



A Biodiversity Strategy

for the Canterbury Region





Charter of Adoption

In signing this Charter, we acknowledge the importance of Canterbury's biodiversity and our role in sustaining it. While the Biodiversity Strategy for the Canterbury region is a non-binding, non-statutory document, we are committed to working collaboratively with our Strategy partners, communities and landowners to implement the Strategy and to achieve positive biodiversity outcomes for the Canterbury region.

Organisations

List of organisations that have adopted the Strategy via the Charter of Adoption as at February 2008 includes:

Ashburton District Council
 Banks Peninsula Conservation Trust
 Christchurch City Council
 Department of Conservation
 Environment Canterbury
 Fonterra
 Kaikoura District Council
 Landcare Research Manaaki Whenua
 Land Information New Zealand
 New Zealand Landcare Trust
 Queen Elizabeth II National Trust
 Royal Forest and Bird Society
 (North Canterbury and Ashburton branches)
 Selwyn District Council
 Te Rūnanga o Ngāi Tahu
 Timaru District Council
 University of Canterbury
 Waimakariri District Council
 Waimate District Council
 Waitaki District Council



Department of Conservation
Te Papa Atawhai



QE II National Trust
 For open space in New Zealand
 Nga Kaitiaki Papa





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Introduction

In Canterbury, the native plants and animals and the landscapes and ecosystems that support them, are recognised nationally and in some cases internationally, as defining this place. They also form a fundamental part of the cultural identity and heritage of Ngāi Tahu, of subsequent settlers, and of the Canterbury community today. However, since the arrival of humans there has been a significant decline in our indigenous biodiversity. This has occurred primarily in the parts of the region subject to the greatest concentration of human impact – generally those environments occurring below about 800m elevation. This includes a significant portion of the region, including the lowland plains, coastal areas, inter-montane basins, hill country and foothills of the inland ranges. The loss of indigenous habitat in these areas has been extensive, and in some areas such as the plains, virtually complete. In lowland and coastal areas, remaining indigenous vegetation tends to occur in small, scattered fragments, waterways have been significantly modified, and less than 10% of the region's previously extensive wetlands remain. In parts of the hill and high country, where habitat loss has not been quite as

extensive, accelerating land use change and intensification is threatening the important indigenous habitat that remains.

In recent years there has been a considerable increase in the level of understanding and recognition of the importance of indigenous biodiversity. This has resulted in an increase in biodiversity related initiatives at all levels, from individual landowners protecting streams, wetlands and areas of indigenous vegetation; to voluntary groups supporting action in their area; to central, regional and local government increasing resources and programmes related to biodiversity.

However, our biodiversity continues to decline and we need to do more. Halting the decline in Canterbury's biodiversity and sustaining it into the future is vital for maintaining our quality of life, preserving cultural heritage, and ensuring a sustainable future for our region. This is a challenging task, requiring widespread positive action, shared responsibility at all levels, and a considerable increase in resources.

A strategic approach will also be fundamental. Given the extent of biodiversity loss that has already occurred in Canterbury, avoiding further loss requires that we focus

as a first priority on protecting and sustaining the most threatened and ecologically significant remaining habitats and ecosystems and the linkages between them, and as a second priority on restoring representative habitats and ecosystems that have been lost or severely degraded. Achieving this will require a coordinated and cooperative approach from the many agencies and organisations with biodiversity related responsibilities and objectives, and from communities, individuals and landowners across the region. Working together will be imperative. As will raising awareness and fostering positive community attitudes towards indigenous biodiversity, and empowering communities to take action.

In recognition of this, an Advisory Group representing key stakeholders in biodiversity management across the region was formed in 2006 to work with Environment Canterbury staff and an independent facilitator in the development of this Strategy.



The Strategy applies to the entire Canterbury region, which stretches from the Clarence River/Waiarau catchment in the north to the Waitaki River catchment in the south, and from the Southern Alps and inland Kaikōura ranges in the west to the outer edge of the Coastal Marine Area (the '12 mile limit') in the east. It is a non-statutory document, intended to sit alongside existing statutory and other instruments relating to biodiversity, and it will contribute, at a regional level, towards achieving the goals of the New Zealand Biodiversity Strategy. It takes a long-term approach, but will be reviewed on a 5 yearly basis.

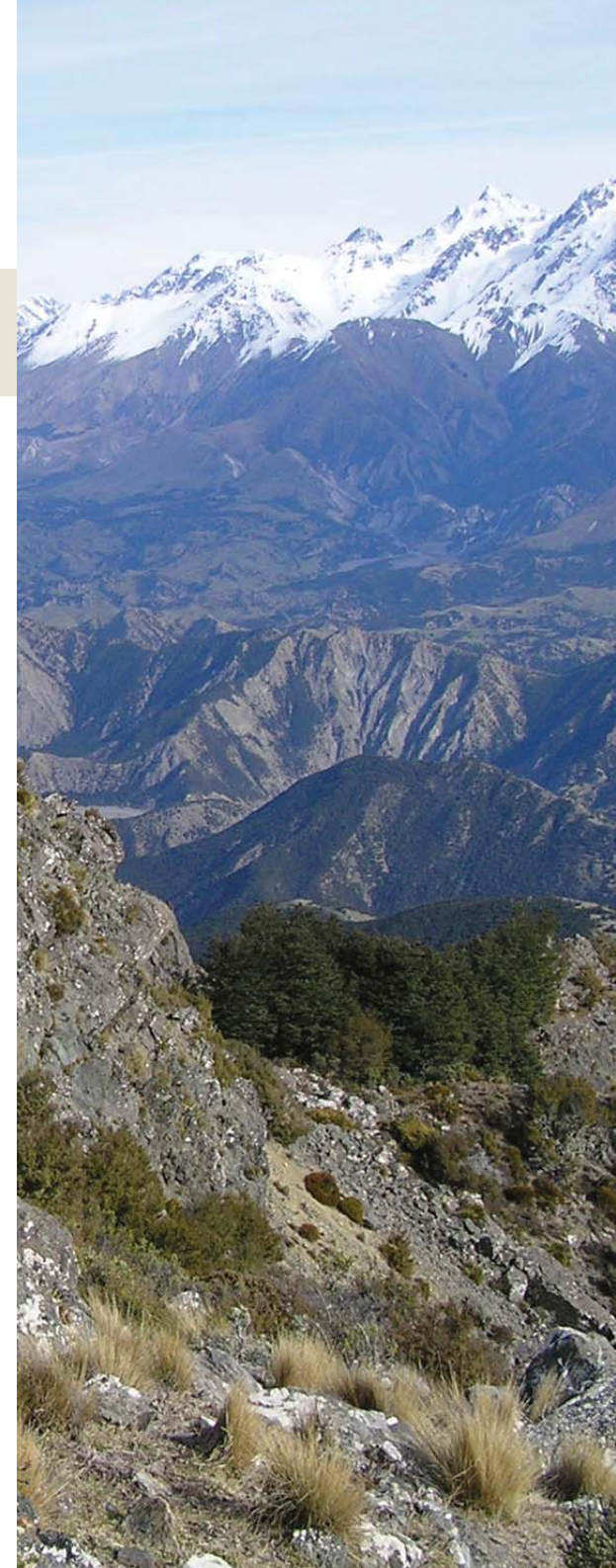
The purpose of the Strategy is to provide guidance and a common focus for policy and decision making, resource allocation, voluntary effort, and on-the-ground projects and initiatives relating to biodiversity management in the region. It aims to build on the good work already occurring, to raise awareness of biodiversity values, to facilitate the coordination of agency effort through synergies and partnerships, and to support and encourage the efforts of communities and individuals.

The Strategy establishes a common Vision and a number of Goals. It identifies the actions we need to take to

achieve those goals together, identifies who has a role to play in those actions, and provides the framework for the development of specific action plans. It establishes a strategic approach built around the general concept of first protecting what remains, and secondly restoring what has been lost, and identifies priorities on this basis.

The policy context within which the Strategy sits is outlined in Appendix B, and the general roles and responsibilities in relation to biodiversity management within Canterbury are illustrated in Appendix C.

Many of the organisations represented on the Advisory Group have pledged their support and commitment to sustaining Canterbury's biodiversity by adopting this Strategy. The success of the Strategy now depends on these organisations demonstrating that commitment through actions, support, and the provision of resources. A measure of the success of the Strategy will be that actions are incorporated into organisations' formal work programme planning processes. But it will also depend on the willingness of other organisations, communities, and individuals to share in the responsibility and contribute to sustaining our indigenous biodiversity into the future.





The Biodiversity Strategy Advisory Group

The Advisory Group established in 2006 to assist in the development of this Strategy is made up of representatives from the following organisations.

Ashburton District Council	Waimate District Council	NZ Fish and Game (North Canterbury)
Christchurch City Council	Waitaki District Council	University of Canterbury
Environment Canterbury	Te Rūnanga o Ngāi Tahu	Queen Elizabeth II National Trust
Hurunui District Council	Department of Conservation	Banks Peninsula Conservation Trust
Kaikoura District Council	NZ Landcare Trust	Fonterra
Selwyn District Council	Federated Farmers	Landcare Research Manaaki Whenua
Timaru District Council	Land Information NZ	
Waimakariri District Council	Royal Forest and Bird Society (North Canterbury and Ashburton Branches)	

Vision Statement

Our vision for biodiversity in Canterbury

The Canterbury community values and cares for the region's biodiversity and accepts the shared responsibility to work together to ensure it is sustained and enhanced, both now and into the future.

As a result, there is a full range of healthy ecosystems stretching from the mountains to the sea, reflecting the unique and diverse natural character of the Canterbury region. Our indigenous biodiversity is an integral part of our everyday lives and landscapes, it complements the productivity of our sustainable economy and working lands, and where appropriate, it supports sustainable harvest.



Goals

To achieve our Vision for biodiversity in Canterbury, there are a number of Goals that will need to be achieved. Achieving these Goals will take time, and will require cooperation, coordination and an increase in the resources invested in biodiversity management throughout the region.

Goal 1

Protect and maintain the health of all significant habitats and ecosystems.

Goal 2

Restore the natural character of degraded indigenous habitats and ecosystems.

Goal 3

Increase the integration and sustainable use of indigenous species in modified environments (e.g. farm, urban, lifestyle blocks).

“Significant” in this strategy refers to habitats and ecosystems that are significant due to their representativeness, rarity, distinctiveness, or ecological context. Some examples may include – ‘originally rare’ ecosystems such as limestone rock outcrops; healthy, representative examples of a particular habitat or ecosystem type; habitats that support threatened or endemic species; habitats that provide important linkages or corridors between significant habitats; habitats and ecosystems of a type that have been extensively depleted, such as wetlands and coastal dune systems; and areas of indigenous vegetation in environments where less than 20% indigenous cover remains.



Goal 4

Enhance public awareness, understanding and support of biodiversity.

Goal 5

Encourage, celebrate and support action by landowners and communities to protect, maintain and restore biodiversity.

Goal 6

Improve the range and quality of knowledge and information about Canterbury's biodiversity for its sustainable management.

"Restore" in this strategy refers to activities aimed at assisting the recovery of indigenous ecosystem health, integrity and viability. The potential to restore ecosystems will vary over space and time and depends on the degree of degradation that has occurred, and the practicability of repairing that degradation. Therefore, 'restore' refers to a wide spectrum of activities, from restoration aimed at returning ecosystems to their original condition; to rehabilitation of ecosystems (enhancing the functioning of the ecosystem on a recovery pathway toward an improved state); to the reconstruction of lost ecosystems (recreating original ecosystems by assembling the plant, animal and ecosystem components).





What is Biodiversity?

“Biodiversity” is short for biological diversity. It describes the variety of all biological life – the different **species**, from micro-organisms to trees, animals and fungi; the **genes** they comprise; and the **ecosystems** they collectively form. This includes diversity within species, between species, and of ecosystems¹. It forms a fundamental part of the natural heritage and unique character of our nation and its regions.

Genetic Diversity:

The variability in the genetic make up among individuals within a single species. In more technical terms, it is the genetic differences among populations of a single species and those among individuals within a population².

Species Diversity:

The variety of species - whether wild or domesticated - within a particular geographical area. A species is a group of organisms which have evolved distinct inheritable features and occupy a unique geographic area. Species are usually unable to interbreed naturally with other species due to such factors as genetic divergence, different behaviour and biological needs, and separate geographic location³.

Ecological (ecosystem) Diversity:

The variety of ecosystem types (for example, forests, deserts, grasslands, streams, lakes, wetlands and oceans) and their biological communities that interact with one another and their non-living environments⁴.

¹ International Convention on Biological Diversity ³ New Zealand Biodiversity Strategy, 2000

² New Zealand Biodiversity Strategy, 2000 ⁴ New Zealand Biodiversity Strategy, 2000

Why is Biodiversity Important?

New Zealand's unique biodiversity is internationally important. Many of our indigenous species are endemic, meaning they are found nowhere else on earth. This high level of endemism is the result of isolated evolution and the diversity of the land and seascapes of New Zealand. The ecosystems in which these species live are also highly distinctive, for example, the kauri forests of the northern North Island, the braided river systems of the eastern South Island, and the geothermal ecosystems in the central North Island⁵.

Because of this high level of endemism and distinctiveness, New Zealand's indigenous biodiversity makes a significant contribution to overall global biodiversity. It also means that the responsibility for its continued existence lies with all New Zealanders, as it cannot be conserved in nature elsewhere in the world. This also applies in Canterbury, where many components of our regional biodiversity are not found outside of the region. Therefore, responsibility and action at the regional and local level are vital to its protection.

Biodiversity provides a range of benefits that contribute to our lives in both material and immaterial ways:

- Economic benefits in the form of: ecosystem services⁶; tourism opportunities; marketing advantages of a clean, green environment; and potential commercial and medical uses.
- Social benefits in the form of a distinctive national/regional identity as well as various recreational, research and educational benefits.
- Cultural benefits in the form of being able to recognise and continue Māori traditions, knowledge, and customary uses.

⁵ New Zealand Biodiversity Strategy, 2000

⁶ Ecosystem services include producing raw materials (principally food and fibre), purifying water, decomposing wastes, cycling nutrients, creating and maintaining soils, providing pollination and pest control, and regulating local and global climates.



Biodiversity is our biological wealth. The New Zealand economy is based primarily on the use of biological resources and the benefits from ecosystem services. A 1997 study by economists suggested that the total annual value provided by New Zealand's indigenous biodiversity could be more than twice that of New Zealand's gross domestic product (GDP)⁷. In 2003 the total economic value of Canterbury's land based and coastal ecosystem services and biodiversity were estimated to be \$8.5 billion and \$504.3 million respectively for the year ending March 1998⁸.

There is still a lot that we don't know about our indigenous biodiversity, and so it also represents a pool of untapped opportunities.

Natural systems do not recognise human boundaries. As well as protecting our most important places for indigenous biodiversity, we have to manage this biodiversity as best we can in farming and forestry environments and alongside marine industries, while ensuring a sustainable return from these activities.

Sustaining New Zealand's biodiversity will benefit the whole community, through the clean air and water and biological productivity that come from healthy ecosystems, the pride and profit we get from New Zealand's distinctive biological and green branding, and the enjoyment and sense of identity we derive from our natural world.

New Zealand Biodiversity Strategy, 2000

⁷ New Zealand Biodiversity Strategy, 2000

⁸ McDonald and Patterson, April 2003



Ngāi Tahu and Biodiversity

Hutia te rito o te harakeke	When the centre of the flax bush is picked
Kei hea te Kōmako, e kō?	Where will the bellbird sing?
Ki mai ki ahau	You ask me
He aha te mea nui o te ao?	What is the greatest thing in the world?
Māku e ki atu	My reply is
he tangata, he tangata, he tangata	it is people, it is people, it is people

Like many other iwi (tribes), Ngāi Tahu have a significant interest in the protection, management and restoration of indigenous biodiversity. This stems from the relationship that Ngāi Tahu have with the biodiversity of Canterbury, developed over centuries of occupation, close interaction and use. The above whakataukī (proverb) provides an insight into this relationship, and the importance that biodiversity has for ongoing culture, identity and well-being. Importantly, it demonstrates awareness of the ecological link between harakeke (NZ flax) and the kōmako (bellbird), and of the role that people can play in either destroying or maintaining such linkages. The need for ongoing management of biodiversity within the Canterbury region is therefore aligned with the traditional relationship between Ngāi Tahu and the environment, as well as a number of key traditional concepts, including whakapapa (genealogy), mahinga

kai, kaitiakitanga (often likened to guardianship), and the philosophy of ki uta ki tai ('from the mountains to the sea').

Whakapapa forms the basis for the Ngāi Tahu approach to biodiversity management by accounting for the genealogical connection between people, plants, birds and insects through their shared descent from Tāne Mahuta – “god of the forest”. The crux of the relationship, however, is the custom of mahinga kai and the interdependence between people and the species and natural resources that provide the gift of sustaining life.

Mahinga kai refers to the sustainable gathering of food and resources, the places where they are gathered, the practises used in doing so, and the resources themselves. Mahinga kai customs underpin Ngāi Tahu culture and are central to the relationships of people with places and resources, and to the





ongoing cultural, economic, social and spiritual wellbeing of the iwi. Mahinga kai is also the major vehicle for the transfer of traditional ecological knowledge, culture and identity from generation to generation. The Ngāi Tahu commitment to mahinga kai and customary use implies a desire for sustainable use and the need to manage, protect and restore species, habitats and ecosystems to enable such use to occur.

Kaitiakitanga is an inherited responsibility of those who hold manawhenua to ensure that the mauri (life force) of the natural resources of their rohe (region) is healthy and strong, and the life-supporting capacity of these ecosystems is preserved. Kaitiakitanga enshrines an obligation to safeguard the well-being of the land, water, sites, and biodiversity for future generations - *mō tātou, ā, mō kā uri a muri ake nei* – for us and our children after us⁹. Kaitiakitanga and manawhenua also incorporate the obligation of manaakitanga or the provision of hospitality to manuhiri (visitors). In these ways, the mana (prestige, power, authority) of the people is derived from the natural environment and its ability to provide the necessities of life.

⁹ Christchurch City Council, July 2004

¹⁰ Te Rūnanga o Ngāi Tahu, April 2003

Ki uta ki tai, meaning “from the mountains to the sea”, is the concept used by Ngāi Tahu to describe its overall approach to contemporary natural resource management. Founded on traditional values and understandings, ki uta ki tai involves the creation of a number of tools, such as natural resource management plans, monitoring and reporting processes, education, and site/area specific management and restoration strategies to address the continuing challenges and threats faced by the natural environment, including indigenous biodiversity¹⁰.

Through iwi management plans and other policies, Ngāi Tahu have indicated a clear desire that taonga species and mahinga kai resources within the Canterbury region need to be both preserved and enhanced so that the environment can continue to provide the necessities of life as well as ensuring that traditional practices are not lost to future generations. Ngāi Tahu recognise the need to approach environmental management in a holistic (including ecological, cultural, social and economic factors) and scientifically sound manner.

A number of key outcomes relevant to biodiversity have been identified in the Ngāi Tahu 2025 vision document produced in 2000, including:

- Increasing the abundance of, access to, and use of mahinga kai.
- Appropriately protecting all wāhi tapu, mahinga kai and taonga tuku iho according to Ngāi Tahu values and interests.
- Enhancing waterways to support healthy populations of species of importance to Ngāi Tahu.

The Kaikōura Rūnanga Natural Resource Management Plan 2005 neatly summarises the policy positions of Ngāi Tahu in relation to biodiversity, advocating for:

- The protection of key biodiversity areas and sites;
- The connection of areas and sites of high indigenous biodiversity through corridors from mountains to sea. Such corridors would enable the movement of plants, birds and other biodiversity; and
- The encouragement of activities that are appropriate to maintaining, protecting and enhancing biodiversity.

Ngāi Tahu Whānui

Ngāi Tahu Whānui are the iwi (tribe) comprised of individuals who descend from the five primary hapū (sub-tribes) of Ngāi Tahu, Ngāti Mamoe and Waitaha, namely Kāti Kuri, Ngāti Irakehu, Kāti Huirapa, Ngāti Tuahuriri and Ngāi Te Ruahikihiki, and who hold manawhenua over most of the South Island, including the Canterbury Region. Manawhenua refers to the exercise of political and occupational authority by particular whānau (extended family groups) and hapū with customary rights to a particular area or resource, established through whakapapa (hereditary rights), tikanga (lore and custom), and ahikaaroa (occupation and use). (Tau et al, 1990)

Te Rūnanga o Ngāi Tahu is the tribal authority established by the Te Rūnanga o Ngāi Tahu Act 1996 to give a legal identity to the tribe and to represent the tribal collective of Ngāi Tahu Whānui. Te Rūnanga o Ngāi Tahu is made up of representatives from the 18 Ngāi Tahu Papatipu Rūnanga (marae-based communities) situated throughout Te Waipounamu (the South Island). Ten of these Papatipu Rūnanga are located within the Canterbury Region, from Kaikōura in the North to Moeraki in the South, and are shown on Map 1.

Map 1: Ngāi Tahu Papatipu Rūnanga



Map courtesy of Te Rūnanga o Ngāi Tahu



Biodiversity in Canterbury

From the Southern Alps, over the foothills, across the plains, along braided rivers to coastal lagoons and estuaries, dune systems, rocky peninsulas, and out to sea, Canterbury forms a significant part of New Zealand's unique network of biodiversity. It is the largest region in the country, covering approximately 4.2 million hectares, and around 800 kilometres of coastline. This large area, the diverse landforms, and varied climates mean that the region has an extensive and diverse range of ecosystems that support many species of plants, animals and micro-organisms.

However, like the rest of New Zealand, there have been significant losses in indigenous biodiversity in Canterbury. This has primarily occurred through the loss and modification of habitat as a result of extensive deforestation, burning, drainage, settlement and development (changes that were in some cases, actively encouraged through government policy of the time), and the introduction of invasive pests. Habitat loss and modification, and the impact of animal and plant pests remain the principal threats to indigenous biodiversity in Canterbury today.



Animal and Plant Pests

Collectively, invasive pests pose the single greatest threat to New Zealand's remaining indigenous biodiversity¹¹, surpassing even habitat loss in many areas. The principal threats from pests are predation on and competition with, indigenous plants and animals, as well as disease and hybridisation. The following is a list of just some of the biodiversity pests in the Canterbury region –

- Pest Animals: possums, mustelids (ferrets, weasels, stoats), rats, feral cats, rabbits, Bennetts wallaby, feral goats, feral deer, thar and chamois, feral pigs, wasps, magpies.
- Pest Plants (terrestrial): banana passionfruit, bell heather, boneseed, Darwin's barberry, hieracium, old man's beard, phragmites, wilding conifers, wild thyme, Mexican daisy, grey willow, broom, and gorse.
- Freshwater Pests: didymo, egeria, lagarosiphon.
- Marine Pests: undaria.

This list is not exhaustive, and there are other pests or potential pests of concern to biodiversity, particularly plant pests, which can smother or overshadow native plants, and provide significant competition. There are now about the same number of introduced plant species growing wild in New Zealand as there are native plant species, but only 7 species of invasive weeds have been successfully eradicated from New Zealand.

Over 75% of the biodiversity plant pests in New Zealand today were originally introduced to New Zealand as garden plants.

Broom and gorse are included in the list above, but pose a threat to biodiversity only in certain contexts, such as braided riverbeds and tussock grassland, while in some other contexts they can be important nursery species for the regeneration of indigenous vegetation. Given this, broad-brush rules regarding the control of plant pests such as gorse and broom can impact negatively on indigenous biodiversity in some instances, highlighting the importance of better integration and alignment between pest management and biodiversity at both the policy and operational levels.

Animal pests are a very serious threat to biodiversity, impacting on vegetation, threatened plants, invertebrates, lizards and birds. Browsing pests such as feral deer, goats, and possums change the structure and composition of forests, shrublands and grasslands. Since its introduction in 1837, the possum has invaded almost every corner of New Zealand. Feeding on foliage, flowers, fruits, and fungi, possums can have a significant impact on indigenous forests, and through canopy browsing can destroy even mature forest areas. They also eat insects and the eggs and chicks of native birds.

¹¹ New Zealand Biodiversity Strategy, 2000





New Zealand's indigenous flora and fauna evolved in the absence of mammalian predators, and so predators such as rats, stoats, possums, and wild cats have had catastrophic effects on our native birds, insects, lizards and other animals. Since the arrival of humans and their accompanying pests, forty four New Zealand birds have become extinct. For many remaining species, predation by pests is the greatest threat to their survival. For example, the significant decline in penguin numbers on Banks Peninsula over the last few decades has been due to predation by pests, especially ferrets, but also stoats and wild cats. And predation of young kiwi, chiefly by stoats, is the most important factor contributing to the continuing decline of mainland kiwi populations.

Freshwater and marine ecosystems are particularly vulnerable to invasion by pests and weeds because it is very hard to detect them until they have become a problem. Furthermore, once aquatic pests have become established, they are very difficult to eradicate, due to the limited number of control methods; their ability to spread through an entire river catchment, harbour or estuarine system; and the difficulty of controlling all inputs to a particular catchment. A recent example in the South Island, is the spread and establishment of the invasive freshwater algae, didymo.

Because of the significant threat that pests pose to biodiversity, a focus on biosecurity and effective and timely pest management is imperative. Some of the key challenges to managing pests in Canterbury are the large size of the region, the fact that most people live in the urban environment of Christchurch (where pests new to the region often originate), and that many pests have the greatest impact in more remote areas. Pest control is a fundamental part of any biodiversity protection or restoration project, and given that pest problems (and costs of control) increase exponentially if left uncontrolled, will form a significant part of on-going management of an area in order to maintain biodiversity values.

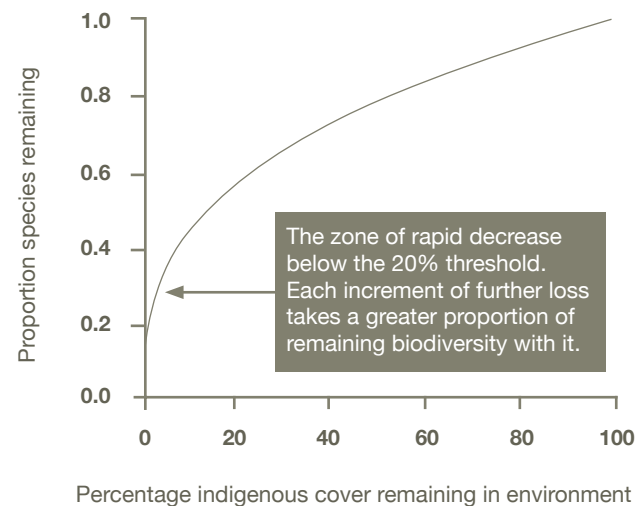
Some introduced species can also impact on indigenous species through competition or predation, but are valued for other reasons. For example, trout and salmon are highly valued for recreation purposes, but prey upon and compete for habitat with indigenous freshwater fish species.

Habitat Loss and Modification

The significance of habitat loss and modification for biodiversity can be seen in the generalised species-area curve (Figure 1), which illustrates the relationship between habitat area and species number. As the amount of habitat reduces, there is an exponential increase in the loss of species.

The rate of species loss is relatively small as a result of initial decreases in habitat area (upper right of the curve in Figure 1). As the area of habitat is progressively reduced, the rate of species loss increases. There is a critical threshold when habitat area has decreased to around 20%, at which point the rate of species loss accelerates rapidly. Over a significant part of the Canterbury region we do not meet this 20% habitat area threshold. The extent of indigenous habitat loss varies across the region, but is greatest in those areas most impacted by human activities. Based on Land Environments of New Zealand (LENZ) and the Land Cover Database (LCDB) respectively, Figures 3 and 4 illustrate the historical changes that have occurred to land cover across Canterbury between pre-human and modern times.¹³

Figure 1: Illustration of generalised species-area relationship¹²



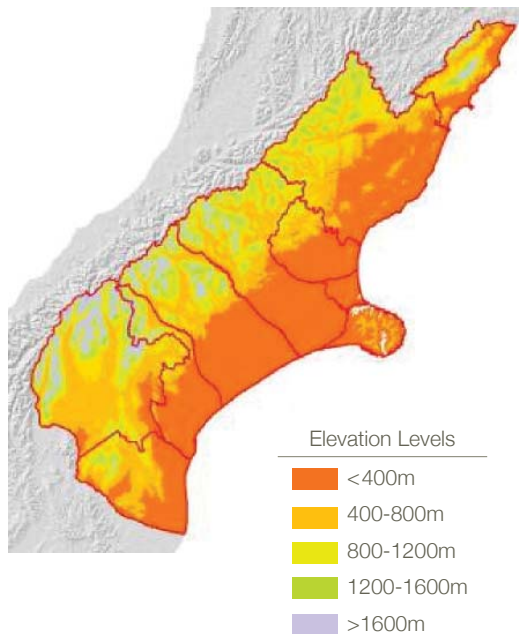
¹² Ministry for the Environment and Department of Conservation, April 2007

¹³ LENZ is a national classification system used to map areas that are similar to each other, regardless of where they occur. LENZ uses 15 climate, landform and soil variables that can influence the distribution of species to identify areas with similar environment or ecosystem character. These are known as "land environments". LCDB classifies New Zealand's vegetation cover into 43 cover classes, and based on satellite imagery, identifies the extent of these cover classes across the country.



Land

Figure 2: Elevation Zones



The spread of elevation zones in Canterbury are shown in Figure 2. The most significant losses in indigenous habitat and biodiversity have occurred in lowland and coastal environments (<400m), where development has been, and continues to be, most intensive. Around 90% of the previously extensive indigenous vegetation in these areas has been lost, and in some parts less than 1% remains¹⁴. Lowland forests, shrublands, and indigenous grasslands have been reduced to small, scattered fragments, which are threatened by changing land use, browsing pressure, edge effects, weeds and pests. Innumerable freshwater and coastal wetlands have been drained and reclaimed, and many remaining wetlands are under threat from land use change and intensification, grazing, recreational impacts, and coastal erosion. These lower elevation environments, where there has been the greatest loss of indigenous vegetation and habitat, represent the parts of the region where remaining indigenous biodiversity is at the greatest risk of further loss.

In montane environments (400-800m) the loss of indigenous cover has not been as extensive as in the lowland and coastal areas (around 60-70%), and numerous forest remnants, tussock grasslands, and some important ecological corridors remain. However, some parts of the hill country and inland basins are currently experiencing rapid rates of land use change and intensification, which poses an increasing threat to remaining indigenous habitats and ecosystems. Pests such as possums, deer and goats also pose a threat to forest remnants, and wilding conifers have become a significant threat to native tussock grasslands.

In general, alpine and high country environments (>800m) remain dominated by indigenous vegetation although even here, grazing by introduced animals is having an impact. There are large areas of remaining tussock grasslands in the intermontane basins, as well as extensive wetland complexes. However, these areas are subject to increasing pressure from both land use change and the spread of animal and plant pests, including an increasing threat from wilding conifers.

¹⁴ Walker et al, 2006.

Figure 3: Pre-human vegetative cover

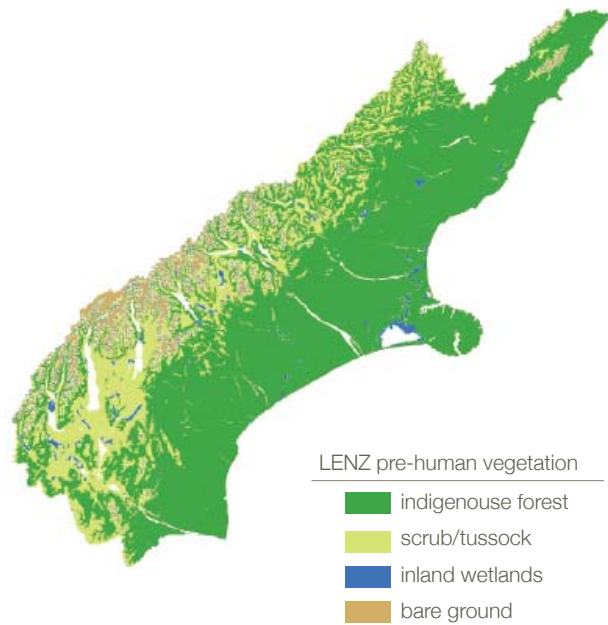
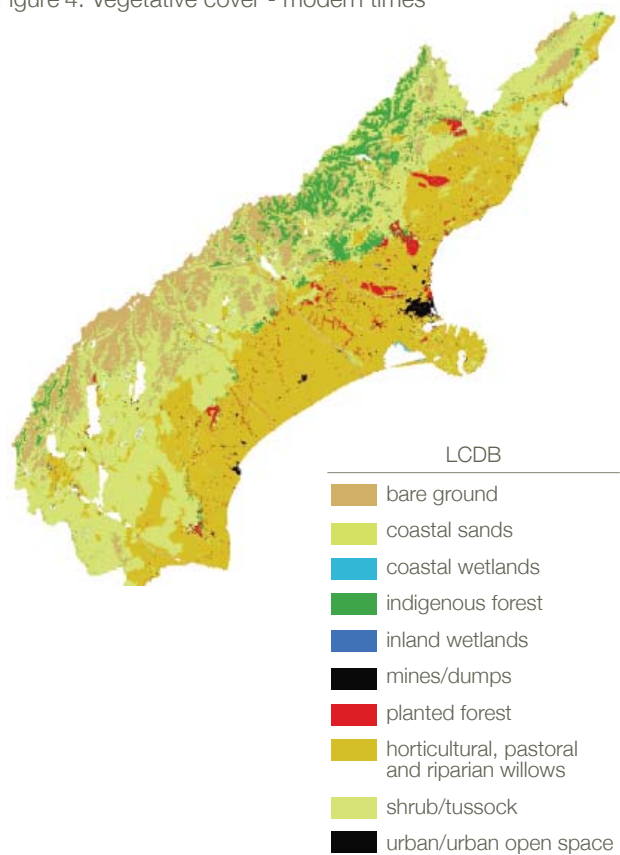


Figure 4: Vegetative cover - modern times





Freshwater

Rivers, streams, lakes, wetlands and riparian areas provide important habitat for many freshwater fish, invertebrate, plant and bird species, but also act as ecological corridors and 'stepping stones' connecting different habitats and ecosystems. These freshwater habitats support a diverse range of indigenous freshwater fish, including the endemic endangered Canterbury mudfish/kōwaro, and in the northern most parts of the region, the threatened northern galaxias, dwarf galaxias, and shortjawed kōkopu, which do not occur in other parts of the region. However, many of these waterbodies have been and continue to be adversely impacted by adjacent land uses, including the loss of riparian vegetation, and development within the wider catchment.

Water quality is predominantly influenced by the type and intensity of land use within the catchment, point and non-point source discharges, and loss of riparian vegetation. Instream habitat is also influenced by the character and extent of riparian vegetation, and can be degraded by the sedimentation of streambeds. Outside of climactic influence, water quantity is primarily affected by changes in catchment vegetation cover and water abstraction, and has a direct impact on water quality through the capacity of the waterbody to dilute, assimilate and disperse contaminants. Many organisms have adapted to specific physical conditions, and therefore changes in the flow regime and water level and quality can influence the distribution and lifecycles of many plant and animal species.

There is a close link between the loss of indigenous vegetation cover, land development and the degradation of freshwater ecosystems. Consequently, the most extensive impacts on water bodies have also occurred within the lower elevation environments of the region. This is most evident in relation to lowland streams, the lower reaches of braided rivers, and wetlands. Water quality in many lowland streams is degraded, riparian areas have been cleared, and many streambeds have become smothered in fine sediment. Introduced fish species such as trout and salmon have also impacted on the prevalence of some indigenous fish species through predation and competition for habitat. There has been widespread habitat loss and modification within the lower reaches of braided rivers due to water abstraction, flood control works, gravel abstraction, decreasing water quality, and infestations of animal and plant pests.

The originally extensive regional network of wetlands has been significantly reduced through draining and reclamation. Only about 10% of the original wetlands of the region remain, and in coastal areas it is estimated to be only 5%. Remaining wetlands are subject to on-going pressure from increased development and land use intensification.

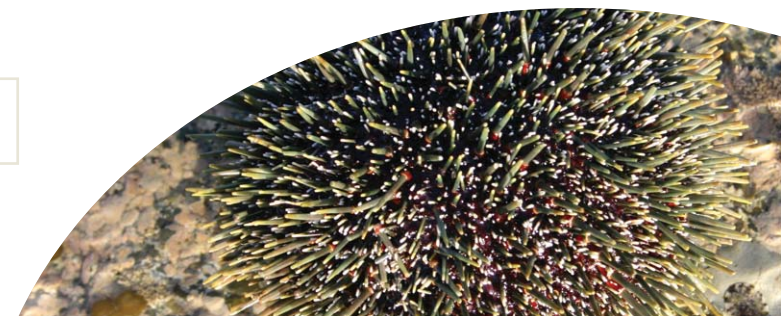
Although water quality in hill and high country rivers has generally remained relatively high, changes in land use is causing water quality degradation in some rivers. Similarly, water quality in high country lakes generally tends to be high due to lower intensity land use, however a number of smaller lakes surrounded by more intensively used farm land have elevated nutrient levels. Lowland lakes tend to have high nutrient concentrations¹⁵.

Coastal and Marine

The Canterbury coast is ecologically diverse and rich in marine life. There is a wide range of marine and coastal ecosystems, from diverse offshore habitats (e.g. deep water rocky reefs, boulder reefs, pebble habitats, sand, mud, and horse mussel beds), to the muddy and sandy sediments of harbours, to the rocky shore platforms and cliff faces of headlands, and inland through river mouths to estuaries, lagoons and dunes. These habitats support a high diversity of species, including an abundance of seabirds, marine mammals, diverse fish fauna and seaweeds. For example, the rocky Kaikōura coastline includes biodiversity 'hotspots' such as Kaikōura Peninsula, Haumuri Bluffs and Oaro-Mikonui; the Kaikōura Canyon is a key habitat for sperm whales, dusky dolphins and seals; and offshore islands and the Banks Peninsula coastline provide important habitat for sea birds and marine mammals. The coastal reef system off Timaru is also important as it is the only one of its type between Banks Peninsula and the Waitaki River.¹⁶

¹⁵ Proposed Natural Resources Regional Plan, Chapter 4: Water Quality

¹⁶ Department of Conservation, 2000





The many river mouths, estuaries, and coastal lagoons provide an extremely important complex of habitats for large numbers of indigenous plants and animals, fulfil an important nursery function as a link between freshwater and marine environments, and hold significant cultural heritage value for Ngāi Tahu. Kaitorete Barrier is the largest landform of its type in New Zealand and holds the largest remaining area of continuous pīngao duneland, has special indigenous shrub and grassland communities, and is habitat for some species of plants and flightless moths found nowhere else¹⁷.

However, like terrestrial and freshwater ecosystems, the pressures impacting on the region's coastal environments reflect the extent and intensity of adjoining land use and development, and the changing demands on our coastal and marine environments. Water and habitat quality in coastal lagoons, estuaries and harbours has been reduced as a result of urban and agricultural runoff, sedimentation, port activities, sewage discharges, and the inputs from streams and rivers with degraded water quality. Many of the coastal forests and shrublands of the region have been cleared, although the Kaikōura coastline provides one of the strongholds for coastal forest in the eastern South Island. Coastal dune environments have also been modified through vegetation loss and disturbance due to the encroachment of urban and subdivision development and recreational activities that damage ecological processes. Coastal cliff environments are not well understood, but grazing and pests threaten the many plant species that are specially adapted to these harsh conditions.

Changes in sediment loadings in major rivers due to gravel abstraction and flood control works have resulted in modification of coastal processes. There is also an increasing demand for use of parts of the coastal marine area, particularly around Banks Peninsula, for aquaculture, and as the regional population increases, so have pressures on recreational fisheries. Many coastal environments are also impacted by animal and plant pests, and in the marine environment the invasive algae undaria is a significant threat.

¹⁷ Department of Conservation, 2000

Biodiversity and Climate Change

Canterbury is however home to the Banks Peninsula Marine Mammal sanctuary for the protection of the Hector's dolphin/upokohue; the Pohatu Marine Reserve at Flea Bay, Banks Peninsula; a taiapure reserve across the whole of Akaroa Harbour; mataitai¹⁸ reserves in Rāpaki Bay and Port Levy/Koukourārata in Lyttelton Harbour; a statutorily backed rahui at Whakatu Quay in Kaikōura; and a proposed marine reserve within Akaroa harbour. In Kaikōura, Te Korowai o Te Tai o Marokura (Kaikōura Coastal Guardians) is a collaborative group of key stakeholders formed in 2005 to consider the use of Marine Protection Areas and other approaches to ensure sustainable management of the coastal marine area from the Clarence/Waiiau-toa to Conway Rivers.

In New Zealand, it is predicted that climate change will result in an increase in average temperatures, fewer extreme cold temperatures, more high temperature episodes, changes to average rainfall patterns, reduced areas with snow cover, shorter seasonal snow cover, snowline rise, heavier and/or more frequent extreme rainfall, and a rise in sea level. Should these changes occur, they may give rise to a range of potential effects on ecosystems and biodiversity. The main potential effects on biodiversity are gradual change in habitat, changes in species' distribution, and increased threats from pests and disease due to changes in disease vector distribution.

For changes in species' distribution, it will be crucial that species are able to relocate or move into more suitable areas, which can only happen if there are corridors along which species can move. In reality, species' habitats are frequently constrained by human development and structures, such as urban development, farm land, sea-protection structures, etc. Therefore, the adequacy of buffer zones and corridors to allow for shifts in habitat and distribution will become increasingly important, as will reducing to the greatest extent practicable, existing stresses on vulnerable species, ecosystems and habitats.

¹⁸ Taiapure and mataitai reserves are areas where tangata whenua have a greater input to the management of fisheries. In both cases, a special cultural or spiritual relationship must exist between tangata whenua and the area covered by the reserve. Taiapure reserves allow local Māori, via a management committee, to recommend to the Minister of Fisheries, regulations for the management of fisheries within the taiapure area. Mataitai reserves are specific traditional fishing grounds placed under the authority of the tangata whenua so that they may manage and control the non-commercial harvest of seafood through bylaws.



Special Features of Canterbury's Biodiversity

The Canterbury region can be divided into a number of "landform units" that represent the different bio-geographic environments of the region. These landform units are set out in the Table attached at Appendix A, along with the key threats to biodiversity within each, and some of the actions and initiatives that are already occurring.

Despite the biodiversity losses that have occurred, there remain a range of habitats, ecosystems, and species that make this region special, and which highlight the importance of on-going initiatives to maintain and enhance the biodiversity of the region. Some of these are listed below:

- A network of culturally and ecologically significant river mouths, estuaries and coastal lagoons, including Te Waihora/Lake Ellesmere, Ashley/Saltwater Creek, Brooklands Lagoon, the Avon-Heathcote Estuary/Ihutai, the Ōpihi Lagoon, Lake Forsyth/Wairewa, Conway/Tutae Putaputa, Clarence/Waiiau-toa and Waiiau River mouths, and Wainono Lagoon.

- Nationally significant examples of natural beach dune vegetation at Kaitorete Spit with the largest remaining area in New Zealand of the nationally rare native sand binder pingao, and other nationally threatened plant species.
- Banks Peninsula Marine Mammal Sanctuary for the protection of Hector's dolphin/upokohue - New Zealand's first marine mammal sanctuary.
- Home to some of the world's rarest bird species (e.g. Huttons shearwater/tītī, orange-fronted parakeet/kākāriki, black stilt/kakī, white-flipped penguin/kororā, yellowhead/mohua, great spotted kiwi/roroa).
- A rich coastline of diverse inshore and offshore habitats supporting a high diversity and abundance of marine life that includes many seabird species, seals, dolphins, whales, diverse fish fauna and abundant and diverse seaweeds.
- Motunau Island Nature Reserve is predator-free and internationally significant as a habitat for seabird species such as the fairy prion/tītī, and is the main breeding colony of the endangered white-flipped penguin/kororā.
- The upwelling of nutrient-rich waters from the Southern Ocean at Kaikōura support dense populations of plankton and marine algae and abundant krill, squid and fish, which attract many marine mammals and prolific seabird life.

- Pohatu Marine Reserve at Flea Bay, Banks Peninsula provides a 218 hectare marine sanctuary.
- A network of braided rivers which are ecosystems of international importance providing ecological links between the mountains and the sea, and habitat for a diversity of bird species including several threatened species (e.g. wrybill/ngutu parore, banded dotterel, black-fronted tern, Caspian tern, black billed gulls, black stilt/kakī).
- Indigenous shrublands, tussock grasslands and wetlands in the foothills and intermontane basins provide important remaining indigenous habitat.
- Remaining and restored wetlands and indigenous vegetation remnants on the Plains are ecologically highly valuable (e.g. Travis Swamp, kanuka woodland at Eyrewell and Bankside, kowhai and mixed shrubland at Rakaia Island, and native grasslands at McLeans Island).
- Substantial areas of mountain beech forest in the catchments of the Ahuriri, Dobson/Hopkins, Rakaia and Waimakariri Rivers, Craigieburn Forest Park, Arthur's Pass National Park, and in the frontal ranges within the Ashburton and Waimakariri districts.
- The Lake Sumner/Hoka Kura area and the headwaters of the Hurunui and Waiiau Rivers are dominated by extensive red, silver and mountain beech forests.



Key

- Most outstanding example of New Zealand cedar/pahautea forest in the eastern South Island in the headwaters of the Rakaia River catchment.
- Good examples of mixed podocarp forest still exist in the Peel Forest area, and podocarp-hardwood forest at the head of the Rakaia, Wilberforce, and Mathias Rivers.
- Kaikōura is one of the few places nationally where coastal to alpine indigenous ecosystems can be found within a few kilometres of the coastline.
- Naturally rare limestone areas in North and South Canterbury provide “habitat islands” that support specialised plant communities (e.g. Kura Tawhiti/Castle Hill and Awakahomo Karstland, Waitaki Valley). The Kura Tawhiti/Castle Hill limestone area also has special significance for Ngāi Tahu.
- Iconic high country landscapes that include extensive examples of tall tussock grasslands, native shrublands and beech forest communities, and many lakes and wetlands that provide nationally and internationally significant bird habitat.
- Largely unmodified alpine environments with alpine vegetation, extensive screes, bare rock, permanent icefield and glaciers.

	High country lakes and wetlands providing important bird habitat
	Important coastal dune systems e.g. Kaitorete Spit
	Network of culturally and ecologically important coastal lagoons, estuary and river mouths
	Internationally important braided river ecosystems
	Naturally rare limestone areas
	Rich and diverse coastal and marine habitats and ecosystems
	Important coastal and lowland wetlands and vegetation remnants
	Important remaining wetlands, shrublands and tussock grassland in the foothills and intermontane basins.
	Extensive areas of important beech forest systems





Priorities for Biodiversity Management in Canterbury

Prioritising where and how resources available for biodiversity management are applied is key to ensuring achievement of the most effective outcomes in the most efficient manner. The following priorities are intended to provide guidance and a common direction for the application of resources, support, and on-the-ground efforts. However, they should not be read as diminishing the importance of efforts that may be occurring outside the stated priority areas. All efforts and initiatives contribute at some level to improving the overall state of biodiversity, and the celebration and encouragement of individual and community effort in all areas is fundamental. Agencies will need to balance the way in which they apply their resources between identified priority areas, and the need for on-going support and advocacy within communities generally.

There are two elements to the priorities identified in this Strategy. The first is a general principle that should guide decision making and efforts on the ground, and the second relates to the specific areas where efforts should be focussed as a first priority.

Guiding Priority Principle

Focus first on protecting and maintaining what remains, and then on restoring what has been lost.

In order to halt the on-going decline in indigenous biodiversity, the first priority in Canterbury must be the protection and maintenance of remaining significant indigenous habitats and ecosystems, and maintenance of linkages between indigenous habitats. Not only is this fundamental to preventing further loss of biodiversity, it is also the most cost-efficient approach. The costs, in monetary, labour and on-going management terms, of protecting an area from further loss are significantly lower than those involved in restoring or reconstructing habitats or ecosystems once they have been lost or degraded.

In this context, 'protect' means protection from further loss or degradation, and extends beyond just physical or legal protection to include on-going active management to ensure that habitats are not lost to weeds or animal pests. Legal protection which prevents future clearance, drainage or other action that would effectively destroy the functioning of the particular habitat or ecosystem may help. However, legal protection alone is not sufficient to maintain biodiversity values, and in some instances may not be necessary, appropriate, or practicable. Generally, the most successful examples of ensuring at least some degree of protection of remaining habitats and ecosystems are those that involve working closely

with the landholder concerned, and that address the on-going future management of the area.

Action cannot, however, stop at protection of what remains, because without restoration of some of what has been lost, indigenous habitat within many parts of the region will remain well below the critical 20% threshold, and indigenous biodiversity will remain seriously threatened and vulnerable to further decline. Therefore, the second priority for biodiversity management in Canterbury is the restoration of representative habitats and ecosystems that have been lost or degraded, particularly in those areas where the greatest degree of loss has already occurred. There is a wide spectrum of restoration and enhancement activities, and the potential for restoration and the extent to which it is aimed at returning an area to its 'original' state, will vary with time and space. It is important that wherever practical, restoration efforts are directed towards those areas where the greatest benefits will be achieved, and where there is a sufficient level of landholder and/or community commitment to ensure the greatest likelihood of long-term success.



Priority Areas for Action

The following areas are where action and efforts should be prioritised, and each is discussed in more detail in the subsequent sections.

- Threatened Environments:
 - environments where less than 20% indigenous cover remains.
 - environments where there are low levels of protection coupled with increasing threats to remaining indigenous habitats and ecosystems.
- Habitats and ecosystems that are naturally rare or distinctive.
- Habitats and ecosystems that support rare and threatened species.



Threatened Environments

The coastal, lowland and montane environments are where the greatest losses of indigenous biodiversity have already occurred within the Canterbury region. In addition, the indigenous cover that remains in these environments supports a disproportionately large percentage of New Zealand's most threatened species, habitats and ecosystems¹⁹. Added to this pattern of biodiversity loss in lower elevation environments, the region's network of legally protected areas is biased towards higher, wetter, mountainous environments, with little protection of remaining indigenous habitats and ecosystems in lowland (< 400m) and montane (400-800m) environments. While pests and weeds threaten both protected and unprotected indigenous species and habitats, loss of indigenous biodiversity that has poor legal protection is more likely both as a consequence of active clearance activities and through attrition, degradation, or 'passive' clearance (such as exclusion of indigenous species by invasive weeds, predation by pests, regeneration failure due to browsing), since management inputs tend to be lower²⁰. These factors combined, mean that the remaining indigenous biodiversity within lowland, coastal and montane environments is at the greatest risk of further loss.

In the coastal and lowland environments, the loss of indigenous cover has been extensive, with considerably less than 20% remaining in most areas. Based on the generalised species-area relationship, which indicates a dramatic increase in the rate of species loss once habitat area drops below 20% (see Figure 1), priority should be given to efforts and resources aimed at the protection, maintenance and restoration of biodiversity within these environments.

It is important to note that 'indigenous cover' referred to above and generally throughout this Strategy, refers to indigenous vegetation cover generally, and is not restricted to original 'pre-human' indigenous vegetation. In many parts of Canterbury, particularly where there have been extensive losses in indigenous vegetation and habitat, remaining areas of importance for biodiversity are often induced or secondary indigenous vegetation, such as secondary scrublands or short tussock grasslands, or areas of mixed indigenous and exotic vegetation.

¹⁹ Walker et al, 2006

²⁰ Walker et al, 2006





An area of increasing priority in Canterbury is the inland hill country and intermontane basin environments.

The extent of indigenous habitat loss within these environments has not, historically, been as great as in lower elevation and coastal areas due to less extensive and intensive land use. However, as a result of several factors, including the Land Tenure Review process and the development of irrigation potential at increasingly higher altitudes, parts of these environments are currently undergoing some of the most rapid changes in land use within the region.

This, coupled with the fact that there are very low levels of formal protection within these environments, is placing remaining indigenous habitats and ecosystems under increasing threat of loss and degradation.

The spread of elevation zones in Canterbury are shown at Figure 2, and the distribution of protected areas across the Canterbury region are shown in Figure 5. Table 1 below summarises the extent of indigenous cover loss and existing level of protection by elevation zone, in Canterbury.

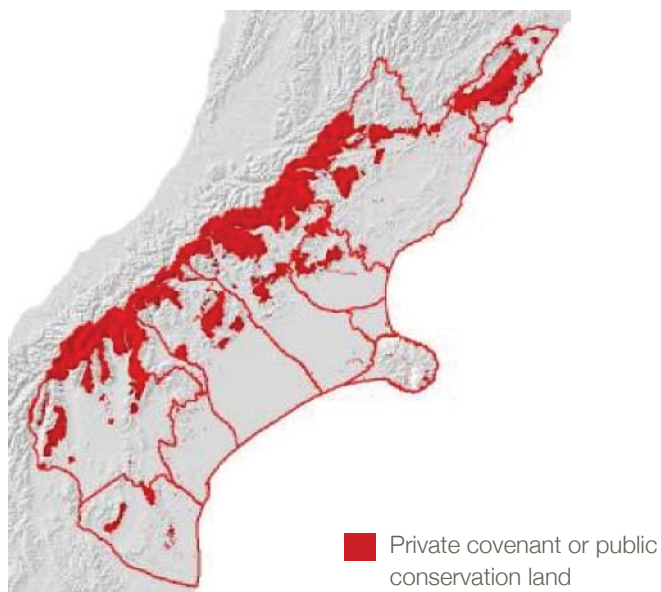
Table 1:
Percent Indigenous Cover Loss Since European Settlement and Percent Land Area Legally Protected, by Elevation Zone

Elevation Zone	0-400m	400-800m	800-1200m	200-1600m	>1600m
Indigenous cover loss (%)**	90	60	20	2	0
Land area protected (%) ²¹	2	12	45	55	68

**It is recognised that prior to European settlement there had been changes (some human-induced) to the nature of the original vegetation cover (e.g. forest replaced by tussock grasslands and shrublands). However, vegetation cover remained predominantly indigenous, and the figure included here refers to the percentage of that indigenous cover lost since the arrival of Europeans.

²¹ Only includes DOC reserves and QEII covenants

Figure 5: Protected Areas (2005)²²



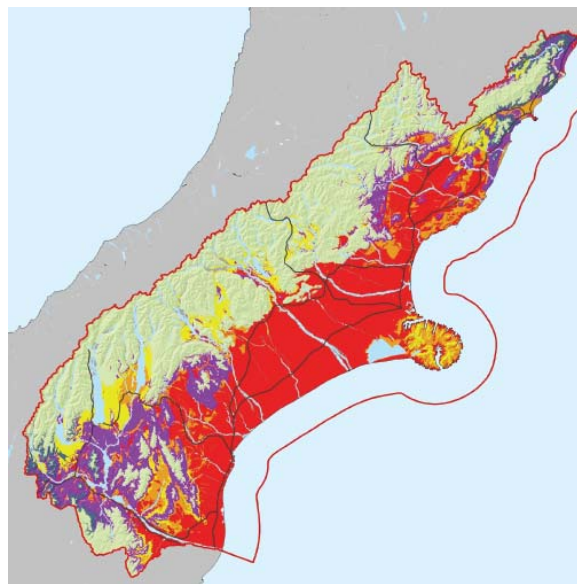
The threatened environment priority areas discussed above are consistent with a recently developed classification tool that identifies the environments within New Zealand where remaining indigenous biodiversity is subject to the greatest threat of further loss. Using LENZ maps, LCDB, and data about land protection status, different environments are classified on the basis of two key elements of biodiversity vulnerability – the extent of past indigenous habitat loss, and the current level of legal protection²³.

²² Only includes DOC reserves and QEII covenants

²³ The threatened environment classification tool has been developed by Landcare Research Manaaki Whenua. By combining LENZ maps with LCDB2 (2001/2002) satellite imagery, and the Protected Areas Network (limited to DOC and Nature Heritage Fund land, QEII covenants, Nga Whenua Rahui land, and Auckland and Wellington regional parks) changes in vegetation cover over time can be seen, as well as what vegetation is formally protected. It is acknowledged that there are a number of limitations associated with the threat classification tool due to the limitations of the underlying datasets. However, in the absence of any comprehensive alternative, it is a useful tool that, combined with local knowledge, can help guide the identification of general priority areas for action, particularly at the national and regional scale.



Figure 6 ²⁴: Threatened Environment Classification Categories in Canterbury



Key

■ <10% Indigenous cover left	■ >30% left & <10% protected
■ 10-20% Indigenous cover left	■ >30% left & 10-20% protected
■ 20-30% Indigenous cover left	■ >30% left & >20% protected

²⁴ www.biocommunity.org.nz/detail.php?ar_id=10065

The greatest threat to remaining indigenous biodiversity occurs in land environments where there has been the most extensive loss of indigenous cover, because biodiversity loss accelerates as habitat loss advances (as shown in the generalised species-area curve at Figure 1). Lower threat occurs in environments where there has been less indigenous cover lost, but where the level of legal protection of remaining indigenous habitats and ecosystems is low. On this basis, the classification tool identifies the following ‘threat categories’:

- Acutely threatened (<10% indigenous cover remains)
- Chronically threatened (10-20% indigenous cover remains)
- At risk (20-30% indigenous cover remains)
- Critically underprotected (>30% indigenous cover remains and <10% legally protected)
- Underprotected (>30% indigenous cover remains and 10- 20% legally protected)
- Less reduced and better protected (>30% indigenous cover remains and >20% legally protected)

Using this classification tool, those parts of the region where remaining indigenous biodiversity is most at risk of loss can be identified – the lowland plains and coast, coastal hill country, inter-montane basins and foothills of the inland ranges (Figure 6).



Intensive land use and habitat loss, together with low levels of protection in lowland, coastal and montane environments, has been and continues to be a major contributor to the extent of indigenous biodiversity loss in Canterbury, and to the degree of threat that applies to what remains. Furthermore, the much-reduced and highly modified areas of indigenous cover remaining in these environments support a disproportionately large percentage of the region's most seriously threatened species, habitats and ecosystems.

In addition, the remaining indigenous habitats and ecosystems, particularly in the lowland and coastal environments, occur in small, scattered remnants, some of which are at risk of being so diminished as to lose their usefulness as parts of a larger whole. Recognising the significance of ecological connections between these scattered habitats, and seeking to retain or restore those connections is essential. In order to prevent further decline in the region's biodiversity, priority must be given to securing the protection and on-going maintenance of the remaining indigenous habitats and ecosystems and the linkages between them, within these lowland, coastal and montane environments. On this basis, Table 2 sets out a number of areas that should be given priority in terms of resources and effort aimed at biodiversity protection and restoration.





Table 2: Priority Action Areas for Canterbury

	Regional examples	Example of remaining indigenous vegetation/habitat
< 10% indigenous cover remaining	Canterbury Plains, Culverden Basin, Ashwicks Flat, Cheviot Basin, South Canterbury hill country, Waitaki fan, Lees Valley.	Freshwater wetlands, coastal salt marsh, kahikatea-matai podocarp forest, tōtara-matai podocarp forest, beech-podocarp forest, dry woodland, dry shrubland and grassland, red tussock grassland, coastal sand dune, braided riverbeds.
10-20% indigenous cover remaining	Kaikōura Plains, North Canterbury coastal hill country, Port Hills, Banks Peninsula foothills, Greenpark Sands, parts Mackenzie Basin, Hakataramea Valley, parts Hunters Hills, mid-Waitaki Valley.	Freshwater wetlands, coastal salt marsh, kahikatea-matai podocarp forest, tōtara-matai podocarp forest, beech-podocarp forest, mixed hardwood forest, kānuka forest, small-leaved scrub and shrubland, tall and short tussock grasslands.
20-30% indigenous cover remaining	Amuri Range, Banks Peninsula hill tops, upper Waimakariri basin, upper Rakaia Valley, Lake Heron basin-Ashburton Lakes, upper Rangitata Valley, parts Mackenzie Basin, parts Hunters Hills	Freshwater wetlands, beech-podocarp forest, beech forest, hardwood forest, small-leaved scrub and shrubland, tall and short tussock grasslands.

Naturally Rare or Distinctive Ecosystems

Naturally rare or distinctive ecosystems are those that were rare before the arrival of humans in New Zealand. This may encompass ecosystem types that are small in size but geographically widespread, to those that are larger but geographically restricted²⁵. Protection of these ecosystems is important as they generally support high concentrations of threatened and endemic species which is vastly disproportionate to their area. For example, naturally rare ecosystems collectively contain half of the nationally threatened plant species. This makes them important both in terms of their intrinsic value and their contribution to overall biodiversity²⁶.

Examples of naturally rare or distinctive ecosystems in Canterbury include:

- Volcanic rock outcrops (e.g. Banks Peninsula)
- Limestone rock outcrops (e.g. Awahokomo Karstland in the Waitaki Valley)
- Braided riverbeds (e.g. the Waimakariri, Waitaki, Clarence/Waiiau-toa, Ashley/Rakahuri and Rakaia rivers)
- Dune deflation hollows (e.g. Kaitorete Spit)

²⁵ Ministry for the Environment and Department of Conservation, April 2007

²⁶ Ministry for the Environment and Department of Conservation, April 2007



Habitats and Ecosystems Supporting Rare and Threatened Species

Although the Department of Conservation (DOC) has direct responsibility for the protection of threatened species, the bulk of its work in this regard is undertaken on public conservation land. However, many threatened species also occur within and are dependent on, habitats outside of the conservation estate. One of the primary threats to the survival of many threatened species is the loss and fragmentation of habitat, as well as predation and competition by pests and weeds. This makes the protection and on-going management of habitats that support threatened species outside of the conservation estate a key priority for biodiversity management in Canterbury.

The most recent threatened species classification list (2005) indicates that over 900 of our native species are either acutely or chronically threatened. More than 300 threatened or endangered species occur in Canterbury, including birds, marine mammals, freshwater fish, invertebrates and more than 200 of New Zealand's nationally threatened indigenous plants²⁷. Some examples of Canterbury sites supporting rare or threatened species outside the DOC estate include:

- Canterbury mudfish/kōwaro at Tawera (View Hill stream near Oxford)
- White-flipped penguin/kororā nesting areas on Banks Peninsula
- Long-tailed bat/pekapeka population at Hanging Rock-Kakahu Bush
- Hutton shearwater/titī nesting area at Puhi Peaks, Seaward Kaikōura Range
- Newly discovered dryland shrub *Olearia adenocarpa*, Waimakariri River margins
- Black stilt / kakī habitat within the bed of the Waitaki River
- Endangered whipcord Hebe (*Hebe armstrongii*) and endangered climbing everlasting daisy (*Helichrysum dimorphum*) found only in the Waimakariri Basin.

²⁷ Eighteen bird species (including the black stilt or kakī, the world's most endangered species of wading bird); 2 marine mammals (including the Hector's dolphin or upokohue); 6 freshwater fish species (including the Canterbury mudfish or kōwaro); 70 invertebrate species (including the Robust grasshopper which lives on riverbeds in the Mackenzie basin); and more than 200 nationally threatened plant species. (Department of Conservation, Canterbury Conservation Management Strategy, 2000; deLange et al, 2005, NZ Journal of Botany).



Opportunities for Better Biodiversity Management

A number of key issues for effective management of biodiversity in the region have been identified. These issues can be broadly grouped under the following headings:

- Leadership
- Coordination and Integration
- Monitoring
- Empowerment and Capacity Building
- Attitudes, Awareness and Incentives
- Technical Information

Leadership

Leadership in protecting and maintaining our biodiversity is important at both the agency and community level.

Agencies, such as DOC and local authorities (regional and city/district councils), have statutory responsibilities to conserve and maintain indigenous biodiversity respectively. How those responsibilities should be met, such as through regulation, advocacy, education or other means, is not, however, specified. This means that there is considerable variation in the extent to which agencies around the region, particularly councils, are meeting these responsibilities and showing leadership in biodiversity management. This is reflected in differing levels of effort and significance that councils place on biodiversity management, and the extent to which they explicitly recognise the loss of indigenous biodiversity as a significant environmental issue. Some have taken proactive measures such as providing incentives, financial and technical support to landowners and community groups, and funds and staff resources for protection and education, while others rely solely on reactive, regulatory measures. This results in inconsistencies in the level of protection and management of biodiversity values across the region, and uncertainty for landowners and the community.





Although it is important that the most appropriate approach for the particular district or region is adopted, where agencies rely solely on regulatory measures, without additional proactive approaches, this can have a perverse effect by creating disincentives for landowners to value and protect biodiversity. And where a solely voluntary approach is taken without proactive education, advocacy and incentives as well, this can result in biodiversity losses and criticism from parts of the community for not taking a more regulatory approach. The reality is that a combination of measures, proactively implemented and monitored, are required if positive biodiversity outcomes are to be achieved. The success of any particular approach also depends on the application of good practice in implementation, including involving key stakeholders (including landowners) from the outset, focussing on those who are willing, and taking a partnership approach.

In addition, although many agencies own or manage land, not all lead by example in the management of biodiversity values on those lands. This can undermine their ability to enforce or advocate for change amongst other landowners and the community. It is therefore important that agencies lead by example by proactively managing public land for the protection and maintenance of biodiversity values, and by identifying and taking up opportunities for restoration initiatives on public land.

Leadership from within local and regional communities is also important through non-government organisations, community groups and trusts, and from individual community leaders. Communities promoting and celebrating success stories and sharing experiences that motivate and inspire others in similar circumstances, is fundamental to raising the profile of private sector biodiversity enhancement.

Consumer markets are increasingly demanding evidence to back up our “clean green” image, and industry leadership is also required to highlight the economic importance of this image, and the need to ensure that this is backed up by reality on the ground²⁸.

²⁸ Examples include Fonterra's Clean Streams Accord

Agency Leadership Through Good Practice

The Environment Canterbury Property and Reserves Section administers approximately 26000ha of land, and is committed to the protection and rehabilitation of ecosystem remnants, habitats and species within all its lands. This includes regional parks and regional reserves, most of which have been vested for flood and soil protection. Most of the regional reserves are located in lowland dryland environments, and around 12000ha are leased out for grazing purposes. In order to improve the protection and rehabilitation of indigenous habitats on its reserve lands, Environment Canterbury has reduced the period of many of its leases to allow a greater degree of flexibility in terms of incorporating management changes aimed at protecting and sustaining biodiversity values. It has also retired some areas from productive uses, and where this occurs, rental rates are reduced accordingly.

Environment Canterbury is also developing a Reserves Management Plan to formalise conservation mechanisms for indigenous habitats and prioritise protection and

rehabilitation measures for those habitats. This will focus effort for protection, rehabilitation and enhancement on the most threatened habitats within the Canterbury lowland environment, including wetlands and peat bogs, lowland river systems and adjacent forests, dunelands, coastal forest, scrub and herbfields, lowland tussock grasslands, and braided river ecosystems. An ecosystem approach will be taken, based on the reinstatement of ecosystem processes as far as possible and the principle of limited intervention with the aim to create self-sustaining ecosystems. Further components of biodiversity management on Environment Canterbury land are pest management, fostering of research and community involvement, and monitoring of ecosystem health, protection and rehabilitation measures, and rare species populations. A Regional Parks Management Plan is also being developed which includes biodiversity protection and rehabilitation.



Industry Leadership – NZ Deer Farmers Landcare Manual

The New Zealand Deer Farmers Landcare Manual was developed as a Sustainable Farming Fund project and was completed in 2004. It provides comprehensive information for deer farmers, who as an industry have committed to improve environmental sustainability within their individual farms. The manual forms part of an integrated deer industry environmental programme and is the result of an environmental strategy devised in 2000. The manual has been issued free to all known New Zealand deer farms.

Ngāi Tahu Mahinga Kai Enhancement Fund

In seeking to achieve some of the environmental outcomes set out in Ngāi Tahu 2025, Te Rūnanga o Ngāi Tahu has established a Mahinga Kai Enhancement Fund with the purpose of re-establishing a network of tribally significant mahinga kai resource areas and species. Around \$300,000 per year has been allocated to this fund, which supports a number of current projects within the South Island focussing on particular species or places. One of these projects that is specific to Canterbury, is the Kaupapa Kererū project.

The Kaupapa Kererū project was set up in 2000 with the objective of increasing numbers and the range of kererū on Horomaka/Banks Peninsula through a two-pronged approach:

- *working with the community to raise awareness and appreciation for kererū, including their key role in the restoration of indigenous forest; and*
- *researching kererū ecology, including numbers, distribution, movements and foods as a basis for improving habitat.*

A number of different research projects are being coordinated as part of the overall Kaupapa Kererū project.



Co-ordination and Integration

Greater integration between management agencies, and a coordinated, cross-sectoral and holistic approach to biodiversity management will lead to more efficient and effective biodiversity outcomes.

Although there are a range of agencies, organisations, community groups, trusts and NGO's within the region undertaking biodiversity related programmes and initiatives, integration and co-ordination between them is frequently lacking. This can result in inefficiencies and missed opportunities for sharing knowledge and experiences, for better alignment of effort and resources, and for establishing partnerships.

All local, regional and central government agencies have differing functions which they are required to carry out in accordance with a range of legislation, the objectives of which can at times conflict with the biodiversity maintenance role these agencies also have. Unless a more coordinated and aligned "whole of agency" approach is taken, this can lead to conflicting messages from and between agencies in relation to biodiversity management and resource use and development.

Project River Recovery Upper Waitaki - Successful Partnership

Project River Recovery was established in 1991 by DOC and the Electricity Corporation of New Zealand (now Meridian Energy). The programme, funded by Meridian Energy, seeks to maintain and restore braided river and wetland habitat for the indigenous wildlife communities of the Upper Waitaki River catchment, stabilising or increasing the numbers of those species currently under threat. It is a good example of an effective partnership between industry and DOC to protect and enhance biodiversity values.

Project River Recovery involves a range of activities including weed control, construction of wetlands, and

research and monitoring programmes. The control of exotic weeds has helped to maintain or restore over 33,000 hectares of riverbed for feeding and nesting habitat, around 100 hectares of new wetlands have been created, and water levels are controlled by weirs to maximise bird feeding habitat during the breeding season. Research undertaken as part of the project has indicated that predation (by cats, ferrets, stoats and hedgehogs) is the principal cause of nest failure, and that breeding success is higher at sites where predator control mechanisms have been introduced.





Attitudes, Awareness and Incentives

In Canterbury, indigenous biodiversity is under the greatest threat in lowland, coastal and montane environments. The majority of land in these environments is in private ownership. Therefore, the protection and maintenance of biodiversity on private land is fundamental to maintaining the range of species and ecosystems that make up the biodiversity of our region. Achieving this relies heavily on the support of private landowners. Already, private landowners make a considerable contribution to New Zealand's overall biodiversity through initiatives such as native bush protection and riparian fencing and planting. However, the extent of biodiversity loss within areas dominated by private ownership is such that furthering the level of protection and restoration remains one of the critical challenges for biodiversity management. Central to this is increasing awareness, changing attitudes, identifying ways that will generate positive behaviour changes, and increasing the level of recognition and support (both financial and technical) for private landowners seeking to protect and restore indigenous biodiversity on their land.

Agency, Landowner and Community Partnerships

Banks Peninsula provides important nesting habitat for the endangered white-flipped penguin/kororā. A number of efforts by local landowners, agencies and community groups are resulting in increases in the number of penguins returning to the Peninsula. In 2003, the Banks Peninsula Conservation Trust ran a mustelid trapping workshop at Otanerito and later formed the 'Penguin Protectors' working group to coordinate efforts with DOC and to assist private landowners with trapping efforts. A number of landowners, DOC, and a school group are trapping to protect colonies. The largest colony on Banks Peninsula is located at Pohatu / Flea Bay and for many years has been protected through trapping by local landowners, resulting in an impressive increase in breeding pairs from 717 in 2000/2001 to 893 four years later. Transpower grants have lent support to these efforts, which have also included the purchase by DOC of important penguin habitat alongside the Pohatu Marine Reserve in Flea Bay; work by Christchurch City Council and environmental groups to construct and maintain a predator-proof fence and undertake predator trapping at Godley Head; and landowners, DOC, local community members and Environment Canterbury working together in the establishment and monitoring of a network of predator traps around key sites on the Peninsula.

Attitudes and Awareness

Increasing people's awareness and changing attitudes and behaviours so that biodiversity is appropriately valued, will be critically important.

At present, perceptions of biodiversity within the community differ from being something to be protected, restored and valued as part of Canterbury's natural and cultural heritage, to being an impediment to development, or a potential liability through which agencies may try to regulate landowners' activities. Many people have little or no awareness or understanding of biodiversity and its importance to our day to day lives. A recent national survey indicated that although 65% of respondents had heard of the term 'biodiversity', only 36% of these knew much about it²⁹. And in a recent survey of rural landowners in Canterbury, only 13% of respondents illustrated an understanding of the term "biodiversity"³⁰.

Low public awareness and the sometimes negative perceptions of biodiversity in terms of how it may impact on private property rights, present significant barriers to achieving indigenous biodiversity gains in many areas. This is particularly so in lowland dryland environments where people are generally unaware of the indigenous fauna and flora, the threats they face, their generally poor ecological condition, and the potential for their recovery. This is exacerbated by the traditional conservation approach, which has been to separate indigenous biodiversity away from productive lands into reserves and parks. There is a need for a fundamental paradigm shift from this traditional approach, to a range of approaches that not only seek to increase the area of land with high biodiversity values that is protected, but that also seek to increase the level of understanding of the practical and economic value of incorporating indigenous biodiversity into the working landscape.

²⁹ UMR Research, July 2005

³⁰ Opinions Market Research Limited, May 2006



Greening Waipara Project

Successful actions come about through partnerships and the sharing of knowledge and skills.

This research-driven project stems from initiatives by Lincoln University, local wine growers, the Hurunui District Council and Landcare Research to calculate the dollar-value of the services provided for free by nature in the arable, pastoral and horticultural sectors. Over 30 vineyards in the Waipara Valley are involved in the project, which is looking at the added value provided by ecosystem services, such as biological control of pests, pollination, keeping soils fertile, and other environmentally-friendly practices, including reduced reliance on herbicides and pesticides, creation of swales and wetlands with native species to filter contaminated stormwater and vineyard effluent – all done via the restoration of habitat using species which were once common. Shelter belts, entranceways, stream and pond edges, vineyard borders and even the vine rows themselves are all receiving an ecological ‘make over’. A number of New Zealand native species are showing real promise as a potential companion to grapes. Some are considered Māori taonga, which gives added reason for them to be included in restoration efforts.

Restoring the Natives - Champions Within the Community

Over a number of years, Resource Management Individual Award winner John Stevens from South Canterbury has cleared willows, poplar and gorse from four hectares of his 16ha property near Willowbridge in South Canterbury, and planted more than 10,000 trees, shrubs, and grasses. Reaction to his project has been mixed, he says, “but most people are now coming round to the idea that it will look magnificent in future. Receiving the award has promoted what I’m doing and that gives further encouragement for other people to do it.”



Incentives

Maintaining and restoring biodiversity has benefits for the wider local, and sometimes regional and national community. However, it requires money and on-going effort. Therefore, providing support and worthwhile incentives are fundamental to ensuring widespread protection and maintenance of biodiversity on private land.

The protection of biodiversity on private land is often perceived by landowners as an economic liability and as having the potential to erode private property rights. Existing central and local government taxation regimes (e.g. rates and income tax) are seen by some landowners as a disincentive to both the protection of existing remnants of indigenous vegetation, and the establishment of new indigenous plantings. There are limits on the extent to which tax deductions can be claimed for tree planting or maintenance expenditure not related to production, and unless rates relief is available, local government rates must still be paid on land even if it has been retired from production for biodiversity protection or enhancement purposes.

These issues highlight the need for the provision of incentives that encourage indigenous biodiversity protection and maintenance on private land, and for greater awareness and recognition of the ecosystem services benefits of biodiversity. Financial incentives include grants and contributions towards

management such as fencing off an area, the purchase of plants or for pest control, contestable funds, or some form of monetary or equivalent “reward” for undertaking biodiversity protection or management, such as rates relief, conservation lot subdivisions, or transferable development rights. Generally, the provision of financial assistance to support action on the ground fosters goodwill and earns biodiversity gains in excess of the dollar value supplied³¹.

The provision of services and support by agencies to landowners and community groups free of charge can also remove some of the potential barriers to on-the-ground initiatives, and provides important recognition of the fact that actions by individual landowners and community members can have wider community benefits. These services might include providing technical staff or specialists to help with a project or give advice, such as a pest control operator, or to help facilitate meetings or prepare farm management plans³².

³¹ Kessels & Associates, 2004

³² Kessels & Associates, 2004





The potential productivity benefits of indigenous biodiversity are also often overlooked. These include a range of 'ecosystem services' such as maintenance of soil structure, stock shelter and prevention of soil erosion, crop pollination, biological pest control, improved aesthetics, and improved pasture and crop production. The presence of areas of indigenous habitat

such as a stand of native bush, a restored wetland, or other "natural area" can also increase property values. With increasingly astute consumer markets there are also significant economic benefits in ensuring that the 'clean green' image of New Zealand produce is backed up by reality on the ground.

Wetland Restoration - Business and Ecological Benefits

John and Pauline Trotter run a 6300ha South Canterbury farm, Kaiwarua Station, situated in the Hunter Hills near Waimate. They run merino sheep, beef cattle and deer. With the help of an Environment Canterbury Environmental Enhancement Fund grant, John and Pauline plan to create and fence a native riparian wetland of 4.1ha as a refuge for wildlife. A major reason for the project is to attract more native birds to the area. The valley floor site, with a stream flowing through, lends itself to enhancement. This will be done by creating bunds or earth embankments, which will double-up as drier nesting sites for birds. The plan is to plant species that would have grown in the area naturally, such as kōwhai, ribbonwood, toetoe, flax, lacebark, and tussocks. In addition to attracting birds, the Trotters believe that the wetland will also enhance their homestay and fishing business. As well as tūi and bellbirds, blue herons and falcons have been seen near the wetland.

Showcasing the Benefits of Biodiversity Within Productive Farm Land

Kowhai Farm is a Heinz Watties productive research farm at Lincoln, Canterbury. A range of measures have been incorporated into the farm system to optimise provision of “ecosystem services” from biodiversity.

- *Tree lucerne (*Chamaecytisus palmensis*) and kōwhai (*Sophora microphylla*) were planted for their nitrogen-fixing qualities, and along with harakeke (or flax), as a valuable source of pollen and nectar in the spring, which are essential sources of energy for many insects that provide beneficial biological pest control. Native plantings were also established along fencelines as shelterbelts, which can increase stock, pasture and crop production, as well as to provide soil erosion protection.*
- *Native grasses have been planted along fencelines for multi-purpose biodiversity benefits. Many of these highly competitive grasses can smother weeds, preventing them spreading to adjacent crops. The grasses also provide habitat for spiders and predatory insects that are useful in the biological control of pests. They may also provide habitat for rare insects, and shelter and nesting sites for some bird species. In addition, the grasses have aesthetic and conservation value.*
- *“Beetle banks” have also been established at Kowhai Farm. This is a grass-covered ridge on the edge or down the middle of a paddock and provides a refuge for spiders and beneficial insects such as ground beetles. In spring, these insects migrate from the beetle bank to the adjacent paddock to feed on a wide range of pests. Work at the farm has shown that the densities of beneficial insects on a 2 year old beetle bank are over 500/m², compared with under 20/m² on areas without a beetle bank.*

Other things that have been included at Kowhai Farm to provide biodiversity benefits include bumble bee motels, wasp hotels, and weta motels.

Ministry for the Environment, Agriculture New Zealand, Selwyn Sustainable Agriculture Society Inc, Watties, Lincoln University; Biodiversity on Farmland – “Good Management Practices”; (undated).



Empowerment and Capacity Building

The most successful biodiversity gains appear to occur when landowners and community groups are given the space to find their own path to achieve their biodiversity objectives for their land/project with initial and ongoing financial and technical support from relevant agencies. For their part, agencies must ensure that landowners and community groups are well informed and well resourced (in terms of initial and ongoing financial and technical assistance).

Kessels & Associates, May 2004

There are increasing numbers of community groups initiating biodiversity restoration and protection projects on the ground. However, this increasing number of groups is drawing on a limited number of volunteers. There is also often considerable variation in the level of skills and knowledge among community groups relevant to the practicalities of their project, such as knowing how to successfully rehabilitate areas, effective pest and weed control methods, and how to deal effectively with agencies to gain support and funding. These factors can lead to increased pressure on existing volunteers and a reduction in the capacity of groups to achieve successful outcomes.

Limitations in the extent and availability of resources and technical expertise from within agencies to assist landowners and community groups can also hinder their progress, as do difficulties in accessing relevant and constructive information

and advice. Landowners have indicated that the provision of site specific information and advice about their particular properties is one of the key factors that would assist in better biodiversity outcomes on private land³³.

The provision of support and assistance to maintain and increase the capacity of the community at the grass-roots level is fundamental to maintaining and enhancing biodiversity in the region. The form that this support and assistance takes will vary, but may include the provision of financial support; materials (e.g. fencing supplies and plants); technical advice; clear, consistent and constructive information; administrative assistance; and the facilitation and development of networks and 'communities of practice'.



³³ Opinions Market Research Limited, May 2006

Banks Peninsula Conservation Trust - Community Based Initiatives

The Banks Peninsula Conservation Trust was established in 2001 and since then has grown from strength to strength. The Trust works closely with government agencies, councils, local rūnanga, NZ Landcare Trust, Federated Farmers and scientists to protect and enhance the indigenous biodiversity and significant landscapes of Banks Peninsula on private land. To date, 23 Conservation Covenants have been registered on private land totaling an area of 258 ha, and another 17 projects are in progress. The Trust is also actively involved in pest eradication, a forest restoration group, a Tuī restoration project, and a biodiversity forum. "It is now also attracting considerable funding from outside organisations. We're getting runs on the board and we're well respected," says Pam Richardson, of the Trust.

A number of local, regional and national funds are available to assist landowners and community groups in relation to biodiversity initiatives. However, information regarding the availability of these funds and relevant criteria is often not readily available, and the processes involved in accessing funding are often time consuming, complex and require a considerable level of detailed information. Streamlining of these processes, and/or the provision of administrative and coordination support to groups and individuals in accessing funding may improve the chances of success, improve uptake of available funds, and potentially increase opportunities for groups and individuals to combine their resources and obtain increased funding.





Monitoring

Biodiversity related monitoring within the region is currently undertaken by a number of different organisations, for different purposes, at a variety of scales, and within different timeframes. Frequently, monitoring is specific to individual programmes and locations. This means that monitoring information is often fragmented and very difficult to collate. This limits the ability to fully understand what is currently being monitored and for what purpose, and therefore the ability to identify and prioritise gaps, or to provide an understanding of the status of biodiversity in the region.

There is also limited monitoring of the relative effectiveness of different management responses or approaches to biodiversity issues, such as regulatory versus voluntary approaches. This makes it difficult to determine which is the most appropriate response or mix of responses, and thus the ability of agencies to take an adaptive approach to biodiversity management.

This also applies to particular programmes or projects being initiated on the ground, whether by landowners, community groups or agencies. Being able to measure and illustrate success is an important part of maintaining and attracting volunteers, agency support, and on-going funding for projects. It is also a useful way of assessing the effectiveness of a particular method that has been used, such as a particular method of pest control, so that subsequent efforts may emulate or vary their approach accordingly.

On-going improvement in the state of biodiversity in the region requires an understanding of what actions are effective and where changes are needed. Therefore, effective monitoring tools and programmes need to be developed, both to monitor particular actions and programmes, and to monitor the regional picture and track progress toward regional goals and targets.

FORMAK – Forest Monitoring Assessment Kit

FORMAK was developed by PA Handford & Associates Ltd with support from MfE's Sustainable Management Fund. FORMAK is a forest monitoring kit designed for use by landowners, landcare groups, community groups and other "hands on" users interested in assessing the condition of New Zealand native forest ecosystems. It is based on monitoring a variety of aspects of the forest ecosystem on one "Site", which is an area of forest which is broadly similar in terms of forest type and management. Small forest remnants are generally treated as one FORMAK site.

FORMAK focuses on changes over time, or 'trends' by using a system of repeat measurements on a regular basis. This allows consideration of measurements over, say 5-10 years, to see if there are upward or downward trends in a measurement, or if there is just considerable fluctuation. Another important aspect is that it aims to begin looking at several aspects of the forest ecosystem at one place. This means looking at how different parts of the forest interact. For example, how bird numbers start to increase once possum and rat numbers are reduced or how the understorey and forest floor change once stock are removed.

The FORMAK website (www.formak.co.nz) has been established to support the monitoring kit by providing a repository for storing and sharing data and a mechanism for generating information summaries.



State of the Takiwā – Culturally Based Environmental Monitoring

State of the Takiwā is a culturally-based environmental monitoring and reporting system being developed by Te Rūnanga o Ngāi Tahu to assess and report on the cultural health of the natural resources and environment in the Ngāi Tahu takiwā. It is a monitoring approach that integrates mātauranga māori (including cultural values such as mauri and mahinga kai) and western science to gather information about the environment and to establish a baseline for the creation of policy and improvement of environmental health.

From monitoring done to date, the positive features of the higher scoring sites relate to their relatively unmodified nature, native vegetation dominance, good access and potential for mahinga kai. The lower scoring sites are associated with the negative impacts of settlement, agriculture, pests, weeds, as well as the loss of river flow as a result of hydro-generation.

Te Rūnanga o Ngāi Tahu 2007

<http://www.ngaitahu.iwi.nz>



Technical Information

Comprehensive, accurate and up to date information about the extent and nature of indigenous species and habitats in an area is a prerequisite to successful biodiversity management³⁴. However, the quality and coverage of regional information tends to be variable and fragmented, and there are a number of significant gaps in existing information and knowledge about particular areas of biodiversity, such as wetlands and marine baseline information.

Obtaining and collating site specific information about biodiversity values that are located on private land can also be difficult due to historical tensions between agencies and landowners, and to landowner concerns about the subsequent use and management of that information by agencies.

The coordination of information development and research is also an issue. There are often various studies and investigations relating to biodiversity being undertaken by different agencies and organisations, but which are not always known about by other organisations involved in biodiversity management. This not only limits the regional knowledge base, but can also lead to inefficiencies through the doubling up of investigation work.

Addressing the biodiversity information needs in the region will require collaboration between key agencies and organisations, and clear identification of roles and responsibilities in relation to particular information deficiencies.

³⁴ Quality Planning website - www.qp.org.nz





New Zealand Biodiversity Recording Network

The NZ Biodiversity Recording Network (NZBRN) is being developed and administered by a team at Landcare Research and Lincoln University together with an informal stakeholder steering group from across New Zealand. The project is funded by the Terrestrial & Freshwater Biodiversity Information System Fund (TFBIS) and is currently hosted at Landcare Research although will remain independent.

The aim of NZBRN is to provide a secure and robust means of storing, retrieving and displaying natural history observations from all over New Zealand. In particular, information is sought that is not otherwise recorded in formal institutional databases, and it is anticipated that input will be received from the interested public, school, scout and naturalist groups, researchers and scientists. Eventually plants, algae, birds, fungi, invertebrates, and other vertebrate animals will be recordable. Indigenous and introduced species, including weeds and pests, can all be recorded. The underlying purpose is to engage the wider public - and young people in particular - in the fascinating and rewarding activity of observing and getting to know living nature as opposed to virtual reality. It is hoped that this may help to raise overall awareness of and protectiveness towards New Zealand's unique and vulnerable biodiversity.

www.nzbrn.org.nz

Targets and Actions

The following Targets and associated Actions have been identified as the first 'building blocks' required to achieve the Goals of the Strategy. Ultimately, a wide range of actions, undertaken over a number of years, will be required to achieve the Strategy Goals and Vision, and it is anticipated that additional and/or revised Targets and Actions will be incorporated during regular reviews of the Strategy.

As with the rest of the Strategy, the Targets and Actions have been developed through a collaborative process with the Advisory Group. They are also guided to some extent by the principle that direct action by agencies should focus on those areas subject to the greatest threat of biodiversity loss and/or contributing the greatest value in terms of regional biodiversity. Other, less direct action, such as raising awareness, providing general support and encouragement, and facilitating networks, is important in terms of changing attitudes and empowering communities in the long term.

A number of the Actions have been identified as being of particularly high priority. These Actions are identified by green shading. Although all of the Actions are important, these priority Actions are those most urgently required to prevent further decline in regional biodiversity and to provide the basis upon which more effective biodiversity management may proceed.



Goal 1

Protect and maintain the health of all significant habitats and ecosystems

Actions

Target 1

There is no further loss of significant habitats and ecosystems from 2010

Performance Indicators:

- Change in the area (ha) of land under formal protection
- Number of priority sites identified and protection plans implemented
- Area (ha) of significant indigenous habitat lost
- Change in amount of money available through biodiversity related funds within the region
- Amount of money allocated from all funding sources to Canterbury biodiversity projects

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 1.1 Identify and prioritise specific sites requiring urgent protection.</p>	<p>ECan (Lead), DOC, TAs, CRIs Ngāi Tahu, QEII, Landowners</p>	<p>December 2008</p>
<p>ACTION 1.2 Develop and implement plans for securing protection* of identified priority sites, taking account of the importance of working with willing landowners and communities, the need for on-going active management, and the desirability of long-term formal protection.</p>	<p>Regional Coordinator (Lead)** ECan, TAs, DOC, CRIs Ngāi Tahu, QEII, BPCT, F&B Federated Farmers, NZ Landcare Trust, landowners</p>	<p>Develop plans for top 10 priority sites within 12 months of strategy completion, and for at least 3 priority sites annually thereafter. Implement plans for at least 3 sites annually from 12 months from strategy completion.</p>
<p>ACTION 1.3 Agencies ensure effective measures are available and in place to fulfil their statutory responsibilities to maintain biodiversity values within the region and to protect significant indigenous habitats and ecosystems. Undertake regular monitoring and review of these measures to ensure their on-going effectiveness.</p>	<p>TAs (Lead), ECan, DOC, MfE/Central Govt</p>	<p>On-going Undertake review of existing measures and effectiveness within 3 years of strategy completion. At least every 3 years.</p>
<p>ACTION 1.4 Increase financial resources available for securing protection of significant habitats and ecosystems.</p>	<p>MfE, DOC, TAs, ECan, Ngāi Tahu</p>	<p>On-going Measurable increase within 3 years of strategy completion.</p>

ECan	Environment Canterbury
DOC	Department of Conservation
TAs	City and District Councils
QEII	Queen Elizabeth II National Trust
MfE	Ministry for the Environment
CRIs	Crown Research Institutes
BPCT	Banks Peninsula Conservation Trust
F&B	Royal Forest and Bird Society
F&G	Fish and Game Council
NZERN	NZ Ecological Restoration Network
NZBRN	NZ Biodiversity Recording Network
MAF	Ministry of Agriculture and Forestry
LINZ	Land Information New Zealand

* Note the discussion regarding the approach to the term “protect” in the context of this strategy at page 26.

** This is a position that will be created to drive the implementation of the strategy. See page 69.



Goal 2

Restore the natural character of degraded indigenous habitats and ecosystems.

Actions

Target 2

There is an on-going increase in the number, quality and effectiveness of ecosystem-based restoration projects and initiatives, particularly in areas where less than 30% indigenous cover remains.

Performance Indicators:

- Change in the area (ha) of land under formal protection
- Change in number of restoration initiatives occurring within threatened environments
- Change in range of tools used within the region to incentivise biodiversity protection and restoration on private land
- Change in the area (ha) of publicly owned/administered land with management of biodiversity values incorporated into management plans
- Change in annual resources (dollars; work hours) budgeted in annual plans for providing assistance for biodiversity restoration initiatives

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 2.1 Increase the availability of information, technical expertise, and financial resources for on-the-ground initiatives to improve indigenous biodiversity.</p> <p>(Also links to Goal 5)</p>	<p>Regional Coordinator (Lead), ECan, TAs, MfE, DOC, CRIs, QEII, Ngāi Tahu, NZ Landcare Trust</p>	<p>On-going</p>
<p>ACTION 2.2 Collate existing information relating to known restoration initiatives occurring within environments where less than 20% indigenous cover remains, and identify and prioritise gaps.</p>	<p>Regional Coordinator (Lead), ECan, TAs, DOC, CRIs, QEII, Ngāi Tahu, BPCT, NZ Landcare Trust</p>	<p>June 2009</p>
<p>ACTION 2.3 Support and develop tools to assist landowner and community-based monitoring and assessment of projects and initiatives.</p> <p>(Also links to Goals 5 and 6)</p>	<p>Regional Coordinator (Lead), NZ Landcare Trust, ECan, TAs, CRIs, MfE, DOC, Federated Farmers, Ngāi Tahu, QEII, NZERN, NZBRN</p>	<p>On-going</p> <p>Provision of public training sessions for FORMAK or similar tool annually from 2008 (ECan).</p>
<p>ACTION 2.4 Review and investigate additional funding mechanisms and incentives for biodiversity protection, maintenance, and restoration on private land.</p> <p>(Also links to Goal 5)</p>	<p>ECan (Lead), TAs, MfE, DOC, CRIs, Federated Farmers, QEII, NZ Landcare Trust</p>	<p>December 2008</p>
<p>ACTION 2.5 Develop an inter-agency programme for the review, assessment and incorporation of biodiversity values (including pest control) into the management of public lands, and the identification of opportunities to enhance ecological linkages between these areas.</p>	<p>ECan (Lead), TAs, LINZ, DOC, Transit, On-Track</p>	<p>December 2008</p>



Goal 3

Increase the integration and use of indigenous species in modified environments (e.g. farm, urban, lifestyle blocks).

Target 3

Awareness of the multiple benefits of incorporating indigenous biodiversity into working and urban landscapes is increased by 2012.

Performance Indicators:

- Change in level of landowner (rural, lifestyle block and urban) understanding and appreciation of the benefits of incorporating indigenous biodiversity into working and urban landscapes (survey)
- Number of workshops/field days/pilot studies held within the region providing information relating to integration and management of biodiversity values within working landscapes
- Change in University courses to incorporate greater emphasis on benefits of indigenous biodiversity
- Change in number of industry environmental standards developed
- On-the-ground projects building biodiversity back into working and urban landscapes

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 3.1 Encourage the incorporation of biodiversity outcomes into on-farm management through workshops, field-days, pilot programmes, farm management plans and working with landowners on an individual basis. (Also links to Goal 4)</p>	<p>Landcare Groups, Federated Farmers, NZ Landcare Trust, MAF, Agricultural and horticultural bodies, institutes, and consultants, Corporate sponsors (e.g. Balance), Meat & Wool Monitor Farms, CRIs, Universities, ECan, TAs, QEII</p>	<p>On-going</p>
<p>ACTION 3.2 Liaise with education providers to encourage increased profile of biodiversity benefits within agricultural, horticultural, viticultural, and landscape design programmes. (Also links to Goal 4)</p>	<p>Regional Coordinator (Lead), ECan, TAs, NZ Landcare Trust, Ngāi Tahu, Universities, CRIs</p>	<p>Explore potential opportunities by December 2008 On-going thereafter</p>
<p>ACTION 3.3 Encourage and work with industries to develop minimum industry standards and promote best practice among members. (Also links to Goal 4)</p>	<p>MfE, Federated Farmers, Industry groups and leaders, ECan, TAs, NZ Landcare Trust, CRIs, Ngāi Tahu, F&G</p>	<p>On-going</p>
<p>ACTION 3.4 Develop, make available, and advocate information outlining the benefits of integrating indigenous biodiversity into working landscapes. (Also links to Goal 4)</p>	<p>ECan (Lead), CRIs, TAs, Te Ara Kākāriki Greenway Canterbury, NZ Landcare Trust, Ngāi Tahu, MfE, QEII, Federated Farmers</p>	<p>June 2009</p>
<p>ACTION 3.5 Encourage the incorporation of indigenous species into landscape designs for urban and semi-urban developments. (Also links to Goal 4)</p>	<p>TAs (Lead), ECan, DOC, F&B, Te Ara Kākāriki Greenways Canterbury, Ngāi Tahu</p>	<p>On-going</p>



Goal 4

Enhance public awareness, understanding and support of biodiversity.

Actions

Target 4

Public awareness, understanding and support of biodiversity is increased by 20% by 2012, leading to increasing instances of consequential behaviour change.

(Also links to Goal 5)

Performance Indicators:

- Change in level of understanding and support of biodiversity and extent of behaviour change (public survey)
- Change in level of understanding about impacts of pests on biodiversity (public survey)
- Change in number of funding applications for biodiversity protection or restoration initiatives received annually from within the region (includes all funding sources, e.g. local, regional and central government funds, community funds, private industry funds)

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 4.1 Regularly promote and publicise biodiversity success stories. (Also links to Goal 5)</p>	<p>Regional Coordinator (Lead), Federated Farmers, NZ Landcare Trust, ECan, TAs, Industry organisations, Community Groups, Media, QEII, DOC, Ngāi Tahu, F&B</p>	<p>On-going</p>
<p>ACTION 4.2 Continued support and expansion of the Environmental Education in Schools programme and other environmental education programmes.</p>	<p>ECan (Lead), Canterbury Schools, Ministry of Education, TAs, DOC</p>	<p>On-going</p>
<p>ACTION 4.3 Increase public awareness and understanding of the impacts of pests and weeds on biodiversity.</p>	<p>ECan (Lead), TAs, DOC, Federated Farmers, NZ Landcare Trust, MAF, QEII, F&G, Biosecurity NZ, Weedbusters, Pest Liaison Committees, Landcare Groups</p>	<p>On-going</p>
<p>Also see Actions 3.1 to 3.5</p>		



Goal 5

Encourage, celebrate and support action by landowners and communities to protect, maintain and restore biodiversity.

Target 5

The accessibility and usability of information, guidance, advice and funding relating to biodiversity protection and restoration is improved by 2012.

Performance Indicators:

- Satisfaction with accessibility and usability of information resources, technical advice and funding sources (survey of community groups, rural landowners)
- Number of enquiries and number of complaints received by information service
- Change to environmental fund application processes

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 5.1 Establish a coordinated regional biodiversity and pest management information service including funding information and assistance.</p>	<p>Regional Coordinator (Lead), ECan, TAs, DOC, MfE, NZ Landcare Trust, NZERN, Federated Farmers, QEII, Ngāi Tahu</p>	<p>June 2009</p>
<p>ACTION 5.2 Investigate the feasibility of a single, centralised application process for all biodiversity funds within the region.</p>	<p>Regional Coordinator (Lead), ECan, TAs, DOC, MfE, QEII, NZ Landcare Trust</p>	<p>June 2010</p>
<p>Also see Actions 2.1, 2.3, 2.4, 4.1 and 8.2</p>		



Goal 6

Improve the range and quality of knowledge and information about Canterbury's biodiversity for its sustainable management.

Actions

Target 6

A framework for monitoring the status of regional biodiversity is established by 2012.

Performance Indicators:

- Progress on development of a monitoring framework
- Change in level of biodiversity related monitoring being undertaken

Actions

ACTION	PARTIES INVOLVED	BY WHEN
ACTION 6.1 Develop an integrated monitoring programme for assessing the state of biodiversity in Canterbury.	ECan (Lead), TAs, DOC, NZ Landcare Trust, QEII, MfE, Federated Farmers, CRIs, Universities, Ngāi Tahu	December 2009
ACTION 6.2 Develop and monitor indicators by which to measure the effectiveness of different biodiversity management measures.	ECan (Lead), TAs, DOC, NZ Landcare Trust, QEII, MfE, Federated Farmers, CRIs, Universities, Ngāi Tahu	June 2010
Also see Action 2.3		

Target 7

Key information and knowledge gaps are addressed through on-going research.

Performance Indicators:

- Change in number of information and knowledge gaps
- Change in number of research programmes contributing to understanding of biodiversity in Canterbury

Actions

ACTION	PARTIES INVOLVED	BY WHEN
ACTION 7.1 Collate existing information and knowledge about biodiversity across the region and identify and prioritise gaps.	ECan (Lead), TAs, DOC, CRIs, QEII, NZ Landcare Trust, Universities, Ngāi Tahu, Federated Farmers Other organisations with biodiversity related information bases.	December 2009
ACTION 7.2 Develop strategies / plans to address priority information gaps.	ECan (Lead), TAs, DOC, CRIs, QEII, NZ Landcare Trust, Universities, Ngāi Tahu, Federated Farmers	December 2010



Target 8

There is an on-going increase in the number of inter-agency and agency/community partnerships that result in biodiversity improvements.

Performance Indicators:

- Number of biodiversity forums/workshops etc run annually and number and diversity of attendees
- Change in number of inter-agency and agency/community partnership programmes with biodiversity benefits
- Number of meetings held by agency biodiversity network annually and extent of representation

Actions

ACTION	PARTIES INVOLVED	BY WHEN
<p>ACTION 8.1 Continue to support existing inter-agency and/or agency/community partnership programmes with biodiversity benefits, and increase the number of such partnerships.</p>	<p>ECan, TAs, NZ Landcare Trust, DOC, LINZ, Community groups, Federated Farmers, Ngāi Tahu, Landowners</p>	<p>On-going</p>
<p>ACTION 8.2 Coordinate and run regular biodiversity forums, workshops, field days or similar, for the sharing of knowledge, information and success stories; to strengthen biodiversity networks; and to facilitate opportunities for partnerships and improved coordination.</p>	<p>Regional coordinator (Lead), NZ Landcare Trust, ECan, TAs, Ngāi Tahu, Community Groups, Landowners, Federated Farmers, NZERN, QEII, DOC, Other interested organisations</p>	<p>Two per year</p>
<p>ACTION 8.3 Establish a regional agency network as a means of better aligning and coordinating annual work programmes and resources, and for the sharing of knowledge and best practice.</p>	<p>ECan (Lead), TAs, DOC, LINZ, NZ Landcare Trust, QEII</p>	<p>June 2008 Meet at least twice per year</p>





Implementation, Monitoring and Review

Implementation

This Strategy sets out a direction for action. To be effective, the Strategy will need to be incorporated into various organisations formal work planning processes, such as Long Term Council Community Plans.

Full implementation of the Strategy may take some time, and will require a coordinated approach and on-going commitment by Strategy partners. It is proposed that the Strategy be implemented through a central Steering Group that is representative of all Strategy partners. This group will have the mandate and responsibility for implementation of the Strategy. Experience from other regions suggests that a coordinator is also fundamental if momentum is to be maintained and Strategy outcomes achieved. Therefore it is proposed that a Regional Coordinator position be established with responsibility for coordinating the implementation, monitoring and review of the Strategy with the Steering Group.

The Actions set out within the Strategy are pitched at a relatively general level, and a key first step in the Strategy implementation will be the development of specific Action Plans for the priority Strategy Actions.

Given the above factors, the principal first steps in implementation of the Strategy are –

- Establishment of a Steering Group with the mandate and responsibility for Strategy implementation. This group should be made up of representatives of the Strategy partners, and would ideally include members of the Advisory Group involved in development of this Strategy.
- Establishment of a Regional Biodiversity Coordinator position with mandate and responsibility to work with the Steering Group in the implementation of the Strategy, and to lead and coordinate input from Strategy partners and others in implementation of the Strategy Actions. There are a number of potential models for the establishment of the Coordinator position, depending on the level of independence sought by Strategy partners. There are a number of potential sources of funding for the position, including central government funding through the Biodiversity Advice Fund; regional funding from Environment Canterbury; monetary contributions from DOC, TLAs and other agencies; contribution in-kind through provision of desk space, computer etc by DOC, Environment Canterbury, NZ Landcare Trust or some other organisation.

- Development of specific Action Plans for priority Strategy Actions within 12 months of Strategy completion. Action Plans should include identification of objectives and outputs, specific roles and responsibilities, specific tasks and timeframes for their completion, and estimated resources required.

Cross Boundary Management

The Strategy applies to the Canterbury region, as defined by the Canterbury Regional Council boundary. However, as biodiversity crosses regional authority boundaries it will be necessary to work with adjacent Regional Councils (and the relevant District Councils) on some issues. In particular, cross boundary management is relevant to the Waitaki District which straddles both the Canterbury and Otago regions. Similarly, there is a cross over of DOC Conservancy boundaries (Canterbury Conservancy and Nelson-Marlborough Conservancy) within the Kaikōura District. Because of these boundary splits the Otago Regional Council and the Nelson-Marlborough Conservancy have been consulted on this Strategy. On the basis of that consultation, it is anticipated that the Strategy will not conflict with these organisations' general approach to biodiversity management in the Otago region and Nelson-Marlborough Conservancy respectively.

Where necessary (and advantageous) to implementation of this Strategy these adjacent agencies will be invited to participate on specific projects/actions.

Monitoring

Strategy Actions will be monitored on two levels. Firstly, they will be monitored in terms of an annual assessment of numbers of Action Plans developed and implemented, and secondly, the progress of Actions will be monitored against the specific tasks and timeframes set out in the Action Plans.

Completion of the Actions will contribute to achievement of the Targets, which will be monitored in terms of the performance indicators identified for each Target. Achievement of the performance indicators provides a measure that illustrates progress towards or achievement of a Target.

Review

The Strategy takes a relatively long-term focus, but will be formally reviewed by the Steering Group on a five-yearly basis. The Targets, Performance Indicators and Actions set out in the Strategy will be reviewed on a more regular basis, which will be at least every two years, and will also be undertaken by the Steering Group.



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Biodiversity Strategy Advisory Group Members:

Ashburton District Council	David Askin, Councillor Derek Glass	Department of Conservation	Don Bogie, Nick Head
Christchurch City Council	Kelvin McMillan, Trevor Partridge	Te Rūnanga o Ngāi Tahu	Craig Pauling
Environment Canterbury	Councillors Ross Little, Judy Waters, June Slee	NZ Landcare Trust	Shelley Washington Frances Schmechel
Hurunui District Council	Andrew Feierabend, Jan Weaver Councillor Jamie McFadden	Federated Farmers	Lionel Hume, Donald Aubrey, Peter Fleming, Pam Richardson
Kaikoura District Council	Jodie Denton	Land Information New Zealand	Phil Royle
Selwyn District Council	Andrew Mactier	Royal Forest & Bird Society	Liz Griffiths, Bill Hood
Timaru District Council	Andrew Hammond	Fish & Game Council	Jason Holland
Waimakariri District Council	Councillors Kath Adams, Jo Kane	University of Canterbury	Angus McIntosh
Waimate District Council	Councillors Peter McIlraith, Mike Balchin	QEII National Trust	Miles Giller
Waitaki District Council	Richard Mabon, Councillor Gary Kircher	Banks Peninsula Conservation Trust	Rick Menzies, Pam Richardson
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References

- Binning, C. *Reinterpreting Conservation - Developing Pragmatic Approaches to Managing Indigenous Biodiversity*; CSIRO Wildlife and Ecology, Australia.
- Canterbury Regional Council, *Regional Coastal Environment Plan*, 2005.
- Canterbury Regional Council, *Canterbury Regional Policy Statement*, 1998.
- Canterbury Regional Council, *Canterbury Regional Pest Management Strategy 2005-2015*, June 2005.
- Christchurch City Council, *Christchurch Naturally – The Biodiversity Strategy (Draft)*, July 2004.
- Department of Conservation, *Canterbury Conservation Management Strategy*, July 2000.
- Department of Conservation and Te Rūnanga o Ngāi Tahu, *Te Waihora Joint Management Plan – Mahere Tukutahi o Te Waihora*, 2005.
- Department of Conservation, *Our World Heritage – A Tentative List of New Zealand Cultural and Natural Heritage Sites*, November 2006.
- Enfocus, *Guideline on Strategic Planning for Biodiversity – A report for Action Bio-Community on using LTCCPs to promote better biodiversity management*, May 2004.
- Environment Canterbury, *Climate Change – An analysis of the policy considerations for climate change for the Review of the Canterbury Regional Policy Statement*, February 2007.
- Environment Canterbury, *Identifying high value environmental areas for animal pest control*, Technical Report No. U02/60, August 2002.
- Green, W., *Benefits of Biodiversity Condition Fund Projects for Biodiversity Priorities*, for Department of Conservation, April 2006.
- Green, W. and Clarkson, B., *Turning the Tide? A Review of the First Five Years of the New Zealand Biodiversity Strategy – The Synthesis Report*, 2005.
- Kessels & Associates, *In Search of the Right Mix - An investigation of tools for biodiversity management*, May 2004.
- McDonald, G. (Landcare Research), Patterson, M. (School of People, Environment and Planning; Massey University), *Canterbury Region's "Hidden" Economy: Assessing the Value of the Region's Ecosystem Services and Biodiversity*, April 2003.





- Ministry for the Environment and Department of Conservation, *The New Zealand Biodiversity Strategy: Our Chance to Turn the Tide Whakakohukihukitia Te Tai Roroku Ki Te Tai Oranga*, February 2000.
- Ministry for the Environment and Department of Conservation, *Protecting our Places – National Priorities for Protecting Rare and Threatened Native Biodiversity on Private Land*, April 2007.
- Ministry for the Environment and Department of Conservation, *Protecting our Places – Information about the Statement of National Priorities for Protecting Rare and Threatened Biodiversity on Private Land*, April 2007.
- Ministry for the Environment, Department of Conservation & Local Government New Zealand, *A snapshot of council effort to address biodiversity on private land: Report back to Councils*, June 2004.
- Ministry for the Environment, Agriculture New Zealand, Selwyn Sustainable Agriculture Society Inc, Watties, Lincoln University; *Biodiversity on Farmland – “Good Management Practices”*; (undated).
- New Zealand Ecological Society and the New Zealand Society of Soil Science, *Review of south island high country land management issues - Joint submission to the Ministerial High Country Review Committee*, New Zealand Journal of Ecology (1994) 18(1).
- Norbury, G. & Walker, S. *Building community and agency support for dryland biodiversity conservation: a review and strategy*, Landcare Research for Department of Conservation, June 2006.
- Opinions Market Research Limited, *Biodiversity Survey - Awareness, Attitudes and Management Opportunities*, for Environment Canterbury, May 2006.
- Papatipu Rūnaka & whānau rōpū representatives Kāi Tahu ki Otago, *Kāi Tahu ki Otago Natural Resource Management Plan*, 2005.
- Phuong Khanh Trinh & Pamela Kaval, *The Importance of Indigenous Biodiversity on Waikato Farms*, Department of Economics, Waikato Management School, The University of Waikato.
- Rutledge, D., Price, R., Heke, H., Ausseil, A-G., *National Analysis of Biodiversity Protection Status: Methods and Summary Results*, Landcare Research / Manaaki Whenua for Ministry for the Environment, December 2004.
- Schmechel, F., *Possibilities for enhancing / reintroducing weka, tūī, and tītī in Canterbury*, for Ngāi Tahu and Department of Conservation, North Canterbury Area, April 2004.

- Stephens, T. & Lawless, P. *Cost-Utility Evaluation of Natural Heritage Conservation Projects*, Department of Conservation, March 1998.
- Tau, T., Goodall, A., Palmer, D. and Tau R., *Te Whakatau Kaupapa – Ngāi Tahu Resource Management Strategy for the Canterbury Region*, 1990.
- Te Rūnanga o Kaikōura (Takahunga Marae), *Te Rūnanga o Kaikōura Environmental Management Plan*, 2005.
- Te Rūnanga o Ngāi Tahu, *Te Rūnanga o Ngāi Tahu Freshwater Policy*, 1991.
- Te Rūnanga o Ngāi Tahu Kaupapa Taiao Unit, *Ngāi Tahu 2025: Ki Uta Ki Tai – Mountains to the Sea Natural Resource Management – a scoping document (Draft)*, April 2003.
- Te Rūnanga o Ngāi Tahu Kaupapa Taiao Unit, *Ngāi Tahu 2025: State of the Takiwā – Cultural Monitoring and Reporting on the Health of Our Environment – a scoping document (Draft)*, 2004.
- Te Taumutu Rūnanga, *Te Taumutu Rūnanga Natural Resource Management Plan*, 2003.
- UMR Research, *Biodiversity & Freshwater Research*, for Ministry for the Environment, Ministry of Fisheries, Department of Conservation, July 2005.
- Waikato Biodiversity Forum, *Restoring Waikato's Indigenous Biodiversity: Ecological Priorities and Opportunities*, September 2006.
- Walker, S., Price, R., Rutledge, D., Stephens, R.T.T., Lee, W.G., *Recent loss of indigenous cover in New Zealand*, New Zealand Journal of Ecology (2006) 30(2): 169-177.
- Walker, S., Price, R., Rutledge, D., *New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs*, Landcare Research / Manaaki Whenua for Department of Conservation, March 2005.
- Walker, S., Cieraad, E., Grove, P., Lloyd, K., Myers, S., Park, T., Porteous, T., *Guide for Users of the Threatened Environment Classification Ver 1.0, June 2007*, Landcare Research / Manaaki Whenua and EnviroLink.



Appendix A - Canterbury Region Landform Units

Landform Unit	Descriptor Points	Key Threats	Examples of Current Action
The Plains	<ul style="list-style-type: none"> • Most highly modified landscape in the region, and one of the most highly modified nationally • <1% indigenous vegetation cover remaining, and exists only in scattered, small, vulnerable, fragments • Home to nationally important ecosystem remnants, e.g. plants and ecosystems of grassland environments such as McLeans Island • Home to majority of region's population • Acutely Threatened environment (< 10% indigenous cover remains) in terms of indigenous biodiversity 	<ul style="list-style-type: none"> • On-going loss and fragmentation of remaining patches of indigenous vegetation as many remaining examples are too small or isolated to survive without intervention • Loss of shelterbelts and associated function as wildlife corridors • Animal and plant pests • General lack of understanding and awareness of dryland biodiversity issues • On-going land use change, intensification and subdivision 	<ul style="list-style-type: none"> • Land and stream care groups working to protect and restore bush fragments, streams and riparian areas • Te Ara Kākāriki Greenway Canterbury group working to establish a network of native vegetation patches and corridors within the working landscape • Booklets and guides to improve awareness and help people take positive action, e.g. <i>Native Plant Communities of the Canterbury Plains</i> (DOC); <i>Establishing shelter in Canterbury with nature conservation in mind</i> (Environment Canterbury) • Kōwhai Farm – research farm illustrating the practical benefits of integrating indigenous biodiversity into a productive farm unit • Increasing numbers of landowners taking action to fence and plant riparian areas of streams and wetlands; fence and protect areas of remnant and regenerating native forest; plant native shelter belts
Lowland Streams	<ul style="list-style-type: none"> • Provide important invertebrate and fish spawning habitat and wildlife corridors • Significant loss and degradation of instream habitat through reduced flows, point and non-point source contaminant discharges, sedimentation, and clearance of riparian vegetation • Loss of riparian vegetation, representing loss of habitat and wildlife corridors for birds, insects, lizards, frogs • Breeding and migration habits of fish species restricted due to structures and crossings • Within Acutely Threatened environment (< 10% indigenous cover remains) in terms of indigenous biodiversity 	<ul style="list-style-type: none"> • Further loss and degradation of riparian areas, impacting on water quality and wildlife movement • Inappropriate stock access to streams • Point source and diffuse discharges leading to further reduced water quality • Altered flow regimes causing changes in waterway dynamics and habitat • Continued land use intensification without safeguards for waterway protection • Animal and plant pests • Large gaps in information in some areas, particularly in relation to biodiversity values 	<ul style="list-style-type: none"> • Environment Canterbury 'Living Streams' programme aimed at increasing understanding and uptake of land management practices that improve and protect surface water quality, in-stream values and riparian habitat • Many stream care groups 'adopting' reaches of streams and rivers to fence and plant riparian margins • 2003 "Clean Streams Accord" between Fonterra, Regional Councils, MfE and MAF • Booklets and guides to improve awareness and help people take positive action, e.g. <i>Riparian Guidelines – A guide to managing waterways on Canterbury farms and companion guides: Lowland Plains Streams and Drains, Inland Basin Streams, and Hill Country Streams</i> (Environment Canterbury); <i>Enhancing Waterways for Native Freshwater Fish</i> (Environment Canterbury); <i>Caring for Streams of the Canterbury Plains</i> (Environment Canterbury) • Environment Canterbury Restorative Programme for Lowland Streams • Increasing numbers of landowners taking action to fence and plant riparian areas of streams

Wetlands	<ul style="list-style-type: none"> • Some of our most important but rare and at-risk ecosystems • Some are internationally significant and many are culturally significant as mahinga kai or waahi tapu sites, e.g. Te Waihora/ Lake Ellesmere, Wairewa/Lake Forsyth, Avon Heathcote Estuary/Ihutai, Wainono Lagoon • Nationally, wetlands support 22% of all native bird species (including threatened species) and 30% of native freshwater fish, yet now cover less than 2% of total land area of NZ • Identified as a National Priority for protection • Form an important connected chain of similar habitats upon which many species, especially migrant birds, rely heavily for feeding, breeding, and resting on migratory routes • Less than 10% of region's original wetlands remain, with greatest losses in coastal, lowland and inland basins • Many at-risk wetlands are on private property • Many occur within Acutely and Chronically Threatened environments (<20% indigenous cover remains) in terms of indigenous biodiversity 	<ul style="list-style-type: none"> • Lack of specific information and understanding of state of wetlands in the region • Continued drainage, reclamation and land conversion • Degradation of water quality from discharges and runoff from farmland and urban areas • Plant and animal pests • Continued and increasing hydrological changes, altering long-term viability of wetlands, particularly on the Plains • Rapid land tenure and land use change in hill and high country is creating an increasing threat of loss and degradation of previously less threatened wetlands 	<ul style="list-style-type: none"> • Environment Canterbury working with Federated Farmers on the development of trial wetland management plans to integrate wetlands into general farm management while protecting their functioning and values • Environment Canterbury Wetland Assistance and Protection grants proposed as part of Proposed Natural Resources Regional Plan (PNRRP) • 2003 Fonterra "Clean Streams Accord" including priority action that existing regionally significant or important wetlands are fenced and natural water regimes protected • Increasing numbers of landowners taking action to fence and plant wetlands
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<p>Banks Peninsula</p>	<ul style="list-style-type: none"> • Unique and distinctive volcanic landforms with a range of microclimates that provide for the southern most distribution of a variety of indigenous plant species • Only about 1% of original forest area remaining in fragmented remnants (Schmechel, F., April 2004) • Forest remnants are regionally significant to biodiversity, especially birds such as kererū/ native pigeon • Volcanic rocky outcrops are naturally rare ecosystems often supporting high concentrations of threatened and endemic species • Home to endemic and regionally rare species, e.g. white-flipped penguin/ kororā, nikau palm, jewelled gecko, morepork, mistletoe • Rocky coastline provides habitats for a wealth of bird and marine life and is a major source of mahinga kai for tangata whenua • Primarily At Risk environment (<20% indigenous cover remains) in terms of indigenous biodiversity, with some Acutely and Chronically threatened (<20% indigenous cover remains) areas 	<ul style="list-style-type: none"> • Animal and plant pests – increasing numbers and locations; new pests invading • Lack of internal surveillance to identify pest spread between regions • Land use changes, intensification and subdivision • Continued waterway degradation • Lack of resources for site protection • Further loss and fragmentation of indigenous vegetation 	<ul style="list-style-type: none"> • Banks Peninsula Conservation Trust – community trust supporting and facilitating education and biodiversity protection through fencing, pest control and covenants • Significant community and landowner effort to protect and increase native vegetation – approx 15% now regenerating native bush; approx 4% under some sort of formal protection (Schmechel, F., April 2004) • Establishment of Hinewai Reserve • Active community and “care” groups such as Friends of Banks Peninsula and Governors Bay Land Care group • Collaborative and coordinated pest control programmes between community, Environment Canterbury, Christchurch City Council and DOC, e.g. coordinated biodiversity possum and wild goat control programmes • Kaupapa Kererū – an iwi-led, community based, multi-agency project between Ngāi Tahu, DOC, Lincoln University and Landcare Research to restore kererū communities in and around Banks Peninsula.
<p>Braided Rivers</p>	<ul style="list-style-type: none"> • A defining feature of the Canterbury region • Internationally significant ecosystems • Naturally rare or distinctive ecosystems identified as a National Priority for protection 	<ul style="list-style-type: none"> • Weed invasion of riverbeds • Animal pests predating on native fauna • Riverbed confinement and altered hydrological regimes through water abstractions, riparian land use, and flood 	<ul style="list-style-type: none"> • DOC and Meridian “Project River Recovery” on Upper Waitaki River – weed and pest control, and maintenance and restoration of braided river habitat, focused on protection of black stilt/kakī • Establishment of Waimakariri River Regional Park by Environment Canterbury, including biodiversity protection

<p><i>Braided Rivers continued...</i></p>	<ul style="list-style-type: none"> • Provide major ecological corridors between the mountains and the sea • Provide unique habitat for specialised plants and animals, including threatened and endangered species, e.g. robust grasshopper, black stilt/kakī, banded dotterel, wrybill plover, black-fronted tern, black-billed gull • Support nationally important recreational fisheries • River margin reserve areas provide ideal base for future biodiversity protection and enhancement initiatives • Lower reaches are within Acutely and Chronically Threatened environments (<20% indigenous cover remains) in terms of indigenous biodiversity 	<p>control leading to loss of habitat, riparian wetlands and sedimentation</p> <ul style="list-style-type: none"> • Decreasing water quality from lower flows and land use intensification within catchments • Habitat disturbance and loss from gravel extraction operations and recreational use of riverbed • Didymo and other invasive aquatic species • Barriers to fish passage • Nesting bird disturbance by recreational and commercial users of riverbeds 	<ul style="list-style-type: none"> • River care groups focussed on maintenance and enhancement of braided river habitat and associated flora and fauna, e.g. Ashley/ Rakahuri Rivercare Group • Development of Lower Waitaki River Management Strategy by community based group
<p>High Country</p>	<ul style="list-style-type: none"> • Lies eastward of the alpine zone and has extremes of weather, particularly heavy snow, severe frosts and strong winds • Iconic landscapes • Indigenous vegetation still dominant in many areas • Remaining extensive areas of tussock grassland and areas of beech forest and shrublands contribute significantly to the high landscape and biodiversity values • Vegetation modified by humans over past 1000 years through burning, grazing and agricultural development 	<ul style="list-style-type: none"> • Pest plant invasions, particularly increasing threat from wilding conifers • Animal pest invasions contributing to land degradation, especially rabbits • Significant change occurring through land tenure review and land use intensification and subdivision in some areas, particularly basins and valleys, leading to loss of wetlands, tussock grasslands, and shrublands 	<ul style="list-style-type: none"> • Development of joint Wilding Conifer Management Plan by DOC, ECan, LINZ and Federated Farmers • Research programmes related to grasslands management and impacts, including MAF Sustainable Farming Fund research project <i>Integrating conservation and production in the high country</i> • Landowner initiatives such as pest free upper river catchments • DOC Hurunui Mainland Island – Hurunui River catchment of Lake Sumner/Hoka Kura. The largest mainland island conservation project in NZ and the only one in Canterbury. Conservation programmes including bird monitoring and pest control in one of the most intact beech forest systems left in Canterbury and home to the only known, significant population of orange-fronted parakeet/kākāriki

<p><i>High Country continued...</i></p>	<ul style="list-style-type: none"> • Greatest modification occurred in valley floors and parts of larger basins where most intensive land use has occurred • Threatened plant and invertebrate loss due to grazing and browsing animals (New Zealand Ecological Society and the New Zealand Society of Soil Science, 1994) • Pest invasions, particularly rabbits and wilding conifers, significantly impact on biodiversity • Large high country lakes generally high water quality; but habitat values and water quality of smaller lakes and tarns vulnerable, especially to impacts of high stock densities within catchments, grazing in lake margins and removal of riparian vegetation • Nationally and internationally significant bird habitat provided by many high country lakes, rivers and wetlands 		<ul style="list-style-type: none"> • Community based conservation groups such as the Ohau and Lake Alexandrina Conservation Trusts undertaking weed control on public lands • Protection of crested grebe/kawana habitat in Lake Pearson/ Moana Rua
<p>Hill Country, Foothills*, Outcrops & Downlands</p> <p>* (Large parts of north and south Canterbury consist of steep to rolling hill country while immediately west of the Plains is the foothills)</p>	<ul style="list-style-type: none"> • Steep to rolling hills, river gorges and valley streams • Hill country areas include some substantial areas of beech forest, significant areas of relatively unmodified tussock grassland and remnant habitats of other indigenous flora and fauna • Land use change continues in some areas through tracking, burning and further development of marginal land and exotic forestry 	<ul style="list-style-type: none"> • Animal and plant pests, particularly increasing threat from wilding conifers • Lack of specific knowledge and awareness of biodiversity values, especially the rare ecosystems supported by limestone outcrops • Rapid changes in land tenure and land use leading to loss of wetlands, tussock grasslands and remaining indigenous cover • Fire 	<ul style="list-style-type: none"> • Increasing numbers of landowners taking action to fence and plant riparian areas of streams and wetlands; fence and protect areas of remnant and regenerating native forest; plant native shelterbelts • Landcare groups such as the Foothills Landcare Group and Friends of Kelceys Bush working to protect and monitor bush remnants on private and public land • Research and monitoring of bat populations in South Canterbury and development of fact sheet outlining steps to take to enhance a property for bats (DOC)

<p><i>Hill Country, Foothills, Outcrops & Downlands continued...</i></p>	<ul style="list-style-type: none"> • Limestone outcrops are naturally rare ecosystems that provide habitat 'islands' and frequently support concentrations of threatened, endangered and endemic species vastly disproportionate to their size • Home to only known long-tailed bat/ pekapeka population in the eastern south island (South Canterbury) 		
<p>Coastal Lagoons, Estuaries and Dune systems</p>	<ul style="list-style-type: none"> • Coastal lagoons, estuaries and river mouths of the region represent a network of culturally and ecologically significant habitats • Significant modification and loss of indigenous coastal ecosystems, vegetation and habitat • Nationally significant landscape at Kaitorete Spit, containing largest unmodified dune system in Canterbury, and internationally rare mixed sand and gravel beach, supports native grasses, pīngao, lizards and indigenous insects • Mouths of rivers and their coastal lagoons provide important habitat for indigenous birds, fish, invertebrates and plants • Chain of coastal lagoons and wetlands are important for migratory birds, Te Waihora/Lake Ellesmere in particular 	<ul style="list-style-type: none"> • On-going agricultural and urban development pressure including clearance or modification of indigenous vegetation, commercial development, inappropriate scale or location of housing, rural and urban discharges to wetlands and estuaries • Coastal erosion • Modification of coastal processes through changes in sediment loadings on major rivers • Recreational uses that damage ecological processes (e.g. damage to sand dune systems and bird disturbance due to recreational vehicles in coastal zones) • Climate change / sea level rise • Encroachment of urban development into dune systems 	<ul style="list-style-type: none"> • Community based trusts and groups such as the Avon-Heathcote Ihutai Trust and the Waihora Ellesmere Trust working collaboratively with local communities, landowners, DOC and local government in the enhancement, restoration and long-term management of estuaries and coastal lakes/lagoons • Partnership between ECan, DOC, Waimakariri DC and Hurunui DC in development of Northern Pegasus Bay Motor Vehicle Access Strategy to address impacts of motor vehicles on coastal dunes • Regular opening of river mouths has positive impacts on water quality and temperature through 'flushing' effect • Active coast care groups taking action to protect and restore important coastal habitats and ecosystems

	<ul style="list-style-type: none"> • Degraded water quality in some river mouth lagoons and in estuaries • Te Waihora/Lake Ellesmere is internationally significant 		
Urban	<ul style="list-style-type: none"> • Significant, regionally rare ecosystem remnants, e.g. Talbot Forest, Riccarton Bush, Travis Wetland • Provide important refuges for some indigenous species, e.g. bellbirds, migratory birds at Avon/Heathcote Estuary/Ihutai and Bexley wetlands 	<ul style="list-style-type: none"> • Subdivision • Point and non-point source discharges • Pests and weeds • Increase in impermeable areas 	<ul style="list-style-type: none"> • Christchurch City Council Biodiversity Strategy (Draft) • Environment Canterbury facilitated River Guardians programme • Guardians of the Styx – a community-based environmental group with the objective of promoting the protection and restoration of the Styx River, Christchurch • Kaikōura GreenGlobe certification • <i>Attracting Lizards to your Garden</i> pamphlet (DOC) • Increasing use of indigenous species in residential gardens
Marine	<ul style="list-style-type: none"> • Ecologically rich and diverse marine environments, but limited knowledge and information about the values of marine ecosystems • Valued coastal and off-shore fishing resources • Rich sea canyons off Kaikōura coast provide important habitat for a range of marine life, including year-round habitat for sperm whales 	<ul style="list-style-type: none"> • Aquaculture developments • Point and non-point source discharges (e.g. sewage and stormwater) • Toxic algal blooms • Undaria and other pests • Shipping accidents • Over-fishing, set-nets, by-catch 	<ul style="list-style-type: none"> • Central Government development of Oceans Policy • Taiapure and mataitai reserves in Akaroa Harbour, Port Levy and Rāpaki Bay Lyttelton Harbour • Marine Reserve proposal for Akaroa Harbour (“Dan Rogers” marine reserve) • Pohatu marine reserve, Flea Bay, Banks Peninsula. • Banks Peninsula Marine Mammal sanctuary for Hector's dolphin/upokohue • Rules on set-netting to protect Hector's dolphin/upokohue • Internationally significant seabird habitat provided by Motunau Island Nature Reserve • Te Korowai o Te Tai o Marokura (Kaikōura Coastal Guardians) formed in 2005 to address sustainable management of the coastal marine area from the Clarence/Waiiau-toa to Conway Rivers in Kaikōura

Appendix B - Policy Context

In 1993, New Zealand ratified the United Nations Convention on Biodiversity, the first global agreement on the conservation and sustainable use of biological diversity. The convention requires governments to develop national biodiversity strategies and action plans. New Zealand produced the *New Zealand Biodiversity Strategy: Our Chance to Turn the Tide / Whakakohukihukitia Te Tai Roroku Ki Te Tai Oranga* in February 2000 (The New Zealand Biodiversity Strategy).

The New Zealand Biodiversity Strategy establishes a vision, goals and principles for biodiversity management in New Zealand. These provide guidance to government agencies and other organisations, but do not prescribe in detail how particular actions related to biodiversity management should be undertaken. Achievement of the national goals will depend heavily on action at the regional and local level, and on the action and assistance of communities and landowners, given that 70 percent of New Zealand's land is in private ownership.

The Resource Management Act 1991 (RMA) outlines the functions of regional councils and territorial authorities for the purpose of giving effect to the Act. These are set out in sections 30 and 31 respectively, and include functions that relate to biodiversity. An amendment to the RMA in 2003 provided clarification and more explicit reference to biodiversity, reflected in sections 30(1)(c)(iia), 30(1)(ga), and 31(1)(b)(iii).

RMA 1991 - Section 30

Section 30(1) Every regional council shall have the following functions for the purpose of giving effect to this Act in its region:

- (b) The preparation of objectives and policies in relation to any actual or potential effects of the use, development, or protection of land which are of regional significance:
- (c) The control of the use of land for the purpose of—
 - (i) Soil conservation
 - (ii) The maintenance and enhancement of the quality of water in water bodies and coastal water
 - (iii) The maintenance of the quantity of water in water bodies and coastal water:
 - (iia) The maintenance and enhancement of ecosystems in water bodies and coastal water
- (ga) The establishment, implementation, and review of objectives, policies, and methods for maintaining indigenous biological diversity.



RMA 1991 – Section 31

Section 31(1) Every territorial authority shall have the following functions for the purpose of giving effect to this Act in its district:

- (b) The control of any actual or potential effects of the use, development, or protection of land, including for the purpose of –
- (iii) The maintenance of indigenous biological diversity.

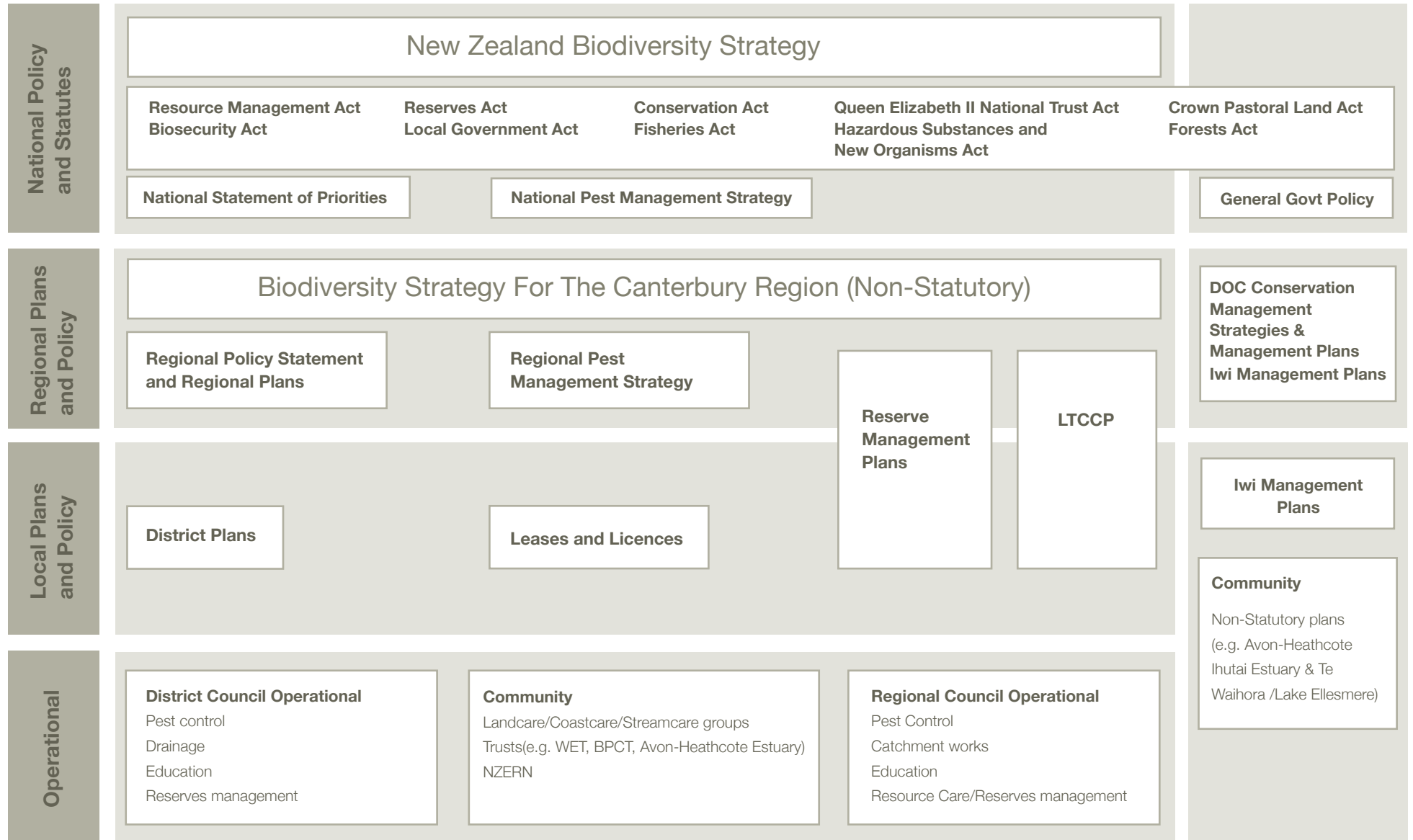
There are a number of other statutes that impact on biodiversity, and which impose related functions and responsibilities on a number of agencies. Those statutes include:

- Conservation Act 1987
- Reserves Act 1977
- Biosecurity Act 1993
- Local Government Act 2002
- Forests Act 1949
- Fisheries Act 1996
- Hazardous Substances and New Organisms Act 1996
- Wildlife Act 1953
- Crown Pastoral Land Act 1998
- Queen Elizabeth II National Trust Act 1977

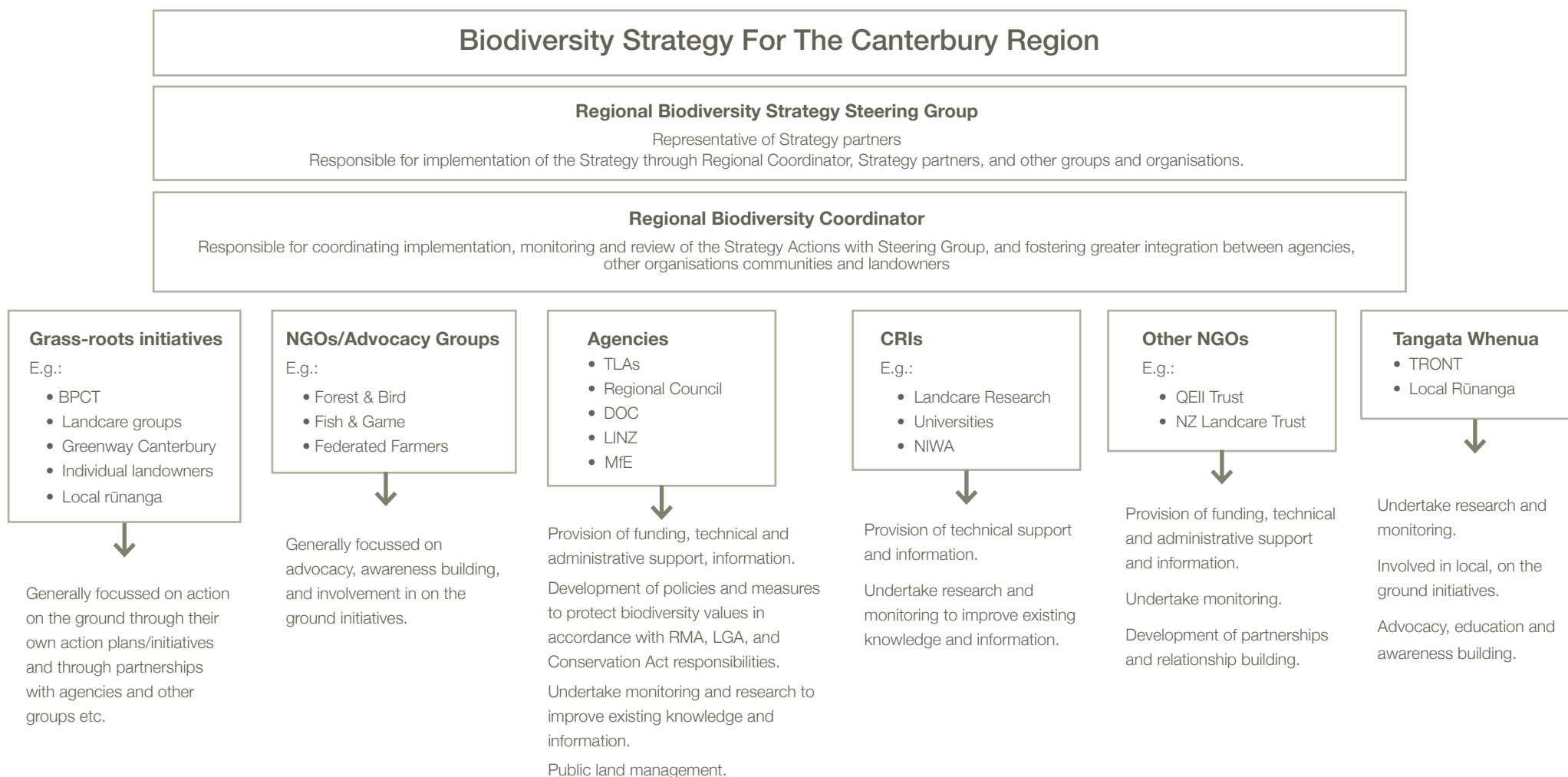
At a national level, this Strategy may also be impacted by sectoral and NGO policy and accords. At a regional level, related documents include the Canterbury Regional Policy Statement, Regional Plans (e.g. Canterbury Regional Coastal Environment Plan 2005; Proposed Natural Resources Regional Plan), the Regional Pest Management Strategy, and regional strategies of other organisations such as DOC's Canterbury and Nelson-Marlborough Conservation Management Strategies and Iwi resource management plans. At a local level are District Plans and non-statutory management plans and strategies for specific sites, such as the Ihutai (Avon-Heathcote Estuary) Management Plan 2004, and the Waihora Ellesmere Community Strategy. Figure A shows the policy context of this Strategy at a national, regional and local level.



Figure A: Legislative and Policy Context of Regional Biodiversity Strategy



Appendix C - Roles & Responsibilities



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