
NATURE
HERITAGE FUND
Celebrating 25 years
Nature
Heritage
Fund

Dedicated to the memory of the Nature Heritage Fund's advisor, negotiator and friend, George McMillan, OBE (1930–2015), who worked so hard to protect New Zealand's natural heritage.

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Looking north across Lake Heron towards the Rakaia River from the Clent Hills acquisition. *Photo: Gilbert van Reenen*

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Introduction from the Associate Minister of Conservation

Hon Nicky Wagner
Associate Minister of Conservation

It gives me great pleasure to see the Nature Heritage Fund's achievements over the past twenty-five years celebrated with this publication.

Since 1990, the Nature Heritage Fund (NHF) has operated as an independent, contestable government fund for the protection of nature on private land. The Fund committee has worked with a wide range of private landowners, local government, and communities.

It has been guided by both government conservation goals and the committee's own criteria to ensure sound ecological assessments are carried out to identify and protect outstanding ecosystems at risk. The expertise of the committee has ensured scientific rigour in setting priorities for the covenanting or purchasing of these ecosystems. Land has been purchased on a voluntary willing seller and willing buyer basis. The way in which the Fund has operated has earned the respect of government, regional communities and land owners alike.

Since its inception, the Fund has received more than 1370 applications, resulting in over 748 approved applications covering 341,881 hectares. This equates to over 1.3% of New Zealand's land area being permanently protected, either through direct purchase or covenants, at a cost of $162.94m from the Fund. As a consequence, forests, wetlands, tussock lands, dunelands and heathlands that were under threat of logging, drainage or agricultural intensification, have been protected.

Some of the Fund's major iconic purchases have been core components of conservation parks in the eastern South Island high country as well as key additions to National Parks. One recent strategic acquisition was the purchase of 56 hectares of dense podocarp forest and fertile wetland near sea level in Okuru, close to Haast in South Westland. It is an excellent example of natural pakihi and lowland forest on alluvial soils, both of which are under-represented on public conservation land. In addition, this acquisition protects the natural landscape character of a popular tourist road and provides a habitat linkage between the Okuru and Waiatoto Conservation areas and the western side of Mt Aspiring National Park. This protection had strong community support and safeguarded a valuable type of forest.

On behalf of the Government and all New Zealanders, I would like to congratulate the Nature Heritage Fund committee members, past and present, for their significant contribution to conservation over the past 25 years, and thank all who have been involved with them in protecting so much of our nation's biodiversity and iconic landscapes.

Hon Nicky Wagner
Associate Minister of Conservation

INTRODUCTION

Background: the establishment of the Forest Heritage Fund in 1990

The year 1990 marked the culmination of nearly two decades of campaigns to protect New Zealand's publicly-owned indigenous forests. The Department of Conservation (DOC) had been established in 1987 to manage most of these **publicly-owned indigenous forests**. Furthermore, government was preparing an Indigenous Forests Policy, which would seek to maintain and enhance in perpetuity virtually all New Zealand's remaining indigenous forests through protection, sustainable management or regeneration. This policy became law in 1993 with the passing of an amendment to the Forests Act 1949, but in anticipation of the legislation there was a marked upsurge in the felling of **privately-owned indigenous forests**. The reasons were complex but included the low returns from managing many small private forests for indigenous timber supply; instead, there was a rush to clear private forests for agriculture (especially to establish dairy farms on valley floors), as well as wide-scale harvest of beech forests in Nelson and Southland for wood chip export.

As part of its Indigenous Forest Policy, government decided to set up a **Forest Heritage Fund (FHF)** in 1990. This contestable Fund was available to private landowners who wanted to see their forests protected. A parallel fund, Ngā Whenua Rāhui, was also established to assist Māori landowners with protection of their lands. Protection through the FHF was to be achieved either through a covenant in perpetuity or by outright purchase. The latter would then be managed as some form of reserve by DOC, local government or a conservation trust. Initially the FHF also assessed QE II National Trust covenant applications, but the FHF committee soon requested that such double handling be discontinued.

A Nature Heritage Fund: addressing New Zealand's diminishing biodiversity

Global concern at the unprecedented loss of the earth's biodiversity led to New Zealand joining more than 150 countries in signing the United Nation's *Convention on Biological Diversity* at the Rio de Janeiro Earth Summit Conference in 1992. The steady decline in our own distinctive biodiversity – through both habitat reduction and the detrimental impact of exotic pests and weeds – was already well documented. When the FHF commissioned an independent assessment of its performance and strategic direction in 1994, it was recommended that the Fund's vision be broadened to encompass the protection of all types of New Zealand's biodiversity:

> To protect indigenous forests and associated ecosystems that represent the full range of natural diversity originally present in the landscape through the establishment of a sustainable and interacting system of protected areas.

So, in 1998, government widened the FHF's mandate to include protecting important wetlands, tussock grasslands, riparian and coastal ecosystems, and rare habitats on private land. To reflect this widened scope, the name 'Forest Heritage Fund' was changed to the **Nature Heritage Fund (NHF)**. Essentially, the role of the NHF was to assist in securing the protection of the full range of representative indigenous ecosystems that occur on private land throughout New Zealand.


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1. The felling of private indigenous forest beside a major West Coast tourist road was still occurring in 2015. This photo was taken at such a site in 2014. PHOTO: GERRY McSWEENEY

2. The conversion of private indigenous forests, especially to establish dairy farms on the more-fertile soils of valley river flats and terraces, has led to major losses of New Zealand's most biologically productive indigenous biodiversity. PHOTO: GERRY McSWEENEY

The widened mandate was very much in accordance with the vision and goals of the subsequent *New Zealand Biodiversity Strategy* (NZBS, February 2000). One of the leading themes in the NZBS was the need to make net gains in the conservation of natural habitats both "within and outside of protected areas". The strategy clearly spelt out the skewed nature of New Zealand's public land protected area system:

> Most of New Zealand's remaining unmodified habitat is either in remote mountainous areas or on offshore islands ... protected within extensive public conservation areas. However, other scarce habitats (such as lowland and coastal forest remnants, lowland grasslands, wetlands and dune lands) remain largely unprotected and vulnerable to ongoing decline.

Administration of the Nature Heritage Fund (NHF)

The NHF was set up with an independent executive committee comprising five people from across New Zealand appointed by Cabinet as advisory to the Minister of Conservation. Over the years the appointees (see p. 92) have had expertise in biodiversity and landscape assessment and protected area management by national and regional authorities, non-governmental organisations and the private sector. A manager and an executive officer, employed by DOC, operate the fund and undertake co-ordination of applications to the Fund, facilitate negotiations with landowners (often with the assistance of a skilled land expert) and service the executive committee. These committee members make recommendations to the Minister for NHF expenditure in response to applications from a wide range of applicants. All decision-making rests with the Minister of Conservation. The applications are judged on merit against a rigorous set of criteria (see below) and there is no coercion involved. All site negotiations respect commercial confidence and are sensitive to the market.

In 2002, government gave the NHF committee the additional role of administering the funds for the conservation component of the SILNA (South Island Landless Natives Act, 1906) lands. The SILNA forests are owned by approximately 40,000 beneficial owners and cover approximately 17,300 ha, mainly in Otago and Southland, particularly in the Catlins, Fiordland and Stewart Island/Rakiura. The NHF committee has taken a proactive approach with SILNA owners, especially regarding areas that have a high priority for protection, seeking to facilitate consideration payments for covenants in perpetuity.

Over the 25 years of the NHF's operation there have been 1369 site applications, of which 748 (around 55%) have been successfully negotiated. Of these 1369 applications, by far the greatest number have been initiated by landowners and community groups (80%), while the remaining 20% have come from DOC and territorial authorities (usually in response to publicly-advertised advice of sale).

Scientific basis to site evaluation

From the start, the NHF adopted a rigorous scientific approach to the assessment of applicants' sites. 'Recommended Areas for Protection' were already being provided for some geographic areas by government's Protected Natural Area (PNA) surveys of the 1980s; these were enhanced by the widespread adoption of the 'Ecological Regions and Districts' concept. This ecological framework of 268 districts within 85 regions had been developed by scientists within the Biological Resources Centre and the Department of Scientific and Industrial Research (DSIR) and then published by DOC upon its establishment in 1987.

The outcome was a realisation that there were gaping holes in New Zealand's protected area network. The NHF Committee recognised the need to focus on closing these gaps in the most scientific and professional manner possible – and in a manner that would help to take the politics out of private land purchases, as was stated by Dr Gerry McSweeney, a long-serving member of the NHF Committee:

> Most politicians will have been subject to intense lobbying by communities who want to see their precious local area protected. That is quite understandable but what the NHF has brought to this whole process is scientific rigour in sorting out priorities for purchasing those ecosystems of real outstanding value. So we have been able to put this community support through the filter of the well-documented PNA programmes and the selection criteria which we have developed.

Development of criteria for ecosystem selection

Initially, the FHF assessed site priority on a hierarchy of four criteria: **representativeness** (including diversity of ecosystems); **sustainability** (viability over the long term with respect to size, shape, resilience, buffering, linkages and threats); **landscape integrity** (the site's contribution to protecting landscape values (including water, nutrient and energy processes); and finally **amenity/utility** (the

site's contribution to the physical and spiritual welfare of local people). Subsequently, the greater emphasis was placed on representativeness and sustainability. In 2007, government released its 'National Priorities for Nature Conservation' (developed jointly by the Ministry for the Environment (MfE) and DOC), which give particular emphasis to the following ecosystems with rare and threatened biodiversity on private land:

- Land Environments (LENZ IV) with less than 20% remaining in indigenous cover
- Indigenous vegetation on dunelands and wetlands
- 'Originally Rare' ecosystems (such as lava flows, braided rivers, salt pans, geothermal systems, karst landforms, etc)
- Habitats of acutely threatened species (as defined in DOC's *New Zealand Threat Classification System Lists*)

The NHF quickly incorporated these priorities into its assessment criteria and responded positively to the Minister of Conservation periodically informing them of new or particular government priorities. In order to achieve the most effective use of the NHF's limited resources for the greatest conservation gains, the committee has tended to focus on the following:

- Expanding and connecting core protected areas
- Habitat protection on islands
- Eastern South Island high country basin and valley floor grasslands
- Reducing the biodiversity loss and management cost associated with grazing leases or logging operations within park enclaves or 'finger valleys' adjacent to existing conservation land

The NHF also found that it could be a catalyst in motivating and partnering local and regional government in successful initiatives to protect large and important natural areas near New Zealand's major cities.

To further assist prioritising evaluations at a regional level, the NHF commissioned six 'regional protection strategies' identifying remaining unprotected indigenous vegetation and habitats within ecological districts and regions. These strategies – for Canterbury, Waikato, Southland, West Coast, Northland, and Auckland – have been made available to local authorities and other agencies, and are a detailed resource for assessing regional biodiversity protection priorities. The interest of the NHF committee in particular local conservation threats led to the preparation of a number of smaller district protection strategies – for D'Urville Island, Golden Bay, Chatham Islands, Canterbury foothills beech forests, Taranaki ring plain forests, Otago high country valley floors, and Banks Peninsula. Furthermore, as the design of protected areas is important for their sustainability, NHF produced the 'Protected natural areas – design guide' in 2004.

The conservation achievements of the NHF over 25 years

The 748 sites protected through the NHF are regionally widespread, extending from Northland to Southland as well as to offshore and outlying islands, including Chatham Island (Rekohu) and Stewart Island/Rakiura. The ecosystems protected are diverse and representative. They include lowland podocarp/beech forest, wetlands, high country tussock grasslands and forests, shrublands, vegetation on moraines and other glacial landforms, dune lands, limestone ecosystems,

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1. The regional protection strategies published by the Nature Heritage Fund. PHOTO: LES MOLLOY

and estuarine areas. The sites range in size from less than 10 ha to over 78,000 ha. Many adjoin existing biodiversity-protected areas while others are more isolated, sometimes only remnants in heavily modified rural landscapes. They include ecosystems that require only pest control to protect biodiversity values, and others that are under more intensive management. Regionally, several of the Fund's contributions have saved iconic landforms and ecosystems from inappropriate development, enhancing their recreation and tourism value through their accessibility to the public.

In the following pages, the diversity and ecological significance of around 60 of the 748 sites that have been covenanted or purchased by the NHF is outlined. These sites are described within 16 thematic or regional groups, to better show how the NHF is achieving its goal of filling the gaps in the network of New Zealand's protected biodiversity and natural landscapes. ■

SOUTH MARLBOROUGH:
A 'HOTSPOT OF PLANT EVOLUTION'

Clarence Reserve – protecting the remarkable biodiversity of the Seaward Kaikoura Range

The Inland and Seaward Kaikoura ranges are the highest mountains in the South Island east of the Southern Alps/Kā Tiritiri o te Moana. They are being rapidly uplifted in one of the most tectonically active parts of the country, enfolding the remote middle reaches of the Clarence River in a faulted depression between their parallel mountain walls. Here the Clarence is forced to meander to the northeast for 80 km before finding a route out of the mountains to the Pacific Ocean.

Unlike the higher-rainfall mountain chains to the west, the Kaikoura ranges escaped the extensive glaciation of the ice ages. Although there are incipient cirque landforms on the south side of Tapuae-o-Uenuku (the highest peak in the ranges), they are unique among New Zealand's mountains for their lack of glacial landforms, which we usually associate with Fiordland, the Southern Alps, and Paparoa and Kahurangi national parks – U-shaped valleys, moraines, cirque basins, tarns and outwash terraces. Instead, the Kaikouras are a stark tan-coloured landscape of sharp bluffed ridges above V-shaped gorged streams, widespread scree slopes and rocky outcrops.

These mountain slopes flanking the Clarence are also some of the driest of our high mountain environments; a 'rainshadow' region, hot and dry in summer and cold and dry in winter. All these factors – dynamic landforms, lack of glaciation and climatic extremes – have combined to generate a nationally unique environment in this inland mountainous part of South Marlborough. Consequently, the Kaikoura ranges are recognised as a 'hotspot of evolution' – one of New Zealand's important centres of plant biodiversity.

1. Looking northeast from Limestone Hill in Clarence Reserve, across the Clarence River to the high peaks of the Inland Kaikoura Range. In the foreground is Goose Flat in the Muzzle special grazing concession and the peak in the distance on the right is Tapuae-o-Uenuku (2885 m), the highest point in Ka Whata Tu o Rakihouia Conservation Park. PHOTO: SHANNEL COURTNEY, DOC

2. Middle reaches of the Clarence River with the limestone landmark of Bluff Hill on the left, an outlier of the conservation park, looking northeast to the Fidget and Jam catchments of the northern Seaward Kaikoura Range and Mt Tarahaka. Muzzle Station grazing lease is over the low-relief land on the right of the photo. PHOTO: SHANNEL COURTNEY, DOC

The impact of pastoralism

The Clarence, like most of the eastern South Island high country, was carved up into pastoral runs by the Crown in the mid-19th century. With today's hindsight, the damage to these fragile lands from a century of inappropriate use is widely recognised; fires associated with pastoralism destroyed most of the original forest dominated by mountain tōtara, mountain celery pine and mountain ribbonwood, particularly on the Clarence faces.

Despite the outstanding distinctiveness and diversity of this dry mountain flora of South Marlborough's mountains, little serious effort was made to conserve a representative portion of this unique landscape. Two strictly protected areas were set aside on the moister coastal side of the Seaward Kaikoura Range. The first was Blue Duck Scientific Reserve in 1903, to protect from milling 85 ha of possibly the densest mixed lowland podocarp forest on the east coast of the South Island. The second was Mount Uwerau Nature Reserve, in the alpine zone, to protect the inhospitable habitat of a breeding colony of Hutton's shearwaters after its chance discovery in 1965.

However, it was not until the early 1990s, after the formation of the Department of Conservation (DOC) and then the Forest Heritage Fund, which became the Nature Heritage Fund (NHF), that systematic surveys were undertaken to assess the region's conservation values. Interest initially centred on private landowners wishing to sell significant forest remnants in the triangle of coastal Kaikoura hill country bounded by Blue Duck Creek, Mt Alexander, and the mouth of the Clarence River. The first NHF purchase was in 1992, for 1194 ha of podocarp forest and shrubland from Seaward Valley Station (becoming Seaward Valley Road Kaikoura Scenic Reserve). The strategic importance of this and later purchases in this coastal locality (see below) lay in their value for providing a coastal forest component of an eventual mountains-to-the-sea corridor of natural landscapes – from the Seaward Kaikoura Range to the Pacific Ocean.

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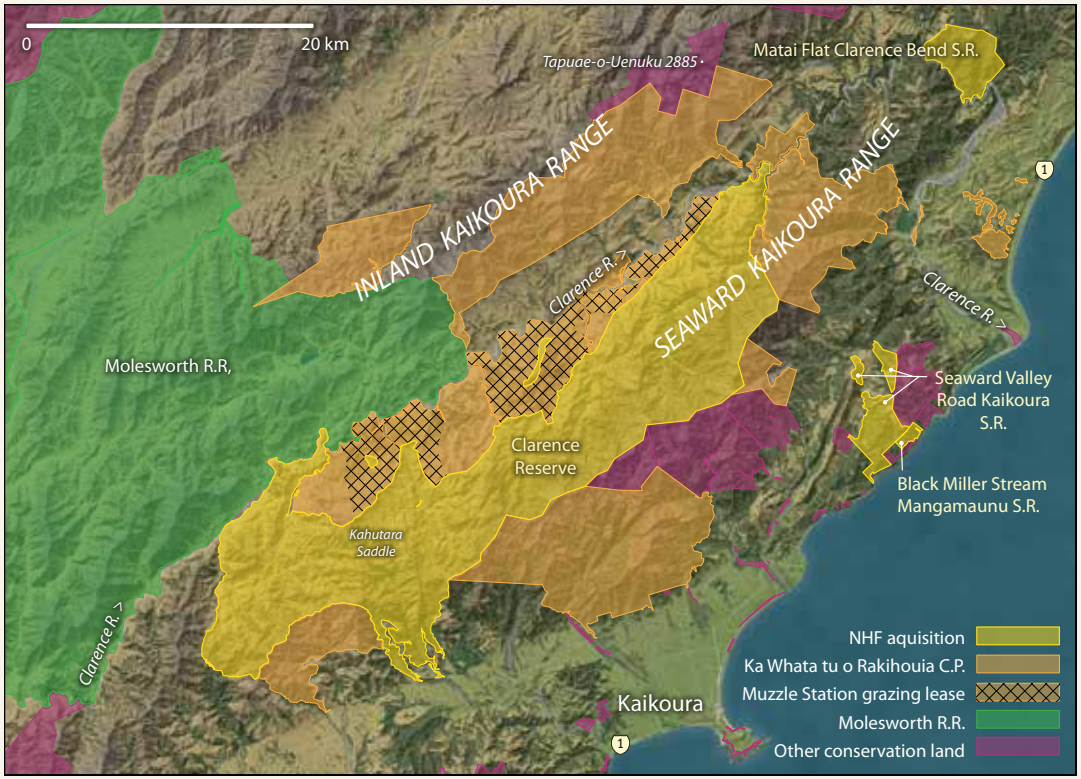
Clarence Reserve – the cornerstone for building a Kaikoura mountains-to-the-sea corridor of protected areas

When the management of Molesworth Station was resumed by the Crown in 1938, Clarence Reserve (52,700 ha) became the largest of the remaining 21 pastoral leases in South Marlborough. Most of Clarence Reserve lay along the steep, bluffy flanks of the Seaward Kaikoura Range on the true right (eastern) side of the Clarence River, with a smaller forested area in the headwaters of the Kahutara River on the southeast side of the range (see map). The name 'reserve' was always a misnomer; it was not a protected area but another marginal pastoral run, amalgamated into the Crown's 'reserve' of unoccupied pastoral lands because of the extreme difficulty of farming in this isolated, mountainous terrain.

In 1993 an opportunity arose whereby the NHF could be used to negotiate a fine balance between pastoral and conservation use on Clarence Reserve. By then it was quite clear that pastoralism was environmentally unsustainable over most of the area; half of the run (an expired POL, or Pastoral



Clarence Reserve and Ka Whata Tu o Rakihouia Conservation Park

Occupation Licence) had already been retired from grazing and earmarked for transfer to DOC. The fund was used to purchase 52,000 ha of the property, consisting of the entire POL and all except 700 ha of lowland pasture in the southeast corner of the run (freeholded from the pastoral lease).

Although Clarence Reserve was now conservation land, around 8000 ha in the floor of the Clarence valley was still considered to be capable of sustainable grazing – but only as a 'special lease' administered by DOC under strict conditions (such as no burning or draining of wetlands, control of pests, reasonable public access, etc). This grazing concession (for 30 years) was eventually taken up by the adjoining Muzzle Station on the opposite (northern) bank of the Clarence River as part of its 2007 tenure review. The Muzzle tenure review also released around 10,000 ha to become conservation land (mostly the higher-altitude slopes of the Inland Kaikoura Range above the Clarence River, but also some special lower-altitude locations like Bluff Hill).

The Clarence Reserve is larger in size than several of our national parks. The purchase was highly significant in conservation terms for it secured the cornerstone for building a Kaikoura protected area network extending from the summit of the Inland Kaikoura Range (Tapuae-o-Uenuku, 2885 m), across the Clarence valley to the Seaward Kaikoura Range (Manakau, 2610 m) and down to the ocean between Half Moon Bay and Paparoa Point. Subsequently, the NHF has been able to fill some remaining coastal gaps in this mountains-to-the-sea network – the 1737 ha Matai Flat Clarence Bend Scenic Reserve, the 141 ha Black Miller Stream Mangamaunu Scenic Reserve, and a 357 ha addition to the earlier NHF purchase which became Seaward Valley Road Kaikoura Scenic Reserve (see map).

In 2002, the Royal Forest and Bird Protection Society (Forest & Bird) mounted a campaign to incorporate this patchwork of more than 80,000 ha of Kaikoura protected areas into one 'Kaikoura National Park'. They pointed to the absence within New Zealand's 14 national parks of any of our distinctive dryland ecosystems, like those enclosed within the Kaikoura ranges. In their opinion, the purchase of Clarence Reserve through the NHF (providing public access for a wide range of recreational opportunities, such as tramping and mountaineering, hunting, rafting and mountain-biking), gave further justification for a park. However, the national park proposal lapsed after the New Zealand Conservation Authority decided not to investigate it further.

Instead, in 2008, government designated almost 90,000 ha of conservation land within the Kaikoura ranges (including the Muzzle grazing concession area) as Ka Whata Tu o Rakihouia Conservation Park (see map). Clarence Reserve, with its vast dryland mosaic of screefields and rocklands, tussocklands and shrublands is indeed the wilderness heart of this most diverse of our eastern South Island conservation parks. ■

Special biodiversity features of Clarence Reserve

CLARENCE RESERVE is notable for its well-developed scree flora and for endemic scree plants like the harebell *Wahlenbergia cartilaginea* and the willowherb *Epilobium forbesii*. Members of the daisy family are a feature of more stable sites – mats of the alpine cushion *Raoulia cinerea*, button daisies of the *Leptinella* genus with their showy flowers, and local variants of the ubiquitous Marlborough rock daisy *Pachystegia* clinging to the most inhospitable of rock faces. Indeed, there are over 350 species of indigenous vascular plants recorded from the area. This represents about 15% of New Zealand's total native flora.

Ecologist Shannel Courtney, who has spent more than 30 years documenting the plant ecology of the drylands of South Marlborough, has stated that the Clarence side of the Seaward Kaikouras is:

> … an extremely important area for South Marlborough dry shrubland and rockland communities, supporting most of the 50 or so plant species endemic to the region and well adapted to the dry environment. The more important species include the rare pink broom (*Carmichaelia glabrescens*), *Brachyglottis monroi*, *Olearia coriacea, Hebe rupicola*, New Zealand lilac (*Hebe hulkeana*), coral daisy (*Helichrysum coralloides*) and Marlborough rock daisy.

The open mountain slopes within Clarence Reserve support one of the highest concentrations of kārearea/New Zealand falcon in the country as well as one of the most diverse populations of lizards (especially geckos) in the South Island. Kea (alpine parrots) of the Seaward Kaikoura Range are of interest, geographically isolated in this eastern alpine outlier far from the closest other kea populations in the Spenser Mountains and Southern Alps/Kā Tiritiri o te Moana.

Parts of the crest of the range are of special significance for their biodiversity, particularly around Kahutara Saddle. Here, the alpine tussocklands (supporting large aciphylla, tall broad-leaved snow tussocks, and mountain flax), bluff crevices and high-quality stands of subalpine mixed scrub and mountain ribbonwood are nationally important for wildlife. Again, to quote Courtney, this habitat is:

> … one of the most important areas for mega-invertebrates and lizards in New Zealand. It supports the Kahutara giant weevil, the giant bluff weta, the scree skink and the black-eyed gecko, all of which are considered to be nationally threatened.

1. The scree harebell, *Wahlenbergia cartilaginea*, is a strict South Marlborough endemic with a threat classification of At Risk – Naturally Uncommon. It is found mostly in subalpine to alpine greywacke screes, particularly above the Clarence River. Like many scree plants, the scree harebell's semi-succulence is an adaptation to store water. Its grey foliage camouflages it against would-be browsers, such as native grasshoppers. Its leaves are also packed with sun-screening pigments to prevent UV damage. PHOTO: SHANNEL COURTNEY, DOC

2. The striking yellow and magenta flowers of the scree button daisy, *Leptinella atrata* subsp. *luteola*. It is another South Marlborough endemic, largely confined to the Kaikoura ranges; its current threat classification is At Risk – Naturally Uncommon. PHOTO: ALAN JOLLIFFE

3. The Waiautoa sunhebe, *Heliohebe acuta*, is confined to the Clarence catchment and is found within Ka Whata Tu o Rakihouia Conservation Park. Its threat classification is At Risk – Declining. It is one of six species of New Zealand's endemic genus *Heliohebe*, four of which are confined to South Marlborough (the southernmost species is a Banks Peninsula endemic, *H. lavaudiana* – see p. 81). PHOTO: SHANNEL COURTNEY, DOC

1. A variety of the Marlborough rock daisy, *Pachystegia* sp. 'B', has its headquarters in the Clarence and is nearly a South Marlborough endemic (its range also extends southwards into the Waiau and Lowry Hills of North Canterbury). It has an entirely inland distribution and smaller leaves and flowers than the better-known *Pachystegia* sp. 'A' from the Kaikoura coast. PHOTO: SHANNEL COURTNEY, DOC

2. The Bluff wētā, *Deinacrida elegans*, is a previously unknown species which was first found in 1988 in rock crevices near Kahutara Saddle on the Seaward Kaikoura Range within Clarence Reserve. Its elegant long-legged stance allows it to be a skilled rock climber. PHOTO: GREG SHERLEY, DOC

3. The rare black-eyed gecko, *Mokopirirakau kahutarae*, is considered to be New Zealand's only alpine gecko. It was first discovered in 1970 near Kahutara Saddle and has since been found at another three sites along the Seaward Kaikoura Range as well as on Mt Arthur in Kahurangi National Park. It is nocturnal and inhabits bluffs and cliffs between 1250 and 2200 m asl. Its threat classification is Nationally Vulnerable. PHOTO: GREG SHERLEY, DOC

4. In early summer the spectacular flowers of pink broom, *Carmichaelia glabrescens*, are an attractive feature of the middle reaches of the Clarence River around Clarence Reserve and Muzzle Station. The Clarence is the stronghold for this endemic species. PHOTO: LES MOLLOY

5. The masses of yellow flowers of *Brachyglottis monroi* can be seen in summer along the Clarence valley. It is one of the fifty-or-so endemic plants found in South Marlborough's dry mountains and is often found on rocky ledges in association with the Marlborough rock daisy. PHOTO: SHANNEL COURTNEY, DOC

GLACIATED GRANDEUR:
THE LAKE HERON BASIN AND HAKATERE CONSERVATION PARK

The Lake Heron basin, deep within the mountains of Canterbury, is a spectacular landscape of glaciated grandeur. The basin is an ancient convergence zone of the former Rangitata, Ashburton, Cameron and Rakaia glaciers, which have now retreated far to the west, leaving behind what many consider to be the richest visually-apparent glacial histories in the New Zealand landscape. In the opinion of eminent ecologist Dr. Colin Burrows:

> The Lake Heron Basin is the single most important location for moraines of the last three glaciations in Canterbury because they are extensive, well-preserved and laid out in unequivocal order.

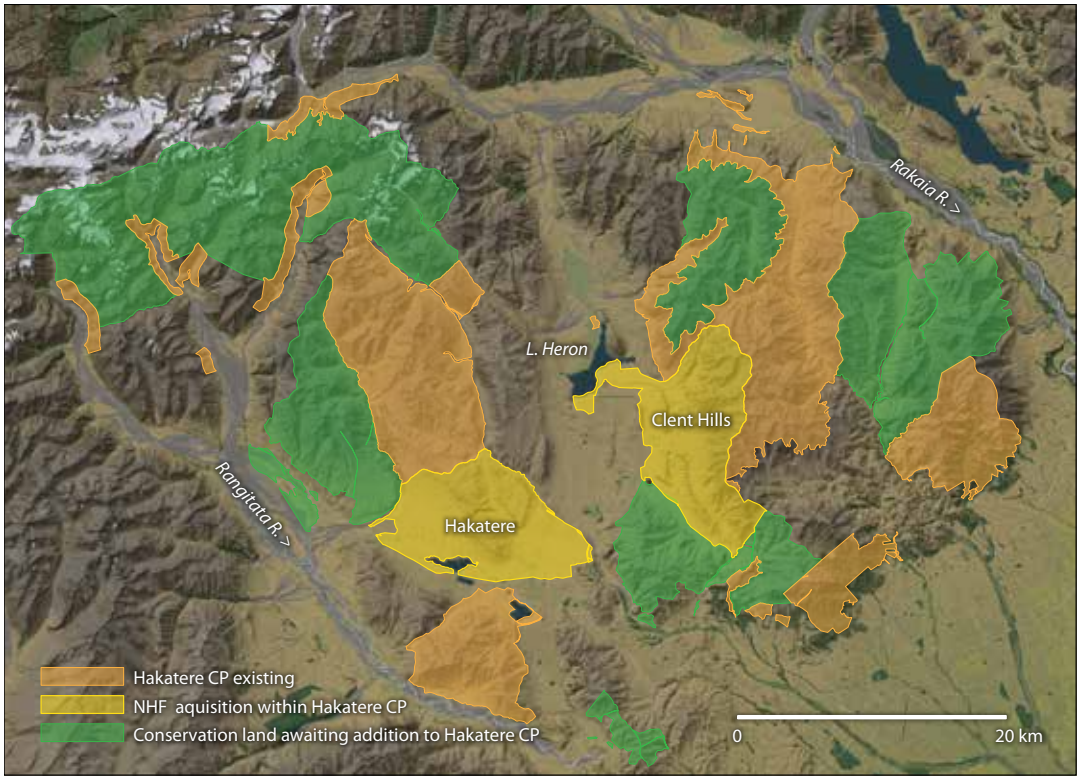
1. Looking north across Lake Heron towards the Rakaia River from the Clent Hills acquisition.
PHOTO: GILBERT VAN REENEN

In particular, the glacial landforms from the last (Otira) Glaciation are preserved in excellent condition. The basin is bounded in the west by the Arrowsmith, Potts, Big Hill and Wild Mans Brother ranges; in the east by the Palmer, Taylor and Mount Somers ranges; and in the south by Clent Hills and the Harper Range.

Within the basin there are 15 sizeable lakes with associated wetlands and literally hundreds of small kettlehole tarns, wetland turfs, and seepages on old moraine surfaces. The braided South Branch Ashburton River/Hakatere crosses the basin and drains the extensive wetlands around lakes Clearwater and Emma in the southern part of the basin; at the other end, the network of wetlands is linked to the Rakaia River via Lake Heron, the Cameron River and Lake Stream (see map).

Lake Heron Basin arguably remains the most natural of our eastern South Island inter-montane basins, particularly now that the former tussocklands of the Mackenzie Basin are being progressively converted to centre-pivot irrigated dairy farms. However, prior to the early 2000s, most of the land within the basin was farmed extensively under Crown pastoral leases; Lake Heron and its narrow shore margin, however, was protected as both a nature reserve and wildlife refuge. The ecological importance of Lake Heron had been highlighted in the 1986 Protected Natural Areas programme (PNAP) report on the ecological survey of the Heron Ecological Region, which described it as "... probably the most important lake/wetland complex remaining in the South Island high country" because of its richness as a habitat for rare, uncommon and threatened bird species. Its water levels were also protected in 1988 as part of the Rakaia River National Water Conservation Order.

A total of 54 bird species have been recorded



Lake Heron Basin and Hakatere Conservation Park

as using the lake. These include nationally significant populations of Australasian coot and New Zealand scaup/pāpango, as well as Australasian shoveler, grey teal/tētē, black swan, and the nationally-endangered Australasian bittern/matuku and marsh crake/koitareke. Lake Heron is also the most important breeding habitat for the endangered Australasian crested grebe/kāmana and one of its two most important over-wintering sites. It is estimated that more than a quarter of New Zealand's crested grebe population lives in the Hakatere Ecological District within the basin. At least 38 bird species have been recorded using the adjacent wetlands in the basin surrounding the lake for feeding, breeding and moulting. This is especially the case for the ducks, geese, grebes, rails and herons.

Clent Hills – the first piece in the jigsaw of basin-floor protection

The first opportunity for the Nature Heritage Fund (NHF) to work with the high country community in achieving 'win-win' outcomes for both conservation and farming within the Lake Heron Basin was provided in late 2003. On behalf of several local farmers, the Ashburton Branch of the Royal Forest and Bird Protection Society (Forest & Bird) made the initial application for the fund to purchase much of the 12,181 ha Clent Hills pastoral lease. A number of successful joint venture high country purchases involving the NHF had resulted in a more positive view of the fund for achieving rational land use in the high country. The farmers were leaders in the local high country community and saw approaching and negotiating with NHF as more likely to achieve a quicker and more satisfactory outcome than tenure review.

Clent Hills station stretched from the shores of Lake Heron (680 m asl) to Mt Taylor on the summit of the Taylor Range (2330 m asl). Approximately 25% of Clent Hills had been subject to agricultural development and this remained within the pastoral lease purchased by the consortium of neighbouring farmers who were then able to increase the viability of three adjoining farms. The NHF purchased the remaining 75% (just under 10,000 ha) which was surrendered from the pastoral lease in May 2004.

The Clent Hills purchase protected a diverse range of features typical of the basin's natural landscape: freshwater wetlands (including Seagull and Manuka lakes and the bog rush and red tussock wetland community on the northern side of Lake Emily); the entire Swin River system with its braids and fans (including significant areas of cushion plants, herbs and grasses which are suitable habitat for banded dotterel/tūturiwhatu); much of the catchment areas surrounding the Lake Heron Nature Reserve and Lake Emily; and the largely undeveloped tussock grasslands and alpine slopes of the Taylor Range, Mount Somers Range and the Manuka Range.

The purchase was a strategic link to a number

1. The glaciated grandeur of the Lake Heron Basin: looking across Swin River to Lake Heron beside the prominent bedrock massif (or 'rock drumlin') of Mt Sugarloaf. PHOTO: GILBERT VAN REENEN

2. Lake Heron is an important breeding habitat for the endangered Australasian crested grebe/kāmana, *Podiceps cristatus australis*, and one of its two most important over-wintering sites. The image shows a crested grebe adult with a juvenile. PHOTO: PETER LANGLANDS

3. Looking into the upper reaches of the Rangitata River from above the Hakatere purchase. In the foreground, excellently preserved parallel lines of late Otiran lateral moraine and kame terraces from the ancient Rangitata Glacier lie within the Mount Potts Conservation Area (awaiting addition to Hakatere Conservation Park). PHOTO: GILBERT VAN REENEN

4. The Hakatere purchase protected rare intermontane basin floor wetlands and tussocklands. Looking northeast across Lake Donne and the Spider Lakes wetlands, all of which drain to the South Branch Ashburton River/Hakatere. PHOTO: GILBERT VAN REENEN

of mountainous conservation areas already protected on the Old Man and Taylor ranges, thereby providing a major step towards the eventual establishment of the Hakatere Conservation Park. At the time of the government's announcement, the Clent Hills rationalisation package was welcomed by Forest and Bird Ashburton branch members, Bill Hood and Peter Howden:

We are both farmers and we also love the Lake Heron basin. This decision means that an extraordinary natural area and its wildlife will be permanently protected. We pay tribute to the surrounding high country farmers who have worked with the Nature Heritage Fund to create this new reserve.

Hakatere purchase – securing the best wetlands in the basin

The Hakatere station at the southern end of the Lake Heron basin also started the tenure review process but it was not successfully concluded. The lessees were aware of the nature conservation values within the pastoral lease and of government's plans for a new high country conservation

1. The Hakatere historic stone cottage was built in 1862.
PHOTO: BRIAN DOBBIE, DOC

park – Hakatere. They opened negotiations with the NHF in 2006 and DOC was very supportive of another positive outcome for conservation within the basin. The NHF's assessment showed that the property met most of the National Priority criteria of the New Zealand Biodiversity Strategy. If negotiations had failed, the basin floor parts of the property would have been under threat of cultivation, wetland drainage and tussock conversion. By 2007 agreement was reached for the purchase of 8597 ha of Hakatere Station pastoral lease along with 1032 ha of the adjacent old Mt Possession Station (university endowment) freehold land, thereby securing both the Spider Lakes and Lake Clearwater, along with easements to Lake Emma.

Hakatere station is of particularly high conservation value for it lies mainly in the floor of the basin, all within one large (c. 10,000 ha) compact area (see map). There are large areas of short tussock grasslands on the glacial outwash terraces and moraines in the east, and snow tussocks on the Clearwater moraines and in the Paddle Hill Creek valley. The property also includes a substantial area of flood plain in the braided South Branch Ashburton River/Hakatere riverbed, with intact original successional communities of mosses, lichens, *Raoulia* cushion plants, *Poa* grasses, etc, as well as two threatened plants (*Luzula celata* and *Muehlenbeckia ephedroides*); in contrast, the Potts River along the western boundary is more incised and carries a mixed shrubland of matagouri, hebes, *Coprosma propinqua*, and mountain flax, *Phormium cookianum*.

There are outstanding suites of wetlands throughout Hakatere: on the gently-sloping outwash surface draining to Lake Clearwater; in the Lambies Lagoon wetlands downstream of Lake Clearwater; and the Spider Lakes draining to Paddle Hill Creek. The scientific importance of the Spider Lakes, with their very diverse turf flora, and other wetland communities, had been well documented by botanists over many years of survey. Twenty-four threatened and uncommon plant species had been recorded on Hakatere, plus several daytime moth types and a rare grasshopper previously not recorded south of the Rakaia River.

The purchase also included the historic Hakatere station buildings at the junction of Ashburton Gorge Road and Heron Road. These included the stone cottage built in 1862 (which may even be the oldest building in mid-Canterbury), the singlemen's (or shearers') quarters and a cook shop. They are now managed by DOC in partnership with the Hakatere Heritage Committee, a local volunteer group that raises funds to restore the buildings for all visitors to use and enjoy.

Hakatere Conservation Park

The acquisition by NHF of Clent Hills and then Hakatere meant that the government could officially open Hakatere Conservation Park (with a total area of just under 60,000 ha) in October 2007. In addition to the park protecting some of the most outstanding glacial geomorphology and biodiversity in the eastern South Island high country, it also provides major recreational opportunities. Trampers and mountain bikers now have access to the upper South Branch Ashburton River/Hakatere catchment; the Lake Clearwater community now has legal access to the lake for fishing; and legal access to the Mount Harper/Mahaanui area has also been secured. With the Clent Hills purchase, fishers gained legal public access to the Lake Heron shoreline for the first time. Since then, DOC has developed an access road with extensive interpretation and public use is high.

There are several large park additions scheduled through tenure review of neighbouring pastoral runs: these are shown on the map as formerly parts of Redcliffe, Glenrock, Double Hill, Barossa, Mt Somers, and Mt Potts pastoral leases; unlike the Clent Hills and Hakatere purchases, however, these are mainly mountainous lands ringing the basin. When these are added, the park will be well over 100,000 ha in area. Tourist visitations to the Rangitata side of the park have been stimulated by the Lord of the Rings film trilogy and tours cover the area 365 days of the year, particularly along the Hakatere-Potts Road to see the striking roche moutonnée of Mount Sunday (611 m), the site used for Edoras in the films, standing proud above the braided bed of the Rangitata River. ■

CANTERBURY'S UPPER WAIMAKARIRI BASIN: AN OPEN-AIR LABORATORY FOR NATURAL SCIENCES

1. The limestone monoliths of Kura Tawhiti (Castle Hill) Scenic Reserve are a major visitor attraction and of special cultural significance to tangata whenua.
PHOTO: LES MOLLOY

Korowai/Torlesse Tussockland Park and Castle Hill

The upper Waimakariri River catchment and Castle Hill basin form one of the most scenic vistas along the historic route from Christchurch across the Southern Alps/Kā Tiritiri o te Moana to the West Coast. Today the route is followed by the 'Great Alpine Highway' (SH 73), which climbs from the Canterbury Plains up over Porters Pass before wending its way through the upper Waimakariri basin and climbing to Arthur's Pass on the main divide. For centuries Māori visited the basin for food-gathering or passed through on expeditions to Te Wai Pounamu for pounamu (greenstone). The prominent limestone outcrops of Castle Hill (named Kura Tawhiti by Ngāi Tahu) were always of particular importance to generations of Māori, offering both shelter and a physical, cultural and spiritual link with ancestors who also dwelt in and passed through the basin long before (see box).

Probably no other part of New Zealand's mountain lands has benefitted from such intense scientific study, aimed at unravelling myriad natural processes, as the basins and surrounding mountains of the upper Waimakariri River. It was here that many natural scientists evolved much of our modern thinking about New Zealand's origins and ecology: Max Gage developed the glacial chronology of New Zealand, and the names of the New Zealand glacial advances reflect their locations in the Waimakariri catchment; Charles Foweraker studied forest dynamics at Cass; Vida Stout used the Cass wetlands to increase understanding of freshwater ecology; Leonard Cockayne, Arnold Wall, Colin Burrows, Brian Molloy and many other botanists identified the mountain flora and its relationship with landforms, soils and climatic variation; John Hayward studied hydrology and erosion processes in the Torlesse Range; and

Tōpuni status of Kura Tawhiti (Castle Hill)

Hidden amongst the sheltering limestone outcrops of Kura Tawhiti (Castle Hill) Scenic Reserve are faint traces of 500-year-old charcoal drawings, which tradition associates with Waitaha, the first Māori travellers through this landscape. The cultural and spiritual ties to distant ancestors make Kura Tawhiti of such special significance to current generations of tangata whenua (Ngāi Tahu), that the area was designated by Ngāi Tahu as a Tōpuni in 1998. The Tōpuni confirms the overlay of Ngāi Tahu values and is an enduring symbol of the tribe's commitment to conserving the area's high natural and historic values, along with ensuring their active involvement in its management.

Lance McCaskill and the Castle Hill buttercup

TEACHER AND OUTSPOKEN conservationist Lance McCaskill is best known for his forthright advocacy of river catchment management to combat soil erosion, and the drafting of New Zealand's first comprehensive soil conservation legislation in 1941. As the first director of the Tussock Grasslands and Mountain Lands Institute at (then) Lincoln College, he had a keen interest in the plants and natural history, and wise use, of the South Island high country. His international reputation as a conservationist led to his initiating New Zealand's involvement in the oldest and largest global scientific conservation union – the International Union for the Conservation of Nature (IUCN).

Lance McCaskill's notable link with the Castle Hill basin was his decades of work (initially with Walter Brockie) in trying to protect and enhance the natural habitat of one of New Zealand's rarest alpine plants – *Ranunculus crithmifolius* var. *parvifolius* (commonly known as the Castle Hill buttercup). Whereas the surrounding Craigieburn and Torlesse ranges consist of greywacke, the Castle Hill basin has very different habitats developed on a range of Tertiary mudstones and limestones. The buttercup and a number of other rare plants such as the limestone forget-me-not *Myosotis colensoi* and Canterbury limestone wheat grass *Australopyrum calcis* subsp. *optatum* were restricted to a small drought-prone wind-swept area of limestone detritus, at constant risk of depredation from the sheep, rabbits and hares that grazed Castle Hill station.

Part of this small, fragile area was fenced in 1948 and McCaskill and his Lincoln College students immediately set about intensively managing the plants by careful weeding, pest control, etc. The government protected the site as a 'flora and fauna' reserve in 1954, the highest protection that could be given at the time. With the passing of the Reserves Act 1977, the fenced 6.4 ha site was renamed 'Lance McCaskill Nature Reserve' in his honour. In the inspiring words of the act, it was set aside for:

> ... the purpose of protecting and preserving in perpetuity indigenous flora ... that are of such rarity, scientific interest or importance, or so unique that their protection and preservation is in the public interest.

McCaskill's work continues and the nature reserve is probably the longest-running plant-monitoring project in New Zealand.

1. The Castle Hill buttercup, *Ranunculus crithmifolius* var. *Parvifolius*, is one of the rarest plants in New Zealand, with only 67 plants surviving on an exposed limestone gravelfield in the Castle Hill basin. Although it had the highest level of legal protection for more than 60 years, it has always been under threat of being crowded out by invasive weeds, trampled by livestock, or stolen by collectors. Its habitat in Lance McCaskill Nature Reserve was recently re-fenced to protect the plants from being consumed by hares. PHOTO: DOC

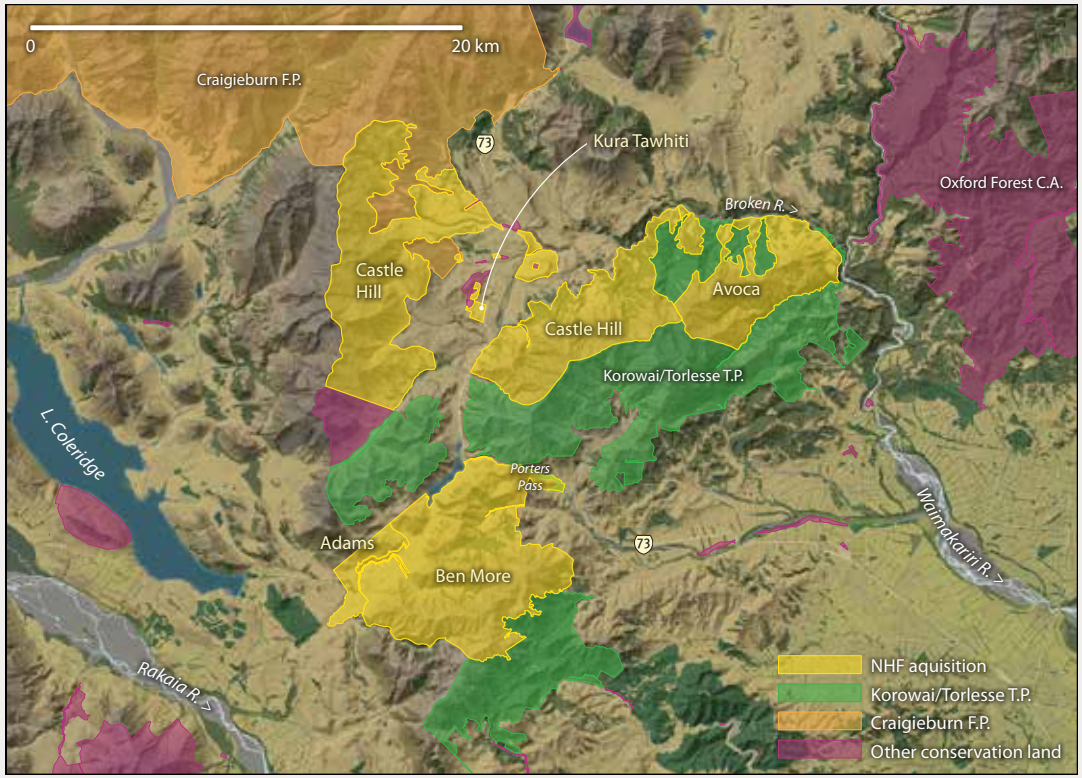
many other earth and biological scientists from Canterbury and Lincoln Universities and government research agencies such as the Department of Scientific & Industrial Research (DSIR) and the Ministry of Works (MWD) were also active in the area.

In hindsight, it is puzzling that so few eminent scientists were at the forefront of the growing conservation effort to legally protect the outstanding ecology of the Waimakariri basin. However, the work by Walter Brockie and Lance McCaskill during the 1940s and 50s to save the rare and threatened Castle Hill buttercup does stand out as an internationally-honoured pioneering example of plant conservation (see box). The New Zealand Forest Service established Craigieburn State Forest Park on the mountains of the Craigieburn Range in 1967, but it wasn't until the Nature Heritage Fund (NHF) became active in the late 1990s, coinciding with substantial farm development programmes clearing valley floor tussockland in New Zealand's high country, that serious efforts began to conserve the tussockland landscapes of the Torlesse and Big Ben ranges on the eastern and southern margins of the basin.

Korowai / Torlesse Tussocklands Park – the first of the eastern South Island high country conservation parks

With the passing of the Conservation Act and the setting up of the Department of Conservation (DOC) in 1987, the former 'State Forest Parks' administered by the New Zealand Forest Service became 'Conservation Parks'. Most of these forest parks were in the forested ranges of the North Island, so the Royal Forest and Bird Protection Society (Forest & Bird) in 1991 proposed 15,000 ha of the Torlesse Range as an ideal candidate for extending the park concept into the drier eastern high country of Marlborough and Canterbury. They also recognised that the Torlesse Range was particularly important "... for science, research and teaching, especially for studies of mountain land stability, plant ecology and soils". However, the Forest & Bird proposal did not receive support from adjoining runholders or DOC, so did not proceed at that time.

The high country park concept was given a two-fold impetus in the late 1990s. The NHF's mandate was widened in 1998 to include tussocklands, dunelands, wetlands and other non-forest ecosystems. Also, the passage of the Crown Pastoral Land Act 1998 allowed pastoral leaseholders to voluntarily enter into tenure review, whereby areas of high conservation value could become conservation land while the lessee gained freehold title to the more productive part of their lease. The lessees along the Torlesse Range explored the concept of tenure review, but some were deterred by the complexity of the process. In the case of Castle Hill and Avoca stations, a preliminary proposal identifying nature conservation areas suggested that if these were protected it would leave



Upper Waimakariri Basin

behind uneconomic farms. Instead, the lessees approached the NHF for a faster, simpler solution.

NHF purchased 6061 ha of Benmore station in 1997 (including about 4100 ha which had already been retired from grazing under a Catchment Board Run Plan but not surrendered from the pastoral lease). The Benmore purchase protected a mix of tussockland, shrubland and beech forest on the Big Ben Range adjacent to SH 73 at Lake Lyndon, Porters Pass and the Thirteen Mile Bush Forest at the southern entrance to the Broken River basin. The following year, a further 492 ha of freeholded former pastoral lease, containing dracophyllum shrubland and snow tussock along both sides of the Lake Lyndon Road, was purchased by the fund from Peter Adams (see map). This acquisition protected an increasingly-rare example of natural vegetation beside a scenic high country road. It was also of strategic importance as it linked protected land on the Big Ben Range with nearly 5000 ha of the Brooksdale run Pastoral Occupation License (POL) to the north (extending from the slopes around Mt Lyndon across to the Torlesse Range), which became conservation land in 2000 through tenure review of Brooksdale pastoral lease.

1. The beautiful flowers of the black scree button daisy, *Leptinella atrata* subsp. *atrata*, above Porters Pass on Foggy Peak, Korowai/Torlesse Tussocklands Park. PHOTO: ALAN JOLLIFFE

2. The scree chickweed, *Stellaria roughii*, in greywacke scree slopes on Foggy Peak, Korowai/Torlesse Tussocklands Park. PHOTO: ALAN JOLLIFFE

3. Another scree plant, *Lignocarpa carnosula*, is a member of the carrot family. Like other palatable native plants in the Korowai/Torlesse Tussocklands Park it has thrived with the removal of grazing stock. PHOTO: ALAN JOLLIFFE

4. The scree pea, *Montigena novae-zelandiae*, is a common plant in the Korowai /Torlesse Tussocklands Park now that grazing sheep have been removed. PHOTO: GERRY McSWEENEY

5. View southwards from the summit of Castle Hill (920 m) across Kura Tawhiti to the southern end of the Torlesse Range in Korowai/Torlesse Tussocklands Park. PHOTO: ROB BROWN

6. Members of the public with NHF committee member Dr Gerry McSweeney (right) above the treeline on the Benmore Station NHF purchase, at the opening of Korowai/Torlesse Tussocklands Park in November 2001. Lake Lyndon can be seen below and the mountains of Craigieburn Forest Park beyond. PHOTO: DOC

Also in 1998, in response to an approach from the lessee, the fund purchased the entire 2647 ha of Avoca station at the northeastern end of the Torlesse Range. Avoca pastoral run was arguably one of the remotest sheep stations in Canterbury and was grazed by the neighboring Flock Hill station. It is located in the lowest-altitude part of the basin and includes special warmer-climate shrublands dominated by kōwhai on the lower slopes. The area is tucked between rugged mountain slopes where Broken River reaches the Waimakariri Gorge. Here, the Midland railway line threads its way through tunnels and across viaducts to reach the classically glaciated landscapes of the upper Waimakariri basin (see map).

In addition to its biodiversity, the Avoca purchase secured the conservation of both the historic Avoca homestead (built in 1906) and the tramway and other relics of the Mount Torlesse Coal Company (which, via the Avoca siding on the Midland line, supplied coal throughout Canterbury until the company's demise after the opening of the Otira rail tunnel in 1923 gave access to cheaper coal from West Coast mines).

The NHF acquisitions now provided enough of a continuous physical link with existing conservation areas (some of them quite large like Broken River Forest, Thirteen Mile Forest, Torlesse Forest and the Brooksdale POL) for the establishment of a conservation park along the area's mountainous backbone. On 4 November 2001, and serenaded by the children of Springfield school among an audience of over 100 local people on the shores of Lake Lyndon, Minister of Conservation Sandra Lee opened the 21,000 ha Korowai/Torlesse Tussocklands Park, which stretches from the Rakaia River in the south to the Waimakariri in the north.

The iconic landscape of the Castle Hill basin

In late 2003, a unique opportunity arose to secure a corridor of protected natural land through the floor of the Broken River basin, thereby providing a physical link between the mountains of

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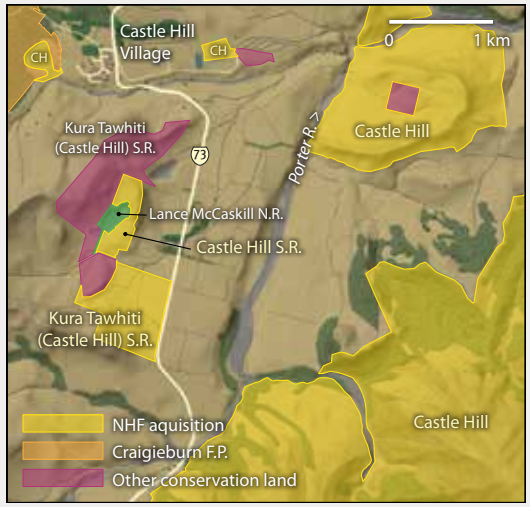
Craigieburn Forest Park and Korowai/Torlesse Tussockland Park. Following an unsuccessful investigation for tenure review, the lessees of Castle Hill Pastoral Lease and associated freehold land (of around 11,000 ha) proposed the property for sale by public tender. This aroused wide public concern. Community groups, conservation and recreation interests, local and regional government all approached central government seeking Crown participation in the purchase and protection of this outstanding landscape of national significance. Castle Hill station not only included the remaining unprotected western slopes of the Torlesse Range and the southeastern slopes of the Craigieburn Range (see map) but it was also bisected by the SH 73 and included the highly-visible and iconic limestone monoliths of Castle Hill.

Subsequently, 8517 ha of Castle Hill station was purchased in 2004 through a successful tender process involving a NHF/private joint venture and a complex process of surveying, fencing and ongoing access negotiation continued over the following decade. This unfortunately slowed the transfer of much of the pastoral lease to the two adjacent conservation parks – most of the portion to the west of SH 73 is scheduled to be added to Craigieburn Forest Park and most of the eastern portion to Korowai /Torlesse Tussocklands Park (see map). Nevertheless, the purchase protected a number of special limestone landforms such as Castle Hill, Prebble Hill and Gorge Hill, along with extensive areas of short and tall tussocks on terraces to the south of Broken River. Elsewhere in



Kura Tawhiti (Castle Hill)

1. The Castle Hill purchase protected an extensive habitat of threatened high country birds like this juvenile kārearea/New Zealand falcon, *Falco novaeseelandiae*. PHOTO: ROD MORRIS

the high country such tussocklands have largely been developed into pasture. The Castle Hill purchase also conferred other public benefits, including protecting the best example of a rock glacier in the Craigieburn and Cass Ecological Districts, securing permanent public access for the Mount Cheeseman skifield, allowing public access to high alpine areas with their specially-adapted scree plants and scree insects and protecting the habitat of threatened high country birds like such as kea and kārearea/New Zealand falcon.

To enhance the core limestone protected areas – the Kura Tawhiti (Castle Hill) and Castle Hill scenic reserves and the Lance McCaskill Nature Reserve (see detailed map) – a 53 ha block of former Castle Hill freehold land (the 'Trelissick fold block') was purchased by the NHF in 2009 and then added to Kura Tawhiti (Castle Hill) Scenic Reserve. Together, these three small adjacent protected areas now cover most of this ecologically and culturally important limestone landscape (in all about 150 ha, see map). Their outcrops and talus slopes provide further refuge for threatened species (ranging from Critically Endangered to Naturally Uncommon) which were previously confined to crevices and rocks where farm management practices could not affect them. During the past decade, the increased accessibility of the Castle Hill limestone landscape has allowed thousands of members of the public, as well as school, university and tourism groups, to visit for nature study, rock climbing and family recreation. Indeed, few other natural sites in the Canterbury high country have such high visitation rates during the summer season (more than 500 people per day). ■

1. Looking west from Mt Hobson (Hirakimata), the highest point (627 m) on Great Barrier Island (Aotea) towards Te Hauturu-o-Toi/Little Barrier Island in the distance. Kaikoura Island (Selwyn Island) lying at the entrance to Port Fitzroy is the prominent island in the middle distance. PHOTO: ANDRIS APSE

COLLABORATING WITH LOCAL GOVERNMENT AND COMMUNITIES

OPPORTUNITIES REGULARLY arise for the Nature Heritage Fund (NHF) to undertake joint venture conservation partnerships with local government. Often these situations are driven by public concern at the possible loss of iconic natural landscapes to development or to foreign ownership. In such cases pressure mounts for multi-party funding approaches to secure properties in public ownership. Central government is asked to contribute via the NHF if the geo/biodiversity outcomes warrant it. Two high-profile examples, each of very high regional significance and each with wide community support, are Kaikoura Island (Selwyn Island) in the Great Barrier Island (Aotea) archipelago and Baring Head/Ōrua-pounui at the entrance to Wellington Harbour.

Kaikoura Island (Selwyn Island)

Kaikoura Island lies at the entrance to Port Fitzroy and is a landscape backdrop to this arrival point for most visitors to Great Barrier Island (Aotea). With an area of 564 ha it is the seventh largest island in the Hauraki Gulf (see map). By 2000, the island's forest cover had been seriously degraded by 140 years of logging, burning and stock grazing for farming; only isolated forest pockets remained in damper gullies, although much of the island was covered in regenerating mānuka and kānuka with a fringe of pōhutukawa around the coastline. In addition to stock, at various times fallow deer, goats, rabbits and pigs had been released, with serious impacts on the island's vegetation.

Several attempts to protect the island's remaining biodiversity had been made in the past: in 1973 the former Department of Lands and Survey made an unsuccessful attempt to purchase the island as an addition to the Hauraki Gulf Maritime Park; and in 1995 the NHF declined an application from the 'Save Our Islands Trust' because the ecological condition was considered too poor to justify the price being asked. Subsequently, in 2002, the New Zealand Native Forest Restoration Trust (NZNFRT) initiated a public campaign to persuade government to purchase the island so that it could be restored as a significant part of Great Barrier Island's biodiversity. The new Minister of Conservation, Chris Carter, eventually accepted NZNFRT's proposition that the island could regenerate to high-quality habitat if deer, pigs and other pests were removed. In a positive spirit, he suggested a funding partnership

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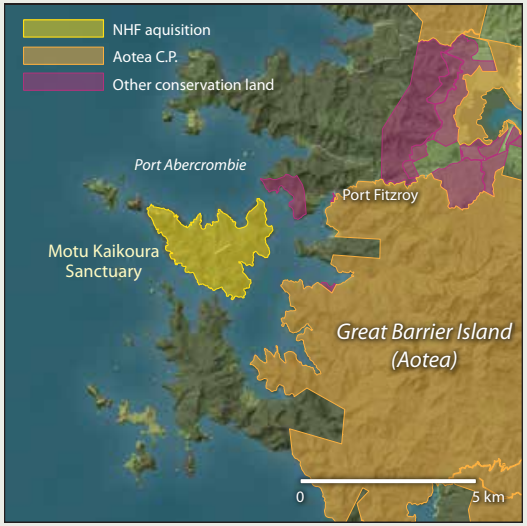
Motu Kaikoura Sanctuary, Great Barrier Island (Aotea)



approach with the NHF if the NZNFRT could involve other regional funders in a joint venture to share the cost of purchase and future conservation management.

The NZNFRT campaign rapidly gained momentum (with good publicity from local media, especially the *NZ Herald*). In June 2003 they had Iwi (Ngati Rehua) and substantial Auckland community support and lodged an application for funding with the NHF. The NZNFRT considered Kaikoura Island to be of strategic importance as a stepping-stone towards a long-term Great Barrier Island conservation vision. At 28,500 ha in area, Great Barrier Island was already of enormous conservation importance as the largest area in the country free of possums, mustelids, Norway rats and hedgehogs. However, many people believed that its conservation value could be enhanced further if it could also be freed of rats and cats. A pest-free Kaikoura Island could play a key role in the shorter term, through the introduction of endangered species which would eventually spread to the adjacent much larger island, as well as providing further safe habitat for endangered species from the larger island (such as pāteke/brown teal and chevron skinks.

Motu Kaikoura Sanctuary

With financial contributions from the ASB Community Trust, the (then) Auckland Regional Council, and many of Auckland's then local territorial authorities, the Minister of Conservation approved the use of the NHF for the largest contribution towards the $10.5 million purchase price in 2004. The Island was protected as a scenic reserve – Motu Kaikoura Sanctuary – and was to be controlled and managed for conservation outcomes by a private Motu Kaikoura Trust. In 2005, the Minister also used the NHF to support the start-up of the Trust and to finance the initial work for achieving the priority goal of eradicating deer (and other animal pests). The importance of the purchase was expressed by Michael Lee, Chair of the then Auckland Regional Council, at the official opening of Motu Kaikoura Sanctuary in May 2005:

> Kaikoura has enormous strategic potential as a staging post in the long-term vision of a pest free Great Barrier Island, which would create a wildlife reserve of international importance. We all would appreciate the significance for biodiversity and the significance for economically vital nature tourism in the Hauraki Gulf and the Auckland Region that a wildlife reserve on that scale would mean.

Over the past decade the Trust has worked hard to achieve what was always going to be a very ambitious conservation vision. Deer, rabbits, cats and pigs have been eliminated, resulting in impressive regeneration of indigenous vegetation; and wilding pines are being progressively removed. It was hoped that ship rats and kiore could be eradicated. An aerial eradication operation (two applications of toxic (brodifacoum) baits) was undertaken across the whole island and surrounding sea stacks in late winter 2008. Initially, this seemed to have been successful. Unfortunately, both ship rats and kiore were detected on the island in early 2009 and subsequent surveys and trapping confirmed that these rodents were re-establishing across the whole island. The eradication probably failed because a small residue of rodents survived the toxic bait drops and/or they reinvaded from Great Barrier Island which is only 100 m away at

the closest point (Man of War Passage) and well within the swimming range of ship rats.

Concerted work by the Trust and its conservation partners and volunteers continues towards achieving the vision of restoring Motu Kaikoura Sanctuary to a high-quality habitat for indigenous biodiversity. Many management lessons have been learned; ship rats and kiore are now being progressively controlled to acceptably low levels through a permanent grid (100 m × 100 m) of 540 bait stations plus over 400 snap traps. This level of rodent control is much more intensive than most places on the mainland conservation estate and it will be intensified if necessary. The island is becoming a stronghold for kākā and recent observations indicate higher numbers of young banded rails/moho-pererū and a noticeable increase in the visibility of small passerines such as fantails/pīwakawaka, grey warblers/riroriro and silvereyes/pihipihi, as well as skinks.

The public profile of both Great Barrier Island and Kaikoura Island was raised in 2014 when then Minister of Conservation Dr Nick Smith announced the government's intention of setting aside 12,109 ha of Great Barrier Island as a new 'Aotea Conservation Park'. This new conservation park was opened by Minister of Conservation, Maggie Barry, in April 2015.

Baring Head

The Baring Head landscape is located on a spectacular coastal headland at the mouth of the Wellington Harbour. This landscape is an integral part of the south coast of the North Island and is seen as part of the day to day experiences of the people who live in the country's capital city. The landscape is accessible and iconic. Its landforms are particularly special … a record of the region's geomorphological history; the coastal escarpments and terraces graphically record the series of uplifts the region has experienced, the most recent during early European settlement. It has remained remarkably unspoiled; it remains essentially as Maori and later European settlers would have first experienced it and the marks of settlement have been subtle and transient … This is a special place!!

These words of Clive Anstey, the Wellington landscape architect commissioned by DOC to report on the head's landscape values, aptly express the significance of Baring Head to the 'Greater Wellington' community – and the multitudes of travellers who have passed by on Cook Strait ferries over the last 50 years. Baring Head is also of international scientific importance because of The National Institute of Water and Atmospheric Research's (NIWA's) Baring Head Clean Air Monitoring Station. This has been in operation for more than 40 years and is an important contributor to global scientific studies into climate change and our impact on the earth's atmosphere. The air

1. The chevron skink, *Oligosoma homalonotum*, is classified as Nationally Endangered. Its stronghold is Great Barrier Island (Aotea) where it is known from around 20 locations. With continued intensive trapping of ship rats and exclusion of Norway rats, the Motu Kaikoura Trust hope that Kaikoura Island (Selwyn Island) could become an important haven for this attractive species, one of New Zealand's rarest lizards. PHOTO: BEN BARR

2. The pāteke/brown teal, *Anas chlorotis*, was widespread 200 years ago, but became highly endangered due mainly to the impacts of introduced predators and the draining of its wetland habitats. The most important population of this endangered but recovering endemic duck is on Great Barrier Island (Aotea) and records have shown consistent numbers on the shoreline and inlets of Kaikoura Island (Selwyn Island). PHOTO: DOC

3. Looking across Lake Kohangatera (one of the Parangahau Lakes) and Fitzroy Bay to the raised marine terraces of Baring Head in the distance. PHOTO: LES MOLLOY

1. Intensive pest control at Baring Head and the nearby Parangahau Lakes has markedly improved the breeding success of banded dotterels/tūturiwhatu. At both sites, hedgehogs and cats were shown to be the most serious predators.
PHOTO: NIKKI MCARTHUR, GW

2. An aerial view of the Baring Head acquisition, showing the Wainuiomata River (left) and the raised marine terrace headland (right). PHOTO: GW

3. The Nationally Endangered *Muehlenbeckia astonii* is a component of the 'grey scrub' on the Baring Head site. Its survival in the wild is hampered by lack of regeneration due to competition from exotic grasses, browsing animals and trampling. PHOTO: DOC

4. The beaches and terrace scarps around Baring Head are important open habitats for lizards, including the Raukawa gecko, *Woodworthia maculata*.
PHOTO: RICHARD ROMJIN.

5. A special ecological feature of the Baring Head site is its plentiful expanse of the increasingly-rare 'grey scrub'. This association of small-leaved, salt-tolerant shrubs can be seen here on the slopes along both sides of the lower Wainuiomata River.
PHOTO: MARK MCALPINE, GW

arriving at this site from a southerly direction has originated from areas of no human population and therefore is a scientific 'baseline' uninfluenced by any local activity.

The headland had formerly been part of the Riddiford family's historic Orongorongo Station and had remained only extensively farmed despite a number of development threats over the years. In 1995, an application to place wind turbines on the marine terraces was turned down by the Environment Court because of the site's 'iconic landscape values'. Over the next decade there were various failed attempts to subdivide the 285 ha farm into lifestyle blocks. Eventually, in May 2010, a proposed mortgagee sale by public tender generated a high level of public interest. The two main interested public agencies were Greater Wellington Regional Council (GW) and DOC. GW already managed a 10.6 ha recreation reserve on the head around the Baring Head lighthouse (built in 1935) and historic buildings, as well as the nearby Parangahau Lakes in East Harbour Regional Park across Fitzroy Bay. DOC managed the nearby Turakirae Head Scientific Reserve (with its internationally-important suite of raised beaches) and much of the mountainous Orongorongo hinterland as Rimutaka Forest Park (see map).

DOC, with the support of GW, quickly submitted an application to the NHF in June 2010 and considerable public support for outright purchase was generated. In an outstanding collaborative effort, GW and the NHF put up most of the purchase price, with welcome financial support from Hutt City Council (the territorial local authority), DOC, and an anonymous benefactor from the public.

The NHF considered that the Baring Head property fulfilled all four of government's 'National Priorities for Protecting Rare and Threatened Biodiversity on Private Land'. The diversity of landforms and habitats, and their unique geographic situation, was outlined in DOC's application:

> It has long been recognised that the wild coastline of the southern North Island is home to a rich array of native insects and plants. Rich not just because of an abundance of species but also because an upland element – species more typical of alpine and montane areas of the South Island are present. ... Contrasting bone-dry divaricating shrub lands on one hand, and lush sedge lands and herbfields sheltering in low shrub forest on the other. In many ways this coast looks and feels like part of the upland South Island, and in fact many of its species are either the same or closely related to such species in upland habitats on the other side of Cook Strait.

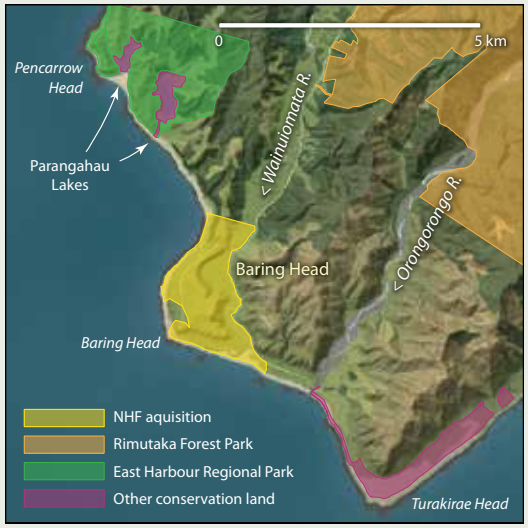
A special ecological feature of the site is its 'grey scrub'. Nationwide, 'grey scrub' is becoming rare because of farm clearance, weed invasion and people's desire to live on coastal subdivisions. According to DOC's Wellington Plant Conservation Strategy, 'grey scrub' has a 'serious decline' status. At Baring Head, severe southerly storms carry salt-laden air 1–2 km inland, restricting native vegetation to these mainly small-leaved, salt-tolerant shrubs and lianes. Some of the more notable 'grey scrub' plants at Baring Head are *Brachyglottis greyi, Clematis afoliata, Discaria toumatou, Muehlenbeckia astonii* (threat classification: Nationally Endangered) and two mistletoes, *Ileostylus micranthus* and *Korthalsella lindsayi*.

The beaches of Fitzroy Bay and Baring Head, the scarp around Baring Head, and the Wainuiomata River mouth are important open habitats for native birds (banded dotterel/tūturiwhatu, variable oystercatcher/tōrea pango, Caspian tern/taranui and blue penguin/kororā), lizards (the Raukawa gecko, copper skink, common skink and the rare spotted skink) and some invertebrates, especially in the *Raoulia australis*-dominated cushionfield occupying a large area of the foreshore (the katipo spider, Wellington coastal moth and Myers' cicada).

Pest control in East Harbour Regional Park

GW have now incorporated the area purchased as scenic reserve into East Harbour Regional Park and developed a Key Natural Ecosystem (KNE) plan to achieve biodiversity conservation on the site. In this the GW is working collaboratively with the Tupoki Takarangi Trust which owns 59 ha of adjacent land. Another key partnership is with the 'Friends of Baring Head' whose volunteers have helped fence off wetlands on the river flats and planted many thousands of native plants. Particularly interesting conservation work by GW is focussing on improving breeding of the banded dotterel/tūturiwhatu (threat classification: Nationally Vulnerable) and protecting lizards from predators.

During the first two years of monitoring at both Baring Head and the nearby Parangahau Lakes, prior to the use of intensive pest control, fencing, or the application of an access rāhui, only 2–3% of banded dotterel/tūturiwhatu nests at these two sites were successfully hatching chicks each year; with additional pest control and the minimisation of disturbance to the nesting areas during the breeding season it improved markedly, to 15–20%. At both sites, hedgehogs and cats were shown to be the most serious dotterel predators. Although more intensive trapping of hedgehogs and cats succeeded in improving banded dotterel/tūturiwhatu nest success, these predators continued to account for most of the nest failures that were still occurring.



Baring Head, Wellington Harbour

With respect to the lizard population, GW's research indicates a complex interaction with both habitat changes and predator control. Hedgehogs are also known to be significant predators on lizards and need to be controlled by trapping. There are also fears that following the removal of stock grazing from the site, there may be an increase in rank grass which will support a higher population of mice, which also prey on lizard species. In turn, cats and mustelids, which prey on both lizards and rodents, could increase in numbers in response to the increase in rodents. This situation is being monitored closely and enhanced pest control measures will be undertaken if necessary. ■

SILNA COVENANTS: WAITUTU AND RAKIURA

Background to SILNA Forests

The term 'SILNA forest' refers to indigenous forests on land allocated to Māori under the South Island Landless Natives Act 1906 (SILNA). SILNA lands originally covered approximately 57,000 ha scattered throughout the South Island but mainly in Southland and Stewart Island/Rakiura. Most of the land was remote and rugged – far from the beneficiaries' traditional kainga or present home, so it was difficult for them to develop their allocated land. Despite the many disadvantages, some SILNA landowners did manage to harvest their forests and/or develop the land, for by the 1970s indigenous timber was becoming scarce enough for them to finally realise some economic benefit from their forests. Soon, large parts of Southland's SILNA forests – West Rowallan, Waimumu, parts of the East Rowallan and Alton forests, and the Catlins – were being cut over or clear felled for logs and for export as wood chips. However, the extremely isolated SILNA forests of Waitutu (on the most fertile lower marine terraces between the Wairaurahiri and Waitutu rivers in southern Fiordland) and Lord's River/Tutaekawetoweto (in southeastern Stewart Island/Rakiura) remained relatively untouched. Their extensive podocarp forests were appreciating in both economic and conservation value – at a time when most of New Zealand's coastal podocarp forest had already been destroyed.

Inevitably, the Southland and Stewart Island/Rakiura SILNA forest blocks were caught up in the indigenous forest conservation campaigns of the 1970s and 80s, as public opinion hardened in favour of conserving all our remaining indigenous forests. In the early 1990s, the government passed legislation to limit the export of indigenous timber (which was mainly as wood chips) and to promote the sustainable forest management of indigenous forest land. However, Parliament created an exemption for the SILNA lands in order to recognise the Crown's obligation to SILNA owners, since indigenous forest logging was virtually the only activity open to them whereby an economic benefit could be derived from the land. The exemption led to prolonged opposition from conservation organisations (especially towards clear-felling of forests). Public pressure for conservation focussed especially on the Waitutu and the Lords River blocks. At the direction of the government, the NHF became involved, seeking conservation outcomes acceptable to the SILNA owners at both Waitutu and Lords River.

1. Looking west across the West Rowallan SILNA forests (foreground) to the mouth of Wairaurahiri River and the Waitutu SILNA forests beyond. PHOTO: LES MOLLOY

2. Waitutu River in Fiordland National Park, at the western margin of the Waitutu SILNA forests. PHOTO: DOC

3. Wairaurahiri River mouth and stony beach. PHOTO: LES MOLLOY

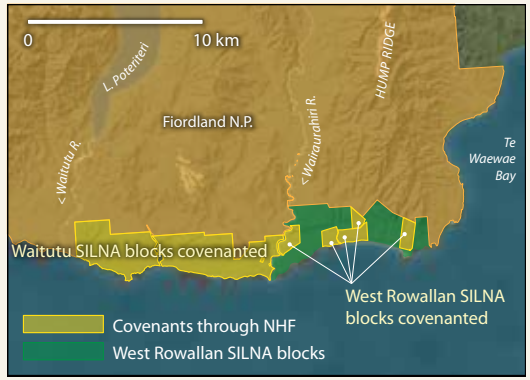
Waitutu – 'the greatest stretch of indigenous lowland forest in New Zealand ... least directly affected by man's activities'

The Waitutu forest tract, including the SILNA lands, is a lowland wilderness on the south coast of Fiordland between Big River and Lake Hakapoua in the west and Te Wae Wae Bay in the east. The forests extend across a remarkable altitudinal sequence of 10 main marine terraces; these are of great scientific interest, recording successive uplift over the past million years. The staircase of terraces lie parallel to the wild coastline and support a range of ecosystems, from extensive areas of dense, tall podocarp and beech-podocarp forests on the younger coastal terraces, through lower-stature forests, to a more open yellow-silver pine and pink pine shrubland on the more leached soils of the wetter terraces. The dense podocarp forest on the SILNA lands of the 1.5 km-wide lowest coastal terraces support a rich birdlife, including what in 1990 was considered to be the largest known population of South Island kākā, as well as mohua/yellowheads, rifleman/tītitipounamu, kākāriki/parakeets, kārearea/New Zealand falcons, ruru/moreporks and korimako/bellbirds.

Although the podocarps in much of the SILNA forests east of the Wairaurahiri River were logged by the Port Craig-based Marlborough Timber Company between 1918 and 1932, the remote Waitutu locality did not gain wide public interest until 1971 when the New Zealand Forest Service announced the Southland part of its ill-fated 'Beech Utilisation Scheme'. This proposal included the logging and part conversion to exotic plantations of much of the 46,500 ha Waitutu State Forest (Waitutu SF) which lay between the coastal SILNA forests and the hinterland of Fiordland National Park. The potential loss of the forests' outstanding wilderness and ecological values resulted in a public outcry and opposition from the Nature Conservation Council, so much so that Waitutu SF was removed from the 'beech scheme' in 1973. Further extensive soil, forest type, and wildlife surveys of the Waitutu area were subsequently undertaken, leading a senior scientist of the Forest Research Institute, John Nicholls, to conclude in a 1976 scientific paper in the New Zealand Journal of Forestry:

> ... here lies the greatest stretch of indigenous lowland forest in New Zealand that has been least directly affected by man's activities, a forest wilderness that is fascinatingly varied, contained within a splendid setting of mountains, superbly beautiful lakes, and a rugged sea coast.

So began a 25-year conservation campaign to add Waitutu SF to Fiordland National Park and to protect the SILNA forests from logging (through covenants which would ensure fair payment to the forest owners for the income foregone). To improve their negotiating position, most of the owners of the 23 SILNA blocks between the Wairaurahiri and Waitutu rivers formed the Waitutu Incorporation and sold their forest cutting rights to a succession of timber milling interests. The New Zealand Forest and Bird Protection Society (Forest & Bird) led a series of national campaigns to protect these forests and the Federated Mountain Clubs of New Zealand (and, subsequently, government's Wilderness Advisory Group) advocated a 'Poteriteri-Waitutu Wilderness Area'. In 1982, the National Parks and Reserves Authority began an investigation into the national park values of Waitutu SF. This exhaustive field and consultative process



Waitutu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generated over 1200 public submissions in support of a park addition and in 1987 the Authority recommended this to government. Later that year, however, Waitutu SF was passed as stewardship land to the newly-formed DOC, which took over negotiations with the Waitutu Incorporation to try and establish protective covenants over the Waitutu SILNA forests.

When the Forest (later, Nature) Heritage Fund was set up in 1990, the Waitutu stewardship land had just become a key part of the Te Wahipounamu - South West New Zealand World Heritage Area. The uplifted marine terraces and biodiversity of Waitutu were recognised by UNESCO as being of 'outstanding universal value' and this placed more pressure on government to negotiate an acceptable agreement for the long-term protection of the coastal SILNA forests. To reinforce its negotiating position, government let the SILNA landowners know that it would strictly enforce new regulations prohibiting the export of any clearfelled indigenous timber. This meant that SILNA forests would have to be harvested in accordance with the Forests Act's sustainable management regime.

In 1994, government appointed George McMillan, a former Director-General of the Department of Lands and Survey, as its negotiator with the Waitutu Incorporation. He was assisted in the 2 year-long negotiations by Allan McKenzie, the NHF's manager. Finally, on 8 March 1996, the Minister of Conservation, Denis Marshall, and Waitutu Incorporation Chairman, John Southerwood, signed a historic Deed of Settlement which removed forever the threat of clearfelling the pristine podocarp forests on 2172 ha of the Waitutu SILNA lands (see map). The subsequent Waitutu Block Settlement Act 1997, which was guided through Parliament by the new Minister of Conservation, Nick Smith, gave the Crown a covenant in perpetuity over the Waitutu Incorporation block and ensured that DOC could manage it as if it were a part of Fiordland National Park. The covenant secured public access rights but the Incorporation retained title to the land and could take traditional foods and plants for customary medicinal use, and build their own lodge on a small area. The incorporation received $13.55 million from the Crown (including $6m from NHF) and an exchange of cutting rights (within a sustainable management framework) to 11,582 ha of the former New Zealand Forestry Corporation indigenous production forests in the Longwoods, Rowallan and Woodlaw Forests. In signalling the incorporation's belief that its production forestry future lay in the sustainable management of beech forests far from their Waitutu land, John Southerwood stated:

> The significance of the Act cannot be over-estimated. It demonstrates the genuine commitment of both iwi and government to protect pristine forests for future generations while enabling the property rights of Waitutu Incorporation to derive an income from essentially regenerating beech forests.

In October 1999, 48,520 ha of Waitutu stewardship land were finally added to Fiordland National Park. Over the following years the NHF has negotiated covenants over five of the West Rowallan SILNA blocks between Sand Hill Point and the Wairaurahiri River (see map) with a sixth protected by a Ngā Whenua Rāhui kawenata. Two of these SILNA blocks (of over 230 ha) – Kuaha ki Waitutu ('The Gateway to Waitutu') – had been allocated to the Orbell family who strenuously protected them as kaitiaki (guardians) for more than a century. In particular, they refused to accept offers to log their dense podocarp and beech trees in the 1920s and in the 1980s they went to the Maori Land Court to oppose the construction of a road through their blocks as part of the Waitutu Incorporation's plans to log their forests.

1. The wooden trestle viaduct across the Percy Burn is the largest of four built by the Marlborough Timber Company in the 1920s as part of its logging tramway to Port Craig. The bridges all lie within the West Rowallan SILNA lands and are protected as historic heritage, but the Percy Burn viaduct is currently closed and awaiting restoration. PHOTO: LES MOLLOY

All six West Rowallan covenants have helped to secure public access along DOC's South Coast (Waitutu) Track, which crosses the historic wooden trestle viaducts across the Percy Burn and other incised streams. Subsequently, the wider public were encouraged to gain an insight into the remarkable ecological and historical values of the Waitutu area by walking the Hump Ridge Track, the result of a partnership between the Tuatapere community, DOC and the SILNA forest owners, who operate the track through a charitable trust.

Today, the iconic Waitutu Forest remains one of New Zealand's largest unmodified lowland forests. It is the habitat of 30 threatened species of birds, fish, lizards and bats and 29 threatened plant species. Waitutu is also a nationally

2. The lower reaches of Lords River/Tutaekawetoweto are an impressive drowned valley system. The river's catchment on the northeastern side of the Tin Range is the largest in an unmodified state on Stewart Island/Rakiura and very significant for having no introduced fish species. PHOTO: LES MOLLOY

3. Lords River/Tutaekawetoweto flows through dense unlogged lowland podocarp/broadleaf forest dominated by rimu and kāmahi, with rātā, broadleaf, miro and mountain tōtara. Prior to covenanting, it was probably the largest area of unprotected privately-owned lowland forest in New Zealand. PHOTO: LES MOLLOY

4. The striking tentacled stinkhorn (or 'anemone fungus', because of its similarity in shape to the sea anemone), *Aseroe rubra*, is often found in the leaf litter of podocarp-broadleaf forest, such as that in the wet Waitutu and Rakiura SILNA forests. PHOTO: ALLISON MOLLOY

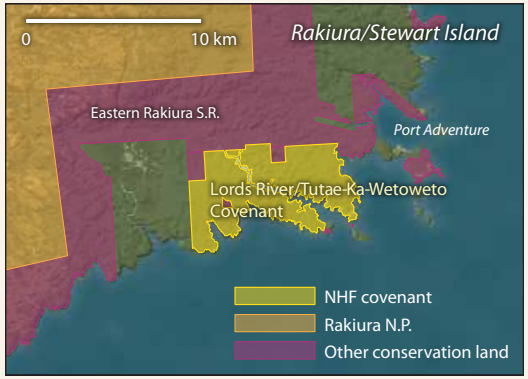
significant site for mistletoe, a stronghold of South Island kākā and has an important remnant mohua population. Waitutu's conservation values are so significant that with the active support of the Waitutu Incorporation and with the consent of successive governments, NHF conservation funding has been further committed to SILNA forests at Waitutu. This has covered the cost of a series of pest control programmes which have expanded the ecological protection and restoration of this special part of New Zealand (see box).

Covenanting the Lords River block of the Tutaekawetoweto forests of Rakiura

The SILNA forests on Stewart Island/Rakiura comprise three large blocks – Port Adventure, Lords River/Tutaekawetoweto, and Toitoi, all administered on behalf of the owners by the Rakiura Maori Land Trust (RMLT). The three blocks are contiguous, located on the southeast of the island between Big Glory Bay and Port Pegasus/Pikihatiti, and together comprise around 10,650 ha of dissected lowland hill country (see map). The lower reaches of Lords River/Tutaekawetoweto are an impressive drowned valley system extending up to eight kilometres inland from the coast. Behind the shoreline the land is undulating in character, containing numerous small rivers and streams. A large proportion of the Port Adventure and Lords River blocks are unlogged lowland podocarp/broadleaf forest dominated by rimu and kāmahi, with rātā, broadleaf, miro and mountain tōtara, *Podocarpus laetus*. With the covenanting of the Waitutu SILNA forests in 1996, the Rakiura SILNA forests remained as probably the largest area of privately-owned unprotected lowland forest in New Zealand. The historical absence of logging, road construction or burning meant that these remote lands comprised a very significant intact forest ecosystem.

Using the Waitutu covenant negotiated with the Crown (see above) as a template, a settlement was reached between the Crown and the RMLT on 9 October 1999 for the Lords River/Tutaekawetoweto block. The covenanted area was 3511 ha and the Crown's contribution to the owners was $10.9 million (with the NHF contributing $5.36m spread over three successive years). This settlement was given effect by the Tutae-Ka-Wetoweto Forest Act 2001, which states that the RMLT is tāngata whenua and beneficial owners have the rights of

Lords River/Tutae-Ka-Wetoweto



ownership, possession and use of the Lords River block. However, the conservation covenant (under s.77 of the Reserves Act 1977) stipulates that the land must be managed with similar objectives to those of a national park. In 2003, The RMLT prepared the Tutae-ka-Wetoweto Forest Management Plan to guide its management of the area.

NHF involvement in the conservation of SILNA lands since the 2002 policy package

In May 2002, the Minister of Forestry, Pete Hodgson, announced government's policy package seeking to end any unsustainable harvesting of indigenous forest on SILNA lands. As part of this package, $16.1m was allocated to the NHF to achieve voluntary settlements with the remaining priority area SILNA forest owners, using conservation covenants in perpetuity. Cabinet identified the West Rowallan, Tautuku/Waikawa and the two remaining Waitutu independent forest blocks as high priorities for this protection. Using this allocation, the NHF has negotiated the protection of a further seven blocks (totalling 808 ha) as conservation covenants in perpetuity. This has included the two remaining Waitutu independent sections and the two unlogged Orbell blocks in the West Rowallan SILNA forests (see above). These four high-priority blocks all contained P1 dense podocarp forest and adjoined the Waitutu stewardship land addition to Fiordland National Park.

Negotiations are continuing with the owners of another 20 SILNA blocks in Southland, with around $7.5m of the SILNA conservation package allocation earmarked for settling conservation covenants in perpetuity for these forests. ■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Waitutu: native forest biodiversity restoration on a grand scale

WAITUTU IS THE LARGEST area of lowland beech-podocarp forest in Fiordland and one of the last areas of mainland New Zealand to be colonised by Australian brushtail possums. The spread of possums westward along the southern Fiordland coast was restricted by the area's remoteness and wet climate; natural barriers like the large Waiau, Waitutu and Wairaurahiri Rivers also hampered possum spread.

Construction of tramway bridges for logging access from Port Craig 95 years ago, and more recently the construction of Forest Service walkway bridges across the Wairaurahiri and Waitutu Rivers, hastened the westward spread of possums into Waitutu Forest. Their browsing initiated the collapse of mistletoe, fuchsia, wineberry and many other vulnerable palatable plants. In Waitutu, this loss of biodiversity and vital nectar and fruit for birds was accompanied by beech and rimu seedfall-linked explosions of mice and rats in this forest. High rodent numbers triggered surges in the number of predatory stoats because once rodent populations start falling, stoats will often switch from their predominantly rodent diet to one that includes many native birds.

From 2001, Landcare Research documented these periodic explosions of mice accompanied by surges in rat and stoat numbers in Waitutu forest. DOC also initiated pest surveys and stoat trapping over small parts of Waitutu from 2006 onwards. By 2009 it was very clear that in the absence of effective and extensive pest control, vulnerable plants were being devastated by possums and birdlife (particularly hole-nesters such as female kākā, ruru and kākāriki) were also being drastically impacted by stoat predation. Targeting stoats alone in isolated trapping, or poisoning programmes without an integrated pest control programme across the whole forest, simply resulted in a surge in rat and mice numbers. This, in turn, led to further breeding and sharp increase in stoat numbers, a situation described by one stoat scientist as "the perfect breeding machine".

Weighing up all this evidence, including the discovery in 2009 that surveyed Waitutu kākā populations were now 85% male birds because of

loss of females and juveniles to stoats, the NHF recognised that large-scale pest control was urgently required across all of Waitutu's forests. Otherwise, the major conservation gains made when the SILNA forests were safeguarded from logging (as described above) were at risk of being lost.

Therefore, in 2009 (and with the full support of DOC Southland (spearheaded by Biodiversity Ranger Colin Bishop), John Southerwood and the Waitutu Incorporation, along with special approval by Government), the NHF channelled $500,000 of SILNA conservation funds to a 1080 operation at Waitutu using aerially applied baits targeting mice, rats and possums. This comprehensive programme implemented the landscape-scale techniques refined by DOC (particularly in South Westland) and also ensured the elimination of most stoats through a secondary kill when they fed on poisoned rats and mice. This first aerial pest control in Waitutu was carried out in October 2010 and covered 30,000 hectares.

The results were immediate and quite unprecedented for this region. In those areas where aerial 1080 was used there was an almost total elimination of all the target pests. In a small 500 ha area in Waitutu where ground-based control methods were used the results were less successful. Subsequent monitoring throughout the whole forest revealed very low remaining pest populations, a surge in successful kākā breeding, the first records of weka in Waitutu, excellent numbers of small native birds and major regeneration of mistletoe and other vulnerable plants. These benefits lasted for the next 3 years and resulted in a remarkable surge in birdlife and forest diversity; but then, predictably, mice, rat and stoat numbers began to increase once again because of invasion from outside the treatment area.

In 2014, at the urging of the Waitutu Incorporation and with the strong support of the NHF and DOC, a further tranche of SILNA conservation funds was approved to carry out a second aerial 1080 operation. In addition to the 2010 treatment area, a further 5000 ha west of the Waitutu River towards the Hakapoua River was included. This area contained what was considered by DOC to be the best mistletoe population in all of Waitutu, along with other vulnerable plant species. The second 1080 application was carried out in October 2014 and was successful in reducing possum, rat and stoat numbers. Mice populations were much reduced but soon recovered to moderate levels because of the high abundance of beech seed. Further 1080 application techniques are now being developed to better-target mice.

In Waitutu forest, 6-monthly monitoring of pest populations and of the recovery of threatened native species continues to be carried out by DOC. Pest control will need to be maintained into the foreseeable future. This level of proactive management will ensure that Waitutu's lowland forest remains an exemplary showcase of both biodiversity restoration and a successful conservation partnership between Waitutu's Māori owners, DOC (particularly the Fiordland National Park managers) and the NHF.

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1. DOC's monitoring in Waitutu indicates that, as with kākā, ruru/morepork *Ninox novaeseelandiae* have a skewed sex ratio with many more males than females observed. This is most likely due to predation, as female ruru also incubate their eggs in tree cavities. PHOTO: PETER BEARSLEY

2. The bright scarlet flowers of the native mistletoe, *Peraxilla colensoi*, are usually found on host silver beech trees in Waitutu. Native birds such as tūī and bellbirds/korimako relish their nectar and bring about their pollination. The mistletoe is very palatable to possums and in 2014 the Waitutu 1080 operation area was extended to safeguard Waitutu's best area of mistletoe habitat. PHOTO: GERRY McSWEENEY

3. Possums and stoats are known to be key predators of nesting kākā and their eggs. Adult female kākā showing signs of possum predation have been recovered from nest cavities in the Waitutu forests. These four young kākā are 65 days old and close to fledging. PHOTO: TERRY GREENE, DOC

RESPECTING WORLD HERITAGE VALUES

Buying out the grazing rights to the 'finger-valleys' of Mount Aspiring National Park

As early as 1936, the Otago section of the New Zealand Alpine Club formulated the first proposals for a national park centred on the mountains around the glaciated Dart, Rees, Matukituki and Makarora valleys at the head of Lakes Wakatipu and Wanaka and the beautiful peak of Mount Aspiring/Tititea (3033 m). During the following 25 years, the park concept gained wide support in Otago but there was a lot of opposition from people who considered their livelihood would be affected. So, when government eventually designated Mount Aspiring as New Zealand's tenth national park in 1964, its area of just under 200,000 ha comprised only the spine of the Southern Alps/Ka Tiritiri o te Moana and a number of so-called 'finger valleys' extending into the alpine interior. Virtually all land with potential for commercial activities such as forestry or mining was excluded and traditional grazing of the native grasslands of the finger valleys within the park was allowed to continue under renewable grazing licences (generally for five-year terms).

Public attitudes gradually changed to give precedence to nature conservation in our national parks, particularly with the passing of the National Parks Act 1980. Under the new act, the management plan for Mount Aspiring National Park placed more emphasis upon scientific values and spelt out the requirement of keeping national parks "as far as possible in their natural state". Grazing, particularly by cattle, was clearly not consistent with the primary purpose of the act and needed to be phased out. The passing of the Conservation Act 1987, and the setting up of the Department of Conservation (DOC) as the new management agency for national parks, further emphasised the incongruity of continued grazing. Additional opposition to grazing, particularly from a wide range of conservation, recreation and tourism groups, was generated when Mount Aspiring National Park became part of a globally important protected area – Te Wāhipounamu - South West New Zealand World Heritage Area in 1990.

During the 1993 public hearings on the draft Mount Aspiring National Park Management Plan, the possibility of using the NHF (then the Forest Heritage Fund) to buy out these grazing rights was canvassed by John Aspinall (then chair of the High Country branch of Federated Farmers, as well as the lessee of Mt Aspiring Station) and Dr Gerry McSweeney of the NHF. Back country visitors had always been welcome to pass through Mt Aspiring Station into the mountainous hinterland via the Matukituki finger valleys. John's parents, Jerry and Phyllis Aspinall, were legendary for their hospitality and in 1957 voluntarily surrendered 20,235 ha from their pastoral lease to help form Mount Aspiring National Park. Jerry Aspinall had served on both the Mount Aspiring National Park Board and the Otago Conservation Board. John and wife Sue continued the Aspinall family's deep concern for the well-being of the park and their

Wilkin and Siberia Valleys, Mount Aspiring National Park

'open door' public access policy, in return expecting only visitor respect for their farming operation. [Subsequently, John and Sue Aspinall successfully concluded a tenure review of Mt Aspiring Station in July 2011, whereby 7345 ha of beech forest and river flats became conservation land around the Matukituki periphery of the park].

However, in 1993 the main concern was the detrimental impacts of cattle grazing in two major valley systems in the park – the Wilkin (including its Siberia tributary) above Lake Wanaka and the Dart above Lake Wakatipu.

The Wilkin and Siberia tributary valleys of the Makarora River

Mt Albert Station held a renewable five-year licence to graze cattle on 300 ha around the Jumboland Flats of the Wilkin Valley and 350 ha of the flats higher up in the hanging valley of Siberia Stream. The cattle would move into the upper

1. Mt Awful (2192 m) above Siberia Flats, in the hanging valley of Siberia Stream, a major tributary of the Wilkin River. Cattle were removed from these flats in the mid-1990s. PHOTO: LES MOLLOY

2. The spectacular leaves and flowers of the Mt Cook buttercup, *Ranunculus lyallii*, in the Young valley after the removal of cattle. PHOTO: LES MOLLOY

3. Aerial view of Cattle Flats in the upper Dart valley, Mount Aspiring National Park. Mount Aspiring/Tititea (3033 m) can be seen in the distance, left. PHOTO: LLOYD HOMER, GNS SCIENCE

Wilkin prior to calving in September and up to 250 dry stock (later reduced to 150) were then allowed to move up into the Siberia Flats from November until the end of April – the height of the summer visitor season (see map highlighting these flats). Tourist interest in the Makarora sector of the park increased markedly during the 1970s, with jet boat trips up the Wilkin River and plane flights into Siberia Flats becoming popular; consequently, complaints about the damage caused by cattle to the Siberia and Jumboland tracks and forest margins increased sharply. DOC was concerned at the lack of regeneration "... on the margins of the forest or for a considerable distance into it". This contrasted with the excellent forest regeneration occurring in the Young valley (another tributary of the Makarora River) where, in a goodwill gesture by Mt Albert Station, cattle grazing had been stopped in the early 1980s.

Severe flooding in the Makarora catchment in the early 1990s caused significant losses to Mt Albert's cattle in the lower Wilkin, covered much of the flats in logs and silt, and destroyed around half of the track to Jumboland Flats. The time was ripe for a 'win-win' for all parties through involvement by the NHF and, in 1994, the fund facilitated a DOC proposal to compensate the lessee of Mt Albert Station for loss of grazing within the park by the purchase of 266 ha of suitable grazing land in the Makarora valley just outside the park.

The Dart valley

Cattle had been grazed on the flats of the Dart River/Te Awa Whakatipu at the head of Lake Wakatipu since around 1900 and the issue of renewal or cessation of the short-term grazing licences confronted DOC in 2000. The Veint family, as lessees of Arcadia Station, were permitted to graze three areas within the park: Cattle Flat and Dredge Flat (a total of 292 ha, with cattle) and Chinamans Flat (68 ha, with sheep). An additional area earmarked for addition to the park, Dans Paddock (83 ha), also had a concession allowing grazing by sheep (see map for location of named flats). Cattle Flat is surrounded by beech forest and ringed by a striking vista of glaciated peaks.

Flats of the Dart valley, Mount Aspiring National Park

It is a 5 km-long scenic highlight of the Rees-Dart circuit, a five-day tramping trip which by 2000 was rapidly increasing in popularity. Fencing of the flats to keep the cattle out of the forest was totally impractical and public complaints about their damage to the track and waterway margins steadily increased.

DOC called upon a Landcare Research scientist, Dr Susan Walker, for advice on the ecological importance of the native grasses on the river flats of the upper Dart valley – not just Cattle and Dredge flats but also Surveyors, Daleys and Quinns flats which were traversed (and briefly grazed) by cattle en route to and from the flats under concession. Walker's report highlighted the cattle-induced gradient from the green of induced exotic grasses at the downstream end of Cattle Flat to a more intact blue-gold sward of native *Festuca matthewsii* tussock at the top end. She considered Quinns Flat to have the best example of a *Festuca matthewsiii/Poa colensoi* grassland she had seen and Daleys Flat the "best example of dense *Poa colensoi* grasslands I have encountered in the eastern South Island". In highlighting how these native grasses had been eliminated from most other mountain valleys in northwest Otago, Walker stated "I know of no other examples of *Festuca matthewsii* and *Poa colensoi* alluvial grassland types south of the Ahuriri valley in south-eastern New Zealand. These grasslands are therefore of extremely high significance for conservation." Walker also commented on the forest damage by cattle:

> ... I was also struck by the damage that has been done by cattle to mountain beech forest along the track. There is a marked, dismaying contrast between the apparently healthy forest with a species-rich understorey immediately north of Cattle Flat and the species-poor, debris-strewn forest encountered immediately to the south of Cattle Flat – a travesty in a National Park and on such a highly significant walking track.

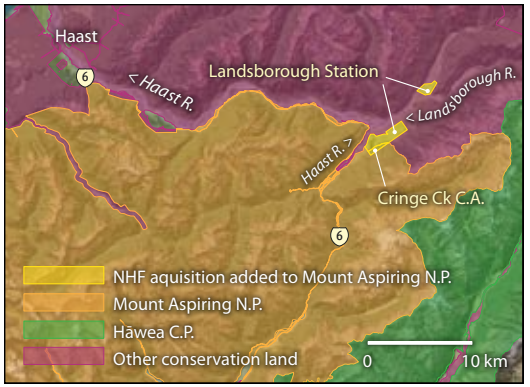
Because of the public interest, DOC called for submissions on the issue; all submitters opposed any further grazing in the national park but called on the Crown to offer fair compensation to Arcadia Station. Like the Wilkin/Siberia dilemma eight years earlier, DOC put a case to NHF which then, on behalf of the government, negotiated an acceptable financial settlement with Arcadia Station. By June 2002, Minister of Conservation Sandra Lee was able to announce:

> Times have changed and grazing in national parks is less acceptable to the public than it was when the park was established in 1964 ... The Government is pleased that settlement was reached to the satisfaction of both the Cattle Flat concessionaires and the Crown.

Landsborough flats above the Haast River junction

Traditionally, cattle had been allowed to graze the finger valleys on the western side of Mount Aspiring National Park – up the Arawhata, Waiatoto, Turnbull and Okuru rivers and on the flats around the junction of the Landsborough and Haast rivers. Whereas the South Westland valleys like the Waiatoto, Turnbull and Okuru are remote and rarely visited, the Haast valley is traversed for its entire length by the South Island's major tourist highway – SH 6. After crossing Haast Pass, the highway descends the wild upper Haast River to break out of the forest onto Pleasant Flat, an outstanding viewpoint for appreciating glaciated Mt Hooker (2652 m) and Mt Ward (2644 m) high above the flats of the lower Landsborough River valley. Furthermore, the Landsborough is famed for its wild recreation opportunities: the middle reaches are used for adventure rafting operations; the alpine realms of the upper valley lie within the Hooker-Landsborough Wilderness Area; and the catchment is popular for tahr hunting.

In 1991, the NHF was able to purchase 68 ha of rare terrace mātai/kahikatea forest adjacent to the park boundary on the eastern side of the Landsborough/Haast river junction (shown as Cringe Creek CA (conservation area) on the map). This highly visible park margin had been in real danger of being logged, so the need to protect the high-quality natural landscape around the Landsborough/Haast junction became a high priority for DOC and the tourist industry. Late in 2004, the owners of the two freehold blocks in Landsborough Station (see map) approached DOC with a view to retiring their whole cattle farming operation if they could negotiate the sale of this strategically important land. The NHF entered negotiations



Landsborough additions to Mount Aspiring National Park

1. Looking ENE across the junction of the Landsborough (L) and Haast (R) rivers, to the flats purchased from Landsborough Station and the forests of Cringe Creek Conservation Area. The prominent peak up the Landsborough valley is Mt Ward (2645 m) on the main divide of the Southern Alps /Ka Tiritiri o te Moana. PHOTO: GILBERT VAN REENEN

2. A tramper resting on Cattle Flats above the Dart River/Te Awa Whakatipu after the removal of cattle. The flats are a landscape feature of the Rees-Dart Track. PHOTO: LES MOLLOY

3. The flowers of the white snow marguerite, *Dolichoglottis scorzoneroides*, Dart valley. PHOTO: LES MOLLOY

4. The Landsborough forest margins between the Haast and Clarke rivers are the richest mohua/yellowhead, *Mohoua ochrocephala*, habitat in South Westland. PHOTO: DOC

and in April 2005 Minister of Conservation Chris Carter announced both the purchase of the 519 ha of freehold land and control of the grazing rights to another 1370 ha. The Minister stated his intention to add the area to Mount Aspiring National Park, but the wheels of government sometimes move with agonising slowness. It was another decade (May 2015) before the Landsborough Station freehold (and adjacent Cringe Creek Conservation Area) were added to the park.

Taken at face value, these purchases have allowed DOC to phase out (or tightly control) grazing on flats along the Landsborough River to its junction with the Clarke River. However, perhaps of even greater importance is that this part of the park margin and the ecologically-important valley floors are now under DOC management and thereby accessible to aerial pest control through helicopter-based 1080 operations. This pest control has proved vital to enhancing the population of the nationally-threatened mohua/yellowhead in the Landsborough forest margins between the Haast and Clarke rivers. This is the richest mohua habitat in South Westland and has been an important source population for translocations of these endangered birds to pest-free sanctuary islands (such as Resolution, Anchor and Coal) in Fiordland National Park. ■

WHERE NORTH MEETS SOUTH

Northwest Nelson, Whanganui Inlet and Kahurangi National Park

1. White heron feeding in Westhaven (Whanganui Inlet) Wildlife Management Reserve, looking SSW towards Kahurangi National Park and the forested hills of the Gavin purchase.
PHOTO: LES MOLLOY

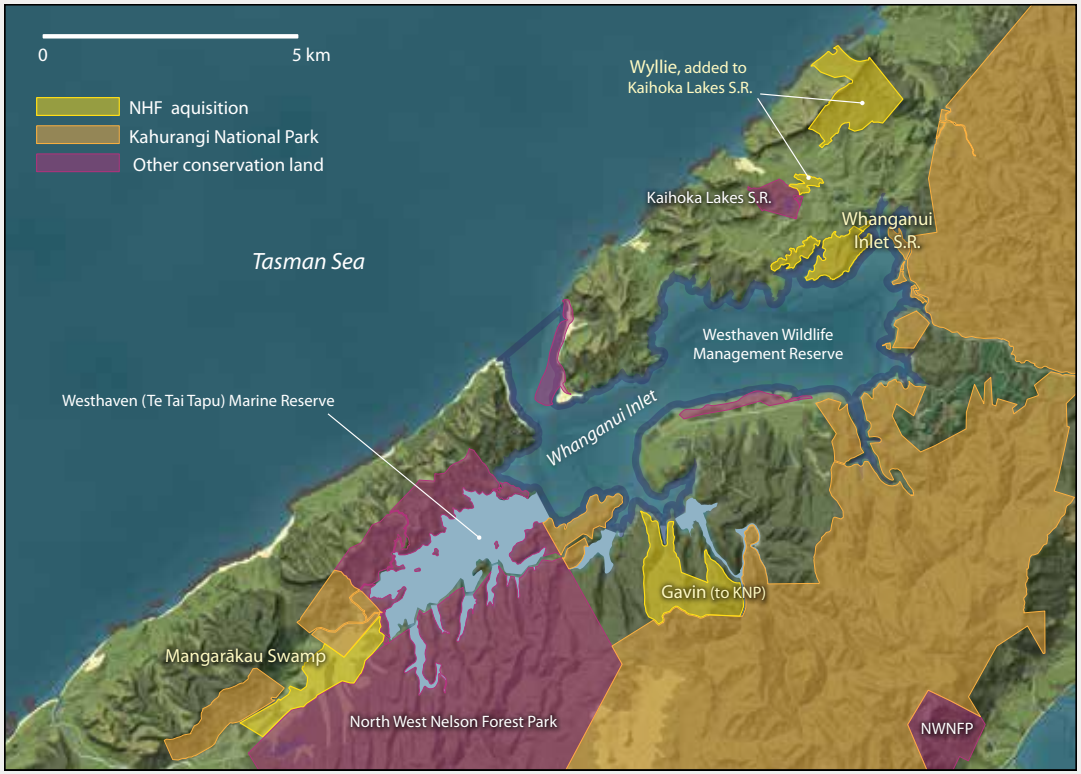
THE NORTHWESTERN tip of the South Island where it narrows towards Farewell Spit is one of the most interesting corners of New Zealand. Here on the otherwise exposed west coast is the isolated haven of Whanganui Inlet, an enclosed, drowned river valley separated from Golden Bay by the densely-forested Burnett Range. It is a highly scenic landscape of great geological and biological diversity, a wonderful panorama of cliffs and sand dunes, lush coastal forest, swamps and tidal channels. The inlet is one of the largest and least-modified estuaries in New Zealand. It was the first to be protected (in 1994) by a combination of marine and wildlife reserves. The southern quarter of the inlet (536 ha) is protected as Westhaven (Te Tai Tapu) Marine Reserve and the remaining three-quarters (2112 ha) as Westhaven (Whanganui Inlet) Wildlife Management Reserve (see map).

Whanganui Inlet is inhabited by about 30 species of marine fish during some stage of their life cycle and is an important breeding and nursery area for snapper, flatfish, and kahawai. Consequently, protection of this estuarine ecosystem is a conservation priority. Of particular concern is the avoidance of sediment input from inappropriate land uses, as this could foul the seagrass beds, salt marshes, tidal wetlands and underwater reefs within the inlet. Although previous exploitation of the area had included logging of the surrounding forest and some clearance for farming, milling of the swamp flax and coal and gold mining, by the 1990s most of the landscape along the eastern side of the inlet was regenerating native forest.

Protecting biodiversity in the forest margins of Whanganui Inlet

Consultation with local landowners over the establishment of the inlet's marine protected areas resulted in the Department of Conservation (DOC) having closer contact with the owners of the Wyllie family farm around the northwestern margin of the inlet. The Wyllie farm also shared a boundary with the Kaihoka Lakes Scenic Reserve, popular for its short walk through an impressive forest of nīkau palms. In 1995, the farm owners approached DOC with a proposal to sell to the Crown 63 ha of a forested peninsula and the covenanting of another 25 ha of the adjacent forested margins of the inlet. The resultant application to the Nature Heritage Fund (NHF) pointed out that this was the largest remaining block of forest left on the northern arm of the inlet and that it had an unusual mixture of plants.

The NHF quickly recognised that the peninsula's forests were representative of the flora of



Whanganui Inlet

the West Whanganui Ecological District, were contiguous with the recently-protected tidal estuary plant communities and, once fenced, were capable of long-term sustainability. The diversity of the forest was reflected in the high number of plant species (124) and the unusual occurrence of three typically North Island trees and a fern (northern cedar/kawaka, *Libocedrus plumosa*; tānekaha, *Phyllocladus trichomanoides*; northern rātā, *Metrosideros robusta*; and the miniature treefern *Blechnum fraseri*). The occurrence of silver pine, *Manoao colensoi*, on such a relatively dry site so close to the coast is also unusual. The peninsula was purchased by the NHF in 1996 and is now known as the Whanganui Inlet Scenic Reserve (see map). In addition to protecting the unusual plant biodiversity, the acquisitions (both the purchased peninsula and the three covenanted areas) also protected the largest population of the extremely localised land snail *Powelliphanta gilliesi subfusca* as well as habitat of the Nelson green gecko, *Naultinus stellatus*.

In 1996, Kahurangi National Park became New Zealand's thirteenth national park and the second largest (at 452,889 ha). Centred on the Tasman Mountains in the northwest corner of Nelson, it is one of the country's most important wilderness landscapes. At its northernmost point in the Burnett Range it adjoins Whanganui Inlet, generating interest in eventually widening a corridor of protected land from the park to the inlet's marine protected areas.

Further south, adjacent to the marine reserve and the Wairoa River (the main river flowing into the estuary from the east), an opportunity arose in 2004 to make this park-to-marine reserve link. In 1987, Murray Gavin had purchased a 204 ha block of podocarp-hardwood-beech coastal forest here. This forest covers an important altitudinal sequence, stretching from the ridge crest at Knuckle Hill (506 m) down to sea level. Having achieved his immediate goal of protecting this forest from further clearance for timber or for lifestyle blocks, Murray then spent the next 18 years carrying out pest control to reduce the numbers of possums, rats and stoats. Although the site had been partially logged for rimu, it still contained many large northern rātā, pukatea, nīkau and hard beech with numerous podocarps such as miro, kahikatea, mountain tōtara and rimu. It also possessed other typical North Island forest trees, such as kawaka and tānekaha, near their southern geographic limit. Some larger trees, including pukatea and rātā, are hundreds of years old and support an abundance of 'hanging gardens' of perching lilies, orchids, climbing and hanging ferns and club mosses. These, together with the profusion of nīkau and rātā, supplejack and kiekie vines, give the forest a lush, subtropical feel.

The Gavin block (see map) was purchased by NHF in 2005 with the intention of managing it as a scenic reserve until it could be added to the national park. It can be accessed off the road from Pakawau as it skirts the inlet to Mangarakau; it can also be reached by canoe up the tidal Wairoa River, revealing a vista of estuary and verdant

1. Looking from Knuckle Hill across the podocarp forest of the Gavin purchase, with the Te Tai Tapu Marine Reserve portion of Whanganui Inlet below. PHOTO: LES MOLLOY

2. Pukatea, *Laurelia novae-zelandiae*, is a component of the wetter portions of the coastal forest at both Whanganui Inlet and Big River. Pukatea's plank buttresses and extensive root system allow it to cope with wet soils. PHOTO: CRAIG POTTON

3. Interior of the kawaka/tānekaha forest on sand dunes in the nearest Wyllie addition to Kaihoka Lakes Scenic Reserve.
PHOTO: LES MOLLOY

4. The Te Tai Tapu daphne, *Pimelea ignota*, is considered to be one of the rarest plants in New Zealand. It is found on the low-fertility soils in the heathland extension of Kaihoka Lakes Scenic Reserve around Mt Lunar.
PHOTO: SIMON WALLS, DOC

5. Looking across the Kaihoka Lakes and the kawaka/tānekaha forest addition towards the cliffs running around to Mt Lunar.
PHOTO: LES MOLLOY

6. The coastal forest around Lagoon Creek in the Big River purchase has a distinctly tropical look, with nīkau palms, climbing kiekie and profuse epiphytes.
PHOTO: CRAIG POTTON

7. The endemic giant land snail, *Powelliphanta gilliesi kahurangica*, seems to be restricted to about 400 ha of the limestone belt around Kahurangi Point.
PHOTO: ROD MORRIS

coastal forest which is of exceptional quality. It took another decade before the Gavin property was added to Kahurangi National Park and the New Zealand Conservation Authority officially recorded its appreciation for this private conservation endeavour at an event held in August 2015:

> … Murray generously sold the forest to the Nature Heritage Fund in the hope that it could soon be permanently protected as an addition to the Kahurangi National Park. Since then, Murray has continued to control pests in this forest. He remains one of the leaders carrying out pest control and forest restoration efforts in the Mangarakau Swamp Queen Elizabeth II covenant restoration project in far western Nelson.

Mangarakau Swamp, at the southern end of Whanganui Inlet, had already been bought and covenanted in 2001 by the New Zealand Native Forests Restoration Trust assisted by a major contribution from the NHF. The Mangarakau story is told elsewhere (on pp. 55 – 56).

The most recent involvement of the NHF in conserving biodiversity around Whanganui Inlet again involved the Wyllie family. In July 2011, Minister of Conservation Kate Wilkinson announced the purchase by the fund of two more important sites in the vicinity of the inlet. A 12 ha forest remnant adjacent to the Kaihoka Lakes protects more of the unusual kawaka/tānekaha forest, this time on old sand dunes. The larger block (177 ha) extends across the prominent escarpment running along to Mt Lunar (239 m) and down to the Tasman Sea. It contains a diverse array of regionally-rare plant communities, such as salt turfs on coastal cliffs and plants able to survive on low-fertility soils derived from conglomerate rocks.

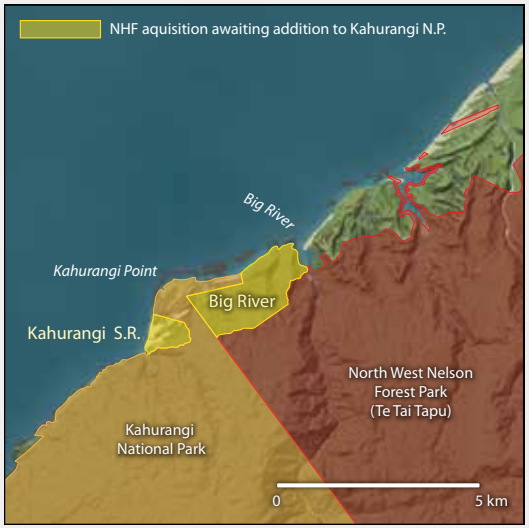
The very infertile soil parent materials have induced a short mānuka-dominated heathland with affinities to the 'gumlands' of Northland. The occurrence of some of the same plant species in both places is another manifestation of the 'north-south' link unique to this corner of the South Island. A shrub species, *Pimelea ignota*, found here is considered to be one of the rarest plants in New Zealand and two other Nationally Critical species (*Pterostylis puberula* and *Brachyglottis cockaynei*) are also present, the latter endemic to the northwest tip of the South Island. The site contains another Nationally Endangered native orchid (*Pterostylis tasmanica*) along with two more uncommon orchids (*Caladenia bartlettii* and *Thelymitra formosa*) which are very rare in Nelson. These two blocks meet all four of government's priorities for protecting rare and threatened biodiversity on private land. They are now protected as scenic reserves and shown on the map as extensions to Kaihoka Lakes Scenic Reserve.

Extending Kahurangi National Park to the Tasman Sea near Kahurangi Point

Further along the Te Tai Tapu coast southwest from Whanganui Inlet the NHF worked with the Tasman Environmental Trust in 2002 to purchase 68 ha of impressive wind-sculpted sand dunes and coastal forest. This enclave lay between the national park boundary and the sea at Kahurangi Point and was being grazed by cattle. Furthermore, the cattle were driven to and fro along the scenic coast between this isolated site and the road head some 20 km northeast. The Kahurangi Point dunes support the largest area of pīngao (golden sand sedge) in the Tasman district, along with rare native coastal plants like salt turf buttercup, *Ranunculus recens*, and the coastal forget-me-not, *Myosotis pygmaea*. The forest is one of the very limited coastal habitats of the great spotted kiwi/roroa, *Apteryx haastii*, and an important habitat for a rare giant land snail, *Powelliphanta gilliesi kahurangica*. When Minister of Conservation Chris Carter announced the purchase in August 2003, he stated government's intention to add it to Kahurangi National Park. He also welcomed the removal of livestock, which would no longer be able to wander along the coast to Kahurangi Point or into the unfenced national park.

Later in 2003, an opportunity arose for the NHF to purchase the adjacent 333 ha of coastal forest between Big River and Kahurangi Point. Save for a 2-km stretch of cutover coastal forest (part of the residue of NW Nelson Forest Park) just north of the mouth of the Anatori River, nearly all of the forests and shrublands have been destroyed along the 52 km Te Tai Tapu coastline from Cape Farewell to the mouth of Big River (excluding Whanganui Inlet). Like the Anatori forest, much of the Big River block vegetation closest to the coast had been logged and burnt in the past; however, behind the 3-km-wide coastal frontage the forest was untouched.

The upper slopes of the forest are a mix of rimu, northern rātā and hard beech on the ridges and pukatea, nīkau and treeferns in the gullies. In the lower reaches of Lagoon Creek there is dense kahikatea-pukatea swamp forest and, because of the high rainfall, there is a luxuriant understory of hanging astelias, and ramparts of kiekie and supplejack vines. Big River is also notable as the southernmost locality in the South Island for the nationally rare sand kānuka, *Kunzea amathicola*. Like the Whanganui Inlet purchases described above, the area has a number of 'northern element'



Big River and Kahurangi scenic reserves

1. Aerial view across mouth of Big River and the coastal forest in the Big River purchase. PHOTO: CRAIG POTTON

2. & 3. The rare native coastal plant, salt turf buttercup, *Ranunculus recens*. The photos show both the thick, semi-succulent leaf rosettes (top) and flower and fruits (bottom). PHOTOS: SIMON WALLS, DOC TOP; SHANNEL COURTNEY, DOC BOTTOM

plant species such as kauri grass, *Astelia trinervia*, toropapa, *Alseuosmia macrophylla* and a small chainfern *Tmesipteris lanceolata*.

Along with Kahurangi Point, Big River contains one of the last lowland populations of great spotted kiwi/roroa, in the upper South Island. This isolated population has been monitored since 1988 and has been found to be genetically distinct from the population in the upland Gouland Downs and Saxon Downs within Kahurangi National Park. The endemic giant land snail, *Powelliphanta gilliesi kahurangica*, is present in the Big River site too; it seems to be restricted to about 400 ha of the limestone belt around Kahurangi Point. This land snail population was declining in the past because of possum and pig predation and trampling from cattle. However, after aerial 1080 operations the snail density increased markedly but it is still classified as Nationally Endangered. The periodic 1080 treatments of the coast and hinterland are considered by DOC to be crucial for the survival of both the kiwi and the endemic snails, because they greatly reduce stoat and rat numbers along with the possums. Consequently, DOC was very concerned for the future of the Big River forest, for any permanent development on the private land (e.g. a resort) could prejudice this important conservation effort and lead to severe restrictions on the pest control programme.

Despite the high biodiversity value of the Big River coastal property, the NHF considered the price being asked by the owners was far too high. The fund monitored the situation as the property was widely marketed both within New Zealand and overseas over the following 8 years. By 2011, the global financial crisis of 2007/08 had led to a downturn in the coastal property market in much of New Zealand and the market price of the property had dropped sufficiently for the NHF to enter into negotiation. In February 2012 Minister of Conservation Kate Wilkinson announced a successful outcome:

> It is a very significant enclave in an existing protected area and links the sea to a national park that is being considered by the NZ Government for nomination as a World Heritage Site.

Not only have the NHF's purchases of the Kahurangi Point and Big River sites protected rare biodiversity, but they have also made public access easier to Kahurangi Lighthouse and the DOC-managed Lighthouse Keeper's house. The two areas are currently being managed as scenic reserves (see map) with the intention of adding them to Kahurangi National Park in the near future. ■

THE LAST PIECES IN THE COAST-TO-COAST JIG-SAW: THE POPLARS AND ST JAMES

1. Looking up the Hope River (in what was formerly The Poplars pastoral lease) towards the Doubtful Range and the forests of Lake Sumner Forest Park. The Poplars acquisition by the NHF enabled public access into the finger valleys of the park.
PHOTO: GILBERT VAN REENEN

The Poplars – securing access to the 'finger valleys' penetrating Lake Sumner Forest Park

In North Canterbury, State Highway 7 is a popular tourist route which threads its way up the Waiau, Hope, Boyle and Lewis river valleys to cross the main divide at Lewis Pass in a superb landscape of beech forests and mountains. The highway is also the entry point to some of the most popular backcountry tracks and deer hunting areas in Canterbury; particularly the Hope/Kiwi and Doubtful valleys, which provide access into Lake Sumner Forest Park, and Boyle Base at the southern end of the St James Walkway. The Te Araroa Trail also passes down the Boyle and up the Hope Valley and over Kiwi Saddle. Public access from the highway into these valleys, however, involved crossing land within The Poplars pastoral lease (6236 ha).

Trespass conflicts were rarely an issue with respect to public access across The Poplars, but the impact of cattle grazing on forest margins and waterways along the 'finger valleys' that penetrated deep into the forest park, and burning of matagouri on the river flats, generated regular complaints from backcountry users. Furthermore, most of the landscape within The Poplars Station that was visible from the highway had been identified within the Hurunui District Plan as 'an outstanding landscape area'. Essentially, sections of the public considered the area not only important for park access but also an iconic natural landscape of considerable interest to travellers. Intensification of dairy farming in the Waiau Plains has also resulted in increasing demand for dry stock grazing during winter months and this could only intensify grazing pressure on the finger valley forests of the upper Waiau catchment.

Following failure of a tenure review, a public auction of The Poplars lease in January 2003 was also unsuccessful. Subsequently, Lesley Shand of the North Canterbury branch of Forest & Bird led an urgent proposal to try and achieve another 'win-win' outcome for both The Poplars Station and for the public. The branch quickly lodged an application to the Nature Heritage Fund (NHF), allowing Keith and Anna Sutton of Wellington to purchase The Poplars in partnership with the NHF in February 2003. Under this joint venture NHF purchased two thirds of the property (c. 4000 ha) while the Suttons purchased the balance, including all the farm buildings and developed pastures. Their goal was to more intensively farm the remaining third outside the finger valleys.

The Poplars proposal had similarities with the NHF's earlier role in buying-out grazing rights to valley flats within Mount Aspiring National Park (see pp. 34–37), but in The Poplars' case the public

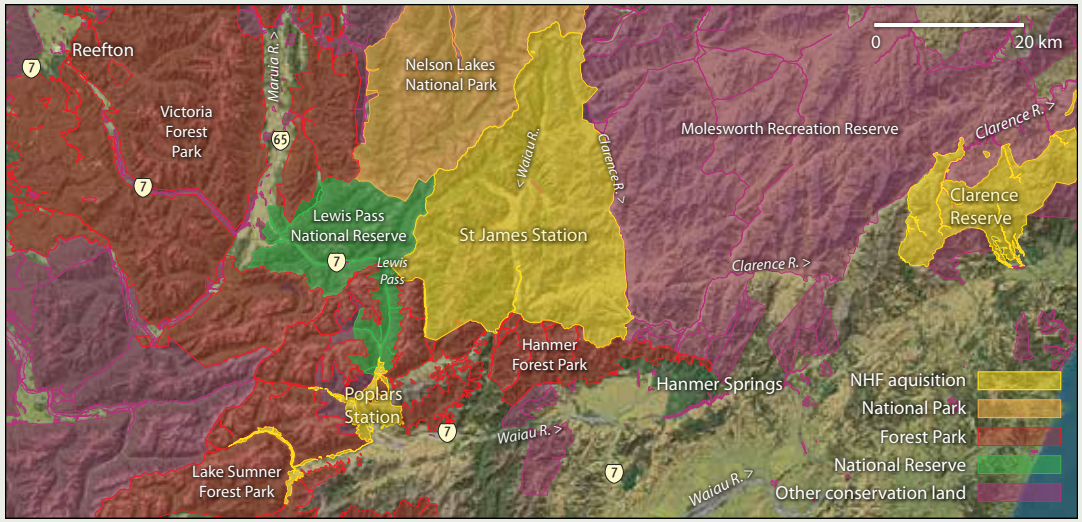
now gained **legal** access to the Hope, Kiwi, and Doubtful valleys, all important routes for trampers, hunters and fishers wanting to enjoy the hinterland of Lake Sumner Forest Park. Furthermore, the addition of these valleys to both the park and the Lewis Pass National Reserve was another gain for biodiversity conservation. The removal of cattle has allowed prolific regeneration of the mixed beech forest and shrubland margins and enhanced the habitats of numerous native bird species, including kākāriki/yellow-crowned parakeet, kākā, kererū, robin/kakaruwai and the threatened mohua/yellowhead and roroa/great spotted kiwi.

In announcing the NHF purchase in Conservation Week 2003, Minister of Conservation Chris Carter paid tribute to the cooperation between the owners of The Poplars station and the NHF:

> … the landowner is able to farm his remaining land more intensively than he could because DOC has agreed to erect fencing and signage to direct the public … away from farmlands and into the newly-purchased open spaces. This arrangement is a classic example of how DOC can work with landowners in the high country of the South Island to their mutual benefit.

St James – the last piece in the east–west protected areas jigsaw

Immediately to the northeast of The Poplars and adjacent to the eastern boundary of Lake Sumner Forest Park lies the former St James Station. With a vast area of 78,399 ha, St James was the largest Crown pastoral lease in New Zealand. It encompassed the upper reaches of two major rivers – the Clarence and the Waiau – flowing out to the northeastern coast of the South Island. Over



St James and The Poplars, showing linkages to other protected areas.

29% of the property was still in forest, comprising mostly the slopes of the Opera and St James ranges and the eastern side of the Spenser Mountains (the main divide separating Canterbury from northern Westland). In 2008 it had been continuously farmed for over 90 years by the Stevenson family; although by then only 13% of the area was being grazed – by cattle and horses – the latter highly prized by equestrians for their quality.

The name 'St James' was probably best known for its association with the St James Walkway, a 4-day tramping circuit from (and back to) the Lewis Pass Highway, with two of those days crossing the Ada, Henry, Anne and Boyle valleys within the station. By 2008, the station was completely encircled by conservation land: in the west lay Lake Sumner Forest Park and Lewis Pass National Reserve, the latter designated in 1981 to protect the outstanding natural landscape along the Lewis Pass Highway (the 'national reserve' status conferring almost the same high level of legal protection as a national park). On its eastern boundary along the upper Clarence River, the station adjoined Molesworth Recreation Reserve, passed to DOC management by government in 2005. To many, St James was now the missing link in the only potential South Island 'west coast to east coast' continuum of public land protected for conservation purposes. To the west lay Victoria Forest Park, Paparoa Wilderness Area and Paparoa National Park; to the north, Nelson Lakes National Park; and beyond Molesworth in the east, the linkage to the Kaikoura coast was now through Clarence Reserve and the newly-designated Ka Whata Tu o Rakihouia Conservation Park (see map).

Instead of entering into tenure review, the Stevenson family informed the government in 2008 of their intention to sell the pastoral lease. Mindful that this iconic part of New Zealand's natural and cultural heritage could be purchased by foreign interests, the government directed the NHF to enter into negotiation with the lessee,

1. The penwiper plant, *Notothlaspi rosulatum*, can be found on the greywacke screes of the Opera and St James Ranges. The plant's rosette of overlapping fleshy grey leaves allows it to merge in with the surrounding rock fragments until its central stalk of sweet-smelling cream flowers makes it more visible in summer. PHOTO: KERRY CRAGG

2. The flowers of the scree button daisy, *Leptinella dendyi*, can make a colourful display on the mountain slopes above 1000 m around the head of the Waiau and Clarence valleys. PHOTO: LES MOLLOY

3. Grassy river flats and beech forest in the upper Waiau valley, St James Conservation Area. Upstream lies Waiau Pass, one of the more challenging sections of the Te Araroa Walkway. PHOTO: KINGSLEY TIMPSON, DOC

4. With an area of more than 78,000 ha, St James was the largest Crown pastoral lease in New Zealand. At the time of purchase by the NHF, only 13% of the station was being grazed, by cattle and horses, leaving most of its high country landscape (like that in this view from 900 m asl Peters Pass), in a natural state. PHOTO: MURRAY QUARTLY

5. The kea, *Nestor notabilis*, is endemic to the Southern Alps of New Zealand and is the world's only mountain parrot. Unfortunately, persecution and predation have sorely depleted its numbers. With only a few thousand birds remaining, it is now a nationally endangered species. The acquisition of the St James property for conservation greatly increases the extent of protected mountain habitat available for kea. PHOTO: GERRY McSWEENEY

with the objective of securing this area (which is as large as Tongariro National Park) for the Crown.

With some financial assistance from Land Information New Zealand (LINZ), the NHF's negotiations were successful and on 8 October 2008 Prime Minister Helen Clark announced the purchase of 78,196 ha of St James Station for $40 million. The Prime Minister said the purchase protected this precious high country from farming and development and opened up a wide range of recreational opportunities:

> It has eleven different tramping routes, the Amuri ski field (now known as Hanmer Springs Ski Area), and great mountain biking, fishing, kayaking, horse riding, and hunting opportunities.

At the time, a spokesperson for the Stevenson family, Mark Tavendale, said the family was pleased the Government would preserve the property's unique landscape for future generations and increase public access:

> The family was concerned that an owner other than the Crown could have had a very different set of priorities for the land. That could have inhibited public access and resulted in the property being developed more intensively for farming purposes, which the family is not in favour of.

The acquisition was heralded by a wide range of interested bodies such as Forest & Bird, Federated Mountain Clubs of New Zealand, New Zealand Deerstalkers Association, Fish & Game New Zealand, Hurunui District Council and many others, including proponents of the Te Araroa Trail (since purchase now secured the key 25 km link through the upper Waiau to the St James Walkway). But not all parties were happy: Federated Farmers criticised DOC's plans to de-stock St James and the National Party opposition conservation spokesman, Nick Smith, questioned why the Government was willing to pay as much as $40 million given that only a small section of the station was used for farming. He also considered that DOC would have a potentially large ongoing cost for weed eradication in the absence of stock.

Although St James has a high public profile because of its outstanding recreational resources, the NHF also emphasised the diversity of landforms and habitats in what is the largest property acquired through the fund. The landscape is dominated by exceptional natural features which include prominent peaks like Faerie Queen (2236 m) and Mt Una (2300 m); glaciated valleys such as those at the head of the Waiau and Clarence rivers; glacial moraine deposits, especially the terminal moraines and kettlehole tarns around Lake Tennyson; and many other streams, wetlands, and lakes. It also has red, mountain and black beech forests, mānuka/kānuka and matagouri scrublands, numerous alpine habitats, at least five species of tussock, and a vast expanse of valley floor native grasslands. Some 430 indigenous plant species have been identified on the property, and 30 native bird species have been sighted there. Purchasing St James has resulted in the protection of six areas (and part of another) identified as Recommended Areas for Protection in the Molesworth Ecological Region Protected Natural Area Survey (16,168 ha of the property).

The St James purchase was of national biodiversity conservation significance in that it met priorities 1 and 2 of the New Zealand Biodiversity Strategy. It is currently being managed by DOC as the St James Conservation Area, but is high on the priority list for reclassification of its stewardship lands over the next few years. Its diverse landscape has become popular with the public because of the correspondingly wide range of wildland recreation opportunities: walking and tramping, mountaineering, hunting, mountain biking, trout fishing, kayaking, horse-riding, skiing, camping and 4WD vehicle access to some areas east of the Waiau River. ■

1. A winter aerial view of the upper Clarence valley portion of the St James Conservation Area. The broad terminal moraine of the former 'Clarence Glacier' which scooped out the trough now occupied by Lake Tennyson, is studded with kettlehole tarns filling holes left by the melting blocks of ice. The Spenser Mountains – the boundary between St James and Nelson Lakes National Park – are the western skyline in the photo. PHOTO: LES MOLLOY

SAVING VALLEY FLOORS AND WETLANDS IN THE EASTERN SOUTH ISLAND HIGH COUNTRY

Birchwood and Ahuriri Conservation Park

Prior to 2004, eastern South Island high country valley floor grasslands and wetlands were grossly under-represented in conservation land. By then two conservation parks had been established in the high country – Korowai/Torlesse Tussocklands Park (see pp. 17–22) in 2001 and Te Papanui Conservation Park in the block mountains of Otago in 2003. However, neither park contained a complete high country valley system like that in the Ahuriri, the southernmost of the four Mackenzie Basin tributaries of the Waitaki River. The upper Ahuriri valley is a truly spectacular alpine setting; a ring of mountains with glaciated peaks such as Mt Huxley (2505 m) and Mt Barth (2456 m) enclosing a largely unmodified valley floor, with the braided Ahuriri River and its extensive river terraces dotted with wetlands in old river channels, cut-offs and oxbows.

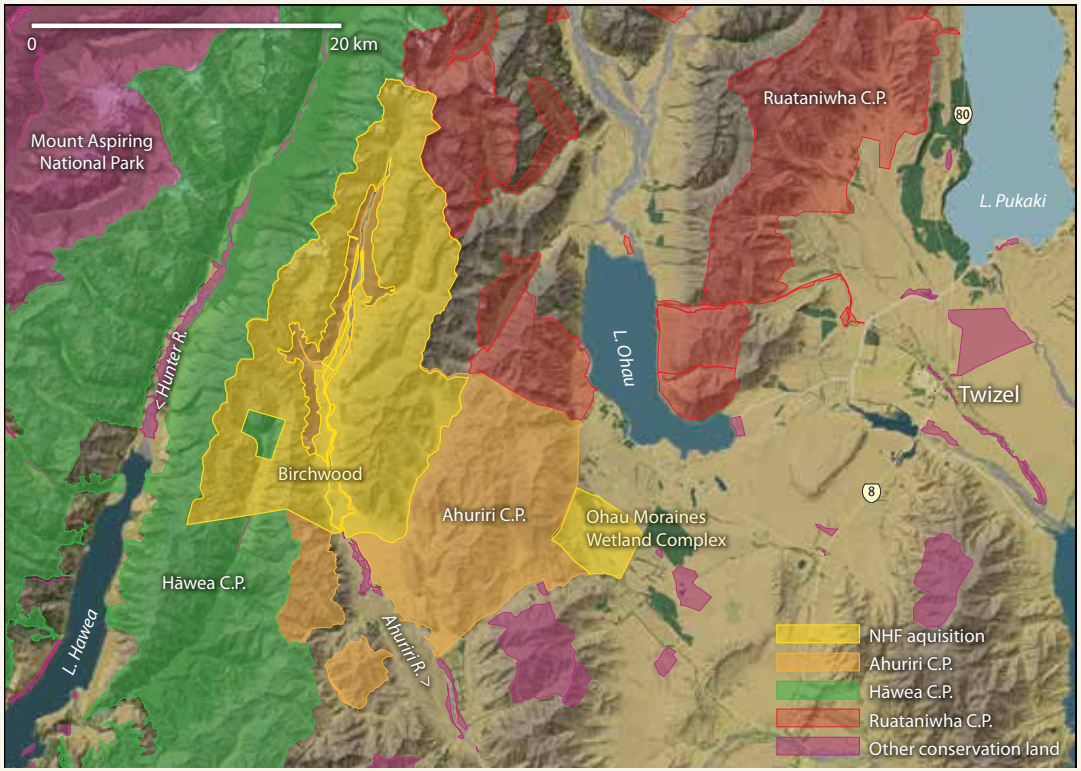
Almost the entire upper Ahuriri valley was included in the 23,783 ha Birchwood pastoral lease held by the Williamson family since 1942. In 2002, DOC were approached by Land Information New Zealand (LINZ) who considered that Birchwood's tenure review provided a unique opportunity for the government to resume full Crown ownership of an entire pastoral lease with outstanding natural landscapes and conservation values – if the Nature Heritage Fund (NHF) was prepared to contribute to a joint purchase of the lease. The Tenure Review process had indicated that over 80% of the property was of high conservation and recreational value and should be transfered to the Department of Conservation (DOC) rather than continue to be farmed. The lessee chose instead to deal directly with the NHF to achieve an outcome suitable to both parties.

Birchwood's lessee controlled not only the pastoral lease but also the only road providing public access to 3757 ha of conservation areas (former state forests) and unalienated Crown land riverbed enclosed within the station. Various Crown agencies had spent over 25 years negotiating with the lessee, mostly in attempts to solve public frustration at the lack of public access rights to the upper Ahuriri valley and the other conservation land beyond. DOC encouraged the NHF to negotiate a purchase, not only to protect the outstanding ecological intactness of the property but also because it would 'once and for all' solve the public access problems.

The NHF's negotiations to purchase were successful and Minister of Conservation Chris Carter's announcement in late August 2004 paid tribute to the Williamson family's efforts in retaining so much of the valley's natural character during their 60 year farming tenure. At the same time he stated, as part of government's policy of establishing a network of high country parks, their intention to create a 49,000 ha Ahuriri Conservation Park around the core Birchwood purchase (see map). This new park was opened in March 2005, with the other 26,000 ha woven together from the enclaves discussed above as well as another four adjacent areas (including retired land from the tenure

1. The upper Ahuriri valley has a largely-unmodified valley floor, with the braided Ahuriri River and its extensive river terraces dotted with wetlands in old river channels, cut-offs and oxbows. PHOTO: DOC

2. Aerial view of the spectacular alpine setting of the upper Ahuriri valley, showing the valley floor and mountain landscape which makes up most of the Birchwood purchase. The prominent snow peak centre left is Mt Barth (2456 m) at the head of Canyon Creek. PHOTO: GILBERT VAN REENEN



Ahuriri Conservation Park (Birchwood and Tarnbrae)

reviews of Ben Avon and Quailburn stations).

The conservation significance of the Birchwood purchase lies in the intactness and extent (the entire valley) of the ecosystem obtained. This includes complete altitudinal vegetation sequences in both the Ahuriri and Dingle Burn (from valley floors at around 760 m asl to enclosing mountain ridges at 2000–2400 m asl). The purchased land also encompasses a marked rainfall gradient along the nearly 30 km length of the Ahuriri valley, with native vegetation composition clearly reflecting the transition between the wetter valley head and much drier lower valley. Mountain beech forest clothes most of the valley sides of the Ahuriri, Canyon Creek and upper Dingle Burn, with silver beech closer to the bushline around 1150 m asl. An attractive feature of the beech forest edges in Canyon Creek and the Dingle Burn is the scarlet mistletoe, *Peraxilla tetrapetala*. The forests and shrublands also contain the historically rare, highly palatable (to deer and possums), and now nationally endangered small tree *Pittosporum patulum*, with its striking deep red, fragrant flowers that appear in springtime.

These forests, and the subalpine scrub, snow tussocklands and herbfields above them, are important habitats for threatened birds like kākāriki/yellow-crowned parakeet, kea, kārearea/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1. The naturally rare and endangered small tree *Pittosporum patulum*, is close to its southern limit in the subalpine scrub and canopy gaps of mountain beech forest above 800 m asl in Ahuriri Conservation Park. PHOTO: SIMON WALLS, DOC

2. The endemic rockwren/pīwauwau, *Xenicus gilviventris*, is the only surviving species in its genus. Field surveys have shown a decline in the number of alpine locations where rock wrens are still present, so the acquisition of Birchwood is important in providing more protected habitat for this engaging, hardy little bird. PHOTO: ROD MORRIS

3. The red tussock/comb sedge bogs on the Tarnbrae moraines are much larger, more contiguous, more species diverse and in much better condition than in any other protected areas in the Mackenzie Basin.
PHOTO: GILBERT VAN REENEN

4. The upper Ahuriri valley is a key habitat for the black stilt/kakī, *Himantopus novaezelandiae*, which is only found in the braided rivers and wetlands of the upper Waitaki River. It has been brought back from the brink of extinction (mainly through predators such as stoats and feral cats) by intensive conservation management over the past 30 years. The wild black stilt population has increased from a low of 23 birds in the early 1980s to an estimated 77 adult birds in summer 2014. Captive breeding and release of juveniles has been critical for building up their numbers. PHOTO: NEW ZEALAND POST

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New Zealand falcon and rock wren/pīwauwau. The upper Ahuriri valley's largely unmodified wetlands and braided river bed are considered of outstanding value for wildlife and important enough to be protected by a Water Conservation Order. They are a key habitat for one of New Zealand's most endangered bird species, as emphasised by Minister of Conservation, Chris Carter, when the purchase was announced:

> Birchwood is one of the jewels of the high country. Its value as a conservation and recreation area is difficult to overstate. The station is a crucial breeding area for black stilt or kakī, of which there are only about 250 left in the world.

The upper Ahuriri is also an important habitat for wrybill/ngutu-pare, banded dotterel/tūturiwhatu and black-fronted tern/tara piroe, as well as providing breeding sites for other wetland and river birds like pied stilt/poaka, marsh crake/koitareke, South Island oystercatcher/tōrea, New Zealand scaup/pāpango, gulls and shags.

Over the decade since Birchwood was purchased there has been a remarkable public response to the recreation opportunities opened up in the upper Ahuriri valley for day walkers, trampers, climbers, fishers, hunters, horse trekkers and mountain bikers. Canyon Creek is a key walking destination, because of its spectacular canyon and gorge route into an alpine hanging valley with grassy flats below the impressive cirque of the Thurneyson Glacier and Mt Barth. The opening of the park extended legal access up-valley for public vehicles by 11 km and up to 2500 vehicles were recorded in the first 6 months of the park's existence.

Tarnbrae – protecting the Ohau Moraines Wetland Complex

Over recent decades, the rapid advance of irrigation and the associated conversion of traditional dryland farming to intensive dairying in the Mackenzie Basin have aroused widespread environmental concern. A number of resident farmers with a deep love of the natural open space landscape of the basin have objected to the intensified land use and its threat to the conservation values of the basin's ecosystems. For many years, Tarnbrae, a 2043 ha freehold property at the foot of Ohau Peak southwest of Lake Ohau (see map), had been managed for conservation by the Lory family who used it only for low-intensity grazing.

The Lory family were very keen to protect the red tussock grasslands and wetlands on the rolling moraines and outwash flats drained by Serpentine and Wairepo Creeks. After discussing their concerns with DOC staff in the Twizel Area Office, they gave the NHF first option to purchase the property for conservation rather than risk selling it to potential developers on the open market. In their application in April 2007, John Dory stated, on behalf of the family:

> Realising the unique and special qualities of the property the Lory family (is) concerned at some of the suggested changes of farming use (to dairy runoff and conversion) by some potential purchasers. Fearing that this would destroy the native habitats that exist on the property we have put forward this application to the Nature Heritage Fund to consider. We have watched and been alarmed at the speed at which neighbouring habitat has been altered by farming practices.

Tarnbrae was purchased by the Fund later that year and included around 700 ha of red tussock and associated wetlands – the most extensive remaining area of wetland still left unprotected in the Waitaki Valley at that time. The NHF was

aware that some of the plant communities in this area are also represented in smaller protected areas in this part of the Mackenzie Basin: Ben Dhu Scientific Reserve, the best area of bog pine in the district, includes a small area of short tussock and red tussock grassland and the Wairepo Kettle-holes Conservation Area protects small areas of red tussockland, fescue tussock and ephemeral tarns. However, the red tussock/comb sedge bogs and fescue tussock on the Tarnbrae moraines were much larger, more contiguous, more species diverse and in much better condition than in any other protected areas in the Mackenzie Basin. Indeed, Tarnbrae contains probably one of the largest wetland areas protected in recent years anywhere in New Zealand. As such, it met criterion 2 of the National Priorities of the New Zealand Biodiversity Strategy.

In recognition of its scientific importance this area has been named the 'Ohau Moraines Wetland Complex' to give it a distinct ecological identity, although it is scheduled to shortly be added to the adjacent Ahuriri Conservation Park (see map). The wetland complex is signposted from the Quailburn Road and it can also be visited from the 'Alps-2-Ocean' cycle trail which passes through it.

1. The Michael Peak purchase covers a large section of the eastern flank of the Saint Bathans Range, from the valley floor at 780 m asl to the highest point on the range at Mt Saint Bathans (2088 m). Looking from the crest of the range, across Hut Creek and the upper Manuherikia valley to the smooth crest of the Hawkdun Range within Oteake Conservation Park. PHOTO: GILBERT VAN REENEN

2. Tall tussock, *Chionochloa rigida*, on the floor of the upper Manuherikia valley, looking towards the flanks of the Hawkdun Range. PHOTO: GERRY McSWEENEY

3. Eminent high country tussockland botanist and conservationist, Sir Alan Mark, with NHF committee member, Dr Gerry McSweeney, at the opening of Oteake Conservation Park in September 2009. PHOTO: GERRY McSWEENEY

Protecting the tussock landscapes of the North Otago dry mountains – Michael Peak and Oteake Conservation Park

The Manuherikia Valley, sheltered from moisture-bearing winds from both the west and south by a maze of uplands and mountain ranges, has the most continental climatic environment in New Zealand. Its headwaters lie between the Hawkdun and Saint Bathans ranges, which are often termed the 'dry' mountains of North Otago. The heights of their summits range from around 1800 m asl in the Hawkdun Range to almost 2100 m asl in the Saint Bathans Range. They make an impressive sight in winter from the Ranfurly–Alexandra highway, where it passes to the north of Blackstone Hill from the Manuherikia valley to the basin in the upper Ida Burn – an uncluttered mountain vista celebrated in many a Grahame Sydney painting or a Gilbert van Reenen photograph.

These ranges have distinctive vegetation, reflecting both their cold, dry climate and their geology, the latter a transition from the greywackes of Canterbury to the schists of Otago. Although they lack the distinctive tors of the schist block mountains of Central Otago, they still have the same broad summits (exhumed relics of the ancient Otago peneplain), yet screes are widespread on their flanks. The screes and rocky fellfields are habitats for species of *Notothlaspi*, *Ranunculus*, *Epilobium*, *Leucogenes*, *Raoulia*, *Leptinella* and other specialist alpine plants, many reaching their southern limits here. Rolling tussocklands of snow tussocks *Chionochloa rigida* (up to 1000 m asl) and *C. macra* (above 1000 m asl)

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are widespread. It is the prevalence of the tall tussocks which sets this natural landscape apart, for nowhere else in the eastern South Island high country are they still the dominant vegetation in the zone below 1000 m asl.

In February 2007, the opportunity arose to protect a large area of this North Otago dry range valley floor tall tussockland when the pastoral lease for Michael Peak was put up for sale by public tender. Close cooperation between the NHF and LINZ resulted in a joint purchase of Michael Peak: two blocks (6900 ha) of pastoral lease in the upper Manuherikia valley and 1088 ha of freehold land down-valley closer to St Bathans village. The Fund saw this as an excellent twofold opportunity: first, to protect the areas of high conservation value on Michael Peak Station and, second, for DOC to trade the down-valley grazing blocks (already modified and dominated by introduced pasture grasses) for other important private conservation areas meeting government's just-released (in June 2007) 'National Priorities for Nature Conservation' – in particular, valley floor landscapes in the upper Manuherikia valley that could also be added to the proposed Oteake Conservation Park.

The protected area arising from the former Michael Peak pastoral lease covers a large section of the eastern flank of the Saint Bathans Range (see map), from the valley floor at 780 m asl to the highest point on the range at Mt Saint Bathans (2088 m), the highest peak in the Central Otago District. It includes spectacular alpine basins dominated by glacial and periglacial landforms, mid-altitude tussock and scree slopes, and incised gullies and gorges with significant patches of shrubland. The higher-altitude areas include large boulder fields dominated by snow totara and a wide range of montane to subalpine shrubs (especially celery pine and coprosma), extensive alpine screes, tall *Chionochloa* tussock grasslands, fellfields, cushion bogs, and riparian and seepage communities. The lower parts of the valley areas have good examples of snow tussock, montane shrublands and red tussock, which are now uncommon in the Manuherikia district because of fires and pastoral development. DOC investigations concluded that the acquisition is:

> … remarkable for the overall good condition of the major vegetation communities present and the high degree of natural character they impart at a landscape scale.

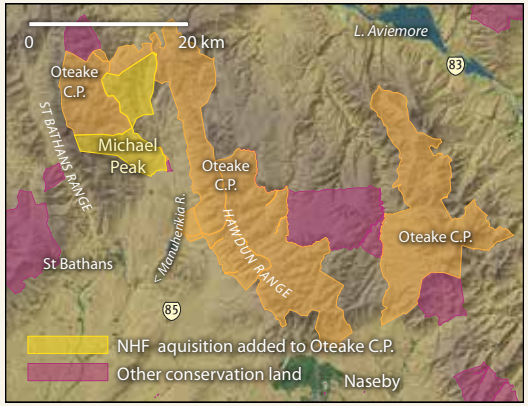
As the property encapsulated a full altitudinal range, and a wide variety of both landforms and aspects, DOC considered it to be 'highly representative of the St Bathans Ecological District'.

Government announced the NHF purchase of Michael Peak station in June 2007, stating its intention to use the 6900 ha as a 'core part' of its proposed Oteake Conservation Park. In the announcement, Minister for Land Information David Parker also pointed to the recreational values of Michael Peak:

> The purchase protects these landscapes and makes them freely available for walking, horse and bike riding. It provides access to Mt Saint Bathans – the highest peak in the district – and to Omarama Saddle, which is a gateway to the Mackenzie Country.

Oteake Conservation Park, covering 65,000 ha of the Saint Bathans, Hawkdun, Ida and Ewe ranges, was designated in 2008. It is worth noting that the NHF had earlier made a major contribution to Otago's other high country tussockland conservation park – Te Papanui (21,000 ha) – with the purchase of 1307 ha of Halwyn Station on the Lammermoor Range in 2001. ■

Michael Peak, Oteake Conservation Park



WETLANDS: PROTECTING THE WEB OF LIFE

Because of its wet climate and varied landforms, New Zealand had a wide variety of wetlands prior to human settlement. These ranged from infertile alpine bogs and tarns to higher-fertility flax swamps, or kahikatea swamp forest in the lowlands. In general, the dominant wetland plants are monocotyledons – grasses (particularly red tussock), reeds, rushes, sedges, flax and cabbage trees. Probably none of our indigenous ecosystems have undergone greater transformation and loss than wetlands. Before human settlement, freshwater wetlands are estimated to have covered about 670,000 ha; by the 21st century this had been reduced to only 89,000 ha – an estimated loss of 87%. Fertile lowland swamps, particularly in Waikato, Bay of Plenty, Manawatu/Horowhenua and Southland, have suffered the greatest losses (to dairying and horticulture); those that are infertile or at high altitudes tend to predominate in our remaining suite of wetlands.

From its inception in 1990, the Nature Heritage Fund (NHF) desired to protect remaining wetlands of high conservation value and its ability to do so was enhanced when government broadened its mandate from 'forests' in 1998. Then, in 2007, government released its policy on 'National Priorities for Nature Conservation', with wetlands listed as one of the four priority ecosystem categories because of their importance for wildlife, water conservation, and the increasing threat to them from agricultural intensification. Over the past 25 years, the NHF has managed to covenant or purchase many types of wetlands, some small, some large, like the Ohau Moraines Wetland Complex (see pp. 49–50). Four of them are discussed here to illustrate this diversity and how they sometimes provide strategically important links to other protected habitats.

Waituna – links in the great wetland complex of Southland's Awarua Plains

Over the years the NHF has supported a number of applications from farmers around Southland's internationally important Awarua Plains/Waituna wetland complex. This large wetland ecosystem comprises a mosaic of wirerush wetlands and mānuka shrubland, with a swampy valley carex-flax-red tussock system having connections to Waituna Lagoon. Two successful NHF applications from members of the Waghorn family have not only increased the protected area but, more importantly, also improved both the reserve design (by providing an ecological linkage) and public access into the wetland complex. In 2002, 318 ha of largely intact peatland lying to the north of the Waituna Lagoon were purchased from Raymond Waghorn (see map). Prior to this there was only a narrow fringe of land protected on the north side of the Waituna Wetlands Scientific Reserve. Therefore this purchase extended the ecological sequences inland and provided more buffering for Waituna Lagoon from the farmed hinterland. It also extended the protected area north to a road and so facilitated access into the peatland area (subsequently enhanced through the construction of a loop walking track within the block). This access was of some significance to

1. The Waituna Wetlands Scientific Reserve contains many native orchids, such as this greenhood species, *Pterostylis montana*. PHOTO: DOC

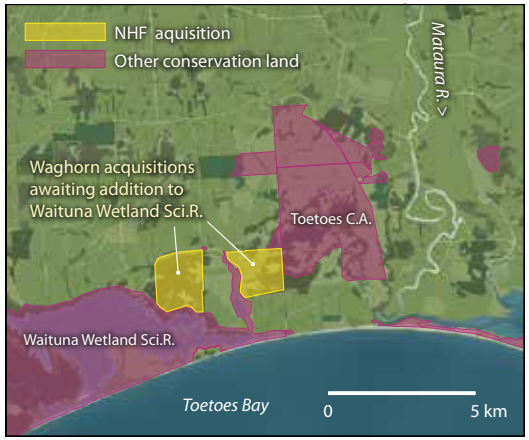
2. The endemic fernbird/mātātā, *Megalurus punctatus*, has been adversely affected by the widespread destruction of its natural wetland habitats following European settlement. It is now rare but has a significant large habitat in Southland's Waituna Wetlands Scientific Reserve. PHOTO: DOC

3. The common tussock butterfly, *Argyrophenga antipodum*, or tussock ringlet is found in carex-flax-red tussock wetlands at sea level, like this male in the Waituna Wetlands. PHOTO: DOC

4. Both Waghorn purchase areas are being managed by DOC as scenic reserves while awaiting addition to the 4000 ha Waituna Wetlands Scientific Reserve, a wetland of international importance. PHOTO: BRIAN RANCE, DOC

5. The Raketapauma wetland near Waiouru probably originated in successive Taupo eruptions. Pyroclastic flows and ash showers from the eruption around 1830 years ago probably filled in the shallow gullies and impeded drainage here at their southern extent. PHOTO: DOC

Waituna wetland, Southland



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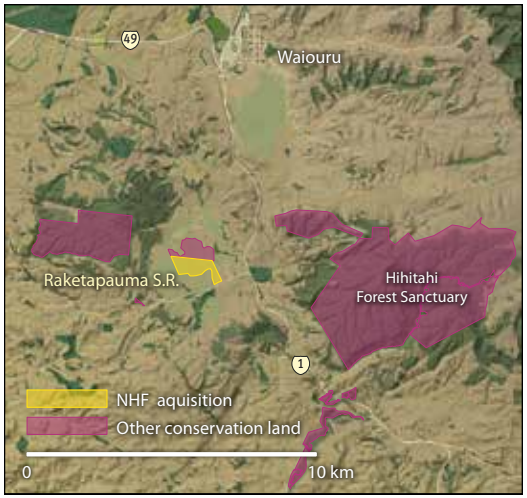
the bird-watching public as there are limited sites with easy access into the Awarua Plains / Waituna protected wetland complex, with much of the protected wetland inaccessible behind farms.

A further 179 ha was purchased from Murray and Beverly Waghorn in 2007, thereby extending a protected area corridor from the Toetoes wetland complex out to a roadside and facilitating public access into the wider Toetoes wetland. Again, this purchase provided an important habitat linkage as it adjoins the Little Waituna Lagoon portion of the Waituna Wetlands Scientific Reserve and therefore links the 2000 ha Toetoes Conservation Area wetland with the rest of the extensive Awarua Plains / Waituna protected wetland complex (see map). Both NHF purchase areas are being managed by the Department of Conservation (DOC) as scenic reserves awaiting addition to the 4000 ha Waituna Wetlands Scientific Reserve. The Waituna wetland is one of the largest and most intact wetland complexes in New Zealand and is a 'Wetland of International Importance' under the Ramsar Convention on Wetlands. In the words of Brian Rance, DOC's 'Technical Advisor – Ecology' who has wide experience in the ecology of Southland's wetlands:

> It was great to support both Raymond Waghorn and his brother Murray with these NHF applications. Both have a long association with the area and have a strong desire to see the values protected. They are strong conservation advocates for the Waituna Lagoon and wider wetland complex. Both areas contain features of special importance and add value to the extensive protected area wetland complex.

Raketapauma wetland, Waiouru

The Raketapauma wetland (about 500 ha in area and located 8 km south of Waiouru) is one of the sources of the Hautapu River, a major tributary of the Rangitikei River. It has an interesting origin. Like other wetlands within the Moawhango and northern Rangitikei Ecological Regions, its origin dates from successive Taupo eruptions. It lies at the southern edge of the pyroclastic flows of the so-called 'Hatepe eruption' of around 1830 years ago which, along with the subsequent ash showers, probably filled in the shallow gullies and impeded drainage. DOC's 1993 Protected Natural Areas (PNA) survey of the upper Rangitikei catchment identified Raketapauma as one of the highest priority wetlands remaining in the region. Subsequently, Horizons Regional Council completed their regional Wetland Inventory and Prioritisation



Raketapauma, Waiouru

Project in 2005 and identified the wetland as the second largest in its Rangitikei/Manawatu/Whanganui region. They also accorded it one of their highest priorities for protection because of the threat of drainage, intensified grazing and further weed invasion (especially from wilding lodgepole pines which were already a scourge of indigenous biodiversity right across the nearby Mt Ruapehu ringplain and Moawhango tussocklands).

Consequently, Horizons worked closely with the landowners of two blocks (totalling 150 ha) that they were willing to sell (see map). They then approached DOC with a proposal for both agencies (Horizons and DOC) to jointly manage this core of the wetland if an application to the NHF was successful. The NHF Committee found that the wetland was in a predominantly natural state and ecologically functional. Although the wetland was surrounded on all sides by grazing stock, its size and degree of wetness meant that the animals were unable to venture very far into it. Rehabilitation of the margins would be achieved through fencing.

The Moawhango Ecological Region PNA survey had also identified three other nationally-significant privately-owned wetlands in the wider area (Reporoa Bog, Makirikiri Tarns and Ngamatea East Swamp). However, these are quite different from the Raketapauma wetland, being at much higher altitude (1100 rather than 800 m asl), on different landforms and with different vegetation compositions. A fourth wetland close to Waiouru – Ngamatea West Swamp – would once have been of national significance and similar to Raketapauma but had already been lost through drainage and conversion to pasture.

The purchase was successfully concluded in 2007 and the transfer registered as Raketapauma Scenic Reserve in 2008. The wetland is home to a number of regionally and nationally rare species, including the nationally-endangered swamp leek orchid, *Prasophyllum hectorii*, and the fernbird/matātā which inhabits the large tracts of red tussock around the wetter margins.

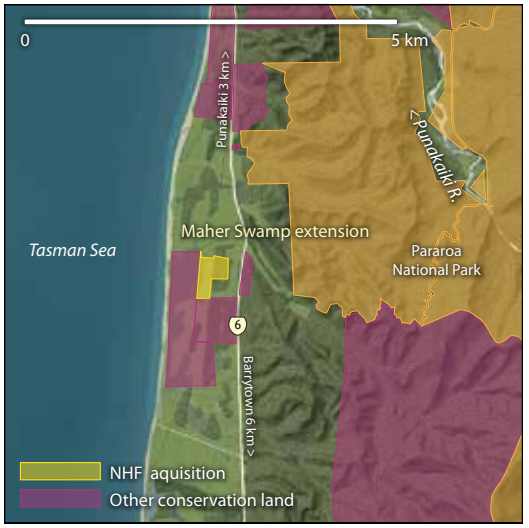
Extending protection of the Maher Swamp on the Barrytown Flats

The Barrytown Flats are south of Punakaiki and adjacent to the southwest boundary of Paparoa National Park on the West Coast. Most of the flats have been cleared for farming, but small areas (like Nikau Scenic Reserve and the Maher Swamp) have been protected. The sands under most of the flats contain the mineral ilmenite which is the most important ore of titanium and is mined to produce titanium dioxide, a white powder widely used as a base pigment in paint, paper and plastics. A bid to mine the area was launched by Fletcher Challenge Limited back in 1988. Westland Ilmenite Ltd built a processing plant but in 1993 the then Minister of Conservation Denis Marshall declined permission to mine Maher Swamp, which was considered to contain 11% of the ilmenite resource on the flats. Rio Tinto took over the operation and dismantled the plant as the venture was considered uneconomic at the time because of a collapse in the price of titanium sands on world markets and over-abundant supplies of lower-priced titanium-bearing sands elsewhere in the world.

In 2006, the Coates family approached DOC with a proposal to sell some of their land which included a portion of the swamp as well as associated forest on dune ridges. The landowners had an offer from a developer to purchase 34 ha of land around their dune wetland adjoining the Maher Swamp. However, they wanted the wetland portion excluded from the sale and (in concert with DOC) applied to the NHF for the Crown to purchase it so it could be protected. From the owners' perspective, the sale (of 15.2 ha) in 2007 gave them an opportunity to buy adjoining land and enhance the economic viability of their existing deer farm.

The Maher Swamp, an area of about 100 ha, is the only large wetland of its type within the Punakaiki Ecological District. It has three main vegetation types: flaxland, patches of raupō/bulrush in the wetter sites, and *Carex sinclairii*-dominated grassland. The NHF purchase extends the swamp by a further 9 ha to the east (inland) and protects another 6 ha of forest on the dune ridges (see map). This dune forest is dominated by northern rātā, with kahikatea, mātai and rimu and a subcanopy which includes kāmahi, māhoe, puka and nīkau.

The Maher Swamp, including the portion within this purchase, has also been identified by the West Coast Regional Council as a significant wetland. On 15 October 2015, two decades after



Maher Swamp, Barrytown

1. The NHF purchase extended the 100 ha Maher Swamp on the Barrytown Flats by a further 9 ha to the east (inland) and protected another 6 ha of forest on the dune ridges. The aerial photograph shows the extent of the swamp looking south towards Barrytown.
PHOTO: ANDRIS APSE

plans were abandoned to mine the Barrytown Flats for ilmenite, the media reported that Pacific Mineral Resources Ltd has applied to undertake exploratory drilling on the flats, including four drill holes in Maher Swamp.

Mangarakau Swamp – protection through partnership

Prior to 2002, Mangarakau Swamp of about 300 ha in extent was the largest freshwater wetland in the Tasman District remaining without full protection. It is ranked as a nationally significant wetland and was identified in DOC's Nelson/Marlborough Conservation Management Strategy as having the highest priority for protection. DOC already administered 60 ha of the northwestern margin of the swamp and the nationally important Te Tai Tapu Marine Reserve in the southwest portion of the adjacent Whanganui Inlet (see map, p. 39). The New Zealand Native Forests Restoration Trust (NZNFRT) had extended its conservation mandate to include wetlands and wished to acquire Mangarakau Swamp for protection – its first conservation venture in the South Island. From 1994 on, the NZNFRT was assisted by DOC in matters like ecological information about the wetland and in 1996 it approached the NHF for financial assistance. Agreement on price was reached with the owners in 2001 and, with the addition of a bequest from the Rosemary Middleton Fund, the NHF enabled the NZNFRT to purchase 147 ha to become 'Mangarakau Swamp Scenic Reserve'. The NZNFRT also intended to protect the wetland in perpetuity by way of a QE II Open Space Covenant.

The Mangarakau Swamp is a pivotal ecological entity in a region known for its dramatic and pristine landscapes; it is another valuable link

1. Mangarakau swamp is an important habitat for the Australasian bittern/matuku, *Botaurus poiciloptilus*, a large, secretive, heron-sized bird. They are most active at dawn, dusk and through the night and are rarely seen because of their excellent camouflage. PHOTO: CRAIG BULLOCK

2. Mangarakau Swamp supports diverse vegetation communities including flax and raupō/bulrush flats, large areas of open water and regenerating kahikatea-pukatea forest on the higher margins. Looking southwest to the limestone escarpment and across the swamp draining to the Paturau River. PHOTO: LES MOLLOY

in the network of protected areas around Whanganui Inlet and other conservation land adjoining the wilderness hinterland of Kahurangi National Park (see 'Where north meets south', pp. 38 – 42). It supports diverse and extensive vegetation communities including flax and raupō/bulrush flats, large areas of open water and regenerating kahikatea-pukatea forest. The surrounding forest and topography ensure that sediment and nutrient run-off does not degrade this near-pristine fish habitat. Aquatic species include the common bully, kōura, long-finned eel/tuna, inanga, banded kōkopu, giant kōkopu and short-jawed kōkopu. It is also the only known habitat for the brown mudfish in the Nelson/Marlborough region. Mangarakau Swamp is also an excellent habitat for rarely seen wetland birds like the Australasian bittern/matuku, fernbird/mātātā and marsh crake/koitareke.

This case is a prime example of the partnerships the NHF has developed with non-government organisations to achieve conservation outcomes. A considerable amount of community funding has been used to develop a field centre beside the wetland and there is strong ongoing support in restoration and pest control work from the 'Friends of Mangarakau Swamp' organisation. This area has increasing public use and a large volunteer programme behind its management.

In front of 150 supporters at the official opening on 8 February 2003, Minister of Conservation Chris Carter stated that the protection of Mangarakau Swamp was a 'fantastic achievement' and:

> It is the Nature Heritage Fund's policy to foster a partnership approach with local and regional councils, conservation organisations and community groups to achieve better conservation outcomes and more effective use of funding resources.

He lamented that New Zealand had only 5% of its freshwater wetlands left but said that government was making strenuous efforts to encourage landowners to protect our remaining wetlands either through covenants or, where appropriate, purchase by the Crown:

> Traditionally they were seen as something to drain but now thanks to environmental science we know better. ■

RARE AND THREATENED DRYLAND ECOSYSTEMS OF INLAND OTAGO

1. Looking upstream across the terraces of the meandering Clutha River/Mata-Au near Luggate. Some of the NHF purchases from Contact Energy Ltd can be seen on both sides of the river. PHOTO: GILBERT VAN REENEN

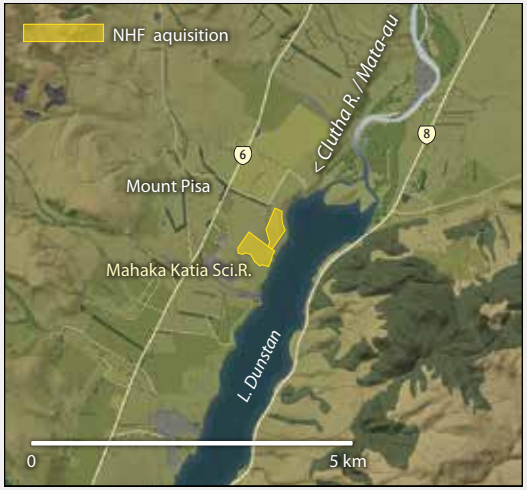
THE CLIMATIC distinctiveness of inland Otago is related to its distance from the sea and its sheltered position in the rain shadow east of the Southern Alps/Kā Tiritiri o te Moana. Major valleys, like those of the middle reaches of the Clutha River/Mata-Au and the Taieri and Waitaki rivers, have the most continental climatic environments in New Zealand. These rivers thread their way through a maze of dry inter-montane basins – Strath Taieri, Maniototo, Manuherikia and upper Clutha – where winters are cold, summers hot and annual precipitation can be as low as 400 mm. This dryness has allowed the formerly substantial areas of indigenous forest and woodlands to be largely reduced to grasslands and shrublands through fire and other impacts; this loss has both natural and human causes, the latter over the past 800 years from Polynesian hunter-gathers and European pastoralists and goldminers. With respect to the biota (and cultural heritage) along the river beds and low river terraces of the Waitaki and Clutha River/Mata-Au rivers, major threats in recent times have been inundation under lakes formed for hydroelectricity generation, road construction, and intensification of dairying, horticulture and viticulture through irrigation.

The remnant woody plant communities that remain are among the most overlooked and least understood of all New Zealand vegetation types. A very small part (estimated by scientists at <2%) of both the area and biodiversity of dry, lowland eastern South Island land environments is presently protected in Department of Conservation (DOC)-managed reserves. This is certainly true for inland Otago. However, government recognised in the New Zealand Biodiversity Strategy (2000), and in the 2007 policy 'National Priorities for Nature Conservation', the critical importance of urgently adding to New Zealand's public conservation lands those habitats and ecosystems that are currently poorly represented. Consequently, the Nature Heritage Fund (NHF) has been very open to approaches to protect any worthy remaining dryland ecosystems of inland Otago. Four examples, from the Waitaki and Clutha River/Mata-Au river valleys, are described here as examples of the range of small dryland remnants which the NHF has been able to protect.

Pisa Flats – 'keeping one's feet dry' above Lake Dunstan

Saline and alkaline soils (commonly known as 'salt pans') formerly covered more than 40,000 ha (or 6% by area) of the semi-arid valley floors and terraces of the Maniototo basin, mid-Manuherikia valley and upper Clutha River/Mata-Au valley. By the early 1990s, less than 100 ha remained. Concerned at the imminent loss of these unique Central Otago ecosystems, DOC urgently commissioned Landcare Research soil scientists and botanists to survey the remaining 24 salt pan sites in Central Otago and rank them for their conservation importance in terms of their area, the extent to which they represented site condition prior to European settlement, diversity and rarity of their biota and soils. A site at Pisa Flats a few metres above the newly-formed Lake Dunstan in the upper Clutha River/Mata-Au valley was ranked the highest. The Pisa Flats site had already been identified in the Protected Natural Areas (PNA) survey of the Pisa Ecological District as one tiny area of private land that encapsulated the best remaining natural history of the valley floor ecosystems of the upper Clutha River/Mata-Au valley. In this area of just 20 ha, over 40 different dryland native plant species (13 of which are uncommon or rare) had survived, probably because this high terrace site was the most saline and least attractive for border-dyke irrigation. The site has also been ranked as a 'Soil Site of International Significance'.

Pisa Flats (Mahaka Katia)



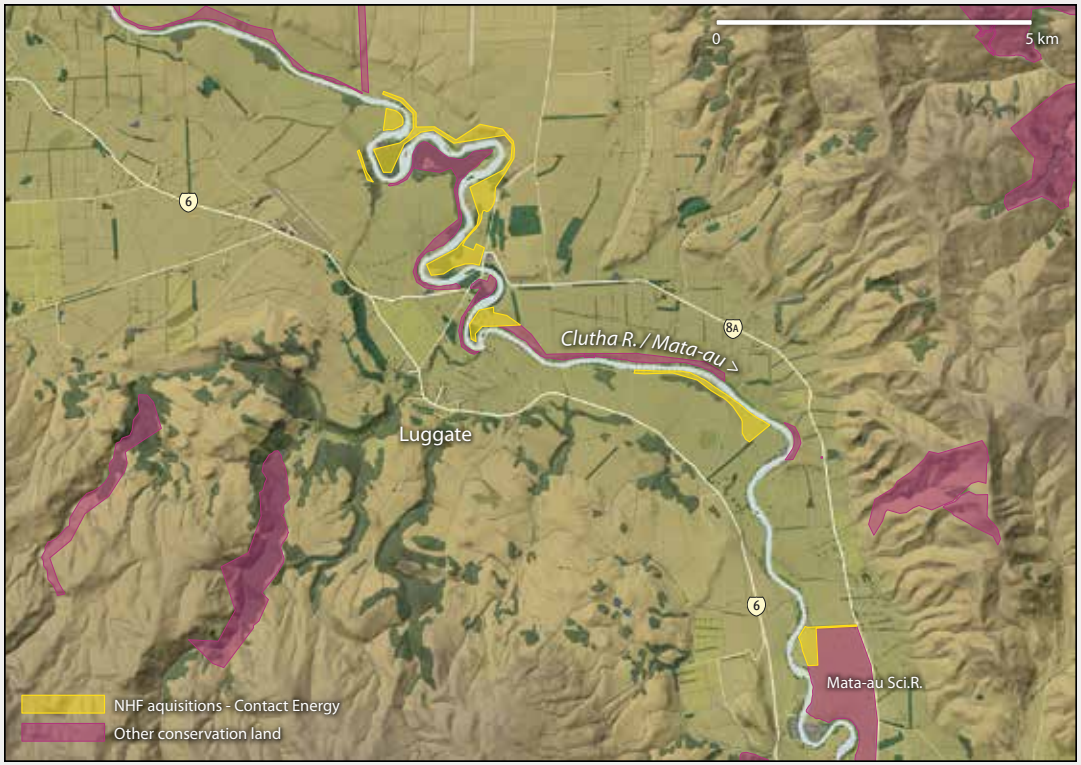
Applications for the sale of two adjacent blocks on Pisa Flats were forwarded to NHF by DOC during 1999 and successful negotiations with the Manson family and Lake Dunstan Farms Ltd as owner parties were subsequently concluded. Two local community organisations also contributed finance in support of the purchases. The outcome (see map) was the 27 ha Mahaka Katia Scientific Reserve, in ecological terms a protected area of the highest national conservation value. The excessively well-drained gravels on the outer margins of the terrace (see photo) are highly drought-prone in summer. These margins would have originally supported only sparse, low-stature woody vegetation, thereby permitting a co-existence with light-demanding herbs and grasses, some of which still survive on this part of the site. Elsewhere along the Clutha River/Mata-Au valley floor, forest or scrub would have predominated in pre-human times. The suite of rare and endemic plants at Pisa Flats indicates an evolutionary history which is quite different from that at other dryland outwash terraces of the eastern South Island.

The conservation importance of the Pisa Flats site cannot be overstated. Botanically, it is considered to have one of the highest concentrations of rare and endemic plants in all of New Zealand. These include *Myosotis uniflora*, *Craspedia* 'Clutha' (unnamed endangered species endemic to Pisa Flats); *Leptinella* 'Clutha' (unnamed critically endangered species, possibly restricted to Pisa Flats); *Galium* sp. (unnamed species only reliably known from this site) and several other vulnerable dryland plants.

In summary, the site is doubly worthy of its scientific reserve status. First, it was part of an uncommon ecosystem in pre-human times and it is extremely rare now; and second, it contains an unparalleled concentration of endemic and rare plants. After survey the site was securely fenced and weeds, rabbits and other pests controlled. Fence security is monitored and threatened plants regularly surveyed.

Staking claim to some of the remaining natural Clutha River/Mata-Au terraces at Luggate

With the privatisation of the Electricity Corporation of New Zealand Ltd in the 1980s, Contact Energy Ltd acquired extensive areas of land beside the upper Clutha River/Mata-Au (hereafter upper Clutha) around Queensberry and Luggate; these river terraces had been taken as possible inundation sites for their planned Upper Clutha Hydro Scheme. In April 2011, Contact announced their intention to begin geotechnical investigations for a hydro dam on the upper Clutha near Luggate, possibly at the 'Devil's Nook' switchback, a popular geological/hydrological feature. Public opposition from Wanaka and upper Clutha communities was immediate. The chairman of the Clutha River Forum, an alliance of environmental groups opposed to any further dams on the river, said the Luggate proposal was "too destructive, too backward thinking, and too problematic". Public



Clutha (Contact Energy), Luggate

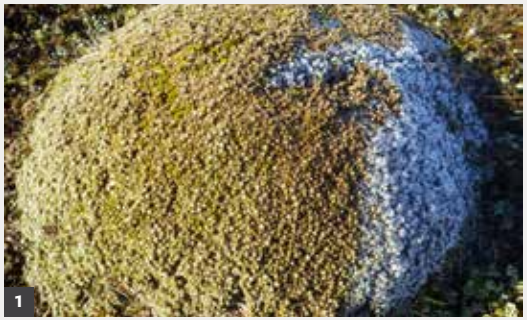
1. *Myosotis uniflora* and *Craspedia* 'Clutha' flowering on the terrace surface of Mahaka Katia Scientific Reserve at Pisa Flats. PHOTO: NEVILLE PEAT

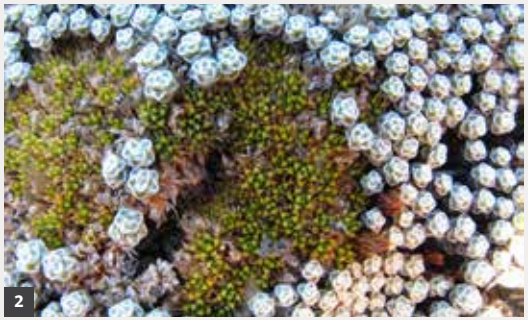
2. The conspicuous yellow flowers of the uncommon cushion forget-me-not *Myosotis uniflora* at Pisa Flats. PHOTO: CRAIG WILSON, DOC

opposition was such that in May 2012 Contact announced their formal decision to end the upper Clutha hydro-development project. Contact's hydro projects manager Neil Gillespie also gave notice of their intention to review the future management and ownership of all their land holdings near the upper Clutha and that selling the land was "one of the options that could come out of [the review]".

This was a unique conservation opportunity, for during the previous decade Contact's 'land banking' had saved many of the river terraces between Albert Town and Queensberry from the wholesale transformation suffered by of much of the upper Clutha's once-natural and magnificent scenic vista which has been carved up into a near-industrial landscape of lifestyle blocks, centre-pivot irrigation systems, vineyards and dry stock dairy grazing. Contact Energy wanted to sell the land and was not interested in any protective covenants. An urgent survey of the ecological, recreational and historic values of the 11 Contact blocks offered for sale was quickly undertaken by DOC. A proposal to acquire eight of the areas on offer was put to the NHF in February 2014. Some of the areas were found to meet all four national priorities for biodiversity protection. Furthermore, the eight were of high strategic value as they all adjoined marginal strips along the river; if protected as public land, most of them would help in the completion of the community-supported Newcastle and Upper Clutha River walking/cycling tracks.

Negotiations with Contact Energy were successfully concluded and six of the sites purchased through the NHF in June 2014 (see map). Five of the sites (with a total area of 149 ha) are to become scenic reserves, contributing to a narrow (only 50–400 m wide) continuum of conservation land on both sides of the river. The largest of these (97 ha) extends for about 8 km along the true left of the river above the Luggate bridge (see map); it includes two peninsulas within hairpin





1. A cushion of the pillow pimelea, *Pimelea pulvinaris*, with unthawed frost on the shaded side. In late spring these cushions are covered in sweet-smelling flowers which attract a wide variety of small beetles, flies and moths. PHOTO: BRIAN PATRICK

2. The pin cushion *Colobanthus brevisepalus* (threat classification: At Risk – Naturally Uncommon) amongst *Raoulia australis* cushions, Mata-au Scientific Reserve. PHOTO: JOHN BARKLA, DOC

3. A boulder copper butterfly (*Lycaena* sp.) that is found on both the Mahaka Katia and Luggate sites. The larvae feed on *Muehlenbeckia axillaris* on the rocky terraces along the Clutha River/Mata-Au. PHOTO: BRIAN PATRICK

4. Looking south across the limestone escarpment of Wai o Toura Scientific Reserve towards Mt Domett in Oteake Conservation Park. PHOTO: GRAEME LOH, DOC

5. *Carmichaelia hollowayi* at Wai o Toura – one of only three sites in New Zealand where this critically endangered dwarf native broom can still be found. Because it is very palatable to stock, fencing of these vulnerable sites is extremely important. PHOTO: GRAEME LOH, DOC

bends of the river, a good portion of the terrace surface and extensive kānuka shrublands. This larger area is known to contain eight uncommon or threatened dryland plant species, including mouse-tail, a forget-me-not, cushion pimelea (*Pimelea sericeovillosa* subsp. *pulvinaris*, found on most of the sites), a creeping bidibid, the small cushion herb *Colobanthus brevisepalus*, the creeping bachelor's button daisy *Leptinella serrulata* and the cushion mat daisy *Raoulia beauverdii*.

The sixth area (of 15 ha) is further downstream and forms an enclave in (and will be added to) the remarkable 165 ha Mata-au Scientific Reserve (see map). This reserve was once termed the 'Desert Block' of Long Gully Station but was passed to DOC in April 2014 after tenure review of the pastoral lease. It is the largest and most intact remnant of the semi-arid cushion terrace vegetation in the upper Clutha valley and the NHF-purchased enclave now provides access from the reserve to the banks of the river.

Mata-au Scientific Reserve and the six former Contact Energy blocks, along with Mahaka Katia Scientific Reserve, are all superb remnants of Central Otago's valley-floor drylands. In the words of noted Otago entomologist and botanist Brian Patrick, the specialised dryland plants and soils are the habitats of:

> ... a suite of rare invertebrates that includes the day-flying moths *Arctesthes catapyrrha, Australothis volatilis, Eudonia gyrotoma* and *Notoreas elegans*. Additionally the salt-pans at Mahaka Katia support the day-flying moths *Paranotoreas fulva* and *Loxostege* new species, both species with their larvae feeding on the halophytic [salt-tolerant] *Atriplex buchananii* there. On display at both these sites too is a range of grasshoppers, crickets and beetles that are now rare in the valley-floors of Central Otago. The significance of these sites for our endemic invertebrate fauna played a large part in the recognition, and eventual formal protection for their conservation values of these sites.

Limestone escarpment communities in the Waitaki Valley

The limestone landscapes of the Waitaki River valley of North Otago, and in particular the Awahokomo limestone karstland south of Lake Waitaki, have long fascinated geologists and botanists alike for their abundance of fossils and as refugia for a suite of rare indigenous dryland plants which prefer the less-acidic soils derived from limestone. In their book *Wild Rivers: discovering the natural history of the Central South Island*, authors Neville Peat and Brian Patrick outline the ecological significance of these karst landscapes:

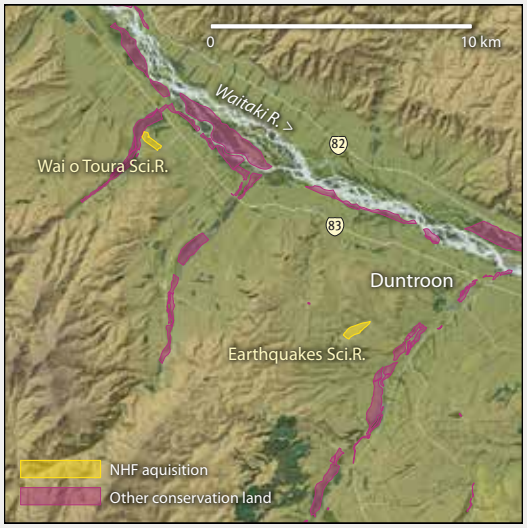
> Of the 77 native plants found here [the Awahokomo karstland], at least six are local endemics, a veritable treasure trove of biodiversity. One of these is the threatened, low-growing broom *Carmichaelia hollowayi*. Only 60 individuals remain.

The impact of farming in the Waitaki valley has largely reduced the habitats of most of these rare plants to limestone escarpments and isolated cliffs beyond the reach of grazing animals. Some farmed sites have been protected by QE II covenants but opportunities to establish public reserves have been limited. However, two important small properties, only 10 km apart in the Otekaieke-Duntroon locality within the valley, have recently been purchased through the NHF.

David and Lorraine Parker of Lone Hills on Gards Road had long been supportive of DOC's interest in protecting the plants on a 19 ha limestone escarpment portion of their property (see map). They had also been aware of the geological significance of the site (known as 'Trig Z'), as its spectacular fossil beds are a focus for field geology classes from Otago and Canterbury universities. It is a reference site for Otekaieke Limestone and an important reference source of fossils, such as whales, dolphins and undescribed cetaceans as well as penguins and bony fish. The property is also a key habitat for Holloways broom *Carmichaelia hollowayi*, a rare plant classified as Nationally Critical under the New Zealand Threat Classification System. It also contains the nationally endangered Kawarau cress *Lepidium sisymbroides*, and other at risk species such as *Muehlenbeckia ephedroides* and *Raoulia monroi*.

The option of a conservation covenant was discussed with the Parkers but because of the intensive restoration management that would be required and the desire to open the site to the public this was not their favoured option. In announcing this important NHF purchase, the first of its kind in the region, on 15 February 2013, Minister of Conservation Dr Nick Smith stated:

> In the past we have seen a greater focus on protecting the high country in this area through processes such as tenure review, so it is a credit to the Parkers that we have now secured the protection of this threatened lowland habitat ...The cliffs provide refuges for many native herbs, including prostrate kowhai (*Sophora prostrata*) and Oamaru limestone's own native broom, *Carmichaelia hollowayi*. It is one of only three places in New Zealand where the nationally



Waitaki valley limestone sites

1. Earthquakes Scientific Reserve is the only known habitat of the endemic gentian, *Gentianella calcis* subsp. *Waipara*, shown here growing on limestone detritus.
PHOTO: GRAEME LOH, DOC

2. A study group at the whale fossil display at the foot of the limestone escarpment in Earthquakes Scientific Reserve.
PHOTO: GRAEME LOH, DOC

> critical *Carmichaelia hollowayi* grows, having fifteen of the sixty remaining plants found in the wild ... This site hosts a range of rare plants and is also an important archaeological site with evidence of early Māori occupancy. The limestone beds boast a spectacular fossil record of dolphins, whales and penguins and hopefully one day the reserve will become part of the Vanished World fossil trail.

The site is currently managed as 'Gards Road Scenic Reserve' by DOC but it is likely to soon be given a Te Reo name – 'Wai o Toura Scientific Reserve'. Since its purchase, DOC has co-ordinated volunteers in removing the weed boxthorn, *Lycium ferocissimum*, and establishing nursery-propagated seedlings from the rare plants on the site.

The second Waitaki limestone escarpment habitat of interest to DOC is close to Duntroon at a site known as 'Earthquakes'. This 25 ha property was owned by Graeme and Lindsay Francis who were aware of the significance of the site and had generously co-operated with DOC, universities and local government and tourism promoters of the 'Vanished World' fossil trail regarding access. For most of the estimated 8000 annual visitors, the main attraction of the site is the fossilised bones of a baleen whale only a 150 m walk along a track to the base of the escarpment (see photo). It is a listed Geopreservation Site and it is also notable as a key site in New Zealand's palaeoecology, because of its animal and plant fossils documenting the ecological history of the region prior to the arrival of humans. Indeed, the site has been important in the debate over the timing of Polynesian arrival and there are examples of early Maori rock art important enough to be listed by the New Zealand Archaeological Association. Furthermore, the site is one of the few with subfossil remains of the now extinct laughing owl.

However, for DOC the driver for the approach to the NHF was threatened plant conservation. This is the only known habitat of an endemic gentian, *Gentianella calcis* subsp. *Waipara*, with about 200 plants distributed around three microsites within the property. It also contains another as yet undescribed plant, a *Gingidia*, which may be endemic to the site. Like the 'Wai o Toura Scientific Reserve', the Earthquakes site also has a small number of the nationally endangered *Lepidium sisymbroides*.

In May 2014 the NHF approved the purchase of the site for reasons very similar to those applying at Wai o Toura up valley: the extent of weed control, fencing and habitat restoration required was beyond the resources of the private owners and the archaeological and other scientific significance of the site argued for its purchase and careful management as public conservation land. It will be known as 'Earthquakes Scientific Reserve'. ■

ISOLATED LOWLAND FOREST REMNANTS IN THE NORTH ISLAND

1. The extensive buttressing root systems of the kahikatea, *Dacrycarpus dacrydiodes*, within Yarndleys Bush.
PHOTO: CRAVE PHOTOGRAPHY

When the Nature Heritage Fund (NHF) was established by government as the then 'Forest' Heritage Fund in 1990, the focus of applicants was naturally on seeking forest protection through covenants or through purchase of privately-owned **forest** ecosystems. In the South Island, three native woodchipping operations (one in Nelson, one near Rangiora in Canterbury and one at Awarua in Southland) had created incentives for the clearance of native forest for agriculture. However, a change to the Forests Act forced these woodchipping operations to halt native woodchip exports during the late 1990s, after which they converted to using only exotic plantation wood or closed down. Although the NHF's mandate was widened in 1998, forest conservation continued to be a significant part of its work. This was particularly true for the North Island where around 75% of New Zealand's population now live and where intensive farming had led to the widespread draining of wetlands, clearance of forests and forest degradation through grazing by domestic stock. Lowland podocarp/broadleaf forests, in particular, are lacking in the protected area network, especially in the more fertile river valleys and basins of Waikato, Taranaki, Bay of Plenty, Manawatu and Wairarapa. Many lowland forest remnants in these regions have been protected through the NHF and four different examples are outlined here.

Yarndleys Bush – a superb kahikatea remnant in Waipa District, Waikato

In 1978–79, the then Waipa County Council was concerned about the steady decline in the extent of privately-owned forest in its rural landscape and undertook a survey of such native bush stands. Only around 120 ha, mainly kahikatea forest, remained. One of the best was a 14.5 ha stand of kahikatea-dominant swamp forest, Yarndleys Bush, about 4 km north of Te Awamutu. The forest was highly visible beside State Highway 3 and entirely surrounded by the Yarndley family's dairy farm. The QE II Trust was interested in protecting the forest by covenant and in 1982 asked the Biological Sciences Department of the University of Waikato to undertake a quick botanical assessment of the forest. However, the owners rejected the option of a covenant but informed the newly-named Waipa District Council that they had fenced off the forest from stock and were open to a sale to ensure its long-term protection.

Waipa District Council was very aware that under its planning scheme the forest could easily be sold for subdivision as small rural residential lots, so it approached the NHF in May 1991 for assistance in purchasing the forest to ensure its preservation. Waipa District Council and the NHF each provided 50% of the purchase price and the forest is held in fee simple by the council as a scenic reserve known as 'Yarndleys Bush'. The larger kahikatea trees in the forest are 32–35 m in height and are not yet fully mature. The fencing out of stock has brought about marked regeneration of understory plants over the past 30 years, with plentiful pukatea, tītoki, māhoe and tree ferns, particularly in the western lobe of the forest.

Over the years, Waipa District Council has shown itself to be an enthusiastic caretaker of this forest, which is rapidly growing in popularity as a place to visit. There are now extensive boardwalk paths, interpretation panels and a new (October 2015) enlarged carpark and walkway.

Forest remnants on the Wairarapa Plains – Lowes Bush and Allen Bush

The Wairarapa Plains Ecological District of some 117,000 ha is mainly intensively farmed with very little indigenous forest left. A Protected Natural Area (PNA) survey of the district identified 19 Recommended Areas for Protection (RAP) covering about 1250 ha (only 1% of the district's area). One of these with the highest priority for protection was 50 ha of mature kahikatea-dominated lowland forest (with pukatea and swamp maire in wetter parts) at an altitude of 110 m asl midway between Carterton and Masterton and

Yarndleys Bush, Te Awamutu

1 km southeast of State Highway 2 (see map). The prime location of the forest (on the plains close to Masterton) and its aesthetic appeal made it a very attractive property for a lifestyle lot subdivision.

The NHF approved funding for a covenant over the forest in 1994 but in 1997 the landowners of the two blocks, David Lowes and Mark Allen, sought to change the application to an outright acquisition. This was supported by the Department of Conservation (DOC), which considered the entire block to be the "best representative of the once extensive podocarp swamp forest of the Wairarapa Plains". Indeed, DOC considered it the largest and most intact privately-owned remnant of kahikatea swamp forest within the Wellington Conservancy: "distinctive for its size, maturity, ecological diversity and condition."

After further negotiation with NHF and DOC, only David Lowes sold his block (the larger of the two at 42 ha, now Lowes Bush Scenic Reserve) in 2000. By 2012, Mark Allen was in a position to re-approach the NHF with an application to sell the remaining, smaller 7 ha block. This part of the contiguous forest tract, containing a higher proportion of mature kahikatea, was successfully purchased in 2013. In addition to the mature kahikatea swamp forest, the Lowes/Allen Bush forests also contain a small area of raupō/bulrush swamp with very large trees of the twiggy tree daisy *Olearia virgata*. There is also a healthy population of a threatened (Nationally Critical) perennial creeping herb, the swamp musk *Mazus novaezeelandiae*.

Pati Tapu – a precious remnant of the Seventy Mile Bush

Pati Tapu Bush is a remnant of the historic Seventy Mile Bush, a forest tract that once stretched from

Lowes/Allen Bush Wairarapa

Pati Tapu, Wairarapa

Wairarapa to Hawke's Bay. It lies in the hill country of Eastern Wairarapa Ecological District, about 9 km south of Alfredton. The PNA survey of this large district was published in 2004 and Pati Tapu Bush was one of 49 areas recommended for protection. The McKenzie family owners had already covenanted part of this RAP with the QE II Trust. However, with the highlighting of the biodiversity values of Pati Tapu Bush in the PNAP report, they sought to sell the two remaining forest blocks (with a total area of 39 ha) to the Crown through the

1. An aerial view of Yarndleys Bush, with the characteristic conical shapes of the kahitatea trees dominating the forest canopy. PHOTO: WAIPA DISTRICT COUNCIL

2. The contiguous tract of Lowes Bush Scenic Reserve and Allen Bush are together considered to be the best remnant of the once extensive podocarp swamp forest of the Wairarapa Plains. The kahikatea pictured are mature trees within Allen Bush. PHOTO: LES MOLLOY

3. The finding of the 'wood rose' *Dactylanthus taylori* in Pati Tapu Bush was the first recorded occurrence of the plant in the Wairarapa. Pati Tapu is a major southwards extension of range for this highly unusual plant, which holds a special place in New Zealand's indigenous flora as the only fully parasitic flowering plant and the southernmost member of its mainly tropical family. PHOTO: TONY SILBERY, DOC

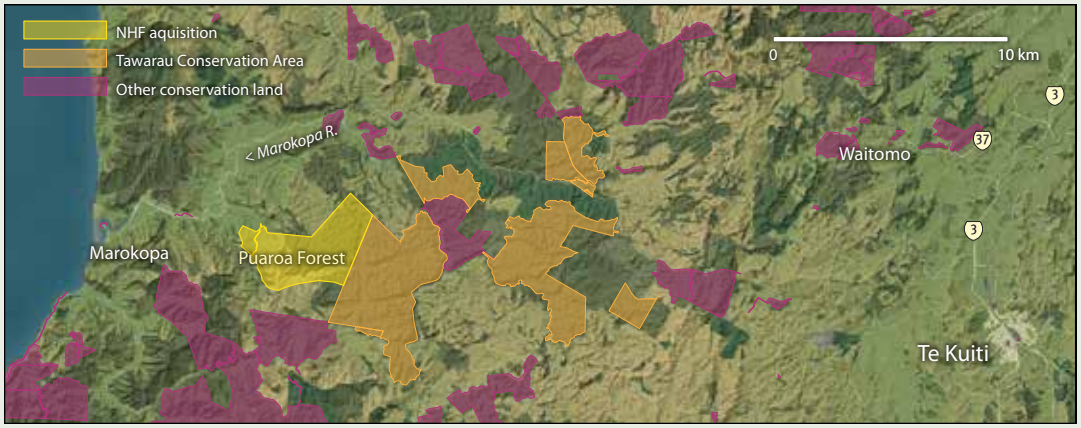
4. Pati Tapu Bush is a northern Wairarapa remnant of the historic Seventy Mile Bush. Tōtara, mātai and kahikatea are the dominant trees. PHOTO: TONY SILBERY, DOC

NHF. DOC supported the proposal and informed the NHF committee that the owners intended to put the proceeds of the land sale towards the fencing and on-going management costs of the three QE II Trust-covenanted areas on their farm.

The two blocks comprise dense lowland podocarp forest with a canopy height of 25 m; tōtara, mātai and kahikatea are the dominant trees, with smaller numbers of rimu. Site altitude is 180–400 m asl. Surveys have recorded 110 native plant species in Pati Tapu Bush, including the 'wood rose' *Dactylanthus taylori* – a rare botanic treasure that grows on the forest floor. This is the first recorded occurrence of the wood rose in the Wairarapa and is a major southwards range extension for the species (formerly its southernmost habitat was at Mangaweka in the Rangitikei). Pati Tapu is also an important habitat for bats which are important pollinators of the wood rose.

Minister of Conservation, Kate Wilkinson, announced the purchase of the two blocks in January 2011 to be managed by DOC as scenic reserve and to be known as 'Pati Tapu Bush' (see map). In paying tribute to the work of Alfredton farmers and conservationists, Bruce and Sue McKenzie, the Minister stated:

> The McKenzies put in a lot of effort to protect all the forests on their station, ensuring Pati Tapu retained its character. It is a beautiful stand of bush and its purchase as a reserve allows all New Zealanders to enjoy it, which I'm sure they will.



Puaroa Forest, King Country.

1. Prior to its purchase Puaroa Forest in the western King Country was considered by DOC to be the largest area of unprotected karst under indigenous vegetation in New Zealand.
PHOTO: DOC

Puaroa Forest – a karst wonderland west of Waitomo

In June 2007, the owners of Marokopa Station approached DOC's Te Kuiti office with a very exciting proposal to sell around 700 ha of heavily-forested karst (limestone) landscape in the upper reaches of the Puaroa and Mangakahia streams in the western King Country (see map). They were not prepared to covenant the area, which contains truly lowland forest, ranging from an altitude of around 150 m asl in the stream floors to only 220–280 m asl on the deeply-dissected karst plateau summit. At the time the proposal was made, Puaroa was considered by DOC to be the largest unprotected area of indigenous vegetation on karst in New Zealand.

Puaroa Forest is geomorphologically complex, with two major gorges, many limestone bluffs, dolines and spectacular tors (up to 50 m high) of Orahiri limestone along some of the summit ridges, and a major fault scarp (over 100 m high in places) forming the southern boundary of the block. Submergent streams are common and there is a major stream resurgence in the lower Puaroa Gorge. The as yet incompletely explored Mangakahia Gorge stream capture phenomenon is probably unique in the North Island and is not found in the better known Waitomo karst 25 km to the northeast.

Whereas much of the famous Waitomo Caves karst is compromised in that its catchment lies within farmland (with consequent risk of sediment pollution in the caves), the Puaroa karst and the adjoining karst in Tawerau Conservation Area (4005 ha) are completely forested. This confers significant environmental benefits, maintaining the karst features in a natural state by moderating groundwater inflows, maintaining high water quality, ensuring speleothem growth at natural rates, and protecting the microclimate around cave entrances. Together, the Puaroa and Tawerau karst landscapes are of such importance that they have sometimes been described as the North Island's lesser equivalent of Paparoa National Park.

Puaroa Forest has warmer-climate vegetation compared with the adjoining Tawerau Forest to the east. Large podocarps (rimu, mātai and miro) are common around Mangakahia Gorge, but in other areas hīnau and kāmahi-quintinia are the dominant canopy trees. There are other stands containing tawa, pukatea, tānekaha and rewarewa. Several threatened species including North Island long-tailed bats/pekapeka, kārearea/New Zealand falcon, kererū, long-finned eel/tuna, kōura and a rich diversity of snail species are known to be present.

The NHF committee considered that Puaroa Forest met all four of the New Zealand Biodiversity National Priorities criteria so, in late 2007, 690 ha of the forest were purchased through the Fund. The area is currently awaiting registration as a scenic reserve. Overall, Puaroa provides an important strategic link in the mosaic of protected forested land in the western King Country (see map) and secures a forest type that is under-represented in the Waitomo Ecological District. ■

PROTECTING KEY COASTAL LANDSCAPES OF HIGH ECOLOGICAL OR AMENITY VALUE

1. Looking across the estuary of the Waikawau River to the forested slopes of Waikawau Bay Scenic Reserve and the headland at Kawetoto Reef.
PHOTO: LES MOLLOY

2. A yellow-phase Auckland green gecko, *Naultinus elegans elegans*, at Waikawau Bay.
PHOTO: DOC

THE STEADY loss of the natural character of New Zealand's coastal environment is well known. Of the many key issues listed in the government's 'New Zealand Coastal Policy Statement 2010' (p. 5), two stand out of particular concern for addressing the loss of our coastal geodiversity and biodiversity:

> Loss of natural character, landscape values and wild or scenic areas along extensive areas of the coast, particularly in areas closer to population centres or accessible for rural residential development;
>
> Continuing decline in species, habitats and ecosystems in the coastal environment under pressures from subdivision and use, vegetation clearance, loss of intertidal areas, plant and animal pests, poor water quality, and sedimentation in estuaries and the coastal marine area.

Accordingly, when the Forest Heritage Fund's mandate was widened in 1998, applications to the now Nature Heritage Fund (NHF) for the protection of threatened coastal landscapes increased markedly. Many coastal applications have been approved over the intervening years and four different cases are outlined below. All four sites were purchased between 2002 and 2005 as part of the government's new conservation policy to increase the protection of coastal land.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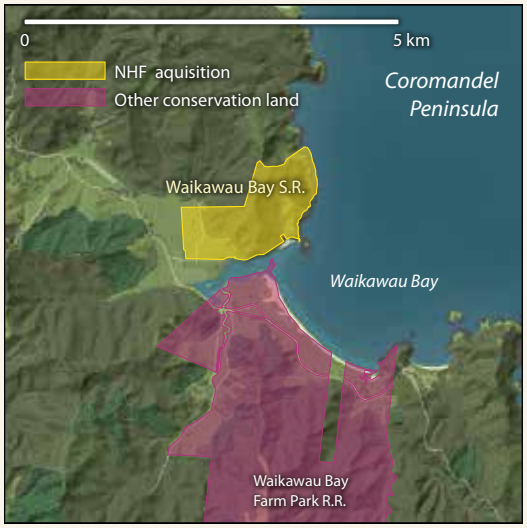
Coastal forest at Waikawau Bay, Coromandel Peninsula

Waikawau Bay is a 2.5 km-long white sand beach on the northeast coast of Coromandel Peninsula about 35 km from Coromandel township. The beach has become very popular with summer holiday-makers, particularly after the former Department of Lands and Survey purchased 925 ha in 1975 to establish Waikawau Bay Farm Park. Waikawau was one of the earliest 'farm parks' established under the Reserves Act, a successful concept whereby recreation reserves protected significant coastal landscapes yet allowed for the co-habitation of Crown-managed farming and 'minimal-facilities' camping by the public.

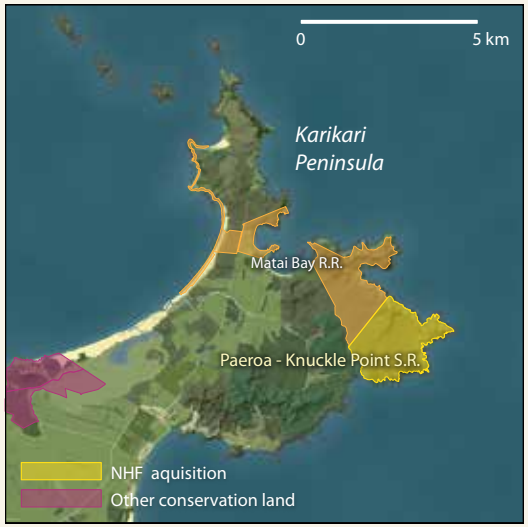
Along its southern boundary, Waikawau Bay Recreation Reserve is contiguous with Coromandel Forest Park. However, Waikawau Beach was bounded at its northern end by a privately-owned forested headland (with a fringe of wetland and duneland beside the Waikawau River estuary) that various owners had periodically attempted to sell or subdivide. Subdivision proposals for this highly-visible backdrop to the bay met with considerable public opposition in the district planning process, so much so that in 1993 the owner made an application to the NHF to sell 98 ha, but this had to be declined.

A subsequent owner, an American banker, donated the land to Auckland University which then put up 149 ha for sale by public tender in early 2003. The Thames/Coromandel District Council immediately took its concerns to the Prime Minister and then Minister of Conservation, Chris Carter. The Minister had discussions with the university and called for an urgent funding application from the Department of Conservation (DOC) to the NHF. Government considered the



Waikawau Bay, Coromandel Peninsula

Paeroa-Knuckle Point, Northland



land of such priority for protection from subdivision that Cabinet also elected to provide special funding and the land, now known as Waikawau Bay Scenic Reserve, was purchased by the Crown in April 2003 (see map).

At the time of sale, Dr Ewen Cameron, then Curator of Botany at Auckland Museum, provided a summary of the high botanical values of the site, based on his visits over the previous 12 years:

> The property has the best accessible coastal forest in the area, which also possesses extremely high plant diversity and forms the backdrop to the popular beach.

Of the very high number of plant species he recorded on this relatively small property (453), 64% are native. The mature and regenerating coastal forest contains emergent pōhutukawa above a canopy of kohekohe, pūriri, karaka, taraire, tawa and rewarewa and covers 30% of the site; mānuka and kānuka cover another 50% and there are areas of regenerating kauri. In the decade following the removal of goats, and stock from the lower parts of the property, regeneration of the forest and coastal shrubs, grasses and herbs has been impressive.

Paeroa-Knuckle Point Scenic Reserve, Karikari Peninsula

Coastal landscapes have come under increasing pressure in Northland, with coastal real estate prices escalating in recent years and natural coastal land becoming scarcer, particularly along the indented (and more sheltered) eastern coastline. The Karikari Peninsula in the Far North between Rangaunu and Doubtless bays still retains much of its natural character and DOC's campsite in Maitai


1

Bay Recreation Reserve (488 ha) attracts thousands of campers each summer. In 2002 an area of 383 ha around Knuckle Point (known as 'Paeroa' to Te Whanau Moana and Te Rorohuri hapu of Ngāti Kahu, who have manawhenua over and are kaitiaki of the area) was offered to the real estate market as one parcel of land. Paeroa is contiguous with Maitai Bay Recreation Reserve and also with 1000 ha of Ngāti Kahu land to the southwest (see map). Initially, a 7-lot subdivision was proposed for the property but then the owners gave the Crown first option of purchase. Tangata whenua Ngati Kahu were strongly supportive of Paeroa being protected by Crown purchase through the NHF because of the land's ancient history and very high cultural significance to them (it includes many archaeological sites, named localities, pā and wāhi tapu).

Natural areas remaining on the Karikari Peninsula had already been ranked by DOC's former Northland Conservancy as 'Priority Areas for Integrated Management'. DOC undertook a field inspection and held a hui with tangata whenua before an urgent application was submitted to the NHF to secure and preserve the area because of its ecological, cultural, landscape, historic and archaeological values. This was successful and

1. Pōhutukawa, *Metrosideros excelsa*, and kānuka, *Kunzea linearis*, forest on the coastline of Paeroa-Knuckle Point Scenic Reserve, Karikari Peninsula, Northland. PHOTO: DOC

2. This aerial view of the Greville Harbour/Whararikí site shows the cliffs, dunelands, lagoon and forest. The purchase has been incorporated into D'Urville Island Scenic Reserve, thereby completing an east–west corridor of protected land right across the island. PHOTO: DOC

3. The impressive dunes in the Greville Harbour/Whararikí purchase reach a height of 25 m at the northern end of Moawhitu Beach and extend inland for 400 m. They are scientifically and culturally important, containing bones of kākāpō, moa, tuatara, kōkako and various large petrels. PHOTO: ROY GROSE, DOC

'Paeroa-Knuckle Point Scenic Reserve' is now managed in close consultation with iwi (see map).

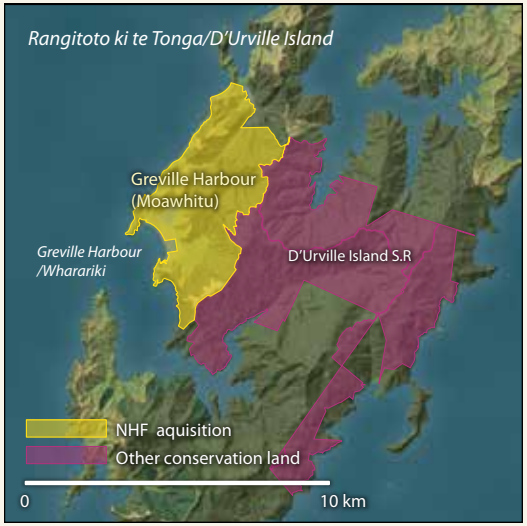
Paeroa-Knuckle Point Scenic Reserve lies within the North Island's northernmost ecological district – Aupouri – which is distinguished by its paucity of indigenous forest. The reserve is important ecologically for its forest remnants, gumlands and undeveloped coastline of rocky reefs (which includes one of the very few New Zealand fur seal haulout sites on the eastern coast of Northland). Although historic fires have affected the reserve, there are large areas of mature pōhutukawa and kānuka, and an area of kohekohe-dominant coastal forest at Brodies Creek. Kohekohe-dominant forest is a rare vegetation type within Northland and is unrecorded elsewhere in the Aupouri Ecological District. The gumland vegetation (kānuka- and mānuka-dominant) provides excellent habitat for a wide range of orchids, including threatened and regionally significant species.

Greville Harbour/Whararikí, Rangitoto ke te Tonga/D'Urville Island

The biodiversity significance of Rangitoto ke te Tonga/D'Urville Island, the eighth largest (c. 16,000 ha) of New Zealand's islands, has long been recognised because of its lack of possums, feral goats and ship rats. A partly-farmed property on the northwestern side of Greville Harbour/Whararikí had been the subject of DOC's conservation interest throughout the 1990s; first, the owners sought to sell off the 'unproductive forest land' to reduce their mortgage but the valuation was too low for them to accept; second, when subdivision was sought in 1996, both DOC and the QE II Trust tried, unsuccessfully, to have the sand dunes and a freshwater lagoon protected by covenant. The NHF Committee also recognised the significance of the island's habitats and in 1998 commissioned ecologist Geoff Walls to report on areas of special conservation significance over the entire Island. Over the years the NHF has commissioned protection strategies for many regions of New Zealand, as well as more detailed strategies for particular areas where there is special conservation interest or the threat of rapid landscape change. The latter include Banks Peninsula, Golden Bay, D'Urville

Island, the Canterbury foothill forests and the arid saltpans of Central Otago.

Consequently, when this large Greville Harbour freehold property (1797 ha) was put up for sale by public tender in April 2003, DOC were able to recognise its significance vis-à-vis other natural areas on the island. No tenders were accepted at that time and the property was re-advertised in May 2005. This prompted DOC to put an application forward to NHF to purchase this outstanding coastal landscape of cliffs, lush native forest, sand dunes and a freshwater lagoon. Ngāti Kōata as tangata whenua call this locality 'Moawhitu'. Moawhitu is of high cultural, spiritual, historic and traditional significance to Ngāti Kōata and it was traditionally one of their main settlements on Rangitoto ke te Tonga/D'Urville Island. The settlement, located on this northern beach of Greville Harbour and around the inland lagoon, was used as a mahinga kai. The lagoon itself was an important source for eeling and provided a sheltered haven for canoes.



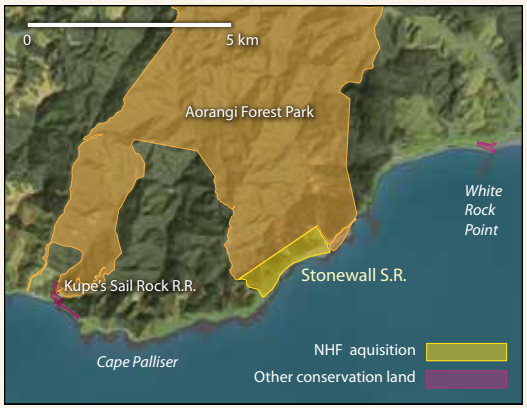
Greville Harbour, Rangitoto ki te Tonga/D'Urville Island

The NHF's purchase of the entire 1797 ha of Moawhitu (see map) was announced by the Minister of Conservation, Chris Carter, in July 2005. The acquisition was supported by the local community because it secured an area that could have ended up in foreign ownership and been developed with risk of its native ecosystems being degraded. The property is bounded by the existing D'Urville Island Scenic Reserve (into which it has now been incorporated), so the Greville Harbour / Moawhitu purchase completed an east–west corridor of protected land right across D'Urville Island. It has opened up extensive hunting opportunities and DOC has established a public campsite in the bay which attracts visitors by yacht, kayak and boat.

The site contains an impressive area of dunelands which, at around 80 ha, is by far the largest area in the Marlborough Sounds, where such dunelands are rare. The dunes reach a height of 25 m at the northern end of Moawhitu Beach and extend inland for 400 m; they are scientifically important, containing bones of kākāpō, moa, tuatara, kōkako and various large petrels. The lagoon behind the dunes is the largest freshwater body in the Marlborough Sounds and is an important habitat for waterfowl and freshwater fish.

Coastal forest on the lower slopes contains kohekohe (the dominant canopy species), tītoki, kaikōmako and nīkau which are replaced by beech and rimu forest on the ridges. Species like kohekohe and other highly palatable plants like *Pseudopanax edgerleyi*, *Pittosporum cornifolium* and three leafy mistletoes (of the genera *Ileostylis*, *Tupeia*, and *Peraxilla*) are flourishing on the property because of the absence of possums. The Greville Harbour acquisition also contains some distinctive geological and geomorphological features, including Bottle Points Cliff, a nationally-important ultramafic coastal cliff. These cliffs are part of the Nelson 'mineral belt', forming one of the few ultramafic cliff habitats in the country, and are clothed in serpentine vegetation, which is nationally rare.

Stonewall, Cape Palliser.



'Stonewall block', Cape Palliser, South Wairarapa

The remote coastline on the southeast corner of the North Island around Cape Palliser has long been valued for its wilderness character. However, access along the coast and into the southern part of Aorangi Forest Park had been a contentious issue for many years. The Koers family who farmed Ngapotiki Station approached DOC in June 2004 to express their interest in selling some of their land to improve public access along the coast and into the park. This offer obviously appealed to DOC, not only because it would resolve access conflicts but also because of the

geomorphological, biodiversity and scenic significance of the 121 ha 'Stonewall' block (so named because it contains the lower reaches of the Waitetuna Stream which drains the Stonewall Basin in the rugged interior of Aorangi Forest Park).

This section of coastline was of such regional landscape significance that it had already been identified as a protection priority in several planning documents, including the Lands and Survey Coastal Reserves investigation and the Wairarapa Coastal Strategy. The strategic significance of the land was very high as it would give an altitudinal 'park-to-sea' linkage of protected land. It also made lateral linkage sense at sea level because there was a small piece of park covering the eastern portion of the Ngapotiki Fan (an important Geopreservation Inventory landform) to the east and Kupe's Sail Rock Recreation Reserve to the west (see map).

An application to the NHF was made by DOC and in January 2006 Minister of Conservation, Chris Carter, announced its purchase as a scenic reserve:

> This stunning piece of coastal flat runs from the western part of the famous Ngapotiki Fan to the boundary of land owned by the local iwi Ngati Hinekawa. ... There is a diverse range of regionally-threatened plant species and communities that make this an extremely important biological area that is almost unique in the lower North Island.

These regionally-threatened plant communities include coastal turfs, 'grey scrub' and consolidated gravel beaches. The Cook Strait endemic shrubs *Brachyglottis greyi* and Cook Strait kōwhai, *Sophora molloyi*, are present along with other regionally-threatened, -uncommon, or -restricted plants like *Chionochloa beddiei*, *Crassula peduncularis* and *Eryngium vesiculosum* (see photos). Another rare community is a *Pimelea/Raoulia* cushionfield supporting a population of an undescribed endemic *Notoreas* moth (see the dryland Clutha River/Mata-Au sites, pp. 58–61).

One of the NHF's conditions regarding future management of what is now the Stonewall Scenic Reserve was that 4WD vehicles would continue to be excluded, as there is a risk of them damaging the biodiversity of this unique piece of landscape. It is now visited by the public for a variety of recreational reasons – for camping, hunting and surfing access (especially to the noted White Rock 'left hand point break'). ■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1, 2, 3 & 4. A group of four regionally-threatened, regionally-uncommon, or regionally-restricted indigenous plants within Stonewall Scenic Reserve: *Chionochloa beddiei*, *Crassula peduncularis*, *Eryngium vesiculosum* and the endemic Cook Strait kōwhai *Sophora molloyi*.
PHOTOS: JEREMY ROLFE, DOC

5. Looking northeast from the Stonewall Scenic Reserve purchase near Cape Palliser, across the Ngapotiki Fan and White Rock reef, to Te Kau Kau Point. The steep slopes to the left are in the adjoining Aorangi Forest Park.
PHOTO: JOE HANSEN, DOC

STRENGTHENING NATIONAL PARK BOUNDARIES: ENCLAVES AND LINKAGES

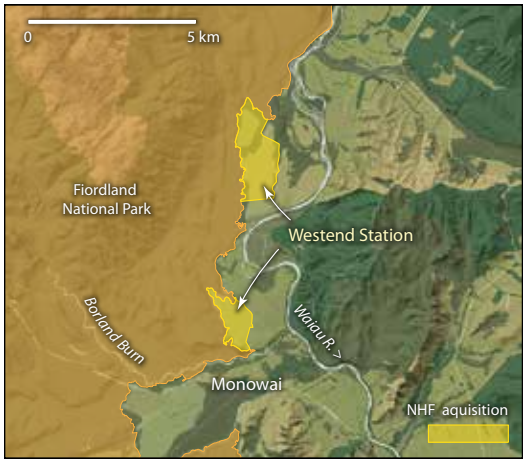
1

The Nature Heritage Fund (NHF) has played a key role in acquiring properties to improve the boundaries or biosecurity for some of our national parks. In most cases these acquisitions are intended to be added to the park and ensure greater representation of special ecosystems or species within the park or greater ease of conservation management of the park (as highlighted by the two purchases made near Kahurangi Point; see pp. 41–42); in other cases, the land acquired may not be added to the park itself but will serve as a linkage to other conservation lands, or provide a protected habitat continuum to the coast. The following five examples for Fiordland, Mount Aspiring, Westland/Tai Poutini and Abel Tasman national parks illustrate both these situations.

Frost flats on the Waiau River margin of Fiordland National Park

Fiordland National Park is generally considered to have a high degree of landscape integrity, particularly the steep mountainous terrain of most of the fiords. However, the NHF has been involved in improving lowland forest protection on the park's southern boundary (see Waitutu SILNA forests, pp. 28–31) and its southeastern boundary along the Waiau River. The terraces along the true right (western) side of the Waiau River, between its outlet from Lake Manapouri and the Monowai River, have a number of 'frost hollows' that have developed on glacial outwash gravels from the adjacent Hunter Mountains. These are naturally rare ecosystems found on terrace or valley floors where, in suitable conditions, cold air accumulates during the night after draining down surrounding slopes ('katabatic winds'). These pockets along the Waiau consequently carry a distinctive, more open, frost-tolerant and low-nutrient-tolerant vegetation of lichenfield-red tussock and scattered bog pine-celery pine-mānuka nestled within the mountain beech forest that dominates the adjacent parkland.

One of the best examples of this ecosystem was found on two blocks (total area 402 ha) of Westend Station just upstream from the Waiau's junction with the Borland Burn (see map). The NHF purchased the two blocks from the O'Brien family in 2004 and they are expected to be incorporated into Fiordland National Park in 2016. These naturally rare ecosystems originally covered only about 2% of the Te Anau Ecological District, but now less than half of this amount remains – and only 10% of this has any form of legal protection. The size, intactness, diversity and patterning of these Borland frost flats are considered nationally important, as few other examples remain following land conversion for agriculture in western Southland and they are much more modified. The formation processes for these frost flats are still being unravelled. Dr Geoff Rogers, a Department of Conservation (DOC) ecologist who has studied all of the remaining sites states:



Westend Station additions to Fiordland National Park

1. Frost flat vegetation on the Westend Station addition to Fiordland National Park. The lichenfield-red tussock grades subtly through bog pine-mānuka to the mountain beech forest margin beyond. PHOTO: GEOFF ROGERS, DOC

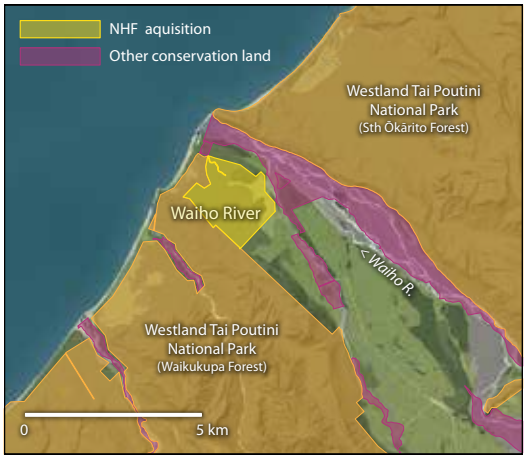
2. An aerial view across the mouth of the Waiho River, looking south towards the Southern Alps/Ka Tiritiri o te Moana. The Waiho floodplain kahikatea forest can be seen in the centre of the image. PHOTO: ANDRIS APSE

Indeed, O'Brien's is one of the few sites of lowland bog pine on its characteristic glacial outwash-cold air inversion topography where the surrounding matrix forest remains more or less intact. I've sampled all eastern South Island sites of this bog pine/mountain celery pine ecosystem and just a few Southland sites give a steer on the original, local extent of the bog pine-celery pine ecosystem in relation to the matrix forest that prevailed beyond the frost-prone, basin and valley floor. The topographical transition can be particularly subtle, with just a few centimeters of change in relief producing a corresponding change from bog pine-celery pine to beech.

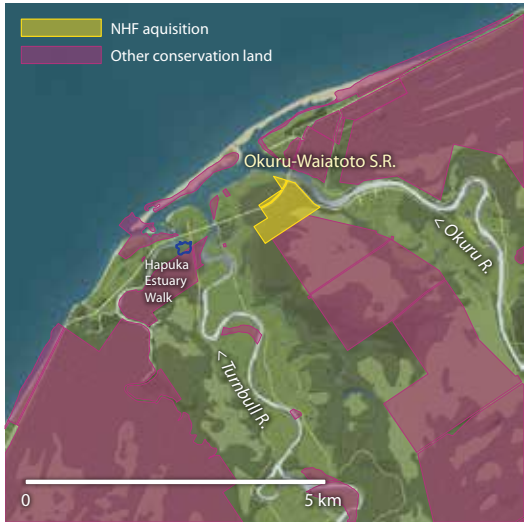
Kahikatea forest of the Waiho Floodplain – linking South Ōkārito and Waikukupa Forests of Westland/Tai Poutini National Park

When Westland National Park was established in 1960, it consisted mainly of mountainous areas, primarily the tourist attractions of the neves and icefalls of Franz Josef Glacier/Kā Roimata o Hine Hukatere and Fox Glacier/Te Moeka o Tuawe; absent were the vast lowland podocarp forests on the ancient moraines that stretch out west of the glaciers and the Alpine Fault to the coastline between Ōkārito Lagoon and the Cook/Weheka River. When the revised National Parks Act of 1980 gave much greater emphasis to the protection of ecosystem diversity within the national park system, a protracted forest conservation battle ensued over whether these forests should be added to the park. In 1982, government added the southern part of Ōkārito Forest and all of Waikukupa Forest (around 25,000 ha in total) to the park (see map). Subsequently, government decided to cease the logging of the Crown indigenous forests formerly vested in Timberlands West Coast Ltd; thereby another 6000 ha of dense lowland podocarps in the northern part of Ōkārito Forest and around 6000 ha of similar forest in the adjoining Saltwater Forest were added to the park in 2002.

The renamed Westland/Tai Poutini National Park was now truly worthy of the appellation



Waiho, Westland/Tai Poutini National Park



Okuru-Waiatoto, Haast Coastal Plain

– "New Zealand's great 'Mountains-to-the-Sea' park" – and this was confirmed when its international significance was recognised and it was listed by UNESCO in 1991 as a key part of Te Wāhipounamu - South West New Zealand World Heritage Area. However, one ecosystem element was still missing from the park. This was a representative area of the kahikatea forest that had once covered the river flats of the Whataroa, Waiho and Cook/Weheka rivers but which had been steadily milled over many years and largely cleared for farming.

In 2008, a director of Rangiora Sawmills Ltd approached DOC's West Coast Conservancy advising that the company wished to sell their blocks of kahikatea forest on the alluvial flats near the mouth of the Waiho River. The area had already been ranked as of high biodiversity value by the New Zealand Wildlife Service in the 1970s and a DSIR Botany Division report around the same time stated that the kahikatea forest contained other large podocarp trees like tōtara and mātai, as well as *Coprosma wallii*, a rare, densely-divaricating coastal shrub. Inspections during 2009 confirmed for the NHF that although 25% of the area had been lightly logged in the past, it was regenerating profusely. Another 10% of the property consisted of a fertile flax wetland, with fringing kōwhai forest and coprosma shrublands. Acquisition of this Waiho forest would also secure the alluvium it was growing on – the remaining unprotected component of the much studied and scientifically important 'Franz Josef Soil Chronosequence' which has been the subject of several papers outlining its soil/vegetation changes over time.

Negotiations through the NHF were successfully concluded and in July 2010 Minister of Conservation Kate Wilkinson announced that 378 ha of these dense lowland kahikatea forests and wetlands at the mouth of the Waiho River (see map) would eventually be added to Westland/Tai Poutini National Park and the World Heritage Area. As the minister stated:

> This purchase secures a strategically located area that is surrounded by Westland/Tai Poutini National Park. It links two protected areas of Waikukupa Forest and South Okarito Forest to create a continuous protected coastal zone that is the centre-piece of one of New Zealand's most iconic mountain-to-sea landscapes. There are also significant recreational opportunities with permanent and practical public access to Waiho Beach for walkers and a mountain bike trail to the coast has now been constructed through the middle of the forest on old logging access roads. Birds such as kererū, kea, tui, bellbird and kākāriki migrate from the mountainous national park to the lowland forest near the coast for seasonal food availability. There are also places where whitebait breed and bittern, fernbird and spotless crake are found.

Linking dense podocarp forests of the Haast Coastal Plain to Mount Aspiring National Park

Unlike the 'Mountains-to-the-Sea' coastward extensions of Westland/Tai Poutini National Park (see above), Mount Aspiring National Park does not extend across the densely-forested and wetland-studded Haast Coastal Plain to the coast. Instead, the park is partly linked to the coast by a matrix of stewardship land and scenic reserves managed by DOC. The scenic road from Haast to Jackson Bay/Okahu is a popular tourist route through the tall podocarp forests of this isolated corner of

Te Wāhipounamu - South West New Zealand World Heritage Area. One of the most impressive natural vistas on the road is around the mouths of the Okuru and Turnbull rivers, close to DOC's popular Hapuka Estuary kōwhai forest loop walk (see map).

Clear felling of some of this highly-visible forest on private land alongside the Jackson Bay road at Okuru during early 2015 generated a great deal of concern among many locals and visitors. Typical of this concern was that expressed by Neroli Nolan, a fourth generation member of a well-known local pioneering family, who wrote to NHF committee member, Dr Gerry McSweeney:

> Over the years I have witnessed huge areas of forest destroyed by logging, natural wetlands drained, and stands of kowhai destroyed for farming and I feel it is time to protect what is left. The recent clear felling of bush in the area caused dismay amongst many locals and left tourists bewildered at the destruction of native forest adjacent to a main road. This is not just another stand of native bush somewhere in South Westland, it is highly visible and enhances the natural beauty of the area.

Because more than half of the forests on the more-fertile alluvial soils of the Okuru and Turnbull river flats had already been logged and converted to pasture, DOC had expressed an interest in purchasing through the NHF any remaining blocks of high conservation value if the owners wished to sell them. An approach to DOC in late 2014 was made by John Dalgety (on behalf of the N. A. Wallis (Okuru) Ltd family trust) to sell their 56 ha natural pākihi (infertile wet ground formed above an underlying impermeable layer), bog forest and lowland podocarp/broadleaf forest

block adjacent to the road and river (see photo). The bog forest is dominated by kahikatea, along with other smaller podocarps such as pink, silver and yellow-silver pine. In July 2015, Associate Minister of Conservation Nicky Wagner announced the purchase through the NHF of the block, which is to be named 'Okuru-Waiatoto Scenic Reserve':

> Both the pākihi and the lowland forests which make up this land are under-represented in public ownership, so the acquisition is doubly welcome. The pākihi provides a perfect home for the declining South Island fernbird and supports several types of native plants, including sun orchids, carnivorous sundews and bladderworts. The wetland will form a natural western boundary to the Okuru and Waiatoto conservation areas, which extend to Mt Aspiring National Park.

The Dalgety extended family also made a statement expressing their delight that the land which had been in the family for three generations would now be preserved for future generations to enjoy:

> Now is the time for this well-positioned coastal property to be both protected and made available for Haast locals, as well as visitors to South Westland.

And, as a result of local objections to the clear felling of the roadside forest in the Okuru locality, the NHF was also able to reopen a deferred application to purchase the adjacent 14 ha Buchanan Block. This tall kahikatea and rimu and kōwhai/flax swamp forest on alluvium and sand dunes extends to both the mouth of the Okuru River and along the road opposite the Wallis block. If this application is successful, the two purchases

1. Looking southeast across the mouth of the Okuru River to the forest and pākihi within Okuru-Waiatoto Scenic Reserve. A continuum of protected landscape now extends back to the mountains of Mt Aspiring National Park in the distance. PHOTO: GERRY McSWEENEY

1. View northeast from near Canaan Saddle across Canaan Downs to the forest margin of Abel Tasman National Park. PHOTO: SIMON WALLS, DOC

2. Canaan Downs Scenic Reserve is an important habitat of the yellow phase of the landsnail *Powelliphanta hochstetteri hochstetteri* which is endemic to the Pikikiruna Range. PHOTO: ROB SUISTED

3. The wetland on the former Hadfield property is an important mātātā/fernbird habitat, one of its few long-term, viable coastal habitats in the Nelson Region. PHOTO: MIKE BODIE, DOC

4. The shrublands fringing Awaroa Inlet contain by far the largest population of the naturally uncommon weeping inaka, *Dracophyllum urvilleanum*. PHOTO: SHANNEL COURTNEY, DOC

(as Okuru-Waiatoto Scenic Reserve) will protect this iconic South Westland roadside vista and improve the linkage of Mount Aspiring National Park with the coastline.

Enclaves within Abel Tasman National Park – Canaan Downs and Awaroa Inlet

When Abel Tasman National Park was formed in 1942, its coastal boundary was ragged because of a number of privately-owned enclaves. A similar situation applied to the Canaan karst system portion of the park along the Pikikiruna Range. Over a number of years the NHF has been used to purchase three properties to incorporate within the park, or to buffer its boundaries (it is the smallest of New Zealand's 14 national parks). Two of these acquisitions were quite large. These were Canaan Downs and the Hadfield property inland from Awaroa Inlet.

The Canaan Downs property occupied 758 ha of the Canaan plateau, much of it marble karst within an unusual internally-draining basin and wholly surrounded by Abel Tasman National Park. The owners approached DOC in April 2003 prior to putting the property on the open market, where there was a high likelihood that the outstanding karst treeland would be marketed as lifestyle blocks and fragmented with roads and buildings. DOC brought the sale of Canaan Downs to the attention of the NHF as an urgent case requiring priority consideration, warning that lifestyle blocks would threaten its ability to undertake future aerial 1080 operations over this sector of the national park. Furthermore, it was estimated that 50% of the total water flow into Gorge Creek Cave and the very large Gorge Creek resurgence came from sinks on Canaan Downs; along with Harwoods Hole, this cave and aquifer are the most significant karst features in the park. Consequently, DOC considered that acquisition would give much greater protection to the aquifer, as continuation of traditional grazing in the area would maintain undesirable rates of sedimentation around the sinkholes and the Canaan Downs polje (a slowly-draining, sediment-filled sinkhole, a very rare karst feature in New Zealand).

The forest on Canaan Downs reflects variations

in the underlying geology. On shallow soils derived from schist the forest is dominated by mountain beech, mountain cedar, celery pine and pink pine. With the transition to marble, however, there is an abrupt change to pure stands of mature silver beech. The property also supports the yellow phase of the landsnail *Powelliphanta hochstetteri hochstetteri* (which is endemic to the Pikikiruna Range) and the rare large carnivorous landsnail *Rhytida oconnori*.

Following purchase through the NHF in 2004, the area is now managed by DOC as Canaan Downs Scenic Reserve (see map). In addition to its geodiversity and biodiversity values, the acquisition also improved public access to tracks within the park and important features like Harwoods Hole, the deepest vertical cave shaft in New Zealand. The open downs are also popular for mountain-biking. In the near future, an assessment of Canaan Downs Scenic Reserve will be undertaken by DOC and parts which meet national park criteria (and where the existing recreational use can continue) will be added to Abel Tasman National Park.

The setting of the former Hadfield property inland from Awaroa Inlet is quite different. Rather than limestone, the underlying rock is Separation Point granite, from which the famous golden sand beaches of the park are derived. This 793 ha property around the Awapoto and Awaroa catchments had been lightly farmed by four generations of the Hadfield family until the last, Bill Hadfield, passed away in January 2004. It was the end of an era and his children, aware of the strategic and ecological importance of this enclave within the national park, fortunately decided to offer it for sale to DOC; the alternative of putting it on the open market risked its seven separate titles being easily carved up into lifestyle blocks or resorts in the only remaining large block of private land on this iconic coastline easily reached by road.

The property had a diverse landscape of saltmarsh and freshwater wetland, shrubland and regenerating and unlogged native forest. It included possibly the largest stand of kahikatea forest in the Tasman District, where the few remnants of this forest type that survive have an uncertain future owing to the lowering of local water tables through farm drainage. The hill country portion fringing Awaroa Inlet contains by far the largest population of the naturally uncommon weeping inaka, *Dracophyllum urvilleanum*, one of the largest of our narrow-leaved 'grass trees'. The acquisition's wetland is also an important habitat for the mātātā/fernbird, securing one of its few long-term, viable coastal habitats in the Tasman District now that much of the pākihi in Golden Bay has been drained and developed into pasture.

The NHF and DOC were well aware that purchase of the Hadfield property would close the gap existing between the northern and southern sections of the park (see map); indeed, it had already been identified in reports as the highest priority for protection in Golden Bay and the largest tract of privately owned lowland forest in the Tasman District. A successful purchase through the Fund was announced by Minister of Conservation, Chris Carter, in November 2006:

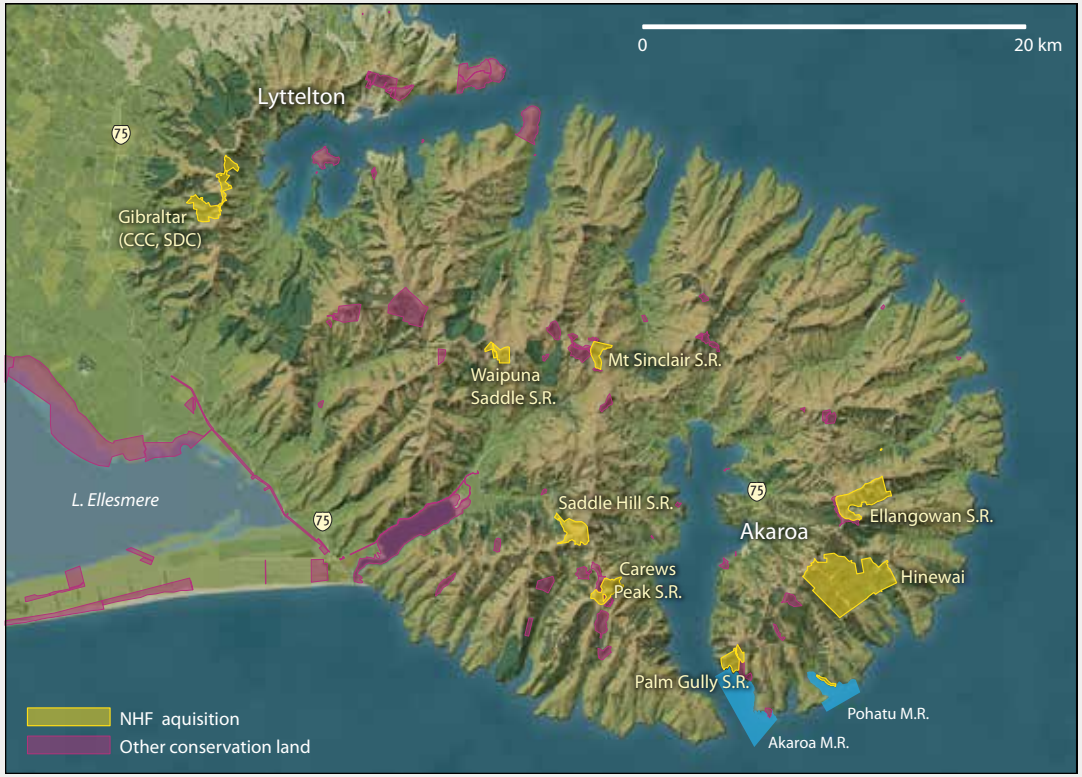
> Land on the Abel Tasman coast is highly sought after and the Hadfield property, which can be accessed by the Awaroa Road, could have ended up as a multi-dwelling subdivision. Instead it will remain in its natural state for everyone.

The acquisition was added to Abel Tasman National Park in 2008. ■

5. The Awaroa Inlet addition to the park contains possibly the largest stand of kahikatea forest in the Tasman District, where most kahikatea forest has already been replaced by farmland. PHOTO: DAVE HANSFORD

Canaan Downs and the Awaroa addition to Abel Tasman National Park

BANKS PENINSULA:
REPLENISHING THE STOREHOUSE OF RAKAIHAUTŪ



Banks Peninsula. *NB: this map does not show extensive Christchurch City Council reserves, which are predominant on the Port Hills*

THE STORY of Banks Peninsula relates some of the worst and best treatment of indigenous landscapes in New Zealand. Historical clearing of the land for farming and the milling of the forest for timber reduced the native forest cover to around only 1% of its pre-human extent. Pockets of podocarp/broadleaf forest survived in moister gullies and many of these were protected in the 19th Century as reserves; but in terms of modern protected area design these areas were too small, unrepresentative (being mostly shady upper-slope habitats), and vulnerable to boundary attrition (usually through fire and/or poor fencing).

The good news, however, is the wide variety of private-public conservation partnerships that have established on the peninsula. Many concerned landowners, community trusts, conservation NGOs, iwi and other individuals, along with Christchurch City Council (CCC) and The Department of Conservation (DOC) have all worked hard over the past 25 years to try to replenish the 'storehouse of Rakaihautū' (Te Pataka o Rakaihautū). The Summit Road Society was formed in 1948 to further Harry Ell's vision of protecting the nature and open space landscape of the Port Hills and this vision has been carried on by CCC as it established its network of reserves. Peninsula farmers were early-adopters of the 1977 Queen Elizabeth II National Trust Act (QE II) covenants as a way of protecting forest patches on their land. Then, in 2001, a group of landowners formed the Banks Peninsula Conservation Trust (BPCT) and gained covenanting authority (as an alternative to District Plan regulation) to promote voluntary protection. To date, there are more than 100 conservation covenants (about half BPCT and half QE II) protecting approximately 1000 ha across the peninsula.

Banks Peninsula is botanically rich, with more than 550 vascular plant species. According to Nicholas Head (DOC botanist), the reasons for this include the following: the presence of wide environmental gradients (wet to dry, sea level to above 900 m); the variety of habitats (coasts, volcanic bluffs, wetlands, forests, shrublands and grasslands); isolation as an island for much of its history, giving rise to species endemism (10 species are found nowhere else); its role as a refugia during Pleistocene glaciations (enabling species to survive there) and the presence of rare ecosystems (such as Kaitorete Spit and Lake Forsyth (Wairewa) with their own distinctive plant

1. Land clearance for farming and milling for timber reduced the native forest cover of Banks Peninsula to around only 1% of its pre-human extent. Although many of the forest remnants have now been protected by covenant or purchase as reserves, some areas of indigenous vegetation are still being cleared. PHOTO: NICHOLAS HEAD, DOC

2. Mature mountain tōtara, *Podocarpus laetus*, trees are an important component of the Waipuna Saddle Scenic Reserve purchase. This type of forest is an important remnant of the forest which once occurred in the Herbert Ecological District sector of Banks Peninsula, where less than 1% of old-growth forest now remains. PHOTO: NICHOLAS HEAD, DOC

species). Consequently, Banks Peninsula has been singled out as a priority region for increased conservation effort.

Today, DOC manages more than 65 scenic, historic, recreation and other reserves and conservation areas on Banks Peninsula (plus two adjoining marine reserves) but the shortcomings of these reserves – and the challenge to increase the involvement of private landowners – were well spelt out in the 2002 Canterbury Conservation Management Strategy (CMS):

> The current network of reserves and covenants on the peninsula is scattered and lacking in ecological representation. The long-term viability of the remaining flora and fauna is not assured due to the small size of some reserves, their isolation and lack of adequate buffer zones. … Much remnant indigenous bush on private land has no formal protection and its continued well-being is not guaranteed. These may provide opportunities to work with co-operative landholders to protect these areas.

From its inception in 1990, the then Forest (now Nature) Heritage Fund (NHF) could see the need to commit funds to help conserve privately-owned indigenous remnants on the peninsula. Since 1990 the NHF committee has been involved in 27 Banks Peninsula cases, 11 of which have resulted in covenants or outright acquisition (see map). Several of these have involved joint ventures with the Summit Road Society, community trusts like the Josef Langer trust and local authorities (such as the NHF contribution to the purchase of 122 ha of Gibraltar Farm forest on the Port Hills by CCC and Selwyn District Council).

Hinewai – an outstanding example of habitat recovery and conservation

In response to one of its earliest applications (in 1990 when Denis Marshall was Minister of Conservation) the NHF helped fund the Maurice White Native Forest Trust's purchase of Otanerito Station (870 ha). This land was then added to the trust's existing 109 ha Hinewai Private Reserve, which is now all protected under a Reserves Act Protected Private Land Covenant. Since then, Hinewai, under the guiding management of Hugh Wilson (who carried out the 1992 Banks Peninsula Ecological Region PNA survey) and assisted by an army of volunteers, has increased in size to 1230 ha. Today it is held up as an outstanding example of how the peninsula's ecosystems can recover. Hinewai has shown the critical importance of goat and possum control and the critical role of gorse (provided it is safeguarded from fire) in providing a nurse crop for native forest regeneration.

Improving 'Connectivity' – NHF extensions to four existing scenic reserves

The NHF has tried to take a strategic approach on Banks Peninsula, seeking to knit together isolated fragments of already-protected indigenous habitat with strong threads from new acquisitions. This approach has been aided by both the Banks Peninsula Protected Natural Area (PNA) survey (with its three ecological districts – Port Hills, Herbert and Akaroa) and the NHF's Canterbury Protection Strategy (published in 2009). Guiding principles have been the desire to protect under-represented ecosystems, threatened ecosystems, ecological sequences (often altitudinal) and ecosystems which are known to be resilient and have a strong potential for being restored to something approaching their original condition. Four important NHF acquisitions are outlined in the following pages to illustrate the effectiveness of this strategic 'connectivity' approach.

Ellangowan Scenic Reserve

In 2000, Graeme Stanley Phillips approached the

NHF about an area of 278.6 ha at the head of Ellangowan Stream – the first approach by a landowner wishing to sell one of the 1992 PNA report's 'recommended areas for protection'. Unlike the other limited reserves then existing in Akaroa Ecological District, DOC considered this property to be:

> … unique in that it is more holistic in design. As a result it encompasses a far greater range of representative communities within its boundaries. In addition it will link up with the existing Ellangowan Scenic Reserve, greatly enhancing its sustainability and conservation value … the inclusion of this area into the reserve network will create one of the most outstanding conservation areas in the Akaroa Ecological District.

After purchase through the NHF, the area was formally added to Ellangowan Scenic Reserve (see map) in July 2003. QE II Trust covenants along its upper and lower boundaries extend the protected area by another 162 ha. The site is in the adjacent catchment to Hinewai and encompasses a valley floor to ridge-crest altitudinal sequence including lowland podocarp (mātai/tōtara) and broadleaf, *Griselinia littoralis*, forest in the gullies; red/black beech forest on lower hill slopes; and mountain tōtara, *Podocarpus laetus*, on the upper hill slopes. The site also contains the nationally threatened shrub *Coprosma wallii* (At Risk - Declining) and several Banks Peninsula endemics: Banks Peninsula hebe, *Hebe strictissima*; the sun hebe, *Heliohebe lavaudiana*; and Banks Peninsula fork fern, *Tmesipteris horomaka*.

Mt Sinclair Scenic Reserve

In August 2003, DOC was approached by Michael and Tania Stronach who wished to sell their block of podocarp forest (dominated by mountain tōtara and mātai) on the northeastern slopes of Mt Sinclair (841 m). An application was made to the NHF for this forest block which was a significant component of the less than 1% of original forest remaining in the Herbert Ecological District. Furthermore, it was of strategic importance because it would connect three existing scenic reserves – Mt Sinclair, Glenralloch, and Whatarangi Totara – all on the other slopes of Mt Sinclair. However, the Stronach property had some important vegetation differences from the other more westerly and south-facing, wetter and cooler reserves – it contained more mature kōwhai, lowland ribbonwood, kaikōmako, narrow-leaved lacebark and mātai.

In 2004, the 70.3 ha Stronach block was purchased through the NHF and added to Mt Sinclair Scenic Reserve to form a viable protected area of more than 150 ha across the contiguous reserves (see map). This augmented area is an important source of seasonal food for a range of indigenous birds including bellbirds/korimako, robins/kakaruai, tomtits/ngirungiru, grey warblers/riroriro, brown creepers/pīpipi, fantails/pīwakawaka, riflemen/tītitipounamu and, especially, kererū. It also adjoins the popular 'double fence line' walkway along unformed Summit Road, allowing more of the peninsula's natural heritage to be accessible to the walking public.

Palm Gully Scenic Reserve

In April 2015, Minister of Conservation Maggie Barry announced that two important properties on opposite sides of Akaroa Harbour had recently been purchased by the NHF:

> Ninety hectares of regenerating bush and black beech forest have been brought from the Hamilton family, who have a long history in the Akaroa area and previously gifted Palm Gully Scenic Reserve to the Crown. The newly bought land will link Palm Gully up with other reserves and covenant land in the area … The second piece of land is on the south side of Akaroa Harbour and will almost treble the size of the Carews Peak Scenic Reserve.

The Hamilton purchase is entirely within the Nikau 'recommended area for protection', one of the top 10 sites so ranked by Hugh Wilson in the Banks Ecological Region PNA report. It adjoins a QE II conservation covenant to the north and will increase the size of Palm Gully Scenic Reserve five-fold. With the Minister of Conservation, Nick Smith, approving the adjacent 475 ha Akaroa Marine Reserve in April 2013, there is now a second protected land–sea continuum in the Banks Peninsula environment (the other being NHF's July 2000 purchase of the Flea Bay cliffs to form Pōhatu Wildlife Refuge now adjacent to Pōhatu Marine Reserve – see map). The enlarged Palm Gully Scenic Reserve is a mosaic of interconnected forest, shrubland, tussockland and cliff communities, with many vegetation sequences on a diversity of landforms, across sunny and shady aspects, and from sea level to 530 m asl. It contains a number of nationally threatened plant species, such as *Aciphylla subflabellata*, the local endemic 'Akaroa sun hebe' *Heliohebe lavaudiana* and Lyttelton forget-me-not, *Myosotis lytteltonensis*. Furthermore, a number of common trees reach their southern limit at the site – pigeonwood, pōkākā, nīkau, kawakawa, akeake and tītoki.

Carews Peak Scenic Reserve

The fourth 'connectivity' example is on the upper eastern slopes of Carews Peak (794 m) above Wainui. It was purchased from Gail Turney of

1. The NHF purchase of the Hamilton property in 2015 enlarged Palm Gully Scenic Reserve (already a gift to the Crown from the Hamilton family) by another 90 ha. The reserve is now a mosaic of interconnected forest, shrubland, tussockland and cliff communities on a variety of landforms, across sunny and shady aspects, extending from sea level to 530 m asl.
PHOTO: NICHOLAS HEAD, DOC

2. The rare endemic Banks Peninsula fork fern, *Tmesipteris horomaka*, is a newly described species known from only 11 sites on the peninsula, including some of the NHF acquisitions. PHOTO: SALLY TRIPP.

3. 'Akaroa sun hebe' *Heliohebe lavaudiana*.
PHOTO: MELISSA HUTCHISON

4. The yellow rock daisy *Brachyglottis lagopus* is one of many small herbaceous native plants protected in the extended Carews Peak Scenic Reserve.
PHOTO: ALICE SHANKS

5. A montane grassland of narrow-leaved snow tussock, silver tussock, hard tussock and browntop on slopes above 720 m asl on Carews Peak above Bossu Road.
PHOTO: ALICE SHANKS

6. Volcanic outcrops on the summit slopes of Carews Peak Scenic Reserve contain a distinctive subalpine flora, including narrow-leaved snow tussock, species of dracophyllum and aciphylla, *Brachyglottis lagopus* and the endemic Banks Peninsula hebe, *Hebe strictissima*. PHOTO: ALICE SHANKS

Edzell Farm by the NHF (with a contribution from the estate of Mrs Diana Watson through her legacy to the North Canterbury branch of Forest & Bird). This 110.4 ha addition to Carews Peak Scenic Reserve contains small patches of old growth podocarp forest, diverse plants on volcanic outcrops, snow tussock grasslands, springs, streams and a natural landslip-impounded wetland (the latter now quite rare on the peninsula) – all adding up to another high-quality remnant of what Akaroa Ecological District was like prior to human arrival. Importantly, the acquisition links existing Peraki Saddle Scenic Reserve with the northernmost block of the existing Carews Peak Scenic Reserve. In effect, there is now an almost continuous 14 km-long ribbon of protected areas along the Bossu Road ridge crest from the new Saddle Hill Scenic Reserve in the north (also purchased by the NHF) to Long Bay Scenic Reserve in the south.

The Carews Peak acquisition was also an ideal 'win-win' result for both the landowner and conservation, for once the new fences are built there should be no more management cost to DOC than is currently expended on the existing scenic reserves.

As pointed out by Alice Shanks (botanist, long-time advocate of conservation covenants on Banks Peninsula and currently Christchurch-based representative of QE II National Trust), this addition:

> … is not only a gain for biodiversity protection, increased amenity, secured landscape and cost-effectiveness, but also it sorts out a long-term boundary issue, creates a better-designed and managed protected area, and reduces long-term boundary maintenance costs for both the farmer and the Department of Conservation. ■

1. Looking northeast from the slopes of Carews Peak (794 m) across Wainui and Akaroa Harbour to Akaroa township.
PHOTO: ALICE SHANKS

1. Remnants of rare Chatham Island akeake and keketerehe coastal broad-leaved forest still cling to cliffs on the south coast of Chatham Island (Rekohu). Looking westwards across Nikau Gully in the Day block of the South Chatham conservation covenant. PHOTO: AMANDA BAIRD, DOC

2. 'Clear' areas on the southeastern part of the South Chatham Conservation Covenant are probably fire-induced, but the deep-rooted bamboo rush, *Sporodanthus traversii*, growing here with flowering swamp aster, *Olearia semidentata*, is able to recover more rapidly than woody species. A tarahinau seedling (inset) is the first glimpse of forest recovery on the tableland at the southeast edge of the Day block of the South Chatham conservation covenant. PHOTOS: AMANDA BAIRD, DOC

CHATHAM ISLAND COVENANTS

Of all New Zealand's outlying islands, the Chatham Islands 850 km east of Christchurch exhibit the greatest degree of endemism in their flora and fauna. Their location at 43–44°S, far out in the South Pacific Ocean, accounts for their frequent winds, storms and sea mists. Despite receiving little more than half the average sunlight of the New Zealand mainland, the islands nevertheless have an equable maritime environment, with few winter frosts and little diurnal variation in temperature.

Chatham Island (Rekohu) is nowhere higher than 300 m asl and is studded with lakes and wetlands. The largest – 18,000 ha Te Whanga Lagoon – is the island's main topographic feature. It is one of New Zealand's largest and least-modified saltwater lagoons and a haven for fish and migratory wading birds. A landscape feature of the otherwise low-lying northern end of the island is a line of small volcanic cones. To the south, the undulating southern tablelands are likewise of volcanic origin but are now deeply covered with peat. These southern tablelands are the wildest part of the island, terminating in impressive 200 m-high cliffs extending for 30 km along the south coast. The tablelands support the most extensive remaining forests on the island, especially in the Tuku, Kawhaki and Waipurua catchments. This is a habitat of critical importance for two of the world's most endangered birds: the parea/Chatham Island pigeon and the Chatham Islands tāiko/magenta petrel.

The native vegetation of the Chatham Islands is not only interesting because of the high degree of endemism in its flora (42 species and subspecies of the higher plants, or 11% of the Chatham Islands' total). It is also notable for the absence of the usual New Zealand forest trees like beech and podocarp species, as well as common coastal trees

1. A view southwards across Tuku Nature Reserve and the South Chatham covenants. This is the most important habitat of the parea/Chatham Island pigeon. The prominent tree is a rautini, one of the Chathams' tree daisies. PHOTO: DOC

2. The Parea/Chatham Island pigeon (*Hemiphaga chathamensis*), is critically endangered and its habitat is restricted to the southwest part of Chatham Island (Rekohu). Although similar in appearance to the New Zealand pigeon, it is around 20% heavier, making it one of the world's heaviest pigeons. PHOTO: DOC

3. Rautini, *Brachyglottis huntii*, is a striking sight when in flower. It is one of the Chatham Islands' distinctive tree daisy species and was once much more widespread. It is now most prevalent along the margins of streams flowing off the remote southern tablelands, including the South Chatham covenants. PHOTO: PETER DE LANGE, DOC

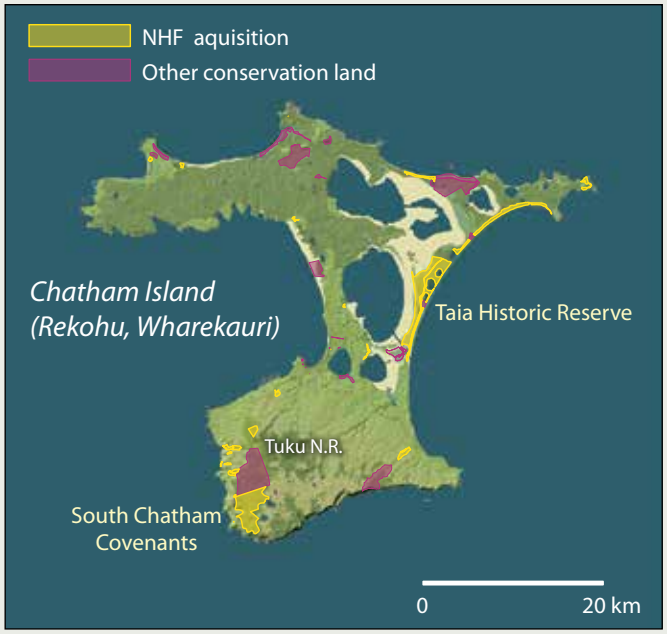
4. The Chatham Island swamp aster, *Olearia semidentata*, flowering profusely. PHOTO: PETER DE LANGE, DOC

like rātā, kohekohe and tawa. Instead, a limited number of usually woody shrubs have evolved into gigantic forms. For example, akeake, *Olearia traversiorum*, can grow to 15 m tall, and is the largest of New Zealand's many tree daisies. Likewise, common New Zealand shrub genera such as hebe and coprosma have here evolved tree forms, such as *Hebe barkeri* and *Coprosma chathamica*. Another example is the Chatham endemic tarahinau, *Dracophyllum arboreum*, its Latin descriptor denoting its treelike form (up to 12 m high); most other members of this genus occur as shrubs in the montane environment of mainland New Zealand.

The need to conserve the outstanding, but rapidly disappearing, biodiversity of the Chatham Islands became an issue in scientific circles in the early 1950s. The eminent DSIR scientist Sir Charles Fleming and his colleagues convinced the government to purchase the first reserve – South East Island (Rangatira Island) – in 1953. After the removal of sheep, the island became an important sanctuary for Chatham Islands' wildlife. Over the next 30 years the former Department of Lands and Survey acquired (often through generous gifting by the owners) another 20 significant nature, scenic or historic reserves. With the establishment of the Department of Conservation (DOC), additional lands were set aside as conservation areas in combination with the reserves; together, these now cover around 4700 ha, or 5% of the total land area of the Chathams. Many have protected habitat remnants where threatened plants and wildlife have survived through fencing-off the reserve from grazing stock. In the case of the 1239 ha Tuku Nature Reserve, intensive pest control for possums, rats and cats has benefited populations of the taiko (thought extinct until 1978) and parea (numbering only in the 40s in 1990). In particular, the saving of the black robin on Little Mangere Island (Tapuaenuku), The Fort and South East Island (Rangitira Island) through the pioneering conservation techniques of Don Merton and his Wildlife Service colleagues, is now a revered part of New Zealand's conservation folklore. But despite these reserves, DSIR botanist Geoff Kelly expressed alarm (in a series of survey reports) at the deterioration of the original vegetation of Chatham Island (Rekohu) through the depredations of introduced cattle, sheep, pigs and possums, along with natural tree death from storm damage, disease and old age. Wind damage during violent storms and stock browse are a deadly combination. These forces have caused the loss of 90% of the islands' forests. In the words of experienced field ecologist Geoff Walls, who spent many years studying the decline of the Chatham Islands' forests:

> Whenever domestic stock or feral browsers (especially cattle) are regularly present, forest understory becomes depleted, regeneration is impeded and the entire forest structure deteriorates. Forest invariably becomes woodland/tree fernland, which in turn becomes grassland, bracken fernland, sedgeland or bare ground. The process is frighteningly rapid.

When DOC took over all terrestrial conservation responsibility for the islands in 1987, staff were determined to develop a special relationship



Chatham Island covenants

with tangata whenua to ensure that conservation outcomes did not negate kaitiakitanga over their whenua and taonga. This became a real possibility with government establishing both the Forest (Nature) Heritage Fund (NHF) and the Ngā Whenua Rāhui fund in 1990, each with the ability to negotiate protective covenants (kawenata) over private land of conservation value.

The Royal Forest and Bird Protection Society (Forest & Bird) took the initiative and in 1990 submitted the first Chathams application to the newly-established NHF. This was for covenants to protect six privately-owned habitats – Mairangi, Big Bush, Te Roto, Gillespies Creek, Point Munning and Tuku. These were all forested areas and most of the $240,000 contributed by the fund was used to fence them to exclude sheep and cattle which were preventing any forest regeneration. Over the years, landowners' attitudes warmed towards covenanting for conservation – partly through the demonstrable benefits from fencing and pest control and partly through good advocacy work by DOC staff (including Ngā Whenua Rāhui staff). Since then, the fund has been involved in another 16 applications from private owners, all of them conservation covenants (see map and table) except for the outright purchase of the Taia property (now Taia Historic Reserve). In addition, the NHF helped fund the successful re-vegetation programme on Mangere Island over a period of four years from 1991 at a cost of $41,500; over 15 years more than 100,000 trees were planted on the island, dramatically altering its ecology and appearance.

In October 2009, the government showed its appreciation for the conservation commitment of islanders seeking covenants on their properties through the NHF. The Minister of Conservation, Kate Wilkinson, and NHF committee chair, Di Lucas, visited the islands to inspect some of these covenants and present certificates of appreciation to the landowners (see box) and to encourage further protection, especially on the Te Whanga Lagoon margin and in the northern parts of Chatham Island.

Although most of these covenanted areas have been of moderate size (less than 70 ha), NHF committee member Dr Gerry McSweeney considers them a microcosm of the natural ecosystems of Chatham Island (Rekohu), including:

> … rocky seacoast and dunelands rich in endangered plants; a chain of lowland forest remnants on limestone encircling a lagoon; low forest and shrubland growing on impoverished peatlands; part of the largest surviving contiguous area of bush on the island, home to endangered birds; and lowland forest and shrublands of major cultural importance to the Chathams indigenous people (Moriori).

Four of the applications to the NHF, however, have been for large areas of Chatham Island habitat. These were for the three properties making up the 1241 ha South Chatham covenant in 1995 and the 1198 ha Taia property in 2000 (see map).

The South Chatham Covenant – a fencing saga which achieved good conservation outcomes

The bulk of the remaining forest on Chatham Island (around 6000 ha) is found on the southern tablelands, so the approach to the NHF from the owners of the contiguous Holmes, Seymour

Table of Chatham Island covenants funded by the NHF, 1990–2010

COVENANT	OWNERS	AREA	ECOSYSTEM	OTHER COMMENTS
Mairangi	Keith Kamo, Leo Tuuta, Donald Tuuta and Albert Tuuta, representing majority shareholders.	12.6 ha	Matipo, kōpī forest.	One of few remaining coastal forests on volcanic soils of northern Chatham Is (CI).
Big Bush	Raana Tuuta.	6.4 ha	Mixed broadleaved forest.	Lagoon edge of limestone supporting CI kōwhai and CI ribbonwood.
Te Roto	Raana Tuuta and six shareowners.	6.1 ha	Kōpī-dominated broadleaved forest.	
Gillespies Creek	Alfred and Robyn Preece.	72.1 ha	Tarahinau-dominated forest with heathland regenerating to forest.	Threatened flora and fauna, including CI nīkau and astelia.
Point Munning	Muirson Fisheries (Muirson family).	51 ha	Coastal broadleaved forest, flax, scrub and coastal turfs. Unique situation of peat soils combined with schist.	Habitat for fur seals, Pitt Island shags and two threatened coastal cresses.
Te One School	Shanedale Fishing Ltd (Goomes family) and Ngāti Mutunga o Wharekauri Trust.	4.5 ha	Mixed broadleaved forest.	School project to engender conservation values and practise in pupils.
Kaingaroa Station	Barker family, then Kōpī Holdings (Hokotehi Moriori Trust).	247 ha	Coastal mixed forest on dunes and dune flats.	Megaherb habitat (CI forget-me-not and CI sow thistle).
Frank's Bush	Greg and Rosemarie Horler.	70.1 ha	Tarahinau-dominated mixed broadleaved forest.	Valuable northern extension of the southern forests.
Te Matarae	P F Smith, P A Smith and T Piper.	12.3 ha	Mixed kōpī-broadleaved forest.	On lagoon shore, with CI kōwhai and CI ribbonwood.
South Chatham 1	Robert and Jan Holmes.	180 ha	Tarahinau-dominated broadleaved forest.	Threatened flora and fauna, including rautini and red-crowned kākāriki. One of three significant CI nīkau populations.
South Chatham 2	Ron Seymour.	800 ha	Tarahinau-dominated broadleaved forest.	Threatened flora and fauna, including *Hebe barkeri*, rautini, and CI tāiko.
South Chatham 3	Neville Day and Chris Clark.	325 ha	Tarahinau-dominated and coastal broadleaved forest remnants.	Threatened flora and fauna, including keketerehe and red-crowned kākāriki.
Waihi	Jo and Pat Tuanui.	15.7 ha	Coastal broadleaved forest.	Includes a dune slack with re-established threatened wetland plants; CI toetoe, *Carex tenuiculmis* and *Deschampsia cespitosa*.
Maunganui	Anthony Tuanui and Deirdre Thomas.	14.5 ha	Coastal broadleaved forest and swamp forest.	
Rangitihi	Muirson Fisheries (Muirson family).	68.6 ha	Coastal broadleaved forest on dunes and dune flats and shore of a dune lake.	Threatened CI sow thistle above the beach.
Rakautahi	Alison Turner and Simon Norman.	9.1 ha	Coastal mixed broadleaved forest.	
Matakatau Creek	Denis Prendeville and Debra Whittaker-Prendeville.	28 ha	Tarahinau mixed broadleaved forest and regenerating shrub/fernland.	Threatened flora including rautini.
Awatotara Manuel & Evelyn Tuanui Family	Bruce Tuanui.	70.2 ha	Tarahinau mixed -broadleaved forest with kōpī and regeneration in shrub/fernland.	Threatened flora and fauna, including rautini and parea/CI pigeon.
Tuku	Bruce and Liz Tuanui.	52.3 ha	Tarahinau mixed broadleaved forest with kopi and regeneration in shrub/fernland.	Threatened flora and fauna, including *Hebe barkeri* and parea.
Kiringe, Waterfall Bush, Waterfall Coast	Bruce and Liz Tuanui.	19 ha	Mixed kōpī-broadleaved forest and coastal herbfields.	Winter feeding for wildlife.
Sweetwater	Bruce and Liz Tuanui.	6.7 ha	Tarahinau mixed broadleaved forest.	Predator-free habitat for translocated CI taiko and CI petrel management. Scarp features a good population of keketerehe.

and Day properties provided an exciting opportunity to covenant a large part of the forested tablelands south of the Tuku Nature Reserve. The area could then be fenced off, have domestic stock removed and feral animals eliminated. The biodiversity values of this remote landscape have been promoted to the islanders by DOC's senior ranger ecologist on the islands, Amanda Baird:

> The south-west supports the most extensive forest on Chatham Island, expanses of upland bamboo rush and Chatham aster, with important populations of threatened plants and animals. It contains the only breeding sites in the world for taiko and the Chatham Island mudfish … Cloud cover is more persistent inland, resulting in higher rainfall and lower evapo-transpiration. The gentle topography slows drainage producing wet ground conditions that favour moisture loving species, such as sphagnum moss and the endemic bamboo rush (native only to Chatham Island).

The NHF-financed fencing of the 17.4 km perimeter of the three titles that comprise the South Chatham Covenant was a monumental effort, spanning several years. The plan was to link up the South Chatham Covenant with the Tuku Nature Reserve to the north, thereby creating a 2479 ha protected area, by far the largest in the islands. Initial fencing on the more-accessible western side of the covenant was undertaken by several of the landowners and their family members; fencing materials were placed by helicopter along the 8.2 km length of a hand-cleared fence line. Some years later the 9.2 km eastern and southern portions of the fence were built. As this boundary was more remote and inaccessible to vehicles,

1. A view across the Taia Historic Reserve, looking southwards. In the foreground is a vegetation community of bracken fern and pouterere, *Leptecophylla robusta*, a shrub endemic to the Chatham Islands. Beyond, on damper ground, inaka, *Dracophyllum scoparium*, is re-establishing within the bamboo rushes. PHOTO: AMANDA BAIRD, DOC

2. A dendroglyph (raukau momori) on a kōpō, *Corynocarpus laevigatus*, tree within Chatham Island māhoe, *Melicytus chathamicus*, forest in Taia Historic Reserve. PHOTO: LES MOLLOY

3. Looking east from the middle of the Taia Peninsula in Taia Historic Reserve, with the south shore of Lake Kairae on the left and the northern end of Lake Taia on the right. PHOTO: AMANDA BAIRD, DOC

4. The rare Chatham Island button daisy, *Leptinella featherstonii*, (At risk – Relict) is now confined to cliff sites around Kaingaroa where it has a close association with bird-nesting sites. PHOTO: PETER DE LANGE, DOC

fencing was achieved by teams camping out and a helicopter placing 130 bundles of materials at 70 m intervals along the cleared boundary. Because of the few defining topographic features in this landscape of continuous forest and shrubland, local and mainland DOC staff needed to spend weeks manually clearing a fence line along the legal boundary; this was followed by two teams of local farmers undertaking the majority of the fencing – in all, a truly heroic effort!

At the time the fencing was completed, cattle and hundreds of wild Saxon merino sheep inhabited the extensive peat forests and adjacent open coastal parts of the covenant. Following fencing, one of the landowners worked to attract cattle back onto his farmland while elsewhere such steady hunting pressure was applied that cattle have probably been eliminated. A helicopter inspection in October 2015 did not detect any feral cattle. Feral sheep numbers are now much lower and they only occur in small scattered groups; the October 2015 helicopter inspection suggested around 60 animals.

Taia Historic Reserve – a regenerating wetland

By contrast, the Taia property encompasses 11 km of the sand spit between the eastern side of Te Whanga Lagoon and Hanson Bay (see map). The northern part contains three lakes tucked behind the dune system – Makuku, Kairae and Taia – while further west and south the landscape is a wetland of ephemeral ponds and meandering channels covered in swamp vegetation. This consists largely of rushes, sedges and restiads (particularly the endemic bamboo rush, *Sporadanthus traversii*), with regenerating swamp heath/inaka, *Dracophyllum scoparium*; more recently, moisture-loving Chatham Island karamu, *Coprosma chathamica*, is establishing. These wetlands comprise about 90% of the property but kōpī/akeake forest remains as a thin ribbon along the back of some of the dune system and as isolated stands around the lakes.

The Kaingaroa Station dunelands and forest (247 ha), adjacent to the Taia property on its northern side and bordered by Hanson Bay, were protected by covenant in one of the earliest NHF cases on Chatham Island (in 1991). The Barker family had farmed Kaingaroa Station for 100 years before selling it to the Hokotehi Moriori Trust in 2003. Furthermore, in 1990 the Barkers had given the land for one of New Zealand's most important reserves – the J.M. Barker National Historic Reserve (Hāpūpū) – to protect its raukau momori (or carved dendroglyphs) of great historical and cultural importance to Moriori. However, stock from the farmed Taia property to the south were roaming up Hanson Bay beach and entering the Kaingaroa dunes from the seaward side. The 1198 ha Taia property was then bought outright by the NHF from local farmers Ted and Ann Hough, with the application initiated by Moriori and facilitated by the Nga Whenua Rahui committee. The purchase of the Taia property and its destocking overcame the problem of stock trespass onto the Kaingaroa Station dunes and has resulted in a dramatic improvement of forest regeneration within both the Kaingaroa covenant and the Taia purchase.

In announcing the Taia purchase in February 2002, Minister of Conservation Sandra Lee stated that the management plan for what would now be a large Taia Historic Reserve would recognise Moriori as kaitiaki. At the time, Hokotehi Moriori Trust chairperson Alfred Preece described the purchase as a "win-win" for all concerned:

> It is particularly a win-win for the landowners because they have been trying to sell the property for a number of years. It's not a viable farming unit but low-lying land and only farmable when the lagoon is open.

He re-iterated the damaging effect that cattle previously had on the conservation values now within the reserve and expressed his hope for the future land management partnership between DOC and Moriori:

> I can see only good things coming from it because we share a similar kaupapa as far as conservation is concerned.

The overall investment by the NHF in the Chatham Islands has been around $1,430,000, most of this spent on fencing to protect the biodiversity of around 3225 ha of covenanted private land. Covenanted lands (via both NHF and Ngā Whenua Rāhui) are now almost as extensive as the public conservation land and play a crucial role in protecting the islands' unique biodiversity – both their range of ecosystems and species (about 11% of plants and 22% of birds are endemic). Given the small portion of land that is protected compared with the mainland (about 9% compared with 32%) it is essential that the fundamentals of stock exclusion by fencing and the removal of feral stock (especially within remnant forests on Chatham Island (Rekohu) and Pitt Island (Rangiautia)) are rigorously maintained. DOC recognises this management priority through a regular maintenance programme for reserve and covenant fences and by undertaking hunting where animal problems develop. ■

CONCLUSION

Why has the Nature Heritage Fund been so successful?

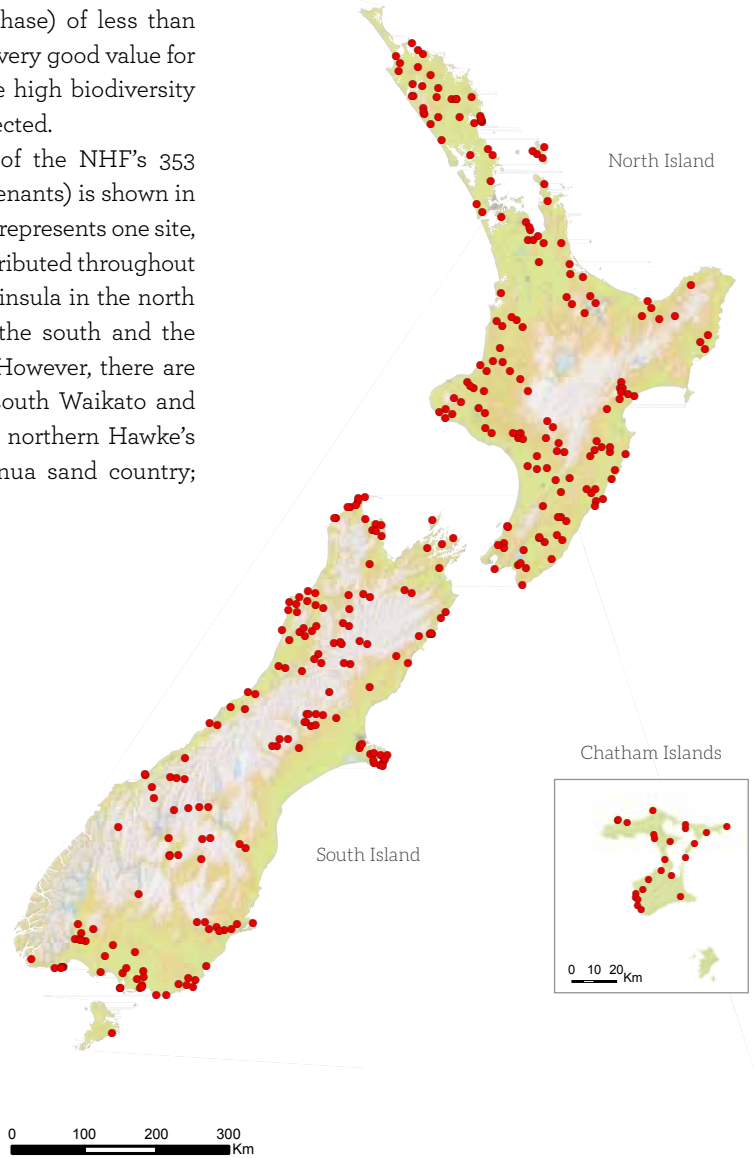
LOOKING BACK over 25 years of operation, involving the evaluation of over 1370 site applications, the Nature Heritage Fund (NHF) committee can reflect on what has been achieved. The outcome of the NHF's work up until mid-2015 is summarised in terms of overall area and cost in the table below.

The area of 341,881 ha protected is impressive – almost 1.3% of New Zealand's land area. More covenants in perpetuity (395) have been achieved, compared with the 353 outright acquisitions. However, the purchased sites are much larger on average and make up nearly 88% of the total area protected by the NHF. The overall cost (measured in dollars at the time of purchase) of less than $500 per hectare is considered very good value for the taxpayers' dollar, given the high biodiversity values of most of the land protected.

The regional distribution of the NHF's 353 purchases (and the SILNA covenants) is shown in the sketch map, where each dot represents one site, regardless of size. Sites are distributed throughout the country, from Karikari Peninsula in the north to Stewart Island/Rakiura in the south and the Chatham Islands to the east. However, there are some notable regional gaps: south Waikato and the catchment of Lake Taupo; northern Hawke's Bay; the Manawatu/Horowhenua sand country;

Nature Heritage Fund statistics as at 30 June 2015.

		Total area (hectares)	Average size (hectares)	Cost per hectare
Applications received to date	1369			
Cases approved	748			
Area protected (hectares)	341,881			
Overall cost	$162.94m			$476.60
Number of covenants	395	41,842	106	$99.03
Number of acquisitions	353	300,039	850	$529.25



The map shows the geographic spread of the areas protected by the NHF on private land through purchases and covenants throughout New Zealand and Chatham Island in the 25 years since 1990.

The points are indicative only and do not reflect the size of the individual areas protected.

[Note: the 310 Open Space covenants that were funded by the NHF prior to the late 1990s are not included on this map].

1. Associate Minister of Conservation, Nicky Wagner, with the NHF group at the 25th celebration at Hakatere Conservation Park, 5 December 2015. From L to R at back: Mike Lee, Minister Nicky Wagner, former Minister of Conservation Phillip Woollaston, NHF Chair Di Lucas, Gwenda Harris, Jan Riddell, Les Molloy. Front: Gerry McSweeney and John Wardle. PHOTO: LOU SANSON

central Marlborough; Canterbury Plains and Mackenzie Basin; North and Central Otago.

Has the NHF been effective in its present modus operandi? The Minister of Conservation commissioned an independent review of the Fund and its operations in 2010. The review team's conclusions were very supportive and included the following observations on the Fund's achievements and operations:

- [there are instances of] ... farmer-initiated applications where land purchased by the Fund for protection facilitated improved agricultural utilisation on remaining land. The Fund also has strong networks with community restoration groups and local government, and frequently assists with funds for assessments, fencing, and pest management ...
- We are impressed with the scope and content of these reports [NHF regional strategies]. We consider they form a consistent and comprehensive set of reference points that materially assist fund applicants, decision making, and especially prioritisation.
- In terms of the biodiversity criteria ... we can confirm that the Nature Heritage Fund has adopted clear assessment criteria that support Government priorities.
- We therefore consider the fund's operational and purchase costs as representing good value for money. Moreover the fund has leveraged considerable additional contributions for some purchases.

Guiding principles: what has the NHF learned?

Over the last 25 years, in its efforts to answer the questions of "where, what, why and for whom" in its assessment of applications, the NHF committee has learned to be guided by the following 16 principles:

- Be responsive and flexible in response to approaches from landowners and, within reason, tailor individual packages to suit each landowner's particular circumstances.
- Pay a fair market price for the ecosystems recommended for protection and sometimes assist with one-off actions to protect natural areas, such as fencing.
- Accept that there will be times when it is appropriate to walk away from negotiations rather than set high bench marks for future purchases by agreeing to unrealistic prices or purchase conditions. Frequently, the same conservation option will reappear with a better solution at a later date.
- Maintain an entirely voluntary approach to covenanting or purchase, with the complete lack of any compulsory measures.
- Conduct all negotiations on a willing seller-willing buyer basis in commercial confidence.
- Ensure that landowners can plan their futures with greater certainty by using the Fund's delegated ability to negotiate settlements promptly and pay for them quickly. This ability to make unconditional offers also speeds up the whole process.
- Be prepared to protect large areas (such as Clarence Reserve, Birchwood, Waitutu or St James) when assessments show that piecemeal protection could not achieve the integrated nature and landscape conservation and recreational opportunity outcomes possible from large-scale protection.
- Be responsive to political, community and iwi support for land protection.
- Welcome applications from third parties, such as non-governmental organisations (NGOs), for sites they consider should be purchased for protection.
- Maintain a tight set of assessment criteria, efficient responses to applicants, low administration costs, and ensure that any protection is in perpetuity and legally enforceable.
- Recognise the value of NHF leverage in bringing about a joint venture, often with adjacent landowners, but also with local government agencies and NGOs.
- Respect and support those landowners who are prepared to sell to the NHF at a fair market price, and be particularly responsive to those who have a passion to see their areas protected in perpetuity, but also accept that they may sell land for conservation at less

than they might achieve on an open market.

- Be open to helping to achieve acceptable solutions at times when the community is keen to protect outstanding natural values on private land but the landowners require a reasonable return from protecting their land.
- Recognise that long-term biodiversity conservation often requires land managers to carry out landscape-scale pest and weed control, so the purchase and subsequent incorporation of enclaves of private land into parks and reserves can often make biodiversity protection more efficient and effective.
- Try to avoid the 'double dipping' scenario where land already protected by covenant or strict resource consent conditions is offered for outright purchase.
- Avoid involvement in sites subject to Resource Management Act consents that have already applied protection conditions.

The future – the work remaining to be done

Some people might say that the work of government funds such as the NHF will never be completed to everyone's satisfaction; that there will always be the need for such funds to respond to situations where private land of high biodiversity (or geodiversity) value should be protected in the national interest. Despite 25 years of achievement by the NHF in New Zealand, there are still many ecosystems lacking representative areas in permanent protection. The 'recommended areas for protection' (RAPs) resulting from Protected Natural Area (PNA) surveys are still important indicators of gaps which should be filled. However, PNA surveys have not been completed for all Ecological Regions and Districts, so 'filling the gaps' means that authoritative and comprehensive inventories of the biodiversity remaining in these areas are still required.

Obviously, covenanting the remaining high-priority SILNA indigenous forests of Otago and Southland is still a work in progress. On the other hand, the outstanding network of eastern South Island high country parks now established is primarily the result of NHF purchases and conservation land derived from pastoral lease tenure review. Further tenure review will hopefully protect a significant range of the valley floor indigenous grasslands and wetlands that could otherwise remain at risk of being lost through intensive agricultural development. With regard to the high country, the standout biodiversity and landscape conservation challenge is to achieve a 'Mackenzie Basin Drylands Park'. There will always be situations where the acquisition of privately-owned ecosystems on the margins of our national parks is in the national interest. A topical case at this time (February 2016) is the over-whelming public response to the 'crowd-funding' effort by almost 40,000 citizens to purchase 7 ha of a privately-owned iconic sandspit at the mouth of Awaroa Inlet adjacent to Abel Tasman National Park.

Because the NHF is now at its lowest level of funding in its 25-year history, it will need to be even more strategic in its work but, by necessity, will be limited in its ability to address new applications. It will still need to respond positively to applications aimed at protecting natural ecosystems which are limited in extent, such as coastal dunelands and forests, estuary margins, wetlands and karst landscapes (and other 'originally rare' ecosystems with unusual geology or landforms).

With the increasing threat to the stability of our indigenous ecosystems from climate change, a long-term focus on site sustainability and resilience will be paramount. Two of the NHF's very successful strategic initiatives are likely to continue – enabling better biodiversity conservation outcomes by enhancing protected area linkages and corridors ('connectivity'); and increasing the buffering and resilience of our national parks through purchases which allow the infilling of private enclaves or the augmenting of otherwise unsatisfactory boundaries.

The last 25 years have seen a transformation of the New Zealand park and reserve network, largely through the work of successive supportive governments, often using the NHF's purchases as a catalyst. Many new parks in the high country, and mountains-to-sea conservation land sequences, only exist because NHF initiatives protected the core of these areas. Moreover, in the last 25 years the NHF has contributed to a re-defining of New Zealand's conservation aesthetics. Conservation lands are no longer primarily snowy mountains and forested ranges; instead, they now encompass a wonderful diversity of coastal dunelands, kauri gumlands, estuaries, wetlands, salt pans and shrublands (the latter formerly described by the pejorative term 'scrub').

The next 25 years will hopefully see these important NHF and government conservation initiatives consolidated and expanded such that every New Zealander and visitor can delight in the unique and special ecosystems of New Zealand confident that these are being well managed and preserved for the future.

NHF Committee members and Ministers of Conservation, 1990–2015

NHF Committee:

Di Lucas (Chair)	1990 – Present
Gerry McSweeney	1990 – Present
John Wardle	1990 – 1999
Jim Pottinger	1990 – 2001
John Ruru	1990 – 1991
Jan Riddell	2001 – Present
Mike Lee	2001 – Present
Les Molloy	2008 – Present

Fund Manager (DOC) NHF support staff

Allan Mackenzie (Fund Manager) 1990–2014, assisted by NHF executive officers/advisors Gwenda Harris 1990–1992, Natalie Quirk 1993–1994 and John Morton 1995–2016 during this period.

Ministers of Conservation:

Philip Woollaston	1990
Denis Marshall	1990–1996
Simon Upton	1996
Nick Smith	1996–1999
Sandra Lee	1999–2002
Chris Carter	2002–2007
Steve Chadwick	2007–2008
Tim Groser	2008–2010
Kate Wilkinson	2010–2013
Nick Smith	2013–2014
Maggie Barry	2014–
Nicky Wagner Assoc. Minister	2015–

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New Zealand Government