

# Priority Biodiversity Conservation Actions for the Wellington Region – A Think-piece

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## **Preamble**

The need to ‘halt the decline’ of biodiversity is as relevant to the Wellington region as it is to the rest of New Zealand. Questions are often raised about how to prioritise funding for biodiversity to improve ecological outcomes when faced with a task that is both complex and challenging. Doing ‘everything everywhere’ is not possible, but fragmented approaches do not appear to be making the difference that is required to halt the downward trajectory of ecological loss. This think-piece argues that evidence-based decision-making is possible and that data and scientific information gathered by Greater Wellington Regional Council can be used to prioritise systematic conservation action to improve ecological outcomes in the Wellington region.

Matauranga Maori offers a holistic perspective and a conceptual framework. While this think-piece is based in ‘western science’ thinking, all aspects are being considered in a holistic way and is hopefully complementary to a Matauranga Maori approach. It is acknowledged that science is only one part of the picture for how ecological restoration can take place and that engagement with communities, landowners, agencies and individuals is necessary for conservation activities to occur. A lack of strategic context for community conservation however is an issue. These groups would want their activities to be making a difference and to be able to see the impacts of their efforts. Sharing what has been learned from the wealth of GWRC information, combined with scientific principles provides a framework that can aid regional conservation decision-making.

The principles for systematic conservation planning are:

- Aim to conserve a viable, representative sample of every different type of indigenous biodiversity.
- Aim to conserve the key processes that allow indigenous biodiversity to persist over the long-term.
- Set quantitative biodiversity targets to achieve representation and persistence.
- Use the best available science to ensure robust, defensible and credible results.
- Aim for consistency across terrestrial, inland water, coastal and marine realms.
- Use an adaptive approach: start simply and plan for iterative improvements.
- Keep the process simple, with clear and understandable outputs.
- Make a clear link to implementation by remaining aware of the policy context.
- Be appropriately inclusive and engage stakeholders at relevant stages.
- Make the products easily accessible for wide use.

We seek to achieve this representativeness through:

- Protecting what we have, starting with the most significant ecosystems, and
- saving the most threatened ecosystems and species first, while we can.

This think-piece examines what we know about the indigenous ecosystems and threatened species in our region from ecological information collected over the past 15 years and details how that data can inform conservation action.

## **Key Recommendations**

- Reinstate possum control funding for five-yearly 1080 possum control in GWRC's forests
- Maintain a reserve fund for controlling rats in Wainuiomata and East Harbour Mainland Islands during mast years
- Ensure wetland sites where wetland birds are present receive pest control
- Restore the peatland in Queen Elizabeth Park
- Encourage the community through WaP2P or other groups to instigate a large landscape-wide pest control buffer around Wairarapa Moana to reduce the number of pests reaching bittern nests
- Encourage the focus for landscape-wide pest control to be for river and wetland birds, rather than to target small forest remnants, unless they are known lizard sites
- Work with the community and other agencies to encourage an increase wetland extent at sites where wetland soils exist and multiple ecosystem benefits accrue
- Consider ways to improve ecological connectivity to the wider landscape in response to sea level rise
- Work closely with territorial authorities to improve coastal spatial planning
- Support care-groups and species networks to improve the viability of threatened species populations

## 1. Introduction

Greater Wellington Regional Council's (GWRC) terrestrial ecology monitoring programmes have been underway for many years, with long-term data having been obtained from a variety of sources, both at regional and local scales. This information has provided GWRC with a unique overview of the issues and priorities for improving outcomes for indigenous ecosystems and species in the Wellington region. While there continues to be much to learn, the use of this data and the learnings derived from analysing monitoring results can aid decision-making to ensure funding can be targeted to areas where the greatest gains can be made for biodiversity. What ecosystems and species we have, what state they are in and what could be done to improve that state is all knowledge that can aid the planning of the way forward and inform a strategic approach to making a difference to the region's indigenous flora and fauna.

Conservation planning, as well as monitoring has been an important focus for GWRC and the use of both international and national expertise has guided progress in this area. It has been useful to consider not just ecosystems, but also indigenous species within our region to aid the identification of 'best bang for the buck' actions that would help to halt the decline of biodiversity and improvement of ecosystem services. There are never enough resources to 'do everything everywhere', but there are ways to focus actions that will make the biggest difference. The decline in biodiversity continues in the Wellington region, just as it does nationally, but if conservation activities are too dispersed, opportunities to halt the decline can be lost. Working with communities, landowners and care-groups is of great importance to biodiversity conservation efforts, but prioritising actions based on scientific knowledge will help all parties achieve positive ecological outcomes.

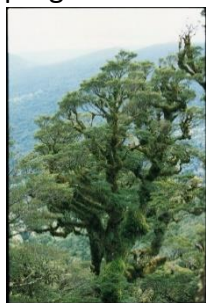
The loss of biodiversity across the regional landscape is well-known. There has been major clearance of lowland forests for the development of agriculture and urban areas, logging of the accessible timber, drainage of wetlands and large-scale species loss. "Turning the tide" on this loss of indigenous biodiversity however comes with high costs and is often difficult to achieve (e.g. returning robin to Wainuiomata Mainland Island or building large, constructed wetlands). Maintaining the ecosystems and species that are still surviving in our region is key to "halting the decline". The easiest way to do that by far, is to maintain the best-functioning examples of each ecosystem type present<sup>1</sup>. The aim of biodiversity conservation is to maintain representative, persistent examples of all biodiversity. That is the philosophy behind the Key Native Ecosystems Programme and it is imperative that that programme is adequately funded.

The loss of vulnerable indigenous ecosystems and species across the Wellington landscape also needs to be reduced as much as possible. These species make up the components of our ecosystems and each loss contributes to the ongoing biodiversity decline. Biodiversity protection, maintenance and restoration can be considered from the perspectives of both ecosystem type and individual species. This report examines the current ongoing impacts on the region's biodiversity and approaches to reducing those, while information about how prioritise restoration activities that could re-establish functioning ecosystems and species populations across the region is also provided.

## 2.1 Forest ecosystems - reducing ongoing impacts and halting decline

Our analyses show that while forest habitat loss is still occurring, these impacts are less than those of pests<sup>2</sup>. Pest control (both animal and plant) therefore continues to be the key management activity required to maintain forest biodiversity. The priority is to secure the 'old-growth' forests as they contain species and habitat (e.g. nesting holes for birds like rifleman) not found in regenerating forests. However, supporting forest regeneration is also essential to ensure that populations of rare and threatened plant species persist.

Monitoring results for forest regeneration in areas where we maintain high levels of ungulate control often disappoint the pest control managers. The data shows that the most palatable species are still being eaten by the few animals remaining<sup>3</sup>. The hunting programme is nevertheless well worth the effort, as that work is 'holding the line'. Areas



with uncontrolled, high numbers of goats and deer (eg in the Eastern Wairarapa), have less representative plant communities compared with data from forests where ungulates are managed. Our analyses show that ungulate pellet counts are highest in those forests types that have the least area protected in our region<sup>4</sup>. The Threatened forest types therefore need more attention. Many are only represented by small remnants that need to be fenced and have better pest plant control to secure their biodiversity.

Possum control and the resulting relief from rodents is also critical to the survival of forest communities. Evidence from our possum monitoring has shown that aerial 1080 control operations can reduce possum numbers for up to five years and that additional ongoing ground control can maintain them at lower densities over this time. Huge gains have been made in forest health from possum control operations that have been completed over the last decades. Our monitoring of rata tree canopies (as an indicator of possum damage) shows that rata health has improved dramatically due to possum control operations<sup>5</sup>. It is important to maintain these programs and not to lose those gains.

Forest birds are often a focus for the outcomes of pest control and our monitoring has shown that pest control efforts in the region are making a difference<sup>6,7</sup>. The results however don't show real improvement of indigenous forest birds in small remnants, such as Rewanui<sup>8</sup>, Upper Hutt City<sup>9</sup> or Porirua Scenic Reserve; which can be frustrating for pest control managers. This is because the indigenous bird species remaining in those small forest remnants are there because they can survive without pest control (eg grey warbler or fantail). The pest-sensitive species (eg rifleman) that increase under management have been lost from these small patches. Other species of interest such as tui and kereru respond over much larger landscapes because of the way in which they use resources (eg kereru largely breed in old-growth forests). It is therefore important that we focus pest control on the old-growth forests to ensure the persistence of all the indigenous forest bird species in our region. These are the areas, along with intensive pest control sites, such as Zealandia,

Pukaha, and Kapiti, Mana and Matiu-Somes Islands, that supply the best breeding sites for these species.

Data from our State of the Environment Terrestrial Ecology Monitoring Programme has shown that the old-growth forests in the main spine of the Tararua and Rimutaka Ranges, Greater Wellington's lands (Wainuiomata and Hutt Water Collection Areas, Kaitoke Regional Park, and Akatarawa and Pakuratahi Forests) and in the Eastern Wairarapa are the reservoirs of our indigenous forest birds (Figures 1 and 2). The smaller forest remnants still hold some habitat resources for these species, but they are not the main areas where these birds breed. The dispersal corridors for birds should be considered a lower priority than pest control for old-growth forests, because without large, productive source populations of these bird species, any corridors that are created will be largely unused (for most native forest bird species, it's the juveniles that use corridors for dispersal, not adults). Similarly, bats, invertebrates and reptiles all benefit from pest control across all forests, but the strongholds for these species are the old-growth forests.

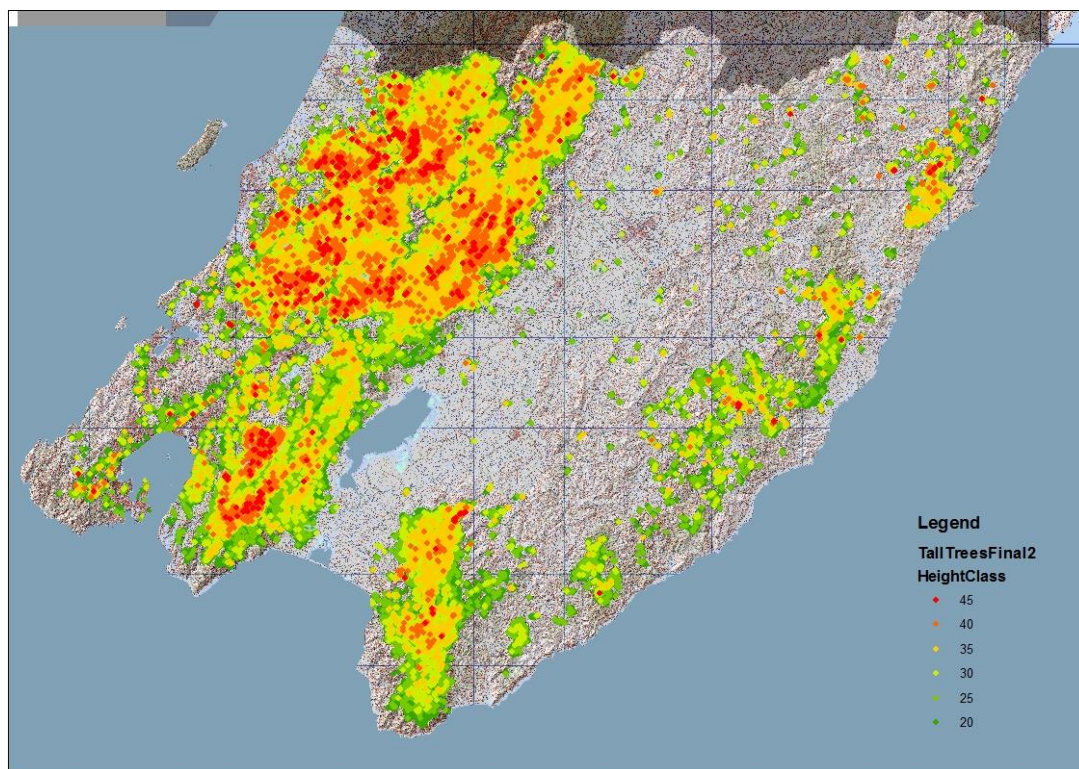


Figure 1: Old-growth forests of the Wellington region, as indicated by tree height

Our recent analysis of the regional species conservation status has shown that, there are over thirty Regionally Threatened plant species, plus multiple Regionally At Risk species in our forests<sup>10</sup>. The maintenance of the habitat for those species is key to their survival, particularly for rifleman (titipounamu),<sup>11</sup> which are the most sensitive indicator of the outcomes of predator control due to their vulnerability to predators and their low dispersal abilities. It is also important to control pest animals in old-growth forests at low densities for other bird species that are making a come-back to the mainland (e.g. red-crowned parakeet), as this is where they will find the best nesting opportunities. Rifleman is a 'deep endemic', which means that it is an ancient species that is found only in New Zealand. It is thought to be the

most ancient of New Zealand’s passerine species and is the only surviving member of the NZ wren family in the Wellington region. This species has a national threat classification of At Risk – Declining and there is major concern about the declining populations of this bird in our region, as they are sensitive to predation from rats and stoats. Studies over the past 14 years in Wainuiomata Mainland Island have shown that population increases for this species occur when rats are kept at low numbers<sup>6</sup>.

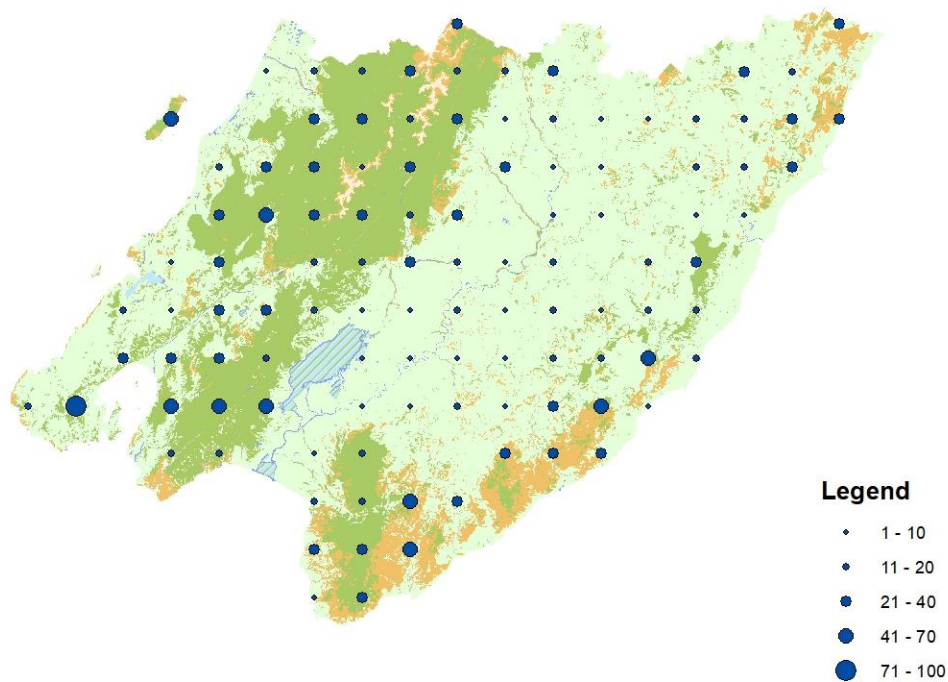


Figure 2: Snapshot of indigenous forest bird species abundance from State of the Environment Terrestrial Ecology monitoring. Represented as the number of indigenous forest birds counted in a total of 10 five-minute bird counts from five points sampled over two days at each site

There are four lizard species remaining that largely use forest as habitat: barking/Wellington green gecko, North Island forest gecko, Ngahere forest gecko and common gecko<sup>12</sup>. Barking gecko are Regionally Threatened, while North Island forest gecko and Ngahere forest gecko are Regionally Declining. Both surviving bat species are both Nationally and Regionally Threatened and while our knowledge of invertebrate species is limited, snail studies have shown that rat control is of crucial importance for those species. Lizards are still being discovered in some of the smaller remnants across the landscape<sup>13</sup>, so pest control activities should focus on improving habitat for those species where they are present.

While smaller in terms of impact when compared to pests, there are still losses of indigenous forest in the region. GWRC involvement with territorial authority planning and

the use of offsetting during consenting is of importance in minimising the impact of those losses. Clearing of indigenous forest within pine plantations is still occurring, but there have been major improvements in the way exotic forest managers are considering biodiversity, as accreditation for environmental stewardship can improve market access and prices for the product. Providing these forest managers with ecological data has resulted in improved ecological practices.

## **2.2 Restoration of forest ecosystems**

Conservation science highlights the need for a minimum viable area for the retention of representative populations. At least 10-30% of the natural extent of a habitat is required to retain its species. In the absence of supporting studies, this is usually reflected as a 20% target. However, as a starting point, the aim should be to return all threatened habitat to a minimum of 10% of their natural extent. While controlling pests is crucial to maintaining forest ecosystem functions and species populations within that habitat, restoring larger landscapes needs a wider focus. If the principle of retaining representative portions of all habitat types is applied, then increasing the extent of threatened forest types becomes a priority. This approach will improve the viability of the diversity of forest types within the region. The threatened forests are declining because they are now reduced to smaller, disconnected, more vulnerable remnants within the landscape<sup>14</sup>. Fencing of those remnants is important, but so is bolstering them with plantings around them. Within the wider landscape, there are opportunities to garner multiple benefits for biodiversity, carbon storage and water quality by retirement of erosion-prone land. Restoration of swamp forest can occur by re-establishing wet areas, while plantings on the sides of rivers and waterways will also contribute to improving the extent of threatened forests in the region while there are significant opportunities in GWRC parks.

The Forest Restoration Opportunities report<sup>15</sup> details how an increase in extent for each of the threatened forest types within each whatua could be achieved. This information can be used for GWRC planting programmes, but also for offsetting decision-making. The NPS for Indigenous Biodiversity is requiring that urban areas maintain at least 10 percent of their indigenous forest extent. This will mean that Porirua, Kapiti Coast, South Wairarapa and Masterton District Councils will need to consider how to increase their area of indigenous forest, as all their urban areas contain less than 10 percent indigenous vegetation cover. GWRC can play a role in providing the information about appropriate vegetation types, as well as assisting with offsetting decisions that will enhance biodiversity around the townships.

In terms of threatened species; territorial authorities, special interest groups, e.g. Wellington Botanical Society and care-groups can play a major role. The detail provided in the regional conservation documents that have been published recently highlights where those differences can be made<sup>10</sup>. Wellington City Council have already begun using the threatened plant document to plan how they can respond with their care-groups, nurseries and council staff, while the lizard conservation status document is being used by the Wellington Regional Lizard Network. Other care-groups are also showing an interest in to assisting with restoring these species within the landscape.

## **2.3 Recommendations for forest ecosystems**

- Akatarawa Forest, Kaitoke Regional Park and Pakuratahi Forest possum control operations

Funding for 5 yearly 1080 possum control operations for these forests needs to be re-instated. These areas contain unlogged forest, threatened plant species and regionally significant plant



and bird communities. A recent possum monitor indicates that possum levels in Akatarawa Forest are well above the 5%RTC target and no pest control operation has been completed for over 7 years.

- Key Native Ecosystem programme addition of Mount Percy

There is a willing landowner who would be open to protecting this Eastern Wairarapa regionally significant forest and to having a pest control regime that would ensure the future regeneration of a forest type that is currently not covered in any of the KNEs.

- Continue intensive pest control in Wainuiomata and East Harbour Mainland islands to maintain rifleman numbers. Ideally hold a reserve of funding for pest control operations during mast years. There is now evidence that rodent irruptions of more than 15% tracking rate can erode improvements in bird abundance that are made in other years.
- Continue pest control activities in KNEs to maintain indigenous ecosystems and species' population across the range of forest ecosystem types in the region.
- Continue support for Wellington City Council's predator-free programme, as well as providing buffers for Pukaha and other DOC areas.
- Use the analysis of threatened forest types to inform planting programmes across the region and to offset any losses of indigenous forest
- Work with special interest groups, care-groups, territorial authorities and landowners to improve the conservation status of threatened species within forest habitats

### **3.1 Wetland ecosystems - reducing ongoing impacts and halting decline**

Wetland ecosystems in our region have benefitted from the fencing and pest control programmes that have been put in place over recent years. Our Wetland Health monitoring programme only began four years ago, but the findings of those studies show that wetlands are generally in good condition<sup>16,17,18</sup> (70% of the 90 wetlands surveyed so far). While the first monitoring surveys showed that fencing results in an improvement in wetland organic matter, (which is important for wetland functioning<sup>16</sup>), it was found in subsequent surveys that the responses of wetlands to different pressures were affected by urbanisation and the history of the location. Each year, three wetlands have been monitored for the presence of wetland birds and fish. From this we discovered significant populations of spotless crane and some marsh crane, both of which are Regionally Critically threatened<sup>11</sup>. Being ground-nesting birds, pest control at the sites they were recorded from is essential to ensure their persistence in the region and should be given priority.

A number of threatened plant species have been identified in wetlands. Unfortunately, the modification of these wetlands by pest plants (particularly exotic grasses) has meant that the removal of livestock through fencing the wetland can have negative consequences. We may therefore need to consider more flexible management options at some wetland sites.

Wairarapa Moana is by far the most significant wetland complex in the region. It is home to 56 National Threatened and At Risk species, which is the greatest regional concentration of species



of conservation concern at one location. Ongoing pressures on terrestrial biodiversity come from pest plants and animals. Significant gains have been made in halting the invasion of alder and in clearing large areas of willows that have infested the lake-edge wetlands<sup>19</sup>, with continued emphasis on maintaining those gains and making further improvements being a priority. It is possible now though to slow the pest plant control programme to fine-tune the restoration approach.

Wairarapa Moana is the only known site in the region where a self-sustaining population of bittern (matuku) are present. This Nationally Critical threatened species has undergone major population losses around the country attributed to mammalian pests and it is likely that this is the second-largest remaining population in the country. Controlling pests that threaten the viability of the Wairarapa Moana population is therefore paramount. Despite pest control having been undertaken in selected wetlands on the eastern side of Lake Wairarapa, the maketu population does not appear to be increasing<sup>20</sup> and it is noted that the number of pests killed at the site are not falling over time. This makes this species a candidate for a landscape-scale protection programme. Caspian terns that nest on Onoke Spit (the only location in the region at which they breed), are classified as Regionally Critically threatened<sup>11</sup> and could similarly benefit from landscape-scale pest control.

Consideration of changes to lake levels for the Barrage Gate consent need to be made with care as many species have now adapted to the existing habitat and making changes will result in the loss of sensitive species, many of which are nationally threatened. The nationally and internationally significant shorebird populations are highly vulnerable to manipulations in water levels, as are nationally significant populations of indigenous turf plants. The shoreline bird surveys are being analysed to understand how various lake levels influence bird populations to inform the discussions around management of the lake levels.

### 3.2 Restoration of wetland ecosystems

While fencing, planting and pest control activities are of great importance in restoring the current wetlands, it is noteworthy that the Wellington region has one of the highest degree of historic wetland loss in the country. It has been estimated that less than three percent of the wetlands are remaining in this region. Increasing wetland extent is one of the objectives in the Natural Resources Plan and is an ambition that will improve biodiversity and ecosystem services. Dairy NZ and other agencies have been advocating for the use of constructed wetlands to aid the mitigation of the impact of farming activities. While there may be some sites where constructing wetlands are appropriate, there are many sites across the region (and usually at least one area on most farms) where retirement of a wet paddock or area will not only be the most cost-effective way to minimise



contaminants, but also to improve indigenous biodiversity, i.e. where multiple ecosystem benefits can accrue<sup>21</sup>. The soils and hydrology of an area (see Figure 3) are key to the re-establishment of a functioning wetland. Creating wetlands in non-wetland soils means that it will take a long time for wetland ecosystem processes to establish and it is difficult to find any international or national evidence that natural functioning can be restored fully at such sites.



**Figure 3: Wetland soils in the Waipoua catchment**

The value of seeps<sup>22</sup> is now being recognised and the policies and rules in our Natural Resources Plan have made a major difference to how developers are approaching subdivision proposals, as the rules have encouraged a need to work with the landscape. An increased understanding of the value of wetlands has been developed in the farming community, but conveying information about the values of wetlands is a 'work in progress.' Research on catchment approaches to hydrology and understanding the ecosystem benefits will aid this. The approach to restoring threatened wetland species, especially birds and plants is an area that is currently being investigated. Existing literature is being supplemented with information from the surveys conducted through our Wetland Health Monitoring Programme to develop a list of plant species that are appropriate for restoration in each wetland type<sup>23</sup>.

Greater Wellington has an opportunity to restore peatland at Queen Elizabeth Park. Peatlands contain about 42 percent of the world's soil carbon and store more carbon than any other vegetation type, including the world's forests. When peatlands are drained the organic matter that composes the peat starts to dry out and release carbon back into the atmosphere. So, besides their unique biodiversity and threatened species, peatlands should be protected to contribute to GWRC's climate change initiatives. Our easiest win would be the restoration of our second largest peatland in the region at Queen Elizabeth Park because it is already part of GWRC's Parks network. Our team has just completed a detailed survey of the extent of the peat to inform such a restoration effort. The greater challenge lies in securing Mangaroa Swamp in Upper Hutt which is the largest peat resource in the Wellington region (equivalent to 12,500ha of indigenous forest which is bigger than the Hutt Water Collection area and Kaitoke Regional Park combined), but is under threat of development as it is on private land. Ongoing discussions are being held with Upper Hutt City regarding this wetland.

The restoration of Wairarapa Moana wetlands is a huge and long-term task that is complicated by wider issues in the Ruamahanga catchment, but there are ways to find opportunities to prioritise restoration actions at this site. A new approach to protecting the most vulnerable species present (bittern) would be to encourage landscape-wide control of mustelids and cats.



Opportunities for large-scale restoration (including the propagation of rare plant species) are present at Lake Domain and JK Donald reserve. Restoration plans are already completed – this work just needs funding and large-scale planting effort. Ongoing discussions about lake water levels and the Barrage gates are being held, but any decisions made need to take into account the habitat requirements of the range of species that depend on this

large wetland complex for their survival. It is expected that Wairarapa Moana will receive Ramsar status in the near future – this categorisation is based partly on the presence of threatened wading birds that use the site.

### **3.3 Recommendations for wetland ecosystems**

- Ensure sites where wetland birds such as spotless crane and marsh crane are present receive pest control
- Restore the peatland in Queen Elizabeth Park
- Encourage the community through WaP2P or other groups to instigate a large landscape-wide pest control buffer around Wairarapa Moana to reduce the number of pests reaching bittern nests
- Continue to maintain pest control at wetland Key Native Ecosystem sites
- Work with the community and other agencies to encourage an increase wetland extent at sites where wetland soils exist and multiple ecosystem benefits accrue
- Complete research into threatened wetland species habitat requirements
- Continue to fund fencing and pest plant control for existing wetlands
- Continue pest plant and animal control at Wairarapa Moana
- Consider how to manage threatened plant species that will be lost if the wetland is fenced.
- Develop a programme that will identify where the best opportunities could be found to increase natural wetland extent to 10%

- Complete mapping of smaller wetlands present in the region
- Appropriate wetland plants for each wetland type to be used in restoration plantings

#### 4.1 Coastal ecosystems - reducing ongoing impacts and halting decline

Monitoring of the coastal dune systems in the region began in 2017/18 and the programme aims to monitor five large dune nodes and eleven satellite dune systems. To date, the results from assessments made at two nodes and five satellites have been collated and reported<sup>24</sup>. The picture is poor for coastal dune ecosystems with the results showing an average score of 12 out of 25 for dune condition and around two thirds of the plants being exotic species. The regional threat classification system our team just completed has identified a large number of Threatened and At Risk plant species in our coastal ecosystems<sup>10</sup>. These systems are also under threat from climate change and act as a refuge for some species, such as lizards. Copper skink, spotted skink and Minimac gecko can still be found in the coastal areas and efforts to control mice and rats at the significant lizard sites on the mainland are essential. Responses of lizard populations to management are slow<sup>25</sup>, but it is clear that, apart from on the islands and in sanctuaries, lizard numbers are declining across the region<sup>12</sup>.

A coastal bird survey of the region completed in 2018 provided evidence of the significant



coastal bird areas in the region<sup>26</sup>. This information is being used to update the proposed Natural Resources Plan, but it has also highlighted species that are in very low numbers in the region. These include reef heron, Northern NZ dotterel (both Regionally Critical) and variable oystercatcher (Regionally Vulnerable). The data has provided the ability to supply targeted feedback on resource consent proposals in coastal areas, as well as to consider appropriate offsetting actions. We are now

working with Wellington City Council to monitor reef heron and variable oystercatcher numbers on their district council coastline.

#### 4.2 Restoration of coastal ecosystems

Coastal ecosystems are our sentinel sites for the impacts of sea level rise due to climate change. In most cases, it is not possible to change the extent of this ecosystem type, but providing room for these systems to move inland is of high importance. While we may not be able to escape the inevitable habitat loss in some areas, maintaining the resilience of coastal ecosystems will help them buffer increasing coastal storms, not only protecting our infrastructure, but also creating opportunities to establish new communities. It is therefore essential that we don't give up on pest control efforts, particularly pest plants that alter dune morphology, exacerbating storm surge impacts. Where inland migration is possible mapping of these opportunities can be completed, but we will need to improve our liaison with territorial authorities to ensure spatial planning takes this information into account. Sea level rise is the number one threat to our saltmarshes, with the key intervention being to allow for retreat. This requires changes in thinking around urban planning design. Many of the



region's coastal ecosystems no longer function naturally because of the presence of seawalls or housing developments.

Our team has just completed developing a list of appropriate plant species to use for coastal restoration to facilitate the maintenance of healthy dune communities<sup>31</sup>. Care-groups often form an affinity with dune ecosystems and can be encouraged to care for threatened species at these sites. Improving lizard habitat requires intensive pest control and support for care-groups undertaking that work is a priority. Care-groups are also taking part in pest control actions for banded and Northern NZ dotterel to improve nesting success outcomes. Supplying data and advice to inform these activities will aid a strategic approach to 'halting the decline' in these systems.

### **4.3 Recommendations for coastal ecosystems**

- Continue to fund KNE dune ecosystem pest plant control and restoration efforts
- Continue to control pest animals at known lizard sites
- Support care-group activities in protecting faunal habitats and undertaking pest plant control
- Consider ways to improve ecological connectivity to the wider landscape in response to sea level rise
- Work closely with territorial authorities to improve coastal spatial planning

### **5.1 Riverine ecosystems – reducing impacts and halting ongoing decline**

Flood Protection has been working for some time to improve the way in which activities around nesting river bird species are conducted. Monitoring and research projects have shown that Flood Protection are being successful in minimising impacts on these species<sup>27,28, 29</sup>. During this research however, the impact of pests on these species has been highlighted<sup>30</sup>. Banded dotterel are Nationally and Regionally Vulnerable, while the black-billed gull is both Nationally and Regionally Critically threatened. More can be done to protect these vulnerable species. Monitoring has shown that the Opouawe River supports around 23% of the regional populations of banded dotterels, so is an obvious priority for landscape-scale predator control designed to protect riverbed-nesting bird species.

### **5.2 Restoration of riverine ecosystems**

Some landscape-wide pest control is proposed on the upper Ruamahanga River and is being established near the mouth of the Opouawe River based on the recommendations of the river bird surveys<sup>32</sup>. It would be worthwhile having a landscape-wide network established around other rivers. The findings from recent research completed along the Waingawa River<sup>30</sup> has highlighted the impact that pests are having on these species. Black-billed gull change their breeding site every year, so surveying for their presence in spring is an important task. Once located, pest control can be established around the colony to aid the population viability of this critically threatened species.

### **5.3 Recommendations for riverine ecosystems**

- Instigate landscape-scale predator control for river birds in the upper Ruamahanga River and in the lower Opouawe River

- Establish landscape-wide predator control along other rivers in the Ruamahanga catchment

## **6. Naturally uncommon ecosystems**

There are a number of naturally uncommon ecosystem types in the Wellington region, including coastal turfs, shingle beaches, marine mammal haulouts and ephemeral wetlands. The identification of these sites is a 'work in progress', but conservation activities are already occurring at some sites, e.g. the shingle beach at Parangarahu Lakes.

## **7. Aquatic Ecosystems**

This report has focussed on terrestrial biodiversity, but it is worth noting that many of the solutions to issues for aquatic biodiversity are land-based. Additionally, a key principle of systematic conservation planning is to ensure consistency across the terrestrial, aquatic and marine domains. Aquatic biodiversity is impacted by multiple stressors, which include habitat loss, contaminants (excess nutrients and sediment), fish passage issues and pest fish. The whitua implementation process provides some pointers as to how the region's waterways, lakes and coastal aquatic environments could be restored. These actions include fencing and planting of riparian and wetland areas, revegetation/retirement of erosion-prone land to reduce sedimentation, the setting of water quantity limits and the management of urban contaminants. The task to improve the ecological health of these systems is huge because it involves land-use change, infrastructure improvements and multiple stakeholders.

Factors such as fish passage and pest fish need a particular focus. There is a fish passage programme at Greater Wellington, but resources are limited and implementing improvements in access for fish across the landscape will take some time. Pest fish are widespread and present a major challenge in terms of control, not least because of unfaltering protection by user groups. This may be addressed through strategic planning that acknowledges the requirements of the user groups and identifies opportunities to achieve a balance with conservation objectives. Estuary management plans could provide a link to the whitua implementation plans to promote connectivity for fish. At Wairarapa Moana, research is underway to determine if it is possible to maintain low introduced fish numbers in lake-edge wetlands in order to allow native fish communities to re-populate that habitat. This work shows promise and continuing to find ways to improve outcomes for aquatic faunal communities is a priority. As for terrestrial biodiversity, it is important to maintain a long-term vision, but it is possible to prioritise some actions that will make a bigger difference in the short-term. This process has been initiated and includes the identification of activities that will provide multiple benefits, such as retiring/revegetating highly erodible land or considering landscape-wide approaches to flood protection and water quantity deficits by increasing wetland extent.

## 5. Discussion

Using a regional view of the conservation issues across the Wellington landscape highlights priority areas where improvements in ecosystem and species conservation can be made. Functioning ecosystems and species populations are still present throughout the landscape and remain a conservation priority. How to restore what has been lost is challenging, but the information about the state and trend of these ecosystems and species can provide pointers as to which conservation actions are priorities.

The information we have gathered has identified the most significant sites for biodiversity in the region. The monitoring data has shown that old growth forests are key reservoirs of indigenous species and that pest control in those areas is of paramount importance. Small forest remnants need fencing, pest plant control and edge planting, but controlling predators will not result in high biodiversity gains. The focus for pest control across the landscape needs to be on species that will benefit the most from implementation of such a programme. Regional threat lists are providing information about which species are the most vulnerable.

Each whaitua has different biodiversity challenges and it is proposed that priority biodiversity actions be developed to reflect that. It is recommended, for instance, that a Ruamahanga landscape-scale pest control initiative should target actions that will enhance habitat for wetland and river bird species. In terms of biodiversity corridors in that whaitua, improving riparian habitat from the Turanganui catchment to the Rimutaka Ranges is the most cost-effective way to establish linkages for rifleman to move across the landscape. In the Wellington/Hutt whaitua, caring for the existing ecosystems in the GWRC forests and water collection areas is a priority.



Wetland research has shown that there is a diversity of wetland types within the region, but that these systems need to be restored in an appropriate fashion to maintain that diversity. Increasing wetland extent also requires a consideration of the landscape variables and the habitat requirements of indigenous species. This knowledge can be woven into the whaitua implementations strategies. Some species such as lizards would benefit from sanctuaries and care-group efforts. Threatened species networks can work with care-groups to turn the tide of biodiversity loss through the provision of adequate information and resources.

Providing advice to and working with territorial authorities is essential for spatial planning that integrates both biodiversity and climate change needs. Coastal ecosystem health and the consideration of the impacts of developments on threatened species is also an area where gains can be made by closer interactions with territorial authorities.

The regional monitoring data, surveys and research can provide a framework for decision-making that to date has had limited application. This scientific strategic context should help to inform and sit alongside the aspirations of Iwi and the community for improving the state of biodiversity within the Wellington region.



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