Landscape Connections Trust

The HALO PROJECT
Beyond Orokonui

LANDOWNER REPORT

BIRDS AND BIODIVERSITY ON YOUR PROPERTY

Private Landowners: Rhys Millar & Niki Bould,
54 Mihiwaka Station Road, Port Chalmers

INTRODUCTION TO THE LANDOWNER REPORT

Between 2014-2017 the Landscape Connections Trust completed a study that examined the relationship of birds to the various habitats that exist within the Halo Project area.

The landowner reports are one result of that work, with each report being specifically tailored for each individual landowner that participated in this project. This landowner report provides you with an overview of bird and habitat relationships throughout the project area as well as on your own land, highlighting the biodiversity qualities of your patch.

We have structured the report in four parts. The first part describes why we conducted the study in the first place and summarises the results for the full Halo Project area. The second part describes the methodology and the high-level project findings. The third part of this report summarises the work that was completed on your property and provides you with an overview of where we conducted the bird count, the types of habitat you have on your land, the variety of birds we counted in each habitat, and the relationships between birds and the habitat types that are found on your property. We hope you find it interesting to learn about what was found on your property, and how this fits within the bigger picture.

Lastly, we have outlined some ideas about how to enhance biodiversity within the Halo Project area. We hope this might give you some ideas to help protect and enhance native habitat for the benefit of our native birds.

THANKS TO...

This Landscape Connections Trust project is funded by the DOC Community Fund, the Dunedin City Council and Birds New Zealand. The scientific methodology and analysis has been designed and implemented by Wildlands Consultants. This landowner report is based upon information within the Wildlands Consultants report (2016a).

Experienced volunteer ornithologists from Birds New Zealand collected bird count data for this Bird and Habitat Relationship Study. Our sincere thanks go to all of these groups, and in particular the large voluntary effort of the Birds New Zealand team. Also a large thanks goes to Craig McKenzie for his donation of photos.

Our thanks go out to the 10-member Community Advisory Group (CAG) that guides the work of the Landscape Connections Trust. The group includes local landowners, DOC representatives, Otago Natural History Trust members, Kāti Huirapa Runaka ki Puketeraki, local conservation groups, and other interested parties.

Lastly, our sincere thanks to all landowners who participated in this project and freely gave us access to their properties to conduct the bird counts. Your enthusiasm and support is much appreciated.

Front page photos credit: Flyover Media (www.flyover.co.nz)

COMMONLY USED TERMS

Seed vectors = birds that scatter and germinate seeds

Dispersal range or capacity = the distance different birds travel and scatter seeds.

5 minute bird count = a bird count method in which birds are recorded if they are seen or heard within 100 metres of a selected site, over a five-minute period. Other useful information like ambient noise, weather and vegetation type is also recorded.

Endemic birds = native birds that are found in no other country.

Frugivorous birds = Bird that feeds on fruit, such as kererū, bellbird/kōparapara and silvereye/pihiphi.

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1. BIRDS WITHIN THE NEW ZEALAND LANDSCAPE

1.1 BACKGROUND – THE HALO PROJECT

The Landscape Connections Trust (LCT) is a Dunedin-based conservation trust that's primary role is to support the planning, administration, fundraising, development and implementation of a variety of environmental projects under the name 'The Halo Project'.

The LCT vision is "from Silver Peaks to sea, communities and nature thriving in balance".

The Halo Project (and LCT's) Mission is to inspire and work with our communities to enhance, protect and connect with this landscape.

The Halo Project involves a range of activities, from habitat restoration of forest ecosystems, wildlife monitoring, supporting landowners with best practice advice for environmental management, pest control initiatives, restoration of seabird habitat sites, and this - the 'Bird and Habitat Relationship Study' (originally produced in 2017).

1.2 PCE REPORT – TAONGA OF AN ISLAND NATION

In May 2017, the Office of The Parliamentary Commissioner for the Environment (PCE), released a report into the state of New Zealand's native bird populations called 'Taonga of an island nation: Saving New Zealand's birds'. Her investigation is pertinent to why the LCT deemed it necessary to conduct the 'Bird and Habitat Relationship Study'. In it she highlights the challenges our native birds face and what it might take to restore them in large numbers back on to the mainland of New Zealand.

"There are 168 different species of native birds in New Zealand. Of these, 93 are especially precious because they are found in no other country. But they are far from safe. Only 20% – one in every five – is in good shape. And one in every three is not far off from following the moa and many others into extinction. The situation is desperate."
Dr Jan Wright

In addition, Landcare Research published their 2017 report stating, "Between 1969–1979 and 1999–2004 there was widespread and systematic of loss of endemic forest birds from New Zealand's forests. This trend is likely to have continued since 2004." They highlighted a decrease in range of the South Island birds such as the kererū, tūī, bellbird, weka, long-tailed cuckoo, South Island robin, tomtit, fantail and morepork. Positively though, they did find that the New Zealand falcon, parakeet species, grey warbler and shining cuckoo increased in range.

1.3 WHAT IS CAUSING THE DECLINE IN OUR NATIVE BIRDS

There are a variety of reasons why our native birds are on the decrease. We have summarised a few key issues here:

PREDATORS

Feral cats, ferrets, stoats and ship rats are a huge threat to our native birds. They predate on the birds themselves, and also consume their eggs.

Loss of habitat

The Halo Project area has beautiful and ecologically significant areas of indigenous forest habitat that are essential for our native birds. Unfortunately, large areas of this forest habitat are not thriving, and in some cases are declining, due to a lack of management.

Habitat fragmentation

The amount and types of habitat needed by birds varies from species to species. Some will fly between isolated remnants of habitat. But some forest birds, including rifleman and saddleback, are unable or unwilling to cross even quite short stretches of open land or water. Thus, they can become trapped in patches of bush, unable to leave to find more food, or to breed outside of their own little group (PCE, 2017).

Invasion of pest plants (weeds) on bird habitat

Some vines can climb high into trees and smother potential bird habitat. These invaders include **old man's beard, banana passion fruit, and honeysuckle**. In Port Chalmers, Ravensbourne, and other tracts of land within the project area, the spread of **sycamores** has become a significant ecological and amenity issue, causing significant concern to residents within the area. Each sycamore tree produces many seeds over it's lifetime and these seeds are well adapted to being wind-dispersed. Seedlings are shade tolerant and can form dense stands in shady conditions. These stands can prevent desirable species from establishing. Sycamore will spread into areas of native bush, preventing the recruitment of other species in a bush remnant, eventually leading to a pure sycamore forest.

The ability of sycamore to spread exponentially and to regenerate from inadequate control methods means a whole-of-landscape management plan is required so as to ensure collective and individual action is working towards the same outcome.

Competition on food source

New Zealand birds eat a great variety of foods. The grey warbler eats flying insects; fantails eat a wide variety of critters including moths, flies, spiders, wasps, and beetles. The kiwi forage for grubs in the leaf litter on forest floors. Tūī, stitchbird and the bellbird feed on the sweet nectar in flowers and the Kererū eat the fruit, leaves, twigs, buds and shoots of over a hundred native and fifty exotic, shrubs and trees.

Unfortunately for our native birds, there are a wide variety of introduced species that also feed on the same food source. **Possums** are the most well known destroyers of the bush. They eat the shoots, flowers, fruit and seeds of many plants. Unchecked, possums can eat out the crowns of mature trees, in some areas of New Zealand this has lead to the collapse of the forest canopy. **Rats** and **mice** also compete with birds for food. They eat worms and insects that birds feed on. Ship rats are skilled climbers; they scamper up trees to eat fruit and seeds. Rodents will also eat seedlings, stopping new plants from establishing. Though not such an issue within the Halo Project area, **wasps** are at some of the highest densities in the world in South Island beech forest. They eat huge amounts of honeydew, as well as many insects and spiders.

Some animals do not compete directly with birds for food, but modify habitat by selectively browsing on favoured plants, thus causing changes in the composition of the vegetation, such as **deer, goat, pigs, rabbits** and **hares**.

2. SUMMARY OF THE BIRD AND HABITAT RELATIONSHIP STUDY

2.1 5 MINUTE BIRD COUNT LOCATIONS

During the spring of 2014 and 2015, the Otago branch of Birds New Zealand and Wildlands Consultants Ltd led volunteer teams to conduct five-minute bird counts (5MBC) at sites across the Halo Project area.

The project used 5MBC methodology and covered as many different habitat patches as possible. Birds were recorded if they were seen or heard within 100 metres of the site over a five-minute period, but analysis of habitat relationships was restricted to birds recorded within the habitat. Other useful information like ambient noise, weather and vegetation type were also recorded.

Figure 1. Bird counters in action. Photo credit: Jinty MacTavish

The 5MBC locations are shown in Figure 2, over page. Birds were recorded at a total of 625 different count sites distributed throughout the project area between August 2014 and mid-December 2015. As the amount and distribution of potential forest bird habitat was extensive, not all areas of forest bird habitat could be sampled, and larger areas of habitat were under-sampled. A subset of sites was counted on repeat occasions.

The approach taken was to count more intensively at local sites scattered across the project area. Most parts of the project area were sampled, with the exception of the extreme northeastern and northwestern parts (Wildlands, 2016a).

HALO PROJECT AREA

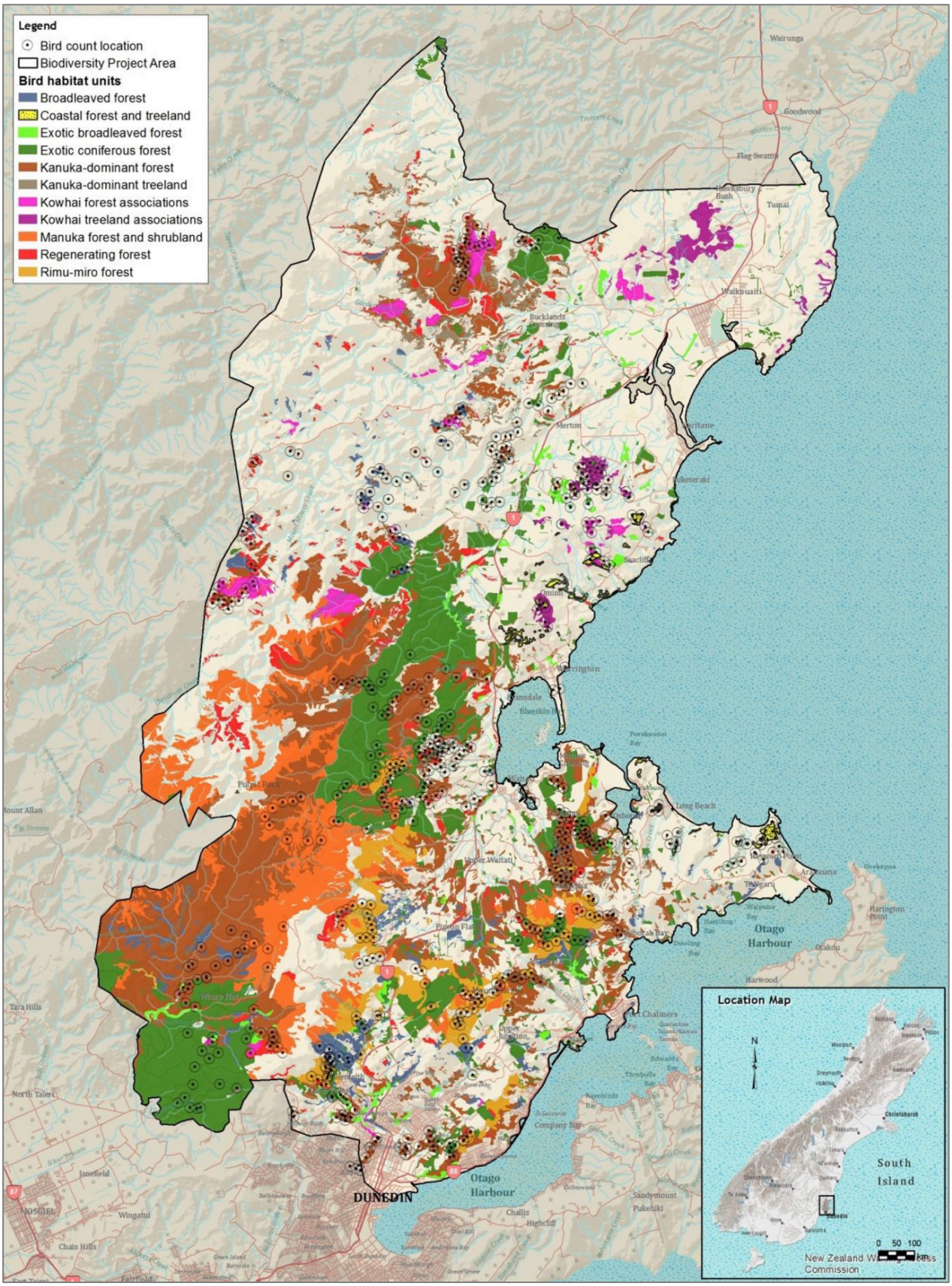


Figure 2. Halo Project area map showing locations of bird count sites and major vegetation types (credit: Wildlands Consultants Ltd 2016a)

2.2 BIRD COUNT RESULTS

The Wildlands Consultants report (2016a) explains that thirty-three bird species were observed in the five-minute counts. Eighteen of these species were indigenous species, and fifteen species were introduced and naturalised species. Three of the indigenous species are currently listed as Threatened or At Risk (Robertson et al. 2013). South Island kākā (Threatened-Nationally Vulnerable) was observed only within the Orokonui Ecosanctuary, while South Island rifleman/tītīpounamu (At Risk-Declining) were recorded in low numbers, and South Island fernbird/mātā (At Risk-Declining) were only recorded rarely.

The numbers of each of the indigenous birds recorded are shown in Figure 3.

INDIGENOUS BIRDS RECORDED WITHIN THE HALO PROJECT AREA

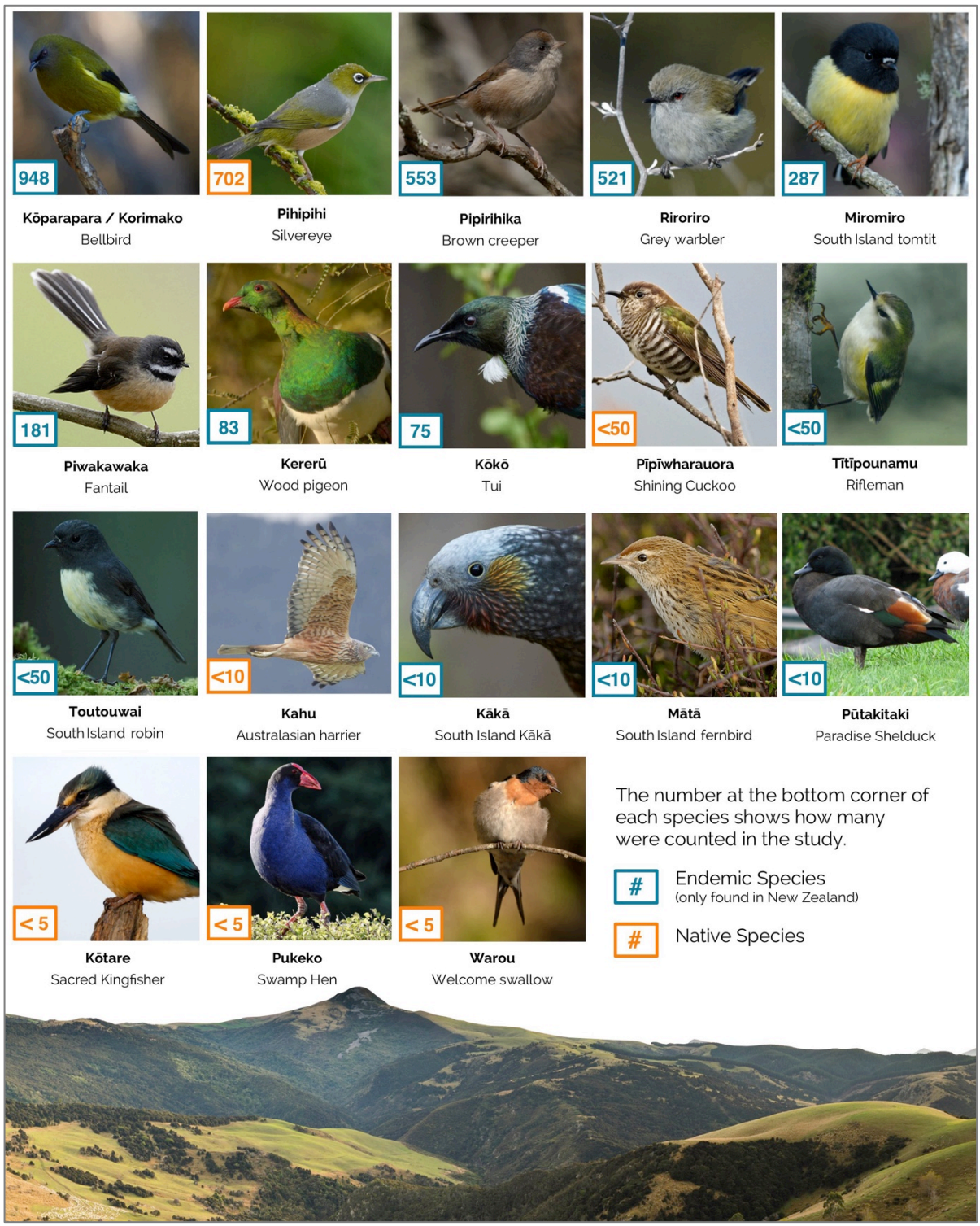


Figure 3. Results of number of indigenous bird species counted within the Halo Project area

3. BIODIVERSITY ON YOUR PROPERTY

Private Landowners:
Rhys Millar & Niki Bould

Address:
54 Mihiwaka Station Road, Port Chalmers

3.1 OVERVIEW

One main habitat was identified on your property:

- Kānuka dominant forest (dark brown)

*Forest – no understory grazing

Your property had a total of one bird count location, shown in Figure 4 below:

- The count was conducted in kānuka dominant forest

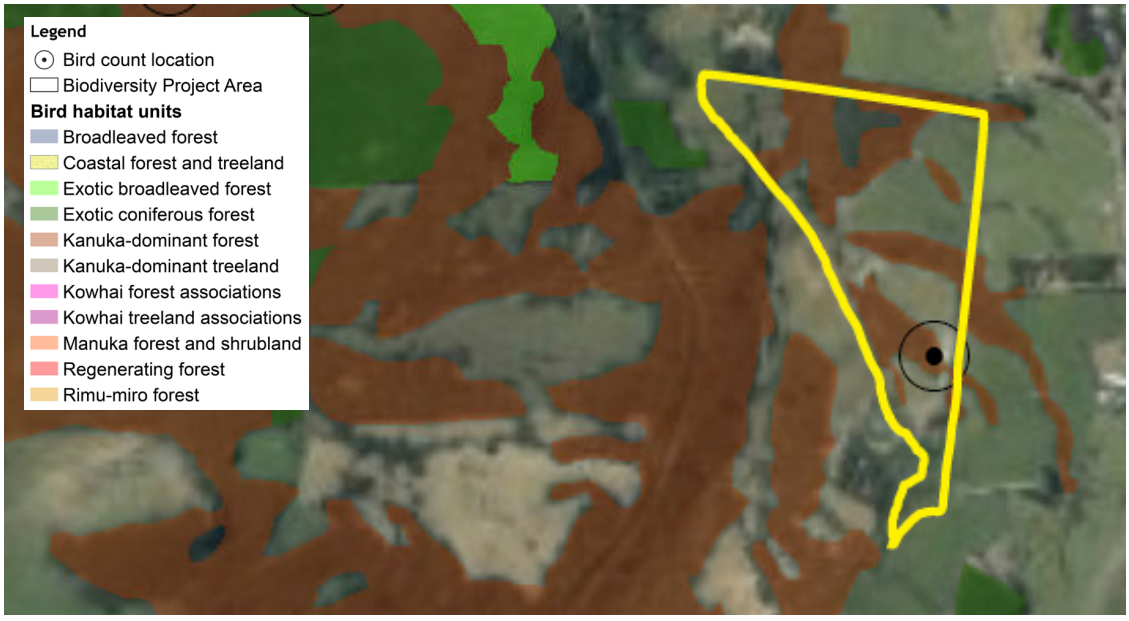


Figure 4. Map showing your property boundary, the main habitat and the one 5MBC location for your site within the project area

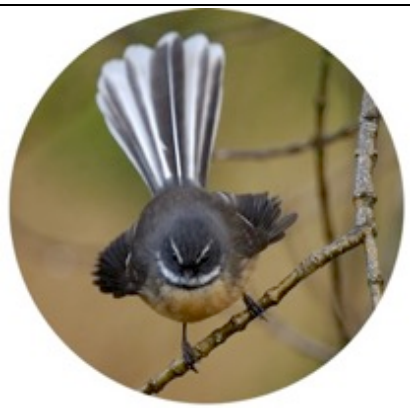
3.2 BIRD SPECIES COUNTED ON YOUR PROPERTY

The birds counted on your property, and the habitats where they were counted, are described below.

Photo credit: Craig McKenzie

ENDEMIC SPECIES

Bellbird / Kōparapara / Korimako	
Observed in 1 of 1 count location:	
1 in kānuka dominant forest	

Fantail / Piwakawaka	
Observed in 1 of 1 count location:	
1 kānuka dominant forest	

Grey warbler / Riroriro	
Observed in 1of 1 count location:	
1 in kānuka dominant forest	

NATIVE SPECIES

Silvereye / Pihipihi	
Observed in 1 of 1 count location:	
1 in kānuka dominant forest	

INTRODUCED SPECIES

Chaffinch	**Redpoll**	**Blackbird**
Observed in 1 of 1 count location:	Observed in 1 of 1 count location:	Observed in 1 of 1 count location:
1 kānuka dominant forest	1 kānuka dominant forest	1 kānuka dominant forest

3.3 BIRD AND HABITAT RELATIONSHIPS ON YOUR PROPERTY

Successful habitat provides three key things for birds:

1. Food availability.
2. Composition, size and connectivity (how close habitat patches are to one another).
3. An absence of mammalian pests.

Wildlands Consultants (2016b) summarised the habitat descriptions throughout the Halo Project area. One main habitat type was mapped for your property and described below. Other habitat types identified within the project area are included in Appendix 5.1.

KANUKA-DOMINANT FOREST

Brief description	Bird species relationship information
Kānuka-dominant forest is currently widespread in the Halo Project area. The understory and ground cover of kānuka-dominant forest varies according to successional stage and whether the understory is browsed or grazed. In heavily grazed sites, there may be no understory and the ground covered primarily in exotic grasses and herbs. In ungrazed sites, the understory typically comprises dense regeneration of broadleaved tree species and/or small-leaved shrubs in very dry sites. A diverse range of indigenous ferns, grasses, and herbs are usually present in the ground layer, but in young self-thinning stands with a low dense canopy, the ground layer may mostly comprise litter.	Kānuka forest is an under-appreciated forest type, but is a key habitat for indigenous insectivorous birds, most probably because the flaky bark and branch structure of kānuka provides an abundance of crevices in which invertebrates can shelter. When in flower, kānuka also provides an abundant nectar source for invertebrates. Consequently, kānuka-dominant forest is important habitat for insectivorous birds such as grey warbler, brown creeper, fantail, tomtit, rifleman, and in the Silverstream valley, toutouwai/South Island robin.

Figure 5. Kānuka-dominant forest near Doctors Point.
Photo credit: Kelvin Lloyd

WHY THIS HABITAT IS IMPORTANT

Throughout the project area, the recorded bird-habitat relationships showed that food availability was likely the primary factor determining bird distributions (Wildlands, 2016a). Overall, indigenous vegetation was the most important habitat type for native birds, particularly during spring when indigenous species produce flowers and fruits, which is a key food source. Treeland habitats were less used, most likely because they lack the sub-canopy and understory vegetation layer that provides habitat for spiders and insects, upon which many indigenous birds feed.

4. Biodiversity Restoration

4.1 Biodiversity Restoration and the On-Farm Benefits

To help achieve the biggest impact from available resources, projects should target high value areas first. Some of the key actions that landowners can take to improve biodiversity are shown below, in Figure 6.

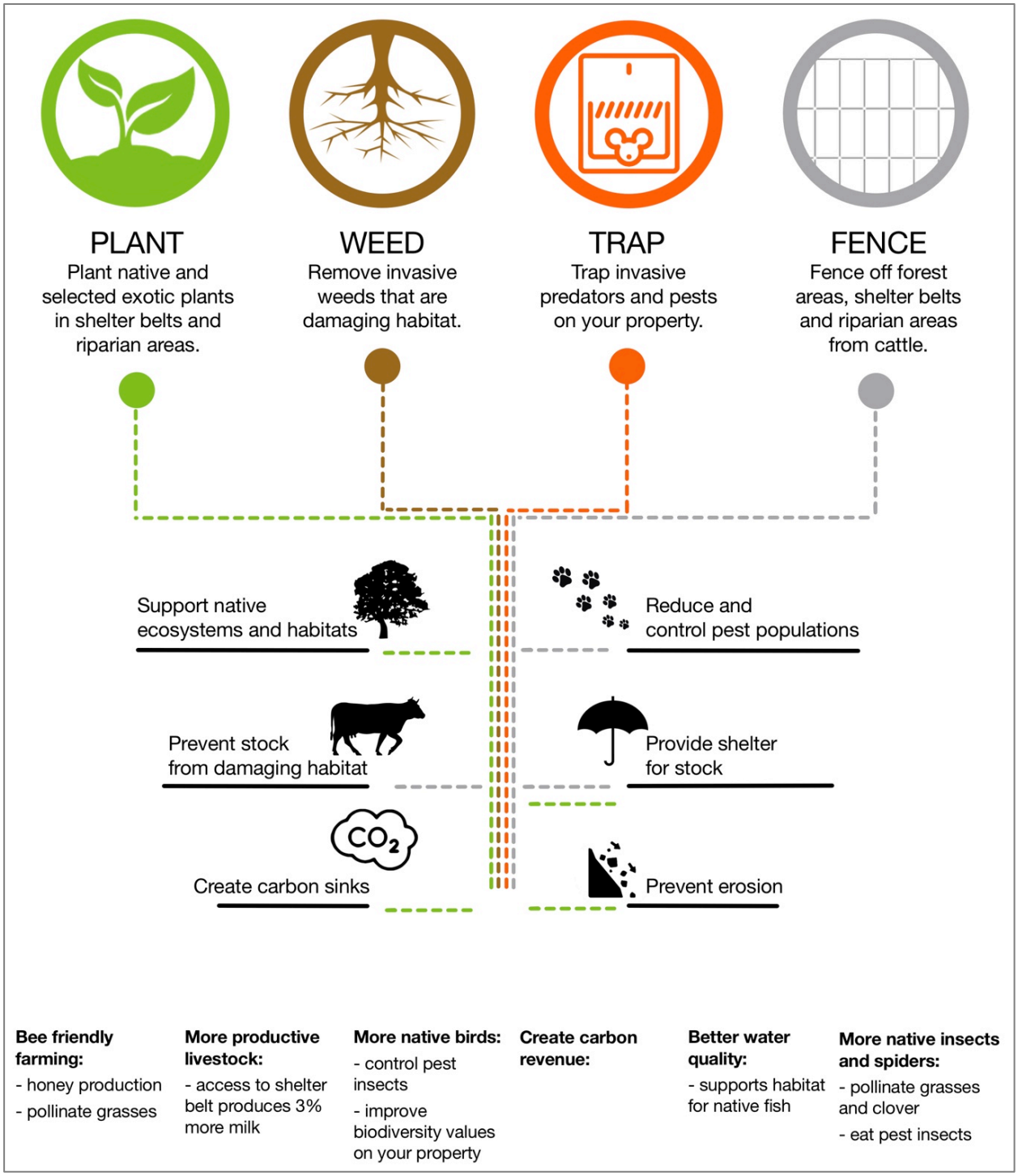


Figure 6. Biodiversity restoration action can result in many benefits to landowners.

The necessity for the land to provide a productive return requires landowners to think carefully about how they might integrate the management of indigenous biodiversity with the main productive requirements of the property. Biodiversity restoration can provide a number of other benefits to landowners, extending beyond the enhancement of habitats and species.

Biodiversity restoration can also:

- Improve soil stability (particularly in steep farmland areas and river/coastal banks);
- Enhance water quality (provide suitable shaded habitat for native fish species);
- Increase resilience to environmental changes (flooding, drought, etc.);
- Contribute to CO_2 reductions;
- Provide a source of firewood;
- Provide stock shelter;
- Support bird populations that help control pasture pest insects, which damage grasses and clover.

4.2 BIODIVERSITY RESTORATION ON YOUR PLACE

If you are looking to undertake any management actions, the protection and enhancement of your existing forest habitat is recommended as a priority.

Your property includes a number of existing patches of habitat. It is important to start by protecting and enhancing the native vegetation that already exists on your place, prior to beginning new restoration activities. Existing habitat will have a combination of physical and biological features that are easy to degrade, but take decades to develop.

You can help improve habitats on your patch by:

1. Planting and conserving habitat;
2. Fencing;
3. Pest control;
4. Weed control.

Figure 7 depicts these key actions, with further detailed explanation provided overleaf.

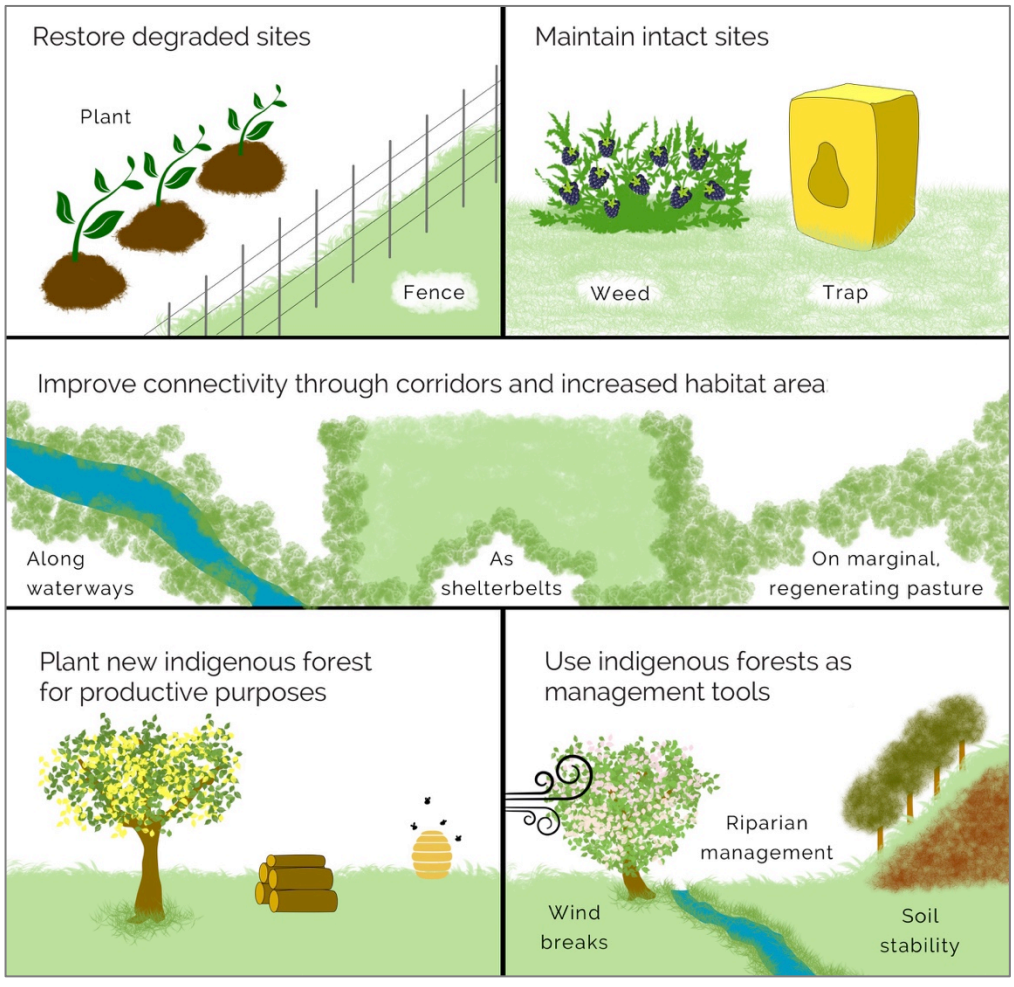


Figure 7. Ways of incorporating biodiversity

1. PLANTING AND CONSERVING HABITAT

Landowners have the potential to incorporate indigenous biodiversity into their landscapes in the following ways:

- Restoration of existing sites; or maintaining the condition of “intact” sites;
- Improving the connectivity of existing sites, through corridors and increased habitat area (e.g. along waterways, shelterbelts or marginal regenerating pasture land);
- Using new plantings of indigenous forests for “productive” purposes (timber, alternative produce);
- Using new plantings of indigenous forests as management tools that have traditionally been exotic plantings (e.g. windbreaks, riparian management, soil stability).

Habitat connectivity across a landscape is very important, as some birds won’t cross open or poorly vegetated areas and become restricted in how they move through their local habitat.

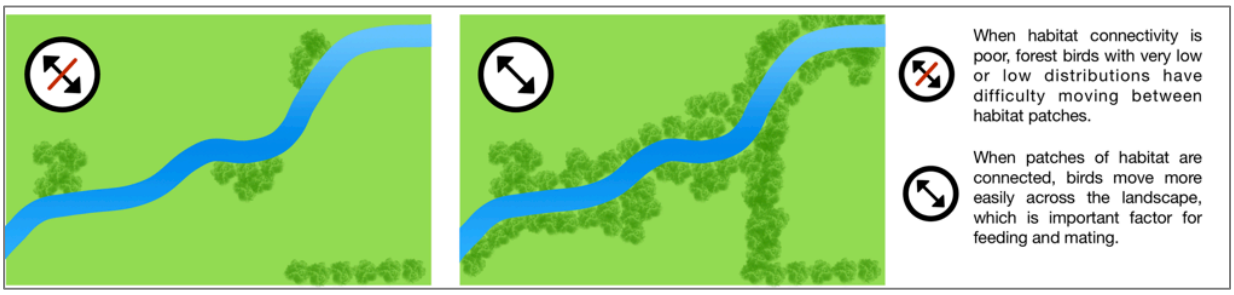


Figure 8. Illustration of poor and good habitat connectivity

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

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.

In landscape areas where threatened or endangered plant or animal species are found, landowners could consider restoring neighbouring areas into habitat to buffer the protection of these species.

If you are planning on doing some replanting, high quality indigenous forest habitats such as kānuka forest, broadleaved forest, podocarp and broadleaved forest are excellent choices.

While planting natives can help improve local biodiversity, exotic plantation forests have also been shown to effectively support vulnerable bird species. Connecting plantation sections through additional planting can be a great way to utilise the biodiversity benefits of exotic species.

RESTORATION TIPS

Planting native species will add to the indigenous diversity of your area, increasing seed source and providing food for native birds. Enriching established vegetated areas would boost the existing biodiversity qualities of the landscape. Vegetated areas may have lost diversity through disease or intense browsing, and changes to populations of pollinators (like insects) or seed vectors (birds to scatter and germinate seeds) may mean their dispersal capacity may be reduced or lost.

ECO-SOURCING - Ecosourcing refers to the propagation of native plants from local areas and the planting of them back within the same region. Ecosourcing is often used in restoration projects because locally sourced plants are thought to be more likely to survive than those

from further away. This is because species are often better adapted to local conditions. Of equal importance, by using ecosourced native plants you will help to maintain the area's unique local characteristics. Ecosourcing will avoid the risk of planting species which are not native to the local area and which could become invasive.

WEED CONTROL - Carry out weed control prior to planting, as weeds can outcompete newly planted vegetation. Visit weed busters www.weedbusters.org.nz for comprehensive information about specific weed management, and different methods for managing weeds.

STAGE PLANTING – In open areas, plant species that can tolerate exposed conditions like shrubs and hardy trees planted first, and bring in less tolerant species over time.

Use PLANT PROTECTORS with mulch mats to reduce water loss, for example the Combi Guard.

Figure 9. Combi guard (before and after picture)

WHAT TO PLANT

Where possible, replicating the native habitat of an area will mean placing new plants in areas they're likely adapted to, which will improve their chances of success. The Halo Project area has many different vegetation habitats, so speak to the LCT Project Team about what might be appropriate for your area.

2. FENCING

Fencing forest habitats to exclude stock helps fragile understory vegetation to regenerate; supporting better habitat for birds. When installing fences, it's a good idea to allow room for vegetation buffer zones between the fenced areas or around water systems. Trees and shrubs provide shade in streams, increasing stream health and improving habitat for native fish.

There may be funding options available to you for fencing off bird habitats. Speak to the LCT team about what may be available.

Figure 10. Aorere Catchment Project in Golden Bay – Fencing around restoration waterway

3. PEST CONTROL

Targeted and consistent pest control can have a huge effect in boosting native bird populations. Pest control options include live traps, kill traps, shooting and poisoning. Recent advances have made equipment more humane and easier to use, with some options including domestic dog and cat protection.

For more pest control information, see our 'resources' tab on the website (www.haloproject.org.nz).

Figure 11. Mammalian Pest Control: Doc200 / A24 Rat trap / Sentinel / Timms

4. WEED CONTROL

Weeds are invasive plants that typically invade open or disturbed sites. There are also some shade tolerant weeds that invade under a forest canopy. They can have significant impacts on all types of vegetation, whether it is indigenous, exotic trees or pasture species. Weeds include herbs, shrubs, grapes, ferns, vines and trees, and are generally very aggressive in their demand for light, space, moisture and nutrients.

Weeds will compete with exotic crops and will generally hamper their growth rate and health. From an agricultural perspective, the main benefit of controlling weeds is higher crop productivity.

Weeds affect native forests by invading and outcompeting the indigenous components. Weeds damage indigenous forests by:

- Smothering and strangling trees: climbers such as old man's beard and banana passionfruit are well known examples of strangling creeper species.
- Suppressing natural regeneration: in situations where light levels are high or soils are freshly disturbed and open, conditions are ideal for invasive weeds. Gorse is a common example of this.
- Overtopping and crowding: some weed species, such as sycamores, can grow rapidly through breaks in the canopy, and then overtop and crowd out the indigenous species.

Figure 12. Pest weed plants: Banana Passionfruit / Old Man's Beard

MANAGING WEEDS

Here are some general pointers for managing weeds on your property:

1. Most weed species are prolific seed producers and, once established, are very hard to control. Removing weeds before they have established and spread will save extensive work later on. The first priority should be to kill or remove the plants before they produce seed. Although wind and birds play a major role in seed distribution, the removal of nearby seed sources can significantly reduce the problem.
2. Healthy forests, whether exotic or indigenous, will be less susceptible to weed invasion than degraded forests, with full canopy cover and heavy undergrowth reducing the likelihood of weeds establishing. It's important to eliminate these potential sites, as increased light or clear ground provides easy access for colonising weed species. The quicker trees are established, the greater the habitat's ability to keep weeds at bay.

ADDITIONAL MANAGEMENT OPTIONS

Domestic pets can be our best companions, but they can also have an impact on wildlife. Think about bird aversion training for dogs. These training courses teach awareness and avoidance of birdlife to help keep your best friend from harming your local birds.

Cats catch prey. They target some pests, such as rabbits and mice, but also native birds, skinks and lizards. Responsible cat ownership includes, for example, using a BirdsBeSafe® collar to help them from catching bird and lizard prey. De-sexing cats will help prevent unwanted breeding and stray cat colonies.

Figure 13. Birdsbesafe collar cover

Look at the Halo Projct website www.haloproject.org.nz for more information on the "How safe is my cat?" project. This project has evaluated how cats pose a risk to birds, how far cats roam (one cat in our study roamed 227 hectares! see Figure 15) and whether cats are safe around the mammalian traps that are used in trapping programmes.

Figure 14. Typical Urban cat (note: scale is 100m)

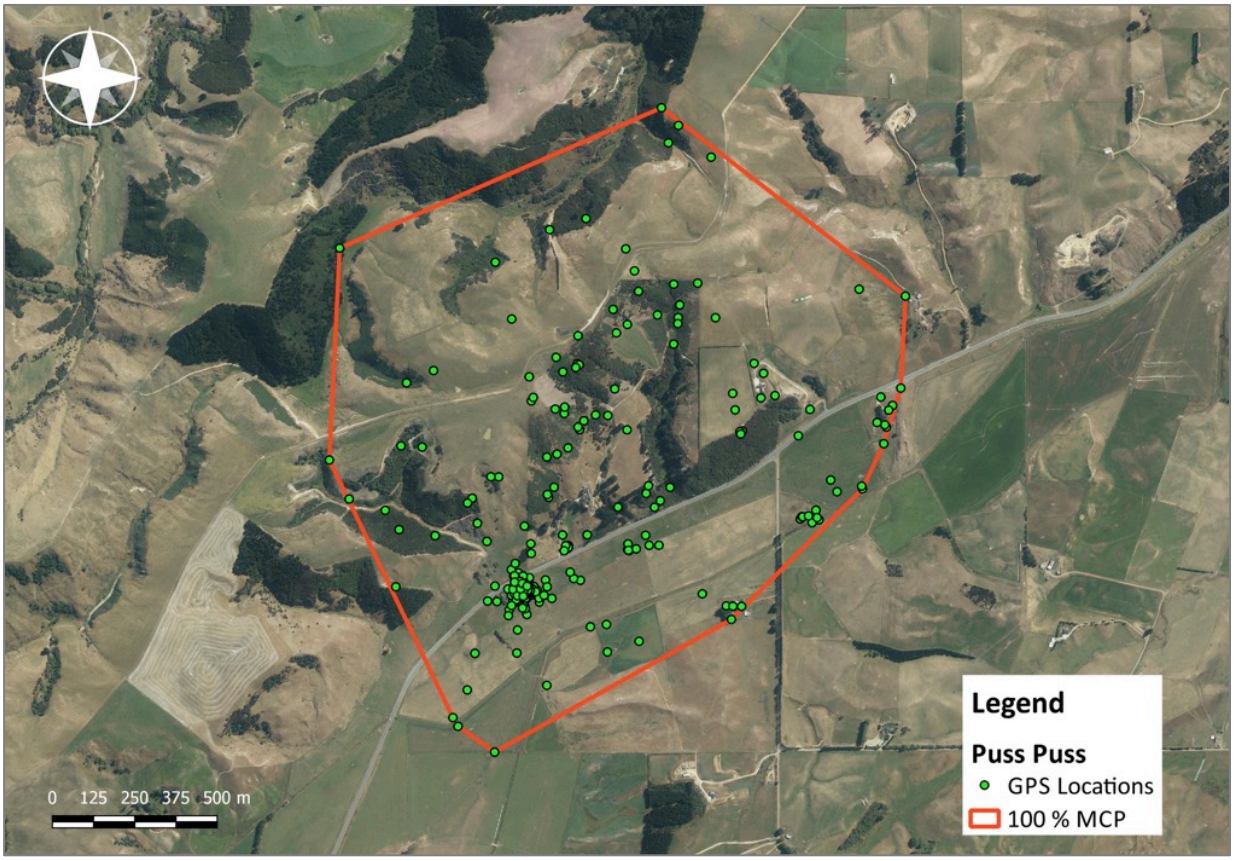


Figure 15. Extreme Rural cat (note: scale is 500m)

4.3 FUNDING

Some funding grants are available for local biodiversity projects. For more information, please contact:

Rhys Millar, Landscape Connections Trust

landscapeconnectionstrust@gmail.com

027 3877 866.

4.4 REFERENCES

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4.5 FURTHER READING

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5. APPENDICES

5.1 OTHER BROAD SCALE HABITAT TYPES

The following table summarises other broad scale habitat types (not found on your property) and their relationship with bird species identified within the Halo Project area.

Habitat types	Brief description	Bird species relationship information
Broadleaved forest	Broadleaved forest lacks emergent trees and typically occurs on shady faces and in gullies that have acted as historic refuges from fire and mechanical clearance. It often contains old broadleaved trees that may be one to several centuries old and thus is not easily replaceable. It is widespread in gullies at lower elevation in the Halo Project area.	Broadleaved forest is dominated by fleshy-fruited tree and shrub species and provides important feeding habitat for frugivorous birds such as kererū, bellbird/kōparapara, and silvereye/pihiphi.
Coastal forest and treeland	Areas of broadleaved forest and treeland occur on coastally-influenced lowland hill country in the east of the Halo Project area. Coastal forest is scarce in the Halo Project area, while areas of sparse treeland are relatively common. These areas of treeland are not, however, regenerating, so in the absence of active management they will slowly decline and be lost. Many areas of coastal forest are grazed, and only a few are protected.	Coastal forest is generally a poor habitat for indigenous forest birds mostly likely because it is significantly reduced in extent, and often in relatively poor condition. In contrast, exotic birds such as chaffinch, blackbird, and song thrush are conspicuous in coastal forest. Coastal forest would have historically provided breeding habitat for seabirds and for New Zealand sea lion, but these functions have been lost due to loss of coastal habitat and predation by mammalian pest animals. As such, protection of existing areas of coastal forest, and active restoration of coastal treeland areas, is a priority if the ecological functioning of this forest type is to be improved.
Kānuka - dominant treeland	Kānuka - dominant treeland generally comprises scattered kānuka trees above exotic pasture.	It provides relatively poor quality habitat for indigenous forest birds, with only bellbird/kōparapara, grey warbler and fantail recorded more than occasionally in kānuka-dominant treeland. Conversely, exotic bird species such as chaffinch, blackbird, and song thrush are present in most kānuka treeland sites.
Exotic coniferous forest	Exotic coniferous forest comprises stands of plantation coniferous species, mostly radiata pine with some Douglas fir and macrocarpa. It is extensive in the Halo Project area and occurs as both large, continuous areas managed by forestry companies, and many smaller woodlots on farmland.	Older and larger stands of plantation forest, especially those that are adjoining with areas of indigenous forest, often provide excellent habitat for indigenous forest birds, including insectivorous species such as grey warbler, brown creeper, fantail, tomtit and rifleman, and the omnivorous bellbird/kōparapara. As New Zealand was a primarily forested landscape, New Zealand forest birds are poorly-adapted to exotic pasture, but are much better adapted to exotic forest.
Exotic broadleaved forest	Exotic broadleaved forest mainly comprises stands of poplar, willow or sycamore.	The habitat values of exotic broadleaved forest are poorly known.

Kōwhai forest associations	Kōwhai is a characteristic species of dry forest in the Waikouaiti River catchment in the northern part of the Halo Project t area. Remaining examples of kōwhai forest associations are important as they occur on relatively warm, productive sites that have been widely cleared to allow farming, so relatively little of this forest type remains.	Kōwhai provides important seasonal habitat for birds such as kererū, bellbird/kōparapara, and tūī/kōkō. In general these forest associations are excellent habitat for nectivorous and frugivorous native bird species.
Kōwhai treeland associations	Kōwhai treeland association comprise scattered trees of kōwhai with other native species such as ribbonwood, lacebark, and sometimes matai, kahikatea, and tōtara, horoeka, broadleaf, tarata and māhoe. Kōwhai treeland associations would require active restoration to recover to kōwhai forest, and under a grazing regime, will slowly decline and ultimately be lost as the existing trees age and die.	Mature kōwhai trees that remain in these treelands are still likely to provide a useful seasonal food source for kererū, bellbird/ kōparapara, and tūī/kōkō.
Mānuka forest and shrubland	Mānuka forest and shrubland is restricted to upland areas. These stands appear to be successional and are slowly being replaced by broadleaved forest trees. Mānuka forest generally has a sparse ground layer and understory, with regenerating broadleaved trees present as saplings. Mānuka shrubland often occurs on poorly drained sites, and gaps between shrubs may be occupied by narrow-leaved snow tussock, inaka and sedges and rushes.	Mānuka forest and shrubland is a key habitat for mātā (South Island fernbird) which currently is most frequently observed in upland habitats. Mānuka forest also provides good habitat for insectivorous/omnivorous indigenous birds such as grey warbler, brown creeper, bellbird/kōparapara, fantail, and tomtit.
Regenerating forest	Regenerating forest generally comprises mixtures of regenerating indigenous trees and shrubs and commonly includes exotic shrubs such as gorse and broom.	Regenerating forest is generally a poor quality habitat for indigenous forest birds, but is favoured by the exotic dunnock.
Rimu-miro forest	Moist forest in which rimu and miro are characteristic emergent podocarps cloaks the slopes of the volcanic hills from Flagstaff to Mopanui. Hall's tōtara and pōkākā are also often present as emergent trees. A canopy of broadleaved trees occurs below these emergent trees, typically containing broadleaf, fuchsia/kōtukutuku, putaputawētā, horopito, māhoe, horoeka, and kōhūhū. The understory typically supports small-leaved shrubs and tree ferns, while crown fern is usually prominent in the ground layer, along with bush flax and many smaller ferns. A substantial cover of epiphytes and bryophytes usually occurs on tree trunks and fallen logs, with typical epiphytes being species of filmy fern, hound's tongue fern, hanging spleenwort, and the perching orchids raupeka and peka-a-waka. Vines of climbing rata and lawyer are commonly present in the canopy. This forest type is strongly representative of the original forest type on the Dunedin volcanic hills.	A structurally complex forest type with high habitat and species diversity, and being dominated by fleshy-fruited tree and shrub species, provides particularly important feeding habitat for frugivorous birds such as kererū, bellbird/kōparapara, and silvereye/pihiphi. Most other indigenous forest birds in the Dunedin area are also common in this forest type.

We hope you enjoyed your report.