

Wellington City Council Biodiversity Action Plan

September 2007



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ME HEKE KI PŌNEKE
WELLINGTON CITY COUNCIL

Wellington

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What is a biodiversity action plan?

This action plan coordinates Wellington City Council's biodiversity activities and identifies local priorities and actions to protect and restore biodiversity. These biodiversity activities include pest control, revegetation planting, and partnerships with other organisations and groups. Wellington's biodiversity action plan ensures that the national targets set by the New Zealand Biodiversity Strategy (2000) are translated into local action.

The vision statement for this action plan is:

Wellington is a city that protects and restores biodiversity and proudly showcases its natural areas. It is a city renowned for its kaitiakitanga, its environmental guardianship.

This document describes what biodiversity is, why it's important, what mechanisms we have in place for its protection and what we are doing to manage our biodiversity assets. It also gives a profile of Wellington's biodiversity, focusing on main ecosystems or habitats.

The action plan identifies the programmes designed to achieve the vision of this plan, and the corresponding responsibilities, funding sources and timeframes.

The emphasis of this strategy is on Wellington's indigenous biodiversity. The term 'Wellington's biodiversity' means the indigenous biodiversity that occurs naturally in Wellington.

The outcomes of this plan will include:

- identifying the current state of Wellington's biodiversity and the areas/species which require the most protection
- protecting Wellington's indigenous biodiversity on both public and private land
- where possible, restoring our indigenous biodiversity and ensuring that it's easily accessible for all Wellingtonians
- motivating the community to become more involved in biodiversity conservation
- working closely with other organisations to ensure the conservation of Wellington's biodiversity
- generating quality information through research and monitoring to enable us to protect, restore and manage our biodiversity into the future

Introduction

Biological diversity – or biodiversity – is the complete variety of life on earth, and people are an integral part of this. Biodiversity is easiest to understand when you think of the different kinds of plants and animals around us and all the species that support and link them. 'High biodiversity' can mean that there are a lot of different species, while 'biodiversity loss' means that these species become extinct. However, biodiversity is more than plants and animals. Biodiversity includes:

- genetic diversity, which is the variability in the genetic make-up amongst individuals of the same species
- species diversity, which is the variety of species within a particular area
- ecosystem diversity, which is the variety of ecosystem types and associated biological communities or habitats (e.g. scrubland, forest, sand dunes, wetlands, streams).

All Wellingtonians (including Wellington City Council) have a positive or negative effect on biodiversity, both global and local. This comes through political choices, jobs, economic activities and daily actions. There is a huge opportunity for all to become more aware and more responsible; to enhance biodiversity generally through the cumulative effect of positive actions, small and large.

Perhaps the greatest challenge is to make everyone realise that they have an impact on biodiversity and can play a part in its conservation.

Biodiversity incorporates all biological life, including fungi and micro organisms, the genes they contain and the ecosystems of which they form a part. These life forms contribute to essential ecological processes.

Global Biodiversity

The protection of biodiversity is a global issue and is an essential ingredient of sustainable development. International awareness of biodiversity has been steadily growing since the 1992 United Nations Conference 'Earth Summit' in Rio de Janeiro. The Convention on Biological Diversity, one of the outcomes of this summit, recognises that biodiversity is about plants and animals as well as people and our need for food, medicines, fresh air and water, shelter, and a clean and healthy environment. New Zealand is a signatory to this convention on biodiversity, and the *New Zealand Biodiversity Strategy* (2000) was prepared as part of New Zealand's commitment to biodiversity protection. The New Zealand Biodiversity Strategy establishes national goals to "turn the tide" on biodiversity decline and includes action points for Local Authorities. Retaining a high level of indigenous biodiversity will result in a high level of global biodiversity.

Globally, biodiversity is in decline and the rate of biodiversity loss is accelerating.

Indigenous Biodiversity

New Zealand is an internationally recognised world 'hotspot' for biodiversity. This is because we have exceptionally high numbers of endemic species (species found nowhere else in the world). This high endemism is largely the result of our long isolation from other land masses and diverse habitat and climate, allowing unique flora and fauna to develop. Around 90 percent of New Zealand's insects and marine molluscs are found nowhere else on earth. This is also true for 80 percent of our vascular plants (which includes trees, ferns and flowering plants); 25 percent of bird species; all of our 60 reptiles; our four remaining frogs and all our species of bat. Compare this to Britain, which is a similar size but has only two endemic species.





Leadership in Biodiversity

The Local Government Act 2002 sets local authorities (regional, city and district councils) a mandate to promote sustainable development. Biodiversity is a critical measure of sustainability, with clear environmental, social, economic and cultural benefits and these are summarised below ¹.

- **Environmental:** Biodiversity describes the variety of life on earth. Indigenous biodiversity refers to the biological life unique to New Zealand. Locally, Wellington's indigenous biodiversity is also unique, boasting community associations and genetic diversity that aren't found anywhere else in the world. Resilient and stable ecosystems are essential to sustain all of our activities in a functioning environment.
- **Economic:** Without healthy biological resources and ecosystem processes we would be without basic services such as the production of raw materials, clean water, waste decomposition, soil conservation and climate regulation. A 1997 Massey University study estimated that the total annual value of New Zealand's indigenous biodiversity could be more than twice that of its Gross Domestic Product – which would put it over \$200 billion.²
- **Social:** Much of Wellington's distinctive identity, its sense of place, is bound in its natural areas. Eco-tourism is important in attracting national and international visitors who visit areas such as the Makara Peak Mountain Bike Park, Otari-Wilton's Bush, Wellington Botanic Garden and Karori Wildlife Sanctuary.
- **Cultural:** There is intrinsic value in biodiversity and for many, particularly Maori, it is an essential part of their world-view.

Under the Resource Management Act (RMA), local authorities have a role in protecting biodiversity, particularly with respect to the use and development of land. For example, under Section 6 of the RMA (1991) councils must recognise and provide for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna³.

Wellington's Biodiversity Challenge

If you wanted to write a book about Wellington's vegetation, your friends would probably say, 'A book about gorse? Why?' This would harden your resolve. Obviously your friends have not looked twice at the groves of karaka tucked into gullies or bounced on the springy cushions of pohuehue on the coast... Perhaps they are so used to the sight of wind-buffed flax and taupata on rocky cliffs that they no longer notice it... There is no one particular feature that characterises the Wellington region... it seems to contain a little bit of all New Zealand.

Wellington's Living Cloak, Isobel Gabites 1993:7

In her opening page of *Wellington's Living Cloak*, Gabites captures the exceptional thing about Wellington; the diversity in landscape. From the rugged South Coast, to the bays, the harbour, rural hinterland, green belts, ridgelines and hilltops – all of these define Wellington. And with these landscapes and associated vegetation types, comes ecosystem diversity, species diversity and genetic diversity.

Wellington City Council manages around 3600 hectares of publicly owned open space land. Wellington City must look after the biodiversity values of this land, as well as providing leadership in the conservation of biodiversity values throughout the city.

Biodiversity conservation is about ensuring the:

- *viability of naturally occurring local populations of species*
- *resilience of the range of habitats and ecosystems that makes Wellington unique*

¹ Willis, G 2004. Guidelines on Strategic Planning for Biodiversity. A report for Action Bio-Community on using LTCCPs to promote better biodiversity management. Auckland: Enfocus Ltd.

² Patterson M and Cole A 1999. Assessing the Value of New Zealand's Biodiversity. Occasional Paper Number 1, School of Resource and Environmental Planning, Massey University, February 1999.

³ See also Sections 5(2)(a-c) and 7 (b), (d), (f), (g); and the RMA Amendment Act (2003) s.31(1)(b)

Existing policies and mechanisms for Wellington City

Council Strategies

In 2006 the Council approved seven strategies including a new **Environmental Strategy** that provides high-level statements about the Council's long-term environmental intentions for Wellington. The Biodiversity Action Plan sits directly under the City Council's **Environmental Strategy**. It is identified as a key implementation action of the Strategy, and addresses the city's need for a coherent plan to address biodiversity issues.

This plan is prepared in the context of the following Council outcomes:

- Making Wellington *more liveable*, where Wellington's natural environment is more accessible to all for a wide range of social and recreational opportunities that do not compromise environmental values;
- Creating a stronger *sense of place*, where Wellington recognises and protects significant features of its natural heritage;
- *More actively engaged*, where a collaborative participatory approach is pursued for environmental kaitiakitanga (guardianship) by information sharing and establishing partnerships;
- *Better connected*, where Wellington has a network of green space;
- *More sustainable*, where Wellington's environmental impact will be reduced by making efficient use of natural resources;
- *Safer*, including clean water and air to protect public health and ecosystems;
- *Healthier*, with the protection of land and water based ecosystems to sustain natural processes;
- *More competitive*, with a high quality environment attracting more visitors.

This plan also sits in the context of the Council's **Economic Development Strategy**, where a 10 year outcome is to advocate for tourism products that promote Wellington's unique sense of place. The unique natural heritage of Wellington creates strong potential for eco-tourism.

In addition, this plan is influenced by the **Culture and Wellbeing Strategy**, which emphasises enhancing elements of the city's sense of place, including native flora and fauna; and becoming more actively engaged, including access to historical and heritage information, and investing in the city's public environment.

It will give effect to the **Urban Development Strategy** by assisting in the creation of a more sustainable environment. Reducing our ecological footprint and protecting and maintaining a green network throughout the urban environment.

This plan will support the **Social and Recreation Strategy** by encouraging community participation and involvement in biodiversity conservation, continuing close working relationships with community groups involved with restoration and enabling these groups to communicate by providing networking opportunities.

This plan sits alongside Capital Spaces (Open Space Plan), Energy Plans, Water Conservation Strategies, and Solid and Liquid Waste Management Plans. Plans such as the Pest Management Plan sit directly under the Biodiversity Action Plan (see Figure 1).

Capital Spaces (1998) outlines Council's vision for Wellington's open spaces. Open spaces are defined as outdoor places in the city that have ecological, recreational, landscape or heritage values. Ecological values are described as plants and animals and the habitats they live in; in other words, biodiversity values. Reserve management plans sit under Capital Spaces and these either directly or indirectly refer to biodiversity management.

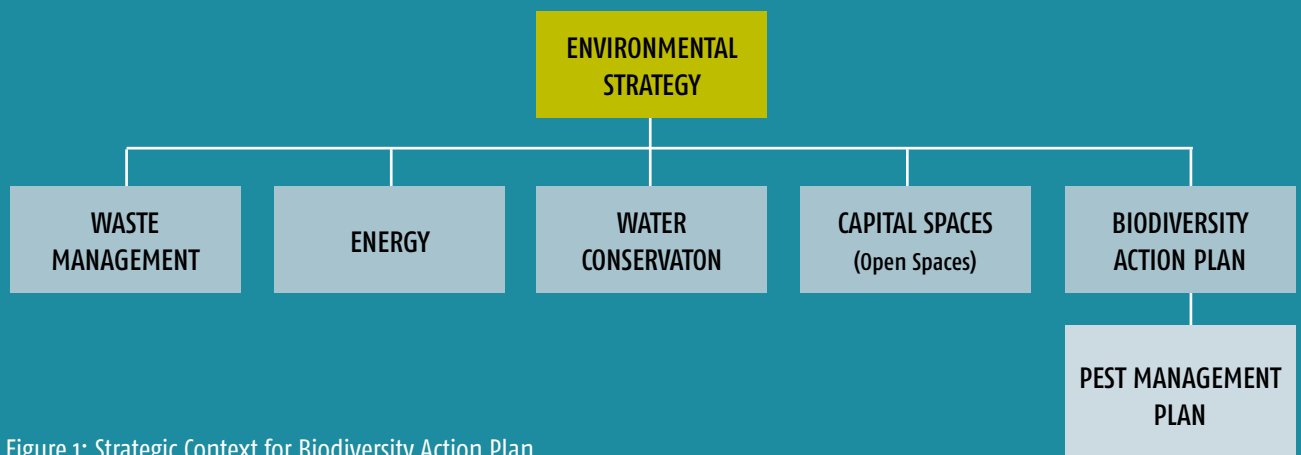


Figure 1: Strategic Context for Biodiversity Action Plan

There are 10 guiding principles of Capital Spaces, four of which relate directly to biodiversity, these are:

- Enhancing natural succession: ...Council will seek to control plant and animal pests and to reintroduce later successional species such as rimu, miro, rata, tawa, kohekohe and hinau.
- Better networks and corridors: Council will seek to create ecological corridors and recreational networks that maximise the value of the open space...
- Protecting threatened species: ... Council will support the reintroduction of native species.
- Protecting the coast and streams: Council will seek to... promote the revegetation of riparian areas with appropriate native species. This will contribute to improving water quality and to enhancing native aquatic habitats.

Wet and Wild: Bush and Streams Restoration Plan (2001) identified a five-year series of operational priorities and targets relating to the restoration of the city's regenerating bush, primary forest remnants and streams. The functioning of this plan finished in 2006. Restoration is one of the four major facets of the Biodiversity Action Plan and it will supersede Wet and Wild and continue a new five year series of operational priorities and targets.

The **District Plan** provides objectives, policies and rules relating to significant areas of Wellington's natural heritage (Conservation Sites), as well as for land valued for its natural character and provision of informal open space (Open Space B 'natural environment' and Open Space C 'inner town belt'). The District Plan also includes the Subdivision Design Guide, which lists criteria for using existing landscape, landform and vegetation. Subdivision applications are assessed against these criteria.

The Council has also recently reviewed the **Code of Practice for Land Development**. The Code of Practice is essentially a toolbox

for development, and the review is including guidelines for the protection and promotion of open space values.

Existing Projects

In addition to the above policies, the Council currently carries out projects that have direct biodiversity outcomes, these include the provision of environmental grants, pest management, threatened plant conservation and multiple revegetation projects using eco-sourced plants. Examples of revegetation projects are: community greening (providing community groups and local residents with free plants), replanting following the removal of exotic vegetation (such as weeds and hazardous trees) and planting in key native ecosystems around the city. Pest management is carried out in accordance with the **Pest Management Plan** (2005). Other projects are carried out under the Parks and Gardens Business Plan. The Wellington Botanic Garden and Otari-Wilton's Bush have specific plans and projects governing the management of indigenous biodiversity within their area. The Council contributes land, funding and expertise to the Karori Wildlife Sanctuary (a haven for birds and plants with a 500-year vision of restoring native flora and fauna, a conservation advocate and an internationally recognised community conservation project) and Wellington Zoo (protecting plant and animal biodiversity by holding and breeding exotic and indigenous endangered species, having direct involvement in local community-based biodiversity projects, working with relevant organisations on health and research projects regarding indigenous biodiversity). The Council also supports the proposed Marine Education Centre (which aims to showcase the unique marine environment, establish a regional coastal plant reserve as well as education programmes and research initiatives).

Voluntary action is a huge contributor to biodiversity management. The Council supports biodiversity volunteers through environmental grants and through the community greening programme.

In 2007 the Council provided 43 volunteer groups with around 15,000 eco-sourced natives to plant across the city. This is in addition to thousands of plants the groups grow in home nurseries. These numbers are increasing every year. In 2002, just 12 groups planted 8,900 plants. The groups prepare the sites for planting and maintain them until the native plants are established. This community contribution is crucial to the successful ongoing management of biodiversity in Wellington City and is increasing every year.

A profile of Wellington's biodiversity

Wellington's biodiversity is maintained by habitats that can be broadly grouped into nine different categories.

Each of these habitats supports a unique community of species and faces a different range of threats; although habitat loss and pest species are common threats across all habitats.



LOWLAND FOREST

The forest cloak

Wellington was once cloaked by about 20,000 hectares of lowland broadleaf-podocarp forest. Trees such as northern rata, with its bright red flowers, would have been a common sight, along with rimu, matai, kahikatea and totara. These would have been emerging through a solid canopy of tawa, kohekohe, kamahi, titoki, pukatea and kowhai. The forest interior would have been thick with climbers like kiekie and supplejack, and the forest floor carpeted with ferns^{4, 5}.

Today, less than 5 percent of this forest remains, mostly in gullies and remote areas out of the reaches of development, fire and early logging. Some areas have also been preserved by early Wellingtonians. Otari-Wilton's Bush and the Wellington Botanic Garden native forest remnants are some of the best examples of these.

These relicts of ancient forest are now accompanied by regenerating forest dominated by the ever-present mahoe. These new forests are growing up through the gorse that colonised Wellington's retired farmland and are now a valued part of Wellington's open space⁶. They also have an important role in buffering the ancient forest from the effects of fragmentation.

The remnants of original forest are important seed sources for the regenerating areas. The regenerating areas are important for the health and eventual restoration of many forest species, including birds such as kaka, kakariki and bellbird, and even the long-tailed bat.

4 Gabites, Isobel (1993). *Wellington's Living Cloak: A Guide to the Natural Plant Communities*. Wellington Botanical Society/Victoria University Press, Wellington.

5 Boffa Miskell (1998). *Wellington's Native Vegetation: A Brief Survey of Early Historical Records*. Prepared by Boffa Miskell Ltd for Wellington City Council.

6 Park, Geoff (1999). *An Inventory of the Surviving Traces of the Primary Forest of Wellington City*. Prepared for Wellington City Council.

Photo left (top to bottom): Northern Rata in flower at Otari - Wilton's Bush, Photo: Neil Price, Wellington City Council. Land Snail, Photo: Rod Morris. Crown Copyright, Department of Conservation, 1986.

Tui at Otari - Wilton's Bush, Photo: Neil Price, Wellington City Council.

Photo Below: Green Gecko, Photo: Andrew Morrison, Crown Copyright, Department of Conservation.



Main Issues for lowland forest

Development pressure: Wellington is a growing city so there is still development pressure on a number of areas. In the past, development has been synonymous with forest clearance, and in some places clearance is still a threat to Wellington's forests. Fragmentation is another associated issue. Fragmentation occurs when the edges of forest are 'nibbled away' or what was a continuous tract of vegetation is broken up, and the resilience and viability of the forest is diminished. Maintaining ecosystem biodiversity is an important part of ensuring a healthy city, and must be managed alongside development. Low impact subdivision design is one tool available to help preserve natural ecosystems.

Introduced mammals: Possums, rodents, cats, goats, mustelids, pigs, deer, sheep and cattle have all had a huge impact on Wellington's forests over the years; eating palatable native plants, seeds, native insects, lizards and birds as well as disturbing their habitats. Extensive control programmes have made a big difference, particularly for reducing possum numbers. However, ongoing control and education is required and priority areas have been identified for control in the Wellington City Council Pest Management Plan (2005), as well as by Greater Wellington Regional Council and the Department of Conservation.

Weeds: Weeds are an on-going issue for Wellington's lowland forest. There are a huge number of problem weeds, many of which begin their life as attractive garden plants and then jump the fence, travelling by bird dispersal or through corridors such as reserves, railways and streams. They then out compete and smother native plants, eg climbing asparagus, old man's beard and banana passionfruit. Wellington City Council has two kinds of pest control programmes, weed-led and site-led. Weed-led programmes aim to eradicate problem weeds throughout the city (eg old man's beard, banana passionfruit). Site-led programmes focus on clearing a suite of weeds from important biodiversity sites called 'Key Native Ecosystems'.

Restoring the Town Belt forest: The inner Town Belt has a number of areas that are being restored and returned to native forest. Often these areas arise as a result of the removal of hazardous conifers. Restoration includes weed clearance, reintroduction of indigenous plant species through managed regeneration and planting, and potentially, the reintroduction of appropriate wildlife. There is also a vision to restore a continuous band of indigenous vegetation along Wellington's Outer Green Belt through a combination of planting both adjacent to and within existing key native areas.

A profile of Wellington's biodiversity continued . . .

Action case study: Trelissick Park Group

Trelissick Park is a Wellington City Council reserve that follows the Kaiwharawhara Stream down Ngaio Gorge. The area was extensively milled for tawa and rimu in the mid-nineteenth century, however through natural regeneration, and with the support and encouragement of the Trelissick Park Group volunteers, elements of the original forest are being restored. Mature tawa, rewarewa and titoki are common, and with the ongoing care of volunteers and the City, the future of the reserve is looking good.

Threatened species

Many animals that would have once occurred in Wellington's forests are now extinct in the region, while others, such as Wellington's green gecko are thought to be in critical decline. However, conservation efforts by the Karori Wildlife Sanctuary, Wellington Zoo and the Department of Conservation are helping to reintroduce some of these species. Birds such as the little spotted kiwi, hibi and saddleback can now all be seen at Karori Wildlife Sanctuary. Recently, tuatara have also been reintroduced to the Sanctuary, as have giant weta, and some lizards have been identified as having translocation potential. Invertebrates such as the giant pill millipede and large land snails may also be released in the Sanctuary one day.

Genetic biodiversity

Genetic biodiversity is the variability in genetic make up among individuals of the same species. As population size decreases, less individuals combine and genetic diversity is reduced. Genetic variability is important because it helps local populations cope with local conditions; particularly important in Wellington's wind swept conditions. We try to protect and maintain genetic diversity by making sure all the plants we use for ecosystem restoration and revegetation (from forests to wetlands to sand dunes) are Wellington eco-sourced plants. This means that seeds are collected from local wild populations of the plants and then grown in nurseries. Using plants that are not eco-sourced can threaten the integrity of the city's natural ecosystems.

SCRUB AND SHRUBLANDS

Wellington has two main kinds of scrub and shrubland communities; grey scrub and manuka/kanuka shrubland. These ecosystems are a special part of Wellington's biodiversity. They are important transitional communities in ecological succession and are essential habitat for lizards, insects and some birds.

Main Issues for Scrub and Shrublands

Lack of information: A combination of the transitional nature of scrub and shrubland, and difficulty identifying communities by aerial photography or satellite imagery, means that we have little information on current and historic cover. Addressing this lack of information presents an opportunity for better managing Wellington's biodiversity.

Animal pests and weeds: As with forest, pests such as possums, pigs, rodents and stoats are a problem in scrub and shrubland, where they eat palatable native trees, seedlings and prey on native insects and birds. Weeds such as gorse and Darwin's barberry are particular problems for shrubland and scrub ecosystems. In particular, gorse is an early coloniser and has out competed kanuka and manuka in this successional role.

Clearance: Because scrub and shrubland are often transitional communities, they tend to be more readily cleared than mature forest often as a result of development. However, this clearance must be balanced with the retention of ecological processes and biodiversity.

Fire: Scrub and shrubland are particularly vulnerable to fire damage, which is likely to be a combination of where they grow (eg retired farmland and growing in close association with gorse) as well as their largely woody nature. Manuka and kanuka are particularly flammable species.

Action case study: Darwin's barberry weed control

Darwin's barberry has been steadily creeping along Wellington's Outer Green Belt over the last few decades, particularly around Mt Kaukau and Wright's Hill. This prickly leaved and golden flowered small tree often grows in association with gorse, and is a problem around the edges of forest and in disturbed scrub. Because there's so much Darwin's barberry around, Wellington City Council is targeting priority areas for clearing, as determined by the Pest Management Plan. The first section to be cleared is along the Skyline Track above Otari-Wilton's Bush, and contractors started work on it in 2007.



Grey scrub

Grey scrub tends to occur in the relatively exposed environments of Wellington's south-west peninsula. Grey scrub is characterised by small-leaved divaricate shrubs (shrubs that have fine, right-angled branches with a woody tangled appearance), and climbers such as pohuehue (*Muehlenbeckia*). It is called grey scrub because it appears grey from a distance. In Wellington's grey scrub, you will generally find small leaved coprosmas (*Coprosma propinqua*, *C. crassifolia*), pohuehue, *Olearia solandri*, *Ozothamnus leptophyllus*, kowhai, manuka and bush lawyer. Grey scrub is also habitat for the nationally vulnerable plant, *Muehlenbeckia astonii*, and regionally threatened matagouri.

Manuka/Kanuka shrubland

Manuka/kanuka shrubland is generally found on previously forested land and lightly grazed hill country. It has become relatively rare in Wellington as gorse has taken over its ecological niche. Wellington's remaining manuka/kanuka shrublands are important to protect to maintain a natural process of forest succession. Research has found that forest growing up through gorse has less diversity of species than forest that grows up through kanuka/manuka, and that some plant groups, such as podocarps, orchids, and small leaved shrubs are less common in gorse than in manuka/kanuka shrubland ⁷.

COASTAL FOREST AND COASTAL SCARP

The wind buffeted and salt laden coastal escarpments facing the Cook Strait (Wellington's South Coast) as well as the harbour escarpments, were once covered with a mosaic of coastal forest, dense coastal scrub, flax and tussockland, and scree. The coastal forest was dominated by kohekohe, ngaio, northern rata, akiraho and kowhai, the dense coastal scrub was characterised by tauhinu, mingimingi, matagouri, prostrate kowhai, pohuehue and speargrass; both with a complex mosaic of scree, coastal flax and tussock.

Coastal forest

Today, less than 1 percent of coastal forest remains. Some small remnants can be found along the Harbour Escarpment, as well as some areas along the South Coast. Spooky Gully within Te Kopahou Reserve is a good example of a South Coast forest remnant, with its spectacular tree hebe forest interwoven with scramblers such as native jasmine and native clematis.

Coastal scrub

The scrub of the coastal scarp has fared a little better than the coastal forest but is still in serious decline⁸. Matagouri is now endangered in the Wellington area, however pohuehue, mingimingi, tauhinu and taupata are still a relatively common sight along the coast, as are the flax clad cliffs.

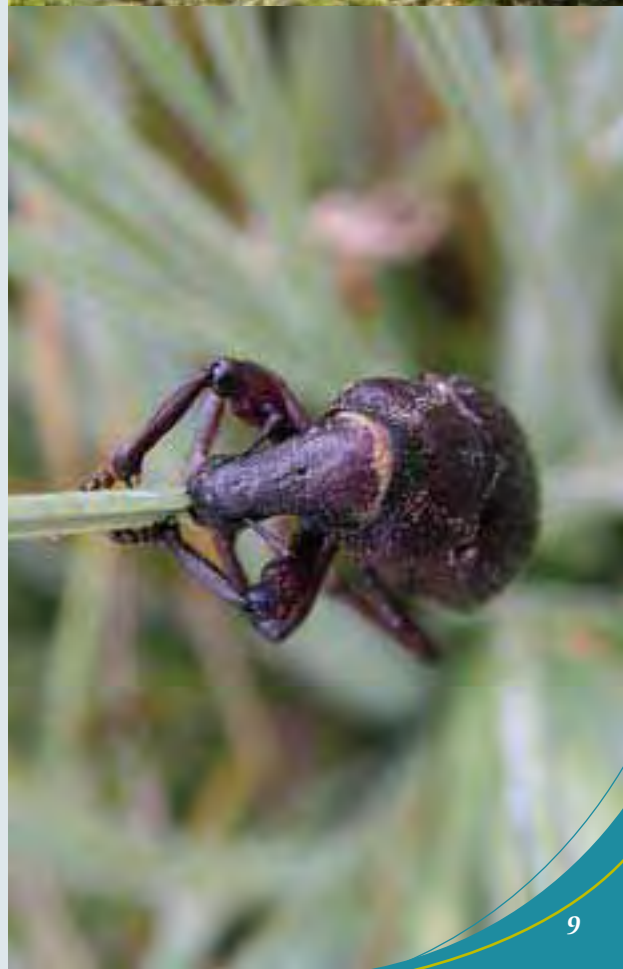
⁷ Sullivan, J.J.; Williams, P.A.; Timmins, S.A. (2007). Secondary forest succession differs through naturalised gorse and native kanuka near Wellington and Nelson. *New Zealand Journal of Ecology* 31.

⁸ Sawyer, J.W.D (2004). *Plant Conservation Strategy: Wellington Conservancy 2004-2010*. Department of Conservation, Wellington.

Photo left: Te Kopahou Reserve, Photo: Justine Hall, Wellington City Council.

Photo right (top to bottom): Coastal Escarpment at Wellington's South Coast, Photo: Justine Hall, Wellington City Council.

Speargrass Weevil, Photo: Andrew Morrison, Crown Copyright, Department of Conservation.



A profile of Wellington's biodiversity continued . . .

Main Issues for Coastal Forest and Scarp

Quarrying: Although quarrying has ceased along the South Coast with the acquisition of the Owhiro Bay Quarry by Wellington City Council, it is still active along the harbour escarpment between Wellington City and the Hutt Valley. Future quarrying activity will need to take biodiversity values into careful consideration.

Development pressure: Whilst the steepness of the coastal scarp means that it hasn't seen a large amount of development pressure, this is still an issue for the future, bringing with it the associated threats of ecosystem clearance and fragmentation. Again this can be managed through careful consideration of land use and principles of low impact subdivision design.

Pests: Goats, pigs and possums are a particular problem in many of these areas, as are coastal weeds such as boneseed and evergreen buckthorn. However a number of coastal sites have been identified as priority areas for pest control in the Wellington City Council Pest Management Plan (2005) due to their ecological significance. The steep nature of many of these sites is an ongoing challenge.

Action case study: Te Kopahou animal pest control.

Te Kopahou historically had very high numbers of goats and pigs. Between 1990 and 1993 more than 3000 goats were shot in the area. In 2006, 364 goats were shot. From December 2006 until June 2007, the numbers of goats shot dropped to 134. This shows that definite progress is being made. Anecdotal evidence, such as no sightings, indicates that pig numbers are also down.

Threatened species

The coastal scarp is an important habitat for many species which are now threatened, due mainly to habitat loss. One example is the speargrass weevil. The speargrass weevil (*Stephanorhynchus insolitus*) and Hutton's speargrass weevil (*Lyperobius huttoni*) live on speargrass around the South Coast. However, speargrass has been decreasing due to grazing, pig rooting and out competition by weeds, and so the weevil's habitat is being lost. Department of Conservation have an active programme translocating the weevils to offshore islands to try and ensure their survival. Another example is the geometrid moth (*Notoreas 'wellington'*), a striking orange, black and white moth. Again, the main threat to this species is habitat loss, in this case the decrease of its host plant *Pimelea cf urvilleana*.

COASTAL FRINGE

Wellington's coastal fringe is a dynamic mix of rocky foreshore, coastal turf communities and coastal dunes.

Wellington's rocky foreshore defines the 'wild coast' experience, but on closer inspection the rocky foreshore is actually an intricate mix of coastal turf communities (or herbfields), coastal shrubland, sedges, grasses and rushes. A great example can be found at Hue-te-Taka (Moa Point).

Coastal turf

The unifying feature of Wellington's coastal communities is that they are adapted to tolerate very salty and windy environments. The coastal turf communities are characterised by low growing dense mats of herbs, often with very fleshy leaves that protect the plant from desiccation (eg NZ iceplant, shore bindweed, glasswort). Sedges, grasses and rushes growing in these areas are also specialists at withstanding salt and dehydration. Many also tolerate very low nutrient levels and shifting sands, good examples are pingao, spinifex and sand tussock. You can also find coastal shrubs in some of these areas, including tauhinu, sand pimelea and sand coprosma.

Coastal dunes

Coastal dunes form where there is shelter from strong waves, a supply of sand, and onshore winds⁹. The side closest to the sea (foredune) is very dynamic and sand binding plants have an important role. The two main native sand-binders are pingao (*Desmoschoenus spiralis*) and spinifex (*Spinifex sericeus*); however the introduced marram grass is now most commonly seen. Other native species of coastal foredunes are sand tussock (*Austrofestuca littoralis*), sand coprosma (*Coprosma acerosa*), and sand daphne (*Pimelea aff. arenaria*). An important site for coastal dunes in Wellington is from Owhiro Bay to Karori Stream. In the past, all five native foredune species have been recorded in this area, but in the last 10 years only sand tussock and pingao have been found. This area is one of the only sites in the North Island where 'Marlborough minimac' geckos occur. Common, brown and copper skinks and common geckos have also been recorded here¹⁰.

⁹ Milne, R. & Sawyer, J. (2002). *Coastal foredune vegetation in Wellington Conservancy*. Department of Conservation, Wellington.

¹⁰ *Ibid.*

Photo right (top to bottom): *Suaeda novae-zelandiae*, Photo: John Barkla. Coastal Dunes, Photo: Justine Hall, Wellington City Council. Cook Strait Little Blue Penguin, Photo: Rosalind Cole, Crown Copyright, Department of Conservation. Fur Seal, Photo: Gary Holz, Crown Copyright, Department of Conservation.



Coastal wildlife

The coastal fringe is an important place for many bird species; but for a number of reasons many of these bird species are now threatened. The banded dotterel is one example; this bird nests in soil, shingle or sand dunes using little, if any, nest material. This means that its breeding ground is easily disturbed by vehicles, people and pets. The little blue penguin is another example. The 'little blue' is the smallest penguin in the world, and adults come ashore in Wellington between May and June to prepare nests, laying eggs from August to November. The landscape has been modified, and their habitat destroyed as a consequence. While many of them have adapted to nest under houses or reserves around the coast, many are killed by vehicles, pets and ferrets and stoats.

Wellington's wild coast also has a number of seal 'haul-outs'; and the most accessible site is at Red Rocks or Sinclair Head. Between May and October, male fur seals rest up here between feeding. Fur seals are the most common seal around New Zealand and are slowly recovering from commercial sealing in the 1870s.

Main Issues for Coastal Fringe

Land use pressure: The coast is a popular place to live and visit, and so has always been under pressure from development and recreation. Land use that is sympathetic to the coastal environment is an important consideration and simple actions like keeping vehicles to formed tracks and not dumping rubbish can make a big difference.

Weeds: Weedy grasses, herbs and trees are a serious problem and threat for the coast. Plants like gazanias and garden arctotis, attractive enough in a garden setting, grow well in this salty environment and smother native coastal herbs. The introduced marram grass is now common along the coast and has largely displaced pingao, spinifex and sand tussock. Meanwhile weed trees and shrubs such as karo, boneseed, and evergreen buckthorn threaten to out compete many of the native shrubs.

Climate change and coastal erosion: The effects of climate change will increase coastal erosion and inundation in many areas. Although climate-change effects are very gradual, land-use planning decisions usually have long-term horizons because of the permanency of structures (e.g. buildings, roads, seawalls). Climate-change effects will therefore eventually have major implications for those decisions. It has been recognised that the coastal fringe provides a natural defence against the sea¹¹.

¹¹ Ministry for the Environment (2004). Coastal Hazards and Climate Change: A guidance manual for local government in New Zealand.

A profile of Wellington's biodiversity continued . . .

Action case study: Oku Coast Care

This group works on the Island Bay Sand Dune, the last small remnant of a large dune area that originally extended right back to Severn Street. They became involved after noticing a bulldozer on the dunes clearing a path through the dune vegetation to put in a boardwalk. They worked with Wellington City Council to change this project into a dune restoration effort. The Council has since fenced the area to protect the dune plants. Since 2003 the group has held public working bees to carefully remove invasive weeds and plant the dune with native foredune plants, returning it to a more natural state. The group also plant a number of rare and endangered native dune plants.



OFFSHORE ISLANDS

The only island that sits within Wellington District is Tapu Te Ranga, the namesake of Island Bay.

Tapu Te Ranga is typical of Wellington's South Coast environment, and as an island potentially offers a safer place for nesting and roosting seabirds. Tapu Te Ranga is designated as a Conservation Site in the District Plan. It is characterised by flaxland, salt marsh and scrubland and is home to two rare plants found nowhere else in Wellington; *Crassula moschata* and *Suaeda novae-zelandiae*.

The islands Matiu (Somes), Makaro (Ward) and Mokopuna sit prominently in Wellington's harbour, but are within the Hutt City jurisdiction. The biggest of these, Matiu, was occupied by Maori for generations and its use in more recent times has included a quarantine station, internment camp and military defence position. It is now managed by the Department of Conservation and is a site of active restoration and home to a number of conservation species, including tuatara and kakariki (red crowned parakeet).

All of the harbour islands are important nesting sites for little blue penguins.

Photo above: Planting at Island Bay Sand Dune photo: Justine Hall, Wellington City Council.
Photo right (top to bottom): Kakariki, Photo: Crown Copyright, Department of Conservation.
Tapu Te Ranga island, Photo: Neil Price, Wellington City Council.

Main Issues for Offshore Islands

Weeds: As with the coastal environment, the indigenous ecosystems of Tapu Te Ranga Island are at serious risk from weeds. Weeds of concern include karo and pohutukawa (although both of these plants are native, neither occur naturally in Wellington), boneseed, buck's horn plantain, and wallflower (*Cheiranthus cheiri*).

Litter: Litter washes up on the island and is a risk to wildlife.

Fires: Fire is a huge threat to this ecosystem, and under no circumstances should people light fires on the island.



WETLANDS

Wetlands include swamps, bogs, shallow lakes and salt marshes – essentially any area of land covered by water for some period of time¹². Man-made ponds are not normally considered to be a wetland. Wetlands are important places for biodiversity – they support more bird species than any other ecosystem. Wetlands are also important places for water purification (trapping sediments and removing excess nutrients), for preventing flood damage, for healthy fisheries, and for recreation¹³.

All over New Zealand, wetlands have been drained, filled and built on. In Wellington, most of our wetlands have been lost and those that remain are mostly small swamps, usually characterised by raupo, purei and harakeke¹⁴. These include a raupo wetland in Opau Valley, a carex wetland in Hawkins Hill and a wetland in Takarau Gorge. There is also a small estuary at the mouth of the Kaiwharawhara Stream.

Coastal wetland – Makara Beach Estuary

Wellington City has only one salt marsh estuary, and this is located at Makara Beach. Estuaries are incredibly rich biodiversity spots due to the combination of terrestrial and wetland plants, seashore life and wading birds. At Makara Beach Estuary there is a community of saltmarsh ribbonwood, as well as salt turf, sedges and rushes. It is an important area for blue heron, rare freshwater snails, and black flounder breeding. It is also the only area in Wellington suitable for inanga spawning¹⁵.

Main Issues¹⁶ for Wetlands

Draining and filling: Although this has slowed since the mid-1980s when the government ceased its subsidies for irrigation, flood control and drainage schemes; small scale losses, particularly of ephemeral wetlands, continue.

Changes to water levels: Wetlands are affected by the streams and catchments that feed them. When streams are filled and piped, then this can dry out a wetland, or if stormwater discharges into a wetland it may scour out a channel and so drain the wetland. Wetlands are excellent examples of the ecological principle that everything is interconnected.

Weeds and pest animals: Weeds such as grey willow and exotic grasses can replace wetland native plants and alter water flow and quality. Aquatic weeds, such as hornwort, are also finding their way into the region. These weeds choke out all light and take all oxygen from the water. Pest animals (possums, hedgehogs, mustelids, cats and rats) are a problem as they prey on native birds and their eggs. Herbivorous pests (rabbits, hares, possums) also eat wetland plants. Pest fish such as koi carp also cause trouble, outcompeting native fish and increasing sedimentation.

Pollution: While wetlands can be thought of as 'nature's kidney's', their ability to deal with pollutants is limited. Higher levels of nutrients can cause weed invasion; while increased sediment can be held in the wetland, causing it to fill up and become dry.

Loss of buffers and connections: Animals that live in wetlands often need well vegetated areas to nest in – these buffer areas seldom remain today. Similarly, few have intact corridors of vegetation that link them with the landscape.

¹² Greater Wellington (2003). Wetland Action Plan.

¹³ *Ibid.*

¹⁴ Greater Wellington (2003). A beginner's guide to wetland restoration.

¹⁵ Taylor, M.J. & Kelly, G.R. (2001) Inanga spawning habitats in the Wellington Region, and their potential for restoration. NIWA, report prepared for Wellington Regional Council.

¹⁶ Greater Wellington (2003). Wetland Action Plan.



A profile of Wellington's biodiversity continued . . .

Action case study: Karori Wildlife Sanctuary wetland restoration

Karori Wildlife Sanctuary has carried out a wetland restoration project around the historic man-made dams (built in 1870 and 1906) within the Sanctuary valley. The Sanctuary now has a diverse range of freshwater habitats representative of what would once have occurred within the Wellington area. Their next step is the removal of exotic fish and the restoration of native fish communities.



STREAMS

Streams are one of the Wellington region's threatened ecosystems. The streams are also affected by what happens in their catchments, which is the area of land drained by that stream system. Wellington's streams can be described simply as rural streams and urban streams¹⁷. Rural streams include lower Karori Stream, Makara Stream and Ohariu Stream – as well as some of the more remote or 'wilderness' streams such as Oteranga Stream. Much of the country associated with these rural streams has a long history of farming and grazing, and these streams are often characterised by a lack of streamside (riparian) vegetation. Some rural streams (eg Waiariki and Opau Streams) also flow through areas of fragmented or regenerating forest.

Urban streams include Owhiro Stream, Kaiwharawhara, Ngauranga and the Porirua Stream system, as well as the 'lost streams' (now piped) of Te Aro, Houghton Bay, Miramar and the inner city. The Porirua Stream system, or catchment, is the largest in Wellington, running north from Johnsonville to exit at Porirua Harbour. Urban streams have been, and continue to be, heavily modified and influenced by residential development and urban living.

Streams provide habitat and food for hundreds of plants and animals – from algae to eels. They also provide freshwater for people and animals to drink and places for people to play¹⁸. Although many of Wellington's streams are small, and some are even dry at certain times of the year (ephemeral), their biological health is important both for the species they support and also for the harbour and sea they flow into.

Stream margins, or riparian areas, are an important part of stream biodiversity – providing riparian habitat as well as improving water quality and habitat by providing shelter for fish, lowering water temperature, removing sediment, filtering out some pollutants, preventing damage to stream banks, and increasing bird and insect life.

Threatened species

Nearly all of New Zealand's freshwater fish species migrate between freshwater and the sea during their lives and this is an important part of their breeding cycle. This means that if streams are lost, or if there are barriers to fish passage, then fish will become extinct from that particular stream. Giant kokopu, long finned eel and short jawed kokopu are all nationally threatened fish that are known to occur in Wellington.

¹⁷ WCC. Wellington Wet and Wild: Bush and Streams Restoration Plan.

¹⁸ Greater Wellington (2004). Mind the stream: a guide to looking after urban and rural streams in the Wellington Region.

Photo Left (top to bottom): Kaiwharawhara Stream, Photo: Justine Hall, Wellington City Council.

Giant Kokopu, Photo: Angus McIntosh, Natural Sciences Image Library.

Photo far right (top to bottom): Wellington City, photo: Neil Price, Wellington City Council. Landscaping at Waitangi park, Photo: Neil Price, Wellington City Council.

Main Issues for Streams

Infilling, piping and culverting: Filling and piping streams (including ephemeral streams) leads directly to habitat loss for aquatic species, and causes barriers to fish passage. In addition, filling and piping is often associated with development and an increase in impermeable surfaces, leading to greater stormwater run-off that affects water quality. Stormwater run-off also causes stream bank erosion. Innovations for low impact development are helping protect stream ecosystems.

Water quality: Water quality and biodiversity go hand in hand. Water quality is affected by sediment and pollutants that get into streams by stormwater runoff, or directly leaching into streams. It is also affected by rubbish entering the stream. Stream biodiversity is in turn affected, and biodiversity measures such as the number of insects are important indicators of pollutants, water quality, and stream health.

Weeds: Weeds such as willow, blackberry and exotic grasses can replace riparian native plants and alter water flow and quality. Aquatic weeds, such as hornwort, are also finding their way into the region. These weeds choke out light and take all oxygen from the water.

Pest animals: Pest animals (possums, hedgehogs, mustelids, cats and rats) are a problem as they prey on native birds and their eggs. Herbivorous pests (rabbits, hares, possums) also eat riparian plants. Pest fish such as koi carp also cause trouble, outcompeting native fish and increasing sedimentation.

Action case study: Project Kaiwharawhara

Project Kaiwharawhara is a stream restoration programme that began in 2002, uniting community groups, councils and organisations, and incorporating multi-disciplinary design and planning. The vision of Project Kaiwharawhara is to protect and enhance the natural landscape, ecosystems, homes and recreation areas, and for the stream to be a local focus. This vision is being achieved through an innovative community catchment plan. Work so far has included riparian planting alongside Kaiwharawhara stream, stream bank stabilisation, and remedial works down the stream to allow fish passage.

URBAN AREA

Approximately 4,200 hectares of Wellington are in a built urban environment, compared with around 3,600 hectares of Council-owned open 'green' space. The urban environment also includes 1,200 kilometres of road reserve.

It is possible for an amazing amount of biodiversity to be found in this environment. There are about as many wild native plants in New Zealand cities (350–550 species or 14–22 percent of the flora) as in National Parks (440–660 spp. or 17–26 percent) (Given & Meurk 2000)¹⁹.

¹⁹ Given, D.; Meurk, C. D. (2000). Biodiversity of the urban environment: the importance of indigenous species and the role urban environments can play in their preservation. In: Stewart, G. H.; Ignatieva, M. E. ed. *Urban biodiversity and ecology as a basis for holistic planning and design. Proceedings of a workshop held at Lincoln University 28–29 October 2000. Lincoln University International Centre for Nature Conservation No. 1.* Christchurch, Wickliffe Press. Pp. 22–33.



A profile of Wellington's biodiversity continued . . .

Much of Wellington's land environment²⁰ that has been identified as acutely threatened²¹ sits within the built urban area. The majority of this land is privately owned. Planning that protects and restores the indigenous remnants within this area is critical to the survival of many species, mitigating the effects typical of urbanisation²².

Private gardens can greatly contribute to the overall biodiversity of the city through suitable plant choice and gardening practices. This not only provides a habitat for the plants themselves, but also creating an attractive environment for indigenous birds, lizards and insects.

People's interaction with the natural environment also plays a key role; it is within the urban area that most people experience these interactions. An awareness of the value of biodiversity in our own backyards can lead to an appreciation of the ecological importance of the wider landscape. In this context, social objectives can be as important as ecological outcomes²³.

Main Issues for Urban Area

Nature of the land: Urban environments typically have highly disturbed natural systems which make a poor starting base for the seed sources, soil structures and networks of fragmented habitat systems needed to make the restoration of self-sustaining viable ecosystems a reality.

Infill housing: There is growing concern over the impact infill housing is having on the character of residential areas. It also impacts on biodiversity by creating less green open space and more impervious surfaces. Removing urban bush fragments reduces the areas which birds can use as stepping stones between reserves.

Weeds: The main weed concern in the urban environment is that of 'garden escapes'. About 75 percent of land weeds and 50 percent of freshwater weeds are garden escapes. On average, eight garden plant species each year become established in the wild in New Zealand.

Pest animals: Cats (both feral and domestic), rodents, possums and hedgehogs are commonly found in urban areas. Individually, and in combination, these pose a major threat to indigenous biodiversity. Dogs also pose a threat, particularly to our indigenous birdlife in urban coastal areas.

Community engagement: There is already a growing awareness and appreciation of indigenous biodiversity within the urban community. However this needs to be supported by leaders, for example, ensuring the provision of readily available local native plants. Our indigenous biodiversity must continue to become a common experience for all Wellingtonians, and not something to be found only outside the urban boundaries.

Action case study: Threatened species in roadside planting

Urban landscapes such as traffic islands and road reservations are now being used in Wellington City as an integral part of plant species recovery programmes. Threatened indigenous plants grown in urban plantings are used as 'insurance populations', research resources, seed sources and as an advocacy and education tool. They are valuable components of conservation programmes as well as being attractive parts of the urban landscape. Some examples of this are the use of the nationally threatened plants *Euphorbia glauca*, *Austrofestuca littoralis* and *Muehlenbeckia astonii* in traffic islands around Wellington City.



20 Leathwick, J; Morgan, F; Wilson, G; Rutledge, D; McLeod, M; Johnston, K. (2003). Land Environments of New Zealand: Technical Guide. Auckland: David Bateman Ltd.

21 Walker, S; Price, R; Rutledge, D. (2005). New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs. Report no: LC0405/038 prepared for Department of Conservation, by Landcare Research.

22 Clarkon, B; Wehi, P; Brabyn, L. (2007). Bringing back nature into cities: Urban land environments, indigenous cover and urban restoration. CBER report No. 52. University of Waikato, Hamilton.

23 Kilvington, M; Allen, W. (2005). Social aspects of biodiversity in the urban environment. In Greening the City. Royal New Zealand Institute of Horticulture (Inc.).

THE HARBOUR & COASTAL WATERS

Wellington's coastal waters are home to marine mammals such as the common dolphin and orca, and Wellington Harbour has unique marine features including a giant kelp forest and a population of rare sponge (*Latrunculia brevis*). The waters of Wellington's South Coast support a rich and varied mix of plants and animals, due partly to a complex topography and wide variety of habitats. The high biodiversity is also due to the collision of three major oceanic currents, the result being a mix of warm Pacific and cold sub-Antarctic waters. The community of plants and animals found here is unique in New Zealand, with many species occurring at the northern and southern limits of their range. At least 100 different species of algae (seaweed) have been recorded on the South Coast, and sea horses, many fish species, crayfish and paua can all still be found. Even Wellington's intertidal zone is filled with a rich number of seaweeds, shellfish, and other invertebrates.

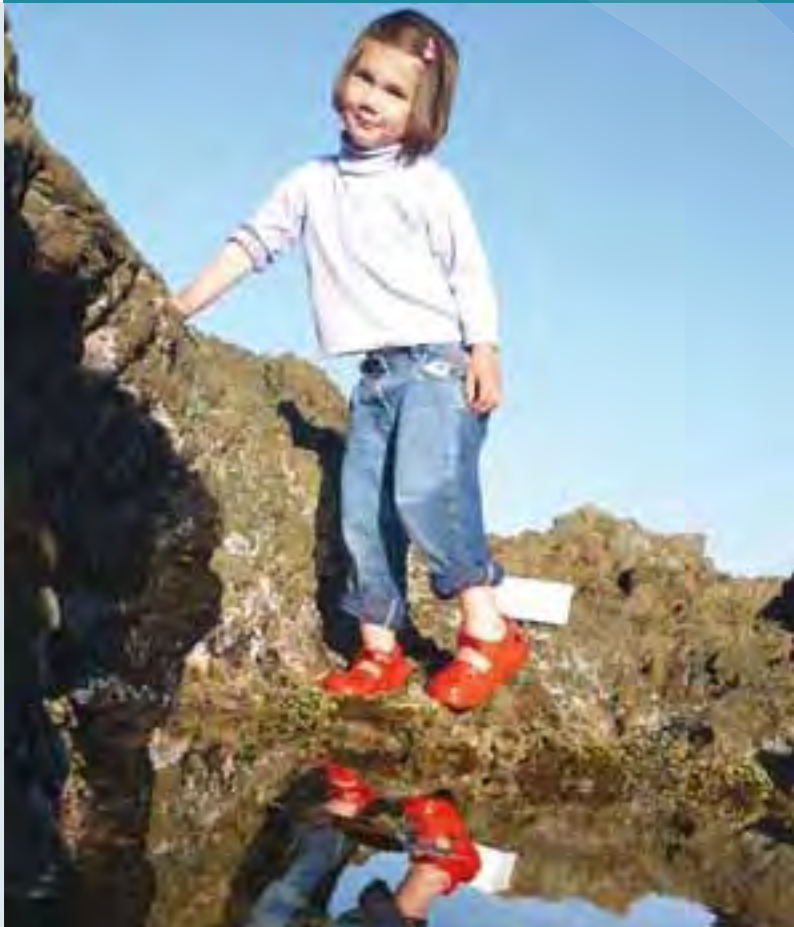
Nationwide, scientists estimate that as much as 80 percent of New Zealand's indigenous biodiversity may be found in the sea. Yet less than 1 percent has ever been surveyed. On average, seven new marine species are identified every fortnight.

The marine environment is also very important for many of our freshwater fish species. Almost half of them are diadromous and use both the streams and the sea to complete their life cycle. Our native eels are thought to breed in deep ocean trenches somewhere near Tonga. Their larvae return to New Zealand on the ocean currents and re-enter the stream systems. The adults never return as they die after spawning.

Wellington City Council's management extends only as far as the mean high water level. However there is no doubt that what happens on the land influences what happens to the harbour and coastal ecosystems. Land management practices have flow on effects down to the sea, especially via streams. Despite many environmental pressures, the general condition of Wellington's intertidal sandy beaches and estuaries is currently healthy ²⁴.

24 Stevens, L., Robertson, B. & Robertson, B. (2004). *Broadscale habitat mapping of Sandy Beaches and River Estuaries – Wellington Harbour and South Coast*. Report prepared for Greater Wellington, by Cawthron Institute, Nelson.

Photo Left (top to bottom) *Euphorbia glauca* at Lyall Bay, Photo: Justine Hall.
Planting at Lyall Bay, Arbor Day 2006, Photo: Neil Price, Wellington City Council.
Photo right (top to bottom): Exploring Wellingtons rocky coast, Photo: Rachel Ahyong.
Blue Cod, Photo: Crown Copyright, Department of Conservation.
Sea Horse, Photo: W Farelly, Crown Copyright, Department of Conservation.



A profile of Wellington's biodiversity continued . . .

Main Issues for Harbour and Coastal Waters

Water pollution: The quality of the harbour waters is affected by landfill leachate, nutrient pollution, stormwater, sewage disposal and litter. All of which come from land based activities. High levels of pollution can harm aquatic life and marine mammals are particularly vulnerable to plastic rubbish.

Sedimentation: Sediment from land uses (such as catchment development and road building) and stream channel erosion often settles in coastal waters. Continual sediment delivery to inshore environments reduces light penetration, and prevents plants from growing. This affects bottom dwelling organisms such as worms, crabs and shellfish, the base of the marine food web.

Shellfish collection: The depletion of shellfish due to recreational gathering can be an issue if legal limits are not adhered to, particularly around the South Coast for species such as paua.

Structures: Structures in coastal areas may cause physical changes to the foreshore or seabed, and may detract from the natural character, ecology and landscape quality of the coastal marine area. Water and seabed sediment quality may also be affected.

Action case study: Wellington Harbour sediment sampling

The most significant medium to long-term impact of urban stormwater discharges on the Wellington Harbour environment is the accumulation of stormwater-related contaminants in the sediments. This is because the contaminants can, over time, build up to concentrations that are toxic to sediment-dwelling organisms. The Wellington Harbour sediment sampling project is being conducted to make an assessment of benthic community health and sediment quality and accumulation. Sampling and analysis is being funded by Greater Wellington, Wellington City Council and the Hutt City Council.

SURROUNDING DISTRICTS

Wellington's biodiversity does not end at the edge of Wellington City's boundaries, and neighbouring areas are very important. For example, many birds migrate to and from Kapiti Island in the northwest, the Tararuas to the north, and the Rimutakas to the east. Stream systems, such as that drained by the Porirua stream, can incorporate multiple districts within their catchment area. Although this action plan focuses on Wellington City's unique biodiversity, we must be aware that biodiversity is not confined to legal boundaries and ensure that we work with our neighbours to ensure local biodiversity protection.

Photo right (top to bottom): Wellington City showing Rimutaka Ranges in background, Photo: Neil Price, Wellington City Council. Wellington coastline showing across harbour to Hutt Valley and Tararua Ranges, Photo: Neil Price, Wellington City Council.



INTRODUCED SPECIES

New Zealand is characterised by a mix of native and introduced species which combined make up the country's total biodiversity. New Zealand has the highest number of introduced mammals of any country in the world and the second highest number of introduced birds. In the case of vascular plants, we now have more introduced species in the wild than native ones and this number is increasing all the time.

Many of the pressures on New Zealand's indigenous biodiversity are from plants and animals which were introduced with the arrival of humans. These species were introduced into Wellington from other parts of the country as well as from overseas. However, these introduced species are neither all 'good' nor all 'bad'.

Introduced species can threaten our indigenous biodiversity through processes such as out-competition, hybridisation, predation and browsing. But they can also provide benefits depending on the situation in which they are found.

Introduced species can provide complementary food for a range of indigenous species. For example, the presence of bottlebrush from Australia provides a feeding source for tui. A forest stand, whether indigenous or exotic, provides an extra dimension of habitat (height) in comparison with grassland. This is reflected in the indigenous insect and bird populations that find cover in these habitats.

Our primary production is dependent on introduced biodiversity in agriculture, horticulture and forestry. The revenue from this introduced biodiversity also enables us to further protect our indigenous biodiversity.

Introduced species can be used to effectively convey conservation messages and used as examples for education purposes, such as at Wellington Zoo and Wellington Botanic Garden. The messages of conservation and sustainability can be shared regardless of the provenance of the species involved. These places also run breeding and propagation programmes, safeguarding global genetic biodiversity in a controlled environment.

Wellingtonians value many introduced species for aesthetic, cultural and heritage reasons. Introduced species can enable the community to identify with the city by providing evidence of its past in the existing environment. For example Wellington Botanic Garden has some of the oldest radiata pine in the country (dating back to the 1860s), which went on to become New Zealand's main timber tree. One area of significance to local iwi is a karaka grove between Red Rocks/Pariwhero and Sinclair Head/Te Rimurapa, which is associated with a pre-European Maori settlement site. Karaka is thought to be native to the north of the North Island, but to have been introduced to Wellington. Pohutukawa, another introduction to Wellington from the north of the North Island, is also of cultural significance and contributes to Wellington's urban sense of place.

The challenge is to find a balance between the benefits provided by introduced species and the threats they may present to local biodiversity. This balance is best determined on a case-by-case basis.



Strengths, issues and opportunities for current biodiversity management

Strengths

- Baseline monitoring for vegetation cover and ecological health of selected reserves
- Bi-annual bird counts in selected reserves
- Good data on forest remnants
- Revegetation systems in place
- Pest Management Plan
- Council supported organisations with strong biodiversity focus (Wellington Zoo and Karori Wildlife Sanctuary)
- Extensive possum control programme in partnership with Greater Wellington Regional Council
- Existing community volunteer groups with a keen interest in biodiversity conservation
- Threatened plant conservation being carried out by Otari-Wilton's Bush, Botanic Garden and Berhampore Nursery
- Dedicated weed eradication team and pest officer
- Some protection of ecological links and corridors underway.

Challenges

- Lack of plans and strategies for co-ordinating revegetation and protection
- Lack of awareness of biodiversity issues amongst the wider community
- Few incentives for private landowners to get involved in biodiversity conservation
- Few protection mechanisms for biodiversity on private land
- Potential for a perceived erosion of private property rights
- Data deficient on biodiversity and ecological values other than forest remnants
- Dealing with extended timeframes – biodiversity conservation can take a long time, from pest control to restoration
- The lack of information can mean that by the time we realise we had something it's gone
- Obtaining adequate resources
- The need for ongoing management, particularly pest control.

Opportunities

- City-wide identification of sites of ecological and biodiversity significance
- Co-ordination of biodiversity efforts and capacity creation – eg coordinating revegetation and hazardous tree removal for biodiversity gain
- Improve information gathering and sharing about threatened species
- Strengthen partnerships with Greater Wellington Regional Council, Department of Conservation, research organisations, tangata whenua, and community groups for city-wide biodiversity gains
- Incentives for private landowners to get involved in biodiversity conservation
- Review and update District Plan protection for biodiversity
- Provide regulation, education and incentives for biodiversity protection and enhancement
- Sources of funding for biodiversity management eg Biodiversity Condition and Advice Fund (DOC), Sustainable Management Fund (MFE)
- Increase public awareness
- Integrated catchment management
- Further management of water quality and the 'receiving environment'.



Wellington's vision for biodiversity

Wellingtonians identified a vision for Wellington's landscape and ecosystems through the development of the Long Term Council Community Plan (2006/07 – 2015/16).

Community outcomes for the environment included:

- Wellington will promote the **sustainable management** of the environment, and support increased opportunities for the exercise of kaitiakitanga or environmental guardianship
- Wellington **protects** and showcases its natural landforms and indigenous ecosystems
- Pest animals and plants are eliminated as methods become available, and no new pests will become established
- Wellington will **preserve and improve** its parks, trees and open spaces
- Wellingtonians will **protect** and have access to public green open spaces and the coast.

This can be translated into an overall vision for Wellington's biodiversity:

Wellington is a city that protects and restores biodiversity and proudly showcases its natural areas. It is a city renowned for its kaitiakitanga, its environmental guardianship

There are four themes and 13 objectives that have been developed to cover the actions needed to achieve this vision and the ongoing conservation of our indigenous biodiversity.

The Council will **identify** the state of Wellington's biodiversity by:

- Having confidence in our knowledge of Wellington's biodiversity
- Recognising the relationships and interactions between species and environments
- Recognising the relationships and interactions between people and biodiversity.

The Council will **protect** Wellington's biodiversity from further fragmentation and loss by:

- Conserving Wellington's biodiversity values
- Actively protecting sites that collectively represent the full range of Wellington's biodiversity
- Providing RMA and policy protection (eg through District Plan and input into regional plans) for sites with ecological significance
- Motivating, inspiring and educating landowners to protect biodiversity on their own land
- Motivating, inspiring and educating communities to get involved in conserving biodiversity.

The Council will strive to **restore** Wellington's biodiversity by:

- Restoring Wellington's indigenous ecosystems to a healthy state
- Ensuring that biodiversity is a common experience for all Wellingtonians.

The Council will undertake **research** to enable the continuing successful management of Wellington's biodiversity by:

- Ensuring a consistent city-wide approach to biodiversity aims and priorities
- Implementing a city-wide monitoring system consistent with regional and national monitoring
- Building our capacity to protect and restore Wellington's biodiversity.

Action Plan

The actions outlined in this plan cover a range of initiatives to promote the conservation of biodiversity.

Many of the actions will be funded through budgets developed for the relevant asset management plans and annual plans.

Other actions will be funded through alternative budget sources. This means funds will be sought from sources such as sponsorship and grants in liaison with key internal and external partners such as government agencies, educational institutes and non-government-organisations.

The actions outlined in this plan will be reviewed annually as part of Council's planning and budgeting processes.

Measuring our Performance

Initial targets are provided in the form of a five-year timeframe. Additional targets to help measure our performance are:

- pest management plans in place for 15 Key Native Ecosystem sites in year one, with plans developed and implemented for three additional sites in each successive year
- protection mechanisms in place across a representative range of Wellington's biodiversity by year five. Protection mechanisms may include legal protection, restoration planting, and pest control
- protection mechanisms in place for all Wellington City Council-owned sites of ecological significance by year five
- protect all Wellington City Council-owned areas with ecological significance as vested reserves by year three
- create four ecological management plans per year for sites of biodiversity value
- increase the number of eco-sourced native plants supplied by the Council to community groups by 1000 plants per year
- two programmes each year that aim to change human behaviours which have a negative impact on biodiversity
- one training programme provided for across-Council biodiversity awareness per year.

The Biodiversity Action Plan will undergo a comprehensive review, with community consultation, after five years. At which time a revised action plan will be constructed.

Theme 1: IDENTIFY

Objective 1.1: Have confidence in our knowledge of Wellington's biodiversity				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
1.1.1 Create a technical report outlining the current state of Wellington's biodiversity *	Desktop collation of existing information; liaise with DOC and other organisations; ecological field survey to fill gaps	Open space and recreation planning, Wellington City Council	A004 Existing funds (staff time)	✓				
1.1.2a Complete survey and assessment to identify important and under represented ecosystems and their services *	Desktop analysis and survey; create ecosystem maps; ecological field survey to fill gaps eg in association with the DoC Protecting Natural Areas design guide	Open space and recreation planning, Wellington City Council	A004 Existing funds (staff time)	✓				
1.1.2b Complete survey and assessment to identify Wellington's acutely and chronically threatened species and their habitats *	Desktop collation of existing information; liaise with DOC and other organisations; ecological survey to fill gaps; create vegetation and species location maps	Open space and recreation planning, Wellington City Council	A004 Existing funds (staff time)	✓				

* These actions must be completed before many of the key operational actions e.g. 2.1.1 and 3.1.1 can commence

Objective 1.2: Recognise the relationships and interactions between species and environments				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
1.2.1 Identify ecological linkages and habitat requirements (including riparian/stream and coastal connections) for a 'green and blue network' plan *	Ecological research; field survey and desk top analysis	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)		✓			

* This action must be completed before operational actions 3.1.3 and 3.2.2 can commence

Theme 1: IDENTIFY continued . . .

Objective 1.3: Recognise the relationships and interactions between people and biodiversity								
Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
1.3.1 Identify and prioritise areas where human activity impacts on ecological health	Review of human activities that impact ecological health eg pollutants down stormwater drain, weed dumping, vegetation removal; prioritise these threats	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)		✓	✓	✓	✓
1.3.2 Identify areas of traditional Maori use and biodiversity value	Liaison with Treaty partners	Parks and Gardens, Wellington City Council	C560 Existing funds (staff time)	✓	✓	✓	✓	✓

Theme 2: PROTECT

Objective 2.1: Conserve Wellington's biodiversity values				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
2.1.1 Prioritise the protection of Wellington's biodiversity (on public and private land)	Use information from Objectives 1.1 and 1.2; Level IV Land Environments of New Zealand; risk assessment; ecological significance; national protection priorities <ul style="list-style-type: none"> • indigenous vegetation associated with land environments that have 20% or less remaining in indigenous cover • indigenous vegetation associated with sand dunes and wetlands • indigenous vegetation associated with 'originally rare' terrestrial ecosystem types • habitats of acutely and chronically threatened indigenous species 	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓				
2.1.2 Work with relevant organisations to ensure that no nationally or regionally threatened species are lost to Wellington and that their genetic diversity is retained as far as possible <ul style="list-style-type: none"> • the in-situ and ex-situ protection of threatened species • propagation of threatened species 	Work with organisations such as DOC, Greater Wellington Regional Council, Karori Wildlife Sanctuary, QEII National Trust, Wellington Zoo, NZPCN etc on species recovery plans, and ensure direct management at sites of threatened species, by supporting the work of Otari-Wilton's Bush, Berhampore Nursery and other private and public collections; establish seed sources of full range of indigenous native plants	Open Space and Recreation Planning, Parks and Gardens, Wellington City Council	A004 C514 C560 Existing funds (staff time)	✓	✓	✓	✓	✓

Theme 2: PROTECT Continued . . .

2.1.3 Control pest plants and animals in accordance with Wellington City Council's Pest Management Plan	Approve funding for the next seven years to implement the Pest Management Plan adopted in 2004 and the Pest Management Implementation Plan adopted in 2005.	Parks and Gardens, Wellington City Council	C509 C510 <i>Increase funding through Parks and Gardens' asset management plans and to be considered as part of the 2008/09 Draft Annual Plan</i>	✓	✓	✓	✓	✓
2.1.4 Eradicate feral goats from the south-west peninsula	Collaborative project between Greater Wellington Regional Council, DOC, Wellington City Council, QEII National Trust, landowners. Wildlands consultants currently working on plan.	Parks and Gardens, Wellington City Council /Poneke Biodiversity team, DOC; Biosecurity, Greater Wellington Regional Council	C510 Existing funds External funding (Biodiversity Condition Fund – administered by DoC)	✓	✓	✓	✓	✓
2.1.5 Create ecological management plans for all areas of ecologically significant public land, as identified in objective 1; linking with local community groups and iwi where applicable	Ensure that all sites of ecological significance have ecological management plans; beginning with priority sites	Parks and Gardens/ Open Space and Recreation Planning, Wellington City Council	C524 Existing funds (staff time)		✓	✓	✓	
2.1.6 Work with private landowners to create ecological management plans for areas of ecological significance on private land, as identified in objective 1	Priority sites and working with QEII National Trust and other organisations where appropriate	Parks & Gardens/ Open Space and Recreation Planning, Wellington City Council	C513 Existing funds (Staff time) <i>Additional funds to work with private landowners may be required through the new initiative process</i>			✓	✓	✓
2.1.7 When reviewing or preparing reserve management plans, ensure that biodiversity is recognised and provided for	Open Space Planning to seek ecological input on all plans	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓

2.1.8 Prepare a biodiversity checklist/guidelines relating to the protection of indigenous biodiversity for applicants seeking planning approval		Open Space and Recreation Planning, Planning Group, Wellington City Council	A004 Existing funds (staff time)	✓					
2.1.9 Prepare Council standard to ensure that future Council planting will not threaten indigenous biodiversity	Use NZPPA and Greater Wellington Regional Council pest plant lists to determine appropriate species selection	Parks and Gardens, Standards, Wellington City Council,	C524 Existing funds (staff time)	✓					
2.1.10 Work with Porirua City Council, Lower Hutt City Council, Greater Wellington Regional Council and DoC to protect large scale linkages/corridors on a regional scale and to ensure cross boundary management of important catchments and ecosystems		Open Space and Recreation Planning, Parks and Gardens, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓	✓
2.1.11 Work with other organisations to support and develop biosecurity incursion response plans	Work with Greater Wellington Regional Council, MAF, DoC, NIWA, Biosecurity NZ	Parks and Gardens, WCC	C509 C510 Existing funds (staff time) <i>New money may be needed if a major biosecurity incursion occurred</i>	✓	✓	✓	✓	✓	✓

Theme 2: PROTECT Continued . . .

Objective 2.2: Actively protect sites that are collectively representative of the full range of Wellington's biodiversity				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
2.2.1 Protect the sites prioritised in objective 2.1.1	Through legal protection such as local government or Crown ownership, reserve status or covenants; protect dunes and coastal ecosystems from vehicular damage through public awareness, prohibited areas, signage and enforcement	Parks and Gardens, Wellington City Council	C509 C510 C513 C514 External funding may also be sought via Central Government grants; <i>Cost estimates unavailable until action points 1.1, 1.2 and 2.1.1 completed</i>		✓	✓	✓	✓
2.2.2 Protect all Wellington City Council owned areas of ecological significance as vested reserves	Systematically process all sites, starting with highest biodiversity values; reserve declaration and classification	Open Space and Recreation Planning / Property, Wellington City Council	C429 Existing funds (staff time)	✓	✓	✓	✓	✓

Objective 2.3: Provide RMA and policy protection (e.g. through District Plan and Regional Plans) for sites with ecological significance				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
2.3.1 Increase regulatory protection through the District Plan provisions for all sites of ecological significance (including ecological linkages) from further clearance and fragmentation	Review of Conservation Sites listed in the District Plan; developing criteria of significance	Planning Policy, Wellington City Council	C533 Existing funds (staff time)	✓	✓			
2.3.2 Ensure District Plan changes adequately protect biodiversity values through objectives, policies and rules.	Provide ecological input into District Plan changes; conditions on consents	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
2.3.3 Strengthen provisions in the District Plan and Regional Freshwater Plan for retaining streams in a natural state, 'day-lighting culverts', ensuring fish passage and protecting and restoring riparian margins	Review of rules and tools, as well as education programme for surveyors, developers and engineers; use the Code of Practice	Planning Policy, Wellington City Council / Greater Wellington Regional Council	C533 Existing funds (staff time)	✓	✓			

2.3.4 Refine systems for use with District Plan maps to highlight areas of important biodiversity on both public and private land	Database, overlay map		C533 Existing funds (Staff time)	✓	✓			
2.3.5 Ensure existing biodiversity is conserved and enhanced on proposed development sites, based on GIS and inventory information, and site visits	Consent officers have access to up-to-date information and interpretation of information so can make informed decisions with expert input; conditions on consents; update streams shapefile on GIS and include ephemeral streams	Parks and Gardens/GIS team, Wellington City Council	SEPG06 Existing funds (staff time)		✓	✓	✓	✓

Objective 2.4: Motivate, inspire and educate landowners to protect biodiversity on their own land

Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
2.4.1a Identify, create and implement incentives to get people to care for biodiversity on private land	Sharing covenant fencing costs between Wellington City Council, QEII, Greater Wellington Regional Council and landowner; grants; technical assistance; education programmes; community recognition	Open Space and Recreation Planning, Wellington City Council / Greater Wellington Regional Council	C513 Grants Existing funds (staff time) <i>Additional funding may be required depending on incentives created</i>			✓	✓	✓
2.4.1b Complete and implement Wellington City Council covenant policy	Review existing policy; consult with key stakeholders	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)		✓			
2.4.2 Work with other organisations to collate information on, and promote funding sources available for landowners to protect and manage biodiversity on their own land (including carbon credits)	Provide publication or web information on opportunities such as Biodiversity Condition Fund and carbon credits	Open Space and Recreation Planning/ Parks and Gardens, Wellington City Council, Greater Wellington Regional Council and other local authorities	A004 C524 Existing funds (staff time)		✓	✓	✓	✓

Theme 2: PROTECT Continued . . .

Objective 2.5: Motivate, inspire and educate communities to get involved in conserving biodiversity									
Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	
2.5.1 Continue support for community revegetation, restoration and education programmes	Continue to improve Community Greening programme – providing in-kind support, plants and materials, technical advice; EnviroSchools; encourage community initiatives; work in collaboration with other organisations eg Greater Wellington Regional Council Take Care programme, DoC Weedbusters programme	Parks and Gardens, Wellington City Council:	C513 Existing funds (staff time)	✓	✓	✓	✓	✓	
2.5.2 Continue the Council Environmental Grants scheme	Ongoing financial commitment to grants scheme of \$80,000 per annum; re-evaluate the criteria	Community Services, Wellington City Council	Grants Existing funds (staff time)	✓	✓	✓	✓	✓	
2.5.3 Identify sites where new voluntary groups are needed and facilitate setting up groups to fill these gaps	Gap analysis of active community groups	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time)	✓	✓	✓	✓	✓	
2.5.4 Continue relationships between organisations with a strong biodiversity focus, eg Wellington Zoo, Karori Wildlife Sanctuary, and Parks and Gardens	Closer liaison between biodiversity programmes, promoting city-wide relevance where possible	Strategy and Partnerships/ Parks and Gardens, Wellington City Council	C513 C524 C560 Existing funds (staff time)	✓	✓	✓	✓	✓	
2.5.5 Work with relevant organisations to develop and promote guidelines, ideas and actions to help households and communities get involved	Publications/internet	Parks and Gardens, Wellington City Council, Greater Wellington Regional Council	A004 C513 Existing funds (staff time)	✓	✓	✓	✓	✓	
2.5.6 Collate information on and promote funding sources available for community groups to carry out biodiversity conservation work	Publication/internet	Parks and Gardens, Wellington City Council	A004 C513 Existing funds (Staff time)		✓				
2.5.7 Create programmes to target 'problem behaviours' identified in objective 1.3.1 and bring about behaviour change	Social marketing; education programmes; implementing awareness programmes for rubbish dumping – particularly green waste; educational campaign about environmental weeds (including native weeds); work with private nurseries; stormwater sump patterns	Parks and Gardens, Wellington City Council / Greater Wellington Regional Council	C509 C513 C524 Existing funding will cover up to 2 social marketing programmes per annum	✓	✓	✓	✓	✓	

2.5.8 Provide education and skills development to increase community capacity for biodiversity conservation and kaitiakitanga	Continue to provide training opportunities (eg 'Growsafe', first aid, restoration) for community groups; consider school education programmes; secure funding	Parks and Gardens, Wellington City Council / Greater Wellington Regional Council / Doc	C513 Existing funds	✓	✓	✓	✓	✓
2.5.9 Investigate possible options to get more green waste from the city and region going to the compost facility		Citioperations, Wellington City Council	SEQP03 Existing funds (staff time)	✓	✓			
2.5.10 Pursue opportunities for business involvement and partnerships	Sponsorship, planting programmes, encouraging sustainable business practices; support and encourage corporate volunteer programmes	Parks and Gardens/ Marketing, Wellington City Council	C513 (staff time) External funding will be sought via sponsorships	✓	✓	✓	✓	✓
2.5.11 Establish and provide networking opportunities for local community groups to exchange information	Biannual forums, restoration day, training opportunities, workshops, acknowledgement events	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time)	✓	✓	✓	✓	✓
2.5.12 Create and promote programmes designed to attract visitors, tourists, migrants to assist in the restoration of Wellington's biodiversity	Global volunteer network, Volunteer Wellington, Wellington City Council migrant programme	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time)	✓	✓	✓	✓	✓
2.5.13 Create initiatives to promote linkages between biodiversity and recreation opportunities	Publicise through the Council's Sport and Recreation forum	Recreation Wellington, Open Space and Recreation Planning, Parks and Gardens, Wellington City Council	Existing funds (staff time)	✓	✓	✓	✓	✓
2.5.14 Complete education strategy review		Parks and Gardens, Wellington City Council	C524 Existing funds <i>New money may be applied for depending on outcomes of review</i>	✓				
2.5.15 Ensure local iwi have the opportunity to be involved in conservation initiatives	Regular meetings, invitations and communication	Open Space and Recreation Planning, Parks and Gardens, Wellington City Council	Existing funds (staff time)	✓	✓	✓	✓	✓

Theme 3: RESTORE

Objective 3.1: Restore Wellington's indigenous ecosystems to a healthy state								
Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
3.1.1 Restore Wellington's biodiversity and representativeness	Implement restoration programmes developed under objective 2.1 and 2.2: Restoration programme; enhancement planting; flora and fauna transfer and translocations Parks & Gardens, WCC	Parks and Gardens, Wellington City Council	C513 C514 <i>Additional funding may be required depending on restoration programmes and planning work completed</i>		✓	✓	✓	✓
3.1.2a Continue stream restoration programmes in accordance with community and catchment priorities.	Implementing the Stream Protection Programme, riparian planting and protection (including indigenous vegetation buffers), retention and restoration of fish passage, stream bank stabilisation, ensuring all works in stream are in accordance with Greater Wellington Regional Council best practice guidelines.	Parks and Gardens, Wellington City Council / Greater Wellington Regional Council	C513 Cx437 Existing funds	✓	✓	✓	✓	✓
3.1.2b Continue to work on catchment-based projects including flood hazard mapping and water quality improvements. Broaden the scope of Council work to support principles of sustainable and integrated management of natural and physical resources.	Reduce reliance on piped systems, integrating built water with the natural water cycle and associated ecosystem services. Promote integrated whole-catchment approaches through appropriate land use and development, protection of natural catchment systems, overland flow paths, minimising and managing ground disturbance, maximising local soakage to ground, collection and use of stormwater, riparian planting.	Infrastructure, Wellington City Council / Greater Wellington Regional Council	C090 WWC498 Existing funds	✓	✓	✓	✓	✓

3.1.3 Implement green and blue network plan developed in objective 1.2.1, including using road reserve and railway land as ecological corridors	Restoration programme; revegetation; work with private landowners; encourage and support native plantings (and weed control) in urban areas where links are required	Parks and Gardens, Wellington City Council, On-Track	C513 C514 Additional funding may be required depending on restoration programmes and planning work completed			✓	✓	✓
3.1.4 Continue to use eco-sourced plant material and promote it to the wider community	Education and provision of eco-sourced revegetation plants through Berhampore Nursery (including eco-sourcing guidelines); restoration programme; work with private nurseries;	Parks and Gardens, Wellington City Council	C514 Existing funds (staff time)	✓	✓	✓	✓	✓
3.1.5 Develop areas where biodiversity traditionally valued by Maori can be restored, and harvested if appropriate	Continue the provision of flax production in Otari-Wilton's Bush	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time)	✓	✓	✓	✓	✓
3.1.6 Develop and implement integrated restoration plans for areas cleared of exotic vegetation e.g. hazardous trees	Initiate a replacement programme to gradually replace the over mature conifers with native vegetation over 20 – 30 years	Parks and Gardens, Wellington City Council	C514 C524 A008 Existing funds (staff time)	✓	✓	✓	✓	✓
3.1.7 Evaluate the reserve planting scheme to ensure the supply of appropriate native eco-sourced species	Internal review	Parks and Gardens, Wellington City Council	C513 Existing funds	✓	✓			

Objective 3.2: Ensure that biodiversity is a common experience for all Wellingtonians								
Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
3.2.1 Develop and promote 'biodiversity in the backyard' community action initiatives	Biodiversity- friendly gardening eg creating habitat for lizards, birds and insects; secure external funding; prioritise areas in which to begin programme through work in objectives 1.2.1, 1.3.1 and 2.1.1	Parks and Gardens, Wellington City Council / Greater Wellington Regional Council, DOC	C513 (staff time) External funding will be sought via grants and sponsorship			✓	✓	✓
3.2.2 Encourage community participation in 'green and blue network' as developed in objective 1.2.1	Identify and promote the 'green and blue network' through Council channels such as the Branch Out magazine and the 'Our Wellington' page	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time) <i>Additional funds to work with private landowners may be required through the new initiative process</i>			✓	✓	✓
3.2.3 Publicise Council's and other organisations activities, events and achievements relating to Wellington's biodiversity	Media articles, publications eg Branch Out, Our Wellington page; website	Park and Gardens/ Marketing, Wellington City Council	C524 Existing funds	✓	✓	✓	✓	✓
3.2.4 Enhance existing Council displays of indigenous vegetation to increase community awareness and appreciation of local plants	Promote through Otari-Wilton's Bush, garden beds and traffic island displays; identify suitable indigenous species for specimen planting where appropriate	Parks and Gardens, Wellington City Council	C513 C560 Existing funds	✓	✓	✓	✓	✓

Theme 4: RESEARCH

Objective 4.1: Ensure that consistent city-wide approach to biodiversity aims and priorities				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
4.1.1 Establish clear targets and standards for biodiversity conservation	Establish bottom-lines and restoration goals; develop a set of biodiversity performance indicators (and monitor and report on them regularly)	Open Space and Recreation Planning/ Performance and Research, Wellington City Council	A004 Existing funds (staff time)	✓				
4.1.2 Adopt and implement a system of sharing biodiversity data between organisations (eg MfE, DOC, Greater Wellington Regional Council, Landcare Research, NZPCN, Victoria University, Karori Wildlife Sanctuary, QEII National Trust, NIWA)	Internet-based database/ GIS/regular meetings	Open Space and Recreation Planning, Wellington City Council / Greater Wellington Regional Council / DOC Tech Support	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.1.3 Incorporate biodiversity principles and priorities into infrastructure and land management	Incorporate biodiversity principles into Council plans and policies such as the Code of Practice, Subdivision Design Guidelines	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.1.4 Promote enhanced biodiversity awareness in all City Council practices	Create and/or modify training programmes across Council to encourage biodiversity education; work with all council business units to have input into relevant council policy ie Procurement Policy	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.1.5 Explore opportunities for community involvement in research, including monitoring	Local bird counts, water quality, bioblitz, enviroschools, involve local iwi in the monitoring of cultural harvest sites and research of sites and species of interest to them	Parks and Gardens, Wellington City Council	C513 Existing funds (staff time)	✓	✓	✓	✓	✓

Theme 4: RESEARCH – continued . . .

4.1.6 All interested/ affected parties have access to information about Wellington's biodiversity values, and what they can do to make a difference	Shared database; internet; regular meetings eg environmental forum	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
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Objective 4.2: City-wide monitoring system that is consistent with regional and national monitoring				Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Actions	How it might be done	Lead responsibility	Funding source					
4.2.1 Monitor biodiversity indicators in accordance with MfE guidelines and with consideration of climate change. Work with other local organisations to ensure common indicators for biodiversity monitoring are used so data can be easily aggregated	Set up consistent monitoring framework and annual programme (incorporating existing monitoring work) in a collaborative approach with other key organisations	Open Space and Recreation Planning/ Parks and Gardens, Wellington City Council	A004 C509 C510 C524 Existing funds	✓	✓	✓	✓	✓
4.2.2 Monitor effects of stormwater runoff on different receiving environments	Put consistent monitoring framework in place; look at levels of sediment build up and effects on biodiversity	Infrastructure, Wellington City Council / Greater Wellington Regional Council	C090 External funding from Greater Wellington partnership	✓	✓	✓	✓	✓
4.2.3 Set up systems to ensure monitoring information is used to improve management of biodiversity, taking climate change into consideration	Ongoing review of Council restoration programmes	Open Space and Recreation Planning, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓

Objective 4.3: Build our capacity to protect and restore Wellington's biodiversity

Actions	How it might be done	Lead responsibility	Funding source	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
4.3.1 Continue to improve our internal expertise and capacity in biodiversity conservation (eg role of Otari-Wilton's Bush in threatened plant management, role of Berhampore Nursery in restoration, current knowledge of pest and weed issues)	Training; keeping up-to-date with research literature; using Council individual performance plans; regular interest forums with Council staff	Parks and Gardens, Wellington City Council	Existing funds	✓	✓	✓	✓	✓
4.3.2 Continually review and identify local research needs	Regular meetings between organisations and interest groups; keeping up to date with research literature and research institutions	Open Space and Recreation Planning Wellington City Council / Greater Wellington Regional Council /DOC	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.3.3 Facilitate discussions with key people to establish a biodiversity network or modify an existing network for information sharing	Foster relationships with Te Papa, universities, DOC, Landcare Research, Karori Wildlife Sanctuary, Wellington Zoo, MfE and other research organisations; regular meetings	Open Space and Recreation Planning, Wellington City Council / Greater Wellington Regional Council /DOC	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.3.4 Work with other areas locally, regionally, nationally and worldwide to achieve best practise in biodiversity protection	eg International Local Action for Biodiversity project	Open Space and Recreation Planning	A004 Existing funds (staff time)	✓	✓	✓	✓	✓
4.3.5 Increase knowledge of the effects of impervious surfaces on the receiving environment	Through national groups such as the Road Controlling Authorities forum and the NZ Water and Wastes Association	Infrastructure, Parks and Gardens	WWA041A RTC453 Existing funds (staff time)	✓	✓	✓	✓	✓
4.3.6 Investigate the impact of climate change to ensure current vegetation selection is appropriate	Work with universities and other local research institutions	Open Space and Recreation Planning/ Parks and Gardens, Wellington City Council	A004 Existing funds (staff time)			✓	✓	✓
4.3.7 Ensure Wellington City Council has relevant and current information on the requirements of threatened species and their habitats	Work with other organisations eg DoC and local research institutions; information gained through biodiversity networks	Open Space and Recreation Planning/ Parks and Gardens, Wellington City Council	A004 Existing funds (staff time)	✓	✓	✓	✓	✓

Glossary

Benthic: living on or under the substrate at the bottom of the ocean.

Biological Diversity (biodiversity): the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (Convention on Biological Diversity).

Biosecurity: the protection of people and natural resources, including biodiversity, from unwanted organisms capable of causing harm.

Community: the collection of organisms found at a specific place and time.

Convention on Biological Diversity: an international agreement on biological diversity that came into force in December 1993. The objectives of the Convention are: the conservation of biological diversity; the sustainable use of its components; and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

Diadromous: diadromous fish regularly migrate between freshwater and seawater.

Ecology: the study of the distribution and abundance of species and the relationship and interactions between the species and their environment.

Ecological significance: defined for an area by one or more of the following ecological features; representativeness of Wellington's indigenous biodiversity, high diversity of ecological and physical features, degree of natural character, relative size and shape, relative rarity and special features, buffering, connectivity and viability. These ecological features contribute to Wellington's indigenous biodiversity and include consideration of current and potential biodiversity values.

Ecological succession: a fundamental concept in ecology, refers to more-or-less predictable and orderly changes in the composition or structure of an ecological community. Succession may be initiated either by formation of new, unoccupied habitat (eg a severe landslide) or by some form of disturbance (eg fire, severe windthrow, logging) of an existing community.

Eco-sourced species: plants that have genetic provenance in the location.

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endemic: an indigenous species which is restricted to a particular geographical region ie it is found nowhere else in the world.

Exotic species: see Introduced species

Ex-situ conservation: the conservation of species outside their natural habitat.

Feral species: a domesticated species that has become wild.

Habitat: the place or type of an area in which a living thing naturally occurs.

Inanga: the adult lifestage of the most abundant whitebait species – *Galaxias maculatus*.

Indigenous species: a plant or animal species that occurs naturally in New Zealand.

In-situ conservation: the conservation of species (and the ecosystems and habitats that support them) within their natural surroundings.

Introduced species: a plant or animal species which has been brought to the locality by humans.

Kaitiakitanga: implies guardianship, stewardship, protection, care and vigilance. It introduces the idea of an inter-generational responsibility and an obligation to protect the natural environment.

Key Native Ecosystems: a Key Native Ecosystem (or KNE) describes a natural feature that is exceptionally important in terms of its ecological value and/or biodiversity.

Land environment: an area whose boundaries encompass similar environmental characteristics caused environmental variables such as climate, landform and soil.

Native species: see Indigenous species

Originally rare ecosystems: an ecosystem type that was present, and rare, when Maori arrived – and still exists today.

Representativeness: the extent to which areas are capable of reflecting known biological diversity and ecological patterns and processes.

Sustainable: conducting activities or using the components of biodiversity in a way and at a rate that does not lead to the long-term decline of biodiversity.

Threatened species: a species that is vulnerable, endangered or presumed extinct. Acutely and chronically threatened indigenous species are species that meet the specific criteria to be listed in one of these categories in the "New Zealand Threat Classification System Lists" (refer to www.doc.govt.nz for up-to-date lists).

Translocation: a deliberate and mediated movement of wild individuals or populations from one area to another.