The
HALO
PROJECT
Beyond Orokonui

We aim to inspire and work with our communities to enhance, protect and connect with this landscape.

A planning guide to native forest restoration
for landowners with native forest remnants

Version 1: August 2020

A companion document to
"Forest restoration planning and planting guide for landowners in the Halo Project area"

FOREST HABITAT RESTORATION

Integrating biodiversity across this landscape.

From Silverpeaks to Sea, the Halo Project aims to inspire and work with our communities to enhance, protect and connect with this landscape. By working with enthusiastic landowners, we will improve the biodiversity values and ecosystem functioning on both public and private land within the Halo Project area.

We work alongside people who are passionate about improving the biodiversity values of their properties by developing site-specific restoration plans; helping them to access restoration funding; coordinating volunteer-driven seed collecting and planting; and overseeing the implementation of restoration projects.

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This planning guide booklet has been developed by the Halo Project and is a companion document to:

The HALO PROJECT
Beyond Orokonui

We aim to inspire and work with our communities to enhance, protect and connect with this landscape.

Forest restoration planning and planting guide
for landowners in the Halo Project area

A companion document to "A planning guide to native forest restoration for landowners with native forest remnants"

Artistic impression collating the different habitat types and landforms within our project area.
See the Forest restoration planning and planting guide for explanation of the different habitat and landform types.
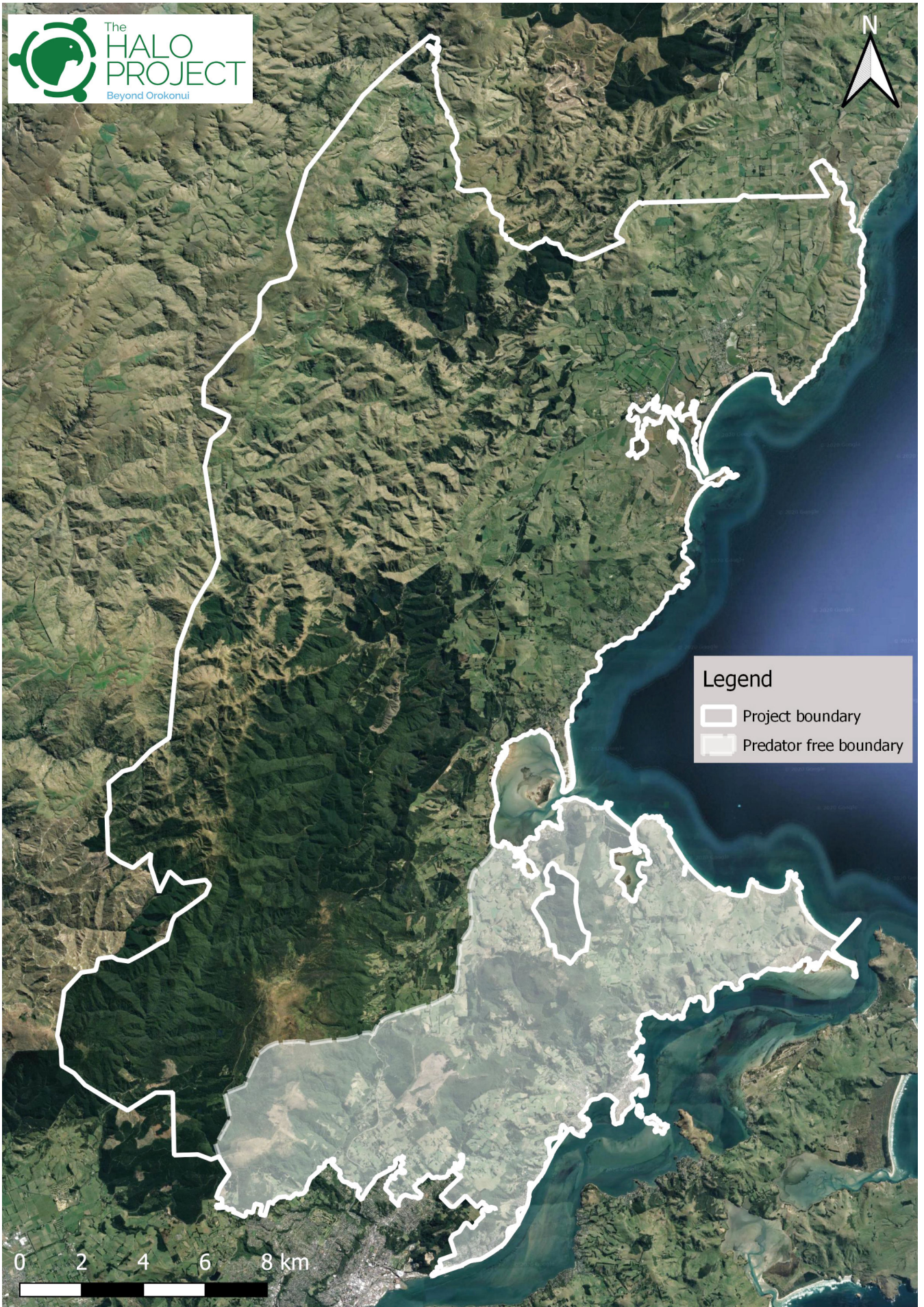
Figure 1: Map of the Halo Project area

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DECIDING WHAT WILL HAPPEN TO YOUR NATIVE FOREST REMNANT

This booklet is a tool designed to help landowners assess the value of native forest remnants on their properties, and to outline options for maintaining and enhancing those areas which are most important to them.

This tool is designed to help you decide what, where and when forest remnant management is needed to meet your own restoration objectives.

While there are restoration guides available online[1], this booklet provides a step-by-step process to help you decide where restoration is a viable option on your property and what the priority management requirements are. It helps you gather the information you need to develop your own management plan, based on your assessment of natural, cultural and economic values, as well as physical features, current use and threats to vegetation health. It also links you to national and local information and funding sources.

Many restoration projects involve planting, hence we have developed the **Forest restoration planning and planting guide for landowners in the Halo Project area** to assist you.

Once you've completed this process and created your planting plan, you'll be able to calculate the costs of remnant management, and potentially apply for funding for restorative management (fencing, planting, pest control), or work with us to help you achieve your goals.

Figure 2: Established riparian planting along Waitati Stream

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1 Department of Conservation restoration guide: www.doc.govt.nz/protecting-and-restoring-our-natural-heritage-a-practical-guide/; Nature Heritage Fund guide www.doc.govt.nz/pna-guide-june-2005.pdf.

Sustainable land management:
Restoring biodiversity aids how an ecosystem functions

Landscapes that are rich in native biodiversity help to better protect water quality and resources, form and maintain healthy soils, and provide pest (invasive weeds, animal browsers and predators) and disease management. Increasing native biodiversity contributes to climate stability, the breakdown of pollutants, and nutrient storage and cycling. By providing a more ecologically balanced landscape, we are ensuring the long-term functioning of the ecosystem, and thus its sustainability[2].

Restoring and reconnecting remnants of our natural history

Since the arrival of humans in Aotearoa New Zealand, native forest cover has been reduced by more than 70% (Ewers et al., 2006). Remaining patches of forest are called forest remnants – they are remnants of once larger areas of indigenous forest. They generally retain a range of different tree species and a forest structure including native ground plants (e.g. ferns and bush flax/astelia) and climbers (e.g. climbing rata) as well as mature trees. True remnants are areas that were never cleared, however, many remnants are regenerating after fire or clearance and may be less intact but still ecologically important.

Tree-lands are another form of remnant native vegetation common within coastal and lowland Otago. Tree-lands are groups of mature trees or shrubs that may or may not form a canopy and generally have pasture or bare ground beneath. These habitats lack any other features typical of forest ecosystems (e.g. understorey vegetation) and so do not provide particularly good habitat for native species. However, with proper management, tree-lands have potential to become highly important areas for biodiversity conservation. Many areas of native bush within the Halo Project's boundary are mixtures of remnant forest and tree-land.

The decision-making processes in this booklet can be applied to any of the hundreds of thousands of remnants of vegetation that are found on private land across New Zealand. However, the focus here is primarily on native forest remnants and tree-land areas on private property in coastal and lowland Otago within the Halo Project boundary (see Figure 1). These remnants are a high priority for the Halo Project as they are poorly protected (legally) yet common enough to restore and improve their connectedness across the landscape.

This booklet guides you through a six-step process which will help you develop your own management / restoration plan for your property.

You will need to consider and decide:

1. What native vegetation you have and what information you have about each patch.
2. Which values these patches hold for you and your family, as well as the specific characteristics they possess and what threatens their existence.
3. What you want to achieve.
4. Which management options will help you achieve your restoration goals.
5. How to prioritise your chosen management options.
6. How you could fund your restoration plan.

You can write into this guide as you work through it. There are copies of each form at the back of this booklet that correspond to each of these six steps. Copy the blank forms as many times as you need so you have a copy for each patch of native forest remnant you want to restore.

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2 Sustainable Landowners Group – Management Handbook (2003)

1 UNDERSTANDING YOUR NATIVE FOREST REMNANTS

This first section will help you understand what you have on your own property.

1.1 Collating information on native forest remnants on your property

Nobody knows your property as well as you do and, therefore, no one else is better placed to identifying patches of vegetation on your property as you are.

Think about where these patches are on your property, and what information you have about their ecological value, such as: species diversity (a species list), presence of rare or endangered species, habitat quality or intactness, soil or substrate type, ecosystem functioning (soil protection, water quality).

Bringing together any information you have about the native forest patches on your property will help you to make decisions about the relative importance

✓ TASK 1:

Collate any maps, reports or information you have about the native forest remnants on your property.

(Don't worry if you don't have this information – this booklet will take you through the process of collecting other information that will help you make your decisions).

of each patch later in the decision-making process.

Figure 3: Regenerating broadleaf forest protected from livestock

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Figure 4: *Cattle in paddock with native forest remnant*

Sources of this type of information include:

- Topo maps or other maps of your property
- Landowner reports from The Halo Project
- Farm plans
- Resource consent applications
- Areas of significant conservation value (ASCV) survey reports (more recently called Areas of significant biodiversity value)
- Botanical Society species lists
- Other reports or documents

INFORMATION ABOUT YOUR PROPERTY

Make notes about the information you have about your property and any native forest remnants here:

 TASK 1

Attach any reports or information you have about the native forest remnants on your property to the back of this booklet.

Mapping and labelling native forest remnants on your property

A relatively simple but effective way of mapping and labelling all the vegetation on your property is to take a farm map printout and draw on all the native patches (Figure 5). This is a great way to get the whole family (particularly kids) involved in the decision-making process.

It will help you if you label patches based on their habitat type or dominant canopy species (see Section 1.3 to help identify habitat types and tree species). It also makes practical sense to identify the boundaries of these patches using other landscape features such as fence lines, property boundaries, or landforms (e.g. streams, cliffs).

To make the decision-making process easier, give each patch you have identified a number and unique name e.g. '1. Ridgeline regen', '2. Hilltop bush', or something with personal meaning like '7. Henry's bush' or '8. Sheep shelter' (see Figure 5).

If you are limited in native forest remnant patches, then to increase the scope of your analyses, include exotic tree

> ## ✓ TASK 2:
>
> **Find a map of your property.**
> **Draw around all native or exotic vegetation patches on your property. Record the coordinates.**
> **Give each patch a number and a unique name** (record no., name and coordinates in the form overleaf).
> **If you have done this digitally - print out a map for each patch*.**

plantations and scrubland. Exotic tree plantations and scrub can be important habitat for native species (insects/ birds) and can be considered in your restoration plans (as lower priority).

For those who are more technologically inclined, mapping could be completed electronically using Google Earth or GIS program. You may find the resources below useful for obtaining/making maps if you don't already have them.
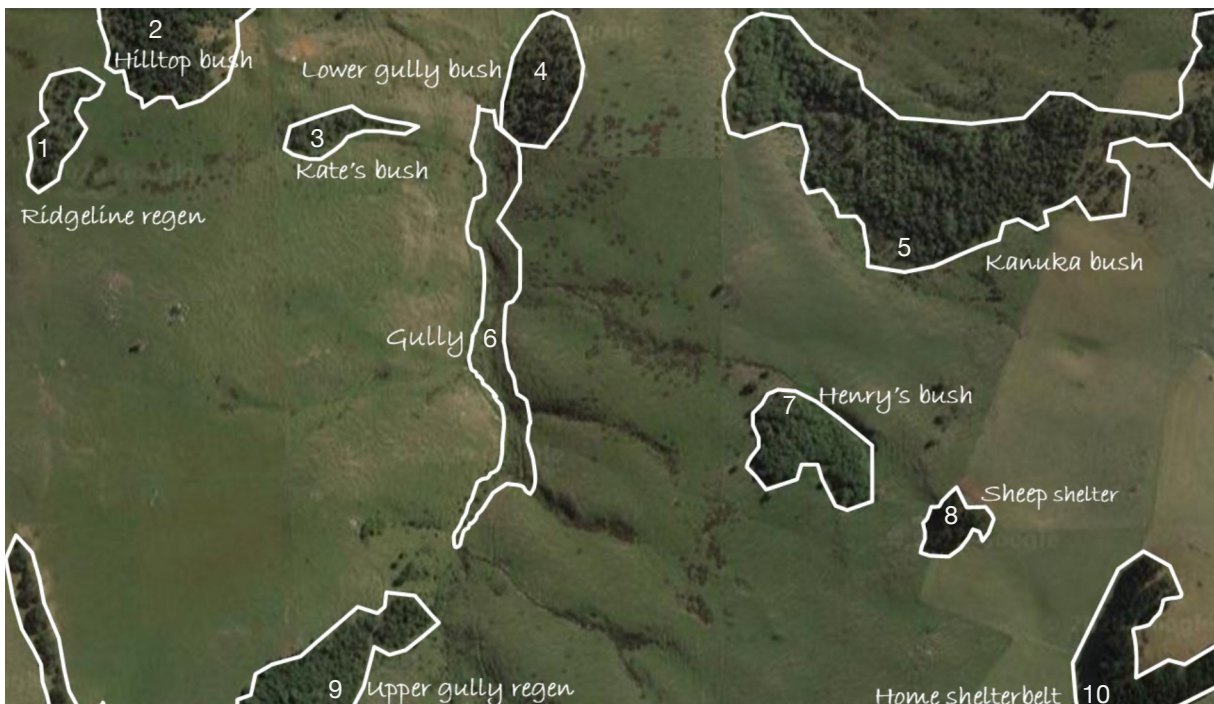
Figure 5: An example of a property or farm map created using Google Maps and Microsoft Publisher to draw around, number and name each remnant patch

* Attach the printed maps of your remnant patches to the back of this booklet - ensure each patch is labelled.

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RECORD ALL FOREST REMNANTS

Use this form to record the different remnant patches you have on your property*.

Patch Number	Patch Name	GIS coordinates or grid reference or coordinates
Example from Figure 5:		*E.g. Lat -45.78724 Long 170.60417*
4	*Lower Gully Bush*	*45°47'16"S 170°36'15' E*
5	*Kānuka Bush*	*CE17 138268*
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

*If you have more than 12 remnant patches, add them to the list in the back of this booklet, under Additional Forms, page 43. Attach all corresponding maps.

Useful Resources (mapping):

Google maps (aerial images of your property- select 'Satellite' option)
https://www.google.co.nz/maps

Dunedin City Council rates maps
http://www.dunedin.govt.nz/services/rates-information/search-by-map

LINZ Data service (freely available GIS layers including property boundaries, but this is only useful if you have GIS experience)
https://data.linz.govt.nz/

Understanding the physical and agricultural characteristics of each patch is vital if you're going to make important management decisions. Try making lists of the characteristics of each patch.

The physical nature of a patch may determine what you ultimately decide to do with it (e.g. if it's steep, difficult to work hill country, or conversely, frequently waterlogged, you may wish to retire it from farming).

You may think about which features the site possesses that make it important to local biodiversity. For example, a gully patch may shade a stream, attract native birds to feed or nest, contain a rare or uncommon shrub or be home to lizards. It may contain several 'old growth' trees – true remnants of a past forest. It may be native vegetation on an unusual soil type, such as a limestone outcrop.

Also consider the site's agricultural characteristics. List all the reasons the site is important to your current farming operations. If there are few, or no reasons, it may indicate this site is a good candidate for restoration.

Marginal farmland or 'scrubby' country can provide great sites for restoration. With the right approach, restoration projects can be compatible with the productive capacity and management objectives of your property. For example, an erosion-prone sidling might not be suitable for farm or plantation production, but could be suitable for biodiversity restoration.

Habitat connectivity across a landscape is very important, as some fauna (birds,

TASK 3:

For each patch you have mapped and named, record the physical and agricultural characteristics.

Note: There is another character assessment form on page 44 of this booklet. Copy all the blank forms (page 44 onwards) as many times as you have forest remnants. Each remnant needs its own set of forms.

If you know your property well, this will be a desktop exercise. Otherwise, we recommend you walk around and into each patch while making your assessment.

lizards, insects, spiders, soil invertebrates) can't cross open or poorly vegetated areas to find food or mates. Plant species can't spread between remnant vegetation if their pollinators and seed dispersers are absent. Figure 6 shows poor habitat connectivity and good habitat connectivity.

Windbreaks and vegetated waterways can both provide benefits to stock, and link patches of native forest remnants. They can be mixed exotic/ indigenous plantings, with timber production, shelter, pest control and connectivity between forests, which are all part of a functioning system.

Table 1 provides examples for each of the listed characteristics, use it to help you complete the form overleaf.
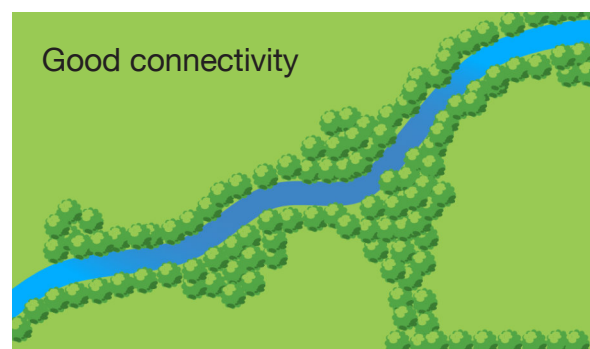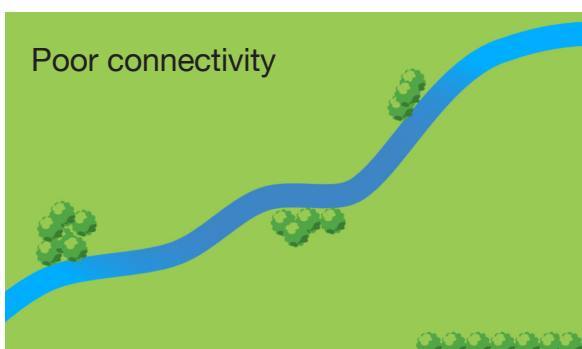

Figure 6: Illustration of poor and good habitat connectivity

Table 1: Factors and corresponding characteristics to consider for each patch of remnant native vegetation

Factor	Characteristic	Description
Physical	Soil/ substrate type	What soil type/s is the patch located on (e.g. alluvium, silt, loess, clay, basalt, schist, conglomerate, limestone)?
Physical	Terrain	What terrain is the patch located on (e.g. river flat, gully, hilly, cliff)?
Physical	Water bodies	Are there any bodies of water in/near the patch (e.g. streams, rivers, ponds, lagoons, wetland)? Is the patch riparian (e.g. remnants adjacent to rivers and streams)?
Physical	Habitat connectivity	How close are the nearest areas of remnant forest or tree-land? If there are none on yours, include those on your neighbour's property.
Physical	Natural hazards	Is the area threatened by landslides, flooding, coastal erosion or any other form of natural hazard?
Agricultural	Current use	How is the land used now? Grazed? Stock shelter? Retired? QEII covenant? Some other use?
Agricultural	Fencing	What is the fencing situation around the patch? Fully fenced? Partially fenced? Not fenced at all?
Agricultural	Other farming features	Are there any agricultural buildings or facilities in/near the site (e.g. tracks, troughs, sheds), any culverts or earthworks within the patch?

CHARACTER ASSESSMENT FORM

Use this form to record the characteristics of each forest remnant patch.

TASK 3

Patch number and name:

Characteristics	Your description of the characteristics of the patch
Soil/ substrate type	
Terrain	
Water bodies	
Habitat connectivity	
Natural hazards	
Current use	
Fencing	
Other farming features	
Anything else?	

Identifying size and shape of forest remnant patches on your property

Understanding the size and shape of each patch of remnant forest will help you make more informed decisions further on in this process.

The size and shape of each patch is really important to consider because, generally, the bigger and more compact the patch is, the higher its long-term viability will be if threats to regeneration (particularly pests) can be controlled or removed. With the removal of threats, the forest structure and how it functions will improve over time.

Figure 7 and 8 illustrate a compact (left) and a sprawling (right) forest patch. A compact (round rather than long) shape has more forest 'interior' and less forest 'edge' compared to a sprawling forest patch.

Long and/or narrow patches are more exposed to the elements and to weed

✓ TASK 4:

Estimate the size of each patch of forest remnant.

Use either Google Earth or DCC's rates map to draw a polygon around each patch to estimate the size (http://www.dunedin.govt.nz/ services/rates-information/search-by-map)**.**

Identify the shape of each patch.

Summarise habitat connectivity you described in Task 3.

invasion so develop forest characteristics that are less natural. Sprawling patches may need more work than compact patches as supplementary planting will be required for restoration.

Ideal forest patch shape:
Minimum edge with maximum forest interior

Sprawling forest patch:
Long edge with little interior. Stippled (light green) areas indicate where supplementary planting can improve shape by reducing edge length and increasing forest area.
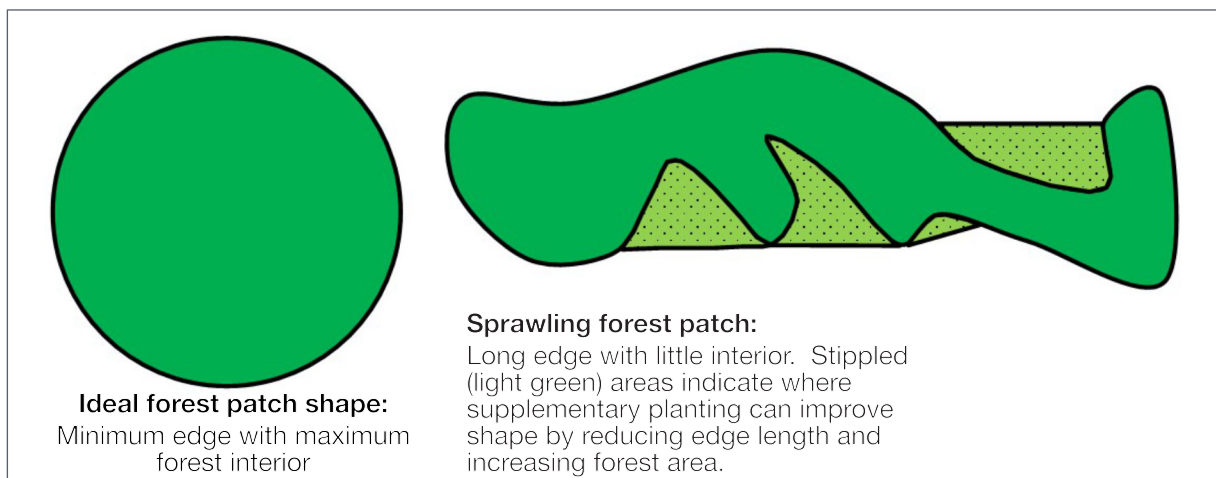
Figure 7: Compact (left) versus sprawling (right) patch shape

Figure 8: An example of compact (4. Lower gully bush) and sprawling (5. Kānuka bush) forest patches. The size of the patch labelled 5. Kānuka bush is measured approximately around the red line.

Figure 9: Red line shows an example of linking up three different patches to improve habitat connectivity. Or a shelterbelt can improve connectivity.

Smaller patches may not be as beneficial to restore on their own, unless you can link up patches that are close to each other (see section 1.3 under habitat connectivity and shown here in Figure 9).

 = Shelterbelt

SIZE, SHAPE & CONNECTIVITY FORM

Use this form to record the size, shape and connectivity of each forest remnant patch.

 TASK 4

Patch Number	Patch Name	Size (choose a unit of measurement)	Shape	Habitat connectivity
Examples from Figure 8 & 9:				
4	*Lower Gully Bush*	*2,000 m²*	*Compact*	*Could improve health of other smaller remnants (patches 3 & 6) by connecting to this patch.*
5	*Kānuka Bush*	*3.2 hectares*	*Sprawling*	*Could be connected to Patch 4 via shelterbelt planting*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Identifying the forest profile for each of your remnant patches

Task 5 and 6 can be completed together. Visit each patch and try to describe the different species that make up the forest profile. See Resource (page 56) for help identifying native species of trees.

Ideal native forest profile

Healthy bush or forest has a structure of many 'layers', from tiny seedlings on the forest floor up to the tallest trees towering over the forest canopy. This is often referred to as a complex forest structure.

The diagram in Figure 10, shows a healthy forest where there are a variety of species of trees growing at different levels throughout the forest.

Seedlings and leaf litter layer

Healthy bush is characterised by a deep covering of leaves on the ground which, together with rotting logs and branches, provide ideal growing conditions for a mosaic of ferns, mosses, lichens and emerging seedlings.

Understorey layer & sub-canopy

Above the forest floor there should be an understory and sub-canopy layer, making it difficult to see far into the bush before there is a 'wall' of vegetation.

Understory plants such as coprosma, māhoe, makomako and tree ferns

TASK 5:

Identify the forest profile for each of the patches you have identified. Use the forest profile form (page 12)

occupy the layer from a height of approximately 20 cm to 2.5 m. Above this, the taller sub-canopy trees (e.g. mahoe, patē, putaputaweta and pigeonwood) form a layer between the understory and the canopy.

Below the canopy you will also find saplings of various ages waiting to be 'released' in the gaps that are left by older trees as they die.

Canopy layer

A healthy canopy will be almost continuous (except for tree-fall gaps) and will usually comprise a variety of species, with different trees dominating over time as they compete for space in the canopy. Common canopy trees are mātai, kāpuka (marbleleaf), patē, kōwhai. When looking up into the canopy you should see climbing vines (such as rata and supplejack) and different species of epiphyte e.g. Astelia and filmy ferns.

Emergent layer

The final layer, the 'emergents', are particularly tall trees that tower above the surrounding canopy e.g. kahikatea, tōtara and rimu.
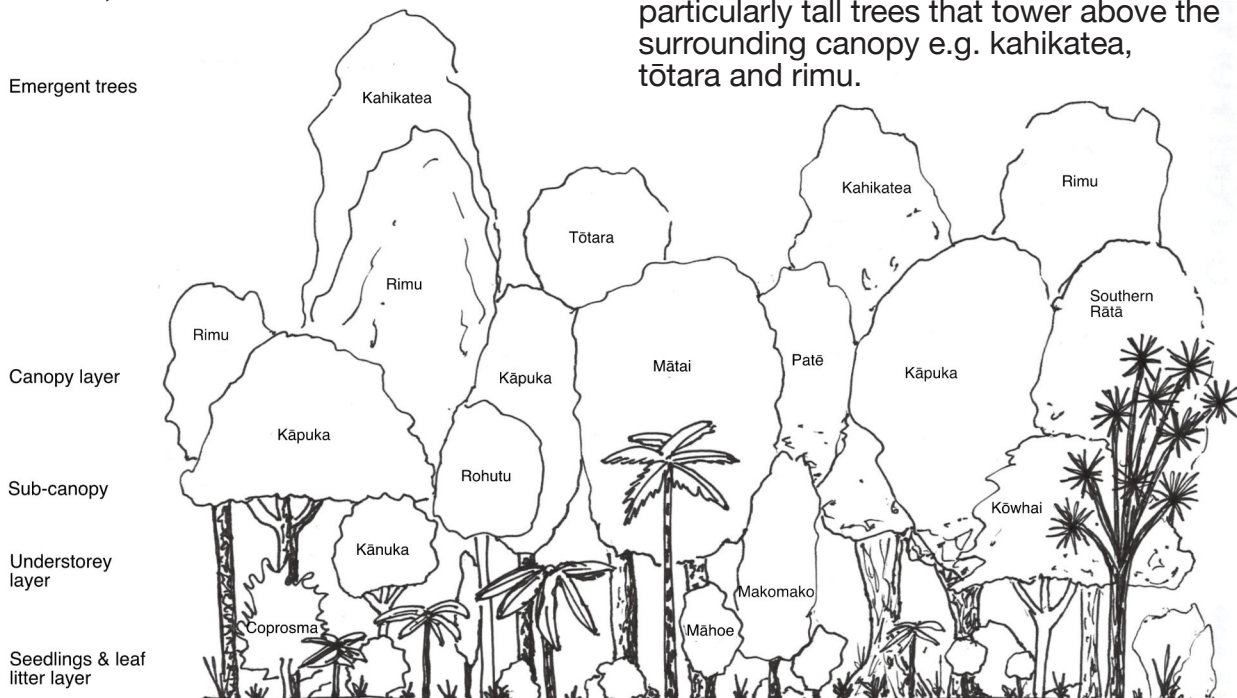

Figure 10: Ideal native forest profile (text & image adapted from www.doc.govt.nz/bush-layers depicting a forest profile)

FOREST PROFILE FORM

Use this form to identify tree species present. Then try and identify what habitat type you have in each patch*. For example kānuka, podocarp forest, tree-land, gorse scrub.

✓ **TASK 5 & 6**

Patch number and name:

Forest Profile elements	Your description
Date:	
Dominant tree species present: Emergent layer - what are the tallest trees you can see? e.g. rimu, tōtara, (other native species) or exotics such as old man pine, eucalyptus	
Other tree species present: Canopy and sub-canopy layers - what are the other trees you can see? e.g. miro, mātai, kōwhai	
Are the tree species healthy? Describe as best you can. Unhealthy could be smothered in vines, stripped bark, broken branches, dead trees	
Understorey present: (Y/N) Can you see shrubs and ferns?	
Dominant understorey species: Understorey & seedlings/leaf litter layers - what do you see lower down, below eye-level? e.g. native species like ferns, seedlings, or weeds like gorse, broom, hawthorn seedlings or pasture species?	
Habitat type: **Task 6 (overleaf) - Can you describe whether the vegetation is just trees with little understorey (treeland),** healthy or unhealthy **forest remnant** (comparing it to Figure 10) or is it **exotic scrub** (gorse, broom, hawthorn, etc.)?	
Summary: Complex or Simple Is the remnant complex (multiple vegetation layers) or simple (a canopy and not much on the forest floor, with not a lot in between)	

* Remember, there are more forms at the back of this booklet. Photocopy the blank forms as many times as you need so you can fill out the required forms for each forest remnant you identify.

Identifying forest remnant habitat types on your property

A large number of remnant and regenerating forest patches exist within the Halo Project area. Section 3: 'Supplementary Planting' (page 29 - 44) of the Forest restoration planning and planting guide describes seven forest remnant habitat types of Eastern Otago. The diagram in Figure 11 provides an overview of these habitat types.

It will help you further on in this booklet if you can identify the habitat type or dominant canopy species of each of the forest remnants you have identified on your property.

These could also be 'podocarp/ broadleaf remnant', 'kōwhai tree-land', 'kānuka shrubland', or 'gorse regrowth'.

TASK 6:

Identify forest remnant habitat types on your property.

Use Section 3 of the Forest restoration planning and planting guide to help you identify these.

Complete with Task 5 (page 12).

Take this booklet with you and visit each patch. Complete Task 6 on the form in Task 5 on page 12.

If identifying trees is not your speciality, see page 56 (Resources) for books to help you recognise native tree species.

3.1 Podocarp forest

3.2 Broadleaved forest

3.3 Coastal forest and tree-land

3.4 Kōwhai dominated forest and tree-land

3.5 Kānuka dominated forest

3.6 Regenerating forest

3.7 Forest understorey
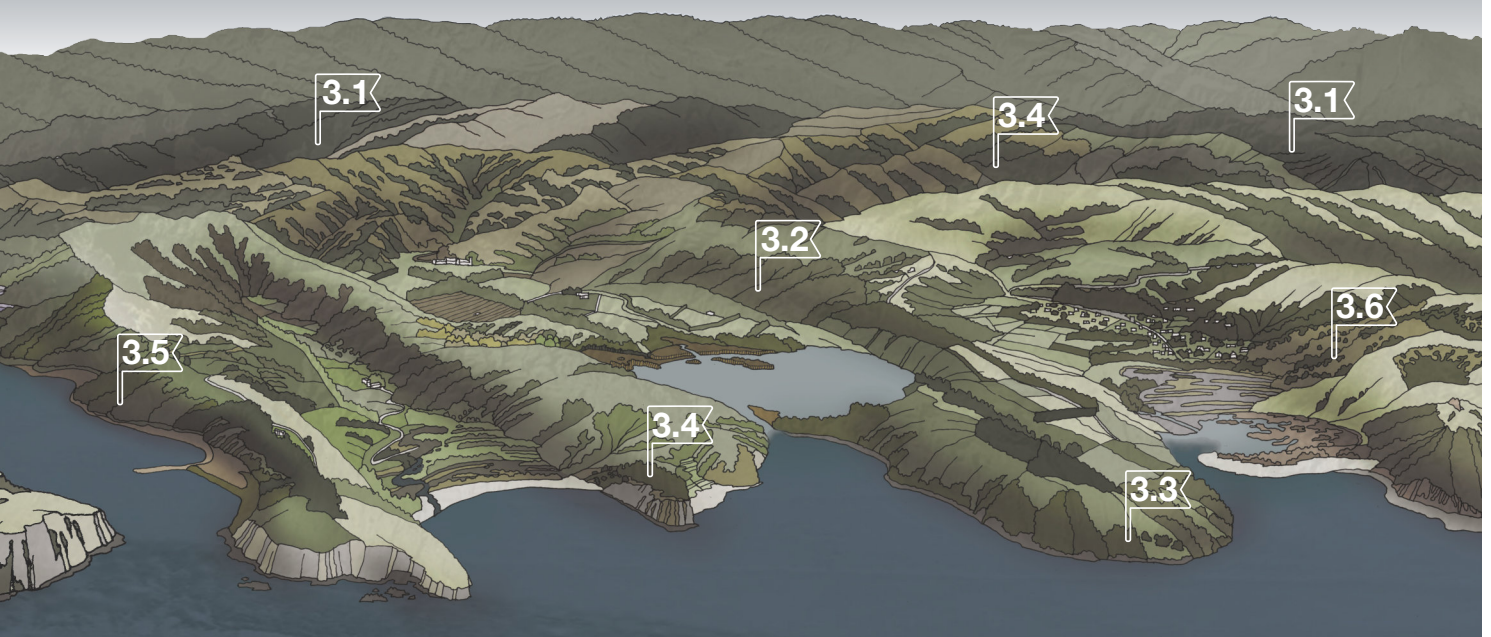
Figure 11: Landform diagram of forest remnant habitat types. Taken from page 30 of the Forest restoration planning and planting guide

ADDITIONAL NOTES

Write any additional notes about what you are learning or your thoughts regarding each patch here:

Patch Number	Patch Name	Your thoughts
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

2 FOREST REMNANT VALUES AND THREATS

Now that you have identified all of the patches and brought together all available information about them, their features, uses and what is found within them, it's time to think about their values. It's also important to think about the threats to each patch and to record all you can identify.

By ranking these values and threats you will be able to make the important decisions further on in this booklet.

Note: There are more assessment forms at the back of this booklet.

TASK 7:

For each patch you have identified use the values assessment form to record and rank what each patch means to you and your family. Rank using high, medium or low.

We recommend you walk around and into each patch while making your assessment.

2.1 Identifying important values of each native forest remnant

What do your native forest remnants and tree-lands mean to you and your family? Table 2 provides a list of different values with examples of what that might mean.

Values do not have to be purely related to people and can come in different forms. The diagram below is a copy of Figure 8 on page 9 and on the right are example values for two sample patches.

4. Lower gully bush
- Farming value: provides shelter for lambing ewes.
- Environmental value: prevents erosion on the slope.

5. Kānuka bush
- Cultural value: been in the family for years, really want to preserve it.
- Biodiversity value: have seen kākā feeding there.
- Amenity value: have a great view of it from the house.

Table 2 Values and examples for patches of native vegetation on private land

Value	Examples
Farming or business value	Shelter for stock; contains necessary farm features or buildings Such as sheds, water troughs, tracks.
Amenity value	It looks good; adds character to the property; I just like it.
Species rich and biodiversity value	Overall assessment of resources for wildlife - habitat for birds; lots of native plants; rare native species; seed source (such as flowers, fruit); lots of foliage, lots of insects, etc. Are there any rare species?
Cultural or spiritual value	Been in the family for years; habitat for taonga; provides a place of peace and quiet; historic importance; mahinga kai site.
Environmental value	Erosion control; provides water filtration for streams; shades a stream.
Recreational value	Hunting and gathering; place for the kids to play; bush walks; enjoyed by neighbours/ the community.

VALUES ASSESSMENT FORM

Use this form to record what each patch means for you.

Patch number and name:

Values	Value to you and your family	Ranking (high, medium, low)
Farming or business value *		
*If you place farming / business as a higher value than other values then the only option (see Section 3) for this remnant is **Option 3: Maintain current state.**		
Amenity value		
Species richness / Biodiversity value		
Cultural or spiritual value		
Environmental value		
Recreational value		
Turn the ranking from high, medium and low into a score. High = 2, Medium = 1 and Low = 0 Add up the score in the box on the bottom right of this table. Do NOT include farming/business value in the score.		
Overall value assessment	**Make notes here** (e.g. Have to decide whether this patch is more valuable for lambing ewes or restored for erosion protection).	Score: /10

2.2 Identifying threats to each native forest remnant

Assessing the threats facing the patch is vital if you're going to choose to do any form of restoration or enhancement work on that patch. Table 3 contains a list of potential threats to consider.

Use Table 3 to help you list all the threats you can think of for each patch of native vegetation you have identified on your property.

TASK 8:

For each patch you have identified use the threat assessment form to record and rank the threats to patch health.

Rank using high, medium or low.

Figure 12: *Threat (stock access) - Old ribbonwood trees with sheep grazing at the base*

Table 3: *Potential threats facing each patch of remnant vegetation on your property*

Threat	Description
Weeds	How prevalent are weeds at the site? Focus particularly on woody weeds like gorse, broom, sycamore, etc. Also think about how much of the site is comprised of rank grass.
Plant mortality	Plant mortality is a problem in tree-lands and grazed forest remnants. Can you see seedlings coming through to replace dying mature trees and shrubs?
Animal pests that eat plants (e.g. possums, rabbits, hares, deer, goats, pigs)	How often do you see these pest animals at the site? Is the damage they cause obvious/widespread? What signs of this do you see (e.g. possum scratching on trees, animal scat, pig rooting)? Do you control/hunt these animals?
Animal pests that eat native animals (e.g. mice, rats, hedgehogs, feral cats, stoats, ferrets)	Do you see any of these animals at the site? Do you have any evidence of them being at the site (e.g. tracking tunnel or chew card results)? How many native birds or lizards have you seen in/near the site?
Stock access	Does stock have access to the site? What type of stock have access to the site (cattle, sheep, deer, goats, horses, pigs)? Does it have access at light or heavy stocking rates, and seasonally or all year?

THREAT ASSESSMENT FORM

Use this form to record the threats to forest health for each patch.

TASK 8

Patch number and name:

Threat	Threats to patch health	Ranking (high, medium, low)
Weeds		
Plant mortality		
Plant-eating pests: possums, rabbits, hares, deer, goats, pigs		
Animal-eating pests: mice, rats, hedgehogs, feral cats, stoats, ferrets		
Stock access		
Turn the ranking from high, medium and low into a score. High = 2, Medium = 1 and Low = 0 Add up the score in the box on the bottom right of this table.		
Overall threat status	Make notes here:	Score: 10

3 OPTIONS FOR RESTORING FOREST REMNANTS

This section is all about determining what you want to see happen with the native bush remnants or tree-lands on your property.

The key decision is whether or not you want to keep using the area for farming or economic operations, or whether you want to retire it for restoration purposes.

This booklet is designed to help with ecological restoration purposes only.

In this section there are five **options** for remnant forest and tree-land patches, each option has corresponding management actions (Section 4).

Selecting one or more of these options for each patch will help you to determine the management actions required.

TASK 9:

Choose which option* you want for each forest patch on your property.

Please note that there are legal restrictions around clearing native vegetation (Option 5).

Use the information you've collated for each patch of forest to aid your decision-making. None of the options are mutually exclusive and, for restoration purposes, you will need to combine some options (e.g. Option 1: Place under legal protection and Option 2: Enhance/restore).

Useful Resources (sources of legal protection):

QEII National Trust (open space covenant)

https://qeiinationaltrust.org.nz/

Department of Conservation (covenant)

https://www.doc.govt.nz/about-us/science-publications/conservation-publications/protecting-and-restoring-our-natural-heritage-a-practical-guide/legal-protection/

A protected private land agreement (where an owner has an area set aside as 'protected private land' under the Reserves Act 1977)

Ngā Whenua Rāhui (to protect the natural integrity of Māori land and preserve mātauranga Māori)

https://www.doc.govt.nz/get-involved/funding/nga-whenua-rahui/nga-whenua-rahui-fund/

A property covenant (that is binding on both present and future owners via Dunedin City Council)

Stephenson Fund (for covenant enhancement)

https://qeiinationaltrust.org.nz/managing-your-covenant/the-stephenson-fund

Natural Heritage Fund

https://www.doc.govt.nz/get-involved/funding/nature-heritage-fund/

* Once you understand all of the options available; read the management actions in Section 4.1. Section 4.2 links up the Options with the corresponding management actions required.

OPTION 1 — Place under legal protection

A common approach taken by landowners in Aotearoa is to legally protect areas of high biodiversity value by establishing a QEII National Trust open space covenant. There are now more than 4,600 covenants, protecting a total of more than 180,000 ha of land.

The vast majority of lowland and coastal areas in New Zealand, like the Halo Project area, are highly developed for agriculture. Such development has led to widespread destruction of native vegetation in these areas. Protecting any remaining native vegetation is therefore of huge benefit to the conservation of indigenous biodiversity in these areas. The Halo Project area contains many fragments of vegetation perfectly suited to protection under a QEII open space covenant.

Selecting this option ensures that many of the values you identified in Section 2.1 are preserved forever, particularly the biodiversity, amenity and environmental values.

This is the best way to leave a legacy.

OPTION 2 — Enhance / restore

Choose this option if you're seeking to improve the quality of a degraded patch of vegetation. Enhancement can include: fencing-off patches from stock to allow natural regeneration, planting between patches to increase patch size and connectivity, planting to fill areas of rank grass, weed control and predator control.

OPTION 3 — Maintain current state

This option is likely to require some management. To maintain a tree-land or bush remnant, replacement of trees is likely to be required over time. Stock access, animal pests that eat native plants, and dense grass swards restrict natural regeneration of most forest tree species.

This option will generally require low density replacement plantings of specific tree species. Plantings will need protection from browsing animals.

This is a good option for patches of gorse or broom scrub, as well as exotic plantations, that have the potential to regenerate into native forest, given enough time.

OPTION 4 — Leave as is

This is the 'do nothing' option. Without predator and/or weed control, replacement planting, natural regeneration, fencing and/or stock management, existing native vegetation will die off over time and remnants are likely to degrade.

OPTION 5 — Manage for pasture

This option is still likely to require an assessment of the ecological values of any area of indigenous vegetation proposed to be cleared. You may or may not be permitted to clear an area of native vegetation (e.g. if it is unlikely you'll be able to legally clear an area, it may change your opinion about whether the site should be restored or not).

4 ACHIEVING YOUR CHOSEN OPTIONS

Having decided what to do with each of the forest remnants on your property, you must now think about how you're going to do it. Section 4.1 details management actions that will assist you with reaching your desired goals.

Given this guide is designed to assist with decisions around ecological restoration, only management actions that contribute towards achieving legal protection (Option 1), restoration/enhancement (Option 2), and/or remnant maintenance (Option 3) are detailed in this guide.

None of the management actions outlined are mutually exclusive, they should be used in conjunction to protect and enhance remnants of native forest and tree-land on your property. Section 4.2 links the management actions back to the options in Section 3.

4.1 Management actions

ACTION 1   Legally protect

Covenants

Typically, legally protecting parts of your land begins by contacting your local QEII Trust representative or Dunedin City Council biodiversity advisor and discussing which areas you want to protect and why you want to protect them.

In most circumstances, covenanting areas will require them to be fenced from stock and to be subject to weed and predator control. When the covenant is first created, the QEII National Trust funds half of all fencing costs and contributes funding to assist with replanting, predator trapping and weed control (QEII National Trust, 2019). Once you have covenanted land, you may apply to the Stephenson Fund. This promotes further restoration/protection within already established QEII covenants.

The QEII National Trust website has detailed information about the process of protecting your land as well as contact details of your local representative.

You can also work with the Department of Conservation to place a covenant on your property. If you have an ecologically important remnant (e.g. it is large and has a great range of native plants and animals) you can apply to DOC's Nature Heritage Fund for land purchase and costs (e.g. fencing, survey, valuation and title transfer fees) or to place a covenant, with initial costs covered (e.g. fencing, survey and covenant and registration fees). (See Useful Resources on page 19 for sources of legal protection).

District plan protection

If you prefer not to covenant land, you can protect areas with high natural value via Dunedin City Council's Areas of Significant Biodiversity Value (ASBV) system, whereby your patch is recognised in the district plan and restrictions are placed on activities which would destroy those values. DCC provides a free ecological survey for landowners to assess the values, provided the landowner agrees to schedule the ASBV in the district plan. You can contact the biodiversity advisor to discuss this option (biodiversity@dcc.govt.nz).

ACTION 2   Fence

Fencing to exclude stock is the best option for patches of bush that you want to protect in the long term.

Permanent post and netting (as in Figure 13) is recommended; post, wire and batten fencing is also good. An additional electric outrigger may be necessary on a permanent fence to prevent horses and cattle leaning against the fence, especially when bulls are farmed. Deer fencing would be required if deer are farmed adjacent to a covenant. Fences can also be made rabbit and hare proof if desired.

Including a gate in the fence line can enable any stock that do manage to break through the fence to be quickly removed. Ensure any gate it well latched and locked so that it cannot be easily or inadvertently opened.

Refer to Section 6 for sources of funding for fencing.

Figure 13: *Examples of different fences around sprawling native forest remnant.*
Top left: post and batten. Top right: post, waratah and lightning dropper. Bottom: post and netting fence.

ACTION 3 Plant native species

Planting of native seedlings is likely to be an integral part of maintaining or enhancing your bush remnants and tree-lands.

Seedlings require work and maintenance to grow. It is particularly important to protect them from browsing animals until they get above browse height. If stock can be excluded by fencing, plantings may still need protection from animal browsers, such as hares, rabbits, possums and pūkeko.

Several factors will influence which species you plant in your restoration area. For example:

- Is the planting supplementing existing vegetation or is it an 'open' site (ie. retired pasture)?

- If it is supplementary, what other vegetation is nearby?

- If it is planting an open site, what type of landform is it located on (e.g. steep coastal slope, river flat, gully)?

If the planting is for supplementary purposes, then you should try to plant species similar to those that already exist in the patch you're restoring.

We have developed a

**Forest restoration planning and planting guide
for landowners in the Halo Project area**

to compliment this booklet. It takes you through the development of a planting plan for both open site planting (page 17 of the planning and planting guide) and supplementary (enhancement) planting (page 29) projects. It contains lists of species which are suitable for both situations, and guides you through the planning process, from deciding which species to plant, to looking after your plantings.

Refer to Section 6 (page 41 in this booklet) for sources of funding for planting natives.

Figure 14: *Volunteers supplementary planting in native forest remnant*

ACTION 4   Manage stock

Simply fencing-off a bushy area from stock (as in Action 2) may not be practicable in every situation. Other stock management options may be better suited to your situation to integrate ecological restoration and farming.

First of all, think carefully about the impacts of stock if they are given access to patches of bush. When stock access areas of native forest, scrub or new plantings, they can do some of the following:

- Increase soil disturbance, compaction, and erosion, creating bare sites for weed invasion;
- Browse and trample native seedlings, reducing or preventing natural regeneration;
- Damage established shrubs and saplings in understorey layers;
- Damage bark of semi-mature and mature trees and shrubs;
- Trample root systems of trees;
- Change the forest environment by creating gaps and opening the understorey;
- Introduce weeds by depositing seeds via hoofs and dung;
- Increase soil fertility, which may favour introduced weeds.

Ideally, stock access would be eliminated from planting sites. However, farming operations and planting can coexist in some situations. For example, small areas of plantings within pasture can be fenced-off, or individual trees protected by 44-gallon drums or railing.

Another option is to closely regulate which species you allow to access the block. Cattle, deer and goats do significantly more damage to native forest vegetation than sheep so excluding these species may allow you to continue to graze the site whilst also minimising the impact on the vegetation (as in Figure 15). However, it is worth considering that even sheep can cause damage to native vegetation, particularly by eating seedlings.

Figure 15: Unfenced coastal forest remnant with sheep grazing

ACTION 5   Control weeds

Weed control is an important part of enhancing sites and ensuring they don't degrade. Weeds can outcompete and smother native species, seriously degrading remnant forest as well as hindering planting operations.

Weed control is most effective when you use the methods specified for the species you are controlling. The Weedbusters website contains information to help you identify and control environmental weeds (Figure 16).

Prioritise control

Not all weeds need to be controlled. Some herbaceous weeds will eventually be shaded-out by a canopy of regenerating vegetation. Some weeds will only be found around the edges and along tracks, such as common herbaceous pasture weeds (e.g. thistles, foxglove, fireweed). These weeds have low impact on regeneration so are low priority for control.

Weeds that prevent native seedling growth by smothering or shading should be controlled (e.g. sycamore, hawthorn, tradescantia, ivy). Likewise, exotic climbers that smother canopies and kill trees should be high priority for control (e.g. banana passionfruit, Chilean flame creeper, old man's beard, ivy). The native climber, large-leaved muehlenbeckia/

pōhuehue does not need to be controlled.

Note that there are regulations outlined in the Otago Regional Pest Management Plan (RPMP) around which invasive species that landowners are required to control on their property.

Gorse and broom

Large areas of gorse on steep ground that won't be used for farming may be able to be left alone for native species to regenerate. Given enough time, native plants are capable of dominating gorse scrub and forming healthy forest ecosystems in Dunedin's ecosystems[3]. This is a long-term option (10+ years) and requires certain conditions to be met; stock must be excluded, browsing animals such as rabbits, hares and possums (predators) must be controlled, and fires must be prevented. Moist sites close to native seed sources will revert to native cover faster than dry sites distant from native forest.

Prevention and surveillance

Ensure your restoration project is not a source of weeds. Remove invasive plants from your patch, and dispose of weedy waste wisely.

Regularly check your plantings, removing weeds before they set seed.

Figure 16: Search for any weed species at Weedbusters NZ (Image: Screenshot of https://www.weedbusters.org.nz/weed-information/weed-list/tradescantia/

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3 Lee et al., 1986

Examples of climbing (Figure 17) and exotic weeds (Figure 18).

Banana passionfruit	Chilean flame creeper	Old man's beard

In fruit	Leaf	Seeding
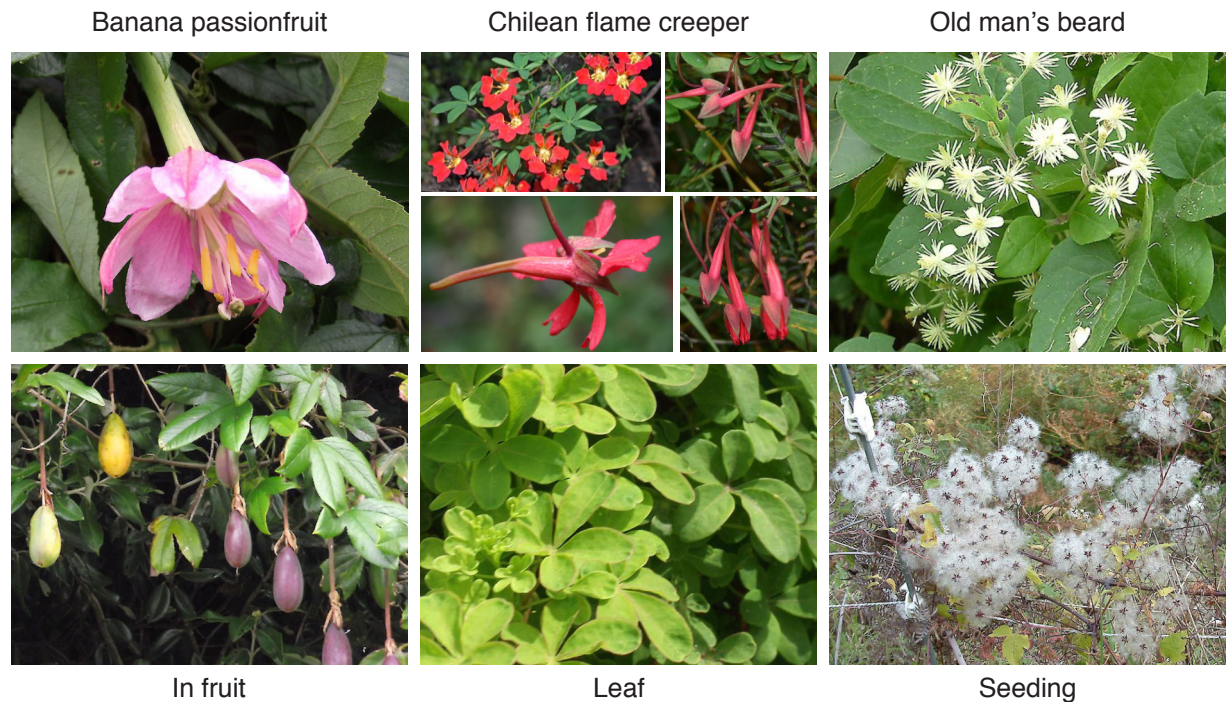
Figure 17: *Climbing weeds (Photos: Otago Regional Council and Weedbusters)*

Sycamore	Radiata pine	Douglas fir	Hawthorn	Gorse	Broom

Figure 18: *Exotic weeds (Photos: Otago Regional Council and Weedbusters)*

Useful Resources (weed control):

Weedbusters NZ (weed identification, control and disposal guidelines)
http://www.weedbusters.org.nz/weed-information/
Otago Regional Council (RPMP, weed identification and control guidelines)
https://www.orc.govt.nz/plans-policies-reports/regional-plans-and-policies/regional-pest-management-plan
https://www.orc.govt.nz/managing-our-environment/pest-hub
Bionet (weed control guidelines)
https://www.bionet.nz/

ACTION 6   Control pests

Predators that eat native animals

Introduced predators, such as stoats, ferrets, hedgehogs, rats, mice, feral cats and possums, can all significantly reduce populations and breeding success of native birds[4], reptiles[5] and invertebrates[6]. Controlling them is, therefore, a key requirement of successfully enhancing any patch of remnant bush or tree-land.

Predator control is primarily achieved by trapping, and a range of best practice hunting and trapping guidelines for landowners can be found online (see links in Useful Resources overleaf).

If your property lies within the Halo Project's predator control area (see Figure 1), it is possible that some predator control already occurs on your property, or it can occur at your request. Alternatively, funding is available from a range of sources to assist with the purchasing of traps (e.g. Dunedin Biodiversity Fund). If the patch is under QEII covenant, funding is available through the Stephenson Fund.

Pests that eat or damage native plants

Feral deer, goats, pigs, possums (see Figures 20 & 21), hares and rabbits can all cause significant damage to native vegetation[7]. The larger species (deer, goats and pigs) can be kept at relatively low densities through regular hunting. Rabbit, hare and possum numbers can also be kept in check by hunting, particularly spotlighting at night when they're out feeding. However, possums can be difficult to hunt in forest remnants and so may require other management actions, such as trapping or poisoning. Pests need to be kept at very low levels to prevent damage to native plantings or remnant vegetation.

Figure 19: *Halo Project stoat trap in box adjacent to riparian planting*

Ideally, predator control is used in conjunction with other protection options, such as fencing and plant protectors. Plant protectors effectively guard plants from damage from smaller browsing animals, such as pūkeko, rabbits and hares.

When plantings are near water, native pūkeko can cause significant damage by pulling seedlings out of the ground. If pūkeko are likely to be a problem, it is best to plant larger plants, ensure they are planted firmly in the ground and use plant protectors.

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4 Innes et al., 2004
5 Towns and Daugherty, 1994
6 Watts et al., 2011
7 Wright et al., 2012

Figure 20: *Possums mark territory by scratching or peeling bark*

Figure 21: *A casualty of possum browse – thin-barked totara Podocarpus hallii (Photo: Alex Ghaemaghamy)*

Useful Resources (predator control):

Department of Conservation (predator and control information)

https://www.doc.govt.nz/nature/pests-and-threats/

https://www.doc.govt.nz/nature/pests-and-threats/predator-free-2050/toolkit-predator-free-2050/practical-guide-to-trapping/

The Halo Project (Urban Predator Control Toolbox)

https://www.haloproject.org.nz/resources

Pest Detective (species identification and control)

https://www.pestdetective.org.nz/culprits/

Bionet (predator monitoring and control guidelines)

https://www.bionet.nz/

https://www.bionet.nz/library/npca-publications/ (best practice guidelines)

Otago Regional Council (Pest Hub)

https://www.orc.govt.nz/managing-our-environment/pest-hub

TrapNZ (predator management database)

https://www.trap.nz/

Game bird hunting regulations

https://fishandgame.org.nz/game-bird-hunting-in-new-zealand/hunting-regulations/

Identifying management actions for each option for each forest patch

Section 3 outlined all of the restoration options available. Section 4.1 outlined all of the management actions associated with restoration. This section highlights which actions belong with which option.

Remember that none of the management actions are mutually exclusive, they should be used in conjunction to protect and enhance remnants of native forest and tree-land on your property.

Table 4 and the list on page 30 show the same thing in two different ways. They both show the options (from Section 3) and their corresponding management actions (Section 4.1).

TASK 10:

Decide which management actions you'll need to apply to each patch to achieve the outcomes you've chosen.

Use the table on page 32 to help you decide which management actions you'll need to apply to each patch to achieve the outcomes you chose in Task 9.

Note that we do not promote clearing of native species for pasture management. See 'Useful Resources' below for info.

Table 4: *Summary of management actions related to each management option, as identified in Section 3 and 4*

		Management Actions						
		1. Legally protect	2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests	Check local regulations
Options	1. Place under legal protection	✓	✓	✓	✓	✓	✓	
	2. Enhance / restore		✓	✓	✓	✓	✓	
	3. Maintain current state		✓	✓	✓			
	4. Leave as is							
	5. Manage for pasture							✓

Useful Resources (rules around native modification):

Section 16 of Dunedin City Council's 2GP (lists the rules around clearance or modification of indigenous vegetation on private land. It is a discretionary activity so, in many cases, consent must be sought)

https://www.dunedin.govt.nz/__data/assets/pdf_file/0011/149528/18.-Special-Provisions-Indigenous-Vegetation-and-Fauna.pdf

OPTION 1
Place under legal protection

Corresponding management actions:

Action 1: Legally protect
Action 2: Fence
Action 3: Plant
Action 4: Manage stock
Action 5: Control weeds
Action 6: Control pests

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OPTION 2
Enhance / restore

Corresponding management actions:

Action 2: Fence
Action 3: Plant
Action 4: Manage stock
Action 5: Control weeds
Action 6: Control pests

OPTION 3
Maintain current state

Corresponding management actions:

Action 2: Fence
Action 3: Plant
Action 4: Manage stock

OPTION 4
Leave as is

Corresponding management actions:

No management actions
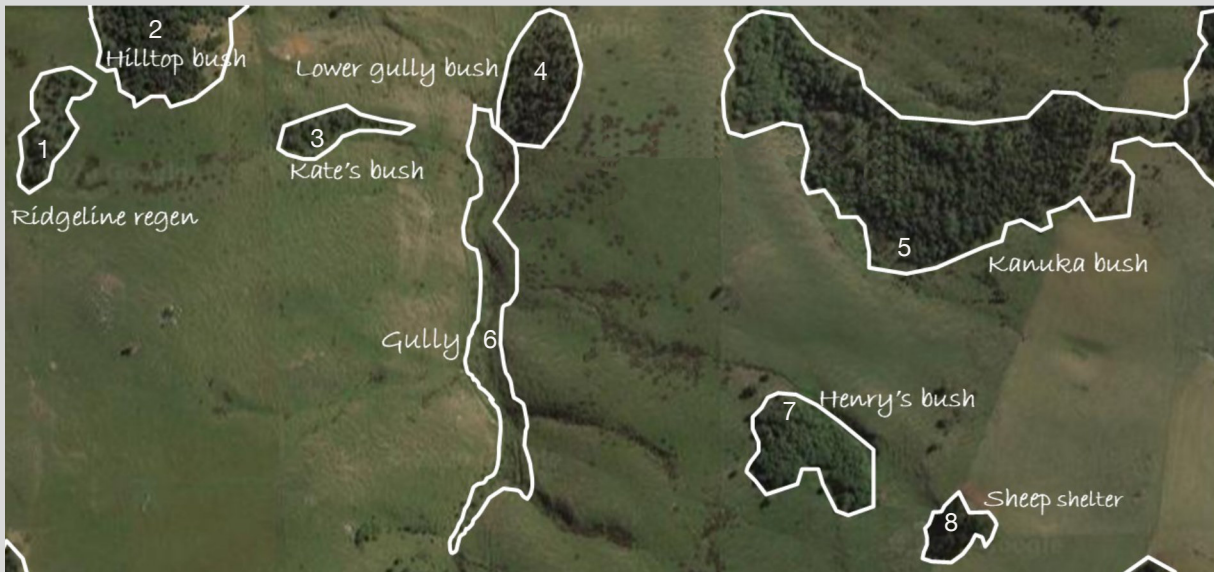
OPTION 5
Manage for pasture

Corresponding management actions:

Check local regulations
(Indigenous vegetation clearance rules in the Dunedin City Council 2nd Generation District Plan: 2GP)

EXAMPLE: OPTIONS AND MANAGEMENT ACTIONS TABLE

This is an example of how to complete Task 9 and Task 10.

Copy of Figure 5: *Using this as an example of a property with forest remnant patches, patch no. 5. Kānuka bush is assessed to decide which option is the best and therefore, what corresponding management actions are required.*

Patch number and name: 5. Kānuka bush
Preferred option:
1. Place under legal protection

Therefore, management actions are:
Action 1: Legally protect
Action 2: Fence
Action 3: Plant
Action 4: Manage stock
Action 5: Control weeds
Action 6: Control pests

TASK 10 Choose the corresponding management action.

TASK 9

Choose your preferred option (see Section 3)

Management Actions							
Options	1. Legally protect	2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests	Check local regulations
1. Place under legal protection	✓	✓	✓	✓	✓	✓	
2. Enhance / restore							
3. Maintain current state							
4. Leave as is							
5. Manage for pasture							

Make notes about your decisions here (example):

Forest remnant no. *5. Kānuka bush* has small areas within it where the kānuka is starting to die out and other forest species are coming through. Some parts are narrow and prone to invasion by weeds. This is a special piece of native forest for us, with lovely walking tracks through it, we can see it from our home and we enjoy the wildlife it brings. We value it highly.

Therefore, we have decided to place this patch of native forest remnant under legal protection. We will fence it off from the grazing paddocks and keep stock out of it. We will supplementary plant to fill in gaps and control pest animals and weeds in order to ensure it continues regenerating. We will plant a shelter belt for stock, which will also enhance connectivity to Patch *4. Lower gully bush*.

OPTIONS AND MANAGEMENT ACTIONS TABLE

Use this table to help you decide which management actions you'll need to apply to each patch to achieve your chosen options (Task 9).

TASK 10

Patch number and name:

TASK 9

Options		Management Actions						
		1. Legally protect	2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests	Check local regulations
	1. Place under legal protection							▨
	2. Enhance / restore	▨						▨
	3. Maintain current state	▨				▨	▨	▨
	4. Leave as is	▨	▨	▨	▨	▨	▨	▨
	5. Manage for pasture	▨	▨	▨	▨	▨	▨	

Make notes about your decisions here:

5 PRIORITISING AND PLANNING FOR RESTORATION

If you have two or more patches of vegetation on your property, it is possible you may not have the time or resources to begin restoration on each one.   Firstly, you will need to prioritise which forest remnant patches you will prioritise (Section 5.1) then determine what management actions are needed most urgently (Sections 5.2).

5.1 Prioritising your forest remnants for restoration

Prioritising sites that need the most urgent attention or that you value the most is an important part of a restoration plan.

We have tried to help you make that decision by providing the summary sheets on the next few pages. If you have a large patch that you value highly, and you could reduce the impact of threats on those qualities, make it a high priority for management action. Conversely, small patches of lesser value to you will not be high priority.

If you have multiple patches that are of equal importance, then choosing which

> **TASK 11:**
>
> **Prioritise your forest remnant patches.**
>
> Do this by filling in the forms (pages 35 & 36) with all of the information you have gathered. With all the information in front of you, you will need to decide which remnant patch to prioritise.

patches to prioritise becomes more difficult. **Seek advice if you are unable to make this decision.**
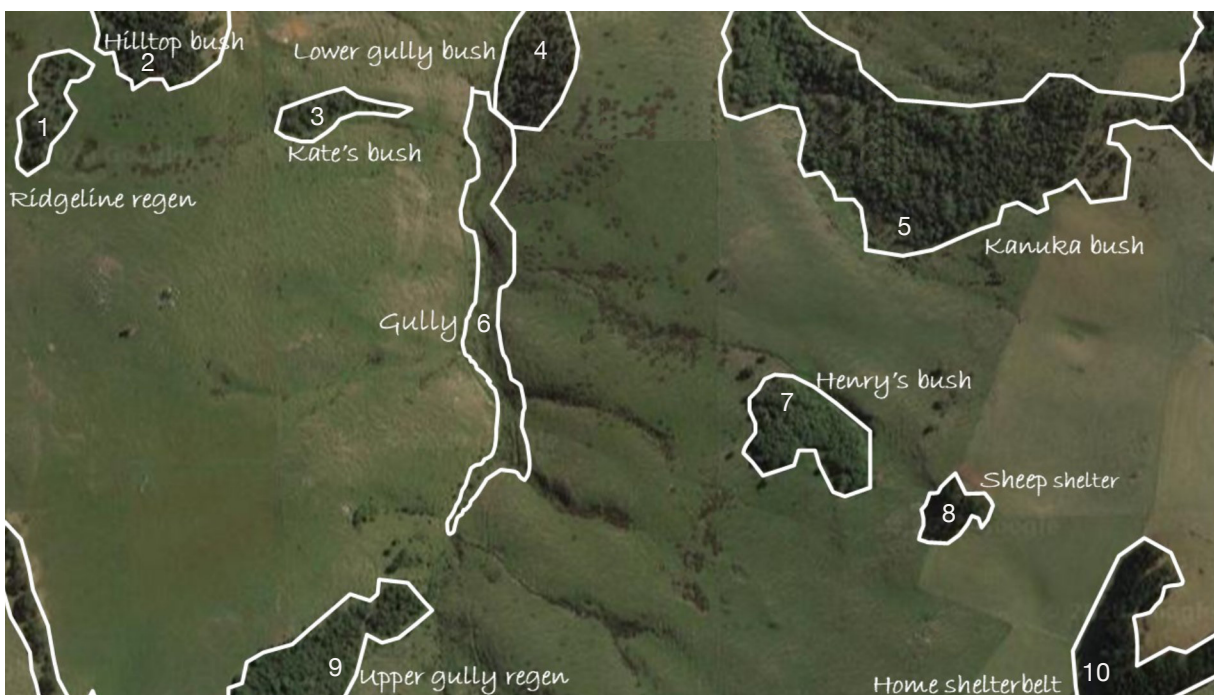
Copy of Figure 5: Example showing 10 different potential forest remnant patches in need of restoration.

EXAMPLE: PRIORITISING YOUR REMNANTS

This is an example of how to complete Task 11

Patch No. (Task 2)	Patch Name (Task 2)	Size & shape (Task 4)	Habitat connectivity (Task 4)	Forest Profile (Task 5)	Species richness / Biodiversity (Task 7)	Values (Score from Task 7)	Threats (Score from Task 8)	Restoration options (Task 9)	Priority ranking (Task 11)
1	Ridgelin e regen	Small / sprawling		Simple	Low	6/10	4/10	4. Leave as is	/
2	Hilltop bush	Small / compact		Simple	Low	4/10	2/10	4. Leave as is	/
3	Kate's Bush	Small / sprawling		Simple	Low	7/10	10/10		/
4	Lower Gully Bush	Small / compact	Could improve health of other smaller remnants by connecting 4. Lower gully bush to 3. Kate's bush and 6. Gully.	Complex – Healthy and compact forest remnant, complex profile.	High – have been told there is rare skink species living here	10/10	6/10	2. Enhance /restore could connect to 3. Kate's bush and 6. Gully.	4
5	Kānuka Bush	Large / sprawling		Complex – Kānuka dominant forest, with multiple layers of tree species, lots of natives.	High	9/10	3/10	1. Place under legal protection	3
6	Gully	Small / sprawling	Could connect to the healthier patch of 4. Lower gully bush to aid restoration.	Simple – Sporadic native species, understorey is mainly weeds, vines all over the edges.	Low	4/10	10/10	2. Enhance /restore could connect to 4. Lower gully	1
7	Henry's bush	Small / mostly compact		Medium, some different species	Medium	3/10	10/10	4. Leave as is	/
8	Sheep shelter	Small / mostly compact		Simple – only kānuka treeland	Low	2 (more important to keep as shelter)/10	10/10	4. Leave as is	/
9	Upper gully regen	Large / sprawling		Complex	High	10/10	4/10	3. Maintain current state	2
10	Home shelter belt	Medium size / sprawling		Complex	High	6/10	5/10	4. Leave as is	/

PRIORITISING YOUR REMNANTS

Use these forms by summarising all the information you have gathered for each forest remnant patch*. Compare your decisions and decide which patch or patches to focus on.

TASK 11

Patch No. (Task 2)	Patch Name (Task 2)	Size & shape (Task 4)	Habitat connectivity (Task 4)	Forest Profile (Task 5)	Species rich biodiversity (Task 7)	Values (Score from Task 7)	Threats (Score from Task 8)	Restoration options (Task 9)	Priority ranking (Task 11)
1						10	10		
2						10	10		
3						10	10		
4						10	10		
5						10	10		
6						10	10		

*If you have more than 12 remnant patches use the form on page 50 to add more.

Patch No. (Task 2)	Patch Name (Task 2)	Size & shape (Task 4)	Habitat connectivity (Task 4)	Forest Profile (Task 5)	Species rich biodiversity (Task 7)	Values (Score from Task 7)	Threats (Score from Task 8)	Restoration options (Task 9)	Priority ranking (Task 11)
7						/10	/10		
8						/10	/10		
9						/10	/10		
10						/10	/10		
11						/10	/10		
12						/10	/10		

Prioritising management actions for each forest remnant

Now you have decided upon the forest remnant patches you are going to improve, you need to prioritise the actions required to achieve your chosen options.

This section provides a way of assessing how you can improve the health of your forest remnant through related factors:

1. The shape, size and habitat connectivity of the patch (Tasks 2 & 4);
2. The structure of the vegetation within the patch (from forest profile in Task 5);
3. The available food resources for wildlife, e.g. flowers, fruit, foliage, insects (biodiversity from Task 7);
4. The pest free status of the patch, e.g. animal predator abundance, stock access or invasive weedy species (identified in threats from Task 8).

These four factors influence the health of the native forest remnants. By working through this guide, you will have identified the biggest threats to the values and health of your forest remnants. Prioritise the management actions which will have the biggest impact on reducing threats and improving forest health in areas:

1. Look to improve the size and shape and connectivity of your patch by filling gaps, i.e. supplementary planting. Connect smaller, more vulnerable patches, to healthier ones by fencing and supplementary planting, even if small patches are species poor. If threats are removed, regeneration will improve biodiversity.
2. When forest patch structure is complex there are more food resources to

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TASK 12:

Prioritise management actions for each forest remnant patch.
Fill in the table on page 38.

---

support native species. Look to improve structure by preventing animals from browsing. Excluding stock, as well as feral browsers (deer, pigs, goats, possums) will allow forest canopy and understorey species to regenerate.

3. Species rich forest remnants provide food for a wide variety of plants, birds and insects. Supplementary planting may be needed to restore a remnant forest patch that has large gaps in the canopy or is lacking in food resources (e.g. flowering trees and trees with berries and fruit). Planting is also needed in tree-lands where regeneration is prevented by pasture and stock access. Prioritise protecting planting in declining tree-lands and forest gaps.

4. Improving the pest free status of a patch, excluding stock and feral browsers, predators and weeds, you will improve the forest structure and the abundance of wildlife it supports.

If you are still feeling stuck or unsure on how to prioritise management actions or remnant patches, get in touch with us.

Table 5: *A summary of benefits of management actions on remnant forest health. Adapted from information in Bush vitality assessment: growing common futures, by Helmut Janssen.*

In Table 5, we can see that fencing and planting will improve the size, shape and connectivity of your patch.

Completing all five actions will improve the forest profile and structure as well as the biodiversity values.

Fencing and controlling weeds and pests improves the pest-free status.

		Management actions to improve remnant health				
		2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests
Key factors influencing remnant health	Size, shape & connectivity	✓	✓			
	Forest profile & structure	✓	✓	✓	✓	✓
	Species richness / Biodiversity	✓	✓	✓	✓	✓
	Pest-free status	✓		✓	✓	✓

EXAMPLE: PRIORITISE MANAGEMENT ACTIONS
This is an example of how to complete Task 12

Patch no. & name: 4. Lower gully bush
Preferred option: 2. Enhance / restore
Therefore, management actions are:
Action 2: Fence
Action 3: Plant
Action 4: Manage stock
Action 5: Control weeds
Action 6: Control pests

Management actions to improve remnant health		2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests
Key factors influencing remnant health	Size, shape & connectivity	✓	✓			
	Forest profile & structure	✓	✓	✓	✓	✓
	Species richness / Biodiversity	✓	✓	✓	✓	✓
	Pest-free status	✓		✓	✓	✓

Make notes about your decisions here:
There are five actions that need to be taken, but it is obvious from Table 5, that if we want to enhance / restore the Lower gully bush, we need to link it up to two other smaller, less healthy remnants. Therefore, fencing is the first task we need to take (which will automatically manage stock access). Then supplementary plant and control weeds and pests once a fence is installed.

PRIORITISE MANAGEMENT ACTIONS

TASK 12

Use this table to decide what actions are urgently needed for each forest remnant:

Patch number and name:

Preferred option:

Management actions to improve remnant health		2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests
Key factors influencing remnant health	Size, shape & connectivity					
	Forest profile & structure					
	Species richness / Biodiversity					
	Pest-free status					

Make notes about your decisions here:

Resources for restoring your native forest remnants

Thorough management planning will help you to achieve your goals and realistically price the effort required in terms of time, money and resources. Calculating the cost of the effort involved is the final step in creating your management or restoration plan.

Planting native species

If your plan involves planting, use our **Forest restoration planning and planting guide for landowners in the Halo Project area** to understand the different types of native species that will suit your forest patches.

The **HALO PROJECT** Beyond Orokonui

We aim to inspire and work with our communities to enhance, protect and connect with the landscape.

Forest restoration planning and planting guide for landowners in the Halo Project area

A companion document to "A planning guide to native forest restoration for landowners with native forest remnants"

TASK 13:

Work out which resources you will need and your best estimate on pricing for each.
(Use our planning and planting guide for help understanding requirements)

Seek the advice of experts to help you complete your restoration plan. You will need to include costings of plants and protectors, weed and predator control, fencing and any labour costs.

Once you have calculated the costs associated with your restoration plan, you can apply for funding to help you implement it.

The Halo Project team are happy to work with landowners wishing to restore and enhance forest remnants within our project area. Contact us for help or advice when you need it.

Legend

- ⬜ Site boundary (4.31 ha)
- ⋯ Fencing required (855 m)

Planting Areas
- 🟪 Block 1 (1.08 ha)
- 🟦 Block 2 (1.35 ha)

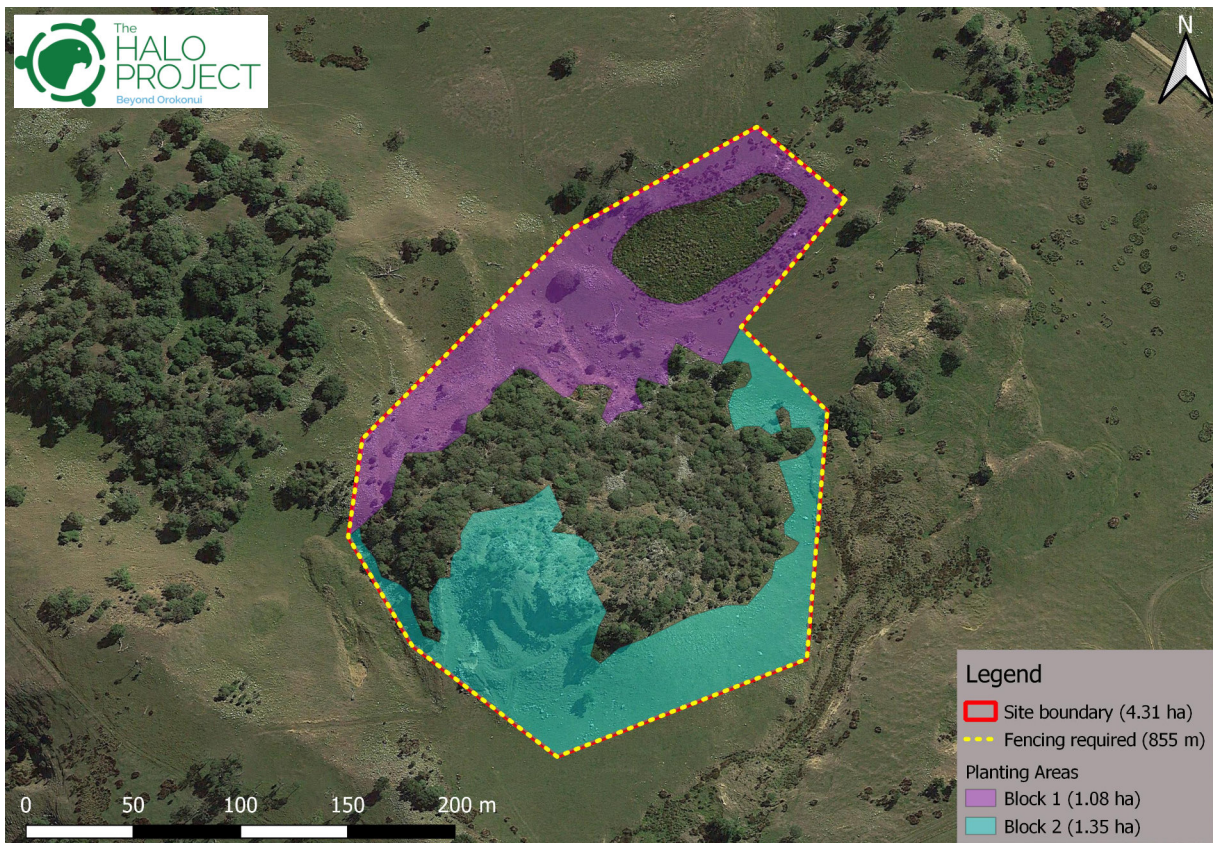0   50   100   150   200 m

Figure 22: A map of a proposed restoration project, where areas for supplementary planting and fencing requirements are calculated using GIS. This map was produced by the Halo Project

PRICING OF RESOURCES

Use this table to record costs for resources you will need:

TASK 13

Resources	Patch no. & name	Patch no. & name	Patch no. & name	Patch no. & name	Totals
Patch no. & name	1.	2.	3.	4.	
Plants					
Plant protectors					
Weed control					
Predator control					
Fencing					
Labour costs					
Other					
Totals					

Who to ask for help:

- **The Halo Project, Forest Restoration Coordinator**
  info@haloproject.org.nz
- **QEII National Trust, regional rep**
  https://qeiinationaltrust.org.nz/find-your-rep/
- **Dunedin City Council, Biodiversity Advisor**
  Ph (03) 477 4000 or biodiversity@dcc.govt.nz
- **Trees That Count, regional rep**
  https://www.treesthatcount.co.nz/about-us/our-team
- **Department of Conservation Otepoti/Dunedin Office**
  Ph (03) 477 0677 or dunedinoffice@doc.govt.nz

Useful Resources (for restoration):

Department of Conservation (Restoration guide)

https://www.doc.govt.nz/about-us/science-publications/conservation-publications/protecting-and-restoring-our-natural-heritage-a-practical-guide/

Department of Conservation (Nature Heritage Fund guide)

https://www.doc.govt.nz/globalassets/documents/getting-involved/landowners/nature-heritage-fund/pna-guide-june-2005.pdf

6 FUNDING YOUR FOREST RESTORATION PLAN

Funding options exist to alleviate the cost of restoration to landowners (see Table 6). Placing a patch under a QEII National Trust covenant provides legal protection of a site in perpetuity, as well as provision of half of the fencing costs. Placing patches under a QEII covenant would also make it possible to apply for the Stephenson Fund which exists solely to enhance QEII covenants.

The Dunedin City Council Biodiversity Fund is designed to fund restoration projects on private land. As with QEII funding, a 50:50 cost sharing basis exists with a maximum allocation of $5,000.

The Otago Regional Council's ECO Fund is also designed to assist any project which aims to enhance the environment within Otago. A key requirement of this fund is the involvement of community, something which may be difficult for the landowners themselves to achieve. However, with the involvement and assistance of the Halo Project, obtaining community involvement is achievable.

Through their Trees That Count (TTC) program, the Project Crimson Trust aims to help connect trees planters with organisations looking to fund tree planting. Talking with your local TTC rep is a great way to find out whether you're eligible to receive trees.

The One Billion Trees (1BT) programme provides grants to help landowners increase the extent of forest cover on their property.

The Department of Conservation's Nature Heritage Fund is to protect indigenous ecosystems that represent the full range of natural diversity originally present in the landscape through the establishment of a sustainable and interacting system of protected areas. The fund supports activities to protect native ecosystems, through helping to permanently protect representative, sustainable, landscape and amenity values of indigenous ecosystems. It does this by purchasing land or through covenanting, leasing, accords, and management agreements.

Figure 23: Volunteers at a Halo Project planting day

Table 6: Potential funding sources for habitat restoration projects

Fund	Criteria	Pay arrangement	Maximum value ($)
QEII National Trust	Relatively simple to establish. Begin by contacting your local QEII rep. See https://qeiinationaltrust.org.nz/ for more information.	50:50 sharing of fencing costs	Situation dependent
Stephenson Fund	For further enhancement of existing QEII covenants. See https://qeiinationaltrust.org.nz/managing-your-covenant/the-stephenson-fund/ for more information.	50:50 cost sharing arrangement	$2,000-$20,000
Biodiversity Fund – Dunedin City Council	Area must be placed under a protective covenant. Funding is used to protect, enhance and manage areas of importance to indigenous biodiversity. See www.dunedin.govt.nz/funding for more information.	50:50 cost sharing arrangement	$5,000
Trees That Count	Landowners, who have carried out planting from 2016 onwards, can apply for free native trees. See https://www.treesthatcount.co.nz/planters	Trees provided free of charge	Situation dependent
One Billion Trees Funding	Must contribute to the governments goal of 1 billion trees by 2028 as well as improve innovation, research employment and/or biodiversity. See https://www.teururakau.govt.nz/funding-and-programmes/forestry/one-billion-trees-programme/ for more information.	Direct landowner grant	$4,000 per ha (base rate for indigenous plantings) + up to $2,000 per ha in top up funding for projects which benefit indigenous biodiversity
ECO Fund – Otago Regional Council	Any project working to protect or enhance the environment. Must involve community participation. See https://www.orc.govt.nz/our-council-our-region/eco-fund for more information.		$150,000+ (capable of funding large or small projects)
Nature Heritage Fund - DOC	Native ecosystems that in their local or national context are considered important ecologically. It includes indigenous forests, wetlands, tussock lands and coastal ecosystems on private land. See https://www.doc.govt.nz/get-involved/funding/nature-heritage-fund/		
Ngā Whenua Rāhui Fund - DOC	Legal protection for Maori-owned land. See https://www.doc.govt.nz/get-involved/funding/nga-whenua-rahui/nga-whenua-rahui-fund/		

Additional Forms

RECORD ALL FOREST REMNANTS

Use this form to record the different remnant patches you have on your property*.

TASK 2

Patch Number	Patch Name	GIS coordinates or grid reference or coordinates

Copy the following blank forms (page 44 onwards) as many times as you need in order to complete one full set per remnant patch that you record here in Task 2.

CHARACTER ASSESSMENT FORM

Use this form to record the characteristics of each forest remnant patch.

Patch number and name:

Characteristics	Your description of the characteristics of the patch
Soil/ substrate type	
Terrain	
Water bodies	
Habitat connectivity	
Natural hazards	
Current use	
Fencing	
Other farming features	
Anything else?	

SIZE, SHAPE & CONNECTIVITY FORM

Use this form to record the size, shape and connectivity of each forest remnant patch.

TASK 4

Patch Number	Patch Name	Size (choose a unit of measurement)	Shape	Habitat connectivity
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

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FOREST PROFILE FORM

Use this form to identify tree species present. Then try and identify what habitat type you have in each patch*. For example kānuka, podocarp forest, tree-land, gorse scrub.

 TASK 5 & 6

Patch number and name:

Forest Profile elements	Your description
Date:	
Dominant tree species present: **Emergent layer - what are the tallest trees you can see?** **e.g. rimu, tōtara, (other native species) or exotics such as old man pine, eucalyptus**	
Other tree species present: **Canopy and sub-canopy layers - what are the other trees you can see?** **e.g. miro, mātai, kōwhai**	
Are the tree species healthy? **Describe as best you can.** **Unhealthy could be smothered in vines, stripped bark, broken branches, dead trees**	
Understorey present: (Y/N) **Can you see shrubs and ferns?**	
Dominant understorey species: **Understorey & seedlings/leaf litter layers - what do you see lower down, below eye-level?** **e.g. native species like ferns, seedlings, or weeds like gorse, broom, hawthorn seedlings or pasture species?**	
Habitat type: **Task 6 (overleaf) - Can you describe whether the vegetation is just trees with little understorey (treeland), healthy or unhealthy forest remnant (comparing it to Figure 10) or is it exotic scrub (gorse, broom, hawthorn, etc.)?**	
Summary: Complex or Simple **Is the remnant complex (multiple vegetation layers) or simple (a canopy and not much on the forest floor, with not a lot in between)**	

VALUES ASSESSMENT FORM

Use this form to record what each patch means for you.

Patch number and name:

Values	Value to you and your family	Ranking (high, medium, low)
Farming or business value *		
*If you place farming / business as a higher value than other values then the only option (see Section 3) for this remnant is **Option 3: Maintain current state.**		
Amenity value		
Species richness / Biodiversity value		
Cultural or spiritual value		
Environmental value		
Recreational value		
Turn the ranking from high, medium and low into a score. High = 2, Medium = 1 and Low = 0 Add up the score in the box on the bottom right of this table. Do NOT include farming/business value in the score.		
Overall value assessment	**Make notes here** (e.g. Have to decide whether this patch is more valuable for lambing ewes or restored for erosion protection).	Score: /10

THREAT ASSESSMENT FORM

Use this form to record the threats to forest health for each patch.

TASK 8

Patch number and name:

Threat	Threats to patch health	Ranking (high, medium, low)
Weeds		
Plant mortality		
Plant-eating pests: possums, rabbits, hares, deer, goats, pigs		
Animal-eating pests: mice, rats, hedgehogs, feral cats, stoats, ferrets		
Stock access		
Turn the ranking from high, medium and low into a score. High = 2, Medium = 1 and Low = 0 Add up the score in the box on the bottom right of this table.		
Overall threat status	Make notes here:	Score: 10

OPTIONS AND MANAGEMENT ACTIONS TABLE

Use this table to help you decide what management actions you'll need to apply to each patch to achieve your chosen options (Task 9).

TASK 10

Patch number and name:

		Management Actions						
TASK 9		1. Legally protect	2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests	Check local regulations
Options	1. Place under legal protection							
	2. Enhance / restore							
	3. Maintain current state							
	4. Leave as is							
	5. Manage for pasture							

Make notes about your decisions here:

PRIORITISING YOUR REMNANTS

Use these forms by summarising all the information you have gathered for each forest remnant patch*. Compare your decisions and decide which patch or patches to focus on.

TASK 11

						Patch No. (Task 2)
						Patch Name (Task 2)
						Size & shape (Task 4)
						Habitat connectivity (Task 4)
						Forest Profile (Task 5)
						Species rich biodiversity (Task 7)
						Values (Score from Task 7)
						Threats (Score from Task 8)
						Restoration options (Task 9)
						Priority ranking (Task 11)

PRIORITISE MANAGEMENT ACTIONS

Use this table to decide what actions are urgently needed for each forest remnant:

TASK 12

Patch number and name:

Preferred option:

		Management actions to improve remnant health				
		2. Fence	3. Plant	4. Manage stock	5. Control weeds	6. Control pests
Key factors influencing remnant health	Size, shape & connectivity					
	Forest profile & structure					
	Species richness / Biodiversity					
	Pest-free status					

Make notes about your decisions here:

PRICING OF RESOURCES

Use this table to record costs for resources you will need:

Resources	Patch no. & name	Patch no. & name	Patch no. & name	Patch no. & name	Totals
Patch no. & name	1.	2.	3.	4.	
Plants					
Plant protectors					
Weed control					
Predator control					
Fencing					
Labour costs					
Other					
Totals					

Resources	Patch no. & name	Patch no. & name	Patch no. & name	Patch no. & name	Totals
Patch no. & name	1.	2.	3.	4.	
Plants					
Plant protectors					
Weed control					
Predator control					
Fencing					
Labour costs					
Other					
Totals					

ADDITIONAL NOTES

Write any additional notes about what you are learning or your thoughts regarding each patch here:

References

Ewers, R. M., Kliskey, A. D., Walker, S., Rutledge, D., Harding, J. S. and Didham, R. K. (2006) Past and future trajectories of forest loss in New Zealand. *Biological Conservation*, 133, 312-325.

Innes, J., Nugent, G., Prime, K. and Spurr, E. B. (2004) Responses of kukupa (*Hemiphaga novaeseelandiae*) and other birds to mammal pest control at Motatau, Northland. *New Zealand Journal of Ecology*, 28, 73-81.

Janssen, H. J. (2006) *Bush vitality assessment: Growing common futures*. Published by Helmut J. Janssen in assoc. with regional councils, territorial authorities, and the Department of Conservation, Wellington

Lee, W. G., Allen, R. B. and Johnson, P. N. (1986) Succession and dynamics of gorse (*Ulex europaeus L.*) communities in the Dunedin Ecological District South Island, New Zealand. *New Zealand Journal of Botany*, 24, 279-292.

Millar, Rhys (2003) *Sustainable Landowners Group – Management Handbook*. Published by Wrightson Forestry Services, Dunedin.

Otago Regional Council, 2019, *Otago Regional Pest Management Plan 2019-2019* https://www.orc.govt.nz/plans-policies-reports/regional-plans-and-policies/regional-pest-management-plan

Towns, D. R. and Daugherty, C. H. (1994) Patterns of range contractions and extinctions in the New Zealand Herpetofauna following human colonisation. *New Zealand Journal of Zoology*, 21(4), 325-339.

QEII National Trust (2019) *Queen Elizabeth II National Trust Annual Report 2019*. https://qeiinationaltrust.org.nz/publications-and-resources/.

Watts, C. H., Armstrong, D. P., Innes, J. and Thornburrow, D. (2011) Dramatic increases in weta (Orthoptera) following mammal eradication on Maungatautari – evidence from pitfalls and tracking tunnels. *New Zealand Journal of Ecology*, 35(3), 261-272.

Wright, D. M., Tanentzap, A. J., Flores, O., Husheer, S. W., Duncan, R. P., Wiser, S. K. and Coomes, D. A. (2012) Impacts of culling and exclusion of browsers on vegetation recovery across New Zealand forests. *Biological Conservation*, 153, 64-71.

Resources

If you are unfamiliar with native tree species of New Zealand, these two books are really useful in helping to identify different species on your property.

The Life-Size Guide to Native Trees by Andrew Crowe.
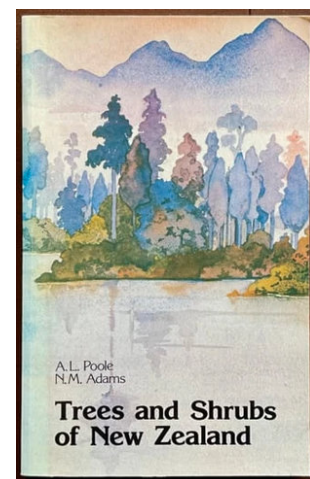
Trees and Shrubs of New Zealand by AL Pool & NM Adams

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The
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