Progress toward achievement of Environment Waikato's Regional Policy Statement objectives:

Biodiversity and natural heritage

Environment Waikato
REGIONAL COUNCIL

This document is the first of a series of reports to be prepared to assess the extent to which Environment Waikato is achieving its Regional Policy Statement objectives. Such assessments are to be repeated at five-yearly intervals. The reports are in response to the Resource Management Act (RMA) requirement to monitor the efficiency and effectiveness of policies, rules or other methods (RMA, Section 35(2)). As well as assessing progress toward achievement of objectives, the reports are to make recommendations concerning future implementation, development and monitoring of the Regional Policy Statement and regional plans.

This report has been prepared by Maureen Marra and Urlwyn Trebilco, with substantial support from Karen Denyer. We wish to express our appreciation to the many other Environment Waikato staff members and external parties who have also contributed to this report.

Executive summary

This report assesses the extent to which the biodiversity (biological diversity) and natural heritage objectives in the Waikato Regional Policy Statement (RPS) are being achieved. The objectives are:

3.11.4 Objective: Maintenance of Biodiversity
Biodiversity within the Region maintained or enhanced.

3.15.2 Objective: The Region's Heritage
The protection of regionally significant heritage resources, and allowing subdivision, use, and development of other heritage resources, while ensuring that there is no net loss in the Region.

Implementation methods

Environment Waikato has undertaken a wide range of activities, and has committed significant resources into activities, which help to manage regional biodiversity. The methods include educational campaigns, financial support for projects, pest control activities, research, advocacy, support for care groups and other community groups, and consent requirements which help to maintain biodiversity.

This assessment reviewed the extent to which Regional Policy Statement and Regional Plan methods, which would help to support the biodiversity and natural heritage objectives, are being implemented. The main conclusion is that the large majority of these methods are being implemented. There is however less attention to the natural heritage methods, particularly matters such as landscape and amenity.

In some cases projects that have greatest potential benefit for biodiversity are undertaken for other purposes, for which biodiversity is a side benefit (such as possum control for Tb management, Clean Streams and the Peninsula Project, which are directed primarily at water quality and dune restoration for erosion prevention). As a result, monitoring of biodiversity gains from these programmes is not generally a high priority.

Resource use pressures

The assessment reviewed pressures on biodiversity and natural heritage in the region. In general, such pressures are increasing. These pressures include land use intensification, coastal development, residential development in sensitive areas, increasing spread of plant and animal pests and the risk of new pests.

Public response

General public support and awareness of the need for protecting biodiversity appears to be gradually increasing.

Achievement of objectives

In general it is clear that the two objectives are not being achieved. For some ecosystems and some parts of the region, the situation is better than for others. In general, the following observations can be made.

- The loss of geographic extent of biodiversity resources is in general less of a threat to biodiversity than the loss of the quality of biodiversity resources through pests, water pollution, habitat degradation and loss of connectivity (such as barriers to fish passage).
- Wetland ecosystems are still declining in geographic extent (largely through illegal drainage) and in quality.
- Possum control operations in forest areas have probably resulted in biodiversity improvement in treated areas, although possums still remain a significant threat to forest biodiversity. As a result of land clearance, lowland forest is now mostly represented in forest fragments, and these are generally unprotected.

- Stream/river water quality and ecological condition is continuing to decline in lowland areas, particularly in association with intensive farming activities. Many streams lack riparian protection and are accessible by farm animals. These factors imply continuing decline of stream/river aquatic biodiversity in these areas. Stream biodiversity is also under considerable threat from pest fish and aquatic weeds.

- Historically, there has been a very marked decline in the quality and biodiversity of lakes in the Waikato region. There is evidence that, at least in some cases, this decline is continuing. Some biodiversity improvements (or at least reduced degradation) can be expected in peat lakes, which have received a lot of attention in recent years. A major project to develop new rules to protect Lake Taupo water quality is well underway.

- In terms of marine ecosystems, Environment Waikato's main involvement and knowledge relates to estuaries. In general it is likely that biodiversity of estuaries is continuing to decline, particularly due to sediment input which is well above pre-human levels. Pests, nutrients and contaminants are also potentially threatening marine biodiversity.

- It is probable that Beach Care groups have reversed the decline of dune/beach biodiversity.

- Geothermal ecosystems have probably remained relatively static in recent years, although they remain under threat from energy extraction and weed infestations. Recent policy changes aim to manage these threats.

- It is very difficult to make comments about natural heritage trends because Environment Waikato has not determined which heritage resources and values have regional significance, and does not have good indicators for tracking the condition of the region's natural heritage. It is clear that the regional landscape is changing rapidly, particularly due to subdivision and housing development around Hamilton, adjacent to rivers, lakes and the coast, and in other accessible and attractive parts of the region. It is likely that this is resulting in the loss of some landscape and amenity values.

Recent initiatives

There are a number of recent initiatives being undertaken by Environment Waikato which could potentially improve management of biodiversity in the region. These include investigating, in conjunction with the Department of Conservation, a prioritisation process for biodiversity management efforts, establishing the Natural Heritage Partnership Programme, improving monitoring of permitted activities, establishing new rules to control activities such as stock in waterways, strengthening Resource Use group enforcement capabilities and linking biodiversity and biosecurity management.

Recommendations for improved implementation

Recommendations for implementation improvements include:

- improve communication of regional plan resource use requirements with key stakeholders
- develop guidance with respect to natural heritage resources and values to protect
- improve coordination of efforts to manage biodiversity and natural heritage with other agencies such as territorial authorities, Department of Conservation, Ministry of

Fisheries, Biosecurity New Zealand and Fish and Game Council
- raise the profile of pest management (particularly weed management) in Environment Waikato groups, particularly Resource Use group, Policy/Strategy group and River and Catchment Services.

A number of other improvements are suggested in the report.

Recommendations for policy development

A number of recommendations are also made with respect to future policy development, including:

- raise the profile of biodiversity objectives via the Regional Policy Statement review, to reflect recent changes to the Resource Management Act in terms of regional council responsibilities for biodiversity and to reflect the New Zealand Biodiversity Strategy
- provide more targeted objectives and policy for biodiversity and natural heritage, which more clearly indicate priorities for action
- develop stronger methods for biodiversity and natural heritage protection in regional plans
- seek to develop joint objectives, policies and methods for biodiversity and natural heritage management with territorial authorities, the Department of Conservation, Ministry of Fisheries, Biosecurity New Zealand and the Fish and Game Council.

Recommendations for future policy effectiveness assessment

The method chosen for assessing the effectiveness of policies and methods with respect to the biodiversity and natural heritage objectives has been successful although some improvements are suggested.

Tui.

Table of contents

1 Introduction

This report is to assess the extent to which the biodiversity (biological diversity) and natural heritage objectives in the Waikato Regional Policy Statement (RPS) are being achieved. This is in response to the Resource Management Act (RMA) Section 35 requirement which states:

[35(2) Every local authority shall monitor -] (b) the efficiency and effectiveness of policies, rules, or other methods in its policy statement or its plan.

The Act also states that:

(2A) Every local authority must, at intervals of not more than 5 years, compile and make available to the public a review of the results of its monitoring under subsection (2)(b).

To carry out these requirements, the approach taken focuses on RPS objectives as these represent the key RMA matters which the regional council is seeking to influence[1]. Assessing the extent to which the objectives are being achieved will provide a good indicator of the efficiency and effectiveness of the regional council's policies, rules and other methods in its RPS and regional plans. However, it is also important to consider not just the changes to biodiversity and natural heritage resources, but also changes to pressures on these resources, and the extent of implementation of methods. The analysis includes:

- a description and discussion of the relevant objectives
- an analysis of the extent to which relevant methods are being implemented
- a pressure/state description of key ecosystem types and other natural heritage resources
- recommendations for future policy development, method implementation and information collection.

Section 3.11 of the RPS describes Environment Waikato's issues, objectives, policies and implementation methods for biodiversity. It is important to note that the mandate to manage biodiversity has been strengthened since the RPS was drafted via changes to s30 (Functions of Regional Councils) of the RMA, and to the Local Government Act which allowed councils greater scope to address issues of concern to their residents. In addition, further direction has been provided by the National Biodiversity Strategy (February 2000). Environment Waikato also has biodiversity responsibilities through other legislation and national policies such as the Biosecurity Act and the National Coastal Policy Statement. Biodiversity is specifically addressed under Section 3.11, but is also a key component of other sections of the RPS including 3.5 Coastal, 3.4 Water and 3.7 Geothermal. These will be the subject of a future report.

Section 3.15 of the RPS describes issues, objectives, policies and implementation methods for heritage. Natural heritage is dealt with in this report, while cultural heritage matters will be the subject of a future report.

Native Bush, Te Kauri.

[1] Future reports will focus on other RPS objectives.

2 Understanding the objectives

In order to assess the extent to which objectives are being achieved, it is important to have a clear understanding of what the objective means. This section of the report therefore seeks to interpret more specifically what the objective is seeking to achieve. The section aims to discuss important assumptions and definitions, and to describe what success would look like for each objective.

2.1 Biodiversity

Section 3.11 of the RPS provides an objective, policies and methods to manage biodiversity. Biodiversity is defined as:

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

The objective is as follows:

3.11.4 Objective: Maintenance of Biodiversity
Biodiversity within the Region maintained or enhanced.

The issue which gives rise to the objective is:

Biodiversity is important in maintaining ecosystem viability. Biodiversity tends to be lost when ecosystems are broken up or damaged by inappropriate use of land or water, invasion by exotic plants or animals or unsustainable use of species. There has been a reduction in the range, extent and health of indigenous vegetation and habitats of indigenous fauna and this trend is continuing.

The biodiversity objective is very broad and it is not clear from the wording, what success in terms of the objective might 'look' like. The objective does not easily translate into indicators of the extent to which the objective is being achieved. The following observations are derived from the contents of the Biodiversity chapter in the RPS, to help better understand the intention of the objective.

1) Biodiversity comprises three levels of organisation (genetic, species and ecosystem diversity).

2) The main reason for maintaining biodiversity is so that the region's ecosystems remain viable.

3) To maintain or enhance biodiversity there must be no net loss of geographic extent, health (quality) or variety of living organisms in the region.

4) Although exotic species can be important, in general the emphasis is on maintaining and enhancing indigenous biodiversity.

5) Biodiversity is declining. To reverse this trend there must be changes to resource use activities and pressures in the region.

6) The main threats to biodiversity identified in the issue statement are:
   a) breaking up or damaging ecosystems by inappropriate use of land or water
   b) invasion by exotic plants or animals
   c) unsustainable use of species.

The National Biodiversity Strategy, published after the RPS was written, provides clearer guidance on biodiversity objectives in its goals and principles. Goal 3, for example, states:

Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified ecosystems in production and urban environments; and do what else is necessary to maintain and restore viable populations of all indigenous species and subspecies across their natural range and maintain their genetic diversity.

Note that the National Biodiversity Strategy is not a statutory directive but a clear indication of central government thinking. The strategy was prepared in response to the current state of decline of national biodiversity, and to help stem the loss of biodiversity worldwide, in support of New Zealand's commitment as a signatory to the International Convention on Biological Diversity.

2.2 Natural heritage

Section 3.15 of the RPS provides objectives, policies and methods regarding heritage. The section deals with both natural and cultural heritage, which are managed under objective 3.15.2. A separate objective relates to Maori heritage and this will be assessed in the Iwi Issues and Integrated Management sub-project.

Heritage is not defined in the glossary, but is described in the RPS in the following way:

Heritage is a complex resource that people perceive and value from many different perspectives. The Waikato Region's heritage involves aspects of the natural, physical and cultural environment, inherited from the past, which define the present and which will be handed on to future generations.

The Region's heritage comprises:

a. *Natural heritage – includes indigenous flora and fauna, terrestrial, marine, and freshwater ecosystems and habitats, landscapes, landforms, geological and geomorphic features, soils, and the natural character of the coastline.*
b. *Cultural heritage – includes sites, places, place names, areas, waahi tapu, taonga, structures, objects, artefacts, natural features of cultural and historical significance, historical associations, people and institutions.*

It may also be helpful to note the following definition of heritage from the Oxford Compact Dictionary:

***heritage 1** property that is or may be inherited; an inheritance. **2** valued things such as historic buildings that have been passed down from previous generations. **3** before another noun relating to things of historic or cultural value that are worthy of preservation.*

Heritage can therefore be considered to be valued elements of the landscape or environment that people wish to pass on to their children.

The objective is as follows:

3.15.2 Objective: The Region's Heritage
The protection of regionally significant heritage resources, and allowing subdivision, use, and development of other heritage resources, while ensuring that there is no net loss in the Region.

The issue which gives rise to the objective is:

Natural and cultural heritage resources are integral parts of the Region's heritage. Subdivision, use and development have the potential to degrade and destroy natural and cultural heritage.

The objective has a footnote which states that Appendix 4 provides criteria for determining significance of natural and cultural heritage. However the appendix only provides criteria for determining significance of cultural heritage. Therefore, although the objective specifically relates to regionally significant heritage resources, no guidance is given about what regional significance would mean in the context of natural heritage.

Appendix 3 of the RPS provides criteria for determining significant indigenous vegetation and significant habitats of indigenous fauna. This would therefore give some guidance in relation to significant natural heritage resources, at least in terms of indigenous vegetation and habitats of indigenous fauna. The areas where guidance

is particularly lacking appear to be in relation to landscapes, landforms and geological and geomorphic features.

Heritage is really about how people value places, and their spiritual or cultural connections to them, whereas biodiversity is about more tangible (that is, biological, chemical and physical) characteristics of ecosystems. One cannot therefore conclude that satisfying the biodiversity objective will necessarily achieve the heritage objective regarding living organisms.

It should be noted that the policies and methods for the objective do not envisage regionally significant heritage resources being inventoried. Instead, the significance of particular heritage resources is to be assessed on a case by case basis through district plan development processes and through resource consent processes. The objective is to be achieved by providing adequate protections to heritage resources through these processes, as well as through education and general advocacy.

Opoutere Harbour, Coromandel.

3 What Environment Waikato has done about biodiversity and natural heritage

To understand how effective and efficient the biodiversity and natural heritage methods have been, it is important to know the extent to which they have been implemented. As part of the research for this report, questionnaires were constructed based on the key methods in the RPS, Regional Plan and Regional Coastal Plan which would work to promote or enhance biodiversity and natural heritage. In the RPS, the methods for achieving the objective broadly fit into the following categories.

a) The development of regional strategies and management plans.
b) The development of inventories and monitoring programmes, and research support.
c) An environmental education/information programme.
d) Community partnerships.
e) Funding and incentives for the restoration and protection of ecosystems.
f) Advocacy and promotion of biodiversity issues.
g) Regulatory mechanisms.
h) Direct action.

The Environment Waikato groups that are responsible for each method were determined and individual questionnaires relevant to each group were constructed. Various group representatives were surveyed using these targeted questionnaires to assess implementation. The following is a summary of implementation of the key biodiversity and natural heritage methods[2]. Further details of implementation methods are also described in Section 4 of this report, in relation to specific ecosystems.

3.1 Implementation methods supporting biodiversity and natural heritage objectives

A Strategies and management plans

- Waikato Regional Pest Management Strategy. Environment Waikato's Regional Pest Management Strategy 2002–2007 sets out management programmes for 85 plant pests and 22 animal pests. Environment Waikato works in conjunction with the Department of Conservation and neighbouring regional councils on pest control.
- Regional Plan (regulatory framework for resource use).
- Regional Coastal Plan (regulatory framework for resource use in the coastal marine area).
- Long-Term Council Community Plan (budgeting, strategic and annual planning).
- Biodiversity Action Plan (Environment Waikato's stated intentions to integrate biodiversity across the organisation).
- Catchment plans (including Whaingaroa Harbour, Waihou River catchment, Peninsula Project and Taupo Nui a Tia).

B Monitoring, inventories and research

Many of Environment Waikato's monitoring programmes and inventories are not specific to biodiversity. However, many of the regional environmental inventories and monitoring programmes have relevance to biodiversity, particularly regarding the extent and health of ecosystems. Primarily, threats to, and the state of ecosystems, are monitored and/or the diversity and extent of ecosystems is recorded.

[2] A more detailed summary of the surveys is in Environment Waikato document #1077191. The completed surveys are in documents #1082237 (Environmental Education), #1082224 (Policy), #1082246 (Resource Information Group), #1082690 (Strategy and Biosecurity), #1082693 (River and Catchment Services) and #1080676 (Resource Use Group).

These programmes include the following.

Biological monitoring/inventories

- Database (list) of threatened species (not location information).
- Significant sites inventories (including key ecological sites – priority areas for pest control, inventories of significant sites in Otorohanga and Waitomo districts, priority wetlands for management on dairy farms).
- Regional vegetation inventory (GIS maps with some attribute data).
- Geothermally-influenced vegetation inventory.
- Freshwater fish distribution.
- Freshwater biological resources. This data set is a compilation of surveys describing freshwater biological resources in the Waikato region. Surveys have been done for various reasons, but primarily to form a baseline record.
- Regional ecological monitoring of streams. This monitoring uses a biosurvey technique incorporating water quality and physical habitat assessments. Its purpose is to characterise regional stream habitat quality, biota and degradation for evaluating mitigation options.
- Coastal resource database. This is an online database of literature and projects related to coastal ecosystems.
- Estuarine vegetation maps.
- Regional Estuary Monitoring Programme (REMP). This is ongoing monitoring which includes monitoring of intertidal benthic invertebrates, and sediment parameters such as sediment micro-algae, sediment nutrients and carbon. The physical aspects include sediment grain size parameters, as well as sediment elevation monitoring.
- Wetland condition monitoring (selected freshwater wetlands).
- Fish passage barriers in some catchments.

Physical monitoring/inventories

- Geothermal surface features change monitoring. Regular monitoring is intended to identify significant changes or potential threats to the features.
- Land cover database (versions I and II).
- Land tenure database of property details including a cadastral database, legally protected areas in Department of Conservation estate and Queen Elizabeth II National Trust Covenants on privately owned land.
- Coastal beach profiles.
- Coastal structures database.
- Estuarine sediment monitoring. Sediment characteristics for a number estuaries are monitored for long-term trends of sedimentation and nutrients.
- Surface water levels of rivers lakes and tides. Data has been collected to monitor extreme levels and to characterise the nature of water resources.
- Farm points and farm boundaries (AgriBase).
- Archaeological sites.
- Community biodiversity projects database.
- Land Environments of New Zealand (LENZ).
- Bioclimatic zones.
- Ecological districts and regions.
- Water quality monitoring/inventories of geothermal sites, lakes, streams/rivers, and coastal water.

Research support

Environment Waikato is a management agency and therefore carries out little direct research itself, but it works with universities, consultants and crown research agencies to support research into ecosystem functioning, the effects of pests and other pressures on biodiversity, and restoration techniques. The council also supports science conferences, research and staff publications. Research that has been supported by Environment Waikato includes:

- the distribution of long-tailed bats in urban areas
- seasonal movement and diet of tui and bellbirds in the Hamilton basin
- impact of marine farming, including carrying capacity in the Firth of Thames for mussel aquaculture
- nutrient enrichment and tracing the origin of estuarine sediments
- catchment to sea sediment transport modeling

- impacts of sea level rise
- mangrove spread
- biodiversity of urban streams
- indicators of river and lake health
- biodiversity significance of ephemeral streams and karst systems
- risk analysis for Firth of Thames wetland (Ramsar site).

C Education/information

Environment Waikato has developed a comprehensive promotional and educational programme on the region's biodiversity that includes:

- fact sheets and web pages on the value and management of scrub, wetlands, native forest, mangroves and dunes, and local planting guides for restoration projects
- a management plan template for wetlands and prioritisation tools to help land owners and resource managers assess relative value of natural areas and manage them appropriately
- content on the Environment Waikato website that contains general information and indicators of the state of the environment – www.ew.govt.nz/enviroinfo
- Biodiversity Advice Waikato on 0800 BIODIV – this is a freephone system for biodiversity advice that is run in conjunction with the Waikato Biodiversity Forum
- field days and information days
- public presentations
- competitions
- support for 40 of the region's schools on the Enviroschools programme
- support for the Farm Environment Awards, which promote environmental issues and recognise good practice on farms.

D Community partnerships

Increasingly, working with the community is becoming more important as the community becomes more informed and engaged through the various education programmes. The number of Environment Waikato supported care groups in the region has increased from two in 1992 to 35 in 2005. There are currently 184 community based, biodiversity related projects underway in the region. Some projects are specifically biodiversity focused, all are intrinsically ecosystem based. Environment Waikato is also working with various groups to improve the land use activities of foresters, farmers and earthmovers.

Formal community partnerships which Environment Waikato is actively involved with include the following.

- Waikato Biodiversity Forum – a coalition of management agencies, community groups, iwi representatives, research institutes and individuals with a collective interest in working towards a shared biodiversity vision.
- Fonterra Accord – a guide for farmers on managing dairy shed effluent. It provides best practice management guidelines for farmers as part of the Regional Action Plan signed in May 2005 by Environment Waikato and Fonterra. The action plan is part of the dairy industry's Clean Streams Accord, where the dairy industry and Environment Waikato are working together to improve water quality in streams, rivers, groundwater and wetlands in dairying areas.
- Waipa Peat Lake Accord – for peat lake protection.
- National Wetland Trust – with plans to build a national wetland centre in the region.
- Eco-sourced Waikato.
- Queen Elizabeth II National Trust.
- Developing a community harbour plan for Whangamata.
- Working with Whaingaroa Environment Centre on estuarine monitoring in Raglan Harbour.
- Various community biodiversity projects such as the Maungatautari Ecological Island Trust, Waiwhakarere (Horseshoe Lake Restoration Trust) and Moehau Environment Group.

E Funding and incentives

In conjunction with the community and other agencies, Environment Waikato supports and/or provides expertise and funding for a number of regional ecologically based programmes that directly or indirectly promote, protect or enhance biodiversity and natural heritage. They include the following.

- The Natural Heritage Fund – a place-based conservation programme designed to secure permanent conservation assets in the Waikato region. The programme has funds available specifically for the purchase or other permanent protection of significant natural areas.
- The Environmental Initiatives Fund – where Environment Waikato supports community based projects. In 2004/05 the fund contributed approximately $240,000 to 26 community environmental and education projects. Grant recipients range from small rural schools to major community projects and individual conservation projects.
- The Clean Streams Programme – to encourage fencing for which Environment Waikato pays part of the costs

F Advocacy and promotion

As part of the assessment for this report, Environment Waikato group representatives were surveyed to ascertain how often they thought staff in their groups would advocate or promote biodiversity aims in their day to day work. All respondents from the Environmental Education, Policy, River and Catchment Services and Resource Use groups considered that such aims would be advocated or promoted always or often by staff.

Environment Waikato also carries out formal advocacy via submissions to national policy statements and strategies, neighbouring regional council policy statements and plans (where relevant for cross-boundary issues), district/city plans, district council Long-Term Council Community Plans and district council resource consent applications.

G Regulatory mechanisms

There are a number of rules in the Regional Plan and Regional Coastal Plan which have conditions or standards which may help to avoid, remedy or mitigate adverse effects on indigenous biodiversity. This is particularly so for rules related to wetland drainage, vegetation clearance, works in the Coastal Marine Area and takes, discharges or works in water bodies. Environment Waikato staff undertake a range of regulatory responses where such rules are not complied with. Table 1 shows the number of enforcement activities which were undertaken from March 2005 to March 2006.

North Island Kokako.

Table 1: Enforcement action taken by Environment Waikato – March 2005 to March 2006

Type of action	Number of actions
Infringement notices	
Dairy farm discharges to water	58
Dairy farm discharges to land which may enter water	40
Earthworks without adequate sediment control	37
Stream works	7
Works adjacent to a wetland	2
Vegetation clearance	3
Abatement notices	
Discharge of dust	1
Earthworks without adequate sediment control	4
Dairy effluent discharges	1
Investigations for possible prosecutions	
Contaminant discharge to land	5
Earthworks	2
Removing mangroves	1

Resource consents sometimes have conditions to avoid, remedy or mitigate effects on biodiversity and to a lesser extent natural heritage. However, there are not strong directions in the Regional Plan rules to support such conditions, and as a result, they are probably not employed sufficiently to offset the effects of resource use on biodiversity and natural heritage. This will need to change with the new regional council mandates for biodiversity protection in the Resource Management Act.

Resource use monitoring activities in some cases are providing some protections for biodiversity. One example is the recent drive to improve earthwork sediment and erosion controls in the region. This has resulted in a marked reduction in sediment run-off from roadwork and subdivision development sites. A developer recently calculated that during development of a 5.5 hectare subdivision site, sediment run-off into a Raglan Harbour salt marsh area would be reduced from a potential 176 tonnes (if the site had been uncontrolled) to only 8.8 tonnes, using sediment ponds and flocculants.

H Direct action

Environment Waikato carries out a range of works which can have direct biodiversity benefits. The work of the Biosecurity group and River and Catchment Services is particularly important in this respect. Examples include:

- river stabilisation works (including fencing and riparian planting)
- wetland restoration (such as at Opuatia near Rangiriri)
- pest control in key ecological sites
- possum control.

Kakabeak.

3.2 Methods where implementation could be improved

The research for this report has shown that the large majority of methods in the Regional Policy Statement and regional plans, which would help to achieve biodiversity and natural heritage objectives, are being undertaken. However there are some areas where implementation can be improved.

One key area relates to communication of Environment Waikato rules and requirements to resource users. Education for land owners, resource users and contractors regarding Environment Waikato's resource use requirements has been patchy. Generally the large resource users and industries, such as energy producers, territorial authorities, forestry interests and the dairy processing industry are reasonably well informed about council's regulations. However individual land owners and contractors (such as earthwork contractors and helicopter sprayer contractors) are often less well informed. While anecdotally staff know of situations where illegal works have been carried out as a result of ignorance of council regulations, and equally of situations where the rules were clearly flouted, it is unknown what proportion of illegal works were based on ignorance versus a disregard for the rules. Recently a letter regarding scrub clearance rules was sent to helicopter sprayers that resulted in an upsurge in consent applications for scrub clearance. This suggests that the rules were previously not clearly communicated.

There is sometimes a lack of regulatory response to illegal resource use activities. This may be due to a range of factors including illegal activities occurring without Environment Waikato's notice, a lack of understanding by the public (and sometimes Environment Waikato staff) about the environmental consequences of some illegal activities, lack of resources to respond to non-compliance issues, the cost to Environment Waikato of some enforcement activities and so on. What ever the reason, activities are continuing to occur in the region that are reducing biodiversity resources, but where there is no resulting regulatory response. For example, there is evidence to show that the region continues to lose wetland and indigenous forest areas (detailed in Section 4 of this report), and yet in the last 10 years there has been only one prosecution for forest vegetation clearance, and one for illegal works in a wetland. A prosecution for clearance of geothermal vegetation is pending.

Other specific Regional Policy Statement and Regional Plan methods that are not currently being implemented to any significant extent are as follows.

- RPS Biodiversity policy 3, implementation method 4: Working with territorial authorities, Department of Conservation and ministries to advocate for the establishment of conservation forests, marine reserves and other reserves to protect significant indigenous vegetation and significant habitats of indigenous fauna.
- RPS Biodiversity policy 3, implementation method 5: Promoting heritage protection orders and water conservation orders to protect significant indigenous vegetation and significant habitats of indigenous fauna where appropriate.
- RPS Biodiversity policy 3, implementation method 6i: Considering the use of economic instruments as an incentive to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna.
- RPS Heritage policy 1, implementation method 1: Through resource consents, identifying and providing for the protection of significant natural and cultural heritage resources, including the protection of views and sight-lines of outstanding natural features and landscapes.
- RPS Heritage policy 2, implementation method 3: Through environmental education programmes, providing education and practical guidance on how heritage resources can be maintained and encouraging land users to adopt management practices which

avoid, remedy or mitigate adverse effects on natural and cultural heritage resources.

- RPS Heritage policy 2, implementation method 4: Through education and information, encouraging an awareness of landscape values and the need for protection, by consultation with farming and forestry organisations, development and resource using enterprises, and conservation organisations.
- The management of weed introductions through consents for earthworks and works in waterbodies (s 4.3 and 5.1)
- Developing joint strategies with territorial authorities to address accelerated erosion in karst landscapes.
- The Regional Coastal Plan has some methods related to the protection of biodiversity in the Coastal Marine Area (such as 17.2.3 Consultation with the Ministry of Fisheries – to advocate for management practices to resource users harvesting marine life, that ensure marine ecosystems and fish stock are managed sustainably). Generally, Environment Waikato does not actively pursue such initiatives.

Kahikatea fruit.

4 Description of ecosystems

The following section focuses on each ecosystem type (palustrine wetlands, terrestrial, streams, lakes, marine, beaches and dunes, and geothermal). A state-pressure-response approach was used to identify changes in health and extent of these ecosystems, and to make assumptions about the biodiversity status. Environment Waikato response methods that relate to biodiversity and ecosystem viability are discussed, including regulatory, education, monitoring, enforcement, the supply of information, community partnerships and direct action, and the gaps and inadequacies in these methods are identified. A summary of the biodiversity trend is given discussing what is working and what is not, with recommendations for improvement.

4.1 Palustrine[4] wetland ecosystems

State/trend

In 1840 there were fewer, larger freshwater wetlands in the Waikato region. After 150 years of drainage, the large wetlands have been lost or split into small fragments. Today, most of the region's wetlands are scattered and smaller than 50 hectares. The once massive 25,840 hectare Gordonton peat bog, for example, now consists of just one 60 hectare remnant. Since European settlement, the extent of wetlands in the region has been reduced from 100,000 to 30,000 hectares.

The region's wetlands are ecologically important in that they provide breeding and wintering grounds for a range of wetland birds, including a number of endangered species. They support a diverse range of plants and animals, including a number of rare and threatened species that are specific to wet habitats. Two of the region's palustrine wetlands, Kopuatai and Whangamarino, are recognised as being of international importance. The region's peat bogs are unique to the southern hemisphere. Two plants now found only in the Waikato region of New Zealand, the giant cane rush *(Sporadanthus ferrugineus)*[5] and the threatened swamp helmet orchid *(Anzybas carsei)*[6], occur only in peat bogs. The Hauraki-Kopuatai peat dome is the largest surviving raised bog in the region and is considered unique in world terms. It supports a distinct wetland community, which includes a number of threatened fish, birds and species of plants, including the giant cane rush.

Threats/pressures

Wetlands continue to be lost. In 1995 there were 30,000 hectares remaining in the Waikato region. By 2002, a further 600 hectares were drained, mostly without resource consent. Most wetland areas are declining in health through weed incursions, particularly of willow and reed sweetgrass. Almost one third of wetlands are infested with willows. Wetlands have become one of the region's rarest and most at-risk ecosystems. The decline of these ecosystems is of biodiversity concern.

Wetlands face many pressures including stock incursions, peat mining, drainage, weeds, nutrients and sedimentation. Drainage, weed invasions and stock damage are the main threats. Drainage is a particular threat as the desire to extend agricultural investment takes precedence over wetland conservation. This is in part due to the perception some people hold that wetlands are waste land, and in part due to the nature of private property rights where land owners exercise their rights to do what they wish on their own properties, despite wetland drainage requiring a consent under the Regional Plan. The Fonterra Accord has set targets to fence and restore the hydrology to some of the region's wetlands bordering dairy farms, although to date the level of implementation is unknown.

4 Palustrine wetlands are areas of still, fresh water with emergent vegetation (as opposed to flowing water, ie streams, saline water, ie estuaries, and still water with submerged vegetation, ie lakes).
5 This species was formerly also present in Northland. A related species occurs in the Chatham Islands.
6 This species is also native to Australia, but in New Zealand has only been found in one wetland.

Response/methods

There are regulations in place that are specific to the protection of the region's wetlands. These include rules controlling the vegetation clearance from and the drainage of wetlands, water takes from lakes and wetlands, setting of water or bed levels and controlling discharges of contaminants to wetlands. There is a range of regulatory methods to protect areas of significant indigenous vegetation and significant habitat of indigenous fauna, which offer some protection for wetlands. In recognition of the continued loss of wetlands, Environment Waikato is preparing guidelines on wetland protection that explain rules about the drainage of wetlands. To date, there have been no prosecutions for drainage infringements.

Currently, the extent of the region's wetlands is mapped on a five-yearly basis, driven by the frequency of air photograph availability. Monitoring of wetland condition is undertaken for the Toreparu and Opuatia wetlands. Other agencies such as the Department of Conservation monitor other sites and the data for these are with Landcare Research.

Environment Waikato has produced a comprehensive information/education package of fact sheets and webpages on wetlands and their restoration. Awareness and community protection of wetlands has increased, with many care groups now working on restoring wetlands, and an increased number of covenants in place. Many land owners have registered Queen Elizabeth II National Trust Covenants over their wetlands to protect them in perpetuity. Most protected areas are smaller than five hectares. The largest area with covenant protection is 46 hectares of manuka wetland surrounding Lake Maratoto. About 10 per cent of the Queen Elizabeth II covenants registered in the Waikato region are for wetlands (about 34 covenants)[7].

Environment Waikato offers incentives for the protection/restoration of wetlands, streams and some lakes and has provided funds through the Environmental Initiatives Fund for this purpose. Environment Waikato is supporting the National Wetland Trust to set up a national wetlands centre at Rangiriri. Other Environment Waikato wetland initiatives include the following.

- Two wetland restoration community programmes are supported by Environment Waikato: Toreparu and Pungapunga.
- Restoration at Opuatia wetland (fencing, planting, willow control, hydrology and monitoring).
- In a new project in the Long-Term Council Community Plan, Environment Waikato will enhance wetlands created on flood/drainage scheme land where soil was excavated for building up stop banks. The project is driven by River and Catchment Services, who are currently looking at opportunities at Lake Waikare and Thames (Kaueranga River mouth).
- In the Coastal Wetlands Project, Environment Waikato inventoried 70 Coromandel coastal wetlands (including back dune wetlands). From this, sites have been prioritised and the top 15 have been identified for management action. Two have been targeted for establishment of community restoration projects and are in the early stage of development.
- Wetlands that border or are within dairy farms have been identified and assessed for regional significance as part of implementation of the Fonterra Clean Streams Accord. Environment Waikato has offered consultant advice to assist land owners developing management plans for priority wetlands on dairy farms. Those with multiple land owners are priority areas for establishing care groups over the coming years.

[7] Calculated from Queen Elizabeth II database held by Environment Waikato.

Gaps/issues

- Although wetlands are monitored through aerial photography and mapping, and through legal protection orders, there is not enough monitoring on wetland condition to be able to report on the state of wetland health across the region.
- Except for coastal wetlands, there are no proactive wetland programmes equivalent to those under the Fonterra Accord, for wetlands that are adjacent to non-dairy farms (that is, prioritising and targeting for management).
- The Fonterra Accord is restricted to 'regionally significant' wetlands, a subset of 'significant wetlands'. The definition varies between regions and is loosely applied to the larger, representative examples in the Waikato. There is little apparent implementation by the industry to date.
- Environment Waikato's direct action for wetland enhancement is limited.
- Wetlands are excluded from the Forest Accord (that is, they are not specifically protected from harvest or planting activities in plantation forests).
- There are no random checks on wetlands. Environment Waikato relies on consents being applied for and complaints from the public to be made aware of illegal works. There is often a reluctance to prosecute or take enforcement action because of the cost to ratepayers and the negativity surrounding this process in a climate of fostering goodwill, working in partnerships and responsible environmental management.
- There is no specific Environment Waikato budget targeted to providing financial assistance to land owners seeking to undertake wetland reconstruction.
- Land owners may be unaware that wetlands are eligible for Clean Streams funding for fencing.
- There is little integration with the Department of Conservation or Fish and Game with respect to management of wetlands since the Waikato Wetland Forum appears to have been disbanded.
- There is insufficient education to resource users, contractors and land owners regarding the rules designed to protect wetland biodiversity.

Summary and recommendations

The extent and health of wetlands in the region is continuing to decline. The two key causes are land drainage and weed infestations. It appears that despite efforts to educate the public about the importance of wetlands there is still evidence of wetland drainage that may be reflecting a lack of support for, and understanding of the need for wetland protection. It is recommended that efforts continue to build this understanding, particularly by targeting land owners in the vicinity of key wetlands. Greater efforts are needed to inform wetland owners and drainage contractors of the regulations. There is also a need to monitor compliance with wetland drainage rules, and stronger regulatory responses to non-compliance are needed. This will serve to inform land owners and resource users that Environment Waikato is serious about wetland protection. There is a need to increase the amount of wetland condition monitoring and strengthen links with other wetland management agencies to combine resources and coordinate monitoring and reporting.

Kahikatea forest.

4.2 Terrestrial ecosystems

State and trends

Currently about 25 per cent of the Waikato region remains in terrestrial indigenous vegetation cover. In the past 150 years the loss of indigenous forest has been a consequence of the establishment and expansion of pastoral farming and urban development. Forest fragmentation has resulted, and today around 88 per cent of the 4922 forest stands in the Waikato region are small fragments (less than 25 hectares)[8]. However, they have important biodiversity value because in some parts of the region these small forest fragments are all that remain.

Waikato forests represent a major component of the region's natural heritage. The Coromandel Peninsula has significant areas of high quality forest, such as the Waitekauri forest, areas of regenerating native forest and some areas of coastal forest. The entire catchments of many streams in the Coromandel State Forest Park are amongst the most pristine in the region, and provide important habitat for native fish and the endangered brown teal. In particular, the Moehau ecological area supports an almost complete altitudinal sequence of plant and animal communities from near sea level to sub-alpine conditions. It is home to a number of threatened endemic species (such as land snails and Archey's frog). The Pureora Forest Park includes unmodified altitudinal vegetation sequences, dense lowland, high altitude peat bogs and natural post-Taupo eruption vegetation. It also supports a number of threatened birds, bats and plants as well as regenerating native forest. Mounts Tongariro, Ruapehu and Ngauruhoe, which are included in the region's only National Park, have World Heritage status. The park features extensive beech forests, mountain tussockland, fernlands, sedge, rushland, mossfields and alpine plant associations. The Kaimanawa and Tongariro Forest Parks are also important terrestrial ecosystems. The western King Country forests include a complete altitudinal sequence of indigenous vegetation, from close to sea level to the crest of the Herangi Range. The Tawarau State Forest contains significant limestone and associated features.

Forests are important for biodiversity because most of the region's native terrestrial flora and fauna comprise forest and scrub ecosystems. In the Waikato conservancy, around 130 species of plants and 60 vertebrate animals are threatened with extinction. About 160 threatened species inhabit forest and scrub ecosystems in the Waikato region (K. Denyer, personal communication 2006). Some native species are endemic to the Waikato region. For example, Archey's frog is only found in Whareorino Forest and in the Coromandel Range. Although Environment Waikato does not have information that there have been recent extinctions from the region, there have been no natural re-introductions of native species. There have been a number of assisted introductions and translocations of native species[9], including the following.

- Native bird species:
  - brown teal to the Coromandel, which establishes another population in the area
  - southern takahe and North Island brown kiwi introduced to the Maungatautari Reserve
  - North Island weka – 101 captive-bred weka were released in the Karangahake Gorge area between 1992 and1996
  - North Island robin – reintroduction of 30 birds to Kakepuku Mountain in 1999, 30 birds to Mangaokewa Reserve in 2001, 30 birds to mainland remnants Barnett Reserve and Stephenson's covenant in 2001 and 41 birds to forest remnants in Benedale between 2002 and 2006.
- Tuatara – reintroduced to Whakau (Red Mercury) Island, nine adults and 12 juveniles released in 1996.

[8] http://www.ew.govt.nz/enviroinfo/indicators/land/biodiversity/index.htm
[9] http://www.massey.ac.nz/%7Edarmstro/nz projects.htm

- Skinks (marbled, Whitaker's, robust and egg-laying skink) – released on Korapuki Island between 1986-1993.
- Weta:
  - middle island tusked weta – 82 released on Double Island in 2001 and 64 released on Red Mercury Island between 2001 and 2002
  - Auckland tree weta – 52 adults released to Korapuki Island in 1997.

Monitoring of indigenous vegetation shows that forest and scrub are still being cleared for pasture and forestry, but the rate of vegetation clearance is declining. Scrub forests are often targeted as there is a perception that land forested in scrub is waste land. Almost all the forest clearance takes place where forests are not legally protected. As an example, between 1996 and 2002 around 580 hectares of forest were cleared from the Waikato district alone, all of which were from unprotected areas[10].

Pressures/threats

Vegetation clearance remains a threat to forest extent, distribution and connectivity despite the Forest Accord principle that significant native forest will not be cleared for plantation forestry. Clearance for forestry was the main reason for vegetation clearance nationwide between 1995/96 and 2000/01[11]. Vegetation cleared for forestry is mainly scrub and second growth forest. Environment Waikato recently granted a consent application to clear 600 hectares of second growth indigenous forest to establish an exotic forest plantation. In this case, a number of conditions were imposed to minimise effects on biodiversity, including requirements for 10 and 20 metre buffer strips (the larger strip for a major river) and a requirement that 278 hectares of remnant rimu-tawa forest be covenanted for protection in perpetuity.

The main pressures on the health of remaining areas of forest and scrub are animal pests browsing on plants and preying on wildlife, and stock and invasive plant pests that particularly pressure lowland and coastal forests. The greatest animal pest threats are from possums, ship rats and stoats, but also from goats, deer and pigs. These pests impact on the viability and health of ecosystems.

Response/methods

Environment Waikato does not have strong provisions in the Regional Plan for protection of indigenous forest. There are rules related to vegetation clearance, although these are for the purpose of erosion control rather than biodiversity or natural heritage protection. With the recent changes to legislation which give regional council's a much stronger mandate for biodiversity protection, this is a matter which should be addressed in future policy and plan reviews. Three infringement notices were issued between March 2005 and March 2006 for vegetation clearance.

Appendix 3 of the Regional Policy Statement provides criteria for determining significant indigenous vegetation and significant habitats of indigenous fauna. This is used to varying degrees by Environment Waikato staff. The Policy group currently strongly advocates for the use of this criteria for determining areas to be protected by territorial authorities. The Resource Use group and River and Catchment Services use the criteria less often. Despite this, these two groups do often advocate for protection of indigenous terrestrial vegetation in consent processes and when working with land owners.

10 Walker, S., Price, R., Rutledge, D. 2004. New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs. Landcare Research Contract Report LC405/038 prepared for Department of conservation, 76p.

11 Walker, S., Price, R., Rutledge, D. 2004. New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs. Landcare Research Contract Report LC405/038 prepared for Department of conservation, 76p.

12 Denyer pers comm. 2006, from GIS analysis.

Legal protection of areas of indigenous vegetation is the most effective way to ensure they are not cleared. Around 270,000 hectares of native vegetation in the Waikato region (45 per cent of the total) are legally protected as public conservation estate under the Conservation Act, Reserves Act or National Parks Act. About 70 per cent of the area of native forest in blocks larger than 100 hectares is legally protected as public reserves[12]. In addition many land owners have protected individual areas of native vegetation through Queen Elizabeth II National Trust covenants. The extent of these covenants, which mostly protect lowland forests, continues to increase from around 4000 hectares protected in 1992 to around 11,000 hectares in 2006[13]. Additional protection can occur through the Natural Heritage Fund that is available to purchase highly significant areas, and through Kawenata that is designed to protect land on Maori Trust Land. Some district councils also have protective covenants, often secured through provision of extra subdivision rights.

The viability of some forest and scrub ecosystems is enhanced through Environment Waikato's pest management strategies. Environment Waikato has had 140 sites in Waikato, Franklin and Thames-Coromandel districts assessed for biodiversity values as part of the process for prioritising areas for pest control. In addition, extensive possum control in conjunction with Department of Conservation and community groups has been undertaken at a number of key ecological sites that include:

- Te Tapui Reserve
- Hakarimata Range and private farmland
- Mount Karioi
- Moehau
- Whenuakite
- Harkers Reserve
- Pukemokemoke Reserve
- Bald Hill Landcare
- Kapowai Kiwi Group
- Moehau Environment Group
- Pukemore key ecological site
- Sharpe Road key ecological site
- Manaia Peninsula
- Papa Aroha Group
- Hunua Range.

There are currently 12 community possum control schemes in various stages of implementation or planning throughout the region. At the time the 2002 Regional Pest Management Strategy was completed, there were only six schemes. The Department of Conservation's pest management in the Waikato conservancy has also increased markedly over the past 15 years. In 1992, 1472 hectares were possum controlled. By May 2006 the controlled area had been extended to 108,563 hectares[14], which is about 20 per cent of the total area of native forest in the region. Some positive ecosystem responses to the 1080 programmes have been measured, including the following.

- Waipapa ecological area in the Pureora Forest Park has the largest population of kaka on mainland New Zealand. The number of kaka increased by about 271 after 1080 was applied in 1984, 1991, 1995, 1996, 2001 and 2002. The 20 monitored females all survived at Waipapa, but at nearby Waimanoa Forest, stoats killed at least five of nine nesting females.
- Robin nesting success at Pureora was 72 per cent following a 1080 operation in 1996. A year later the population had increased by 28 per cent, compared with a nearby area where no 1080 was applied, where robin numbers increased by only three per cent.
- Mistletoe plants have been all but eaten to extinction by possums around New Zealand, except in areas where 1080 is applied. In 1994 mistletoe was absent in Pureora Forest, but a year after an aerial 1080 operation the first plants were found.
- At Mapara Reserve there were just five kokako breeding pairs in 1989. By 1997 there were 44 after intensive use of aerial 1080 and other toxins at bait stations. Nesting success at

[13] Denyer pers comm. 2006
[14] Andrew Styche, Department of Conservation, Personal communication June 2006.

Mapara was 40 per cent over this period. In contrast at Rotoehu Forest where no 1080 was used, nesting success was much lower at 15 per cent.

- Thirty-two radio tagged kiwi, living in a large area of Tongariro Forest that had aerial 1080 applied in 2001, were thriving six months after the drop. Chicks had a 40 per cent survival rate, compared to five per cent before the drop.
- Pest control has been carried out in Whenuakite key ecological site. This is the largest intact area of lowland coastal forest in region.

Gaps/issues

- There are examples of forest and scrub areas having been illegally cleared where no enforcement action has occurred (compare with streams where over 100 infringement notices were issued in the year 2005/06 for stream-related offences).
- The Forest Accord cannot be relied upon by Environment Waikato to protect indigenous vegetation from clearance for plantation forestry, because the accord does not protect scrub, or any forest patches less than five hectares, or apply to parties who are not signatories to the accord.
- Many district councils also have rules regarding vegetation clearance[15], but there are some areas where there is no statutory protection for indigenous vegetation. Many district councils do not have the ecological expertise to assess application for vegetation clearance.
- There are no regulations for protection of terrestrial vegetation for biodiversity values. Rules are designed to protect soil and water quality.
- There has been no comprehensive monitoring of forest/scrub health other than on parts of the Department of Conservation estate and general surveillance of Queen Elizabeth II covenants.
- About 80 per cent of the remaining areas of indigenous vegetation do not receive any protection from pests.
- Many remnants of indigenous vegetation are not protected from stock and there are no regulations requiring such protection.
- There are very few areas that are totally pest free. The pest free areas are generally limited to offshore islands and to date, there is one predator-proof fenced reserve on the mainland.

Summary and recommendations

Animal pests, and to a lesser extent plant pests, remain the key threats to terrestrial indigenous biodiversity. Possum control operations have been shown to result in very significant improvements to forest biodiversity in treated areas. Ongoing pest control is therefore very important to the region from a biodiversity point of view. More comprehensive pest control targeting possums, rats, mustelids and ungulates at priority sites will lead to better biodiversity outcomes.

One of the biggest biodiversity and natural heritage boosts for the region is the development of the community driven pest eradication and restoration of the Maungatautari Reserve. When the project is complete, the reserve will be the largest (approximately 3200 hectares) pest-free, native forest area in mainland New Zealand. The biodiversity gain for the region includes the opportunity to reintroduce locally extinct taxa. The recent releases of North Island brown kiwi and takahe to the reserve are the first steps in this process. The Moehau Environment Group has similar plans for the northern Coromandel, but still has some way to go to engage the local

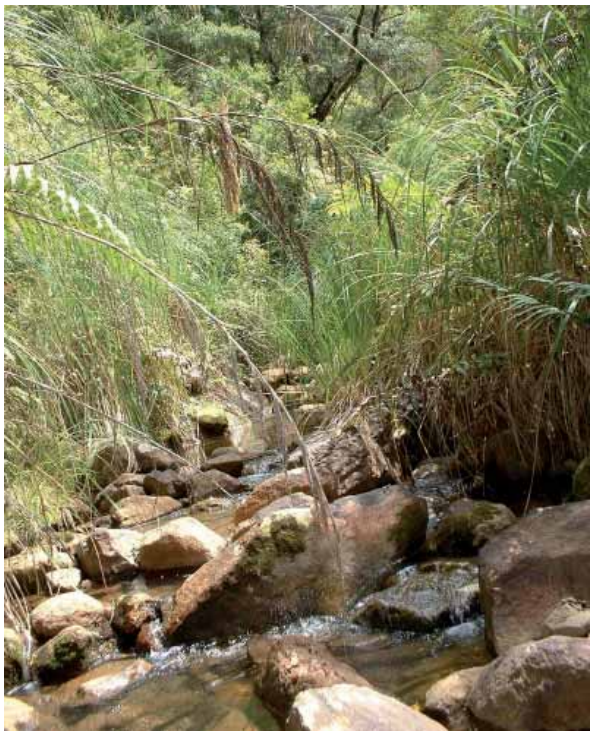
15 Tyrrell, 2002. Indigenous Vegetation Regulatory Protection Mechanisms for the Regional and District Councils in the Waikato Region, paper prepared for Environment Waikato, November 2002, document #792938.

16 See Appendix 1, Table 2: From Walker, S., Price, R., Rutledge, D. 2004. New Zealand's remaining indigenous cover: recent changes and biodiversity protection needs. Landcare Research Contract Report LC405/038 prepared for Department of Conservation, 76p.

community in this project. The translocations and releases of native species into forest patches, reserves and off-shore islands carried out during the 1990s and early 2000 years are significant biodiversity gains at specific, community and ecological scales.

There is a continued loss of extent of indigenous forests, although the rate is very small (perhaps 0.3 per cent loss in the region between 1996 and 2001[16]). The main issue in terms of extent of forest is the continued loss of small remnants, which can be the only remaining local examples of forest in many lowland areas. Many of these remnants are also threatened by stock access, as well as animal and plant pests. Reducing remnants increases patch isolation and reduces corridor jump stations. Fewer than 10 per cent of forest patches less than 25 hectares have any legal protection.

There should be consideration of stronger protections in the Regional Policy Statement and regional plans for indigenous terrestrial biodiversity.



Kirikiri Stream, Coromandel.

4.3 Streams/rivers/ground water depended ecosystems

State/change

Environment Waikato has mapped about 38,000 kilometres of streams in the region. Around 95 per cent of the mapped lengths are small streams. Many kilometres of small streams and springs remain unmapped. Many of these, including underground streams associated with karst landscapes, can have significant biodiversity values.

Environment Waikato has recently published a report on the patterns, trends and ecological condition of Waikato streams based on monitoring of aquatic invertebrates from 1994 to 2005[17]. This monitoring represents the only specific indication of stream/river biodiversity. It shows:

- invertebrate richness and abundance, MCI scores and ecological condition were mostly well below or below the average of all sites sampled throughout the region in Hauraki, Upper/Middle Waikato and Lower Waikato
- several measures of stream condition were well above or above average at the sites sampled in Taupo, West Coast, Waipa and Coromandel
- habitat quality scores were also below or well below the average in most assessments from Lower Waikato, Upper/Middle Waikato and Hauraki, and above or well above the average in most assessments from Taupo and Coromandel
- ecological condition appears to have been stable over the monitoring period at around three-quarters of sites, the remainder of sites show statistically and/or ecologically significant evidence of decline in ecological condition
- ecological decline appears greater in smaller lowland streams with higher proportions of upstream catchment development

[17] Collier, K. and Kelly, J. 2006. Patterns and Trends in the Ecological Condition of Waikato Streams Based on the Monitoring of Aquatic Vertebrates from 1994 to 2005, Environment Waikato Technical Report 2006/4.

- declines in water quality are attributed to changes in land use, particularly pastoral intensification and land drainage.

Other monitoring and research identified:

- the Waitoa River has very low diversity and abundance of fish, partly due to industrial discharges to the river
- the Waipa River has a good diversity of fish species, but at very low densities due to high levels of suspended sediment
- the rate of loss of physical habitat for indigenous fish has stabilised, principally because of rarity of unimpacted habitat rather than from recognition of its importance
- the major part of the region where culverts are considered to restrict migratory fish passage at most flows is the Coromandel Peninsula.

Threats/pressures

Threats to the region's stream ecosystems include:

- water abstraction
- structures
- pollution from nutrients
- sediment and heavy metals
- land use intensification
- riparian degradation.

The most significant threat for small streams is the loss of riparian vegetation, which results in stream bank erosion and the loss of stream protection. Many streams now lack surrounding forest and riparian canopy cover, thus are subject to in-stream habitat loss and high summer temperatures. The loss of substantial areas of wetland and bush covered stream habitat coupled with passage restrictions has affected fish populations, particularly because many indigenous fish are migratory and cryptic, preferring streams and rivers with abundant cover.

Other threats are as follows.

- At least half of the region's indigenous fish species need access to the sea but in many rivers and streams access is prevented by dams and culverts. Surveys of 377 Coromandel culverts and 194 culverts in the Whaingaroa catchment showed that only 24 per cent and 41 per cent respectively provided adequate fish passage.
- Aquatic habitat loss in some cases has been caused by stream channelling and river dredging.
- Although there are no data to support this assertion, it is expected that there has been a decline in native aquatic species caused by the competition and predation of non-native species such as trout, koi carp, catfish and mosquito fish.
- Harvesting and reduced spawning habitat (such as in wetlands) has resulted in the decline of whitebait and long fin eel populations.
- Nutrients and sedimentation have increased substantially due to land use intensification, including urban and peri-urban development. This is especially the case for small streams, ephemeral streams and springs.

Response/methods

Environment Waikato's Regional Plan has a number of rules for activities designed to protect stream and river habitats and aquatic ecosystem values. These include rules to control stock access to water bodies (including priority sites for stock exclusion), rules for stream works and structures, rules for works in riparian areas, rules to establish and maintain minimum water levels in some water bodies, rules for discharges and so on. A number of these rules have only recently become operative and have not yet been extensively implemented. As noted earlier, a number of infringement notices and other enforcement actions have been taken with respect to activities which can have adverse effects on stream ecosystems.

Agriculture is a major cause of stream degradation in the region. Environment Waikato is involved in a number of activities to reduce the impact of agriculture on water bodies, such as through the Fonterra Accord and the Clean

Streams Accord. The Farm Environment Awards are also very important as a means of promoting farm practices which protect water bodies.

Nutrient run-off to streams and rivers is a significant issue for the region, although its precise relationship to biodiversity is unclear. Environment Waikato is working with fertiliser companies and independent fertiliser consultants to promote the new fertiliser rule in the Regional Plan. In addition, Environment Waikato is supporting a range of research initiatives which are investigating the adverse effects of fertiliser and nutrients on water bodies, and researching farm management techniques that would reduce nutrient impacts on water bodies. Work has begun on Environment Waikato's sustainable agriculture project, which will eventually result in new policy and rules for managing the effects of farming on water bodies.

Environment Waikato is undertaking a range of educational programmes designed to result in improved stream management by land owners and others. Almost half of Environment Waikato's educational work is focused on riparian management. Some of these projects include:

- the Clean Streams campaign, launched in 2001 to promote availability of money for stream improvement works
- working with farm consultants, Fonterra and Federated Farmers to promote stream protection
- identifying the riparian areas at risk.

The integrated catchment management project is a new Environment Waikato initiative that will focus on two catchments of approximately 100 farms in Upper Waikato. The aim of the project is to communicate Environment Waikato's rules to farmers through pamphlets, at meetings, field days and other farmer gatherings. The catchment management project will concentrate on 'whole farm planning' to identify an integrated plan for the farm. There will be opportunity via this project to work with land owners to set targets and create action plans to address biodiversity issues.

Gaps/issues

- Quantifying the changes of land cover, shade, stop-banking and loss of habitat due to fish barriers are able to be assessed using GIS, but this has not yet been done.
- The majority of methods in the RPS and regional plans do not consider small ecosystems such as springs and ephemeral springs.

Summary and recommendations

Environment Waikato has committed significant resources into addressing the main causes of decline in stream quality and biology. Methods include research, education, pest control, regulation, community involvement, stream projects and funding and industry regulation and agreements. Despite these efforts, stream health in many areas is poor, and in some streams appears to be still declining. Environment Waikato's public perception surveys between 1996 and 2003[18] reported that Waikato residents are very aware of examples of decline of stream water quality.

Poor stream health is particularly prevalent in intensively farmed areas. This will remain the case as long as streams in these areas continue to lack the protection of riparian vegetation. There is a definite need for stronger incentives and regulations to encourage rural land owners to improve stream protection on their land.

There is perhaps a note of hope in that there appears to be a growing public acceptance of the need for adequate stream protection. Community surveys reveal that water pollution is the most important environmental issue facing the Waikato

[18] Environmental Awareness, Attitudes and Actions 2003. A survey of residents of the Waikato Region. Environment Waikato Technical Report 2004/01. pp 216

[19] Edwards, T., Clayton, J. and de Winton, M. 2005. The Condition of Lakes in the Waikato Region using LakeSPI, Environment Waikato Technical Report 2006/13, prepared by National Institute of Water and Atmospheric Research Ltd (NIWA).

region, indicating there is good community support for ongoing stream enhancement work. In some rural areas, there are increasing examples of land owners taking the initiative to fence and plant sections of stream bank on their property.

4.4 Lake ecosystems

State/change

There are over 100 lakes in the Waikato region. These range in size up to 612 square kilometres (Lake Taupo), and vary in character including peat lakes, volcanic lakes, floodplain lakes and dune lakes. All lakes are important for native fish, some are particularly important for eel fisheries and others support rare plant and fish species.

A recent report by the National Institute of Water and Atmospheric Research Ltd (NIWA) investigated 33 lakes in the Waikato region using LakeSPI, a method that uses Submerged Plant Indicators (SPI) to report on lake condition[19]. This report compared current condition of these lakes with an assumed pre 1900 'pristine' condition. The report concluded that:

All lakes have shown a significant reduction in LakeSPI scores from the pre 1900 'pristine' state. More of the peat and riverine lakes have deteriorated and by the year 2000, half of the peat lakes and all the riverine lakes in this study had become devegetated. The dune and volcanic lakes of the region deteriorated more slowly and only one volcanic lake is now devegetated (Ngahewa). (Edwards, Clayton and de Winton, 2005, page i).

The NIWA LakeSPI report goes on to note that of the lakes studied, only two lakes (Rotopiko North and Rotopiko East, both peat lakes) were classified as having excellent condition, 15 were in satisfactory condition and 15 lakes were unsatisfactory (devegetated). The two lakes currently in excellent condition still show distinctive stress, consistent with the type of historical changes known to have taken place in the other lakes.

The NIWA report discusses long-term changes in lake condition. However, there is also evidence that decline of lake condition is continuing to occur in many cases. Barnes (2002)[20] studied water quality data for eight shallow lakes in the Waikato region. Over the period of study (1995 to 2001), three lakes deteriorated in quality, four showed no change and one showed an improvement in quality.

Because of their national significance, considerable effort has gone into understanding and protecting peat lakes. About 50 per cent of peat lakes in the region have some degree of riparian protection (fencing and vegetation), although riparian protection is not always sufficient to protect the lake from the effects of agricultural nutrients. Some of the dune lakes are in very good condition and have good associated wetlands (such as Lake Taharoa).

Pressures/threats

The key pressures on the biodiversity of lakes are reduced water levels (from drainage activities), plant and fish pests, riparian degradation and sediment discharges.

- Extensive invasions of submerged weed species have displaced native species in many lakes. In many peat and riverine lakes in the Waikato, egeria displaced native species and then the egeria population itself collapsed, resulting in devegetated lakes. In such lakes, algae growth or re-suspension of bottom sediments reduced clarity so that aquatic plants could not re-establish (Edwards, Clayton and de Winton, 2005). Also, riparian infestations of willows and blackberry impact on many lakes.

[20] Barnes, G. 2002. Water Quality Trends in Selected Shallow Lakes in the Waikato Region, 1995 – 2001, Environment Waikato Technical Report 2002/11.

- Introductions of pest fish such as koi carp, rudd, catfish and mosquito fish also contribute to devegetation of lakes (uprooting plants and disturbing bottom sediments), and compete with native fish species.
- Many lakes are in a eutrophic state. Although lakes naturally become eutrophic over time, the speed of eutrophication is greatly increased by the presence of agricultural nutrients. This generally increases the potential for algal blooms.
- Vegetation removal and drainage by land owners leads to aquatic habitat degradation.

Response/methods

The Regional Plan has many rules for the protection of water bodies. There are some specific rules relating to lakes. For example, it is a non-complying activity to take water from most lakes and there are also particular restrictions on discharges to lakes. Many of the region's lakes are in the Regional Plan stock exclusion areas, and some lake levels are set by Regional Plan rules.

Some monitoring of lake water quality is ongoing. Environment Waikato has embarked on a project to set minimum levels and to install level regulating structures in selected lakes. Around 25 per cent of peat lakes have level control structures and about 50 per cent have regular level monitoring. Macrophytes are monitored in some peat lakes. Environment Waikato is currently considering methods for assessing biodiversity and biological health of lakes. The methods may include monitoring of invertebrates, drainage inflows, bird species present, fish passage and riparian plantings. In addition, Environment Waikato is currently working on an assessment of public access to lakes and navigable rivers.

Environment Waikato currently provides funding and support to four care groups which are working on riparian restoration and lake enhancement projects. Some lakes are also eligible for Clean Streams funding. Environment Waikato's commitment to the Waipa Accord will provide $650,000 over six years for protection of Waipa peat lakes. This is a joint project with Waipa District Council, the Department of Conservation, the Fish and Game Council and iwi. Funds are also available through the Natural Heritage Fund for long-term protection measures such as land purchase.

Several projects to improve the water and riparian quality of the region's lakes are underway. The Waikato Peat Lake Nutrient Removal Scoping Exercise has investigated methods to deal with lake nutrients in the Waikato district. The project is currently modeling nutrient influx to lakes and possible effects of control mechanisms. Part of the project will investigate the control of pests and weeds. Field trials may then be undertaken. Environment Waikato is also considering the development of a regional lake management plan for management and research purposes. The first stage will compile all lake information and identify information gaps.

Environment Waikato has recently proposed a variation to the Waikato Regional Plan, to address the declining water quality of Lake Taupo. The variation is primarily to introduce land use controls and wastewater controls to prevent increases in nitrogen leaching to the lake. The variation proposes rules that will require farmers to gain consents for their farming operations, as a way to manage nutrient leaching in the lake catchment.

Gaps/issues

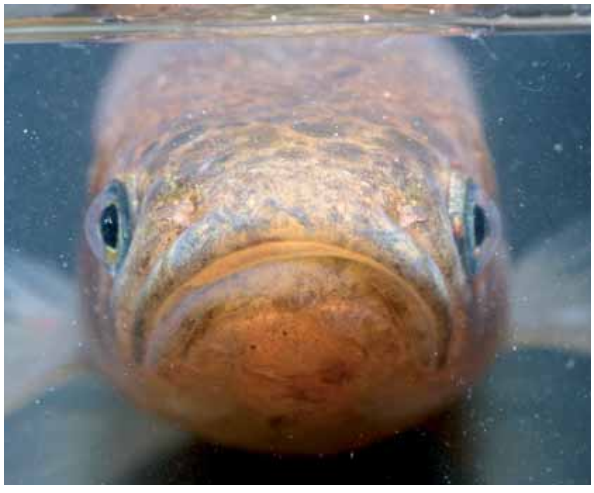
- There is currently no comprehensive monitoring of lake biodiversity in the region. It is therefore difficult to identify biodiversity trends in lakes.
- There is generally poor knowledge about the effects of surrounding land use on lake biodiversity. For example, there is not good information on the effect of nutrients on lake biodiversity.
- The lack of information on lake biology poses problems for assessment and protection.

- Lakes are poorly flushed (substantially closed) environments. Therefore, it is very difficult to restore damaged lake habitats.
- Opportunities to acquire lake margins to enhance riparian planting are limited by their high land value and cost of purchase.

Summary and recommendations

Continued work is needed to improve knowledge about the state and trends of lake biodiversity. It is clear that some lakes are in very good condition. However, some of these do not have formal protection and are therefore at risk to future deterioration. Many lakes in the region have very poor water quality and lack riparian protection. This is particularly the case with flood plain lakes in the lower Waikato River catchment.

The key recommendations with respect to lake biodiversity are that Environment Waikato seeks to better understand the response of lakes to catchment land uses (and therefore gain a better understanding of threats to lake biodiversity) and that there is improved tracking of lake biodiversity. This will help with decisions about how best to protect and restore lake ecosystems. It is probably necessary to prioritise efforts with respect to lake protection. Lake Taupo and Waipa peat lakes are already being given high priority for protection. However no formal prioritisation process has occurred. The LakeSPI report provides good information on which to base prioritisation.



Banded Kokopu.

4.5 Marine ecosystems

State/change

Environment Waikato's main focus with respect to marine ecosystems is on the land/sea interface and the effects of land use activities on the marine environment. The Waikato region has 1150 kilometres of open coast and estuarine shoreline, and 35 estuaries. The habitats of 12 estuaries have been mapped, providing a baseline to show future changes (such as change in extent of mangroves and seagrass). High sediment loads into estuaries from some catchments have been estimated to be 50-80 times the pre-human sedimentation rate. Research has shown that in the fringe of the mangroves in the Firth of Thames, sediment accumulation can be as high as 70 millimetres per year[21]. Increasing sedimentation of estuarine margins can increase mangrove habitat seaward, which in turn can displace shellfish beds, seagrass beds and habitats for shore birds. Analysis of aerial photographs shows that mangroves have expanded seawards rapidly over the last 50 years, in one location expanding about 750 metres seaward over just 14 years. Preliminary results from sediment monitoring show high levels of DDT in parts of the Firth of Thames from past land use, and high levels of arsenic naturally occurring from the local volcanic rock.

Pressures/threats

Research has established that the main threat to estuaries is increased rates of sedimentation. Although estuarine communities can adapt to changing conditions and muddy environments, the increased sediment run-off that has occurred as a result of land use changes has been found to decrease benthic faunal biodiversity and abundance, adversely impact on shellfish (including kai moana species such as pipi and cockles) and cause major changes in estuarine vegetation. Sediment deposition as thin as seven millimetres can lead to changes in benthic faunal communities, and that deposition of two centimetres of sediments can kill all fauna present.

Increased levels of sediment in estuaries result in adverse effects on filter feeders[22] and changes in the structure of benthic communities[23]. Recovery from deposition of sediments can take a long time, and so repeated sedimentation can degrade soft sediment communities[24]. In some Waikato region estuaries, the diversity of benthic soft-sediment intertidal fauna has been found to be lower in muddy sediments than in more sandy sediments[25]. Sedimentation also adversely affects plants, by shading phytoplankton (microscopic algae in the water column) and microscopic algae on the seabed (both these categories of algae are food for other organisms). Seagrass beds will often have higher diversity of macrobenthic animals than most other intertidal habitats. Sediment can also reduce areas of seagrass. The biggest change brought about by sedimentation is probably mangrove spread. There is nothing wrong with mangroves per se, but where they replace areas of seagrass or shellfish beds, some people argue that they reduce biodiversity. Certainly the biodiversity of bottom-dwelling animals within mangrove stands is lower than in most other intertidal estuarine areas.

The frequency with which sediment deposits are occurring is thought to have increased since human habitation of New Zealand because of land clearance. Current potential sediment sources include farmland (particularly regularly cropped land and river banks subject to destabilisation from stock), commercial forests during harvesting, and earthwork sites such as road realignments and subdivision development. Animal pests such as goats and possums in native bush can increase sediment transport by reducing vegetation cover. It appears that stop-banks considerably exacerbate sedimentation of estuaries as they effectively channel sediment laden floodwaters to estuaries rather than onto floodplains, where much of the sediment would have previously settled.

Farm run-off is changing the nutrient and habitat status of estuaries in farm catchments.

Invasive species are a problem in estuaries and other marine areas. Taxa such as *Spartina*, salt water paspallum, sea squirt and *Undaria* are continuing to spread. Populations of sea squirt and *Undaria* are established in the Firth of Thames, and *Spartina* and salt water paspallum in Raglan Harbour and many other estuaries. The extent and effects from these invasions are not well understood. Aquatic weeds are spread by boat traffic, fishing activities, run-off from land and stock access to estuaries.

Other threats to the marine environment include marine farms, coastal structures, reclamations and effluent discharges.

Response/methods

Environment Waikato has a number of rules in the Regional Plan and Regional Coastal Plan for managing the discharge of sediment to waterways and the coastal marine environment (such as rules for discharges, earthworks and vegetation clearance, stock in waterways and structures in waterways). As reported earlier, a number of infringement notices have been given out for activities which may affect water quality, including 37 for earthworks without sufficient sediment control.

21 Swales, A. 2006. Mangrove-habitat expansion and sedimentation, Southern Firth of Thames – Progress Report for Environment Waikato.

22 Ellis, J.; Cummings, V.; Hewitt, J.; Thrush, S.; Norkko, A. (2002) Determining effects of suspended sediment on condition of a suspension feeding bivalve (Atrina zelandica): results of a survey, a laboratory experiment and a field transplant experiment. Journal of Experimental Marine Biology and Ecology 267: 1147-174. Hewitt, J.; Hatton, S.; Safi, K.; Craggs, R. (2001) Effects of suspended sediment levels on suspension-feeding shellfish in the Whitford Embayment. NIWA Client Report ARC01267. 32pp.

23 Lohrer, A.M.; Thrush, S.F.; Hewitt, J.E.; Berkenbusch, K.; Ahrens, M.; Cummings, V.J. (2004) Terrestrially derived sediment: response of marine macrobenthic communities to thin terrigenous deposits. Marine Ecology Progress Series 273: 121-138.

24 Lohrer et al., 2004; Thrush, S.F.; Hewitt, J.E.; Norkko, A.; Cummings, V.J.; Funnell, G.A. (2003) Macrobenthic recovery processes following catastrophic sedimentation on estuarine sandflats. Ecological Applications 13 (5): 1433-1455.

25 Felsing, M.; Singleton, N; Gibberd, B. (2006) Regional Estuary Monitoring Programme (REMP) Data Report: Benthic Macrofauna Communities and Sediments – July 2002 to April 2004. Southern Firth of Thames and Whaingaroa (Raglan) Harbour. Environment Waikato Technical Report 2006/27. 131pp.

The Regional Plan does not directly address the potential for weed spreading during activities in or near the Coastal Marine Area or in waterbodies which discharge to the Coastal Marine Area. Although the Regional Coastal Plan has more direct policy for managing the import of exotic plant species to the Coastal Marine Area, the rules do not generally deal with the issue of weed importation during works in the Coastal Marine Area.

The main response to weed and animal pest threats is via the Regional Pest Management Strategy. Pest management of estuaries undertaken by Environment Waikato includes:

- some pest control through the Peninsula Project
- *Spartina* control, jointly with Department of Conservation, in a range of locations such as Aotea harbour, Kawhia, Raglan, Tairua and various other Coromandel sites
- alligator weed control at Port Waikato.

Environment Waikato is currently prioritising estuaries to determine which need most urgent attention and this will form the basis for future estuarine work. Environment Waikato is also supporting research into the effects of nutrients on mangrove expansion, tracing sediment sources to see the contribution from different land uses, and monitoring estuarine water quality.

Estuaries are the collecting point for all contaminants which come off land and into rivers and streams. Environment Waikato is increasingly fostering and supporting catchment management processes in order to protect key estuaries and harbours. For example, the West Coast Project is developing a catchment management planning approach in conjunction with territorial authorities (Otorohanga, Waitomo and Waikato). Other similar projects include Coromandel harbour planning, the Whangamata Harbour Management Plan and the Whaingaroa Catchment Management Plan. The main activities are fencing and planting riparian areas to reduce sediment delivery to estuaries.

Environment Waikato is also working with foresters, farmers and earthmovers to improve land use activities. Greater attention has been given to monitoring of major earthworks sites in the last five years, particularly in the Hamilton area where large scale subdivision activities are continuing. As a result, there has been considerable improvement in sediment control practices at these sites.

In the coming year, Environment Waikato will introduce a new programme designed to change people's perceptions of the coast and to get people to think about the coast as an 'environment' rather than an asset/investment/playground (Coastal Community Change Strategy).

Gaps/issues

- It is very difficult to manage the cumulative effect of many different sediment discharges, which are individually assessed and consented. There are no easy methods to assess how much sediment release from an estuary catchment is too much.
- Even the best management practices for earthworks cannot prevent sediment release.
- There are limited restoration opportunities for estuaries, mostly because it is almost impossible to reverse sediment effects without causing more problems. One option is to remove mangroves, although this is time consuming and costly – and some would argue it is short sighted to deal with the symptoms (mangroves) rather than the cause (sedimentation). Rehabilitation of saltmarsh is also difficult. Techniques for replanting lost seagrass beds are limited, and in practice replanting is costly and survival rates are low. Reversing sedimentation is also difficult because once bed levels have been heightened, the water is shallower, the currents therefore slower, and the rate of sediment deposition therefore higher. Estuaries could be dredged, but this would be a massive undertaking, which would be costly and ecologically very damaging as it would

kill many soft sediment animals and plants.

- Because estuaries are accumulatory in nature, they are subject to degradation from everything that comes down the rivers, such as nutrients, contaminants and sediments. All of these 'stressors' are present naturally, but at lower levels than what are currently found. It is hard to isolate the effects of individual stressors, and near impossible to restore estuaries to their former glory.
- Environment Waikato has limited involvement with respect to offshore marine ecosystems. A number of issues are beyond Environment Waikato's control, such as the harvesting of marine organisms and the casualties of fishing – for example, Maui's dolphin (that is often caught in nets).
- There appears to be some disagreement between Environment Waikato and Biosecurity New Zealand as to who should take responsibility for marine pests. This needs to be resolved.

Summary and recommendations

Environment Waikato has restricted its involvement in coastal ecosystems to near-shore areas, particularly estuaries, because estuaries are the most productive ecosystems and are very prone to pressures. As one Environment Waikato scientist has stated: *"We are losing the battle. Estuaries are continuing to deteriorate and there is no indication that our current efforts will abate this. Estuaries are very difficult to restore once damaged".* The main issue is sedimentation, although nutrients, contaminants and aquatic weeds are also key threats. Because it is so difficult to restore damaged estuaries, the focus must be on reducing threats.

Environment Waikato is currently prioritising estuaries for protection and carrying out risk analyses to better understand how to effectively protect them. Increasing understanding of risk is supported as a necessary part of developing effective protection strategies. Prioritising effects will help to focus them where most advantage can be gained.

Estuary protection can only be achieved by improvements to land use practices. All activities which serve to protect land stability, reduce contaminant run-off and leaching, and protect the habitats of streams, will ultimately serve to protect estuaries. It is important therefore that there is continued improvement in catchment management techniques for prioritised estuaries.

The effect of discharges of nutrients and contaminants on estuaries needs to be better understood.

Marine pests are increasing, and there needs to be a coordinated prioritised effort to manage this threat.

4.6 Beach/dune ecosystems

State/change

There are very few natural dune systems with intact ecological sequences left in the region. Indeed dunes are one of the most depleted ecosystems in the region. There is almost a total loss of back-dune swamps. Native dune herbs and grasses have been replaced by exotic plants. Some dune birds are highly threatened, and unmodified areas which remain safe for haul out/beaching of penguins and seals are rare. Very few dune ecosystems have retained their natural character.

Beaches and dunes generally do not have high biodiversity values although there are some rare species which inhabit some dunes, such as the northern New Zealand banded dotterel and salt water tussock. Around 16 per cent of New Zealand's population of banded dotterel breeds on the Coromandel Peninsula. Between 1996 and

[26] Dowding, J.E. 2006. Management of New Zealand dotterels in Coromadel Peninsula. DOC Research and Development Series 252. Department of Conservation, Wellington. 30p.

2004, the dotterel population increased by 58 per cent, an increase of 102 adults[26].

Beaches are very important for shoreline protection and protection of coastal amenity values. Monitoring of beaches shows periods of erosion and accretion but it is too early to see long-term trends from this monitoring. There are no obvious trends from beach water quality monitoring. The beach profile surveys are infrequent and focus on periods of extreme erosion or accretion.

Pressures/threats

The main pressures on beach and dune ecosystems are coastal development, forestry and weed invasion. In the past, large areas of coastal dune have been destroyed by coastal development (for example in Cooks Beach, Hahei and Whitianga). New areas of beach dune are still being opened up to development (such as Kennedy Bay and Matapaua Bay). Increased coastal development brings cats and dogs to sensitive areas, and increases potential for the spread of weeds and exotic plant species. Predation of eggs and chicks by domestic and feral animals (including mustelids, cats and hedgehogs) is a serious threat to the dune-nesting birds. Native trees are often removed to make way for development. A positive note is that the conversion from coastal farmland to housing appears to have reduced cattle grazing on dunes.

Illegal structures continue to be built on beaches in some areas and uncontrolled beach access is still causing damage to dune ecosystems at some sites. Limited use of vehicles on beaches below mean high water springs is a permitted activity (with conditions) in the Regional Coastal Plan. Above mean high water springs, use of vehicles is controlled by territorial authorities, and dune protection from vehicle use varies for different district councils. Vehicle use in dunes can cause severe stability problems due to damage of dune vegetation. Vehicles can also disturb nesting sites in the high tide beach area. The low tide beach is more resilient to vehicle use, although in some cases, concerns have been expressed about effects on shellfish beds.

Response/methods

The Regional Coastal Plan has rules for managing activities such as vegetation removal, construction or demolition of structures, sand extraction and vehicle use in the Coastal Marine Area. These rules have some provisions for protecting biodiversity and natural heritage values. The Regional Plan does not have good biodiversity or natural heritage protections for works adjacent to the Coastal Marine Area. Some sand dune areas are included in the definition of 'high risk erosion area', and there are more stringent provisions generally for works in such areas. However, the focus of controls on such works is generally to manage effects on land stability.

Environment Waikato is involved in research to find the best long-term solutions for coastal erosion. Reports have been completed for Cooks Beach and Buffalo Beach. The next stage is to find ways of implementing the solutions through district plans. There is increasing public and territorial authority acceptance of the need to protect beach areas from inappropriate coastal development. Increasingly, catchment based growth planning is occurring in beach areas. This is starting to look more at the kind of development which is appropriate to the biodiversity and natural heritage values of coastal areas.

Beach Care groups are proving very effective at stabilising and protecting beaches and dunes. Some groups are starting to develop plans for planting of specific varieties for native insect habitat and for the planting of appropriate vegetation in back-dune systems. Environment Waikato is working with a land care group which is controlling bushy asparagus at Rings Beach.

There is also some animal pest control in some coastal environments (such as through support for Project Crimson to protect pohutukawa).

Gaps/issues

- Environment Waikato has little direct control of people's use of dunes. Dune protection therefore relies on collaboration with communities and territorial authorities.
- Apart from limited exceptions such as boneseed control at some Beach Care sites, there is no comprehensive programme for pest control on dunes by Environment Waikato.
- Environment Waikato has no dune ecologists so dune biodiversity may not receive an appropriate level of attention.

Summary and recommendations

Beach Care groups and public information have probably reversed the decline of dune ecosystems at managed sites, resulting in improved biodiversity and natural character of dunes. However coastal development continues to impinge on new dune areas and pests continue to impact on dune fauna. Stronger protections, particularly in district plans, are needed if this is to be prevented in future. The new focus from Environment Waikato and care groups on back-dune areas will further increase the viability of these ecosystems.

4.7 Geothermal ecosystems

State/change

The Waikato region has about 600 hectares of geothermally influenced vegetation, plus non-vegetated areas that include geothermal features such as pools. They include the following ecosystem types.

- Terrestrial:
  - geothermal altered cool soils (poor soil, scrub vegetation)
  - heated ground (prostrate kanuka, mosses)
  - steamy ground (tropical ferns).
- Aquatic:
  - springs/lakes
  - mud pools
  - streams.

Geothermal ecosystems are characterised by gradients in temperature and unusual concentrations of minerals and elements. They generally support simple communities with low biological diversity, and are often characterised by high abundance of some specific taxa, tolerant of the harsh conditions[27] or benefiting from a frost-free environment. A few core species occur across many geothermal ecotones, but most occur only in specific geothermal conditions[28]. They support seven threatened species of plants, mostly ferns that require the frost-free environment of steamy stream sides and fumaroles.

A recent report[29] on the distribution of biota from geothermally influenced standing waters in the Taupo volcanic zone stated that many zooplankton and macro-invertebrate taxa were only found in very limited areas and often in very limited numbers. This makes them more

27 Boothroyd, I., Browne, G., Muchna, K. 2005. Extreme ecotones: The invertebrate fauna of the land-water interface of a geothermal stream. New Zealand Ecological Society Annual Conference Abstracts, September 2005, Nelson, New Zealand

28 Hay, I., Boothroyd, I., Turner, S. 2005. Diversity of Macrobiota in Geothermal Streams of the Taupo Volcanic Zone. New Zealand Ecological Society Annual Conference Abstracts, September 2005, Nelson, New Zealand

29 Duggan, I, Boothroyd, I.(2002). The distribution of biota from some geothermally influenced standing waters in the Taupo Volcanic Zone. NIWA Client Report: EVW02226

30 Bycroft, C. and Beadel, S., 2006. Priorities for Pest Plant and Animal Control, and Fencing at Geothermal Sites in the Waikato Region. Environment Waikato Technical Report 2006/18, prepared by Wildland Consultants, Doc. No. 1066745

vulnerable to extinction if significant changes were to occur in the geothermal resources. The change in extent of geothermal ecosystems since 1992 unknown, but is considered to be very low.

Pressures/threats

Main threats are:

- damage from weeds
- rubbish dumping
- filling
- contamination of pools (including spray drift)
- the extraction of heated water and steam.

Most terrestrial geothermal habitats are affected by weeds. Twenty-six sites are considered to need immediate attention or are flagged as high priority areas for active management (mainly weed control)[30].

Response/methods

Almost all geothermal habitats in the region are defined in the Regional Plan as significant geothermal features. A recent variation to the Regional Plan has provided a revised management regime for geothermal areas. Such areas are managed in accordance with a use classification system which includes protected systems, research systems and development systems.

Enforcement action has been taken on several occasions for activities in geothermal areas. Some significant sites have been fenced and weed control is planned for priority sites.

An inventory of geothermal vegetation in the region is completed and will be updated every five years. Environment Waikato staff are discussing management of key geothermal areas with land owners in their vicinity. Workshops will be provided to give land owners information about land use practices to protect geothermal features.

Other relevant educational initiatives include:

- Environment Waikato support for a Royal Society project sponsoring a teacher to develop a geothermal feature care kit
- provision of information about geothermal features to schools in the Taupo area
- seminars and fact sheets on the care of geothermal features.

Gaps/issues

- The information on geothermal aquatic species is poor and there is almost no information on geothermal microbes.
- Geothermal sites are extremely hazardous, thus are difficult environments to establish community care groups.

Summary and recommendations

Although the biodiversity of geothermal ecosystems is low, the rarity of the ecosystem and the unique combinations of species they support add to the diversity of ecosystems in the Waikato. However, they are still poorly understood. A lot of effort has recently been undertaken to develop new policy and rules for the management of geothermal areas. It is too soon to assess the success of these new provisions.

Dragonfly – Thomas Wilding, NIWA.

5 Natural heritage

This section seeks to assess the extent to which the RPS natural heritage objective is being achieved. As stated earlier, the objective is: *"The protection of regionally significant heritage resources, and allowing subdivision, use, and development of other heritage resources, while ensuring that there is no net loss in the Region".*

State/change

Environment Waikato does not track how the region's natural heritage is changing. It is therefore not possible to provide a clear statement on trends. Territorial authorities have not been surveyed about natural heritage trends, and it is likely that they would have better information on this issue. The following comments are necessarily qualitative and to a large extent based on observation and anecdotal evidence.

There is strong pressure in the region for the development of areas of high landscape and natural character value. This has been the case for several decades in coastal areas and is likely to continue. As an example of this pressure, the permanent population of the Thames-Coromandel district is expected to increase by 20 per cent between 2001 and 2021[31]. Some towns on the peninsula will grow much more rapidly than the district average over the next 20 years. The population of Whitianga for example is expected to increase 79 per cent by 2021, and Pauanui by 45 per cent[32]. It should also be remembered that some populations of Coromandel towns can increase many times over the holiday period (the peak population of Whitianga, Pauanui and Whangamata during the holiday season can reach 7, 17 and 12 times the usual population respectively)[33]. The potential for further reduction of heritage values in the Coromandel Peninsula is therefore very high.

Increasing development can greatly change the character of places. Again using the Coromandel Peninsula as an example, Thames-Coromandel District Council planners have stated that eight camping grounds in the district have disappeared over the last few years due to demand for land for residential and holiday accommodation. These planners also stated that the peninsula is becoming a playground for the rich, and is becoming unaffordable to the average New Zealander. The historic 'relaxed casual' atmosphere is becoming 'smart casual' and towns such as Whitianga are increasingly becoming more 'dressed up'.

At the opposite extreme, some Waikato towns are suffering from depopulation. This is having an effect on the viability of some services such as doctors and supermarkets. A Waitomo District Council planner reported that in Te Kuiti the district council has greatly downsized, the hospital has downsized, insurance companies have left town, the railways administrative people have gone, Lands and Survey has gone and the Post office has downsized. Again, there have been no studies to indicate whether this decline in rural Waikato region towns would represent a loss of heritage to the region or not.

In recent years, there has been a very significant increase in residential development of river and lake margins. Much of the Waikato River banks near Hamilton (particularly north of the city), have now been subdivided and built on. Pressure for development in more accessible areas near Lake Taupo is very high, and also has been increasing steadily over recent years.

There are many parts of the region which are also being rapidly subdivided for rural residential development, which is markedly changing the character of some rural areas. The value of farm land as a heritage resource has not been assessed, so it is difficult to know if this represents a further erosion of the region's heritage.

31 Forgie, V. and Patterson, M.,2002: Structure and Dynamics of the Waikato Economy, Massey University, Palmerston North, June 2002.

32 Thames-Coromandel District Council, 2003: Demographic Profiles – Thames-Coromandel District and Main Settlements.

33 Thames-Coromandel District Council, 2004: Peak Population Study 2003/4.

The Environmental Defence Society's Raewyn Peart claims there is a lack of national and regional policy about landscape issues, which leaves local councils very unsupported and results in continued decline of landscape values in some areas. She adds that *"the Waikato Regional Policy Statement developed by Environment Waikato does not provide sufficient guidance on critical regional landscape issues. This is a strategic gap in the policy framework and it needs addressing"*[34].

Pressures/threats

Some key threats to heritage have been alluded to above. Threats would include:

- pressure for urban, rural-residential and coastal development
- pressure for commercial development of heritage resources (such as various aquaculture activities)
- land development, such as conversion of forest and scrub areas to farming
- tourism development
- possibly other migration patterns such as depopulation of towns in the southern Waikato.

Response/methods

The Regional Plan does not have strong mechanisms within the rules for protection of natural heritage. Although the Regional Policy Statement has policy about protection of natural heritage through resource consents, this is in fact rarely done. Territorial authorities are sometimes encouraged to identify and provide for the protection of significant natural heritage resources in their district plans. However in general, Environment Waikato has not strongly advocated for protection of areas or sites in the region which would be highly valued as heritage resources (apart from those areas with high biodiversity values).

The Regional Coastal Plan does have much stronger provisions for the protection of natural heritage. As a result, consent processes for activities in the Coastal Marine Area are more likely to have provisions related to heritage protection (such as the protection of natural character and coastal amenity). There is also stronger Environment Waikato advocacy for heritage protection in district plans related to the coastal environment.

Policy staff have stated that most first generation district plans contained a schedule of significant heritage locations. Some of these were supported by district landscape assessments (of varying extent and comprehensiveness). Most district plans identified key locations to be protected by land use rules. The quality and effectiveness of these provisions vary greatly from district to district. In some cases, the provisions are strong, but territorial authorities have found it difficult to maintain protections in the face of strong development pressure, particularly in coastal areas.

Currently a lot of district councils are preparing second generation district plans. There are powerful lobby groups trying to free up mechanisms which restrict development in sensitive locations. In response, there are signs that the schedule of protected places approach in first generation plans is being replaced by more non-regulatory approaches. This could leave sensitive areas less protected than under first generation plans.

Environment Waikato has recently established the Natural Heritage Partnership Programme. This programme is to provide funds for natural heritage projects, such as for fencing of natural areas (such as at Mt Maungatautari), purchase of land or development rights, securing land by covenants or lease, providing money for protection work or advocacy and so on. The programme does not envisage a region wide prioritisation of heritage sites. Each project will be

[34] Peart, R., 2004: A Place to Stand – The Protection of New Zealand's Natural and Cultural Landscapes, Environmental Defence Society Incorporated, Auckland. P. 7.

assessed on a case by case basis. The fund for the programme is funded by a targeted rate.

Summary and recommendations

The character of the Waikato region is rapidly changing in some areas, particularly the more attractive and often sensitive areas. It is important that there is some assessment of what this means for natural heritage. If there is a better understanding of what elements of the regional landscape are valued by the population as heritage resources, there could be more effective tracking of changes to heritage, resulting in better policy and regulatory methods for management of heritage.

It is particularly important that Environment Waikato works more closely with territorial authorities to protect regionally significant heritage resources. This is because territorial authorities can have more direct control over land development, are often subject to the strongest pressure from developers, and would generally have better information about heritage resources than the regional council. There should be stronger policy in the RPS to support the efforts of territorial authorities in protecting key heritage resources.

Tui.

6 Conclusions, observations and recommendations

6.1 Are the objectives achieved?

As stated earlier, the biodiversity objective is: *Biodiversity within the Region maintained or enhanced.* In general it is clear that the two objectives are not being achieved. For some ecosystems and some parts of the region, the situation is better than for others. There appears to have been an increase in awareness of the issue of biodiversity by local authorities and community groups, with a more explicit reference to biodiversity in their statements and actions. However the scale of the threats facing ecosystems means a massive effort is required to restore their extent, health and functioning. The same observation can be made in terms of the natural heritage objective. The following statements summarise the findings of this report in terms of achievement of these objectives.

1) Environment Waikato has undertaken a wide range of activities, and has committed significant resources into activities, which help to manage regional biodiversity. The Maungatautari Project, supported by Environment Waikato, is a major achievement in this respect.

2) Environment Waikato staff actively advocate for biodiversity maintenance and enhancement in their day to day activities.

3) Environment Waikato now has a lot of information and knowledge about regional biodiversity. There is therefore a much greater understanding of the state of biodiversity and the interplay of pressures on biodiversity resources.

4) The large majority of methods in the RPS and regional plans, which would help to achieve the biodiversity and natural heritage objectives, are being undertaken. There is however less attention to the natural heritage methods, particularly to matters such as landscape and amenity. There is also less attention to methods which relate to coastal biodiversity outside of estuaries. Less attention is given to economic instruments, promotion of heritage protection orders and conservation orders, or specific programmes for karst landscapes. It also appears that consent processes could better address potential for weed invasions during earthworks and in-stream works.

5) There is reasonable use of the RPS Appendix 3 to determine significant indigenous vegetation and significant habitats of indigenous fauna, and generally good adoption by district councils. However, some Environment Waikato staff do not actively use these criteria.

6) In some cases projects that have the greatest potential benefit for biodiversity are undertaken for other purposes, for which biodiversity is a side benefit (such as possum control for Tb management, and Clean Streams and the Peninsula Project – which are directed primarily at water quality and dune restoration for erosion prevention). As a result, monitoring of biodiversity gains from these programmes is not generally a high priority. There are few programmes other than education and partnerships where biodiversity is the primary objective, but this is changing with a refocusing of pest control toward biodiversity objectives, the establishment of wetland care groups and new programmes to enhance biodiversity on Environment Waikato land.

7) Pressures on biodiversity and natural heritage are increasing in the region. Such pressures include land use intensification, coastal development, residential development in sensitive areas, increasing spread of plant and animal pests and the risk of new pests.

8) General public support and awareness of the need for protecting biodiversity appears to be gradually increasing. It is likely that Environment Waikato's educational initiatives and work with resource users are partly responsible for this in the Waikato region. This

is resulting in increasing voluntary measures such as stream fencing and planting by land owners (although still only to a minor extent) and increasing biodiversity protection by community groups. There are currently around 140 community groups in the region carrying out activities which help to protect and restore biodiversity.

9) Large scale land use changes which impact on natural ecosystems are much less of a threat to biodiversity than in the past, but vegetation is still being cleared for pasture, plantation forestry and urban development. In this sense, the loss of geographic extent of biodiversity resources is in general less of a threat to biodiversity than the loss of the quality of biodiversity resources through pests and water pollution.

10) Wetland ecosystems are still declining in geographic extent and in quality. Illegal land drainage, stock access and weed invasion are the main threats. These threats are particularly related to adjacent farming activities.

Kowhai.

11) Most remaining large tracts of forest are legally protected by Department of Conservation reserve status. Biodiversity in general has probably improved in these areas to some degree over recent years, due to extensive possum control operations covering about 24 per cent of the total forest area in the Waikato region. The Forest Accord may have been a significant help in terms of reducing the extent of forest biodiversity loss through forestry operations. However, nationwide forestry has been the greatest cause of indigenous vegetation clearance in the last decade. As a result of clearance, lowland forest is now mostly represented in forest fragments, and these are generally unprotected. Despite possum control operations, possums still remain a significant threat to forest biodiversity. Other animal and plant pests are also ongoing threats. There are now as many exotic vascular plants in the wild as there are native species.

12) Stream/river water quality and ecological condition is continuing to decline in lowland areas, particularly in association with intensive farming activities. Many streams lack riparian protection and are accessible by farm animals. These factors indicate continuing decline of stream/river aquatic biodiversity in these areas. Stream biodiversity is also under considerable threat from pest fish and aquatic weeds.

13) Historically, there has been a very marked decline in the quality and biodiversity of lakes in the Waikato region. There is evidence that, at least in some cases, this decline is continuing. Some biodiversity improvements (or at least reduced degradation) can be expected in peat lakes which have received a lot of attention in recent years. Some lakes maintain very good water and habitat quality and it is important that these lakes are protected into the future. Unlike streams, damaged lakes are extremely difficult to restore due to lack of flushing ability.

14) In terms of marine ecosystems, Environment Waikato's main involvement and knowledge relates to estuaries. In general it is likely that biodiversity of estuaries is continuing to decline, particularly due to sediment input which is well above pre-human levels (due to erosion from land use and harvesting activities, sedimentation from earthworks, and stopbanks which prevent sediment loads in water during floods from dropping out on flood plains). Pests, nutrients and contaminants are also increasingly threatening marine biodiversity.

15) Although there is not comprehensive information about biodiversity of dune/beach ecosystems, it is probable that Beach Care groups have reversed the decline of dune/beach biodiversity.

16) Geothermal biodiversity has probably remained relatively static in recent years, although they remain under threat from energy extraction and weed infestations. Recent policy changes aim to manage these threats.

17) It is very difficult to make comments about natural heritage trends because there is not a good understanding of which heritage resources and values have regional significance, and because there are not good indicators for tracking the condition of the region's natural heritage. It is clear that the regional landscape is changing rapidly, particularly due to subdivision and housing development around Hamilton, adjacent to rivers, lakes and the coast, and in other accessible and attractive parts of the region. It is likely that this is resulting in the loss of some landscape and amenity values.

18) The recent establishment of the Natural Heritage Partnership Programme is a very important step in moving toward better heritage protection. This is the first major programme that Environment Waikato has developed for such protection. It will allow a greater focus on heritage issues.

19) There are a number of methods being undertaken which have particular benefit for biodiversity and/or natural heritage objectives. Examples of key activities are as follows.
   a) Education campaigns, advertising campaigns and provision of information (such as fact sheets) which support the objectives.
   b) Working with major resource user groups and individuals (farming/forestry) to find better ways of reducing land use effects on biodiversity resources.
   c) Imposing consent conditions for protection of biodiversity.
   d) Supporting activities which protect and enhance biodiversity through the Environmental Initiatives and Natural Heritage Funds.
   e) Ensuring territorial authorities have strong biodiversity and natural heritage provisions in district plans, growth strategies and structure plans, particularly for areas such as dunes and wetlands which are highly sensitive to damage and/or have particular biodiversity importance.
   f) Providing direct support for major projects which benefit regional biodiversity.
   g) Assessing the extent of stream structures (such as culverts) which inhibit fish migration, and working with farmers, territorial authorities and Transit to ensure removal of obstacles.
   h) Developing improved systems for tracking consented activities to help better understand relationships between biodiversity and resource use pressures.
   i) Supporting initiatives for riparian protection of water bodies (fresh and marine) and for keeping stock out of water bodies.
   j) Inspecting sediment and erosion control where significant earthworks are occurring (including forestry and farming operations).
   k) Supporting the caregroup approach, particularly in prioritised, targeted areas of biodiversity and natural heritage importance.

l) Promoting legal protections for biodiversity resources.
m) Pest control.

In summary, although Environment Waikato is involved in a very large range of initiatives with respect to biodiversity, and to a lesser extent natural heritage, and although there are some significant successes, the policies and methods are not successfully achieving the objectives in these areas. This is partly because Environment Waikato does not have control over many of the pressures affecting biodiversity and natural heritage and partly due to the size and complexity of the issue. It appears that the two key issues related to the objectives are land use management and pest control. As a political organisation, Environment Waikato can only manage land use to the degree which the community finds acceptable. As awareness of the issues increases, more will be able to be done to require that land use reduces its impact on biodiversity. With respect to pest control, this is to some extent a question of resources, although Environment Waikato cannot expect to have anywhere near the level of resources required for total pest control. However, there are many things that can be done to improve council's management of biodiversity and natural heritage. Recommendations for improvements are reported in the following sections.

Seagulls.

6.2 Comments and recommendations with respect to policy implementation

1) Given the extent of biodiversity and natural heritage issues in the region, it is important that specific issues are prioritised for response. Some prioritisation has occurred in the past, but this has been somewhat ad-hoc, either driven by a particular activity (such as pest control), by historic rules (such as from previous Water Board decisions), or by championing by staff with a particular specialist skill or interest in a given ecosystem. Currently, smaller rivers, streams, wetlands and peat lakes seem to have been given more biodiversity attention than other ecosystems. Coastal wetlands and wetlands that adjoin dairy farms have been prioritised for assistance with fencing and weed control, but this has not been done for non-dairy wetlands. There has been prioritisation of terrestrial areas for pest control in some parts of the region (through the key ecological sites programme), and geothermal areas have been well inventoried and prioritised for management actions. Prioritisation of biodiversity resources was discussed in a presentation to the Environment Waikato Environment Committee in December 2005 (refer document #1030536) and is the subject of a two-year project funded through the Long-Term Council Community Plan. This project is strongly supported by the writers of this report.

2) The prioritisation process should not just protect areas of high biodiversity value, but also degraded areas of rare or significant biodiversity which should also be restored. Where possible, biodiversity targets should be developed for these priority areas. The prioritisation process needs to take particular note of the guidance in the National Biodiversity Strategy (February 2000).

3) Currently the Resource Use group is developing processes for monitoring of permitted activities. This could have significant benefits for biodiversity resources. As reported earlier, there is substantial anecdotal evidence that illegal activities are occurring in the region which adversely affect biodiversity (such as wetland drainage and native vegetation clearance), and which are not being detected and/or responded to. In determining permitted activity monitoring processes and priorities, it is recommended that such monitoring be considered for areas of high biodiversity value.

4) Environment Waikato has recently increased capacity for enforcement by employing dedicated enforcement staff and improving staff training about enforcement processes. It is important that where resource use activities illegally adversely affect biodiversity or natural heritage resources, enforcement action is taken to make it clear that such incidents will not be condoned.

5) There is a need for better communication of requirements of regional rules (such as requirements for permitted activities) in the region. Targeted communication with key contractor and industry groups is likely to be particularly helpful in this respect.

6) There is a clear need for greater direction for staff concerning implementation of the natural heritage objective. The problem largely stems from the shortage of any staff with expertise in this field (such as historians, archaeologists and landscape architects), and therefore the lack of a 'champion' for the resource. There should be debate about whether council should seek to employ staff with such expertise. There also needs to be consideration of what elements of natural heritage in the region are important (from a regional perspective). It is recommended that a system be developed for determining regionally significant heritage sites, perhaps in the way that Appendix 3 helps in decision making about significant indigenous vegetation and significant habitats of indigenous fauna.

7) The recently launched Natural Heritage Partnership Programme is potentially the vehicle for managing council's response to natural heritage issues. It is important that this programme develops clear targets for natural heritage protection. It is also important that this programme does not focus on biodiversity to the exclusion of other heritage resources and values.

8) Environment Waikato cannot, on its own, reverse the trend of declining biodiversity. The issue needs to be addressed in a more coordinated fashion with agencies involved in the management of biodiversity and heritage resources, particularly territorial authorities, iwi groups, the Department of Conservation, Ministry of Fisheries, Biosecurity New Zealand and the Fish and Game Council. Environment Waikato also needs to continue to work with industry groups, particularly those representing farming and forestry. Environment Waikato should investigate opportunities for working more closely with these organisations to jointly achieve council's objectives with respect to biodiversity and natural heritage.

9) Probably above all else, the key ongoing threats to both terrestrial and aquatic biodiversity would be animal and plant pests. For this reason, Environment Waikato's recent steps to better coordinate biosecurity and biodiversity activities are considered positive steps forward. However, it will be important that this new arrangement is carefully scoped in a way that provides clear strategic directions for biodiversity management. There needs to be clarification as to whether this new arrangement will also have responsibilities with respect to the natural heritage objective. If not, there needs to be a clear decision about where natural heritage responsibilities lie in the organisation.

10) It is recommended that Environment Waikato groups consider how they can improve pest management (particularly weed management) through their respective activities. There would be a range of opportunities for improved pest management by:
    - the Resource Use group, via consent assessments
    - River and Catchment Services, through Environment Waikato's own physical works and the work of land management officers
    - the Policy/Strategy group – ensuring regional and district plans contain adequate policy for dealing with this issue.

    A recent development in this area is that the Biosecurity group has recently been looking at how to better control the spread of weeds during earth moving activities. The group is considering how the Resource Use group can help in this initiative.

11) More effective and efficient ways of tracking regional scale habitat condition (such as through key indicator species) should be considered. This could include more regular synthesis of Environment Waikato and Department of Conservation information, such as data on threatened species.

12) Other methods which Environment Waikato could initiate, improve or undertake more regularly to help achieve the biodiversity and natural heritage resources are as follows.
    a) Educate staff on the importance of biodiversity protection, identification of biodiversity threats, methods to avoid or minimise effects on biodiversity from land use activities, and use of Appendix 3 of the Regional Policy Statement. Staff should be reminded of the document "Resource Use Group Biodiversity Practice Note" (document #859975) which covers many of these subjects.
    b) Recognise the value of Environment Waikato Resource Information staff as 'champions' for biodiversity protection. Maintain such champions for all major ecosystem types and ensure they are involved in major resource use (including Environment Waikato works) and policy decisions which could potentially affect these ecosystems.
    c) Improve regional biodiversity inventories. Note that currently Environment Waikato relies on the Department of Conservation for information about threat status and the distribution of native species.
    d) Better promotion of the potential use of the Clean Streams programme and the Natural Heritage Fund for biodiversity protection (such as for fencing wetlands).
    e) Working with land owners (not just dairy farmers) in the vicinity of areas with high biodiversity and natural heritage values to encourage protection measures (such as animal and plant pest control).
    f) Increase the financial commitment to 'action on the ground' efforts such as planting and monitoring projects.
    g) Provision of information about exotic plant and animal species in the coastal environment and ways to prevent spreading these pests.
    h) Consider raising the priority and budget of pest control in geothermal and marine ecosystems. Seek a coordinated and prioritised process for dealing with pest species in the marine environment.
    i) Improve education and information about how to prevent weed spread due to recreational use of water bodies. Encourage installation and use of boat and fishing gear washing facilities at key locations.
    j) Seek a better understanding of the effects of nutrient and other contaminant discharges on estuaries.
    k) Seek a better understanding of the relationship between water quality and aquatic biodiversity to help better target remedial actions in impacted water bodies.

l) Seek to improve control of pest fish species in freshwater and marine water bodies.

m) Seek to improve understanding of the relationship between various land use practices and sediment generation.

n) Investigate a sediment budgeting approach to management of sediment inputs from land use activities to sites of high biodiversity and/or natural heritage value. This would entail determining acceptable sediment loads from the catchment, then determining management practices needed to achieve this.

o) Work with owners of communally owned Maori land which has particularly high biodiversity and natural heritage values, to find mutually agreed methods of protecting such resources into the future.

p) Consider the use of economic instruments as a means of encouraging protection and enhancement of biodiversity and natural heritage resources. For example, consider mitigation charges for resource users who undertake activities which adversely affect biodiversity, to contribute to funding of mitigation activities.

Whangapoua crab.

6.3 Comments and recommendations with respect to policy development

1) It is recommended that the profile of biodiversity objectives needs to be raised to match other key objectives such as soil and water quality. The Resource Management Act mandate for regional councils to manage resource use impacts on biodiversity has been significantly strengthened since the RPS was drafted. Section 30(1)(c) of the Act was amended by the 2003 Amendment Act by adding *"the maintenance and enhancement of ecosystems in water bodies and coastal water"* to the list of purposes for controlling the use of land for. Section g(a) was also added to the list of Section 30 responsibilities which states that regional councils are responsible for the *"establishment, implementation, and review of objectives, policies, and methods for maintaining indigenous biological diversity".* It is noted that Environment Waikato's 2006-2016 Long-Term Council Community Plan includes an undertaking to review the biodiversity provisions of the RPS, beginning in 2006, to take account of legislative changes and national standards.

2) It is recommended that Environment Waikato seeks to develop objectives and policies for biodiversity and natural heritage which provide clearer direction to the organisation. Currently the RPS objectives and policies for these resources are not specific enough to provide clear guidance as to what council wants to achieve. More targeted objectives should be developed during the forthcoming review of the RPS. These should be informed by the New Zealand Biodiversity Strategy. Consideration would then need to be made as to how these new objectives and policies are translated through variations to the Regional Plan and Regional Coastal Plan. Note that a presentation to the December 2005 Environment Committee discussed

possible measurable regional goals for biodiversity[35]. The suggested goals were as follows.

i) No further local extinctions.
ii) Twenty per cent of local environments in indigenous cover.
iii) Ecosystems protected in representative proportions.
iv) Enhance quality of degraded systems:
    - increase dominance of native species
    - restore natural functions (such as water regimes).
v) Return 'lost' biota (such as tuatara, takahe, kakapo, hihi).
vi) Recreate 'lost' ecosystems:
    - restoration of specified ecosystems from scratch
    - one pest free example of every major ecosystem type.

3) There is a particular need for better policy guidance with respect to natural heritage (if in fact this is to remain an RPS issue). Currently, the lack of clear and targeted natural heritage objectives seems to be translated into a lack of direction for Environment Waikato staff dealing with external stakeholders. In developing policy for natural heritage, there is a need to take a broad view of what such policy may address. For example, heritage can include elements of regional character. Issues such as the importance of traditional rural character should be considered. Environment Waikato should discuss whether the changing rural character in many parts of the region is in fact an issue that should be addressed. The same would go for the changing character of west coast beaches, and changing landscape and social characteristics of the Coromandel Peninsula.

4) Irrespective of any changes to the RPS, the methods in the Regional Plan, and to a lesser extent in the Regional Coastal Plan, do not provide strong enough protection with respect to natural heritage issues. There are many controlled and discretionary activity rules, for example, which do not contain any protections with respect to natural heritage. There are currently not strong Regional Plan mechanisms to encourage farmers to provide riparian protection for streams, rivers, lakes and wetlands on their property or to protect significant springs and ephemeral streams. There is therefore a need, in order to effectively work towards the natural heritage objective, to improve such provisions in the regional plans.

5) Any review of biodiversity and natural heritage objectives, policies and methods should include a review of how information to assess achievement of objectives will be collected. Methods to track the state of resources, and the pressures on these resources, should be stated at least in a general sense in the RPS and regional plans. Currently the regional plans do not provide satisfactory guidance about how effectiveness of the methods is to be monitored.

6) Environment Waikato should work with territorial authorities, the Department of Conservation, Ministry of Fisheries, Biosecurity New Zealand and the Fish and Game Council in an effort to jointly establish objectives, policies and methods for biodiversity and natural heritage resources with these agencies. These organisations all have programmes which impact on the state of biodiversity and natural heritage in the region. The region would therefore benefit from better coordination and alignment of these planning documents.

7) There is potential for an increased threat to biodiversity through the removal of vegetation clearance regulations under the Transitional Regional Plan, which required consent for removal of more than one hectare of trees over a one year period. In any case,

[35] Document #1030536.

the Regional Plan lacks adequate provision for protection of terrestrial ecosystems from land use activities. This needs to be remedied by policy change.

8) Marine pests are increasing, and there needs to be a coordinated prioritised effort to manage this threat, backed up by policy change. Agreement needs to be sought between Environment Waikato and Biosecurity New Zealand about their respective roles with respect to marine biodiversity and pest control.

9) There should be consideration of a biodiversity database which captures information about biodiversity values in the region, which could be displayed as a GIS map layer. This would help to flag biodiversity issues for consent officers and planners commenting on territorial authority proposals. This could be made a method in the policy statement or plan.

Native cabbage tree.

6.4 Comments and recommendations with respect to policy assessment

The following comments and recommendations are made concerning the method of policy effectiveness assessment undertaken.

1) The approach chosen for evaluating policy effectiveness has been largely successful in that it generated useful comments about the extent to which the objectives are being achieved, and that it provided recommendations for improved policy implementation and development.

2) The method of targeted questionnaires, which were responded to during interviews with representatives of various Environment Waikato groups, has provided a reasonable assessment of implementation of methods.

3) The model used for assessing the state of biodiversity and natural heritage resources, pressures on these resources and identifying key responses was also considered effective. The use of Environment Waikato experts to fill out this model for the different ecosystem types, again during facilitated discussions with the Policy Effectiveness Programme Manager, was also considered successful.

4) If more time and resources were available, it would have been helpful to have greater input from other organisations such as district councils, iwi groups, the Department of Conservation and territorial authorities. In this respect, it would be helpful to do some forward planning with these organisations, to ensure that Environment Waikato can access their information as relevant, during future policy effectiveness projects. There may even be opportunity for joint monitoring and reporting that would be useful to Environment Waikato and these other organisations.

5) With respect to biodiversity, Environment Waikato has a number of experts, whose opinion, experience and knowledge could be called on. However, there was no one with similar expertise with respect to natural heritage (apart from its biodiversity components). Therefore much better information was available for biodiversity than natural heritage. The natural heritage assessment would therefore have particularly benefited from input from external experts in this area.

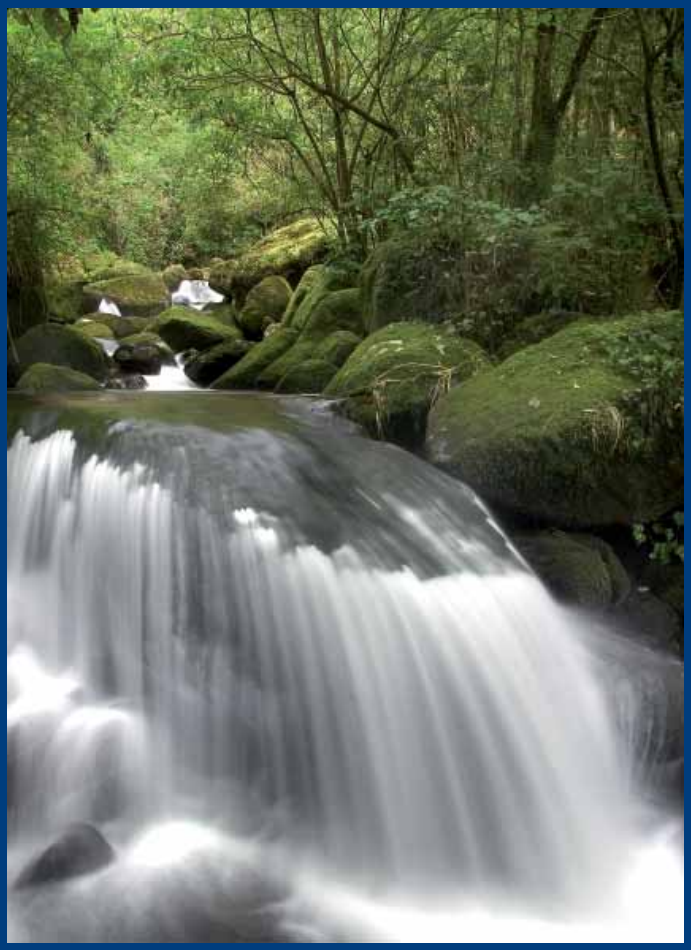
6) The 1999 INGAP report[36] outlines an integrated monitoring guideline that includes types of indicators, monitoring and reporting procedures. This guideline should be reviewed to ensure that it continues to be relevant, particularly with respect to the new statutory responsibilities such as those related to biodiversity. In terms of biodiversity, the review should consider recent work on national biodiversity assessments[37]. Improved biodiversity indicator and pressure monitoring would greatly help future policy effectiveness assessments.

7) Environment Waikato staff were very willing to support the assessment. However there were severe time restraints in some cases due to other work commitments. It is very important that time for key staff is budgeted well in advance of the need for their input. There is a particular need for Resource Information group staff to have time allocated to support policy effectiveness processes.

8) Although the approach was successful with respect to the target objectives in this case, it may need amendment for other target objectives, depending on the level of in house expertise and knowledge about the objectives, available data sources, the existence or not of other relevant management agencies and so on.

[36] Environment Waikato 1999. Integrated Monitoring. A Manual for Practitioners.

[37] Lee, W., McGlone, M., Wright, E. 2005. A review of national and international systems and a proposed framework for future biodiversity monitoring by the Department of Conservation. Landcare Research Report LC0405/122.



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