STATE OF THE ENVIRONMENT OF THE MANAWATU-WANGANUI REGION | 2005

TECHNICAL REPORT

SIX | NATIVE BIODIVERSITY



horizons
REGIONAL COUNCIL

SIX | NATIVE BIODIVERSITY

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1. BIODIVERSITY VISION AND RESPONSIBILITIES

New Zealand's State of the Environment report (Taylor, 1997) concludes that loss of indigenous biodiversity is New Zealand's most pervasive environmental issue.

New Zealand is regarded internationally as one of just 25 global biodiversity hotspots and this region's podocarp-broadleaf forests are at the heart of it.

New Zealand's Biodiversity strategy (MfE, 2000) generated a vision shared by all New Zealanders "to halt the decline of native biodiversity" by 2020.

The Resource Management Act amendments in 2003 extended Regional and Local Governments legal responsibilities to maintaining native biodiversity. A regional biodiversity policy to this effect is yet to be drafted.

The scope of this Council's native biodiversity activity in the Long-Term Council Community plan 2004-14 (LTCCP, 2004) states; "The native biodiversity activity focuses on halting the decline of native habitats and species within the region and ensuring the survival and restoration of significant native habitats on private land". This mission statement is aligned with the outcome of New Zealand's biodiversity strategy (MfE, 1998; MfE, 2000A; MfE, 2000B) and recommendations made by the Parliamentary Commissioner for the Environment (PCE, 2001).

This technical report summarises policy-relevant information from this new science. Essential biodiversity inventories will produce baseline information that supports effective biodiversity policy development and its efficient implementation.

Figure 6-1: Lowland podocarp-broadleaved forest. Key native ecosystem remnant. Prime endemic species habitat and significant biodiversity asset. Bushy Park Wanganui (HJ Janssen).

2. ISSUES / PRESSURE

2.1 THREATENED NATIVE ECOSYSTEM PROCESSES

This region's most pervasive biodiversity issues are the combined effects of nearly 80% of native forest habitat being lost since 1840 and the impacts of introduction of animal pests. Many of this region's relatively recently isolated native animal and plant populations are now under siege by introduced predators, such as stoat and feral cat; omnivores such as possum, ship rat, pig, hedgehog and herbivores

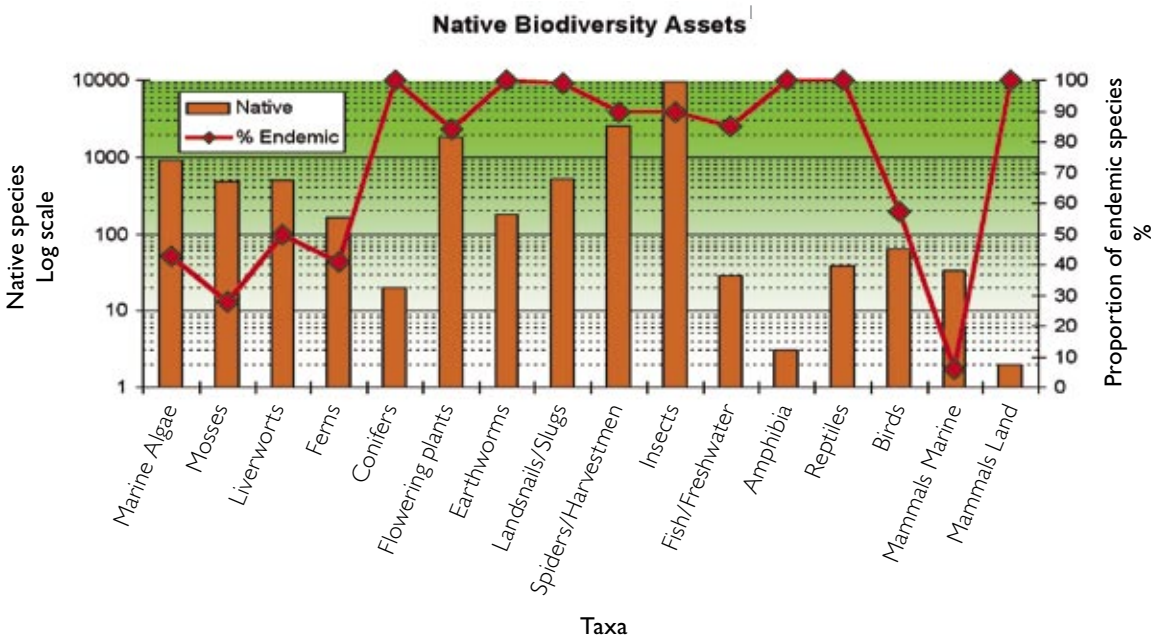

Figure 6-2: New Zealand's Biodiversity Assets.

This region's podocarp-broadleaf forest ecosystems contain the bulk of New Zealand's biodiversity assets (Wardle, 1983; Godley, 1985). Almost all of its species (flowering plants, conifers, invertebrates, amphibians, reptiles and forest birds) are endemic to New Zealand (Fleming, 1979). They occur nowhere else.

The vast majority of New Zealand's endemic species are forest dwellers (as forest covered most of New Zealand in pre-human times). Fewer endemic species occur outside forest ecosystems and many indigenous species have disappeared from deforested areas.

In New Zealand, 75% of all native trees are bird dispersed and tree species make up 33% of all plant species in New Zealand (Anderson et al in press, Brockie, 1992). This contrasts with other temperate regions of the world, where on average 25% of all trees are bird-dispersed and tree species make up just 9% of all plants.

[1] Number and proportion of endemic species that typically inhabit an ecosystem can usefully prioritise sites. The vast majority of endemic species inhabits lowland native forest ecosystems.

Plants rely on birds (and insects) for pollination and seed-distribution and can provide reliable food-resources that once sustained abundant and diverse native bird populations.

Recent research[2] has confirmed the importance of native birds for the effective:

- Pollination of many native plants, irrespective of flower size and,
- Seed-dispersal of most native forest plants.

Where native birds are absent, neither introduced birds, nor insects are effective surrogates that could prevent widespread pollination failure (resulting in low fruit set and fewer seeds per fruit) (Castro, 1997; Hinsley, 2000; Ward, 2003).

Seed-dispersal rates on the mainland are significantly reduced to 20%, compared to 94% on an offshore island native bird sanctuary, despite seed dispersal by some introduced birds (silvereye, starling, blackbird, thrush and myna). Pollination failure and reduced seed-dispersal rates are due to:

1. Extinction (huia, piopio…) and mainland elimination (hihi, saddleback, kokako) of 45% of New Zealand's native bird species (Castro, 1997).
2. Low density (kereru) and range contraction of most remaining native birds (tui, bellbird, kokako, kaka, weka, whitehead) and invertebrates (Brockie, 1992; Spurr, 2000; Ward, 2003).

Any biodiversity management strategy must revive remaining plant, bird and invertebrate populations in order to restore symbiotic links and resilience to native ecosystem processes (Meurk, 2000; Janssen, 2004; 2002).

Forest ecosystems that have been reduced below 20% of their original size (see Figure 6.3) breach a resilience threshold (Meurk 1998). They may collapse, with species extinctions in free-fall.

[2](Anderson SH, et al, in press; Murphy, 2001; Williams, 1996; O'Donnell, 1994).

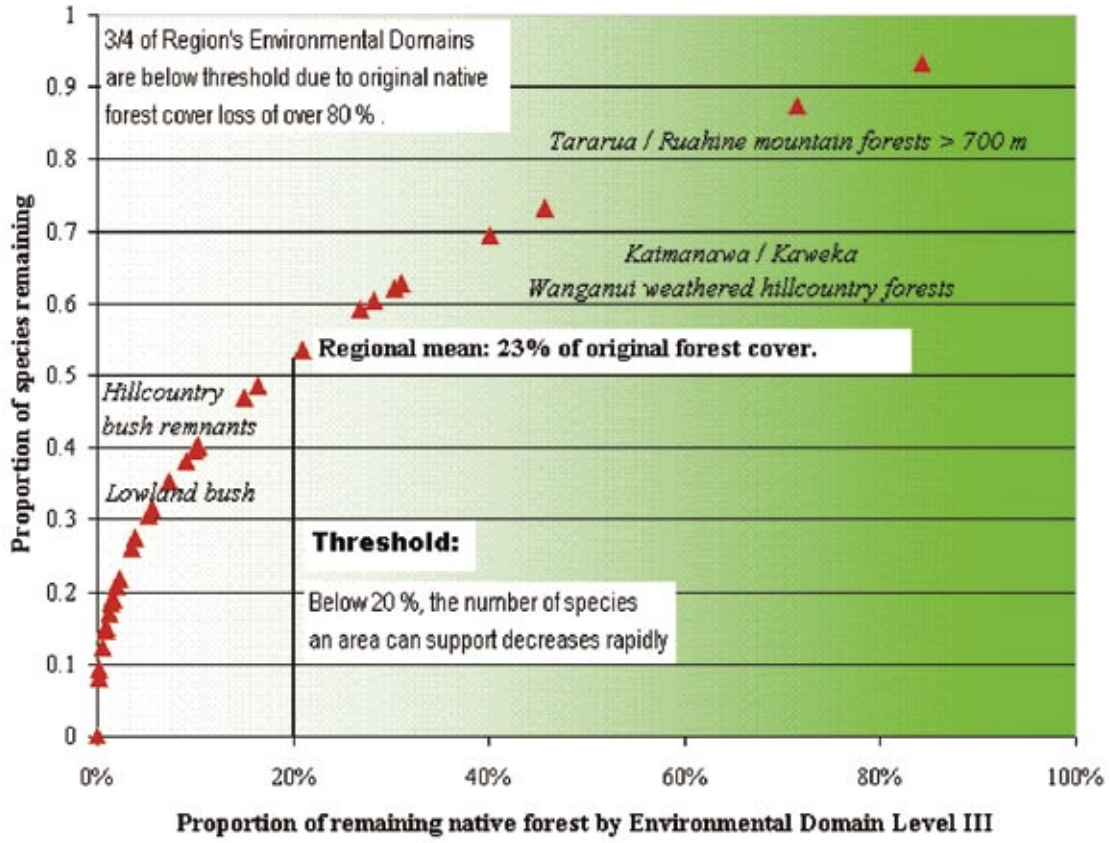

Figure 6-3: Remaining Native Forest cover for each Environmental Domain in relation to pressure on species diversity

Each red triangle represents one of 37 Environmental domains[3] (Leathwick, et al, 2002) at level 3 that cover the Manawatu-Wanganui region. The position of each triangle in relation to the X-axis shows the amount of native forest remaining compared to its original extent. Any habitat loss predictably reduces species diversity (compare to Y-axis) (Williams GR, 1982; Schreiner, 2003; Simberloff, 1985; Flux 1989).

Substantial habitat losses have already extinguished many endemic populations from these domains. Many more will happen unless decisive action is taken to prevent further extinctions. "Extinction debt" is the term used to describe the combination of factors (small habitats; isolated plant and animal populations under pressure from weather extremes; introduced predators and competitors) that drives continuing biodiversity decline, which follows initial habitat loss. Since most habitat loss has occurred relatively recently (100-150 years), actual species diversity in this region's bush remnants may therefore nonetheless be higher, compared to the prediction shown on Figure 6.3.

What ever the case may be, decisive restoration of ecosystem processes, particularly through establishment of corridor linkages is required in 75 % of this region's environmental domains, where habitat loss has breached the 20 % threshold (Meurk, 2000b). This includes most lowland and hill country environmental domains.

[3]An environmental domain is a spatial framework for addressing conservation and resource management issues. Environmental domains are areas with similar environmental influences on inhabiting biota (life forms). Definitions are based on climatic and substrate variables that are relevant to forest tree growth and which are the non-living components, used to define ecosystems. Environmental domains reflect the tessellated (scale-dependant) extent of possible forest communities and unmodified native ecosystems. Today they often include modified cultural landscape, hence the term environmental domain rather than ecosystem. Level 3 defines environmental domains at a scale suitable for regional monitoring and reporting.

Just two environmental domains retain adequate native bush cover and they are both mountain forest ecosystems in the central ranges. The environmental domains associated with the volcanic plateau, the Kaimanawa, Kaweka, Hauhungaroa and the weathered Wanganui hill country have lost over half their original forest cover.

When 80% of a habitat has been lost (20% remaining), a threshold is breached where species loss proceeds at unacceptably unsustainable levels. Native forest cover is under-represented and all remaining native bush remnants are therefore considered significant in terms of RMA section 6c (Norton, 1999).

The region clings onto this threshold with its 23% native forest cover, a third of which is privately owned lowland and hill country forest, much of it highly fragmented and unfenced.

For 75% of this region's environmental domains, particularly native lowland and hill country ecosystems, this threshold is already breached.

However, many expected extinctions can be prevented with empathy towards our native heritage and determined and collective effort (Meurk, 2000; PCE, 2001; Janssen 2004).

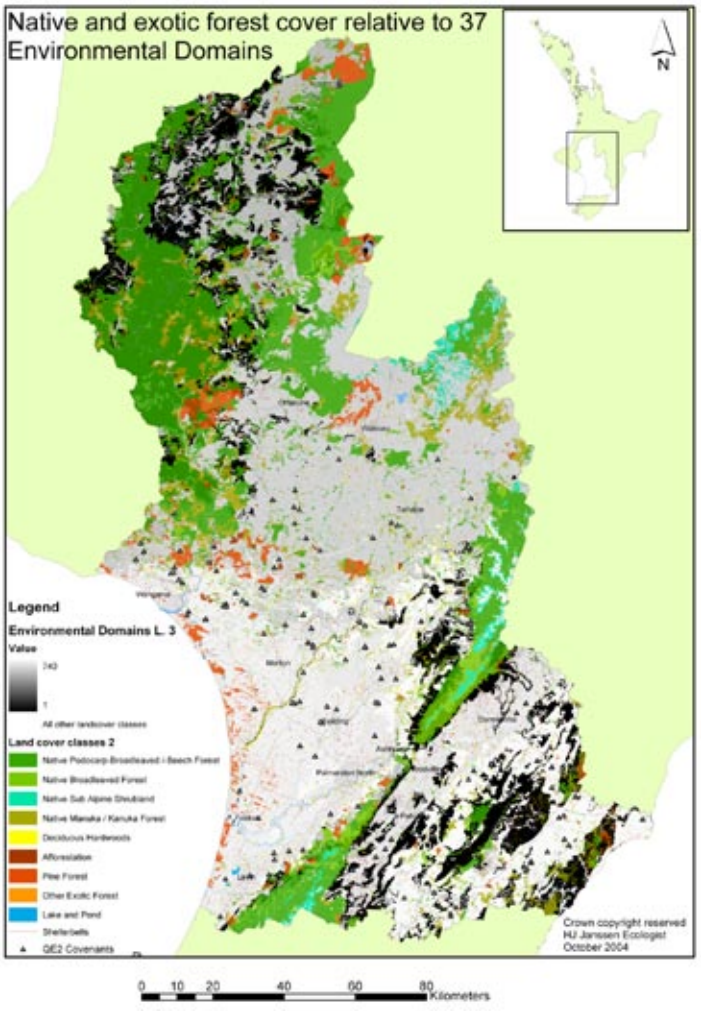

Figure 6-4 Regional native and exotic forest cover relative to Environmental Domains level 3.

2.2 PLANT PESTS

Environmental plant pest can be characterised as being particularly tolerant to shade or extremes in temperature and water-availability (Grime, 1979; Delcourt 1987). As vigorous climbers[4] and shade tolerant groundcover[5] or woody plants[6] they are problematic at forest edges, in lowland native forest remnants, wetlands and alpine environments[7].

As landowners take a greater interest in protecting and enhancing stands of native bush on their property, Horizons Regional Council is being increasingly called upon to provide advice on the control of environmental plant pests. Pest plants such as old man's beard (*Clematis vitalba*), banana passionfruit (*Passiflora mollissima*), moth plant (*Araujia sericifera*) and Tradescantia (*Tradescantia fluminensis*) can cover forest edge or forest floor, preventing regeneration, and can extend into the forest canopy where they are capable of smothering mature trees if left uncut and untreated. *Pinus contorta* and shade tolerant exotic conifers, such as Douglas Fir (*Pseudotsuga menziesii*) can become a significant threat to native ecosystems and the alpine environment. *Pinus contorta* and Douglas Fir seedlings are already naturalizing in the tussock and herb fields on Mount Ruapehu.

Some plants pests can expand following animal pest control operations, highlighting the need for integrated pest control that abides by the law of diminishing returns wherever eradication is not an option.

Generally, good progress was made in the areas of Horizons and DoC control plants, bio-control, education and information. However, a number of areas of concern remain:

- The number of old man's beard sites outside of containment areas continues to increase (in part due to increased surveillance).
- Data inconsistencies or gaps in the monitoring records.
- There is a relatively low priority on site-specific plants.
- Several regional surveillance plant pests are more widespread than originally thought.
- Where control is not well coordinated between neighbours there is a high probability for reinvasion of plant pests.

4 Old Man's Beard (*Clematis vitalba*), banana passionfruit (*Passiflora mollissima*), moth plant (*Araujia sericifera*).

5 Tradescantia (*Tradescantia fluminensis*).

6 Barberry (*Berberis darwinii*); tree privet (*Ligustrum spp*); Douglas Fir (*Pseudotsuga menziesii*) and other shade tolerant exotic conifers.

7 Hornwort in lakes and wetlands *Pinus contorta* and Douglas Fir.

2.3 SUSTAINABILITY OF NATIVE FORESTRY

The past four years have seen a significant increase in both area and volume harvested from virgin native stands. Three sustainable forest management plans were issued in the region allowing an annual harvest of 2,054m^3 for 50 years over the Ruapehu, Manawatu and Stratford districts, encompassing a total area of 1,227ha.

Seventy-two sustainable management permits (issued for 10 years) apply to a total of 9,289ha. Eighty-six personal use permits are operational for a 10-year period and a total timber volume of 2,887m^3.

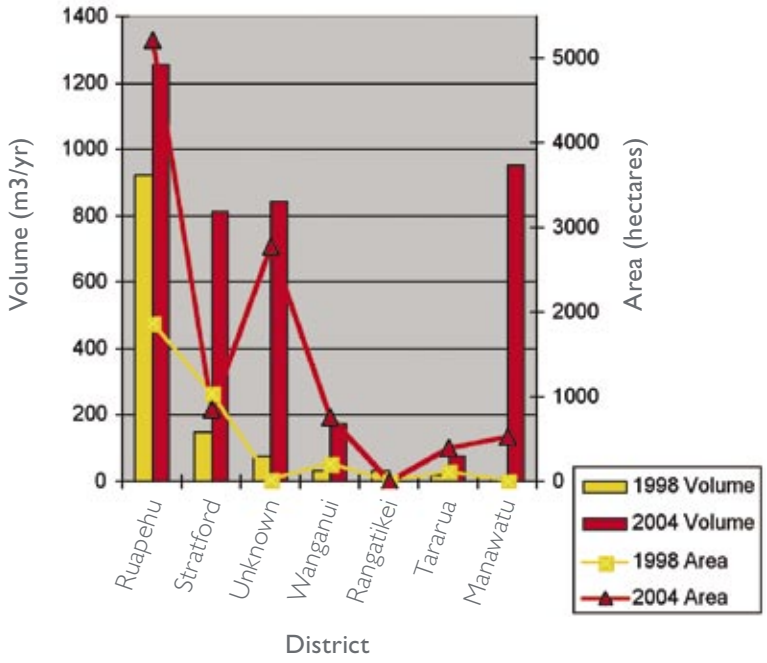

Figure 6-5: Significant increase in area and volume harvest from natural native stands between 1994 and 2004 by District. Where a district is unknown the postal address is outside of the Manawatu Wanganui Region, in which case the privacy act prevents disclosure of logging operation site.

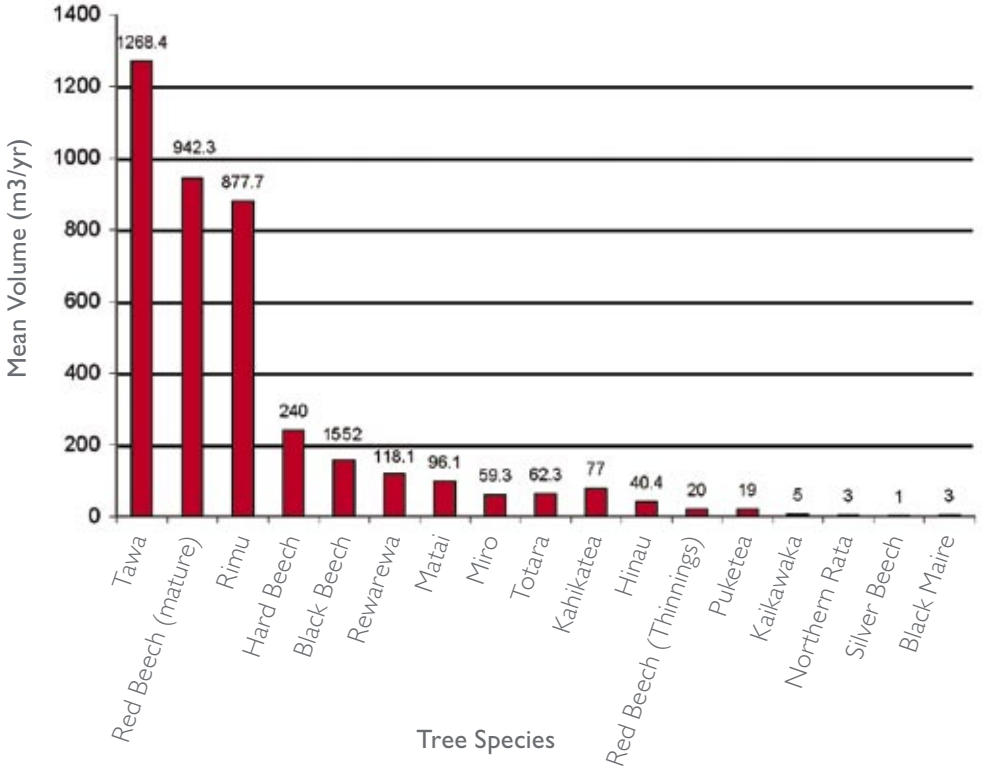

Figure 6-6: Mean annual timber-volume harvested by native species.

Sustainable permits and plans cover 10,510ha, more than twice the area under QEII covenants. Forest owners increasingly manage their forest capital sustainably by harvesting second-grade male trees and protecting top quality female seed trees. They realise that it is in their best interest to avoid over-harvesting.

We can neither confirm a net loss of native cover, by conversion to pasture, pines or native timber harvest, nor a net gain through natural regeneration, reversion because:

- Any native cover change is within the error margins of remotely sensed data and,
- Monitoring of harvesting-effects on biodiversity and adequate retention of top quality seed-trees is under-resourced.

In contrast to harvest of native timber species, there where also areas of natives that were planted. In 2003-04 native trees were planted for conservation or amenity purposes at 30 sites, totaling 18 hectares, a promising start. However, planting needs to be scaled up significantly in order to mitigate ongoing pressures on native remnants' and populations' survival.

[8] Note: While all key native ecosystems will also be significant native areas (SNA), not all SNAs are necessarily key native ecosystems. Some SNAs may be significant for other than ecosystem-process-sustaining purposes; for example an under-represented habitat-type or the presence of rare or distinct species. The most efficient way to maintain native biodiversity is by restoring key native ecosystem processes, while maintaining other SNAs

2.4 BUSH REMNANTS UNDER SIEGE

Many forest remnants were severely damaged as a result of increasingly common climatic abnormalities, such as the:

- Drought in 2003,
- Floods and storms of February 2004 (Kitchener park) and
- Cold winter and spring with snowfalls at lowland forest level (Totara reserve).

These events killed hectares of adult canopy trees such as shallow-rooting tawa (*Beilschmiedia tawa*) and emergent podocarps and highlight the importance to restore ecosystem functioning, rather than combating isolated issues.

These events diminish the food resources available to resident bird populations and generate opportunities for plant pest invasions. Where bush-edges had been planted up earlier and understoreys restored, their increased resilience reduced much of the damage seen elsewhere.

3. RESPONSE.

3.1 TOWARDS MAINTAINING INDIGENOUS BIODIVERSITY

The publication "Bush Vitality, A Visual Assessment Kit" (Janssen, 2004) helps users realise site-specific drivers of biodiversity decline and inspires land managers to restore resilience to the cultural landscape and maintain native biodiversity.

It is vital to understand all drivers of biodiversity decline to reverse this trend and maintain what is left. A biodiversity inventory is needed to help identify significant native habitats, key native ecosystems[8] and biodiversity monitoring and research needs (Norton, 1999; MfE 2000; Meurk, 2000; Janssen 2002).

Restoring key native ecosystem processes and maintaining linkages among native habitats, can effectively maintain native biodiversity and efficiently achieve our vision and responsibilities.

All historic biodiversity data has been digitized and can now be analysed. As a result we produced the "Issues and Options report for the Manawatu District's SOE report (Janssen, 2002)" and the Kahikatea Floodplain ecosystem report suggesting buffer and corridor zones for environmentally sustainable city expansion in Palmerston North (Janssen, 2002).

These innovative publications provide a useful overview of existing biodiversity information from historic data, spatial data layers and latest applied research. They were made possible through design and construction of ecoBase (regional biodiversity database). EcoBase contains all historically collected ecological data and its analysis in conjunction with spatial data layers provides a robust basis to generate preliminary lists of priority sites and identify inventory, monitoring and research needs. This information is essential to effectively maintain this region's native biodiversity.

We completed a pilot biodiversity inventory project that produces a list of prioritised wetlands for each of this region's Districts (Janssen, 2005). Information on threats to ecological wetland condition is used to develop restoration plans. Last year wetland owners and He Tini Awa trust, completed five wetland restoration projects. Four additional prioritised wetland restoration projects have started this year, and five further projects are planned.

3.2 VOLUNTARY PROTECTION

Within the region the Queen Elizabeth II National Trust protects 4,284ha of native bush and wetlands by legal covenant agreements. Stock is excluded from these covenants with over 330 km of fence. Sites range from 0.4 to 276ha, with a mean size of 20 hectares. Of the 212 covenant sites, 173 were registered from 1982 to 1999 and the remaining 39 sites from 2000 to 2004 and over 30 sites with registrations pending.

3.3 ANIMAL PESTS CONTROL

Predators threaten native chicks, eggs, and nesting birds. Kokako and hihi have now completely disappeared from our region apart from predator-controlled reserves, while many other native forest birds remain at risk. Kiwi populations are declining by 5% per year.

Intensive predator control is carried out in only a few reserves and mainland islands. The main areas are at:

- Raurimu and Rangataua; to protect kiwi and bats.
- Manganui a te Ao to protect blue duck.
- Paengaroa; 100ha is being controlled to protect sensitive divaricating plants and Robins.
- Bushy Park 110ha is being controlled to protect kiwi and other birds.
- Mt Bruce; 600ha is being controlled to protect kaka and enable kokako release.

Integrated predator, possum and rat control is considered necessary at regular intervals at key native ecosystems and at significant native sites.

Figure 6-7: Effective possum eradication
Photo Horizons Regional Council archives.

Possum are climbing omnivores and as such plunder birds nests and reach every part of the forest, feeding on buds, flowers, fruits and leaves, changing the structure and composition of forests, where they are not controlled. Canopy collapse has irreversibly altered tens of thousands of hectares of Rata-Kamahi and Mountain Cedar forest in our region, particularly in the Ruahine ranges and where possums are not controlled their browsing of other palatable species would ultimately devastate indigenous forest structure.

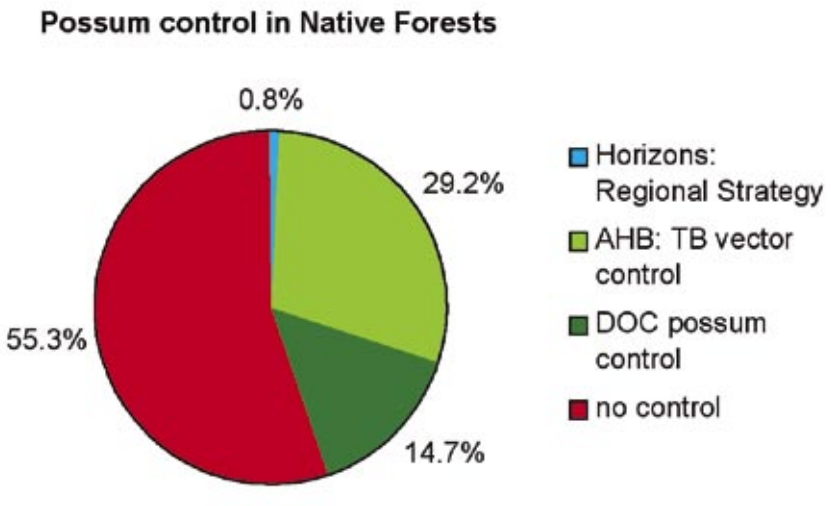

Figure 6-8 Possum control is carried out on about 45 % of native forests.

- Department of Conservation controls possum in 110,000 ha of native forest (15 %).
- Horizons Animal Pest Unit and other contractors control 219,000ha of native forest (29%) via the Animal Health Boards (AHB) Tuberculosis control program.
- Horizons Regional Council controls possum in 6,000ha of native forest (1%) under the Regional Animal Pest Management Strategy; 4,000ha of which have been classed as High Value Conservation Areas and 2,400ha are Possum Control Areas.

Goat and/or deer control covers 221,000 ha (29 %) of native forest and is managed by the Department of Conservation.

AHB operations have reduced by 25% over the past 2 years and this trend is thought to continue. Comprehensive pest control needs to continue and be targeted towards achieving specific outcomes for maintaining ecosystem processes and biodiversity to prevent further species extinctions and protect their necessary range expansion.

3.4 IMPROVING HABITAT CONNECTIVITY

Native trees were planted throughout the region at 30 sites, totaling 18 hectares.

It is clear that native plantations need to be scaled-up significantly to maintain native biodiversity and achieve associated environmental benefits (soil and water conservation, recreation, regional identity). A key driver for scaling-up native afforestation is the potential for afforestation programmes to provide a future sustainable native timber resource. Managed native plantations can re-connect key native ecosystems and will become an essential element that maintains native biodiversity.

Policy incentives backed up by generous environmental grants, biodiversity funds and carbon credits are now required to:

- Support pioneering land managers to initiate native plantations on deforested land (Janssen, 2004).
- Develop mixed-species plantation methods and apply silviculture techniques that can guide a natural succession of compatible exotic and native trees to sustainable permanent canopy native forestry (Janssen, 1992; 2004).

The "Bush Vitality Assessment kit's" "Integrated Management Strategy" chapter introduces reforestation methods that use a mixture of compatible exotic and native trees for this purpose. Joint workshops on compatible native afforestation and silviculture can inspire as experts and practitioners share their

Figure 6-9: Natural transition between reed land and wetland forest McPherson Forest and Bird Reserve.
Photo: Helmut Janssen.

The Manawatu-Wanganui region has important research needs to effectively restore its ecosystem processes and maintain its native biodiversity.

Biodiversity research now needs to:

1. Identify and confirm significant native habitats.
2. Identify and confirm native remnants in each environmental domain that retain some functionality and resilience (key native ecosystems).
3. Identify and confirm effective corridor linkages between key native ecosystem remnants to maintain their resilience long-term.
4. Identify and confirm native remnants that contain rare or distinct species or populations.
5. Develop and test effective integrated pest control in native remnants on private land.
6. Develop and test efficient native afforestation methods and silviculture practices to re-establish natural resources and maintain native biodiversity.

4. POLICY RESPONSE

4.1 PLANNING THE OUTCOME FOR THE REGION'S BIODIVERSITY

Imagine we are in the year 2020. Biodiversity research and monitoring results just confirmed that our region maintains its native biodiversity assets with no further decline since 2010. We look back and recall the decisions and actions that were taken.

In reporting on the state of the region's biodiversity in 2004, we realised that 20% of the time had already past within which New Zealand's biodiversity vision and our pledge to halt biodiversity decline was to be achieved. Sixteen years were left to accomplish this task.

We agreed on the following principles and drivers for success:

1. We maintain native biodiversity where we restore native ecosystem processes in the cultural landscape.
2. Enhanced native keystone species diversity, density and range are good indicators of restored native ecosystems processes in this region.
3. Priority or key native ecosystems are those relatively functionally intact native remnants where keystone and indicator species diversity is highest.
4. Wetlands and riparian zones are dynamic, habitat-diverse zones that are native migration corridors, connecting mountain with coastal native ecosystems.
5. Maintain wetland and aquatic biodiversity by restoring connectivity (mitigate perched culverts) and re-establish natural-vegetation riparian corridors.
6. Current voluntary mechanisms, including pest control provide important, but temporary relief to besieged native populations.
7. To restore ecosystem processes to long-term resilience, and take isolated native habitats off costly intensive care, they need to be reconnected within and between catchments.
8. Together we can shape a more resilient environment as sustainable resource managers integrate and enhance native ecosystem processes.

Consequently we agreed on the following course of actions:

1. Biodiversity research continues to provide regional information needs for effective biodiversity policy development and efficient implementation.
2. Inspire the public, set-up and support land-care groups to restore the resilience of identified key native ecosystems and their linkages.
3. Provide effective biodiversity policy and financial incentives to support innovative resource managers, who:
   - Maintain significant native habitats.
   - Manage comprehensive and successful pest control operations.
   - Establish and maintain biodiversity-enhancing riparian corridors.
   - Establish sustainable native forest resources for future generations.
4. Research and monitoring to demonstrate biodiversity management effectiveness and to update priorities.

In the year 2005 a preliminary list of such key native ecosystems was made available from historic data for each Environmental Domain in the region. Biodiversity inventory, research and monitoring needs were confirmed and approved.

The key native ecosystems list pinpoints sites where native biodiversity resilience can most efficiently be restored with comprehensive animal pest control and native afforestation that buffers and connects prioritised native remnants along riparian corridors, wetlands and across catchment boundaries.

The lists of key native ecosystems and the pest strategy's HVCA list overlap in part, which gave us a head start where pests were already controlled.

Throughout this time the Bush Vitality Assessment kit provided information and inspiration to guardians of any native remnant to effectively restore its vitality and ecosystem processes.

Public policy incentives, public funds and carbon credits support land managers to establish permanent forested corridors between catchments. A network of permanent-cover forest plantations composed of a succession of compatible exotic and native trees rapidly reconnected native remnants. The plantations' effective silvicultural management for sustainable timber production, soil and water quality and recreation purposes provide the incentive for efficient and coordinated pest control.

In 2005 people realised that together we could achieve New Zealand's biodiversity vision for this region and maintain it for us, the world and future generations.

Figure 6-10 Endemic podocarp forest. Unique biodiversity treasure and natural resource.
Photo: Helmut Janssen.

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