

Identification and prioritisation of high value terrestrial biodiversity sites for selection within the Key Native Ecosystems Programme in the Wellington region



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Executive summary

Greater Wellington Regional Council (GWRC) initiated a review of its Key Native Ecosystems (KNE) programme in 2011. This programme aims to manage a representative range of high value terrestrial biodiversity sites in the Wellington region. This report details the systematic conservation planning process used to identify high value terrestrial biodiversity sites in the region for management purposes. The process involved an assessment of both biodiversity value and biodiversity variability across the landscape. Biodiversity value was assessed using indicators of rarity and ecological integrity, while an ecosystem classification system (Singers and Rogers 2014) was employed to determine regional biodiversity variability.

The ecosystem classification system process resulted in the identification of 38 terrestrial ecosystem types in the region; 21 forest, 7 wetland, 6 coastal and 4 other ecosystem types. A total of 218 sites were listed as high value biodiversity sites and a prioritisation process was used to identify the best sites within each ecosystem type. The scoring process applied differed between forests, wetland/coastal and other ecosystem types, but components of representativeness, rarity and ecological integrity were considered in each case. Fifty-eight sites were selected as part of the voluntary KNE programme.

A re-analysis of priority sites was completed in 2015 to assess which sites should be added to the KNE programme if sufficient funding was to become available. Recommendations resulting from this process include adding rimu, matai, hinau/black beech forest ecosystem type in the eastern Wairarapa, increasing the number of sites in lowland forest remnants and adding selected riverine areas to the KNE programme.

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1. Introduction

Greater Wellington Regional Council's (GWRC) Key Native Ecosystem (KNE) programme was initiated in 2002 in response to the New Zealand Biodiversity Strategy (2000), with the aim of protecting and enhancing native flora and fauna in selected sites throughout the Wellington region. This programme covered territorial reserves and private land and initially started as a pest animal control programme, with pest plant control added at a later date. The process used to select KNE sites involved a call for submissions from stakeholder groups (and the public) to identify 'high value biodiversity' areas in the region (excluding Department of Conservation (DoC) lands). The ecological values of the indigenous ecosystems (40,000ha) in GWRC's parks and forests were at that time managed under GWRC's parks and forests ecological management programme. A scoring system for evaluating sites across the region for inclusion in the KNE programme was developed for the KNE programme and over time more sophisticated techniques, such as satellite imagery and GIS maps were used to identify high value biodiversity areas.

A review of the KNE programme was initiated in 2011 when it was combined with GWRC's Parks ecological management programme. A Biodiversity Strategy developed by GWRC in July 2011 included two high level goals; "high value biodiversity areas will be protected" and "regional ecosystems and habitats will be maintained". As part of the review, systematic conservation planning was employed to identify 'high value biodiversity sites' across the region. The goal of systematic conservation planning is to identify areas for protection and/or management in a way that enables the efficient use of limited resources to ensure the persistence of a representative range of biological diversity (Margules and Pressey 2000). This means that both biodiversity value and variability (pattern) need to be captured in a biodiversity management and/or protection programme to capture a full range of biodiversity variables and to ensure the persistence of the range of ecosystem types. The process documented in this report for the Wellington region involved the assessment of biodiversity values across the landscape on a site basis using indicators such as the presence of intact ecological communities and the presence of rare species, while an assessment of variability was completed using representativeness as defined by an ecosystem classification system. In this case, the Singers and Rogers (2014) system was used.

The objective of the prioritisation process described in this report was to identify the best remaining examples of representative high biodiversity value sites in the Wellington region for management in the KNE programme. This process needs to be differentiated from the identification of 'significant' sites for district planning purposes, although similar tools are used for both processes. The criteria used to determine 'significance' are set out in the Regional Policy Statement (GWRC 2013) and while similar, are different to those used here. All high value biodiversity sites listed in this report are likely to be identified as 'significant' in district plan. The goal here however, is to identify the best remaining sites for selection within the KNE programme and investment through active management, rather than to identify every site that should be protected. The best most ecologically intact sites are chosen for management because it is more cost-effective to maintain or enhance

ecosystems with high ecological integrity (i.e. in good ecological condition) than to restore degraded ecosystems. Note however that some of the sites chosen may be small or fragmented as those remnants are the only remaining examples of their type. Ecological integrity can be defined as “containing the full potential of indigenous biotic and abiotic features, and natural processes, with functioning sustainable communities and habitats” (Lee et al. 2005).

2. Methodology

2.1 Assessment of biodiversity values

A wide range of information was used to identify sites containing high biodiversity values, including that collated through the KNE and Parks programmes in previous years. Sites were assessed in three broad ecosystem types: forests, wetlands and coastal ecosystems. Information was drawn from the following sources:

- Data and recommendations from field surveys completed in the Wairarapa and Kapiti Coast as part of the DoC Protected Natural Areas programme (Kelly and Park 1986). Completed surveys include the Ecological Districts of the Wairarapa Plains (Beadel et al. 2000), Eastern Wairarapa (Beadel et al. 2004), Foxton (Ravine 1992), Manawatu Plains (Ravine 1995) and Puketoi (Findlay 1992), with Recommended Areas for Protection (RAPs) being identified as part of those reports
- DoCs Ecosites database
- Relevant desk-top studies, e.g. Biological Resources of the Wellington Region (WRC 1984)
- GWRC Parks data and information, as sourced from monitoring data and resource documentation
- Information contained in site visit reports made in the earlier years of GWRC's KNE programme
- "Top 100" site information for forests from site visits completed by GWRC's Biosecurity Department
- LENZ threatened environments GIS layer
- Threatened species GIS layers supplied by DoC and updated by internal GWRC staff
- A desktop assessment of wetlands in the Wellington region (Boffa Miskell 2013)
- A ranking of estuarine systems in the lower North Island (Todd et al. 2016)
- A report on coastal biodiversity on private land in the Wairarapa (Rebergen 2009)
- A journal article on rare terrestrial ecosystems (Williams et al. 2007)

2.2 Assessment of a representative range of biological diversity

The approach used to capture regional biodiversity variability for this assessment evolved over time as new techniques became available during the course of the project which began in 2011. The initial approach was to build on previous work that had been completed by GWRC in 2002. A GIS layer had been developed that used the LENZ classification system (Leathwick et al. 2002) to determine how different sites were from each other in terms of abiotic variables such as soil fertility and mean annual temperature. This work is explained more fully in Section 2.4.1. The Singers and Rogers ecosystem types were in development for a number of years prior to publication (Singers and Rogers 2014) and it was recognised in 2012 that this classification system could provide a mechanism for determining variability (and hence representativeness) across the region. The identification of the various ecosystem types in the region meant that representative examples of each of

those types could be identified for inclusion in the management site network. As a result, the GWRC GIS layer was used as one of the prioritisation tools, but the Singers and Rogers ecosystem classification tool proved more useful for determining representativeness. It is acknowledged that the Singers and Rogers system does not include seral or scrub communities that are also important for native species, but the focus here was on prioritising the most intact sites for management purposes.

A workshop was held in Wellington in 2011 where an expert panel was used to identify the ecosystem types present in the region (from the national list) using the Singers and Rogers classification system and list the best remaining examples of those ecosystems. A map depicting the areas of the different potential ecosystem types was produced by Nick Singers for Wellington in September 2014.

2.3 Remaining extent of Singers and Rogers ecosystem types

The remaining extent of each of the Singers and Rogers ecosystem types needed to be determined in order to rank sites for prioritisation purposes. The Singers and Rogers ecosystem types in the Wellington region are shown in Table 2.1 and the spatial extent of those types is shown in Figure 2.1.

Table 2.1: Singers and Rogers ecosystem types in the Wellington region

Forest ecosystems

MF1, Totara, titoki forest
 MF2, Rimu, matai, hinau forest
 MF2, Rimu, matai, hinau forest and MF5, Black beech forest mosaic
 MF20, Hard beech forest
 MF5, Black beech forest
 MF6, Kohekohe, tawa forest
 MF7, Tawa, kamahi, podocarp forest
 MF8, Kamahi, broadleaved, podocarp forest
 WF1, Titoki, ngaio forest
 WF2, Totara, matai, ribbonwood forest
 WF3, Tawa, tiitoki, podocarp forest
 WF6, Totara, matai, broadleaved forest [Dune Forest]
 WF8, Kahikatea, pukatea forest
 CDF4, Hall's totara, pahautea, kamahi forest
 CDF7, Mountain beech, silver beech, montane podocarp forest
 CLF10, Red beech, silver beech forest
 CLF11-2, Silver beech
 CLF11-3, Silver beech, kamahi forest
 CLF4, Kahikatea, totara, matai forest
 CLF9, Red beech, podocarp forest
 CDF6, Olearia, Pseudopanax, Dracophyllum scrub [Subalpine scrub]

Wetland ecosystems

Swamp mosaic
 WL10, Oioi restiad rushland/reedland
 WL12, Manuka, tangle fern scrub/fernland
 WL18, Flaxland
 WL19, Raupo reedland
 WL20, Coprosma, twiggy tree daisy scrub
 Fen mosaic

Coastal ecosystems

DN2, Spinifex, pingao grassland/sedgeland
 DN2/5 Coastal Sand dunes Mosaic
 DN5, Oioi, knobby clubrush sedgeland
 Rocky beach
 SA2, Searush, oioi, glasswort, sea primrose rushland/herbfield [Saltmarsh]
 SA4, Shore bindweed, knobby clubrush gravelly/stonefield

Alpine ecosystems

AL4, Mid-ribbed and broad-leaved snow tussock tussockland/shrubland
 AH3, Gravelly/stonefield, mixed species cushionfield

Cliff ecosystems

CL3, Coprosma, Muehlenbeckia shrubland/herbfield/rockland

River ecosystems

BR1: Hard tussock, scabweed gravelly/stonefield

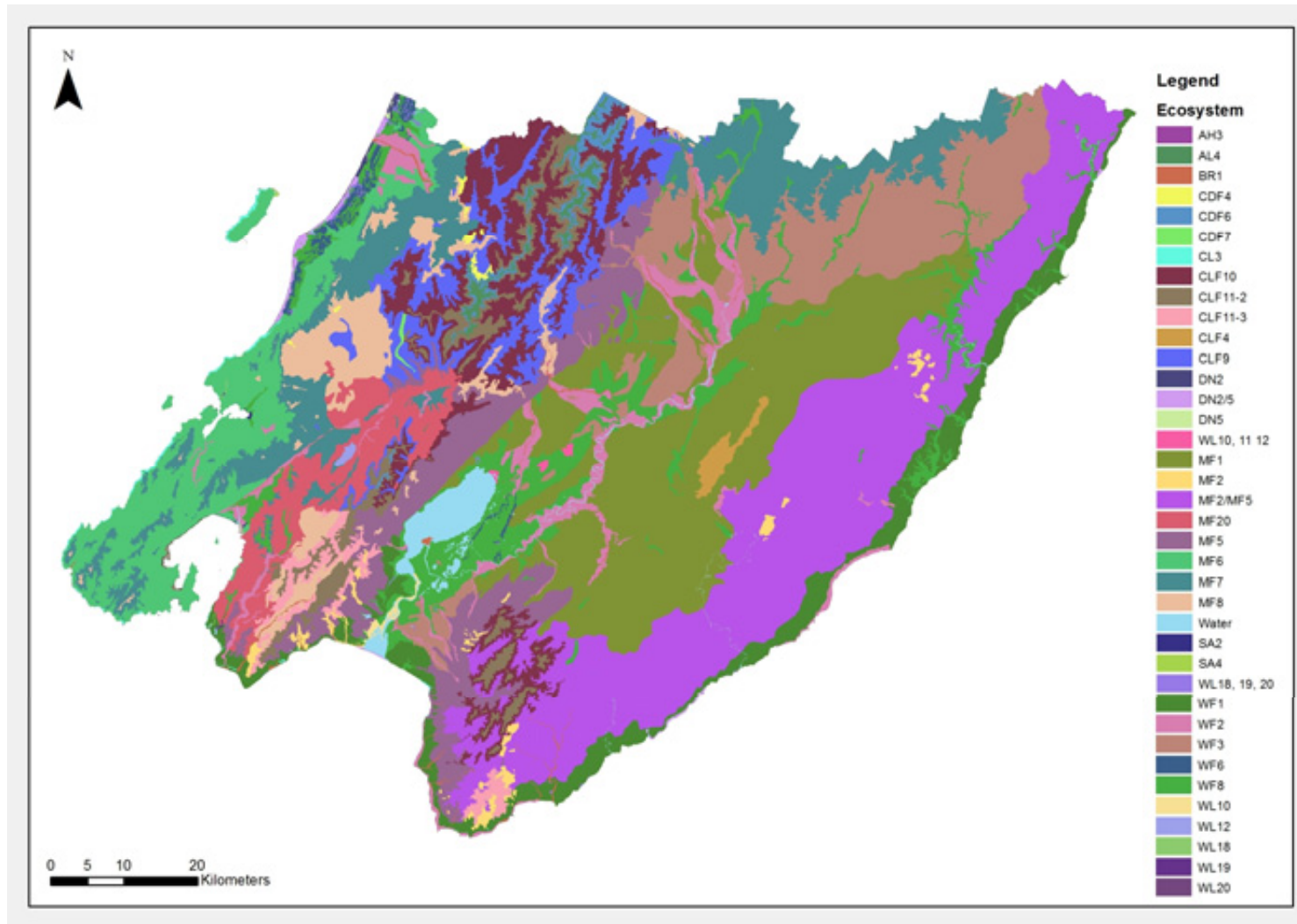


Figure 2.1: Map of Singers potential ecosystem types in the Wellington region. Refer to Table 2.1 for a list of ecosystem types

Twenty-one forest, seven wetland and six coastal ecosystem types in the region were identified, as well as four other ecosystem types, which are:

- Alpine (2 types)
- Cliff
- Scree and braided rivers

An analysis of how much remains of each ecosystem type was completed for the forest ecosystems by overlaying the relevant indigenous Landcover Database (LCDB) cover classes with a layer containing the 38 identified Singers and Rogers ecosystem types in GIS. The results of this analysis (Table 2.2) indicate that the percentage remaining of 20 forest ecosystem types varies from 0.7 to 100%, with major loss of habitat having occurred in the lowland areas. There are difficulties in determining the remaining extent of indigenous vegetation in the other ecosystem types, such as wetlands using LCDB however, as the mapping scale does not provide sufficient resolution at a regional scale.

Table 2.2: Remaining area of Singers potential forest ecosystem types in the Wellington region using LCDB4 (alpine scrub forest type not included)

Forest Name	Remaining area (ha)	Original area (ha)	Percentage remaining (%)
CLF4, Kahikatea, totara, matai forest	22	2,973	0.7
WF8, Kahikatea, pukatea forest	526	50,739	1.0
MF1, Totara, titoki forest	2,411	122,364	2.0
WF6, Totara, matai, broadleaved forest dune forest	78	3,613	2.2
WF2, Totara, matai, ribbonwood forest	691	26,106	2.6
WF3, Tawa, tiitoki, podocarp forest	1,898	71,085	2.7
WF1, Titoki, ngaio forest	1,088	34,439	3.2
MF6, Kohekohe, tawa forest	7,805	49,271	15.8
MF2, Rimu, matai, hinau forest and MF5, Black beech forest mosaic	22,946	140,437	16.3
MF7, Tawa, kamahi, podocarp forest	15,053	66,858	22.5
MF20, Hard beech forest	7,195	27,677	26.0
MF5, Black beech forest	23,418	50,274	46.6
MF2, Rimu, matai, hinau forest	3,190	4,790	66.6
MF8, Kamahi, broadleaved, podocarp forest	22,027	25,653	85.9
CLF11-3, Silver beech, kamahi forest	7,360	8,144	90.4
CDF4, Hall's totara, pahautea, kamahi forest	844	924	91.3
CLF11-2, Silver beech	18,731	20,475	91.5

Forest Name	Remaining area (ha)	Original area (ha)	Percentage remaining (%)
CLF10, Red beech, silver beech forest	42,521	45,425	93.6
CLF9, Red beech, podocarp forest	28,771	30,316	94.9
CDF7, Mountain beech, silver beech, montane podocarp forest	377	377	100

2.4 Prioritisation of high biodiversity value sites

A large number of sites containing high biodiversity values were identified across the region during the project. This resulted in a need to complete a prioritisation process to identify the best remaining sites. The approach to the prioritisation was dependant on the ecosystem type, i.e. forest, wetland or coastal ecosystem.

Some sites that had been selected during the information-gathering process were removed from the original lists where advice was received that the area was no longer of high value (e.g. where native forest had been cleared for plantation forestry purposes or wetlands where hydrological function was now impaired).

The threatened species information available at the time of the prioritisation was poor. If this exercise were to be repeated, the accuracy of the scoring for this attribute would be improved by the regional threat lists and the (now) increased understanding of the locations of threatened species across the region.

2.4.1 Forests

Forest sites were scored for prioritisation purposes using a range of attributes chosen to reflect both ecological integrity and rarity (e.g. the ‘Forest GIS’ and “Identified site” scores highlighted the larger, more intact sites, while the Ecosystem and LENZ scores provided for representativeness and rarity). A list of the attributes used, along with descriptions of how they were scored is as follows:

1. Ecosystem: Using the Singers potential ecosystem GIS layer, a weighting was placed on representative sites in relation to the area remaining in the region under native vegetative cover. The weighting used was: < 100ha = 5, <1,000ha = 4, <5,000ha = 3, <15,000ha = 2 and >15,000ha = 1.
2. LENZ Threat: The LENZ 4 Threat Classification GIS layer indicates areas where less than 10% of the Level 4 land environments remain in native vegetation (see Walker et al. 2007). Where a site was fully within a threatened LENZ area, it was accorded a score of 2. If part of the site area was in the threatened LENZ category, a score of 1 was applied.
3. Species: The presence of threatened species within sites was determined using GIS layers supplied by DoC and updated using GWRC data, and from local knowledge. A scoring range of 1-3 was used, where 1

represented a record of one threatened species and 3 represented the presence of three or more threatened species.

4. RAP or Identified Site: Some sites had previously been identified as being the best examples of their type, either through DoC PNA surveys (RAPs) or through the Singers expert workshop. These sites were accorded a score of 1, while other sites were scored 0.
5. Forest GIS: The GIS analysis of forest remnants in the region incorporated assessments of both biodiversity value and of distinctiveness (variability across the landscape). LCDB GIS layers for forest cover were used from which nearly 7,000 forest remnants greater than 1ha in size were identified. A gap of 15m was used to separate sites. Weightings were then applied to each of these sites for the following factors:
 - Size – a large site is more resilient and more likely to provide habitat for a wide range of species than a small site, but a site that is twice the size of its neighbour is not necessarily two times more valuable. Each site was allocated a score= $\text{hectares}^{0.4}$.
 - Natural character – a score was allocated to a site based on the mix of indigenous, broadleaf and scrub identified in the LCDB GIS layer. Scores applied were: scrub=0.1, broadleaf=0.3 and indigenous forest=1.0.
 - Distinctiveness – the analysis used the physical variables that underlie LENZ to assess how distinctive each site was from each other and to the land environments on DoC land within the region. A mean distinctiveness based on the LENZ data for each site was calculated and ranged from 0.3 (most common) to 1.0 (most different).
 - Importance – a weighting was used for forest types that are now much reduced, so that riparian and lowland forests received higher scores than upland forests and likewise for conifer and broadleaf forests versus beech forest. This analysis used an early version of EcoSat, which used satellite imagery to distinguish beech forest from conifer and broadleaf forest.

There were some issues with pine forest reflectance mimicking that of the native forests in the EcoSat imagery. Despite this, the forest GIS layer was considered worthwhile using for this prioritisation process because it included components of resilience (size) and connectedness that were not evaluated using the other attributes. Checks were also made of sites using aerial photography to determine if pine forest was present, prior to their inclusion in the high biodiversity site list. For the forest GIS layer, sites were scored as follows: Top 40 = 3, Top 80 = 2, Top 120 = 1.

2.4.2 Wetlands

Wetlands were prioritised using a scoring system based on the composition of the vegetation, the faunal community and the presence of threatened species. The scoring system followed the methodology used in an earlier draft of Todd et al. (2016) for assessing native community and species values, as follows:

- Floral and faunal community scores of 1-5, where 1=minimal biodiversity value with few or no native species present and 5= high biodiversity value, with a healthy native ecosystem containing a wide range of species.
- Threatened species score of 1-5, where 1=no significant species present and 5=presence of multiple threatened species.

The scores were determined using the site data available.

Different criteria were used for identifying outstanding and significant wetlands for GWRC's Proposed Natural Resources Plan (PNRP) process, as the purpose was to determine 'significance', rather than for management priorities. However, it is noted that all of the outstanding wetlands in the PNRP had been included in the priority lists developed here.

2.4.3 Coastal ecosystems

The same prioritisation criteria and scoring system that were used for wetlands were used for coastal ecosystems. Again the scores were determined using data available about the site.

Information from the draft lower North Island estuaries assessment by Todd et al. (2016) was then used to incorporate estuaries into the coastal ecosystem priority list. All of the highly ranked sites now listed in the final estuaries assessment had been identified in the priority list for coastal ecosystems. It was decided however that where sea walls or development now impacted the natural function of a dune system, then the system would not be included in the priority list.

2.4.4 Other ecosystem types

The focus on forests, wetlands and coastal ecosystems during the initial prioritisation process meant that the alpine, cliff and braided river ecosystem types were not originally considered in the priority site lists. While the alpine ecosystem types were largely protected through their location on land managed by the DoC and the cliff ecosystem type (CL3) was incorporated into the identified coastal ecosystem site list, high value examples of the braided river ecosystem types were not picked up. The omission of this ecosystem type is revisited in Section 4.

2.5 KNE selection process

A selection process to include a site within the KNE programme was developed following the identification and prioritisation of high biodiversity sites in the region (described above).

The KNE programme is a non-regulatory voluntary programme (requiring landowner approval) that seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region by managing, reducing or removing threats to their ecological values. KNE sites can be located on private or publically owned land. Land managed by DoC is generally excluded from this programme (DoC sites are highlighted throughout this document in bold type).

Sites with multiple ecosystem types present were prioritised for inclusion within the KNE programme first. Subsequently, other high value sites were approached for inclusion based on the ecosystem type they represented in order to try and establish a full range of original ecosystem types within the KNE programme. A site must also be considered sustainable for management in order to be considered for inclusion in the KNE programme. Sustainable for the purposes of the KNE programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

The exact boundaries of a KNE site are determined by landowner approval and may include part of, or adjacent parcels of the originally identified high value sites.

3. Results

3.1 High value biodiversity sites

A total of 218 sites were identified as high biodiversity value sites (Figure 3.1). These sites are listed in Appendix 1 (Tables A1.1 – A1.5). There were 126 forest sites identified, including ten that contained multiple Singers ecosystem types (Tables A1.1 and A1.2). The areas of the forest sites ranged in size from 1 to over 5,000ha. Wetlands (38 sites) and coastal ecosystems (43 sites) are shown in Tables A1.3 and A1.4, while other ecosystem types (11 sites) are listed in Table A1.5. Some of the 216 sites were listed in more than one of the four ecosystem types, as multiple ecosystem types were present in the area, e.g. Fensham Reserve is listed in both the forest and wetland lists.

The most significant of these areas are those that contain multiple Singers ecosystem types. They are important not only because of those individual types, but also because there are continuous connections between ecosystems (ecotones). Ecotones often contain high biodiversity values because of overlaps between floral and faunal communities and these areas can act as buffer zones for more sensitive ecosystems. Apart from the ten forest sites listed that contain multiple ecosystems, Wairarapa Moana wetlands and Te Awarua-o-Porirua Harbour provide examples of wetland and coastal complexes, respectively.

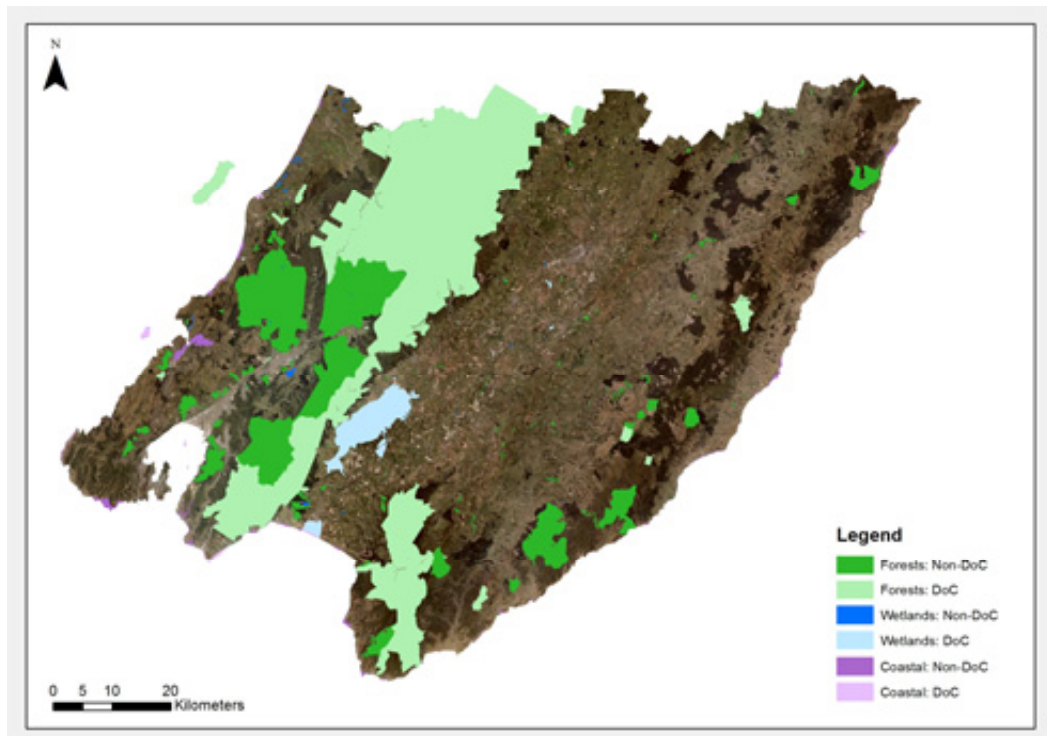


Figure 3.1: High value biodiversity sites in the Wellington region

3.2 Key Native Ecosystem sites

The KNE selection process resulted in the inclusion of 58 sites in the KNE programme. These are shown in Figure 3.2 and listed in Table 3.1, along with the relevant names of the high biodiversity value sites used in the priority listings. GWRC is also involved in collaborative restoration programmes for Wairarapa Moana and Te Awarua-o-Porirua Harbour, so these sites were not included in the KNE programme.

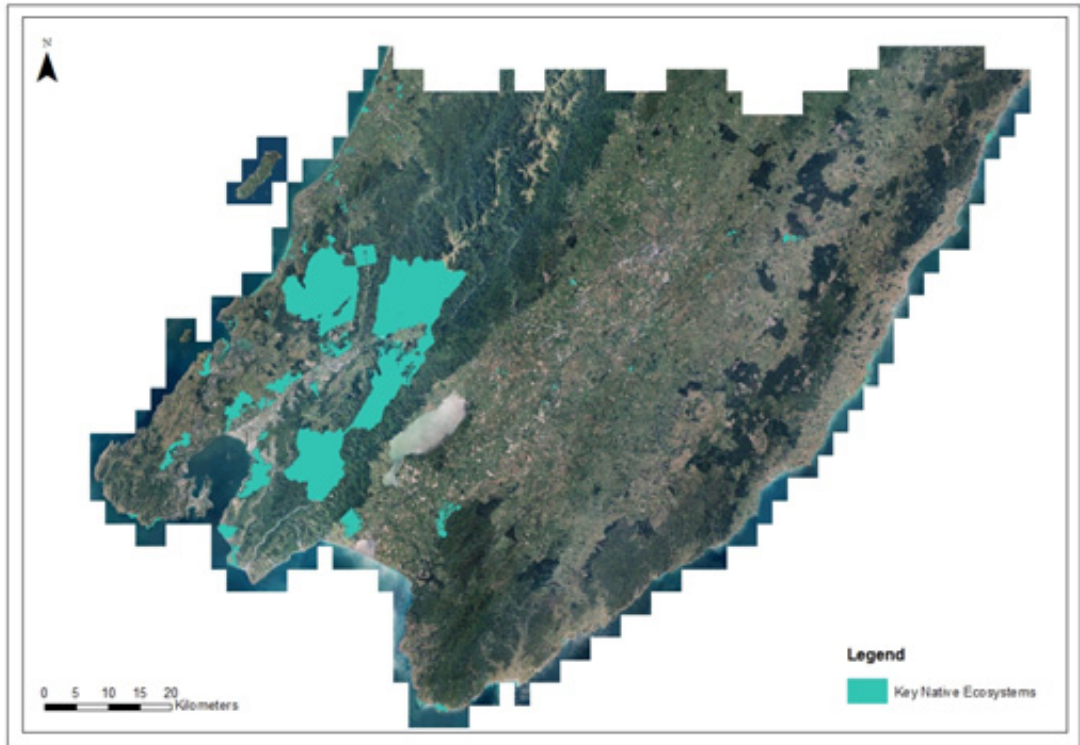


Figure 3.2: Key Native Ecosystems sites as of December 2016

Table 3.1: Key Native Ecosystem Sites as of December 2016 (n=58)

Key Native Ecosystem name	Sites in priority lists	Ecosystem type example
Akatarawa Forest	Akatarawa Forest, Drapers Flats wetland, Whakatiki wetland, Martins River Swamp	CDF4, CLF9, MF20, MF7, MF6, MF8, WL18, WL19, WL20
Baring Head/Ōrua-pouanui	Baring Head, East Harbour Regional Park (part)	CL2, CL3, SA4
Battle Hill Bush	Battle Hill	MF6
Belmont-Dry Creek	Dry Creek	MF7
Belmont-Korokoro	Korokoro	MF6, MF7
Belmont-Speedy's	Speedys Stream	MF6, MF7
Cape Palliser (Matakiakiakupe)	Cape Palliser	CL2, SA4, SA7
East Harbour Northern Forest	East Harbour Regional Park (part)	MF20
Fensham	Fensham Reserve	MF5, WF8
Forest Lakes Area	Forest Lakes	WL18, 19, 20
Haruātai / Pareomatangi	Haruatai Park	WF8
Haywards Scenic Reserve	Haywards SR	MF20
Homewood Coastal Plains	Homewood Road Bush, Patanui Stream, Uruti Dunes (part)	WF1, WF8, DN2
Hutt Water Collection Area	Hutt Water Collection Area, Maymorn Ridge wetland	AL4, CDF6, CDF7, CLF10, CLF11-2, CLF9, MF20, WL12
Kaitoke Regional Park	Kaitoke Regional Park, Te Marua	CD7, CL9, MF20, MF7, WF2, BR1
Karahena Bay Bush	Karahea Bay	MF6
Keith George Memorial Park	Keith George	MF7, MF8
Kelson Bush	Kelson Bush	MF6, MF7
Lake Pounui	Lake Pounui	WF8
Lake Wairongomai & Stream	Lake Wairongomai	WL18, 19, 20
Lower Waikanae Forest Remnants	Turf Farm, Lion Park	WF6, WF8
Mataikona Coast	Mataikona River Mouth (part)	DN2, DN5
Nga Manu Wetland Complex	Nga Manu Wetland Complex	WF6, WF8
O-Te-Pua/Paru ā uku Wetlands	O Te Pua-Pukehou	WL18, 19, 20
Omahu	Otahoua Swamp	WL18, 19, 20
Otaki Coast	Otaki Estuary and Coast	SA2, DN2, DN5
Owhanga	Mataikona Tussockland	DN2, DN5
Paekākāriki Escarpment	Paekakariki Escarpment	CL3, MF6
Pakuratahi Forest	Pakuratahi Forest, Ladle Bend Wetland	CDF6, CLF10, CLF11-2, CLF9, MF20, MF5, MF7, WL12

Key Native Ecosystem name	Sites in priority lists	Ecosystem type example
Parangarahu Lakes Area	Parangarahu Lakes and shingle beach, East Harbour Regional Park (part)	CL3, WL18, WL19, WL10, SA2, SA4
Peka Peka Coast	Pekapeka Dunes	DN2
Porirua Western Forests	Porirua SR	MF6, MF7
Queen Elizabeth Park Complex	QEP remnants, QE Park Northern Wetland, Poplar Ave Wetland, QE Park Dunes and Whareroa, Estuary	WF6, WL12, WL18, 19, 20, DN2, DN5
Raroa-Pukerua Bay Coast	Pukerua Bay Escarpment	CL3
Rewanui	Rewanui and Rorokoko	MF1
Riversdale-Orui Coast	Riversdale-Orui (Motuwaireka Stream and Dunes), Uruti Dunes (part)	WL18, 19, 20, DN2, SA2
Rocky Bay Coast	Rocky Bay (included in Whitireia)	CL3, SA4
Ruamahanga River Terraces	Morrison's Bush	MF1, WF2
Strang's Bush	Strang's Bush	MF1, WF8
Sulphur Wells	Sulphur Wells	WF3
Tauherenikau Bush Remnants	Tauherenikau	WF2, MF1
Taupo Swamp Complex	Taupo Swamp-Are Harakeke	WL18, WL19
Te Hapua Wetland Complex	Te Hapua Wetland Complex	WL 18, 19, 20
Te Harakeke Wetland Complex	Te Harakeke	WL 18, 19, 20
Te Horo Forest Remnants	Otaki cluster	WF2
Te Kawakawa-Black Rock	Te Kawakawa Point	SA4, SA7
Tora Coast	Tora Bush	MF2/MF5
Trentham Memorial Park	Substitute for Trentham Scenic Reserve	MF7, WF2
Waihora	Waihora/Mangaroa	MF5
Waikanae River Complex	Devil's Elbow, Te Rama	MF6
Wainuiomata/Orongorongo	Wainuiomata/Orongorongo WCA, Skull Gully wetland, Orongorongo swamp	MF20, MF8, CLF11-2, CLF11-3, CLF9, WL18, WL19, WL20, WL12
Waitohu Coast and Wetlands	Waitohu (Estuary and Dunes)	DN2, SA2
Waterfall Road Bush	Waterfall Road	MF6
Wellington South Coast	Frypan	DN2
Western Wellington Forests	Otari	MF6
Whangaimoana Coast	Whangaimoana	SA2
Whitireia Coast	Whiteria Cliffs (Onehunga Bay)	CL3, SA4
Wi Tako Ngātata	Wi Tako	MF20

4. Recommended additional KNE sites

The prioritisation process enabled the selection of representative, high biodiversity value sites for management by GWRC as part of its KNE programme. While there are many ecosystem types where management is maintaining or enhancing the habitat present, there are still some ecosystems that are not currently being managed in the region in a way that would maintain the long-term integrity of the ecosystem. Any new sites to be added to the KNE programme should be drawn from the high value biodiversity sites listed in Appendix 1.

The generalised species-area relationship shown in Figure 4.1 indicates curves for biota of different body size. When the area of habitat remaining for an ecosystem type falls below 20-30%, species are lost from the system at a more rapid rate. An area of 30% remaining of an ecosystem type has been regarded as a minimum goal for habitat protection (Walker et al. 2008).

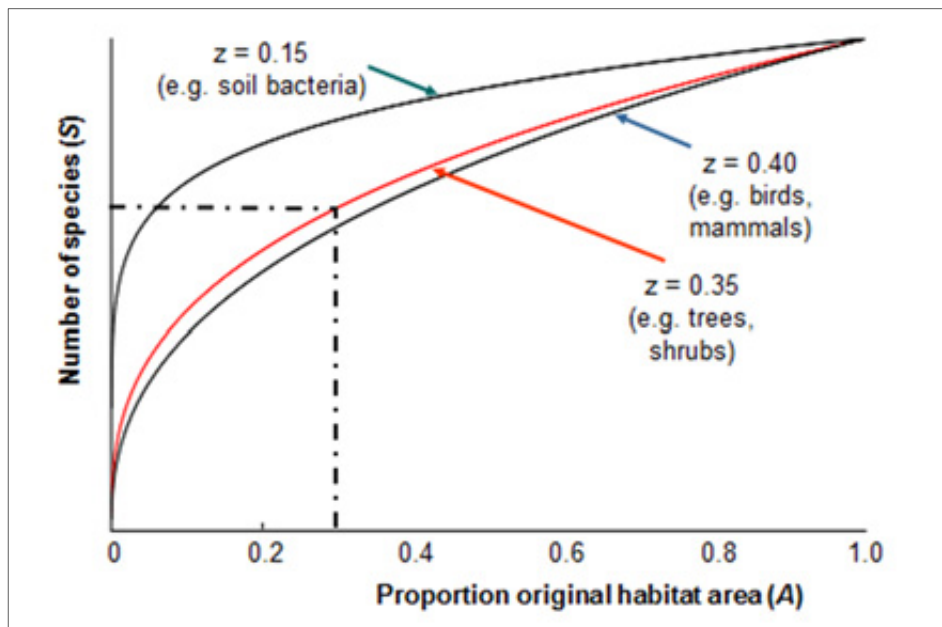


Figure 4.1: Species/Area relationship from Walker et al. (2008)

In terms of protecting the ecological integrity of each ecosystem type then, ideally the following guidelines apply:

- All remaining remnants of ecosystem types in the region with less than 30% of their original cover remaining should be protected (which includes management where possible); and
- All ecosystem types that have more than 30% of their original cover remaining should have at least 30% of the original area managed in a way that allows for the long-term viability of that ecosystem type.

It is recognised that it would be a challenge for GWRC to manage that much area of each ecosystem type. The KNE programme could aim to have a percentage of the original area of an ecosystem type (e.g. 10%) managed in a way that will maintain the ecological integrity of that ecosystem.

Eight lowland forest types and the braided river ecosystem have less than 10% of the original area being managed in a way that will maintain the ecological integrity of those ecosystem types. These are:

- MF2/MF5: Rimu, matai, hinau forest and black beech mosaic
- WF1: Titoki, ngaio forest
- WF8: Kahikatea, pukatea
- WF2: Totara, matai, ribbonwood
- MF1: Totara, titoki
- WF6: Totara, matai, broadleaf
- WF3: Tawa, titoki, podocarp
- CLF4: Kahikatea, totara, matai forests
- BR1: Hard tussock, scabweed gravelfield/stonefield (braided river ecosystem)

In summary, recommended sites for inclusion in the current KNE programme should be selected from:

- MF2/MF5; Rimu, matai, hinau/black beech (the largest historical ecosystem in the region) – this ecosystem type has less than 30% of its original vegetation remaining and only a few sites that are being managed in a way that will maintain the future of that ecosystem type. There are no examples of this ecosystem type in the current KNE programme. Sites in order of priority are:
 - Lagoon-Hills-Heights/RAPs
 - Mt Percy Bush
 - Kumanga Bush
 - Mount Adams/Pahaoa River Bush; and
 - Rocky Hills Extension
- BR1: Hard tussock, scabweed gravelfield/stonefield (braided river ecosystem type) is a major gap in the current regional biodiversity management programme. These sites are important for river bird populations (McArthur et al 2015). There are currently no examples of this ecosystem type in the current KNE programme. Sites in order of priority are:
 - Opouawe River
 - Upper Ruamahanga (ca. opposite Masterton/Rathkeale College)
 - Waingawa/mid-Ruamahanga rivers
- CLF4: Kahikatea, totara, matai – a nationally distinctive forest type
 - Waimana Road Bush
 - Eringa Road Bush
- WF3; Tawa, titoki, podocarp, WF6; Totara, matai, broadleaved forest, MF1; Totara, titoki, WF2; Totara, matai, ribbonwood WF1; Titoki, ngaio and WF8; Kahikatea, pukatea forest ecosystem types which all have less

than 10% of their original vegetation currently under management. Sites in order of priority are:

- Ahi Paku a and b (QEII covenant)
- Skeet's Covenant (QEII covenant)
- Kahuiti Bush
- Tinui River Bush
- Rahui Station Bush
- King/McArthur – Carterton flats
- Murphy's Line Bush/Snell's
- Admiral Road/Moetapu Bush (QEII covenant)
- Mary Crest

5. Discussion

The mapping of the Singers potential ecosystems for the Wellington region has enabled an assessment to be made of the remaining high value biodiversity sites of each ecosystem type in the region. It is envisaged that the Singers potential ecosystem mapping will be completed for the whole of the North Island in the near future, as other regional councils are now employing this classification methodology. This will aid GWRC's understanding of whether or not the Wellington region provides a stronghold for certain ecosystem types. In the meantime, Nick Singers has identified CLF4: Kahikatea, totara, matai as a nationally distinctive ecosystem type in this region, (i.e. not found in other parts of the country). Most of the indigenous vegetation has been removed from this ecosystem type, but a few patches remain and are under-protected and unmanaged.

This report has focussed on the need to maintain ecosystem types based on the vegetative cover. As such, the focus has not been on the management needs of fauna, such as birds, lizards and invertebrates that require habitat where rodents, possums and mustelids have been reduced to low levels in order to thrive. Intensive pest control areas such as Zealandia, Pukaha/Mt Bruce, Kapiti Island and the Wainuiomata/Orongorongo KNE and East Harbour Northern Forest KNE are important sites for enhancing the reproductive success of these fauna. The maintenance of habitat across the landscape is also important for the future viability of these fauna across the region. In the long-term, the loss of habitat from remnant native areas will result in the loss of fauna. This is the current trajectory for some areas in the region, such as in the eastern Wairarapa where a diversity of native species can still be found.

There has been a move towards national consistency in prioritising both management and protection of high biodiversity value sites. The use of the Singers ecosystem typing has made this possible in parts of the country for which these ecosystem types have been defined and mapped. John Leathwick (2012) makes use of the ecosystem types in his management prioritisation approach using "Zonation". He has completed this work on DoC land and is currently working with Auckland, Waikato and Bay of Plenty Regional Councils. GWRC is also planning to work with John Leathwick to complete Zonation for the Wellington region to ensure alignment with national methodologies. It will also be worthwhile to re-evaluate the KNE sites in terms of threatened species presence once the regional threat lists are completed.

6. Recommendations

If further sites are added to the KNE programme in the short-term, the following priorities are recommended:

- Prioritise the inclusion of selected sites in the MF2/MF5 ecosystem type.
- Initiate KNE sites on high value riverine sites for the purposes of protecting nesting river birds from pests.
- Protect and manage remaining CLF4 sites where possible.
- Add more sites of lowland forest ecosystem types that have less than 10% of the original area managed (or protected) as detailed in section 5.

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Appendix 1: High value biodiversity sites in the Wellington region

Table A1.1: Singers forest ecosystems containing multiple ecosystem types (in priority order)

Site Name	Singers Ecosystem Classification
<i>Tararua Forest Park</i>	MF7, CLF10, CLF9, AL4, CLF11-2, MF8, CDF4, MF5, AH3, CDF6, CDF7
<i>Rimutaka Forest Park</i>	MF2, WF1, MF5, CLF11-2, MF8, MF20, WF2, CLF11-3, CLF10, BR1
<i>Aorangi Forest Park</i>	MF2, MF2/MF5, MF5, CLF11-2, WF1, CLF11-3, BR1, CLF10
Wainuiomata/Orongorongo Water Collection Area	MF20, MF8, CLF11-2, CLF11-3, CLF9, WL18, WL19, WL20, WL12
East Harbour Regional Park, including Northern Forest, Parangarahu Lakes and Baring Head	MF20, MF7, MF5, CL3, WL18, WL19, WL10, SA2, SA4
Hutt Water Collection Area	AL4, CDF6, CDF7, CLF10, CLF11-2, CLF9, MF20, WL12
Akatarawa Forest	CDF4, CLF9, MF20, MF7, MF6, MF8, WL18, WL19, WL20
Pakuratahi Forest	CDF6, CLF10, CLF11-2, CLF9, MF20, MF5, MF7, WL12
Kaitoke Regional Park	CDF7, CLF9, MF20, MF7, WF2, BR1
<i>Kapiti Island</i>	MF6, CL3, SA4

Sites managed by the Department of conservation are shown in bold italic font

Table A1.2: High biodiversity value forest sites (excludes the large forests with multiple ecosystems shown in Table A1.1)

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Nga Manu	5	2	2	1	1	11	WF8, WF6
Tinui River Bush	3	2	2	1	3	11	WF3
<i>Carter Scenic Reserve</i>	4	2	3	1		10	WF2
Haruatai Park	4	2	1	1	2	10	WF8
Homewood	4	2	1		3	10	WF1, WF8
<i>Matarawa Conservation Area</i>	4	2	1		3	10	WF2
<i>Rewa Bush</i>	3	1	2	1	3	10	MF2, MF2/MF5
<i>Rocky Hills Sanctuary</i>	3		3	1	3	10	MF2
Tauherinikau	4	2		1	3	10	WF2, MF1
Ahi Paku a and b	3	2	2	1	1	9	MF1
Keith George	2	2	1	1	3	9	MF7, MF8
Lagoon-Hills-Heights/RAPs	1	2	2	1	3	9	MF2/MF5
Matariki Bush	4	2			3	9	WF1
<i>Mt Bruce</i>	2		3	1	3	9	MF7, MF8, CL9
Murphy's Line Bush/Snells	4	2			3	9	WF8
<i>Pukunui Bush/ Oumakura SR</i>	2	2	1	1	3	9	MF2/MF5
Rahui Station Bush	3	2		1	3	9	WF3
Skeet's Covenant	3	2		1	3	9	MF1

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Waikanae Reserves	4	2	2		1	9	WF8
Wairongomai Bush	3	2		1	3	9	WF1
Western Hills Harbour	2	2	1	1	3	9	MF6
Admiral Road/Moetapu bush	4	0	1		3	8	WF2
Hemi Matenga and Parata Bush	3		1	1	3	8	MF6, MF7
Kahuiti Bush	3	2			3	8	MF1
King/McArthur – Carterton flats	3	2			3	8	WF3
Korokoro Valley	2		2	1	3	8	MF6, MF7
Lake Pounui	1	2	2		3	8	MF5
Lowes Bush	4			1	3	8	WF8
McKay/Eringa Bush	4	2			2	8	WF8
Morrison's Bush	4	2	1	1		8	MF1, WF2
Mt Percy Bush	3	1		1	3	8	WF1, MF2/MF5
Otaki Cluster	4	2		1	1	8	WF2
Paraparaumu SR	2	2		1	3	8	MF6, MF7
Pounui Holdings	1	2	2		3	8	MF5
Ruakokopatuna/Kershaws	3	2			3	8	MF1, MF5
Strangs Bush	3	2			3	8	MF1, WF8
Sulphur Wells and remnants	3	2			3	8	WF3

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Trentham Scenic Reserve	4			1	3	8	MF7, WF2
Turf Farm	5	2		1		8	WF8, WF6
Waimara Road Bush	5	2	1			8	CLF4
Wainuioru River Bush	3	1		1	3	8	MF1
Arohanui	3	2			2	7	MF1
Dog Hill Bush	1	2	1		3	7	MF5
Donalds	4	2		1	0	7	WF8
Dunvegan Forest Remnants	4	2		1		7	WF2
EC Holmes SR	4	2		1		7	WF8
Eringa Road Bush	5	2				7	CLF4
Greytown Park Bush	4	2	1			7	WF2
Haywards SR	2		1	1	3	7	MF20
Huangarua Farm Ltd	3	2			2	7	WF2, MF1
Kaikaikuri Stream	3	2			2	7	MF1
Kumahanga Bush	1	2		1	3	7	MF2/MF5
Makara River	4	2		1		7	MF1, WF8
Manawa Annedale*	3	2			2	7	WF3, MF7
Mary Crest	5	2				7	WF6
Mount Adams/Pahaoa River Bush	1	2		1	3	7	MF2/MF5
Ngatahuna Bush	3	2			2	7	MF1

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Oporua SR	4	2		1		7	WF8
QEP Remnants	5	2				7	WF6
Rewanui and Rorokoko	3	2		1	1	7	MF1
Rocky Hills Extension	3			1	3	7	MF2, MF2/MF5
Smith	5	2				7	WF6
Solway Park Bush	4	2	1			7	WF8
Stout	4	2			1	7	WF2
Tauweru River Banks	4	2	1			7	WF3, WF8
Tinui Taipo	3	3		1		7	WF3
Tuitarata Bush Scenic Reserves	4				3	7	WF8
Upper Hutt Flats	2	3			2	7	MF20
Waihora/Mangaroa	1	2		1	3	7	MF5
Waterfall Road	2	3	1	1		7	MF6
Western Aorangi	1	2		1	3	7	MF2/MF5
Battle Hill	2		1		3	6	MF6
Doyles	1	2			3	6	MF5
Dry Creek	2			1	3	6	MF7
Howden Hills	3				3	6	MF2, MF2/MF5
Inverell Bush	2	2			2	6	MF7
Kelson Bush	2			1	3	6	MF7, MF6

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Lion Park	4	2				6	WF8
Ngaranui Trust Bush	1	2	1		2	6	MF2/MF5
Nikau SR	2	2	1	1		6	MF6
North Waikanae	4	2				6	WF8
Paraparaumu remnants	4	2				6	WF8
Peter's Bush	3	1	2			6	WF8
Pigeon Bush	2	1			3	6	MF1
Porirua SR	2	1	2	1		6	MF7, MF6
Rara Bush	1	1		1	3	6	MF2/MF5
Te Kopi Road Bush/Lamb's Bush	4	2				6	WF8
Te Wharau Bush	1	1		1	3	6	MF2/MF5
Tora Bush Covenant	5			1		6	MF2/MF5
Western Lake Road	1	2			3	6	MF5
Devil's Elbow	2			1	2	5	MF6
Fishermans	2	2	1			5	MF6
Furniss Bush	1	1			3	5	MF2/MF5
Gladstone Road	3	2			0	5	MF1
Karahena Bay	2	2	1			5	MF6
Makara Bush	1		1		3	5	CLF10
Naenae Stokes Valley	2				3	5	MF20

Forest Site Name	Ecosystem	LENZ Threat	Threatened Species	RAP or Identified Site	Forest GIS	Total Score	Ecosystem Classification
Oporua Bush	4			1		5	WF8
Otahoua Swamp	3	2				5	MF1
Otari	2		2	1		5	MF6
Speedy's Stream	2				3	5	MF7, MF6
<i>Tauwera Conservation Area</i>		2			3	5	MF7
Te Marua Bush	2	2		1		5	MF20
Wi Tako	2	1	1	1		5	MF20
Caldwell Bush	1				3	4	MF5
Fensham	1	2		1		4	MF5
Little Kaiwhata Bush	1				3	4	MF2/MF5
Maidstone Park	2	1		1	0	4	MF20
Muaupoko Stream	2	2				4	MF6
Puetawa Bush		2			2	4	MF7
Wairere Bush	2	2				4	MF7
Keils Bush	2				1	3	MF7
Khandallah Park	2		1			3	MF7, MF6
Colonial Knob	2					2	MF7, MF6
Te Rama	2					2	MF6
Huntleigh Park	2					2	MF6

*Recent information indicates that Manawa Annedale should be replaced with a site on Lot 2 DP410185

Sites managed by the Department of conservation are shown in bold italic font.

Scoring Legend for forest sites

Ecosystem (native cover remaining in Singers ecosystem types)	
< 100ha	5
< 1,000ha	4
< 5,000ha	3
< 15,000ha	2
> 15,000ha	1
LENZ threat	
No part of site	0
Part site	1
Whole site	2

Threatened species	
One species present	1
Two species present	2
Three or more species present	3
RAP or identified (high value) site	
Identified site	1
Forest GIS layer	
Sites ranked 1 to 40	3
Sites ranked 41 to 80	2
Sites ranked 81 to 120	1

Table A1.3: High biodiversity wetland sites

Wetland Site Name	Flora Score	Fauna Score	Threatened Species Score	Total Score	Ecosystem Classification
<i>Wairarapa Moana (including Lake Onoke)</i>	5	5	5	15	WL18, WL19, WL20, WL10, BR1
Parangarahu Lakes	5	5	5	15	WL10, WL18, WL19
Taupo Swamp-Ara Harakeke	5	4	5	14	WL18, WL19
O Te Pua-Pukehou	5	5	4	14	WL18,19,20
Nga Manu Wetland Complex	5	5	4	14	(WF6, WF8)
Lake Pounui	5	5	4	14	(WF8)
Te Hapua Wetland Complex	5	4	4	13	WL18,19,20
Te Harakeke	5	4	4	13	WL18,19,20
Orongorongo Swamp (plus north)	4	5	4	13	WL12
Maymorn Ridge (Two sites)	4	5	4	13	WL12
Waingawa Swamp	5	3	4	12	WL18,19,20
Skull Gully	4	5	3	12	WL18,19,20
Poplar Ave Wetland	4	4	4	12	WL12
Ladle Bend Wetland, Pakuratahi	4	4	4	12	WL12
Forest Lakes (Lake Waitawa)	4	4	4	12	WL18,19,20
Whakatiki Wetlands, Akatarawa	4	4	3	11	WL18,19,20
Taumata Lagoon (Hayes), Taumata Oxbow	3	4	4	11	(WF8)
<i>Railway Lakes</i> and QE Park Northern Wetland	3	4	4	11	WL18,19,20
Martins River Swamp	4	4	3	11	WL18,19,20

Wetland Site Name	Flora Score	Fauna Score	Threatened Species Score	Total Score	Ecosystem Classification
Lake Nganoke- Turanganui	4	4	3	11	WL18,19,20
Mangaroa Swamp	4	3	4	11	WL12
Drapers Flats, Akatarawa	4	4	3	11	WL18,19,20
Riversdale-Orui Coast	3	4	3	10	WL18,19,20
Waimeha Lagoon	3	4	3	10	WL18,19,20
<i>Omega Bogs and Tarns (Tararuas)</i>	4	3	3	10	AL4
Ngatotara Wetland Complex	4	3	3	10	WL18,19,20
<i>Carters Scenic Reserve – Pikes Lagoon</i>	4	2	3	9	WL18,19,20
Fensham Reserve	3	3	3	9	WF8
<i>Allen/Lowes Bush</i>	3	3	3	9	WL20
<i>Okupe Lagoon (Kapiti Island)</i>	3	3	3	9	SA4
Kaiwhata-Stansborough wetland	2	4	2	8	WL20
Waimoana wetland	2	3	3	8	WL20
Lake Wairongomai	2	3	3	8	WL18,19,20
Tuturumuri Wetlands	3	2	3	8	WL18,19,20
Ruamahanga Loop	2	3	3	8	WL18,19,20
Otahoua Swamp	3	2	3	8	WL18,19,20
<i>Mt Cone</i>	3	2	3	8	AL4
Huritini Swamp	2	2	4	8	WL18,19,20

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Scoring Legend for wetland sites

Flora Score: Floral community score of 1-5 with 0 = no or few native species present and 5 = high biodiversity value, with a healthy native ecosystem containing a wide range of values

Fauna Score: Faunal community score of 1-5 with 0 = no or few native species present and 5 = high biodiversity value, with a healthy native ecosystem containing a wide range of values (includes both aquatic and terrestrial species)

Threatened Species Score: Score of 1-5, where 1=no threatened species present and 5 = presence of multiple threatened species.

Table A1.4: High biodiversity value coastal sites

Coastal Site Name	Flora	Fauna	Threatened Species	Total Score	Ecosystem classification
Porirua Harbour	5	5	5	15	SA2
Wairarapa Moana	5	5	5	15	SA2, DN2, DN5
Ocean Beach	5	5	5	15	SA4
Pencarrow Lakes (Lakes and shingle beach)	5	5	5	15	CL2, SA2, SA4
Te Kawakawa Point	5	5	5	15	SA4, SA7
Kapiti Island	5	5	5	15	CL3, SA5, SA7
Waikanae (Estuary and dunes)	4	5	5	14	DN2, SA2
Makara (Estuary and dunes)	4	5	5	14	DN2, SA2, SA4
Mana Island	5	5	4	14	CL3, SA5, SA7
Flat Point (dunes)	5	4	4	13	DN2, DN5
Glendu	5	4	4	13	DN2, SA5
Cape Palliser (Mangatoetoe to Ngapotiki fan)	5	4	4	13	CL2, SA4, SA7
Baring Head	5	4	4	13	CL2, CL3, SA4
Matiu/Somes Island and Mokopuna	3	5	5	13	SA7
Frypan	5	4	4	13	DN2
Castlepoint	4	4	4	12	DN5, CL2, SA7
Uruti/Waioronu	5	3	4	12	DN2
Honeycomb Rock and Kahau Rocks	4	3	5	12	DN5
Pahaoa	5	3	4	12	DN2

Coastal Site Name	Flora	Fauna	Threatened Species	Total Score	Ecosystem classification
<i>Turakirae Head</i>	4	4	4	12	CL3, SA4, SA5, SA7
Whakataki River	3	4	4	11	SA2
Oterei River	3	4	4	11	SA2
Te Humenga Point/ Crawfords	4	3	4	11	(WF2)
Mukamuka	5	4	2	11	DN2, SA4
<i>Makaro/Ward Island</i>	3	4	4	11	SA7
Moa Point, Tarakena Bay and Palmer Point	4	3	4	11	CL3
Cape Terawhiti (Oteranga Bay to Ohau Point)	4	4	3	11	CL3, SA7
Whitireia Cliffs (Incl. Rocky Bay and Onehunga Bay and coastal forest remnant)	3	3	5	11	SA4
Patanui Stream	3	3	4	10	(WF8)
Otaki Estuary and dunes	4	3	3	10	SA2, DN2, DN5
Mataikona River dunes	3	4	3	10	DN2, DN5
Mataikona Tussocklands	4	3	3	10	DN2, DN5
Waitohu (Estuary and dunes)	4	3	3	10	DN2, SA2
Waikarakara Estuary	3	3	4	10	(WF8)
Riversdale (Motuwaireka Stream and dunes)	3	3	4	10	DN2, SA2
Tora (Bush, Awhea Estuary and adjacent dunes)	4	3	3	10	CL6
Red Rocks	4	3	3	10	CL2, CL6, SA5
QE Park dunes and Whareroa Estuary	3	3	4	10	DN2, DN5

Coastal Site Name	Flora	Fauna	Threatened Species	Total Score	Ecosystem classification
Wiraka Point and Rock and Pukerua Bay Escarpment	3	3	4	10	CL3
Rocky Bay	3	3	4	10	SA5
Whangaimoana	3	3	3	9	SA2
Pekapeka Dunes	2	2	4	8	DN2
Paekakariki Escarpment	2	2	2	6	CL3

Sites managed by the Department of conservation are shown in bold italic font.

Scoring legend for coastal sites

Flora Score: Floral community score of 1-5 with 0 = no or few native species present and 5 = high biodiversity value, with a healthy native ecosystem containing a wide range of values

Fauna Score: Faunal community score of 1-5 with 0 = no or few native species present and 5 = high biodiversity value, with a healthy native ecosystem containing a wide range of values

Threatened Species Score: Score of 1-5, where 1=no threatened species present and 5 = presence of multiple threatened species

Table A1.5: Other ecosystem types – high value biodiversity sites

Alpine ecosystems

AL4: Mid-ribbed and broad-leaved snow tussock/shrubland	Tararua Forest Park
AL4, Mid-ribbed and broad-leaved snow tussock tussockland/shrubland	Tararua Forest Park
AH3, Gravelfield/stonefield, mixed species cushionfield	Tararua Forest Park

Cliff ecosystems

CL3, Coprosma, Muehlenbeckia shrubland/herbfield/rockland	Kapiti Island , Paekakariki escarpment, Whitireia Coast, Parangarahu Lakes, Baring Head
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River ecosystems

BR1: Hard tussock, scabweed gravelfield/stonefield

River site name	Notes
Ruamahānga River/upper section (Rathkeale College to Te Ore Ore Rd bridge)	Breeding habitat for entire regional population of black-billed gulls (Nationally critical)
Opouawe River (braided river habitat)	Breeding habitat for 25% regional population banded dotterel (Nationally vulnerable)
Ruamahānga River/upper section (Rathkeale College to Te Ore Ore Rd bridge)	Breeding habitat for 20% regional population of banded dotterel (Nationally vulnerable)

The Greater Wellington Regional Council's purpose is to enrich life in the Wellington Region by building resilient, connected and prosperous communities, protecting and enhancing our natural assets, and inspiring pride in what makes us unique

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