

The State of our Biodiversity

Biodiversity in its simplest form describes the degree of nature's variety. Scientifically it is a more complex concept referring to:

- Genetic diversity – which is the genetic variety that exists within members of the same species. For example, there are several different types of weta.
- Species diversity – this refers to the variety of species in a given area. For example, Hector's dolphins are different to sperm whales, which are different to orca.
- Ecosystem diversity – the variety of places in which plants and animals can live. For example, mangroves, wetlands, forests and grasslands.

The loss of biodiversity is an international concern, with the diversity of plants and animals invariably compromised in all areas of human settlement and activity. Environmental change has accelerated to such an extent that the ability of many plants and animals to adapt to their ever-changing environment has been greatly reduced. The natural process of evolution is being overwhelmed, and the loss of diversity, in both plant and animal species, is unavoidable. Losing our natural biodiversity is seen as the nations most persistent and harmful environmental problem. Key threats to biodiversity at a national level are outlined in *The State of New Zealand's Environment 1997*¹. They include:

“
Environmental change has accelerated to such an extent that the ability of many plants and animals to adapt to their ever-changing environment has been greatly reduced.
 ”

- Habitat loss and fragmentation. This is a result of agricultural use, roads, and commercial, industrial and residential developments. Together these activities account for 63% of New Zealand's total land area, and more alarmingly, over 90% of New Zealand's lowland areas.
- Exploitation by humans. Varying degrees of pressure is exerted on both plant and animal species, primarily through hunting, fishing, gathering and collecting.
- The introduction of plant and animal pests. They upset the natural order of New Zealand's native species by hunting them, competing with them for food and/or habitat, or alternatively, damaging their environment.

Waitakere City mirrors the New Zealand trend in declining numbers of native plants and animals. Although records of extinctions in the City are incomplete, we do know that we've lost:

- 10 plant species from the Waitakere Ranges
- 15 bird species and 1 mammal (short-tailed bat) from the urban areas and foothills
- 11 bird species and 1 mammal (short-tailed bat) from the Waitakere Ranges

Unfortunately more plant and animal species are likely to be lost, with a number already at risk of becoming locally extinct. In the urban areas and foothills alone, less than 9% of the original vegetation cover remains, with 15 plant species and 7 bird species in serious decline.

¹ The Ministry for the Environment, 1997. *The State of New Zealand's Environment 1997*.

One of the most significant problems encountered by Waitakere City Council in protecting biodiversity is the lack of available information. Although a large volume of data does exist, it has generally been collected by a variety of different agencies for a number of purposes. Collating this information for use in long term monitoring of biodiversity is problematic and lacks the required accuracy. Despite these issues a number of publications provided valuable information for this chapter. Major sources of information were the *Waitakere Ecological District Survey Report for the Protected Natural Areas Programme* (Denyer, K., et al, 1993), the *Ecological Survey of Waitakere City Lowlands* (Julian, A, et al, 1998), and *The State of New Zealand’s Environment*. Additional data was gathered from a variety of reports commissioned by the Waitakere City Council over the last decade, and interviews with local experts.

“
 One of the most significant
 problems encountered by
 Waitakere City Council in
 protecting biodiversity is the
 lack of available
 information.”

This chapter is written in the state, pressure, response format and highlights:

1. **THE IMPORTANCE OF BIODIVERSITY**
2. **THE CURRENT STATE OF BIODIVERSITY IN WAITAKERE CITY**
3. **KEY ISSUES THREATENING BIODIVERSITY IN WAITAKERE CITY**
4. **WHAT THE COUNCIL IS DOING TO PROTECT AND ENHANCE BIODIVERSITY, AND WHAT YOU CAN DO**

KEY INDICATOR

Clearance of vegetation within the Tamaki Ecological District – estimated up to 30% removal in some areas.

The loss of vegetation within the Tamaki Ecological District is probably the most pressing concern for biodiversity in Waitakere City. In order to establish the extent of this problem aerial photography from 1993 and 2000 was compared to determine the extent of vegetation clearances within the City. The research is only partly completed, but preliminary results suggest that vegetation within the Tamaki Ecological District is being lost at an alarming rate. In some areas up to 30% of the vegetation has been lost in the seven-year period between 1993 & 2000. Given that only an estimated 9% of Tamaki Ecological District vegetation remains, the biodiversity of our City is undeniably threatened.

“
 vegetation within the
 Tamaki Ecological District is
 being lost at an alarming rate
 ... in some areas up to 30%
 ... between 1993 and
 2000.”

1. THE IMPORTANCE OF BIODIVERSITY

The importance of biodiversity is as diverse as the concept itself. Although attempts have been made to put a dollar value on biodiversity, with varying degrees of success, to many the value of biodiversity is so extensive it can't be calculated. The importance of biodiversity is probably best described by outlining the ecosystem services that are provided by the natural environment as a whole, and therefore linked to the biodiversity of a region. Ecosystem services can be described as the natural processes involved in sustaining human life and society. They are significantly disrupted and downgraded as a result of continual environmental degradation. In future years it is likely that the demand for ecosystem services in urban areas will exceed the supply capability of the remaining natural ecosystems.

■■■■■■■■■■

••

Ecosystem services can be described as the natural processes involved in sustaining human life and society.

”

■■■■■■■■■■

Natural ecosystems perform many life-sustaining functions that are often taken for granted. The absorption of carbon dioxide and the production of oxygen, which are one of life's basic requirements, are a function of ecosystem services. Others include maintaining the water cycle, waste treatment, pollution control, flood mitigation, and the detoxification of contaminants. More visible functions are also on offer, with the genetic resources of areas with high natural diversity

valued for their contribution to the pharmaceutical industry - a large number of contemporary medications are based on compounds found in various plants, animals and micro-organisms. The recreational value of intact areas of nature are also valued, with eco-tourism ventures, and everyday outdoor recreational activities highly valued by many communities.

At a basic level New Zealand can be described as a biodiversity “hotspot” with a unique and diverse variety of plants, birds and insects. New Zealand broke away from Gondwanaland early on in the world's evolutionary process, with our native birds and invertebrates evolving without the influence of mammalian predators. Much of our native vegetation survives from the Gondwanaland era, with New Zealand well known internationally because of this ancient vegetation. Waitakere City contributes significantly to the natural wealth of biodiversity in New Zealand. Few cities have the extent of native vegetation that remains in Waitakere City, with the Waitakere Ranges supporting a number of threatened and rare native species.

2. THE STATE OF BIODIVERSITY IN WAITAKERE CITY

Waitakere City includes three separate ecological districts and borders a fourth. Defined as regions that form a distinctive and identifiable area that functions as a unit with regard to climate, biology, landform and cultural factors, the ecological districts of New Zealand were defined as part of a nationwide study known as the Protected Natural Areas Programme. Waitakere City includes:

- The Waitakere Ecological District, which covers over half the City and is dominated by the Waitakere Ranges.
- The Tamaki Ecological District, which crosses a number of local authority boundaries and includes the Auckland Isthmus as well as areas of the North Shore and South Auckland. Within Waitakere City it covers the majority of our lowland areas, from the foothills of the Waitakere Ranges to the Waitemata Harbour.
- The Rodney Ecological District, which only forms a small part of the northwest of Waitakere City and is for the most part un-surveyed.

It is important to recognise that Waitakere City is so diverse ecologically, as the differences between the districts are often overlooked. It is easy to think that Waitakere City has an abundance of vegetation because of the Waitakere Ranges. This is dangerous for biodiversity with the importance of vegetation in urban areas often undervalued. With the Waitakere Ranges and vegetation in urban areas part of two separate ecological districts, the need for protection of both becomes increasingly important.

••
It is easy to think that Waitakere City has an abundance of vegetation because of the Waitakere Ranges; this is dangerous for biodiversity with the importance of vegetation in urban areas often undervalued.

• FOREST, SHRUB AND SCRUB BIODIVERSITY

Waitakere Ecological District

Historically, the Waitakere Ranges were covered in dense rainforest dominated by podocarp and broadleaf species such as Kahikatea, Rimu, Karaka and Tawa. Kauri forests were common in the eastern parts of the Ranges, with Pohutukawa forests flourishing along the West Coast and around the shores of the Manukau Harbour. These historical vegetation patterns have been altered over the last 1000 years, with the arrival of both Maori and European settlers resulting in major environmental changes. By the 1940's all but 2% of the Waitakere Ranges had been modified by commercial logging to some extent. The greatest destruction to the coastal fringes of the District was by extensive bush fires, which were started to clear land for agriculture.

Although 90% of the Waitakere Ranges has returned to native bush, vegetation patterns have been altered, with the majority of vegetation now forming bands of successional and regenerating forest and scrub. A few areas have remained in their original state (e.g. the Cascades Kauri Park) and from these we are able to see what the historical vegetation patterns were like in the Waitakere Ranges. Pohutukawa still survive in exposed areas of the coastline, although much of the coastline vegetation now consists of manuka scrub.

Agricultural activities along with kanuka forests dominate the inland lower slopes of the Ranges, and the areas that were heavily logged are noticeable in that there is a lack of emerging vegetation. Emergent trees are more common in the interior areas of the Ranges where selective logging occurred but vegetation was not totally destroyed by fire.

Despite continued environmental damage, the Waitakere Ecological District is an area that is still rich in plant life - with 542 species of higher plants, which represents 20% of the flowering plant species and 60 % of the ferns in New Zealand. The district is also home to 21 rare and endangered plants (such as the carnivorous bladderwort), and includes several other plant species that are endemic to the region. Areas of significant native vegetation are identified on the Proposed District Plan as Managed Natural Areas. There is a correlation between the more extensive vegetative cover in the Waitakere Ecological District and the Managed Natural Areas.

Along with native vegetation, introduced species have also flourished in the warm moist climate. Many have naturalised to the point where they are now considered a problem, with 175 plants in the District now regarded as pests. Many of the weed species were not introduced accidentally rather they were purposely planted in household gardens. The invasive nature of many of these popular garden species was not immediately recognized and they have since been able to spread rapidly throughout the Ranges. This problem is intensified in the Waitakere Ecological District, with many people choosing to live in the bush environment. This type of development can be damaging, with even small bush clearances greatly increasing the chances of weed invasion.

█
 ●●
 Despite continued environmental deterioration, the Waitakere Ecological District is an area that is still rich in plant life, with 542 species of higher plants, which represents 20% of the flowering plant species and 60% of the ferns in New Zealand.
 █

The diversity of wildlife found in the Waitakere Ecological District is a reflection of the regions historical environmental changes. Forest clearance, timber extraction and the introduction of predators, have resulted in the loss of several bird species (refer to Table 1). Despite the loss of diversity, the Waitakere Ranges forms an important refuge for the remaining species, some of which are now considered threatened. A large number of introduced bird species are also found in the district, with many taking advantage of changes to the remaining vegetation to establish healthy populations.

Table 1: Extinct, Rare & Threatened Birds in the Waitakere Ecological District

Extinct Birds	Rare & Threatened Birds
North Island Weka ^α	Banded Rail (Mohopereru/Mioweka) ^β
North Island Brown Kiwi ^α	North Island Kaka ^α
North Island Kokako ^α	Long Tailed Cuckoo (Koekoera) ^α
Whitehead (Popokatea) ^α	New Zealand Falcon (Karearea) ^α
Bellbird (Korimako/Makomako) ^α	Australasian Bittern (Matuku/Matuku-hurepo) ^β
Stitchbird (Hihi) ^α	North Island Fernbird (Matata/Tataki) ^β
Red-crowned Parakeet (Kakariki) ^α	Marsh Crake (Koitareke) ^β
Yellow-crowned Parakeet (Kakariki) ^α	New Zealand Dotterel ^φ
Brown Teal (Pateke) ^β	Banded Dotterel (Tuturiwhatu) ^φ
New Zealand Scaup (Papango) ^β	Caspian Tern (Taranui) ^φ
New Zealand Dabchick (Weweia) ^β	New Zealand Pigeon (Kereru) ^α
	Spotless Crake (Putoto/Puweto) ^β
	Variable Oystercatcher ^φ

^α Forest, shrub & scrub bird
^β Freshwater & wetland bird
^φ Coastal & estuarine bird

Source: Waitakere Ecological District Survey Report for the Protected Natural Areas Programme (K.Denyer et al, 1993), and the Ecological Survey of Waitakere City Lowlands; Julian, et al, 1998.

Other significant fauna in the region includes several small colonies of the native long-tailed bat. These are present in both the northern and southern sections of the Waitakere Ranges but the two populations are thought to be genetically different. It is not known how many individuals remain in the northern population, but the southern population is thought to be severely threatened, with only an estimated 25 individuals remaining. The native short-tailed bat, which was once common in the region, has not been recorded for some time.

A number of native gecko and skink species are still present in the Waitakere Ecological District, with the ornate skink, copper skink, forest gecko, pacific gecko and Auckland green gecko all recorded within the Waitakere Ranges. The striped skink, which had been observed historically in the Waitakere Ranges has not been seen for a number of years and is now thought to be locally extinct. Also present in the District is the introduced rainbow gecko, which is of concern as it has the potential to out compete our native copper skink.

●●
*A staggering 700 species
of beetles have been identified
in a forest near Bethells (Te
Henga), with land snails,
including the native kauri
snail, numbering nearly 100
species.*

Because of the mild climate and a high diversity of plant species in the District, many invertebrates flourished. Although many species are thought to have been lost as a result of habitat loss and predation, a number of endemic species still remain in the region. A staggering 700 species of beetles have been identified in

a forest near Bethells (Te Henga), with land snails, including the native kauri snail, numbering nearly 100 species.

The District is typical of the majority of mainland New Zealand in that it has increasingly serious problems with introduced animal pests. Possums, rats, cats, stoats and other feral animals all flourish in the District and their increasing numbers have had a devastating impact on the regeneration of native plants and the breeding success of wildlife. Not only have some species become locally extinct as a result of these introduced predators, many others remain extremely vulnerable to their advances, and some populations are thought to have been reduced to such an extent that they are no longer viable.

Possums have had a well-documented effect on some types of forest in the district, especially concerning is their impact on the coastal pohutukawa forests. Possums are also responsible for destroying a number of other species including rata, halls totara, and kohekohe. Unfortunately possums have not limited their destruction to our native vegetation; they have also been observed attempting to catch baby long-tailed bats. However there is some hope, with work carried out by the Auckland Regional Council greatly reducing possum numbers over the last four years. Operation Forest Save removed over 80,000 possums from the Waitakere Ranges; with follow-up work suggesting the population is becoming more manageable.

Tamaki Ecological District

The Tamaki Ecological District is a highly modified environment. The original vegetation is fragmented, and primarily restricted to gullies and stream margins where it escaped the fires that were associated with agricultural activity. Historically, large areas of the lowlands within Waitakere City were made up of a great variety of forest types. Some areas had more specialised vegetation, such as the Whenuapai region, which was dominated by the likes of Totara, Matai, Puriri and Tairaire. Riparian margins throughout the region also exhibited specialised vegetation patterns, with Totara, Kahikatea and Puriri forests flanking our waterways.

■■■■■■■■■■
 •• *Weed invasion is often the result of people dumping their garden waste, which includes invasive species, within the bush.*
 ■■■■■■■■■■

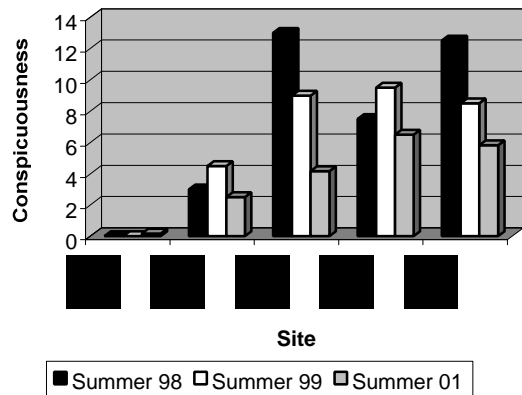
Today’s vegetation patterns in the Waitakere City lowlands are like many other urban areas in New Zealand. Native vegetation is fragmented in nature and primarily in the regeneration stage, although a small number of remnant forests remain. Recent research has indicated a dramatic loss of vegetation within the Tamaki Ecological District (refer to the key indicator for this chapter), suggesting that this unique vegetation has remained under constant pressure, and is rapidly being degraded.

Exotic species are common in the remaining areas of forest, with pine and wattle both frequently encountered. As with the Waitakere Ecological District, invasive weeds are a problem, with the regeneration of native plants threatened in many areas. Weed invasion is often the result of people dumping their garden waste, which includes invasive species, within the bush. The escape of invasive species from urban household gardens is another common means of introduction.

The fragmented nature of the remaining habitat within the Tamaki Ecological District has resulted in wildlife populations that have been greatly reduced in number and diversity. We know that historically native bird life would have been highly diverse, with other native species including the kauri snail, long-tailed and short-tailed bats, and a range of invertebrates, most notably snails, all present.

As a result of habitat loss and predation a number of bird species are now extinct within the District (refer to graph below). In order to monitor the remaining species, research within Waitakere City has focused on the bird populations of the Tamaki Ecological District. Counts of native bird species are used to measure their “conspicuousness” (how easily they are seen and/or heard). Conspicuousness is a useful indicator of ecosystem health, and the state of both urban forest fragments, and urban native bird populations. Waitakere City Council began using this for long term monitoring in 1998, with recent results suggesting that our urban forest fragments are under increasing pressure. The most recent survey was completed in March 2001 and included five sampling sites within the City. Overall there has been a slight decrease in fantail numbers, a slight increase in silveryeye numbers, and the kereru population has remained fairly consistent. The most alarming result was the significant decrease in the presence of tui at four of the five sites. It indicates that the health of our urban forest fragments has probably declined, with a lack of food combined with predation most likely responsible for the decrease in numbers of both tui and fantail.

The conspicuousness of Tui in Urban Forest Fragments within Waitakere City



The loss of habitat within the Tamaki Ecological District has been responsible for the disappearance of many species. Invertebrate populations although surprisingly diverse in urban forest fragments (a result of their disturbed state) are thought to have been greatly reduced. Although the short-tailed bat is no longer seen within the District, research of late is suggesting that long-tailed bats, resident in the Waitakere Ecological District, are making foraging trips that include the vineyards and orchards of the foothill regions, and the riparian margins of some urban areas such as Swanson. There is concern that these regions provide an important source of food for the bats, with continued development likely to threaten this resource and the ongoing survival of the bats.

“Manuka stands, the preferred habitat for many of these species, are often overlooked with many people failing to recognise the importance of maintaining these areas.”

Table 2: Extinct, Rare & Threatened Birds of the Tamaki Ecological District

Extinct Birds	Rare & Threatened Birds
Bellbird (Korimako/Makomako) ^α	North Island Kaka ^α
North Island Brown Kiwi ^α	New Zealand Pigeon (Kereru) ^α
North Island Kokako ^α	Banded Rail (Mohopereru/Mioweka) ^β
North Island Robin (Toutouwai) ^α	North Island Fernbird (Matata/Tataki) ^β
North Island Saddleback (Tieke) ^α	New Zealand Dotterel ^ϕ
North Island Weka ^α	Variable Oystercatcher ^ϕ
Pied Tit (Miro miro/Nguru ngiru) ^α	Grey Duck (Parera) ^β
Red-crowned Parakeet (Kakariki) ^α	
Yellow-crowned Parakeet (Kakariki) ^α	
Whitehead (Popokatea) ^α	
Australasian Bittern (Mutuku/Matukuhurepo) ^β	
Brown Teal (Pateke) ^β	
Marsh Crake (Koitareke) ^β	
New Zealand Dabchick (Weweia) ^β	
Spotless Crake (Putoto/Puweto) ^β	

^α Forest, shrub & scrub bird

^βFreshwater & wetland bird

^ϕCoastal & estuarine bird

Source: Waitakere Ecological District Survey Report for the Protected Natural Areas Programme (K.Denyer et al, 1993), and the Ecological Survey of Waitakere City Lowlands; Julian, et al, 1998.

Information on the native gecko and skink populations within the Tamaki Ecological District is scarce. It is thought that many species have isolated populations, with their survival in some cases threatened by predators such as rats and cats. Manuka stands, the preferred habitat for many of these species, are often overlooked with many people failing to recognize the importance of maintaining these areas.

● **FRESHWATER AND WETLAND BIODIVERSITY**

The impact of human settlement on freshwater and wetland habitats in Waitakere City has been extensive. Wetlands throughout the City were drained to make way for agricultural development, and more recently, for residential and industrial use. As residential settlement became more widespread, streams and rivers were straightened, and others were channeled and piped. Riparian vegetation also suffered, with much of the vegetation cleared for farming use, more notably within the Tamaki Ecological District.

“
 The native Hochstetters
 frog is no longer present in
 the Tamaki Ecological District
 as a result of habitat loss and
 degradation”

Originally Waitakere City had a number of wetland areas with the largest remaining being the Te Henga Wetland (Bethells Swamp). A small number of other wetlands have been retained, with Whatipu maintaining a somewhat seasonal wetland area, and a number of small wetlands remaining within the Tamaki Ecological District. The loss of wetland habitat has resulted in the local extinction of at least three birds, although the region does still support a number of threatened species (refer to Tables 1 and 2). Wetlands are a surprisingly important habitat for bird species, with 33% of all threatened birds depending on wetlands for their survival.

Recent research has shown that invertebrate populations within many of our streams are fairly healthy. Koura is fairly common and the rare freshwater crab has also been seen in the Tamaki Ecological District. However, the degrading of

Updated as at 1 September 2002
 Updates @ www.waitakere.govt.nz

a number of urban streams has resulted in more sensitive species being lost from these regions. Freshwater fish populations show a similar trend, and although a total of 12 native fish species have been identified city wide, many are not present in urban streams in any significant numbers. Koaro and banded kokupu are both threatened species that still survive in Waitakere City, but their numbers are thought to be much reduced. The distribution of the banded kokupu in Waitakere streams is nationally significant, they occur in 30% of our streams, and only 10% nationally. Of great importance to Waitakere City and New Zealand is the recent discovery of the shortjaw kokupu in some of our streams. The shortjaw kokupu is one of New Zealand's rarest native freshwater fish and its discovery has excited enthusiasts citywide.

Of concern for our native freshwater fish is the presence of the mosquito fish. This is an introduced predator, which has the ability to out-compete the adults of some species of native fish, as well as preying on the young of both fish and frogs. Other introduced fish in the region include koi carp, rudd, perch and tench. They are very difficult to control and are all considered noxious pests because of their ability to cause significant damage to aquatic ecosystems.

The native Hochstetters frog is no longer present in the Tamaki Ecological District as a result of habitat loss and degradation. However it is still present in parts of the Waitakere Ecological District. It is the most aquatic of our native frogs and is often found near some of the more unpolluted streams in the Waitakere Ranges. Introduced frog species include the golden bell and the green frog, which while native to Australia have been present in New Zealand for sometime.

THE IMPORTANCE OF RIPARIAN MARGINS

Waitakere City Council has spent a considerable amount of time and effort educating Waitakere City residents about the value of riparian margins. In particular, urban riparian margins are often degraded and their importance overlooked by both homeowners and developers alike. Waitakere City's Proposed District Plan provides for the protection of riparian margins because of the benefits they offer to both landowners and waterways. Riparian margins act as a buffer for the stream environment against the potential effects of land-use. They are able to:

- Provide habitat on the banks and in the stream for wildlife
- Increase biodiversity, bringing native species closer to your backyard
- Help maintain lower water temperatures during summer months (essential for native fish)
- Reduce silt, heavy metal and oil pollution in streams
- Prevent the growth of weed species both on the banks and in the water
- Maintain water clarity
- Reduce slips and erosion on stream-banks
- Reduce flooding because plants absorb water and improve drainage
- Increase drought resistance in nearby lawns and pastures
- Help to retain valuable topsoil - plants filter the runoff

If your property backs onto a stream or creek in Waitakere City, please contact the Landscape and Community Project Co-ordinator at Council for information on how to enhance your riparian margins, protect your property from flooding, and increase the health of our aquatic ecosystems. The Council is able to provide assistance to all private landowners who are doing riparian margin restoration work that is *not* a regulatory requirement. You are entitled to free expert advice and depending on the extent of the restoration work and the land involved, you may also be eligible for Council assistance with weed control and replanting with native plants. In cases where a landowner is legally required to do restoration work the Council is still able to offer expert advice.

Updated as at 1 September 2002
Updates @ www.waitakere.govt.nz

The following pictures show before and after riparian restoration work:



? MARINE AND ESTUARINE BIODIVERSITY

The marine and estuarine environments bordering Waitakere City are the responsibility of the Auckland Regional Council and the Ministry of Fisheries. Although out of Waitakere City Councils authority, land use activities and human actions strongly impact upon these areas, often resulting in a loss of biodiversity. Waitakere City's marine environments are very diverse. The Waitemata and Manukau Harbours are relatively sheltered with minimal wave action; in contrast the rugged West Coast is typified by high-energy wave action.

●● *The hectors dolphin and a number of fish species in the region are under threat due to fishing pressure. In some areas intertidal shellfish are threatened because of over-collecting.*

A number of marine mammals regularly visit the Waitakere City coastline. A small population of hectors dolphin is occasionally seen off the West Coast, and a growing colony of New Zealand fur seals is resident on Oaia Island. The hectors dolphin and a number of fish species in the region are under threat due to fishing pressure. In some areas intertidal shellfish are threatened because of over-collecting. Shellfish in all regions, especially in the Manukau and Waitemata Harbours, are under pressure from urban run-off. Loaded with silt, heavy metals and oil, run-off is suspected to be responsible for the drop in shellfish diversity in some regions. Also concerning is the increasing number of introductions of invasive marine pests. A number of species have caused regional concern including a species of tubeworm and the Asian date mussel.

Mangroves dominate estuarine vegetation in Waitakere City, providing a valuable refuge for juvenile fish and shellfish. They have remained largely intact over time although they are constantly under pressure from coastal housing developments, and stormwater treatment facilities. The tidal flats in the sheltered Waitemata and Manukau Harbours are home to a large assemblage of intertidal organisms including the introduced mud snail, mud crab and pacific oyster. The West Coast includes a diverse range of plants and animals, some live on the rocky parts of

the shoreline, while others prefer the sandy areas. Commonly encountered species include the pipi, tuatua, mussel, cockle and bull kelp. There has been concern for the bull kelp over the last couple of years. However the dramatic drop in abundance is now thought to be a natural process typical of high-energy environments.

The coastal areas surrounding Waitakere City support a number of threatened and rare birds (refer to Tables 1 and 2). Unfortunately many species including the fernbird and the banded rail are vulnerable to predation by cats and dogs. Concern has also been noted for the West Coast populations of the grey-faced petrel, the flesh-footed shearwater, the sooty shearwater, and the diving petrel. Although all species are common on the islands of the Hauraki Gulf, all have faced a decline in their West Coast numbers over recent years.

3. KEY ISSUES THREATENING BIODIVERSITY IN WAITAKERE CITY

Waitakere City has a history of human modification, with urbanization, commercial and industrial development, and agricultural activities, all having an adverse effect on the City's biodiversity. As a City we are not alone with these difficulties, with key threats in Waitakere City identical to those faced by the entire Auckland region, and in fact the country as a whole. The key causes for concern lie with habitat loss and fragmentation, and introduced plant and animal pests.

- **HABITAT LOSS & FRAGMENTATION**

The loss of habitat in Waitakere City has been predominantly within the Tamaki Ecological District and wetland/riparian areas. Although primarily a result of historical land-use practices, many areas are still being cleared today, with homeowners and developers alike failing to recognize the value of our City's natural areas.

It's not uncommon for people to think that the few trees on the edge of their property are unimportant. Residents rationalize that it's all right for them to fell their trees because of course there are many others in their local patch of bush. Unfortunately their neighbours may also come to the same conclusion and their combined activities compromise already fragmented areas of bush in urban areas. Recent research into the loss of vegetation in Waitakere City highlights this attitude, with staggering habitat loss within a seven-year period from 1993 – 2000. In some areas of the City up to 30% of vegetation has been lost, and although some of this loss is as a result of subdivision development, much of it is a result of numerous people cutting down just 2 or 3 trees.

“
 much of [vegetation loss]
 is a result of numerous people
 cutting down just 2 or 3
 trees.”

Loss of habitat directly threatens the City's biodiversity with the remaining areas of vegetation in the Tamaki Ecological District critical for species survival. With vegetation within the Tamaki Ecological District being a mere 9% of it's original area, and with many of the City's wetland areas drained and riparian margins cleared, care must be taken by all residents to protect what little still remains. Tamaki Ecological District vegetation is fragmented as a result of historical vegetation clearances. As more vegetation is lost the effects of fragmentation are magnified:

- It becomes increasingly difficult for native plants and animals to disperse between areas of bush. This jeopardizes their survival as inbreeding is encouraged and genetic diversity decreases.
- Many species adapted to living in the sheltered, shaded interior of bush areas become threatened as their environment becomes increasingly exposed to light, wind and weed invasion. These changes have occurred rapidly, with the majority of New Zealand's native species not able to adapt in time.
- The smaller a fragment becomes the higher its edge to interior ratio becomes. This results in higher rates of weed and pest invasion, with many urban forest fragments no longer large enough to survive these invasions.
- Food supply and nesting habitat becomes more limited, with many species unable to find a year-round supply of food, and suitable habitats within which to nest.

The loss of Tamaki Ecological District vegetation is arguably the most pressing concern for biodiversity in Waitakere City at present. This however does not mean we should overlook vegetation in the Waitakere Ecological District. As one of the biggest blocks of continuous vegetation in an urban area in New Zealand, its biodiversity value is significant. All Waitakere City residents need to be aware of the unique environment in which they live, and next time you go to do work around your backyard, just remember how important your native trees are to biodiversity in the entire City.

- **INVASIVE PLANT & ANIMAL PESTS**

Invasive plant and animal pests are a significant problem in Waitakere City, with a large amount of resources within the Waitakere City Council dedicated to controlling this problem. There are now more exotic plants growing in the wild in New Zealand than there are native plants. This is a continuing problem with an average of 8 plants introduced yearly; Waitakere City is now home to over 175 plants considered environmental weeds. It's alarming to learn that over 75% of our land-based plant pests and about 50% of our freshwater weeds are garden escapees.

“
 Waitakere City is now
 home to over 175 plants
 considered environmental
 weeds.”

Environmental weeds are of particular concern because of the impact they have on both native plants and animals. They permanently alter the structure, successional processes, and species composition of ecological communities, resulting in a loss of biodiversity as well as the degradation of our native ecological communities. Invasive plant pests:

- **Strangle** native plants, preventing continued growth and in some cases killing the plant.
- **Smother** native plants, preventing adequate light reaching native species, resulting in compromised growth and survival rates.
- **Halt** regeneration of bush by preventing the growth of native plant seedlings. This halts the natural processes within areas of bush and forest, and jeopardizes the long-term survival of native species.
- **Exclude** native species by out-competing them for resources such as space and nutrients.

Waitakere City's Weed Management Strategy was developed to combat the environmental weed problem in the City. The goal of the weed strategy is the:

“Protection of the quality, resilience, biodiversity and ecological integrity of Waitakere City's natural habitat from the impacts of environmental weeds”.

In order to achieve this goal the residents of Waitakere City need to be aware of the problem and do their part to prevent the spread of invasive weeds. To find out what you can do to help refer to the '*What you can do*' section of this chapter.

Introduced animal pests in the City include possums, stoats, ferrets and cats. They pose a threat to native wildlife, and also jeopardize the health of our native vegetation. A concerted effort by the Auckland Regional Council has greatly reduced the number of possums in the City, with regular maintenance work carried out to ensure the ongoing success of this work. New Zealand evolved in the absence of predators like the cat, stoat and ferret, with much of our native wildlife helpless to defend themselves against such predators. Unfortunately the number of these predators is increasing, and the numbers of our native wildlife declining.

- **GENERAL**

There are a number of other concerns for biodiversity in Waitakere City. In particular the freshwater environment faces a number of threats. Water quality and the ability of streams to support life is threatened by:

- Piping and culverting of waterways.
- Vegetation clearance and earthworks associated with development which can lead to high levels of sediment getting into waterways disrupting filter feeding organisms and disturbing fish and invertebrate habitats.
- A loss of riparian vegetation which can cause temperatures to rise which is above the tolerance levels of most native fish and invertebrates, and in turn causes unwanted algae to grow.
- Stormwater containing contaminants from roads (e.g. oil, zinc, copper).
- Sewage entering waterways.

The State of our Biodiversity

C A S E S T U D Y

LAINGHOLM WEEDFREE GROUP

Laingholm Weedfree is a voluntary community group which formed to bring awareness of weeds to Laingholm residents. The group has been proactive in weed management and replanting programmes.

In September 1999, a kerbside collection of weeds was organised by the Laingholm WeedFree Group and by the Council through the Community Assistance Programme.

The Green Network Community Assistance Programme is a partnership programme where the Waitakere City Council provides advice and assistance, which supports and encourages private landowners and community groups who wish to improve natural areas.

In cooperation Laingholm residents removed weeds from their properties, Metropolitan Waste provided a collection truck (free of charge), community volunteers loaded the truck, and the Council covered the disposal costs.

“
The weed collection
removed 24 tonnes of
environmentally damaged
weed waste ... in 3 days.”

Over 90 landowners and 26 local volunteer workers participated in the project. The weed collection removed 24 tonnes of environmentally damaging weed waste (from 10% of Laingholm's properties) in 3 days.

The Community Assistance Programme has also provided the Laingholm WeedFree Group with free specialist advice with regards to Giant Reed infestations on private properties and has funded a commercial contractor to remove the infestation, working alongside volunteers from the group. As a result, the Laingholm WeedFree Group has set their sights on working with all landowners to eradicate Giant Reed from Laingholm.

WHAT THE COUNCIL IS DOING:

- Establish regulatory controls - The regulatory controls that the Council puts in place to protect biodiversity include riparian margin management, structure plan requirements, and District Plan controls on vegetation clearances and other land use activities. The Council has also undertaken a number of other non-regulatory initiatives that help restore biodiversity including trials of litter traps in urban streams and the fitting of culverts with mechanisms that allow for native fish migration.
- Revegetation and weed control programmes - The Council is actively involved in a number of revegetation and weed control programs on its own land and through its Green Network Community Assistance Programme it offers advice and support for such initiatives on privately owned land. The Council is also pro-active in promoting the use of eco-sourced plants. Eco-sourced plants are grown from locally collected seeds, thus protecting the genetic resources of Waitakere City. The Council has doubled the number of eco-sourced plants used within the City over a three-year period, with over 85,000 eco-sourced plants used in revegetation work in each of the 2000 and 2001 financial years. Through the use of regulatory controls the Council is also ensuring others protect Waitakere City's genetic resources by requiring the use of eco-sourced plants in some developments.
- Other non-regulatory approaches to the protection of biodiversity include the numerous community partnerships and educational programmes the Council is involved in. Twin Streams, Project Whau, Wai Care and Keep Waitakere Beautiful, all involve community and council participation.
- Advice is available to all Waitakere City residents and businesses! Practical assistance (such as plants and help with weed control) is available in areas of high conservation priority. The Council can provide financial assistance with fencing off of stock to protect stream banks and sensitive areas. Rates relief is also available in some circumstances, if you are willing to forfeit subdivision potential to protect these sensitive areas.

“
*The Council is actively
 involved in a number of
 revegetation and weed control
 programs on it's own land.*
 ”

WHAT YOU CAN DO:

- Waitakere City residents in both urban and rural areas can be involved in protecting the City's Biodiversity. You can start simply by ensuring you dispose of your garden waste appropriately – if you're not sure how to dispose of weeds give the Council a call and they'll be able to inform you of safe disposal options.
- Learn to recognize weeds in Waitakere City and replace them with plants native to the area. If you'd still like to use exotics, request a copy of the 'Friendly Alternatives' brochure from the Auckland Regional Council to learn about alternatives to many popular ornamental garden plants that have the potential to be invasive.
- You can obtain a copy of 'A guide for planting and restoring the nature of Waitakere City' from the Council, it explains which plants are suitable for planting in your area. A number of other resources are also available from the Council, ring the call center on 839 0400 for further information.
- Please be careful with your pets! If you own a cat make sure it is kept inside at night (when they do most of their hunting), and be responsible about neutering your animals to prevent unwanted litters. If you own a ferret please make sure that you are housing it securely and if you can no longer look after it, contact a local rescue organization, please don't release your animals into the wild.
- Remember to think carefully about what you dispose of down your drains. Your stormwater is carried into your local waterways and on into the marine environment, affecting both plant and animal life as it travels.
- Join a local community group or form your own and get involved with restoration work in your local area. You can make a difference. There are currently over 20 active groups operating in Waitakere City.
- Finally if you have a large area of bush on your property ensure it is well fenced and protected from grazing stock. Consider placing a conservations covenant on the bush to protect it for future generations.

REFERENCES FOR FURTHER INFORMATION

- Department of Conservation Website (<http://doc.govt.nz>)
- Ministry for the Environment Website (<http://mfe.govt.nz>)
- New Zealand Native Freshwater Fish Society Website (<http://www.nzfreshwater.f2s.com>)
- Waitakere Ecological District PNA
- Tamaki Ecological District PNA
- City Update
- Waitakere City Weed Management Strategy
- Ecosourcing Code of Practice and Ethics
- Various Green Network Publications
- A survey of the aquatic fauna and flora of the Te Henga wetland (Bethells Swamp), West Auckland. (McCullough Freshwater Consultancy, 1998)
- Managing Riparian Zones: A contribution to protecting New Zealand's rivers and streams. Volume One: Concepts. (NIWA, 1995).
- The Green Network: Growing the Green Network
- Plants for you: Waitakere's Green Network Community Assistance Programme #1
- Bring out your weeds: Waitakere's Green Network Community Assistance Programme #2
- Be rid of your weeds: Waitakere's Green Network Community Assistance Programme #3
- Eco Sourcing: Growing the Green Network
- Waitakere City Native Freshwater Fish Baseline Study (McCullough Freshwater Consultancy, 1997)
- Waitakere City Native Freshwater Fish Baseline Study #2 (McCullough Freshwater Consultancy, 1998)
- Waitakere City Freshwater Fish Baseline Study Year Three (1999)

- Fish Passage with Solutions for Native Species (Comprehensive Stormwater & Aquatic Ecosystem 1999 – Conference Paper)
- Mid-Waitemata Harbour Catchment Freshwater Ecological Survey (ARC Technical Publication #99, 1998).
- The freshwater fisheries and habitat values of the Opanuku and Oratia Streams, West Auckland (McCullough Freshwater Consultancy, 1997)

Links to other chapters:

- State of our Land
- State of our Water
- State of our Air