

Draft Indigenous Forests Action Plan

April 2005

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1. Introduction

Greater Wellington has identified ten “Quality for Life” elements in its ten-year plan covering the period 2003 – 2013. These elements describe how our work programmes contribute to a “good society”. One of the elements is biodiversity with an associated goal of “healthy ecosystems”. In turn, one of the ecosystem types that has been identified as needing attention is indigenous lowland forest.

In common with many regions in New Zealand, the Wellington region contains a considerable area of Crown-owned upland native forests and associated ecosystems. These are managed by the Department of Conservation and form the Rimutaka, Tararua and Haurangi Forest Parks. In contrast, the majority of our lowland ecosystems including native forests (apart from some significant areas within Forest Parks and Greater Wellington’s Regional Parks) have been lost to urban and agricultural development and those that remain are scattered fragments. Many are privately owned while some are territorial authority reserves. From an ecological perspective, lowland forest remnants are extremely important for the following reasons:

- They support a wide range of biodiversity (greater than their upland counterparts);
- Some forest types (such as kahikatea) only occur in lowland situations;
- Although fragmented, birds are able to use them as “stepping stones” to move through the landscape to different feeding areas;
- They contain refuges for threatened plant and animals;
- They can form the nucleus of ecological restoration projects.

Because of the various threats to indigenous forest and lowland indigenous forest in particular they face a bleak future without some form of management.

The purpose of this action plan is to describe how Greater Wellington intends to address the protection, management and, where necessary, restoration of significant indigenous lowland forest.

It does this by:

- discussing the current state of indigenous lowland forest in the region and the ownership of these areas;
- explaining why Greater Wellington must act to protect, manage and restore these ecosystems;
- proposing a vision for the region’s indigenous lowland forest ecosystems and relevant goals to support the vision;
- identifying the key actions that Greater Wellington will take to achieve the vision;
- describing the resources Greater Wellington will apply to its programmes;
- describing the monitoring that will be undertaken to know if we are achieving the results we seek.

This action plan addresses land owned by Greater Wellington, territorial authorities and private landowners. It does not address land owned or managed by the Department of Conservation, or other Crown land.

2. Relationship with Greater Wellington's biodiversity programme and other initiatives

In 2000, Greater Wellington increased its investment in regional biodiversity because it recognised the need to halt the continued loss of remnant areas, species, and ecosystems. Greater Wellington's biodiversity programme addresses the following ecosystem types, which are depleted or under threat in the region:

- beaches and coastal dunes, escarpments, and estuaries,
- wetlands,
- rivers and streams,
- lowland bush.

Each of these different ecosystem groupings is addressed in different ways, both through plans and strategies, and through a wide variety of programmes and projects.

This "Indigenous Forest Action Plan" focuses on the protection, management and restoration of **indigenous forest**, particularly in lowland areas.

The "Coastal and Marine Ecosystems Action Plan" (in preparation) addresses the management, protection and restoration of **beaches, coastal dunes and escarpments and estuaries** in the Wellington region.

The "Wetland Action Plan" addresses all natural (rather than constructed) **wetlands** above the coastal marine area, except rivers (those with flowing water).

The strategic direction for ecosystems in **rivers and streams** is set out in the "Strategy for Achieving Riparian Management in the Wellington Region". This is being supplemented by a series of investigations into the health of river ecosystems, and the ecological communities that live in them (e.g. native fish).

3. The current state of indigenous forests in the Wellington region

3.1 The history of forest loss

Indigenous forest covered most of the Wellington region prior to the arrival of humans. Ninety eight per cent of the region was clothed in forest, the balance being made up of dunelands, wetlands and high altitude grasslands.

Clearance for agriculture, horticulture, settlements, roads and railways has led to this figure being reduced to twenty eight per cent or about 324,000 hectares today. In common with the rest of New Zealand, forest loss was not even across all forest types with lowland forest suffering the greatest loss as this covered the most sought after lands.

Figures 1 and 2 compare the extent of indigenous forest cover in pre-human times with the current extent. Much of the lowland forest that remains is found in scattered remnants across the region.

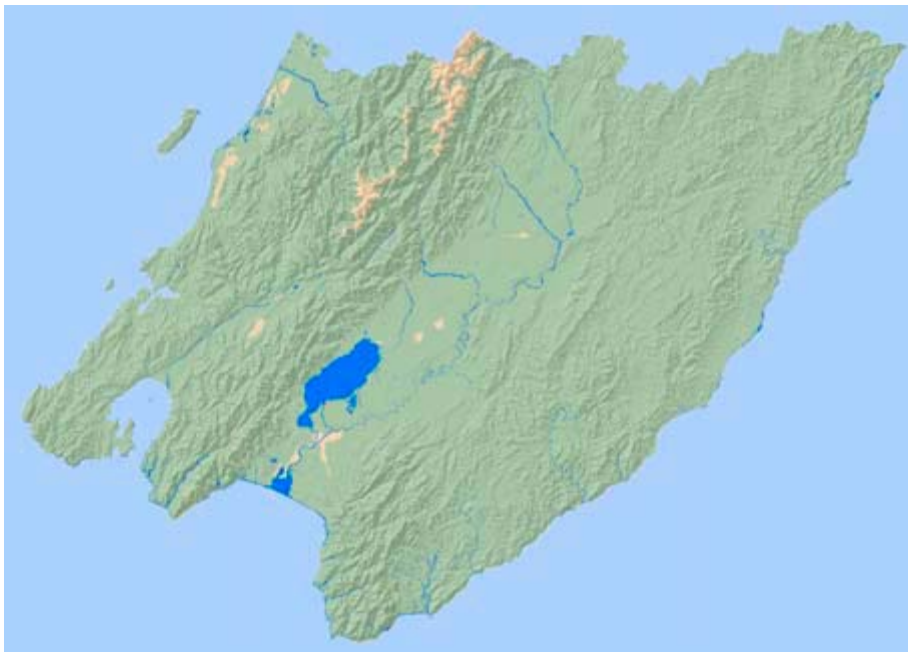


Figure 1: Extent of indigenous forest prior to the arrival of humans.

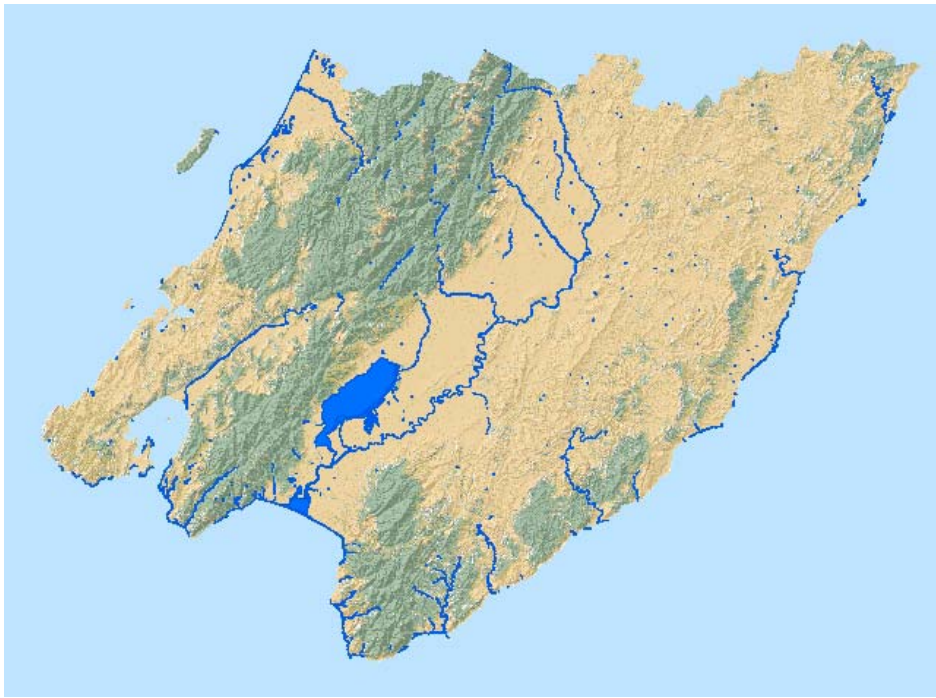


Figure 2: Extent of indigenous forest today.

3.2 Why indigenous forest is valuable

Indigenous forest has many values. These are summarised below:

<p>Biodiversity</p> <p>Indigenous forest ecosystems support and nurture our unique plants and animals. While a few of our plant and animals have adapted to non-indigenous habitats, the vast majority are dependant on the continued existence of forest ecosystems.</p> <p>Even scattered forest remnants can be the last refuges of some plants and animals and frequently provide wildlife corridors allowing the movement of birds between seasonal food sources.</p>
<p>Soil conservation</p> <p>Many of the regions soils are prone to erosion. Indigenous forest, even relatively small blocks in heads of gullies, for instance, aid in the prevention of soil loss and the associated degradation of stream habitat.</p>
<p>Hydrological cycle</p> <p>Forests collect rain, trap atmospheric moisture and allow the ordered release of water into waterways thus minimising peak flows and the risk of flooding.</p>
<p>Greenhouse gases</p> <p>Forests mitigate the effects of greenhouse gases by absorbing carbon dioxide (a result of burning fossil fuels) and releasing oxygen.</p>
<p>Importance to Maori</p> <p>Our indigenous forests have important roles in Maori culture, past and present, including spiritual values and sources of traditional foods, materials and medicines.</p>
<p>“Snapshot of the past”</p> <p>Remaining forests provide living impressions of what much of New Zealand looked like prior to the arrival of humans. They are living museums of our natural history.</p>
<p>Reservoirs for the future</p> <p>The remaining forests provide reservoirs of potentially useful genetic material with human applications such as medicine. They also provide templates for re-vegetation and restoration activities.</p>

3.3 What threats do our remaining indigenous forests face?

The threats faced by the region’s indigenous forests have changed considerably since the days of clear felling in the early 20th century. Today’s pressures include grazing, invasion by pest animals and plants and fragmentation. Unchecked these pressures will lead to a decline in forest condition that will eventually lead to a break down in ecological processes and eventual collapse of the ecosystem.

The most common threats and common management responses are listed below:

Threat	Management response
<p>Stock grazing</p> <p>Stock destroy undergrowth, prevent regeneration and introduce pest plant seeds.</p>	<p>Fencing to exclude stock</p>
<p>Pest animals</p> <p>There is a long list of pest animals that degrade forest ecosystems. This is either directly by destroying vegetation (possums, deer, goats) or indirectly by preying on indigenous wildlife (mustelids, for example)</p>	<p>Undertake pest animal control. Possums are the biggest threat and require control, although greater gains are made through the integrated control of all pest animals.</p>
<p>Pest plants</p> <p>The threat posed by pest plants has been underestimated in the past. Their effect on indigenous forests ranges from invading the forest floor and preventing regeneration (e.g. wandering willy) through to canopy smothering (e.g. old man’s beard).</p>	<p>Undertake pest plant control. Careful assessment of the problem is required in order to target those species most threatening to the forest’s ecological processes.</p>
<p>Fragmentation</p> <p>The region’s remaining forests are scattered remnants of a once continuous forest. As remnants, these forests have a high proportion of “edge” relative to their overall size. This alters the microclimate in the bush because of the effects of drying winds. Conditions then become less favourable for the germination and survival of seedlings and pest plants enter forests via the forest edge.</p> <p>Isolated patches of forest inhibits the ability of wildlife to move about in search of food or mates.</p>	<p>The “edge effect” can be overcome with restoration planting to “seal up” the edges of forest blocks by preventing the entry of wind.</p> <p>The isolation of one block of forest from another and the corresponding detrimental effect on the movement of wildlife is more difficult to overcome but integrated shelterbelt planning and restoration projects can assist.</p>
<p>Unsecured status</p> <p>Much of the region’s remaining indigenous forest is on private land. It exists, in many cases, because of the stewardship of current landowners. However, there is no guarantee that future owners will have the same attitudes.</p>	<p>Encouraging landowners to enter into perpetual protective covenants is a cost effective way of ensuring the protection of privately owned indigenous forest.</p> <p>Such protection also justifies agencies such as Greater Wellington investing in the management of such areas.</p>

3.4 Where are the region's most significant indigenous forests?

Greater Wellington will never have sufficient resources to devote to the protection of all indigenous forest in the region. Some form of prioritisation is necessary to guide where Greater Wellington should concentrate its efforts.

Using computer-based techniques, the region's indigenous forests have been mapped down to a minimum of 1 hectare in size. This process has identified some 6,800 distinct areas of indigenous forest. These 6,800 areas have then been ranked using the following ecological criteria: (Note: A fuller description of the methodology used is given at Appendix 1).

- a) Distinctiveness. This is a measure of “uncommon-ness”. The less common a forest type, the more valuable it will be to the region.
- b) Importance. Greater weighting is given to remaining forest in areas that have lost the most, for example the Wairarapa Plains.
- c) Natural character. This is a measure of how much the vegetation has been modified by logging, fire and other human factors.
- d) Size. Greater weighting is given to larger forest areas reflecting their greater ecological resilience than that of smaller areas.

Figure 3 shows the location of indigenous forest in the region ranked according to biodiversity value (dark green is the highest value). In essence the map is highlighting those that have high overall biodiversity and the ability for that diversity to persist long into the future.

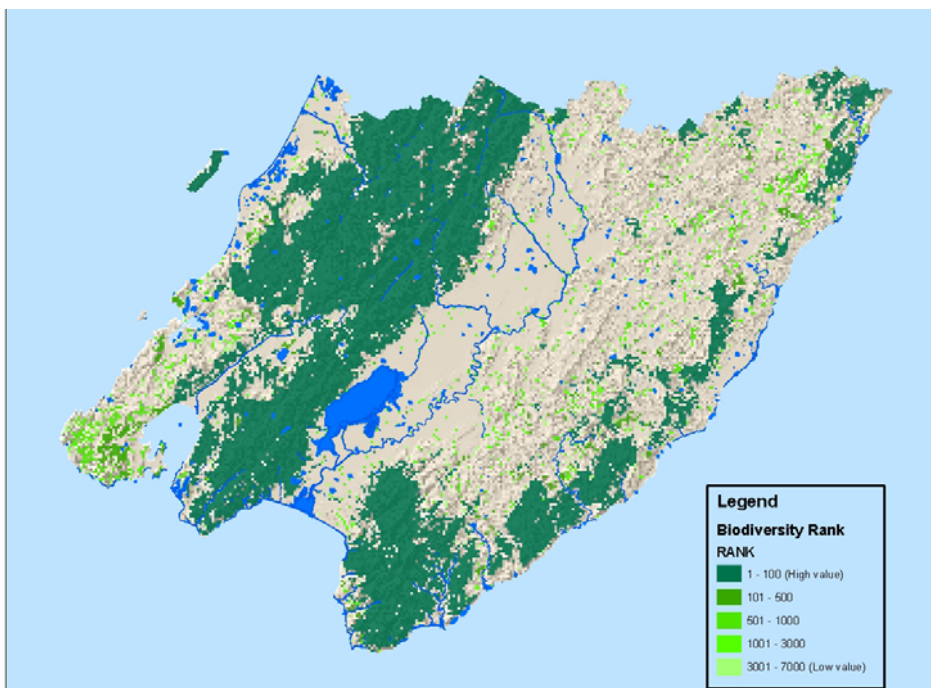


Figure 3: Biodiversity value of the Region's indigenous forest.

With this information Greater Wellington is now in a position to assess the relative ecological value of any area of indigenous forest in the region. This will greatly assist in determining priorities, for instance when considering those areas on private land that might be eligible for Key Native Ecosystem status.

3.5 Who owns the region's most significant indigenous forest?

By overlaying the forest prioritisation information (section 3.4) with ownership information this question can be answered. For the purposes of the analysis four categories of ownership were used – Private, Crown (DoC, LINZ, and other unallocated Crown land), Greater Wellington, and Local Authorities. Table 1 provides an overview of the total area of indigenous forest under each owner type.

Table 1: Indigenous forest by ownership type

Ownership type	Area (ha)	% of total area of indigenous forest
Private	152,000	48
Crown	124,000	38
Greater Wellington	44,000	13
Local authorities	4,000	1
Total	324,000	100

Areas calculated using GIS and GW held base information layers: Docdistnct (Ecosat, LENZ,) and Region_owners (DCDB, DoC Estate, WRC lands).

The table clearly shows that private landowners own a little under half of all of the indigenous forest in the region, with the Crown making up the bulk of the remainder. What it does not show is who owns what in relation to biodiversity value.

Figure 4 below depicts the biodiversity value information from Figure 3 overlaid with ownership information. “Low” values equate to very small forest fragments of a single and common forest type and “high” values equate to very large fragments with a diverse range of rare lowland and common upland forest types.

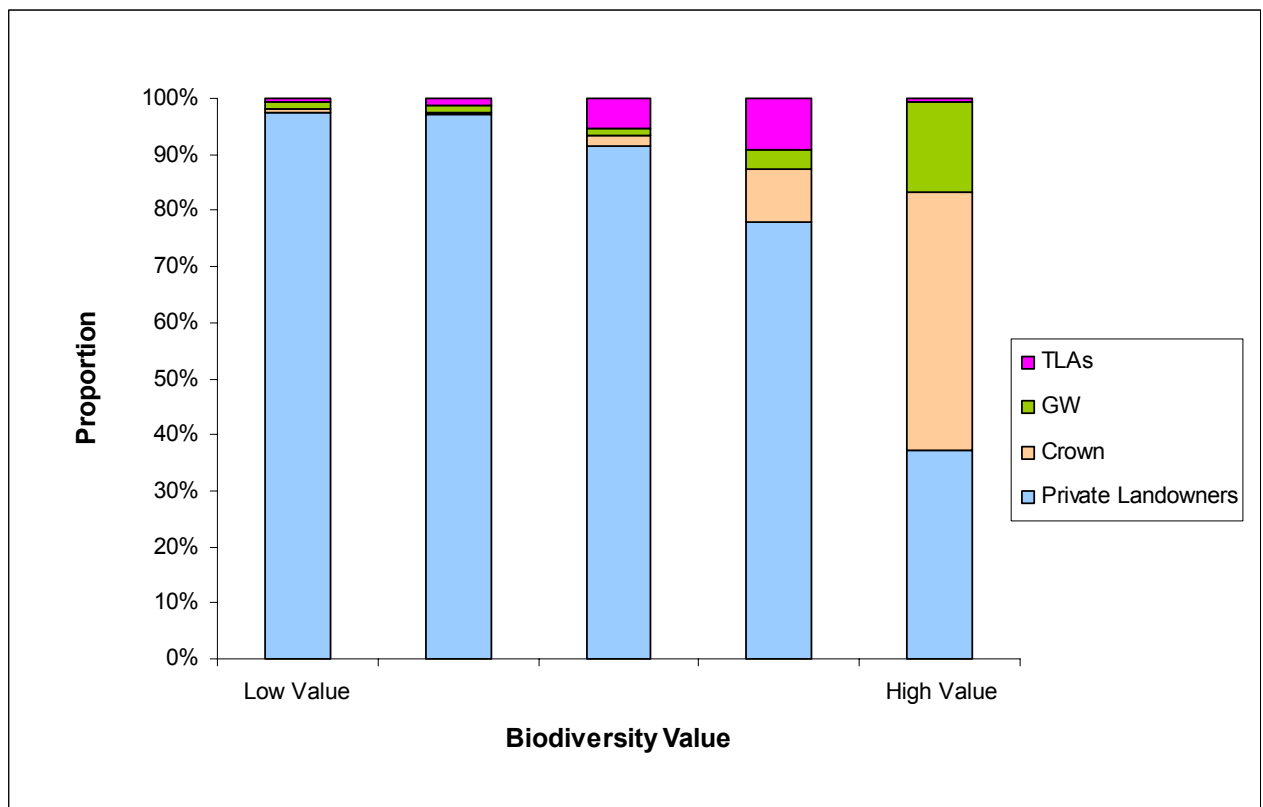


Figure 4: Ownership of high biodiversity value indigenous forest.

Figure 4 shows that private landowner are the stewards of many of the small fragments of common forest types. Predictably, the chart also highlights the value of the large upland forest owned by the Crown. Interestingly, it shows of what local government agencies own, much of it can be considered high value estate. Perhaps surprisingly, it shows at least 30% of the very large, very diverse, and very valuable forest ecosystems are in private ownership.

3.6 What does this all mean?

This plan describes the actions Greater Wellington is taking, or can take, to protect and improve the remaining indigenous forest in the Wellington region. As noted in the Introduction, Crown owned indigenous forest is managed by the Department of Conservation. Greater Wellington does not usually have an involvement in this land. However, Greater Wellington does assist with the protection and management of privately owned indigenous forest. It also assists in the management of some forest owned by territorial local authorities through its Key Native Ecosystem programme and, of course, it manages its own estate.

The figures presented in Table 1 and Figures 3 and 4 draw attention to the potential influence Greater Wellington can have over a large proportion of the region’s most significant indigenous forest.

The ways that Greater Wellington works to improve this indigenous forest are detailed in Section 6.

4. Why Greater Wellington must act to protect, manage and restore indigenous lowland forest

This chapter discusses why Greater Wellington must act to protect and restore lowland forest. In summary, this is because of Greater Wellington's:

- commitment to the New Zealand Biodiversity Strategy
- responsibilities under the Resource Management Act 1991 (RMA);
- wider commitment to the Region's indigenous biodiversity;
- adoption of an ecosystem-based approach to biodiversity management;
- and
- responsibility as the landowner of a significant lowland forest resource.

4.1 Greater Wellington is committed to contributing to the goals of the NZ Biodiversity Strategy

The New Zealand Biodiversity Strategy (NZBS) was adopted by central government in 2000. The strategy notes that regional councils have a critical role in implementing its goals.

The NZBS has a set of “desired outcomes for 2020 and beyond” These are:

- i) A net gain has been made in the extent and condition of natural habitats and ecosystems important for indigenous biodiversity
- ii) Scarce and fragmented habitats (such as *lowland forest* (emphasis added), wetlands and dunelands) have increased in area and are in better ecological health due to improved connections and the sustainable management of surrounding areas. Some modified habitats are restored.
- iii) A more representative range of natural habitats and ecosystems is secure in public ownership, complemented by an increase in privately owned and managed protected natural areas. Increased and more effective pest management, coupled with species recovery, has restored ecological processes in these areas.
- iv) No new pest species have become established.

4.2 Greater Wellington has responsibilities under the Resource Management Act (1991)

The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna is a matter of national importance under section 6 (c) of the RMA.

Through methods in the Regional Policy Statement (RPS), Greater Wellington has chosen to emphasise a *non-regulatory* approach, such as raising public awareness and providing advice and assistance to landowners who are protecting indigenous forest.

Greater Wellington has recognised that more can be achieved by working with landowners than by relying on regulation to protect indigenous ecosystems. This Action Plan is a key part of the development of Greater Wellington's non-regulatory approach and will meet Greater Wellington's commitments in the RPS.

4.3 Greater Wellington's commitment to the region's indigenous biodiversity

Greater Wellington is undertaking a broad programme of biodiversity management to help protect ecosystems. Much of the funding in this programme is devoted to the management and reduction of pest plants and animals from areas of high ecological value (largely bush areas but also wetlands, escarpments and dunes). Funds are also being applied to marine ecosystem management, and to the freshwater environments.

Activities in Greater Wellington's biodiversity programme that benefit indigenous forest include:

- pest plant and animal control in the wider landscape, e.g. National Pest Management Strategy (Bovine Tb) control programme;
- support for QEII National Trust covenanting;
- support for pest plant and animal control in covenanted areas;
- Key Native Ecosystem programme;
- iwi project funding;
- Take Care community action;
- Parks and Forests Environmental Asset Management Plan;
- Parks and Forests restoration initiatives and environmental enhancement programmes.

4.4 Greater Wellington has adopted an ecosystem-based approach to resource management

Greater Wellington signalled its intention to take an ecosystem-based approach to managing the environment in its RPS. The outcomes sought are:

- The overall quality (health) of ecosystems is increased by strengthening key processes;
- Healthy functioning ecosystems are distributed throughout the Region, including the rural and urban environments;
- The area and quality of indigenous ecosystems is increased;
- The Region has a diversity of healthy ecosystems which represent the full range of regional flora, fauna and habitats; and
- Special ecosystems are actively protected and appropriately managed.

4.4.1 The importance of ecological processes

What is Greater Wellington's "ecosystem approach"? All living things are part of complex interacting webs, or systems, that are powered by natural processes and cycles (e.g. the hydrogen, carbon and nitrogen cycles, photosynthesis, energy flows and decomposition). An ecosystem approach to resource management means attempting to sustain and support these processes by managing water, land, air, plants and animals, in ways that help these wider systems function in a healthy and viable manner.

This type of management is different from our earlier efforts to control discrete parts of the environment, such as the quality of water in a river or the conservation of soil on an eroding hillside, in isolation from the ecosystem of which they are a part. This separation was often for economic or institutional reasons. An ecosystem approach means managing a system of interacting parts, not just a discrete area or species. If a single part does require management, an ecosystem approach means doing so in a way that increases its contribution to the health and viability of the wider system, as well as ensuring its own viability.

Sustaining ecological processes is important in all places, from relatively pristine areas to urban and agricultural landscapes. It is just as important on private land, as it is on publicly owned parks and reserves. Of course, our ability to fund any type of intervention is limited and will necessitate some priority setting in collaboration with stakeholders.

4.4.2 Ecosystem Types

Greater Wellington's ecosystem approach also places an emphasis on certain types of ecosystem because of their rarity or absence from the protected lands in the Region. These special ecosystems are:

- Beaches and coastal dunes, escarpments and estuaries;
- Wetlands;
- rivers and lakes; and
- lowland forests.

There are many places in the Region where ecosystems of these types need help to make them sustainable. Greater Wellington recognised this in 2000 and allocated significant additional funding to increase management in these places.

4.5 Responsibility as a landowner of significant lowland forest resources

Greater Wellington is responsible for managing and, in some cases, restoring lowland forests on the land it owns or manages.

Greater Wellington's investment in protecting and managing lowland forest will:

- protect regionally important lowland forest by using best practice pest control techniques;
- manage human activities in the indigenous forest in Greater Wellington parks and forests through the relevant management plans and policies;
- continue to support community involvement in the protection of lowland forest, e.g. MIRO in East Harbour Regional Park and Wellington Botanical Society in Kaitoke Regional Park.

5. Vision and goals

Vision:

The Wellington region has the full range of indigenous lowland forest ecosystems protected and under active management. We can make this vision a reality by breaking it into a number of smaller and more achievable goals:

Goal 1: The variety, extent and value of indigenous forest ecosystems in the region is determined, prioritised and documented

Resources for the protection, restoration and management of indigenous lowland forest ecosystems are finite and some form of allocation mechanism is necessary. By prioritising we can ensure that our efforts are directed to the highest value areas.

Goal 2: Indigenous lowland forest ecosystems under Greater Wellington control are managed to high standards.

Greater Wellington is positioning itself to be the leading agency in biodiversity management outside the Crown estate. An important aspect of this is “leading by example” on our own lands. Greater Wellington is seeking to manage indigenous forest under its control according to best practice and to the highest standards, as detailed in the Parks and Forests Environmental Asset Management Plan

Goal 3: High value indigenous lowland forest ecosystems (outside the Crown estate) are managed to the highest standards irrespective of ownership.

Through its Key Native Ecosystem programme, Greater Wellington is attempting to ensure that the highest value legally protected areas in the region are receiving the highest standards of management support.

Goal 4: Significant lowland forest ecosystems in private ownership are legally protected in perpetuity and receive appropriate levels of management inputs.

Much of the region’s remaining biodiversity is on private land. Greater Wellington works with private landowners to assist them to legally protect biodiversity resources by way of QEII National Trust covenants and offering management advice and, in some cases, support.

Goal 5: Monitoring guides the direction of our programmes by confirming (or otherwise) their success.

It is important that we know if our programmes are achieving their stated objectives. Monitoring programmes are essential tools to assess the effectiveness of existing policies and actions and guide the formulation of new ones.

Monitoring programmes are already in place for Key Native Ecosystem areas and for areas of indigenous forest managed by Greater Wellington. Work is currently underway as part of preparing the next State of the Environment Report to determine suitable methods of monitoring change in the region's indigenous forest.

6. Key actions Greater Wellington will take to achieve the vision

6.1 Work with private landowners

As noted in Section 3, a large proportion (48%) of our remaining indigenous lowland forest is in private ownership. It is critical that Greater Wellington's strategies and programmes engage with, motivate and assist private landowners. The Council has a long and successful record of working with private landowners as a result of its soil conservation, biosecurity and river control programmes.

The Council has recently developed a graduated service delivery programme for landowners seeking assistance managing and/or protecting indigenous lowland forest (and other ecosystems). This ranges from telephone advice through to integrated pest management delivery depending on the ecological value of the resource in question and whether the area is legally protected.

Appendix II contains a flowchart showing how the various levels of private land service delivery are determined.

6.2 Provide extra assistance to owners of high value indigenous forest through the Key Native Ecosystem programme

Greater Wellington has long recognised that more intensive pest control is required to bring maximum benefits to lowland forest remnants. In response, in 1996, the Council's five-year Regional Pest Management Strategy (RPMS) launched the Key Native Ecosystem (KNE) initiative. The KNE programme is intended to protect and enhance native plants and animals in a range of representative sites throughout the region by the on-going integrated control of both pest plants and animals. The council's commitment to the programme was reinforced in the latest RPMS covering the period 2002 – 2022. Through the KNE programme with its focus on the management of a range of pest plants and animals (not just possums) in the highest priority sites in the region, the council is seeking to achieve major biodiversity gains.

There are currently seventy four KNE sites totalling 17,808 hectares, of which 46 are on territorial local authority land (TA) and 28 on private land. Work on TA land is undertaken on a cost share basis with the council concerned. An example is Trelissick Park in the Ngaio Gorge.

6.3 Help landowners to legally protect indigenous forest

Private landowners wishing to legally protect forest fragments (and other ecosystems) on their land in perpetuity while retaining ownership and management control can do so by entering into a QEII National Trust open space covenant. Covenants have proven to be an attractive option for landowners with over 153 covenants registered protecting some 4,695 hectares in the Wellington region. The ecological condition of a covenant is monitored by the National Trust as is compliance with the terms of the covenant agreement.

To encourage more land to be legally protected, Greater Wellington provides financial support for private landowners entering into a covenant. Typically the cost of fencing the area to exclude stock is shared between the landowner, the QEII National Trust and Greater Wellington. In addition the Council shares the cost of surveying the Covenant with the National Trust.

If a new covenant is of sufficiently high ecological value, it can be considered for the Council’s KNE programme. However, the Council has recognised that it is not possible to provide assistance at the “KNE level” to many covenants that could benefit from the control of pest plants and animals. As a result, the Council has established a “covenant condition” fund. The intent of this fund is to assist landowners at the time of entering into a covenant to get the area into the best possible condition by controlling (or in some cases eliminating) pest plants and animals.

Landowners are provided with guidance on how to maintain their covenants in this condition. Unlike the KNE programme this assistance is “one-off”.

6.4 Work with other agencies

Greater Wellington cannot achieve its biodiversity goals for the region on its own. There is a wealth of experience and expertise contained within other agencies and, indeed, the community. The Council is committed to working with other agencies such as:

- Department of Conservation
- QEII National Trust
- Territorial Authorities
- Wellington Fish and Game Council
- Federated Farmers
- Royal Forest and Bird Protection Society
- Community groups

Inter-agency collaboration is assisted by Greater Wellington’s sponsorship and facilitation of the Wellington and Wairarapa Land Protection Forums.

6.5 Manage our own lands to a high standard

6.5.1 Management of the Ecological Values of the Regional Parks, Regional Forests and Water Collection Areas.

Greater Wellington manages over 40,000 ha of indigenous land ecosystems in the Wellington Region within its Regional Parks, Regional Forests and Water Collection Areas. There are five Regional Parks and four forests. The size of these areas is indicated in the table below:

Parks	Total Area (ha)	Indigenous forest and scrub (ha)	Other land ecosystems
Kaitoke Regional Park	2,860	2,580	
East Harbour Regional Park	2,060	1,660	Wetlands (84ha) Coastal sands (18ha)
Belmont Regional Park	3,600	1,590	
Battle Hill Farm Forest Park	500	30	Wetlands (8ha)
Queen Elizabeth Park	640	15	Dunes (150ha) Wetlands (60ha)
Total	9,700	5,900	300

Forests			
Akatarawa Forest	15,420	12,250	Wetlands (17ha)
Pakuratahi Forest	8,050	7,000	Wetlands (3ha)
Wainuiomata/Orongorongo Water Collection Area	7,400	7,350	Wetlands (10ha)
Hutt Water Collection Area	8,750	8,740	Wetlands (4ha)
Total	39,600	35,300	50

Areas calculated using GIS and layers: LCDBv2 and WRC Recreation Zones

The threats to the ecosystems on Council land come from introduced animals and human use. The impacts of pest animals and plants are managed through the Environmental Asset Management Plan, while the environmental impacts of human use are managed through the parks and forests management plans, or through the Environmental Management System. The Environmental Asset Management Plan seeks to care for the ecological values of the land managed by Parks and Forests by setting out a programme of pest control and forest health monitoring. An integrated approach to pest control is taken. In the past, funding has been made available for possum control and the control of old man's beard. Other funding was available for small-scale operations in other areas, but an integrated programme was not in place for all of the Council land. Funding has now been obtained to control possums, goats, and pest plants across all areas of indigenous vegetation on Council land. Some control of other pests also occurs in some specific areas, e.g. rabbits in Queen Elizabeth Park and rats and mustelids in Battle Hill bush remnant and East Harbour Regional Park.

Best practice techniques are used to control pests, e.g. the use of Judas goats and the development of pest plant plans. Currently "mainland island" type pest control sites are being developed at East Harbour Regional Park and in Wainuiomata/Orongorongo water collection area (see mainland island section). It is envisaged in the Environmental Asset Management Plan that in future, other areas on Council land may be selected as intensive control sites.

Restoration initiatives involving care groups are also underway in lowland forest remnants in Queen Elizabeth Park, Belmont and Kaitoke Regional Parks. These groups are involved in planting projects to expand these remnants, as well as pest control activities.

6.5.2 Management of the Ecological values of Soil Conservation Reserves

The land covered under Soil Conservation Reserves totals some 3,806 hectares and includes Stoney Creek, Tauanui and Hiwinui and Rough Hill Reserves. Tauanui, Hiwinui and Rough Hill Reserves were established under the Soil Conservation and Rivers Control Act 1941 and are gazetted Soil and Water Conservation Reserves. Their management was initially vested in the Wairarapa Catchment Board. Title was eventually obtained by the Wairarapa Catchment Board and transferred to the Greater Wellington Regional Council.

Each of the four reserves contains significant areas of indigenous forest or scrub:

Conservation Reserves	Total Area (ha)	Indigenous forest & scrub	Other land ecosystems
Tauanui	408	93	
Hiwinui	770	120	
Stoney Creek	2,189	945	Wetlands (1 ha)
Rough Hill	439	417	
Total	3,806	1,575	1

Future management actions

All four Reserves have been managed in the past for their soil conservation values. With the possible exception of Rough Hill, each of the Reserves was highly erodible and the off-site impacts of the erosion on downstream assets were significant. These impacts have largely been mitigated by the change in land use to a blend of protection and production forestry, and the inclusion of strategic riparian areas.

Management in the future will obviously need to remain wedded to the key elements of soil conservation and biosecurity. However, an ecosystem approach will necessarily require a broadened strategy that identifies a range of additional values for protection and enhancement.

In managing these lands recognition needs to be given to Goals 2, 3 and 5 of this plan. This means that Greater Wellington will undertake the following actions:

- Indigenous land ecosystems identified through the prioritisation process and falling within the Reserves will be managed to high standards.
- Management will include integration with relevant Greater Wellington biosecurity initiatives for pest animal and plant control.
- Harvesting plans will give full recognition to the existence of significant land ecosystems and protect the existing values.
- As part of any revegetation plan, the opportunity to enhance or expand any existing land ecosystems will be considered.
- Long term financial planning will recognise any potential loss in revenue, and ensure adequate funding is set aside for protection and enhancement programmes.

6.6 Mainland Island concept

The prioritisation programme that ranked the region's indigenous forest outlined in Section 3, highlighted that some of the highest value native forests in the region are owned and managed by Greater Wellington. The best example is the water catchment areas of Wainuiomata and Orongorongo. The Council is in the early stages of developing a "mainland island" concept for part of this area. A mainland island is a defined area in which intensive control of pest plant and animals is undertaken. Inevitably this has a beneficial effect on the residual biodiversity of the area and increases in the numbers and range of indigenous plants and animals is achieved.

Such intensive control also allows for the reintroduction of species that were once present but now locally rare, endangered or extinct.

A project plan will be developed for consideration by the Council in due course.

6.7 Land Management Department supporting activities

Greater Wellington administers a number of land management programmes that, by their very nature, encourage the development and protection of biodiversity values. These programmes target sustainable land use on three main fronts and include hill country erosion, wind erosion within the Wairarapa valley, and riparian management.

Programmes are delivered to landowners through a specific plan, whether it is a conservation or sustainability plan, a wind erosion control plan or a riparian plan. Each plan offers financial assistance to undertake work, to mitigate against the adverse environmental effects of the erosion problem.

The opportunity to enhance or protect biodiversity is closely aligned to the content of each plan. Erosion prone soils throughout the regions hill country often have indigenous remnants as a vegetation cover, either in a hillslope or gully situation. These areas are often included as part of the erosion control measures and although not legally protected, the biodiversity values are greatly improved through the removal of stock. Where necessary, pest animal control is also undertaken.

The same situation occurs with wind erosion control plans and riparian plans. When areas are fenced to facilitate shelter or riparian planting, the existence of indigenous vegetation within or near to the site offers opportunity for inclusion, and therefore enhancement of the biodiversity values.

Financial assistance for the Riparian programme is targeted at twelve key catchments. These catchments contain riparian zones of high biodiversity value and diverse ecosystem characteristics. Assistance is provided to areas within these catchments where the values and characteristics need to be enhanced. Landowners are required to fence the sites, and Greater Wellington will complete the planting requirements, and subsequent maintenance needs for the two years following planting.

6.8 Provision of Advice

Recognising that many private landowners do not seek financial assistance but just require advice and information, the Council has produced a series of biodiversity booklets aimed at private landowners and Care Groups.. These are available free of charge.

The titles are:

- i) *The Beginner's Guide to Wetland Restoration*
- ii) *Restoration Planting: A guide to planning restoration planting projects in the Wellington region*
- iii) *Mind the Stream: A guide to looking after urban and rural streams in the Wellington region*
- iv) *Managing Your Bush Block A guide to looking after indigenous forest remnants in the Wellington region*
- v) *Controlling Problem Weeds in Riparian Zones*

Restoration Planting and *Managing Your Bush Block* are of particular relevance to the objectives of this plan

The above booklets build upon the successful *Wellington Region Native Plant Guide*. With sales approaching the 10,000 mark, the plant guide has been a very successful source of information for householders wishing to take up an ecosystem based approach to their backyards and gardens. The guide has enabled the ecosystem message to be delivered to the urban community.

7. Monitoring – how will we know if we are achieving our vision?

Monitoring the success or otherwise of our programmes is an important component of this Action Plan. It is only by undertaking some form of measurement that we can determine if the management strategies outlined in this plan are achieving their objectives.

In general terms we will design monitoring to:

- i) *Measure the change in the total area of indigenous lowland forest over time and the area under legal protection. This will give us a measure of change in extent.*

The extent of forest habitat types across the region will be assessed for significant changes. This is a “Big Picture” indicator that can be summarised at regional level. Most of the information about the physical extent of lowland forest ecosystems can be generated from satellite imagery with some groundwork to verify habitat types.

This indicator will tell us if indigenous lowland forest ecosystem remnants are getting larger. Coupled with a GIS overlay of protected areas this will tell us if we are increasing the degree of protection of lowland forest ecosystems overall.

- ii) *Assess the overall area of lowland forest subject to pest plant and animal pressures. This will give us some idea of the condition of the resource and changes in this can be measured over time.*

Introduced plants and animals reduce the viability of populations of indigenous species through predation and competition. Specific monitoring strategies will be based on the type of pest animal or plant and type of control policy. Generally we will monitor aspects of the pests themselves such as indices or direct measures of extent or density. The change in pre-control and post-control numbers can be used to determine how effective pest control has been.

For invasive weeds, the preferred approach will be to determine the extent of infestations and monitor the change in infestation over time. Where pest density cannot be directly monitored, as is usually the case for pest animals, estimates will be made by randomly sampling the population.

The information is generally collected and analysed at a local level. However, pestilence can be aggregated to regional level and reported as the number of ecosystems impacted by each pest species.

- iii) *Measure the improvement in biodiversity in lowland forest when pressures such as pest plants and animals are removed. This will provide us with confirmation that our programmes are working and to what degree.*

While it is relatively simple to measure the changes in the number of hectares of lowland forest, it is much more difficult to get an overall picture of changes in the biodiversity condition. We recognise that we cannot measure or even begin to estimate the population sizes or every native species of plant, animal, fungus, or bacteria. However, we do need to measure the response of some selected examples of our biota to see if our actions are “making a difference”.

Some of the indicators used include:

- Measurements in increases in diversity and abundance of native birds;
- Measurements of possum browse on native trees;
- Permanent enclosure plots to measure forest response to browser and grazer absence;
- Seedling plots to measure recruitment, and;
- Ground travelling native invertebrates, measuring changes in higher taxonomic diversity and change in proportions of larger invertebrates as a response to predator removal.

Monitoring in Greater Wellington parks and forests

Parks and Forests have had a monitoring programme in place for some years on Greater Wellington-managed land. This programme has been set up to assess both operational success and improvements in ecosystem health. Methods used to determine operational success include:

- possum trap catch;
- ungulate number indices;
- rodent/mustelid tracking and
- pest plant mapping.

Outcome monitoring methods include:

- rata digital photography;
- fruit-fall plots;
- ungulate browse plots;
- permanent vegetation plots;
- bird transects;
- photopoints and
- condition assessment.

Specialist monitoring techniques that are used to monitor forest health are phenology recording, rare plant monitoring and surveillance for introduced insects and pathogens. An ongoing survey programme ensures that knowledge about the indigenous flora and fauna and their habitats on Greater Wellington land is continually updated.

Appendix 1

Methodology used for identifying and ranking indigenous forest areas in the Wellington region.

In 2002 Landcare Research provided GW with a land cover classification at 15 metre resolution. We chose four classes to represent regional forest sites:

- Indigenous Forest
- Broadleaf Scrub/regenerating forest
- Narrow leaf scrub (mainly manuka/kanuka)
- Unspecified scrub (mixed scrub association, but not gorse or young pines)

Sites were mapped as continuous mixtures of these 4 classes. A gap of more than 15 metres results in the generation of a new site. All sites less than one hectare were removed, leaving approximately 6800 forest remnants in the region.

Element 1: Distinctiveness

Landcare Research has classified New Zealand's land environments using a range of climatic and soil variables (Land Environments New Zealand, or LENZ classification). The LENZ classification variables have been shown to correlate with forest composition and the hypothesis is that the more distinctive environments will have communities of plants and animals in mixtures that are distinctive from more commonplace LENZ categories. GW believes the remaining indigenous forests in the most distinctive areas are significant biodiversity assets.

Element 2: Importance

GW have given some weighting toward how important a forest fragment is, based on the degree of loss of habitat types. Importance is determined by two measures.

The first measure of importance is based on how much indigenous forest remains in each of the 13 classes of the region's physical environment as defined by the LENZ data. Importance of extant forest is highest in environment classes that have suffered substantial loss of forest cover, such as those in the Wairarapa Plains for example.

The second measure of importance is based on the composition of extant indigenous forest in contrast to a pre-human base line. Beech forest tends to be on harder country, less suited to farming and other human utilisation than broadleaf/conifer forest. Land use practices have led to a greater proportion of loss of broadleaf and conifer forests, making remnants of these forest types more important than beech.

Element 3: Natural Character

Natural Character is an indication of how the vegetation character of a fragment has been influenced by harvesting, fire, or other human-derived disturbances that cause climax forest to revert to earlier stages of forest succession. The natural character was calculated for each site, based on whether it was classified as unspecified or narrow leaf scrub (low natural character), broadleaf / regenerating scrub (moderate natural character) or indigenous forest (high natural character).

Gorse/broom and exotic forest classes are identified separately in the land cover data, but were not included in the prioritisation exercise.

Element 4: Size

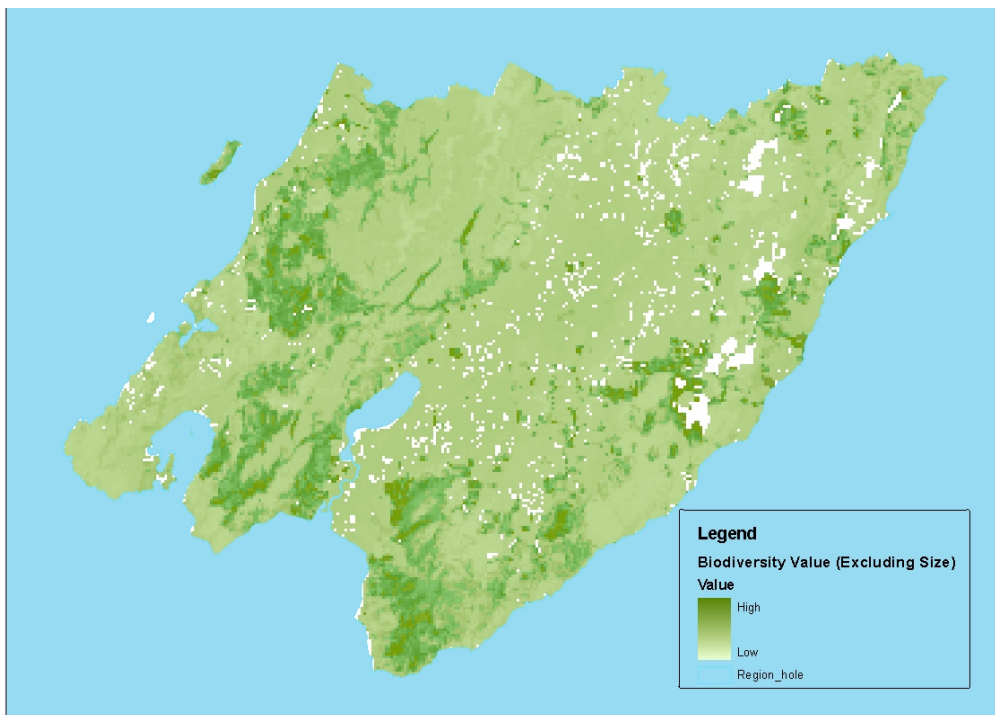
Larger fragments are more valued than smaller ones because they are better at absorbing the effects of large-scale ecological and environmental process (for example slips). The core of a larger fragment is also less affected by the surrounding land use than the core of a smaller fragment.

The size of a fragment and the number of species it can contain follows a diversity-area curve represented mathematically as “hectares^{0.4}”. The diversity-area curve reflects the dependence of large bird and tree species on large areas to sustain their populations. The curve effectively means that while a site twice the size of its neighbour is more valuable, it is not twice as valuable.

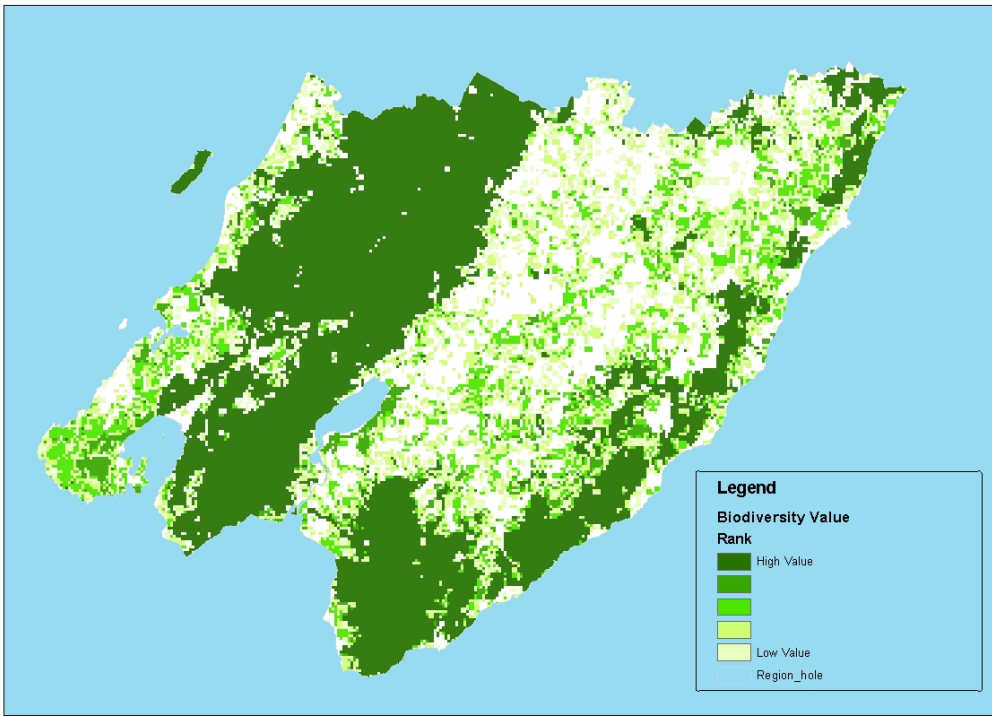
Putting it together

Under the prioritisation exercise, the scarcity and distinctiveness of lowland forest ecosystems causes them to be rated as extremely valuable. Map 3a depicts the individual 15 metre pixel values that are derived by combining “Distinctiveness”, “Importance”, and “Natural Character”. This map highlights the location of biodiversity “hotspots” (dark green), where the vegetation character and abiotic features indicate potentially distinctive pockets of biodiversity. Many of the “hot spots” are small lowland kahikatea remnants or the lowland / kahikatea component of much larger forest remnants.

Lowland forest is one part of the mosaic of indigenous forest ecosystems throughout the region. Large forest remnants with mixtures of forest types are more likely to support a greater variety of under-storey plant species, native birds, lizards and invertebrates. Map 3b shows the forest fragments as they have been prioritised including the “Size” element. The map depicts the value (with dark green as the highest value) of forest fragments based on the overall diversity within the fragment and the ability for that diversity to persist long into the future. Protecting the most valuable of these fragments results in the protection of a great deal of the significant lowland forests.



Map 3a: Biodiversity value excluding the effect for fragment six.



Map 3b: Biodiversity value including the effect of fragment size.

Appendix II

Protecting biodiversity on private land a qualifying process for management assistance

