Wairarapa
Pūkaha to Kawakawa
Alliance

Wairarapa landscape-wide pest animal control stocktake

IMAGE: Andrew Stewart

Acknowledgements

This stocktake was researched and compiled by Philippa Crisp on behalf of the Wairarapa Pūkaha to Kawakawa Trust. Philippa was assisted by the Pest Animal Control working group: Ian Gunn, Todd Jenkinson, Christine Reed and Rebecca Jamieson.

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Executive Summary

Multiple pest animal species are present across the Wairarapa landscape and are impacting indigenous ecosystems, as well as farming and forestry economies.

Multiple pest animal control projects are occurring within the region, which are all contributing to lowering pest numbers, but consideration needs to be given to effective long term sustainable approaches based on pest type, as well as the impact on and the state of threatened ecosystems and species.

Different approaches are proposed for different pest species.

- A regional possum control programme run by the agencies (Greater Wellington Regional Council (GW) and the Department of Conservation (DOC)) would provide the best approach for this pest. It is recommended that the Wairarapa Pūkaha to Kawakawa Alliance (Wai P2K) should advocate for a regional possum programme to be funded in the coming GWRC Long Term Plan, while DOC should ensure that lands, they manage receive pest animal control in a complementary fashion.
- DOC have received funding for a national project to control deer and goats on the DOC estate in the recent budget. Wai P2K should promptly advocate for the protection of the Conservation estate within the Wairarapa region to be funded in a sustainable manner.
- An investigation of ways to encourage neighbouring farmers to allow contract and/or concession hunters to lower feral deer numbers to improve the health of the deer herds, as well as lower the damaging impacts of these animals on the farms and in the forest ecosystems, should be initiated.
- Where goats are present in large numbers, education should be provided to neighbouring landowners on the impact of these pest animals and control methods be encouraged and implemented (in plantation forests, as well as DOC land and farmland).
- Other pest animals, such as mustelids, cats, hedgehogs, rabbits and rats, can be controlled on a localized basis, with large-scale projects being considered in terms of specific species/ecosystems to protect.
- Surveillance is required to detect emerging pests, like wallabies, before they become established.

Four Eco Zones within the Wairarapa region are proposed. Each zone will have a focus that will maximize the biodiversity gains that can be made through pest animal control. These can be built upon existing activities or proposals that have been undertaken or put forward by agencies, landowners, and volunteers.

- **Northern Wairarapa Eco Zone**: Continued advocacy for the funding of pest control in and around Pūkaha is vital. Goat and deer control is a high priority in

many of the remnants across the landscape, while Rewanui Trust Reserve is an important site for ongoing predator control activities.

- **Central Wairarapa Eco Zone:** A high proportion of the population of river nesting birds including the nationally threatened pohowera (banded dotterel) are present along 20km of river length between the Waingawa confluence and Gladstone Bridge. Some trapping of mustelids, hedgehogs and cats is occurring to benefit the nesting success of these birds, but the trap network needs to be expanded. Also, within this Eco Zone is the Ponatahi Lizard Sanctuary. A mechanism to continue to protect lizards within this fenced sanctuary needs to be found, as well as funding to survey and monitor the species present.

- **Eastern Wairarapa Eco Zone:** Halting the retraction of the range of tītipounamu should be a focus in this Eco Zone. This can be achieved by agencies funding 1080 possum control in the area on an ongoing basis. Deer numbers need to be lowered to protect the habitat and farmland. Goat control and pest control in Rewa Bush is also a high priority in this Eco Zone, as is Rocky Hills Sanctuary. Enhancement of the network protecting the important.

- **Southern Wairarapa Eco Zone:** Protecting the nationally critical matuku-hūrepo (bittern) at Wairarapa Moana is a high priority. Areas on the lake margin can be enhanced by strategic trapping of mustelids and cats on farmland. The protection of tītīpounamu habitat in the Aorangi Forest Park is also an important focus, which will require advocacy to the agencies to continue 1080 operations. Volunteer efforts underway are important.

- Returning species that have been lost to the region, such as whio or pāteke, would also provide for focused conservation effort around iconic species.

Predator Free 2050 is funding research projects to provide new tools that may improve pest control effectiveness over time. An awareness of the latest pest animal control techniques and local trials of new inventions is encouraged.

An organisation or group that can provide oversight of pest control contracts in terms of quality and professionalism is needed.

Urban communities could be encouraged to focus on specific projects, such as a lizard survey or to aid in regional volunteer effort. Sites that are not far from townships, such as Rocky Hills forest or Matarawa Conservation Area would benefit from predator control.

Education programmes about different pests, such as cats and hedgehogs should be developed

Training should be given to volunteers to enable them to complete pest control in the most effective way. Working in partnership with GWRC where volunteers and staff alternate trap checking should be considered.

Local councils should be encouraged to consider a combined cat management strategy

Data collation using Trap.NZ is key to the maintenance of records for the outputs of pest control operations. Ongoing agency monitoring to determine outcomes is beneficial. Bird monitoring in Pūkaha and Rewa Reserve will complement any operations. Training volunteers to undertake this monitoring will be useful.

Funding of pest animal control will continue to be a challenge but having good information about what the outcomes are and how those outcomes can be achieved provides certainty to funders.

Considering pest animal control from a landscape view provides a mechanism for collaborative and synergistic actions that will help to prevent reinvasion and focus effort. Recommendations for next steps are included at the end of this report.

What does the pest animal control stocktake aim to achieve?

The Wairarapa Pūkaha to Kawakawa Alliance (Wai P2K) has a vision of "thriving biodiversity and connected communities where land, water and people flourish" and a mission of promoting community-led large landscape scale environmental restoration[1]. Wai P2K aims to develop a regional plan for integrated animal pest control as part of this vision with a goal of having organisations working together on biodiversity projects. The Wai P2K landscape includes the whole Wairarapa district from Pūkaha in the north to Kawakawa in the South, (an area of over 355,680ha) and has multiple agencies, landowners and care-groups currently undertaking pest animal control within the region.

The Department of Conservation (DOC) has developed a Biodiversity Strategy and Action Plan for New Zealand – Te Mana o te Taiao [2]. The vision is *Te Mauri Hikahika o te Taiao* – the life force of nature is vibrant and vigorous". Five outcomes have been identified that include thriving ecosystems and indigenous species, mātauranga Māori and linking nature to people's lives and prosperity.

The implementation plan released in April 2022[3] lists actions many of which are related to integrated pest animal control and to the funding of volunteer initiatives. Priority areas identified include "addressing the ongoing threat of introduced pest species and weeds" and "larger scale and more integrated approaches to biodiversity protection".

Other relevant strategies or documents are Greater Wellington's Regional Pest Management Strategy[4], Predator Free 2050 (that has an aim of the complete removal of five predators by 2050)[5] and Greater Wellington's Biodiversity Strategy[6]. The Ministry for the Environment (MFE) has recently released an Exposure draft on the National Policy Statement for Indigenous Biodiversity (NPS)[7].

While pests are not specifically a focus in the document, the goal of the NPS is to maintain indigenous biodiversity. It is recognised that the health and well-being of people is dependent on the health and well-being of indigenous biodiversity. Pest control is also key to protecting our natural ecosystem carbon sinks (see recent Forest and Bird report[8]) and water production.

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[1] https://waip2k.org.nz/wp-content/uploads/2021/11/WaiP2K-Strategic-Plan-FINAL.pdf
[2] https://www.doc.govt.nz/globalassets/documents/conservation/biodiversity/anzbs-2020.pdf
[3] https://www.doc.govt.nz/globalassets/documents/conservation/biodiversity/anzbs-implementation-plan-2022.pdf
[4] https://www.gw.govt.nz/your-region/plans-policies-and-bylaws/plans-and-reports/environmental-plans/regional-pest-management-plan/
[5] https://pf2050.co.nz/
[6] https://www.gw.govt.nz/assets/council-publications/Biodiversity-stocktake-2016.pdf
[7] https://consult.environment.govt.nz/biodiversity/npsib-exposure-draft/
[8] https://www.forestandbird.org.nz/sites/default/files/2021-06/Native%20Habitat%20Carbon%20in%20Crisis%20Report%20v2.pdf

The goal of this stocktake is to provide an overview of how pest animal control could be approached using the lens of the regional landscape. There are pest animal control activities being undertaken by multiple parties within the region but lowering pest numbers across such a large area is a challenge. Consideration is given to possible approaches that will complement national and regional strategies, but also provide focus areas that will result in the greatest biodiversity benefits.

What is the current situation?

Pest Animal Control

Regional Pest Management Plan

The Regional Pest Management Plan (RPMP) produced by Greater Wellington Regional Council (GWRC) under the Biosecurity Act 1993 outlines how the regional council will manage and eradicate pest animal and plant species within the Wellington region. Animal pests in the RPMP are managed by GWRC under four pest management programmes, with the approach taken being largely dependent upon how widespread the species is and the impacts of the invasion.

The programmes are Exclusion, Eradication, Sustained control and Site-led.

What this means in terms of pest animal in the region and delivery is as follows.

Exclusion: Wallaby – GWRC control.

Eradication: Rooks – GWRC control.

Sustained control: Feral rabbits and wasps – Occupier pays, but assistance provided.

Site-led: Possum, feral goat, feral deer (fallow, red and sika), mustelids (ferret, stoat and weasel), rats (Norway and ship), pest cat and magpies are controlled as part of site-led programmes, e.g. Key Native Ecosystem plans and the Regional Possum and Predator Control Programme. Cost recovery or referral services are also provided to territorial authorities and landowners.

Pest Control Activities in the Region

Multiple agencies are involved in pest animal control in the Wairarapa region. The current activities are described by agency below:

Department of Conservation

The Department of Conservation (DOC) is responsible for over 120,000ha of land containing indigenous ecosystems within the Wairarapa area (see Figure 1). These include areas such as the eastern Tararua and Remutaka Forest Parks, Pūkaha, Aorangi Forest Park, Rewa Bush, Rocky Hills, Carter Scenic Reserve, Lowes Bush, Castlepoint Scenic Reserve, Oumakura Scenic Reserve and Tora Bush Scenic Reserve. Wairarapa Moana is run as a collaborative between Ngāti Kahungungu, Rangitāne, DOC, GWRC and South Wairarapa District Council. There are also several DOC-covenanted areas and Ngā Whenua Rāhui projects[9] present in region. DOC mainly completes possum and goat control in the large forest parks, while sites such as Wairarapa Moana and Project Kaka are also a special focus area for pest animals.

[9] https://www.doc.govt.nz/get-involved/funding/nga-whenua-rahui/our-work/

Greater Wellington Regional Council

Greater Wellington (GW) has two main pest control programmes within the Wairarapa region (see Figure 1). The first is the Regional Possum and Predator Control Programme (RCCP) which is controlling possums in the northern Wairarapa area (around 205,500ha) following the cessation of the OSPRI (TB free) work. Mustelid control is also in place along two river reaches (Waingawa and upper Ruamahanga) and in the buffer zone around Pūkaha.

The second programme is the Key Native Ecosystem (KNE)[10] programme that seeks to protect the high value biodiversity sites within the region. There are forest, wetland, and coastal sites (total area of around 3,000ha), which receive pest control for relevant pests, such possums, rats, mustelids, and goats. GW also has pest animal management programmes for the plantation forests they own within the region at Stoney Creek, Hiwinui and Tauanui Forests.

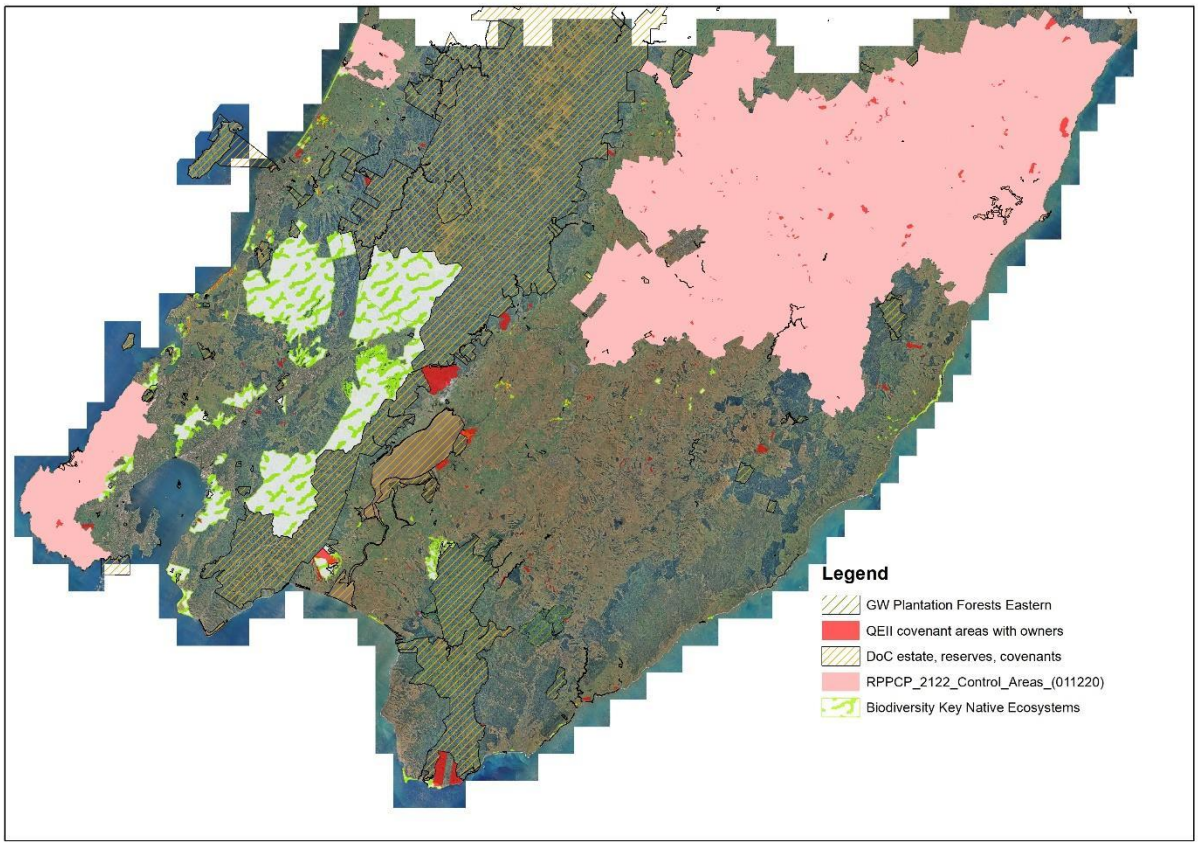

Figure 1: Pest control sites for DOC, GWRC and QEII in the Wairarapa/Wellington region

OSPRI (Operational Solutions for Primary Industries)

Controlling the possum population is part of the TB free programme for New Zealand, as possums carry and spread tuberculosis to farmed livestock. OSPRI conduct pest control activities within selected areas until possum numbers are reduced to 1 possum per 10 ha for a period of at least 5 years (see Figure 2).

[10] Greater Wellington Regional Council — Key Native Ecosystem programme (gw.govt.nz)

At one stage, the whole of the Wairarapa region was receiving possum control for the purpose of lowering TB in the region, but some areas have now been declared TB free meaning that OSPRI operations are likely to cease in the region over time (note that areas marked as 'survey' do not receive OSPRI possum control).

The current TB Management Areas used[11] for planning pest control operations in the Wairarapa are Central and South East Wairarapa, Northern and Eastern Tararua and Remutaka-Hutt.

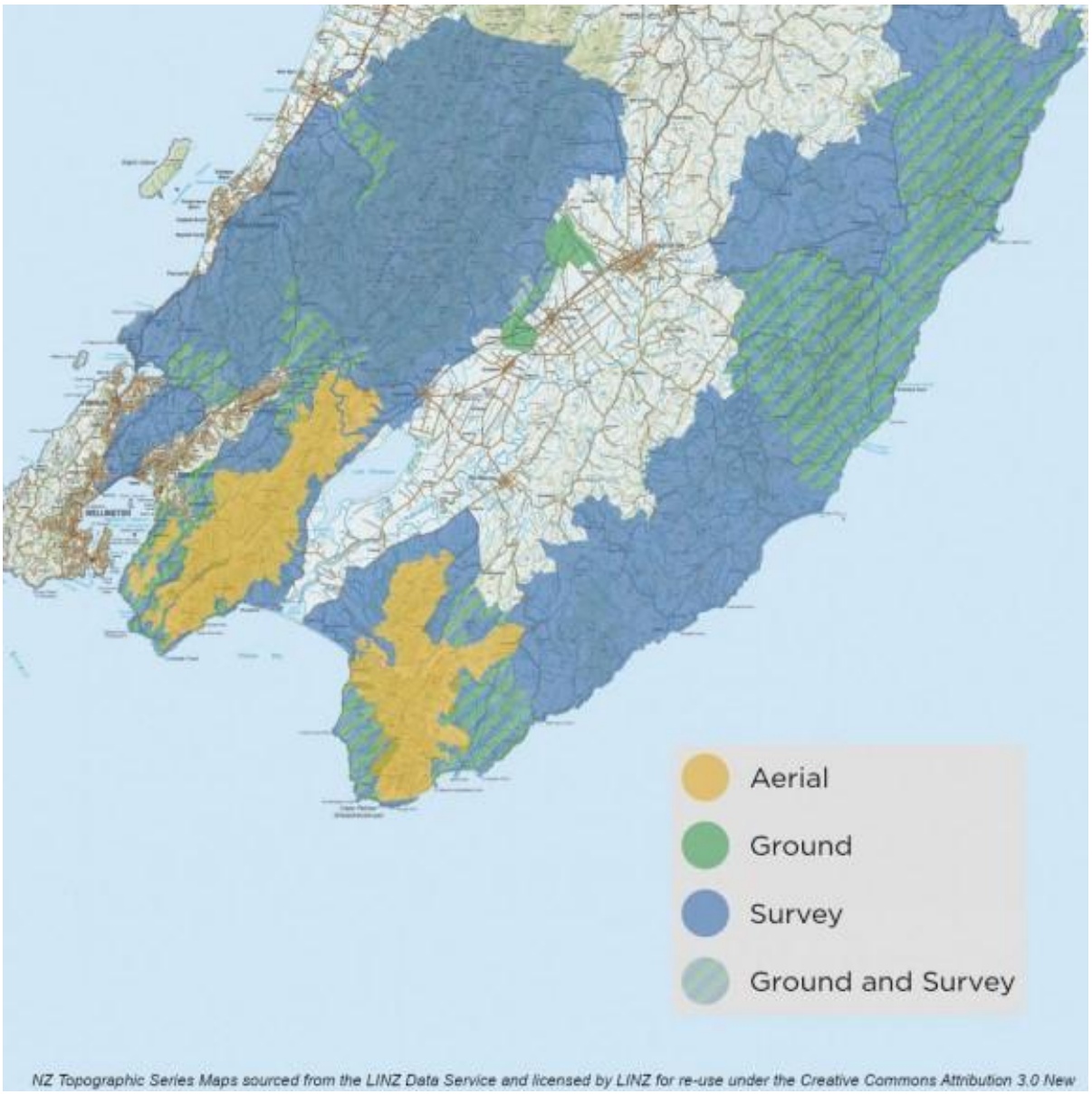

Figure 2: OSPRI operational possum control areas in the Wairarapa/Wellington region

[11] Pest control in Wellington | OSPRI

QEII National Trust

QEII National Trust[12] support landowners in protecting natural and cultural areas on their properties with covenant agreements and the provision of some funding for activities such as fencing and pest control. To date, there are 217 covenants in the Wairarapa region registered with the Trust which total an area of around 5,340ha (see Figure 1).

Forest and Bird

Forest and Bird have a Wairarapa branch that currently has over 300 members (including kid's club members). Volunteers' complete pest control at significant sites such as Fensham Reserve and Carter's Scenic Reserve, along with involvement in monitoring and targeted pest control to protect bird species at some locations.

Care-groups and landowners

Multiple care-groups and/or landowners are involved in pest animal control in the region (see Figure 3). Over 40 areas are listed on the Trap.NZ website[13] at present, with around 3,000 traps/bait stations being used. Some information about other groups, as well as agency pest control operations can also be found on the Predator Free NZ website.[14] The main pests being targeted by care-groups are rats, mustelids, hedgehogs, and possums.

[12] Protecting Your Land | QEII National Trust
[13] Welcome to Trap.NZ | Trap.NZ
[14] The Big Picture - Predator Free NZ Trust

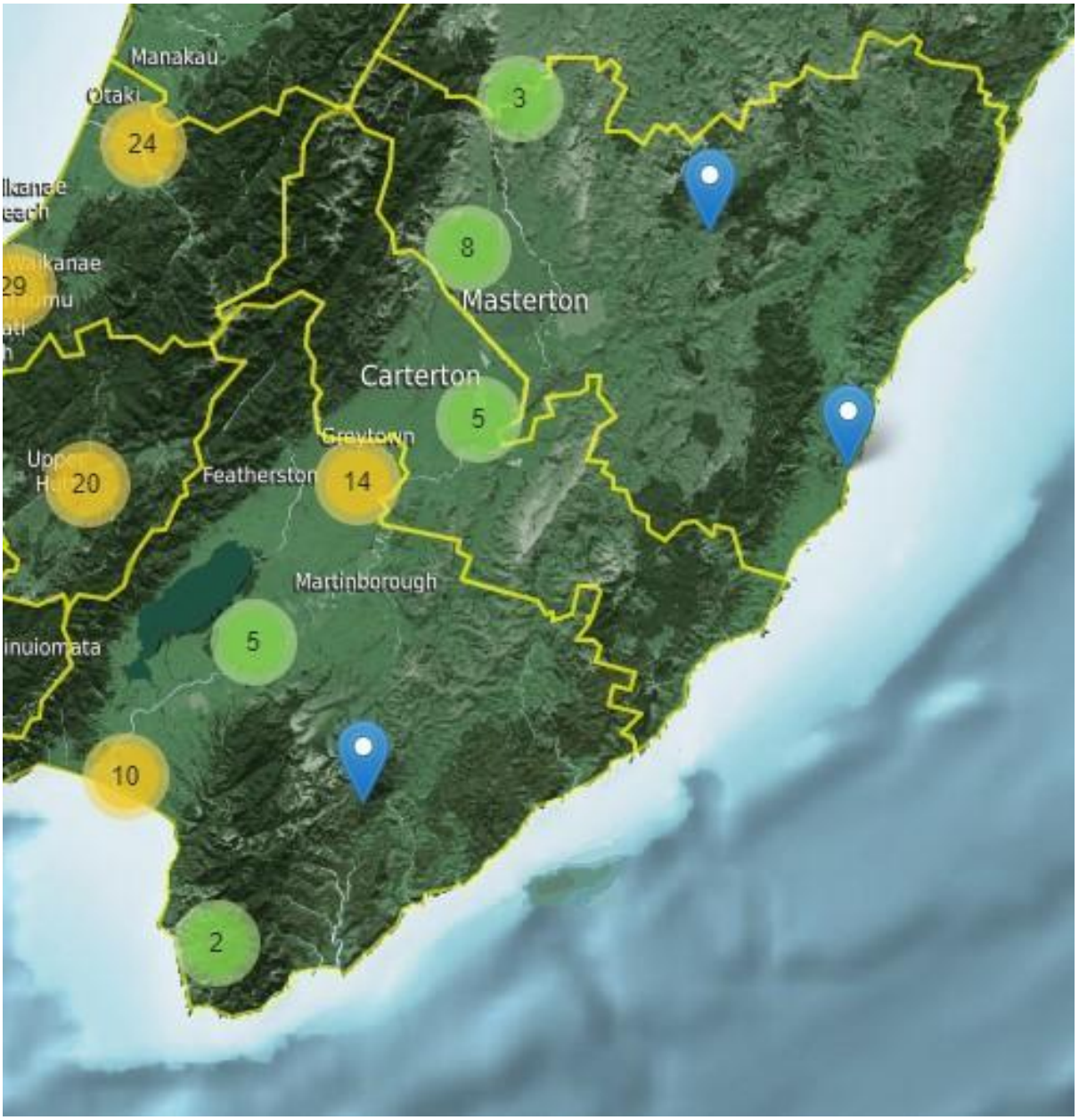

Figure 3: Pest control groups in the Wairarapa on the Trap.NZ website (numbers indicate the number of groups)

Carbon-farming and pine plantations

Pine plantations control browsing animals such as possums, deer and goats in the early stages of the planting to prevent tree loss, while some such larger companies such as Juken NZ Ltd and Forest Enterprises complete pest control under environmental plans developed for Forest Stewardship Certification (FSC). There is no requirement for pest control for carbon farming or the One Billion Trees grants, but there is a requirement for the vegetation to reach 5 meters in height with a minimum canopy cover of 30% to earn carbon credits and damage to plantings or native regeneration means that further plantings would need to be completed to earn those credits.

State of the biodiversity

Ecosystems

Forests

Old-growth indigenous forests provide habitat for the native plant and animal species that are still surviving within the Wai P2K area. Fifteen indigenous forest ecosystem types have been identified within the Wairarapa region.[15] Of these forest types, seven are Critically Endangered as less than 10% of the original area is remaining, while another three forest types are Endangered (less than 30% remaining) and one Vulnerable (less than 50% remaining).

These forest types are listed in Appendix 1, Table 1. The four other forest ecosystem types are not threatened, as they are upland forest types, such as those that are found in the Department of Conservation Aorangi, Tararua or Remutaka Forest Parks. It is still important that ongoing pest control is undertaken in those forests as that is where the bulk of the remaining native animals are living.

In terms of pest animal impacts on the threatened forest types, the greatest impacts presently are on four forest types, which include the eastern Wairarapa forest mosaic of black beech forest on the ridges and rimu, matai, hinau forest in the valleys. These larger areas of forest in the eastern Wairarapa are of regional significance, but are currently being impacted by possums, deer and goats (see High value biodiversity sites in Figure 4).

Many of the significant forest remnants in the Ruamahanga valley are currently being protected through KNEs, QEII covenants or volunteer efforts. Some nationally and regionally threatened plant species are also impacted by pest animals, especially by the browsers.

Wetlands

There has been a very large loss of wetland extent within the Wairarapa area, and all remaining natural wetlands are regarded as significant ecosystems because there are less than 10% remaining. Recent regional and national changes to legislation associated with wetland health has meant that all natural wetlands should have stock excluded, while funding has also been provided by GWRC to many landowners for fencing of natural wetlands.

Wairarapa Moana is an outstanding wetland ecosystem that provides habitat for many threatened species within the region. There is a pest animal work programme underway that is overseen by the Wairarapa Moana collaborative. This highly significant site would benefit from a landscape-wide approach to predator control.

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15 https://www.gw.govt.nz/assets/Documents/2018/12/Forest-ecosytems-of-the-Wellington-region.pdf

Coastal ecosystems

Significant coastal ecosystems[16] within the Wairarapa region have been identified and have restoration efforts being undertaken by GWRC, QEII and volunteers. There are some areas where the exclusion of stock and feral animals need further attention, but that can be achieved through improving animal pest control in areas currently under restoration.

Other ecosystem types

There are other ecosystem types present in the region, such as riverine systems and naturally uncommon ecosystem types, such as coastal turf. Research is still being completed in this area and some positive actions taken where information is known, e.g. the protection by fencing from deer of a saline wetland in eastern Wairarapa through a Forest Stewardship Certification environmental plan.

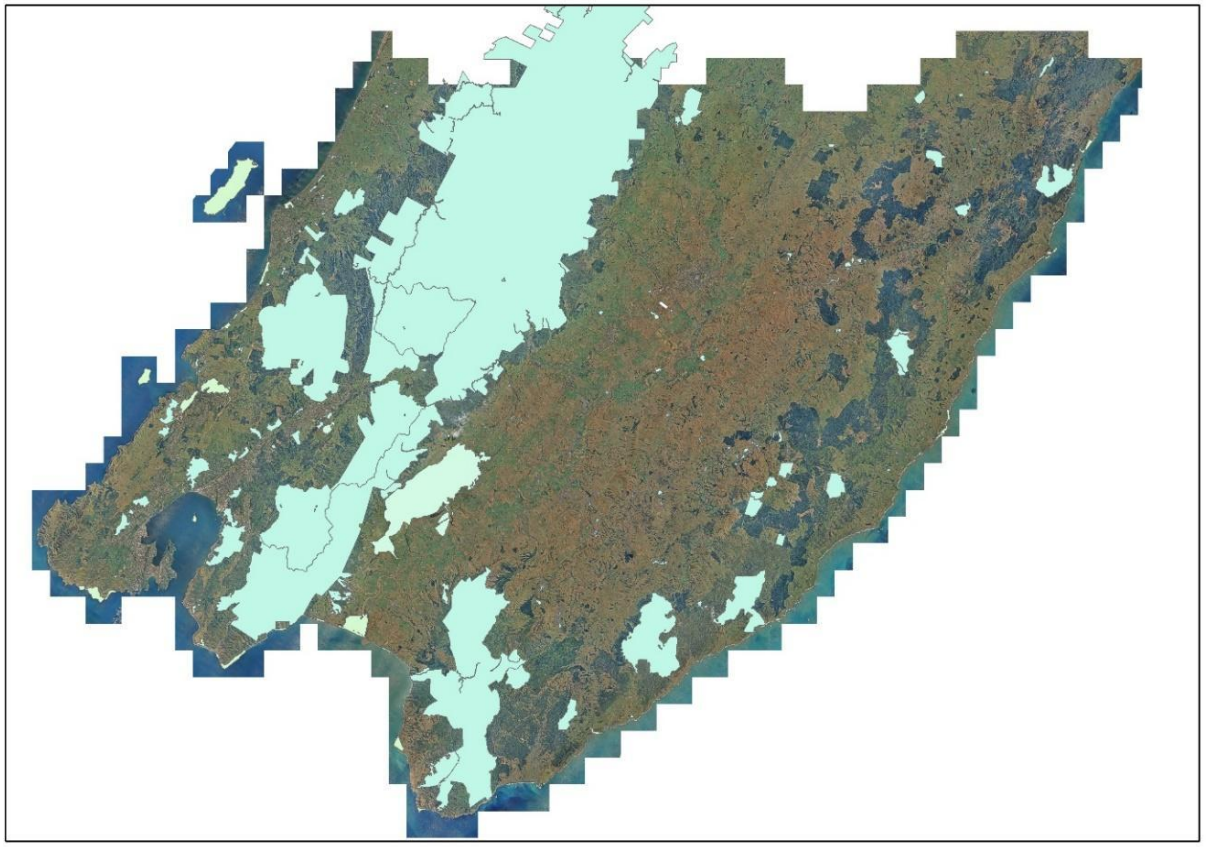

Figure 4: High value biodiversity sites (in blue) in the Wellington/Wairarapa region

16 https://www.gw.govt.nz/environment/our-natural-environment/our-unique-ecosystem-types/coastal-areas

Fauna

A list of the threatened birds, lizards, bats and invertebrates in the region is shown in Appendix 1, Table 5.

Birds

The remaining tall forest habitat in the region provides a home for eleven indigenous bird species; riroriro (grey warbler), tūi, tauhou (silvereye), pīpīwharauroa (shining cuckoo), kereru, miromiro (tomtit), pōpkotea (whitehead), kārearea (falcon), tītipounamu (rifleman), pīwakawaka (fantail) and koromiko (bellbird). Another five forest species have only been recorded at Pūkaha or in the Tararua Forest Park; yellow and red-crowned kākāriki, koekoeā (long-tailed cuckoo), kākā and kōkako. Birds in the Wellington/Wairarapa region are monitored on an 8 x 8km grid across the region by GWRC[17].

A snapshot of that data (Figure 5) shows that there are good populations of birds in the larger forests in the Wairarapa, especially in the Tararua, Remutaka and Aorangi forests, plus the forest remnants of the eastern Wairarapa. The most threatened forest bird species in the region- tītiipounamu (rifleman) are still present in the Aorangi Forest Park and those Eastern forests, but in much reduced numbers. The health of those populations are a focus for pest animal control in this stocktake.

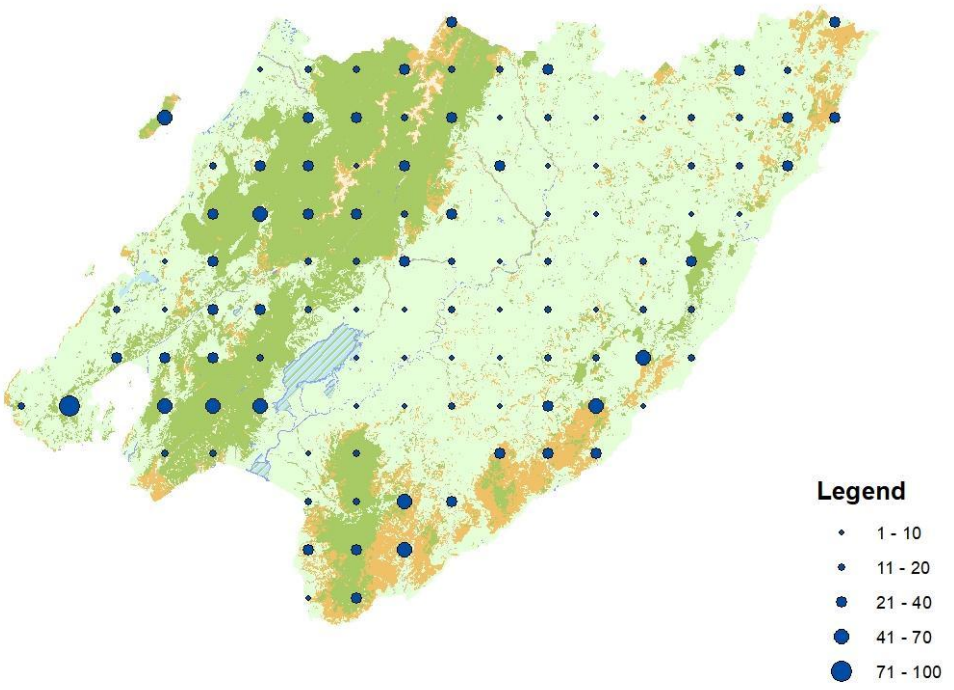

Figure 5: Indigenous forest bird species abundance in the Wairarapa/Wellington region (number recorded)

[17] https://www.gw.govt.nz/annual-monitoring-reports/2020-21/terrestrial-ecology/index.html

Wetland birds are threatened within the Wairarapa region. Of greatest importance is the matuku-hūrepo (bittern) population at Wairarapa Moana. This is a nationally significant population, as this species is undergoing a decline in numbers in other parts of the country. Controlling animal pests to aid the health of this population is a high priority.

The other wetland bird species needing protection from pests is pūwheto (spotless crake). There are only a few sites in the region where this species has been identified as being present – those sites require animal predator control. Coastal bird species that will benefit the most from pest animal control are tūturiwhatu (NZ dotterel) at Riversdale and matuku moana (Reef Heron). The local Forest and Bird branch are undertaking pest control around the nesting tūturiwhatu, but there is no protection in place for matuku moana.

Riverine bird species benefit greatly from pest control as predators can have a major impact on nest survivorship. Mustelids, cats and hedgehogs are the main culprits, and some predator control is in place. It is recommended that this work be extended so that much of the population of these birds in the region will be protected. There are some important population clusters in the mid and lower Ruamahanga and Opuawe Rivers.

Lizards

Lizards are under great pressure from predators within the region. The Ponatahi Lizard Sanctuary is of regional significance. Three threatened lizard species; kokowai (spotted) skink, ngahere (forest) and moko kākāriki (barking) gecko are present in the sanctuary. Ongoing protection of this site is a priority. Some coastal areas are also acting as refuges for lizards, but more monitoring is needed to identify which sites are of greatest significance. Urban backyard trapping will also aid lizard species, but knowledge of lizard presence in the region is limited, so more surveying is encouraged as a first approach.

Bats

Long-tail bats have been recorded recently in Rewanui and Rewa reserves and in the Mangatarere, while they have been seen previously in the eastern Wairarapa. Short-tail bats are thought to be present in the Tararua Ranges. More needs to be understood about where the bat colonies are located and how best to protect them, but they are known to use old-aged trees to breed and predators such as cats, possums, rats and stoats impact bat populations.

How will aim of the stocktake be achieved?

Pest types

There are many pests present within the Wairarapa landscape. Information about the impacts of the different species can be found in Appendix 2. This report has focused on control of the main pests and is considering the approach from at a regional scale. The work of care-groups and landowners can feed into this approach - all pieces of work can be combined to make an impact across the landscape, but a strategic approach is required when there are multiple pest species and a large land area.

Control of some pests is best tackled on a wider landscape scale than others, e.g., goat control can cover a large area to contain the population. Rats are best controlled in smaller sites, given their small home range and the fact that they are found everywhere within the region.

Possums

At present, possums are being controlled across some areas of the region, but numbers have risen in other locations especially where no possum control has occurred for up to ten years (see Map 1 in Appendix 3). This means that the forests in those areas are being decimated through browsing of the canopies and impacts on birdlife.

Possums also graze pasture and affect farm productivity. Lowering the possum levels in the eastern catchments is a high priority to improve regional biodiversity values. The last OSPRI 1080 control operation in the Aorangi Forest Park is planned for 2022. An effective approach in future will be to expand the GWRC RPPCP programme following on from the OSPRI/DOC operation in the Aorangi Ranges moving north along the eastern Wairarapa to control possums in these most vulnerable areas (but to also maintain a rolling control front).

Department of Conservation will need to supply funding for their important reserves; Rocky Hills, Ouamaha SR and Rewa Reserve to both ensure that the significant biodiversity values are protected and to prevent re-invasion of surrounding areas. Possum numbers are also high in Pūkaha/Mount Bruce. A 1080 control operation in that area is planned to take place in August 2022.

Ungulates

Feral deer and goats are having major impacts on indigenous vegetation in the region. They also reduce the available grazing in pastures and cause extensive damage to plantation forests. New plantings of both native and exotic vegetation are also very vulnerable to the impacts of these pest animals.

Feral deer

Feral deer have become a major concern both from a conservation and farming perspective (see Map 2 in Appendix 3). Over the past three decades, feral deer numbers have risen to levels not seen since the 1960s. Both red and fallow deer have also been spreading in range. Fallow deer have been released in the region and have dramatically increased in number in the region in the past ten years. Native forests (and wetlands) in the Tararua Forest Park, as well as the Remutaka and Aorangi forests are being heavily impacted. Ultimately these impacts will decrease future carbon storage and the long-term viability of the native forests needed for climate change mitigation.

Additionally, the browsing of these animals will be increasing sedimentation in the downstream waterways of the Wairarapa and increasing erosion vulnerability. Deer abundance in the Tararua Forest Park is patchy and control efforts should focus on those areas where population levels need to be lowered.

On private land, deer have grown to numbers that are affecting not only existing forests, but also plantings of native vegetation. The NZ Game Council is running an education programme to encourage herd management, which involves culling the hinds as much as possible to improve the health of the herd and allow the young bucks to grow to improve hunting opportunities.

While landowners may be hesitant about allowing others to access their land to control feral deer, an education programme and encouragement of groups of neighbouring farms to allow contractors or concessionaires to cull hinds is a positive way forward for deer control.

The $30 million provided to DOC in the latest national budget indicates how much of a priority this issue has become. The recently released DOC framework developed for managing feral deer, goats and other browsing pest animals has indicated that regional collaborative plans will be developed[18]. Working with the local NZ Deerstalker's Association will be a useful approach.

Goats

Goats are an issue in some parts of the region and goat control should be encouraged as much as possible as these pests can have a major impact on forest regeneration. While DOC are responsible for goat control on Conservation estate, plantation forest owners and farmers should be encouraged to control these pests on their land.

The goat numbers in the Remutaka Forest Park have been so high recently that there has been a need to close State Highway 2 at selected times to enable culling operations, as there has been health and safety concerns about vehicles colliding with

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[18] https://www.doc.govt.nz/globalassets/documents/conservation/biodiversity/te-ara-ki-mua-framework.pdf

goats on the highway. Goats are reinvading large areas and growing rapidly in numbers in the Tararua Forest Park.

Mustelids

Stoats, weasels and ferrets are all present in the Wairarapa landscape. These pests often use tracks, rivers, ridges and roads to travel. Strategically placed traps are the best devices for control. Ferrets (similar to cats) are attracted to areas where rabbits are present and can switch prey when rabbit numbers fall, so rabbit control is important where high rabbit numbers are present.

Agency/volunteer/landowner collaborations in selected areas (see Eco Zones) is the best approach for controlling these pests. Well-trained practitioners are an important tool in completing this work (as for cats, rodents and hedgehogs). Two of the biggest issues with mustelids are that they can be very trap-shy and that they reinvade areas from across large distances.

Data from intensive trapping at Kahutara Lagoon on the side of Lake Wairarapa over several years has shown that the number of mustelids caught has remained constant. The lure used, type of trap, trap spacing, and location are all important considerations in setting up mustelid control. Increased survival rates of bird species rely on trapping being established and maintained to a high standard.

Feral cats

Feral cats are present across the landscape and are more numerous than is commonly thought. They feature in trap results of the volunteer groups. A regional programme to control feral cats will be welcomed. While controlling feral cats is a contentious issue, these animals have a major impact on native wildlife. There is a need to appeal to cat owners regarding the value of keeping their cat safe and healthy (see Safe Cats Safe Wildlife campaign[19]).

Potential ways to manage cats at a regional level have been recently considered by Taranaki Regional Council[20] and it is suggested that the Wairarapa District Councils be encouraged to consider restrictions. Feral cats have large, overlapping home ranges and are easiest to catch in mid-winter when food sources are low. Timm's traps have been used effectively in parts of the region, but new techniques are on the horizon.

Rodents

Rodents (Ship and Norway rats, and mice) are present across the landscape. They can reach high populations in the lowland forests and have major impacts on native birds and lizards. Focused control in selected high value biodiversity sites is the best approach for these pests. Rat numbers are dramatically reduced by aerial 1080

[19] https://www.zooaquarium.org.au/SCSWNZ/SCSWNZ/About.aspx

[20] https://www.stuff.co.nz/taranaki-daily-news/news/129363331/cat-control-a-complex-and-contentious-issue-for-taranaki-regional-council

operations, making it easier to subsequently control them with ground-based techniques.

Rats are responsible for most of the destruction of eggs and chicks in New Zealand forests. Ideally all pest animals will be being controlled at sites where rodent control is being undertaken. The use of bait in bait stations spaced 100 x 100m apart, replenished every three months has been an effective way to lower rat numbers in forest areas, while intensive rat control during the bird breeding season only (late winter to early summer) is also an approach that has been used.

Rabbits/hares

Rabbits and hares cause damage to native plantings and need to be controlled prior to planting to ensure good seedling survival. High rabbit numbers are also a concern if located near significant native fauna sites as the ready food supply increases the breeding success of ferrets and cats. Site-focused control programmes for these pests should be considered with a strategic focus, e.g. the rabbit control project around Pūkaha.

Hedgehogs

Hedgehogs can have significant impacts on river and coastal bird species as well as lizards and should be controlled in areas that are likely to improve the viability of significant populations of those species. Hedgehogs also cause issues by filling the traps that could be catching mustelids or rats in other conservation projects. An analysis of the published volunteer efforts in the region shows that almost 70% of the catches have been hedgehogs.

Pigs

Pigs are increasing across the region as they are being released and breeding, encouraged by providing supplementary food by some landowners and hunters. Pig rooting affects the regeneration of the forests and a loss of pasture on the farmland – the damage caused by these pests is high in some areas in the region. Releases should be discouraged as much as possible and increased hunting pressure recommended to known hunting groups. Education about the impacts of these pests will aid understanding of the need for effective control.

Eco Zones

Four Eco Zones are proposed for the Wairarapa region to provide a focus for the protection of vulnerable species and ecosystem types threatened by animal pests. It is much more difficult to re-introduce a native species back into an area than to improve the viability of the existing populations that are under pressure. One of the principles of systematic conservation planning is to protect the existing representative

ecosystems, starting with the most significant ecosystems and saving the most threatened species[21].

The four Eco Zones have been established using catchments, as future funding proposals will be likely to take a catchment spatial approach. This doesn't mean that pest control activity needs to cover the whole area shown, but any pest control work within those areas will contribute to the protection of those species or ecosystems. Aspects such as timing of control and strategic trap locations will need to be considered in operational planning for these areas. The four Eco Zones are shown in Map 1 of Appendix 4, with higher resolution maps shown in Maps 2-5.

Northern Wairarapa

Control of pests across the landscape to protect Pūkaha is a high priority in this Eco Zone. Highly threatened species such as kōkako and kiwi are present at the sanctuary, but funding constraints have meant that possum control has not been undertaken for some time and possum numbers are high at present. Deer are also entering the reserve. Protecting values within Rewanui Trust Reserve (as well as in all small forest remnants) is also important in the Eco Zone. While Pūkaha is a key remnant of endangered tawa, kāmahi podocarp forest. Rewanui Trust Reserve is a representative example of critically threatened tōtara/titoki forest. Other important remnants in this area include Tinui River Bush, Mt Percy, Tauweru Conservation Area, Sulphur Wells, Castlepoint Scenic Reserve and Mataikona Tussocklands.

Central Wairarapa

The focus in this Eco Zone is on the river nesting birds. Along with the Opouawe River in the eastern Wairarapa, the braided river habitats in the mid-Ruamahanga and lower Waingawa Rivers support the majority of the threatened pohowera (banded dotterel) in the region, as well as a significant proportion of black-fronted dotterel. Predator control around these clusters will result in major benefits to these species. Ponatahi Lizard Sanctuary is also a priority in this Eco Zone, as are lizards in general. A mechanism to aid the protection of the lizard sanctuary needs to be found.

The Tararua Forest Park is the most significant habitat for indigenous forest species in the region. This means pest control in activities in and abutting the Park are important. Forest birds, bats and lizards have been detected outside the park along one of the rivers in this area. There is also the potential for the reintroduction of whio into this area, as some of the Tararua Forest catchments provide suitable habitat for this species. The upper Mangaterere Stream was the last known long-term site for this species in the region, but a young male duck was reported in the Waingawa catchment two years ago. Also of significance in this Eco Zone is Fensham Reserve and Carter Scenic Reserve, while King, McArthur, Perry's Bush provides a representative example of tawa titoki podocarp forest. Matarawa Conservation Area is a significant totara, matai, & ribbonwood forest remnant (both critically threatened).

[21] Greater Wellington Regional Council — Priority conservation actions for the Wellington region – A think-piece (gw.govt.nz)

Eastern Wairarapa

Tītipounamu (rifleman) populations are showing a major decline in numbers in the forests of the eastern Wairarapa caused by the high rat numbers and deterioration of the condition of the forests. A focus on halting the retraction of the habitat extent of this threatened species will provide ecological benefits to the region. This can be achieved by 1080 control operations which will lower rat numbers as well as control possums in these significant forest remnants providing benefits for forest health.

While Rewa Bush Conservation Area is in the catchment of the Whareama River that is included in the Northern Eco Zone, it makes sense to include this site in the Eastern Wairarapa, as it provides a representative example of the main forest type of the eastern zone – rimu, matai hinau forest in a black beech mosaic. Protecting long-tailed bat habitat will be worthwhile in this area. It is noted that neighbours of Rewa Bush Conservation Area have recommended the development of a local Iwi-led business to complete this work. Another important remnant is Rocky Hills Sanctuary, which at present receives no pest control. Opouawe River remains a focus for the protection of pohowera (banded dotterel), plus the coastal protection of nesting tūturiwhatu (NZ dotterel) at Riversdale.

Southern Wairarapa

Protecting the Wairarapa Moana matuku-hūrepo (bittern) population is an important focus for this zone, while maintaining the ecological values of the Aorangi Forests is also a priority. The work of Aorangi Forest Trust can be bolstered in this area. Wairarapa Moana provides habitat for multiple threatened species that are be impacted by pest animals. The Wairarapa Moana pest control project needs to be increased beyond the current pest animal control at Kahutara/Wairio wetlands (and around Pounui). Any enhancement of pest control networks through that area will be of benefit. Tītipounamu are still present in the Aorangi Ranges and those population should have continued protection through ongoing pest control operations. Swamp forest remnants are important in this zone – while the remaining areas are small, they provide habitat for a critically threatened forest type – kahikatea, pukatea forest. Examples of this forest type in the zone are Snell's/Murphy's Line bush and Tuhitarata Bush Scenic Reserve.

Species reintroductions

While protecting existing species populations within the region is a priority, reintroductions of species that have been lost from the region should also be considered, especially if these species are being bred at Pūkaha.

Iconic species can capture the public interest and provide strong motivation for volunteer effort. Whio is one example of such a species and some catchments in the Tararua Ranges are likely to provide adequate habitat for the return of this river bird.

Similarly, there may be appropriate wetland sites in the region where pāteke could be released and protected from the impacts of pests. Other examples could be

considered in future if the habitat is suitable, the likelihood of a successful translocation is high and the ongoing pest control requirements can be met.

Putting it all together

The Wairarapa region is a large area with multiple pest management issues and a number of agencies and volunteer/landowners involved. Different approaches need to be taken for different pests.

Learnings from other landscape projects in New Zealand indicate that operational efficiency is important. Possum control in the Cape to City project in Hawke's Bay focused on landowner responsibility as a control method. It was found however that landowners also have other jobs they need to focus on, which meant that the overall maintenance of the pest control network was haphazard.

The primary recommendation in a review of that project was that there should be a move to a contractor-based model for possum control[22]. Feedback from the Taranaki Mounga project is that there has been a variable response from landowners who have been asked to check traps eight times a year and there have been challenges in using the new trap technology that uses electronic nodes to signal trap releases.

The use of skilled contractors for establishing and maintaining pest control networks is important. While technology is likely to improve over time to allow for easier pest detection and control, many of the current inventions are still in the trial stage and are not a 'silver bullet'. Predator Free 2050 has several research projects underway[23], but well- trained and skilled pest control personnel continue to be key to operational effectiveness and successful long-term outcomes.

Funding and effort can be wasted if pest control is not completed to high standards. The formation of a technical organisation or group has been suggested to assist with improving the effectiveness of pest control in the region. Working with Federated Farmers and other local NGOs, such as Ducks Unlimited would also be worthwhile.

[22] http://hawkesbay.infocouncil.biz/Open/2021/05/EICC_12052021_ATT_EXCLUDED.htm
[23] https://pf2050.co.nz/current-research-projects/

Recommendations for the different pest types

Possums	• Should be controlled across the landscape by agencies such as GWRC, DOC and OSPRI
Goats	• Targeted pest control using contractors in specific sites, such as Rewa Reserve, neighbouring plantations forests and properties, as well as encouragement of control by landowners in other areas. DOC should be encouraged to control goats in the Remutaka and Tararua Forest Parks.
Feral deer	• Use of suitably- qualified contractors to assist neighbouring properties to lower hind numbers, with DOC using money allocated in the recent budget to improve control on DOC estate. An opportunity exists for a hunter/Game Animal Council-led management approach to feral deer culling in the Aorangi Forest Park.
Mustelids	• Strategic trapping set-ups, with skilled assistance to be provided to establish the networks. GWRC have found that a successful model of trapping has involved alternating trap checking between staff and volunteers. In this way, trap maintenance and the quality of control can be maintained
Feral cats	• A similar approach to mustelids is recommended. Landowners can also assist with control around hot-spot breeding areas such as barns. Rural landowners could also be encouraged to use traps for rodent control, rather than relying on cats.
Rodents	• Best established at strategic locations where biodiversity values are high – this is an area where volunteers can make a difference.
Rabbits/Hares	• Control prior to planting, but also where the ferrets and cats are likely to impact biodiversity values.

There is the potential for exclusion fences to be used at some sites or to control particular species. Upgrading of deer fences around reserves may act as a deterrent to deer and goats. While exclusion fences can be costly, it is a type of infrastructure that is often considered by funding agencies, as there is a one-off cost involved. There is however a need to have funds available to provide for ongoing maintenance.

Focusing on Eco Zones

Focusing on maintaining the ecosystems and species that are under the greatest pressure provides the greatest biodiversity benefit for the region, but reintroductions may also provide an impetus for volunteer conservation effort. Operational planning would be needed to maximize landscape-wide efforts for some species, such as the river-nesting birds and matuku-hūrepo at Wairarapa Moana, but other areas such as Pūkaha, Rewa and Rocky Hills need a site focus.

The larger forests and eastern Wairarapa blocks will benefit the most from enhanced regional pest control programmes. These Eco Zones are large and there will be a need to 'start small' and make progress with specific projects that will both make a difference and encourage local conservation action. Once the pest management focus required for the chosen species/site is decided, existing conservation activities in the area can be linked to provide an effective landscape-wide effort.

An example of a project in one Eco Zone is protecting Bittern at Wairarapa Moana. The first step would be to identify which pest animals pose the greatest threats to the breeding birds (given that the habitat is not limiting reproduction success). The

Wairarapa Moana collaborative have some pest animal control in place in the wetlands where the birds are breeding, but key pests such as mustelids (mainly stoats) and feral cats keep moving into the area.

Widening the trapping of those species into neighbouring farmland with the agreement of landowners and incorporating existing trapping networks in nearby KNEs, QEII covenants or private initiatives will provide a much more effective predator control programme and allow that threatened species population to recover.

Urban Pest Control

There are several groups working to lower pest animal numbers in and around the towns in the Wairarapa as can be seen in Figure 3. WaiP2K are keen to work in the towns where the bulk of the population is present. Encouragement of backyard trapping of pest animals will aid engagement and provide learning.

One of the issues for the urban areas is that there is a low percentage of indigenous vegetation present which has an impact on the availability of native wildlife habitat (though Featherston backs onto the Tararua Ranges and Greytown has O'Connor's Bush).

There are some areas of indigenous vegetation however in or near the towns where focused pest animal control projects could improve biodiversity outcomes, e.g. Solway Park in Masterton. These sites are usually on private land however, so landowner agreement would be required.

The NPS for Indigenous Biodiversity will be requiring an improvement in the ratio of indigenous vegetation in the future and there will be a need to protect any plantings from pests. Involving the communities in a lizard survey of the townships would be a worthwhile exercise, as little is known about the current extent of these species. There are also representative remnants that are near towns that are currently not receiving pest control or where extra help would be welcomed.

One stand-out example is Rocky Hills forest which is a very significant remnant with no pest control is in place. It is around 25 km from Martinborough and can be accessed from the road. Similarly, residents from Greytown could be encouraged to assist with Matarawa Conservation area, Carterton with King, McArthur, Perry's bush, Featherston with Snell's/Murphy's Line and Masterton with Rewanui Trust Reserve.

Funding sources

The Predator Free NZ website lists numerous organisations in New Zealand who fund environmental projects, including pest control[24]. DOC also lists funding sources[25] and has a Community Fund that is run once a year. Predator Free 2050 and DOC's Jobs-For-Nature provided funding in recent times for larger projects, but those funds are now closed.

To access any funding opportunities, operational plans referencing how pests are being targeted in the wider landscape to achieve a wide variety of biodiversity and economic benefits will be necessary

Pest animal control and carbon sequestration for climate change could well become an important topic (and possible funding avenue) in the future. Forest and Bird recently released a report[26] that estimates that the control of feral browsing pests to low levels would increase the carbon sequestration of native ecosystems by an equivalent of 15% of New Zealand's 2018 net greenhouse emissions.

Invasive pests are likely to be increasingly advantaged by warmer, less frost-prone winters and will impact future forest generations and carbon sinks. One landowner uses carbon credits to fund trap purchases, but how that approach could be used on a wider scale is yet to be determined. Funding from the One Billion Trees programme has been allocated to research into scaling up indigenous forest regeneration. Controlling pests while allowing natural native forest regeneration (especially on erosion-prone land) should become a priority.

[24] https://predatorfreenz.org/toolkits/groups-toolkit/funding-and-grants/
[25] https://www.doc.govt.nz/get-involved/funding/other-funding-organisations/
[26] https://www.forestandbird.org.nz/sites/default/files/2021-06/Native%20Habitat%20Carbon%20in%20Crisis%20Report%20v2.pdf

How will success be monitored?

Output monitoring

Records of animals shot or trapped should be maintained and stored in a central location. It is understood that there have been different websites/techniques available to store data, but that Trap.NZ[27] has become the preferred site.

As such, agencies, landowners and volunteers will all be encouraged to use Trap.NZ so that the data can be stored in one place. Possum monitoring is ideally completed using a statistically valid methodology and skilled contractors to provide a greater certainty of the result (another recommendation from the Cape to City review). Volunteers may find it useful to set up rodent monitoring tracking tunnels to monitor their results. Information about how to do that can be found on the Predator Free NZ website[28].

Outcome monitoring

Good ecological monitoring takes skill and requires a good sampling design. In order to gather enough data to make a determination as to whether or not the population of a particular species is increasing or decreasing as the result of conservation actions, appropriate sampling strategies are needed to gain adequate data.

While volunteers will be encouraged to complete monitoring within their area of interest, regular agency monitoring results will also be utilized to determine if outcomes are being met. Using indicator species within each Eco Zone will assist with this. Recommendations for each Eco Zone are:

Northern Wairarapa - Kōkako at Pūkaha and bird monitoring in Rewa Reserve (training of volunteers will be required).

Central Wairarapa – regular river nesting bird results currently undertaken by GWRC and lizard monitoring at Ponatahi Lizard Sanctuary (funding of the latter is needed).

Southern Wairarapa – Bittern counts currently undertaken by the Wairarapa Moana collaborative and Victoria University monitoring results in the Aorangi Forest Park.

Eastern Wairarapa – titipounamu numbers currently monitored by GWRC and DOC, while nesting success determinations at Opouawe should be established.

Where volunteers are keen to undertake their own ecological monitoring, techniques are provided both on the Predator Free NZ website or advice can be obtained from DOC or GWRC.

[27] https://trap.nz/
[28] https://predatorfreenz.org/toolkits/is-your-predator-control-working/

Recommended next steps for Wai P2K

1	Iwi engagement	• Meet with Rangitāne o Wairarapa and Kahungunu ki Wairarapa to gain an understanding of their view of pest control in the Wairarapa region • Seek opportunities to incorporate mātauranga Maori into pest control projects • Identify Iwi workforce opportunities
2	Regional pest control –agencies	• Prepare a submission to GWRC's LTP on the need for ongoing regional possum control funding • Lobby DOC to prioritise feral deer and goat control on the Conservation estate in the Wairarapa region • Work with hunters, DOC, local NZ Deerstalkers Association members and the Game Animal Council to develop a feral deer and goat management plan for the Aorangi Forest Park
3	Private land feral deer and goat control	• Identify groups of neighbouring landowners who would be prepared to fund feral deer culling operations on their properties • Identify groups of neighbouring landowners who would be prepared to fund goat culling operation on their properties • Provide educational material to landowners on feral deer herd management • Explore models for hunting concessions and clubs to control ungulates across farms
4	Collaborative projects, as detailed in the Eco Zones or species reintroductions	• Identify three projects to be initiated as a priority • Develop pest management plan requirements for each project which indicate costs, landowner buy-in, volunteer involvement and feasibility considerations • Apply for funding for the projects to multiple partners
5	Capacity	• Make training available to contractors who wish to undertake pest animal control • Form a 'technical advisory group' that could provide advice on quality standards for pest control work • Provide volunteers with training on pest control, monitoring and data curation
6	Education/community	• Prepare and provide educational material about how biodiversity and ecosystem services values are affected by pests in the Wairarapa region • Consider preparing and disseminating a lizard survey to the urban communities • Involve primary and secondary schools in local projects
7	Funding	• Research opportunities for funding of pest control operations • Interact with MFE on providing opportunities for pest control in relation to climate change initiatives
8	Research	• Complete research on the importance of effective pest management in achieving high carbon farming outputs. • Investigate the value of stimulating volunteer pest management networks within urban areas

Appendix 1:

Table 1: Regionally threatened forest ecosystem types in the Wairarapa region

Forest Type Name	Threat Ranking	Where - Example sites
Kahikatea, totara, matai	Critical	One or two remnants in Central Wairarapa – Eringa Road Bush
Kahikatea, pukatea	Critical	Very small remnants in all EcoZones -Lowes Bush, Tuitarata Bush Reserves
Tītoki, ngaio	Critical	Few remnants on coast in Northern, Eastern and Southern Wairarapa – Matariki Bush, Wairongomai Bush
Tawa, tītoki, podocarp	Critical	Northern and Central Wairarapa – Tinui River Bush, Sulphur Wells
Tōtara, tītoki	Critical	Northern and Central Wairarapa – Rewanui Trust Reserve, Strang's Bush, Wainuioru River Bush
Tōtara, matai, ribbonwood	Critical	Alongside rivers in all Eco Zones – Tauherenikau Bush, Carter Scenic Reserve
Rimu, matai, hinau	Endangered	Eastern and Southern Wairarapa – Rocky Hill Sanctuary
Rimu, matai, hinau/ black beech	Endangered	Northern and Eastern Wairarapa – Rewa Bush, Lagoon Hills Heights
Tawa, podocarp	Endangered	Northern and Central Wairarapa – Pūkaha, Wairere Bush
Black beech	Vulnerable	Central and Southern Wairarapa – Tararua and Remutaka Forest Parks

Table 2: Threatened bird species

Name	Threat ranking	Where (Breeding Sites)
Matuku- hūrepo (bittern)	Nationally and Regionally Critical	Wairarapa Moana
Matuku moana (reef heron)	Nationally and Regionally Critical	Mid- eastern Wairarapa coast
Koekoeā (long-tailed cuckoo)	Nationally and Regionally Vulnerable	Aorangi, Remutaka and Tararua Forest Parks
Taranui (caspian tern)	Nationally Vulnerable and Regionally Critical	Wairarapa Moana (Onoke spit)
Whio (blue duck)	Nationally Vulnerable and Regionally Extinct	Pūkaha (captive)
Moho (takahe)	Nationally Vulnerable and Regionally Critical	Pūkaha (captive)
Tūturiwhatu (NZ dotterel)	Nationally Increasing and Regionally Critical	Riversdale and other Eastern Wairarapa river mouths
Ngutu pare (wrybill)	Nationally Increasing and Regional migrant	Wairarapa Moana
Pāteke (brown teal)	Nationally Increasing and Regionally Critical	Pūkaha (captive)

Name	Threat ranking	Where (Breeding Sites)
Kōkako (NI kōkako)	Nationally Increasing and Regionally Critical	Pūkaha
Kārearea (bush falcon)	Nationally Increasing and Regionally Critical	Forest
Pārera (grey duck)	Nationally Vulnerable and Regionally Critical	Eastern Wairarapa wetlands (interbreeding with mallards)
Weweia (NZ dabchick)	Nationally Increasing and Regionally Vunerable	NZ stronghold, Wairarapa Moana, farmland dams
Tītipounamu (rifleman)	Nationally and Regionally Declining	Tararua, Remutaka and Aorangi Forest Parks, Eastern Wairarapa forests
Pīhoihoi (pipit)	Nationally Declining and Regionally Vulnerable	Coastal areas and farmland
Pohowera (banded dotterel)	Nationally Declining and Regionally Vulnerable	Braided rivers and eastern Wairarapa coastline (Opuawe- significant breeding area), Wairarapa Moana
Kākāriki (yellow-crowned parakeet)	Nationally Declining and Regionally Endangered	Tararua Forest Park, Pūkaha
Kororā (blue penguin)	Nationally Declining and Regionally Vulnerable	Cape Palliser
Tarāpunga (red-billed gull)	Nationally Declining and Regionally Vulnerable	Castlepoint, Cape Palliser, eastern Wairarapa river mouths
Kuaka (eastern bar-tailed godwit)	Nationally Declining and Regionally Critical	Wairarapa Moana
Pūwheto (spotless crake)	Nationally Declining and Regionally Endangered	Wairarapa Moana, specific wetlands in the Ruamahanga and Eastern Wairarapa
Kotoreke (marsh crake)	Nationally Declining and Regionally Critical	Wairarapa Moana
Huahoau (lesser knot)	Nationally Declining and Regionally Critical	Wairarapa Moana
Tara (white-fronted tern)	Nationally Declining and Regionally Endangered	Te Awaiti and Honeycomb Rock (eastern Wairarapa coast)
Tōrea pango (variable oystercatcher)	Nationally Recovering and Regionally Vulnerable	Eastern Wairarapa coastline – Castlepoint and Riversdale important sites
Kākā (NI kaka)	Nationally and Regionally Recovering	Pūkaha, Tararua Forest Park
Māpunga (black shag)	Nationally Relict and Regionally Critical	Wairarapa Moana, eastern Wairarapa river mouths
Kawaupaka (little shag)	Nationally Relict and Regionally Vulnerable	Wairarapa Moana
Kākārīki (red-crowned parakeet)	Nationally Relict and Regionally Recovering	Pūkaha

Name	Threat ranking	Where (Breeding Sites)
Black-fronted dotterel	Nationally Naturally Uncommon and Regionally Vulnerable	Braided rivers in the Ruamahanga and eastern Wairarapa
Kawau tūi(little black shag)	Nationally Naturally Uncommon and Regionally Vulnerable	Wairarapa Moana
Kōtuku ngutupapa (royal sponbill)	Nationally Naturally Uncommon and Regional Coloniser	Wairarapa Moana
Kiwi-nui (NI brown kiwi)	Regionally Critical	Pūkaha, Remutaka Forest Park
Pāpango (NZ scaup)	Regionally Vulnerable	Wairarapa Moana
Poaka (pied stilt)	Regionally Vulnerable	Braided rivers in the Ruamahanga and eastern Wairarapa
Tētē motoiti (grey teal)	Regionally Recovering	Shallow lakes and lagoons in the Ruamahanga and eastern Wairarapa
Kererū (NZ pgeon)	Regionally Recovering	Most forests

Table 3: Lizard species

Name	Threat Ranking	Where
Kupe skink	Nationally and Regionally Critical	Shrubland, farmland near Carterton, Masterton (not recorded since 1970's), recently found in the Tararua Forest Park
Copper skink	Nationally Declining and Regionally Critical	Forest, coast, areas with good ground cover, Fensham
Moko kākārīkī (barking gecko)	Nationally Declining and Regionally Vulnerable	Tree-dwelling, also found in scrubland, Ponatahi
Ornate skink	Nationally and Regionally Declining	Forests, shrubland, vegetated coastlines. Not recorded in Wairarapa for 20 years
Ngahere gecko (forest gecko)	Nationally and Regionally Declining	Arboreal – forests and shrubland, Fensham, Rewanui, Ponatahi
Kokowai skink (spotted skink)	Nationally Relict and Regionally Recovering	Ponatahi, Martinborough, Te Kawakawa

Table 4: Bat species

Name	Threat Ranking	Where
Pekapeka (long-tailed bat)	Nationally and Regionally Critical	Rewanui, Eastern Wairarapa, Mt Holdsworth, Trenairs Bush
Pekapeka (short-tailed bat – central subspecies)	Nationally Declining and Regionally Critical	Tararua Forest Park

Table 5: Invertebrates

Name	Threat Ranking	Where
Katipō	Nationally Declining	Eastern and Southern Wairarapa coasts

References:

https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs36entire.pdf

https://www.gw.govt.nz/assets/Documents/2022/03/Conservation-status-of-bird-species-in-the-Wellington-region-Dec.pdf

https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs35entire.pdf

https://www.gw.govt.nz/assets/Documents/2020/01/Conservation-status-of-lizard-species-in-the-Wellington-region.pdf

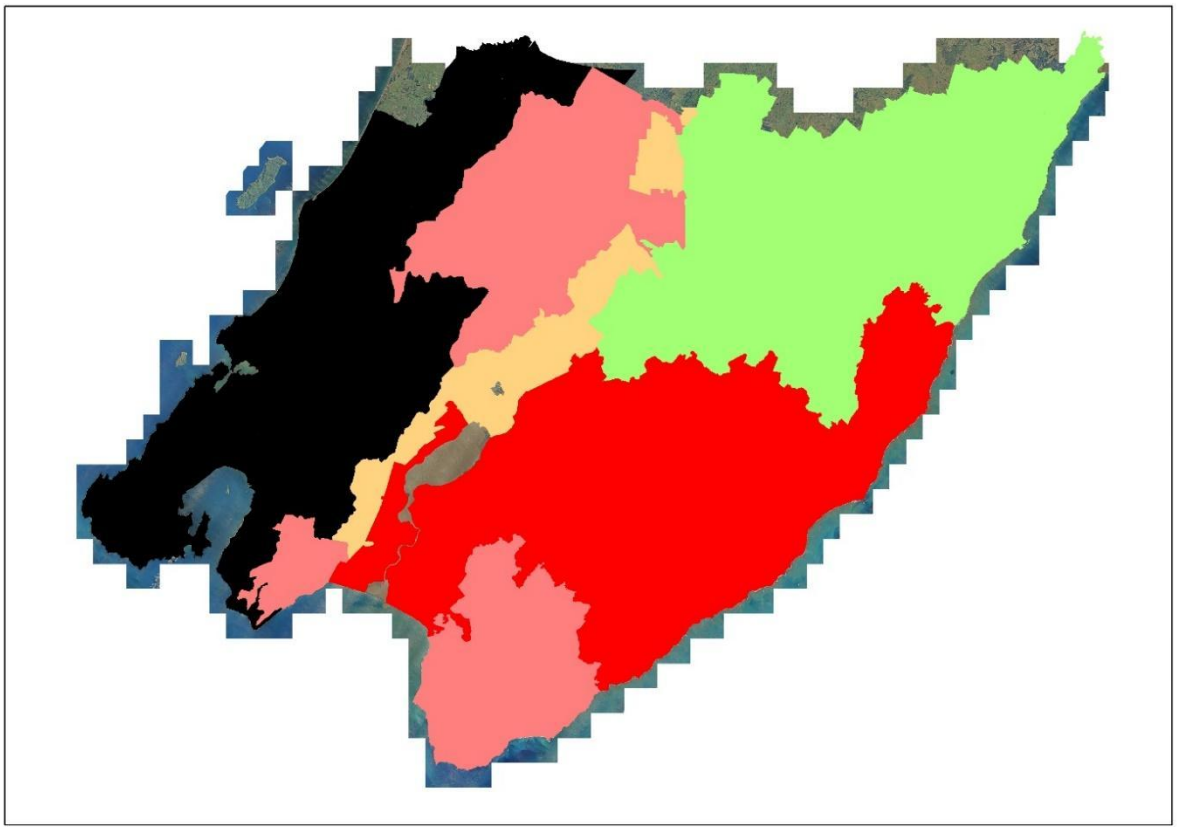
Appendix 2: Pest impacts

Pest animal	Impacts on native vegetation	Impacts on pasture production	Impacts on native fauna, e.g. birds, lizards	Damage to newly planted vegetation	Carrier of diseases such as TB or toxoplasmosis	Contribution to erosion and sedimentation in waterways
Possums	✔	✔	✔	✔	✔	✔
Feral goats	✔	✔		✔		✔
Feral deer	✔	✔		✔	✔	✔
Mustelids			✔		✔	
Feral cats			✔		✔	
Rats			✔			
Hedgehogs			✔		✔	
Rabbits	✔	✔	✔[1]	✔		✔
Hares	✔	✔		✔		

1. *Note: Rabbit population eruptions contribute to an increase in native faunal pests such as ferrets and feral cats*

Appendix 3:

Map 1: Possums in the Wairarapa region



Little possum control in last ten years – high possum

Possum control planned in the next few years by OSPRI

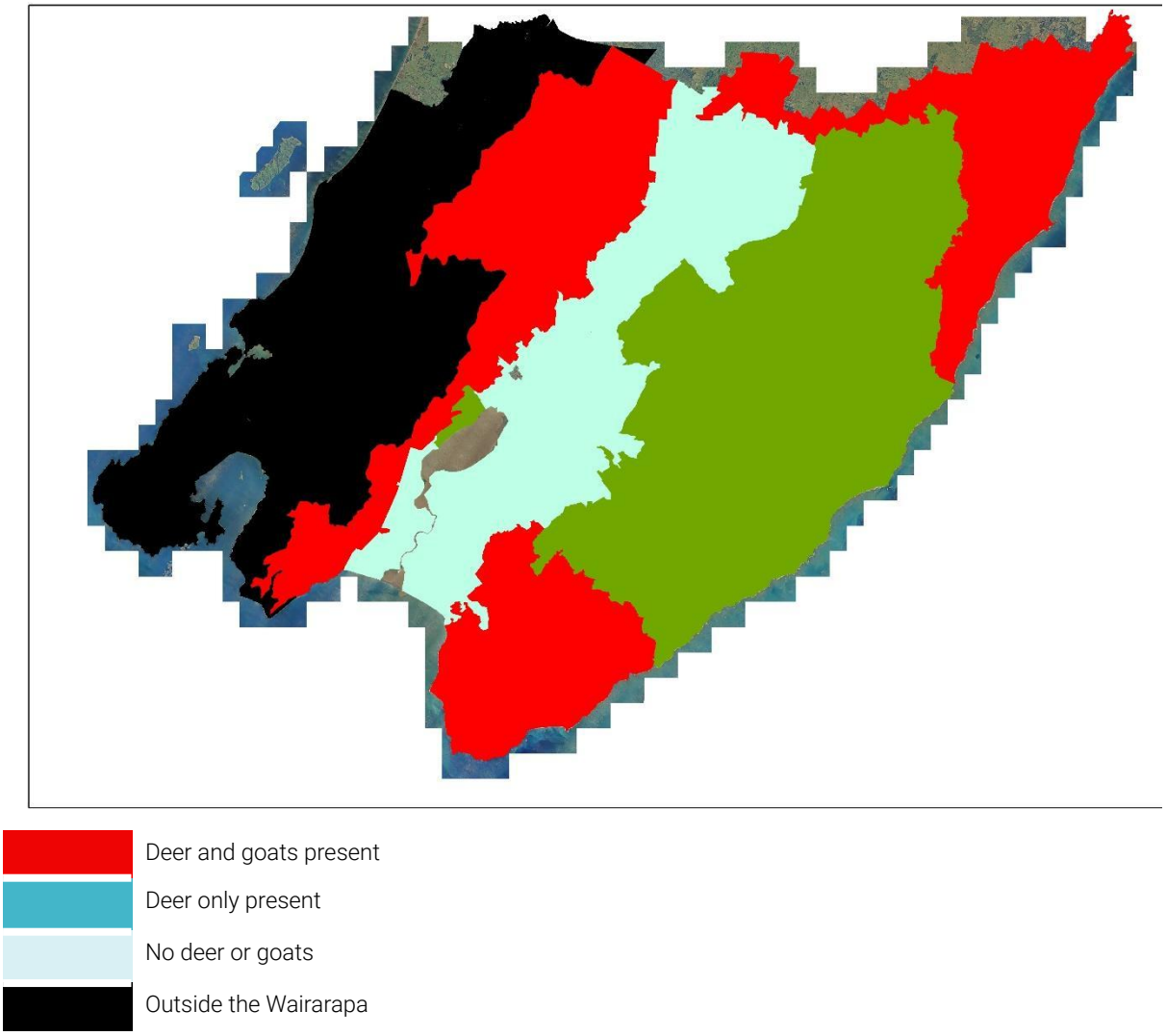
Possum control under current control by OSPRI

Regional Possum and Predator Control ongoing possum

Outside the Wairarapa

It is difficult to provide definitive possum levels in a map at this scale, as there will be possums in remnants across the landscape, however the map above provides information about landscape-wide possum control programmes. OSPRI is unlikely to have ongoing possum control in the region, as the number of herds with Tb present have declined over time.

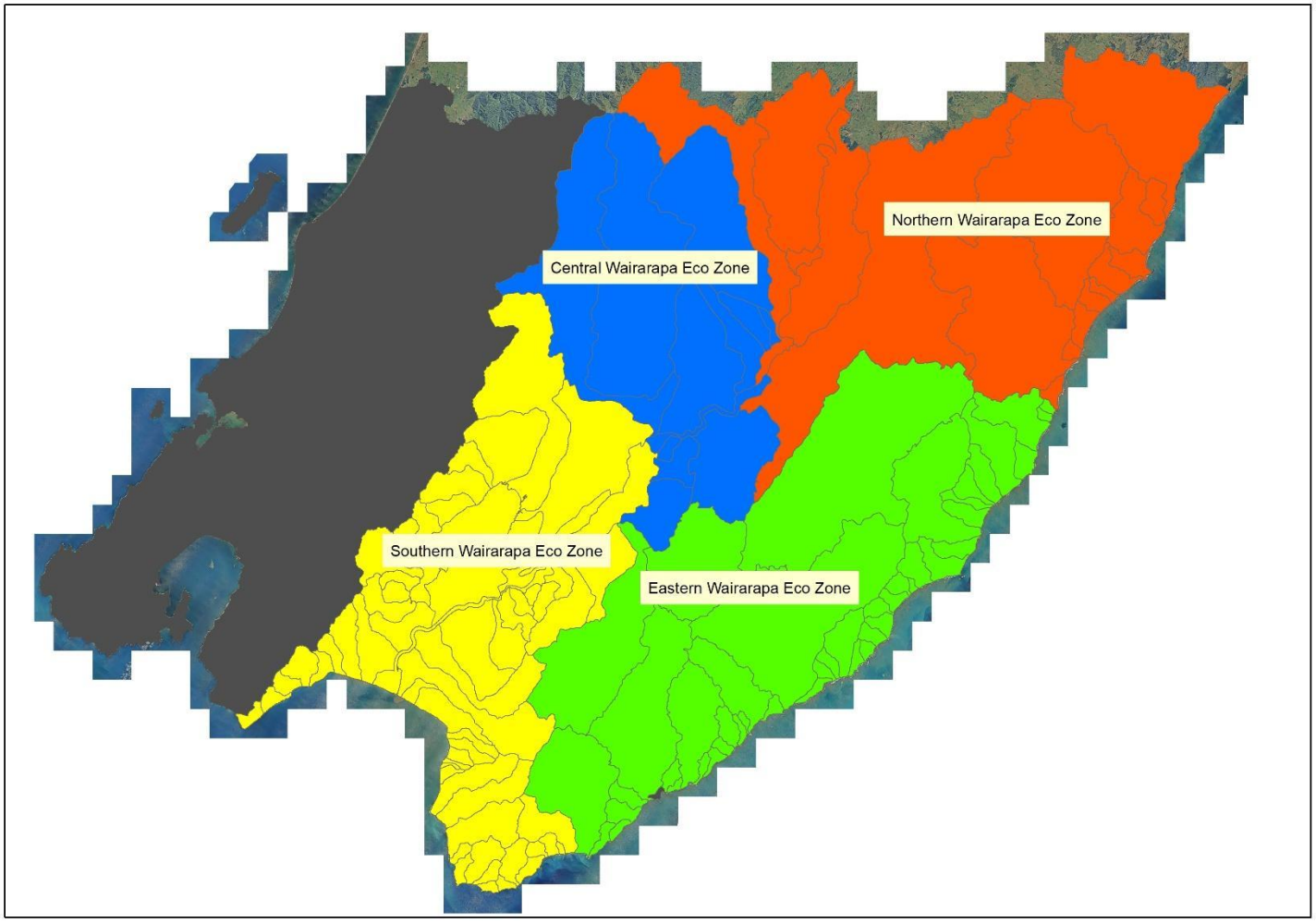
Map 2: Ungulates in the Wairarapa region



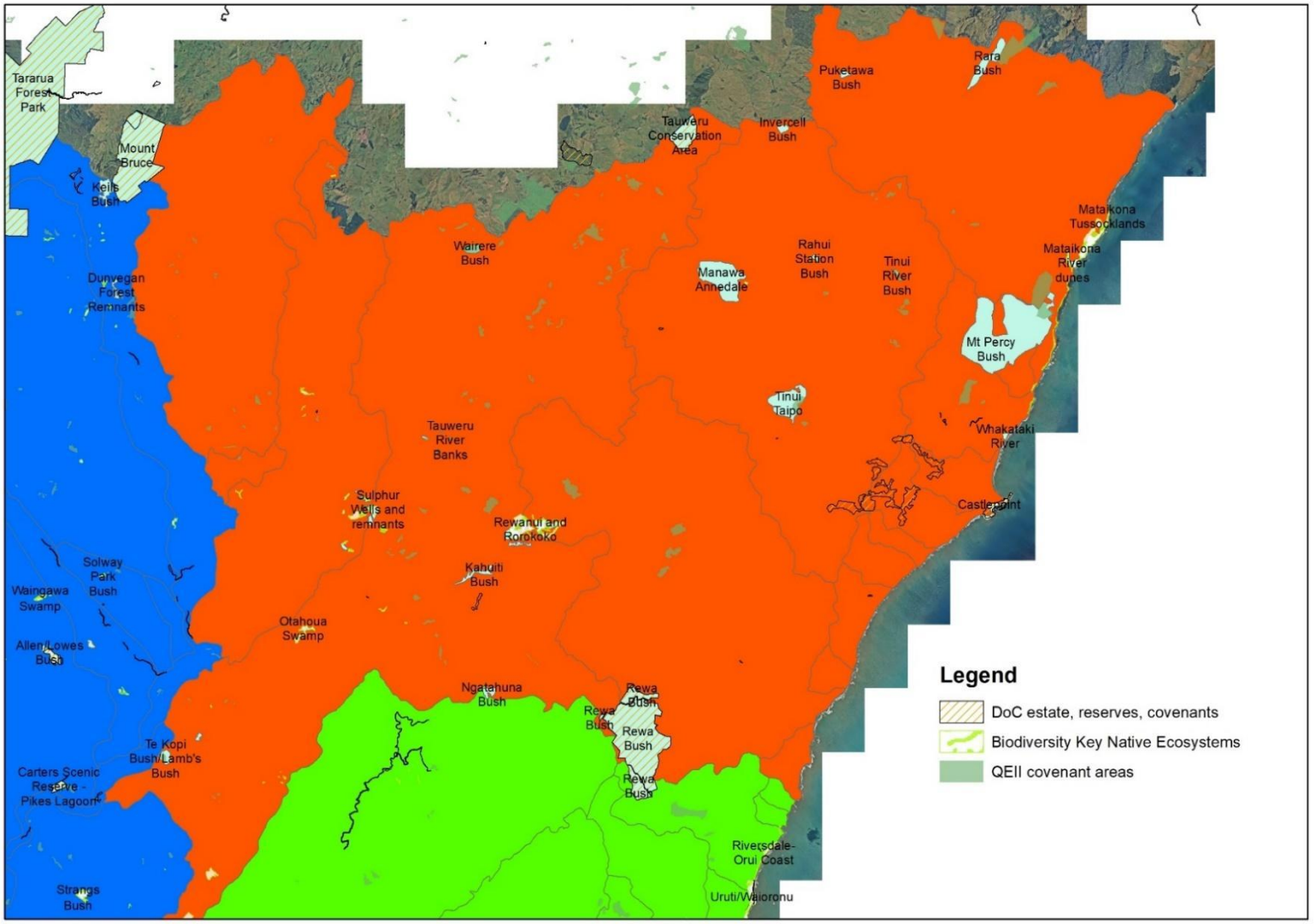
The boundaries shown here reflect what is known about the main deer and goat populations in the region, however fallow deer are pushing further into farmland in many areas and goats may be present at other sites.

Appendix 4: Eco Zones

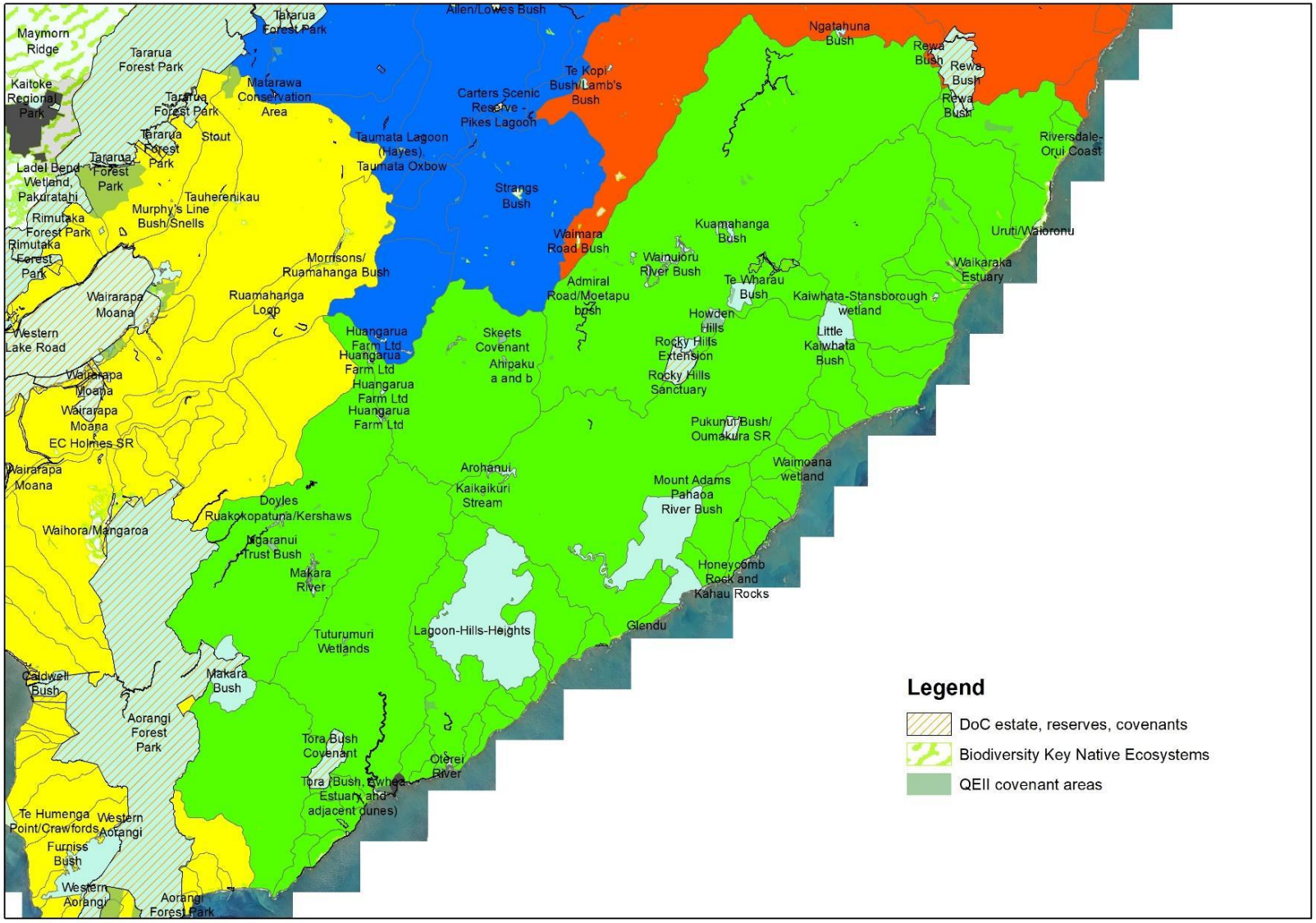
Map 1: Whole Wairarapa view



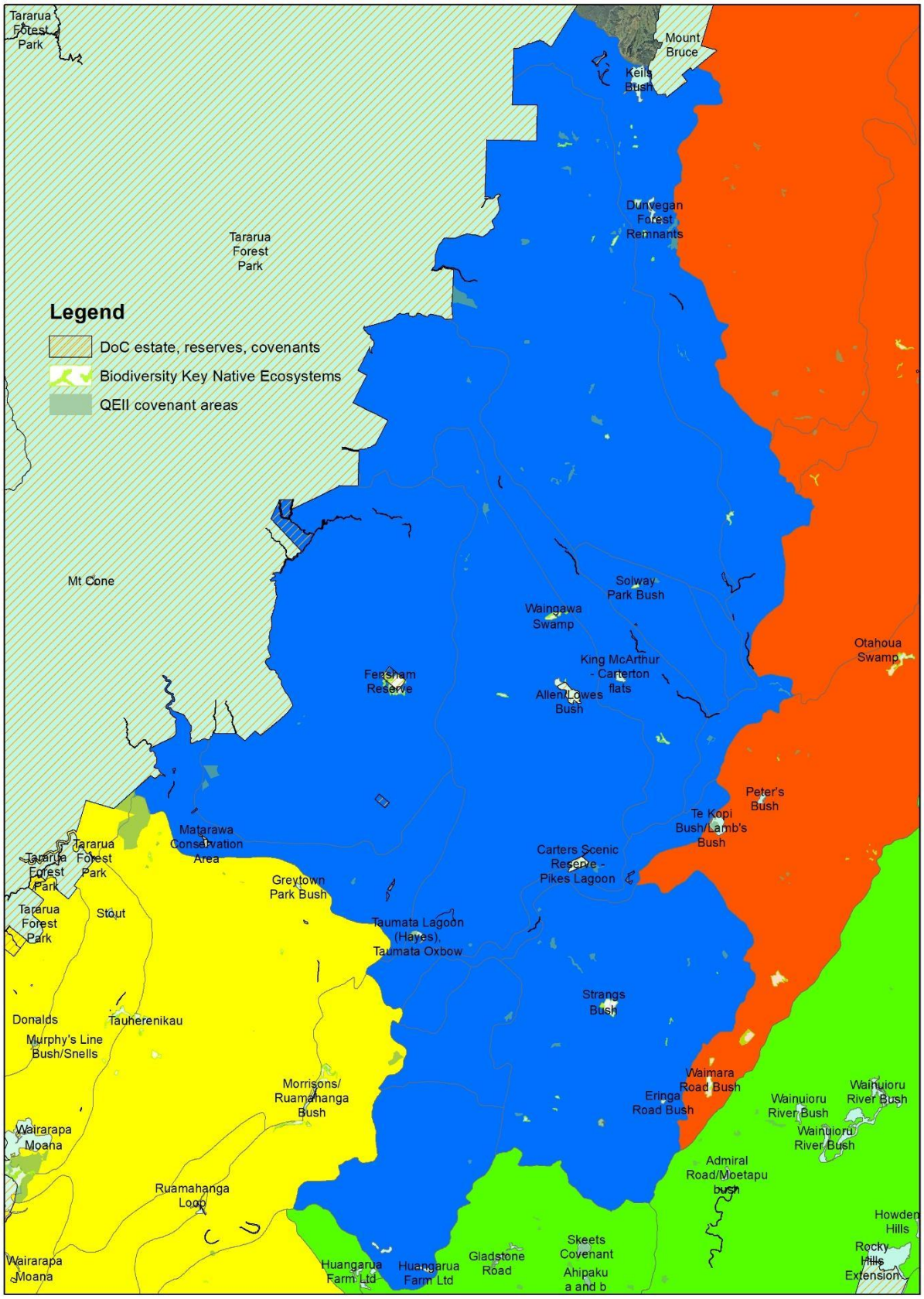
Map 2: Northern Wairarapa Eco Zone



Map 3: Eastern Wairarapa Eco Zone


Maymorn Ridge
Tararua Forest Park
Kaitoke Regional Park
Matarawa Conservation Area
Tararua Forest Park
Tararua Forest Park
Stout
Tararua Forest Park
Ladel Bend Wetland, Pukuratahi
Tauherenikau
Murphy's Line Bush/Snells
Rimutaka Forest Park
Rimutaka Forest Park
Wairarapa Moana
Western Lake Road
Wairarapa Moana
Wairarapa Moana
Wairarapa Moana
EC Holmes SR
Wairarapa Moana
Waihora/Mangaroa
Caldwell Bush
Aorangi Forest Park
Te Humenga Point/Crawfords
Western Aorangi
Furniss Bush
Western Aorangi
Aorangi Forest Park
Tararua Forest Park
Allen/Lowes Bush
Carters Scenic Reserve - Pikes Lagoon
Taumata Lagoon (Hayes)
Taumata Oxbow
Strangs Bush
Morrisons/ Ruamahanga Bush
Ruamahanga Loop
Huangarua Farm Ltd
Huangarua Farm Ltd
Huangarua Farm Ltd
Huangarua Farm Ltd
Huangarua Farm Ltd
Doyles Ruakokopatuna/Kershaws
Ngaranui Trust Bush
Makara River
Tuturumuri Wetlands
Makara Bush
Tora Bush Covenant
Tora (Bush, Estuary and adjacent dunes)
Te Kopi Bush/Lamb's Bush
Waimara Road Bush
Admiral Road/Moetapu bush
Skeets Covenant
Ahipaku a and b
Arohanui
Kaikaikuri Stream
Lagoon-Hills-Heights
Olorei River
Ngatahuna Bush
Rewa Bush
Rewa Bush
Rewa Bush
Riversdale-Orui Coast
Kuamahanga Bush
Wainuioru River Bush
Te Wharau Bush
Howden Hills
Rocky Hills Extension
Rocky Hills Sanctuary
Kaiwhata-Stansborough wetland
Little Kaiwhata Bush
Uruti/Waioronu
Waikaraka Estuary
Pukunui/Bush/ Oumakura SR
Waimoana wetland
Mount Adams Pahaoa River Bush
Honeycomb Rock and Kahau Rocks
Glendu
Legend
DoC estate, reserves, covenants
Biodiversity Key Native Ecosystems
QEII covenant areas

Map 4: Central Wairarapa Eco Zone



Map 5: Southern Wairarapa Eco Zone