

# VANISHING NATURE

facing New Zealand's biodiversity crisis

Marie A Brown

R T Theo Stephens

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Bevis Fedder





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Published with the assistance of the  
New Zealand Law Foundation



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Back cover picture: Rengarenga Lily (*Arthropodum cirratum*) by John Leathwick

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Environment Act 1986

Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012

Fisheries Act 1996

Fisheries (Benthic Protection Areas) Regulations 2007

Fisheries (Kaimoana Customary Fishing) Regulations 1998

Freshwater Fisheries Regulations 1983

Hauraki Gulf Marine Park Act 2000

Kaikoura (Te-Tai-o-Marokura) Marine Management Act 2014

Kaimoana Customary Fishing Regulations 1998

Land Act 1948

Local Government Act 2002

Local Government Amendment Act 1989

Marine Mammals Protection Act 1978

Marine Reserves Act 1971

Maritime Transport Act 1994

National Parks Act 1980

Native Plants Protection Act 1934

Ngā Wai o Maniapoto (Waipa River) Act 2012

Ngāti Tuwharetoa, Raukawa, Te Arawa River Iwi Waikato River Act 2010

Queen Elizabeth II National Trust Act 1978

Reserves Act 1977

Resource Management Act 1991

Resource Management (Marine Pollution) Regulations 1998

Soil Conservation and Rivers Control Act 1941

Subantarctic Islands Marine Reserves Act 2014

Te Ture Whenua Act 1993

Town and Country Planning Act 1977

Treaty of Waitangi (Fisheries Claims) Settlement Act 1992

Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010

Waitakere Ranges Heritage Area Act 2008

Water and Soil Conservation Act 1967

Whitebait Fishing Regulations 1994

Wild Animal Control Act 1977

Wildlife Act 1953

## List of abbreviations and acronyms

**EEZ Act** Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012

**Freshwater NPS** National Policy Statement on Freshwater Management 2014

**IUCN** International Union for the Conservation of Nature

**NIWA** National Institute for Water and Atmospheric Research

**NGOs** Non-governmental organisations

**NZCPS** New Zealand Coastal Policy Statement

**NZPCN** New Zealand Plant Conservation Network

**OECD** Organisation for Economic Cooperation and Development

**Proposed Biodiversity NPS** Proposed National Policy Statement on Indigenous Biodiversity

**QEII Trust** Queen Elizabeth II National Trust

**Ramsar Convention** Convention on Wetlands of International Importance

**RMA** Resource Management Act 1991

**WWF** World Wildlife Fund

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*Rob Fenwick*

## Foreword

It's a great pleasure to have been invited to write the foreword for *Vanishing Nature*, the latest publication from the Environmental Defence Society – and possibly the most important.

As the book explains with compelling clarity and logic, we have a crisis in New Zealand. It's one that every New Zealander needs to address: the declining state of our natural heritage.

It's a sobering read. Ever since people first arrived in these remote islands, nature has suffered at our hands. Species have gone extinct, some during our own lifetimes, and others are teetering on the brink.

Aotearoa / New Zealand evolved in the absence of mammalian predators. It was a true paradise in which a unique flora and fauna prospered and grew. On land, in our streams, rivers and lakes, and in our vast oceans, life was abundant. It still is, but there is a slow, insidious decline in our native biodiversity.

Dr Marie Brown and her co-authors chronicle New Zealand's story and then look at how 'the system' is responding to the massive challenge of continuing decline.

Many government agencies, private land-owners, marae-based groups and voluntary entities are doing great work in this area. The Department of Conservation is developing partnerships with the business sector to expand the resources available for the battle to save nature. Thousands of individuals are working under the umbrella of a myriad of groups to expand habitat, and to control and eliminate introduced pests and weeds. But as this book explains, in spite of all of the effort we are still going backwards.

What can we do to turn this trend around?

The authors have not just analysed the problems; they have offered solutions. Despite its title, *Vanishing Nature* is a positive and forward-looking book. It concludes we must maximize every tool at our disposal and develop solutions at multiple levels.

For example, we need better science, both to understand our natural heritage, especially in the oceans, and to develop new techniques for pest control. We must fund and support the voluntary sector and landowners to play their part and celebrate the great many wins already

in process. We must refine and strengthen regulation and ensure the law provides for the place of nature among other competing priorities. We must develop new strategic tools including economic incentives to properly cost negative impacts on our biodiversity and motivate constructive behaviours.

Over the years I have been involved in this great challenge in many roles, most recently in establishing the Predator Free New Zealand Trust. Predator Free New Zealand believes New Zealanders universally want to protect and celebrate their natural environment. Many don't know how and need simple pathways to engage, while others are involved through an army of community group activity, but these are often unconnected and lack strategic support. These are roles Predator Free New Zealand seeks to address.

All over the country I see great work done by many people endeavouring to expand pest-free environments. Their efforts, like the messages of this book, are inspirational beacons of hope that the decline of New Zealand's biodiversity is reversible.

I congratulate Marie Brown for the monumental research effort evident in this book and I acknowledge Gary Taylor, Raewyn Peart and the Environmental Defence Society for continuing to publish books of profound importance in the ongoing battle to protect New Zealand's natural heritage.

*Rob Fenwick* CNZM HonD Nat Res (Linc)



*Bruce Clarkson*

## **Preface**

New Zealand is an internationally recognised global biodiversity hot spot with most of our native biota not found anywhere else. However, our ecosystems have been transformed since human settlement, at a rate and scale unparalleled during this period in most of the settled world; and biodiversity decline continues apart from 'islands of hope' (marine and terrestrial sanctuaries and intensively managed areas) sparsely

scattered across the country. This biodiversity decline and the imperative to reverse the decline are the subject of this systematic treatment and analysis of the problem viewed through a fresh lens.

Compared with earlier approaches, *Vanishing Nature* is cross-disciplinary, covering the social, economic and ecological drivers of decline. Four core chapters directed at the Department of Conservation and public land, private land, freshwater ecosystems, and marine ecosystems, and an additional chapter reflecting on community conservation, provide a substantive basis for later consideration of solutions to reversing the decline of biodiversity. In essence, this is an independent review of progress in implementation of the New Zealand Biodiversity Strategy. It is very timely, considering 10 years have elapsed since the last review and much has changed in the interim.

In considering the role of the Department of Conservation and its predecessors in protecting public lands (Chapter 3), the authors rightfully highlight the remarkable achievements in offshore island and threatened species management. Recent progress and developments are also covered, including the application of systematic conservation planning. So too are troubling aspects of the recent departmental restructuring, reduction in advocacy work, the utility of monitoring systems that inform systematic conservation assessment, and questions around the adequacy of funding to protect the biodiversity resources of public conservation lands. All are matters that deserve a fuller public and professional debate.

Conservation of biodiversity on private lands (Chapter 4) continues to be a thorny problem in many parts of New Zealand but one that must be solved given the unrepresentative nature of public conservation lands. The range of relevant policies and instruments and their limitations is considered in relation to the economic and social drivers leading

to ongoing decline. Sound evidence is provided that monitoring and compliance are not strong enough and the range of incentives too limited to secure permanent gains. Countering this is the vanguard of exemplary practice from a limited but growing number of private landowners.

Freshwater ecosystems were highlighted for more attention in the 2005 Biodiversity Strategy review. As outlined (Chapter 5), the focus has increased in recent years as water quality and water allocation issues have become more acute, and greater numbers of native freshwater species become threatened. Statutory reforms, collaborative approaches and up-scaling of restoration efforts to catchment level are all considered to show promise but more needs to be done to reverse degradation regionally and nationally.

The sheer scale of the marine environment (Chapter 6) and its information requirements make protecting this biodiversity resource a daunting challenge. The authors outline significant progress in gathering information but limitations of lack of baselines, and incomplete taxonomic inventory and understanding persist. Progress in gazetting new marine reserves has improved representativeness but significant gaps remain. Adequate protection is characterised as compromised by a range of ongoing impacts and barriers, including fishing, invasive species, regulatory weaknesses and under-implementation.

Community conservation (Chapter 7) is motivated by the high value New Zealanders accord their natural heritage. With growing community contribution to stalling biodiversity decline comes concern at over reliance on volunteers and how to encourage better integration of public, private and individual efforts to protect our biodiversity. Again, there is a strong sense of the need to do better to cope with the magnitude of the problem.

Finally, the solutions framework focusing on strategic initiatives, tactical initiatives and practical initiatives outlined at the outset (Chapter 2) is revisited. A wide range of solutions (Chapter 8) is offered, derived from the authors' critical analysis and strong insight into the drivers of biodiversity decline.

This is a valuable contribution to debates on how to more effectively protect and enhance our precious indigenous biodiversity. But, more importantly, the solutions identified have the potential to galvanise regional and national approaches to more-effective implementation.

*Bruce Clarkson* BSc MSc DPhil Waikato

Interim Director Biological Heritage National Science Challenge

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Gillian Crowcroft NZPCN

*Hebe adamsii*, an endemic shrub found only in the North Island, classified as nationally critical

# 1 The story so far



*Kōtare/kingfisher (Halcyon sancta) on a cabbage tree (Cordyline australis), Waikato River*

## Overview

Biodiversity is critical to human prosperity and its ongoing loss is a result of both historical and modern drivers. Prior to the arrival of humans, much of New Zealand was blanketed in ancient forest and extensive wetlands. A unique flora and fauna gave New Zealand global prominence as a hotspot of biological diversity. Just 700 years of human presence,<sup>1</sup> however, has resulted in large-scale environmental change. Both the speed and magnitude of this, have caused the extinction of much natural heritage, and imperilled an alarming proportion of what remains. The responsibility for safeguarding what's left, falls to New Zealanders, because there is nowhere else that our indigenous species can be conserved. Anything lost here is also lost to the world.

In 2010, the Global Biodiversity Outlook concluded that the world had fallen well short of reaching the goal of the Convention on Biological Diversity: "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth". In the same year, New Zealand submitted its fourth national report to the Convention on Biological Diversity, outlining progress towards meeting the goals of the Convention during the 2005-2009 reporting period. The report notes that 33.4 percent of New Zealand is legally protected,<sup>2</sup> and that progress has been made in building public involvement in conservation, and in increasing active management of the conservation estate. But the overall picture is one of a failure to meet the target of a significant reduction in ongoing biodiversity loss.<sup>3</sup> It is becoming increasingly clear, that radical and enduring change to biodiversity management and governance is required, to effectively protect and sustain the country's biodiversity.

New Zealand's evolutionary history, like other island ecosystems such as Hawai'i, has predisposed it to particularly severe biodiversity losses following the arrival of humans and their exotic entourage. By the same token, our economic dependence on agriculture and tourism, underpinned by market branding focused on being 'Clean and Green' and '100% Pure' explicitly relies upon the protection of biodiversity and the maintenance of healthy ecosystem services (see Box 1.1). New Zealand's reliance on such ecosystem services indicates that there is considerable economic value derived from our biodiversity, but it also poses an environmental management conundrum: can we grow our economy while also maintaining the prosperity supplied by biodiversity and ecosystem services?

### Box 1.1 Ecosystem services

Ecosystem services are values that humans derive from the state and abundance of natural systems and their component parts. Ecosystem services are defined by the United Nations Environment Programme as "the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth."<sup>4</sup>

Now in 2015, one third of New Zealand's land area is held primarily for conservation. Community-based conservation projects are proliferating and conservation science has delivered a wealth of new knowledge and effective conservation tools. A suite of international agreements and national legislation has been enacted to protect biodiversity, and biodiversity responsibilities have been conferred upon a range of agencies, most particularly on the Department of Conservation and councils.

Despite these remarkable efforts, biodiversity decline continues, as pests and habitat loss push increasing numbers of native taxa toward extinction. Among our plants, 289 are threatened and 749 are at risk, meaning that they are likely to be extinct within the next century. This is nearly 40 percent of the total number of New Zealand's native plant species.<sup>5</sup> Native freshwater fish have suffered even greater declines, with 74 percent currently at risk or threatened.<sup>6</sup> Of the 417 bird species still



Sarah Herbert

*Hochstetter's frog (Leiopelma hochstetteri) is one of only four endemic New Zealand frogs, is semi aquatic and is the only one with a tadpole stage*





*The fecund Australian brushtailed possum (Trichosurus vulpecula) has wreaked havoc on indigenous flora and fauna, proliferating since its intentional introduction to kickstart a fur trade*

present in New Zealand (56 species are already extinct), over 40 percent are now threatened or at risk.<sup>7</sup> Our native lizards are also in serious decline with approximately 85 percent being threatened or at risk.<sup>8</sup> Our two endemic marine mammals (New Zealand Sealion; Maui's Dolphin) are both threatened.<sup>9</sup> Combined with the substantial reduction in the extent and health of indigenous ecosystems, these threatened species statistics indicate the parlous state of our remaining indigenous biodiversity.

Biodiversity loss, like climate change, is a symptom of unsustainable production and consumption systems. These systems arise from human population growth, abetted by perverse economic drivers that render prosperity-damaging actions economically viable. Avoidance of negative environmental effects, restoration and environmental compensation become discretionary costs.<sup>10</sup>

Global recognition of biodiversity loss has been many times incorporated into international statements and agreements. Prominent among these is

the Rio Declaration which arose from the 1992 United Nations Conference on Environment and Development. Its parties undertook to observe 27 Principles, noting the need to have regard to *inter alia* the needs of future generations (Principle 3), to regard environmental protection as integral to development (Principle 4) and to enact 'effective environmental legislation' (Principle 11). These principles reflect the idea that long-term human prosperity requires societies to live within environmental limits.

Living within such limits is difficult, because the benefits individual members of society derive from the consumptive use of the environment, can often far outweigh any losses they directly suffer from the environmental degradation such use causes. The conflict between these private use interests, and the public interest in the longer-term prosperity sustained by living within environmental limits, poses some perplexing policy questions and governance challenges. What is the best mix of environmentally consumptive development and environmental protection to sustain and enhance prosperity? How can agencies of democratically-elected governments, effectively constrain the actions of well-resourced and determined private interests, in order to protect the diffuse interests of the distracted and ill-informed public? Indeed, what are the environmental bottom lines required to ensure prosperity? These questions are central to the conflict between public and private interests in the environment.

Private interests seek ambiguous policy and eschew strict regulation, preferring voluntary mechanisms, minimal outcome monitoring and dilatory enforcement of whatever environmental regulation might apply. Advocates of the public interest seek definitive policy, strict and effectively enforced regulation, and informative outcome monitoring to render regulatory agencies accountable to the public interest. Regulatory agencies want to survive the cross-fire. They do so by aligning with the most powerful interest which, unfortunately, is often not the public interest in maintaining biodiversity and ecosystem services. This is indicated by symbolic and ambiguous policies (which provide laudable rhetoric in support of the public interest but allow actual decisions that favour private interests), weak regulation, dilatory enforcement and uninformative monitoring. This conflict-orientated dynamic among the stakeholders is ultimately why so few countries have managed to maintain their biodiversity, or more generally, the state of their environments.

Effective solutions will be founded on the understanding that environmentally sustainable economies are a precondition for lasting prosperity. They will involve more than seeking definitive policy and strict regulation efficiently enforced by agencies. This is because the

divergent interests of private, public and agency stakeholders render this conventional approach unachievable on its own. Effective solutions will involve institutional reforms and novel mechanisms designed to bring private and public interests in the maintenance of biodiversity towards alignment. If public and private interests are aligned, then definitive policy, efficient enforcement and rigorous outcome monitoring will become normal for regulatory agencies. An environmentally sustainable economy, with the prospect of delivering lasting prosperity, will be the end result. The remainder of this book is devoted to identifying the socio-economic drivers of our vanishing nature in order to formulate solutions to the biodiversity crisis and its impacts on our long-term prosperity.

## The importance of biodiversity

### **Box 1.2 Definition of 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”.<sup>11</sup>

Biodiversity and healthy ecosystem services underpin human prosperity. But the dependence is mutual, because some level of prosperity is required to enable biodiversity protection and the maintenance of ecosystem services, in the face of short-term human needs and wants. From large-scale dependencies upon climate regulation and pollination services, through to more localised dependencies on ecosystems for food, materials for construction and cultural or spiritual fulfilment, human prosperity is indivisible from the fate of the natural world.<sup>12</sup> This is why, if human living standards are to be maintained or improved, our societies must live within environmental limits at regional to global scales.

There is a growing recognition that degradation of natural systems, including biodiversity, has a real and substantial economic cost. Seminal work by Robert Costanza *et al* in 1997, valued the ecological function of Earth at a stunning US\$33 trillion per year. This sparked interest in framing nature conservation as having economic merit, rather than merely being considered a cost.<sup>13</sup> The Millennium Ecosystem Assessment, in 2005, recognised the economic merit of nature conservation and confirmed that changes in the health of ecosystems were directly linked to human wellbeing. The Convention on Biological Diversity assessments noted in 2010 that: “Biodiversity will be better protected through actions that

are justified on their economic merits. The development of tools for the valuation of biodiversity is a priority”.<sup>14</sup> In 2014, Costanza *et al* revised their early research, issuing an updated estimate of the global value of ecosystem services of between US\$125 and US\$145 trillion per year. The authors also noted that a reduction in ecosystem services due to land use change alone, of between US\$4.3 and US\$20.2 trillion per year, had occurred during the 17 years since publication of the first research paper.<sup>15</sup>

Excluding values such as these from markets, and therefore from most decisions about human impacts on natural systems was identified by the Millennium Ecosystem Assessment as a principal driver of biodiversity loss.<sup>16</sup> Notwithstanding the obvious utility of undertaking valuation, Costanza *et al* highlight that many ecosystem services are incompatible with conventional market frameworks, and that a more successful approach is to transform institutions to better recognise the profound value of natural systems to humans.<sup>17</sup>

Biodiversity and ecosystem services carry intrinsic value, with compelling ethical arguments to provide for their persistence, quite apart from any value they may pose to humans.<sup>18</sup> All species and ecosystems have intrinsic value, which provides powerful justification for conservation activities. Intrinsic value is defined in the Resource Management Act 1991 (RMA) as:

*intrinsic values, in relation to ecosystems, means those aspects of ecosystems and their constituent parts which have value in their own right, including—*

- (a) their biological and genetic diversity; and*
- (b) the essential characteristics that determine an ecosystem’s integrity, form, functioning, and resilience.*<sup>19</sup>

Early recognition of this values approach exists in the 1982 United Nations World Charter for Nature which states that: “Every form of life is unique, warranting respect regardless of its worth to man”.<sup>20</sup> The contention that the intrinsic value of biodiversity should be considered, together with any use-based values, now underpins the Convention on Biological Diversity. Modern definitions of ecosystem services also recognise non-use values such as the cultural and spiritual importance of particular species and ecosystems.

## Historic biodiversity loss in New Zealand

In New Zealand, a curious assemblage of species, a varied climate and eons of total isolation created a biota and ecosystems vulnerable to the rapid ecological change that was to come with human settlement.<sup>21</sup> More than 90 percent of our indigenous flora is found nowhere else; as well as all



*The Mackenzie Basin is being converted to intensive dairy farming but the value of dryland biodiversity lost is not reflected in the price of milk*

of our indigenous reptiles and amphibians, 70 percent of our freshwater fish<sup>22</sup> and more than 70 percent of our birds.<sup>23</sup> Marine biodiversity is estimated to make up 80 percent of New Zealand's total biodiversity although much of it has yet to be discovered.<sup>24</sup> Following the relatively recent settlement by humans during the 13th century, New Zealand lost a high proportion of its vertebrate species very quickly, having one of the highest extinction rates in the world.<sup>25</sup>

The absence of indigenous land mammals contributed to the underlying vulnerability of our ecosystems and species. New Zealand's fauna have some curious characteristics that, although endearing, left them extraordinarily vulnerable to the impacts of the mammalian predators that were introduced by human colonists. For example, the kākāpō when sensing danger simply freezes, rather than running away, seeking cover or actively defending itself.<sup>26</sup> This was an effective strategy when the main predator was the Haast eagle, but for ground-based mammalian predators the kākāpō immediately became a 'sitting duck', and its numbers plummeted after their arrival. Few, if any of our endemic birds, lizards and large invertebrates have effective ways to avoid predation by mammals. One can only imagine how ill-equipped moa were to evade early Polynesian hunters.

### Impacts of human settlement

Polynesian settlers, and the rats and dogs they brought with them, caused the first wave of ecological degradation. This led to large-scale ecosystem change, with more than 30 percent of forest wiped out and the extinction of 30 bird species, most before AD1600 after barely a century

of occupation.<sup>27</sup> Range contractions for many other species resulted from hunting, loss of habitat and the introduced kurī (Māori dog) and kiore (Polynesian rat).

European settlement commenced with visits by itinerant sealers and whalers to harvest vulnerable marine mammal populations in the south of New Zealand.<sup>28</sup> Permanent European settlement further diminished ecosystem function and species abundance through a relentless and widespread regime of ecosystem transformation. Land clearing for urban development and agricultural expansion, forest felling to meet timber demand and hunting continued to destroy indigenous species and their associated ecosystems, with two-thirds of forest wiped out in the first 700 years of occupation.<sup>29</sup>

Active introductions of socially desirable, but ecologically devastating, land mammals by settlers and their acclimatisation societies were to have some of the most enduring impacts of all of these changes. Acclimatisation societies actively introduced and reintroduced mammals in order to spark a new industry in the fledgling colony of New Zealand, to control a species previously introduced and becoming a problematic pest, or simply to recreate the appearance of a European landscape. For example, the rabbit (*Oryctolagus cuniculus*) was introduced as a food source in the 1860s. Preferring open land, the rugged and thickly-forested landscape of New Zealand was initially not good habitat for rabbits, and they struggled to take hold.

The rapid land clearance and drainage of the mid-1800s, however, meant that large swathes of the country became habitable by rabbits. Within 20 years, they were declared a serious agricultural pest, consuming



*Introduced rats are serious predators threatening many large native invertebrates, lizards, birds and bats with extinction. Effective rat control is one of our more pressing conservation challenges*



*European rabbits (Oryctolagus cuniculus) are abundant throughout New Zealand and a serious agricultural pest in the central South Island*

much pasture in competition with livestock.<sup>30</sup> The impacts of rabbits on indigenous biodiversity were also significant. Rabbits suppress regeneration of some ecosystem types by grazing and burrowing, including those occupying sand dunes, salt pans and the margins of wetlands.<sup>31</sup> The solution was to introduce the stoat (*Mustela erminia*).

The stoat is one of the world's most effective predators, and is now ubiquitous across the New Zealand landscape. Stoats are agile, fecund

and extremely adept swimmers and climbers.<sup>32</sup> In their average one-year life span, stoats occupy large home ranges and travel distances of up to 70 kilometres in a fortnight.<sup>33</sup> Stoats prey on a wide range of birds, lizards and insects. They are the principal predators of the iconic kiwi, and contribute significantly to predation of a host of other threatened species such as the rock wren, kakī, kākāpō and the kōkako.<sup>34</sup> Although the impacts of stoats were immediately apparent after their introduction during the 1880s, the stoat was granted legal protection by the colonial government, and this protection was not lifted until 1936.<sup>35</sup>

In both terrestrial and aquatic environments, a multitude of botanical introductions have caused biodiversity loss, by displacing native plants from their habitats, and introducing novel plant pathogens. More than 30,000 plants have been introduced to New Zealand, either on purpose or accidentally through imported material.<sup>36</sup> Of those, about 2500 have since become naturalised, with more than 300 being invasive. Much modern conservation effort is directed at killing mammalian pests and invasive plants including gorse, old man's beard and wilding conifers.

Purposely introduced exotic species, such as trout, have had significant impact on freshwater biodiversity. Trout prey on native freshwater fish and invertebrates, altering community structure and reducing indigenous species' abundances and distributions.<sup>37</sup> The rapid establishment of trout in New Zealand waters gave rise to a vibrant and internationally



*The endemic Buller's mollymawk (Thalassarche bulleri) is one of the smallest of the albatross family*

renowned recreational fishing industry. This resulted in conflict between the high value fishers placed on trout as a resource to be exploited and its negative ecological effects. Deer, pigs and goats are also simultaneously conservation pests and valued hunting species.

The vast sea surrounding New Zealand is home to an extraordinary diversity of life. More than 40 percent of the world's seabirds, and more than half the world's marine mammals, pass through New Zealand waters either as residents or following migratory pathways. As elsewhere in the world, key threats to oceanic function and biodiversity include fishing, pollution, invasive species and climate change. Sediment run-off, nutrients and faecal pathogens pollute streams, lakes, rivers, estuaries and shallow coastal areas. The settlement of sediment on the seabed, so dramatically modifies underwater habitat, that an entirely different suite of species can displace the former community. The ecological integrity of the marine environment has been further diminished by direct effects of fish harvest, physical damage from fishing equipment (much catch is taken by seabed-damaging bottom trawling), and macro-scale changes such as ocean acidification and climate change.

## Responses to biodiversity loss

The loss of indigenous biodiversity in New Zealand has prompted management responses reflecting opportunities and prevailing social attitudes of the time. Responses include active engagement with international conventions (e.g. Convention on Biological Diversity), production of comprehensive legislation that addresses many aspects of biodiversity loss, administrative restructuring to form a lead conservation agency (Department of Conservation) unfettered by conflicting development objectives, and most recently, a proliferation of private and community led conservation projects.

Māori, as the traditional and indigenous people of New Zealand, have a unique and important role in the protection of indigenous biodiversity and ecosystems. Their occupation over centuries, has led to the development of a significant body of traditional ecological knowledge, and a culture intrinsically linked with the natural world. The role of Māori in indigenous biodiversity protection is increasing, as progressive settlement of Treaty of Waitangi claims is growing iwi land and resource ownership nationwide. In addition, co-management agreements and iwi-led conservation projects are becoming more common. Embedding Māori culture and aspirations within our conservation and environmental institutions is essential, if conservation is to be socially and culturally sustainable.

## Convention on Biological Diversity

New Zealand has been an active participant in global efforts to curtail the loss of biodiversity (see Table 1.1). New Zealand is a signatory to a number of international treaties with biodiversity implications, most particularly the Convention on Biological Diversity. The 1971 Ramsar Convention, the 1975 Convention on the International Trade in Endangered Species of Flora and Fauna and the 1979 Convention on Conservation of Migratory Species are also important. In addition, the 1994 United Nations Convention on the Law of the Sea includes specific obligations to conserve marine biodiversity.

New Zealand signed the Convention on Biological Diversity in 1993, the key international commitment that covers all levels of biological organisation wherever they occur.<sup>38</sup> The Convention was initiated by the United Nations Environment Programme, with the text being agreed during 1992 in Nairobi, Kenya.

The signing of the Convention was opened at the Rio Earth Summit, and it came into force at the end of 1993. The objectives of the Convention are:

*... the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding ..*<sup>39</sup>

Commitments New Zealand made in signing the Convention include:

- “Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, inter alia, the measures set out in this Convention relevant to the Contracting Party concerned” (Article 6a)
- “Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitor their effects through sampling and other techniques” (Article 7c)
- “Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity” (Article 8a)
- “Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies” (Article 8f)

**Table 1.1 International biodiversity-related agreements**

International instrument	Year NZ ratified	Key agency	Key commitments
International Agreement for the Regulation of Whaling	1946	Department of Conservation	<ul style="list-style-type: none"> <li>• Participation in collaborative decision-making regarding the practice of whaling</li> </ul>
Convention on the International Trade in Endangered Species	1975	Department of Conservation	<ul style="list-style-type: none"> <li>• Administration of Trade in Endangered Species Act 1980</li> <li>• Regulation of trade in endangered species to ensure it does not affect their long-term survival in the wild</li> </ul>
Ramsar Convention	1976	Department of Conservation	<ul style="list-style-type: none"> <li>• Designation of Ramsar sites</li> <li>• Inclusion of wetland conservation in land use planning</li> <li>• Establishment of nature reserves including wetlands</li> </ul>
Convention on Conservation of Migratory Species	1979	Department of Conservation	<ul style="list-style-type: none"> <li>• Protection of migratory species across all environments</li> </ul>
Convention on Biological Diversity	1993	Department of Conservation	<ul style="list-style-type: none"> <li>• Development of national strategies, plans or programmes for the conservation and sustainable use of biological diversity</li> <li>• Identification of processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity, and monitoring of their effects through sampling and other techniques</li> <li>• Establishment of a system of protected areas or areas where special measures need to be taken to conserve biological diversity</li> <li>• Rehabilitation and restoration of degraded ecosystems and promotion of the recovery of threatened species</li> </ul>
United Nations Convention on the Law of the Sea	1994	Department of Conservation	<ul style="list-style-type: none"> <li>• Prevention of pollution</li> <li>• Protection of marine biodiversity</li> </ul>

### ***New Zealand Biodiversity Strategy***

New Zealand's principal implementation tool for the Convention on Biological Diversity is the non-statutory New Zealand Biodiversity Strategy which contains four goals (see Box 1.3).

A bi-cultural approach to conservation is an increasingly important dimension of biodiversity protection in New Zealand. Accordingly, the Strategy identifies Māori as key partners in conservation of indigenous biodiversity. Jurisprudence of the Environment Court has also recognised the unique relationship that Māori have with the natural world, and the divergence of their perspectives from traditional Western resource governance.<sup>40</sup> Numerous Acts give specific consideration to the relationship between Māori and the natural world, making consideration of Māori perspectives a mandatory component in decision-making.

This special role is likely to become increasingly pertinent to biodiversity conservation as Treaty settlement proceeds (see Box 1.4). The outcomes sought by the Strategy (by 2020) are:

- “The relationship that Māori have with New Zealand's indigenous biodiversity, as tangata whenua, is recognised and valued in the process of conserving and sustainably using biodiversity. Traditional Māori knowledge, or mātauranga Māori, about biodiversity is respected and preserved and informs biodiversity management.”
- “Effective working relationships, founded on the Treaty of Waitangi, are continuing to be built between government agencies and iwi and hapū, enabling their involvement at all levels of biodiversity management. The resolution of Treaty claims has expanded the roles Māori play in biodiversity management, enhanced the integration of cultural values, and informed how benefits from the use of

indigenous biodiversity can be shared by New Zealanders. There is greater community understanding of Māori customary use of native species and this continues to be ecologically sustainable.”

- “Māori are managing their interests in biodiversity reflecting different iwi and hapū priorities, and sharing in the benefits of its use, to support their economic and social aspirations and fulfil their responsibilities as kaitiaki”.<sup>41</sup>

## Domestic legislation

New Zealand governments have passed a wealth of legislation relevant to biodiversity and conservation (see Table 1.2) and have established a number of agencies with responsibilities for biodiversity protection. The legislation and agency responsibilities apply to some or all of the key domains for biodiversity:

- Terrestrial biodiversity (on public and private land)
- Freshwater biodiversity
- Marine biodiversity

### *Terrestrial biodiversity*

The scale and speed of nineteenth century land use change was dramatic, but some exceptional forward-thinking people were able to set aside a few areas to be spared from destruction. The first of these, in 1887, was the world-famous Tongariro National Park. It was gifted to the people of New Zealand by the visionary Ngāti Tūwharetoa chief Sir Tumu Te Heuheu, only the second protected area of its kind in the world, now covering more than 79,000 hectares.<sup>42</sup> The incremental setting-aside of land would later build a protected area network of globally significant proportions, with approximately one-third of New Zealand’s land area being under some level of legal protection from habitat destruction.

Around 1900, people became dissatisfied with the lack of recognition given to indigenous species, and raised the alarm about their decline. One was Richard Henry, an Irishman who – noting the effects of mammalian predation on native bird populations – single-handedly toted hundreds of threatened species including the kākāpō to safer places. Richard Henry kept detailed records of the habits of indigenous flightless birds and his descriptions of these were one of the first recorded alerts to the decline of our indigenous biodiversity.<sup>43</sup>

The acclimatisation societies gradually broadened their focus to the management of native game, spurred by a growing appreciation of the importance of indigenous wildlife. The passing of the Animals Protection

### **Box 1.3 Goals of New Zealand Biodiversity Strategy**

#### *Goal One: Community and individual action, responsibility and benefits*

Enhance community and individual understanding about biodiversity, and inform, motivate and support widespread and coordinated community action to conserve and sustainably use biodiversity; and enable communities and individuals to equitably share responsibility for, and benefits from, conserving and sustainably using New Zealand’s biodiversity, including the benefits from the use of indigenous genetic resources.

#### *Goal Two: Treaty of Waitangi*

Actively protect iwi and hapū interests in indigenous biodiversity, and build and strengthen partnerships between government agencies and iwi and hapū in conserving and sustainably using indigenous biodiversity.

#### *Goal Three: Halt the decline in New Zealand’s indigenous biodiversity*

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.

#### *Goal Four: Genetic resources of introduced species*

Maintain the genetic resources of introduced species that are important for economic, biological and cultural reasons by conserving their genetic diversity.

Act in 1907 provided absolute protection to some native birds, such as the endemic kea, and required licences for the harvest of most others. The Animals Protection and Game Act 1921-22 allowed further species to be protected, such as the tuatara and native bats.<sup>44</sup> Although the hunting of many native species continued under this regime, it was tightened and controlled sufficiently to reduce some pressure on native bird populations.<sup>45</sup>

While ecological areas continued to be set aside for conservation purposes through the efforts of government and non-government agents alike, development activities elsewhere were gradually diminishing

#### **Box 1.4: Treaty settlements and biodiversity**

The Treaty of Waitangi Act in 1975 established the Waitangi Tribunal, which investigates claims by Māori related to alleged breaches of the Treaty of Waitangi. The Office of Treaty Settlements (a division of the Ministry of Justice) administers the negotiations. In addition, Treaty settlement processes increasingly entail Māori adopting decision-making functions under the RMA in respect of places or resources of significance.<sup>46</sup>

The Treaty settlement process addresses the historical (i.e. pre-1992) grievances of Māori. These grievances are based on the Crown failing to live up to the agreement struck in the Treaty of Waitangi. Grievances are very specific to the iwi and hapū who suffered them, but often include unjust land alienation (and in some cases blatant confiscation), failure to protect the Māori culture and language, restricting rights of Māori through legislation and general mistreatment of Māori over many decades.

Settlements are not compensation; they are the redress that the Crown provides to recognise the grievances suffered. Redress is agreed between the Crown and the settling group and typically includes four elements: historical redress (through apologies, acknowledgments and a historical account), financial redress (cash payments), commercial redress (the vesting of properties that are intended to be commercial enterprises) and cultural redress (arrangements over areas with strong historical and cultural significance, typically Department of Conservation land).

No private land is included in Treaty settlements. The respective responsibilities of the Crown, local authorities (who are not considered the Crown for the purposes of Treaty settlements) and Māori over land in a settlement is agreed during the settlement itself. Matters that may affect biodiversity conservation include changes in the status of land and the handover of management responsibilities for areas and resources.

For example, the Deed of Settlement signed between the Crown and Ngāti Kuri resulted, among other things, in a co-management agreement for Te Oneroa-a-Tōhē/Ninety Mile Beach.<sup>47</sup> The agreement also resulted in the formation of the Te Hiku o Te Ika Conservation Board, and the intention to produce a parallel conservation management strategy. The new Conservation Board is an entity that has assumed the functions of the Northland Conservation Board with respect to the settlement area.<sup>48</sup>

The Wai 262 claim is an example of a long-running Treaty claim that is of particular significance to indigenous biodiversity and conservation governance. The claim relates to the recognition in law of Māori culture and traditional knowledge. Claimants were concerned that Māori had been inadequately consulted on a range of matters that had direct impact on their rights under the Treaty, such as entering into international agreements.<sup>49</sup> The report that finally emerged in 2011, two decades after the claim was lodged, made a suite of recommendations to give Māori concerns a more equal standing in resource management and conservation.<sup>50</sup>

natural capital, as the economy boomed and the population grew. The Native Plants Protection Act 1934 was introduced to protect native plants, particularly those located outside reserves and national parks, but was never much utilised. The Act provides for penalties if any individual 'takes' a native plant without landowner consent, but they are minimal. The soil conservation movement had a much more significant role to play in achieving the protection of many high-country forests from widespread destruction. The Soil Conservation and Rivers Control Act 1941 was the first environmental legislation in New Zealand requiring national coordination and it provided for the establishment of Soil Conservation Reserves.<sup>51</sup>

In 1953, the Wildlife Act came in to force, applying to all New Zealand environments. It was originally developed to guide the protection and control of wild animals, including game.<sup>52</sup> Indigenous and game species

are now both managed under the Act (and some species fall into both categories). The game management-focused nature of this legislation means that it is perhaps not fit for the purpose of protecting native species and their habitats from damage and demise. Despite this, the Act remains the key legislation for the protection of indigenous species. The key provision is section 3:

#### *3. Wildlife to be protected*

*Subject to the provisions of this Act, all wildlife is hereby declared to be subject to this Act and (except in the case of wildlife for the time being specified in Schedule 1, Schedule 2, Schedule 3, Schedule 4, or Schedule 5) to be absolutely protected throughout New Zealand and New Zealand fisheries waters.*





*West Coast green gecko (Naultinus tuberculatus)*

As well as protecting some indigenous species, the legislation also provides for the establishment of wildlife sanctuaries, refuges and management areas; for wildlife planning; and for planning and management activities related to game. With the passing of the Wildlife Act, conservation got underway in the back-country. The Wildlife Service, the Forest Service and the Department of Lands and Survey mapped forests, surveyed for wildlife, trapped pests, worked to recover species from the brink of extinction and added land to the reserve network. The diversity of habitats protected grew, as did the area of protected public land. Many vulnerable areas were put aside for the benefit of future generations.

During the period running from post-war until the early 1980s, agricultural expansion intensified with mechanisation, aerial topdressing, government subsidies and economic drivers such as the Korean War. The farming sector enjoyed guaranteed minimum prices, grants to convert natural habitat to pasture, and tax credits for general expenses. By the early 1980s, about 40 percent of a typical sheep-and-beef farmer's income came from government subsidies.<sup>53</sup> This incentivised large-scale habitat clearance and wetland drainage on private land. On public land, government

agencies did the same thing: the Forest Service cleared indigenous forest to plant fast-growing exotics; the Ministry of Works and Development dammed rivers and changed lake levels for hydro-electric power schemes; and the Department of Lands and Survey drained wetlands and cleared native vegetation for farming – all in the name of progress.

During the 1970s there was increasing concern about the environmental impacts of major infrastructural developments (particularly the hydro-electric power schemes), the loss of native vegetation caused by farm development, and native forest logging on public land. This led to the introduction of statutory mechanisms to better account for the environmental impacts of infrastructural developments and to facilitate legal protection of remnant native vegetation. Major infrastructural projects were required to undertake environmental impact assessments from 1973 and the Reserves Act 1977 introduced better ways to acquire reserves and provide for their ongoing management. The Town and Country Planning Act 1977 and the 'Wild and Scenic' amendment to the Water and Soil Conservation Act 1967 in 1981 provided additional legal mechanisms for managing effects of development on wildlife.



Catherine Kirby

In 1991, the world's first sustainable development legislation was granted royal assent. The RMA provides a single framework to administer the "use, development and protection of natural and physical resources" (but excludes minerals and fisheries).<sup>55</sup> The RMA introduced a more integrated approach to the management of natural and physical resources and outlined a standard process for resource consent applications.<sup>56</sup> Section 5 of the Act requires that the "life-supporting capacity of the environment" be "safeguarded"; section 6 directs *inter alia* that areas of significant vegetation, and significant habitats of indigenous fauna, should also be protected as a matter of national importance. It also recognises the national importance of wetlands, lakes, rivers and the natural character of the coast.

Widespread consultation on protection of biodiversity on private land took place, in the late 1990s to early 2000s, by a Ministerial Advisory Group which produced the Bio-What? report. This report focused on biodiversity outside public conservation land, and recommended among other things, that a national accord on biodiversity was required.<sup>57</sup> It took until 2011 to notify a 'Proposed National Policy Statement on Indigenous Biodiversity' (Proposed Biodiversity NPS) and this has yet to progress towards finalisation. The key impediment to progress on this document is the perceived interference with private property rights that regulating protection of biodiversity on private land in the public interest inevitably entails.

*The endemic epiphyte, the New Zealand bamboo orchid (Earina mucronata) is commonly found perched in lowland forest*

In 1980, the National Parks Act was passed, to preserve "in perpetuity as national parks, for their intrinsic worth and for the benefit, use, and enjoyment of the public, areas of New Zealand that contain scenery of such distinctive quality, ecological systems, or natural features so beautiful, unique, or scientifically important that their preservation is in the national interest".<sup>54</sup> New Zealand now has fourteen national parks, managed on behalf of the Crown by the Department of Conservation.

In 1987 Fish and Game New Zealand, the modern agent for the protection and management of game and its habitats, was formed. It is a legacy of the acclimatisation societies, now amalgamated to form the new entity under the Conservation Act 1987. Although a public entity, Fish and Game is not funded by the taxpayer, but instead its budget is principally sourced from licence fees to hunt or fish the species it manages.



Gareth McGregor

*Tongariro National Park was gifted to the people of New Zealand by the visionary Ngāti Tūwharetoa paramount chief, Sir Tumu Te Heuheu*



Mike Joy

*The torrentfish (Cheimarrichthys fosteri) is our most distinctive native freshwater fish. Abundant and widespread only 30 years ago, it is now among our most rapidly declining fish species*

### **Freshwater biodiversity**

Regulatory responses to the loss of freshwater biodiversity have been more limited than in terrestrial environments. In 1941, the Soil Conservation and Rivers Control Act was passed, creating catchment boards – Crown agencies charged with controlling flooding through river management and soil erosion control. Catchment boards were slow to develop, taking more than 20 years to eventually cover 90 percent of the country.<sup>58</sup> Their function was eventually delegated to regional councils under the Local Government Amendment Act of 1989. Freshwater species are jointly managed by the Department of Conservation (native freshwater fish and other wildlife as well as noxious fish species), the Ministry for Primary Industries (commercial freshwater fish, aquaculture and some biosecurity risks) and Fish and Game Councils (sports fish and game birds).

Of all freshwater environments globally, wetlands have been the most severely impacted.<sup>59</sup> This pattern is amply reflected in New Zealand, where wetlands now occupy less than 10 percent of their original extent, one of the highest proportional losses in the world.<sup>60</sup> During the early 20th century, large wetland drainage schemes were implemented, meaning that by 1983, 4100 kilometres of drains were maintained nationally.<sup>61</sup> Drainage schemes were facilitated by legislation and government financial support, including the drainage of the extensive Hauraki Plains and the plains of the Manawatū River, which included rerouting of rivers (the Manawatū used to meet the sea several kilometres north of the present location).

In 1976, New Zealand became a signatory to the Convention on Wetlands of International Importance (more commonly known as the Ramsar Convention).<sup>62</sup> Among the Convention's provisions is a requirement to

designate sites of international importance, a process managed by the Department of Conservation and based upon nominations.

In 1986, New Zealand released the 'New Zealand Wetlands Management Policy'.<sup>62</sup> The policy was designed to complement the development of the national wetlands inventory so that the Department would: "be in a position to foster the sensitive management of remaining wetlands: as beautiful, complex productive ecosystems, rich in unique plants and animals, rich in historical memory of how our culture developed."

The terms of the Ramsar Convention are not linked specifically to New Zealand legislation, but are provided for in a number of ways. For example, Ramsar sites are listed in Schedule 4 of the Crown Minerals Act 1991, meaning they are closed to mining.<sup>63</sup> The Conservation Act controls the recognition of further Ramsar sites, which requires that the Governor-General recommend the listing of a wetland to the Ramsar Secretariat.<sup>64</sup> The RMA recognises that the protection of wetlands is a matter of national importance. Regional and district plans and policy statements may recognise the values of Ramsar sites, but typically do not contain Ramsar site-specific rules distinct from other wetlands.

Impacts on freshwater environments are managed by regional planning instruments, resource consenting under the RMA, and also by non-regulatory approaches devised by regional and local councils. Regional councils must undertake the "maintenance and enhancement of ecosystems in water bodies and coastal water" under the RMA (section 30).<sup>65</sup> The identification and protection of terrestrial areas of significant indigenous biodiversity, can also provide some protection to adjacent freshwaters, but this mechanism cannot address impacts resulting from activities upstream (e.g. drainage and pollution) or downstream (e.g. barriers to upstream fish passage).

Freshwater environments can also be protected through the Reserves Act and the Conservation Act, through covenants under each of these, and by water conservation orders under the RMA. This latter mechanism arose due to public concern about the impacts of hydro-electric power development on wild rivers and associated recreational opportunities and habitat for important wildlife (such as whio, or blue duck). Before 1991, this tool was available under section 20D of the Water and Soil Conservation Act 1967, as a result of the Wild and Scenic Rivers Amendment Act of 1981. The Amendment Act contemplated two levels of protection: strict water conservation orders for nationally significant environments, and local water conservation orders for important waterways that did not meet the high test of national significance, but which were nonetheless significant. Water Conservation Orders are now provided for under Part 9 of the RMA, but the lower-tier version was replaced by regional plans.



*Poorly designed culverts are obstacles for migratory freshwater fish, preventing them from occupying habitats upstream*

Pollution of freshwater environments from expanding agriculture, industry and urban development led to significant degradation in water quality and loss of biodiversity in lowland rivers. Efforts in the 1990s to address point-source pollution achieved dramatic reductions in concentrated discharges through actions including:<sup>66</sup>

- Improved municipal sewage treatment facilities
- Improved management of industrial water waste
- Capture and treatment of effluent from milking sheds

However, these efforts were not reflected in improved measures of lake, river and stream health because of increasing effects of diffuse non-point-source pollution.

Diffuse pollution remains a difficult challenge to address. Wetlands also remain insufficiently protected from development impacts, and rates of loss and degradation continue apace, particularly for small wetlands on private land.<sup>67</sup> Freshwater management reform, which includes freshwater biodiversity, has been underway in recent years. A key outcome has been the advent of the National Policy Statement on Freshwater Management 2014, which sets out national bottom lines for the first time.

### ***Marine biodiversity***

The Marine Reserves Act 1971 and later, the Marine Mammals Protection Act 1978, are the primary regulatory responses to the need to protect marine biodiversity. The former provides for the establishment of marine reserves between mean high water springs and the 12 nautical mile limit

(the 'territorial sea'). The Exclusive Economic Zone was established long after this Act was enacted and marine reserves cannot currently be established in that area. The Act has a similar governing purpose to the National Parks Act 1980, being to preserve: "as marine reserves for the scientific study of marine life, areas of New Zealand that contain underwater scenery, natural features, or marine life, of such distinctive quality, or so typical, or beautiful, or unique, that their continued preservation is in the national interest".<sup>68</sup> There is no reference in the legislative purpose to biodiversity protection although this is currently foremost among the reasons for establishing marine reserves. The legislation is not fit for the purpose of biodiversity protection, and a broader, contemporary legal context for marine protection is needed.

The Marine Mammals Protection Act was based on the United States 1972 legislation of the same name. The Act provides protection to all marine mammals. It enables establishment of marine mammal sanctuaries as refuges for marine mammals from harmful activities. In addition, there is provision for population management plans to address conflicts with fisheries. In practice, the legislation has failed to live up to its promise. While the Act has prevented intentional killing of whales, dolphins, seals and sea lions, its implementation has failed to sufficiently address fisheries bycatch and disruption from other activities such as aquaculture and tourism.<sup>69</sup>

In the marine environment, the 1980s brought new recognition of fish stocks being rapidly depleted by an over-abundance of fishing vessels.<sup>70</sup> In 1986, New Zealand introduced a then world-leading quota management system to address catch allocation issues and protect the productivity of indigenous species by implementing catch limits (total allowable catch). Quotas and total allowable catches were developed to set a maximum take for each stock based on a notional maximum sustainable yield. Some 100 species are now managed in this way.<sup>71</sup> The commercial catch is set over and above recreational and customary take and is revised at regular intervals by the Minister for Primary Industries based on scientific and policy advice.<sup>72</sup> The present-day Fisheries Act 1996 also includes provisions related to biodiversity.

The RMA provided for national policy instruments applicable to the coastline and territorial sea. These instruments are national policy statements and national environmental standards. The only mandatory national policy statement is the New Zealand Coastal Policy Statement, now in its second iteration (New Zealand Coastal Policy Statement 2010 or NZCPS). The NZCPS contains provisions that recognise biodiversity in the coastal environment including coastal land and the territorial sea. Policy 11 (Indigenous biodiversity) contains some of the strictest provisions related to biodiversity protection in New Zealand (see Box 1.5)

New Zealand recently passed legislation to manage the environmental impacts of activities in the Exclusive Economic Zone, primarily mining, oil and gas extraction. The Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 (EEZ Act) was enacted with the purpose of promoting “the sustainable management of the natural resources of the exclusive economic zone and the continental shelf”.<sup>73</sup>

In considering an application for a marine consent under the legislation, the Environmental Protection Authority must have regard to biodiversity matters, specifically “the importance of protecting the biological diversity and integrity of marine species, ecosystems, and processes” and “the importance of protecting rare and vulnerable ecosystems and the habitats of threatened species”.<sup>74</sup>



Angela Simpson

*Ngarunui, Raglan: the West Coast of the North Island has rich mineral and oil and gas resources on and offshore, creating conflicts between the protection of biodiversity and economic development*

**Box 1.5 NZCPS Policy 11 Indigenous biological diversity (biodiversity)**

To protect indigenous biological diversity in the coastal environment:

- (a) avoid adverse effects of activities on:
  - (i) indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists;
  - (ii) taxa that are listed by the International Union for Conservation of Nature and Natural Resources as threatened;
  - (iii) indigenous ecosystems and vegetation types that are threatened in the coastal environment, or are naturally rare;
  - (iv) habitats of indigenous species where the species are at the limit of their natural range, or are naturally rare;
  - (v) areas containing nationally significant examples of indigenous community types; and
  - (vi) areas set aside for full or partial protection of indigenous biological diversity under other legislation; and
- (b) avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on:
  - (i) areas of predominantly indigenous vegetation in the coastal environment;
  - (ii) habitats in the coastal environment that are important during the vulnerable life stages of indigenous species;
  - (iii) indigenous ecosystems and habitats that are only found in the coastal environment and are particularly vulnerable to modification, including estuaries, lagoons, coastal wetlands, dunelands, intertidal zones, rocky reef systems, eelgrass and saltmarsh;
  - (iv) habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes;
  - (v) habitats, including areas and routes, important to migratory species; and
  - (vi) ecological corridors, and areas important for linking or maintaining biological values identified under this policy.

**Table 1.2 Key biodiversity-related legislation**

Act	Year	Primary Agency	Key matters/tools
Native Plants Protection Act	1934	Department of Conservation	• Native plant species declarations
Wildlife Act	1953	Department of Conservation	• Species-based protection • Protected areas (wildlife sanctuaries, refuges and management reserves) • Population management plans (e.g. to address fishing-related mortality)
Marine Reserves Act	1971	Department of Conservation	• Marine reserves
Reserves Act	1977	Department of Conservation	• Terrestrial reserves • Covenants
Queen Elizabeth II National Trust Act	1977	Queen Elizabeth II National Trust	• Queen Elizabeth II covenants
Marine Mammals Protection Act	1978	Minister and Department of Conservation	• Species-based protection • Population management plans • Marine mammal sanctuaries • Marine mammal tourism permits • Marine mammal protection regulations
National Parks Act	1980	Department of Conservation	• National parks
Conservation Act	1987	Department of Conservation	• Conservation areas • Conservation management strategies, plans and general policy • Concessions regime • Covenants
Resource Management Act	1991	Territorial authorities  Regional councils  Minister and Department of Conservation  Minister and Ministry for the Environment	• National Policy Statements and National Environmental Standards • Objectives and policies in regional policy statements • Objectives, policies and rules in regional plans, district plans and regional coastal plans • Resource consents • Financial contributions • Environmental compensation
Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act	2012	Environmental Protection Authority	• Marine consents • Regulations

*Protection of biodiversity and ecosystem services is enabled by a plethora of legislation implemented by a multitude of agencies. The primary legislation for species protection is the Wildlife Act, with habitat protected under other Acts including the Reserves Act, the Conservation Act and the Queen Elizabeth II National Trust Act 1978. In addition to the general legislation above, a suite of locally-relevant legislation has also been enacted to protect specific geographic locations (e.g. the Waitakere Ranges Heritage Area Act 2008 and the Hauraki Gulf Marine Park Act 2000).*

## **Agencies and biodiversity protection**

New Zealand has conferred specific statutory responsibilities for biodiversity on several central government agencies as well as on regional and local government. The government reorganisation of the 1980s amalgamated the Forest Service, the Wildlife Service Department of Lands and Survey to create the Department of Conservation to



Trent Bell

*The fate of charismatic species such as the tuatara (*Sphenodon punctatus*) often attract the public's interest, but the overall decline of biodiversity has limited political traction*

administer national and forest parks, scientific, nature, scenic and marine reserves as well as much undesignated public land with conservation values termed 'stewardship land'. The Department of Conservation is now the principal agency responsible for the protection of indigenous biodiversity on public land. The Department is mandated by the Conservation Act to manage the public conservation estate, to advocate for the conservation of natural and historic resources on and off public conservation land, and to foster recreation interests.<sup>75</sup>

The Department of Conservation also administers species-conservation relevant legislation,<sup>76</sup> and has a vital advocacy function under the RMA and other legislation, to help ensure that indigenous species and ecosystems are appropriately considered in decision-making by other agencies. In addition, the Department administers the New Zealand Threat Classification System to list species according to their risk of becoming extinct.

The New Zealand Conservation Authority (Te Pou Atawhai Taiao O Aotearoa) is an independent governance organisation that is serviced by the Department. The Conservation Authority's role is set out in section 6B of the Conservation Act and within the National Parks Act and the Reserves Act. The Authority comprises thirteen members and has an advisory function to the Minister of Conservation and the Director-General of Conservation. It is able to investigate matters of national importance and make submissions. It also has a key role in approving conservation management strategies nationally. Fourteen associated Conservation Boards provide a regional presence across the country.<sup>79</sup>

#### **Box 1.6 The role of protected area networks**

A protected area network is a collection of areas secured by legal tools for conservation purposes. Article 8(a) of the Convention on Biological Diversity requires that parties "Establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity".<sup>77</sup> Legal protection of natural areas is an effective mechanism for reducing the threat of habitat destruction and loss. In combination with restoration of degraded ecosystems, and sustainable management of areas outside legally protected sites, protected area networks are crucial to the protection of biodiversity.<sup>78</sup>

The same government reorganisation that established the Department of Conservation, also replaced the then Commissioner for the Environment with the Parliamentary Commissioner for the Environment and the Ministry for the Environment, with their functions set out in the Environment Act 1986. The Parliamentary Commissioner is an Officer of Parliament, independent of the government of the day, and acts as a watchdog over environmental management. The Parliamentary Commissioner has undertaken several investigations of pertinence to biodiversity management which are referenced in this book.

The Ministry for the Environment is the lead agency for administration of the RMA and is in charge of state of the environment reporting. It oversees the activities of local and regional government, which have been increasingly delegated responsibility under the RMA for indigenous biodiversity on private land, in freshwaters and in the territorial sea. Regional councils have the main responsibility for biodiversity, but territorial authorities also have a role.

The primary work of the Environment Court (formerly the Planning Tribunal) is RMA proceedings, but it also has jurisdiction over matters in a range of other legislation. The Environment Court is a specialist Court, that sits throughout the country, with a primary focus on resolving disputes about resource management and environmental protection.<sup>80</sup> Decisions of the Environment Court are binding and Judges and Commissioners typically have specialist training in environmental law, planning, engineering or related fields. The Court plays a critical role, and has been described internationally as "an innovation in environmental governance".<sup>81</sup> Similar specialised judicial institutions have been established all over the world in recognition of the need to better safeguard the environment.<sup>82</sup>

Other agencies have key roles for specific matters. The Ministry for Primary Industries is responsible for managing fishing impacts on marine biodiversity. The Fish and Game Council manages acclimatised fish (most notably trout and salmon) and game birds, some of which are native (e.g. paradise shelduck, shoveler duck and pūkeko). In addition, the recently-established Environmental Protection Authority now has a role in biodiversity protection through administration of the EEZ Act (determination and monitoring of all marine consents) and the RMA (processing of resource consents of national significance via a call-in process).

## Modern losses – the decline of biodiversity is continuing

Habitat destruction, extinction and the impacts of invasive species are legacies of past and modern pressures alike. But incremental habitat loss continues and introduced pests push native species further towards extinction.<sup>83</sup> While it is certainly true that in recent decades conservation efforts have successfully increased populations of some threatened species (e.g. kōkako, black robin, saddleback and Whittaker's skink), and the loss of some ecosystem types (e.g. offshore islands) has been reversed, the overall picture is largely one of ongoing loss and degradation.

However, the public is not well aware of the threatened status of New Zealand's biodiversity. There are many reasons for this, including that 'good news' stories receive wide publicity in the media, but ongoing declines for many species go unreported and get less traction. The implications of this are serious and pernicious. So long as members of the general public are ill-informed on the true state of indigenous biodiversity, they are unlikely to embrace calls for additional expenditure or stronger regulation to improve biodiversity outcomes achieved by the Department of Conservation and other agencies.<sup>84</sup>

In 1997, New Zealand's first and most comprehensive State of the Environment report noted that indigenous biodiversity decline was our "most pervasive environmental issue". Strangely, the second (and most recent) State of the Environment report, released in 2007, made little mention of biodiversity decline. Notwithstanding, recent ecosystem degradation is a reality. On public conservation land, degradation is driven by introduced pests and weeds. Habitat loss, mostly due to mining and hydro-electric power, is comparatively minor. On private land, pests and weeds are also problematic, but the principal driver of loss is the intensification of agriculture and peri-urban expansion (although urban expansion occurs over a much smaller area). Degradation and clearance is continuing in areas that are already most threatened because of historical pressures (e.g. coastal and lowlands environments).<sup>85</sup> Those same environments are poorly represented in the protected area network, they support a significant proportion of threatened biodiversity and they are usually the most favoured environments for agriculture and urban development. This is a familiar pattern globally, in which conservation areas are typically residual to productive use, and so are typically small or absent in warm, fertile, low-relief environments where humans prefer to live.<sup>86</sup>

Legally protected areas now cover about one-third of the country – albeit generally the steepest, coldest and wettest parts. Nevertheless, New Zealand is one of only 24 countries to have more than 20 percent of its land area in formal protection.<sup>87</sup> However, the percentage area of land legally protected is a poor indicator of biodiversity retention and ecosystem function in this country, because invasive species are such a

Marie Brown



*A denuded stream corridor across farmland in the Marlborough Region, where stock have easy access to the waterway and indigenous vegetation has been entirely erased*



significant pressure. To assess the state of biodiversity within protected areas, the extent of protected land must be examined along with its representativeness, the ecological threats to biodiversity within it, and how well these threats are controlled.

The naturalisation of 11 introduced mammalian predators continues to wreak havoc on the vulnerable flora and fauna of New Zealand, with control and eradication of these pests occupying a significant proportion of national conservation spend on both public and private land.<sup>88</sup> New techniques and economies of scale have driven down the per hectare cost of control but many biodiversity pests are still not adequately controlled on most public conservation land.<sup>89</sup> Pest control efforts outside the conservation estate may well be significant, but their extent and intensity are poorly understood due to poor record keeping and scant monitoring.

Conservation globally and in New Zealand has a strong land-bias. Freshwater and marine environments have not received the same focus, particularly on the establishment of protected aquatic areas and the collection of baseline information about aquatic species and ecosystems. Protection from diffuse, non-point source pollution is most especially problematic, with more than half of New Zealand's land area being farmed, and with much recent conversion to intensive dairying. High stocking rates and poor management of diffuse run-off have caused a rapid decline in the quality of many lowland freshwater resources.<sup>90</sup>

There is no doubt that New Zealand once led the world in aspects of conservation management, particularly invasive species eradication and threatened species management. This includes tasks once thought to have been impossible, such as mammal pest eradication, or saving species like the black robin and the kākāpō from the brink of extinction. Many global firsts for conservation have occurred due to the ingenuity of dedicated New Zealand experts. However, ongoing reductions in the research spend and technical capacity of the Department of Conservation means that New Zealand's capacity for conservation innovation has been much reduced and is now at risk.

In 2013, the announcement of the National Science Challenges included a challenge entitled 'New Zealand's Biological Heritage'. The implementation of the challenge, including additional science funding, will be carried out within three main research programmes: real-time biological heritage assessment, reducing risks and threats across the landscape, and mitigation and restoration.<sup>91</sup>

The implementation of the Research Plan associated with the National Science Challenge over ten years, will help address some required tasks outlined in this book, such as more comprehensive and available scientific

information. It is likely, however, that the relatively small pool of funding (\$25 million over five years, with a five-year extension possible) will limit what the programme can achieve. Notwithstanding the limited funding, the collaborative science model that the Science Challenges enable has substantial potential to improve integration of research programmes, improve information management and increase efficiencies.

New Zealand has been criticised domestically and internationally for failing to make good on the promises of the Rio Declaration and other key international agreements.<sup>92</sup> New Zealand presently ranks worst in the United Nations for the protection of threatened species, with more species threatened with extinction here than in any other nation. The present approach to conservation is simply not creating the change required to arrest the decline. It is not limiting the pressures on biodiversity and not achieving the level of protection required to halt the loss.

The scale of the decline is at odds with the very substantial efforts over many decades to avert such losses. A dedicated national agency (Department of Conservation), in association with iwi, councils, community groups and some committed entities among the private sector, work tirelessly to 'turn the tide' on the loss of biodiversity in accordance with the vision articulated in the Biodiversity Strategy. As a global innovator in biodiversity conservation, particularly pest control methods and offshore island management, New Zealand has many times achieved the seemingly impossible. It has world-class scientific capability in its universities and crown research institutes. New Zealand also has good public support for conservation evidenced by public surveys that consistently rank conservation as a high priority for New Zealanders. We have abundant and comprehensive domestic legislation, central, regional and local government agencies charged with biodiversity protection responsibilities, and a committed environmental non-governmental (NGO) sector. So, why does biodiversity loss and ecosystem service degradation still continue at such alarming rates? This is a critical question that this book seeks to answer.

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## 2 Drivers of biodiversity loss and a framework to address them

Biodiversity loss continues because conservation efforts address proximal rather than fundamental causes of that loss. Here we describe the forces that push biodiversity and ecosystem services into decline despite the very considerable legislative, administrative, scientific and practical conservation efforts New Zealanders have made to protect their natural heritage.

## Key drivers

In 2000, the Worldwide Fund for Nature, in association with the Macroeconomics for Sustainable Development Programme and the Global Environment Facility, established the 'Root Causes' project in response to growing recognition that current efforts to address biodiversity loss were failing. The study provided four key conclusions: first, that biodiversity is declining and loss is accelerating in scale and scope; second, that solutions to date have not worked; third, that this is due to a basic failure to recognise the conflicts between growth and consumption, and sustainable development (including biodiversity protection), with the ever-present bias toward the former; and finally fourth, that new approaches to protecting biodiversity will only be successful if they address the fundamental drivers of biodiversity loss that arise from the conflict referred to in the third conclusion.<sup>1</sup>

The loss and degradation of biodiversity and ecosystem services is fundamentally caused by market failure (i.e. missing or incomplete markets), exacerbated by the unequal power of private development interests and public conservation interests, and the lack of recognition of how many key commodities rely on biodiversity.<sup>2</sup> Market failure arises, because there is no price or explicit value for biodiversity and many associated ecosystem services, and this leads to a level of investment in conservation that is less than socially optimal – whatever that level might be.

The role of regulation is to address this shortfall. However, regulation often fails because:

- Private vested interests have more influence than public interests on regulatory design
- Agency capture by more powerful development interests (e.g. agriculture and fisheries) precludes or weakens some regulatory initiatives and constrains enforcement
- The government interest in economic growth and revenue (from rates and taxes) gained from land development and resource use can be compromised by conservation actions that might limit such development



Gareth McGregor

*The dollar cost of a tree, forest or other element of nature is difficult to assign, meaning their true value is commonly ignored*

In combination, these factors drive the creation of ambiguous and disjointed regulation, dilatory enforcement, fragmented biodiversity information, inadequate monitoring and incoherent conservation performance reporting. New Zealand has ample examples of all of these outcomes, and effectively addressing them is pivotal to the challenge of protecting our indigenous biodiversity.

Markets usually fail to supply socially appropriate conservation services because biodiversity is a common pool resource. Such resources are shared; no user can exclude others. They are technically challenging to value, difficult to protect, and may not recover once harmed beyond certain thresholds. Market forces cause progressive degradation of the resource, leading to a scenario known as the 'tragedy of the commons', in which everyone's prosperity is diminished.

The tragedy of the commons was first described in a seminal article by Garret Hardin in 1968.<sup>3</sup> He predicted that where a common pool resource is available to a number of individuals, each will act in their own interest, exploiting as much of the resource as possible to obtain additional benefits while bearing the same depletion costs as any other stakeholder. Much biodiversity and associated ecosystem services have the characteristics of common pool resources, which means that the individual private interest in consuming the productive and regenerative capacity of the resource is not aligned with the public interest in maintaining it. The solution is market intervention in the form of regulation designed to allocate resource use rights in a manner that sustains the resource. However, private interests in resource consumption and another social phenomenon termed the 'collective action problem', interact to cause regulation failure. Consequently, resource degradation continues, despite considerable legislative effort to halt or reverse it.

A collective action problem occurs if many people benefit from an action (e.g. biodiversity conservation, roading or hospitals), but its high cost renders it impossible to carry out without broad participation. The problem is characterised by 'free riding', where most people do not materially contribute to action in the public interest, but benefit from the commitment and hard work of a few people who do. Collective action problems can be addressed to some degree by:

- The establishment of markets to ensure resource allocation is efficient
- Regulation to ensure equitable cost sharing
- Community mobilisation to achieve broad voluntary participation and action

None of these solutions work particularly well for biodiversity. Most biodiversity is excluded from markets because explicit market valuation is not feasible, regulation to safeguard biodiversity is malleable to private interests, and the costs of conservation tend to be concentrated while the benefits of conservation are thinly distributed. In addition, public support for conservation is insufficient to achieve substantial and durable community mobilisation. However, regulated markets such as 'cap and trade' or transferable quota systems, can work satisfactorily for some ecosystem goods (e.g. fish stocks and water) and ecosystem services (e.g. waste assimilation services for sulphur, nitrogen and carbon emissions).

### ***Markets not valuing biodiversity***

Goods and services are subject to market failure if markets are unable to assign welfare-maximising prices to them. Much biodiversity and most

#### ***Box 2.1 Valuation and commodification of biodiversity***

Commodification is a mechanism to render something "that can not ordinarily be owned or that others have a right to, as a product to be bought or sold".<sup>4</sup> Commodification of biodiversity has attracted harsh criticism because it assumes 'fungibility'. A product which is 'fungible' is one that can be exchanged without adverse consequences for the resource or for the parties to the exchange. Homogenous things like water or nitrogen are easily quantified by fungible units. Thus a litre of water can be equitably exchanged with another litre of water.

Biodiversity rarely meets the fungibility test. Biodiversity, unlike carbon dioxide or water, cannot be divided into discrete and tradable units. Where 'units' of CO<sub>2</sub> may have similar impacts anywhere in the atmosphere, and therefore one kilogram of CO<sub>2</sub> is pretty much the same as any other kilogram of CO<sub>2</sub>, biodiversity is usually unique to time, space and type.<sup>5</sup> This means that biodiversity is difficult (and some authors would argue, impossible) to value adequately for market or decision-making purposes.<sup>6</sup>

Realistic valuation of natural capital is problematic without market prices, as is usually the case for biodiversity.<sup>7</sup> This is because biodiversity is complex. Consequently estimates of value are inevitably incomplete, as not all aspects of value can be accounted for. Undervaluing biodiversity in the context of applying market mechanisms may put it at greater risk than retaining conventional regulation that prohibits damage unless specifically permitted. Furthermore there are reasons to doubt the ability of environmental markets or other valuation approaches to protect biodiversity.<sup>8,9</sup> We believe that valuation of biodiversity, and economic instruments that require it, should be treated with scepticism and caution.

ecosystem services are unpriced by markets and so are excluded from market transactions. However, biodiversity and ecosystem services are essential to human prosperity and therefore have considerable value. The exclusion of biodiversity from markets renders its loss an un-costed

externality. Consequently its loss is usually free of charges to those responsible for its depletion. The value of biodiversity lost to market-based activities such as farm, mine or fishery development is unrecognised and not accounted for in prices for produce, minerals or fish. Consequently, there are no price signals reflecting the value of biodiversity relative to other commodities, or reflecting changing value with increasing scarcity or diminished vitality. This is a fundamental cause of biodiversity and ecosystem service depletion both in New Zealand and globally.<sup>10</sup> In short, market failure for biodiversity and ecosystem services erodes human welfare and prosperity.

### ***Weak regulation***

The standard response to market failure is regulation: the creation of public institutions and enactment of regulation to protect the public interest, for the benefit of the many, from excessive exploitation for the private benefit of a few. The design and implementation of regulatory frameworks, in response to biodiversity decline, have been the focus of industrialised nations since the 1970s.<sup>11</sup> New Zealand has been at the forefront of this. However, despite the very substantial efforts of various governments and their agencies, unrelenting pressure from powerful industry groups and other forces such as the global financial capital market have tended to frustrate and confound the achievement of desired goals.<sup>12</sup> In essence, the interaction of the collective action problem (described below) and the focused commitment, resources and power of private interests, tends to prevent regulation achieving its public interest goals. This is sometimes termed 'intervention failure' or 'government failure'.<sup>13</sup>

Mancur Olson published 'The Logic of Collective Action' in 1965, arguing that the process of establishing regulation was vulnerable to powerful interests that displace the public interest within regulatory processes designed to safeguard it.<sup>14</sup> This phenomenon is referred to as 'agency capture' among other terms.<sup>15</sup> George Stigler noted that agency capture can occur in a number of ways, including direct lobbying or the 'revolving door' where staff are exchanged between the regulator and those regulated.<sup>16</sup> Development proponents are more powerful, better-resourced and more capable of arguing their case for consuming a resource than a diffuse and largely uninformed public arguing to sustain the resource. This imbalance enables the stronger development interests to pressure regulators to reduce the regulatory burden, avoiding provisions that are sufficiently strong to sustain biodiversity. Consequently, legislation intended to safeguard the public interest in nature, ends up safeguarding unsustainable 'business-as-usual'. Internationally, this outcome tends to be particularly acute with fisheries management legislation, and New Zealand is no exception.

An increasingly globalised world has brought new challenges to the interplay of environmental protection and the economy. Natural resource industries, such as mining, and oil and gas extraction, are largely financed by international capital. Jurisdictions with more-stringent environmental standards, which create higher costs for business, risk losing the attention of international investors. This encourages countries dependent on outside capital, such as New Zealand, to engage in a 'race to the bottom' through reducing environmental protections in order to compete more successfully against other nations for capital.

Pressure to constrain conservation initiatives may also come from the regulator and its political masters. Governments are proponents of the public interest in both biodiversity protection and economic development, and many regulators have dual roles in promoting economic growth while managing its environmental impacts (e.g. Ministry for Primary Industries and regional councils). However, the absence of markets for nature, the general lack of recognition of human dependence on biodiversity and ecosystem services, and the electoral advantages of creating economically buoyant times, means that political pressure will favour decisions that increase economic activity even if it results in harm to the environment. Thus in practice, there is a tendency for governments, regulators and the regulated community to hold similar aspirations that are not well aligned with the broader public interest.<sup>17</sup>

Even when strict regulations are in place, drivers affecting the way they are applied and implemented, mean that they may not be effective. Broad use of discretion, reliance on inappropriate or misleading mechanisms, and the individual actions of agency staff can result in outcomes that diverge significantly from the aspirations articulated in policy documents. Shari Clare and Naomi Krogman referred to this phenomenon as 'bureaucratic slippage'.<sup>18</sup> Bureaucratic slippage creates an environment in which agency capture develops. Agency capture occurs when the regulated parties are able to control the implementation of policy through their influence on difficult-to-measure factors such as agency design and culture.<sup>19</sup> The outcome of agency capture is weak and poorly implemented regulation at the expense of the public interest.

### ***Weak public pressure for conservation***

It is increasingly apparent that neither the market nor regulation can achieve sufficient protection of biodiversity and ecosystem services to maintain or grow our prosperity. Effective democracy and community mobilisation are critical for sound management in the public interest of common pool resources.<sup>20</sup> However, such community activism is difficult to achieve as a result of the collective action problem.

Olson casts serious aspersions upon the ability of the diffuse public interest to match the well-resourced and concentrated efforts of private interests in conflicts over environmental protection. He posited that members of the wider public were unable to organise themselves in the same way that more concentrated industry interests could achieve. In the absence of strong public pressure, regulatory processes are less likely to protect public goods through conservation funding, regulation or other initiatives.<sup>21</sup>

However, this does not mean that advocates of the public interest are without power, or that public interest groups cannot counterbalance or even sometimes prevail over private interests. Public interest groups enjoy the advantage of public trust, because they are seen as being less self-interested than the regulator and other parties. Ideological motivation can be a strong driver of deep commitment, focus and extraordinary energy. In addition, diverse public interest groups can collaborate and combine their efforts to maximise effectiveness.<sup>22</sup> Nevertheless, the ongoing loss of biodiversity and ecosystem services are testimony to the greater power of private economic interests.

Environmental NGOs, both nationally and internationally, have developed significant wealth, resources and power and are able to challenge powerful governmental and private sector forces.<sup>23</sup> Their early successes spurred membership growth and enthusiasm, with commensurate developments in sophistication, capacity and influence. In New Zealand, early victories of the environmental movement such as Save Manapouri

and the campaign against native forest logging on Crown-owned land, have provided the foundations of a strong NGO sector.<sup>24</sup> These groups are the critical counter-balance to private development interests and they have pivotal and irreplaceable roles in advocacy and legal action on behalf of the public interest. For this reason, their advocacy efforts need to be viewed as distinct from those by private sector interests (see Box 2.2).

## Implications for biodiversity management

The impact of market failure, the influence of vested interests on regulatory approaches, and limited recognition of human dependency on biodiversity and ecosystem services are central to the ongoing biodiversity decline. The resulting symptoms are:

- Ambiguous and disjointed regulation
- Poor institutional alignment
- Slow or lax enforcement
- Fragmented biodiversity information
- Inadequate monitoring and incoherent conservation performance reporting

### *Ambiguous and disjointed regulation*

The protection of biodiversity and ecosystem services is contentious, because development interests bear both the direct costs and future opportunity costs, whereas the public derive the benefits. As a result, stakeholders in the formulation of regulation, typically occupy very different positions. Where consensus is necessary, ambiguity is the device by which acquiescence if not agreement can be achieved. Ambiguity yields policies and regulations obscure enough to please all parties, vague enough to be unenforceable, and so ill-defined that failures to implement the policy will be difficult to detect and impossible to litigate. Ambiguous policies sound lofty but accomplish little beyond enabling all interests to be served (or appear to be served) in some way or another.<sup>25</sup>

This ambiguity can take many forms. It commonly occurs in legislation with opposing objectives and no guidance as to how these may be reconciled or balanced. For instance, tools under the RMA often require local government to implement conflicting objectives. One example is the inconsistency between national policy statements. The National Policy Statement on Renewable Energy Generation 2011 requires councils to provide (via their plans) for renewable energy generation, including hydro-electricity, which often has severe impacts upon river ecosystems. By contrast, the National Policy Statement on Freshwater Management

Bryce McQuillan



*Manuka (Leptospermum scoparium) flower. Can its valuable antibiotic honey enable market forces to protect stands remaining on private land?*

### **Box 2.2 Advocacy for and against biodiversity**

Advocacy on biodiversity issues is strongly weighted towards private interests. Private interest organisations almost always outcompete public interest ones for resources and political influence. Farming interests are especially dominant, given the way incentives encourage that sector to minimize constraints on production, including those implicit in protecting biodiversity on private land. The dominant advocate in the agricultural sector is Federated Farmers of New Zealand. It is a powerful national lobby group with close relationships with members of National-led governments. Federated Farmers has a large team of policy analysts and legal capacity to enable it to have a significance presence in most planning processes. It focuses its advocacy on protecting landowner rights in order to minimise constraints on what farmers can do with their land.

Horticulture New Zealand, DairyNZ, Fonterra (New Zealand's largest company), Irrigation New Zealand and a wide range of other industry players help bulk up the extent of private sector advocacy. These entities are supported by government agencies that exist primarily to promote growth and economic development. That support includes a range of subsidies, grants, incentives, scientific research programmes and powerful advocacy from Ministers with responsibilities for the sector.

Counter-balancing advocacy on behalf of the public interest in biodiversity comes largely from the established environmental NGO organisations: Forest and Bird; World Wildlife Fund New Zealand (WWF); the Environmental Defence Society; and (mainly in the marine context) Greenpeace. There is a plethora of other smaller and regional entities that make up the counter-weight but their influence is less significant. The Department of Conservation has a statutory responsibility to advocate for nature on private land and does that through RMA processes and increasingly through public-private partnerships. It too is stretched and sometimes subject to political interference. Fish and Game, a statutory entity, focuses its advocacy on freshwater only but is a significant presence.

This asymmetry between public and private interests is played out daily across New Zealand with biodiversity often the loser. It is especially difficult for biodiversity advocacy organisations engaged in RMA processes, because those processes are very resource-intensive. Raising funds to advocate for private interests in land is a lot easier than raising funds to speak for nature. The engagement of experts to assist in such a process – particularly from the private sector and (increasingly) the government sector – is difficult because they more and more depend upon alignment with industry interests for their funding.

2014 demands that the same agencies turn their attention to overall improvements in the health of freshwater ecosystems. Despite the equal weighting of these two national policy statements, no guidance exists on how a given decision-maker might reconcile the conflicting intentions.<sup>26</sup>

### **Poor institutional alignment**

Poor institutional alignment exists where agencies, ostensibly acting in the public interest, are not well-aligned to their relevant mandates. This means that one agency is charged with achieving a particular end, but is unable to do so, because it does not have the required statutory capability. An example in New Zealand is the Department of Conservation, which although being the primary agency charged with the protection of marine biodiversity, has limited jurisdiction to control fishing activity which is one of the key pressures on the enormous array of life within our coasts and oceans. Attempts to introduce measures to protect marine biodiversity often run up against fishers' property rights,<sup>27</sup> with potential displacement of resource users (commercial, customary and recreational) thwarting attempts to establish marine protected areas, particularly no-take marine reserves.

### **Slow or lax enforcement**

While there is obvious public interest in achieving high compliance with consent conditions, agency capture and the political power of private landowners, create perverse incentives resulting in low priority for consent monitoring and follow-up enforcement. Capture incentivises agencies to allocate minimal resources to compliance monitoring, and discourages use of formal enforcement mechanisms, unless non-compliance materially damages the interests of other members of the regulated community. Hence the agency responsible for marine fisheries



is energetic and effective in its enforcement of the quota management system. In contrast, monitoring of compliance with provisions intended to minimise impacts on biodiversity, such as through observer programmes, can be dilatory and ineffective. Similarly, some rural councils tend to avoid active enforcement of district rules or consent conditions intended to maintain biodiversity, because they tend to conflict with primary production activities. This can be demonstrated by the very low levels of compliance observed in agricultural consents under the RMA.<sup>28</sup>

Low enforcement probability encourages non-compliance because the regulated community is aware that the chances of non-compliance being (a) identified and (b) addressed, is very low indeed. This is why – in a recent assessment of compliance with conditions of resource consents issued under the RMA – only 4.8 percent of consents requiring protection or maintenance of biodiversity or ecosystem services by the agricultural sector were in compliance with conditions. In contrast the energy sector, with very much lower representation on councils and correspondingly higher scrutiny of consents, achieved 100 percent compliance.<sup>29</sup>

#### ***Fragmented biodiversity information***

Baseline inventory and monitoring of ecosystems and species, and research to reduce uncertainty about the impact of management, are essential for robust evidence-based biodiversity management and policy. They are also needed to report on outcomes and build agency accountability for progress towards desired policy goals. However, New Zealand has a poor record of long term monitoring of biodiversity, and scant baseline data is a pervasive issue for biodiversity management as a result.<sup>30</sup>

#### ***Inadequate monitoring and reporting***

In 2006, the paucity of state and trend data of biodiversity in New Zealand was highlighted:

*Biodiversity monitoring remains extremely uneven across the country and with a lack of comparable, consistent data for assessing trends there is a corresponding issue of accountability for performance. The review recommends that this issue receive urgent attention.*<sup>31</sup>

The politics of agency accountability are such that, even where scientifically robust indicators of change are available, they will not be included in politically-derived monitoring frameworks. Cost is the usual excuse given, but the real reason is more likely concern about consequences should robust measurement tell a story that diverges from the current political narrative. Improved state and trend monitoring and reporting are essential to establish agency accountability.<sup>32</sup>



*Kererū (Hemiphaga novaeseelandiae)*

The most recent (2007) Ministry for the Environment State of the Environment<sup>33</sup> report is a good example of a document that fails to describe the outcomes for biodiversity of policy and management actions. The fledgling Environmental Monitoring and Reporting Project between regional councils and the Ministry for the Environment is planned to address biodiversity in time, but focus is presently on freshwater management. The Department of Conservation Tier One reports (described in Chapter 3) describe outcomes for common and widespread biodiversity, but not for the threatened species and habitats most in need of conservation action. Development work continues, and regional councils are working toward integrated monitoring, but funding is minimal and progress slow. It is not clear that either Department of Conservation or council initiatives will actually monitor the state of our most threatened biodiversity.

#### **A framework for solutions**

The causes of biodiversity loss are diverse, interconnected and seem somewhat chaotic. They include introduced pests and weeds, masting

events, pathogens, habitat fragmentation and loss, pollution, climate change, destructive fishing methods, market failure, agency capture, inadequate environmental legislation, dilatory compliance and enforcement, the power of private development interests and a lack of recognition of the contribution of nature to our prosperity. Solutions to neutralise these factors are similarly diverse, numerous and need to be integrated to efficiently address fundamental and proximal causes of loss, as well as the factors that link them. We create some structure to the seemingly chaotic plethora of solutions to a multitude of problems by recognising three categories – strategic, tactical and practical – reflecting the systemic levels at which loss-causing processes occur.

*Strategic initiatives* are large-scale solutions that address the fundamental causes of loss: market failure, collective action and human population growth. *Tactical initiatives* address agency behaviour and the balance of power between private and public interests. More proximal and ecological

causes of loss are countered by *practical initiatives* such as fencing, predator and weed control, close-order threatened species management, fire management, covenants and land administration.

Initiatives at higher levels are likely to facilitate and bring additional resources for solutions at lower levels. For example, solutions to address market failure may improve agency behaviour and result in increased resources for the implementation of practical solutions. However it is a one-way relationship. Implementation of sound practical solutions is unlikely to facilitate strategic initiatives to address market failure or the collective action problem.

## Strategic initiatives

Very much more conservation should be achievable if conservation interests can find ways to align the public interest in conservation with private and government interests. Two key approaches exist. One is to find ways to build public support or a social mandate for conservation, in order to redress the power imbalance caused by the collective action problem. Another is to reform our economic institutions to better serve the public interest in protection of biodiversity and ecosystem services.

### *Broad social mandate*

The goal of building a broad social mandate for biodiversity protection is to facilitate and enable crucial collective action; that is, to win so much public support for more stringent environmental regulation that vested interests cannot thwart it. The rise in public support for conservation over the past few decades holds promise for better implementation of regulation and rigorous enforcement. This pressure could build up sufficiently to precipitate institutional reform and legislative review, leading to far greater resourcing of practical conservation solutions. However public support tends to be labile rather than durable, so any legislative reforms enacted during periods of strong public support for nature conservation (1980s), may potentially be undone during periods of weaker support (post 2006). Even while the public largely recognises biodiversity loss as a serious issue, the specific management approaches to address it may not be supported at a local level.<sup>34</sup> The most durable strategic solutions are likely to be ones that align the interests of the principal stakeholders – private interests, agencies and the public – so that there is little incentive to later undo reforms.

### *Economic drivers*

Just as our economic institutions can be designed to exacerbate market failure for biodiversity, they can also be designed to minimise its impacts. This can be achieved through aligning public, private and government

Shona Myers



*Kidney fern (Trichomanes reniforme)* is a widespread forest species that quickly becomes scarce in areas trampled by hooved animals

interests in biodiversity and ecosystem services. This alignment could be formed by economic institutions that:

- Give landowners an economic interest in the conservation of biodiversity and ecosystem services on their land (to align private interests with those of the public in biodiversity protection).
- Contribute to economic growth (to align the wider public interest in economic growth with biodiversity interests)
- Generate so much revenue from healthy biodiversity and ecosystem services that the provision of government services is substantially dependent on this revenue source (to align government and biodiversity interests)
- Create substantive landowner and government interest in robust spatial and temporal biodiversity information (to align institutional information needs with private, government and biodiversity interests)

A strategic solution such as a land tax based on the consumption of biodiversity and ecosystem services could meet all four criteria. Such a

solution is likely to be more durable, and ultimately more effective, than tactical or practical initiatives alone. Furthermore, such a strategic solution should reduce conflict between private and public interests in biodiversity and so create opportunities for new and additional tactical solutions. It would also fund additional resources for practical conservation actions on both public and private land.

### Tactical initiatives

Tactical initiatives shift power away from negative development interests via strengthened regulation, better use of existing provisions and precedents set via case law, and improved agency behaviour. However, without sufficiently strong public support, tactical opportunities may be limited because vested interests are likely to have both the motivation and capacity to thwart or disempower such initiatives. The limiting of litigation funding to NGOs through the Environmental Legal Aid Fund is an example of a move to weaken those acting in the public interest. This is in stark contrast to government funding for irrigation proposals that had a hefty increase in the same political term. In May 2013, Environmental Legal Aid funding was restricted to appeals to the Environment Court



Brian Cutting

The native manuka chafer beetle (*Pyronota festiva*) is also considered a pasture pest

and board of inquiry proceedings. Funding can no longer be sought for appeals to higher courts. In addition, the Fund continues to be limited to RMA matters and has not been extended to recognise the new EEZ Act regime. The success of tactical initiatives requires a public and political environment supportive of measures to protect biodiversity.

## Practical initiatives

At a practical level, conservation interests must make full and early use of the conceptual advances and conservation tools developed in recent years (while also fostering ongoing innovation). These initiatives enhance the practice of conservation and enable opportunities to protect biodiversity and ecosystem services to be maximised. Examples include our continuously improving predator control and exclusion methods, close-order species management, tracking technologies and informatics.

New Zealand is a leading innovator in conservation and the capacity to continue in this role is a key requirement for protecting indigenous biodiversity. There are a variety of programmes underway within the Department of Conservation, crown research institutes, the private sector, iwi, councils and community groups to achieve just this end.

Improving efficiency and effectiveness of existing solutions is also practical. The framework for the tool or approach often already exists, but poor implementation constrains the potential contribution to biodiversity protection and maintenance. The plethora of conservation efforts on the ground, from the registration and administration of covenants through to the support of landowners wishing to engage in conservation, could be enriched to improve outcomes for biodiversity. Practice improvements in central and local government, particularly related to monitoring and enforcement, would also go a long way in curtailing impacts on biodiversity in the first instance and would help ensure that regulatory roles are reliably exercised.

## Solid but insufficient progress

Given the pervasive consequences of market failure, collective action and regulatory failure, it is not surprising that present efforts are failing to create the change necessary to halt the loss of biodiversity and degradation of ecosystem services in New Zealand. Very significant progress at both tactical and practical levels has been made and biodiversity loss would undoubtedly be even more serious without that progress. But much greater change is needed and this will depend more on strategic and tactical initiatives that change incentives and behaviour.

To be effective, initiatives must fit the social, economic and ecological context. This varies in many dimensions, not least across different forms

of ownership and across terrestrial, freshwater and marine domains. Therefore, our search for effective ways to address the biodiversity crisis requires an understanding of these different contexts, and that is the focus of the next four chapters.

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# 3 Managing public conservation land



*Dusky Sound, Fiordland*

Establishing the Department of Conservation as a dedicated national agency to manage the vast public conservation estate was a farsighted positive step taken by the reformist Labour Government led by David Lange during the mid-1980s. The Department was to provide leadership in biodiversity protection, as a gathering of the green dots, these being the functions previously speckled through multiple agencies with conflicting development roles.

The Department has its own Cabinet Minister, the Minister for Conservation. Its core functions include the management of conservation, recreation, tourism and other commercial activities on public conservation land, threatened species listing and management, ecological research, conservation innovation, and broader advocacy in processes such as resource consenting under the RMA and High Country Tenure Review under the Land Act 1948.

The current challenge is how to build and sustain the Department's capacity to protect the biodiversity on public conservation land and carry out its broader statutory functions fully and effectively. The challenge is daunting because the task dwarfs the Department's capacity. Major disparities between the conservation task and the funding available to achieve it, are a normal features of environmental management agencies here and internationally, due to the economic characteristics of conservation (see Box 3.1). Other reasons include the sheer size of the task. New Zealand must address significant conservation challenges with a low population and small economy compared with many other countries of similar size, with less severe biodiversity challenges, and with much higher population density (e.g. United Kingdom).



Raewyn Peart

*Iconic places such as Hauturu/Little Barrier Island are jewels in the crown of biodiversity, managed on behalf of New Zealanders by the Department of Conservation*

### **Box 3.1 Funding for conservation**

Unlike conservation, many benefits of public services such as health, education, justice and infrastructure are concentrated on and enjoyed by individuals with both economic and electoral power. This concentration of benefits enables markets to develop so that service provision costs are partly or wholly paid by the individuals benefitting from the service. The more concentrated the benefit, the greater the opportunity for markets to develop, the higher the proportion of costs that can (at least in principle) be paid by the direct beneficiaries of the service and the better service supply can meet demand.

Electoral power is a major determinant of service subsidy with service providers and beneficiaries both having a vested interest in public subsidy. For example, health and education services provide concentrated benefits to individuals (especially service providers and their clients) as well as benefits dispersed across society through enhanced public health, higher workforce participation, social equity and economic efficiency. The concentration of benefits for individuals enables well-developed markets for subsidised private provision of diverse health and education services. However, these markets do depend on subsidy, advocated most strongly by service providers and their customers, and justified by the widely dispersed public benefits it enables.

Some other public services, such as social services provided by Child, Youth & Family and conservation services supplied by the Department of Conservation, have fundamentally different economic structures which cause chronic underfunding. The direct beneficiaries of these services are children and native species respectively. Neither have economic capacity, nor can they vote. They can neither buy the services they need, nor can they advocate or vote for more public subsidies. In addition, agency interventions incur unwelcome costs to parents and resource users alike. Few parents welcome either the removal of their children or agency involvement in family affairs; hunters are vexed by the impact of 1080 operations on deer and pig populations; and landowners resent Departmental interest in the impact of their activities on biodiversity. Those who bear the costs of intervention, have good reason to advocate actions that diminish the capacity of

agencies to intervene, and impose irksome costs in the public interest.

Conservation delivers only thinly dispersed benefits which provide no basis for market development. Without a properly functioning market, supply cannot match demand. Public supply of conservation services by agencies, is tightly restricted by the electoral consequences of the collective action problem, combined with the not unreasonable antipathy of those who bear the concentrated costs of conservation. The end result is chronic underfunding of conservation.

This chapter describes the challenges and impediments the Department of Conservation faces in effectively carrying out its statutory functions: how the collective action problem contributes to under-funding, diminished capacity for innovation and management, and a statutory role that is very much more constrained than envisaged by legislation. These constraints on the Department's capacity limit New Zealand's ability to protect its indigenous biodiversity. Rebuilding its capacity will inevitably involve increased core funding to enable active management of all public conservation land. The Department will need a culture that is genuinely supportive of innovation and improvement and management that is accepting of the inevitable challenges this will present to the *status quo*. But most important will be unwavering political support for the fulfilment of its statutory advocacy roles.



*Powelliphanta superba* is a large, carnivorous, endemic snail inhabiting South Island forests

John Leathwick

### **Box 3.2 Global investment gap for biodiversity**

Global conservation investment must be greatly upscaled to secure biodiversity, but not to a level outside current means. For example, organisations jointly presenting to the 5<sup>th</sup> World Parks Congress (2003) estimated that management of the world's existing protected areas would only require an additional \$2.5 billion globally (a very small amount at that scale).<sup>1</sup> Recent reports worldwide identify that an increase in conservation funding will be needed, to meet necessary targets for biodiversity.<sup>2,3</sup>

## **Public conservation land**

The Department of Conservation manages public conservation land on behalf of the Crown for the benefit of the New Zealand public. This covers 33.4 percent of New Zealand's land area, and is protected for different conservation-relevant purposes, under various pieces of legislation. The land is classified into multiple categories including national park, forest park, scenic reserve, nature reserve, historic reserve and scientific reserve. One of the larger categories is stewardship land. This is land that was allocated to the Department to manage until its use was formally decided (see Box 3.3). Land managed by the Department also includes a surprising number of sportsgrounds, campgrounds, cemeteries, gravel pits and quarries.

In 2013, the total area of public conservation land was 8,804,218 hectares, comprising 3,116,856 hectares of national park (35.4 percent), 4,889,255 hectares of conservation area including stewardship land (55.1 percent) and 798,107 hectares of reserve (9.1 percent). Recent changes in area between 2003 and 2013 follow exchanges and disposals associated with treaty settlements and high country tenure review, but area overall changed little.<sup>4</sup>

At all scales, the protection of biodiversity reflects conservation opportunity rather than need. The size of protected areas is often insufficient to represent the ecological character of the landscapes in which they are located.<sup>5</sup> Protected areas may be land 'left over' after land-use patterns were established and not selected for the ecological values they sustain. Consequently, biodiversity at most risk of imminent loss (e.g. remnant native communities on flat land in fertile lowlands), is rarely a priority for protection.

The futile attempts to establish a national park in Marlborough's Rai catchment in the early 20<sup>th</sup> century, which was located in lowland areas suitable for economic activities such as grazing, illustrate the difficulties involved in conserving biodiversity inhabiting fertile environments.<sup>6</sup> The recent High-Country Tenure Review process is also an example of where the areas of lowlands with high ecological value were relegated to private ownership and the already over-represented uplands were generally added to public conservation land.<sup>7</sup> Similarly, conservation land in the flat valley floors of the South Island's West Coast is managed for stock grazing, not the biodiversity that would otherwise occupy these environments.

Because public conservation land is residual to economic uses it is not representative of the full range of ecosystems in New Zealand. Rather, it is mainly remote, low-fertility, wet, cold, steep and high-elevation.<sup>8</sup> Consequently, many indigenous species and ecosystems of warm and fertile lowlands remain only on private land. Non-representation aside,

### **Box 3.3 Stewardship land**

About one-third of public conservation land is categorised as stewardship land. Stewardship land was temporarily handed over to the Department of Conservation during the government restructuring of the late 1980s. Many officials seeking to preserve potential development opportunities, were opposed to this land being protected from exploitation, and so fought to preserve broad discretion for the use of land in the public conservation estate.<sup>9</sup>

The stewardship 'holding pen' includes both the original allocation of public land, and land purchased or received by the Department since that time. In handing the land over for the temporary management by the Department of Conservation, the intention was that it would be assessed and reallocated to different land uses - from conservation (e.g. gazetted formally as reserve) to other purposes. This did not occur. As a result, although stewardship land sits within public conservation land, it is not protected to the same extent as other conservation land.<sup>10</sup> Prominent recent development proposals for areas of stewardship land include the hydro-electric scheme affecting the lower Mokihinui River by Meridian Energy, and the opencast coal mining of the Denniston Plateau (by Bathurst Resources) which was approved.



public conservation land is protected in perpetuity and performs a range of critical functions. These include the conservation of extensive tracts of habitat, the protection of headwater catchments and the provision of refuges (on the many offshore islands) for the species most vulnerable to mammalian predators.

While public conservation land is held primarily for conservation and recreation purposes, much commercial use occurs on it. There is public infrastructure such as roads, electricity generation and transmission facilities; tourism infrastructure such as ski fields; and extractive activities such as mining, grazing, apiaries, wild animal recovery and logging. These are all occurring within a system of access arrangements and concessions. Access arrangement processes occur under the Crown Minerals Act 1991, while concessions are issued under the Conservation Act. The administration of these processes is a part of the Department of Conservation's role.

## A dedicated national agency

The Conservation Act established the Department of Conservation in a significant period of government restructuring during the late 1980s, but such an agency was first envisioned much earlier. The 1975 Maruia Declaration, a charter of conservation interests, first broached the concept of a 'Nature Conservancy' in New Zealand. The release of the 1982 'Environmental Management in New Zealand: A Strategy', by five NGOs (Forest and Bird, the Environmental Defence Society, the Federated Mountain Clubs of New Zealand, the Native Forests Action Council, and Environmental and Conservation Organisations of New Zealand) created a united front to lobby for the creation of the Department of Conservation, among other changes.<sup>11</sup> In 1985, post-election, the Acting Prime Minister Hon Sir Geoffrey Palmer opened an Environment Forum at Parliament that led to the establishment of a working party. This was convened to assist in carrying through the Forum recommendations until the Department was formally launched under the Conservation Act in 1987 by Prime Minister David Lange.<sup>12</sup>

The Department combined the conservation arms of four government departments and ministries:

- Department of Lands and Survey (except farm development, which went to Landcorp)
- Forest Service
- Wildlife Service
- Archaeology section of the New Zealand Historic Places Trust<sup>13</sup>

Within two years, the Department would be restructured losing 188 staff

and one-third of its budget. Teething problems in the early years included the lack of a robust financial system, inconsistent planning systems and a need to dissolve the divergent cultures that arrived into the new organisation.<sup>14</sup> Many restructures were to follow as the Department struggled with a plethora of roles and perpetual resource limitations.

## Statutory role

The functions of the Department of Conservation are mainly set out in the Conservation Act, but the Department administers a total of 25 Acts (see key legislation in Box 3.4). In this section we outline the key elements of the Department's statutory role.

### ***Box 3.4 Key legislation underpinning the Department of Conservation's role***

Conservation Act 1987  
Resource Management Act 1991  
Land Act 1948  
Marine Mammals Protection Act 1978  
Marine Reserves Act 1971  
National Parks Act 1980  
Native Plants Protection Act 1934  
Reserves Act 1977  
Trade in Endangered Species Act 1989  
Wild Animal Control Act 1977  
Wildlife Act 1953

### ***Other roles***

Biosecurity Act 1993  
Crown Minerals Act 1991  
Crown Pastoral Land Act 1998  
Fisheries Act 1996  
Local Government Act 2002  
Public Works Act 1981  
Treaty of Waitangi Settlement Acts

### ***Conservation Act 1987***

The Conservation Act formally establishes the Department of Conservation and sets out the majority of its functions. They relate primarily to the protection of natural and historic resources and recreational and tourism values. These are:

*(a) to manage for conservation purposes, all land, and all other natural and historic resources, for the time being held under this Act, and all other land and natural and historic resources whose owner agrees with the Minister that they should be managed by the Department:*

*(ab) to preserve so far as is practicable all indigenous freshwater fisheries, and protect recreational freshwater fisheries and freshwater fish habitats:*

*(b) to advocate the conservation of natural and historic resources generally:*

*(c) to promote the benefits to present and future generations of—*

*(i) the conservation of natural and historic resources generally and the natural and historic resources of New Zealand in particular; and*

*(ii) the conservation of the natural and historic resources of New Zealand's sub-antarctic islands and, consistently with all relevant international agreements, of the Ross Dependency and Antarctica generally; and*

*(iii) international co-operation on matters relating to conservation:*

*(d) to prepare, provide, disseminate, promote, and publicise educational and promotional material relating to conservation:*

*(e) to the extent that the use of any natural or historic resource for recreation or tourism is not inconsistent with its conservation, to foster the use of natural and historic resources for recreation, and to allow their use for tourism:*

*(f) to advise the Minister on matters relating to any of those functions or to conservation generally:*

*(g) every other function conferred on it by any other enactment.*

Thus, the Department has a wide range of functions under the Conservation Act.

### **Wildlife Act 1953**

New Zealand's premier legislation for the protection of indigenous biodiversity is the Wildlife Act. The Act contains a number of strong provisions, including providing for 'absolute protection', a notion not found elsewhere in New Zealand's biodiversity-relevant legislation. However, the implementation gap is significant. There is no statutory linkage between the New Zealand Threat Classification System (see Box 3.5) and the Wildlife Act. If a species is classified as threatened or at risk, there is no statutory recognition of this status and no mandatory action to address pressures on the species. This is at odds with legislative approaches internationally. Some species listed as threatened or at risk are even commercially harvested (e.g. long finned eel and four out of the five freshwater fish that constitute 'whitebait').

Section 53 of the Wildlife Act requires that permits are obtained for certain activities in respect of species covered by the Act. Table 3.1 contains an outline of the schedules and an example of the taxa included on the schedules. No further guidance on the issuing of permits is codified in practice, with broad discretion available to issuing agency staff. The requirement for a permit is broad, as the legislation is in fact quite strong – any disturbance to indigenous wildlife covered by the Act necessitates a permit. Examples of activities include marine consents which affect the seabed, subdivision that damages wildlife habitat, and other development where wildlife may be affected. Many situations arise where a permit although required, is not sought, and the need for it is not enforced. Even when a permit is issued, the Department has scant capacity for follow-up and enforcement of conditions. There are few prosecutions for breaches, despite the broad reach of the Act and the very best efforts of the staff in the Department.

We illustrate an example of this in the interaction between the RMA and the Wildlife Act in Chapter 4. At the time of writing, the permitting process under the Wildlife Act was under a review called 'Outside In – Working together for Wildlife, Research and Collection'. The reasons for the review as outlined on the Department's website included concerns from users and others that the permit process was slow, complicated and lacked transparency.<sup>15</sup>

**Table 3.1 Schedules of the Wildlife Act 1953**

Note that protection often does not extend to the Chatham Islands.

Schedule	Description	Examples
1	Wildlife declared to be game	California quail, grey duck, pūkeko
2	Partially protected wildlife	Silvereye, brown skua
3	Wildlife that may be hunted or killed subject to Minister's notification	Black swan, South Island weka (Chatham Islands only)
4	Wildlife not protected, except in areas and during periods specified in Minister's notification	No species listed
5	Wildlife not protected	Cat, mouse, yellowhammer
6	Animals declared to be wild animals subject to the Wild Animal Control Act 1977	Fallow deer, pig, Himalayan tahr
7	Terrestrial and freshwater invertebrates declared to be animals	Weta, Powelliphanta (snails)
7A	Marine species declared to be animals	Black coral, white pointer shark
8	Wildlife not protected but may be kept, bred or farmed in captivity pursuant to regulations made under principal Act or by Minister's direction	Stoat, ferret, weasel

### **Working with Māori**

The advent of the Department of Conservation also brought about a different and stronger statutory relationship with Māori. Section 4 of the Conservation Act requires that the Department “give effect” to the principles of the Treaty of Waitangi. This is a strong directive relative to “have regard to” used elsewhere in statute. The Conservation Act requires that the role of the Department be “interpreted and administered so as to give effect to the principles of the Treaty of Waitangi.”<sup>16</sup> The Department has a unit devoted to Māori resource management called Kāhui Kura Taiao. This unit is governed by a committee comprising iwi representatives which reports directly to the Minister of Conservation. The unit oversees the contestable Mātāuranga Kura Taiao Fund which was set up to support hapū/iwi initiatives.<sup>17</sup> It also oversees the Ngā Whenua Rahui Fund which



Angela Simpson

*Wellington tree weta (Hemideina crassidens) is one of a multitude of species protected under the Wildlife Act 1953*

is specifically targeted at supporting voluntary protection of Māori-owned land.<sup>18</sup>

### **Advocacy role**

The role of the Department in advocating for maintenance of indigenous biodiversity outside of public conservation land has been significant. This includes providing expert evidence in support of Water Conservation Orders, improving mitigation for development proposals under the RMA, and achieving stronger overall provisions in regional and district planning instruments. The Department has, until recently, actively submitted in

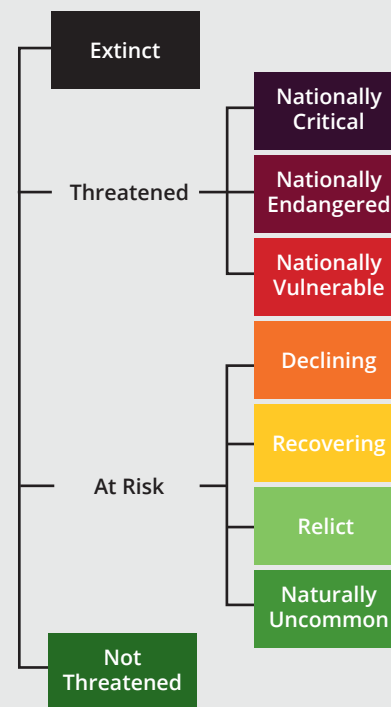
### Box 3.5 Threat-classification system

The Department of Conservation administers a system to categorise species according to their risk of extinction. The system is intentionally different from the global International Union for the Conservation of Nature (IUCN) Red List, to reflect the special ecological circumstances of the New Zealand island archipelago. The IUCN system is based on continental ecosystems and so is somewhat inappropriate for islands such as the New Zealand archipelago. Notwithstanding, New Zealand does observe the IUCN Red List and the New Zealand Threat Classification System is designed to complement it.<sup>19</sup>

The product of the New Zealand Threat Classification System is the threatened species classification.<sup>20</sup> The word 'threatened' is an umbrella term that is broken down into a number of status categories. The most serious status is nationally critical, followed by nationally endangered, nationally vulnerable, declining, recovering, naturally uncommon and relict (i.e. surviving from environmental conditions no longer present). The status of each taxa is determined by a scientific committee. The system itself is comprised of manuals and lists of taxa falling into each status category.

The most recently updated version of the list was released in 2012.<sup>21</sup> A total of 799 (6.5 percent) of the 12,223 taxa assessed were classified as being threatened with extinction (i.e. nationally critical, endangered or vulnerable) and 3540 (29 percent) as at risk of extinction. A further 3940 taxa (32 percent) are likely threatened or at risk, but are classified as 'data deficient' because so little is known of them that they cannot be classified with any confidence. This means that only one-third of New Zealand's indigenous species is known to be secure. However, many of the 'data deficient' species may in the future be classified 'acutely threatened' as soon as there are sufficient data to allow assessment. Indeed, the Department of Conservation has stated that some 'data deficient' species may be extinct already.<sup>22</sup>

Perhaps the chief value of these lists is for monitoring trends over time in reasonably well known taxonomic groups. In comparing data from the most recent list to the 2005 version, the security of 12 taxa genuinely improved (e.g. brown teal, *Anas chlorotis*), while the risk of extinction increased for 59 taxa (e.g. Great-spotted kiwi, *Apteryx haastii*).<sup>23</sup>



RMA settings. It has provided crucial ecological expertise highlighting the importance of the often disregarded Wildlife Act and supporting stronger mitigation of adverse effects (or the avoidance of impacts where appropriate).

Data demonstrates a dramatic recent drop in advocacy work outside public conservation land by the Department, where submissions were lodged on just nine resource consent applications during the 2012/2013 year, compared with 48 in 2011/2012 and 98 in 2010/2011.<sup>24</sup> A substantial reduction in two years is clear evidence of a severely constrained statutory advocacy role during the 2011-2014 term of the National-led government. Further, figures indicate that spending on external advocacy processes decreased from \$4,853,000 in 2009/2010 to \$3,618,000 in 2012/2013 (a

25 percent reduction).<sup>25</sup> It is possible that as long-running cases come to a conclusion, the Department's statutory advocacy will decrease even further.

Federated Farmers of New Zealand has been a vocal opponent of the Departmental statutory role.<sup>26</sup> In 2008 it published a review of the RMA, noting that the statutory advocacy role under the Conservation Act "undermines any incentive landowners have to work with DOC", and that the Department engages in "aggressive advocacy". The review argued that this role, and associated funding, should be removed in favour of a non-statutory 'advisory' role with respect to private land and plan preparation at regional and district plan levels.<sup>27</sup> The review further recommended that, where Crown submissions are required, only a 'whole of government'

submission should be made, in order to limit central government involvement in plan preparation to matters of national importance only.<sup>28</sup>

The Department has since been absent from many prominent consent processes (including Boards of Inquiry administered by the Environmental Protection Authority) – a fact also illustrated in the Auditor-General's review of 2012. The review noted that the Department had developed a prioritisation system, but the actual effort undertaken, seemed to depart from the priorities that the system set down.<sup>29</sup> Without being 'at the table' in consent processes, the ability for the Department to undertake its statutory advocacy role for indigenous biodiversity in the public interest is limited.

In practice, NGOs such as Forest and Bird and the Environmental Defence Society together with a statutory entity, Fish and Game, have borne much of the public interest advocacy duty that the Department was originally set up to perform. These organisations are considerably less well-resourced than the Department of Conservation. Further, even when the Department advocates on behalf of the public interest, the playing field is far from level. Proponents of development usually have far greater resources at their disposal than would-be opponents.<sup>30</sup>

## Transforming conservation science

Despite the many constraints, the Department has been responsible for some of the most transformative developments in conservation science in New Zealand. Together with the Department of Scientific and Industrial Research (and later, crown research institutes), the early years of the Department and its predecessors were characterised by significant leaps forward in island management, threatened species management and additions to the already vast (although still unrepresentative) conservation estate. New Zealand has a remarkable history of drawing species back from the brink, attributable in part to our extraordinary efficiency at sending them there. The Chatham Island black robin, for example, has recovered to a population of 250 in 2013 from a single breeding female in 1980, an internationally-renowned recovery effort.<sup>31</sup>

Other notable achievements include the rediscovery and recovery of the takahē, whose numbers have climbed from a single relict population in the Murchison Mountains in 1948 to several populations managed throughout the country, in the longest-running species recovery programme in New Zealand's history.<sup>32</sup> In 2007, a mast-seeding year of beech and tussock led to a halving of the wild Murchison population of takahē (see Box 3.6). The achievements of the Department of Conservation must be maintained by active management, likely in perpetuity.

### Box 3.6 Mast events and what they mean for biodiversity

Mast-seeding occurs when one or several dominant plant species (e.g. beech, rimu, tussock grasses and flax) flower and seed simultaneously, producing very much greater quantities of seed than in most ordinary (non-mast) years.<sup>33</sup> Mast-seeding is an evolutionary adaptation by plants to ensure that at least some progeny survive every few years in the face of seed predation. However, New Zealand's distinctive ecology and the rapacity of our introduced mammal predators, make for devastating consequences for native birds following mast events. An abundance of food leads to population explosions of mice and rats followed by stoats. When the seed supply runs out, the starving predators eat native birds, their chicks and eggs, causing serious population declines and extinctions.

Such destructive events serve to illustrate not only the magnitude of the impact of exotic predators, but also the importance of research and innovation in biodiversity management, in this case into methods to predict and address mast events. Present research is being undertaken by Landcare Research, which is developing a model based on temperature changes, which could mean mast-seeding is predictable a year in advance. Such innovation has and will enable pest control efforts to be undertaken *en masse* to limit the impact of such an event on recovering biodiversity. In 2014, the 'Battle for the Birds' project came with a cash injection of nearly \$10 million to the Department of Conservation to upscale pest control efforts in preparation for a mast-seeding event.



Raewyn Peart

The flightless takahē (*Porphyrio hochstetteri*) was once thought to be extinct but was rediscovered in 1948

While successes were achieved in the early years of the Department of Conservation's operations, the rising awareness of the threat of mammalian predators was taking hold, and it became clear that the Department needed to upscale its efforts to effectively address the impact this would have.<sup>34</sup> The overriding threat to biodiversity in protected areas is mammalian predators, and New Zealand's substantial innovation in the area of large-scale pest control has provided the inspiration for some of the more ambitious conservation movements in New Zealand such as Predator Free New Zealand (see Box 3.7).

Large-scale pest control generally relies upon the use of Sodium Monofluoroacetate (1080), in baits laid aerially or by hand, in addition to a range of other techniques. The use of this and other poisons, to combat the tide of predators and safeguard indigenous biodiversity, has been highly contentious in parts of the country. The concerns of some members of the public (a small but vocal minority) include the effects of poison on livestock, dogs and water supplies and reductions in hunting opportunities arising from death of target species. A range of concessions and extensive communications protocols have negotiated the use of 1080 to some extent, but the public concern does remain. In 2011, the Parliamentary Commissioner for the Environment completed an extensive review of the use of 1080 and concluded that: "... based on careful analysis of the evidence that not only should the use of 1080 continue (including in aerial operations) to protect our forests, but we should use more of it".<sup>35</sup>

Offshore island ecosystem restoration is another world-leading innovation pioneered by Departmental scientists and conservation managers. Research identified predation by rats as a common cause of decline for a multitude of island species – lizards, tuatara, small seabirds and large invertebrates. Then experimental management in the 1980s established the feasibility of eradicating rats and other mammals from islands, leading managers to establish pest-free island sanctuaries for indigenous biodiversity wherever suitable islands occur.<sup>36</sup> Given the technical difficulty on the mainland, of controlling predatory mammals to sufficiently low densities to secure some of our most vulnerable species, offshore sanctuaries present the best chance for retaining many of our most vulnerable vertebrate taxa.<sup>37</sup> However, those technical difficulties are being addressed with the establishment of Mainland Islands – areas of private and public land surrounded by specially designed predator-proof fences. Many species are totally dependent on predator-free areas for continued survival.

The Department of Conservation and Landcare Research have led pioneering research and implementation of systematic conservation planning (see Box 3.8). The Department is presently resourced to

### **Box 3.7 Predator Free New Zealand**

Predator Free New Zealand was formed in 2013, after a meeting of scientists and conservation advocates was convened the previous year in the central North Island by Forest and Bird. Predator Free New Zealand has attracted attention for its ambitious mission to suppress or eradicate invasive mammalian predators from New Zealand's mainland. The initiative is not led by the Department of Conservation, but the Department along with many universities and research institutions (in particular Landcare Research) has lent its support and endorsement. The concept has also been endorsed by the Parliamentary Commissioner for the Environment, following her 2011 review of 1080.

Predator Free New Zealand has a vision to "protect our endangered native species by eliminating the threat of predators". Three main objectives underpin this vision:

- Building engagement by promoting current pest control initiatives
- Encouraging strategic pest management through data sharing and coordination of efforts
- Fostering research into the development of new pest control strategies

The goal of Predator Free New Zealand is to "dramatically reduce" predator populations by 2040 – the 200 year anniversary of the Treaty of Waitangi. Present efforts are focused on mapping predator management nationally by major agencies, with a second stage intended to map the efforts of community groups and sanctuaries. Ultimately the organisation intends to establish a 'rolling front' of pest control operations from one end of the country to the other. While many would regard it as a lofty goal, it is inspirational, and there is no doubt that powerful effort must be channelled into pest control in order to have a hope of safeguarding New Zealand's biodiversity from further significant loss. As well as technical challenges, there are social challenges that the initiative must address, including social acceptance of large-scale pest control in some parts of the country (particularly using aerial 1080).<sup>38</sup>

intensively manage about 12.5 percent of public conservation land.<sup>39</sup> There is increasing pressure to do more with less, and to ensure that the best 'bang for the buck' is gained from each conservation dollar spent. Systematic conservation planning can provide a scientific basis for such optimisation. Data can be used to rank conservation actions from a scientific perspective, accounting for known uncertainty. A proactive programme of identifying areas needing the most protection and management, helps apply resources to the most important actions, in the most efficient and cost-effective way.<sup>40</sup>

The Department of Conservation has operationalised systematic conservation planning, developing a method to prioritise cost-effective conservation actions, instead of protection of places. The 'Vital Sites Model' is another innovation achieved by the Department and Landcare Research. The model identifies significant sites for biodiversity conservation and prioritises conservation actions based on the threats to the sites' viability. This approach enables conservation actions to be

targeted at the biodiversity at most imminent risk of loss, thereby averting the most serious losses.<sup>41</sup>

### Progress made against key challenges

The role of the Department of Conservation in the protection and management of biodiversity on and off public conservation land is significant and wide-ranging – crossing geographical and jurisdictional boundaries nationwide. The resources available to do this task are insufficient.<sup>42</sup> This funding shortfall is to be expected, and efforts to address it include increasing efforts to partner with other organisations and sources of revenue, and to more rigorously prioritise conservation actions.

The Department aligns its activities around a set of outcome statements, which are set out in the Departmental Statement of Intent, an agreement with Government that is regularly updated (present version is 2013-2017).



Bryce McQuillan

*The gradual recovery of the saddleback or tieke (Philesturnus carunculatus rufusater) is largely attributable to successful pest control programmes as spending a lot of its time on the ground meant saddlebacks quickly disappeared from the mainland because of rat predation*

### **Box 3.8 Systematic conservation planning**

Techniques to prioritise conservation actions in order to maximise the achievement of higher level goals, have improved significantly in recent decades, particularly with the advent of systematic conservation planning. This is the proactive, science-led identification of conservation priorities, and the subsequent prioritisation of protection and management activities.<sup>43</sup> Systematic conservation planning can be conceptualised as a six-stage process towards a robust selection of conservation sites and activities:<sup>44</sup>

1. Compile data on the biodiversity of the planning region
2. Identify conservation goals for the planning region
3. Review existing conservation areas
4. Select additional conservation actions
5. Implement conservation actions
6. Maintain the required values of conservation areas

In an environment where resources for conservation are scarce, prioritising the most urgent conservation work and critically examining the relative importance of each task, makes good management sense.

For natural heritage (Intermediate Outcome 1), the high-level outcome statement is: “The diversity of our natural heritage is maintained and restored”.

Six key outcome objectives sit beneath this high-level goal, the first two of which are taken directly from Goal Three of the New Zealand Biodiversity Strategy. The full set of objectives is:

1. A full range of New Zealand’s ecosystems is conserved to a healthy functioning state
2. Nationally threatened species are conserved to ensure persistence
3. Nationally iconic natural features are maintained or restored
4. Nationally iconic species are managed to ensure their populations are maintained or restored

5. Locally treasured natural heritage is maintained or restored through partnerships
6. Public conservation lands, waters and species are held for now and future generations.<sup>45</sup>

Tasks set out in statute and in the Statement of Intent include the management of public conservation land, threatened species protection, science and innovation, advocacy and the issuing of permissions. However, efforts to undertake these roles encounter grave difficulty from chronic underfunding, weak statutory context, and systematic weakening of Departmental capacity.

### **Funding mismatch**

In theory, the availability of funding allocated to conservation would be expected to be less than socially optimal because there is no market price or explicit value for biodiversity. This appears to be borne out in the New Zealand case. The Department of Conservation is not funded sufficiently to address the magnitude of the conservation challenges it must face. This is evidenced by the fact that just 12.5 percent of public conservation land receives necessary pest control; that statutory advocacy activities have been substantially reduced; and that many scientific and technical positions have been removed from the staff structure.

Biodiversity management tasks constitute only one category of a suite of responsibilities that Vote Conservation must service, with a substantial proportion of the Vote allocated to recreation and tourism (33 percent in 2013).<sup>46</sup> The biodiversity-related components of the Vote Conservation appropriations in 2013/2014 included: working with communities (\$21.407 million or five percent), implementation of regional pest management strategies (\$5.774 million or one percent) and natural heritage management (\$162.847 million or 37 percent).<sup>47</sup> Thus less than half (around 43 percent) of Vote Conservation is allocated to biodiversity conservation. Staff numbers have remained fairly constant since the Department was established, at a little over a thousand permanent staff and several hundred temporary. In 1987, there were 1111 permanent staff and 718 casual staff. In 2012, there were 1148 full-time employees.<sup>48</sup> In 2012, the Office of the Auditor General reviewed Departmental performance and noted that the key asset of the Department lay in its people – particularly specialist staff engaged in front-line conservation.<sup>49</sup>

Departmental focus on research and innovation is also substantially less than in previous times. This includes funding for in-house research and for the purchase of external scientific advice and research from crown research institutes and other providers. Investment in research (science



expenditure) was approximately 6.2 percent of Vote Conservation in 1989, and has declined significantly in the years since. The science expenditure for outside sources has also decreased from approximately six percent down to approximately one percent in 2009 (see Figure 3.1). These figures are only estimations due to the opaque nature of Departmental accounting over time. Nevertheless, the trend of declining investment in science funding is quite stark. An eroding investment in science by the Department, will not only negatively influence its ability to purchase research externally, but also its ability to support the wider science system via co-funding.

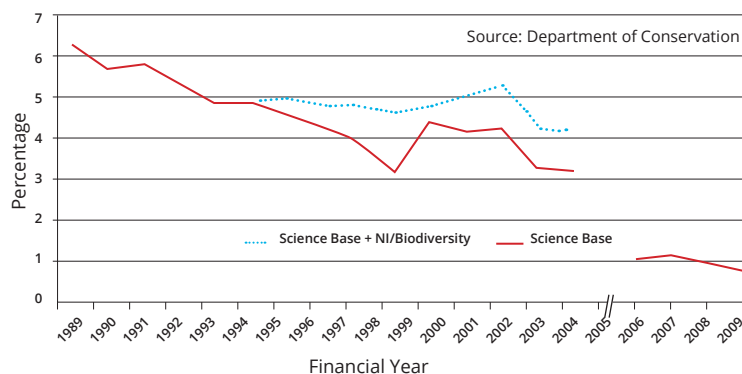
**Box 3.9 How underfunded is conservation compared to other public services?**

Given that publicly funded services can never meet demand, any public service can be viewed as being underfunded to some degree. But if only 12.5 percent of people needing publicly funded healthcare received it, or only 12.5 percent of people charged with criminal offences were prosecuted, or only 12.5 percent of children needing publicly funded education received it, or if the Inland Revenue Department had sufficient capacity to collect tax revenue from only 12.5 percent of taxable sources, then underfunding would surely be considered dire.

While this supply-demand comparison might be an engaging thought experiment, public funding adequacy is properly assessed by identifying which service, if given an extra dollar, would add the largest increment to our collective prosperity. Unfortunately this approach is especially problematic for conservation, because gross domestic product is the conventional (though deeply flawed) measure of our collective prosperity. The cost of habitat destruction and the cost of its restoration both contribute positively to gross domestic product (as do cigarette sales and the healthcare costs of smoking), which makes avoidance of habitat loss seem a most inefficient way to spend an extra dollar. Clearly this is nonsensically perverse from a conservation economics perspective. However, it does indicate that establishing the 'right' level of conservation funding relative to other public services is a seriously vexed question. A question that no doubt perplexes the very best minds in the Treasury.

Figure 3.1 Department of Conservation's science expenditure 1989-2009

Science Expenditure as a percentage of total revenue (crown plus other contributions)



In 2005, Wren Green and Bruce Clarkson conducted a review of the New Zealand Biodiversity Strategy analysing progress made to date by the Department in achieving its goals and outlining matters requiring resolution.<sup>50</sup> While the authors identified a range of areas where progress had been made, they recommended a 'course correction' that would result in better prioritisation of management actions by the Department, enhanced capacity for environmental reporting, and investigation into additional sources of conservation funding. Since that time, the Department has embarked on doing all three of these: implementing systematic conservation planning to optimise resource allocation; establishing a new system for documenting biodiversity trends; and restructuring to facilitate additional funding from partnerships to be directed at conservation.

**Prioritisation**

Systematic conservation planning is being applied in New Zealand, using an approach developed under the Department's Natural Heritage Management System. This uses spatial prioritisation software (Zonation) to rank conservation actions prescribed for a set of approximately 1000 ecosystem management units, mostly located on public conservation land. The units were chosen for their collective ability to contain representatives of a full range of terrestrial and freshwater ecosystems, and/or populations of threatened species.<sup>51</sup> Priorities are calculated based on the representation of ecosystems and threatened species, the difference made by management, and its cost. Similarly the Department recognises the need to prioritise work aligned to the remaining four objectives in the natural heritage work programme, but progress with achieving this has been slow.

The Natural Heritage Management System approach to prioritisation does not focus resources on biodiversity at most imminent risk of loss, but selects areas based on representativeness. The focus on representation is known to be a sub-optimal strategy but it is easier to implement.<sup>52</sup> Better retention outcomes are likely to result if prioritisation focuses on vulnerability reduction by making the most difference to the likelihood of loss. Representation outcomes are also better with a vulnerability focus. Barriers to vulnerability-based prioritisation in New Zealand include decisions not to collect and assemble the data needed for such an approach.

Data required are maps of the distributions of native species and the factors threatening them. The data become more powerful as they progress from presence-only data to presence-absence data and on to

abundance data. Vulnerability-based prioritisation requires distribution maps for nearly all known threats, the majority of our most threatened species, and a representative selection of common and widespread non-threatened species. The Department's Tier One monitoring programme (described below) does not supply data describing the distributions of rare and threatened species, and therefore cannot contribute to the data used in prioritisation processes. While this may be a fundamental flaw in the design of Tier One monitoring, it seems likely that sub-optimal prioritisation is better than none at all. Enshrining evidence-based prioritisation into New Zealand's biodiversity management system, via systematic conservation planning and standardised nationwide monitoring, has been an important step forward for the protection of New Zealand's biodiversity. However, it remains to be seen whether Tier One monitoring results have sufficient utility to inform the Department's business planning and contribute to the protection of New Zealand's biodiversity.

### *Conservation performance reporting*

Conservation success is commonly measured by crude indicators such as the spatial extent of land and water legally protected or under more than 'benign neglect' management. Such indicators may not reflect the conservation actually achieved. Conservation performance is properly described by metrics that estimate the difference made by management interventions in averting community degradation and loss of species at local and regional scales.

New Zealand, as a signatory to the Convention on Biological Diversity, undertook to:

- Identify and monitor, through sampling and other techniques, the components of biological diversity, identified ecosystems and habitats, species and communities, and significant genetic resources
- Identify and monitor the processes 'likely to have significant adverse impacts on the conservation of biological diversity'
- Collect and maintain the data in good order.<sup>53</sup>

Accurate reporting of biodiversity status requires the use of metrics that describe not only the degree to which protected areas represent natural variation of biodiversity across the landscape, but also the degree to which the ecological integrity of protected areas is maintained. Furthermore, because ongoing active management (e.g. pest control) is often required to maintain ecological integrity, the utility of any monitoring programme depends on its power to detect the effects of management. A part of this utility is its ability to inform conservation management decisions.<sup>54</sup>



Catherine Kirby

*Perching lily or Kahakaha (Collospermum hastatum)*

Trends in the abundances of indicator species are commonly used to indicate the ecological health of habitats, despite much research demonstrating that this intuitively appealing association between species abundance and ecological health is at best unreliable.<sup>55</sup> There is much species-specific monitoring being undertaken, mostly for threatened species such as the kiwi at a limited number of locations.<sup>56</sup> However, until quite recently, there was no nationally consistent monitoring framework proposed for biodiversity.

The need for a national biodiversity monitoring framework was identified in the mid-2000s, and in 2005, the Department of Conservation and Landcare Research teamed up to design what became known as the Biodiversity Monitoring and Reporting System. In order to keep the scope of the project tractable, the system was confined to terrestrial environments, and also focused primarily on public conservation land. However, some guidance on monitoring and reporting in freshwater and marine environments was developed, and a few sites not on public conservation land are included within the monitoring programme.<sup>57</sup>

The system is three-tiered. Tier One is a biodiversity add-on to a whole-of-government initiative to monitor forest carbon at a national scale. It is based on five-yearly counts, and measurements in randomly located plots distributed throughout the country, but mostly in forest on public conservation land. The biodiversity focus of Tier One is necessarily on common and widespread species and ecosystems because only these are likely to be present within existing carbon plots. Rare and threatened biodiversity require a very different monitoring strategy, targeted to particular taxa and ecosystem types, because they are unlikely to be encountered in randomly located plots. Since conservation management must focus on the rare and threatened, if it is to efficiently avert loss, the results of Tier One monitoring are unlikely to be of much immediate value for conservation management purposes.

The outputs of the first two years of monitoring have been used in the Department of Conservation's Annual Report for 2011-2012 and 2012-2013, but the data have not been made generally available to the scientific community, and none has been published in scientific journals. Conclusions drawn from the data include the following:

- Non-forested ecosystems had more native plant species than weed species (7:1) but had more weeds overall than forested ecosystems
- Sites in forested and non-forested ecosystems had more weeds when they were at low elevations and nearer to settlements
- Seven of the naturally uncommon species had more than 20 percent of extent within stewardship land.<sup>58</sup>

While these conclusions may provide some interesting ecological insights, it remains to be seen whether a biodiversity monitoring programme that does not provide information on the state of species and ecosystems in most urgent need of conservation intervention, can usefully inform conservation management decisions. The fact that Tier One data have not been used in the systematic prioritization of conservation actions, suggests that the data produced lack conservation business relevance. Further, some Tier One indicators do not meet all of Statistics New Zealand's requirements for accuracy, reliability and representativeness, a requirement for their use in national environmental reporting.

Given the expense of Tier One monitoring, and the lack of demonstrable conservation business utility, a review seems inevitable. It is likely that its design, constrained by the primary purpose of forest carbon monitoring and divorced from the concepts and principles of systematic conservation planning, will be found to be seriously wanting. However, it is possible that Tier Two may yet be designed specifically to serve the information needs of conservation management planning and reporting.

Tier Two monitoring is intended to assess the effectiveness of management interventions at selected locations. Design work for this tier is just getting underway (in 2014) and it is unclear whether this will effectively address the need to measure the difference made by conservation management and policy interventions. Tier Three will intensively monitor a few sites, primarily for research purposes, but design work for this has yet to get underway. Thus, to date, only Tier One has reached implementation stage and its utility for conservation has yet to be established.

### *Partnerships approach*

In 2011, the Department of Conservation restructured itself (for the third time within three years), and implemented a radically new 'Partnerships' management model (see Box 3.10). The Partnerships model is aimed at harnessing private and other non-departmental resources towards achieving national strategic conservation priorities. New Zealand has now been divided into six partnership regions: two in the South Island and four in the North. Present corporate partners include Dulux, Air New Zealand and Fonterra (see Box 3.11).

The new model represents a strategic shift towards more open and inclusive conservation. As well as extending the role of the private sector in its work, the Department expects to increase conservation awareness and knowledge in other stakeholders such as iwi, councils and the general public. The initiatives being pursued under the new model range from local community projects to national scale projects.

### **Box 3.10 Partnerships Model**

The Department of Conservation describes the organisational elements of the Partnerships Model as follows:

*The Conservation Services Group is responsible for doing great conservation work - to specifications, on and off public conservation land, independently and in partnership. Their goal is to do high quality conservation work to plan, as cost effectively as possible.*

*The Conservation Partnership Group is responsible for driving growth in conservation through partnerships. Their goal is to secure beneficial “value exchanges” with partners like iwi, business, local authorities, private landowners and communities.*

*The Kahui Kaupapa Atawhai Group works to integrate Kaupapa Māori with conservation management, and build cultural awareness for working with Māori. This Group is responsible for achieving more conservation through partnerships with iwi.*

*The Science and Capability Group designs and implements systems by which science, technical, capability and communications informs and enables DOC and the sector to deliver increased conservation outcomes for the benefit of New Zealand both now and in the future.*

*The Business Performance Group provides the corporate services for the business. This includes business, commercial and information technology systems and services required to support the business in delivering the Strategic Direction.*

*The Policy and Regulatory Services Group aims to embed conservation thinking and its links to New Zealand's prosperity across agencies and sector groups, and with our Treaty partners.<sup>59</sup>*

A key driver of this shift in approach was the Department's recognition that the conservation challenge greatly exceeded its capacity and budget, whilst community expectations of the private sector were growing. Rising consumer expectations were driving a global trend towards companies embracing broader social and environmental objectives as well as the traditional financial ones.<sup>60</sup> Embracing corporate social responsibility has led some industries to invest in conservation initiatives.<sup>61</sup>

Unfortunately, corporate social responsibility has been relatively slow to take hold in New Zealand.<sup>62</sup> Most businesses remain focused on providing a profit for their shareholders rather than on achieving public interest objectives like conservation outcomes. This means that some companies partnering with the Department are likely to make decisions on what conservation activities to support based on factors such as proximity to chief markets, marketability and brand alignment, and these may not align with conservation priorities. There is a real risk that corporate interests may influence conservation work programmes and possibly even conservation policies. At worst this could further threaten vulnerable biodiversity.

It is not yet clear how well this risk is being managed or how the private sector stake in conservation will be marshalled to best effect. In a 2012 review of Departmental achievements, the Auditor-General noted an absence of an “integrated, strategic framework” that regional partnership work fitted into.<sup>63</sup> The ability of the Department to muster robust technical rationales and strong negotiating skills, in order to appropriately direct private sector conservation effort, will be a critical determinant of the success of the Partnerships model.

### **Box 3.11 Fonterra and the Department of Conservation Partnership**

Fonterra is the principal cooperative of the dairy industry in New Zealand. In March 2013 it entered into a ten-year commercial partnership with the Department of Conservation. The partnership is part of Fonterra's existing 'Living Waters' initiative, demonstrating Fonterra's "long-term commitment to caring for New Zealand's waterways, ensuring dairying works alongside natural habitats and ecosystems of healthy, living water – now, and for the future."<sup>64</sup>

The project will spend \$20 million improving five waterways around the country, being:

- Kaipara Harbour
- Firth of Thames

- Waikato Peat Lakes
- Te Waihora-Lake Ellesmere
- Awarua-Waituna

These are sensitive waterways in catchments under significant pressure from dairy farming. Some of the sites are internationally significant wetlands recognised under the Ramsar Convention. A joint steering group has been established to guide the project and implement the agreed 'Community Investment in Water Initiative',<sup>65</sup> This sets out a series of common principles, objectives and other administrative matters. There is potential for further waterways to be included and for the partnership to be extended.



*Pressures of intensive land uses have caused serious declines in water quality and freshwater biodiversity. Awarua-Waituna Lagoon, Southland is one of the locations of the Fonterra and DOC Partnership*

## Key conclusions and a way forward

We have demonstrated that Department of Conservation funding is paltry relative to the size of the conservation task. We have also said that the economic characteristics of biodiversity mean that its conservation will be under-supplied (even without the collective action problem). In addition, the above review demonstrates that dogged determination and hard-working staff have made significant progress despite the perpetual shortfalls. However, there is a need to radically review the way in which the public interest in conservation is viewed, and to investigate funding structures that will provide more secure, long-term funding for core conservation purposes.

The diminished capacity of the Department to deliver on key tasks such as statutory advocacy, innovation and research to improve conservation management, and to develop robust programmes to track the difference made by management interventions, is deeply concerning. The dilatory enforcement of compliance with the suite of legislation that the Department is responsible for is predictable, as is the under-funding, and the outcome may be terminal for indigenous biodiversity. A stronger, better-resourced conservation agency is a critical element of the protection of New Zealand's ailing indigenous biodiversity.

Trent Bell



*The work of the Department of Conservation is critical to the survival of the piwauwau/rock wren (Xenicus gilviventris) and many other species*

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An aerial photograph showing a road curving through a landscape of green fields and some trees. The scene is captured from a high angle, looking down on the terrain.

# 4 Protecting biodiversity on private land



*In most regions, our biodiversity now exists in a novel context*

Indigenous biodiversity on private land in New Zealand is declining through habitat removal, pollution and the impacts of invasive species. While many regional and territorial authorities, the Department of Conservation and agencies such as the Queen Elizabeth II National Trust (QEII Trust) have protected large tracts of native vegetation from development; have put in place local government planning instruments to help maintain biodiversity; and have implemented a multitude of non-regulatory initiatives, their efforts have been insufficient to halt the decline.

Regulatory methods to protect private land biodiversity are often thwarted or weakened by private interests. The strong mechanisms that do exist are typically under-implemented (e.g. Wildlife Act).

Major industries and private landowners can exert strong political influence over agencies, often openly and directly, through disproportionate representation in elected positions.<sup>1</sup> The economic drivers to clear and develop land are also powerful.

Landowners who destroy biodiversity through development, stand to gain financially, while the cost of depleted biodiversity falls on the public. Incentives for landowners to conserve biodiversity are weak and there are limited mechanisms for the public to compensate landowners for the benefits of the biodiversity and ecosystem services retained on their land. We explain why currently available approaches are failing to protect biodiversity on private land. We identify improvements to existing measures and propose some new methods that may be very much more successful.



Marie Brown

*The protection of biodiversity on private land is achievable through purchase, covenant, fencing and pest control*

## Importance of private land for biodiversity

While public conservation land covers more than 30 percent of New Zealand's land area, it does not reflect the full range of New Zealand's ecosystems, with about 20 percent of ecosystem types being entirely absent from public conservation land or already extinct.<sup>2</sup> This means that the retention and protection of biodiversity on private land are essential to the maintenance of the full range of biodiversity and ecosystem services overall. The New Zealand Biodiversity Strategy, the Department of Conservation's Statement of Intent and the many regional and district planning instruments, all have the goal of protecting a full range of ecosystems and species. An integrated approach to land management, which embraces biodiversity on both public and private land, is very much needed if this goal is to be achieved beyond the short-term.

Biodiversity on private land is vulnerable to the impacts of development which results in habitat removal, fragmentation and degradation against a background of rapid decline due to pests. Rates of biodiversity loss in these areas are very high and the species affected are typically poorly represented in legally protected areas.

The highest rates of loss tend to occur in environments where native vegetation has already been significantly reduced in extent by the impacts of human settlement.<sup>3</sup> This is partly because the more degraded an area is, the harder it is to argue for its protection. Remnant natural areas are sometimes acquired and legally protected by the Department of Conservation and councils, but budgets for this are usually small, and agencies are often reluctant to purchase or receive land due to the high costs of ongoing management. Different, innovative methods are needed to protect biodiversity on private land, and to enable the active management required to ensure its retention.

### Landowners

The critical agent for biodiversity protection on private land is the landowner. Public goods on private land, in the form of biodiversity and ecosystem services, are available to the public at no charge. The landowner meanwhile generally bears the opportunity cost of development potential foregone (except where protection has facilitated economic gain through tradable development rights and the like). Where there is no or only limited financial incentive for the private landowner to conserve biodiversity for the benefit of the wider public, but a strong financial incentive to gain private benefit from its destruction, the latter is likely to ensue. Some regional and district councils provide incentives as part of their biodiversity programmes and these may include rates relief, funding for active management (e.g. fencing), technical advice, development rights and support for pest control. But the general and widespread decline of biodiversity on private land indicates that these incentives are insufficient.<sup>4</sup>



Angela Simpson

*Tiny orchids such as this dancing spider orchid (*Nematoceras acuminatum*) commonly occur on private land and effective conservation depends on landowner knowledge and agency assistance*

Methods to protect indigenous biodiversity on private land are generally reactive and/or based on voluntarism. Many private landowners carry out conservation tasks on their properties in the absence of government support and incentives, and their individual efforts are very valuable. Often other incentives for them are in place, such as the income from tourism, but in most cases their personal values drive their participation. There is no clear information on the proportion of landowners engaging in biodiversity conservation, or what the outcomes of those efforts are. Rates of decline however, suggest that these efforts are nowhere near sufficient to curtail the overall loss, and a substantial upscale in protection and management of biodiversity on private land is needed if what little remains is to be retained.

### RMA and biodiversity

The key legislation through which biodiversity may be protected on private land is the RMA. This seeks to protect biodiversity through a number of provisions. "Safeguarding the life-supporting capacity of air, water, soil, and ecosystems"<sup>5</sup> is an element of the overriding purpose of the Act which is "to promote sustainable management". The Act does not

prohibit the use of air, soil, water and ecosystems but requires that their life-supporting capacity is safeguarded during any such use. The Supreme Court has recently recognised that environmental protection is a “key element” of sustainable management.<sup>6</sup> Ecosystems are also referred to in section 7 where decision-makers must have particular regard to “(d) intrinsic values of ecosystems”.

The matters of national importance in section 6 of the RMA, which decision-makers must “recognise and provide for” includes “(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna”. Although this section requires significant habitats of indigenous biodiversity to be ‘protected’, unlike the Wildlife Act, it does not protect the species themselves. The imperative to protect is not limited to protection from ‘inappropriate’ activities, as is the case for several other section 6 matters (such as outstanding natural landscapes), and therefore is stronger.<sup>7</sup> However, ‘protection’ does not itself require the avoidance of all adverse effects – remediation, mitigation and offsetting may be available.<sup>8</sup>

Section 6(c) is generally implemented by identifying ‘significant natural areas’ or providing ecological criteria that identifies what is significant, and including rules in district or regional plans to control vegetation removal and other activities (such as earthworks) in those areas. However, the focus of the Act is on managing the effects of activities, rather than regulating the activities themselves. This has drawn some criticism, because it tends to focus attention on reactive solutions rather than anticipatory approaches to environmental problems.<sup>9</sup>

### *Role of regional and local councils*

Biodiversity management on private land in New Zealand has been largely devolved to regional and local government, with some oversight provided by the Ministry for the Environment. Regional councils have primary responsibility for regional scale biodiversity protection across all domains under the RMA with the function of “the establishment, implementation, and review of objectives, policies, and methods for maintaining indigenous biological diversity”.<sup>10</sup> City and district councils manage the “control of any actual or potential effects of the use, development, or protection of land” for the purpose of maintaining indigenous biodiversity.<sup>11</sup> Councils perform these responsibilities by developing objectives, policies, methods and rules in regional and district planning documents, through processing resource consents, and through allocating funding during the annual plan process.

The statutory mandate of regional councils is ‘maintaining’ biodiversity. What this means is disputed by different councils, many of which are wary of the expectation this places upon them. In 2004, a survey of councils’ efforts to address biodiversity retention on private land demonstrated that there was wide variation in actions taken. For example, the review

found that 77 percent of councils that responded (from a 90 percent response rate) could identify significant sites within their jurisdiction, a little over half had a mechanism in their plan to identify significant sites, and most included rules to reduce habitat clearance and disturbance.<sup>12</sup>

The effectiveness of councils, in carrying out their biodiversity mandate, is hindered by conflicting goals such as economic development and environmental protection. The complexity of their statutory role, and how the public values councils and their roles, were analysed by Jeff McNeil in the early 2000s. The study found that regional councils had low public value due to sector capture, low public support, and variation in capability to carry out statutory duties.

McNeil’s research demonstrated that the highly devolved nature of environmental governance in New Zealand creates opportunity for ‘agency capture’ (as described in Chapter 2), citing the preponderance of industry interests in elected councillor positions as evidence. Limited national leadership, and a highly devolved policy-making context, were considered unlikely to generate good environmental outcomes. The research recommended a review of the “structure, function and finance” of regional government in New Zealand.<sup>13</sup>

The decentralisation of biodiversity management to the local government level, during the 1990s, was largely undertaken without accompanying budgetary support. This has meant that councils have had to rely on their property rating base to fund biodiversity efforts. As a result, funds for proactive biodiversity work can be in short supply in places with a small population and/or economy, even if there is political support for biodiversity maintenance.



J S Dodsworth NZPCN

*Native iris (Libertia cranwelliae) a nationally critical threatened plant recently (2006) rediscovered at one site near East Cape where c.30 plants are growing in coastal forest*

Many councils, particularly those with small rating bases, lack capacity to carry out the full range of their statutory functions. This issue is compounded when the council administers a large geographical area or an area with high biodiversity values. Some additional support is available for poorly resourced councils (see Box 4.1).

#### **Box 4.1 Envirolink**

Envirolink is a fund administered by the Ministry for Business, Innovation and Enterprise for research to inform management of the natural environment, including biodiversity. Monitoring and conservation actions are not eligible for funding. The fund has three key aims:

- Improve science input to the environmental management activities of regional councils
- Increase the engagement of regional councils with science and research outputs
- Contribute to greater collective engagement between councils and the science system

Envirolink is aimed at funding the adaptation of management approaches to fit local conditions, and the translation of research into practical guidance for managers. Approximately \$1.6 million per year is available to nine regional council and unitary authorities that cannot meet their research needs unassisted.<sup>14</sup>

#### **Role of Māori**

Māori are Treaty partners and have a critical role in biodiversity protection. The RMA (and its predecessor the Town and Country Planning Act) recognises this, providing that the “relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga” is a matter of national importance”.<sup>15</sup>

However, Māori perspectives are often poorly provided for in policy and practice. Provisions for consultation and participation on matters under the RMA (including biodiversity) are patchy and not well-implemented, and statutory provisions enabling agencies to delegate management responsibilities are rarely invoked. For example, Māori are to be consulted in the preparation of RMA policy and plans, but there is no duty to consult in respect of resource consents or notices of requirement, other than through the general public notification provisions.<sup>16</sup>

The RMA does recognise iwi management plans which are described as: “a relevant planning document recognised by an iwi authority and lodged with the council”. Local authorities are required to ‘take into account’ such documents during the preparation or change of RMA plans.<sup>17</sup> Iwi management plans are produced by iwi, iwi authorities, rūnanga or hapū to address resource management in particular localities. They may address a single issue such as discharges to water, or have a wider scope than just resource management alone. They do not follow a standard format and may be very brief and informal, or comprehensive and wide-ranging.

A review of the effectiveness of iwi management plans was undertaken for the Ministry for the Environment in 2004. The report found that such plans varied significantly in their “style, size, content format and presentation”, noting that variation was a result of a range of factors including differences in iwi and hapū represented, the age of the document and the funding available to develop it.

The review concluded that the effectiveness of such plans was constrained by inadequate:

- Resources and funding to support their development and use
- Expertise amongst many iwi
- Support by councils for iwi involvement in environmental management
- Requirements in the legislation to ensure iwi involvement.<sup>18</sup>

There have been legislative moves to strengthen the role of Māori in resource management which have not borne fruit. In 2010, the Resource Management (Enhancement of Iwi Management Plans) Amendment Bill was tabled in Parliament by the Labour Party, intending to “strengthen[s] the provisions of the Resource Management Act 1991 by which iwi management plans influence district plans and policies”, but it was voted down on its first reading. Section 33 of the RMA allows local authorities to transfer any of its functions, powers or duties under the RMA to, *inter alia*, an iwi authority, but such a transfer has never taken place, largely due to reluctance by local authorities to relinquish their decision-making responsibilities.

In 2005, the RMA was amended to provide for joint-management agreements to be entered into by Māori and local (and other public) authorities. This was intended to provide a halfway house, where decision-making could be shared between councils and Māori entities, rather than being entirely transferred. A number of joint management agreements exist, the first under this provision being between Ngāti Tūwharetoa and the Taupo District Council, signed in 2009.<sup>19</sup> Other co-management agreements were signed prior to this enactment, such as that between Ngāti Whātua o Ōrakei and the Auckland City Council.<sup>20</sup>

Another way in which incorporated Māori groups can actively engage in biodiversity management is through the heritage order provisions of the RMA which enable such an order to be placed over an area which may be “of special significance to the tangata whenua for spiritual, cultural, or historical reasons” amongst other things.<sup>21</sup> Such an order is a powerful tool to stop incompatible development as a resource consent that would nullify the effect of the order cannot be legally granted.<sup>22</sup> However in practice, these provisions are rarely called upon, due to a range of caveats. For example, the Environment Court may still revoke the order even if it is in place or require the heritage protection authority (in this case the Māori proponent) to purchase the land where it is rendered incapable of reasonable use, and there is significant financial cost involved in establishing heritage orders.<sup>23</sup>

Cultural impact assessments in the context of specific resource consents and other applications can be an important mechanism for highlighting the traditional ecological knowledge of a particular area, and for recognising the concerns of iwi and hapū in relation to a specific project. Many agencies also invite the views of Māori through hui, management and advisory committees and the employment of Māori liaison officers. A cultural impact assessment and other consultative strategies are not mandatory, but may assist in the planning of a development and the preparation of consent conditions. A nationwide database of contacts for iwi or hapū has been established and is maintained by Te Puni Kōkiri.<sup>24</sup>

### ***Regional and district planning instruments***

Regional and district plans determine whether or not a resource consent is required before an activity proceeds, and if it is required, what matters will be considered in processing it to a decision. Effective management of biodiversity relies on the control or elimination of key pressures by focusing regulatory attention on the prevention of activities that pose most threat to species and their habitats. Examples of regulatory provisions in regional and local planning documents that aim to protect biodiversity include:

1. Restrictions on the removal of habitat on private land
2. Identification and protection of significant natural areas on private land by a data layer depicted on planning maps (or a schedule)
3. Controls on development activity within a specified distance from wetlands, other water bodies and within riparian corridors.<sup>25</sup>

Permitted activities are those allowed without resource consents. Most farming and many forestry operations are typically permitted activities in plans. Standards can be prescribed for permitted activities, but the lack of a consent process, can mean the council is not aware of the work being undertaken and therefore is not able determine whether the standards

are met. It also means councils are unable to recover monitoring costs.

The nature and scale of impacts on biodiversity would not appear to be well-correlated to the level of control on activities generating the impacts, as provided for in local and regional planning instruments (see Box 4.2). New Zealand is not alone in its regulatory blindness to the impacts of primary industries. The German Federal Nature Conservation Act has been hailed for its eco-centric approach to nature conservation. Yet, this is significantly weakened by exceptions for agriculture, forestry and fisheries that still enjoy a traditional precedence over conservation. Although their combined effects have the most deleterious impact on nature, they are also the most privileged within legislation intended to protect species and regulate human interferences.<sup>26</sup>



*Mixed land uses in Happy Valley, Southland demonstrate the changing context for indigenous species*

### ***Integration***

The Department of Conservation and councils (especially regional councils) manage biodiversity side-by-side, under different legislation, and their planning and conservation actions have rarely been integrated. The Department has focused on biodiversity on public conservation land and the councils on private land and council reserves. Integration of conservation actions, where appropriate and possible, can help to improve their overall cost-effectiveness. For example, region or district-wide assessments of significance often don't include biodiversity on Crown land managed by the Department, and so may not present a sound overview of biodiversity in the area, and vice versa. Another example is where a regional council may carry out large-scale pest control in the same season and adjacent to a similar effort by the Department. The 2012 review of the Department of Conservation's performance by the Auditor-General did note recent instances where the expertise and resources of the Department and the relevant councils were being shared and where management was integrated.<sup>27</sup>

#### **Box 4.2 Regulation of forestry impacts**

Plantation forestry is exotic-dominated and covers approximately seven percent of New Zealand's land area within 60 planning districts.<sup>28</sup> Forestry is typically managed as even-aged stands, clear-felled at 26-32 years of age.<sup>29</sup> Clear-felling, with associated earthworks for tracks, causes temporal spikes in sedimentation yield which can degrade waterways and the marine environment. Broad-scale clear-felling also limits the degree to which standing exotic forestry contributes to conservation of common and widespread biodiversity.<sup>30</sup>

The impacts on biodiversity of plantation forestry are controlled by regional and district planning instruments and a range of voluntary instruments. One such voluntary instrument is Auckland's 'Forestry Operations in the Auckland Region: A Guide to Erosion and Sediment Control'.<sup>31</sup> Plan instruments controlling forestry are highly variable among regional and district jurisdictions, ranging from permitted through to non-complying activities.<sup>32</sup> For example, forestry remains a permitted activity in the proposed Auckland Unitary Plan, subject to conditions.

In 2010, a national environmental standard for plantation forestry was proposed in light of the significant variation found in lower level planning instruments.<sup>33</sup> The variability is particularly inefficient where one forest block may be subject to rules of more than one planning district. Progress on this Standard by the Ministry for the Environment was stalled and the job of preparing it has since been delegated to the Ministry for Primary Industries. Recent media reports indicate that resolution is near and advice to Ministers is expected to be provided in 2015.

#### **Role of national guidance**

A national policy statement is a tool provided for under section 45 of the RMA. It enables central government to provide mandatory guidance to regional and district councils on balancing matters of national benefit where there are local costs. Presently, four national policy statements exist (Renewable Energy, Electricity Transmission, Freshwater Management and the mandatory NZCPS). A further two (Urban Design and Indigenous Biodiversity) have had significant work done on them, but are yet to reach fruition. The lack of national guidance for regional councils is an oft-cited barrier to good and consistent environmental management, including in relation to indigenous biodiversity.

A Proposed Biodiversity NPS has been drafted, and shelved, multiple times. It was recommended by the 'Biowhat?' report in 2000, the New Zealand Biodiversity Strategy in 2001, and the review of the Strategy in 2006. It has been consulted upon nationwide, most recently in 2011, but has not been finalised.

After failed attempts to finalise the Proposed Biodiversity NPS, the Ministry for the Environment and Department of Conservation, released a 2006 guidance document titled 'Protecting our Places: Information about the National Priorities for Protecting Rare and Threatened Biodiversity on Private Land'. This outlined four priority areas for conservation, which were intended to help guide agencies and individuals in ensuring that conservation occurs in areas where it is most needed. The national priorities inform decision-making on the focus of projects funded under the suite of contestable biodiversity funds available from central government. In addition, regional and local councils (having the lead mandate in the protection of biodiversity on private land) can use the priorities to steer conservation effort in the most effective directions.<sup>34</sup>

The finalisation of the Proposed Biodiversity NPS would deliver a range of positive outcomes, particularly by making approaches to protecting biodiversity more consistent throughout the country, improving alignment between jurisdictions, and reducing the costs and effort required to devise provisions and methods. These gains would be particularly beneficial to industries and other stakeholders that undertake activities affecting biodiversity in more than one region or district. The document as it is presently written would achieve:

- Recognition of the need to arrest the decline in biodiversity, introducing the concept of 'no net loss' as a goal for biodiversity management
- A common definition of ecological significance
- A common suite of criteria to identify sites of ecological significance which agencies would be required to implement (and could add to, but not remove criteria from)

Raewyn Peart



*Sediment impacts on estuarine habitat caused by inappropriate forestry practices*



*Fragmentation of tussock grassland communities as a result of pasture improvement*

- A clearer directive to regional and local government to implement existing statutory requirements, by providing a baseline of minimum standards
- Guidance on aspects of biodiversity offsets, including the mitigation hierarchy

The Proposed Biodiversity NPS was well supported by research institutions, community groups and other non-vested conservation interests. Local Government New Zealand submitted generally in support of the change on behalf of the more than 80 local government agencies nationwide.<sup>35</sup> However, a few local government agencies submitted independently, presenting contrary viewpoints. They challenged the regulatory approach adopted (e.g. Hurunui District Council)<sup>36</sup> on the basis of the economic cost of identifying significant biodiversity, the lack of recognition of non-regulatory methods to protect indigenous biodiversity, and the impact that further direction may have on relationships between agencies and the communities they serve.

The Summary of Submissions<sup>37</sup> indicates that the bulk of opposition to the document came from private landowners, business and industry who do most damage to biodiversity. Opponents did not acknowledge how much economic benefit private interests gain at cost to the public interest. It is therefore unsurprising that private interests see little benefit in constraining their consumption of public environmental goods as proposed by the document.

Concerns raised in submissions included:

- Failure to recognise costs associated with the protection of biodiversity on private (particularly productive) land

- Lack of financial compensation or incentives to alleviate these costs and reward landowners for providing public benefits
- Potential for extending constraints on property rights and business decision-making
- Lack of funding available to support private conservation projects
- Potential scope creep: extending the biodiversity functions of local government outside the bounds of what the submitter considers the RMA provides for
- Limited consideration of economic impacts on agencies, landowners and the private sector, and how these might be addressed in practice

The document is a useful start to addressing the lack of national guidance for addressing key pressures on biodiversity. However, there are a number of possible improvements that could and should be addressed. For example:

- Further develop the significance criteria to provide practical guidance on assessment and include important measures such as representativeness
- Further address freshwater, wetland and marine ecosystems
- Provide greater recognition of the habitats of indigenous fauna
- Include a presumption of avoidance of effects on significant environments
- Increase focus on biosecurity: exotic pests and weeds are the most serious threat to indigenous biodiversity within legally protected areas
- Address the protection of taxa such as fungi, lower plants and invertebrates
- Address soils or soil organisms
- Clarify the relationship between the Proposed Biodiversity NPS and management of public conservation land
- Review the list of ecosystems in Schedule 1 and ensure it is complete
- Provide for incentives for conservation of indigenous biodiversity on private land
- Clarify the decision-making implications in areas where the Proposed Biodiversity NPS and extant NZCPS overlap





*Toutouwai/South Island robin (Petroica australis). Nest predation results in declining male-dominated populations but where pest control is carried out, populations increase rapidly, and the sex ratio returns to almost 1:1 within a few years*

- Expand the vision of the document to one that focuses not only on the maintenance of the present state of biodiversity, but also on restoration and enhancement.

Revisiting the draft proposed in 2011, within a wider collaborative process, would potentially address these deficiencies and enhance the positive contribution that the document could make.

### Assessing significance

In order to fulfil their function to protect areas of “significant indigenous vegetation and significant habitats of indigenous fauna” under section 6(c) of the RMA, councils must first identify them.<sup>38</sup> These are commonly referred to as ‘significant natural areas’ but may also be known by a variety of other names (e.g. special natural areas or significant ecological areas). The identification of areas of significance may be used to develop layers of information on planning maps, or to formulate schedules of places that may or may not be included in the relevant district or regional plan. Most councils do survey and identify significant sites, but the methodologies and criteria to assess significance differ markedly. Further, the way the information is used ranges from being treated as a non-regulatory inventory, through to underpinning regulatory protection via rules in planning instruments. The main determinants of the value of this exercise to biodiversity protection are the resourcing provided for the assessment, the criteria used, and the methods used to protect biodiversity identified in a planning context.

### Resourcing

The robust assessment of biodiversity in a council’s jurisdiction, and identification of significant sites, is a costly process and is rarely a high priority for funding. The lack of resourcing often results in sub-optimal methodologies being employed, undermining the strength of the resulting provisions, and their ability to curtail biodiversity decline.<sup>39</sup> Landowner opposition to the process can be very heated and agencies will generally shy away from doing politically difficult tasks. On the West Coast, a local authority’s efforts to assess private land for biodiversity values were described as a “Mugabe-style land grab” by a local politician.<sup>40</sup> Landowners also often resist providing access to their land for Council staff or their contractors. Some landowners object to aerial surveys when they are carried out as an alternative to the more confrontational ground surveys.

Criteria can sometimes be skewed, to achieve protection of low value areas, and this commonly occurs where mechanisms such as ‘bonus lot’ provisions are used. In this scenario, landowners are much keener for areas of their property to qualify as ecologically significant, given the economic incentive of an additional lot being created in exchange (see Box 4.3).

#### **Box 4.3 Bush lot subdivision in Rodney District**

In the Rodney District of Auckland, a plan provision was introduced that allowed a landowner to subdivide additional lots if a significant ecological area (forest or wetland) elsewhere on the property was covenanted and fenced in exchange. During the period of the provision being active, 4161 new covenanted areas were established as a result of 2662 subdivided property titles (as at August 2010). Most have no requirement for active management, and of the 31 covenants monitored in 2011, none were fully compliant with the relatively minor conditions attached (e.g. intact fencing).

In a 2010 evaluation by Rodney District Council itself, it was noted that the bush lots protected were small, isolated and of low ecological value.<sup>41</sup> This is a result of criteria that are too broad and easily open to interpretation, with economic incentives driving landowners to pressure the council to concur that an offered site is significant.<sup>42</sup> This example serves as a caution on the use of regulatory economic incentives, with overly accommodating ecological significance criteria attached. The ultimate result was greater development, likely impacting on biodiversity, with limited ecological values protected in exchange.

Many smaller councils with large areas of biodiversity, may not have the resources available to do a biodiversity survey. Surveys require ecological expertise, survey equipment, and the use of information technology such as GIS. To reduce these costs, many councils rely on aerial photos or legacy information about biological resources (i.e. 'desktop analysis') instead of on-the-ground surveys where the information is ground-truthed. Desktop analysis can lead to significant errors, and undermine the purpose and integrity of the identification mechanism. This is particularly pertinent where the sites identified have stricter regulatory requirements placed on them. If the identification of sites cannot be robustly defended, they are unlikely to survive the statutory planning process. Even if they do, it is more difficult to exclude incompatible development (see Box 4.4).

### Assessment

Assessment of significance is generally done according to criteria set by each council in the absence of national guidance. Most criteria address one or more of the following site attributes:

- Inherent ecological values of the site
- Representativeness
- Rarity
- Diversity and pattern
- Distinctiveness/special ecological characteristic
- Ecological context
- Size and shape
- Connectivity<sup>47</sup>



The nationally critical Awahokomo gentian (*Gentianella calcis* subsp. *calcis*) is endemic to limestone bluffs

#### Box 4.4 Far North District Council 'special natural area' layer

The Far North District Council set about identifying 'special natural areas' that were notified as part of its first District Plan. Following an outcry from the 2200 affected landowners (including public marches)<sup>43</sup> the council was sacked and the plan rewritten.<sup>44</sup> Material factors that led to the withdrawal of the plan provisions in 1998 included:

- Special natural areas were substantial in area and impacted economic opportunities
- The areas identified constituted more than half of some properties
- Landowners were not consulted in identifying and mapping the areas
- The areas mapped were not accurate.<sup>45</sup>

When the plan was re-notified in 2000, the council opted for a voluntary approach to biodiversity protection, with only limited rules controlling habitat removal.<sup>46</sup> Regulatory provisions were later reintroduced through the submissions process, and the present version of the plan recognises the importance of not just habitat protection, but management through pest control including exclusion of certain domestic pets from some areas. Nevertheless, the long road to recognise these pressures demonstrated what small local councils face in attempting to fulfil their statutory role.

Narrow criteria for significance typically exclude much important biodiversity.<sup>48</sup> Narrow criteria will likely result in a small sliver of ecosystems being protected or some ecosystems not being recognised at all. Such a procedure can neither slow biodiversity loss, nor account for vulnerability. If representativeness is used correctly, it should include the rare and the commonplace.

Political pressure to minimise conflict with constituents, by limiting the extent of significant natural area assessments, is common. The West Coast Regional Council avoids landowner confrontation by identifying such areas only if they occur on public land. Some councils cap the number of areas that can be identified on privately owned land. These pressures on the technical assessment process inevitably render significant natural area site schedules incomplete and inadequate for the purpose of retaining what biodiversity remains.



Many landowners voluntarily protect their land through covenant schemes such as that administered by the QEII Trust

Criteria may also be used on a site-by-site basis to assess the values of an individual site. However, in the absence of a regional or district-wide survey to provide context for the site assessment, evaluation of significance can only be an interim judgment. If similar sites have not been assessed, there is no basis for evaluating how any one site compares with the regional or district norm. The rigour applied to the assessment of significance is commonly a subject of discussion in the Environment Court, and recent decisions point to a need for more comprehensive criteria and more robust methodologies.<sup>49</sup>

#### **Methods to protect identified areas**

Once information on the location of significant areas has been assembled, it can be used to support the development of both regulatory and non-regulatory methods for protection. Regulatory methods can involve rules which make potential modifications to the area trigger the need for a resource consent. Where no such rules exist, the identification of significant sites still provides a valuable source of general biodiversity information, and can assist in targeting incentives and prioritising conservation work for the council and others.<sup>50</sup>

Regulatory approaches vary from instituting strict rules prohibiting specified activities in areas identified as significant, to having weaker rules restricting vegetation removal, through to merely recognising

that significant biodiversity is present but requiring no further action or restriction. Councils may also choose a combination of these approaches. Landowners often oppose significance assessments, usually by not allowing access for survey purposes, because they perceive that it will lead to further erosion of property rights. The promise of a non-regulatory approach can improve landowner participation, but is unlikely to be a reliable protection mechanism for biodiversity. Reliable protection requires rules that are enforced.<sup>51</sup>

#### **Weaknesses of approach**

Given the extent of loss, indigenous biodiversity on private land should be assumed to be significant unless demonstrated otherwise.<sup>52</sup> The politically fraught nature of the assessment process, poor and incomplete survey methods, and a lack of regulatory recognition of the values identified all diminish the ability of this significance assessment to achieve the 'maintenance' of biodiversity. A few councils, notably Tasman District, have adopted a collaborative governance approach to assessing their jurisdiction for significant natural areas in recognition of the challenges of the exercise encountered elsewhere.<sup>53</sup> Even where it is successful and robust it is unlikely to be sufficient. The significant natural area work programme cannot therefore be the only means by which councils carry out their statutory mandate.

#### **Resource consents and mitigating harm**

More than 34,000 resource consents, representing the bulk of development in New Zealand, were issued in 2012/2013 by regional and district councils and the Environmental Protection Authority.<sup>54</sup> It is through the decision-making process for resource consents that the ecological effects of development are avoided, remedied, mitigated or declined outright due to unacceptable adverse effects. The decision-making process, requirements for mitigation actions, compliance and monitoring are all important dimensions of this function in protecting biodiversity. Sometimes planning assessments of consent applications result in requirements for mitigation actions to be undertaken by the applicant, to attempt to address the adverse effects of development on biodiversity. The requirements are typically stated in a side-agreement, or more commonly as a condition of consent.<sup>55</sup>

#### **Mitigation of ecological harm**

Consistent with global trends, mitigation of ecological harm in the form of biodiversity offsetting or similar is underway in New Zealand. It is presently *ad hoc* without national policy guidance. Consequently, approaches vary regionally. Requirements for mitigation tend to be negotiated on a case-by-case basis, with or without expert input. Research has demonstrated that the outcomes of this approach are generally poor and it is likely to be placing vulnerable biodiversity at additional risk.<sup>56</sup> Where development

is allowed, requirements to internalise ecological costs through the mitigation of harm are weak, inconsistent and unlikely to meet ecological goals.<sup>57</sup>

During the period of 2009 through to 2012, the Department of Conservation convened a Biodiversity Offsets Programme, funded by the Cross-Departmental Research Pool (administered by the Royal Society of New Zealand).<sup>58</sup> The objectives of the programme were to:

- Devise objective measures for comparing biodiversity at impact and offset sites
- Develop a cost-effective mechanism to establish that there has been no net loss in biodiversity at impact and offset sites
- Identify places where biodiversity can be restored to achieve a net gain, via a transparent re-creation or enhancement process
- Define biodiversity trade and exchange equity issues across time, location and ecological similarity
- Understand the utility of different offset measures by testing their ability to achieve equity across a range of contrasting scenarios
- Demonstrate how biodiversity offsets can be implemented effectively, through partnering with entities that have volunteered pilot case study projects to develop and test an agreed measurement system.<sup>59</sup>

In 2014, the then Minister for Conservation Hon Dr Nick Smith released the major output of the above process: the New Zealand Government's 'Guidance on Good Practice Biodiversity Offsetting'.<sup>60</sup> The guidance provides information for decision-makers and applicants on what is good practice for biodiversity offsetting, with a focus on terrestrial environments. The document also includes technical guidance appendices for skilled practitioners involved in the formulation of biodiversity offsets. The guidance does not address policy or regulatory matters, however, although it does link offsetting to existing statutory processes such as RMA consents.

### ***Compliance and monitoring***

Conditions that require positive conservation actions are important, as they act to lessen the impacts of development on biodiversity. However, compliance with such conditions must be enforced. Research has demonstrated that councils do not rigorously enforce either their plans or the conditions of consent. The result is unconsented ecological impacts.<sup>61</sup> The lack of monitoring and enforcement on the ground is often blamed on

limited resourcing. However, the charging capability in section 36 of the RMA, which enables councils to recover the costs of monitoring consents, suggests that lack of monitoring is more likely a result of low political priority than lack of resources.<sup>62</sup>

Where enforcement does occur, penalties are typically small and the likelihood of cost recovery for the prosecuting agency is low. In the 2012/2013 survey of local authorities, the risk of not being able to recover the often significant costs of prosecution, was commonly cited as a reason for not pursuing enforcement action.<sup>63</sup> However, a local authority can recover three types of cost under the RMA:

- Costs incurred by a local authority in the taking of a prosecution (e.g., solicitor fees and witness expenses) and recovered before the District Court
- Costs borne in the investigation of an offence and recovered in proceedings before the Environment Court pursuant to its general discretion to order reasonable costs paid
- Costs resulting from any direct action taken to remedy effects where there is non-compliance; as well as the indirect costs of investigating and monitoring those effects, recovered by way of an enforcement order under section 314(1)(d). These costs can be recovered either before the Environment Court or in the District Court upon prosecution under the RMA.<sup>64</sup>

The recovery of these costs is at the discretion of the Court, and typically will only be awarded in the event of a successful prosecution. The Costs in Criminal Cases Act 1967 (section 13) sets a maximum cost recovery per day, and most decisions on costs have conformed to this scale.<sup>65</sup>

Eighty percent of local authorities surveyed in 2013 reported minimal resourcing for monitoring, enforcement and prosecutions, with 436.7 full-time-equivalent staff unevenly distributed across 78 authorities nationwide. Most monitoring and enforcement staff were not full-time and few were appropriately qualified.<sup>66</sup>

The bi-annual survey of local authorities indicates a trend of increasing enforcement action however, with abatement notices being the most common enforcement mechanism used.<sup>67</sup> In 2012/2013, there were 3400 RMA enforcement actions nationally, the most ever recorded. There is also a trend towards larger fines. In 2009, the maximum penalties under the RMA were increased from \$200,000 to \$300,000 for individuals and \$600,000 for companies (although the maximum term of imprisonment did not alter).<sup>68</sup> The total average fine increased from \$19,789 before the amendment came into effect to \$28,792 afterwards.<sup>69</sup>

Political interference in enforcement processes seems common. For example, Taranaki Regional Council noted that there is a 'political element' in the decision to prosecute under the RMA in justifying its practice of allowing elected representatives to have that authority rather than staff.<sup>70</sup> In contrast, a 2011 audit of regional government water management by the Officer of the Auditor-General expressed concern at the high level of potential political influence in enforcement processes in some regional councils.<sup>71</sup> Several councils required permission from the elected council to prosecute, and some required their staff to gain approval even for low level enforcement actions such as issuing fines. The review reinforced the view that enforcement was a technical process, and that political influence ought not to have an explicit role at all, noting: "councillors should not be involved in investigating breaches, or deciding whether to prosecute. To ensure fairness in matters of non-compliance, councillors should endorse an enforcement policy and should expect staff to rigorously apply that policy".

That any political interference is possible and indeed condoned in some cases reduces the credibility and impartiality of the whole process<sup>72</sup>. The Auditor-General went on to note –

*There are strong and longstanding conventions against elected officials becoming involved in prosecution decisions. All investigation and enforcement decisions on individual matters should be delegated to council staff for an independent decision.*<sup>73</sup>

Compliance assessment and enforcement decisions are vulnerable to political influence. Both would function more predictably and equitably if attempts to exercise such influence could be prevented. One way to prevent political interference is to separate consenting functions from follow-up compliance assessment and enforcement functions. Consenting could remain a council function while compliance assessment and enforcement would be undertaken by a centralised agency such as the Environmental Protection Authority. This agency could perform the enforcement functions for several different Acts, improving consistency and improving expertise, professionalism and consistency. The agency would require a regional presence because local familiarity is commonly a critical dimension of enforcement. This concept is re-visited in Chapter 8.

### Species protection on private land

The Department of Conservation addresses direct impacts on wildlife on private land through the Wildlife Act and the Native Plants Protection Act. A permit must be obtained from the Department in certain situations, as well as any RMA consents required.<sup>74</sup> As described in Chapter 3, the Wildlife Act is a powerful piece of legislation, including concepts such as 'absolute protection' for wildlife. Theoretically, all instances of harm or potential harm to indigenous wildlife protected by the Act trigger the need for a permit. Permits typically include strict conditions to protect the individual fauna, including handling restrictions, translocation requirements and



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*Tecomanthe (Tecomanthe speciosa), reduced to just one individual in the wild, has been propagated and sold in garden centres.*

other protocols. However, the Act is poorly implemented, and enforcement of non-compliance is notably lax.<sup>75,76</sup>

The Native Plants Protection Act is the main regulatory method available to protect populations of threatened plants outside public conservation land. This Act has not been enforced, contains a maximum penalty of just £30, and does not apply to the landowner. Therefore even the most threatened of our native plants do not enjoy any legal protection outside of formally protected areas (unlike most fauna under the Wildlife Act). No other legislation fills this gap. Consequently the protection of threatened plants on private land is very difficult without voluntary landowner participation or land purchase for legal protection.

The lack of a statutory or operational linkage between the RMA and the Wildlife Act has significant implications for indigenous biodiversity. While RMA consent authorities will often direct resource consent applicants to survey wildlife as part of their assessment of environmental effects, and to obtain any necessary permits from the Department of Conservation under the Wildlife Act, the processes are not integrated. Nor are councils necessarily able or willing to sufficiently critique inadequate assessments of environmental effects.<sup>77</sup> Councils cannot refuse consents on the grounds that wildlife permits should be obtained, stop processing the consent until they are obtained, or revoke them later if permits are not obtained. RMA practitioners are often unaware of Wildlife Act requirements. The opaque interaction between the RMA and the Wildlife Act represents a risk to indigenous biodiversity (see Box 4.5).

If impacts on wildlife are assessed for development purposes, the assessment may be a one-off, or a number of assessments may be undertaken over a confined period of time. This approach does not account for seasonal variation in presence of some taxa, so poses additional risk where a species is migratory. New Zealand hosts a significant percentage of the world's migratory species, particularly marine mammals and seabirds. Migratory species are defined as:

*the entire population of any species or lower taxon of wild animals whose members cyclically and predictably cross one or more national jurisdictional boundaries.*<sup>78</sup>

The 2009 review of the conservation of New Zealand's migrant birds concluded that most species' populations are declining due to (1) loss of 'refuelling' spots in East Asia, (2) loss of inter-tidal habitats here in New Zealand, (3) increased disturbance from recreation activities, and (4) ecosystem change from sedimentation.<sup>79</sup> As a signatory to the Convention on Migratory Species, and a host to so many of the world's migrant species, this is a sad indictment of biodiversity protection in New Zealand.

As an interim practical measure, processes could be developed between the Department of Conservation and local government to ensure that

species protected under the Wildlife Act are automatically considered during RMA processes. This would require greater capacity within the Department and political support for the enforcement of the protection provisions of the Wildlife Act. It would also require councils to assume greater responsibility for addressing impacts on wildlife in RMA processes. It is simply not feasible for the Department to submit on every consent where wildlife is potentially affected, and capacity to do this has recently been even more reduced (e.g. the Department submitted on just 17 resource consents between July 2012 and March 2014).<sup>80</sup> Guidance or national standards would be a possible means of linking the two processes. However, statutory guidance on biodiversity matters has been rare because of opposition by vested interests who advocate the sanctity of strong private property rights.

## Covenancing over private land

Currently, the only way to stimulate landholders to implement biodiversity recovery and enhancement activities (other than via resource consent), is through voluntary negotiation of contractual conservation management agreements such as covenants, or through the provision of financial incentives. Private land covenants, with requirements for active conservation management, can offer useful contributions to biodiversity maintenance if the management effectively addresses the ecological impacts of introduced pests and adjacent land uses.

Covenants generally recognise the importance of site values. They are registered either for a regulatory purpose (i.e. as a condition of resource consent) or because the owner wishes the habitat to be protected. Management conditions (e.g. grazing limits) are agreed between the covenanting body and land owner. Covenants and their conditions are registered on the land title and remain in perpetuity, or for 999 years.

There is no national strategy that guides the selection of areas appropriate to covenant, although there is non-statutory guidance that might influence decision-making (i.e. the Ministry for the Environment and the Department of Conservation's 'Protecting Our Places' document). Decision-making however, is generally confined to determining whether or not an offered site complies with any criteria that do exist, rather than the proactive identification of suitable sites that may improve representativeness or otherwise contribute to conservation goals. Some councils have identified areas of priority for covenanting, such as where the proportion of protected land area is low, and the habitat type is largely privately-owned.

Covenants run with the property, appear on the property title, and apply to all future owners. The administration of covenants has a weakness in that it does not adequately provide for issues that may arise with change of ownership. There is no formal transfer system where a council can advise the landowner of the nature of their responsibilities more fully. The

**Box 4.5 New Zealand's lizards: a forgotten but threatened fauna**

There are approximately 100 New Zealand lizard species with one or two new species still being discovered every year. They occupy habitats from mountainous peaks down to the splash zone of rocky coasts.<sup>81</sup> Lizards are a widespread but patchily distributed group.<sup>82, 83</sup> Around 85 percent of our lizard fauna is classified as either 'threatened' or 'at risk'.<sup>84</sup>

The threats to lizards are pervasive and chronic, including suites of introduced predators, habitat destruction and population fragmentation, ecotoxic agricultural chemicals and wildlife poaching.<sup>85</sup> Many of our lizards are long-lived (lifespans of many decades), slow breeders and poor dispersers with home ranges of only a few square metres. These traits put their populations at risk of extinction in today's world. The extremely severe range contractions (commonly >99.9 percent), and localized extinctions that have occurred over the last two centuries, indicate just how imperilled our native lizards are.<sup>86</sup>

Lizard populations are commonly affected by land development projects subject to land use consents under the RMA. Quite

simply, in the face of bulldozers, lizards cannot 'fly away' and save themselves. Nor can they easily replace themselves via a high reproductive output that compensates for losses. When a population is gone, it is gone forever. However, lizards are usually overlooked by developers and their environmental consultants when undertaking 'assessments of environmental effects' as part of the RMA process. This is despite the legal protection that this fauna should enjoy under the Wildlife Act. Some councils will require lizard surveys as part of the assessment process, but sometimes not for the less threatened species (e.g. common skink).

The Society for Research on Amphibians and Reptiles of New Zealand produced the New Zealand Lizards Conservation Toolkit.<sup>87</sup> The Toolkit was produced to help developers comply with legislation when their projects affect native lizards. The Toolkit recommends lizard rescue and relocation programmes, along with site protection, habitat enhancement and pest control. It prefers a 'net gain' over 'no net losses' in mitigation activities wherever possible.



*Jewelled gecko (Naultinus gemmeus) inhabit remnant coastal shrublands on the eastern South Island, mostly on private land. They are threatened by wildlife poaching, habitat destruction and introduced mammal predators, including domestic cats.*

change in land ownership can put ecological gains made from a covenant at risk because the new owners are unaware of the responsibilities pertaining to the natural features on their property.<sup>88</sup> In the case of RMA-related covenants (e.g. bush lot subdivisions), subsequent owners do not receive the direct benefit from the covenant being in place, and have fewer incentives to carry out fencing and pest control on an ongoing basis.<sup>89</sup> There is no formal mechanism to advise new owners of the nature of their responsibilities to maintain a covenant, and the lack of monitoring and advisory services means ecological gains made during the previous tenure, are often lost due to neglect or when the covenant is removed on application.

### ***Covenanted tools***

The main types of covenant include:

- Conservation covenant with the Department of Conservation, a council or another authorised body under the Reserves Act or the Conservation Act
- Open space covenant with the QEII Trust under the Queen Elizabeth the Second National Trust Act 1977
- Ngā Whenua Rāhui Kawenata between Māori landowners and the Minister of Conservation under the Reserves Act.

Most conservation covenants are registered in favour of a regulatory agency such as the Department of Conservation or a council, which means that the covenant may only be varied or uplifted with the agency's consent. Many councils (e.g. Waipa District Council) run specific covenanting schemes with varying requirements, and many of these are linked to development incentives. Each of the agencies that hold covenants records, monitors and administers them separately, according to different criteria. So it is unclear what area is under protection on a national, regional or even local basis, where they exist and their present ecological condition.

Multiple reviews over the last decade<sup>90</sup> have noted similar issues with covenants and their management, including the ecological degradation of sites despite their protected status. Many covenant agreements also provide for activities that are not consistent with retention of natural values (e.g. aerial herbicide spraying, cultivation and grazing of stock). In addition, the quality of administration, selection criteria, compliance monitoring and enforcement are all matters of concern to conservation interests.

Establishing covenants can entail significant costs. Initial ecological and land surveys, registration and initial pest control and habitat management all incur costs. The costs are sometimes split between the agency and the landowner, but in varying proportions, and not usually

where a development incentive (e.g. bonus lot) is available. For example, Whangarei District Council does not cover any survey costs, application fees, or the costs of covenant registration although landowners may apply for rates relief for the covenanted area. Some councils pay the full cost of surveys and registration of the covenant in addition to rates relief and ongoing financial and technical support. Other councils provide no such support. During the consultation phase for the most recent iteration of the Proposed Biodiversity NPS, the New Zealand Conservation Authority submitted that rates relief for protected areas should be a "universal requirement" as a minimum to encourage protection of biodiversity on private land.<sup>91</sup>

Some landowners want to protect valued features of their land but not through government agencies. They have alternatives: the QEII National Trust and the more recent but local Banks Peninsula Conservation Trust (see Box 4.6). A non-governmental statutory agency, the QEII Trust, has a significant role to play in private land conservation. The Trust was formed in 1977 by pioneering conservationist Gordon Stephenson. With the advent of new legislation by the same name, the Trust set about supporting landowners to covenant open space on their properties for cultural, archaeological, landscape and biodiversity purposes. To date, the Trust has supported the protection of 3803 registered covenants nationally, covering 125,137 hectares, with the largest covenant covering 6564 hectares and an average covenant size of 29.5 hectares.<sup>92</sup>

The covenants are monitored bi-annually, with enforcement action being very rare, even for the most egregious non-compliance. In 2013 the QEII Trust successfully prosecuted a covenant owner in the High Court for the first time.<sup>93</sup> The Trust has selection criteria, and acceptance of a potential area requires agreement of the Trust Board. Criteria include biodiversity values, naturalness, presence of threatened environments, value as an ecological corridor, presence of significant fauna, and the sustainability of the habitat area as a whole.<sup>94</sup>

The Ngā Whenua Rāhui Fund was established in 1991 to encourage the voluntary protection of ecosystems (originally only forests) by way of kawenata (covenants) on Māori land, Māori reservations or by physical protection through fencing. Kawenata are registered in accordance with section 77A of the Reserves Act and an 'agreement for the management of land' is made in accordance with section 29 of the Conservation Act.<sup>95</sup> Māori Reservations can be established as an alternative to kawenata, under section 338 of the Te Ture Whenua Act 1993, which protects areas and provides for public access subject to landowner permission. Physical protection may not include legal protection, and may simply require the fencing of habitat.<sup>96</sup>



### *Protecting biodiversity values through covenants*

The success of covenanting schemes is usually demonstrated through evidence of uptake based on the number of hectares protected. While this is somewhat useful, it tells us little about the biodiversity values, the condition of the biodiversity and whether management interventions are improving outcomes. Measurements to demonstrate the presence or absence of ecological gains are much more valuable, but much rarer.<sup>97</sup> Requirements for active management are often minimal or not enforced anyway. The contribution of covenants to biodiversity conservation could be substantially improved if the following actions became standard practice:

- Develop a national strategy to target covenanting of the most important habitat (while not discouraging the setting aside of less threatened ecosystems).

- Establish a national database to record the location, purpose and ecological values of each covenant.
- Specify nationally consistent minimum requirements for frequency of monitoring, degree of subsequent protection from key pressures and standard indicators to monitor and inform compliance evaluation.
- Include biodiversity conservation outcomes achieved by covenants in national and regional environmental reporting. Topics to report should include: biodiversity protected; management actions; and trends in the state of endangered biodiversity located on covenants.

Many of these suggested improvements sit neatly within existing practice and existing statutory functions, but may also entail substantial cost. More reliable and substantial funding for the administration of protected private land, and more resources available to assist landowners with ongoing management, would no doubt improve biodiversity outcomes.



Raewyn Peart

*Willing private landowners ensure the public is able to access important conservation sites, such as the hides at Miranda, by providing access over their land and supporting conservation activities*



*The Banks Peninsula Conservation Trust are actively working to protect biodiversity on private land*

#### **Box 4.6 Banks Peninsula Conservation Trust**

The Banks Peninsula Conservation Trust, formed in 2001, is the only community-led covenanting program in New Zealand. The Trust actively seeks the buy-in of landowners in protecting areas of high ecological value on the Banks Peninsula. Apart from its role as a covenanting agency, the Trust also runs community open days, forums and working bees to achieve its vision: to “create an environment in which the community value, protect and care for the biodiversity, landscapes and special character of the Banks Peninsula”.<sup>98</sup>

The Trust was started in response to dissatisfaction about district planning rules seeking to protect important landscapes on the Banks Peninsula. The Trust sought to provide an alternative to regulatory control over private land and to engage the community in a broader vision of conservation. Since 2003, the Trust has operated as a covenanting authority under the Reserves Act, being the only non-government entity to have this power, besides the QEII National Trust. To date the Trust has administered the covenanting of some 51 separate areas, covering 634 hectares, with a similar extent presently under negotiation.<sup>99</sup>

The Trust’s wider community engagement activities include a newsletter and other outreach activities, development of pest management strategies in partnership with agencies, and the release of tūi onto the peninsula. The Trust also administers the Wildside Programme, a multi-agency conservation programme where the efforts of the regional and territorial authorities, the Department of Conservation and the community are combined in working toward the vision of “Healthy land, water, people from summit to sea”.

This must be funded however, and we later canvass potential ways to raise this additional revenue, including polluter-pays approaches and an environmental consumption tax.

### **Non regulatory methods**

Councils also contribute to biodiversity maintenance through non-regulatory methods, such as by setting up regional biodiversity forums, preparing non-statutory planning documents to guide management, and providing advice and funding to private landowners who volunteer to protect biodiversity. For example, Auckland Council released a non-statutory ‘Indigenous Biodiversity Strategy’ in 2012.<sup>100</sup> The Strategy was developed by a Technical Advisory Group comprising staff, and is intended to be accompanied by a Biodiversity Work Plan for the region, reviewed on a five yearly basis.<sup>101</sup> It includes several objectives and measures, and indicators are attached to each, to inform monitoring and evaluation in the future.

The private sector usually prefers a voluntary approach to regulation when addressing environmental management issues because compliance is optional, compliance costs are minimal, and flexibility and autonomy are retained. Voluntary approaches include industry standards and accords (e.g. Sustainable Water Dairy Accord, formerly known as the Clean Streams Accord). The Clean Streams Accord has existed in some form or another since 2003, and the latest iteration has been criticised for limited scope and long timeframes with unenforceable goals.<sup>102</sup> While such agreements may assist in reducing impacts, they are not compulsory, and have the inherent problem of ‘free-riders’ who choose not to comply. Voluntary accords have been demonstrated to be of limited value in addressing key ecological pressures, as they do not provide sufficient compulsion to undertake mitigation activities.<sup>103</sup> However they can be more successful in generating support for taking some action to protect biodiversity, rather than complete opposition to protection.

Some landowners and industry advocacy groups (such as Federated Farmers) promote a non-regulatory approach to the biodiversity maintenance functions of councils, including the identification of significant natural areas. They argue that voluntary involvement, incentives and landowner support and advice should be the primary means of securing biodiversity on private land, and that more can be achieved this way. Such interests typically argue that where landowners must relinquish rights for the sake of biodiversity and other public goods, compensation should be payable. A proposal similar to this in respect of proposed changes to the RMA was supported by 79 percent of farmers surveyed.<sup>104</sup> However, on the flipside, resource users and landowners do not pay the public for the degradation of biodiversity that occurs as a result of their activities, and there is limited evidence that a non-regulatory approach on its own can deliver much more than ongoing loss.



*Puawhananga (Clematis paniculata)*

Incentives are not commonly offered for biodiversity conservation purposes in New Zealand. Incentives may include tradable development rights, rates relief, assistance with management costs for habitat on private land, and free advice and plants distributed by councils. Despite the current lack of incentives, it is clear that they are a useful and effective conservation device because, where incentives are offered, landowners appear take them up quickly (e.g. Rodney bush lot subdivision rules).

Some landowners are wary of government department or council-based incentive programmes and choose to avoid them. Practical concerns with incentive uptake include the complexity of application processes and the need for the landowner to match the funds made available. The range of incentives in New Zealand is narrow compared with some

other jurisdictions around the world, where private landowners are often encouraged to carry out conservation measures through incentives such as cash payments for ecosystem services. A broader range of incentives and mechanisms for private land conservation measures is clearly required to better encourage biodiversity protection on private land.

## State of biodiversity reporting

Effective management of biodiversity relies on robust monitoring of state and trends. Reporting on the state of indigenous biodiversity on private land is the role of councils and the Ministry for the Environment as part of broader State of the Environment reporting. In 2006, the Organisation for Economic Co-operation and Development (OECD) in its 'Environmental Performance Review of New Zealand' noted that the country did not have good national environmental data. It said: "National-level aggregates of data and indicators on the state of the environment and environmental pressures are scarce, thus impeding efforts to strengthen outcome-oriented environmental policy-making".<sup>105</sup>

To present a robust picture, the extent and condition of indigenous biodiversity would need to be measured, the nature and extent of key pressures that degrade it identified, and the difference made by management or regulatory interventions quantified. This is not a trivial task, and can only be achieved with substantial resources both for implementation and the development and validation of measurement methods. New Zealand has a poor record of long-term monitoring, and this is a much more acute problem outside of public conservation land than inside, due to a broader range of pressures and much less centralised management.

The Ministry for the Environment has produced the two State of the Environment reports (1997 and 2007). The 2007 State of the Environment report drew serious criticism arising from concerns about weak data, incoherent analysis and misleading presentation of trends. In addition there appeared to be political interference, when a draft conclusions chapter was removed prior to publication, but resurfaced following political pressure from the New Zealand Green Party.<sup>106</sup> This environmental reporting debacle created serious public distrust in national environmental reporting and there were compelling calls for environmental reporting to be independent of government.

Mandatory environmental reporting was discussed at some length by the Parliamentary Commissioner for the Environment in her 2010 review entitled 'How Clean is New Zealand? Measuring and Reporting on the Health of our Environment'. The report recommended the following actions be undertaken by the Minister for the Environment:

- Draft legislation that assigns roles and responsibilities for regular reporting on the state of the environment to different public entities



*Crinipellis filiformis*, found on Lindemanns Track under mixed broadleaf / podocarp forest, Kaimai Ranges, Bay of Plenty

- Ensure that indicators for assessing the state of the environment are reviewed, the underlying environmental statistics are significantly improved, and primary data are made publicly available on the Internet
- Assign the responsibility for state of the environment reporting to an agency or agencies that can provide the required independence and technical capacity.<sup>107</sup>

In 2010, the newly drafted Environmental Reporting Bill was released. The Bill addressed some of the above matters, but did not address the collection and quality of the data underpinning environmental reporting – an area of serious concern for biodiversity. The purpose of the Bill is to introduce mandatory environmental reporting, using a ‘pressure-state-impacts’ approach to five environmental domains: air; atmosphere and climate; land; freshwater; and marine. The latter three domain reports will feature information on biodiversity and ecosystems. Responsibility for the reporting was given to the Secretary for the Environment and the Government Statistician, while the independent Parliamentary Commissioner for the Environment would provide comment. Under the framework, one domain will be reported on every six months, and an overview produced every three years.<sup>108</sup>

Public consultation in 2011 demonstrated that, while submitters were supportive of the government taking action in this area, many were concerned about the independence of the proposed reporting including the ability for the Minister to direct the metrics to be reported upon. Most submitters favoured the role of environmental reporting sitting with the Parliamentary Commissioner for the Environment (subject to adequate resourcing) and a reporting period of five years.<sup>109</sup> The Bill has not yet been passed into law, but the first synthesis report is tentatively scheduled for mid-2015. The Air Domain report was released in 2014, based on data to 2012.<sup>110</sup>

### *Pressure-state-response framework*

There are challenges in using pressure-state-response frameworks to report on the state of biodiversity because it assumes linear causality. Determining cause and effect, and the relative impact of pressures and responses (management interventions), can be very difficult. This is because biodiversity itself is complex, and the interactions between human impacts and ecosystems and species are complex and non-linear, and causative relationships can be difficult to determine. Indicators needed to capture accurately the state of biodiversity must inevitably be great in number, be measured nationwide, and vary with ecosystem type. It is possible to combine them in ways that reflect progress towards an explicit conservation goal but at considerable cost to opportunity for informative analysis and interpretation.

Pressures can be easy or hard to identify depending on the context. But more problematic is the basic assumption of pressure-state-response models; that effective reduction in pressure leads to state improvement; often does not hold for biodiversity. For example, when nest predators selectively kill female kōkako or kākā (as they are known to do), eradication of the nest predators may not result in kōkako population recovery because the adult population is reduced to mainly male birds. There are many other such examples in the plant world, where plants threatened by grazing cannot recover when grazing animals are removed, because of competition effects exacerbated by the removal of grazing.

Biodiversity differs from other environmental variables (e.g. water and air quality) because context is all-important. A species cannot be recognised as rare or threatened, unless it has been found to be absent from most other sites surveyed nationwide, and there is likely a downward trend over time. In contrast, air or water quality can be assessed simply from the amounts of a few features and substances present in a single sample.

Impacts of pressures on biodiversity can be challenging to measure, not least because they are context dependent, vary with environment and may change over time. Furthermore, the effect on biodiversity of responses to pressures is rarely able to be determined cleanly due to political influences.<sup>111</sup> As such, a pressure-state-response framework may be an inappropriate vehicle to describe the state of indigenous biodiversity. The unfortunate fact is that the long-term under-investment in the development of biodiversity survey, monitoring and reporting methods means that there are no satisfactory solutions that can be feasibly implemented now. However, the concepts and methods developed for systematic conservation planning hold much promise for integrated monitoring, prioritisation and reporting.<sup>112</sup> We believe this is the most pragmatic and useful approach for biodiversity monitoring in the future.

## Sources of information

Regional councils (particularly Environment Canterbury) expressed concern that the Environmental Reporting Bill, as proposed, did not provide enough clarity on reporting system design and components.<sup>113</sup> Determining which data will be drawn upon is a work in progress for the Ministry for the Environment, but early reporting will be based on available information only, as little funding is available to expand the depth and breadth of existing monitoring programmes nationally.

Notwithstanding this, State of the Environment reporting is able to draw from a wide range of available information sources that meet Statistics New Zealand criteria for data robustness. Landcare Research and the Department of Conservation maintain large databases from which indicators of biodiversity loss can be estimated.

Regional councils have also initiated the development of the Environmental Monitoring and Reporting Framework which is being developed as a partnership project between Local Government New Zealand, the regional council's resource management group and the Ministry for the Environment. The aim of the Framework is to "develop and operate regional/national environmental (air, water, etc.) data collection networks that are delivered via a widely accessible national data and reporting platform." The group is proposing to establish a Federated National Data System, and funding is being applied for from a range of sources to implement this (e.g. the Ministry for Business, Innovation and Enterprise and the Community Environment Fund).

Although information on biodiversity is collected for a range of purposes around the country, central collection and collation remain elusive. The Terrestrial and Freshwater Biodiversity Information System programme (see Box 4.7) has made significant headway in centralising information and data-sharing between biodiversity management agencies.<sup>114</sup> Information is also collected for resource management purposes (e.g. wildlife surveys for significant developments) and a central repository for that data is not yet available. Further, confidentiality between experts and clients often means the information is not made available for general use by agencies. Individual developers can submit these data to public databases such as NatureSpace however.

## Key conclusions and a way forward

The combined efforts of councils, the Department of Conservation, the QEII Trust and other stakeholders to protect biodiversity on private land are substantial, but fall short of what is required to retain what remains of our native biodiversity. While the Department retains the primary statutory mandate for biodiversity protection under the Conservation Act, its means of achieving this outside public conservation land have become seriously

### **Box 4.7 Terrestrial and Freshwater Biodiversity Information System**

The Terrestrial and Freshwater Biodiversity Information System Programme Fund was established to support the roll-out of the New Zealand Biodiversity Strategy in 2000. The intention of the fund was to "support seamless access to essential biodiversity data, information and knowledge to achieve the goals of the New Zealand Biodiversity Strategy 2000". The Programme included a Strategy, released in 2007.<sup>115</sup>

The Strategy envisioned a range of outcomes to be achieved by 2015 that are relevant to biodiversity maintenance on private land. Outcomes included good coverage of biodiversity data for private land, the ability for biodiversity data to be compared across local, regional and national scales, and the formation of national standards for biodiversity data. The ultimate results of the programme were to include: an improvement in quality of decision-making, an accurate national picture of biodiversity being available, and the elimination of duplication of effort and cost of data collection.

The Terrestrial and Freshwater Biodiversity Information System has been instrumental in improving the nature of biodiversity information and supporting initiatives such as Nature Watch (a community bio-recording system). At the time of writing, funding had been withdrawn, and a review of the fund was taking place which included a survey of users.

constrained. Inadequate funding means that the Department cannot retain the capacity to advise councils and other agencies on conservation priorities (see Chapter 3), or to integrate its Wildlife Act and Conservation Act functions with RMA processes to maximise benefits to biodiversity. Political support, funding and capacity for the Department to implement its statutory mandate to formally advocate for nature conservation all need to be strengthened greatly; and the mandate for councils to maintain biodiversity needs to be subject to far greater accountability.

Despite a clear mandate to do so under the RMA, councils have a highly variable approach to biodiversity maintenance, with some still clinging to the notion that it is not their role or that biodiversity is of negligible importance. Monitoring at all levels is inadequate to inform the public of progress toward protecting the public interest in nature. National environmental monitoring is piecemeal and not immune to political interference. Consequently, a clear and robust picture of the state of



*The stately royal spoonbill (Platalea regia) is the only one of the world's six spoonbill species that breeds in New Zealand*

biodiversity on private land remains elusive. While progress has been made by the Department of Conservation in developing the Biodiversity Monitoring and Reporting System to deliver a national picture, present efforts are confined to common and widespread biodiversity present on public conservation land.<sup>116</sup>

Very different pressures impact biodiversity on private land. Pressures such as toxic substance pollution, nutrient enrichment and habitat loss are rare on public conservation land. This suggests that additional measures will be needed to monitor trends in biodiversity retention on private land, and that some of the indicators currently used to monitor biodiversity on public conservation land will prove uninformative. Some councils have comprehensive monitoring programmes of some environments (which is regionally and locally valuable) but the variable nature of council monitoring means a national picture is difficult if not impossible to 'cobble together'.

Private interests have thwarted many attempts to introduce regulatory frameworks that are sufficiently robust to slow the loss of biodiversity and degradation of ecosystem services. Some private interests have resolutely opposed relevant regional and district planning instruments and every version of the Proposed Biodiversity NPS. Where potentially more effective regulations do exist, such as the Wildlife Act, resources and political support sufficient for effective implementation are not provided. Fragmented regulatory tools mean that species and ecosystems are managed separately, inevitably leading to inefficiencies and biodiversity loss. The Native Plants Protection Act has never been enforced, and the Wildlife Act is often ignored.

If we are to turn the tide of biodiversity loss, biodiversity protection on private land needs to be stronger, broader and very much more effective.

This will require stronger incentives for proactive conservation measures. The strong uptake of economic incentives, where they are offered, demonstrates that there is an appetite for private land conservation in New Zealand. What remains is the task of devising ways to fund meaningful incentives that generate robust and secure ecological gains. Private interests extract enormous value from the destruction of the public interest in biodiversity and ecosystem services on private land, and there is no present means of compensating the public for the degradation of common goods. One solution might be to tax the destructive consumption of biodiversity and ecosystem services and use these funds to support conservation on private land. In this way, those who enjoy private benefits from destroying public goods would compensate the public for their loss; while those who have retained public goods at personal cost would be reimbursed and compensated for their economic opportunities foregone.

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A long-exposure photograph of a waterfall cascading over mossy rocks in a forest stream. The water is blurred, creating a soft, ethereal effect. The rocks are dark and covered in vibrant green moss. The background is a dense forest with soft, dappled light.

# 5 Safeguarding freshwater biodiversity

Freshwater ecosystems contain just 0.8 percent of the Earth's surface water yet they support six percent of the Earth's known biota.<sup>1</sup> They are crucial to human prosperity;<sup>2</sup> Indeed human economies cannot function without them. New Zealand's farming, tourism and recreation industries are especially reliant on freshwater resources. However such reliance also puts freshwater ecosystems under extreme pressure from a multitude of human uses. So extreme is this pressure, that freshwater biodiversity is now declining faster than that of terrestrial or marine ecosystems.<sup>3</sup> Concern about consequences for human prosperity has led to policy changes designed to limit the degradation and depletion of freshwater resources.

Users of freshwater ecosystems do not pay for the degradation of the public interest in freshwater biodiversity and ecosystem services that they cause. Regulatory and practical initiatives have not prevented ongoing degradation, as to do so requires the setting of cumulative limits which must not be exceeded, which until recently have been rare.<sup>4</sup> This failure is

probably because of vested interest influence on the selection, design and implementation of these initiatives. There is a strongly held notion that private interests have a 'right' to take freshwater for economic purposes without payment or compensation for the resulting diminution of public interest. The degradation from profound use pressures, pollution and other impacts is reflected not only in declining water quality but also in the fact that New Zealand now ranks among the world's worst countries for the proportion of its freshwater species that are threatened with extinction.<sup>5</sup> Urgent change is needed.

### **New Zealand's freshwater biodiversity**

Freshwater environments extend from ephemeral headwater streams to estuarine mixing zones of sea and freshwater. Freshwater ecosystems include lakes, wetlands, streams, groundwater and geothermal systems which support a great diversity of indigenous aquatic plants and animals, often specially adapted to unique ecological conditions. New Zealand

Raewyn Peart



*Channelised stream in Dunedin with no native fish habitat remaining.*

has 70 major river systems, 770 large lakes and a wide array of other ecosystem types such as wetlands.<sup>6</sup> More than 5500 known native species inhabit our freshwater ecosystems.

Freshwater plants can be grouped into three main types: submerged (growing below the surface of the water), floating plants with or without root attachments to the bottom of the water-body, and those that are emergent (those that rise out of the water). The majority (66 percent) of our freshwater aquatic flora is shared with Australia, a lower level of endemism than is found on land overall. However, freshwater areas often have a high level of local endemism.<sup>7</sup>

New Zealand freshwater ecosystems support an astonishing array of invertebrate life-forms, including freshwater sponges, diatoms, molluscs, worms, insects and crustacea. Freshwater invertebrates in New Zealand waterways are mostly generalist feeders, and they are highly adapted to extreme rainfall events, by having multiple age classes in many rivers. Freshwater invertebrates are also crucial to ecosystem function, underpinning food-webs and driving ecosystem processes. Freshwater invertebrates have been well-studied for monitoring purposes globally since the 1800s, but in contrast, conservation-related studies are rare.<sup>8</sup>

Some of the most remarkably adapted species of freshwater ecosystems are those that inhabit our world-famous geothermal regions. Geothermal ecosystems are very hot, acidic and generally harsh living environments that most species cannot survive in. A range of environmental variables such as gas chemistry, acidity and alkalinity, temperature and substrate combine to create unique ecosystems.<sup>9</sup> Many of the species which are adapted to them are not only extremely hardy, but have a number of useful economic values (e.g. for medicine and industrial processes such as methane emission reduction).

New Zealand's freshwater fish fauna comprises around 50 species, about 92 percent of which are endemic.<sup>10</sup> Our native fish are generally small, secretive and nocturnal, spending their days under stones, logs or overhanging banks. Some have very unusual habits, climbing waterfalls, spawning on land, and depositing their eggs among the grasses of flat estuary shores or in the riparian litter of bush-clad streams. They are often most abundant or diverse in small, steep or high elevation streams (not large rivers), perhaps because these are least affected by human activities. Our unique freshwater species, the torrentfish (*Cheimarrichthys fosteri*), utilises fast flowing habitats often in braided rivers, many of which are heavily impacted by land use.

However, because more than half of our freshwater fish are usually diadromous,<sup>11</sup> meaning that they migrate between the sea and freshwaters to complete their lifecycle, most species are to be found in the lower reaches of big rivers and coastal streams as they migrate between the sea and their freshwater habitats.<sup>12</sup> These typically are the areas of greatest water resource use for agriculture in flatter lowland areas. The migratory needs of our native fish pose a particularly difficult management issue. Economic uses of water, and protection of production land from flooding, inevitably require structures that can impede or prevent upstream-downstream passage. This prevents breeding and compromises population recruitment.

## History of freshwater ecosystem degradation

The rich, fertile lowlands of New Zealand were once blanketed in forest and wetland. Māori occupation reduced large areas to shrubland and grassland but there is no evidence of substantive hydrological alteration. This changed in the 19<sup>th</sup> and 20<sup>th</sup> century, during European colonisation and agricultural expansion, with the majority of lowland wetlands being drained. The Wildlife Service estimated that between 1954 and 1976, the loss of wetland extent was about 12,000 hectares per year.<sup>13</sup> Up until the 1980s, farmers were actively encouraged to drain wetlands with the payment of significant subsidies.<sup>14</sup> Drainage Boards were formed under the Drainage Act 1908, to coordinate and engineer large scale drainage schemes, which remain operative today. New Zealand has now lost more than 90 percent of its wetland area (a much higher proportion than most other developed countries). Many wetland remnants have disrupted hydrological regimes and are further degraded by nutrient enrichment and invasive pests and weeds.

Centuries of habitat clearance, poorly managed fisheries and the impacts of introduced species have left New Zealand with one of the highest proportions of threatened freshwater biodiversity in the world. The upokororo or grayling, once a popular food source for Māori and European settlers, became extinct before 1940. Currently some 74 percent of our native fish are assessed as threatened with extinction, up



Fish barrier



*Whio/blue duck (Hymenolaimus malacorhynchos) is threatened by pests and loss of habitat*

from 65 percent in 2009 and up from 15 percent (just ten species) in 1992. The threat status of fourteen species (26 percent) worsened in the five years<sup>15</sup> since 2009, six (11 percent) due to observed declines, and eight (9 percent) due to improved knowledge.<sup>16</sup> Remaining habitat is critically important to the wildlife dependent upon it. In the Waikato Region for example, 25 percent of threatened species depend on wetlands, which now cover just one percent of the land area.<sup>17</sup> In 2002, just 69 invertebrate taxa were identified as threatened, jumping to 295 in 2010.<sup>18</sup> However, this jump is as much a result of increased knowledge, as it is a reflection of the worsening impacts on invertebrates over these eight years.

The loss and damage to freshwater ecosystems has had negative implications for the relationship between Māori and the Crown. For example, the degraded state of the Waikato River, New Zealand's longest river and ancestral to Tainui iwi, is a source of much distress to this iwi. Substantial declines in fisheries (e.g. 75 percent decline in tuna (eel)) and the local decline or extinction of other important food sources such as the piiharau (lamprey), koura (crayfish) and kaaeo (mussels) have been caused by progressive degradation.<sup>19</sup> One manifestation of this decline is the reduced availability of food and other materials, which impacts significantly on the nature of the manaakitanga (hospitality) that Tainui are able to extend towards their visitors, as well as on their own customary diet and lifestyle. Many waterways and harbours are being returned to traditional owners in Treaty settlements, often in parlous ecological health. Recognition of the state of significant freshwater ecosystems has been a catalyst for important co-management agreements, such as the one for the Waikato River (see Box 5.1).

#### **Box 5.1 Co-governance of the Waikato River**

The Waikato River is New Zealand's longest river and also one of its most modified and polluted. The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 ushered in a co-management agreement that stretches from Lake Karapiro to Port Waikato. The Act arose from Treaty settlement negotiations stretching back to the Waikato River Claim, first lodged with the Waitangi Tribunal in 1987. The matter of the river was excluded from other claims settled earlier, and was negotiated specifically to agreement in December 2007. The settlement led to the formation of the Guardians Establishment Committee to develop the vision and strategy for the management of the Waikato River.

The Ngāti Tuwharetoa, Raukawa, Te Arawa River Iwi Waikato River Act 2010 extended the co-management arrangement from Karapiro upriver to Taupo. A third piece of legislation was the Ngā Wai o Maniapoto (Waipa River) Act 2012, which applied similar principles to the Waipa River. The Vision and Strategy to be developed were then to apply to the entire length of the Waikato River, and the length of the Waipa River from the Puniu River confluence to its junction with the Waikato at Ngaruawahia.

This process established the Waikato River Authority to oversee the implementation of the Vision in association with the Waikato Regional Council.<sup>20</sup> The goal of the governance arrangement was to achieve a swimmable water quality standard for the Waikato River, and for it to be once again safe for the harvest of kai. Thirteen objectives and twelve specific strategies guide the implementation of the Vision. Management is shared between iwi, councils, community stakeholders and other government agencies, funded by a \$210 million enhancement fund bestowed as part of the Treaty settlement process.

Part of this funding has established the Waikato River Cleanup Fund, a contestable community fund available for enhancement projects.<sup>21</sup> In 2013, this fund allocated almost \$6 million to 38 projects.<sup>22</sup> Several pilot projects benefited biodiversity, including koi carp removal, enhancement of spawning habitat for native species and eradication of yellow flag iris.<sup>23</sup> The management aspirations of iwi, councils, research organisations and NGOs have been acknowledged collectively under the agreement, leading to collaborative outputs such as the publication 'Waikato River Restoration: A Bi-lingual Guide'.<sup>24</sup>

Public awareness of the state of freshwater ecosystems has undoubtedly increased in recent years, with polls reflecting that many citizens are deeply concerned about waterways. In a 2013 survey of public perceptions of the environment, more than half the respondents cited farming as the main cause of damage to freshwater.<sup>25</sup> This public concern has translated into increasing pressure on polluting industries to 'lift their game'.

A focus on reducing point-source discharges has improved some measurements of ecosystem health. The Department of Conservation, crown research institutes, councils and other community organisations have expended significant effort in lake (e.g. Rotorua Lakes and Lake Taupo) and wetland (e.g. Te Waihora/Lake Ellesmere) restoration programmes. Dairy giant Fonterra has entered into a partnership with the Department of Conservation to the value of some \$20 million to undertake freshwater ecosystem restoration. While these restoration efforts are doubtless pioneering and laudable, avoidance of such extensive damage in the first place would certainly have been much more cost-effective.

Despite these efforts, water quality and freshwater biodiversity continues to decline as a result of ongoing land-use intensification, pollution from nutrient run-off, sediment, chemical contaminants and faecal pathogens as well as abstraction of water for irrigation, domestic consumption, industrial and other purposes.<sup>26</sup> The effects on aquatic ecosystems increase with proximity to the highly developed or urbanised lowlands. These hotspots of pollution represent the greatest of management challenges for the future.

## Economic significance of freshwater systems

Freshwater ecosystems are profoundly important to New Zealand's economy. They supply clean drinking water; are resources for major industries (e.g. agriculture and energy generation); assimilate agricultural, industrial and domestic waste; and underpin diverse recreational activities. Indeed they are so important for economic and recreational uses that their value for the conservation of native biodiversity is often overlooked and poorly acknowledged.<sup>27</sup> Access to irrigation and stock water, and surface and groundwater as sinks to absorb diffuse and point-source pollution, are vital to agriculture and urban development. The economic importance of freshwater is indicated by a 1998 study that valued the freshwater ecosystem services of the Waikato Region at \$12.6 billion annually.<sup>28</sup>

But these uses also carry with them serious effects on freshwater habitat quality and biodiversity. Such pressures continue to heighten, with areas such as Canterbury significantly increasing stock numbers of dairy cows from 312,000 to 2.1 million from 1989 to 2009.<sup>29</sup> The challenge for New Zealand is to consider how further pressure on fresh water, or stronger biodiversity protection, serves our prosperity goals. Progressive and profound degradation will have intergenerational effects and private economic pressures and lack of political will are largely to blame. Yet long-term economic prosperity will be based on what remains of those same resources.

## Integrated freshwater management

Freshwater biodiversity is difficult to maintain because of the inherent connectivity of hydrological systems. It is impacted both by *in situ* activities as well as upstream and downstream activities and structures. For example, biodiversity in a stream located on public conservation land high in the catchment is likely to be affected by downstream barriers that prevent fish making their way up the main river. Similarly, lowland protection measures cannot control the impacts of pollution entering upstream.

It is for these reasons that the maintenance of freshwater biodiversity and ecosystems requires integrated management (see Box 5.2) that takes a whole-catchment approach, and maintains upstream-downstream connectivity for biota, particularly in the lowlands. Regional councils do have broad powers for catchment management – a catchment approach was in fact what initially defined their boundaries – but they are typically under-utilised.<sup>30</sup> This jurisdictional scope holds promise for more integrated catchment-focused biodiversity protection.

## Key agency responsibilities

The management of freshwater environments in New Zealand, and the species that use them, involves a plethora of agencies and several Acts,



Signs signifying harmful levels of pollution in our waterways are becoming increasingly common. Freshwater biodiversity is often negatively affected by pollution levels long before they become of concern to humans.

### **Box 5.2 Integrated management of freshwater**

Global recognition of the impacts of a fragmented policy setting on freshwater led to the development of the concept of 'integrated management'. While the Rio Declaration 1992, and many other global statements refer to it, its meaning is rarely made explicit. A commonly cited definition is that 'integrated water resources management' is:

*a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.*

Such a management approach involves achieving economic efficiency, social equity, and environmental and ecological sustainability.<sup>31</sup>

An integrated approach to freshwater management, is seen as superior to the traditional piecemeal approach, because it considers the needs of all users as well as the environmental limits within which all must operate. Such an approach is not possible with a haphazard regime. Integrated freshwater management operates at a scale appropriate to the task, which is generally the catchment level. It includes integrated policy, planning and implementation processes across all interests, including those pertaining to adjacent land, and the coastal waters that receive freshwater outputs.

New Zealand has a long history of attempting integrated catchment management, but successful implementation has remained largely elusive. An eleven year research programme administered by Landcare Research (2000-2011) sought to understand more about how integrated catchment management could be applied effectively.<sup>32</sup> A 2010 review of progress to date in New Zealand noted that factors such as agency silos, a lack of institutional coordination, and lack of shared information systems were barriers to effective implementation. The review also identified that there was a lack of a sufficiently strong mandate to integrate management.<sup>33</sup> The notion that these factors were a much greater barrier to integrated catchment management than technical issues emerged from research into stakeholder views, which noted that "our inability to adequately manage freshwater stressors is not so much a deficiency of science as a deficiency in governance."<sup>34</sup>

with different ones involved depending on the particular situation, purpose of management and its location. The Department of Conservation, Fish and Game Councils, the Ministry for Primary Industries, the Ministry for the Environment and regional councils have overlapping responsibilities for both location-based and species-based protection of freshwater biodiversity. District councils have responsibilities for asset management, sewage and stormwater discharges to waterways and drain management, and many have rules in their plans that control activity in riparian margins. In this section we outline the key responsibilities of the various agencies.

### **Department of Conservation**

Freshwater ecosystems on public conservation land are managed by the Department of Conservation under the relevant provisions associated with the underlying land status. However, regional councils have an overlapping role for water and catchment management on public conservation land. The Department has responsibility for the species living in freshwater (most native birds, native fish, invertebrates and biosecurity of noxious and pest fish species). The Department also has an overarching science and technical role, and it has done much research and development in ecosystem classification, species ecology, ecosystem surveys, monitoring and recovery methods.

New Zealand is a signatory to the Ramsar Convention which provides guidance on the protection and management of wetlands, with site administration and reporting on this role undertaken by the Department. The Ramsar Secretariat also administers a list of Wetlands of International Importance, of which New Zealand currently has six. Listing of wetlands with Ramsar does not automatically provide them with any protection domestically (see Box 5.7).

### **Fish and Game Councils**

The Fish and Game Councils (collectively branded Fish and Game New Zealand) are one national and twelve regional public entities established under Part 5A of the Conservation Act and Part 1 of the Wildlife Act. They are charged by statute with managing sports fish and game bird species defined under the Freshwater Fisheries Regulations 1983 and Wildlife Act respectively in accordance with detailed legislative prescription. This role includes advocacy for recreational game-bird hunting and sports fishing, and the protection of those species' habitats. They also manage fish and wildlife stocks.

The conflict between sports fish and game species, and the protection of indigenous biodiversity, creates challenges. Sports fish include brown trout, rainbow trout, Atlantic salmon, sockeye salmon, perch, tench and rudd. Many of these fish species adversely impact indigenous biodiversity. Some game-birds are indigenous.

### **Box 5.3 Arawai Kakariki**

Arawai Kakariki is a wetland restoration programme led by the Department of Conservation, based in three wetlands, two of which are Ramsar sites. The programme has been underway since 2007, covers more than 40,000 hectares, and has ten national objectives to fulfil. Key achievements for indigenous biodiversity protection included (2007-2010):

- Comprehensive inventory of wetland flora and fauna, enabling management goals to be set and providing baseline information to measure success
- Wetland mapping based on aerial photography to delineate areas of intact wetland habitat (priority for protection) and degraded wetland habitat (priority for restoration)
- Over 15,000 hectares of weed control and weed surveillance across the three sites
- Twenty-seven kilometres of boundary fencing across the three sites to reduce stock damage to wetlands and 55 kilometres of riparian fencing to reduce sediment and nutrient input
- Working with regional councils on water quality management initiatives, such as monitoring the health of the Waituna Lagoon Ramsar site.

Between 2011-2014 the Arawai Kakariki programme has continued to invest in on-ground wetland management, including weed management, control of mammalian predators, and scientific investigations to improve understanding of wetland ecosystems. There has also been increased effort on working in partnership with regional councils. Progress is tracked via application of the monitoring and reporting framework. Outcome Reports detailing the status of the sites have been published for two of the three sites; Whangamarino Wetland and O Tu Wharekai (Ashburton Basin/Upper Rangitata River).



John Leathwick

*The stunning kōtuku or white heron is not common in New Zealand. It favours large coastal lagoons, especially on the West Coast of the South Island.*

Notwithstanding the conflicts with biodiversity protection at the species level, Fish and Game undertakes a vital management and advocacy function for freshwater habitats, particularly wetlands for gamebirds and rivers to maintain fish habitats. Fish and Game has powers to manage the recreational harvest of game species, and enhancement of their habitats, but only limited powers to address habitat-loss issues on behalf of its licence holders. It often seeks to achieve habitat protection and enhancement both through advocacy in RMA processes and directly with landowners.

Fish and Game has actively advocated for the protection of wild rivers from direct modification by initiating almost all water conservation orders (see Box 5.4), participating in numerous regional plan proceedings, and by taking an active role in key consent applications such as challenging the Ruataniwha Water Storage Scheme in the Hawkes Bay. The Fish and Game 'Dirty Dairying' campaign, which criticised the dairy industry for its impacts on waterways, led to much greater public awareness of the issues associated with land-use intensification and the potential remedies. This resulted in the Clean Streams Accord, a voluntary accord to improve waterway management by farmers.

### ***Ministry for Primary Industries***

The Ministry for Primary Industries' freshwater responsibilities include managing the commercial harvest of indigenous freshwater fish such as eels (but not whitebait), aquaculture and some biosecurity matters. The Ministry has no conservation mandate but sustainability principles are included in some of the legislation it administers (e.g. the Fisheries Act). The Ministry does have a responsibility to ensure sustainable extraction of fish species. The purpose of the Fisheries Act is: "to provide for the utilisation of fisheries resources while ensuring sustainability",<sup>35</sup> so that the operation of commercial fisheries is conditional upon sustainability of the resource.

### ***Regional and local councils***

Regional councils have primary responsibility under the RMA to protect and manage freshwater ecosystems via regional policy statements and plans and to issue consents allowing the use of, or effects on, freshwater ecosystems. Direct use of freshwater bodies (except for domestic takes of human and stock drinking water, and firefighting) is regulated by the RMA and requires some form of authorisation. Regional councils have, *inter alia*, the function of undertaking the "maintenance and enhancement of ecosystems in water bodies and coastal water".<sup>36</sup> Use of water, water bodies, riverbeds and lakebeds, and discharges into water, all require either consents or authorisation through regional rules in plans. City and district councils sometimes have complementary rules, such as restriction on development within a certain distance from a waterway or on the

amount of impervious surfaces, but are otherwise mainly responsible for wastewater and stormwater management.

Regional council planning instruments provide the strongest regulatory means to protect freshwater biodiversity, as they can identify and protect values within rivers, streams, lakes and wetlands from the effects of activities which they control on a catchment basis. Significant ecosystems can be protected through objectives, policies and rules in regional plans, catchments can be mapped and land use surrounding freshwater ecosystems can be controlled (e.g. through requiring sediment control, riparian fencing or limiting fertilizer inputs and stocking rates). Limits can be placed on pollutants entering waterways and on what water needs to remain in or can be extracted from water bodies for purposes such as irrigation or municipal supply. These are all measures to help manage cumulative effects and reduce declines in aquatic ecosystem health. While most regional and district planning instruments do seek to control activities within certain distances from water courses, consents are rarely declined, and incremental changes to freshwater ecosystems resulting in wholesale cumulative degradation are the norm. This is particularly the case where no limits have been established in regional plans so the cumulative effects are unable to be addressed on a consent-by-consent basis.

The effectiveness of regional council efforts to safeguard freshwater resources has been analysed more than once. In 2008, the failure of regional councils to stem decline of freshwater was attributed in Massey University doctoral research to a range of factors including agency capture by sector interests and variable capacity.<sup>37</sup> In 2011, the Office of the Auditor-General reviewed four regional councils (Taranaki, Southland, Waikato and Manawatu-Wanganui) to determine the effectiveness of their freshwater management. The review noted that all four councils were collecting adequate data on, and had sufficient knowledge of, the freshwater ecosystems within their jurisdiction. In addition, all four councils were implementing regulatory and non-regulatory programmes designed to address the degradation of freshwater environments. But the report concluded that the present mix of regulatory and non-regulatory methods were insufficient to address key pressures on freshwater.

The report then went on to recommend a more integrated approach to freshwater management, improvements in availability of nationally comparable data, and stronger links between freshwater planning and monitoring including better review and management of policy effectiveness.<sup>38</sup> The Auditor General noted concern with the involvement of elected officials in enforcement decisions – not an appropriate practice. Furthermore, the Auditor General noted that the contribution of the rural sector to the economy needed to be weighed carefully against the public interest in clean waterways.<sup>39</sup>



The findings of these research projects are consistent and point to serious agency capture that is preventing appropriate regulation and enforcement to protect the public interest in clean waterways and flourishing aquatic life.

## Protection measures for freshwater biodiversity

### *Site protection*

*In situ* biodiversity protection is a critical dimension of conservation. However, the fragmented management regime for freshwater biodiversity, and the inter-connectedness of freshwater ecosystems and their linkage to coastal systems, mean that protected areas (e.g. parks and reserves) are rarely sufficient to maintain the full range of freshwater biota present within such areas. Indeed the protected land area mechanism confers little protection for native freshwater biota.

The only site protection mechanism specifically designed for freshwater biota is the faunistic reserve provision in Part 9 of the Freshwater Fish Regulations, although general mechanisms such as gazetting as a reserve or registration as a covenant under the Reserves Act or the Conservation Act are also possible. Such methods generally apply only to the land around the water-body, and not the instream habitat itself, and often specifically exclude some species (e.g. fish). They also do not apply to upstream or downstream sources of pollution and other pressures.

Another site-specific mechanism, is the identification of important or sensitive freshwaters in regional plans (as significant natural areas), with limits placed on water taken from them or contaminants entering into them. These areas may be protected, by mapped layers and rules in plans, from specified activities such as water takes, discharges, damming and diversion. The catchments draining into these special sites can also have additional controls placed over them to reduce sedimentation and nutrient contaminants. Many councils have identified areas of freshwater significance within their plans but few have implemented a complete protection regime.

The most powerful freshwater protection mechanism under the RMA is the water conservation order which can be applied to 'outstanding' waters for a variety of purposes including biodiversity protection (see Box 5.4). However, not one regional council has ever proposed a water conservation order, and when applied for in their regions, most have either remained neutral or actively opposed them.<sup>40</sup> Given that regional councils must give effect to the orders, effective implementation is threatened through lack of integrated management, unity of purpose, monitoring and enforcement.

The Conservation Act also includes a mechanism for an overlying status to be applied to an existing protected area (whether public or private), that is adjacent to a water conservation order – called a 'watercourse area'.<sup>41</sup> It must be recommended by the Minister of Conservation, and requires an Order in Council to be established. Where applying to private land, the consent of the affected landowners is required.<sup>42</sup> There are presently no watercourse areas established in New Zealand to date, and further research as to why the mechanism is so under-utilised, would be useful in understanding why this mechanism has been such a dismal failure.<sup>43</sup>



Byrce McQuillan

*The Wairongamai Valley in the Kaimai-Mamaku Forest Park is dotted with mining sites and an array of popular walking tracks*

#### **Box 5.4 Water Conservation Orders**

Outstanding freshwater bodies can be protected by water conservation orders under Part IX of the RMA. This part of the Act has been described as a separate code, as it is not subject to the sustainable management provisions of Part II of the RMA. Its purpose is to recognise and sustain outstanding values of water bodies. Water conservation orders are the highest form of protection for freshwater in New Zealand (similar to a national park status) and may be used to protect rivers, lakes, streams, ponds, wetlands, aquifers and geothermal water. They can be proposed by any party, are processed by the Ministry for the Environment and are recommended by the Minister. Regional policy statements and plans must not be inconsistent with a water conservation order.<sup>44</sup> Presently only one level of water conservation order exists, but prior to the RMA, two levels of protection were possible: the extant level for outstanding water bodies of national significance; and a lower level (local water conservation notices) for important waterways that do not meet the national test as 'outstanding'. Local notices have been superseded by the provisions of regional plans.

Water conservation orders are targeted at outstanding and largely natural water bodies, not often those that are already partially degraded. They can have the effect of protecting the waters of a whole catchment to the extent that these contribute to the outstanding amenity afforded. This means, at least in principle, that the entire ecosystem can be protected<sup>45</sup> which is unusual among the mechanisms capable of protecting freshwater. However, case law has established that water conservation orders cannot protect an entire catchment except where each component of the catchment contributes to its 'outstandingness'. This was determined when Fish and Game argued that the entire Buller catchment was worthy of recognition as a water conservation order on several grounds (including that it is a largely unmodified catchment with high species diversity). This was rejected and the order applies only to certain areas, and excludes the lower reaches which provide some of the most important whitebait habitat on the West Coast.

At present, fifteen water conservation orders are in force around the country. Seven were established prior to the advent of the RMA, and a further eight since.<sup>46</sup> Fish and Game Councils have been the primary proponents of water conservation orders nationally, initiating almost all applications.<sup>47</sup> Monitoring of the orders is not required by legislation, and the effectiveness of efforts to maintain the outstanding values, is not usually measured or well-defined within the wording of the orders.

#### **Species protection**

The threat status of freshwater fish and invertebrates is covered in the New Zealand Threat Classification Framework, and the majority of taxa recognised are listed as threatened, but this has no status in law. The Wildlife Act can protect some freshwater bird species from harm but does not protect freshwater fish, invertebrates, plants or even the freshwater habitats of protected birds. Most wholly freshwater species are exempt from its provisions.

Important habitats can be protected under Wildlife Act provisions such as those for creating wildlife management reserves, wildlife refuges and wildlife sanctuaries, but these usually require ownership of the land or agreement of the landowner. Whitebait species are somewhat protected from harvest by the Whitebait Fishing Regulations 1994, except during the fishing season, when there is no restriction on the amount fishers may take. The only freshwater fish protected under the 1983 Freshwater Fisheries Regulations is the now extinct grayling.

The Conservation Act assigns to the Department of Conservation the function: "to preserve so far as is practicable all indigenous freshwater fisheries, and protect recreational freshwater fisheries and freshwater fish habitats".<sup>48</sup> It is interesting that the imperative is on preservation of the fishery and not the species itself. The effective exercise of this function is dependent on vigorous implementation of the Department's role. However, little has been achieved in this regard since the Department was created in 1987.<sup>49</sup>

#### **Monitoring and describing freshwater biodiversity**

Management of freshwater biodiversity nationally requires a robust and coordinated monitoring method, that combines consistent indicators where appropriate, and provides for coordination of more specific approaches. Many freshwater species have highly restricted ranges and monitoring needs are often site-specific.<sup>50</sup> Present approaches are piecemeal and a number of agencies monitor in different ways for different reasons. New Zealand requires a nationally coordinated programme of freshwater biodiversity monitoring to inform management and enhance the effectiveness of biodiversity conservation.

Most current monitoring is focused on water quality, not on meaningful measures of biodiversity retention (although the two are correlated). Survey effort is concentrated in agriculture-dominated catchments where most of the impacts on freshwaters occur.<sup>51</sup> However, the Department of Conservation has a monitoring role for freshwater ecosystems on public conservation land, and has compiled a comprehensive spatial inventory of wetland, lake and river ecosystems called 'Freshwater Environments of New Zealand' which provides a nationally-consistent classification framework

for management.<sup>52</sup> The classification of Freshwater Environments is designed in the same way as the better-known land environments system, to provide decision-support for biodiversity management. A key innovation of the Freshwater Environments inventory is that the classification was tuned to account for biotic patterns described by fish and invertebrate presence/absence data. All freshwater environments are included, including wetlands, and freshwater species distributions can be predicted by combining species locations with environmental variables used in the classification. Classification systems like this can usefully inform decision-making.

While the Department has led the research and development around tools for freshwater ecosystem identification and conservation, crown research institutes, universities and other research organisations have complemented this with additional tools (e.g. the Freshwater Biodata Information System). They have also undertaken more fundamental research to improve knowledge of little-known habitats and taxa (National Institute of Water and Atmospheric Research - NIWA) as well as made practical advances with lake restoration and in the capture and 'repurposing' of invasive fish into pet food and other products (University of Waikato).<sup>53</sup> The National River Water Quality Network is operated by NIWA, as is a range of other important databases and monitoring programmes. Regional and district councils carry out a significant amount of monitoring of lakes, rivers and wetlands. The Ministry for Primary Industries also holds catch data for the eel fisheries it administers and data pertaining to hydro dams and eel management.<sup>54</sup>

Freshwater fish have been used as indicators of ecosystem condition. The New Zealand Freshwater Fish Database (maintained by NIWA) contains voluntarily submitted records stretching back approximately 100 years, although most records date from the 1970s.<sup>55</sup> All records contain the presence/absence information for sites surveyed and this can be used for comparison between sites. At sites where surveys have been repeated, changes in fish populations can be identified. The Fish Index of Biotic Integrity, developed by Massey University freshwater ecologists, demonstrated change in species composition over 37 years based on presence/absence data from the Freshwater Fish Database. Significant declines in the presence of freshwater fish over this period were evident when the database was interrogated, and these trends were clearly linked to land use. The biggest declines were in pasture, tussock and urban catchments, while native forest and scrub sites retained most of their freshwater fish fauna.<sup>56</sup>

Much freshwater ecosystem monitoring occurs in New Zealand, but it is largely uncoordinated. This results in gaps and overlaps in monitoring effort, inefficient data collection and non-comparable datasets. Most historical information on freshwater biodiversity is a hodgepodge of information collected for legacy purposes by the Ministry of Agriculture and Fisheries, acclimatisation societies and the Department of Conservation, so

is difficult to compare over time. There are also major gaps in information collation and management. For example, there is no national database of invertebrate information and the threat status of many species is unknown. Invertebrates commonly underpin freshwater monitoring programmes, such as the Macroinvertebrate Community Index which is used to describe water quality effects from organic enrichment. Given the global evidence of significant decline, and the existing knowledge of better known taxonomic groups, it is reasonable to assume that many little-known freshwater invertebrates in New Zealand are under great threat.

Where data are collected and available for national reporting purposes, the trends are vulnerable to being obfuscated for political reasons. Previous examples of freshwater monitoring and reporting in New Zealand have demonstrated a lack of understanding about the nature of freshwater ecosystems. There has been a tendency to incorrectly interpret data, and to present trends where none exist, and no trend where one does. For example, aggregating data from pristine upland waterways and polluted lowland rivers mutes the contrast between them, and avoids any potentially useful analysis. Inappropriate treatment of monitoring data confounds rigorous assessment of the state of freshwater ecosystems, and fails to elicit appropriate management responses. The agency responsible for coordinating the data for reporting purposes must – as elsewhere in national biodiversity reporting – be sufficiently independent and competent to ensure accuracy and transparency of analysis.

Piecemeal monitoring is a barrier to formulating effective national strategies to address freshwater biodiversity loss, and coupled with inadequate knowledge, likely means that rates of decline have been severely underestimated in New Zealand and globally.<sup>57</sup> For monitoring to accurately reflect the state of freshwater biodiversity, much greater effort and coordination is required.

## Proximal drivers of freshwater biodiversity loss

Dudgeon identified five principal categories of freshwater threat globally: overexploitation; water pollution; flow modification; degradation and destruction of habitat; and invasion by exotic species. These all interact to exacerbate the consequences for freshwater biodiversity.<sup>58</sup> In this section we describe how these threats play out in the New Zealand setting.

### *Over-exploitation*

Whitebait, koura, some plants and eels are commercially and recreationally fished native species, even as they are threatened with extinction. While this harvest is certainly not the sole nor perhaps even the primary cause of decline of the species, the continuation of fishing in the face of threat, increases pressures on the species. Commercial fishing for species declining in number, and increasingly at risk of extinction, is clearly unsustainable in the longer term. The question is not whether commercial

fishing for long-fin eels and whitebait will end but whether it ends before extinction becomes unavoidable.

### *Whitebait*

The Department of Conservation manages freshwater fish generally, including whitebait. Whitebait are the juveniles of five species of galaxiids. Four of those galaxiid species are now identified as threatened in the New Zealand Threat Classification System. Depending on the reasons for this threat status, there is a risk that ongoing harvest may be placing the species at greater risk of extinction. However there are strong and long-standing cultural and community interests in the harvest. Further restrictions on fishing of threatened indigenous species are certainly needed, but implementing them will require the power of commercial and recreational fishing interests to be sufficiently eroded.

The threats to most species of whitebait have long been known, but the Department has not been active in advocating for conservation measures to be introduced. For example, the '2003-2013 Recovery Plan for Large Galaxiids' identifies over-harvest of whitebait (the juvenile stage of all species covered by the plan) as a key pressure on large galaxiids, but the plan does not specifically address the fishery.<sup>59</sup> Without any harvest limits, and no restrictions on the private sale of catch (whitebait is excluded from the controls on sale and purchase of fish under the Fisheries Act), individuals can garner substantial profit over a season. Indeed whitebaiting is a significant source of secondary income for many people, especially on the West Coast.

Efforts to promote whitebait species conservation have included restrictions on the fishing season, fishing locations and fishing methods and non-regulatory approaches such as information campaigns (e.g. 'Whitebait Connection') and restoration of spawning sites. However, they have seldom contemplated stopping the harvest.<sup>60</sup> Public concern over whitebait conservation was demonstrated in a 2013 poll, with respondents favouring additional catch restrictions and a stronger focus on user-pays approaches.<sup>61</sup>

### *Longfin eel*

The Ministry for Primary Industries administers the commercial fishing of longfin and shortfin eels under the Fisheries Act. Since 2000, longfin eels have been included in the quota management system rather than just being regulated by permit. Freshwater technical staff members from the Department of Conservation participate in relevant working groups, but the approval of the Department is not required for the setting of catch limits. While there is potential for some reduction in fishing pressure, the eel conservation mandate does not rest with the Ministry administering the fishery.

In 2013, the Parliamentary Commissioner for the Environment investigated



Peter Langlands Wild Capture

*Whitebaiting in the surf at the mouth of the Waimakariri River*

the protection of the longfin eel and noted that this poor institutional arrangement between the Ministry for Primary Industries and Department of Conservation had negative outcomes for a threatened endemic species. She noted that while some actions had been taken, such as reducing the total allowable catches in 2007, eel numbers appeared to be continuing their decline and urgent measures were required.

The Parliamentary Commissioner made three specific recommendations to Parliament:

- That the Minister for Primary Industries suspends the commercial catch of longfin eels until longfin eel stocks are shown to have recovered.

- That the Minister of Conservation directs officials to use the policy mechanisms available to them to increase the protection for longfin eels and other threatened migratory fish.
- That the Minister for Primary Industries directs officials to establish an expert peer review panel to assess the full range of information available on the status of the longfin eel population.<sup>62</sup>

In immediate response, the Department of Conservation and the Ministry for Primary Industries released a joint statement, committing to addressing the concerns raised together:

*We take our responsibilities for this species very seriously, and welcome any insights the Parliamentary Commissioner can offer,” and then that they “will take the time to digest the PCE’s recommendations, and we will work together in reviewing and responding to them.”<sup>63</sup>*

In 2014, the Department of Conservation was questioned over whether work had been undertaken to investigate the conservation benefits of a reduced harvest of longfin eels. The Department replied in the negative, noting that as eels are “managed as a commercial fishery under the Fisheries Act, the responsibility of looking at the conservation benefits of reducing the commercial catch of long finned eels is a role of the Ministry for Primary Industries”.<sup>64</sup> Meanwhile the harvest of long fin eels continues.

### **Point-source pollution**

Pollution reduces biodiversity by degrading habitat and adding biological stressors so that a water body becomes temporarily, intermittently or continuously less habitable. It also affects prosperity by limiting uses of freshwater ecosystems (e.g. lost recreational opportunities) and increases cost of uses (e.g. water treatment, intake screens, and human and animal health costs).

While there are many types of pollution, a useful distinction is made between point and non-point sources. Point-source pollution arrives in the freshwater body at one location, such as via a sewage pipe. Non-point source or ‘diffuse’ pollution runs off or through the land, entering water bodies in dispersed locations, both above and below ground. Point-sources are more easily addressed because their impacts, location, ownership and accountability are usually not difficult to define.

Point-source pollution is much less of a serious threat than it was just two decades ago, due to effective regulation. However, point-source pollution still has a localised and cumulative negative effect in many New Zealand river catchments under some conditions.<sup>65, 66</sup> For inland communities, freshwater systems are often the receiving environment for municipal stormwater, sewage and industrial waste discharges. The quality of treatment of point-source effluent to rivers is highly variable, and often depends on the economic resources of the local community, or the spending priorities of local government. Despite considerable improvements in treatment of waste from many cities and towns, significant impacts on aquatic life are still commonly found downstream of point-source discharges.<sup>67</sup>

Efforts in the 1990s to address point-source pollution achieved dramatic reductions in concentrated discharges through actions including:

- Improved municipal sewage treatment facilities
- Improved management of industrial water waste
- Capture and treatment of effluent from milking sheds.<sup>68, 69</sup>

Despite significant efforts in addressing point-source pollution in many regions, water quality indicators have not demonstrated corresponding improvements. For example, while a review of water quality indicators noted that gross organic pollution (e.g. biological oxygen demand) from point sources had reduced, it also identified that soluble nutrients had increased from diffuse loads.<sup>70</sup>

Non-point source pollution has negated the benefits of this clean-up and is now the dominant form of pollution. For example, the Waikato River receives 80 percent of its total pollution load of sediment and nutrients

Peter Langlands Wild Capture



*Eel channels at Birdlings Flat near Te Waihora/Lake Ellesmere were dug to enable the capture of eels*

from diffuse sources, which is remarkable given the number of municipal discharges (Taupō, Mangakino, Tokoroa, Putāruru, Te Kūiti, Otorohanga, Te Awamutu, Pirongia, Cambridge, Hamilton, Ngāruawāhia, and Huntly) and scale of industrial waste discharge from Kinleith.<sup>71</sup>

### ***Nonpoint source pollution***

Regional councils have primary responsibility for addressing diffuse freshwater pollution. They can do this through managing activities within the catchment, setting numerical limits on total discharges through regional plans and identifying when allocations of assimilative capacity have been exceeded. Examples of councils that have set limits include Otago and Horizons Regional Councils. Such limits can have the effect of controlling land-use activities near waterways, and may limit activities such as intensive farming, because they cause serious diffuse pollution. However, councils have been generally slow to develop these controls. In some cases, where limits are set or other methods put in place, the indicators of ecosystem ill-health are already far exceeded. The Freshwater NPS now directs that such limits are set, however, so they will become more common in the future.

Changes in the environment, as a result of management interventions, are often slow due long lag-times as pollutants from poor land use management continue to percolate through groundwater into waterways decades after release.<sup>72</sup> Significant improvements in land-use practices, many of which may be costly in the short term, can take generations to pay dividends ecologically. These lags can be difficult for some stakeholders to appreciate. Groundwater takes a long time to move through a catchment, gathering dissolved nutrients (such as nitrates) as it goes. It may be many decades before groundwater flushes contaminants out of the soil.<sup>73</sup> As a result, management actions such as riparian planting, stock exclusion, capture of contaminants at source and destocking may not be reflected in improved measures of water quality and increased presence of freshwater biodiversity for a long time. Additionally, the thresholds at which ecological damage is seen to occur, may not be commensurate with the limits needed to restore an ecosystem back to a healthy state, risking ineffective long-term outcomes.<sup>74</sup> Without evidence that the measures are making a difference, expenditure on them can be difficult to justify politically.

### ***Flow modification***

Flow modification occurs when water is added, abstracted, released or temporarily stored. Hydro-electric power, water storage, irrigation, drainage and flood protection schemes all modify flow regimes. Such schemes replace natural ecosystems with modified and managed systems

that support a reduced range of biological diversity. River flow management and flood control programmes continue today and amplify historical losses. Water abstraction is most serious for freshwater biodiversity, not least by directly removing the water in which it lives. Abstraction also degrades remaining wet areas downstream, through reducing assimilative capacity, and by enabling slime build-up and sedimentation of the spaces between stones where small fish and invertebrates live.

Regional councils manage abstraction under section 14 of the RMA and through regional plan provisions. The most effective way to both allocate water and maintain biodiversity, is to determine a minimum flow or flow regime required to sustain the ecosystem, and then allocate only an appropriate proportion of the remaining available water. The minimum flow should ensure acceptable supply security for water users. However, just as councils have been slow to put limits on pollution, limits on abstraction have lagged behind allocation, and the flows of many rivers have been fully committed if not over-allocated.

Allocation of water by regional councils increased 50 percent nationally between 1999 and 2006. In 2006, irrigation accounted for 77 percent of allocated water take, public water supply for 11 percent, industrial use for nine percent and the remaining three percent was for stock drinking water. During that same period, the area of irrigated land increased by 52 percent, with irrigation being the main component of the overall increase in allocation.<sup>75</sup> In some cases the allocation process by regional councils has been so ineffectual, that rights to water given in resource consents exceed the total volume of water in the waterway, leaving no buffer for any unlawful takes that may occur or dry weather and low flow. These over-allocated catchments occur commonly on the eastern side of the country in Otago, Canterbury, Marlborough, Tasman and Hawke's Bay. Many other rivers have very close to 100 percent of their low flows allocated, and land use change such as conversion to dairy farming puts intense pressure upon agencies to grant further allocations.

Instead of setting early limits, and addressing the problematic task of reallocation of water permits, abstraction has shifted increasingly to allocation of aquifer supplies. In 2001, approximately 80 percent of New Zealand's inland freshwater biodiversity was thought to be in groundwater. The biodiversity values in aquifers are often unrecognised. Specialised invertebrates such as mites and shrimp live in aquifers many metres below the soil surface, without light. New Zealand is recognised as having quite diverse groundwater biodiversity, due to geological variation and a volatile volcanic history, leading to lots of isolated populations that evolved separately. Key threats to groundwater biodiversity include pesticide residues, agricultural discharges and water abstraction via wells.<sup>76</sup>



*Irrigation and fertiliser application have helped transform naturally dry and infertile areas into areas suitable for farming. The long-term sustainability of this change is questionable.*

When water supplies run low, the attention of regulators is often turned to water storage projects. These consist of dams that harvest water at times of higher flow, for use (either instream or out-of-stream) at times of low flow or high demand. Depending on their scale, dams can have substantial adverse effects on freshwater ecosystems, but economic imperatives increasingly drive their construction to support the urban and agricultural sectors. In addition to private sector economic drivers, the development of dams is subsidised by Government. An Irrigation Acceleration Fund was established in 2011, set to invest up to \$400 million<sup>77</sup> in irrigation projects nationwide.<sup>78</sup> The purpose of the fund is to support feasibility studies for water storage projects, in some parts of the country, to enable production of an 'investment ready' prospectus for each project.<sup>79</sup> To date the fund has invested in the proposed Ruataniwha Water Storage Scheme and similar projects in Hurunui, Wairarapa and Central Plains.<sup>80</sup> The Crown also established Crown Irrigation Investment Limited, a company which manages funding for regional-scale water storage schemes. The company has no environmental protection or conservation mandate, reliant upon RMA processes for the management of adverse effects. Its website also refers to the potential environmental benefits of irrigation and an Expert Panel is convened to advise primarily upon economic viability.<sup>81</sup>

### ***Degradation and destruction of habitat***

Degradation and destruction of freshwater habitat is both a pressure on biodiversity, and the inevitable outcome of the other four drivers. Stream ecosystems are still being degraded and destroyed by damming and diversion where land uses are most intensive (e.g. urban development,

dairy conversion and mine construction). In addition, control structures are still being installed that prevent movement of mobile fauna through the catchment, interrupting lifecycles, and adding further threats to remaining biodiversity.

But much of the loss is caused by activities outside the freshwater habitats themselves. Conversion of native vegetation to pastoral land use, and most recently, the intensification of sheep and beef farming and conversion to dairy-farming are major drivers of aquatic habitat loss.<sup>82</sup> Changes in land use from forested catchments and vegetated estuaries, to open pastoral land use, results in a loss of spawning habitats (on beds or margins of rivers, lakes, wetlands and estuaries), and loss of forested canopy cover and woody inputs (detritus) to streams. Intensification also requires that streams be channelised, diverted through pipes and culverts, or confined within stop banks to maximise pastoral utilisation on-farm. Each of these activities destroys or degrades natural habitat and the impacts can be significant in both urban and rural areas. In the Auckland Region alone, more than ten kilometres of stream loss is consented per annum. In rural Taranaki, a 2010 analysis found that 267 consents had been issued for stream modification since 1995, directly affecting 43.6 kilometres of stream. The report noted an increase in applications and the growing 'popularity' of piping streams, particularly since 2006.<sup>83</sup>

It is important to note that the intermittent upper reaches of streams are often not included in these data, as these semi-aquatic habitats are rarely afforded protection, because they are not defined as 'permanent waterways' in the relevant planning instrument. If they are not defined as a 'stream', 'wetland', 'lake' or 'aquifer' rules applying to the protection of freshwater ecosystems in regional plans often do not apply to them. It is possible therefore, that the true extent of aquatic biodiversity loss is much underestimated. In addition, much wetland drainage and stream modification occurs illegally. Typically insufficient compliance monitoring by regional and district councils means that this is unlikely to be detected and included in estimates of loss.

In-stream barriers, whether lawful or not, have major impacts on mobile and migratory freshwater species, particularly those that occupy different habitats for each stage of their life cycle. This is in spite of fish pass regulations existing since 1947. Hydro dams, culverts and weirs are usually absolute barriers to the passage of native fish. The construction of fish barriers has resulted in the loss of critical habitat connectivity for eels and other species. While long-lived eels may inhabit areas for up to a century following the construction of barriers such as dams, they cannot complete their lifecycle. Hydro turbines kill the eels that attempt to move through them and few elvers (juvenile eels) can climb over significant dams.<sup>84</sup> The degradation of habitat connectivity for migratory species has meant some species are all but extinct in some regions (e.g. short-jawed kokopu in Northland), largely due to habitat destruction and poorly designed culverts blocking access to remaining habitats.



*Fish barriers like this prevent fish moving to different parts of the catchment in order to complete their life cycles.*

The Freshwater Fisheries Regulations charge the Department of Conservation with the statutory duty to control the installation of fish barriers in freshwater ecosystems. All structures constructed after 1 January 1984 have been legally required to seek the written permission of the Director-General of Conservation.<sup>85</sup> This requirement has routinely been overlooked and not implemented. These particular Regulations do not apply to those barriers constructed prior to 1983. But earlier regulations have restricted fish barriers as far back as 1947 with similar issues of non-implementation. Consent renewals often cite this grandfathering provision as a means of avoiding upgrades that would require fish ladders and other mitigation devices or the barrier removed outright.<sup>86</sup>

A plethora of lawful and unlawful structures that block fish passage demonstrate the Department's ineffective implementation of the Freshwater Fisheries Regulations to manage barriers to fish migration. This is despite the fact that engineering and design solutions that maintain fish passage can be straightforward and inexpensive. Regional councils also have a role in protecting freshwater connectivity through provisions in regional plans (see Box 5.5). Agencies charged with managing freshwater biodiversity often form informal working relationships at a staff level to collaborate on matters such as fish passage.

In 2013, the Department of Conservation and NIWA hosted a symposium on fish passage and made a commitment to work together to develop national resources to support fish passage management. Occasionally, regional councils and the Department have formed working relationships to combine the practical application of regulatory functions. For example,

#### **Box 5.5 Protecting freshwater connectivity**

The state of the freshwater fish fauna in New Zealand is testament to the failure of the current regime to adequately safeguard the connectivity of freshwater habitat. Fish and other indigenous biodiversity are seriously affected by barriers to in-stream movement.

Regional policy statements and plans could protect connectivity, and the fish reliant on it, by implementing region-wide goals of no net loss of stream connectivity. Higher planning thresholds for the diversion of waterways and addition of new barriers would potentially reduce new losses of freshwater ecosystems. For example, new barriers in waterways and modifications to the watercourses, should have a minimum activity status of restricted discretionary.

Greater incentives for landowners on private land to protect sensitive aquatic environments including streams, rivers, wetlands, estuaries and the adjacent land, and greater disincentives for activities which harm these ecosystems, would assist. In addition, incentives for landowners to remove existing artificial barriers to upstream migration, including culverts, would progressively enhance connectivity over time.

The installation of new barriers is sometimes unavoidable, or the removal of existing barriers may entail other effects (e.g. bed disturbance and sedimentation). A programme of research could be implemented to develop practical alternatives to culverts, that provide for fish passage, and do not otherwise disrupt ecological processes. However, these methods should be applied to existing and essential structures only, rather than be used to justify further construction of inappropriate barriers in the future.

to avoid the need for two separate applications in the Wellington Region, the Department and the Greater Wellington Regional Council signed an agreement whereby the Department would be considered an 'affected party' under the RMA if a new fish barrier was proposed.<sup>87</sup> While these informal approaches may improve working relationships across agencies, they are no substitute for rigorous implementation of reasonably clear regulations. The failure to provide for fish passage has had widespread impact on freshwater biodiversity, despite over half a century of a clear regulatory mandate to address it.



The cost of restoring degraded freshwater ecosystems (if it is even technically possible to do so) is usually far greater than the cost of maintaining existing ecosystem function. Recovery options such as uncovering (day-lighting) of freshwater streams once channelised or piped, are typically prohibitively expensive, particularly compared to simple avoidance of damage in the first place. For example, a project to day-light a 200 metre reach of an Auckland stream cost ratepayers \$1.2 million. Lakes and rivers affected by nutrient run-off and sedimentation are costly to restore (the Rotorua Lakes restoration cost \$144 million), although much progress has been made in figuring out how this might be done. Some forms of wetland once drained cannot be restored, although construction of artificial surrogates may have some merit. And of course, species, once extinct are gone forever. The removal of fish barriers can be achieved more easily and at lower cost, but often seems too difficult despite its technical simplicity.



Raupo (*Typha orientalis*) restoration, Canterbury

### ***Invasion by exotic species***

Invasive species can be both unwanted pests and valued resources. Many prey on and compete with indigenous species and some may threaten the long term viability of indigenous species populations nationally. Invasive species can also change and disturb ecosystems in ways that reduce native diversity. Aquatic invasive plants can cause severe local damage, sprawling over the riparian margin, and smothering diverse native plant communities.<sup>88</sup> For example, since the mid-nineteenth century, 21 species of invasive freshwater fish have been introduced into New Zealand and have established self-sustaining populations. Pest species include koi carp, brown bullhead (catfish), rudd, perch and mosquito fish (gambusia). Koi and other species are having severe impacts on Waikato rivers and lakes. Trout can have significant effects on native stream invertebrate communities, and are threatening some southern South Island galaxiids with extinction.

Freshwater species, native and exotic, are managed in different ways for different purposes (e.g. commercial harvest and biosecurity) and sometimes those values conflict. Regional councils have responsibility for plant and some animal biosecurity. Ordinarily, the Department of Conservation manages mammalian pest biosecurity issues under the Wild Animal Control Act 1977. But Fish and Game manage exotic sports fish, including trout and salmon, and this management is funded by license fees from anglers.

Trout and salmon populations support New Zealand's primary freshwater fishery, with some 150,000 licences sold to anglers, who fish in more than 1150 different freshwater bodies nationally. Trout and salmon fishing is also a significant activity for the tourism industry. However, trout have had a negative impact on some native species, largely due to their success as invasive predators. Some impacts are now historical, but in other areas trout continue to threaten some rare native galaxiids. Because of their economic value, management of the ecological effects of trout is typically deprioritised. For example, under section 4(2)(b) of the National Parks Act, the Department of Conservation is obliged to attempt to exterminate introduced species in national parks, unless an exemption is granted by the Conservation Authority in its National Parks Policy. Trout is a species which has been granted such an exemption, due to its presence prior to the national park gazettal, so Fish and Game have responsibility for managing trout populations within national parks.

These overlapping and conflicting functions produce a unique problem, where indigenous species do not receive priority over exotic species due to the economic and recreational value of the latter, even in National Parks. In addition, the Department can seldom find resources to exclude any invasive fish, even where Fish and Game is willing to allow this. Instead Fish and Game has developed internal National Policy to ensure that trout are not introduced into new waters in which they don't reside.

## Collaborative change

New Zealand has a poor record of providing national guidance on the management of key pressures on freshwaters, on biodiversity and on resource management more generally. Until 2011, no national guidance existed on the management of freshwater ecosystems. Several prior attempts were unsuccessful. Statutory requirements to set out goals and objectives related to the protection of freshwater, and more general requirements to 'maintain indigenous biodiversity', have been in the RMA since its inception. Obligations on central government agencies to deliver or advocate for freshwater biodiversity have also been clear. However, most regional councils have achieved very little in this regard, and the degradation of freshwater ecosystems is the result. It is telling that the Ministry for the Environment had two attempts to generate a reform programme for freshwater management, both of which ended in failure. The Land and Water Forum (see Box 5.6) has helped to promote important policy reforms including the Freshwater NPS. So what might the water reforms born of the Forum process mean for biodiversity maintenance?

### *National Policy Statement on Freshwater Management*

The Freshwater NPS was revised in 2014 following a 2011 version. It has regulatory implications for regional councils and other decision-makers (including Boards of Inquiry and the Environment Court). These include:

- Consenting decisions (including resource consents, notices of requirement, heritage orders and water conservation orders) must 'have regard' to the provisions of the Freshwater NPS
- Regional plans and policy statements must be modified in order to 'give effect' to the provisions of the Freshwater NPS.<sup>89</sup>

A programme of implementation by each regional council, must be established within eighteen months of the release of the Freshwater NPS. The programme must achieve the objectives laid out in the document by 2025 or 'as soon as reasonably practicable', whichever comes first, or 2030 if 2025 is deemed unachievable by a particular council.

The key change that should directly benefit freshwater biodiversity is the need to "maintain or improve" the overall quality of fresh water in a region (Objective A2), to "protect the significant values of wetlands and of outstanding freshwater bodies" (Objective A2 and B4) and to "improve integrated management" (Objective C1).<sup>90</sup>

Other improvements require regional councils to have monitoring and implementation plans that are publicly notified and to provide transparent public information on accounting for freshwater discharges and takes. Freshwater management by councils is to be founded on a spatial framework of management units and identified values.

### *5.6 Land and Water Forum*

The rise of collaboration as a means of environmental policy development in complex areas (sometimes described as 'wicked problems') has been prominent in recent years. The strength of public concern regarding the management of freshwater prompted the convening of the Land and Water Forum after a call for action arising from the 2008 Environmental Defence Society Conference.

The Forum is composed of stakeholders working collaboratively, with active observers from local and central government agencies, including the Ministry for the Environment and Ministry for Primary Industries. Representation on the Forum includes environmental organisations, recreational groups, iwi, industry groups and science experts.<sup>91</sup> Some 62 organisations are members of the wider forum, with 21 comprising the Small Group and various smaller working groups, which met regularly to draft its reports, and will continue to meet occasionally to keep a watch on implementation of its recommendations.

The Land and Water Forum has produced three reports with recommendations for the management of New Zealand's freshwaters. The first, released in 2009, set out broad goals for freshwater and recommended a range of policy changes. The second (May 2012) provided detailed recommendations on the tools and methods by which such goals could be met. The latest report (November 2012) recommended a range of further implementation strategies including integrated catchment management.<sup>92</sup> An example of an outcome implemented by the Government in response to these recommendations has been the amendments to the Freshwater NPS.

### *National Objectives Framework*

The National Objectives Framework forms part of the revised Freshwater NPS and aims to provide a nationally consistent monitoring framework that could be customised for regional and local needs, but with national bottom lines to ensure minimum standards are achieved everywhere. Attributes to track trends in freshwater ecosystems must be carefully chosen. Water quality attributes typically vary significantly over short periods of time (e.g. diurnally and seasonally) and are influenced strongly by climate, rainfall and other hydrological variations. Long-term trends can therefore be difficult to extract due to natural short-term variability.<sup>93</sup>

Selection of appropriate attributes, measurement protocols and limits are critical to the success of the National Objectives Framework in improving the resilience of freshwater ecosystems.

The Framework consists of a series of values that a water body may be managed for, and a small suite of possible attributes and corresponding minimum levels for those attributes (as well as 'good' and 'excellent' levels). Two of the values – “ecosystem health and general protection for indigenous species” and “human health for secondary contact” – are mandatory. Others are optional and can be chosen by the local community, with options including fishing, swimming and electricity generation values. The overall Framework is consistent with the recommendations of the Land and Water Forum, however the contents (i.e. measures) are not and are, as yet, incomplete.

Each attribute will have a series of bands that correspond to condition levels with a minimum that must be met. Communities and agencies will define the objectives for each water body, using the Framework, and then the relevant regional council will carry out plan-making and management decisions, with those objectives enshrined. They must also ensure that water quality is maintained or improved ‘across a region’. It is difficult to determine how, or whether trade-offs would occur in order to deliver this outcome, as water quality is not measured in regional units. Remaining concerns include the exclusion of estuaries<sup>94</sup> and the deferral of the inclusion of wetlands for the foreseeable future (although discussion of appropriate attributes is present in the Discussion Document for when they are eventually included).<sup>95</sup>

Attributes for “ecosystem health and general protection for indigenous species” include: temperature, periphyton (slime), sediment, flows, connectivity, nitrate (at toxicity rather than at lower concentrations as a problematic nutrient), ammonia (also at toxicity not as a nutrient), fish, invertebrates and condition of the riparian margin.

The ‘numeric objective’ for nitrogen and ammonia concentrations in the 2014 document is set at a level which approaches toxicity to aquatic life. This approach was considered in the Ruataniwha case and rejected by the Board of Inquiry, which found that it was inappropriate to define life-supporting capacity as a level which approached toxicity. Management of nitrogen at much lower levels, is necessary to protect macro-invertebrates, as well as to achieve other outcomes such as avoidance of nuisance periphyton.<sup>96</sup> The Board of Inquiry found that the macro-invertebrate index represents a measure which would safeguard life-supporting capacity as required under section 5 of the RMA. The revised Freshwater NPS does not yet include macro-invertebrate limits (or dissolved inorganic nitrogen), despite their wide use by regional councils and support for them from the parties to the Land and Water Forum.

The new regime was simultaneously described as tough by stakeholder heavyweight Federated Farmers of New Zealand and much too weak to

effect meaningful change by Forest and Bird, with the Ministry for Primary Industries describing it as a regime that balanced economic growth with environmental sustainability. Representatives of the fertiliser industry described the standards set in the National Objectives Framework as “commonsense” and Fonterra noted that it was an “important step forward”.

The Framework is set to be reviewed in 2016 and is recognised as a work-in-progress. Amendments to provide for more restrictive and complete bottom lines should be an output of that review process. The real test of the Freshwater NPS will be whether it will adequately define outcomes to achieve the clear objectives sought by communities for their water bodies. There is considerable risk that it may not.

### *Improving the policy framework*

Freshwater reforms are underway, under the RMA, but have only been partially implemented. To date, there have been some improvements in the regulatory settings for the protection of freshwater biodiversity, but further improvements to the Freshwater NPS and National Objectives Framework are needed if freshwater biodiversity decline is to be halted. Maintaining an ecosystem focus may require a wider range of attributes, with objectives and limits set to deliver life-supporting capacity for the full range of biodiversity, not merely thresholds approaching lethal levels for toxicants such as nitrates and ammonia. Certainly the exclusion of a number of attributes based on their inability to be economically (i.e. cheaply) assessed across the country, limits the ecological relevance and the applicability of useful measures of biological health.

Attributes not presently included, but probably necessary to monitor freshwater biodiversity meaningfully, include:

- Biological monitoring (instream fauna; particularly macro-invertebrates)
- Diurnal variation in instream dissolved oxygen
- Change in water temperature
- Benthic cyanobacteria
- Deposited and suspended sediment and water clarity
- Nutrients causing eutrophic effects in rivers such as soluble nitrogen and phosphorous (these attributes are already present in the National Objectives Framework for lakes)
- Toxic heavy metals
- Barriers to fish migration
- Water flows and levels

Wetlands, estuaries, geothermal systems and aquifers need to be addressed in the Freshwater NPS through including objectives to retain their extent, to maintain their hydrological regimes, and to maintain or improve their ecological function. The Freshwater NPS should also be strengthened to specifically provide for protection of indigenous biodiversity in freshwater environments.

Shona Myers



*Āwhitu Kauritutahi Stream*

## Key conclusions and a way forward

New Zealand's freshwater ecosystems continue to bear the most serious impacts of land-use change and ongoing environmental degradation. Large-scale habitat loss, wholesale alteration of lower reaches of most rivers, damming of rivers for hydropower development, flood control and land development schemes shortening and narrowing river habitats, introduction of habitat-altering exotic plants and animals, pollution from nutrient run-off and leaching, sediment, chemical contaminants and faecal pathogens as well as abstraction of water for irrigation, industry and domestic purposes have all had grave consequences for freshwater biodiversity. The synergy of these multiple stressors, and the adverse effects they cause together, are little understood and given scant consideration in the allocation of abstraction and discharge rights.

Significant policy gaps exist for some types of freshwater environments. Transitional zones such as estuaries and wetlands slip through the gaps and so receive little attention.<sup>97</sup> Recent analysis in Canterbury does demonstrate that they remain under significant threat, with present initiatives being deemed ineffective at curtailing their loss and degradation.<sup>98</sup> While added ability is present within the Freshwater NPS to recognise and protect

outstanding values of significant wetlands, ecosystem health attributes for wetlands are not mandatory. National level guidance on the management of wetlands and estuaries is still required.

The maintenance of biodiversity is not helped by separation of the protection of species, from the protection of their habitats, and the absence of a whole-of-catchment approach to freshwater conservation. Further, the muddled dealings of so many different agencies mean that integrated management of catchments is something of a pipe-dream. The Ministry for Primary Industries manages some harvest operations in the absence of a strong conservation mandate, and provides leadership on economic development activities that dwarfs the conservation advocacy effort of the Department of Conservation. Fish and Game has been instrumental in spearheading a range of conservation actions but also ensures persistence of species like trout that, at least in some areas, have had significant effects on native biodiversity.

Regional councils sit uneasily at the intersection of a range of potentially conflicting roles, with a catchment management role that is fraught with predictable challenges as a result of agency capture, market failure and the collective action problem. Where regional councils are proponents of water storage projects, the conflict becomes rather more acute. For example, the regulator of the Ruataniwha Water Storage Scheme (Hawkes Bay Regional Council) established an investment company that was the applicant for the dam (Hawkes Bay Regional Investment Company).

Proximal drivers of biodiversity loss are numerous, but effective management responses are few, despite the availability of some strong and potentially effective tools that could be used (e.g. water conservation orders, fish passage regulations, harvest regulations and species recovery plans that could address whitebait fishing and species decline).

It would seem that, until integrated management of freshwater ecosystems occurs, vulnerable biodiversity is unlikely to be sufficiently protected to halt its rapid decline. Public engagement in freshwater issues (not simply for biodiversity purposes, but for economic, recreation and tourism reasons as well) has undoubtedly increased in recent years. The combined efforts of agencies, community groups, interest groups such as game-bird hunters and others have doubtless improved the lot of freshwater ecosystems. Freshwater policy reform has been the subject of a national collaborative governance effort, resulting in the release of a Freshwater NPS and a National Objectives Framework. But is this policy reform likely to result in better protection of freshwater biodiversity? Or will vested interests continue to profit from the destruction of public goods and ecosystem services that come with abundant clean water and flourishing biodiversity?

Notwithstanding the potential for further reform, our long history of poor implementation of weak regulation suggests that regulatory and

practical measures to safeguard freshwater ecosystems will only take us so far. If aquatic biodiversity is to be maintained, it must be protected from degradation and loss of extent, with disruptions to connectivity and migratory pathways avoided. And the scale of this management must be broadened. As discussed by David Dudgeon *et al*, the scale of management must take into account the complexities of protecting freshwater ecosystems, which they refer to as “the ultimate conservation challenge”. They note that management paradigms must change to enable “inclusive management partnerships”, and that the state of freshwater biodiversity must be the prime indicator of success.

The damage to freshwater ecosystems has largely been for the benefit of private interests, at the expense of the public interest and indigenous

rights. Decision-makers are influenced by short-term economic objectives, which limit considerations of long-term outcomes including the maintenance and recovery of freshwater resources. It is clear that much innovation in freshwater biodiversity management is required in New Zealand, and that alignment of the many and often competing and divergent interests is necessary. The private and public interest in freshwater ecosystems must be reconciled if the intrinsic, cultural, recreational and ecological values of the systems are to be preserved for our future prosperity. We have a unique freshwater diversity, which desperately needs better management and a longer term view, if it isn't to be further degraded and our freshwater biodiversity lost for good.

John Leathwick



Waitawheta Cascade

### **Box 5.7 Ramsar Convention**

In 1971, New Zealand became a signatory to the Ramsar Convention, and committed to:

- Designate wetlands for inclusion on the List of Wetlands of International Importance
- Promote the significance of these wetlands and monitor and advise of any changes to their ecological character
- Promote the wise use of all wetlands, especially through formulating and implementing national policy on wetland conservation management
- Promote conservation of wetlands and waterfowl by establishing nature reserves on wetlands generally, to compensate for any loss of wetland resources of listed sites, encourage research, increase waterfowl populations and promote training in wetlands research, management and wardening

- Promote international co-operation in wetlands conservation, including the sharing of resources and expertise
- Be represented at Conferences of the Contracting Parties, to govern implementation of the Convention.<sup>99</sup>

At present, New Zealand has specifically included six sites under the Convention covering a total of 55,112 hectares, although there are many other sites that would meet Ramsar criteria. The six sites are

- Whangamarino, Waikato
- Kopuatai Peat Dome, Waikato
- Firth of Thames, Waikato
- Manawatū River Estuary, Manawatū
- Farewell Spit, Golden Bay
- Awarua Wetland/Waituna Lagoon, Southland<sup>100</sup>



*The once common brown teal is now highly endangered because of mammal predators and habitat loss. It can be abundant at sites protected from predators*

When a site is recognised under the Ramsar Convention, the main regulatory implication is that it is then included within Schedule 4 of the Crown Minerals Act 1991. Regional and district planning instruments may also reference the need to consider the Ramsar status of the sites in decision-making processes that may affect them. Some of the wetlands in the above list are under pressure from surrounding land uses (e.g. Lake Waituna, and the Manawatū Estuary)<sup>101</sup> while others or parts of others are in relatively good condition (e.g. internal regions of Kopuatai peat dome, raised bog parts of Whangamarino, Awarua peatland and Farewell Spit).

In 2001, the Office of the Auditor General undertook a review of how effectively New Zealand is meeting its Ramsar Convention obligations. Significant deficiencies were identified with respect to the degradation of wetlands through drainage and progressive encroachment.<sup>102</sup> The review also identified other deficiencies, particularly in the protection of wetlands on private land. In addition, sites already identified as Wetlands of International Significance under the Convention were insufficiently protected from key pressures due to a lack of regulatory or operational links. The Department of Conservation had also been slow to nominate appropriate sites for inclusion in the Convention.

In 2012, the Department reported on the triennial progress in implementing the Convention. Key achievements included the development of the DOC's National Heritage Management System, the Biodiversity Monitoring Framework, and the Partnerships restructure. Another highlight identified was the development of the Arawai Kakariki Programme.<sup>103</sup> Further planned actions to improve the implementation of the Ramsar Convention that are indicated in the report include:

- Establishment of a National Wetland Committee on an advisory basis
- Development of further information guiding the nomination of Ramsar sites
- Focusing on improving the overall management of water bodies and the coastal environment<sup>104</sup>



*Unregulated diffuse pollution by agriculture has caused serious degradation of this Ramsar site (Awarua Wetland/Waituna Lagoon, Southland)*

## Endnotes

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# 6 Protecting marine biodiversity



*Common dolphin (Delphinus delphis), Hauraki Gulf*

New Zealand's biodiversity-rich marine area covers 5.7 million km<sup>2</sup>, more than twenty times the land area.<sup>1</sup> More than 80 percent of our indigenous species are thought to be in the sea, and most are undescribed, as only about one percent of the marine environment has ever been surveyed for its biota.<sup>2</sup> New Zealand's vast marine area is host to an enormous diversity of resident and migratory species – including 40 percent of the world's seabirds and more than half of the world's marine mammals. The endemic New Zealand (or Hooker's) sea lion is the world's rarest sea lion, hunted to near-extinction during the 19th century. The endemic Maui's dolphin is the world's rarest dolphin, now classified as nationally critical – the worst threat ranking short of extinction. There were only an estimated 55 adults in 2010.<sup>3</sup> In addition to iconic marine mammals, the sea surrounding New Zealand hosts some 65,000 species of plants, animals and microorganisms and is a global hotspot for marine biodiversity.<sup>4</sup>

The estuaries, coastal waters and deep ocean areas all contain distinctive and sensitive ecosystems threatened by multiple pressures. Many have their origins in management failures on land and in freshwater ecosystems, allowing pollution, sedimentation and coastal structures to degrade the land-sea interface. Along with increasing knowledge of biodiversity, is a growing awareness of the economic opportunities presented by resource exploitation in marine environments. A range of industries is developing in New Zealand waters, and the cumulative impact of these in addition to the trans-boundary impacts of land management practices, poses a threat to the healthy function of our marine environment. Urgent improvements to our weak regulatory settings are required to safeguard the public interest in a healthy marine environment.

Loss of biodiversity in the sea is much less well-understood than on land, largely because of the technical and logistic challenges involved in



Raewyn Peart

Rāpoka/Hooker's or New Zealand sea lions (*Phocarctos hookeri*) at Sandfly Bay, Otago

research, survey and monitoring. Beyond iconic marine mammals and seabirds, fish and a few keystone macro-invertebrates, much marine biota is undescribed. Indeed, it is often not possible to determine whether a given species is indigenous or not, because the taxonomy and distributions of so many marine species are insufficiently known to make even this basic evaluation. However, the Census of Marine Life project, a decade-long biodiversity inventory programme, aims to address this issue.<sup>5</sup>

In this chapter we provide a brief overview of the main features of New Zealand's marine environments, from the estuaries to the outer edge of the Exclusive Economic Zone and Extended Continental Shelf, and summarise the state of knowledge about their biodiversity and its status. We examine the impacts of private interests, how their activities are managed, and the opportunities for legislative and policy change to improve outcomes for biodiversity. We also identify some new innovative management approaches to conservation and tools for marine biodiversity protection.

## **New Zealand's marine environment – what do we know?**

The patterns and distribution of marine biodiversity, and the functional role of biodiversity in marine ecosystems, have not been systematically explored. Knowledge about the lifecycle requirements of marine species, and the dominant ecological processes, are insufficient to assess the impacts of human activities and management interventions on biodiversity. The lack of taxonomic and distribution information confounds recognition of representative biodiversity hotspots and detailed knowledge of what exists in areas that are protected (e.g. benthic protection areas). Consequently, the degree of modification that has already occurred in the marine environment is difficult if not impossible to assess. Activities that harm biodiversity have typically preceded survey and research so there is no baseline information. This is why effects are usually poorly understood.

Management often occurs in ignorance of effects and without ways to monitor them. The lack of information to inform management is demonstrated in the 2013 Environmental Domain Plan. The Plan ranked the level of official data available to inform six key 'supplementary enduring' questions about the coastal and marine environment in New Zealand. Four official data sources were considered to inform the question to a 'low level' (mainly related to biodiversity, ecosystem services and cultural impacts) and three to a 'medium level' (related to drivers of change in diversity and condition of indigenous species). Four data sources were identified as 'highly informing' and related mainly to fishing: fish stock information, catch effort database, trawl survey database and the National Aquatic Biodiversity Information System<sup>6</sup> (an online mapping tool containing a wide range of maps detailing species distribution, customary

fishing areas and commercial fishing harvest information).<sup>7</sup> So in short, we know a lot about commercial fish and fishing but surprisingly little about the rest of our marine ecosystems.

Substantial effort in recent decades has improved the quantity and availability of information about the marine environment and knowledge is increasing all the time. The launch of the New Zealand Biodiversity Strategy in 2000 included a range of research programmes, including one by the then Ministry of Fisheries (now Ministry for Primary Industries) on biodiversity. Since then, research initiatives such as International Polar Year, Ocean Survey 20/20 (Land Information NZ), PlanBlue (Department of Conservation), Marine Biodiversity Research Programme (Ministry for Primary Industries) and the biodiversity and biosecurity programmes funded by the Ministry for Business Innovation and Enterprise have added much baseline knowledge. Ongoing progress is increasingly challenging as long-term commitment to such programmes is usurped by short-term research variously described as 'innovative', 'productive' or 'will result in a step change'. The result of this has been under-investment in long-term monitoring and research, compounded with a recent reduction in funding for marine biodiversity research.<sup>8</sup> Long-term monitoring is extremely valuable for tracking ecosystem change, and the importance of the data increases disproportionately through time.<sup>9</sup>

A classification of marine environments within the territorial sea and the Exclusive Economic Zone (but excluding estuaries) was published in 2005 by the Ministry for the Environment and NIWA. Numerous data layers have since been added to this classification and it is freely available online. A finer-scale case-study classification was undertaken at a 200 metre resolution over the Hauraki Gulf to ascertain the feasibility of higher-resolution classifications and their value in informing management decisions.

The New Zealand Estuarine Environment Classification was produced in 2007.<sup>10</sup> It is based on physical information and controlling factors that determine estuary hydrodynamics. The system covers 430 water bodies along 18,000 kilometres of coastline and divides them into nine classes.<sup>11</sup> Estuary classification is an important first step in their management as it reduces the risk of estuaries slipping between land and marine management regimes.

In 2008, the Department of Conservation released a classification of the coastal marine environment (the area from mean high water springs out to a depth of 200 metres) entitled 'Marine Protected Areas: Classification, Protection Standard and Implementation Guidelines'.<sup>12</sup> The classification divided New Zealand's territorial sea into 14 biogeographic regions. These regions were divided into estuarine and marine environments to reflect

the differing but interconnected management issues in each. The regions are then further divided by depth, exposure and substrate type to describe a total of 44 broad habitat types intended to underpin the establishment of further marine protected areas. In 2009, Biosecurity New Zealand (now contained within the Ministry for Primary Industries) commissioned a separate coastal classification that mapped the economic, environmental, social and cultural values of the coast.<sup>13</sup> This classification system does not yet cover the Exclusive Economic Zone.

**Table 6.1 Marine classification systems in New Zealand**

Classification system	Description
New Zealand Marine Environment Classification	A map-based classification of the physical and biological characteristics of the marine area within the Exclusive Economic Zone
Marine Protected Areas Classification	Classifies marine protected areas, and provides guidance on protection standards and implementation in report form
National Aquatic Biodiversity Information System	An interactive Web-based mapping tool which displays information on the New Zealand marine environment, species distribution and fisheries data
Ocean Survey 20/20	Biodiversity habitat mapping of the seabed using high definition multibeam data and sampling of benthos. Information is available on the web. Areas covered so far include the Chatham Rise, Challenger Plateau, Bay of Islands and east coast of the North Island.
Seamount Classification	An analysis of the known characteristics of seamounts and classification based on a range of 16 environmental variables
Estuarine Classification	An estuary classification based on controlling factors that influence estuary characteristics

A classification of the seamounts in New Zealand waters was undertaken by NIWA, based on 16 environmental variables and information about more than 800 seamounts.<sup>14</sup> Individual seamounts are characterised by high local endemism, but knowledge of the biota remains limited because of the technical sampling difficulties involved, and scarce taxonomic expertise which is required to identify the specimens. Research by NIWA, in association with the former Ministry of Fisheries and the Foundation for Research Science and Technology has improved knowledge in recent years, particularly of seamounts identified as important for fishing. Seamounts are now known to be highly productive ecosystems that support exceptional species richness. In addition, each seamount has its own distinctive and often endemic biota.<sup>15</sup>

While monitoring efforts are typically disconnected, efforts have been made to consolidate agency data from the monitoring, at a national scale. Some 130 data sets that constitute some form of monitoring in the marine environment have been identified and candidate indicators for a national Marine Environmental Monitoring Programme have been identified.

Coordination of spatial information at more local scales has also been undertaken, such as in the Hauraki Gulf, where the programme 'Seasketch' has been used to bring together known information on the Hauraki Gulf onto a Web-based platform.<sup>16</sup> Individual marine reserves have specific monitoring programmes associated with them.<sup>17</sup> Regional councils also gather data on the marine environment within their respective jurisdictions. For example, Auckland Council has a well-designed marine monitoring programme (albeit only partly implemented to date) developed in association with NIWA.<sup>18</sup>

Investment by the Ministry for Primary Industries into the Oceans 20/20 programme for the 'Fisheries and Biodiversity' theme is helping to improve knowledge of the marine environment. This programme started in 2005, and is aimed at increasing understanding of New Zealand's oceans, including the Ross Sea region. The project covers baseline ecological information, biodiversity distribution data and the mapping of ocean resources. One of the objectives of the project is to establish a national spatial and temporal monitoring programme for coastal and marine areas.<sup>19</sup>

### Threats to the marine environment

Sediment, pollution, reclamation and hard structures such as sea walls and causeways are persistent and ongoing sources of coastal and estuarine degradation. Fishing, dredging, sand mining, aquaculture and recreational use intermittently disturb wildlife and coastal ecosystems. Novel forms of disturbance and degradation may be foreshadowed by



*Seafloor survey, monitoring and research can inform the management and protection of marine biodiversity*

the recent interest in mining marine minerals. The challenge for New Zealand is to appropriately manage the economic interests in the marine environment and to institute effective safeguards of the public interest in healthy marine ecosystems.

Fishing is an important domestic and export industry but has significant impacts on biodiversity through stock depletion, by-catch and damage to seabed habitats from trawling and dredging. Bottom-trawling can destroy fragile biogenic bottom structures such as bivalve reefs and sponge communities. Repeated trawling of an area can reduce habitat and species diversity. Trawling affected 385,032km<sup>2</sup> of the New Zealand marine environment in the 20 year period between 1989/1990 and 2009/2010. This represents 9.34 percent of the total Exclusive Economic Zone and territorial sea and 27 percent of the area shallow and flat enough to fish by trawling.<sup>20</sup> Within that period, the area trawled annually peaked at 107,744km<sup>2</sup> in 2002/2003, and reduced to less than half that (49,708km<sup>2</sup>) in 2009/2010.<sup>21</sup> This decline can be attributed to diversification of fishing methods and more efficient operations. The Ministry for Primary Industries advise that more recent data will shortly be available, and it will include improved information on coastal fisheries. These are generally less well-monitored than those offshore.

Our fragile seamounts are also productive and heavily exploited fishing grounds. Of the 400 seamounts found within fishable depths, NIWA found that 80 percent had been trawled and that this activity damaged individual seamount ecosystems. However, knowledge of seamounts is limited by the scarcity of expertise to identify and categorise the species and communities found on them, both in New Zealand and globally.<sup>22</sup>

Littering of the marine environment is a significant and growing problem for marine species, domestically and internationally. Marine littering, particularly plastics from vessels, is generally illegal in New Zealand waters. This is enforced through the Resource Management (Marine Pollution) Regulations 1998 and the Maritime Transport Act 1994, (particularly the marine protection rules in Part 170). These rules are based on the International Convention for the Prevention of Pollution from Ships and the associated 1978 protocol (commonly known as MARPOL).<sup>23</sup> In 2014, the results of a litter sorting effort by Sustainable Coastlines were published. They revealed that between December 2010 and October 2013, 72.4 percent of litter items collected on coastlines in New Zealand and the Pacific was single-use plastic (such as plastic bags).<sup>24</sup> Plastics find their way up food chains, killing or harming fish, birds, marine mammals and turtles that ingest plastic objects.

In addition to direct impacts from fishing, biodiversity is threatened by invasive species. Marine pests can displace indigenous wildlife and cause ecosystem changes. A review of available data in 2010 (following an earlier synthesis in 1998)<sup>25</sup> identified that a total of 650 non-indigenous and cryptogenic (i.e. those that cannot be confirmed as indigenous or non-indigenous) marine species were known in New Zealand waters. The known distribution of identified marine pests is available online.<sup>26</sup> The



*The right to fish generally overrides the consideration of bycatch and impacts on seafloor biota.*

dependence of the New Zealand economy on shipping means that marine biosecurity risks are high. Invasive species can have significant impact on important industries such as fishing and aquaculture. The Ministry for Primary Industries is in charge of managing such marine biosecurity risks.

Climate change and ocean acidification are already having impacts, and these are likely to become far reaching, affecting most if not all marine ecosystems globally. Ocean acidification is caused by the oceanic absorption of increasing amounts of carbon dioxide from the atmosphere, resulting in progressive acidification, because carbon dioxide lowers the pH of water. The additional carbon dioxide is largely a result of human activities, and approximately half of that added to the atmosphere has been absorbed by the oceans.<sup>27</sup> The impact of ocean acidification is gradually becoming better understood through scientific research, which has demonstrated increasing acidity, and identified direct effects on shell-forming species and some fish.<sup>28</sup> Climate change and ocean acidification are also likely to significantly affect the composition of marine ecosystems.

Other effects of climate change are already evident in New Zealand, with

increased frequency of extreme weather events, and associated flooding of coastal areas. This has prompted short-term mitigation actions that can have negative impacts on indigenous biodiversity. Coastal structures such as seawalls are being built to protect property in low-lying coastal communities from flooding. The effect of such structures can be significant on coastal processes and they may destroy feeding and breeding areas for coastal wildlife such as wading birds.

### Funding marine conservation

The state of the world's marine environments is such that conservation actions are necessary and some are very urgent. But these need to be funded and conservation, marine conservation especially, is costly and usually underfunded. An investigation of marine conservation financing for the WWF in 2004 concluded that effective funding models would require users of marine environments and resources to pay for that use. The report identified that this was likely to "challenge traditional ideas that marine resources are free public commodities".<sup>29</sup> The report also noted that some marine conservation should properly be financed by



Peter Langlands

*New Zealand or Hookers sea lion female drowned by being caught in a trawl net*



government funding and recommended a mixed funding model based on multiple revenue streams.<sup>30</sup>

In 2010, the Nature Conservancy, motivated by the dearth of money available for marine conservation in the United States, set about investigating potential funding models. It identified a range of potential revenue sources. The most immediately promising were government efficiencies (maximising conservation output from existing funding) and market-based tools (payments for ecosystem services). The conclusions of the report emphasised the urgency of funding marine conservation, noting that sustainable conservation financing was critical to balancing environmental and human needs in marine areas.<sup>31</sup>

Users of the New Zealand marine environment typically do not pay to occupy the marine area, or to extract resources from it. Nor are they charged for any degradation of marine biodiversity that occurs as a direct result of their activities. Marine management is largely funded either from property rates (regional council management of the coastal marine areas) or general taxation. Fisheries quota owners pay for the direct costs of research into stock management and fisheries impacts, but do not presently pay a resource rental. They did previously pay such a rental, but factors such as traditional ownership claims by Māori meant the charge was transferred to a user-pays system.

The partial property rights regime surrounding fishing quota also has implications for biodiversity. Activities occupying space such as marine farms and marinas, typically do not pay for the alienation of a public resource, although some marinas do pay a coastal occupation charge. As elsewhere, this approach generally fails the public interest in marine biodiversity, because the revenue is not directed at the broader task of marine ecosystem management; including biological assessment and monitoring to inform effective conservation and protection, establishing baselines, marine spatial planning and the development of ocean policy.

The present marine management model and partial property rights regime provides little scope for marine conservation to be funded by contributions from sectors (e.g. fisheries, minerals, aquaculture, oil and gas projects, coastal structures and commercial shipping). Property rights (e.g. fishing quota) are generally resource-specific (and therefore 'partial'). Although the user-pays approach is used from time-to-time in New Zealand, use of the revenue to mitigate impacts of that use is rare. The lack of an environmental consenting regime for some marine activities (e.g. fishing) also limits opportunities for charging for the damage to the public interest. Other mechanisms exist such as levy systems on quota, or fees for boats registered for fishing, that could be spent on biodiversity management. A more comprehensive and diverse funding model for

marine conservation would be a positive step forward for New Zealand.

## Controlling access to the marine environment

The marine environment is the ultimate commons, and resources extracted from it are common pool resources (e.g. fish and minerals). The multiple interests in the marine environment, and the biodiversity values within it, are managed within a patchy rights-based regime. There is no guiding oceans policy or other policy umbrella under which marine activities may be regulated, threatened species and ecosystems identified and protected, or under which marine spatial planning can occur. The uncoordinated nature of marine management, and the vast extent of the environment itself, is a combination that is not conducive to biodiversity maintenance or indeed the wider protection of the public interest in the marine environment. Integrated ecosystem management is needed to achieve this goal, but progress towards it has been slow.

The need for overarching oceans policy to guide the management of New Zealand's vast marine area was identified in the New Zealand Biodiversity Strategy<sup>32</sup> and by the Parliamentary Commissioner for the Environment in 2000.<sup>33</sup> Recommendations included the development of a National Oceans Plan.<sup>34</sup> Between 2001 and 2003 a Ministerial Advisory Committee was formed to define a vision for improved oceans management, but controversy over the Māori ownership of foreshore and seabed froze this process in 2003. Responsibility to work towards an oceans policy was then handed to the Ministry for the Environment (which announced that work would begin in 2005). In a review of progress to date of implementing the New Zealand Biodiversity Strategy, Wren Green noted in 2006: "Clarifying and coordinating management responsibilities for the marine environment, within a clear strategic framework and a sustainable development context is central to resolving major issues that have confused and handicapped marine management for decades".<sup>35</sup> In 2007, the OECD's 'Environmental Performance Review' was critical of New Zealand's slow progress in developing national oceans policy.<sup>36</sup>

The oceans initiative resulted in some progress towards implementing a regime that would manage the adverse effects of economic activities in the EEZ, eventually culminating in the passing of the EEZ Act. This Act filled a significant legislative gap in the management of the environmental effects of activities within the Exclusive Economic Zone. Of the key outstanding tasks identified in the OECD report, an Act that includes a consenting regime (the EEZ Act), has been the one to come to fruition to date and is an important improvement.

However the management of biodiversity in the marine environment, from estuaries out to the edge of the continental shelf, remains dispersed

amongst many different management agencies under many Acts (see Table 6.2). The development of an Oceans Policy is still not active (as at 2014).

Primary responsibility for marine biodiversity lies with the Department and Minister of Conservation. Their roles are:

- General conservation of indigenous biodiversity, through habitat and species management
- Management of marine reserves, marine mammal sanctuaries and other protected areas
- Preparation of the NZCPS
- Approval of regional coastal plans
- Advocacy for conservation.

These roles intersect and conflict with those of other agencies as shown in Table 6.2. The most problematic intersections occur with the regulation of environmental effects, spatial protection of marine biodiversity, and protection of marine species. Further work is needed to address these conflicts in a way that protects the public interest and provides revenue from users that is deployed to marine environmental protection and management.

### ***Regulation of environmental effects of activities***

The impacts of activities on marine biodiversity are largely managed under the RMA (for the territorial sea), the EEZ Act (Exclusive Economic Zone and Extended Continental Shelf), and the Fisheries Act (entire marine area). Direct protection of marine species or their habitats is primarily achieved under the Wildlife Act, the Marine Reserves Act and the Marine Mammals Protection Act. Specific aspects of the work of Biosecurity New Zealand on invasive species (Biosecurity Act), and Maritime New Zealand on shipping and marine pollution (Maritime Transport Act) are also relevant.

Regional councils manage activities within catchments that may result in harmful discharges into the marine environment, and most activities (other than fishing) within the territorial sea, through regional policy statements, regional plans and the processing of resource consents. Regional coastal plans, which cover the marine area from mean high water springs to the edge of the territorial sea, require the final approval of the Minister of Conservation. They must give effect to the NZCPS, including Policy 11 which specifically addresses biodiversity protection. Regional coastal plans may identify 'significant ecological areas' in a similar manner to significant natural areas on land. Some councils have collected much information

**Table 6.2 Oceans management agencies**

<b>Agency</b>	<b>Role</b>
Department of Conservation and the Minister of Conservation	Undertakes species conservation, reserve management, plan preparation and approval and general advocacy. Manage marine reserves under the Marine Reserves Act 1971 and marine mammal sanctuaries under the Marine Mammals Protection Act 1978.
Minister and Ministry for Primary Industries	Manages fisheries resources in accordance with the environmental principles of the Fisheries Act 1996. Meeting United Nations Law of the Sea and other international fisheries agreements.
Environmental Protection Authority	Manages the consenting regime for mining and oil and petroleum drilling in the Exclusive Economic Zone and Extended Continental Shelf under the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.
Minister and Ministry for the Environment	Administer the RMA and undertaking environmental reporting.
Minister for Primary Industries and Biosecurity New Zealand	Manage invasive pest species through border control and ballast management under the Biosecurity Act 1993.
Maritime New Zealand	Manages shipping and marine pollution under the Maritime Transport Act 1994.
Regional councils	Manage activities within catchments and the territorial sea (excluding fisheries) under the Resource Management Act 1991 and the Local Government Act 2002.
Territorial authorities	Manage land use under the Resource Management Act 1991 and the Local Government Act 2002.
Iwi and hapū	Have a role in the administration of all coastal resources under the Resource Management Act 1991, the Fisheries Act 1986 and the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012, guaranteed by the Treaty of Waitangi. Have a major stake in the seafood industry from Treaty settlements including quota ownership and aquaculture.



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### *Fisheries management*

The environmental effects of fishing activity are mainly managed by the Minister and Ministry for Primary Industries under the Fisheries Act.<sup>38</sup> The Department of Conservation has responsibilities for marine mammal protection and protection of other wildlife, but has no authority to control the fishing activity impacting this wildlife. Access to fishing resources is controlled by the Minister for Primary Industries under the quota management system which addresses the management of commercially harvested fish stocks. The Minister sets a total allowable catch for each fish stock managed under the quota management system, and this is varied from time to time. Under the Act, this system “maintain(s) a stock at or above a level that can produce the maximum sustainable yield, having regard to the interdependence of stocks.”<sup>39</sup> Fishing is characterised by a pervasive expectation that the right to fish will be protected. Fishers’ strong desire to protect this right (and their specific right to quota) generally overrides conservation considerations.

Individual transferable quota is issued for each fish stock managed under the quota management system and can be freely traded. Such quota gives the holder a right to harvest a specific proportion of the ‘total allowable commercial catch’ for that stock, which is authorised through an ‘annual catch entitlement’. This is converted to a ‘quota weight equivalent’ at the start of each fishing year and is generally known as ‘quota’. Quota allocation is administered by FishServe, a private company contracted by the Ministry. Quota is a form of property, over which mortgages and caveats can be placed, and can be transferred from one party to another.<sup>40</sup> Where quota is exceeded it must be reported and the catcher must pay a ‘deemed value’ to the Ministry. Total allowable commercial catch limits can also be exceeded by illegal overfishing or by poaching of stocks, sometimes by organised crime rings.

Quota can be owned by anyone but there are strict limits on direct foreign ownership. Reductions in total allowable commercial catch, high fuel costs, equipment demands and levy requirements have all resulted in owners of small quotas being progressively bought out by large quota owners. Some quota may be leased back to former owners to fish. The result is that quota ownership is now concentrated in large corporates such as Sealord, Talley and Sanford. This has a number of consequences, one being to undermine incentives for quota lessees to minimise ecological impacts. Lessees do not have a long-term stake in the resource – an important pre-condition for sustainability measures to work.<sup>41</sup> Economic drivers to maximise harvest and minimise costs are more powerful and the regulatory agency does not have a strong conservation mandate that might motivate it to manage unforeseen effects.

*Orca (Orcinus orca) seen here in the Bay of Islands, are the largest members of the dolphin family*

on the marine environment, and have identified areas of significance (although mainly inter-tidal and near shore) while others have done very little. In general, councils have placed little priority on the management of the marine portion of their jurisdiction. Part of the reason for this, may be the lack of a funding model for such management as described above.

The main consenting agencies for impacts on marine biodiversity are the Minister of Conservation, regional councils and the Environmental Protection Authority. Like consenting regimes on land, marine consents focus primarily on site-level or activity-specific impacts, and as a result do not manage cumulative effects on biodiversity very well, if at all. In addition, the lack of understanding of some parts of the marine environment means it can be difficult for decision-makers to determine the significance of the impacts of a specific activity with confidence.

The Environmental Protection Authority was established in 2010. It is a government agency that administers the consenting of nationally significant projects under the RMA. It also implements the consenting regime for activities concerning minerals, oil and gas in the Exclusive Economic Zone (but not fisheries) under the EEZ Act.

The purpose of the EEZ Act is similar to that of the RMA: to “promote the sustainable management of the natural resources of the exclusive economic zone and the continental shelf”.<sup>37</sup> At the time of writing, one marine consent application had been heard for iron-sand mining off the Taranaki coast, and another for phosphate mining on the Chatham Rise. Both applications have since been declined on the grounds of uncertainty and inadequate information. The decision documents indicate that environmental concerns were important in determining the outcome of such applications.

Customary and recreational harvest is provided for within the total allowable catch, being the difference between that and the total allowable commercial catch. Customary harvest is provided for under the quota management system, where the fisheries themselves are managed by iwi and hapū under specific legislation (e.g. Kaimoana Customary Fishing Regulations 1998). Māori determine who has rights to customary fishing, based on whether or not a group has tangata whenua status. Recreational harvest is managed through bag and catch limits and restrictions on where to fish and what equipment and methods may be used. Fishing rules differ between regions.

Bag and catch limits control the daily catch per person, but have limited effectiveness in capping the overall take. This is because it is not known how many fishers there are, when and how often they are fishing, and how much they take overall. There is no annual catch limit for individual recreational fishers and nor is there an overall catch limit akin to the total

allowable commercial catch for recreational fishers as a sector. More effective tools for capping the recreational catch, such as licensing, are likely to meet stiff resistance because of the strongly and widely held belief that a person's right to fish is inalienable.

The belief in the right to fish causes hostility against measures for catch reduction and the protection of marine biodiversity more generally (e.g. establishment of marine reserves) which impact fishing. There is also conflict between commercial and recreational fishers over catch allocation for shared fisheries and this can lead to opposition to further catch restrictions. For example, in 2013 recreational snapper fishers objected to proposals to reduce the recreational snapper catch by reducing bag limits and increasing minimum size of individual fish. The proposals were a part of a discussion paper released by the Ministry for Primary Industries scoping revisions of the snapper quota for the first time since 1997, in light of evidence that the fishery was declining.



Angela Simpson

*Kekeno or New Zealand fur seal juvenile numbers are on the increase in much of the country. Recent declines on the West Coast of the South Island may be a result of fishing impacts*

The discussion document identified that recreational catch was significantly higher than provided for in the quota management system allowance and proposed tightening catch limits. Recreational fishers argued that the total allowable commercial catch and breaches thereof were resulting in a 'plummeting' recreational catch for a range of species. They were dissatisfied that their catch level should be the one to be reduced while the commercial catch level was to be maintained.<sup>42</sup> The discussion document noted that conflicts over the different rights and management regime were a barrier to collaborative solutions being reached between commercial, customary and recreational interests:

*Each sector should also be responsible for managing within the allocation provided and for determining appropriate management settings to do so. It is acknowledged that the current framework does not provide an easily comparable set of rights that allow for collective agreement nor create strong incentives for the recreational sector to take responsibility.<sup>43</sup>*

While the various fishing stakeholders squabble over catch numbers, the impact on biodiversity remain substantial, and there seem to be few drivers to reduce these and encourage conservation.

### Impact of fishing on biodiversity

Fishing has wider ecological effects than the quota management system directly addresses. Impacts include physical damage caused by the fishing methods used (e.g. damage to seabed habitats from trawling and dredging), and injury or death caused to protected mammals and seabirds caught in fishing equipment. The ecosystem level impacts of fishing are largely managed under the Fisheries Act through the application of 'sustainability measures' which can include restrictions on where and when fishing takes place and what fishing gear is used.

The setting of the total allowable catch has significant implications for biodiversity. Substantial reductions in fish stocks can impact the resilience and genetic diversity of the species itself. It can also have wider implications for the ecosystem if food-web relationships are disrupted. Trophic cascades have resulted from overharvesting top predators. For example, sea urchin barrens (rocky reefs stripped of kelp and their associated communities by a proliferation of sea urchins) along the north-east coast of the North Island, have become more numerous and grown in extent apparently as a result of the reduction in the numbers of large crayfish and snapper which prey on the urchins. Food sources for seabirds can be affected by the reduced abundance of pelagic predators (especially tuna) that push bait-fish to the surface where they are accessible to shallow-diving seabirds.



*Flesh-footed shearwaters (*Puffinus carneipes*) are caught as bycatch by both commercial and recreational fishers*

There have been some efforts to manage a few of the biodiversity impacts of fishing. In 2004, the Department of Conservation and the then Ministry of Fisheries released the first National Plan of Action targeted at reducing incidental catch of seabirds by commercial fishers.<sup>44</sup> This plan contained two main goals:

- To ensure that the long-term viability of protected seabird species is not threatened by their incidental catch in New Zealand fisheries waters or by New Zealand-flagged vessels in high seas fisheries
- To further reduce incidental catch of protected seabird species as far as possible, taking into account advances in technology, knowledge and financial implications

These plans were to be implemented by a mix of mandatory and voluntary measures, depending on the fishery.

In 2005, the then Ministry of Fisheries released its 'Strategy for Managing the Environmental Effects of Fishing' to address the impacts of "commercial, customary and recreational fishing on all elements of the aquatic environment".<sup>45</sup> The Strategy recognised that the environmental standards in the Fisheries Act 1996 were insufficiently detailed:

*Environmental standards define the point at which the effects of fishing on an element of the aquatic environment move from being acceptable to unacceptable, or adverse. Currently, there are few explicit limits on the effects of fishing, although the purpose and environmental principles of the Fisheries Act 1996 provide high-level guidance.<sup>46</sup>*

Consequently, the Strategy envisaged that standards would be set to



Ben Yi

*The management from the mountains right through to the sea has implications for marine biodiversity*

provide greater guidance on the management of the environmental effects of fishing activity that would consider:

- Weighing up whether effects on species or habitats are sustainable in the long term
- What society feels is the right balance between use and protection
- What the needs of future generations might be <sup>47</sup>

Environmental standards were intended to be non-binding and provide for the consideration of special circumstances. They were to take the form of policy rather than regulation, in providing guidance to the Minister's decisions under the Fisheries Act.<sup>48</sup> The Ministry of Fisheries formed the Aquatic Environment Working Group and the Biodiversity Research Advisory Group and charged both with addressing the matter of fishing's impacts on the environment. While unable to make management recommendations or decisions, these working groups consider the impact of bycatch, effects of bottom fisheries, trophic effects and other impacts.<sup>49</sup> While some progress has been made in specific areas (e.g. seabirds) the sluggish action on addressing sustainable fishing more broadly, and the protection of biodiversity from the impacts of fishing, suggest that the Strategy's policies have proved little more than symbolic.

Transparency of fishing activity has been improved in recent years, by more robust accounting for bycatch, and better recording of the trawl footprint. The figures for both are now more easily accessible to the public and the extent of the problem is better described. However, attention and expenditure on biodiversity conservation remains disproportionately

low. For example, in the 2011/2012 year, the Ministry of Agriculture and Fisheries allocated just 2 percent (\$2.2 million) of its overall budget (\$108.813 million) to conservation services. Of the overall budget for fisheries management, just 31 percent was recovered from industry with the taxpayer paying the remainder.<sup>50</sup>

Despite some improvements in practice, the quota management system today continues to focus on harvest effectiveness rather than ecosystem impacts.<sup>51</sup> This generally precludes ecosystem-based management approaches that would most benefit biodiversity and suggests that the environmental provisions of the Fisheries Act have not been well- implemented. In 2006, Wren Green and Bruce Clarkson suggested that the protection of marine biodiversity, in part, depended upon moving away from narrow measures of sustainability such as total allowable catch, but this shift has not occurred.<sup>52</sup>

Issues with wider ecological effects of fishing persist. Incidental catch of seabirds is a well-known example; another is the impact of trawling on biogenic reefs and a third is trawling's impacts on seamounts. In 2013, the National Plan of Action for Seabirds was updated to recognise that improvement was still needed in the way seabird bycatch was managed by the fishing industry.<sup>53</sup> The report identified that, although reductions in incidental catch had been made by deep-water long-liners, trawlers and the joint venture tuna fleet, more work was needed in inshore trawling, long-lining and set-net fisheries. It was also recognised that the impacts of non-commercial fishing were poorly understood.

Further improvement in the management of fishing effects is much needed to better safeguard marine biodiversity. At present, no environmental impact assessment or consenting process is required before new areas are dredged or bottom trawled, despite the risk of significant impacts on biodiversity. In many cases, such activities occur in advance of any scientific exploration of the benthic habitats in the affected area. There is no requirement or attempt to even identify what may be at risk before the impact occurs. As much damage has already occurred over wide areas, consideration also needs to be given to removing trawling from areas which historically had rich benthic communities, to enable restoration to occur.

The economic incentives to harvest species result in impacts on biodiversity; and addressing impacts is further constrained by other technical and institutional factors. The dual management of both the environmental effects of fishing and the access to the resource by the Ministry for Primary Industries is problematic. The Ministry has a limited mandate for conservation (and limited provision for audit by those who do). These two factors, combined, create a management context that is unlikely to provide good outcomes for biodiversity.

## **Regulatory capture**

Fishing as an industry has been identified as being susceptible to regulatory capture globally.<sup>54</sup> Regulatory capture is a phenomenon characterised by a regulator and the regulated industry having aligned interests, typically in economic activity. Regulatory capture is defined as: ‘where an agency or particular staff members come to identify inappropriately with the interests of those being regulated rather than with the public interest.’<sup>55</sup> As described in Chapter 2, the pressure from the regulated community is typically more organised, has a vital economic interest, and is thus stronger than opposing voluntary advocates of the public interest. The result may be weak legislation, and even weaker enforcement, as the regulator enables the economic activity of the regulated community instead of protecting the public interest from their excesses.

Regulatory capture is characterised by powerful and concentrated industry interests in a resource, close relationships between the regulator and the regulated community, and an alignment of interests between them (e.g. economic development). Evidence of frequent staff movement between the regulator and the regulated community is usually indicative of agency and regulatory capture. The Ministry for Primary Industries has a clear and strong mandate to encourage investment in fisheries, in agriculture and other industries, and this predisposes the agency to identify closely with the interests of the regulated community, making it susceptible to capture.

The influence of the Department of Conservation on both commercial and recreational fishing is very constrained. Use of tools designed to address conservation issues around fishing (e.g. population management plans and marine reserves) continue to be firmly resisted by fishing interests. The slow progress in addressing environmental standards for fishing, the lack of ecosystem management and ongoing issues with bycatch, certainly indicate that the economic interests of the regulated commercial fishing community have largely prevailed over the public interest in marine biodiversity. In contrast, behaviour that undermines the quota management system, and therefore impacts the interests of the commercial fishing sector, is the focus of well-resourced and generally effective enforcement action. The power asymmetry between conservation and fishing interests, combined with a remote, hostile and unfamiliar environment create a unique and formidable conservation challenge.

In 2011, the Department of Internal Affairs published a guide that included measures to limit the risk of regulatory capture in New Zealand’s public service.<sup>56</sup> A particular area of focus in the guide was the implications of members of an industry being recruited by the regulator, or recruited by

industry from the regulatory agency. The guide recommended careful management of conflicts to ensure that regulators continue to act in the public interest. Strategies recommended included the rotation of staff through positions, operating a buddy system and requiring strict recording of regulator-industry interactions.<sup>57</sup> It is not clear if such strategies are being implemented. Staff regularly move between industry and the regulator in many extractive industries in New Zealand, including at executive leadership levels.

## **Regulation for protection of marine biodiversity**

The New Zealand Biodiversity Strategy recognised the importance of protecting marine biodiversity. Theme three of the Strategy related specifically to coastal and marine biodiversity and set the following goals to be met by 2020:

- New Zealand’s natural marine habitats and ecosystems are maintained in a healthy functioning state. Degraded marine habitats are recovering. A full range of marine habitats and ecosystems representative of New Zealand’s indigenous marine biodiversity is protected.
- No human-induced extinctions of marine species within New Zealand’s marine environment have occurred. Rare or threatened marine species are adequately protected from harvesting and other human threats, enabling them to recover.
- Marine biodiversity is appreciated, and any harvesting or marine development is done in an informed, controlled and ecologically sustainable manner.
- No new undesirable introduced species are established, and threats to indigenous biodiversity from established exotic organisms are being reduced and controlled.

Several Acts aim to protect both species and ecosystems in the marine environment, via the establishment of marine reserves (see Box 6.1), the protection of the coastline from development activities, and the formulation of population management plans for threatened species. In this section we review these Acts and the tools within them.

### ***Protection of marine species***

The Marine Mammals Protection Act is the primary legislation for the protection of marine mammals generally. It is an offence under the Act to intentionally ‘take’ a marine mammal without a permit. The word ‘take’ has a wide definition under the legislation and includes injuring, killing,

disturbing or harassing a marine mammal. Despite this protection, the Act effectively permits by-catch of marine mammals without a permit, if the incident is reported. There is no general obligation under the Act to avoid or reduce by-catch, even of threatened species.

The Act provides for the preparation of population management plans to set by-catch limits (a “maximum allowable level of fishing-related mortality”), to which fishers will be required to adhere through regulations under the Fisheries Act, which link to these plans. However, there is no legal obligation to prepare such plans, irrespective of the conservation status of any species known to be affected by fishing activities. The preparation of a population management plan is a lengthy legal process and requires concurrence of the Minister for Primary Industries (the fishery resource manager).

There have been several attempts to prepare population management plans since provision for them was first inserted into the Fisheries Act, but none have been completed. For example, work was started on a population management plan for the New Zealand sea lion in the late 1990s after it was first gazetted as threatened. A non-statutory surrogate for the population management plan: the 'New Zealand Sea Lion Species Management Plan 2009-14' was released instead. This is less likely to protect the sea lions than a statutory document because it is unenforceable.<sup>58</sup>

Population declines have occurred in the years since the non-statutory plan was released, and the New Zealand sea lion was reclassified from ‘at risk-range restricted’ to a more serious threat category of ‘nationally critical’, in 2010.<sup>59</sup> A few years later, reproduction was shown to have dropped a further 18 percent in the year to 2013/2014, due to a range of factors such as disease, low prey abundance and the impacts of bycatch.<sup>60</sup> Present measures are not demonstrating the required reversal in population trends.

The Marine Mammals Protection Act also provides for the creation of marine mammal sanctuaries, designed to provide areas where marine mammals are safe from threats. Such sanctuaries have been created around the mainland coast to protect the Hector’s and Maui’s dolphins, and around the Auckland Islands to protect the New Zealand sea lion. Associated regulations (under the Fisheries Act and the Marine Mammals Protection Act) exclude activities such as set netting from much of these areas. The sanctuaries have certainly had a positive effect on reducing the bycatch of these species. However they do not cover the full range of these marine mammals, and bycatch (albeit at much lower levels), continues.<sup>61</sup>



Raewyn Peart

*Bans on set-netting are in place in the Akaroa Harbour to reduce Hector’s Dolphin bycatch*

A more comprehensive discussion of marine mammals and fishing is presented in ‘Wonders of the Sea: The Protection of New Zealand’s Marine Mammals’ which noted that:

*The Marine Mammals Protection Act 1978 ... has not succeeded in ensuring the health of New Zealand’s marine mammal populations. Many species are suffering from significant stresses. The very survival of some, such as the Maui’s dolphin, is now at stake.*<sup>62</sup>

It would seem as though the Marine Mammals Protection Act is still not protecting marine mammals from one of the most significant impacts on their survival.

The Wildlife Act protects the marine species listed in Schedule 7A of the Act. The schedule contains a few species across diverse taxonomic groups: a range of corals (black, gorgonian, stony and hydro corals), five sharks (oceanic whitetip, basking, deepwater nurse, white pointer and whale shark), two rays (manta and spintail devil ray) and two species of grouper (Queensland and spotted black grouper).<sup>63</sup> The protection is against intentional take, with accidental or incidental damage being legal so long as it is reported. Other forms of ‘take’ of the listed species needs to be authorised by a permit issued by the Director-General of Conservation. There is provision for the preparation of population management plans to address fisheries bycatch issues for (but not limited to) seabirds in a similar manner to those under the Marine Mammals Protection Act. However, no such plans have been finalised.

The Wildlife Act and the Marine Mammals Protection Act enable the protection of marine biodiversity. Other legislation including the RMA, the Fisheries Act and the EEZ Act manage activities which may impact biodiversity. However, the various Acts are not linked, and in practice,



those enabling resource extraction are generally implemented more successfully than those that safeguard biodiversity. The result is that conflicts between fisheries and protected species are largely resolved under the Fisheries Act, in favour of private commercial interests, rather than in favour of the public interest in species protection.<sup>64</sup>

### ***Spatial protection of marine habitat***

Spatial protection of marine environments is a key tool for protecting marine ecosystems and retaining representative examples of different ecosystems. The benefits of marine protected areas to biodiversity are well-understood and well-documented.<sup>65</sup> Key benefits include the protection of species and habitats, the use of reserves as control and reference sites, and benefits to surrounding fisheries from spill-over effects on fish abundance.<sup>66</sup>

Despite the impacts of past and present activities, New Zealand's marine ecosystems are generally intact, and the removal of key pressures will in many areas, but not everywhere, likely lead to ecosystem recovery. For example, the ecosystem recovery observed at Cape Rodney to Okakari Marine Reserve (better known as Goat Island Marine Reserve) has been dramatic and this outcome has been repeated in other no-take marine reserves.<sup>67</sup> Marine protected areas are therefore a key device for alleviating the pressures on marine ecosystems.

The Marine Reserves Act is administered by the Department of Conservation and provides for the establishment of marine reserves within the territorial sea. Under the Act, marine reserves are:

*for the purpose of preserving, as marine reserves for the scientific study of marine life, areas of New Zealand that contain underwater scenery, natural features, or marine life, of such distinctive quality, or so typical, or beautiful, or unique, that their continued preservation is in the national interest.*<sup>68</sup>

The first marine reserve in New Zealand was the Cape Rodney to Okakari Marine Reserve (the Goat Island Marine Reserve), opened in 1977,<sup>69</sup> one of the first 'no-take' marine reserves in the world. Since that time, 34 marine reserves have been created covering 12,795.7km<sup>2</sup>, with several others under consideration. Many more have been proposed but opposed by fishing interests; recreational, customary and commercial.

As already mentioned, the Marine Mammals Protection Act also contains provisions for marine mammal sanctuaries that can be established by the Minister of Conservation.<sup>70</sup> The locations and boundaries of these areas are defined in regulations with rules restricting threatening activities. Six

**Table 6.3 Tools for spatial protection of marine biodiversity**

<b>Protection tool</b>	<b>Act</b>	<b>Agency</b>
Marine Reserves	Marine Reserves Act 1971	Department of Conservation
Marine Mammal Sanctuaries	Marine Mammals Protection Act 1978	Department of Conservation
Marine Parks and Marine Protected Areas (MPAs)	Various ad hoc	Various
Sustainability measures (e.g. Benthic Protection Areas and seamount closures)	Fisheries Act 1996	Ministry for Primary Industries

marine mammal sanctuaries have been established, most to protect the endemic Hector's and Maui's dolphin. The New Zealand sea lion is also protected in the Auckland Islands Marine Mammal Sanctuary.<sup>71</sup> In 2014, the Minister of Conservation ordered a minor interim extension to the area of sea closed to set-netting (a major threat to the Maui's dolphin) in response to continuing concerns about its welfare.

Management of biodiversity in the Exclusive Economic Zone remains the responsibility of the Department of Conservation. However, the Marine Reserves Act 1971 pre-dates the 1982 United Nations Convention on the Law of the Sea which enabled the establishment of New Zealand's Exclusive Economic Zone. Consequently, marine reserves cannot be established beyond the territorial sea. The Marine Reserves Act states that marine reserves may only be established for scientific reasons, so it overlooks biodiversity protection as a legitimate purpose. Strict restrictions on activities allowed in marine reserves means this tool lacks flexibility, the process through which they are created generates conflict rather than consensus, and proposals for marine reserves are usually met with hostility by resource users. Legislation that provides for a wider array of mechanisms, with varying levels of protection, may have greater success in setting areas aside.<sup>72</sup>

Specific locations called 'benthic protection areas' have been identified under the Fisheries Act to conserve seabed biodiversity by protecting it from the impacts of bottom-fishing. This protection was initiated and

designed by the fishing industry to create a series of no-trawl zones within the Exclusive Economic Zone. Many of the areas had limited fishing value anyway due to their very great depth.

The government responded in 2007, by passing the Fisheries (Benthic Protection Areas) Regulations which applied to approximately one third of the Exclusive Economic Zone. These areas were closed to bottom contact activities such as dredging and bottom-trawling, but not to other forms of fishing or other bottom contact activities such as seabed mining (now managed by the Environmental Protection Authority under the EEZ Act). The recent proposal to mine phosphate nodules on the Chatham Rise within a benthic protection area highlights the limitations of creating marine protected areas under the Fisheries Act which is not designed to protect biodiversity from other activities such as mining.

### ***Māori-specific marine protection***

Section 10 of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 provided for the Crown to formulate legislation to

*recognise and provide for customary food gathering by Māori and the special relationship between tangata whenua and those places which are of customary food gathering importance (including tauranga ika and mahinga mātaītai), to the extent that such food gathering is neither commercial in any way nor involves commercial gain or trade.<sup>73</sup>*

These customary protection areas include both mātaītai and taiapure – the two main formal mechanisms for the protection of Māori access and ownership to traditional fishing grounds. A mātaītai is generally stricter and more exclusive than a taiapure.<sup>74</sup>

The Fisheries (Kaimoana Customary Fishing) Regulations came into force in 1998 and enable a mātaītai reserve to be declared. Mātaītai reserves usually exclude commercial fishing<sup>75</sup> and tangata whenua can administer other activities occurring within them. Such areas are not reserves for the purposes of the Marine Reserves Act and are not specifically designed for biodiversity protection.<sup>76</sup> At present, ten mātaītai reserves have been gazetted in the North Island, and a further 21 in the South Island.<sup>77</sup> The Fisheries Act also contains provision for taiapure-local fisheries,<sup>78</sup> areas of the estuarine or littoral zone that are traditionally important to iwi or hapū. Such areas are typically managed by a local Māori representative, and fishing is permitted.

There is conflict between Māori interests in the marine environment, and statutory mechanisms for marine protection and the no-take basis for marine reserves, that stem from differences between the Māori

and colonial world views. The poor statutory basis for reconciling these conflicts does not help. For instance, the Marine Reserves Act does not reference the Treaty of Waitangi, and has no specific provisions relating to the engagement of tangata whenua in proposals for protected areas which they have not initiated. This is problematic because management of harvest from the coastal marine area is a frequent trigger for disagreements between Māori and the Crown.

Māori are often vocal opponents of marine reserves and other protection mechanisms in traditional fishing areas. This is due to the resulting loss of management rights, loss of traditional fishing areas, inflexibility and threats to traditional practices. Māori also oppose conservation measures from time to time both for commercial reasons and because they can have significant implications for Treaty matters. On the other hand, Māori can also be strong supporters of conservation measures. They have been the initiator of several individual marine reserve applications (e.g. Tuhua-Mayor Island and Te Tapuwāe O Rongokako in Gisborne) as well as collaborative marine planning exercises which have identified candidate marine reserves (e.g. Te Korowai o Te Tai ō Marokura – Kaikōura Marine Strategy).

### ***Improving marine protection***

The Department of Conservation reviewed the marine reserves legislation to implement a 'priority action' of the New Zealand Biodiversity Strategy. Submitters indicated wide support for marine reserves as a tool, and for the protection of a representative range of marine ecosystems, with a majority favouring a 'no-take' approach in preference to other less restrictive models of marine protection. A revised Marine Reserves Bill was introduced into Parliament in 2002, but in 2012 it was withdrawn after a lengthy period of inaction. New legislation is being prepared at the time of writing, that is likely to include a biodiversity-related purpose, a wider variety of protection options, and a less divisive process for their application. The exact nature of these proposed changes is not yet known.

In 2005 the Marine Protected Areas Policy and Implementation Plan was developed to implement Objective 3.6 of the New Zealand Biodiversity Strategy:

*Action 3.6 (a): Develop and implement a strategy for establishing a network of areas that protect marine biodiversity, including marine reserves, world heritage sites, and other coastal and marine management tools such as mātaītai and taiapure areas, marine area closures, seasonal closures and area closures to certain fishing methods.*

*Action 3.6 (b): Achieve a target of protecting 10 percent of New Zealand's*

*marine environment by 2010 in view of establishing a network of representative protected marine areas.*<sup>79</sup>

The Policy established a 'Protection Standard for Marine Protected Areas' in 2008. There are three types of protected area recognised reflecting levels of capacity to restrict fishing impacts:

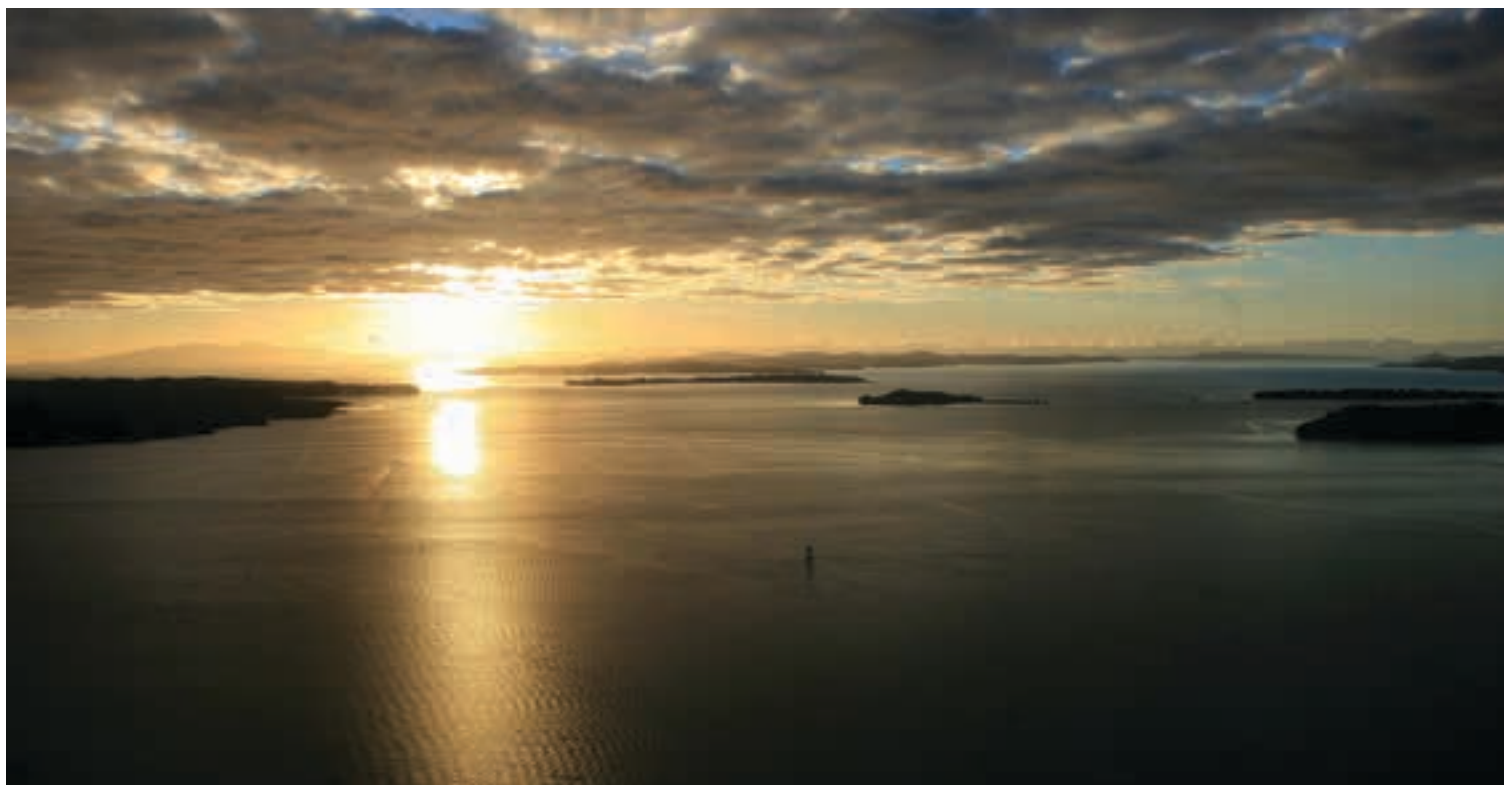
- Type 1: Marine protected areas that provided a high level of protection, including broad scope to restrict damaging activities. Only marine reserves under the Marine Reserves Act 1971 meet the Type 1 standard
- Type 2: Marine protected areas that provide only limited protection, but must as a minimum provide for prohibition of trawling, Danish seine netting and dredging
- Type 3: Marine areas that are partly protected by other tools but do not meet the protection standards of Type 1 or Type 2 marine protected areas<sup>80</sup>

In 2011, the Department of Conservation undertook a gap analysis of marine protected areas, to determine how representative the marine

reserve network was. The report identified significant gaps. Of the ecosystem types represented in the existing network, only a very small proportion of their total area was protected.<sup>81</sup> The report found that only 6.9 percent of all coastal marine bioregions were protected within the coastal marine area, and that this percentage was mostly composed of two large marine reserves (Kermadec Islands and Subantarctic Islands). Aside from those two bioregions, less than one percent was protected to a Type 1 standard. Approximately 1.14 percent of the territorial sea was protected to a Type 2 standard. Most marine bioregions nationally were very poorly represented by marine protected areas,<sup>82</sup> but additional reserves have been established since this gap analysis was published.

#### ***Collaboration in the marine space***

The Marine Protected Areas Policy and Implementation Plan provided a framework for collaborative stakeholder-led processes to identify networks of possible marine reserves within the 14 bioregions identified around New Zealand's coast. This mechanism was intended to help address the current gaps in protection, facilitated by multi-stakeholder groups called marine protection forums. Such processes were established



Raewyn Peart

*Sea Change - Tai Timu Tai Pari, has drawn a diverse group of stakeholders together to participate in marine spatial planning*

by government for the west coast of the South Island (2005) and the Sub-Antarctic region (2008). A third process was established in 2014 for the Otago region (which presently lacks any marine protected areas at all). Only three of fourteen fora have been established and one only very recently after a long delay. Of those that have taken place, stakeholder agreement has been very difficult to achieve. This is the result of both a limited array of protection options available and of the concerns of commercial industries (especially fisheries) about loss of fishing opportunity in areas recommended for protection.<sup>83</sup>

Both the West Coast Marine Protection Forum and the Subantarctic Marine Protection Forum recommended areas for protection to the Minister for Conservation in 2010. As a result of this process, numerous new reserves have been established. In 2013, five new marine reserves (covering 17,500 hectares) received Ministerial approval to be established under the Marine Reserves Act.<sup>84</sup> The government then created three new marine reserves around the Sub-Antarctic Islands (covering 435,000 hectares) in 2014. This was achieved by passing special legislation (the Subantarctic Islands Marine Reserves Act 2014) further highlighting problems with the Marine Reserves Act.

The Kaikōura (Te-Tai-o-Marokura) Marine Management Act 2014 came into force in August 2014. The Act includes provision for a 10,416 hectare marine reserve, whale and fur seal sanctuaries and additional fishing regulations and restrictions on seismic surveying.<sup>85</sup> While some regions of the country have been protected through these processes, more work is needed in others. For example, the north eastern bioregion which stretches up the east coast of the top of the North Island is very poorly protected. Just 981km<sup>2</sup> of the 38,073km<sup>2</sup> area has some degree of protection, and only 79km<sup>2</sup> (0.2 percent) is fully protected in a marine reserve.<sup>86</sup>

Auckland's biodiversity-rich Hauraki Gulf is the setting for another major stakeholder-led process: Seachange (Tai Timu Tai Pari). The process is focused on developing the Hauraki Gulf Marine Spatial Plan. Members of the stakeholder working group, which is developing the plan through a collaborative process, include iwi, industry, environment and community representatives.

Marine spatial planning is an interactive planning mechanism that enables management and allocation of marine resources in a manner that balances the needs of all competing users with the need to protect the environment. Marine spatial planning can be defined as:

*a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through*

*a political process. Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic and participatory.*<sup>87</sup>

This approach better provides for the protection of marine biodiversity in a number of ways. It enables ecosystem management, improves connections between regulatory agencies, and improves capacity for proactive reserve selection.<sup>88</sup> Most experience of marine spatial planning to date has been focused on the establishment of marine protected areas (such as in the case of the Kaikōura example and others above). The marine spatial planning approach used in the United Kingdom, Belgium, Netherlands and Germany is an example of a more comprehensive initiative designed to manage the multiple uses of the marine areas.<sup>89</sup>

## Key conclusions and a way forward

The consistent theme of legislation for the protection of marine species and ecosystems is that it is weak and under-implemented. While there is useful capacity in the legislation for ample protection measures, the conflict with economic interests and the lack of protection advocacy by the regulatory agency, have severely constrained outcomes for biodiversity to date. Conservation measures typically exist only where they do not limit private benefits gained from exercise of private property rights.

However, there are exceptions to this. Set-net bans in Maui's dolphin habitat have impacted commercial fishers as has the growing network of marine reserves. Weaknesses and under-implementation issues can be addressed through legislative amendment; however, good amendments alone will fail to deliver desired outcomes without corresponding changes to the culture of the agencies that manage the marine environment. Specifically, firm action is required to ensure that the Ministry for Primary Industries is not subject to industry capture, so that it can implement its regulatory powers in pursuit of the public interest. Regulating the environmental impacts of fishing needs to be moved to a more independent agency, such as the Environmental Protection Authority. Regional councils need to be incentivised to properly manage other activities in the territorial sea and their associated catchments. Achieving more effective marine biodiversity protection is also likely to require changes in the way that revenue is collected from economic activities in the marine environment and spent on marine biodiversity conservation and environmental protection measures.

Notwithstanding the causes of regulation weakness and under-implementation (market failure, collective action problems and agency capture), there are opportunities for amendments to the Fisheries Act, the Marine Reserves Act and the Marine Mammals Protection Act that could

remove some barriers to the maintenance of biodiversity in New Zealand's marine environment. Barriers to biodiversity maintenance that could be addressed at least in part via amendments include that the current legislation:

- Does not protect threatened indigenous biodiversity, or apply throughout the marine environment or across all threatened biodiversity (e.g. Marine Reserves Act does not apply in the Exclusive Economic Zone; Wildlife Act only protects a few named marine species).
- Is not linked. Key pressures on species and their habitats cannot be managed sufficiently effectively to retain marine biodiversity.
- Includes tools which are unwieldy to use, not fit for purpose, and subject to concurrence by other Ministers with economic development but no conservation responsibility (e.g. population management plans; marine reserves; marine mammal sanctuaries).
- Fails to separate the management of the right to fish from the management of environmental effects on biodiversity of fishing (e.g. Fisheries Act). Consequently, biodiversity is given insufficient priority to provide for its maintenance.
- Does not facilitate management response to long-term environmental changes such as climate change or ocean acidification.
- Does not facilitate integrated management of the marine realm.

Established protected area networks are not representative of the diversity of ecosystems present within our marine environment, and the narrow range of biodiversity-focused tools to achieve that protection is largely inadequate for the task. The legislation fails to provide for contemporary management approaches such as marine spatial planning or management of cumulative effects.<sup>90</sup>

A common feature of activities affecting marine biodiversity is that they are not controlled in a way that recognises the spatial and temporal scale of their effects. Thus the most pervasive, extensive and comprehensive impact – fishing – is not subject to a consenting regime designed to manage its environmental effects. Nor is there scope for a user-pays system that might provide a mechanism for private interests to compensate the public for diminution of the public interest in flourishing marine biodiversity, for their private gain. The general public is largely disconnected from the offshore marine environment and has little notion of its values, threats to them or how they are used and exploited, and this exacerbates the collective action problem.

Marine spatial planning is a promising tool to provide a framework to better manage the effects of marine activities on biodiversity and its early implementation in the Hauraki Gulf will be instructive. Its key barrier is that marine spatial planning is not expressly enabled by current legislation. Legislative change to provide a statutory basis for it, or at least for implementation of its outcomes, is an important next step. Overarching policy for the management and protection of oceans surrounding New Zealand is also a significant gap. A national oceans policy could provide a crucial setting for marine spatial planning.

However no amount of technical solutions, or well-meaning legislative amendments, will effectively address agency capture, resource allocation and fundamental issues with the funding of marine conservation. A more strategic and holistic management approach of both industries and ecosystems will be the only pathway that will lead us to allowing economic activity within environmental limits.

Present resource managers are charged with wider ecosystem management, largely by default and partly by regulatory design, and the outcome for biodiversity is not positive. The cumulative result of all present shortcomings is degradation and loss of our marine biodiversity, some before it can be scientifically described. More innovative ways to manage the marine environment are required if marine biodiversity is to be maintained in something akin to or better than its present depleted state.

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# 7 Supporting community conservation



*Projects such as Rotoroa Island showcase the ability of non-agency conservation to contribute to species and ecosystem protection*

The failure of markets to price biodiversity, and the absence of markets for conservation, do not mean people don't value biodiversity conservation. The recent growth in community conservation is testimony to unsatiated public demand, and hence willingness to participate actively and forgo other pleasures in order to achieve conservation results. Innovations in restoration, developed and proven by the Department of Conservation's Mainland Island programme, captured communities' imaginations and presented an attainable and feasible vision of native communities unimpacted by pests. With the Department and councils as active partners providing sites and/or support, communities have found an outlet for their desire for conservation and have achieved some spectacular successes. Others have achieved substantial progress without agency involvement at all. But sustaining these successes is proving a challenge in the face of absent markets for biodiversity conservation.

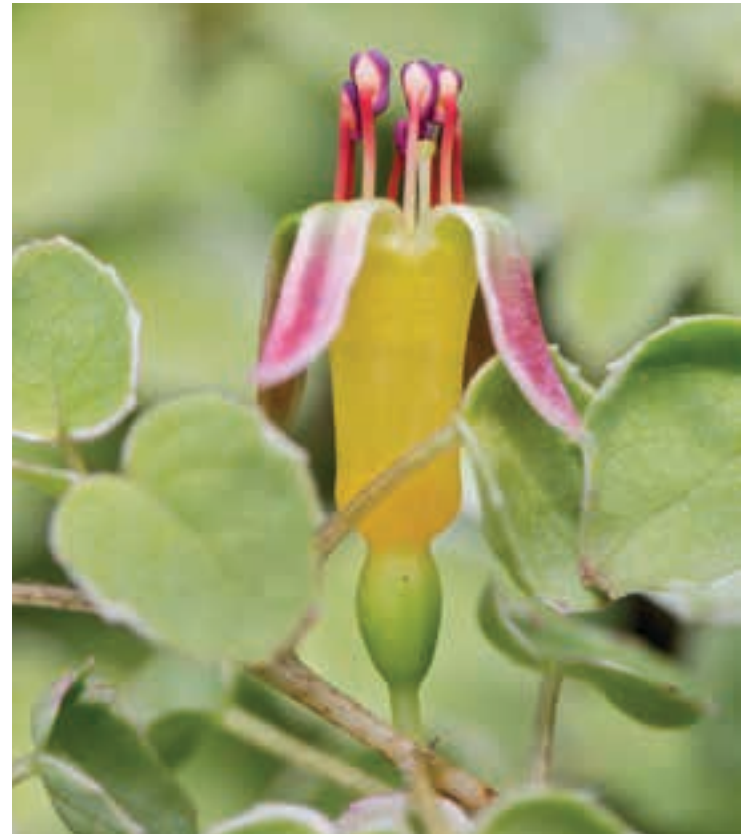
The New Zealand Biodiversity Strategy identified the efforts of communities as crucial to protecting biodiversity. Theme 8 of the Strategy is 'Community Participation and Awareness' and this discusses the importance of engaging the general public and educating them on the importance of biodiversity. The Theme recognises that people are fundamental agents of change; individually and collectively. The Strategy goes on to note that its success was contingent upon:

*behavioural change and the active involvement of people and their organisations and communities in biodiversity management. This relies on people understanding and valuing biodiversity (how it contributes to ecosystem health as well as to their lifestyles) and being motivated to act and respond appropriately to biodiversity issues.<sup>1</sup>*

The rise of non-agency conservation, dominated by community groups and individuals, is changing the context for biodiversity protection in New Zealand. Agencies are increasingly reliant upon volunteer labour input and there is much more conservation to be done than agencies are likely to be mandated and funded to take on. Engaging the community in conservation is important, because the community is a significant stakeholder in the protection of natural heritage, and community conservation increases social capital for biodiversity protection.

Community conservation is now a key part of the biodiversity protection challenge. It can achieve national, regional and local conservation goals. Questions remain, however, over how community conservation can best complement agency efforts, and how it can be sustained financially. The challenge is to enable, maintain and support a thriving community conservation sector that complements the efforts of agencies.

In this chapter we define community conservation and demonstrate



Bryce McQuillan

*Fuschia procumbens*

participation growth nationwide. We consider the growth of the sector, the funding available, and what those mean for agencies in a supporting role. We demonstrate that the tough funding environment, and lack of coordination, is likely limiting the ability of community-led conservation projects to contribute more effectively to biodiversity conservation. We consider the opportunities for innovation in this regard.

## What is community conservation?

Community-based conservation can be defined as "bottom-up (or grass-root) activities that bring individuals and organisations together to work towards achieving desired environmental goals".<sup>2</sup> Community conservation projects vary in scale and scope, from small groups of individuals weeding a local reserve or fragment of privately owned forest, through to large-scale multi-million-dollar Mainland Island projects with hundreds of volunteers and paid staff. Many community conservation initiatives are partnerships between a community group and other organisations such as the Department of Conservation, councils, NGOs such as WWF and the private sector.



Loss of biodiversity is a so-called 'wicked problem' and addressing it requires multi-stakeholder involvement. Fikret Berkes noted that a more nuanced understanding of the socio-ecological context for community conservation is required to improve the effectiveness of community efforts. In addition, a more interdisciplinary approach to conservation is necessary, that allows for multiple actors and for efforts to be undertaken at a range of linked scales.<sup>3</sup> New Zealand has recognised this new paradigm by shifting from central agency conservation to a greater focus upon community partnerships that are broader and more inclusive of other stakeholders.

## Growth of community conservation in New Zealand

The Department of Conservation's Mainland Island projects such as Trounson Kauri Park catalysed community conservation. They demonstrated that rare and threatened species populations could be restored at mainland sites within production and peri-urban landscapes. These projects facilitated advances in pest control and species recovery



Gareth McGregor

*Predator-proof fence at Maungatautari Ecological Island, Waikato*

### **Box 7.1 Project Janszoon**

Project Janszoon is a major restoration project in the Abel Tasman National Park, which commenced in 2012, and which is being undertaken by Project Janszoon (a private trust), the Abel Tasman Birdsong Trust, the Department of Conservation, iwi and the community. The National Park attracts 160,000 visitors a year, but was a low management priority for the Department, which mainly focused on maintaining visitor assets.

Project Janszoon intends to restore 20,000 hectares of the Park over a 30 year time period to 2042. The end-date was chosen as it is both the 100<sup>th</sup> anniversary of the Park's protection, and the 400<sup>th</sup> anniversary of the arrival of Abel Janszoon Tasman, the Dutch explorer. The restoration project has three distinct phases: the secure phase, restore phase and future-proofing phase.

The secure phase has been in progress for three years. To date, it has involved a large wilding conifer programme that has poisoned and felled hundreds of thousands of pines, 15,000 hectares of stoat control and an aerial 1080 operation. The aerial 1080 operation was enabled by a ten year consent from the Tasman District Council (the first of its kind to be issued). More than 11,000 hectares were treated and pest numbers fell to a very low level.

The restore phase has recently focused on re-introductions of formerly resident species such as the yellow-crowned kākārīki and saddleback. Future introductions are likely to include blue duck, brown teal, kiwi, mōhua (yellowhead), kākā and tuatara. This project phase also includes habitat restoration. For example, a lowland remnant of kahikatea has been protected and substantial planting will expand this rare ecosystem. An artificial gannet colony has also been established as Māori records indicate that one used to exist.

The final phase of future-proofing has also been started. This phase is concerned with community engagement and consultation, ensuring that the ecological gains in the Park are sustained into the future. Initiatives include assisting teachers to devise NCEA credits for high school students to obtain through restoration activities in the Park, signing pilot management agreements with three schools to do restoration projects in defined areas, and liaising with the two existing settlements located inside the Park. The Trust has also made its work and the Park available for research organisations looking into pest control methods and other ventures to carry out trials and evaluate the success of new approaches.

### **Box 7.2 Dune Restoration Trust of New Zealand**

In partnership with the Department of Conservation, the Ministry for the Environment, councils, iwi and coast care groups, the Trust has contributed substantially to raising awareness of the profile of dune ecosystems. Thirteen trustees provide national leadership on research into sustainable management of dune systems, community-based restoration methods and promoting public awareness of the importance of this ecosystem type.

Dunes are fragile and dynamic ecosystems that stretch along more than 1100 kilometres of our coastline. As well as being natural shock-absorbers, they are important nesting habitat for many species including the threatened New Zealand dotterel, katipō spiders, skinks and the critically threatened fairy tern. Dune systems have been significantly modified since human settlement in New Zealand and are now considered a nationally rare ecosystem. Historic vegetation clearance for pasture and forestry, as well as the introduction of marram grass and rabbits, has significantly compromised these natural ecosystems. Key

threats include coastal development, inundation, impacts of pests and weeds and damage from poorly managed recreational use (e.g. vehicles and heavy pedestrian traffic). The proliferation of coastal structures such as seawalls also prevents dune systems from operating naturally.

The Trust runs an annual conference, undertakes field trips, produces technical guidance and provides a newsletter and website. It also establishes demonstration sites (e.g. Maketū Spit, Bay of Plenty) for dune restoration and administers and provides advice regarding community monitoring. Community-based dune restoration programmes all over the country remove pest species, plant suitable native plants and physically protect the dunes by fencing and cordons, particularly in bird breeding seasons.

The Dune Trust has a vision “to see the majority of New Zealand dunes restored and sustainably managed using indigenous species by 2050”.



Raewyn Peart

*Dunes, Kaipara Harbour*

methods and have now become the first line of defence against extinction for many vulnerable species.<sup>4</sup> The Mainland Islands demonstrated that ecological function could be restored effectively while having parallel benefits of raising public interest and support for conservation.

The success of Mainland Islands attracted the interest of motivated individuals and groups, who channelled that inspiration into a mushrooming community conservation sector. For example, the Sanctuaries movement ([www.sanctuariesnz.org](http://www.sanctuariesnz.org)) includes more than 60 community projects with significant social and conservation goals.<sup>5</sup> At present, the New Zealand Landcare Trust oversees more than 150 groups undertaking conservation projects on both private and public land.<sup>6</sup> The Waikato Biodiversity Forum provides leadership and assistance to more than 170 member groups working in conservation throughout the Waikato Region. Community conservation has grown immensely in recent decades, participation continues to increase, and projects are becoming more large-scale and professional in their operations.

In 2010, the Department of Conservation was participating in 400 separate partnerships with other groups, which included more than 8000 volunteers and 300 events annually, an example being Project Janszoon (see Box 7.1).<sup>7</sup> One of the most enduring partnerships is the Yellow-eyed Penguin Trust, which carries out important coastal conservation and

species recovery work (see Box 7.6). The work was a lower priority than the Department had money available to resource (the third tier of seven, of which only the two highest are able to be funded). This means that if the Yellow-eyed Penguin Trust was not doing the work, the Department would not pick it up due to budget constraints.<sup>8</sup> This demonstrates that community conservation can effectively complement agency efforts.

Some regional councils are actively engaged in supporting community conservation groups, and in providing expert advice, funding and assistance in a similar way to the Department of Conservation. Regional councils, in particular, are generally active in supporting the activities of community groups (sometimes called 'Care Groups') via contestable funds or direct involvement and support. For example, the Bay of Plenty Regional Council supports care groups across a range of environments including dunelands, estuaries and on public and private land. Support for community work from some councils extends from provision of plants and funding for equipment, through to in-kind support such as marketing assistance, advertising events and providing training. Other organisations also offer support and advice to community groups engaged in conservation in particular environments, such as the Dunes Restoration Trust (see Box 7.2). The rising interest in and participation in community conservation is clearly apparent, and support from other agencies in the way of advice, technical input and funding can improve outcomes.

### ***Box 7.3 Waiwhakareke Natural Heritage Park***

The Waiwhakareke Natural Heritage Park is a restoration project in a landscape much-denuded by pastoral farming. Just 1.4 percent of the original vegetation remains in the Hamilton Ecological District and one percent of wetlands throughout the entire Waikato Region, so rebuilding the indigenous presence on the landscape is of primary importance. Providing habitat for displaced native flora and fauna in a location accessible to an urban population has both ecological and social benefits.

The Waiwhakareke Natural Heritage Park is a 500-year vision to restore sixty hectares of land around a peat lake on the fringe of the city of Hamilton. In 1975, the Hamilton City Council purchased the land surrounding Waiwhakareke/Horseshoe Lake and the restoration is being implemented by partners including the University of Waikato, Hamilton City Council, Waikato Regional Council and community organisation Tui 2000.

An annual Arbor Day planted more than 23,000 plants over 2.25 hectares<sup>9</sup> in 2013 and a further 30,000 were planted on Arbor Day 2014.<sup>10</sup> The total area planted to date is 21 hectares. The project was recognised by the Global Restoration Network as one of Australasia's Top 20 ecological restoration projects. The project provides public education to the schools, scout groups and corporate groups that frequently visit the park to do weeding and planting. The lake area is used extensively for freshwater, wetland and terrestrial ecology research projects. An overall monitoring programme provides insight into the difference made by restoration techniques such as planting and wetland re-creation.

The long term vision is for the park to attract 85,000 visitors per year by 2027 and to eventually to include a predator-proof fence and be suitable for fauna introductions.

Most community conservation occurs near towns and cities where most people live. The result of this is burgeoning community conservation initiatives in peri-urban areas: places that typically receive little focus from the Department of Conservation because these are generally not where conservation priorities and public conservation land are located. However, this does not indicate that urban areas are without ecological value.<sup>11</sup> The urban restoration programmes in major cities are testimony to the values that are present or that can be restored. Example programmes include the Waiwhakareke Natural Heritage Park (see Box 7.3) in Hamilton, Project Twin Streams in Waitakere City and Karori/Zealandia in Wellington. Community-based urban conservation projects fill an important niche that the Department and regional councils often cannot reach in their own work programmes due to low resourcing or low priority for urban conservation.

### Citizen science: community involvement in biodiversity monitoring

Community members can contribute to biodiversity monitoring and so add to the information base used for conservation planning and reporting achievements. For example, observations of species' locations generate distribution data that underpin systematic conservation planning methods. Citizen science contributions include opportunistic records of sightings, specific community-based monitoring of pest presence and abundance, and monitoring of freshwater ecosystems, among many others. Information collected by the community also needs data repository infrastructure, some of which has been ably supplied by voluntary groups such as the Ornithological Society of New Zealand. New Zealand has undertaken some very successful initiatives based on citizen science, and the validity of long term datasets from voluntary organisations fills an important gap left by poor resourcing of agency-led monitoring. One of the most recent citizen science initiatives is NatureWatch NZ (see Box 7.4). Examples of citizen science-led databases in New Zealand include:

- The bird sighting records from the Ornithological Society of New Zealand, which date back to 1939. These records contribute valuable known distribution information on New Zealand birds, are regularly published in hard copy,<sup>12</sup> and are stored online in a peer-reviewed database called EBird.<sup>13</sup> The distribution and diversity data from this database is used regularly for resource management purposes.
- WaiCare is a community-based stream monitoring programme that has been in operation in the Auckland Region for more than 15 years. Community members have the support of a standardised toolkit for monitoring water quality and a local coordinator. They

assess water clarity, dissolved oxygen and the number and diversity of invertebrates present. Monitoring results are uploaded onto the web.<sup>14</sup> The long term datasets available for some waterways, through WaiCare, enable resource managers and the community to understand the changing state of water bodies.

- The Department of Conservation administers a database of marine mammal sightings. Members of the public can use an online form to submit a sighting record. The forms include images and information about possible species to guide accurate identification. There is also an 0800 number in case of a sighting of certain species or any marine mammal that is in distress (e.g. stranded or entangled in a net).<sup>15</sup> This database provides important information on mammal distribution.

### The contribution of community conservation

Community conservation is already regarded as a key part of the challenge in protecting biodiversity, but empirical evaluation of conservation outcomes is rare. Community conservation efforts are generally highly fragmented, often with no connections to the activities of neighbouring groups or others in the vicinity. The result of this is that community conservation may not be efficient, and that the cumulative demand on supporting agencies may be significant, without commensurate biodiversity conservation outcomes. Thus biodiversity outcomes achieved by community conservation are likely to be more expensive than agency-led conservation. However this is uncertain because the costs and benefits of conservation at a community level are rarely systematically collated and analysed.<sup>16</sup>



Bryce McQuillan

Pied stilt (*Himantopus himantopus*), Taupo

#### **Box 7.4 NatureWatch NZ**

NatureWatch NZ provides an online system for the general public to report species sightings, upload photos, request species identifications and to share other matters of natural history interest. NatureWatch NZ was relaunched in 2012, replacing an earlier database (New Zealand Biodiversity Recording Network) and is administered by the New Zealand Bio-Recording Network Trust.<sup>17</sup> The Trust was established in 2005, and adapted a nature observation tool already in use in Sweden (Artportalen).<sup>18</sup>

The aims of the Trust are:

*To increase knowledge, understanding, and appreciation of New Zealand's natural history.*

1. *To engage and assist New Zealanders in observing and recording biological information.*
2. *To develop and support online tools to assist individuals and groups to record, view, share and use biological information.*
3. *To collaborate with people and groups interested in bio-recording.*
4. *To promote and provide secure, open, and ethical sources of biological information for the public.*<sup>19</sup>
5. *NatureWatch NZ is based on open-sourced software called 'iNaturalist', from California.*

The funding for the initiative was sourced primarily from the Terrestrial and Freshwater Biodiversity Information System Programme. Users sign in and can view observations submitted by other members and submit their own. Volunteer curators undertake quality control and answer enquiries from users. NatureWatch is in use by hundreds of volunteer observers and has generated enormous numbers of wildlife observations from throughout New Zealand. NatureWatch provides a centralised depository for information on indigenous biodiversity which helps to improve knowledge of species distributions nationally.

Social priorities for conservation are often not the same as those driven by biodiversity status data. Community conservation is disconnected from national and regional priorities because conservation priorities within local and regional/national frames are quite different.<sup>20</sup> Often,



*The distinctive red damselfly (Xanthocnemis zealandica) is the most common damselfly in New Zealand*

agencies that carry out conservation prioritisation recognise the different drivers for conservation by producing different prioritisation categories. For example, Objectives 1 and 2 under the Department of Conservation's Natural Heritage Intermediate Outcome (see Chapter 3) relate to ecosystem and species outcomes, while Objective 4 for example focuses upon iconic species.<sup>21</sup> Auckland Council similarly recognises these different motivations by including objectives that recognise community aspirations that may differ from objective prioritisation focused on slowing biodiversity loss as efficiently as possible.<sup>22</sup> This is sometimes highlighted as a limiting factor in promoting a stronger social mandate for conservation. It is encouraging to note that some agency conservation business plans are attuned to this.

Community conservation has a wide range of benefits for participants and associated agencies, as well as the wider community. Individuals participating in community conservation benefit from increased social capital for conservation, increased quality of life, raised awareness of the natural environment and learning of practical skills.<sup>23</sup> Community involvement is widely regarded as a highly effective education strategy and builds the appreciation of individuals for the natural world.<sup>24</sup> For example, the value of urban conservation for building social capital for biodiversity protection was pointed out by Green and Clarkson (2006):

*the reconnection of urban dwellers with nature will be necessary to gain better support for reducing the wider environmental impacts of cities and gaining the resources required to restore indigenous ecosystems at regional and national scales.*<sup>25</sup>

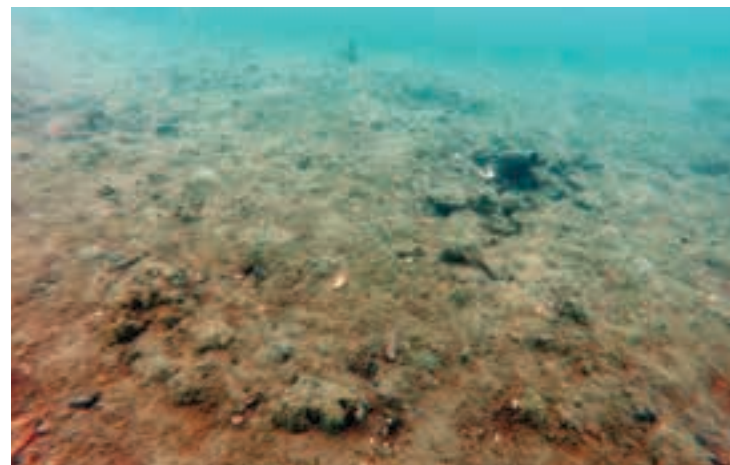
### Box 7.5 Revive our Gulf

Revive our Gulf is a project of the Mussel Reef Restoration Trust which was formed in 2012 following a State of the Gulf meeting. The Trust is a community-led project comprising of 25 people with different expertise including scientists, lawyers, planners and community advocates. The group aims to restore the green-lipped mussel-beds of the Hauraki Gulf. It works closely with the Hauraki Gulf Forum, central government, private individuals and the aquaculture industry, which collectively provide much of its funding and supplies of mussels.

Native green-lipped mussels (*Perna canaliculus*) are filter-feeders, filtering sediments and pollutants to improve water clarity. Green-lipped mussels are also ecosystem-engineers, forming rich habitats for larger species such as stingrays, juvenile fish and marine invertebrates.<sup>26</sup> They are fundamental to ecosystem processes such as nutrient cycling and food web dynamics, but have been substantially reduced in extent globally (85 percent).<sup>27</sup> Dredging and poaching of mussel beds in the early to mid 20<sup>th</sup> century have had large scale impacts on ecosystems, from which the beds have never recovered.

The restoration programme, so far, has included the deployment of three and a half million live adult mussels off the coast of Waiheke Island which will hopefully attract other sea-life and form functioning reef ecosystems. The vision of the group is “A Hauraki Gulf enhanced with restored seabed mussel reefs, healthy ecosystems and a natural biodiversity of marine life”. The Trust has specific time-bound goals including to establish research units in universities, restore a square kilometre of seabed, and establish seed beds with local communities.<sup>28</sup>

### Mussel bed restoration process in the Hauraki Gulf



Shaun Lee

*Silt dominated benthic community prior to restoration*



Shaun Lee

*Placing mussels to initiate mussel-bed re-establishment*



Shane Kelly

*Healthy mussels restored*

Māori cultural benefits may also form an important dimension of community conservation, which often enhances the ability to practise traditional methods of conservation, and engage in practices such as rongoā (traditional medicine based on plant communities) and flax-weaving. Conservation initiatives also provide an opportunity for Māori to connect with traditional ways of life more broadly and to pass on traditional ecological knowledge to younger generations and non-Māori.<sup>29</sup> Much conservation occurs on Māori-owned land and in areas of cultural significance, while other projects combine traditional ecological knowledge with Western conservation approaches to address conservation needs

### **Box 7.6 Yellow-eyed Penguin Trust**

The Yellow-eyed Penguin Trust was formed in 1987 with the aim of conserving yellow-eyed penguins on the Otago coast. It was the first single-species conservation group in the country. The remarkable yellow-eyed penguin (*Megadyptes antipodes*) is endemic to New Zealand. Its natural range extends from Banks Peninsula to the subantarctic Auckland and Campbell Islands. The species is listed as endangered by the IUCN, owing to its restricted range, threats to its marine and terrestrial habitats, and extreme fluctuations in the number of mature individuals. Over the last 25 years the Trust has changed from a volunteer-based organisation to a business-structured one including paid staff. Training corps, local environmental groups, primary schools, disadvantaged youth programmes and other volunteers work with Trust staff (which comprises 5.25 full-time equivalents).

The Trust's founding aim was to resource the many groups and individuals who had been struggling to preserve local penguin populations for some time. The Trust aligns its conservation strategy with the Department of Conservation's recovery plan for yellow-eyed penguins in addressing the two principal extinction pressures: loss of breeding habitat (remedied through coastal re-forestation programmes), and mammalian predators (controlled largely by trapping).

By 1990, the mainland population had plummeted to a mere 150 breeding pairs. Since then, the descent towards local extinction has been arrested. In 2014, mainland numbers had recovered to an estimated 439 breeding pairs. The unexplained deaths of 60 to 70 adult penguins in early 2013 on Otago Peninsula, and starving chicks in 2014, have once again raised serious concerns.

The Trust's vision is that by 2018 it "will be an exemplary ENGO collaboratively obtaining optimum conservation outcomes based on a combination of good science and best-practice management".



Yellow Eyed Penguin Trust

*Yellow-eyed penguin (Megadyptes antipodes)*

jointly. In 2006, Green and Clarkson expressed concern at the rate at which such traditional knowledge is disappearing through the passing of the elderly generation of Māori.<sup>30</sup>

Growing recognition of the importance of traditional ecological knowledge is evident in New Zealand, as cross-cultural conservation projects increase in number and government support gradually gathers.<sup>31</sup> Lyver *et al* provide a useful description of a situation in which traditional knowledge regarding kererū harvest, and Western science-led analysis through population modelling, could generate valuable ecological information from two world-views.<sup>32</sup> Another example of where customary harvest continues alongside conservation, and is substantially administered by Māori, is the case of tītī, mutton-bird or sooty shearwater (see Box 7.7). The tītī depend on maintenance of the natural vegetation and the island ecosystem – so harvest and conservation are mutually interdependent. The importance of Māori in conservation is increasing as mechanisms for protection increasingly recognise Māori world-views, and land transfers provide opportunities for Māori-led conservation to occur.

Agencies derive benefits from participating in community-led conservation. It is a useful opportunity to engage with the community for a range of purposes as well as building social capital for conservation initiatives. The involvement of agency experts can also enhance the public appreciation of the value of science and research to inform conservation. This can benefit agencies and improve relationships with the community.<sup>33</sup> Community conservation also attracts new volunteers and funding sources,

### Box 7.7 Tītī project

The Kia Mau te Tītī Mo Ake Tōnu Atu Project is a bicultural conservation project in which Mātauranga Māori (traditional ecological knowledge) and science have been applied in partnership to conserve the tītī or sooty shearwater (*Puffinus griseus*).<sup>34</sup> The formal partnership between the Rakiura Māori community and the University of Otago began in 1994 and has been community-led from inception.

Around 22 million tītī, a large seabird, breed in colonies on islands throughout New Zealand. A stronghold for breeding lies across 35 islands surrounding Rakiura. The tītī completes a 64,000-kilometre migration every year, flying first to South America and then to the coasts of Japan to feed. Rakiura Māori and researchers from the University of Otago have worked together on the 'Tītī Project' to assess (a) the sustainability of the customary harvest and (b) the comparability of information from a Western science perspective and that of traditional Māori ecological knowledge.<sup>35</sup>

A bonus of the research partnership was triggered by an oil spill in 1998 off the coast of California that killed several thousand tītī. The Rakiura Māori community was awarded some of the mitigation funding from the oil spill to eradicate rats and weka (introduced predators), undertake scientific monitoring and carry out quarantine programmes, in order to help safeguard tītī populations and restore the island ecosystems.<sup>36</sup> The Department of Conservation provided technical advice for the eradication component, but is not a significant partner in the project itself.

Māori have a right to customary annual harvest of tītī. Harvest refers to the removal of chicks from nesting burrows and their capture as they exit the burrow once grown. Combining the skills and resources of multiple stakeholders, and drawing on the two different world-views, has built cross-cultural capital for combined conservation efforts in Aotearoa New Zealand.<sup>37</sup> International and national examples of cross-cultural approaches are increasing rapidly and the learnings derived should be instructive.<sup>38</sup>

particularly to public conservation land where groups are already active.<sup>39</sup> However, the demand on agencies to support community conservation can be significant, and may draw resources away from core conservation activities, and dilute agency focus. The benefits of agency participation in community conservation must be balanced carefully against the costs.

### Sources of funding for community conservation

There is a diverse range of funding sources for community conservation, including agency budgets, philanthropic organisations, businesses providing sponsorship, and compulsory mitigation payments through resource consents (see Box 7.8 and 7.9). Amounts of funding available, criteria and reporting requirements may vary over time, depending on funder priorities. Many of the national and local government community conservation funding pools are linked with programmes to recognise and protect significant natural areas (important areas for biodiversity, identified for planning purposes). They are also often aimed at educating landowners about the importance of conservation, while establishing a stronger basis of information about the area's biodiversity values (e.g. Natural Habitats Tasman).<sup>40</sup>



Peter Langlands Wild Capture

Tītī or Sooty shearwater for sale



Many of the conservation funds available (such as the Community Conservation Partnerships Fund) are also open to regional and local councils which have the resources to write large applications and of course have revenue-raising powers of their own. This can lead to agencies dominating the allocation of community funds and displacing smaller groups. Companies also contribute substantial funding and in-kind support to community conservation voluntarily or as a result of legal requirements (see Box 7.9).

### **Does community conservation diminish the collective action problem?**

Participatory theory proposes that community members involved in decision-making are willing to cooperate with others with similar values, to advance common interests. This process elevates common concerns over and above personal concerns, even when motivations for participation differ.<sup>41</sup> But does the focus on matters of common interest persist beyond the conservation work at hand, and are connections made between unsustainable lifestyles and business activities, and the need for biodiversity recovery to sustain our future prosperity? In other words, does participation in community conservation result in an individual becoming more engaged in advocating for a world in which ongoing biodiversity loss is not a given?

It is commonly assumed that increased support of community conservation will lead to positive action more broadly. For example, in a review of biodiversity management at the time the New Zealand Biodiversity Strategy was released noted: "Awareness of the significance and importance of biodiversity in the general community cannot be over-emphasised, as it is from these quarters that political will, funding and other resources are ultimately derived."<sup>42</sup> Similarly, Goal 4 in the Canterbury Biodiversity Strategy is to "Enhance public awareness, understanding and support of behaviour change". The key indicator is that "Public awareness, understanding and support of biodiversity are increased by 20 percent by 2012, leading to increasing instances of consequential behaviour change". Progress evaluation was to be based on the level of funding applications, and via public survey of attitudes and behaviours, but has yet to be reported.<sup>43</sup> As at September 2013, no evaluation of the outcomes had occurred, and the core assumption that community conservation will stimulate wider conservation involvement remains untested.

It is difficult to attribute wider outcomes to individuals' behaviour change brought about by participating in community conservation. Notwithstanding, in 2005, Landcare Research devised a series of indicators

#### **Box 7.8 Sources of government funding for community conservation**

- Community Conservation Partnerships Fund (replacing the Biodiversity Condition and Advice Funds which allocated in excess of \$4 million in 2013)<sup>44, 45</sup>
- Community Environment Fund (formerly Sustainable Management Fund).<sup>46</sup> While this fund has previously been open to community groups, sometimes rounds are restricted to regional councils only
- Lottery Grants (usually one-off projects only and covering more than simply biodiversity conservation)<sup>47</sup>
- Ron Greenwood Environmental Trust (mainly focused on established community groups, with around \$300,000 available annually)<sup>48</sup>
- World Wildlife Fund Community Funding (distributing a range of funds on behalf of the Tindall Foundation for habitat protection and other hands-on conservation work and environmental education)
- Environmental funding distributed by regional and district councils, such as Auckland Council's Environmental Initiatives Fund. The level of this funding is estimated to be higher than nationally available funds overall and usually includes in-kind advice by council staff and other things that may be difficult to cost precisely.
- Forest and Bird's J S Watson Trust Fund (<http://www.forestandbird.org.nz/what-we-do/partnerships/js-watson-trust>)
- Landcare Trust, WWF and other NGOs that distribute funding either from themselves or on behalf of organisations
- Philanthropic organisations such as the NEXT Foundation



*Kauri/Hard Beech forest in Chelsea, Auckland*

to assess progress towards winning a higher profile for biodiversity:

- Community involvement in biodiversity-relevant planning, processes and in the contribution of corporate sponsorship
- Iwi partnerships formulated
- Measures of community acceptance of eco-vandalism
- Conservation profile in the media and throughout the general public (e.g. events held)<sup>49</sup>

Decision-making in a community group is generally collective, practical skills can be learned by individuals, and an increased appreciation of the threats to biodiversity may translate into behaviour change including

#### **Box 7.9 Examples of private sector funding for conservation**

- Voluntary involvement in conservation activities for team-building purposes and to contribute to community outcomes. For example, Conservation Volunteers New Zealand regularly coordinates corporate involvement in on-the-ground conservation and in wider conservation-related sponsorship programmes<sup>50</sup>
- Compliance requirements for resource consents held by businesses. Although not voluntary these have initiated the involvement of the private sector in conservation, with some organisations going significantly 'beyond compliance' and continuing to be involved actively in community conservation initiatives (e.g. Mighty River Power's Waikato Catchment Ecological Enhancement Trust)
- In-kind assistance to community conservation by providing administrative or logistical support or specific expertise (e.g. financial management, marketing, business planning and specialist advice such as fauna management), and donations of materials (timber) and vehicles for conservation purposes
- Sponsorship of high profile conservation initiatives including the Bank of New Zealand Kiwi Recovery Project and Rio Tinto's sponsorship of the Kākāpō Recovery Project
- Provision of contestable funding for community purposes such as Fonterra's Grass Roots Fund (<https://www.fonterra.com/global/en/sustainability/community/grassroots+fund/grassroots+fund>)

enhanced political awareness and improved environmental practice overall. But what is the evidence for this actually occurring? Community conservation has increased exponentially in the last five years, but biodiversity loss from unsustainable activities has continued apace, and there has been scant public protest at the more destructive developments of recent times (e.g. Denniston coal mine and Ruataniwha dam). These observations suggest that the growth in community conservation has not increased the level of public engagement with national conservation issues overall. This does not mean, however, that the behaviour and perspectives of participating individuals have not altered.

In 2011, a framework for the monitoring of biodiversity outcomes for regional councils was released. It included a set of indicators to track community conservation effort but has not yet been rolled out.<sup>51</sup> A lack of evidence that community conservation genuinely diminishes the collective action problem should not reduce its import, but rather suggest that supporting it from core conservation agency budgets may not be the best use of that limited funding. Alternative funding sources are necessary to ensure that the complementary roles of agency and non-agency conservation are both supported and sustained. Notwithstanding this; research that elucidates any relationships between participation in community conservation efforts and wider conservation involvement and effects on the collective action problem, could be of considerable strategic value.

### Key conclusions and a way forward

Community conservation is wedded to place, and efforts are driven by values other than biodiversity. Groups may not wish to conserve priority biodiversity, preferring to restore places they hold dear that are in less need of conservation effort. Further, some priority tasks are not 'fun' enough to attract volunteers and may be best left to agency paid staff.



Bamboo orchid (*Earina mucronata*)

However, there are many groups that would value direction and that would rather work to achieve national priority tasks identified by national scale analysis. Opportunities to engage in high priority conservation, need to be made available, but at the same time there should be no discouragement of low-priority efforts. Our careworn environment demands enormous efforts in conservation and ecological restoration, and restoration of common and rare biodiversity are both important, but in different ways.

To sustain and maximise the value of community conservation, an overall increase in funding is needed. The funding must be more secure and should not be a burden to agencies because their budgets for conservation are already overstretched. Improvements can be made in efficiency, by coordinating efforts of community groups, and sharing resources. Community conservation coordination is already common in New Zealand. The New Zealand Landcare Trust, many regional councils and other organisations are proactive in drawing together the resources and efforts of many groups to maximise outcomes. The combined efforts of a range of funders and facilitators in supporting Reconnecting Northland demonstrate the value of this approach (see Box 7.10). Coordination of conservation effort also has the added bonus of providing an opportunity to draw together data, and to demonstrate the difference made by the collective efforts of the groups, in a way that is consistent and interpretable.

Better coordinating existing community initiatives is valuable; but planning in an integrated fashion presents even greater opportunities to improve outcomes, by limiting overlap, and ensuring that effort from a range of agencies and community groups generates maximum outcomes. Planning processes for conservation actions include goal-setting, prioritisation and implementation plans. Given the level of community conservation, it is perhaps time that planning occurred in a more collaborative and systematic manner, potentially through the development of regional biodiversity strategies. The concept of regional biodiversity strategies has been proposed since 2000.<sup>52</sup> Many regions and some districts have already developed regional biodiversity documents and strategies, including the Canterbury Biodiversity Strategy,<sup>53</sup> and the work towards the Tasman Biodiversity Accord. Regional biodiversity planning, via a collaborative process, may be an important way to guide community conservation effort in a manner that addresses local, regional and national conservation goals.

Regional biodiversity planning can already happen, but regional-scale planning by regional councils and the Department of Conservation is undertaken under different legislation, and community conservation is not recognised by our existing institutional frameworks. Planning and prioritisation for regional councils is done within a sustainable management regime (the RMA), while the Conservation Act guides the

### **Box 7.10 Reconnecting Northland**

The New Zealand Landcare Trust and WWF have teamed up to coordinate a plethora of conservation efforts under a common goal of restoring the ecology of the Northland region over 50 years. Examining conservation needs on a regional scale, and improving connectivity while enhancing community well-being, are key aims of this multi-decade project. Initial funding by charitable agencies (Tindall Foundation, ASB Trust and the Hong Kong and Shanghai Banking Corporation's Water Programme Fund) is guaranteed for five years, to enable the establishment of a significant network of stakeholders and goals to be formulated. Over time, the key facilitators of the project intend to reduce their involvement and hand over the project to the communities that implement it.

At the time of writing, Reconnecting Northland was in its second phase, the 'Development Phase', in which early socialisation of the concept was taking place. Strategic planning, building relationships with stakeholders and refinement of project priorities should be completed in 2014, with the project then moving into implementation phases. The project demonstrates a long-term vision, a multi-stakeholder approach, and a significant implementation plan that includes deliverables and provision for comprehensive evaluation. It will be instructive to see what outcomes this approach delivers.

Community conservation groups are increasingly well-organised and professional, taking major steps in improving their efficiency and effectiveness, and communicating their achievements. However, the contribution of community conservation to the persistence of biodiversity is unclear because it has never been measured. The extent to which participation in community conservation genuinely drives behaviour change and builds social capital for conservation is not yet known. Research that fills this gap could be very important strategically.

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# 8 Finding solutions

The loss and degradation of indigenous biodiversity is a most pressing issue in New Zealand and the magnitude and urgency of the problem is rising fast. The impact of market failure, the influence of vested interests on regulatory approaches, and the limited recognition of human dependency on biodiversity and ecosystem services, are all central to the ongoing biodiversity decline. We have described the extent of biodiversity loss on public conservation land, on private land, in freshwater and in marine ecosystems. We have also identified the reasons why this has occurred and continues. Efforts to halt or reverse this decline – while laudable – have not been sufficient. Effective and durable solutions must address both fundamental and proximal drivers of biodiversity loss.

In this chapter we distil our observations documented in Chapters 3 to 7 and apply the framework outlined in Chapter 2 to describe the problems

Angela Simpson



*Even relatively common species such as the Toutouwai/North Island robin have experienced significant range contractions due to forest clearance*

and explore ways to address them. We propose solutions across the spectrum of strategic, tactical and practical initiatives. Some of these are already being implemented, some are being contemplated and debated, but others are new. We explain how these solutions can address drivers of biodiversity loss, examine any progress towards implementing them, and attempt to foresee and analyse their strengths and weaknesses. We first provide a brief synthesis of our observations from Chapters 3 to 7.

## Synthesis of observations

### *Chapter 3: Managing public conservation land*

New Zealand's core conservation agency, and extensive terrestrial protected area network, provide a crucial foundation for biodiversity protection. But central government funding is currently inadequate for pest control that is both effective and sufficiently extensive. Effective pest control, over very large areas of public conservation land, is the only way to combat the principal pressure (mammal predators) on indigenous biodiversity located there. This is a matter of providing additional funding, reducing the cost of pest control, and coping with public opposition to broadscale use of aerially spread 1080. However, the capacity for technical advances in pest control to continue is being eroded, because funding for conservation science is declining and is now insufficient to sustain ongoing innovations. Enhancing the capacity of the Department of Conservation to lead in the protection of indigenous biodiversity on public conservation land will demand far more realistic funding, and more attention to addressing the concerns of those whose interests are compromised by pest control. Regaining the Department's capacity to lead conservation on private land will require additional support, including strong political approval for its statutory advocacy functions.

### *Chapter 4: Protecting biodiversity on private land*

The parlous state of biodiversity on private land reflects weak incentives for conservation, most particularly the absence of a 'polluter-pays' approach to the destructive consumption of natural capital. Landowners extract considerable private value from the use of their land, but rarely pay for the repercussions on the public interest in natural capital maintenance. Instead, the impacts of pollution, biodiversity loss and degradation of ecosystem services are externalised to the wider community. Agencies charged with managing the conflict between biodiversity protection and economic development typically expedite the latter, as their natural capital maintenance functions are usually deprioritised in favour of the facilitation of development. Indeed some councils function as agents of agribusiness.

There is little national guidance on addressing these conflicts, limited agency accountability, and a highly devolved system which is very



vulnerable to agency capture. Council effort to manage biodiversity on private land is highly variable across the country despite operating under the same statutory mandate. The key challenge is finding effective ways to address the powerful economic drivers for destruction, and to turn them around, incentivising land uses that conserve indigenous biodiversity and ecosystem services and penalising those that do not.

### ***Chapter 5: Safeguarding freshwater biodiversity***

Wholesale habitat destruction, pollution, physical barriers and exotic pests have resulted in a national decline in freshwater biodiversity that is extreme by international standards. The fragmented regulatory regime for freshwater separates the protection of species from their habitats, and further divides those tasks between different agencies. While recent policy moves show some promise, ecological benefits will take much time to appear and in the interim, some freshwater species may become extinct.

Poor institutional alignment, and a fragmented legal setting, conspire to prevent existing tools achieving the outcomes necessary to avoid extinctions. Agencies must work together collaboratively, and combine resources whenever possible, in order to maximise outputs and minimise the ecological costs of the patchy regime. But to do so, there needs to be better alignment of mandates, to remove the conflict between protection and development roles. As with the conservation of biodiversity located on private land, the release of regulatory agencies from industry capture, and a stronger emphasis on implementing polluter-pays approaches, will support conservation, provide funding for much greater effort and counterbalance incentives for destruction.

### ***Chapter 6: Protecting marine biodiversity***

Limited public awareness of activities in the offshore marine domain, combined with highly concentrated property rights and societal expectations of open access to common fishery resources, provide the setting for an acute collective action problem with consequences exacerbated by industry capture of the regulatory agency. Consequently, the impacts of activities on marine biodiversity are minimally regulated and any royalty or levy arrangements are not directed to biodiversity protection. Conflicts between conservation interests, recreational users, traditional users and powerful industry interests preclude the establishment of a sufficiently large and diverse marine protected area network as a first line of defence against biodiversity loss.

The absence of an oceans policy means no statutory direction is available on priorities for marine conservation and how the various competing interests should be managed. The dearth of marine spatial planning, to resolve conflicts between the multitude of uses, activities and values in the marine environment, means that rational allocation does not occur. This

means that dominance sits with the interest most compelled and able to protect its position.

Legislation is complex, fragmented and generally outdated and does not reflect modern biodiversity management or other key considerations such as the Treaty of Waitangi. Biodiversity-related marine legislation is routinely sidelined, as it is at odds with the otherwise open and free-access nature of the regime, with no compensation required for the degradation of the public interest in biodiversity maintenance. There is an absence of an effective funding model for marine conservation, resulting in little activity in this domain. The vast marine environment faces substantial ongoing declines and an overhaul of marine legislation, separation of regulatory responsibilities and a modern conservation funding model are much needed.

### ***Chapter 7: Supporting community conservation***

The unstinting effort of New Zealanders actively engaged in conservation is evident throughout the country. But the overall effects of these efforts on biodiversity maintenance, while unknown, are likely small relative to the negative impacts of pests, use and development. Dedicated individuals and groups are an important part of protecting biodiversity, but directing, sustaining and supporting these efforts is proving difficult. Meeting partnership expectations and facilitating community conservation is expensive, time-consuming and distracting. Agencies involved in partnerships and community efforts are not appropriately funded for the task.

The involvement of the community in conservation, and the corresponding increase in social capital, suggest that investment in the development of this sector is probably strategically valid and worthwhile. However, this has yet to be demonstrated, and some uncertainty about its strategic value remains and requires investigation.

Maintaining the current level of community involvement requires: (1) increasing the funding available; (2) providing greater security of funding; and (3) improving funding for agencies supporting community conservation. Building enduring partnerships with community organisations, landowners, other agencies and the private sector is the modern challenge of conservation. A determined collective effort offers the best prospect for halting biodiversity loss.

### **Framework for solutions revisited**

The substantial efforts of agencies, the community, land owners and private sector entities in safeguarding indigenous biodiversity are worthy of celebration. Without these, and the suite of legislation to protect biodiversity, the decline would likely have been far worse. However,

much more radical change is needed to secure a future in which we prosper, along with what now remains of our indigenous biodiversity and associated ecosystem services. So what are the solutions to New Zealand's biodiversity loss? How can we maintain the prosperity provided by indigenous biodiversity and associated ecosystem services without undermining the economic growth upon which much of our wellbeing depends?

We think solutions exist at three levels: strategic, tactical and practical.

**Strategic solutions** are large-scale solutions that address market failure, the collective action problem, human population growth, excessive consumption and unnecessary waste. They work by aligning public, private and government interests; by curtailing demand for activities resulting in biodiversity loss; and by incentivising conservation and restoration. Economic approaches such as environmental taxes, polluter-pays systems and payments for ecosystem services, that align divergent interests through strong positive incentives for all parties to support the

system and participate in it, are one class of strategic solution. Another class is collaboration and partnership between conservation interests and sectors normally responsible for environmental degradation. This is the approach pioneered by WWF and recently adopted by the Department of Conservation. Social marketing programmes that address the collective action problem along the lines of the proposed 'national conversation' on biodiversity is another class of strategic solutions. Strategic solutions are few in number but potentially have far-reaching impacts.

Strategic solutions by their nature are disruptive, because they impact many people and organisations, and so require an exceptionally high level of political and managerial commitment to implement. This is why their adoption and implementation are so rare that they are largely absent. Those that bring the interests of the different stakeholders toward alignment (partnerships and some economic approaches) seem likely to be more feasible than those that don't (e.g. polluter-pays systems). However, any effective strategic solution must inevitably be disruptive, because it curtails activities that diminish biodiversity, and it will therefore



Brian Cutting

A stick insect (*Acanthoxyla* sp.) on kahikatea (*Dacrycarpus dacrydioides*)

be resisted strongly by adversely affected stakeholders. But the short-term disruption will ultimately be worthwhile. Genuine change relies upon strategic initiatives aimed at bringing public, private and agency interests towards alignment. Such tripartite alignment of currently divergent interests would surely constitute a real win-win-win solution.

**Tactical solutions** are those that change the power imbalance between private and public interests and increase agency accountability. They give conservation interests the power to protect the public interest more effectively and counter interests in biodiversity destruction. Improved regulation is one class of tactical solutions, as this can help ensure that the public interest is given greater weight than the economic concerns of private interests. Funding support for public good activities such as legal protection, statutory advocacy and compliance enforcement is a class of tactical solutions that can alter the balance of power between public and vested interests without changing regulatory settings. Initiatives that increase transparency, and improve agency accountability for delivering outcomes, comprise a third class of tactical solutions. Such solutions include open and prompt access to official information, objective prioritisation procedures, and mandatory reporting of the state of biodiversity and the difference made by management.

Tactical solutions that involve regulatory changes invite focused resistance by those whose interests and power are adversely affected. Such solutions depend on sufficient public support to overwhelm the power of adversely affected vested interests, which while possible, is unusual. Furthermore, even if regulatory change is achieved, the agencies that enforce it often fail to fulfill their statutory duties, thereby undermining potential benefits. This risk can be mitigated by supporting vigilant environmental advocates, who can appeal adverse decisions, in order to develop a body of appropriate case law reflecting the intent of regulation.

Solutions based on improved agency accountability avoid confrontation with vested interests and, like motherhood and apple pie, are not easily resisted. However, real transparency and accountability are often unwelcome at high political levels, because such transparency inevitably highlights the ongoing erosion of the public interest. This is why national state of the environment reporting has been so fraught, with biodiversity loss, identified in 1997 as our most pressing environmental issue<sup>1</sup>, barely getting a mention in the 2007 report.<sup>2</sup> It may also underlie the difficulty that the Department of Conservation has experienced in implementing objective prioritisation and reporting on the difference made to vulnerable biodiversity by Vote Conservation.

Our analysis suggests that tactical solutions, based on improved transparency and accountability, should achieve some conservation improvements, but it would be unrealistic to expect them to be significant. Solutions based on public funding avoid confrontation with development interests, and tend not to offend agency interests. Consequently there

have been some substantial, important and enduring gains achieved through the public funding of a plethora of initiatives supported by Biofunds, the Environmental Legal Assistance Fund, the Nature Heritage Fund and others. The difficulty is, of course, the lack of public money available to provision these funds. Thus strategic solutions that lead to order-of-magnitude increases for these funds could prove immensely effective.

**Practical solutions** address proximal drivers of biodiversity loss by maximising the effectiveness of management on the ground. Many of these solutions are technical innovations arising from long-term investment in research and development. Among the most useful are advances that reduce the cost and increase the effectiveness of pest and weed control and advances in close-order management of highly threatened species. Many of these advances are based on innovative use of novel technologies developed for unrelated purposes. The communication and positioning technologies now used to track and monitor individual animals, as different as weta and whales, are an example. Another is the molecular techniques used to understand the genetics of populations in order to design breeding programmes that maintain their genetic diversity.

Practical solutions have the great advantage that people really want them. They enable people to do things more effectively, extensively, quickly and cheaply – and to do things they could not do before. They rarely confront development and agency interests and any conflict is usually only between proponents of competing solutions. The downside is that practical solutions tend to be specialised, they address only a very narrow segment of the conservation challenge, and they may not be easily scaled-up. Some, such as novel pesticides, can face daunting regulatory hurdles. However, there are plenty of notable exceptions such as the various advances in aerial 1080 bait distribution, predator-proof fencing and self-setting kill traps. The best practical solutions are those that address a large or key part of the conservation challenge and can be scaled-up for widespread national application.

While strategic solutions will likely enable improvements at tactical and practical levels, practical solutions on the ground will not facilitate higher level solutions – it is generally a one way relationship. It is unlikely that practical improvements will address fundamental economic drivers of biodiversity loss on private land or chronic underfunding of public conservation. However, they will secure greater outcomes from resources already available. Further, should more funding and support be secured from higher-level changes, practical improvements will ensure that better use is made of the additional funding. The challenge is to identify feasible solutions at each of the three levels and to identify the risks and benefits of implementing them.



*Like many species, the Auckland green gecko (Naultinus elegans) is primarily threatened by predation and habitat loss*

*Table 8.1 Summary of solutions*

Level	Solution		
<b>Strategic</b>	<ul style="list-style-type: none"> <li>S1 Partnerships</li> <li>S2 Environmental protection fund</li> <li>S3 Environmental consumption tax</li> <li>S4 National conversation on biodiversity</li> <li>S5 Payments for ecosystem services</li> </ul>		
<b>Tactical</b>	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <ul style="list-style-type: none"> <li>T1 Improve threatened species legislation</li> <li>T2 Key threatening processes regime</li> <li>T3 Increase core funding for the Department of Conservation</li> <li>T4 Mandatory national-level state of biodiversity reporting</li> <li>T5 Provide for the Māori world view</li> <li>T6 Policy for mitigation of ecological harm</li> <li>T7 Market tools for biodiversity conservation</li> <li>T8 Regional biodiversity planning</li> <li>T9 Biodiversity guidance to regional councils</li> <li>T10 Hold agencies accountable for outcomes</li> </ul> </td> <td style="width: 50%; border: none;"> <ul style="list-style-type: none"> <li>T11 Improve compliance and enforcement</li> <li>T12 Expand tools for private land protection</li> <li>T13 Improve covenant management</li> <li>T14 Support landowners to undertake conservation</li> <li>T15 Strengthen the Freshwater NPS</li> <li>T16 Deploy tools to protect freshwater ecosystems</li> <li>T17 Close policy gaps for wetlands and estuaries</li> <li>T18 Reform marine law and policy</li> <li>T19 Allocate stewardship land</li> <li>T20 Strengthen public interest litigation</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>T1 Improve threatened species legislation</li> <li>T2 Key threatening processes regime</li> <li>T3 Increase core funding for the Department of Conservation</li> <li>T4 Mandatory national-level state of biodiversity reporting</li> <li>T5 Provide for the Māori world view</li> <li>T6 Policy for mitigation of ecological harm</li> <li>T7 Market tools for biodiversity conservation</li> <li>T8 Regional biodiversity planning</li> <li>T9 Biodiversity guidance to regional councils</li> <li>T10 Hold agencies accountable for outcomes</li> </ul>	<ul style="list-style-type: none"> <li>T11 Improve compliance and enforcement</li> <li>T12 Expand tools for private land protection</li> <li>T13 Improve covenant management</li> <li>T14 Support landowners to undertake conservation</li> <li>T15 Strengthen the Freshwater NPS</li> <li>T16 Deploy tools to protect freshwater ecosystems</li> <li>T17 Close policy gaps for wetlands and estuaries</li> <li>T18 Reform marine law and policy</li> <li>T19 Allocate stewardship land</li> <li>T20 Strengthen public interest litigation</li> </ul>
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<b>Practical</b>	<ul style="list-style-type: none"> <li>P1 Improve conservation methods</li> <li>P2 Improve pest control methods</li> <li>P3 Improve biodiversity information</li> <li>P4 Ensure access to biodiversity data</li> </ul>		

# Strategic solutions

## S1 Partnerships

*Problem: Conservation is the domain of a single agency with little opportunity for meaningful participation by other stakeholders*

Conservation funding is (at best) static,<sup>3</sup> and the Department of Conservation's funding shortfall identified in Chapter 3 renders a partnerships approach 'logical'.<sup>4</sup> The Department is not sufficiently funded to protect biodiversity either on or off public conservation land. More and better outcomes for biodiversity could be achieved, with a collaborative approach to conservation that engages the resources of other stakeholders.

*Solution: Partnerships in conservation*

The solution involves providing for partnerships between core conservation agencies (the Department of Conservation and regional councils) and other stakeholders in conservation. This is in order to empower communities to be effective guardians of natural heritage, grow the conservation effort and enhance public support for conservation. Partnerships are formal agreements between two or more parties that commit them to participating in a particular conservation project. The agreement secures not just the commitment of the partner, but that of the lead agency as well (usually the Department of Conservation).

*Strengths*

We anticipate that a competently implemented partnership approach will:

- Bring additional resources to conservation
- Enable additional conservation initiatives that complement agency efforts
- Provide opportunities for both private sector and community group participation in conservation
- Broaden public engagement in conservation and possibly reduce the collective action problem

*Weaknesses or risks*

The partnerships strategy entails risks that must be well-managed to avoid perverse outcomes. These include:

- Core conservation priorities being dependent on insecure funding from corporate partners who may exit at any time<sup>5</sup>
- Agency priorities being determined more by corporate brand alignment and what businesses are willing to fund, than by conservation needs, some of which may be incompatible with corporate interests
- Insufficient alignment with national conservation priorities so that partnering on non-priority actions diverts agency resources away from national priorities
- Philanthropic funding being directed into central and local government and away from the third sector (e.g. environmental NGOs)

Corporate partnerships are likely to be vulnerable to changing economic conditions. They are unlikely to persist over many decades, or in perpetuity, which are the time-frames required to maintain biodiversity. In addition, they may not be directed at conservation priorities. Core conservation priorities must be addressed through secure and long-term funding arrangements and the limited core agency resource available should be directed primarily at identified priorities. Potential solutions for managing the interplay of conservation priorities and partnerships include:

- A national endowment fund that corporate sponsors can contribute to, which can be matched to conservation priorities. The Department of Conservation cannot presently implement endowment mechanisms, so this may require the participation of a third party, or for the law to be altered. Further, corporate sponsors may be less enthusiastic, as this may limit their ability to link funding with a project for marketing and reporting purposes.
- Partnerships projects that are not high conservation priority can

internalise running costs, or pay Department overheads such as staff and technical expertise, to limit impacts on central government budgets. This is already common.

- In the case of default (i.e. partner exits agreement), internal policy should ensure that high priority conservation projects are secure.

#### *Recent initiatives*

Agencies are moving toward a partnerships approach, due to both the growing recognition of the social importance of such a strategy, and the realisation that funding for maintaining biodiversity is dwarfed by the task at hand. Increasingly the Department of Conservation and some regional councils are investigating public-private partnerships with corporates, iwi, community groups and other agencies to maximise conservation effort. The private sector has demonstrated a willingness to contribute to conservation, with many new partnerships providing in-kind sponsorship, labour and funding to biodiversity protection.

## **S2 Environmental protection fund**

*Problem: Polluters and destroyers of biodiversity do not pay for the erosion of the public interest in biodiversity resulting from their activities.*

Causing damage to biodiversity is essentially free (although mitigation and compensation requirements are growing steadily). Those who profit from using or degrading biodiversity are not made responsible for the erosion of natural capital they cause. The public bears the loss or pays the additional cost of recovering species and ecosystems. More funding for conservation could be sourced by better internalising ecological costs of consumptive uses of nature.

*Solution: Those who damage biodiversity contribute to a collective fund for conservation activities*

We recommend that New Zealand establish an 'environmental protection fund' or funds, to collect monies from those harming biodiversity, in order to directly contribute to its protection and restoration. There is much potential for 'polluter-pays' mechanisms (based on the principle that those that consume biodiversity pay for the damage caused – similar to



*Southern Alps gecko, (Woodworthia 'Southern Alps')*

a 'polluter-pays' model) - to address biodiversity loss across freshwater, marine and terrestrial environments. Table 8.2 summarises how such an approach could be implemented with both new and existing mechanisms.

### Strengths

Penalising ecologically harmful activities would stimulate innovation in low-impact solutions, encourage avoidance of ecological harm, and generate revenue to fund practical conservation initiatives. The environment protection fund(s) could be substantial and available to all providers of conservation services. A contestable fund, or some other allocation mechanism, could enable community groups, landowners and the private sector to access funds for conservation projects.

### Weaknesses

Polluter-pays approaches are usually unpopular, because affected consumers of environmental quality object to paying compensation for their impacts on the public interest in biodiversity maintenance. They claim dire and unfair economic impact on them individually and more broadly on the national economy. This erodes public support, particularly if affected industries are economically significant (e.g. dairy farming and fishing).

Administration of polluter-pays concepts is difficult and resource-intensive. Many regional and district plans have wide allowances for permitted activities in some environments. This means that existing regulatory instruments are unlikely to provide a suitable trigger for



Egg-laying skink (*Oligosoma suteri*)

Trent Bell

charging. Furthermore, a robust compliance-monitoring system would be essential if each agency was to administer an effective damage-charge system, and an equitable or standard method for valuing the damage would be required.

### Recent initiatives

Collection of money to mitigate ecological harm is not uncommon in New Zealand. Consents or concessions for development projects often include requirements for compensation that may be cash or conservation

Table 8.2: Polluter-pays mechanisms applied to terrestrial, freshwater and marine environments

Terrestrial	Much threatened biodiversity is located on private land where it is at risk from habitat loss and pest impacts. A 'polluter-pays' system could address habitat destruction. Charging on a polluter-pays basis is likely to be administratively easier for private property, because liabilities can be attached to the property title, and collected in a similar way to rates and other property charges. Ecological compensation efforts could be consolidated in a similar way. For example, some councils and organisations already manage trust entities that can collect financial compensation monies and spend them on agreed conservation projects throughout the community. This model could be expanded to facilitate more significant conservation projects.
Freshwater	Some councils charge for discharges to freshwater, or for its abstraction, the fee being based on either metered volume or a flat-rate charge per consent. These charges are sometimes known as 'science and monitoring charges' and are used to fund flow-monitoring and water-management investigations. Remedying the ecological impact of the abstraction is rarely the justification for this charge, and the money collected is rarely spent on freshwater conservation projects. Poor transparency can sometimes mean that the eventual use of the funds is unknown to either those paying it or the wider community. However, the mechanism is widely used and could be appropriated for compensatory conservation purposes.
Marine	Marine conservation is difficult to fund, and monies extracted from commercial and recreational users of the marine environment are rarely used for biodiversity protection. A funding model for marine conservation comprising marine occupation charges, fishing levies, bycatch charges, and central government contributions could provide ample resources for establishing new protected areas, conservation projects and research aimed at protecting marine biodiversity effectively. Some such charging mechanisms already exist, but their purpose, the quantum of monies levied and use of these funds, will need to be reviewed.

work. The destination of the funding is highly variable, with some councils applying the money to non-conservation related work, even if the payment was intended to address impacts on biodiversity.

### S3 Environmental consumption tax

*Problem: The present economic system not only allows, but actually incentivises, the degradation of natural capital*

Free access to natural resources diminishes wellbeing for the wider community, by allowing private interests to capture the benefits of consumption, and socialise the costs. There is no recompense for the loss of public goods and services provided by nature but consumed in pursuit of private gain.

*Solution: Environmental consumption tax*

Systemic change towards an economic system that incentivises positive environmental outcomes is required to effectively address our major environmental issues – climate change, biodiversity loss and degradation of ecosystem services. An environmental consumption tax may be a strategically effective way to precipitate the necessary systemic change. Such a tax would be a shift away from taxing the *production* of private wealth via income, company and capital gains taxes and toward taxing the *consumption* of public wealth. It would push economic growth away from sectors that depend on the depletion of natural capital for commercial viability toward activities that use and grow intellectual and social capital to achieve commercial success.

The environmental consumption tax system envisaged would tax intensive land use most heavily, while areas of intact ecological function would entitle the owners to a rebate. Land cover and use data would be drawn on to divide the landscape into use-intensity categories with different tax rates for each category. The highest per-hectare tax rate would apply to land with impervious built surfaces, with lower tax rates for land retaining greater levels of ecological function. Rebates would be available for areas retaining their natural values through protection and management. Tax rates should be substantial so that other taxes harmful to economic growth can be much reduced or eliminated. In this way the private interest in land development and the multiple but divergent public interests in economic growth, a fair and internationally competitive tax system, and maintenance of biodiversity and ecosystem services can be brought towards alignment.

#### *Strengths*

The greatest strength of this solution lies in its potential to facilitate long-term economic growth while incentivising the maintenance of biodiversity and ecosystem services on private land. This strength depends on tax rates being sufficiently high to substitute revenue raised from growth-damaging

taxes. Economic growth is promoted by incentivising investment in businesses founded on adding value from natural, social and intellectual capital (because of lower income and company taxes) and by improving the international competitiveness of our tax system. A second strength lies in its potential to promote diversification of the economy and reduce our dependence on agricultural commodities. A third strength is its potential for more equitable sharing of the tax burden. At present, the proportion of the tax burden carried by wage and salary earners is among the highest of the OECD countries while the tax burden of landowners is among the lowest.<sup>6</sup> Wage and salary earners could gain more from income tax reduction than they would pay in environmental consumption tax. This effect would be most marked for taxpayers who own no land.

A fourth strength is that this environmental consumption tax would have the indirect effect of putting a price on greenhouse gas emissions – a much-needed initiative required to help address climate change. The United Nations Climate Summit in September 2014 referred to carbon pricing as a "critical tool" to address climate change.<sup>7</sup> Greenhouse gas emissions are broadly correlated with land-use intensity while carbon storage and sequestration are associated with natural areas and their restoration. Tax rebates should be available to landowners providing carbon storage and sequestration services. The consumption tax should be fiscally neutral, made possible by commensurate reductions in income and company taxes.

Intensive agricultural businesses would suffer most in the short term, because their environmental consumption tax would likely exceed their



Marie Brown

*Lake level manipulation for hydro-electric power generation compromises littoral habitats and depletes littoral biodiversity (Lake Tekapo)*



usual company and income tax liability, and the magnitude of capital gains on sale will likely be muted. However, less intensive agriculture could gain in the short term, from new payments for the provision of conservation services. In the longer term, there would likely be benefits arising from more robust and sustainable resource management incentivised by the tax and increased product marketability arising from national brand improvement.

### *Weaknesses*

Taxes are universally unpopular, serious deficiencies in New Zealand's tax system are not widely known,<sup>8</sup> and the imposition of a new tax would require a level of political self-sacrifice and courage not seen in New Zealand for many decades. However, the current debate about the need for a capital gains tax is a promising start; although we argue that an environmental consumption tax would achieve a much greater range of benefits than would be possible with a capital gains tax. An environmental consumption tax may also be simpler to implement equitably. However, much research and modelling are needed to understand and predict the full range of effects that such a novel tax might have, and this is important because perverse and unexpected outcomes are best avoided.

## **S4 National conversation on biodiversity**

### *Problem: Biodiversity does not have high profile politically*

Biodiversity is commonly not a mainstream issue of interest domestically or internationally as people fail to appreciate human dependence upon it. While the Convention on Biological Diversity and a plethora of other agreements nationally and regionally do signal some level of commitment, action is insufficient.<sup>9</sup> A low political profile for biodiversity means that necessary resourcing and appropriate actions to protect natural capital are under-provided.

### *Solution: National conversation on biodiversity*

Elevating the political importance of the worsening state of biodiversity is important. The true state of our natural heritage is generally poorly communicated, possibly facilitating incorrect perceptions of the success of present conservation approaches. National processes can elevate the priority media give to an issue, enable collaborative processes to broker policy solutions, and help realise existing and possibly new high-level goals such as those in the New Zealand Biodiversity Strategy. An extensive public consultation process occurred when the Strategy was written 14 years ago.<sup>10</sup> A public process to again highlight the state of biodiversity, progress towards addressing its ongoing loss, and improving approaches for doing so, would likely be of value. The high level goals of the Strategy are generally sound, but implementation of them has been sluggish and largely ineffective.



Bryce McQuillan

*Community efforts are helping to safeguard species such as the Tuturiwhatu/ New Zealand dotterel, threatened by coastal development and other pressures, demonstrating the importance of engaging the public in the challenge to reverse the decline of biodiversity*

Throughout this book we have referred to the many different stakeholders in conservation, and contended that multiple opportunities for actions and engagement from all interested parties, would maximise outcomes for biodiversity. A pluralistic forward-looking conservation approach demands and invites a collaborative approach to goal-delivery. Analysis of successful collaborative processes demonstrates that good ecological outcomes arise where:

- Social processes have a clear goal and deliver tangible outputs such as reports or policy documents
- Parties are fairly resourced to ensure representativeness and full participation
- Sufficient technical expertise is on hand to provide advice and information
- Performance monitoring metrics are determined at the outset and the success of implementation is tracked and subject to external scrutiny.

We think that much better outcomes for biodiversity are possible if New Zealand embarks upon a national conversation to discuss the state of biodiversity, to consider the key risks and threats, and to formulate solutions for discussion and debate. Such a national conversation could be convened from a grass-roots level, or it could be led by the Ministry for the Environment, or the Department of Conservation. The conversation could occur through one or more of a public written consultation process, a series of national or regional meetings, or a national conference to highlight the state of biodiversity and plan the national response.

The conversation should include comprehensive discussion of Māori views, and the development of a pathway to achieve biodiversity goals that recognises different approaches to biodiversity protection, and provides for them. The Land and Water Forum is an example of a national conversation in which the Māori world view was adopted by all stakeholders and folded into the reform process.

Possible tangible outputs include a refreshed Biodiversity Strategy, a Biodiversity NPS or another document of a similar nature. The solution we later propose, of regional biodiversity plans, could also emerge from this process, with the benefit of national direction and profile.

### *Strengths*

A collaborative process to engage the wider public on the state of biodiversity, and how it might be addressed, is likely to elevate the prominence of the issue nationally, and increase public understanding of the nature of the biodiversity challenge. By mobilising members of the public to engage with the issue it could also help to counter the collective action problem.

### *Weaknesses*

National conversations are costly to coordinate and resource-intensive for parties who wish to be present at discussions. Such large-scale processes are also vulnerable to distortion by private interests and may not deliver outcomes that protect the public interest at all. A clear mandate, pathway and goal for the process should be set in advance and commitments obtained from Ministers to require their Ministries and Departments to take action based on the outputs.

A national conversation also risks inadvertently duplicating or repeating the New Zealand Biodiversity Strategy. However the conversation could contribute to refreshing the Strategy, and also assist in its implementation.

## **S5 Payments for ecosystem services**

*Problem: Market failure means little opportunity to reward those that retain or restore biodiversity and ecosystem services*

There is a reliance on private landowners to safeguard native biodiversity present on their properties. This reliance is most acute for lowland remnants, coastal areas, wetlands and the dryland communities of the central South Island because these are so under-represented in protected areas. However, the meagre economic incentives to protect biodiversity, and the overwhelmingly greater economic incentive to destroy it, create a context in which conservation is unlikely in many cases. For example, where a district plan specifically provides for activities such as subdivision, there is little economic incentive for a landowner to conserve a threatened

species or remnant natural area located on the property. Conservation presently requires the owner to bear both the opportunity cost of development benefits foregone and the cost of conservation actions.

The wider public does draw benefit from biodiversity protected on private land, and there is a compelling argument that landowners who safeguard biodiversity in the public interest should be compensated for their efforts. Many landowners do engage in appropriate conservation, some with no expectation of recompense, because they interpret such conservation as giving effect to their perceived duty of care. They and others would likely do more if the economic incentive was there to fairly recompense them.

### *Solution: Payment for ecosystem services*

Payments for ecosystem services are the flipside of the polluter-pays principle. They provide positive incentives for environmental protection funded by the wider community. This is in recognition of the public benefit of activities such as protecting and restoring habitat, maintaining wildlife strongholds, averting loss of freshwater ecosystems and limiting or avoiding polluting discharges. The wider community (through rates or taxes, or other charging mechanisms) pays providers of ecosystem services (community groups, landowners and agencies) based on agreed value metrics.

### *Strengths*

Payments for ecosystem services can incentivise important conservation actions on private land and such payments can be implemented outside regulatory processes.<sup>11</sup> Those who safeguard biodiversity will receive just recompense and a stable and secure means to maintain ecological gains achieved on their property. There is growing acceptance of this concept in New Zealand, with a number of research programmes focused upon the valuation of ecosystem services, with more practical initiatives also recommending this pathway (e.g. the Mackenzie Accord).

### *Weaknesses*

Payments for ecosystem services would be costly given that two-thirds of New Zealand is in private ownership. Ecosystem services on private land that could be subject to recompense include restoration planting and pest control, and protection of important habitat or a population of a species. The funding to reward those who protect biodiversity must come from somewhere and a funding source to enable such a mechanism to be implemented would need to be both substantial and secure. A complementary approach would be to charge for damage to biodiversity, thus providing a source of revenue by which the government or some other agency could pay for ecosystem services.

# Tactical solutions

## T1 Improve threatened species legislation

*Problem: Legislation for the protection of threatened species, most particularly the Wildlife Act, is inadequate for the task.*

At present, the Wildlife Act definition of 'animal' does not apply to all indigenous fauna, and conservation status has no bearing on the level of protection provided. The definition actually precludes plants, fungi, freshwater fish and most invertebrates from protection. Animal species listed on seven schedules in the Act are (by default) absolutely protected, but the schedules do not reflect threat status. Once a species is assessed as being at some risk of extinction by the New Zealand Threat Classification system, no mandatory action is required by any of our environmental legislation.

In an extraction or development context, biodiversity is commonly failed by non-integrated processes. The interface between the RMA and the Wildlife Act urgently requires review and integration if the extinction of listed threatened species is to be avoided. Many permitted activities in regional and district plans entail risks to the wildlife listed on the Wildlife Act schedules, as well as to wildlife (and plants and fungi) separately classified as being at risk of extinction. Even when a resource consent is required, there is no 'trigger' to remind applicants to seek additional approval under the Wildlife Act if any of these species are present (although some councils include an advice note in consents where relevant).

*Solution: Develop and implement a comprehensive legal framework for threatened species*

New Zealand's wildlife law needs to be reviewed and updated.<sup>12</sup> Even where absolute protection is provided for in the law, this is compromised in practice, in many ways.<sup>13</sup> A rigorous framework, based on legally required action to protect threatened species and their habitats, would more effectively address biodiversity loss.<sup>14</sup> This includes the compulsory production and implementation of plans to guide species recovery. Provisions should enable the adequate protection of both species and their habitats and provide for this to be undertaken across all forms of tenure. Example regimes in Australia, the USA and elsewhere demonstrate the value of more robust legal mechanisms to safeguard indigenous biodiversity.

In the short to medium term, there is a range of useful 'tweaks' that could be made to the existing Wildlife Act to strengthen its capacity to safeguard valued native biodiversity. Most important, the definition of an 'animal' must be broadened to include all taxa, and scheduling should take account of conservation threat status (either the IUCN Red List or the New Zealand Threat Classification System or both). In addition, there should be mandatory conservation actions for listed threatened species.

More proactive 'meeting' in the middle' by consenting agencies could ensure that the processes between the RMA and the Wildlife Act are much better integrated. There needs to be stronger emphasis on reducing the scope of permitted activities to better safeguard wildlife. There should be a requirement that any necessary Wildlife Act permits are obtained before relevant consent can be issued under the RMA or Conservation Act. This could be achieved through internal policy or (more reliably) through legislative amendment that formally links the Acts in an efficient way. The interaction between the Marine Mammals Protection Act and the Fisheries Act is equally fraught and expectations must surely be elevated above simple notification of accidental kill.



Kiri Cutting

*There is no mandatory action required by any of our laws to protect vulnerable species, such as the ancient tuatara (*Sphenodon punctatus*)*



*The long-tailed bat (Chalinolobus tuberculatus) relies on old-age trees for habitat, as they roost in trees holes or under bark*

### Strengths

These relatively minor modifications in law, and improvements in practice, would likely greatly reduce risks posed by development and resource exploitation to indigenous biodiversity. Changes, such as the introduction of mandatory actions to address effects on listed threatened species, would make the present threat classification more meaningful, and mean that appropriate actions to protect threatened species would be more likely to occur.

### Weaknesses

Stricter implementation of the Wildlife Act would need to be a core-funded Department of Conservation function and it would cost more than is currently spent on this matter. Requirements to produce threatened species management plans also require resourcing. Few such documents have been produced by the Department owing to the arduous process required. It may be useful to consider different, less costly and more timely mechanisms that would enable prompt response to the needs of classified threatened species.

A further weakness is the risk of politicising the technical process of classifying species into threat status categories. There is already a tendency for development advocates to resist the listing of some plant taxa found in threatened lowland and dryland environments and this pressure is likely to become very much more intense and influential if a species' threat status has substantive consequences for consent decisions.

## T2 Key threatening processes regime

*Problem: Some key impacts of human activities on biodiversity are not addressed by regulation*

Many key impacts on biodiversity are not adequately addressed by current consenting regimes, while those that do require consent are typically subject to weak mitigation requirements. There is a clear need to

### **Box 8.1 Key threatening processes in Australia**

Australia has the capability to address key threatening processes with specific plans that can transcend the species-focus of recovery management. Where a human activity may threaten the survival, abundance or evolutionary development of a native species or ecological community, it can be listed as a 'key threatening process' under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. Some states such as New South Wales have state-led programmes for recognising key threatening processes in a similar way, and both the Commonwealth and State Governments recognise a 'threatening process' and a 'key threatening process', with only the key processes being listed.<sup>15</sup>

The system works on a nomination basis, and anyone can nominate a process. Specific criteria for listing include processes that cause species or communities to become eligible for inclusion on the threatened list, cause an already listed species or community to become more endangered, or adversely affect two or more listed species or communities. Once a threatening process is listed and specified, a threat abatement plan can be developed, which should set out how to abate the process in a feasible, effective and efficient way.<sup>16</sup> Threat abatement plans are developed by the Commonwealth Minister for the Environment in collaboration with stakeholders and the public. Such plans are intended to provide for the research and management actions that are necessary to reduce the impact of the threatening process to levels that would allow the long-term survival of the affected species or community.

Some 21 processes are currently listed and 14 threat abatement plans are in force nationally. Some criticisms of this approach include the high cost of preparing the plans, overlap with other threatened species planning processes, the failure of plans to require action, and lack of plans despite the known existence of seriously threatening processes because plan development is at the Minister's discretion.<sup>17</sup>

ensure that ecological impacts of activities are more rigorously identified and more appropriately addressed.

*Solution: Recognise key threatening processes and mandate action to address their impacts.*

The key threatening process regime in Australia, which leads to the development of a 'threat abatement plan', holds promise for New Zealand given that such a significant proportion of indigenous biodiversity is threatened by processes that are barely regulated. The Australian example demonstrates the need for the plans to be compulsory, for their development to be rapid and low-cost, and for their implementation to be integrated across relevant statutory processes. Something akin to the Australian approach could potentially be provided for in New Zealand via amendment to the Wildlife Act.

#### *Strengths*

A regime focused on processes known to have significant effects ensures that restrictions put in place genuinely address the key proximal drivers of biodiversity loss. A regime such as this would ensure equitable treatment of impacts regardless of who or what activity gives rise to them. Addressing key threatening processes to a specified acceptable level could be a way to implement a flexible approach to meeting environmental bottom lines.

#### *Weaknesses*

The key human activities that threaten biodiversity in New Zealand are primarily associated with land conversion, drainage and waste disposal and fishing. The likely resistance of the primary industries to such a management tool might make implementation difficult.

### **T3 Increase core funding for the Department of Conservation**

*Problem: Department of Conservation is not funded sufficiently to undertake its statutory duties*

Threatened biodiversity is progressing from local disappearances toward extinction for lack of sufficiently intensive pest control over enough public conservation land. On private land, habitat loss further hastens extinction, in part because the Department of Conservation is insufficiently resourced to carry out its statutory advocacy role.

*Solution: Increase core funding for biodiversity protection by the Department of Conservation*

Secure and sufficient funding of the Department's core biodiversity conservation functions would help secure indigenous biodiversity, particularly on public conservation land. In addition, funding to support its

statutory advocacy role would help alleviate the pressure on biodiversity on private land, particularly that caused by development and resource use.

Sources of existing funding which could be increased include central government pool funding from tax revenue, the contributions of the private sector through the Partnerships model, and income from concessions and access arrangements. Further potential sources include charging for access to national parks and other attractions and for the Department to benefit from increased use of a polluter-pays approach to activities that harm biodiversity.

#### *Strengths*

A strong central agency dedicated to nature conservation is a key element of protecting indigenous biodiversity. A properly funded Department of Conservation could undertake its core functions reliably and assist other agencies in fulfilling their biodiversity-related mandates. For example, a well-resourced Department would be able to advise agencies on conservation management more effectively and assist with technical tasks on a much wider basis.

#### *Weaknesses*

A functional level of funding would strengthen the Department and enable it to challenge proponents of biodiversity harm more effectively. This means that increased core funding is unlikely to be supported unless the Department is shown to be creating national income in some way. Another risk is that additional funding may be being transferred within Vote Conservation to non-biodiversity tasks.



Gareth McGregor

*The efforts of community groups such as the Pirongia Te Aroara o Kahu Restoration Society on Mt Pirongia help the Department of Conservation to protect biodiversity in a hostile funding environment.*

## T4 Mandatory national-level biodiversity reporting

*Problem: There is no mandatory national-level reporting of the state of biodiversity*

National environmental reporting is not mandatory. Agencies are not required by law to report on the state of indigenous biodiversity and specific trends over time or associations with policy and management initiatives. This is a serious deficiency given that the implementation of the RMA has been weak at addressing cumulative effects. The lack of clear communication of the state and trend of indigenous biodiversity contributes to the collective action problem and the lack of political will.

*Solution: National biodiversity state and trend data form part of mandatory environmental reporting*

Mandatory environmental reporting is necessary, and was discussed at some length by the Parliamentary Commissioner for the Environment in her 2010 review. We concur with the Commissioner's recommendations noting that specific indicators for indigenous biodiversity must be carefully selected and that gathering statistically robust and interpretable data is demanding and will require special funding. A Draft Environmental Reporting Bill was introduced in February of 2014, and addresses some, though not all, of these issues.

### Strengths

Independent and mandatory environmental reporting on a wide range of scientifically-determined indicators would improve the credibility of environmental reporting. Accurate information in the public arena may act to reduce the collective action problem by raising awareness about the state of biodiversity.

### Weaknesses

Monitoring of biodiversity state and trend is complex and technically demanding. Indicator selection, measurement data collection, analysis, interpretation and presentation of results all require rare technical expertise. Without appropriately independent technical rigour, key results will be omitted, not analysed or presented to obfuscate politically-inconvenient trends.

## T5 Provide for the Māori world-view

*Problem: Māori world views are not given sufficient regard in biodiversity-related decision-making*

Māori, as partners in biodiversity protection, still do not enjoy sufficient recognition in environmental management, despite significant improvements in recent years. Many statutory processes are limited to Māori having an 'advisory' function and being able only to make 'recommendations'. This leads to disengagement, disenchantment and curtails opportunity for co-management. Further, it can contribute to poor relationships between Māori and the Crown which is a barrier to effective and socially sustainable biodiversity conservation. Sufficient recognition (i.e. consistent with Treaty obligations) would be indicated by fully functional and widespread co-management arrangements.

*Solution: Explicitly express and provide for the Māori world view in policy and practice for indigenous biodiversity protection*

The importance of traditional ecological knowledge is being recognised increasingly, as indicated by the growing number of cross-cultural conservation projects.<sup>18</sup> There is much scope to better provide for partnerships with Māori in conservation and resource management. We recommend that Māori perspectives on resource management are integrated comprehensively in new and amended legislation and policy to ensure Māori are meaningfully acknowledged and their perspectives are addressed in biodiversity planning and management.

Examples of the many areas in which improved recognition could be implemented include:

- Explicit recognition of the Treaty of Waitangi in legislation such as a new Marine Protected Areas Act, and in other resource legislation that does not refer to this founding document.
- Better implementation of mechanisms for recognising cultural matters such as iwi management plans, cultural impact assessments, heritage orders and joint management agreements of culturally important resources.

Shona Myers



*An accurate national picture of the status of biodiversity, including critical ecosystems such as wetlands (Awhitu wetland at Pierce's Hill) is needed to inform management*

- Embracing Māori perspectives on resource management through joint conservation initiatives which safeguard biodiversity while also providing for guaranteed rights of access and harvest.

#### *Strengths*

Māori are partners in the protection of natural heritage. The Māori conservation perspective is complementary to colonial perspectives. An approach that draws on the strength of both Māori and scientific conservation methods would both reduce conflicts over how resources are to be protected and likely make for more iterative and enduring forms of biodiversity management. It would also build enhanced social capital for biodiversity protection amongst Māori. Recently, much progress has been made in formulating a framework for co-management of resources, and for providing more comprehensively for Māori decision-making powers. An example is the Waikato-Tainui River Authority. The Department of Conservation has a number of partnerships with iwi and hapū, and a specific fund (Mātauranga Kura Taiao) and unit devoted to supporting Māori resource management. Increasingly, Māori are active in biodiversity conservation, leading many large-scale ecological restoration efforts throughout the country.

#### *Weaknesses*

Better recognising indigenous perspectives in law, and enabling Māori to participate fully in processes, is likely to create a substantial resource demand that many iwi and hapū will not be able to meet. When recognition is provided for, the demand upon affected iwi must be considered, and resources (at least in the short term) provided to enable participation. As further resources become available to Māori through the Treaty settlement process, desire and capacity to implement biodiversity conservation will only increase. However, so too will the desire to exploit natural resources for economic gain. A key challenge for post-settlement iwi will be reconciling kaitiaki functions with economic development imperatives.

## **T6 Policy for mitigation of ecological harm**

### *Problem: Poor application of ecological compensation measures*

Provision of ecological compensation is highly variable across the country. Exchanges are often poor quality and compliance can be poor.<sup>19</sup> Present *ad hoc* implementation results in highly inappropriate projects proceeding on the basis of equally inappropriate compensatory offers being accepted by the regulatory agencies. The limits of offsetting biodiversity harm are not well-recognised. The result is biodiversity decline, sometimes worse than the status quo, because additional development activity has proceeded on the basis of promised offsetting that does not eventuate. Where offsets are allowed, long-term and flexible management arrangements are often

required, particularly where poorly understood ecosystems or species are affected. Adaptive management is poorly articulated in New Zealand policy, and activity-level guidance is likely needed.

Recent policy developments on mitigating ecological harm have been confined to regional levels (e.g. offset policies within second generation regional policy statements), leading to a proliferation of inconsistent approaches across regions to what is essentially the same concept. Where the practice is used, small and disconnected projects tend to proliferate in the absence of any overarching strategy or coordination. The recently released Government guidance may provide a basis for national policy.

### *Solution: National policy on ecological mitigation*

A national policy statement, or national environmental standard under the RMA, could provide a standard approach, with guidance on critical aspects such as limits to offsetting and parameters for in-kind (i.e. similar elements of biodiversity being exchanged) or out-of-kind (different elements being exchanged) offsetting. In 2010, a review of policy frameworks globally identified six key implementation issues that any framework needed to address (see Table 8.3).<sup>20</sup>

Where possible, such a system should be integrated with conservation prioritisation, to ensure that strategically important conservation activities are conducted as a matter of priority, particularly in the case of large-scale development. Guidance on adaptive management, and ways to secure exchanges over long periods of time, would also be advantageous.

#### *Strengths*

Decision-making based on addressing the implementation issues discussed above would likely yield substantial improvement to biodiversity conservation. Providing decision-makers with a series of principles to consider may improve the attention paid to any proposed mitigation, and improve the consistency in doing so nationally. National policy statements and national environment standards are also mandatory, meaning that local government must implement them.

#### *Weaknesses*

The risk of policy that formally provides for ecological compensation is that failure to observe gateway tests (to recognise the limits to offsetting) may perpetuate the notion that most ecological impacts can be addressed through compensation. In fact, the scope for ecological compensation is much narrower than is acknowledged by current practice. The need to recognise limits to offsetting in policy may not receive sufficient support. However, whether the impact of this is worse than an entirely directionless implementation of the concept is a moot point.

## T7 Market tools for biodiversity conservation

*Problem: The absence of markets for biodiversity means its value is excluded from decision-making*

The value of biodiversity and ecosystem services is inadequately considered in decision-making processes because the absence of commercial or market value adds to the difficulties of weighing the costs and benefits of activities that impact biodiversity. Some decision-makers inappropriately take the absence of market or commercial values as evidence of negligible value.

*Solution: Environmental trading mechanisms for biodiversity protection*

The use of market-based instruments creates opportunities for additional biodiversity protection, but New Zealand has not adopted them. Market tools can be implemented in a number of ways, and for a range of purposes, such as habitat protection, nutrient control and pollution management.<sup>21</sup> They can also usefully complement regulatory approaches. There is rich experience of market-based tools worldwide and significant experience upon which to draw to identify successful approaches that achieve positive ecological outcomes.

*Table 8.3 Key implementation issues for offsetting regimes, as they were recently applied to New Zealand.*<sup>22</sup>

Key issue	Explanation
<b>Equivalency</b>	Equivalence and similarity of compensatory action with the impact being addressed (i.e. in-kind or out-of-kind)
<b>Spatial proximity</b>	Location of compensation in relation to the site of impact, with an assumption that closer is better
<b>Additionality</b>	The compensation action must be a new contribution to conservation that would not have otherwise occurred
<b>Timing</b>	Timing of demonstrating the compensation, relative to the timing of the impact
<b>Duration and Compliance</b>	The required longevity of the compensation action and security of delivery
<b>Currency and Ratios</b>	Metrics used to determine exchanges including mitigation replacement ratios

Market tools can encourage the restoration, recovery and legal protection of habitats and species. They can exchange amounts of these expressed by measures such as area and numbers of breeding pairs.<sup>23</sup> A review of two market-based schemes in Europe identified the following success factors:

- A champion of the scheme to initiate discussions
- A collaborative development process for drafting of rules
- Development of locally appropriate solutions
- The right mix of a regulatory focus and an adaptive governance approach.<sup>24</sup>

Market tools for conservation would potentially improve the treatment of biodiversity in development, improve the likelihood that long-term requirements will be met, and create new markets for ecological protection and restoration activities. A bio-banking platform, well-administered, would provide an alternative delivery mechanism for mandatory conservation activities, and help to inform (and be informed by) landscape-level biodiversity planning.

### Strengths

Environmental trading mechanisms can create economic value for nature and enable the value of nature to be more fully reflected in decision-making. Market-based tools enable ecologically-minded development and resource use to have a stronger fiscal foundation.<sup>25</sup>



Trent Bell

*Careful management of development projects is necessary to safeguard biodiversity, such as the lizards lurking in the grass near this road development site*



## Weaknesses

Environmental trading mechanisms carry risks to biodiversity if poorly implemented. Fundamental concerns also exist about the complexity of biodiversity, and the absence of credible exchange restrictions to avoid exacerbating biodiversity loss by allowing damaging activities that would not otherwise be permitted.<sup>26</sup> Biodiversity is complex, multi-level and context dependent. There is no standard measurement scheme for biodiversity and it is therefore not possible to trade in a way that avoids hidden trade-offs.

Other deficiencies of environmental trading schemes include: greenwashing irreversible harm or inappropriate development,<sup>27</sup> poor verification, weak compliance,<sup>28</sup> a failure to exchange long-term conservation for permanent loss, under-estimation of uncertainty and the absence of overarching decision-making frameworks.<sup>29</sup> A scheme introduced to New Zealand would need to address known weaknesses, provide for a sufficient margin of error, and explicitly account for inherent uncertainty.

## T8 Regional biodiversity planning

### *Problem: Conservation planning is fragmented*

Biodiversity-related planning is typically fragmented, with the efforts of the Department of Conservation, councils (district and regional), landowners and community groups planned or executed in isolation. This occurs because the costs to each group of collaborative planning are large relative to the perceived benefits.

### *Solution: Develop and Implement regional biodiversity plans*

It is likely that conservation could be very much more efficient with pan-tenure biodiversity management and stronger integration of the agencies, organisations and individuals who presently manage biodiversity. Biodiversity exists across all forms of land tenure, so a conservation planning process based on biodiversity values and their distribution will be more effective than one based on forms of land tenure. We recommend that biodiversity conservation planning is undertaken with the full participation of landowners, developers, resource users and conservation stakeholders in each region.

A regional biodiversity planning process could be led by the Ministry for the Environment, the Department of Conservation, or a new national body designed specifically for this purpose. The goal of the process would be to integrate conservation approaches through providing:

- A nation-wide understanding of the relative effort and resourcing of different stakeholders

- An integrated prioritisation process that ensured priorities reflect the most urgent conservation needs nationally
- A single agency to which progress may be reported (to improve accountability)
- A means of integrating and coordinating actions and sharing resources.

## Strengths

A regional approach to biodiversity management is provided for in existing structures under the RMA, and the Department of Conservation generally has an existing relationship with regional and unitary councils that can be built upon. Most biodiversity strategies have been developed at a regional level and may provide a foundation for a collaborative approach in the future.

## Weaknesses

Regional biodiversity planning will be most effective if it is linked with national conservation planning (such as prioritisation), which requires a stronger scientific link between conservation at these two scales. Regional and unitary authorities and the communities they represent may not wish to work with the Department of Conservation or other stakeholders in a collaborative way and, similarly, they may prefer to attend to local rather than national priorities.



Trent Bell

*Regional government, central government, the community and others all have a part to play in the future of areas such as Shakespear Regional Park, Auckland*

## T9 Biodiversity guidance to regional councils

*Problem: Highly variable application of the biodiversity provisions of the RMA*

Biodiversity management and protection on private land is highly devolved: regional and district councils formulate their own approach leading to a high degree of variability across the country.

*Solution: Provide statutory guidance to local authorities on biodiversity protection.*

Regional councils are key biodiversity protection agencies, but greater priority, support and consistency is needed nationally. National policy statements provide a logical vehicle for this direction, but some other regulatory mechanism may also be appropriate. National policy statements also reduce the need for groups acting in the public interest to rely on litigious process, because scope for disagreement is narrowed to debates over what the national policy statement means, rather than what the policy should be.

Key outcomes of national guidance would include:

- National bottom lines for habitat and species protection
- A requirement for councils to administer effective enforcement of biodiversity protection programmes (e.g. follow-up compliance with rules and conditions of consent, taking enforcement action if necessary)
- Consistent definitions for nationally applicable terms
- Guidance and direction on the identification and mapping of sites supporting biodiversity that may be significant under section 6(c) of the RMA
- A requirement for councils to report on indigenous biodiversity loss and gain and the difference made by management actions

National guidance should describe expectations for local government and performance indicators should be specified and reported annually. The NZCPS does contain biodiversity provisions, and this kind of provision must be applied more broadly. There must also be provisions to require a council to take further action when effort is insufficient to meet expectations.

The cost of implementing biodiversity protection mechanisms is a barrier commonly-cited by local government. Cash-poor councils would require nationally funded financial help and technical assistance to achieve their statutory responsibilities. Guidance should be teamed with additional

funding for poorly resourced councils, in a manner akin to Envirolink funding for research purposes. National funding for local bodies to meet national obligations has precedence in some states of the United States where districts are given financial incentives for implementing national-level goals.

### *Strengths*

National guidance would improve biodiversity outcomes by setting minimum requirements for biodiversity-related functions, while providing for regional variation over and above the prescribed bottom lines. The guidance would set a standard that local authorities could not fall below. This would provide much-needed direction to poor-performing councils, while enabling high-performing councils to continue in their valuable biodiversity work programmes. More broadly, national guidance on biodiversity would elevate the loss of biodiversity politically, provide additional impetus for councils to fulfil their biodiversity maintenance functions, and may improve the extent to which biodiversity is considered in a development context. It may also reduce litigation costs around plan-making.

### *Weaknesses*

National policy statements and national environmental standards are subject to public consultation and easily become hostage to advocacy by private commercial interests. The powerful advocacy against the Proposed Biodiversity NPS, and the weak limits within the Freshwater NPS, demonstrate that the outputs of such processes are vulnerable to being weakened to favour individuals and industries that rely on free and unfettered access to natural capital. Such inherent weakness can be addressed, in part, through provision of funding to groups acting in the public interest to maintain a more level playing field than would otherwise exist.

## T10 Hold agencies accountable for outcomes

*Problem: Agencies charged with acting in the public interest to safeguard biodiversity are not sufficiently accountable for ecological outcomes*

Agencies have a wide range of functions, but some are implemented more efficiently and effectively than others, and some are not implemented at all. Without robust monitoring of agency effectiveness, the community is not aware of the achievements and shortfalls in function. Where agencies do not act in the public interest, it is necessary to: (a) have a monitoring system that demonstrates this; and (b) have recourse to challenge the agency and require that it take necessary action. If accountability is not present, agencies can disregard the public interest in favour of the more concentrated and powerful private interests.

### *Solution: Enhanced agency accountability*

We have catalogued many failures by agencies to take effective action on behalf of the public interest in indigenous biodiversity. Despite a plethora of legislation, private interests have effectively curtailed most efforts to ensure protection for biodiversity, notably on private land, on public conservation land where commercially valuable resources occur and at sea. Agency capture, and a lack of political will, routinely limit the persistence of indigenous biodiversity, and consequences for the agency and its executive leaders of failing to protect biodiversity are minor or absent. Biodiversity loss continues and mechanisms for holding agencies to account for this are few and ineffective.

What would it take to ensure that agencies are held to account for ineffectual or insufficient intervention on behalf of the public interest in maintaining biodiversity? We believe that the output-based indicators used to assess agency performance should be replaced by more meaningful measures of outcome and estimates of the difference made. For example, if a council does not process a resource consent within a short statutory timeframe (an output measure), it may be required to provide a fee discount to the applicant or to process it for free. 'Outputs' are subject to far higher expectations, and much more rigorous review, than achievement of 'outcomes'. This must change.

Examples of where more robust agency accountability could be introduced or enhanced include:

- Linking species and ecosystem threat status to the need to take proactive conservation action and to fully mitigate unavoidable adverse effects to a 'no net loss' standard.
- Requiring a conservation plan for species at risk of extinction. This could be as simple as a quick-response protocol in place of, or as a precursor to, recovery plans.
- Requiring that healthy wild populations of species with natural population structures and levels of abundance in all habitats are maintained as a condition of access rights to resources such as fish.
- Requiring that agencies are measured on ecological outcomes such as no reduction in the area of indigenous habitat, the extent of freshwater ecosystems and the population abundance of certain species.

Increasingly, regional councils are articulating the goal of 'no net loss' of biodiversity within their plans and policy statements, at a site, landscape and/or region-wide level. Such a goal is commonly implemented without critical examination of what it means and what it will take to get there. Where the goal is used, it can help to frame a strategic approach to



Bryce McQuillan

*Yardley's Bush, Waikato*

biodiversity maintenance that would provide a lens for agencies to consider the wider gambit of their role and how it relates to biodiversity decline. A goal of 'no net loss' of biodiversity sets out what 'biodiversity maintenance' might mean and may provide a basis for audit and evaluation of agency performance. This would incentivise the examination of how cumulative, permitted and unlawful effects on biodiversity are managed in addition to the often small number captured by rules and consenting requirements.

#### *Strengths*

Indicators of agency achievement could be developed to reflect the difference made by management actions on biodiversity and ecosystem services. This would drive agency culture and practice towards more environmentally effective exercise of functions. Unambiguous, measurable goals should be articulated to drive accountability and they should be subject to independent audit and publicly reported on. In addition, greater recourse to public interest advocates is required, if agencies do not give effect to their policies and plans for the maintenance of biodiversity and ecosystem services. Recourse could include wider provision for appeals, an alternative legal process to challenge ineffective agencies, and enhanced powers for them to be directed to act.

#### *Weaknesses*

Poorly resourced rural agencies may struggle to achieve even the most basic biodiversity maintenance goals due to a lack of core funding and the

vested interests of landowners. It will be challenging to define appropriate indicators, and to establish assessment frameworks, that take into account the different ways that councils operate and the different environments that they work in. This may be ameliorated in time if national guidance on biodiversity is forthcoming.

## T11 Improve compliance and enforcement

*Problem: Compliance monitoring for biodiversity-relevant activities by agencies is insufficient to disincentivise unlawful biodiversity loss*

Enforcement of the Wildlife Act and the RMA, in particular, is notably lacking. For example, almost all wetland loss in Canterbury is unlawful. Non-compliance with regulations to protect biodiversity means that the environment is subjected to additional adverse effects beyond those allowed for by lawful processes. Where monitoring and enforcement action fails to address non-compliance, further unlawful activities may follow, because of the low risk of sanction. The technical process of determining compliance is also vulnerable to political influence and would function more predictably and equitably if attempts to exercise such influence could be prevented.

Weak compliance-monitoring and enforcement may reflect resourcing, but low resourcing reflects political priority, arising from the adverse reaction of the regulated community that enforcement may provoke. The RMA provides mechanisms for councils to charge consent holders for the cost of monitoring compliance with consent conditions. However, the cost of investigations of non-compliance is more difficult to recover. We can find no supportable reason for compliance monitoring to be so poorly funded nationally. Action is needed to invoke existing cost-recovery provisions to lift compliance to an acceptable level.

*Solution: Enhance compliance-monitoring efficacy through greater resourcing and functional separation of consenting from compliance activities*

We strongly recommend greater resourcing for compliance and enforcement processes under all legislation that administers indigenous biodiversity in some way. Resourcing could be improved by full use of charging provisions in the various Acts, and by increased core funding for compliance monitoring. One way to prevent political interference in enforcement processes is to separate permission-granting functions from follow-up and enforcement functions. Permission granting could remain a council function while compliance follow-up and enforcement would be undertaken by a centralised agency such as the Environmental Protection Authority.

It is important to recognise that local familiarity is a critical dimension of enforcement, so while practice may be standardised and have access to central support and technical assistance, a local presence will remain

important in close association with the existing consenting agency. This would necessitate that the Environmental Protection Authority (or other agency) had a regional office infrastructure. The value of this investment could be increased if the agency were to perform the enforcement functions of several different Acts, sharing resourcing and improving professionalism and consistency.

### *Strengths*

The robust implementation of law, through effective enforcement regimes, not only serves to address non-compliance as it occurs, but discourages future non-compliance. Proponents of development and the wider community (through rates) pay for compliance monitoring functions, and these functions should be carried out reliably to give the consenting regime integrity.

### *Weaknesses*

There are strong political incentives to allow weak compliance by powerful or electorally significant sectors of the community. Furthermore, these sectors are likely to firmly resist measures that must inevitably increase their compliance costs. Thus strengthening enforcement capability will require an unusual level of political determination and self-sacrifice.

## T12 Expand tools for private land protection

*Problem: Tools to protect biodiversity on private land are too limited to provide for the full range of situations in which conservation is a potential land use.*

In the current context of under-funded conservation and irresistible economic incentives for biodiversity destruction, private land protection will inevitably be difficult, especially if alternative uses are commercially viable. However private land protection is made even more difficult by: (1) the limited array of tools for the protection of biodiversity on private land; (2) incentives that are insufficient to compensate landowners for opportunity costs and conservation management expenses; and (3) absence of mechanisms for community groups to secure ecological gains made on private land.<sup>30</sup>

*Solution: Devise and provide new tools to protect biodiversity on private land to complement the covenanting arrangements currently available.*

A more diverse range of mechanisms for biodiversity protection on private land would likely increase the number of private landowners willing to protect it. A scan of other developed country jurisdictions identified some complementary mechanisms that could go beyond the 'lock up and leave' approach and enable ongoing management to ensure the persistence of species vulnerable to pests and weeds. Aspects of California's Land for Wildlife Programme, Sites of Special Scientific Interest from the United

Kingdom and Conservation Agreements in Australia (see Boxes 8.2, 8.3 and 8.4) provide particular insights pertinent to the current situation in New Zealand, including:

- The Californian approach was most effective when private landowners were given technical advice, information and paid incentives. Absence of any one increased the risk of failure.
  - The Californian approach also maintained a database of information collected from participating sites that could be used for conservation management purposes.
  - The rigorous, evidence-based establishment of sites of special scientific interest in the United Kingdom by Natural England (rather than relying entirely on voluntarism) maintains the integrity of the wider protection system network and supports good outcomes for biodiversity.
  - Natural England demonstrates the value of a public-funded advisory organisation that is concerned primarily with the protection of nature rather than consenting and other regulatory functions.
  - The Australian approach demonstrates the appeal of agreements that are temporary for landowners, but also legally binding, as it combines certainty and flexibility in equal measure.
- Options to expand the range of mechanisms for protecting biodiversity on private land in New Zealand include:
- Additional funding for agencies to both acquire and administer land for conservation purposes. Demand for the acquisition of land for conservation far exceeds the funding available to purchase it.
  - Provision in law for temporary reserves or covenants, particularly where a species or habitat type is in decline, but where the owner is unwilling to entertain a perpetual protection tool. This may provide for necessary protection of a species or habitat prior to formal acquisition or while a nearby habitat is being made suitable (e.g. through habitat restoration and pest control). A temporary agreement may also be a gateway for more permanent arrangements once a landowner becomes used to the concept and recognises the value of it.
  - Encumbrances over land titles, where pest control operations are undertaken by the landowner, will help secure ecological gains through changes in tenure and convey future responsibility to continue the work. They are also legally enforceable.
  - Contractual agreements between agencies, landowners and other groups that specify parties' intentions and responsibility for biodiversity and commit to site-specific goals.
  - Provision for agreements in which achievement of agreed performance measures triggers payment of financial incentives or eligibility for rates relief or some other benefit.
  - Provision for the statutory imposition of protection orders over critical habitat if other approaches cannot secure threatened biodiversity on private land.
  - Provision for a tool that community groups can utilise to secure gains made on public but particularly on private land, such as an encumbrance or similar.

### ***Box 8.2 Conservation on private land in California***

The State of California has a three-tiered approach to promoting conservation on private land: distributing informational resources, providing technical assistance, and giving incentive payments to cooperating landholders. Among the most successful are the Landowner Incentive Program and the Private Lands Management Program, which mix these three approaches. The Landowner Incentive Program focuses on at-risk species and those requiring most conservation effort. Incentive payments are provided to landowners, to encourage them to choose conservation over development projects, and to allow access for the central authority to survey and monitor at-risk species. The programme has enabled

the Department of Fish and Wildlife to gain better understanding of the presence and location of sensitive species and to devise conservation strategies that more adequately meet the needs of individual species or specific habitats. Implementation requires significant resources as staff need to be trained, priorities identified and marketing materials prepared. It took time to obtain the support and trust of the stakeholders. Most landholders had a development agenda that was not necessarily compatible with the objectives of the programme. Importantly, the programme does not provide long-term security for at-risk wildlife because it is dependent on ongoing government funding which cannot be assured.

### **Box 8.3 Sites of special scientific interest in the United Kingdom**

Designating and managing 'sites of special scientific interest' is one of the major instruments used in the United Kingdom to achieve habitat protection and sustainable use across both public and private land. Designation gives pre-eminence to safeguarding habitats, species diversity and geological and physiographical features. There are currently 4123 sites, covering 8.1 percent of the country. Forty percent of those sites are privately owned with the remainder managed by public authorities, conservation agencies and Ministries. At the end of 2010, 37 percent of all sites were in a favourable condition, while 60 percent were under management regimes that will bring them into favourable condition once natural features have had sufficient time to re-establish.

Natural England is the central designation authority that identifies potential sites. It is a public organisation with the central purpose to "ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development".<sup>31</sup> With more than two thousand employees, and administering several hundred million pounds of core funding and incentive payments, Natural England has the following priorities:

- A healthy, well-functioning natural environment

- People are inspired to value and conserve the natural environment
- Sustainable use of the natural environment
- A secure environmental future<sup>32</sup>

The selection of sites is objective and based on the state of the values present. Once a site has been selected, landowners receive notifications describing:

- Natural features of special interest
- Activities likely to damage those features and which will require explicit consent to be carried out
- How the site should be managed.

Since private owners and occupiers of land hold most sites of special scientific interest, Natural England employs several instruments that ensure that management targets are met by this group. Voluntary five to ten year management agreements between site owners and Natural England are the usual instruments. They specify the conservation services to be provided by the owner and the payments for this. Payment is based on a combination of income foregone, additional costs resulting from the commitment, and an incentivising bonus (a maximum of 20 percent of the income foregone).

### *Strengths*

A greater variety of more flexible mechanisms including incentives, temporary, permanent, statutory and non-statutory means of protection should generate better outcomes for biodiversity on private land. This is because it would likely engage more landowners in biodiversity protection. Temporary and non-statutory methods could be a prelude to permanent covenants later.

### *Weaknesses*

Private land conservation is costly to agencies. They incur costs of marketing, communications, technical input, monitoring, reporting and enforcement. Temporary and non-statutory agreements can easily be breached and gains made may be difficult to secure when properties change hands. There are significant incentives arising from the collective action problem, for agencies not to monitor and enforce compliance, and this will confound achievement of good outcomes for biodiversity.

## **T13 Improve covenant management**

*Problem: Covenants are often not managed sufficiently to secure biodiversity outcomes*

Covenants are the key tool for the legal protection of biodiversity on private land. Landowners may establish a covenant voluntarily or in response to a consent condition requiring protection of habitat. However, ecological outcomes may be disappointing where administration, management and monitoring are inadequate or where the landowner breaches the terms of the covenant.

*Solution: Support strong conservation outcomes from covenanting mechanisms*

New Zealand's covenant programmes offer much opportunity for improvements such as:

- A national strategy to target the most important habitat for covenanting (while not discouraging covenants on less-threatened ecosystems).

Where voluntary management agreements do not lead to the anticipated positive results, Natural England may apply stricter instruments. Management schemes are formal statements which list measures that are necessary for conserving and restoring the special natural features of a site. Management notices are enforceable and state that a site must be managed according to a management scheme. Stop notices specify operations that must cease unless the owner or occupier applies for explicit consent from Natural England. If a stop notice results in financial losses, the owner has the right to be compensated. All of the above decisions by Natural England, including issuing notifications and management agreements, can be appealed by the landowner.

Sites are monitored to ensure compliance with management instruments every seven years. The identification of sites, and application of the management tools described above, constitute the most commonly and successfully applied approach to protecting biodiversity on private land in England. There have been measurable trends of quality improvement and areal increase: over 96 percent of all sites are already in a favourable condition or recovering, and between October 2012 and March 2013, five new sites were notified with areas ranging between 0.03 and 3.5km<sup>2</sup>.

These management tools are particularly successful in attracting long-term and effective landowner participation. The payment of money that often accompanies management agreements, along with the

chance to apply for additional funding under different schemes, constitutes an important incentive for compliance. In addition, the opportunity to submit proposals for conducting potentially harmful activities as long they do not jeopardise the integrity of the site, allows landholders to benefit from commercial land uses. Generally, the participatory designation process where landowners can appeal decisions, and the clear rules on management accompanied by a comprehensive set of guidance documents, create clarity, transparency and legal certainty for landowners.

On the downside, the participatory process is restricted to the affected landowner and does not include the general public or, for example, environmental NGOs. Such bodies can neither propose sites nor participate in their designation or management. In addition, social-economic factors are not considered when designating management plans for the sites. On the one hand, this prevents the ecological effectiveness of such areas being attenuated by economic matters. On the other hand, it may lead to lower landowner acceptance and compliance. However, the monetary payments that accompany the plans help to overcome economic concerns.

- More comprehensive monitoring and compliance assessment to ensure ecological gains are being realised.
- A national database to record the location, purpose and ecological values of each covenant, to improve knowledge of the use of the covenant mechanism, and add to ecological information available about biodiversity on private land.
- Guidance and standards for frequency of monitoring, degree of subsequent protection from key pressures, and a suite of standard performance indicators for reporting and evaluation.
- Inclusion of covenant-monitoring results in national and regional environmental reports. Topics addressed should include the type and amount of biodiversity protected, management actions taken, and their outcomes with narratives describing notable achievements such as recovery of endangered biodiversity.

### *Strengths*

Much threatened biodiversity is on private land and not represented in public conservation land. Covenants are the key legal mechanism to protect these environments. The effective administration of covenants is therefore essential to meeting the goals of the New Zealand Biodiversity Strategy, and international biodiversity commitments.

### *Weaknesses*

Sound and effective national administration of covenants would be information-intensive and require the capacity to communicate effectively with a very large number of landowners. This is expensive, and would have to be specially funded, which implies that this solution is dependent on other solutions designed to bring in additional revenue for conservation expenditure.

#### **Box 8.4 Conservation agreements in Australia**

In Australia, the Commonwealth Government negotiates temporary contracts with landholders to protect biodiversity, habitats, communities, national heritage and Ramsar sites on private or public land and in marine areas. These are known as conservation agreements. The Commonwealth Government maintains 18 conservation agreements with State Governments, private landholders and corporations covering areas between 55 and 430,000 hectares. The agreements require actions that result in a net benefit to conservation, control or prohibit activities that might adversely affect wildlife, and empower staff to regularly

monitor the area. In return, conservation agreements may oblige the Commonwealth Government to provide financial, technical or other assistance to the party bound by the agreement. Although the negotiation of conservation agreements is voluntary, once they are concluded, they are legally binding for both parties and the successors of the landowner until they are legitimately revoked by either party. In case of violations, the person bound by the agreement must first undertake remediation or mitigation measures, which can also be enforced by the Commonwealth Court, before civil liability fines can be applied.

### **T14 Support landowners to undertake conservation**

*Problem: Landowners may not know what conservation actions are needed, or how to do them, or understand the importance of doing them.*

Private landowners manage approximately two thirds of New Zealand, and engaging them in the conservation of native wildlife and plants on their property is vital for social and environmental reasons. While many landowners (the proportion of which we do not know) are active conservationists, much more opportunity likely exists to engage this sector. Many landowners do not know they have biodiversity worthy of conservation on their land, are not willing or capable of personally funding conservation efforts, or may not have enough knowledge to do so. The awareness of landowners as to the benefits of conservation needs to be raised, technical advice made available, and financial recompense or reward systems established to drive greater participation.

*Solution: Support and empower landowners to contribute to biodiversity protection*

Raising awareness of conservation issues among landowners, and how they can contribute to biodiversity protection, may act to diminish the collective action problem and potentially raise public support for conservation more broadly. Provision of rewards for doing so would engage landowners much more effectively, as those interested but unwilling to personally finance conservation would then take part. Engaging landowners in biodiversity conservation would also increase the proportion of threatened species and ecosystems protected. Australia's Land for Wildlife Programme in Victoria provides an example of the integration of private and public conservation (see Box 8.5).

The example of Victoria is instructive because it:

- Reinforces the utility of providing a professional ecological assessment of a landowner's property as a hook that may encourage participation in conservation and promote stewardship
- Shows that a lack of fees and non-binding nature of the participation – although potentially less secure – may build landowner willingness over time and limit reluctance to be involved
- Illustrates the importance of communication, both initially and ongoing through liaison
- Demonstrates that the availability of incentives is an important catalyst for involvement and is likely necessary to improve outcomes
- Demonstrates that incentives must be significant to engage those that use their property for production (e.g. farming) because the economic drivers otherwise strongly incentivise damage to biodiversity

New Zealand could better recognise private land conservation institutionally by implementing a national private land conservation programme similar to Land for Wildlife with regional representation. The programmes administered could include:

- National guidance on management of biodiversity on private land
- Legal advice on covenanting and other mechanisms for security
- Free information, advice and support for landowners
- Provision of discounted or free tools and materials
- Payment of incentives in a nationally consistent way to recognise contribution to national and regional biodiversity goals



### **Box 8.5 Land for Wildlife**

The government-sponsored Victorian Land for Wildlife programme merges use and conservation of private land by supporting landholders to provide habitat for native wildlife. The programme commenced in 1981 and today covers almost 6000 properties, involves around 15,000 people, and covers 5600km<sup>2</sup> (four percent of private land in the state). Each year approximately 200 new properties register for the programme. The primary goal of the initiative is to incentivise conservation-aware landholders to be actively involved in conserving or restoring wildlife and habitat on their properties. It provides a range of benefits for registered landholders, without compromising the legal status and primary use of the property, or conveying any rights of public access. These benefits include:

- Professional on-site assessment of the property's potential to promote indigenous wildlife, and provision of advice on retaining and restoring native flora and fauna
- Information on other available incentives and grants to promote the goals of the programme
- Participation in field trips to other properties and information sessions
- Eligibility to display the 'Land for Wildlife' sign on the property

and a certificate to recognise achievements

- A regular newsletter that advises on the economic benefits of wildlife conservation, familiarises readers with the ecology and management needs of specific species, introduces registered property profiles and outlines their contribution to maintaining and increasing wildlife, and provides guidance on monitoring and managing wildlife.

In principle, any landholder committed to wildlife conservation is eligible to apply. The only condition is that the property is able to provide significant wildlife habitat and can be managed in a way that allows integration of wildlife maintenance and enhancement into the other land management objectives of the property. This could involve, amongst others things, fencing natural habitat, planting native vegetation or controlling predators, livestock and weeds. Properties which are eligible can include farms, parks, school grounds, golf-courses, municipal reserves, cemeteries, prisons and industrial land. Landholders can register through application to the nearest programme extension office. No fees are payable and landholders are free to withdraw at any time. The programme is operated on a small budget, since it is run mainly by volunteers, and does not directly fund conservation efforts by landholders. The lack of financial incentives for landowners resulted in limited participation by profit-driven owners of larger properties such as farmers, who use their land mainly for revenue generation.

- A recommended monitoring programme where landowners can contribute the results of their conservation actions – data that could contribute to national biodiversity monitoring.

## **T15 Strengthen the Freshwater NPS**

*Problem: The present Freshwater NPS does not sufficiently address freshwater biodiversity conservation*

The Freshwater NPS, and the accompanying National Objectives Framework, are important steps forward in freshwater management. However, they need greater capacity to contribute to the protection of indigenous freshwater biodiversity and habitats. Indigenous biodiversity is likely to be negatively affected by changes in conditions that the National Objectives Framework does not presently capture or sufficiently limit. Urgent action is needed to better address biodiversity and ecosystem services within the new policy framework.

*Solution: Use the 2016 review of the Freshwater NPS to strengthen*

*biodiversity provisions and indicators within the existing framework*

The Freshwater NPS is scheduled for review in 2016 and this provides the next opportunity to provide for the maintenance of freshwater biodiversity. Some improvements that could be achieved in the 2016 review (or a sooner review) include:

- Indicators that better reflect the state of biodiversity and ecosystem services
- Inclusion of the full range of freshwater environments (e.g. wetlands and estuaries) with mandatory ecosystem health attributes
- Inclusion of specific targets for the maintenance of freshwater biodiversity

Without more proactive measures to protect and improve the state of freshwater biodiversity, decline is likely to be ongoing and irreversible.



*Our ailing freshwater ecosystems need more attention in policy and practice*

### Strengths

Modifying the existing Freshwater NPS is logical given that it is new, a significant public process was undertaken to get it to this stage, and the broad framework is in line with recommendations of the Land and Water Forum. The practical task of modifying the framework to recognise biodiversity is thus inexpensive.

### Weaknesses

Existing biodiversity monitoring programmes may not already collect information sufficient to support measures for biodiversity, and additional support, training and resourcing may be required for agencies to include the new parameters. In addition, as strengthening the Freshwater NPS is likely to further constrain some land activities, especially intensive dairy farming, it will likely be strongly resisted by that interest group.

## T16 Deploy tools to protect freshwater ecosystems

*Problem: Regulation to safeguard freshwater biodiversity is under-used and under-implemented and incentives are uncommon*

Freshwater ecosystems continue to be reduced significantly in extent by damming, drainage and diversion. This results in outright habitat loss, reduced connectivity of the overall system and diminished ecological integrity. What remains of aquatic ecosystems, after these activities have taken place, is then subject to altered hydrological regimes and pollution. There is an urgent need to prevent further degradation of freshwater ecosystems through effective protection of water bodies and effective control of degrading activities at a catchment scale.

*Solution: Strengthened use of existing protection and management approaches and development of new protection tools*

Freshwater ecosystems require more integrated management, and a large range of existing tools is available that could be deployed within an integrated management framework. These include water conservation orders, regional and district plan rules, reserve mechanisms and other controls. At present, application of these tactical solutions is constrained by private economic interests, who have considerable influence on the actions of regulatory agencies.

Effective protection of freshwaters from degradation over time is linked to the surrounding land use, and the nature of development control. Some practical ways to limit the impacts of adjacent activities (many of which are already widely practised in some regions) include:

- Requiring substantial buffer distances in regional and district planning instruments between freshwater bodies and land uses with negative effects. Research has demonstrated that, as the width of riparian buffers increases, so too does their efficacy in removing pollutants such as sediment and total phosphorous.<sup>33</sup> Vegetation adjacent to a waterway is also important for maintenance of food webs and provision of habitat. Minimum suggested buffer width is 10 metres or more, but this varies with site topography and adjacent land uses.<sup>34</sup>
- Encouraging the re-vegetation and fencing of riparian areas, for both the provision of habitat and entrapment of diffuse pollutants, through regulatory (rules and compensation requirements) and non-regulatory (incentives, free plants and advice for landowners) means. Rules limiting vegetation modification in riparian corridors should not restrict activities undertaken for conservation purposes.
- Including a presumption in regional and district plans of avoidance of drainage, vegetation clearance and other degrading activities near freshwater bodies to reduce sedimentation, maintain and improve habitat quality and maintain hydrological regimes.
- Placing caps on nitrogen discharges sufficient to maintain specified biological features (e.g. maximum chlorophyll) such as that put in place in the Lake Taupō catchment.
- Making farm product purchase by major buyers contingent on compliance with industry-defined standards for farming activities. For example, Fonterra could require suppliers to demonstrate compliance with riparian management standards and nitrogen levels in near-surface groundwater.

### Strengths

These measures have at least some degree of industry acceptance and

are already in place to varying degrees in different parts of the country. The legislative tools required already exist and implementation does not require legislation change.

#### *Weaknesses*

Despite the breadth of available tools, and the capacity of many agencies to implement them, few actually do so. The fact that they don't suggests that effective protection of freshwater biodiversity will not be achieved by regulation and practical effort alone. The economic drivers of degradation are such that freshwater biodiversity cannot be safeguarded without additional strategic policy interventions that counter the economic drivers of degradation.

### **T17 Close policy gaps for wetlands and estuaries**

*Problem: Key freshwater environments, such as wetlands and estuaries in particular, are typically overlooked in law and policy*

Wetlands and estuaries are two of the most threatened and degraded types of freshwater ecosystems in New Zealand and this probably reflects the degree to which they are overlooked in law and policy. Estuarine biodiversity is impacted by drainage, pollution and disturbance from human use. In addition, rising sea levels are contributing to increased demand for sea walls and similar structures, which interfere with sediment budgets and reduce shoreline habitat. Poor provision for the protection of such ecosystems puts vulnerable biodiversity at risk, reduces cultural values, and diminishes ecosystem services such as flood mitigation.

*Solution: Specific and targeted policy recognition*

Protection of estuarine and wetland biodiversity, and the many ecosystem services they provide, relies on managing direct (e.g. drainage and sea walls) and indirect (e.g. pollution and water table reduction) harm. This difficult task is made more complex by overlapping regulatory regimes where different agencies and legislation control different aspects of the same site. New Zealand has a Wetland Policy (1986) that has not been updated since its inception. Stronger policy recognition of wetlands and estuaries in a new or existing national policy statement or national environmental standard could provide constructive clarity and focus.

#### *Strengths*

Specific policy, which targeted the protection of wetlands and estuaries, would amplify their status and help stop them slipping between the cracks of the terrestrial and marine management regimes. Policy could include attributes which track state and trend of biodiversity, and identify areas of priority conservation nationally. The policy or guidance material could also provide agencies with a tool to help reconcile the overlapping management regimes, and provide for a focus on what the ecosystem

affected by a proposal requires to ensure its persistence.

#### *Weaknesses*

Wetlands and estuaries are very important both environmentally and economically because of the valuable ecosystem services they provide (e.g. waste assimilation, stormwater reception, water sources and nursery habitat for valued species). The extent of wetland loss (more than 98 percent in some eastern regions) means that all that now remain are important and worthy of retention. The extent of modification of estuaries, particularly around coastal settlements and intensively farmed areas, is also extensive. This has increased the importance of ecosystem services provided by remaining healthy estuaries which need to be robustly protected. However, retention constrains use rights, which is an opportunity cost to landowners and so is a difficult matter for regulatory agencies to manage.

### **T18 Reform marine law and policy**

*Problem: Marine policy and legislation is inadequate for protecting marine biodiversity and there is an absence of overarching policy.*

Marine policy and legislation is generally either absent or inadequate. There is no overarching policy context for the marine environment, and no platform or statutory basis for marine spatial planning. The legal tools available to protect marine biodiversity (both species and habitats) are outdated, unwieldy and under-utilised, and often are not mandatory. Species protections are generally subservient to commercial extraction and development activities and the result is that a significant proportion of marine mammals and seabirds are threatened. The options available to protect marine habitat are also insufficient. They are narrow in scope (e.g. marine reserves only able to be protected for scientific purposes, and only within the territorial sea) and limited in implementation.

*Solution: Develop a modern and robust policy and legal context for the effective protection of marine biodiversity*

More modern legislation including overarching policy, and the implementation of an effective planning framework, are essential to the future of the marine environment. Oceans Policy has been mooted many times, but progress towards it is slow. Marine spatial planning holds a great deal of promise, as an integrated setting within which to discuss allocation of marine resources and the establishment of a robust representative protected area network, but there is presently no statutory basis for it. Long-term solutions to the protection of the marine environment include:

- A robust Oceans Policy in accordance with earlier recommendations by the Environmental Defence Society<sup>35</sup>
- A statutory basis for marine spatial planning

- Improved biodiversity provisions in existing legislation affecting marine biodiversity
- More modern and effective legal tools for the protection of marine species and their habitats.

In the short term, combined approaches of existing mechanisms may be useful. For example, taiapure reserves and Marine Reserves Act 'no take' reserves could be jointly implemented, with the former acting as a buffer zone to the more stringently protected interior.<sup>36</sup> In the longer term, a more modern regulatory regime is required, and indeed has already been signalled by the current National-led government (elected 2014). Legislative amendment or entirely new legislation is long overdue. Key outcomes of new legislation should include:

- A wider range of marine protected area categories to enable different levels of protection to be implemented, and expansion of their application into the Exclusive Economic Zone
- Statutory provision for marine spatial planning
- Species protection that applies to all species commensurate with threat status and requires compulsory action (e.g. preparation and implementation of a species recovery plan or similar)
- Better linkage between land activities and consequent impacts on marine biodiversity (especially to address sedimentation)
- Stronger emphasis upon bycatch avoidance and provision for penalties for bycatch due to fishing or other activities
- A charging regime for occupation and use of the marine area
- A more inclusive and collaborative decision-making process

#### *Strengths*

A more modern and effective suite of marine legislation would limit the proliferation of *ad hoc* mini-Acts written to protect specific locations and improve the overall effectiveness of marine management. It would enable integrated planning and management of the marine realm, something which has long been acknowledged as a necessary precursor to effective management, but which has proved elusive to date. Further, more flexible protection mechanisms, and a greater recognition of Māori interests, would reduce conflicts over marine biodiversity and potentially see more of it protected. Greater emphasis on controlling the primary causes of impacts on marine biodiversity would reduce sedimentation, fisheries bycatch and physical habitat damage.

#### *Weaknesses*

The review of marine law and policy might come at a cost to existing interests, particularly farming, forestry and fishing. Provisions impacting on existing rights will likely be fiercely challenged, and strong facilitation and advocacy for the public interest will be necessary to provide something akin to an even playing field.

### **T19 Allocate stewardship land**

*Problem: Stewardship land includes important biodiversity that is not adequately protected.*

Stewardship land is held in a statutory holding pen that has the lowest form of protection of all land held by the Department of Conservation. Stewardship land comprises both the historical land bank given to the Department when it was formed, and land gifted or purchased since, for conservation purposes. Without adequate protection, high-value biodiversity may be lost.

*Solution: Allocation of stewardship land*

We recommend that stewardship land is systematically assessed and allocated appropriately to different uses as originally intended, as called for by the Parliamentary Commissioner for the Environment. Such a classification process might enable land of high biodiversity value to be protected to the extent appropriate.

#### *Strengths*

Allocation of stewardship land will provide certainty over the protection status of the land. High-value biodiversity sites, currently on stewardship land, will likely be protected from the various forms of development that are allowed on stewardship land and other low-status categories. Some high-value areas would be protected from open-cast mining by adding them to Schedule 4 of the Crown Minerals Act.

#### *Weaknesses*

The allocation process presents risks to biodiversity vulnerable to development, as demonstrated by the High Country tenure review.<sup>37</sup> There is a risk that commercially valuable habitat remnants, supporting threatened biodiversity in the fertile lowlands or on mineral deposits, are likely to be made available for intensive farming or mining rather than being protected for conservation purposes. The process itself is likely to be costly, and require field surveys to identify values present, and this will require funding.



Large areas of stewardship land play host to such threatened species as Archey's frog (*Leiopelma archeyi*)

## T20 Strengthen public interest litigation

*Problem: The representation of the public interest via case law is poorly funded*

We have described many instances where outcomes for biodiversity fall short of what legislation ostensibly provides for because the law may not have been interpreted and applied appropriately. Action in the courts taken on the part of individuals or groups acting in the public interest can help to ensure that law, where it exists, is fairly applied. Case law also provides crucial insight as to how a particular legal tool is to be interpreted and applied. Legal precedents alter the balance of power between interests and so are much sought after by different stakeholders.

The process of challenging the implementation of law through the courts is resource-intensive and puts much strain on both NGOs and government agencies with statutory advocacy responsibilities. These costs have always been difficult to meet and recently the funds available to support legal defence of the public interest have been reduced. The Department of Conservation has a statutory advocacy role but the financial and political cost of fulfilling its role has been so great that in recent years it has become loath to participate in adversarial legal processes. This role now falls to NGOs such as Forest and Bird, the Environmental Defence Society and Greenpeace, which seek to defend the public interest through litigation.

Groups taking legal action in the public interest typically do so 'on the smell of an oily rag', reliant on donations from supporters, generous *pro-bono* input and the small (and shrinking) amount of public funding available. However, for private interests, legal and expert witness expenses are a tax-deductible cost of doing business. Many processes are heavily evidence-based, so community groups making only lay submissions are generally given less weight than applicants engaging many highly qualified experts. Alternatives to litigation (such as collaboration) are also highly resource-intensive. Consequently, public interest groups are becoming increasingly selective as to what legal actions they can get involved in.

*Solution: Increase scope and quantum of funding available for legal action in the public interest*

### Strengths

Judgments under the RMA are made by an apolitical Environment Court and are subject to further appeal only on matters of law. This process removes scope for direct political influence and enables the public interest to be balanced against other matters in a benign and academic environment. This forum evens the playing field somewhat, acting to defuse the power of private interests, and for matters to be considered on an evidential basis.

### Weaknesses

There will be gaps and variable skill levels in community groups, and funded legal action may not be coordinated to maximise efficiency. There is also potential for funding to be directed at ill-thought-out litigation, based on pseudo-science or ideological positions not justified by facts. However, the current criteria which apply to the Environmental Legal Assistance Fund serve to avoid these problems, and these could be given broader application. The criteria include:

- The focus of the case is the protection or enhancement of nationally or regionally important environmental qualities
- The case affects the wider community or general public
- The case involves issues of national importance which will not be addressed in full before the Environment Court or a board of inquiry without the expert evidence provided by the group
- The degree of collaboration, the commitment of the group, and the resources it can offer to support its case
- The group has shown that financial assistance is required as there is likely to be an imbalance between the level or quality of evidence and case management due to a lack of financial resources<sup>38</sup>

# Practical solutions

## P1 Improve conservation methods

*Problem: New tools and methods are constantly required to address conservation dilemmas*

New Zealand conservation managers must contend with a range of weighty challenges such as pest control, threatened species recovery and a poor knowledge of many species and ecosystems. On-the-ground conservation initiatives have been a hotbed of innovation throughout history, and constant refinement and trials of new ideas will always be required. However, such efforts are difficult to fund (particularly given the Department of Conservation's diminished science capacity).

*Solution: Improved support for development and refinement of conservation methods*

From the research laboratory to the field, New Zealand biodiversity managers must refine approaches to secure the best outcomes for biodiversity, in a context very far from that which most indigenous species evolved in. This requires continuous innovation and review of current practice, something that is very hard to do in a constrained funding environment.

While the simple solution of increasing funding is somewhat axiomatic, other approaches can be teamed with increased resourcing to address the practical problems of conservation. Increasing fiscal support can be teamed with public-private partnerships, community groups participating in trials of unique conservation methods, and stakeholder support for novel approaches. However, these all require a high level of expert capability to function.

### *Strengths*

Those working on the frontline of conservation encounter the strengths and weaknesses of management interventions on a daily basis. Providing for testing of new ideas and methods *in situ* engages frontline staff in innovation and facilitates uptake.

### *Weaknesses*

New ideas for conservation tactics can take a long time to develop, trials can be costly, and few will ultimately prove useful. However, much will

be learned from these failures, and applied in other contexts. This is how innovation progresses.

## P2 Improve pest control methods

*Problem: Pest control methods are too expensive and insufficiently effective to protect vulnerable biodiversity from the impacts of introduced mammal predators at regional and national scales.*

Mammal pests impact biodiversity throughout the mainland and Rakiura/Stewart Island and similar pest control coverage is required to maintain vulnerable mainland biodiversity. This is not currently feasible because pest control is still too costly and inefficient, despite the very considerable improvements achieved over the last two decades.

*Solution: Increase research and development investment in the improvement of aerial 1080 pest control*

The effectiveness of aerial 1080 operations, in maintaining populations of vulnerable native vertebrates, is now much better understood as a result of rigorous experimental management in South Westland. This research has demonstrated that the benefits come not so much from killing possums, but from poisoning ship rats and stoats (that eat poisoned rats) in the spring, before their breeding season gets into full swing. Furthermore, precision aerial application of cluster-spread non-toxic pre-feed, prior to the spread of toxic baits a few days later at the same points, appears to achieve the best results for the least use of toxic bait. This understanding has in large part enabled the 'Battle for the Birds' programme to defend vulnerable forest birds from the consequences of masting events.

Cost and efficiency (and hence the area treated for a given budget) could be further improved if large fixed-wing aircraft could be used to spread the baits, instead of expensive helicopters. In addition, dose rates (kilograms per hectare) could be better tuned to match measured abundances of pests. Additional benefits would be achieved if ways could be found to make the toxic baits more palatable to mice (which seem able to detect the 1080 toxin whereas rats cannot).

### *Strengths*

There is already a substantial infrastructure and capacity in place that can support research and development aimed at improving the efficiency



*Tracking forest gecko: science and research into species is a crucial part of protecting biodiversity*

and effectiveness of 1080 pest control operations. Any developments that improve efficiency, while reducing the quantity of toxin used per hectare, are generally likely to be welcome and may go some way to reducing the conflict between pest control and maintenance of deer and pig hunting opportunity.

#### *Weaknesses*

Improvements are likely to be incremental and not game-changing in nature. Unfortunately, we need game-changing advances if pest control is to be feasible at the scale and intensity required to maintain our vertebrate biodiversity in the face of predation by introduced mammal pests. That said, if we can find a way that 1080 can be used to target mice effectively and kill stoats that eat poisoned mice, then this advance will likely lead to substantial benefits for native wildlife.

*Problem: The range of methods available for the control of mammal pests is very limited and none are sufficiently low-cost and effective to control mammal pests at the national scale.*

We are entirely reliant on 1080 for large-scale pest control operations. But 1080 is a non-specific toxin, so that baits must be designed to be unattractive to non-target species, potentially compromising their acceptability to target pests. Furthermore, death of non-target animals

such as deer, pigs, dogs, cats and livestock, is high among the reasons for ongoing public opposition to 1080 pest control operations.

Novel toxins that are highly target-specific may help resolve some of the issues with 1080, and may offer alternative pest control solutions better suited to particular circumstances.

*Solution: Research into and development of novel toxins for large-scale pest control operations.*

New methods in molecular biology offer ways to design highly specific toxins that may be useful for pest control at very large scales. While there is little possibility of devising a 'silver bullet', it should be possible to expand the very limited range of pesticides currently suitable for broad-scale application.

#### *Strengths*

The development of alternative toxins to 1080 may benefit vulnerable native species and help to reduce public opposition to broad-scale toxin-based pest control.

#### *Weaknesses*



*Kakabeak (Clianthus puniceus) has beautiful flowers that are highly palatable to browsing pest species*

Development of novel toxins has much in common with the development of novel pharmaceuticals. It is an enormously expensive and time consuming business with a high risk of failure. There are daunting regulatory hurdles in the way of formal registration for use. There is also substantial risk that new toxins will not be appropriate for some reason. The research and development required is such that a commercial partner will be essential, and this means any product that eventuates will have to provide a commercially satisfactory return, which may render it too expensive for broad-scale use.

### **P3 Improve biodiversity information**

*Problem: Poor baseline information of New Zealand species and ecosystems*

Limitations to our understanding of ecological interactions (particularly between human activities, pests and native species) mean that there may be little objective basis for identifying an effective conservation

prescription. Autecological research (research on the interactions of particular species with other species and their environment) provides the basis for knowing what conservation to do where, but funding for such research has been declining for several decades, and is now at an all-time low.

Conservation challenges as large as ours demand resourcing for baseline research and conservation methods much greater than those presently provided for. New Zealand's indigenous species exist in a very different world to that which they evolved in and the challenge of pest control and eradication will remain a significant focus of conservation science. Behavioural analysis of pests and their prey, development of novel pest control methods, techniques for captive breeding and the use of genetic science in conservation have rich potential for further inquiry. There is also a great need for social and economic research to better understand the human drivers of biodiversity loss, and how these can be managed in





A pair of pūtakitaki/paradise shelduck (*Tadorna variegata*)

a positive and constructive manner that benefits all, including those who would otherwise gain from such loss.

*Solution: Increased investment in addressing information gaps*

In 2006, Green and Clarkson released a review of the first five years of the New Zealand Biodiversity Strategy, recommending that “...government funding for research underpinning biodiversity objectives, and related biosecurity objectives, is substantially increased”.<sup>39</sup> Since that time, science spending has in fact decreased. Resourcing and support for the collection and communication of core information on species and ecosystems is required to underpin biodiversity management. This includes core funding for science endeavours but also support for science education in schools, placements for tertiary students, and increased capacity for research in science institutions. The National Science Challenges go some way in addressing biodiversity research in particular. However, the additional funding is small and much more is needed.

*Strengths*

Robust information that has business utility and contributes to effective decision-making is the cornerstone of efficient and effective conservation. Understanding the most effective management interventions means that more species and ecosystems will be conserved at less cost.

*Weaknesses*

Information collection and management is a costly exercise and would require a substantial injection of funding and increased levels of expertise

in the Department of Conservation and other agencies.

## P4 Ensure access to biodiversity data

*Problem: Independent national-scale analyses of the state of terrestrial biodiversity and the effects of management, are hindered by impediments to data access and use.*

The Department of Conservation Tier One biodiversity inventory and monitoring data of forests, shrublands and grasslands on public conservation land are potentially vital resources for understanding the state of biodiversity and the effectiveness of conservation management at large scales. These data have been analysed for the Department by Landcare Research in 2012, 2013 and 2014. It is of some concern to us, however, that these reports are not externally peer reviewed, nor are the data yet available for independent analysis, despite being public information.

Inconsistencies in conclusions drawn among the different Landcare Research reports suggest to us that independent external peer review is warranted. Furthermore, because the Department has not made the data available for independent analysis, it is not possible for others to examine assumptions made and conclusions drawn. It is also not possible to use the Tier One data to independently explore different conservation-relevant questions that the Department has not asked, or may prefer not to ask, and yet would certainly provide important insights to the state of biodiversity and management effects. Constraints on access to Tier One data are in stark contrast to the unrestricted availability of the national freshwater fish database, which has spawned dozens of novel insights into aspects of New Zealand’s freshwater ecology over the years, through independent enquiry.

The National Vegetation Survey databank is an important repository of diverse vegetation survey data that is recognised and managed by Landcare Research as a nationally significant database. This databank has enabled some important conservation-relevant research and the development of products such as the Land Environments of New Zealand. However, its use is somewhat limited by a cumbersome (although improved) permissions system, requiring every prospective user to contact and gain permission from the nominated ‘owner’ of each individual dataset not expressly classified for open access. This arrangement complicates national-scale data analyses: requesting national data revealing locations of a common species (e.g. the snow tussock *Chionochloa rigida*) might require correspondence with many individuals. The impediment also appears largely unnecessary. Some datasets in the databank are truly privately owned, and a few are sensitive (such as those with locations of threatened species sought by collectors). However, most nominated owners collected ‘their’ data as staff of government agencies or with government funding. As such, the data are legally public information and it is not appropriate



*Pink Broom (Carmichaelia carmichaeliae) is one example of many threatened plants throughout New Zealand*

to allow individual researchers to impose restrictions on access to them. In some situations however, the authors are understandably reluctant to release the information immediately where they may be intending to publish on it and do not wish to be beaten to the task.

*Solution: Terrestrial biodiversity data collected through government funding*

*should, by default, be acknowledged as public information and accessible without impediment for independent research.*

Restrictions on access are appropriate in exceptional circumstances, such as where knowledge of species' locations would add to their endangerment, as is the situation with some of our lizards. However, this decision should be made at an agency level, informed by an evaluation of the risks and benefits of releasing the information. The solution depends on culture change. This may best be achieved by making public funding for the curation of these data conditional on unimpeded public access to it, except for special situations where access creates additional and unacceptable risk.

#### *Strengths*

Much new knowledge of terrestrial biodiversity and its management would likely be derived from novel analyses by university researchers and other independent scientists and some of this may have important implications for conservation. Furthermore, the capability that would be developed in universities because these data are freely available to students will replace and add to the national conservation research capacity.

#### *Weaknesses*

Independent analyses may reveal problematic issues for agencies, such as weaknesses in survey design and analysis that agencies may prefer remained undisclosed. There is a concern that some researchers might not contribute their data if this meant that it would become available for others to use without their express permission.

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# 9 Summary and vision



*Mitre Peak, Milford Sound*

Our indigenous biodiversity is slipping away. Despite the laudable goals of the New Zealand Biodiversity Strategy, present efforts are insufficient to even halt this decline, much less reverse it. Rates of loss in New Zealand are such that without change, the next few decades are likely to see the extinction of many iconic species (such as the New Zealand sea lion and Maui's dolphin) along with those that live in our disappearing remnants of lowland ecosystems. Without ongoing intervention with pest control, captive breeding and other techniques, a substantial swathe of already imperilled species is also likely to die out. Familiar species that we may lose include kōkako, kiwi, saddleback, black stilt, longfin eel, long-tailed bats and many lizards. It is inarguable that urgent action is needed.

Advances in conservation science, and an explosion of community effort, coupled with a plethora of policy and legislation designed to safeguard biodiversity – although remarkable – have fallen short of what is needed to halt decline. Greatly increased efficiency in conservation activities on the ground (e.g. pest control) have delivered more and more conservation output per dollar. These efficiencies must continue and much more work must be done. The determined efforts of environmental NGOs, the advocacy of the Department of Conservation and some councils, and the actions of individual champions have also won many battles and no doubt slowed the decline. But the war continues and ultimately it is being lost.

Conflicts between economic growth and environmental protection are ever-present, seemingly with little regard for the ultimate dependence of the former upon the latter. To shift the context for conservation from one of perpetual and resource-intensive conflict, demands a strategic

shift toward better aligning the goals and drivers of private, government and public interests. Biodiversity is declining primarily due to systemic problems, and therefore biodiversity decline will be most effectively reversed through solutions that address those systemic issues. It is also patently apparent that a great upscaling of conservation effort is required, and that proximal drivers of loss must be addressed more effectively and intensively. In this chapter we articulate a vision for conservation in New Zealand, and explain how it can and should be implemented.

## Vision

Our vision for conservation of indigenous biodiversity in New Zealand is one of inclusion, collaboration and engagement, an 'all-in' approach that provides for participation from all sectors of the community. Transparent and accountable agencies maintain an emphasis on evidence-based conservation planning and prioritisation, to ensure national biodiversity goals are set and the conservation effort is directed at them as efficiently and effectively as possible. Agencies exercise their functions in an environmentally sympathetic manner, are much less permeable to agency capture and much more focused on outcomes than outputs. They take full responsibility for the outcomes achieved.

Our vision includes an adequately funded and fully functional Department of Conservation that forms enduring partnerships with other stakeholders to protect, maintain and restore natural heritage. This is alongside regional councils who are champions of biodiversity protection, particularly on private land. Strong national leadership from both the Department of Conservation and the oft-absent Ministry for the Environment use their roles to effect the best outcomes. In partnership with iwi and hapū, conservation agencies and groups participate enthusiastically in co-management agreements, which are commonly enacted. Iwi successfully reconcile their dual economic and environmental interests, leading in sustainable development.

With far greater secure funding and technical assistance, community conservation thrives at a much greater scale, with grass-roots outcomes making a powerful contribution to the retention of our natural heritage. Landowners and developers resolutely take on a stewardship role for the biodiversity on their properties and are incentivised and supported to do so. Interventions from environmental policy initiatives, to on-the-ground species recovery work, are subject to a strong culture of rigorous monitoring and evaluation. Interventions are prioritised and then evaluated according to the difference they make.



Ben Yi

Tongariro National Park wetland



Raewyn Peart

*Hoopers Inlet, Otago Peninsula*

## So how do we achieve this vision?

The vision we outline is certainly attractive for many reasons, but achieving it will be no small feat. It relies on behavioural changes at multiple levels and over different timescales. The key tasks can be grouped into six issues to be addressed:

- Funding for conservation
- Aligning divergent interests
- Public mobilisation
- Accountability and monitoring
- Effective legislation, implemented well
- Enhanced front-line conservation

Substantial advances on each of these six issues are needed to halt biodiversity decline and this will involve a mix of strategic, tactical and practical solutions. The right mix will maintain and develop our prosperity. It will do this by putting us on a path towards sustainable economic growth that is no longer founded on environmental depletion.

### *Funding for conservation*

It's all about the money. Funding models for conservation must be improved in order to halt and reverse the decline of biodiversity and ecosystem services. Present models do not generate sufficient resource to achieve conservation goals and new approaches must be implemented. Examples of the funding shortfall are everywhere. The Department of

Conservation cannot properly maintain its present holdings nor fulfil its other functions effectively. Regional and local councils have similar constraints in managing their reserves and private land protection programmes. Private landowners and community groups have limited to no financial support or incentive to undertake conservation, meaning only that a fraction of what could be done, will be done. It is clear that more resources could make a substantial difference to biodiversity.

Improved funding could be achieved in a number of ways including:

- Increased core funding from existing tax revenue and diversion of other expenditures (e.g. health, education, social welfare and irrigation subsidies)
- An environmental consumption tax or another solution that would similarly (a) incentivise activities that protect and retain biodiversity (b) penalise those that damage biodiversity and (c) charge the majority of us who gain benefit from past biodiversity destruction
- Greater emphasis upon the polluter-pays approach including levies, taxes, occupation charges or similar to raise valuable money for protection on land, in freshwater and in marine areas.

Achieving this would also require attrition of the power of private interests, to make it possible to then hold them responsible for the substantial negative effect they have overall on New Zealand's ecosystems. Reducing the failure of markets to account for biodiversity through taxation, payments for ecosystem services and valuation of adverse effects on the environment would raise substantial additional conservation funding and also act to disincentivize ecological damage.



Raewyn Peart

*Porpoise Bay, Catlins Coast*

With substantially more funding being available, the conversations around the protection of biodiversity will become very different as this will enable:

- Enhancement of the core funding of the Department of Conservation and other biodiversity-related agencies through the proceeds of initiatives identified above, and through increase in Vote Conservation's apportionment through Treasury
- Biodiversity protection to be an economically viable form of land use, enabling its proponents to fund capital investment and ongoing management and monitoring
- More effective on-the-ground conservation, with the Department and regional councils in a position of being able – in partnership with communities – to carry out wide-scale integrated pest control and to effectively prioritise those actions.

Conservation efforts of landowners are not sufficiently encouraged or supported in New Zealand due to conflicting economic drivers and a paucity of incentives. At the same time some damaging development activities receive substantial government subsidies and support. Increasing

funding for landowners, who wish to conserve rather than destroy natural capital, would render conservation a viable activity on private land, rather than an excessive burden unacceptable to many. Funding should address not simply the direct costs of conservation, but income foregone as a result of not undertaking biodiversity-damaging activities. This would create a market for biodiversity conservation, with wide-ranging positive impacts. Funding and incentives for community groups require similar enhancement, with much more money required to upscale and maximise the outcomes of community conservation nationally.

#### *Alignment of divergent interests*

The power of private interests to override the public interest in biodiversity conservation has been maintained throughout this book as a leading contributor to biodiversity decline. The clashing of divergent interests lies at the heart of most environmental problems and rhetoric often focuses on the reconciliation of economic and environmental goals in New Zealand. We agree that this is indeed the way forward, and that the most effective long-term solutions will be ones that see the agendas of private interests, agencies and the general public being broadly aligned. A strategic solution



John Leathwick

*Motuopa at dusk*



such as an environmental consumption tax, for example, could serve to disincentivize biodiversity destruction while at the same time raising substantially more money for the conservation of biodiversity, depending on the degree to which it substituted other taxes that fetter economic growth.

### ***Public mobilisation to elicit leadership and vision***

Inspiring leadership and accountability from agencies, and supporting all other stakeholders in conservation to energetically play their part, is no easy feat. Throughout this book, we have maintained that the collective action problem is what creates the context for biodiversity decline. Public support for conservation is variable, and highly motivated proponents of biodiversity harm will almost inevitably counter its effect, even when that public support is high. Engaging the public and building the social mandate for conservation, is essential to help correct the collective action problem and to draw the best out of agencies tasked with acting in the public interest.

We propose many measures to build this support, and to do so at a number of scales. In the first instance, New Zealand should embark upon a collaborative process to elevate the political importance of indigenous biodiversity. A national conversation on biodiversity would yield the best outcomes when the public interest is well-represented; when the private sector's power to dominate is sufficiently diminished; and when there is a tangible outcome from the process (e.g. a National Policy Statement or similar). The outcomes of the national conversation could be regionalised through the regional biodiversity plans we elsewhere recommend. The policy document or strategy would more likely be implemented if it were linked to regional biodiversity plan processes.

A regional implementation focus for biodiversity conservation, with strong links to technical support and guidance from the national level, would draw together the efforts of agencies, iwi, landowners and community groups much more effectively. Coupled with a suite of regulatory and non-regulatory interventions – including payments for ecosystem services, guidance and support from agencies and incentive schemes – the efforts and outcomes of extra-agency conservation can be maximised and public support for conservation can be built in tandem.

Celebrating conservation successes will also be a part of this picture, and the success of this approach is already demonstrable with existing schemes such as the Green Ribbon Awards recognising conservation achievement. Some of the changes necessary to achieve this plural approach to conservation are already occurring, with the shift of the Department of Conservation to a partnerships model, but much more is



*Raukawa gecko (Woodworthia maculata) feeding on nectar from flax, Mana Island*

needed. On the flip side the true state of biodiversity must be much more richly and effectively reported upon to the general public. Experience demonstrates that New Zealanders are fed good news stories much more often than bad, with translates into incognizance of the state of peril of many treasured species and ecosystems.

### ***Accountability and monitoring***

Despite the comprehensive suite of legislation and regulatory tools available to safeguard biodiversity, they are in the main poorly implemented, and thus ineffective in curtailing overall biodiversity decline. We have demonstrated that the root of this failure is the collective action problem, which renders private interest very much more successful at ensuring access to natural capital than the diffuse and poorly organised public interest is in limiting that access. Agency and regulatory capture aggravates this imbalance, rendering agencies more aligned with development interests than with safeguarding the public interest in biodiversity. The power imbalance evident in resource management must be corrected, and agencies given incentives to act in the public interest instead of enabling biodiversity destruction.

If the public interest in the protection of biodiversity is to be effectively served by agencies, they must have greater incentive to act and ideally to

do so with the support of private interests, which would otherwise form a barrier. Addressing agency capture would be much more feasible if greater incentives were in place for agencies to achieve good outcomes for biodiversity, and if there were additional benefits from doing so. The government is generally properly concerned with maintaining the public interest in economic development and biodiversity protection, meaning long-term solutions will require substitution of revenue to achieve both.

Robust national and regional biodiversity monitoring, that measures the right things in the right places, is also essential. The outlay required for adequate monitoring is generally substantial and usually difficult to justify because (a) people do not recognise its importance for informing management, or (b) people are concerned about what the results may show. A robust framework to guide biodiversity monitoring is a crucial step, particularly for agencies. It is not clear whether existing initiatives will deliver what is needed. We recommend that biodiversity monitoring programmes are closely linked to management needs, addressing the most urgent conservation priorities first.

Instituting a culture of robust monitoring and evaluation is also essential, and most likely to be implemented, if a strategic solution is adopted that provides adequate incentive for evaluation of outcomes. Even in their absence, change is essential. Biodiversity monitoring programmes, existing or in development, require analysis and rationalisation to ensure that precious monies are used to best effect and at the correct scale. Both the Department of Conservation and the Ministry for the Environment, together with crown research institutes, the regional councils and other groups doing biodiversity monitoring must organise to maximise monitoring effort. It is particularly timely to do this during the development phase of the National Environmental Reporting Bill.

In the same way that agencies must be more accountable for biodiversity outcomes, so too should effort of other stakeholders – at least to the extent that changes are monitored so that the sum of efforts is known. Private land conservation activities (including covenants), and the biodiversity outcomes of the efforts of community groups, must be monitored more rigorously for ecological outcomes. This is particularly the case when they are in receipt of public money for conservation.

### ***Effective legislation, implemented well***

New Zealand's existing suite of legislation is far from perfect, but many tools and provisions are present that would drive good outcomes, if they were implemented well. Legal reform is also required, particularly in the areas of threatened species protection, the protection of the marine environment and to some extent in freshwater. Changes to legislation

vary from tweaks to existing legislation through to a requirement for large-scale reform (e.g. marine areas).

However, we are convinced that the issues lie only partially in effective legislation, and largely in the implementation gap. In many examples, we demonstrate that poor legislative outcomes are rooted in the power of private interests and property rights overriding the public interest in biodiversity protection. Given the power of private interests, political will for biodiversity protection is largely absent. This has resulted in inadequate funding, poor institutional alignment and dilatory enforcement, meaning that regulation is poorly implemented and does not protect the public interest in biodiversity conservation.

A good look at institutional alignment should reveal that some agencies hold portfolios which are inappropriate. For example, the Ministry for Primary Industries should be discharged from administering biodiversity-related matters. The minimal action taken on threatened species of productive value (e.g. the longfin eel) demonstrates that the present situation will not promulgate good outcomes for biodiversity. The responsibility for biodiversity should rest with the agency that is ultimately in charge of it: the Department of Conservation. The Ministry for Primary Industries should be beholden to the Department on biodiversity matters, and more generally on the environmental principles within the Fisheries Act.

If the interests of normally divergent stakeholders are aligned, then the likelihood of effective environmental legislation being formulated and then robustly implemented will be very much higher. Tactical solutions, such as a modern and effective range of law and policy, enabling things like integrated management of biodiversity, the establishment and enforcement of suitable environmental bottom lines, and certainty for developers is entirely possible if strategic shifts occur. If they do not occur, then robust law protecting biodiversity; adequate implementation and transparent and robust evaluation will continue to be the exception, not the rule. The case-by-case battles will continue to strain the underfunded guardians of the public interest, to the detriment of our natural heritage.

### ***Fighting on the front line***

Strategic solutions and more effective regulatory implementation will drive investment in the practical solutions we outline, because there will be more resources made available, and greater political desire to achieve better outcomes. Improved compliance monitoring, greater investment in conservation research, more money for vital pest control, and greater and more secure funding for the community conservation sector are more easily possible once these shifts take place. Without them, such activities

will remain in a state of perpetual fiscal austerity. They will still occur of course, owing to the dogged determination of those working in these positions, but there is no doubt that greater innovation and achievement would be possible if more funding were available.

### **From here on in – a pathway for change**

New Zealand's indigenous biodiversity is in crisis due to fundamental drivers of loss not being addressed. The changes may seem significant, but the impact of failing to implement them will be colossal. If systemic changes as outlined are not implemented, the firefighting that is biodiversity protection will continue, as poorly resourced guardians attempt to protect the biodiversity henhouse from looting foxes. At present, the foxes have unbridled success in diminishing the effectiveness of biodiversity protection and the result is a bleak future of declining prosperity.

New Zealand has a great many existing advantages: a dedicated national agency for nature conservation; a group of councils increasingly equipped

and willing to play their part in addressing biodiversity loss; a private sector more and more concerned with contributing positively to conservation outcomes; an indigenous people with large land-holdings, actively involved in conservation; and a community conservation sector that consistently matures in size and capability. In addition, New Zealand is a front-line laboratory for conservation science, with some of the best researchers in the world working away in our universities, crown research institutes and other organisations at solving once-insurmountable problems.

These advantages position us well to tackle the biodiversity challenge, and to do so while building ecological resilience, providing a strong future for primary industries dependent on natural resources, and both proclaiming and reflecting our '100% Pure' brand. But to unleash these advantages, and protect the public interest in a healthy environment and flourishing native biodiversity, strategic change is needed. Regulatory solutions will get us some of the way, and technical solutions even further. But profound and enduring change will require bigger shifts on bigger scales. This is a call to arms for our natural heritage.



John Leathwick

*New Zealand's stunning indigenous flora will be better protected when fundamental drivers of biodiversity loss are effectively addressed (Gentian flowers)*

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Raewyn Peart is Policy Director for the Environmental Defence Society. Raewyn was for some years a practising resource management lawyer before moving into the environmental policy field. For the past 20 years Raewyn has been involved in investigating and writing about a range of environmental governance challenges facing New Zealand including landscape protection, coastal development and marine management. Raewyn's last book focused on the challenges of protecting marine mammal biodiversity and is titled 'Dolphins of Aotearoa: Living with New Zealand Dolphins'. Raewyn is also a keen photographer, sailor, snorkeler and snowboarder.



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Dr Theo Stephens trained as a freshwater ecologist, gaining his PhD on the freshwater fishes of Lake Taupo from Waikato University in 1985. His scientific career in the Wildlife Service and then the Department of Conservation initially supported statutory advocacy for protection of freshwater values in North Island rivers and wetlands. Later he helped enable the pioneering restoration of the Mercury Islands, and then began developing systematic conservation concepts, tools and methods. Exploration of social and economic factors driving biodiversity loss and impacting conservation effectiveness became his focus in his later years with the Department of Conservation. Theo retired to hunt, fish and enjoy nature in South Westland in 2012, but continues to support conservation NGOs and the Department of Conservation on a voluntary basis.



### Bevis Fedder

Dr Bevis Fedder is a marine tropical ecologist by training. His MSc thesis focused on options for a more equitable allocation of funds under the Global Environment Facility. His PhD thesis in law dealt with marine access and benefit sharing and how biological databases may contribute to the global multilateral benefit sharing mechanism under the Nagoya Protocol. He worked as a post-doctoral associate at the international graduate school INTERCOAST - Integrated Coastal Zone and Shelf Sea Research, which also supported his research for the Environmental Defence Society. He now works as a science manager in knowledge exchange for the Leibniz Center for Tropical Marine Ecology in Bremen, Germany.

New Zealand's natural heritage lies squarely at the centre of our national identity, our international brand and the future economic prosperity of our people. Yet despite its critical importance, the state of our species and ecosystems is deteriorating. New Zealand holds weakly to its '100% Pure' claim, with present statistics and trends telling a rather different story.

Our rich biodiversity is in peril and urgent action is required to turn the tide in accordance with national goals and global commitments. This book demonstrates that New Zealand has grappled bravely with the practical challenges of conserving biodiversity, resulting in a plethora of achievements, but that fundamental drivers of loss persist, largely unchecked.

Curtailling biodiversity loss and inviting a reconciliation of economic and environmental aspirations will require visionary thinking and action at all levels. In some detail, this book catalogues the path New Zealand has trodden towards the present environmental decline and lays the foundation for a new direction, with a compelling suite of strategic, tactical and practical solutions.

The pathway to true national prosperity lies in a powerful groundswell of action to conserve ecosystems and species and to more effectively provide for their place in the world.

We must follow through on the recommendations in this book. Biodiversity loss is not inevitable, it is a choice. A future of declining natural heritage and loss of some of the world's most iconic species and landscapes is simply not acceptable.

