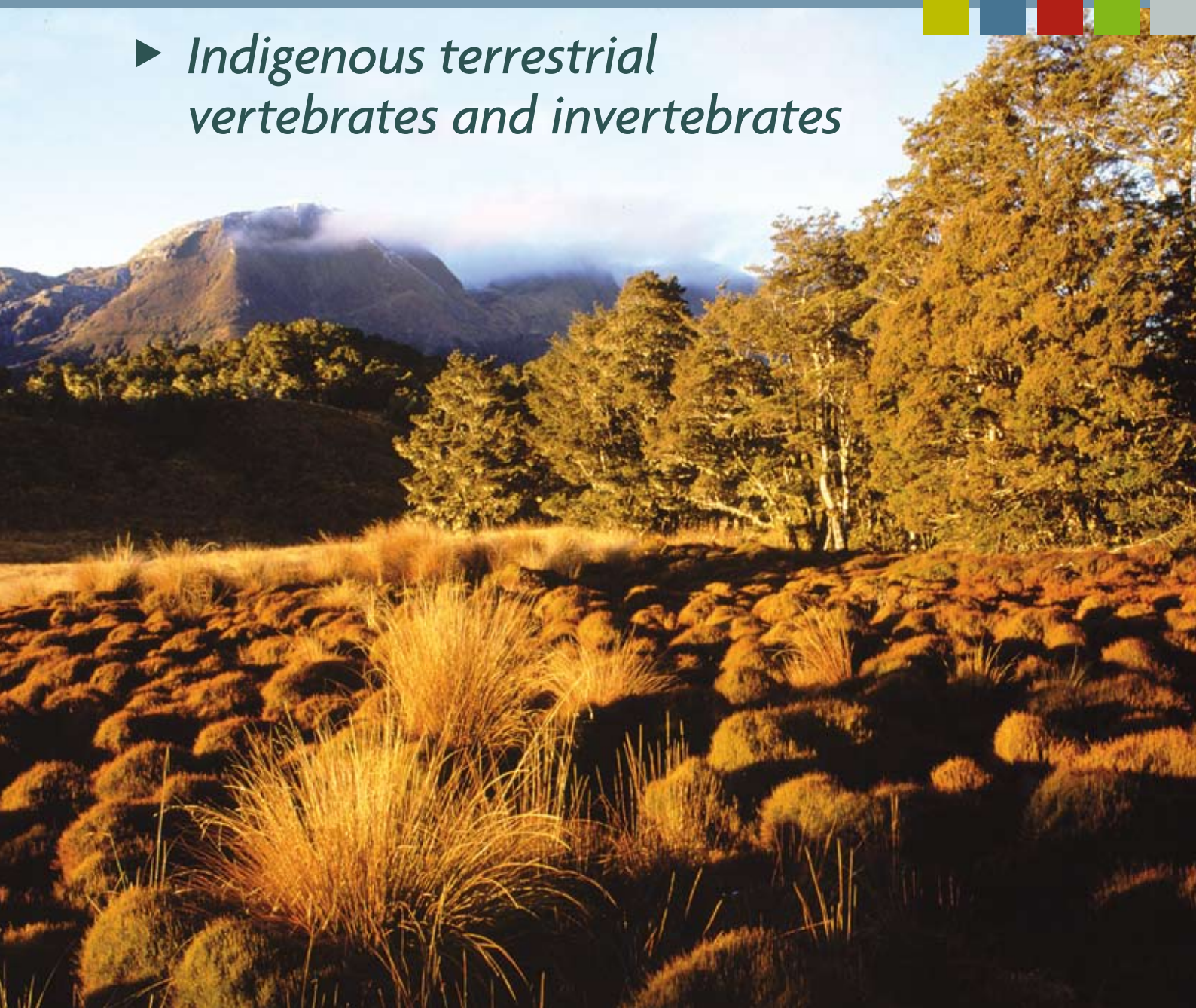


# Tasman District Biodiversity Overview

- ▶ *Indigenous terrestrial vertebrates and invertebrates*



### **Acknowledgement**

Tasman District Council acknowledges funding from the Biodiversity Advice Fund for the printing of this report.

# Tasman District Biodiversity Overview



- ▶ *Indigenous terrestrial vertebrates and invertebrates*

# “And what of the



*“And what of the birds themselves? Diminished larders can only support a certain number of birds, and it is useless to increase bird-life by breeding unless the native food is correspondingly increased. In spite of this they are making astounding efforts to remain in existence. Pigeons, bellbirds, tuis and several species of smaller birds have shown signs of adapting themselves to new environments. Others, less adaptable, have been driven back into the last remaining wilds of New Zealand, where from their mountain vastness they may stage a comeback, if given the opportunity. But, optimistic as one would wish to be, the odds are too many and too heavy against the native fauna. Action is urgently required unless it is to come too late.”*

Perrine Moncrieff, one of the district's foremost conservationists, writing in the Journal for the Society for the Preservation of the Fauna of the Empire in 1944.

# *birds themselves?”*

# Summary

## Executive summary

Tasman District is rich in animal life including many species found nowhere else in the country. This is due in part to its complex recent geological history featuring mountain uplift and faulting, glaciation, and changing sea levels. Tasman offers the largest and most diverse range of limestone and marble landscapes in the country and these areas support their own very localised populations of fauna.

This review aims to outline the role that private landowners who manage a significant proportion of ecologically valuable land – including wetlands and lowland forest that have diminished dramatically – can play in conservation of their local environment and the plants and animals it supports. Management of introduced pest species offers a particular opportunity for involvement in conservation both on private land and across other habitats within the public conservation estate.

A detailed picture of the fauna lost from the district can be put together from the remains found in caves and the observations of the early explorers. The process of extinction revealed continues. Tuatara, native frogs and several seabirds were gone from Tasman before 1800; takahe, saddleback and orange-fronted parakeet lost by 1975; and red-crowned parakeet, yellowhead, kakapo, kokako, little spotted kiwi and Australasian crested grebe apparently died out in the last 30 years.

Tasman is nationally important for its birdlife. Farewell Spit and the district's estuaries and inlets support almost 23% of the country's wading birds in summer and 15% in winter. Coastal wetlands hold most of the South Island population of banded rail. The large areas of forest including Kahurangi and Nelson Lakes National Parks still support populations of kaka, kea, rock wren, falcon and great spotted kiwi as well as the more common forest birds, but several of these species continue to decline. Their rivers are steadily losing blue duck, except where stoat control and reintroductions of birds are taking place.

One of the native bat species, the long-tailed, is still quite widespread in small numbers but the other, the short-tailed has not been recorded since 1977. No native frogs are currently known from the South Island though two species still in existence have been found there in the past. Eight lizard species are found in Tasman; several of these are widespread in distribution and others restricted to small areas particularly in the uplands, e.g. Mt Arthur. A similar pattern is shown by the district's invertebrate fauna. Kahurangi holds the most diverse range of giant *Powelliphanta* land snails nationally, many species confined to the tops of different mountain ranges or individual peaks. It also supports a unique cave fauna with new species still being discovered.

The continuing threats to Tasman's fauna are outlined. While past factors like clearance of forests and drainage of wetlands are less significant today, pest animals and plants are increasingly recognised as key problems. The Council and landowners are obliged to control certain pests, particularly invasive weeds, as set out in the Regional Pest Management Strategy. Possums are a major target of Animal Health Board and Department of Conservation control programmes. However the most exciting development in the past decade has been the way that individuals and community groups have developed their own programmes to tackle key predators: mustelids (stoats, ferrets and weasels) and rats. Proven strategies now exist and these are briefly described.

The increasing efforts of individuals, complementing the conservation work of central and local government, gives hope that the next review will document a turnaround for the district's indigenous fauna. Declines seen in many species may have been halted over large areas and reintroductions may have returned them to more of their previous haunts.

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# Introduction<sup>1</sup>

## 1.1 Purpose:

This review is intended as a companion volume to the earlier 'Review of Indigenous Ecosystems on Private Land in Tasman District and Opportunities for Protection' produced for the TDC by Geoff Walls and Philip Simpson (Walls & Simpson 2004). That report aimed to assist Council and private owners to consider ways to better protect and enhance the ecology of natural areas on their land. This report provides a faunal context, summarising the key animal groups and species present and identifying steps that can be taken to protect and enhance their populations.

The ecosystems review worked with defined land areas to identify the proportion of each ecosystem type that was protected, and specify where private landowners could make the greatest contribution. Wildlife of course can move between different areas and habitats, between private land, council land and the public conservation estate. To focus just on species that may be found on private land would provide an incomplete picture. Thus this review looks across all the key faunal groups of the district and the habitats in which they are found. It identifies those habitats present within private land where owners can make a significant difference through measures like habitat enhancement, pest animal and weed control.

## 1.2 Scope:

This overview provides the first summary of the district's fauna since the survey of the wildlife of the wider Nelson Region carried out by the Fauna Survey Unit of the Wildlife Service in 1979-1985 (Walker 1987). Like that earlier review, this one looks at terrestrial fauna only and does not address freshwater and marine elements. The word 'indigenous', i.e. found naturally in the country, is used to define the species covered by the overview. This means, for example, that it distinguishes between two types of bird added to the fauna in the last two centuries. Those that were brought in by Europeans in the process known as 'acclimatisation' such as blackbirds, finches and little owls are defined as 'introduced species' and excluded from the review. However those that have introduced themselves, largely by flying across the Tasman Sea and thus continuing a natural process of colonisation that has been going on for millions of years, are included. This adds species like the silvereye (arrived c 1860), white-faced heron and spur-winged plover (c 1940), and welcome swallow and black-fronted dotterel (1950's) (Walker, op. cit.).

## 1.3 Introducing the Fauna

The district's biological richness identified by Walls & Simpson (op. cit.) is largely a reflection of its high diversity of animal and plant species, a significant number of which are 'endemic' (i.e. only found here). The uplands of Northwest Nelson, for example, form one of five main centres of plant species evolution on the mainland with 71 taxa of plants confined there (DOC, 1996).

This overview covers all bird, mammal and reptile species and a selection of invertebrates of particular interest. The birdlife of the district includes nearly all the forest bird species remaining on the South Island mainland except for yellowhead and orange-fronted parakeet, and a rich diversity of coastal species including migratory waders. One or perhaps two bat species are present. The reptile fauna has ten taxa including two endemic to the district. The invertebrate fauna best demonstrates the special nature of Tasman with many endemics.

## 1.4 Why Tasman has the fauna it does

A combination of natural and human-induced factors lies behind the current distributions of indigenous species in the district. The natural environment is characterised in this report by different ecosystems and habitats; by altitude - described as a mountains to sea gradient; and by geology - in particular the extent of calcium-rich rocks (limestone, marble). There have been dramatic changes in this environment in recent geological times which have contributed to the pattern of species found today. Human-induced changes have had even greater impacts on the fauna leading to a cascade of national and local extinctions (section 1.4.3). A key question for this report is which human-induced factors can be mitigated or reversed, to lead to a return of native species to more of their previous range and numbers?

Past activities of people and the animals and plants they brought with them has contributed significantly to the pattern of extinction. Currently human activity, and thus its impact, is concentrated along the coast in the west of the district and extends inland to the east - Motueka and Buller Valleys, Waimea Plains. Private land is a particular overlay, though the impacts of people clearly extend throughout, as do the impacts of the species brought with them.



### 1.4.1 A brief geology lesson

Tasman District has very diverse geology (as figure 1) which in turn creates a wide variety of habitats for colonisation by plants and animals. It has some of the oldest rocks in New Zealand, is bisected by the dramatic Alpine Fault, contains large areas of karst (limestone and marble) landscapes and has a dramatic history of mountain uplift, sea level changes and glaciation.

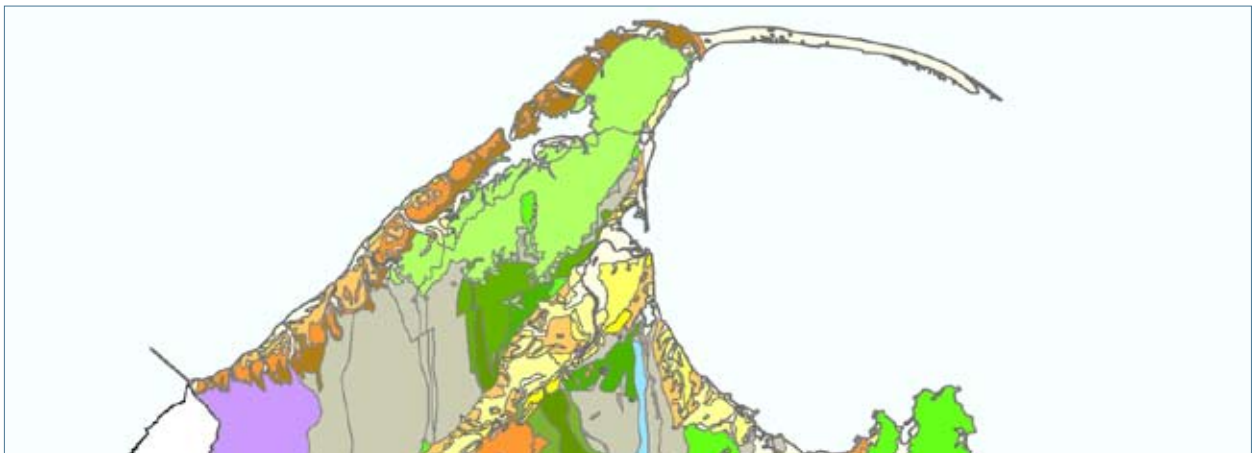
The 'recent' geological history of the district can be summarised as follows (from Stevens et al. (1988)). During the Pliocene era 5 to 2 million years ago the mountains of the Southern Alps were created by the uplift of the land. As the mountain ranges were rising, so too were world sea levels, so that many areas of New Zealand were submerged for the last time in the late Pliocene. Cook Strait was formed at this time. The last ice age began about 2.4 million years ago around the start of the Pleistocene era, comprising periods of cold glacials interspersed with warmer inter-glacials. During the glacials, sea levels fell and the North and South Islands were joined. The last glacial from 100,000 to 10,000 years ago was the most intense comprising major cold phases in between three warmer ones. Forest was very restricted in area during the cold phases. During the most recent cold phase from 25,000 to 15,000 years ago, sea levels dropped around 120 metres forming a temporary landbridge between Tasman and Taranaki. From 14,000 years ago the climate improved

and shrubland began replacing grassland and from 10,000 years ago a major warming phase occurred allowing forests, previously only surviving as patches in Northwest Nelson, to expand rapidly. This expansion was associated with species changes. Seven thousand years ago rimu was probably at its peak extent, and populations of native fauna at their highest. However beech forests were then expanding and by 2,500 years ago a transformation to large areas being covered by this habitat was complete.

The district contains the largest and most diverse range of karst landscapes in New Zealand, particularly the Mt Owen massif, Arthur Range, Takaka Hill/Pipikiruna Range and the Northwest Coast (DOC, 1996). Within these areas are the four deepest cave systems in the Southern Hemisphere, of which Nettlebed (889m) is the deepest, and the three longest in New Zealand headed by Bulmer (39km). These karst areas support particular above-ground associations of plants and animals, contributing to the high number of 71 plant taxa found only in Northwest Nelson. They also contain the highest diversity of below-ground fauna in the country including beetles, spiders, millipedes, wetas and other groups. The cave systems are also a wonderful source of sub-fossil animal bones which allows a detailed picture of the district's faunal history to be developed (section 1.4.3).

One of the most interesting examples of the impacts of these geological changes on the fauna is the evolution

► Figure 1 Geology of northern part of the district



This figure shows the many different rock types found in the district as represented by different colours. It is sourced from Land Information New Zealand data ([www.linz.govt.nz](http://www.linz.govt.nz)) (Crown Copyright reserved). The key that identifies the rocks by colour is too complex to display here.

of *Powelliphanta* land-snails. It is considered likely that today's species originated from small, cold-adapted snails of tussock grasslands (similar to *Powelliphanta rossiana*) – a habitat covering large areas during repeated glaciation events (Walker 2003). The comings and goings of glaciers, rising and falling sea levels and changes in climate eventually restricted such habitats to the tops of mountain ranges and different populations of snails were then isolated from each other and evolved into separate taxa. At the same time the snails adapted to spread into the forested habitats as they increased in extent, producing a further set of taxa typically with larger shells. The result is that Tasman has 29 different *Powelliphanta* taxa spread from the coast to the mountains.

### 1.4.2 Ecosystems of the district and their loss

Walls & Simpson (2004) identified that Tasman District is large and ecologically very rich and interesting. They identified eighteen ecosystem types and these have been grouped for this report into four zones (Table 1):

- Coastal
- Lowland – below 600m altitude
- Upland – between 600 and tree-line (typically c 1440m)
- Mountain – above tree-line

Ecosystem	Zone	% Unprotected
Coastal sand dune and flat	Coastal	49
Estuarine wetland	Coastal	63
Fertile lowland swamp and pond	Lowland	61
Lowland podocarp forest	Lowland	56
Lowland broadleaved forest	Lowland	62
Lowland mixed forest	Lowland	64
Lowland beech forest	Lowland	33
Lowland shrubland	Lowland	55
Frost flat communities	Lowland	33
Infertile peat bog	Lowland/Upland	32
Upland beech forest	Upland	6
Subalpine forest	Upland	0
Upland/subalpine shrubland	Upland/Mountain	0.9
Tussock grassland	Mountain	0
Alpine herbfield and fellfield	Mountain	0
Upland tarn	Mountain	0
Lake	All Zones	11
River, stream and riparian ecosystems	All Zones	34

Table 1: Ecosystems of the district (source: Walls & Simpson 2004), their Altitudinal Zoning and Proportion Unprotected.

The proportion of each that has no formal protection (% unprotected) was recorded as follows (Table 1):

The figures indicate that private landowners may be able to make the greatest contribution to the conservation of the district's fauna in coastal areas, wetlands and lowland forests and shrublands. Other ecosystems such as alpine ones are largely confined to the public conservation estate managed by the Department of Conservation (DOC).

#### Forest loss

Figure 2 shows the pattern of forest loss in the district. It shows for example that apart from a narrow coastal plain of scrub and grassland, all the area to the northwest of the Moutere Inlet was forest before human settlement.

#### Wetland loss

Tasman district shows a recent history of significant loss of wetlands that is common throughout the country. Waimea has lost 90% of its wetland area, Golden Bay over 70% and West Coast and Abel Tasman over 30% (Table 2) (Preece, 2000). Of the wetlands remaining in 1999 only 8.4% were formally protected. Thus individual landowners have a major role to play in the conservation of these vital areas, and in their restoration or potential replacement.

► Figure 2: Forest loss (source: Department of Conservation)

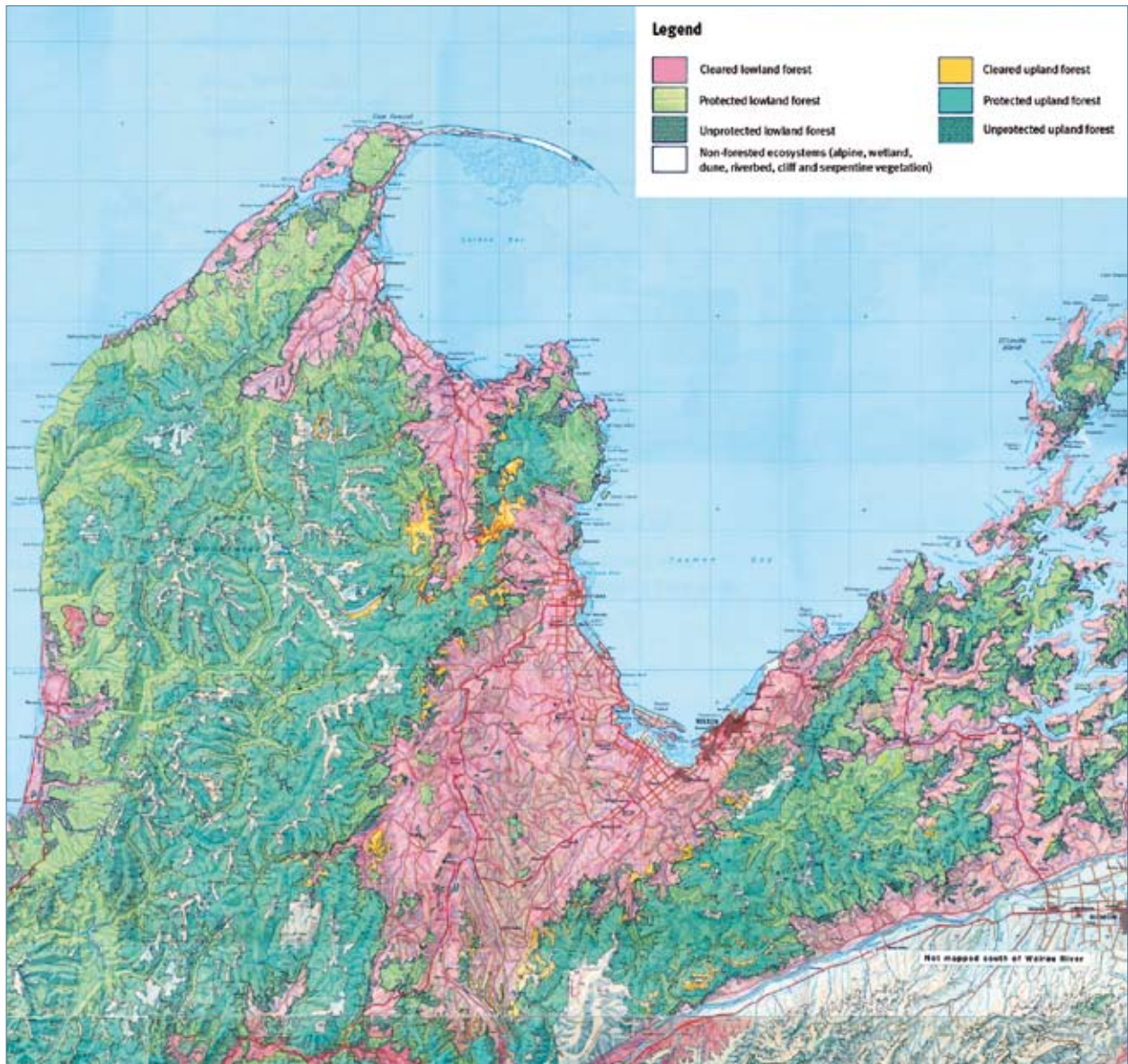


Table 2: Palustrine wetland area and protection for four lowland ecological districts (source: Preece 2000).

Ecological District	1840 area (ha)	1999 area (ha)	Percent of wetlands area lost	Protected wetlands	Percent of 1840 area protected	Percent of 1999 area protected
Golden Bay	3666	814	77.8%	37	1%	4.5%
Motueka	2322	6	99.7%	1.7	0.1%	30%
Moutere	824	59	92.8%	5.5	0.7%	9.3%
West Whanganui	1031	612	40.6%	81	7.9%	13.3%
Total	7843	1491	81%	125	1.6%	8.4%

### 1.4.3 The influence of people and the species they introduced

It is fortunate that Tasman District has an extensive sub-fossil record, particularly of cave deposits, in addition to many detailed reports made by early European explorers. This makes it possible to document the extinction of a range of birds, mammals and amphibians. More importantly in the context of this review, it allows one to record the declines - or 'retreats' to certain habitats - of a range of species which can still potentially be reversed by the actions of landowners in cooperation with other agencies. In the most extreme examples some of these species are no longer found in the district (e.g. kakapo, tuatara) and their return is a longer-term objective.

The changes in the district's fauna as documented below can be attributed directly to the arrival of people and the animals (and their diseases) that they brought with them. The first impact was that of the kiore or Polynesian rats, which we now know reached New Zealand about 2000 years ago, brought by Maori, followed by dogs, then by Europeans and an ongoing series of mammals and other pests.

Caves have preserved many remains of flightless birds like moa and kakapo that fell into them. However they also hold comprehensive samples of smaller birds, bats, reptiles and amphibians left by predatory birds such as the laughing owl that roosted within them (Figure 3).

Sub-fossil bones show that the district once contained a large proportion of New Zealand's extinct fauna as on Takaka Hill for example (Figure 4). It did lack a small number of species found in drier habitats further east, and some wetland species which may have been present but not recorded due to a lack of suitable sites such as swamps. Worthy & Holdaway (2002) have compiled a very thorough review of New Zealand's past faunas. Appendix 1 lists 22 extinct species once recorded here.

A detailed picture of species loss can be developed. Appendix 2 shows a continuous process of extinction beginning with the arrival of kiore, affecting smaller species. Larger species like the moa and adzebills were killed off largely by hunting and habitat modification in the first century of Polynesian settlement. The arrival of Europeans accompanied by a new set of predators (particularly ship rats and mustelids) 'finished off' a final group of species.

Of most interest to this review are species extinct in Tasman District but surviving elsewhere, for they are possible candidates for reintroductions. Working from the present backwards provides the following list of such species:

**Extinct in Tasman in the past 30 years (1977–2007) or possibly still present in very small numbers:** red-crowned parakeet, yellowhead, little spotted kiwi, Australasian crested grebe, SI kokako, kakapo.

**Extinct 1925-75:** takahe, saddleback, orange-fronted parakeet.

**Probably extinct well before the 1800s:** tuatara, several ground-nesting seabird species, Hamilton's frog, Hochstetter's frog.

The early European explorers and settlers in the district witnessed the tail end of this wave of extinctions. While many species had already gone, those that remained were still relatively numerous as the following quotes show:

"It was with the greatest delight that I looked over this beautiful lake; (Rotorua) its deep blue waters reflected the high rocky mountain chains on its eastern and southern shores... The surface of the lake swarmed with birds, giving life to this magnificent scene." (Julius von Haast. 1861. Exploration of the Western Districts of the Province of Nelson).

"Large grey kiwis were visible in the evenings... There were crows (kokako), fernbirds, woodhens (weka) and brown cuckoos as well as blue ducks on the Buller River. Paradise ducks, tuis, parakeets, both red and yellow, saddlebacks, wrens (probably bush wrens) and bush canaries (yellowhead) were all about in large numbers before the stoats and weasels came, and kakas arrived in their thousands whenever food was plentiful." (Win family recollections of late 1880s in Buller country in Newport, 1962).

Around this same time the settlers set about the introduction of overseas birds, following the formation of the Nelson Acclimatisation Society in 1863 which released 143 birds of 16 species in its first year. By 1876 some species were already becoming pests for farmers and orchardists and imports largely ceased in the 1910s. Fortunately two of the early introductions, mynahs and rooks did not become established in the district.

▶ Figure 3: Early smaller fauna of Takaka Hill from Laughing Owl feeding remains



One of the few photographs of the extinct Laughing Owl taken at a nest site in Canterbury by Cuthbert Parr around 1910.

Courtesy of the Parr Family/Museum of New Zealand Te Papa Tongarewa (MA\_B.037808)

Feeding remains located in Takaka Hill caves used by the owls as roosts or nest sites over 10,000 years provide a fascinating snapshot of the smaller fauna of Tasman in the past (Holdaway & Worthy 1996).

Birds were the major item by weight, particularly parakeets and fairy prions with wrens and riflemen, robins, bellbirds and owlet-nightjars also prominent. Bats, rats (kiore) and geckos provided most of the remaining biomass with fewer skinks and frogs.

Studies in Canterbury have shown the diverse range of invertebrates that the owls ate (58 identifiable taxa) including several like the large weevil *Anagotus stephenensis* only now found on offshore islands (Stephens Is. in this case).

▶ Figure 4: Early fauna of Takaka Hill from sub-fossil bones

### Takaka Hill

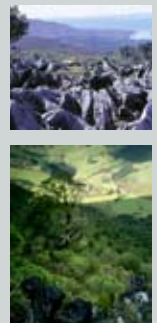


Sufficient dated bones have been found in caves on Takaka Hill to give a good picture of the fauna in its sub-montane beech-hardwood forests before the arrival of people. It was not as rich as that found in drier, lower areas in the eastern South Island, having no habitat for aquatic birds, almost no seabirds, no Haast's eagle or raven and adzebills were rare.

However the list is still a fascinating, long one with many species now extinct:

*Little bush moa, large bush moa, slender bush moa, little spotted kiwi, large kiwi sp., rifleman, grey warbler, yellowhead, brown creeper, rock wren/bush wren, stout-legged wren, Lyall's wren, tomtit, robin, saddleback, fantail, Eyles's harrier, NZ falcon, blue duck, brown teal, Finsch's duck, weka, SI snipe, bellbird, tui, yellow-crowned parakeet, red-crowned parakeet, kakapo, NZ owlet-nightjar, laughing owl, morepork, NZ pigeon, kokako, kea, kaka, SI piopio, Hamilton's frog, Markham's frog, forest gecko, common gecko, Duvaucel's gecko, lesser short-tailed bat, greater short-tailed bat, long-tailed bat.*

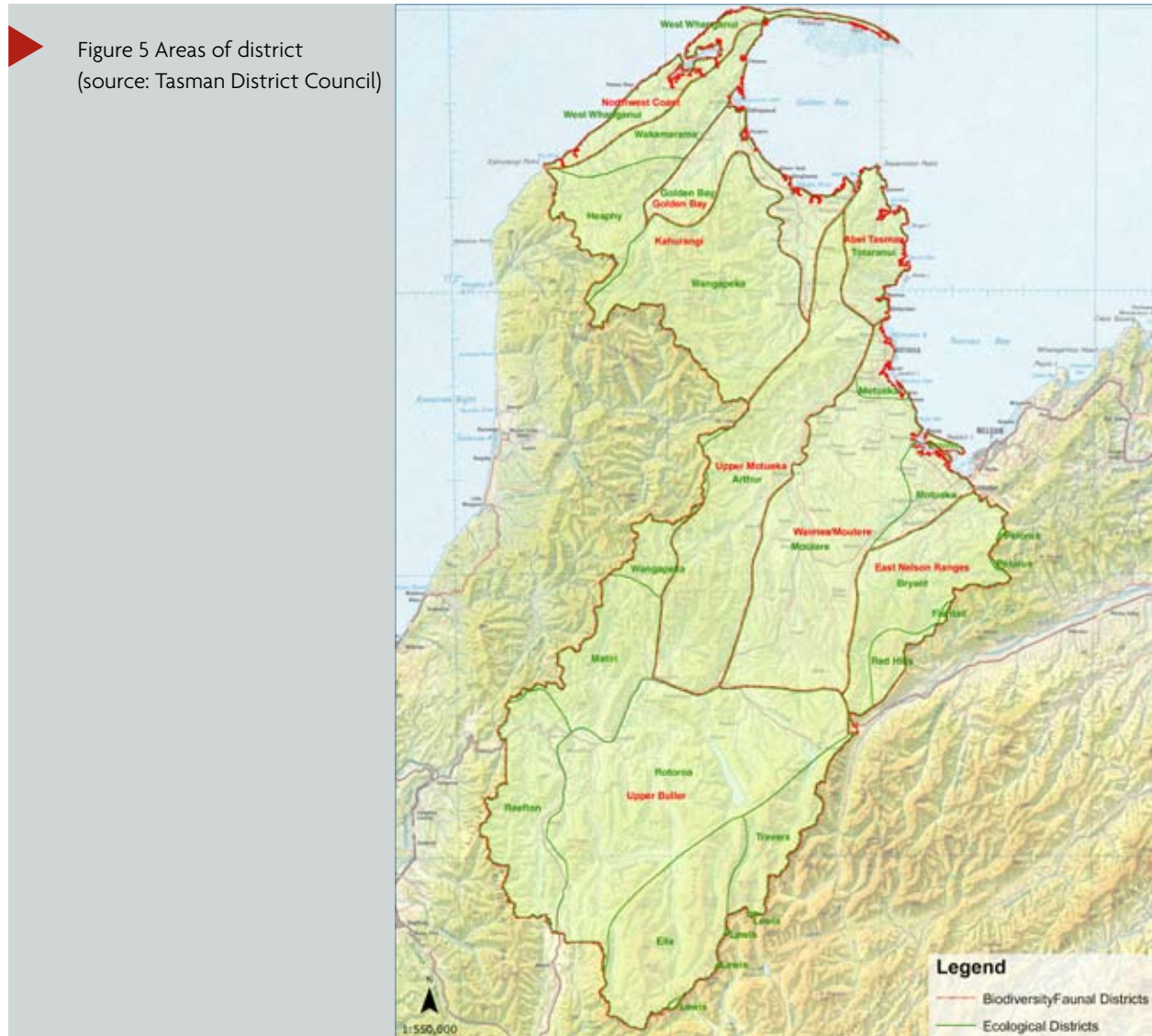
(Source: Worthy & Holdaway 2002).



## 1.5 Areas used in this report

Eight areas are defined for the purposes of this report (Figure 5) to recognise both biodiversity features and

the way that people view the district. Scientists have recognised 15 Ecological Districts within Tasman with different ecological characteristics (McEwen, 1987) but several have been combined here as shown in Table 3.



Area – this Overview	Ecological District(s)
Northwest Coast	West Whanganui
Golden Bay	Golden Bay
Kahurangi	Wakaramama, Heaphy, Wangapeka (part)
Upper Motueka	Wangapeka (part)
Abel Tasman	Totaranui
Waimea/Moutere	Moutere, Motueka
Upper Buller	Reefton, Rotoroa, Ella, Travers, Matiri, Wangapeka (part)
East Nelson Ranges	Bryant, Red Hills

Table 3: Areas used in this review in relation to Ecological Districts

The values of these different areas of relevance to terrestrial fauna can be characterised as follows (most entries sourced from DOC, 1996):



## NORTHWEST COAST

*Te Kopi*

- Extensive dune communities with threatened species
- Coastal and northern rata forest
- Threatened endemic coastal plants and unique communities at Puponga & Whanganui Inlet
- Large estuarine habitats for wading birds
- Several threatened taxa of *Powelliphanta* snails
- Terrestrial limestone and cave communities
- Offshore islands significant for burrow-nesting seabirds
- Significant blocks of private land



## GOLDEN BAY

*Farewell Spit*

- Internationally important inter-tidal areas inside Farewell Spit
- Natural estuaries which support vulnerable species
- Alluvial forest remnants of Aorere and Takaka River valleys
- Mostly private land

## KAHURANGI

*Kahurangi National Park*



- Continuous forest habitat for wide-ranging nationally threatened birds
- Unique invertebrate communities on limestone and marble
- Major distribution centre for *Powelliphanta* snails (18 taxa)
- Largest cave systems in Southern Hemisphere

## ABEL TASMAN

*Torrent Bay*



- Large continuous tract of forest for wide-ranging birds

## UPPER MOTUEKA

*Mt Arthur massif*



- Stronghold for a range of vulnerable and endemic animal species
- Continuous forest habitat for wide-ranging nationally vulnerable birds





## WAIMEA/MOUTERE

*Forest fragment  
(Faulkner's Bush, Wakefield)*

- Mostly private land
- Remnants of forest and wetlands
- Estuaries supporting threatened species
- Important habitats for waders



## EAST NELSON RANGES

*Red Hills*

- Large continuous tract of forest for wide-ranging vulnerable birds
- Ultramafic plant communities supporting vulnerable invertebrates



## UPPER BULLER

*Lake Rotoiti*

- Large continuous tract of forest for wide-ranging vulnerable birds
- Honeydew beech forest communities
- Nationally vulnerable kaka, falcon and blue duck

# Overview of different groups<sup>2</sup>.

*Caution: The information on species distributions presented in the following sections should not be considered comprehensive for all groups. You can help provide a fuller picture. This text was completed in August 2007 but publication was delayed by funding issues so no records after that date are included.*

Unlike Walker's (1987) report, this review is not based on specific field surveys but on published and unpublished reports and the observations of the author and his colleagues. The information on reptiles and invertebrates is largely based on recent publications which have brought all the records together. This is also the case for some groups of birds.

Many species are generally widespread in areas of suitable habitat, or are known to be restricted to a few locations. It is those in an intermediate category that present an important issue. There is a group of forest birds, and a few wetland ones, that have suffered a decline in recent years and apparently disappeared from previous haunts. If this decline is not reversed, by taking action to conserve habitats and control pests as advocated in this overview, some people fear that New Zealand will be faced with a 'Third Wave' of extinctions on the mainland. Species that might be included in this wave are ones that we think of as rare such as Yellowhead and Kaka, but also others that are more common like Robins and maybe even Rifleman.



The Robin provides a good example to illustrate the distribution issue. It seems to have disappeared as a breeding bird from a number of forest patches in the district in recent years but there is little 'hard' data available. The best information that can be gathered is included in the species account below, suggesting losses from specific sites.

## What you can do

You can help us to obtain a fuller picture of the trend for species like the robin by providing the following:

- Corrections – i.e. confirming that a species is still present in an area where this report has indicated it has been lost
- Additions – identifying a further area where a species has been lost and roughly when this loss occurred.

It is important for us to document declines in species like the Robin as accurately as we can rather than allow them to slip away unnoticed. The positive side of doing this is that it identifies where we can take action, both to halt declines in certain areas and also to reintroduce species in others if we can remove the factors that caused their loss. Robins have been successfully reintroduced to many sites around the country accompanied by predator control programmes that have rats as a key focus.

The Ornithological Society of New Zealand (OSNZ) has recently published an Atlas of Bird Distribution in New Zealand 1999-2004 (available for \$98 incl. postage & packaging – details on [www.osnz.org.nz](http://www.osnz.org.nz)). This maps bird records using 10km grid squares. It can be used to place the birds of Tasman in a national context and identify large-scale distributional changes since the first Atlas was produced in 1985.

## 2.1 Birds

Birds are addressed first for several reasons: they are the group with the best information, we know much about the threats to them and how to reverse these, and they can be easily observed as indicators of the results of landowners' efforts.

They are grouped here into the following habitat categories, though some species may overlap across more than one:

- Open sea (nesting in the district)
- Coastal: seashore, estuaries and sandpits
- Rivers
- Wetlands – coastal and inland
- Lowland forests and shrubland
- Upland and mountain
- Modified systems

## 2.1.1 Open sea

New Zealand is world-famous for its diversity of seabirds all of which have to come to land to nest. Tasman District contains a few small offshore islands, most of which are quite close to shore within the swimming range of some predators, so it has relatively few safe nesting locations for seabirds. However recent visits suggest that these may be more significant than previously thought. South Nguroa Island (c 1.5ha), 6km WSW of Cape Farewell, was visited in January 1997 and found to be an important breeding area for Sooty Shearwaters, Fluttering Shearwaters and Diving Petrels with burrows every one or two square metres on average (Millar et al., 1997).

Nearby islets were flown over and also seen to hold bird burrows. Three of these islets, North Nguroa, Richard Seddon Island and a stack south of South Nguroa, were surveyed in February 2003. The same three species of burrowing seabirds were located as well as Red-billed Gulls, Black-backed Gulls and probably White-fronted Terns (Gaze, 2003). Green and Tunnel Islands were checked in April 2003 and Sooty Shearwaters were found on the latter and also on the mainland (6-10 burrows) at Fossil Point (Gaze, op.cit.). Some low intensity management of predators is being undertaken at Tunnel Island and Fossil

Point, with seven stoat/rat traps at each site checked monthly. Nest contents are checked twice during the breeding season using burrowscopes. This confirmed 19 Sooty Shearwater chicks in the 2005/06 season at Tunnel Is, though none seemed to survive at Fossil Point despite two eggs being seen and five adults sitting tight (probably on eggs) earlier on (M. Ogle, pers. comm.).

The islets mentioned are reported as the only known colonies of Fluttering Shearwaters and Diving Petrels on the west coast of the South Island and provide valuable sites for Sooty Shearwater between the Marlborough Sounds and South Westland. As many as 10,000 birds may be present (Millar et al.1997) and these populations may provide opportunities to recolonise the mainland (Gaze, 2003) as discussed below. A further small population of Sooty Shearwater has been found on Tonga Island off Abel Tasman NP (M. Ogle, pers. comm.).

The district does have the distinction of having the only sea level colony of Australasian Gannets in New Zealand, established on mobile sand and shellbanks at the tip of Farewell Spit in 1983/84 (Hawkins, 1988). This has grown steadily from 70-80 nests in the first year to over 1800 nests in 1994/95 (Petyt, 1999) and c.3000 pairs since 2001 (R. Schuckard, pers. comm.).



*Farewell Spit Gannet colony*

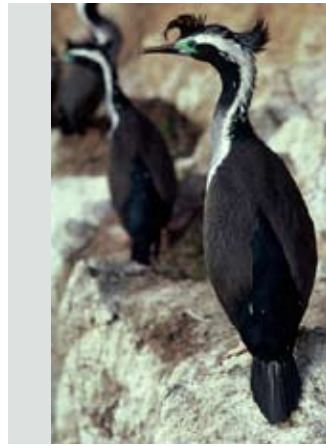
In 1994/95 OSNZ and Landcare Research started a study to investigate how breeding in such an unstable environment affects the population dynamics of the colony and over 700 adults and 960 chicks have been banded to date. Productivity has been extremely low (0.0-0.37 chicks per breeding pair) due primarily to washouts and predation by Black-backed Gulls. Almost every year since 1994 some or all of the six subcolonies have been washed over or had their sides eroded away during very high tides or a major storm. During Cyclone Drena in January 1997 three of the subcolonies were completely washed away, two subcolonies were washed over, and only one colony, although considerably eroded away, was able to rear a few chicks. In September 2005, a southeasterly storm washed out over half of the breeding pairs and a significant portion of the dune structure disappeared.

Why, if the gannets in general are failing to successfully rear chicks, do they continue to breed at Farewell Spit? An abundant food supply, dominated by pilchards (*Sardinops neopilchardus*) and anchovies (*Engraulis australis*), within foraging range of the spit is probably the major factor which makes it a desirable location (OSNZ, Landcare Research, in prep.).



**Cook Strait Blue Penguins** have apparently declined as a nesting species along the coast of Golden Bay and at Farewell Spit in recent decades (Petyt, 1999). Whether this is true of the district as a whole is uncertain, but increased coastal housing development (with associated dogs) and changes to inshore fish stocks are two reasons why this might be expected. Several groups are taking initiatives to turn the situation around, including one of home school students who have set up penguin nest-boxes, an interpretation sign and a few predator traps at Abel Tasman Memorial in Golden Bay. Some of the islands and islets

visited off the Northwest Coast hold colonies of breeding penguins.



**Spotted Shags** nest in a major colony on the Tata Islands north of Abel Tasman NP where 600 birds have been counted (M. Ogle, pers. comm.) and in small numbers on other cliff areas along the coast. Shags from the islands' colony concentrate on Tata Beach in the early morning before leaving to feed at sea;

more than 2000 were counted there in September 2005 (R. Schuckard, pers. comm.). A hundred birds have been counted at winter roosts on the beach off Pakawau (Petyt, 1999), 100 on cliffs at Puponga in 2003 (P. Field, pers. comm.) and larger roosts are found in Nelson to the east on Fifeshire Rock, Nelson Harbour breakwater and Pepin Island. Winter numbers in the region have apparently increased in the past 30 years (P. Gaze, pers. comm.).

#### **Other burrow-nesting seabirds – extinct in the district but potential reintroductions**

The sub-fossil record suggests that eight species of burrow-nesting seabirds used to maintain colonies in the district (Butler, 1991) and one, the Black Petrel was recorded historically from the Heaphy Range in Kahurangi NP (Walker, 1987). Two species, Cook's Petrel and Mottled Petrel, were once among the most numerous birds on the mainland (Worthy & Holdaway, 2002). Reintroducing some of these is a long-term challenge and one that would not have been considered until recently. However we now have the techniques needed both to control the key predators and to attempt re-establishing the birds, based on progress being made in other parts of the country. On Maud Island in the Marlborough Sounds a small colony of Fluttering Shearwater (15 pairs in 2003/04) has been established by the transfer of 334 chicks from another island between 1991 and 1996, housing them in artificial burrows and hand-feeding till fledging (Bell et al., 2005). A similar programme aims to establish a new colony of Hutton's Shearwater on Kaikoura Peninsula (P. Gaze, pers. comm.). These initiatives take advantage of the instinct of many seabirds to return to breed in the colony where they were raised.

## Gulls and Terns

The most detailed data is available for Waimea Estuary which can be used to indicate trends across the district as a whole. **Black-backed Gulls** have fluctuated significantly in numbers. They peaked in the 1970s (maximum count of 3600 on Waimea in May 1977 (Owen & Sell, 1985) compared to 736 in 1999/2000 (Cook & Cooper, in prep.)). This decline after an earlier increase, is considered a result of the closing of rubbish dumps close to the coast and reduction of other food supplies from meat processing and sewage disposal and is likely to have been mirrored elsewhere in the district. On Farewell Spit nesting numbers have fluctuated from less than 30 nests in the 1970s to over 200 in 1988 and have since dropped back to about 80 (Petyt, 1999).

**Red-billed Gulls** breed on the Boulder Bank in Nelson but have also declined there and in the Waimea Estuary since the 1970s. The same factors that affected Black-backed Gulls are likely to have been involved, though Red-billed Gulls are preyed on by the larger species when nesting. On Farewell Spit a past colony on the shell banks was displaced by the gannets and now only an occasional pair attempts to breed along the Spit itself (Petyt, 1999). There is usually a colony of up to 50 pairs at Rototai in Golden Bay (C. Petyt, pers. comm.).

**Black-billed Gulls and Black-fronted Terns** are largely inland birds, though the former has bred in small numbers on Farewell Spit in the past and occasionally does so at Rototai, and they are considered in a later section covering the rivers on which they breed. They do appear on the district's coasts in winter and over 300 terns were present on Bells Island in April 2006 (W. Cook, pers. comm.).

**Caspian Terns** breed on the shellbanks at Farewell Spit – between 80 and 130 pairs in the 1990s (Petyt, op. cit.) and 40-50 pairs more recently (R. Schuckard, pers. comm.), and at Rototai in Golden Bay (c 30 pairs) (C. Petyt, pers. comm.), and at Bells Island since the mid-1980s – around 15 pairs (Cook & Cooper, op. cit.).

**White-fronted Terns** are the district's most numerous tern nesting in several colonies on coastal shellbanks but have declined over the past 20-30 years. Walker (1987) reported three major colonies in the region, two in Tasman at Awaroa Sandspit (400 pairs) and Farewell Spit (200 pairs) and one in Nelson at the Boulder Bank (c 500 pairs). At that time they also bred irregularly at Bells Island, but

a significant colony developed there in the 1990s (180-250 pairs in 1995 and 1997) (Cook & Cooper, in prep.). The Farewell Spit colony has been displaced by the gannets, the Bells Is. one largely disappeared and the Boulder Bank colony which held c 2000 pairs in the 1970s has continued to decline to c 300 in 1998.

Classified Summarised Notes in 1995 report that in Golden Bay there was no record of breeding at traditional sites at Tarakohe and Onekaka; none on the Motueka Spit; and 185 nests on Bells Island in November which were later washed out and no re-nesting attempted (O'Donnell & West 1998).

In the summer of 2006, 110 pairs nested on the end of the Motueka Sandspit after an absence of maybe two decades (P. Samways, pers. comm.). The site became suitable following the creation of an island at the end of the sandspit after dredging of a channel to allow boats a more direct access to Motueka Wharf. The channel filled in almost as fast as it was formed and the 'island' was once again linked to the rest of the spit. However the terns found the high platform created a safe and successful place to raise their chicks. There is usually a colony of up to 650 pairs at Rototai in Golden Bay and c 35 pairs on Archway Island (C. Petyt, pers. comm.).



Terns are very sensitive to disturbance while nesting, liable to desert their nests 'en masse', and increased activity on the coast (e.g. 4WDs, kayaking, wandering dogs) may have caused the decline. However, changes in fish stocks due to periodic over-fishing of certain species may also be involved. Several rarer tern species have been recorded in the district with White-Winged Black Terns and Little Terns regularly seen.

## What you can do

### Potential contribution of private landowners

The nesting sites of many seabirds are quite remote and inaccessible. However those people owning land adjacent to shellbanks used by terns and gulls do have a role to play as described under the next habitat.

Nest boxes may be provided for penguins as the loss of suitable nesting and roosting sites are likely to be significant contributors to their decline.

## 2.1.2 Seashore, estuaries and sandspits

### Waders

Tasman District is nationally significant for wading birds which breed on estuaries and inlets along its coast or visit on migration from the northern hemisphere. Farewell Spit is one of five sites in the country designated under the Convention on Wetlands of International Importance Especially as Waterbird Habitat (RAMSAR). Waimea Estuary, Moutere Inlet, Motueka Sandspit, and Westhaven Inlet are all wetlands of national importance. Farewell Spit has the largest intertidal area (9427ha), followed by Waimea Estuary (2867ha), Westhaven Inlet (2350ha) and Moutere/Motueka (1783ha), while there are also smaller inlets along the Golden Bay and Abel Tasman coasts.

A recent review has summarised the results of high tide counts of waders at Farewell Spit (since 1961) and in Tasman and Golden Bays including Westhaven Inlet (since 1984) (Schuckard, 2002). (All but the most recent figures below on resident and migrant waders are derived from this report.) Tasman District supported 14% of the average national total in winter when most of the birds are resident species, and 23% in spring when 90% are migrants that breed in the Arctic. Farewell Spit holds the largest number and variety of waders in the district with a maximum count of 58590 birds in February 1993 and 38 different species recorded. Its summer average is almost 40,000 birds compared to c 6000 in Golden Bay and c 7000 in Tasman Bay.

### Resident Wader Species

**South Island Pied Oystercatchers** breed on the riverbeds in the district and dominate winter counts on the coast where they feed in flocks in wet paddocks and estuaries. Numbers have increased steadily since the species was

protected in 1940 with winter totals at Farewell Spit almost doubling from 4600 to 8200 between 1970 and 1994.

Golden Bay holds an average of 2600 birds in winter and Tasman Bay 3800 birds.

**Variable Oystercatchers** are found only in New Zealand where they breed along the coast on beaches near the high tide mark. The national population is only around 4000 birds. Most birds remain in pairs on their breeding territories year round, but some form small flocks. Tasman Bay seems particularly significant for this species with an average of 180 there in winter and a maximum count of 498 in February 2001, probably more than any other location in the country. Numbers have also increased steadily in the bay from around 50 in 1983 to around 200 in the late 1990s. Farewell Spit and Golden Bay average about 60 birds each in winter.

Studies by OSNZ have shown that up to 80% of the large numbers found in the Waimea Inlet in winter are juveniles, many more than could be produced locally. The estuary must thus be a settling area for birds that were bred elsewhere (W. Cook., pers. comm.).

Variable oystercatchers can be used as indicators of the state of coastal areas. Most sites have pairs that will attempt to nest, but they are vulnerable to disturbance (e.g. by 4WD vehicles, dogs) and to predation of chicks and eggs.

**Pied Stilts** are an attractive feature of the district's estuaries and breed on the coast and inland on riverbeds. Tasman Bay supports the highest number of birds in the district (winter average 250).



**Banded Dotterels** breed mostly on riverbeds in the east of the island and 1000-1500 birds winter in the district with Farewell Spit, Motueka Sandspit and Westhaven Inlet the key sites. About ten pairs breed on Farewell Spit, 20-25 on Motueka Sandspit, and a few at other scattered

sites. Observations have been made of the Sandspit population over the past four years and there appeared to be a decline in breeding success in 2005/06, after several years of increased erosion led to the likely washing away of some nests during high tides (P. Samways, pers. comm.). Dogs, horses and quad bikes are additional threats to birds nesting there.

**Wrybill** nest outside the district on Canterbury and Otago rivers and winter here in small numbers. Less than ten birds are typically counted between Farewell Spit and Golden Bay and most records are from Motueka Sandspit (average 5) and Bells Island. While the latter averaged 21 over the study (Schuckard 2002) it is an important staging point during the spring migration and a maximum of 182 were counted in August 2004 (W. Cook, pers. comm.).

Two further resident waders, the **Black Stilt** and **New Zealand Dotterel**, are occasionally seen in the district.

### Migratory Wader Species

New Zealand and Australia are the final destinations for many waders that nest in Siberia or Alaska. Tasman District, and Farewell Spit in particular, is one of the key areas in which they spend the spring and summer. Conditions here that may affect the birds' survival can thus directly impact on their world populations.

Three species, Eastern Bar-tailed Godwit, Red Knot and Ruddy Turnstone dominate the influx of arctic waders and are considered individually here. The review identifies 27 other species seen in smaller numbers, a feature that makes the area of particular interest to ornithologists (Schuckard, op. cit.).

**Eastern Bar-tailed Godwits** visit New Zealand from Alaska in what has recently shown to be the longest non-stop migration of any bird. Farewell Spit is one of two sites holding the highest number nationally (Manukau Harbour being the other) with 13,000-15,000 recorded representing up to 15% of those staying in the country. Numbers there seem stable. Golden Bay holds around 1600 birds, most (over 1000) at Westhaven Inlet, and Tasman Bay around 4500 concentrated at Motueka Sandspit and Bells Island sandbanks.

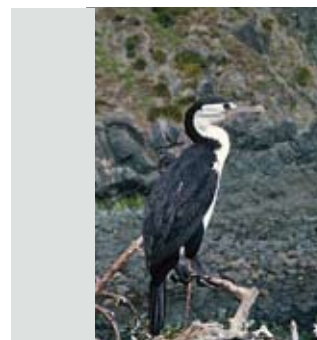
**Red Knots** breed in Siberia. Farewell Spit holds an average of 13,000-15,000 birds or almost a quarter of the national total, while Golden Bay and Tasman Bay support much

fewer (c200 and c300 respectively). This is the one species that has shown a significant decline during the survey, with the Farewell Spit population dropping from 27,000 in 1961 to c.6800 in 2001. There has been a significant increase at Manukau Harbour between 1960 and the 1980s but a shift in birds cannot explain all this change because the largest drops at the Spit happened from the mid 1980s when numbers at Manukau were stable. It has been speculated that changes in numbers of the small bivalve molluscs that are the knots' main food are involved and the OSNZ has started a study on this.

**Ruddy Turnstone** breed in Siberia and Alaska and Farewell Spit holds around 15% of the numbers visiting here in spring (average 1100 birds). Tasman Bay holds around 250 birds, almost all at Motueka Sandspit, and Golden Bay only a few individuals.

### Shags

Detailed information on shags that use estuaries and inland waterways is available for Waimea Inlet. Cook and Cooper (in prep.) undertook high tide surveys in 1999 and 2000 which provides a comparison with a study in 1976-78 (Owen & Sell, 1985) and a review undertaken by the author in 1988 (Davidson & Moffat, 1990). **Black Shags** largely nest inland with colonies known on the Motueka, Gowan and Sabine Rivers and the largest groups are found on the coast in winter. Peak numbers in the inlet were 164 in 1978, c.400 in 1985 and 230 in 1999.



**Pied Shags** have increased since the initial survey when the nearest colony was along Rocks Road, Nelson. In 1999/2000 there were two breeding colonies in the inlet and maximum counts of over 200 birds compared to 100+ in the 1970s. **Little Shags**

have been recorded on every count of the inlet but do not apparently nest. Numbers appear to have declined with only 45 counted in April 2000 compared to 179 in May 1976. **Little Black Shags** are the least common of the district's shags but numbers at the Inlet have increased from a maximum of 8 in 1977, to 16 in August 1984 and over 60 in February and April 2000. Up to 65 were seen in Golden Bay in winter 2004 (C. Petyt, pers. comm.).

*Note: Spotted Shags were covered earlier as a bird of the open sea.*

Elsewhere in the district, Little Shags are the most numerous species on Farewell Spit where roosts of up to 450 birds have been counted in winter (Petyt, 1999).

### Herons, Egrets and Spoonbills

**White-faced Herons** are present on the coast year-round, feeding in estuaries and wet paddocks. They are a species that is hard to census as they move frequently between feeding areas and do not usually use high tide roosts. At the Waimea Inlet, up to 140 birds were counted in 1997/98 and a maximum of only 37 in 1999/2000 though this is more likely a result of counts being done at a different state of the tide (high in the latter study) rather than a real change. Up to 200 have been counted roosting in pines at the Farewell Spit lighthouse (Petyt, 1999).

**Reef Herons** are typically a bird of rocky coasts. They have declined historically as a result of increased human activity along the coastline including reclamations and other developments (Walker, 1987). They are still found in small numbers on coastal rocks near Pohara, a site that held 20-25 pairs in 1925 (Guthrie-Smith, 1936), and at other scattered sites.



**White Herons** are usually sighted as single birds on the district's estuaries, yet at times they together represent a significant proportion of the national population. For example in a national census in August 1977, 6 (7.2%) of the country's total count of 83 birds were counted at Waimea Inlet. However there seems to have been a decline at

that site since then, from maximum counts of 11 that year to four during a 1984 census and two in 1999/2000. Whether this reflects an actual, widespread change is uncertain.

The Tasman District is a key haunt of **Royal Spoonbills** in winter though the nearest breeding colony is at the Wairau Bar, Marlborough. It held the highest numbers of any region (208) during a national survey in June 2000, over 20% of the total (Schweigman, 2000). Key sites in a 1989 census were Waimea Inlet (maximum of 29), Moutere Inlet (28) and Golden Bay (33). Numbers in the region have increased as the national population has, with counts at Farewell Spit of 38 in 1991, 60 in 1993, 74 in 1995 and 95 in 1996 (Petyt, 1999).

Maximum numbers seen in the Waimea and Moutere Inlet in 2003 were 63 and 31 respectively (P. Field, Pers. comm.). In Golden Bay there may be up to 30 at Collingwood, 36 at Rakopi, 17 at Parapara and c 30 at Takaka rivermouth (C. Petyt, pers. comm.).

**Little Egrets** are occasional visitors to the district's estuaries. One or two stragglers of the **Australian Glossy Ibis** have been recorded here. (**Cattle Egrets** are discussed under 'modified habitats'.)

### *What you can do*

#### Potential contribution of private landowners

Private land frequently adjoins these habitats which are typically in Crown ownership. Landowners can make significant contributions such as:

- Minimising run-off of agricultural chemicals
- Restoring native vegetation on margins and controlling the spread of weeds there
- Controlling predators, particularly mustelids, rats and feral cats
- Controlling the movements of dogs, vehicles, horses and boats to avoid disturbance of nesting and roosting areas.

### 2.1.3 Rivers

The **Black-fronted Tern** has been identified as a threatened species 'in serious decline' (DOC 2002). The key nesting sites in the district are braided stretches of the Buller and Matakita Rivers. During a 1995 survey a group of seven birds were counted on the Buller between Speargrass and Howard but no nesting recorded; a regular colony nearer Murchison held 16 birds, though the





landowner thought that this was noticeably less than in previous years; and there was one colony on the Matakītaki (Ure 1995). During a December survey in 1999 only two birds were counted on the Buller and 13 on Matakītaki and it was considered that there was some reduction in numbers associated with increased vegetation of islands (Ure, 1999). There is a record of c.14 adults at a small breeding colony on the Motueka River in 1987/88 (O'Donnell & West 1989).

The **Black-billed Gull** breeds mostly on braided riverbeds within the South Island and moves to the coast in winter. A 1995 survey reported that the only area where this species has bred in the district in recent years is the headwaters and tributaries of Upper Buller. A colony at confluence of Buller and Howard held 70-80 nests in November that year and a smaller colony in the Upper Matakītaki had less than 12 nests (Ure, 1995). In 1999 eight birds were counted on the Buller and 19 on the Matakītaki but no nesting was seen (Ure, 1999).

### **Nesting Waders**

Three native waders covered in section 2.1.2 nest on rivers in the district: South Island pied oystercatcher, banded dotterel and pied stilt.

### **Black-fronted Dotterel**

There are two recent records of this recent immigrant from Australia in the district both in the Waimea, one at Mt Heslington Road and the other at Appleby (D. Cooper, pers. comm.).

### **Blue Duck**

Walker (1987) described blue duck as 'present in good numbers in the mountain streams of north-west and eastern Nelson'. However there seems to have been a decline since then. The most detailed data exists for Kahurangi National Park where surveys in 1998-2000 located a total of 58 pairs, fewer than predicted from an earlier National Distribution Scheme which indicated 68 pairs in the major catchments alone (Studholme, 1999, 2000). Birds appeared to have largely disappeared from outlying rivers such as the Anatori and Parapara where they were recorded in the 1980s, though two were reported from the latter in early 2005 (M. Ogle, pers. comm.). Fewer sightings are apparent in Mt Richmond Conservation Area, and in Nelson Lakes National Park a decline in the earlier stronghold of the East Matakītaki may signal the end of the breeding population there (P. Gasson in prep.).

Recent research has proved that blue duck suffer significant predation from stoats (Willans 2002) and possums are also a threat. This has led to initiatives to trap stoats along lengths of rivers, such as the Friends of Flora programme (see appendix 3) in Flora Stream, Kahurangi National Park and a Department of Conservation project for the Wangapeka River.

If such predator control is coupled with translocations of captive-raised birds there is a potential opportunity to restore populations to rivers that have lost the species. This was first attempted locally in 2004 when ten young birds were released in Flora Stream after being taken as eggs from the Rolling and Pearce Rivers and reared at Peacock Springs in Christchurch. However six died (five of starvation) in the four months following release and the others were recaptured. A combination of factors may have been involved including wet/cold weather, insufficient food (flora is at high altitude and quite shady), and the inexperience of the birds at collecting live food. The surviving birds were eventually released in the Rolling River where they appeared to thrive and have bred with wild birds (P. Gaze, pers. comm.).



The regional blue duck effort increased significantly in 2006 with the DOC undertaking predator control at several sites within its 'Operation Ark' programme and making several reintroductions of ducklings raised in captivity. By the end of the 2006/07 season there were four birds in the Flora (three introduced from the Pearce), 17 in the Pearce, 27 in the Wangapeka, and 19 in the Fyfe (G. Udy, unpubl data). Eighteen eggs taken from the Pearce and Wangapeka had led to 13 ducklings raised by Peacock Springs which were transferred to the Fyfe (seven birds) and Gouland (six birds). Predator trapping led to increases in duck numbers on managed rivers while declines of c 80% were seen elsewhere.

## What you can do

### Potential contribution of private landowners

Owners of land adjoining rivers can assist by:

- Maintaining river health by excluding stock and minimising run-off of agricultural chemicals
- Maintaining/restoring riparian strips of vegetation
- Controlling predators, particularly mustelids and feral cats
- Advocating for maintaining/increasing river flows to maximise the number of significant channels and islands between them providing more secure nesting sites.

## 2.1.4 Wetlands – coastal and inland

### Australasian Little Grebe

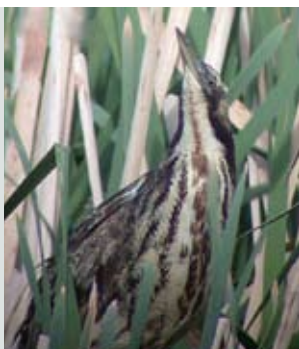
Walker's review identified only a single record of this species on Druggans Dam in the Aorere Goldfields of Golden Bay (Walker, 1987). Since then further sightings have occurred there (e.g. Jan. 1989), and at Wharariki in the 1990s (Petyt, 1999). Nesting occurred at the latter in 2002 though the nest was flooded and a pair was last confirmed there in June 2004 though one bird remains (C. Petyt, pers. comm.).

### New Zealand Dabchick

The dabchick used to breed in the South Island until the 1940s (Heather & Robertson, 2005) but is now very rarely recorded there. One was seen on a small pond at Puramahoi in April this year (C. Petyt, pers. comm.).

### Australasian Bittern

The Northwest Coast is the stronghold for this species in the district with three+ pairs known at Mangarakau and up to nine recorded at Rakopi. The Friends of Mangarakau are seeking to improve breeding productivity at the former site by controlling stoats, rats and possums. One or two pairs probably reside on Farewell Spit where one nest has been found, and there have been occasional sightings of single birds in the Waimea/Moutere at Lower Waimea/Pearl Creek and the Motueka Valley wetlands.



### Banded Rail

An estimated 85 pairs were recorded breeding in the district in 1980-82, representing most of the South Island's population (Elliott, 1989). Re-surveys of Golden Bay in 1994 (Flintoft 1994) and Waimea Inlet in 1990 (Elliott, 1990) and 1997/98 (Lurling, 2001) found that numbers had apparently changed little at these two sites. However Moutere Inlet provides a different picture with a significant decline recorded in 1990 (Elliott, 1990) and then a recovery by 1997/98 (Lurling, 2001). They were recorded at eight sites around Moutere Inlet in 1980-82, only one in 1990 and six in 1997/98.

The decline at Moutere in the 1980's was considered a result of several possible factors including rubbish dumping with associated higher numbers of rats and feral cats; road kills; run-off of pesticides from orchards; and reductions in freshwater inputs due to irrigation dams being built on small streams. The recovery, in the presence of the same factors, is encouraging and shows that numbers fluctuate significantly from year to year. However this small population remains very vulnerable and there must be some question of whether the population would have re-established itself had the only pair recorded in 1990 also been lost.



Introduced mammals certainly prey on banded rail. A domestic cat was recorded killing both birds of one pair in the Waimea Inlet (Elliott, 1983). Elsewhere, five of eight banded rail nests at Omaha, North Island were judged to have been lost to predators and a stoat was videoed at one (Parker & Brunton, 2004). Rats are also likely to prey on nests.

### Marsh Crake

During his 1980s survey for banded rail, Elliott recorded crakes at 8 sites in the district (Elliott, 1989). Several responded to taped calls played near Stockyard on Farewell Spit in 1997 (Petyt, 1999).

## Spotless Crake

This species is largely confined to raupo-dominated freshwater wetlands (Elliott, 1989), so the major strongholds of this species are likely to be the large areas of this habitat at sites on the Northwest Coast such as Rakopi and Mangarakau. One has been seen at Pearl Creek in Waimea (D. Cooper, pers. comm.).

## Pukeko

The presence of pukeko on the list of species in the Wildlife Act that can be controlled, under certain circumstances, indicates that this species thrives in modified habitats such as wet pastures as well as swamps and estuarine margins.

## SI Fernbird

Fernbird are relatively common in the scrub, pakihi and wetland habitats of the Northwest Coast and Golden Bay including Totaranui. Their distribution further east is patchy and birds seem to come and go from small areas of suitable habitat. For example, in the St Arnaud area birds have been recorded in wet sites within the village, at a swamp on the fringe of Lake Rotoroa and at Tophouse in the 1970/80s, and at Black Valley, Louis Creek, Blue Glen Creek and Tophouse between 2000 and 2003 (Gasson, in prep.). A population occurs on a wetland in pine forests inland of Kina and they have also been recorded at Awaroa in ATNP (O'Donnell, 2002).



Outside wetlands, fernbirds prefer low scrub and forest habitats in the early stages of regeneration and they are not found once kanuka or manuka reach a certain height.

<sup>2</sup> Note: Black swan are included here as an indigenous species because they are believed to have introduced themselves by flying across the Tasman around the same time that they were brought in by Acclimatisation Societies.



## Waterfowl

Farewell Spit has been identified as the major moulting site for **Black Swans**<sup>2</sup> in the country (Williams, 1980) supporting 15% of the total population of 60,000 in 1979 (between November and March). Fish and Game have undertaken counts in the district since 1977 and numbers at the Spit have fluctuated between 15,000 (1995) and 6,500 (2002) with no clear trend (Fish & Game, Richmond, unpubl. data.). Westhaven Inlet also holds sizeable flocks (1300 in March 1980, 510 in January 1989 (Butler in Davidson 1990). Small but increasing numbers have been recorded at Waimea Inlet where breeding has occurred at the Bells Island sewage ponds (Cook & Cooper, in prep.).

There is now some doubt whether any pure-bred **Grey Ducks** remain in the district following extensive hybridisation with the introduced Mallard. Numbers shot by hunters seem to fluctuate from year to year in response to weather conditions, with a wet spring typically leading to enhanced breeding.

**NZ Shoveler** are very mobile ducks and can be present in large numbers at times around the district's estuaries and particularly at Bells Island oxidation ponds where around 1000 were counted in May 2003 (L. Davey, pers. comm.). Up to 70 have been recorded at Farewell Spit in June (Petyt, 1999).

**Paradise Shelduck** have been counted during the late summer moult by Fish & Game since 1987. Numbers in the wider region have been lower in the most recent decade (1996-2005) compared to 1987-1994, though an increasing trend is apparent in 'Tasman' (Golden Bay to Lake Otuhie) in the past three years (Fish & Game, Richmond, unpubl. data). Some inland lakes hold significant numbers of roosting birds at times, e.g. over 300 counted on Lake Matiri (Davis & Orwin, 1985).

**NZ Scaup** appear to be increasing in the district (L. Davey, pers. comm.) though detailed figures are unavailable. A recent dramatic increase in the population in Christchurch City indicates the potential of habitat restoration and animal pest control to benefit this species. Up to 47 have been counted at Druggans Dam, 40 at Wharariki Lakes and up to 15 at Kaihoka Lakes (C. Petyt, pers. comm.).

**Grey Teal** have increased in numbers in the district, maybe as a result of the creation of the Bells Island oxidation ponds, and they can now be seen widely there and on a number of ponds in the Moutere and Waimea areas (L. Davey, pers. comm.). On Farewell Spit over 100 were counted in March 1996 (Petyt, 1999) and 160 in July 2003 (P. Field, pers. comm.).

**Southern Crested Grebe** used to nest on Lakes Rotoiti and Lake Rotoroa, NLNP, but the last breeding apparently occurred at the latter sometime between the 1930s and 1960s (Westerkov, 1972). Single birds have been recorded there occasionally, e.g. one in Sept. 1992.

**The Australian Coot** is a rare visitor to the district. Lake Wharariki has held up to six birds including juveniles since they were first seen there in 2001 (P. Field, pers. comm.) and birds have also been sighted at Lake Killarney in Takaka and at Bells Island in recent years. One to two pairs bred at Lake Wharariki up till 2004 (C. Petyt, pers. comm.).

### *What you can do*

#### **Potential contribution of private landowners**

The apparent significant decline of banded rails in the Moutere Inlet, then one of the most densely populated areas of the coastline, provides a warning of what may happen more widely as development and sub-division increases. There are signs that the Waimea Inlet may already be facing a similar situation.

Landowners along the coast can contribute significantly to the conservation of the banded rail and other wetland species by:

- Not dumping rubbish and garden wastes along the coast
- Restoring upper saltmarsh vegetation – in many areas rank or mown grass has replaced the dense sedges/rushes/shrubs that would previously have

provided nesting habitat

- Maintaining freshwater inputs into coastal inlets by keeping streams free of weeds and disturbance by stock and restoring riparian vegetation
- Controlling predators, particularly stoats, rats, and cats by poisoning or trapping.

For waterfowl, predator control can be accompanied by providing secure nesting sites such as islands or thick undergrowth on pond or lake margins. Some species such as grey teal will use specially designed nest-boxes.

### *2.1.5 Lowland forests and shrubland*

This report has divided forests into 'lowland' (below 600m a.s.l.) and 'upland' (above 600m). Though the cut-off point is clearly arbitrary this distinction is useful in the case of birds, as some species are largely confined to lower or higher altitudes though moving between them at times. Davis and Orwin (1985) found Kaka, Shining Cuckoo, Fantail, Robin, Silvereve, Bellbird and Tui to be more common at low (200-600m a.s.l.) compared to high altitudes (1000-1400m); Rifleman, Brown Creeper, to be more common at high; Kea, Grey Warbler and Tomtit had similar numbers at all altitudes.

#### **Western Weka**

Weka are now a relatively rare bird in the district and a cause for concern. A 1995/96 study documented a dramatic decline in weka in Golden Bay from the mid-1980s and found no birds in Abel Tasman National Park (Beauchamp, 1999). The last record on Farewell Spit was September 1991 though they were still recorded at the base in 1992 and 1994 and one was heard in 1998 (Petyt, 1999). A more recent questionnaire-based survey recorded



the presence of weka at a dozen sites from Totaranui to Rockville/Bainham (Hayward 2001). Breeding was reported at ten sites but since then the only area maintaining a reasonable population of birds is Rockville/Bainham with an occasional bird recorded nearer the coast. Weka have also gone from Takaka Hill and Riwaka on its eastern side. Birds are still found in the East Nelson Ranges and occasionally spread from there into Nelson Lakes National Park. Weka are scattered across the ranges of Kahurangi but usually only as isolated individuals. The reasons for the overall decline are poorly understood but predators are likely to be a factor, perhaps combined with reduced food supplies due to climate fluctuations, and disease.

Control of the larger mustelids, stoats and ferrets, and feral cats and dogs is likely to benefit weka. Providing food may also be worth considering – one individual has attracted large numbers in this way in the Marlborough Sounds – but more work is needed before this can be recommended as beneficial in the longer term.

### **New Zealand Pigeon**

Pigeons are largely a bird of lowland forests though they have been shown to nest in silver beech above Lake Rotoroa in NLNP at 1100 m. a.s.l. (Clout et al., 1986). They can be considered a 'keystone' species, i.e. one that is critical to a functioning ecosystem, because of the role they play as the only disperser of certain large fruits. A study at Pelorus Bridge by Landcare Research showed that most birds present in spring fed on the new foliage of deciduous trees, then dispersed up to 18km to areas of native forest to breed (Clout et al., 1986). A further peak in movements coincided with the fruiting of miro. At Lake Rotoroa they were most common between June and September when kowhai leaves were a major food source and they typically moved away around the time of the leaf fall of this species in October/November.

There have been repeat surveys carried out at this lake in 1983-85 (Clout et al. op. cit.) and in 2000-03 which suggested that the population there was stable between those dates (Etheridge 2005).

The use by pigeons of seasonal food sources is well known. Young foliage, flowers or fruits of introduced trees such as willows, poplars, tree lucerne and orchard species now appear critical in providing their year-round food requirements.

Defining the current distribution and status of pigeons in the district is challenging because they are so mobile. At times they are reported to have disappeared from certain sites, or to have appeared in larger flocks than seen previously. What is clear is that pigeons do respond very positively to pest control at forest restoration projects – e.g. at Trounson Kauri Park, one of DOC's mainland islands, they increased significantly in number about a year after the operation began (Gillies et al. 2003). Landcare Research has shown pigeon productivity to be very low in a study of three sites nationally including Pelorus Bridge, with only 12% of nests rearing chicks (Clout et al., 1995). Almost a third of nests were lost through predation of eggs and a further 10% lost through the taking of chicks or an incubating adult. In a further study near Auckland all nests found failed in the absence of pest control, but almost half were successful when possums and rats were controlled (James & Clout, 1996). These results suggest that a widespread species like the pigeon could be threatened unless pests are controlled over large areas.

### **Morepork**

Morepork are heard in forested areas and suburban gardens throughout, though there is no detailed information available on any changes in numbers. Two radio-tagging studies have monitored 13 birds through 1080 operations and one of these died (in an operation using carrot as bait), probably through secondary poisoning. This low level of mortality is not regarded as a threat to the species (Green, 2004).

### **NZ Kingfisher**

Kingfishers move to the district's coast in winter when they become much more noticeable. On Farewell Spit the first birds have been recorded appearing in mid-February and 28 have been counted there in May (Petyt, 1999).



## Welcome Swallow

Welcome Swallows arrived from Australia in the 1950s and the country's fourth ever record came from Farewell Spit (Petyt, op. cit.). They are now widespread and quite common in open country throughout the district.

## South Island Kaka

The district has been a centre for kaka research and management for over 20 years. Studies by Landcare Research at Mt Misery, Nelson Lakes NP and Big Bush in the 1980s showed that kaka were threatened by predators, particularly stoats, and by introduced wasps which competed for a key food item, honeydew (Wilson et al., 1998). They recorded only four fledglings surviving to independence over 11 years at Big Bush and the loss of five out of seven breeding females there, and predicted the extinction of Kaka on the mainland unless action was taken. This was borne out by an international computer modelling exercise (Population Viability Analysis) which estimated a high likelihood of extinction within 29 years based on a conservative estimate of female mortality (Butler et al. 1993).



Department of Conservation scientists then set up a study alongside the Rotoiti Nature Recovery Project (RNRP) ("mainland island") to investigate whether predator control could benefit Kaka. They found that nesting success averaged 86% in the presence of trapping and poisoning for stoats, possums, rodents and wasps (Moorhouse et al., 2003) compared to only 10% in the earlier Big Bush study (Wilson et al., 1998). No female kaka were lost to predators. Preliminary modelling suggested that with these figures, extending the predator control effort to c.1500ha should ensure the recovery of the kaka population (Elliott, G. unpubl. data.). Since then further stoat trapping lines have been added to provide control over c.5000ha (Butler et al., 2003).

The RNRP has recently finished testing the efficacy of a particular model of widespread stoat control (trap lines around the edges of c 800ha blocks) as a way of ensuring kaka recovery. This has enhanced nesting success and reduced female mortality significantly and could now be applicable to other parts of the district. It will be interesting to see if the programmes of stoat trapping along rivers to protect Blue Duck, at Flora Stream and soon the Wangapeka River, reduce problems of the animal low enough over a wider area to also benefit kaka. Breeding has recently been recorded in the Flora (C. Potter, pers. comm.). Almost 100 kaka with radio tags have been monitored during 1080 operations and no deaths have been recorded (Green 2004).

At the time of the earlier regional review (Walker, 1987) kaka were already confined to larger blocks of continuous native forest. It seems likely that the species will have declined within these as the problems experienced at Big Bush with stoats, possums and wasps would have been widespread. Remaining populations are likely to be biased towards males, with females having been killed on nests, and any recovery through management will thus be slow. Another achievement of the kaka research at Nelson Lakes NP was the successful transfer of four female kaka from Codfish Island (Whenua Hou) (Butler, 2003), which means that this is a technique that could be repeated elsewhere if required.

## Parakeets, Yellow-crowned and Red-crowned

Parakeets appear to be restricted to the larger tracts of native forest. Yellow-crowned and Red-crowned Parakeets can only be distinguished reliably if good views are obtained of the birds' heads. When such observations are made the vast majority of birds turn out to be Yellow-crowned, as is true of mainland New Zealand as a whole. As an example, during a survey of the birdlife of Nelson Lakes NP in 1983-85 a particular effort was made to identify parakeets by bringing them in close using taped calls. All 43 birds identified in this way were yellow-crowned (Butler, 1991). One red-crowned was found further east in the Wairau Valley outside the district.

Red-crowned parakeets may persist in Kahurangi NP. During a 1992/93 survey of 93,000ha of the headwaters of the Wangapeka, Owen, Matiri and Mokihinui catchments (assessing suitability of the area for the establishment of

a wapiti herd) Parakeets were found to be widespread. Thirteen individuals at nine locations were identified to species, seven being yellow-crowned and six red-crowned (though only three of these were identified by sight – at Fyfe River).

In Nelson Lakes NP, parakeets were largely found in forest below 600m a.s.l. (77% of sightings), particularly on relatively flat terraces dominated by red beech (Butler, 1991).

*Note: Orange-fronted Parakeets have not been recorded in the district since they were observed in the D'Urville Valley, Nelson Lakes NP in 1965 and seem unlikely to remain.*

### Shining Cuckoo

Shining cuckoos visit New Zealand in summer to breed, laying eggs in the nests of other species particularly grey warblers. During the bird survey of Nelson Lakes NP they were recorded between 30 September and 9 January, largely at lower levels in the beech forests below 700m (Butler 1991).

### Grey Warbler

Grey warblers remain widespread and fairly common. Counts at the RNRP showed that this species appears not to benefit from animal pest control for numbers fluctuated almost identically in treatment and non-treatment areas (Butler et al., 2003).



### Fantail

Fantails, like warblers are widespread, generally common and do not appear significantly affected by animal pests to judge from counts in the RNRP. However there was a dramatic decline in 2001-2002 over a wide area including Tasman District, identified by counts in the RNRP (Paton et al., 2004) and many individual observers (Gaze, 2004). This was attributed to the particularly cold winter of

2001, though high predator numbers following 'record' beech seeding and Salmonella disease may also have been involved.

### Silvereye

Silvereyes are the most abundant native species in many habitats from the forests of the Abel Tasman coast to gardens and form large, active flocks outside the breeding season. It is unclear whether predator control is of significant benefit to this species.

### Bellbird

Bellbirds remain widespread and conspicuous in many of the district's forests. Detailed research has been carried out here by Landcare Research, DOC and Canterbury University, particularly in honeydew beech forests, to give a good understanding of the ecology of this species and its response to pest management.



Within the Rotoiti Nature Recovery Project, Bellbird numbers have increased significantly in response to multi-species pest control as all visitors to the lake can identify. Wasp control to restore the supply of honeydew in summer will have been one key factor and control of rats and stoats is likely to have increased nesting success though this is still not high. The presence of good numbers of bellbirds or tui is vital to the successful pollination of threatened mistletoes (*Peraxilla* spp.) and pollination rates at Rotoiti are now good compared to other sites.

Bellbirds are a good indicator species to assess the success of pest management at a site as they are conspicuous, vocal and thus relatively easy to count.

### Tui

Tui are widespread but in lower numbers than bellbirds and they undertake significant movements in search of seasonal food supplies such as kowhai and flax available in suburban

gardens. At Rotoiti they appear to move away from the non-treatment area at the head of the lake for several months after the summer breeding season.

Tui would be expected to benefit from control of mammalian predators and wasps, and numbers have increased dramatically in Wellington as a result of the removal of pests from Karori Sanctuary and the control of possums at other sites.

### South Island Robin

This species has proved to be sensitive to predation and a study using video cameras at nests proved that rats are a key threat (Brown, 1994). The multi-species pest control programme at the RNRP resulted in increased robin productivity (Etheridge & Powlesland, 2001). In the treatment area nesting success over three seasons was between 77 and 90% and up to 5.5 chicks were produced on average per pair, compared to 25 and 50% in the two seasons monitored in the non-treatment area with a maximum of two chicks per pair. Cats are also proven as robin predators, none more obviously so than St Arnaud School's pet cat which was seen with a robin in its mouth that had been individually banded and named by the pupils! Stoats will also be a threat to a bird that spends so much time on the ground and the open nests are likely to occasionally be raided by possums.

Robins have gone from many parts of the district in recent years such as Torrent Bay, coastal Golden Bay and most of the Waimea Lowlands, though one was seen at the McKee Domain near Ruby Bay in 2001. They are still found in larger forest areas such as Mt Richmond, Big Bush, Nelson Lakes NP and Kahurangi NP. While robins are generally considered a bird of the lowlands, there is a population occupying the upper zones of the forest on Mt Misery, NLNP. This may be a more widespread phenomenon.

### South Island Tomtit

Tomtits appear to have fared slightly better than robins. Though nests are also taken by rats (Brown, 1994), it may be that birds are less vulnerable away from the nest as they spend less time on the ground. Tomtits are still present in low numbers at many sites where robins are absent, e.g. Torrent Bay, Milnthorpe (Golden Bay). Bird counts from the RNRP in St Arnaud showed that tomtits did initially benefit from pest control there, increasing from an average 0.6 birds/count to 1.2 birds/count at the same time that

numbers decreased in the non-treatment area. However this increase was not sustained after pest numbers increased following heavy beech seeding.



### *What you can do*

#### **Potential contribution of private landowners**

Landowners can make substantial contributions to this group of species by their management of remaining patches of native forest and planting to create new patches or corridors. Key activities can include:

- Protecting forest patches from stock by fencing
- Controlling weeds
- Supplementary planting in forest patches – e.g. of the major podocarps if none of these remain as a potential seed source
- Planting streams, gullies, etc. to create corridors linking patches of bush
- Planting native (e.g. flax) and non-native species (e.g. tree lucerne) as food sources for native wildlife
- Controlling the full range of predators and browsing animals.

### *2.1.6 Upland and subalpine habitats*

#### **Great Spotted Kiwi KNP, NLNP (Lake Rotoiti)**

Kahurangi National Park has been identified as the stronghold of this species with about half of its estimated national population of 22,000 living there (McLennan & McCann 2002). Detailed studies have been carried out on a lowland population near Kahurangi Point and an upland one in the area of Saxon Hut on the Heaphy Track. Interesting genetic differences have been found between



the two and the birds on the coast are generally lighter in weight (ibid). The Saxon population has been monitored in detail four times since 1987 and found to be fairly stable (Robertson et al., 2005). This stability was considered atypical of the birds' whole range, possibly due to the high rainfall at this site which might result in lower densities of key predators (stoat, cat and ferret). Adult densities declined significantly in the coastal population between 1987 and 1990 largely due to pig hunting with dogs and possum trapping (McLennan & McCann 2002). Overall the species is considered to be in 'gradual decline' (Hitchmough 2002).

Nine individuals were introduced in May 2004 to the eastern side of Lake Rotoiti, Nelson Lakes NP after being caught in the Corkscrew Creek area of Kahurangi NP. This was the first transfer of this species within the mainland and has been highly successful. All the birds survived, maintained good condition and remained in the vicinity of the release site. Egg fragments in a burrow indicated successful breeding that first year though the chick was not located (Gasson 2005).

During the 2005/06 season one female was found dead but the remaining four pairs apparently all nested. The fate of three nests, two containing fragments of shell and one empty was uncertain. However the fourth produced a chick found with a weight of 520g in May. A further seven birds (four females and 3 males) were transferred from Goulard Downs during the winter.

During the 2006/07 season another chick was found and last year's chick was still alive at adult weight. Two other nesting attempts occurred but the fate of their eggs or chicks is not known. Interestingly the two chicks came from the only nests from near the tree line and the older chick was still with its parents after a year (A. Taylor, pers. obs.). Both factors may reduce the risk of predation.



Adult kiwi are apparently able to cope with mammalian predators, except dogs. Chicks are vulnerable, to mustelids in particular, until they reach adult size. It remains to be seen if the stoat control at Rotoiti is sufficient to allow most chicks to develop into adults there, or whether they will need to be taken to be reared at a predator-free location and re-released when large enough. Early indications are encouraging.

### New Zealand Falcon

Falcons are found in low numbers throughout the region. Most breeding birds are located in forests away from developed areas but young birds disperse widely into farmland and settlements. One recent example provided a mixed blessing to those restoring a patch of forest above Richmond by spending several days feeding on native pigeons attracted by new plantings.



Studies around St Arnaud indicate that pest control may benefit this species. Over two seasons (1999/2000 – 2000/01) nesting success in the RNRP treatment area was 100% (three nests - nine chicks raised from nine eggs) whereas in surrounding areas it was only 50% (four nests – three chicks raised from 11 eggs) (Butler 2003). Falcons nest on the ground so are likely to be particularly vulnerable to predators.

### Brown Creeper

Brown Creeper are South Island birds with rather particular habitat requirements, found most often in manuka/kanuka scrub at low altitudes and in beech and beech/podocarp forests near treeline. They tend to move rapidly through the trees in noisy feeding flocks as silvereyes do and are unknown to many people. This species is the preferred host for nest parasitism by the Long-Tailed Cuckoo. No information is available to indicate any changes in numbers or distribution.

## Kea

One of the most detailed studies of the breeding of Kea was recently carried out on the eastern edge of the district centred on St Arnaud in Nelson Lakes NP (Elliott & Kemp 2004). Forty-four kea nests were located between 1993 and 1998 with the aid of male birds caught at the Rainbow Skifield and other localities and fitted with radio transmitters. The birds nest in natural cavities on the ground during an extended season from August to January which makes them particularly vulnerable to predators. About 50% of nests were successful, a higher rate than for kaka in unprotected sites. This was probably due to most kea sites being at higher altitudes (92% above 900m a.s.l.) where densities of the likely key predators, stoats and possums, were lower, and they also nested earlier than kaka prior to the summer increase in stoat numbers.



The current status of kea was recently modelled using data from the earlier study (Elliott, pers. comm.). This indicated that this population had a 50% chance of declining over the next 100 years but the best prediction was that it was stable. However it is certainly smaller than it would have been before kea were hunted and before stoats and possums spread through the district, and thus more vulnerable to any future threats.

It is difficult to obtain a good picture of any population changes across the district as a whole as most observations are of birds attracted to people or their activities. There has perhaps been a pattern of fewer kea seen at road end car parks such as Mt Robert, Flora and Cobb Valley but this may be due to less food being available at these sites – as people heed messages not to feed the birds – rather than a decline in numbers.

## Long-tailed Cuckoo

This is a migratory species that visits New Zealand in summer from the Solomon Islands to nest. Long-tailed cuckoos are widespread in forested areas at higher altitudes but are nowhere common.

## SI Rifleman

Rifleman is a species that is causing concern among some scientists who feel that a decline may be occurring that could be very hard to detect. While riflemen are widespread in the large forested areas of the district there is evidence from Nelson Lakes NP that their current distribution has been reduced due to predators. Birds used to be seen around Lake Rotoiti and St Arnaud village but by the time the Rotoiti Nature Recovery Project started they were only found part way up the St Arnaud Range.



Counts in 1997 only recorded birds between count stations 12 and 21 (938-1336m a.s.l.). However by 2001 after four years of pest control they were counted between stations six and 24 at tree line (744-1481m a.s.l.). The suggestion is that they will occupy the full altitudinal range if predator numbers are reduced.

## Rock Wren

A review of changes in the abundance and distribution of rock wrens since early last century is currently being written (Michelsen-Heath & Gaze 2007). This includes brief reviews of anecdotal information from Kahurangi and Nelson Lakes National Parks. A population in the Henderson Basin, Kahurangi has been studied since the mid-1980s and appeared to have declined by at least half between the late 1980s and 2004/05 before recovering in 2005/06 (Stocker et al. 2006). However obtaining an accurate census proved difficult and the overall trend is uncertain. That last season there were four nests found and 12 young fledged. Stoat trapping has been carried

out in Henderson since 2000 but whether this has been beneficial is unclear.

A pattern of reduced sightings has been repeated throughout historic strongholds within Kahurangi. There have been only 14 sightings in Nelson Lakes in the past 20 years, mostly from the head of the D'Urville Valley/East Matakaitaki area and the eastern flanks of the Travers Range – but not enough records to confirm any definite changes in range.

### **NZ Pipit**

One of the most widespread native birds, the pipit is a bird of open habitats from above the tree line (hence its inclusion in this section) down to the coast (e.g. 20 once counted at Farewell Spit (Petyt, 1999). No information on population trends is available.

#### *What you can do*

#### **Potential contribution of private landowners**

These habitats are almost exclusively in public ownership so most private landowners have little direct contribution to make. However they can join a group conducting pest control within them such as the Friend of Flora or Friends of Rotoiti.

### **2.1.7 Modified systems**

A few indigenous birds such as the Australasian Harrier and Spur-winged Plover have benefited from the replacement of forests with more open habitats but these are generally dominated by introduced species. From a conservation viewpoint none of the species here require any assistance through pest control. However steps can be taken to manage modified systems to encourage species that do need help.

Cattle egrets are winter visitors to the district from Australia with small flocks found regularly in wet, grazed pastures near the coast. Numbers seem to have declined in the district. National censuses between 1986 and 1990 recorded maximums of 48 in the Takaka area (typically Rototai & Puramahoi), 47 at Appleby and nine at Motueka (Heather, 1991). Whereas in 1999/2000 the maximum

numbers recorded for these two sites by Ornithological Society members (in Classified Summarised Notes) were seven and five respectively (Pollock 2003).

#### *What you can do*

#### **Potential contribution of private landowners**

The successful protection of patches of native vegetation such as bush patches or wetlands often involves work in farmland or gardens nearby. Reducing the impacts at certain sites of wide-ranging predators like stoats or feral cats requires trapping them on a landscape scale. Planting native and exotic food plants can allow wide ranging birds, like tui and pigeon for example, to persist in an area that has only small areas of native bush.

## **2.2 Reptiles**

The original reptile fauna of the district would have been more diverse than is found today. Sub-fossil remains show that tuatara were once widespread but they are now confined to predator-free islands in other districts. The sub-fossil bones of a larger gecko, comparable to Duvaucel's Gecko found on Marlborough Sounds Islands, have also been located (Worthy, 2001).

Two groups of lizards are found in Tasman today, geckos (seven taxa) and skinks (three taxa). Whitaker (2000) provides a key to identifying most of these and information on their distribution and habitat use that is reproduced in the individual accounts below. However lizard research is very active and new forms have been identified since that publication. Some lizards that were previously considered as a single species are actually a group of species, each with very different genetic make-up but similar in appearance. These are termed 'cryptic species'. The national conservation status of each taxon is listed below the name from Hitchmough & Bull (2005). Their regional status was assessed by Whitaker & Gaze (1999) who identified conservation measures needed.

## 2.2.1 Geckos

### Forest Gecko (*Hoplodactylus granulatus*)

Lowland, Upland, Mountain.

Status: Not threatened.



This nocturnal gecko is widespread in forests and shrublands of the district. There is a possibility that a different taxon in the *Hoplodactylus granulatus* cryptic-species complex, *Hoplodactylus* 'Cupola', is found in alpine habitats in Nelson Lakes National Park (Whitaker & Gaze 1999). This has been ranked as 'data deficient' (Hitchmough & Bull 2005).

### Black-Eyed Gecko (*Hoplodactylus kahutarae*)

Mountain.

Status: sparse.

This nocturnal species typically occupying alpine bluffs and cliffs has been found in the Arthur Range and probably occurs more widely on mountain tops within the district.

### Common Gecko (*Hoplodactylus maculatus*)

Coastal, lowland.

Status: not threatened.

This group of cryptic species typically occupy coastal sites, shrubland and forest below 800 metres a.s.l.



### Mt Arthur Gecko (*Hoplodactylus* sp. 'Mt Arthur')

Mountain.

Status: range restricted.

A nocturnal species found in a single population on sub-alpine limestone outcrops and screes in the Mt Arthur massif. This has been identified as a high priority for management by Whitaker & Gaze (1999) to assess the threats to the small known population and to confirm a possible occurrence on the Mt Owen massif.

### Anatoki Gecko (*Hoplodactylus* sp. 'Anatoki')

Mountain.

Status: range restricted

A nocturnal species found on the Anatoki Range.

### Nelson Green Gecko (*Naultinus stellatus*)

Lowland, upland.

Status: gradual decline



This gecko is active by day in forest and shrubland up to the subalpine zone throughout the district. It shows significant variation across its range: animals in Golden Bay are smaller (snout-vent length to 60mm) and mostly plain green, whereas those in Nelson lakes are larger (s-v length to 80mm) with a complex pattern of brown, green and white.

### West Coast green gecko (*Naultinus tuberculatus*)

Lowland, upland.

Status: sparse

This gecko is active by day in forest and shrubland in the extreme southwest of the district.

## 2.2.2 Skinks

### **Speckled Skink** (*Oligosoma infrapunctatum*)

Lowland, upland.

Status: gradual decline.



This species is rare and found at a few isolated sites within the district including the Upper Buller catchment and Golden Downs. It typically occupies densely vegetated grassland, shrubland or fernland at lower altitudes (below 900 metres). It is active by day like all the district's skinks.

### **Spotted Skink** (*Oligosoma lineocellatum*)

Coastal, lowland, upland, mountain.

Status: gradual decline.



Spotted skinks are confined to the eastern edge of the district (Bryant Range and behind Wakefield) in dry scrubby and rocky areas and subalpine grassland up to at least 1600m.

### **Common Skink** (*Oligosoma nigriplantare polychroma*)

All habitats.

Status: not threatened.

The most widespread species in the district it occupies densely-vegetated grasslands and shrublands from sea level to at least 1800m. This is the skink sometimes seen

in suburban gardens though it has apparently declined in Nelson in the past 20 years.



## 2.3 Mammals

Two species of indigenous land mammals are found in the district, long-tailed and short-tailed bats and a third species of bat used to be present but is now extinct.

The **Long-Tailed Bat** (lowland, upland) fits the traditional model of an insectivorous bat seen flying in open areas like the edges of the forest or riverbeds at dusk catching insects on the wing. A DOC database lists several records from Golden Bay, Motueka and St Arnaud areas over the past decade suggesting this species is still widespread in small numbers.

The **Short-Tailed Bat** (lowland, upland) on the other hand feeds within the forest either in the air or on the ground where it can fold its wings to climb trees and forage in the leaf litter. There are less than ten records on the database and the most recent was an animal found dead on possum bait in the Roaring Lion valley in Kahurangi in 1977. This leaves some doubt about whether this species still survives in Tasman.



## 2.4 Amphibians

### Indigenous Frogs

No indigenous frog species have ever been found alive in the South Island. The bones of two living species have been located in the district along with three extinct taxa (Worthy, 1987a). **Hamilton's Frog** (*Leiopelma hamiltoni*) remains have been recorded from caves at Paturau, Takaka and Mt Owen and **Hochstetter's Frog** (*Leiopelma hochstetteri*) at Paturau and Takaka Hill (Worthy, 1987b). More recently, both were found in a cave in Goulard Downs in deposits of pellets left by the extinct Laughing Owl (Worthy, 2001). Currently Hamilton's Frogs are found on Stephens and Maud Islands where they probably form two distinct species, and Hochstetter's frogs are quite widespread largely from the Bay of Plenty to East Cape (Newman, 1996).

It is an exciting prospect to think that there may still be native frogs awaiting discovery in the South Island, and the Recovery Plan does identify the need to search for Hamilton's Frog in Northwest Nelson, particularly on the Paturau coast (Newman, op. cit.). Presumably the survival of Hochstetter's Frog is equally possible as this species still survives on the North Island mainland in the presence of introduced predators. Both frogs are small, nocturnal, silent and well-camouflaged which makes them particularly hard to find. Both require habitats that are continuously damp, though Hochstetter's is the more aquatic of the two and generally confined to the edges of streams.

Whether or not native frogs are located in the district, there is potentially scope for reintroducing them into suitable habitats that can be secured against predators, e.g. fully pest-proof-fenced sanctuaries.

### Introduced Frogs

Mention is being made of the two species of introduced frogs, though they are strictly outside the scope of this document, because it is worth keeping an eye on their numbers for two reasons. Firstly, frogs are considered indicators of the health of aquatic systems worldwide and major declines have been recorded, some occurring very rapidly over a matter of months (Newman, op. cit.). Secondly, frogs and their tadpoles may now be an important food for wetland birds such as bitterns, and reductions in their numbers could have wider impacts.

Two species of introduced frog are found in the district (Figure 6). **The Whistling Frog** (*Litoria ewingi*), a small tree

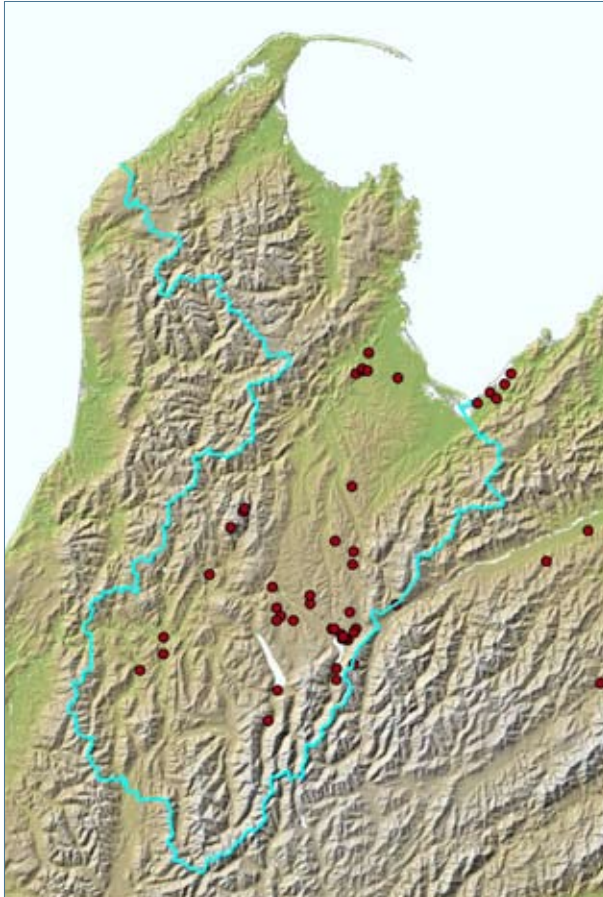


frog, has spread throughout Tasman in recent years. The larger **Southern Bell Frog** (*L. raniformis*) which is the one that makes the familiar 'croaking' noise around ponds, is globally threatened. It is considered a predator of and competitor with native frogs.

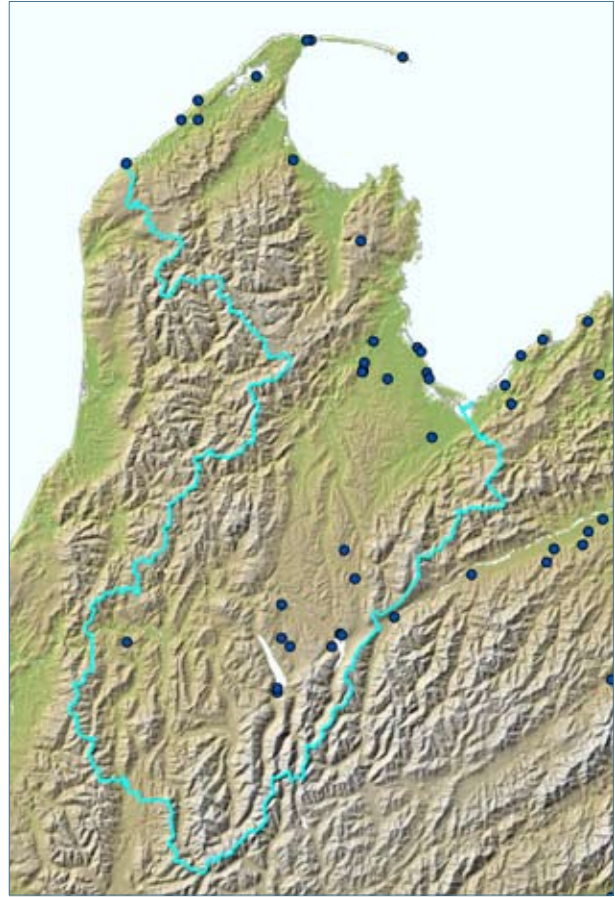




Figure 6: Distribution of introduced frogs in Tasman District. (Source: New Zealand Amphibian/Reptile Distribution Scheme, Department of Conservation - August 2007)



*Litoria ewingii*



*Litoria raniformis*

## 2.5 Invertebrates

This section focuses on several groups and individuals from the diverse array of invertebrates found in the district. They have been chosen because they share one or more of the following characteristics:

- being relatively large and identifiable
- being predators and thus present in smaller numbers than other invertebrates and consequently more vulnerable
- acting as indicators of the health of different ecosystems
- representing groups for which Tasman District is nationally significant.

For groups whose remains have been found in caves (particularly in roosts of predatory birds), it is clear that the invertebrate fauna has suffered the same declines seen in other groups. Some species currently restricted to mammal-free offshore islands were once present on the mainland and are potential candidates for reintroduction.

### 2.5.1 *Powelliphanta* land snails

Land snails of the genus *Powelliphanta* are among the most distinctive elements of the country's fauna. They are nocturnal predators feeding on worms and other soft-bodied invertebrates and adults of different species vary in size from 32mm to 90mm maximum diameter.

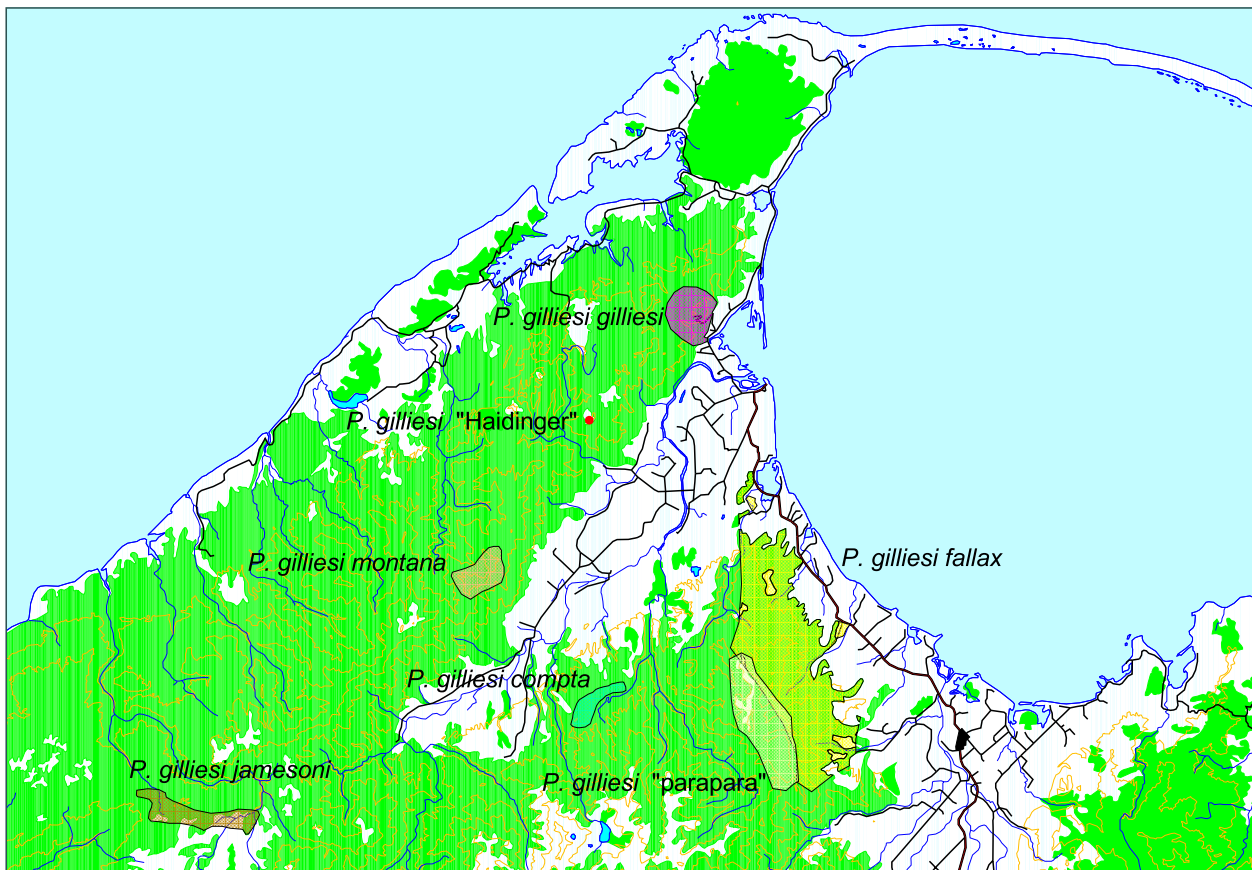
Tasman District, particularly Kahurangi, contains the highest diversity of *Powelliphanta* in the country. This is largely a reflection of the dramatic geological history of the region discussed earlier. Different species were encouraged to develop over the past few million years by the isolation of populations of their ancestors, separated by glaciers, higher sea levels or areas of unsuitable habitat or geology.

Figure 7 presents the known range of seven different forms or sub-species of *Powelliphanta gilliesi* within Kahurangi which illustrates how several recognisably different taxa are isolated on different mountain ranges. Three further sub-species are found within Northwest Coast.

Walker (2003) has produced a recovery plan covering individual taxa within this genus of threatened species. Appendix 4 tabulates 29 taxa from the district from this report including several classified as 'poorly known' and only discovered in the past few decades. It identifies that the ranges of seven taxa include some private land within their distribution. *Powelliphanta* are found in a variety of habitats from sea level to sub-alpine tussock. Lower altitude sites tend to be on calcium-rich soils (on limestone or siltstone) and several of these include private land. If the habitat the snails are occupying is secure, i.e. there is no threat of forest or scrub being cleared, then introduced mammals pose the biggest threat to *Powelliphanta*.



▶ Figure 7 Distributions of sub-species of *Powelliphanta gilliesi* in Kahurangi  
(Source: Department of Conservation)





The presence of *Powelliphanta* in an area may indicate lower numbers of such mammals. But more useful indicators are the proportion of live vs. dead snails, and the proportion of dead shells that are damaged. Different predators leave distinctive damage when feeding on *Powelliphanta*, some biting into the shells from the side (e.g. rats) and others crushing them (pigs).

Pigs, deer, goats and cattle may physically damage snail habitat, reducing the litter layer and causing it to dry out which these moisture-loving animals cannot survive. The forest ground cover can be reduced making it easier for predators to find snails. Possums have been considered the most significant predator for many snail populations in recent years, resulting in several aerial drops of 1080 poison in parts of the public conservation estate. The spotlight has been put on rats in the case of *Powelliphanta gilliesi brunnea* which is confined to a small patch of bush near Paturau. A 381 metre rodent- and hedgehog-proof fence one metre high was constructed around this in 2002 and these mammals eradicated within it. Monitoring in 2003 showed a threefold increase from 2001.

Pigs, thrushes and hedgehogs may also be important predators in some situations. Research on *Powelliphanta traversii* in the southern North Island identified benefits to the snails of rat control using brodifacoum in bait stations, but found an increase in predation by birds (thrushes and blackbirds) suggesting that these also needed controlling (Bennett et al., 2002).

### What you can do

#### How to help:

- Those with *Powelliphanta* populations on their land can assist through protecting and managing the habitats in which they are found, e.g. by fencing out of stock, and by controlling predators.
- The few people whose land is in the defined previous range of a taxon could seek transfers of snails to re-establish them there if the habitat was protected and under appropriate management.
- Those with land bordering snail areas can control predators to lower their densities over the wider area. Pigs and possums are two key species with relatively large ranges so killing animals at your place will protect part of the surrounding forest.

- Others can form a community conservation group to control pests within the public conservation estate.
- New *Powelliphanta* populations are still being found. If you have suitable habitat, moist native forest, scrub or tussock, close to existing snail habitat it is worth searching for shells.

### 2.5.2 Other carnivorous land snails

New Zealand has two endemic genera of carnivorous land snails that are less well known than the larger *Powelliphanta* but no less significant: *Wainuia* and *Rhytida*. Sixteen species are described in a recent review which has concluded that several require conservation action (Efford, 1998). Like *Powelliphanta*, these snails are vulnerable to habitat modification, fire and predation – captive possums, rats and hedgehogs all readily ate *Wainuia*.

Eight of the taxa covered by Efford (op. cit.) are found in Tasman, one *Wainuia* (*W. urnula nasuta*) from the Richmond Range and seven *Rhytida*.

One larger species, *Rhytida oconnori*, with a shell (up to 33mm diameter) similar in size to the smallest *Powelliphanta*, is 'nationally critical' (Hitchmough & Bull 2005). It has only been found in Abel Tasman National Park and seems currently to be confined to a small area around Canaan where an 80% decline has been recorded in the past four years. It was once much more widespread including sites at the coast.

A second taxon, *Rhytida greenwoodi webbi*, is nationally vulnerable. Two populations are known, one in the Motueka River Gorge and a larger one at several sites in East Takaka, though there are some doubts over the taxonomy. Habitats include under *Astelia* on limestone outcrops and under tree ferns.

### 2.5.3 Weta

The Giant Weta may represent the most ancient and primitive part of New Zealand's fauna, with little change from ancestors found 190 million years ago (Meads, 1990). Eleven species are recognised (Gibbs, 1999) and all but one of these are considered threatened (Sherley, 1998).

Four species are confined to offshore islands and most of the others to mountain areas of which two are found in Tasman District.

However the giant weta are only a small part of this group, and there is a interesting range of tree weta, ground weta and cave weta that may be found in Tasman District and that can benefit from the way owners manage their land.

A recent review of ground weta identified one widespread taxon which occurs in Kahurangi and two with very restricted distributions within the same area and the Red Hills respectively (Johns 2001).

### Giant Weta

#### Mount Arthur Giant Weta (*Deinacrida tibiospina*)

Mountain

Status: sparse.

This species, previously known as the Nelson alpine giant weta, has only been found in small numbers in a limited area of sub-alpine tussocks and herbfields in Kahurangi National Park near Mt Arthur.

#### Alpine Scree Weta (*Deinacrida connectens*)

Mountain

Status: not threatened.



This is the most widespread giant weta occupying scree slopes on most of the mountain ranges in the South Island. It has been recorded in Tasman from Kahurangi in the west to Nelson Lakes and Mt Richmond in the east. Like all giant weta it is nocturnal and therefore rarely seen.

## 2.5.4 Carabid beetles

Carabids are a key, conspicuous family of beetles that are one of the top invertebrate predators and used by some as indicators of the 'health' of an ecosystem. The larger species of the family have generally been described scientifically and their distributions are known to some extent. They are included in this overview as important, identifiable invertebrates which are generally flightless, thus presenting a similar picture to *Powelliphanta* with many species showing interesting, restricted distributions.

A recently-produced field guide illustrates many species in excellent black & white photographs (Johns, 2005). Information on those considered under threat has been brought together in a Threatened Species Recovery Plan (McGuiness, 2002) and this illustrates that the Tasman district is also particularly important for this family, as it is for *Powelliphanta*, with nine (or 10) of the 28 species listed as requiring recovery or survey action found here.

Habitat reduction and modification, and predation have been identified as the key issues for the threatened species. Landowners of the district may thus be able to assist in reducing these threats and also provide more records to increasing our understanding of distributions and conservation status.

### 2.5.4.1 *Mecodema* genus



This genus contains the larger species of flightless carabids (12-43mm long) including one, *Mecodema costellum* "spelles", estimated at 50mm (c 2 inches) that has been found as fragments in caves at Paturau and the Aorere Valley and is probably extinct. Tasman District is a key centre for *Mecodema* containing a few widespread species,

e.g. *M. crenicolle* and *M. ducale*, and many others with very restricted distributions including the six threatened species listed below.

#### *Mecodema angustulum*

Upland, mountain.

This medium-sized (20mm long) species is known only from Kahurangi National Park mainly in the Mt Arthur area where it is found in beech forest, scrub and grassland usually under logs. Little is known about it.

#### *Mecodema costellum obesum*

Upland.

This large (34-42mm long) beetle has been found primarily under large decaying beech logs in the Canaan area of Kahurangi National Park and in the east of the district around Tophouse, Lake Rotoiti and the Red Hills. Habitat loss and pig rooting have been identified as possible threats.

#### *Mecodema dunense*

Upland, mountain.

This medium-sized (18-19.5mm long) species is known only from the mineral belt and nearby areas in the Eastern Nelson Mountains, at the upper bush edge and scrub/tussock boundary around Wooded Peak, Mt Richmond and the Dun Mountain.

#### *Mecodema nitidum*

Coastal.

A little-known, smaller, narrow (17mm long, less than 5mm wide) species that has been found in wet forest associated with nikau palms in Golden Bay, around the Kaituna River and Mt Burnett, and also on the West Coast.

#### *Mecodema pulchellum*

Mountain.

A large (29-32mm long) beetle that is found in montane habitats under rocks that has been recorded at Mt Richmond as well as in the Marlborough Sounds. Little is known about this species and more surveys are needed.

#### *Mecodema strictum*

Upland.

A smaller species (17mm long) found only on Takaka Hill in beech forest and under blocks of marble.

#### 2.5.4.2 *Zecillenus tillyardi* (‘Back beach’ beetle) (Not yet found in Tasman).

The only known location of this small beetle (4mm long) is Tahunanui Beach in Nelson where it occupies c 5 hectares of sandy sediments in the embayment known as the ‘back beach’. Surveys elsewhere in Waimea Inlet have so far failed to find further populations but remain a priority within the recovery plan. Creating a further population by translocations to suitable habitat is also being investigated.

### What you can do

#### What you can do to help

Have a look to see what species are found in your area and try to identify dead specimens found using Johns (2005).

Predator control: Rodents and the native morepork would be major predators for nocturnal invertebrates like these and clearly rodents pose a greater threat because of their vastly larger numbers. Currently we can control rats but more research is needed to determine if this alone will benefit large-bodied invertebrates. Several studies including the Rotoiti Nature Recovery Project (Butler et al., 2003) have shown that reducing rats may increase the numbers of mice and these may be an equal threat. Controlling both mice and rats is probably desirable to protect ground invertebrates though it requires a very intensive regime using toxins.

#### 2.5.5 NZ red katipo spider (*Latrodectus katipo*)

This is considered as a flagship species for invertebrate communities in sand dunes.

The endemic katipo, a poisonous spider of the widow family, inhabits coastal sand-dunes and is under threat



(status: 'serious decline') through loss and deterioration of this habitat (Patrick, 2002). During a recent survey, spiders were found at several sites in the district from Motueka to Wharariki, and Farewell Spit was identified as one of 19 preliminary key sites nationwide for securing the future of this species. Katipos are just one of a particular community of invertebrates found in sand-dunes which also includes a large (20-30cm) carabid beetle, *Brullea antarctica*.

### What you can do

#### What you can do to help:

Key threats are the losses of natural sand dunes and their modification and disturbance. Planting of introduced shrubs (e.g. lupins) and pines and the establishment of dense areas of marram grass all make such areas unsuitable for the species. Several groups are now working to restore coastal dunes, including the replacement of marram grass with natives like pingao, spinifex and sand tussock, and you could join or seek to establish one. Two activities to avoid that threaten katipo are driving 4WD vehicles and buggies through dune systems and collecting driftwood off the foredune, a micro-habitat used by the species.

### 2.5.6 Other species of interest:

#### Forest Ringlet (Butterfly) (*Dodonidia helmsii*)

This beautiful butterfly with encircled spots on its wings has been identified as in 'gradual decline' (Hitchmough, 2002) and the Department of Conservation is seeking sightings.

It is not easily seen as it has a relatively short adult stage of a month or so (typically sometime between January and March) and only flies in sunshine quite high up in the forest (Gibbs, 1980). Beech or beech/kamahi forests seem preferred habitats, from sea level to tree-line, as long as they contain the sedges and tussocks on which the larvae feed. Predation by wasps is considered a possible reason for the decline, so the ringlet may benefit from their poisoning.



### 2.5.7 Cave fauna

Tasman District holds nationally significant areas of karst (limestone and marble). These in turn support a cave fauna that contains several species known from a very restricted number of locations including subterranean aquatic snails, a dipluran, a centipede and a spider. This section profiles the large cave spider, also found in Buller District, as a flagship for this group and also looks at the fauna of a single cave, Motupipi or Council Cave, to introduce the variety of species that can be found in such systems.

#### Nelson Cave Spider (*Spelungula cavernicola*)

Range restricted.



This is New Zealand's largest spider with a leg span of up to 15cm and the only one to be legally protected. It is found only in caves but does have functional eyes so it lives not far from entrances sitting in wait for its main prey, cave wetas. It

produces large egg sacs (2.5cm long) which hang suspended on silken threads and potentially provide a monitoring tool. It has been found in four caves in Tasman, and its stronghold is in the Oparara and Heaphy Valleys of Buller District.

### Fauna of Council Cave

Council Cave consists of two parallel passages which join 20 metres from the entrance, one at a slightly lower level and frequently full of water. Its fauna includes four species found in small numbers which until recently were only known from this site: a cixiid bug (*Confuga persephone*) which feeds on the roots of trees (probably only certain species) which penetrate into the cave, two predatory centipedes (*Cryptops sp. and Haasiella sp.*) and a large primitive detritus-feeding insect (*Burmjapyx sp.*) (Order Diplura). *Spelungula* is also present along with carabid beetles, harvestmen spiders, cave wetas and other invertebrates which also use habitats outside. This example shows that the invertebrate fauna of caves can include plant eaters, predators and detritus feeders just like any above-ground forest community.



structures of caves such as stalactites and stalagmites and fossil bone deposits can be permanently damaged by careless visitors.

Actions to manage impacts from the surface:

- Maintain forested cover around cave entrances
- Minimise soil run-off and erosion
- Minimise chemical run-off – fertilisers and pesticides
- Exclude stock from streams and cave entrances

Managing visitation:

- Limit access to vulnerable caves or parts of caves
- Ensure that visitors understand the fragility of caves and the actions they can take to minimise damage.

### What you can do

#### What you can do to help:

Cave systems are fragile and the quality of the habitat that they provide for their special fauna depends largely on activities on the surface and on the impacts of visitors. Caution is needed when defining the catchment of a cave, i.e. the area that needs to be managed to protect it. For in some situations this is different from apparent surface topographical boundaries, with streams from one surface catchment running underground into another one. The physical

# 3. Threats to the fauna of the district and how to manage them

## 3.1 Habitat loss, fragmentation and modification

The past replacement of previous native habitats by modified (human-induced) ones has had a dramatic impact on the district's fauna. Extensive forest clearance of lowland forest (under 600 m) and drainage of wetlands occurred during the first century of European settlement in Tasman. Information contained in the Biodiversity Overview Report (Walls and Simpson, 2004) indicates that lowland forest ecosystems on private land occupy 110,700 ha of Tasman District, about 12% of the total land area (Table 4). This is mostly lowland beech forest (red, silver, black and hard beech) (73%) or beech forest (22%) containing significant amounts of podocarps and broadleaves.

In the same report, Walls and Simpson estimated the publicly-owned land managed by the Department of Conservation occupied 598,351 ha, 62% of the land area of Tasman District. Much of this is the steeper hill country and alpine areas, predominantly upland and alpine beech forest.

Forest clearance is now very much less of a threat. There was limited logging of forest on publicly-owned land well into the 1970s but this effectively ceased with the disbandment of the Forest Service in 1987.

Private owners now require resource consents to cut down

native forest. Prior to 31 March 2007, indigenous forest could only be harvested without a resource consent if it lay outside the Coastal Environment Area and:

- had an approved sustainable forest management plan or permit (under Part IIIA of the Forests Act 1949) and a copy of the approved plan or permit has been lodged with the Council, or
- removed less than 0.2 ha over a three-year period.

From 31 March 2007, two additional conditions were imposed. A consent is required if the indigenous forest is on a lowland alluvial site or on karst terrain.

The effect of the clearance of much of the forest on the lowlands has been the fragmentation of most of what remains into relatively small patches. These patches support a limited, often isolated fauna. The planting of corridors connecting bush patches, particularly along riparian margins, can link patches allowing animals to move between them. However, there is evidence that such corridors can become 'predator traps'. A strip of bush surrounded by modified habitats may be occupied or used as a hunting area by more predatory mammals than an equivalent area within intact forest. Birds using such a corridor may thus be at increased risk of predation unless pest control is carried out.

The modification of habitats is also less of an issue today as most activities are tightly controlled e.g. drainage of wetlands is a discretionary activity.

Lowland forest ecosystems	Area (000 ha)	# Eco-districts	As % area
Lowland podocarp	4.9	7	4%
Lowland broadleaf	1.5	4	1%
Lowland mixed (podo/broadleaf/beech)	23.9	9	22%
Lowland beech	80.4	12	73%
<b>Total</b>	<b>110.7</b>		
As % total land area	12%		

Table 4: Areas of lowland forest systems in Tasman District

## 3.2 Introduced Mammals – pest animals

Some mammals such as cats, dogs, sheep, cattle, pigs, goats become pests when found outside intensively managed, modified habitats e.g. pasture, settlements. Others are considered pests wherever they occur – e.g. brushtail possums, mustelids, rats.

The responsibilities of Tasman and Nelson Councils and of landowners to control or monitor pests are identified within the Tasman-Nelson Regional Pest Management Strategy (TDC & NCC 2007).

The strategy identifies the following mammals as 'Containment Pests' (see p. 51 for definitions): possums, feral cats, feral rabbits and hares, and mustelids.

This section presents some detail of control methods for certain pests but not for others such as possums for which a very wide range of techniques are available. For detailed technical advice you can contact Tasman District Council's Biosecurity Officers.

### 3.2.1 Brushtail Possums

Possums have long been known as a major threat to the country's vegetation but their serious impact on its fauna has more recently become apparent. They are now known as significant predators of *Powelliphanta* land-snails and other large invertebrates and of open- and hole-nesting birds such as kokako and kaka.



There are a very wide range of poisoning and trapping control methods available for possums from research due to their impacts on agricultural as hosts of TB. These

are covered in many different publications and thus not considered in further detail here.

### 3.2.2 Rats

Rats as a group have had and continue to have the greatest impacts on our native fauna. The first arrival around 2000 years ago was the kiore or Polynesian Rat (*Rattus exulans*). It is now considered that kiore 'was the only factor in the extinction of a large percentage of New Zealand's small vertebrate fauna' (Worthy & Holdaway 2002). This species has been largely displaced by the rats that arrived with the first Europeans and probably now only occur on the mainland in a few parts of Fiordland. Today Ship Rats (*Rattus rattus*) are the more widespread of the two European rats while Norway Rats (*Rattus norvegicus*) are concentrated in suburban areas and around wetter habitats.



A great deal is known about the impacts of ship rats in forests where they feed on the ground and up trees. Invertebrates, reptiles, amphibians and bats are all at risk, but the threats posed to birds have been most studied. Video camera studies have shown that robins, tomits and kokako are three species which suffer significant rat predation at their nests, and hole or cavity nesters like yellowheads and saddlebacks are taken while nesting or roosting.

The key to controlling rats is the intensity of the effort, to ensure that every individual is exposed to a bait or trap within its small territory (c.100m in length) and that they are removed faster than their rapid breeding rate. Poisoning using bait stations on a 100 x 100m grid has proved effective and there are a variety of toxins available. Trapping is less effective if numbers are high and requires a denser grid, 50 x 100m. Traps need checking frequently in spring and summer.

Brown rats have been studied in less detail in New Zealand as they are most numerous in modified habitats. Their impacts will include eating seeds and seedlings and preying on small animals of the ground such as reptiles and ground birds and their nests.

Eradication of rats from offshore islands has become routine practice. The same technique of aerial spreading of grain-based baits containing the toxin brodifacoum is currently approved for use in eradicating mammals on the mainland within fully pest-proof-fenced sanctuaries. Karori Sanctuary led the way and other sites like Maungatautari (Waikato) and Tawharanui (Auckland) have followed. A project is developing in neighbouring Nelson District, the Brook Waimarama Sanctuary, which will protect c.700ha of lowland forest.

The numbers of rats, and thus the amount of control needed, can fluctuate dramatically from year to year according to the food supply available. The periodic seeding of beech trees or fruiting of rimu can lead to rapid increases in number. A combination of heavy beech seeding over a couple of years and mild winters saw rats reach almost plague proportions in parts of the South Island in 2000/01 and appear in areas where they had previously rarely been seen. This had a devastating impact on many bird species, including yellowheads in particular.

### 3.2.3 Mustelids

The three mustelids introduced to New Zealand, weasels, stoats and ferrets form a formidable array of predators of increasing size. The smallest, the Weasel, is a small



mammal (e.g. mouse) predator and seems most abundant in modified habitats. The latter is also generally true of the largest, the Ferret which has rabbits as a traditional prey.

The Stoat which lies in the middle of the size range also has rabbits as a major prey item in Europe, but in New Zealand it has proved the most adaptable and destructive mustelid and is found in almost all habitats taking a variety of prey.

Ferrets have been implicated in the demise of ground birds like weka and kiwi and may be a particular threat to birds nesting on braided rivers. They are generally targeted by trapping, particular in Tb areas as they are a carrier of the disease.

Stoats have been proven as a threat to a wide range of birds from kakapo, kaka and kiwi through to blue ducks, yellowheads and robins, as they rapidly search habitats in three dimensions up and down trees. They are wide ranging animals with territories of over 200ha (males) and over 100ha (females) and young have been recorded dispersing as much as 65km (Murphy & Dowding, 1995), so they generally need to be tackled on a 'landscape' scale.

Kill trapping is the main control method for stoats though poisoned eggs have been used. DOC's recommended 'best practice' requires traps to be set 100 metres apart on lines no more than 1km apart and identifies three trap types that have passed humane guidelines: DOC series (200, 250), Thumper™ and Hammer™.

### 3.2.4 Feral cats

Feral cats are proving one of the most difficult pests to address. They can be very wide ranging – a male fitted with a radio-transmitter at Lake Rotoiti covered an area 11km long right around the lake – and are hard to detect and



control. DOC recommends an extensive layout of traps 100-200 metres apart along linear landscape features (fence lines, forest edges, waterways, roads and tracks). Three traps/systems have passed National Animal Welfare Advisory Committee (NAWAC) guidelines: Steve Allan (SA) Conibear trap system, the

Belisle Super X220 in a cubby or a 'chimney' system, or Timms™ traps.



### 3.2.5 Ungulates

The district's forests, shrublands and tussock grasslands are under a varying degree of threats from introduced ungulates. The following information on numbers and distribution is largely based on material supplied by M. Hawes from Nelson/Marlborough Department of Conservation fact sheets.



**Feral pigs** mostly live on farmland and rough hill country which includes thick and extensive scrub cover, but are present throughout larger forest areas. In winter they descend to warmer sites on sunny hill faces and river flats. Due to liberations, land development and changes in land use they have extended their range since the 1970s. They can be found throughout the district although there are only light numbers in parts of Nelson Lakes National Park and they are absent in most western areas of Kahurangi National Park. The highest numbers in Kahurangi National Park are found on the fringes of the Wangapeka, Baton, Ellis, Pearse and the Riwaka and Motueka Valleys. Pigs are also found in the Aorere Goldfields, Parapara and Anatoki. In the Abel Tasman National Park light to moderate numbers can be found from Marahau to Anchorage. There are a few in the Tonga area and moderate numbers in the northern end of the park. Low numbers are found in the Lower D'Urville and Matakaitaki/Glenroy, but there are good populations throughout most of the Murchison conservation areas and Big Bush.

Feral pigs will eat the leaves and fruits of native plants and during digging for roots they turn over soils destroying the understorey and increasing erosion. They are a significant threat to ground nesting birds and larger ground invertebrates including Powelliphanta.

**Red deer** are the most widespread and numerous of introduced game mammals in the district and are widely

distributed throughout forested areas and open high country. They thrive particularly where forest, scrub and grassland lie in close proximity. Red deer numbers are light to moderate in Kahurangi National Park with highest numbers in the Cobb Valley, Boulder Lake, Shakespeare Flat in the Aorere River, Mt Arthur range and the Salisbury/Tablelands area, Mt Owen, Matiri, and further back in the Leslie/Karamea and Roaring Lion areas. Moderate numbers are found around the heads of the Matakaitaki and Sabine Rivers, as well as Speargrass in Nelson Lakes National Park

Red deer are browsers that prevent the regeneration of favoured plant species, significantly changing forest structure and composition. In beech forest their impacts are largely on other more palatable species rather than these keystone species themselves.

**Fallow deer** have readily adapted to beech forest and generally stay in areas of low altitude, inhabiting lower valley sides and river flats. Several populations are found in



the district. In Kahurangi National Park they can be found in the Cobb Valley, Salisbury/Tablelands and the Grecian and Deep Creek areas. In recent years, farm escapes or illegal releases have appeared in the East Takaka and Murchison areas.

**Feral goats** have been present in the region since the 1850s when large numbers were recorded near Nelson as



escapees from farmed animals. They are browsers found in forests and scrub-covered habitats preferably with a rocky substrate (King 2005). Feral goats are largely absent from Northwest Coast, Golden Bay, Abel Tasman, Waimea/Moutere and found in parts of East Nelson Ranges, Upper Buller, Upper Motueka and Kahurangi. They are subject to control in 97% of the c. 6200km<sup>2</sup> that they occupy within DOC's Nelson/Marlborough Conservancy (Fraser et al. 2000).

**Chamois** are the most widespread ungulate nationally after red deer, occupying alpine and sub-alpine zones but occasionally found at lower levels (King 2005). Moderate to light numbers of chamois can be found around Nelson Lakes National Park. They are still colonising Kahurangi NP with low numbers around Mt Owen and sightings have been reported as far north as the head of the Cobb Valley and Anatoki Peak.

[**Himalayan Tahr** are absent from the district but they have been recorded just to the east of Nelson Lakes National Park, perhaps due to illegal movements of animals.]

### 3.2.6 Lagomorphs

**Rabbits** and **Hares** may be considered relatively unimportant direct threats to native fauna as their major impacts are in modified ecosystems. One exception may be hares in subalpine areas where the impacts of their selective grazing of certain plants on invertebrates are unknown.



However rabbits in particular may be an indirect threat, providing the main food supply to allow predators (e.g. larger mustelids and feral cats) to survive in certain areas. Controlling rabbits, e.g. by poisoning with Pindone, may be worthwhile to reduce predator numbers at some key sites, e.g. sandspits, coastal wetlands, and in turn reduce impacts on native fauna.

### 3.2.7 Hedgehogs

It is becoming increasingly apparent that hedgehogs are a significant threat to native wildlife in various situations. In dunelands, riverbeds and around wetlands they may prey on the eggs of ground-nesting birds. In native forests, where they have been found to be more widespread and abundant than previously thought, they consume large numbers of invertebrates every night.



Our increased awareness of the activities of hedgehogs in forests has largely come about through their capture as by-catch in traps set for stoats. In the RNRP for example, 267 animals were caught in three years of trapping at St Arnaud (1998-2001), most along the edges of farmland but others right through the forest up to treeline (441 stoats were trapped over the same period) (Butler 2003).

There are several unanswered questions regarding the possible control of hedgehogs. We do not have tried and true techniques for control; do not know where this is really needed; nor how to measure the results. The by-catch of animals in traps set for mustelids is seen largely as a nuisance, but there may be a conservation benefit if enough are caught.

### 3.2.8 Introduced Birds

Introduced birds are not generally considered pests, though there are a number of ways that they may affect indigenous species including predation, competition for food or nest sites and carrying introduced diseases according to a recent review (Forsyth et al., 2002). The clearest threat documented in this is that posed to the Grey Duck by **Mallards** which hybridise with them readily, to the point that the 'integrity' of Grey Duck as a separate species is doubtful. **Australian Magpies** are observed chasing and killing native birds, perhaps more in defence of territories rather than attempted predation. A recent

Landcare Research study of the effects of removing birds from several localities suggested that their impact was to reduce the conspicuousness of native birds (e.g. N.Z. pigeons) rather than their abundance. It is more important to concentrate on controlling mammalian pests (Landcare Research media release, 14/8/03). However if they can be prevented from occupying new areas without major effort, this is probably going to be worth doing and they have been listed as 'Containment Pests' in the new pest strategy (TDC-NCC 2007). **Song Thrushes** have recently been identified as a possible threat to some populations of *Powelliphanta* land snails (Walker, 2003). **Rooks** are occasionally sighted in the district around Eighty-Eight Valley, St Arnaud and Golden Bay and listed as a 'Progressive Control Pest' with the aim of preventing the establishment of any rookeries.

### ■ 3.3 Introduced plants – weeds

The country does have one famous example of an endangered species benefiting from a weed, the Mahoenui giant weta which is largely confined to gorse in an area near Te Kuiti in the Waikato. But more often such plants are a threat to indigenous species which are not adapted to make use of them or the environmental conditions they may create.

The Regional Pest Management Strategy (TDC & NCC 2007) lists priority weeds under five categories:

- Total Control Pests – limited in distribution or density for which the ultimate goal is eradication (13 species)
- Progressive Control Pests – species unlikely to be eradicated for which reducing numbers/distribution is feasible (11 species)
- Containment Pests – abundant species where the long-term goal is to prevent them spreading to new areas (four species)
- Boundary Control Pests – generally widespread species for which the goal is to control their spread to areas that are clear or being cleared of the pest (eight species)
- Regional Surveillance Pests – species banned from sale or distribution whose distribution and impacts are being monitored (three species).

There has been significant progress made on managing weeds in the district since the previous strategy (TDC & NCC 2001) with three species moved from Progressive Control to Total Control, i.e. now targeted for eradication.

One species first detected in 2002 may have been eradicated over the period.

#### 3.3.1 Total Control Pests

Of the thirteen species, three are agricultural pests leaving ten of potential significance to the district's fauna:

**Cathedral Bells** (*Cobaea scandens*), **Climbing Spindleberry** (*Celastrus orbiculatus*) and **Madeira Vine** (*Anredera cordifolia*) are vigorous climbers that may smother and kill native vegetation and each is known from less than twenty sites. **Boxthorn** (*Lycium ferocissimum*) is a shrub that is a particular threat in coastal areas where it can out-compete and displace native vegetation. It has scattered infestations around the Waimea and Northwest Coast.

The other six species are found in or around waterways and can thus alter their drainage or food chains and in turn affect wetland wildlife. **Spartina** (*Spartina spp.*) inhabits estuaries where it holds sediment causing flooding and restricting bird and fish habitats. It is known from Waimea and Moutere Inlets, Riwaka, Kaiteriteri, Ngaio Bay, Farewell Spit and Westhaven Inlet. **Phragmites** (*Phragmites australis*) is a clump-forming grass that is currently known from only one site south of Murchison.

**Hornwort** (*Ceratophyllum demersum*), **Egeria** (*Egeria densa*), **Entire Marshwort** (*Nymphoides geminata*) and **Senegal Tea** (*Gymnocoronis spilanthoides*) are more truly aquatic. Hornwort was discovered in the Moutere Stream in autumn 2002 and subsequently found in ponds near Mapua and in Motueka township, the first records in the South Island. Treatment by biosecurity staff from DOC and TDC appears to have eradicated it from all known sites, but surveillance will continue. The other three species are known from one, two and two active sites in the district respectively.



Hornwort

### 3.3.2 Progressive Control Pests

This category contains eight species of conservation significance:

**Boneseed** (*Chrysanthemoides monilifera*) is another perennial shrub threatening coastal vegetation. It is largely confined to the Nelson district but there are four infestations in Tasman: Kina, Jackett Island, Pohara and Collingwood.

**Old Man's Beard** (*Clematis vitalba*) is capable of smothering native trees and its control is required in Golden Bay/ATNP/Kaiteriteri and Buller Catchment areas where it is still at low incidence. Many individuals and groups are putting significant effort in to control it in other



Old Man's Beard

areas to protect patches of native bush. **Banana Passion Vine** (*Passiflora mollissima/mixta*) is widespread in many parts of the district but is to be controlled under an operational plan in Golden Bay where it still has a limited distribution.

**White-edged Nightshade** (*Solanum marginatum*) and two species of **Wild Ginger** (*Hedychium gardnerianum* and *H. flavescens*) can invade bush areas. White-edged nightshade is currently more localised, known from sites in the Richmond Hills and Wairoa Gorge. Control of wild ginger is required from Golden Bay to Kaiteriteri where it is still relatively uncommon.



Purple Loosestrife

**Purple Loosestrife** (*Lythrum salicaria*) can invade a variety of wetland habitats where its dense stands can eventually eliminate any open water. Its current incidence in the district is low.

Two grasses which can smother vegetation on the edges of waterbodies, **Reed Canary Grass** (*Phalaris arundinacea*)



Reed Canary Grass

and **Reed Sweet Grass** (*Glyceria maxima*) have recently been added to their strategy and their distribution in the district is still being defined.

### 3.3.3 Containment Pests

**Pampas Grass** (*Jubata*) (*Cortaderia jubata*) threatens bush areas. The species listed is the most invasive one and flowers in late January, compared to a related species that flowers in mid-March. It is widespread in Waimea/Moutere inland as far as Kerrs Hill, and coastal Golden Bay.

**Broom** (*Cytisus scoparius*) and **Gorse** (*Ulex europaeus*) are both largely subject to 'boundary control' and biocontrol work but are required to be controlled in the Howard/St Arnaud area where they are not well established.



Broom

**Lagorsiphon** (*Lagorsiphon major*) is a truly aquatic plant found at numerous sites in garden and farm ponds and some waterways in the district. Its control is very difficult so educating the public about it is the major focus.

### 3.3.4 Boundary Control Pests

**Buddleia** (*Buddleia davidii*) is the main 'boundary control' species of conservation significance as it can invade riverbeds and bush margins. Broom and gorse are also listed outside the Howard/St Arnaud area. The other species listed are a threat to agriculture.



### 3.3.5 Regional Surveillance Pests

**Pinus contorta** and the aquatic **Parrot's Feather** (*Myriophyllum aquaticum*) are listed as 'surveillance' pests as there is currently limited information on their distribution and impact.



Parrot's Feather

## 3.4 Introduced invertebrates

Introduced Vespid wasps have been studied extensively in the district by Landcare Research. Currently the dominant species is the **Common Wasp** (*Vespula vulgaris*) which replaced the **German Wasp** (*V. germanica*) in the region by 1990 (Clapperton et al., 1994). It is found everywhere but builds up to particularly high densities in beech forests containing honeydew, an ideal source of carbohydrate. After research showed that they dominated this resource in summer at the expense of honeyeaters like kaka, tui and bellbirds, methods of control were investigated.

This led to the Rotoiti Nature Recovery Project establishing the largest wasp control project in the country, treating up to 600 hectares with poison placed in fish-based baits in tree-mounted bait stations. A grid of stations 50m x 200m has generally proved effective at reducing wasp activity by up to 90%. This technique should be transferable to other sites once a new registration for the most effective toxin, fipronil, becomes available perhaps later this year.

**Asian Paper Wasps** (*Polistes chinensis*) are a more recent arrival, discovered in the country in 1979 and reaching the district around 1990. They live in small colonies feeding largely on live caterpillars and their potential impacts on indigenous fauna are uncertain.

Two species of introduced ants, **Argentine Ant** (*Linepithema humile*) and **Darwin's Ant** (*Doleromyrma darwiniana*), have been the subject of recent control programmes by TDC and Nelson City Council in the adjacent Nelson District and are both listed as 'Containment Pests'. Argentine Ants are very aggressive and will displace native ants, eat a wide range of invertebrates and even kill nestling birds. Darwin Ants are closely related and similar and are an increasing concern as it seems that they may be able to tolerate cooler conditions than Argentines. Both these species could prove major threats to the district's fauna. Poison baiting options do exist but once they have spread beyond a small area then eradication is impractical. The conclusion of a 2005 Invasive Ant Workshop convened by TDC and Biosecurity New Zealand was that the best option is to run a coordinated control program to reduce their rates of spread and keep long-term control costs down.

Our best defence against new ants is to stop them at the border. Everyone can however take responsibility for keeping an eye out for any ants that are unfamiliar or behaving differently at their place and informing the authorities (MAF or DOC).



Argentine Ant

# 4. What is being done

For many years, groups and individuals have been involved in protecting habitats and enhancing them through fencing, weed control and tree planting. More recently the successes of projects like the DOC's 'mainland islands' have seen control of mammalian predators added to the mix. Appendix 3 lists some of the groups currently involved in the district and how to contact them. There are also many individuals taking action on a variety of scales.

## 4.1 Coordination

A key element helping to sustain this effort has been the formation of the Tasman Biodiversity Forum (TBF) formerly the Tasman Natural Areas Enhancement Group. This group was initiated by the TDC in August 2001 when it was in the process of developing a Natural Areas Enhancement Strategy aimed at maintaining, enhancing and restoring natural areas in the district. TBF originally involved a relatively small range of umbrella organisations: TDC, Nelson City Council, DOC, iwi, Marlborough District Council, QEII National Trust, Fish & Game, NZ Landcare Trust, Forest and Bird, and Federated Farmers. It has since developed to draw in smaller groups and individuals actively involved in restoration on the ground including pest animal control. The Group meets twice a year to listen to a range of speakers who discuss both strategic and practical issues and provide a forum for groups to update others on their activities and seeks advice.

Anyone wishing to find anything more about TBF should contact TDC's Policy Planner Land and Pest, Lindsay Vaughan.

## 4.2 Individual and Group Action

Appendix 3 demonstrates the extensive work being undertaken, most of it initiated within the past ten years following the success of some of DOC's mainland pest control programmes. Small groups and individuals are doing very significant work on their own land under umbrella organisations like NZ Landcare Trust, QEII National Trust and Federated Farmers. In addition, several new organisations have been developed, as Charitable Trusts or Incorporated Societies, with ambitious objectives across areas of significant habitats in a variety of ownerships. Such organisations are working on DOC land in Nelson Lakes and Kahurangi National Parks and smaller reserves in the Waimea and Golden Bay. Control of animal pests has become an increasing focus, developing at some sites after an initial programme of plantings and weed control. There has also been a broadening of that control effort to focus on mustelids, rats and feral cats when it might once have been largely targeting possums.

## 4.3 A brighter future

This overview has identified that Tasman District contains a wide variety of threatened species across all groups of terrestrial fauna. Pest animals are a threat to almost all of them. However there is an increasing enthusiasm among individuals for taking on the task of halting species declines, and increasingly sophisticated tools at their disposal. There are thus grounds for optimism that the next such review will record a range of indigenous groups increasing in numbers and distribution and being reintroduced to previous haunts where pest animals are under control.

The 'urgent action' that Perrine Moncrieff called for in 1944 is coming and there is every hope that it is not 'too late'.

## “And what of the birds themselves?”

*“And what of the birds themselves? Diminished larders can only support a certain number of birds, and it is useless to increase bird-life by breeding unless the native food is correspondingly increased. In spite of this they are making astounding efforts to remain in existence. Pigeons, bellbirds, tuis and several species of smaller birds have shown signs of adapting themselves to new environments. Others, less adaptable, have been driven back into the last remaining wilds of New Zealand, where from their mountain vastness they may stage a comeback, if given the opportunity. But, optimistic as one would wish to be, the odds are too many and too heavy against the native fauna. Action is urgently required unless it is to come too late.”*

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# Appendices

**Appendix 1:** Extinct fauna recorded in the Tasman District.  
*Source: Worthy & Holdaway (2002).*

**Appendix 2:** Probable timings of extinction of different species in Tasman District.  
*Source: Worthy & Holdaway (2002) unless otherwise stated.*

**Appendix 3:** Groups undertaking pest control and restoration in Tasman District.

**Appendix 4:** *Powelliphanta* land snails of Tasman District

## Appendix 1: Extinct fauna recorded in the Tasman District.

Source: Worthy & Holdaway (2002).

Species	Comments
<b>Birds</b>	
Little bush moa – <i>Anomalopteryx didiformis</i>	A small moa that shared forest habitats with kiwi
Upland moa – <i>Megalopteryx didinus</i>	A small moa predominant in the high country
Crested moa – <i>Pachyornis australis</i>	A relatively massive but squat moa species also found above tree line.
Slender bush moa – <i>Dinornis struthoides</i>	A larger moa found in small numbers in all habitats
Large bush moa – <i>Dinornis novaezelandiae</i>	A very large moa also found above tree line
Giant moa – <i>Dinornis giganteus</i>	The largest moa, up to two metres high at the shoulder, largely found in shrubland/grassland
New Zealand merganser – <i>Mergus australis</i>	A fish-eating duck recorded at Delaware Bay (Nelson District) and likely to have been in Tasman.
Finsch's duck – <i>Euryanas finschi</i>	An herbivorous duck found in grassland/shrubland including above tree line.
Haast's eagle – <i>Harpagornis moorei</i>	The world's largest eagle, found in high altitude scrublands and herbfields in the district. Mt Owen has yielded its most complete skeleton.
Eyles's harrier – <i>Circus eylesi</i>	Four times heavier than the Australasian harrier and found in subalpine shrubland on Mt Arthur, Takaka Hill.
Laughing owl – <i>Sceloglaux albifacies</i>	A medium-sized owl relatively common when Europeans arrived.
New Zealand owlet-nightjar – <i>Aegotheles novaezealandiae</i>	Harwood's Hole is the type locality for this nocturnal predator.
South Island adzebill – <i>Aptornis defossor</i>	A predator of shrublands/grasslands below 1000m – bones may recently have been found on Takaka Hill
New Zealand quail – <i>Coturnix novaezelandiae</i>	A widespread species associated with grassland or short scrubland.
New Zealand coot – <i>Fulica prisca</i>	Bones have been found away from aquatic habitats suggesting it may have been more terrestrial like pukeko.
South Island snipe – <i>Coenocorypha iredalei</i>	A nocturnal bird of forest and shrubland feeding by probing in soil/leaf litter.
Bush wren – <i>Xenicus longipes</i>	Previously widespread in forest habitats.
Lyall's wren – <i>Traversia lyalli</i>	Last recorded on Stephens Island – once more widespread
Stout-legged wren – <i>Pachyplichas yaldwyni</i>	A flightless species found in North and South Islands
Long-billed wren – <i>Dendroscansor decurvirostris</i>	The rarest bird fossil in New Zealand found at Takaka Hill and three other sites.
South Island piopio (thrush) – <i>Turnagra capensis</i>	Historically found in the west of the South Island but more characteristic of drier eastern forests.
New Zealand raven – <i>Corvus sp.</i>	Large crows most common at coastal sites.
<b>Mammals</b>	
NZ Greater short-tailed bat – <i>Mystacina robusta</i>	Widespread in past – last population extinct with rat arrival on Big South Cape island in 1965
<b>Amphibians</b>	
Markham's Frog – <i>Leiopelma markhami</i>	A species similar to Hochstetter's Frog once distributed throughout North and South Islands.

## Appendix 2: Probable timings of extinction of different species in Tasman District.

Source: Worthy & Holdaway (2002) unless otherwise stated.

### ► Species extinct due to kiore prior to Polynesian settlement

**Some seabird species** – uncertain but likely for some smaller species.

**NZ Owlet Nightjar** – died out before or soon after Polynesian settlement.

### ► Species extinct between settlement by Polynesians and the arrival of Europeans

**Moa species** – current evidence is that the main populations were extinct by A.D. 1400, less than a century after Polynesian settlement.

**Scarlett's Shearwater** – probably extinct soon after Polynesian settlement with kiore the main factor.

**Haast's Eagle** – survived into Polynesian time but probably largely followed the demise of its main prey, moa. One possible sighting as recently as 1860s in the Landsborough Valley, S. Westland.

**Eyles's Harrier** – survived into Polynesian time as represented in middens.

**South Island Adzebill** – hunted by Maori and probably followed same pattern as the moa.

**South Island snipe** – survived on islets around Stewart Island till 1960s.

**Markham's Frog** – timing of extinction uncertain but kiore probably a key factor.

### ► Species extinct during European settlement

**NZ Merganser** – last record on Auckland Islands in 1902, but perhaps lost from district prior to European settlement.

**NZ Quail** – Considered extinct by 1895 by a naturalist writing from the Karamea-Wangapeka area who had not seen one since 1869 (Jonathan Brough).

**Bush Wren** – possible sighting in Sabine Valley in 1976 was followed up by two expeditions though it was concluded that the bird was probably a rock wren.

**Laughing owl** – no specimen since 1914 and the most recent report was at Mt Maude, Aniseed Valley in 1939 (Walker, 1987).

**SI Piopio** – Reported as abundant west of the axial ranges in the 1880s and widespread till 1890s and apparently gone by c 1900.

**SI Kokako** – Considered by the Department of Conservation to be extinct though some evidence that isolated birds remain. Very scarce in NLNP by 1900 though unconfirmed sightings and calls there in 1963 and 1973 respectively. Have been occasional reports in the district since with the most

recent in Howard Valley in 1987 (Butler 1991).

**Greater Short-tailed Bat** – last population known on Big South Cape Island killed off by ship rats in 1965.

### ► Species locally extinct during Polynesian settlement but surviving elsewhere

**Cook Island Petrel, Mottled Petrel, Fairy Prion** – these seabirds were breeding in large numbers in widespread localities in the South Island before Polynesian settlement. However they do not feature significantly in Maori sites suggesting they became extinct soon after settlement and that kiore were again significant.

### ► Species locally extinct during European settlement but surviving elsewhere

**Little Spotted Kiwi** – an adult female found at Westhaven Inlet in July 1978 is the last mainland record (Worthy & Holdaway, 2002).

**Australasian Crested Grebe** – breeding ceased at Lake Rotoroa, NLNP in 1950s and occasional sightings into 1970s and as recently as 1992.

**NZ Dabchick** – may have ceased to breed in district in 19th century, but still nesting elsewhere in South Island until 1940s.

**King shag** – found during midden excavations at Delaware Bay (Nelson District) and thus likely to have been in Tasman prior to European arrival.

**Fluttering & Hutton's shearwater** – these species largely nested east of the main ranges in the South Island and if present in Tasman probably died out early in European settlement if not before this.

**Yellow-eyed penguin, NZ crested penguin** – timing of loss from Tasman uncertain.

**Red-crowned Parakeet** – last confirmed sightings in district during a survey of Kahurangi in 1992/93.

**Orange-fronted Parakeet** – last sightings in D'Urville Valley, NLNP in 1965.

**Kakapo** – Close to extinction in Upper Buller by 1840s; sign and possible calls encountered in 1934 near Mt Mackay (Moncrieff, 1935); unconfirmed sightings in Kahurangi NP as recently as 1978/9 (Butler 1989).

**Takahe** – formerly widespread in lowlands – 'Nelson hills' in 1934 the last record for the region (Walker, 1987).

**Yellowhead** – stoats (Dilks, 1999) and rats are key threats. Found in Wangapeka/Karamea area up to 1975, Canaan area in 1981 (Walker 1987).

**Saddleback** – disappeared from NLNP/Upper Buller in early 1900's – still in Nelson Region in 1928 (Moncrieff 1938).

### Appendix 3: Groups undertaking pest control and restoration in Tasman District.

The following list of community groups active in restoration in the district is probably not comprehensive as there is more and more good work being done out there. It largely includes groups connected to TBF. We apologise if your activities are not represented and please contact TDC so that you can be included in any future reports. There are also many private owners undertaking restoration on their own land in the district.

#### ► Friends of Mangarakau Swamp Inc. (FOMS)

**Ecosystem under management:**

Lowland swamp and pond

**Main purpose:**

FOMS was formed in April 2003 to promote and assist the restoration and protection of Mangarakau Swamp in its natural state, following its purchase and protection by the NZ Native Forests Restoration Trust. The swamp complex including part managed by the DOC situated at Mangarakau within Northwest Coast is the largest remaining wetland in the region and a home to rare birds like bittern, crakes and fernbird and an endemic brown mudfish.

**Key activities:**

Weed control, tree propagation and planting, restoration following fire, trapping of stoats, rats and possums, maintaining a high class visitor interpretation and education facility and a wilderness lodge for members.

**Contacts:**

John Gilardi (Chairperson)

email: [jrgilardi@gmail.com](mailto:jrgilardi@gmail.com), tel: (03) 524 8534

Robyn Jones

email: [robyn@robyn-jones.com](mailto:robyn@robyn-jones.com), tel: (03) 524 8226

#### ► Onekaka Biodiversity Group Inc (OBG)

**Ecosystem under management:**

Lowland forest, river and estuary.

**Main purpose:**

Formed in 2003, the OBG aims to promote and assist restoration and protection of the Onekaka River, the Onekaka Estuary and adjoining riparian strips, and to work with DOC to enhance the biodiversity values of Washbourn Reserve.

**Key activities:**

Trapping of possums, cats, stoats, rats, mice and hedgehogs, tree propagation and planting.

**Contact:**

Thora Blithe

email: [thora.blithe@globe.net.nz](mailto:thora.blithe@globe.net.nz), tel: (03) 525 6009

#### ► Friends of Rotoiti (FOR)

**Ecosystems under management:**

Upland forest, river, mountain

**Main purpose:**

Formed in 2001 the Friends of Rotoiti works in conjunction with the Department of Conservation to control pests around the margins of the Rotoiti Nature Recovery Project (RNRP) one of DOC's six 'Mainland Islands'. Around 40 of the 80 members maintain lines of stoat traps which run through the Rainbow Valley to the Rainbow Skifield, along Mt Robert Road and along the Lakeside Track to Coldwater Hut, which act as buffers for the RNRP. The group also maintains a 250ha grid of rat traps within St Arnaud Village and surrounding short walks in Nelson Lakes National Park.

**Key activities:**

Trapping for stoats and rats; poisoning of wasps; assisting the DOC in monitoring of pests and native species.

**Contact:**

email: [sleggett@doc.govt.nz](mailto:sleggett@doc.govt.nz), tel: (03) 521 1067

#### ► Friends of Flora

**Ecosystems under management:**

Upland forest, river

**Main purpose:**

Formed in 2001, the FOF's mission is to 'implement a conservation strategy to bring about the protection and/or return of endangered and threatened endemic flora and fauna of the Flora Stream catchment of Kahurangi National Park. This will enhance the experience for all visitors to this popular area, resulting in wider community appreciation and use of the Park'.

**Key activities:**

Trapping and monitoring of stoats, possums and rats; monitoring of native species including bird counts. Reintroduction and protection of the whio and work towards the reintroduction of the great spotted kiwi.

**Contact:**

Bill Rooke (Secretary)

email: [fof@fof.org.nz](mailto:fof@fof.org.nz), tel: (03) 528 9054

web site: [www.fof.org.nz](http://www.fof.org.nz)

## ► Puketawai Cultural and Ecological Restoration

### **Ecosystem under management:**

Coastal

### **Main purpose:**

The proposal is to undertake a cultural and ecological restoration project at Puketawai, an important former pa and kainga site between Riwaka and Kaiteriteri. Puketawai is owned by the Crown and managed as a recreation reserve by a committee made up of representatives of Tangata Whenua (through Tiakina te Taiao) and the nearby Kaiteriteri Recreation Reserves Board.

### **Key activities:**

The different landscape zones will be re-vegetated using native trees and plants sourced from Puketawai and other important cultural sites in the area. Species are being planted for various purposes including food, timber, oils and fibre as well as providing habitat for native birds and animals. There is also a strong education element and interpretation panels will explain the key objectives of the project and the identification of species and their uses.

### **Contacts:**

Dean Walker

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Cherie Tawhai

*email: cherie@tiakina.co.nz, tel: (03) 546 7842*

## ► Milnthorpe Park Society

### **Ecosystems under management:**

Coastal forest and wetlands, dunes.

### **Main purpose:**

The Milnthorpe revegetation project started in 1974 aimed at re-establishing indigenous coastal forest over 165 hectares. In 1999 the renamed Milnthorpe Park was designated as a Scenic Reserve, administered by an incorporated society under an agreement with DOC. The Park extends from ridgeline to coast and includes a discreet catchment and small streams. About a third of the area is currently managed and the whole site is covered by a network of popular walking tracks (maps available on site).

### **Key activities:**

Planting of native species below an over-storey of introduced species; pest control by trapping; development of walking tracks and ponds.

### **Contacts:**

Dick Nicholls (Secretary/Manager)

*tel: (03) 524 8373*

Joe Bell (Chairperson)

*email: gbaybell@xtra.co.nz, tel: (03) 524 8146*

## ► Coast Care

Coast care groups are formed by members of the local community who want to be actively involved in protecting their coastal environment; their work is supported by Tasman District Council. They are present in the following areas within Tasman District: Tata Beach, Ligar Bay, Rangihaeata, Parapara, Collingwood, Motupipi, Little Kaiteriteri, Torrent Bay, Rabbit Island, Pakawau and Pohara.

### **Ecosystem under management:**

Coastal dunes

### **Main purpose:**

Restoration of coastal vegetation

### **Key activities:**

Planting of native coastal species.

Some groups also grow native sand grass plants to help the projects.

### **Contacts:**

For contact details of Groups and further information contact:

Beryl Wilkes, Tasman District Council

*email: beryl.wilkes@tdc.govt.nz, tel: (03) 543 8391*

Stephen Richards, Tasman District Council

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## ► Mapua Wetland Enhancement Project

### **Ecosystems under management:**

Moutere lowland and lowland swamp forest.

### **Main purpose:**

The project is managed by the Friends of Mapua Wetland Inc, formed in 2005. Its main objectives are:

- To restore and protect with a QEII National Trust covenant Mapua Wetland, a 1 ha area adjoining Aranui Park. This was part of the original 400ha Seaton Valley Swamp, one of the larger wetlands in the Nelson region.
- To work collaboratively with the Department of Conservation and the Tasman District Council to

promote integrated management of the wetland and its catchment system.

- To foster public understanding of, enjoyment of, and support for wetland protection.

**Key activities:**

Planning, planting, protection and weeding. The Friends are focusing on some rare and threatened species in the district and collaborating with Mapua School in an environment education programme for older pupils based around the wetland. In late 2008, the Friends applied for a QEII covenant for the wetland. They are also seeking to start a co-operative group with other Moutere District native forest block owners and welcome contacts and interest.

**Contact:**

David Mitchell, secretary

*email: wetland@mapua.gen.nz, tel: 03 540 2873*

► **Marahau Wetland Project**

**Ecosystem under management:**

Lowland wetland and estuary

**Main purpose:**

The Marahau Wetland Enhancement Project began in 1995 to enhance and protect the wetland and estuarine habitat near the mouth of the Marahau River. The area comprises of approx. 4 hectares of unallocated crown land, much of which is under the direct influence of tidal movements. The Marahau / Sandy Bay Residents and Ratepayers Association Inc. has encouraged wider community involvement in this project which has improved the habitat for wetland species such as the rare banded rail and fernbird and native fish (koaro and kokopu).

**Key activities:**

Weed control (gorse, willows, grass), tree propagation and planting, restoration and enhancement of drainage patterns, trapping of predators (stoats, rats, hedgehogs, cats and possums) and public education.

**Contacts:**

Will Simes (Chairperson)

*email: WillSimes@ecokiwi.co.nz, tel: (03) 527 8161*

Betty DeLiefde

*email: b.deliefde@xtra.co.nz, tel: (04) 384 9958*

► **Nelson-Tasman Branch, Forest and Bird**

**Ecosystems under management:**

Lowland forest

**Main purpose:**

The Nelson-Tasman Branch undertakes a wide range of local activities for the national not-for-profit organisation. Current projects include bat surveys throughout the Top of the South Island with enhancement of bat habitat. Of especial interest are the estuaries and their margins of Tasman District particularly Waimea Inlet and the Motueka Sandspit. The branch has restoration projects at Twin Bridges, Aniseed Valley (a 200m stretch of river bank) and Hiwipango by the St Arnaud road (a small area between a native bush remnant and the road) and has a strong member involvement with projects in Wakefield (Faulkner Bush and Edward Baigent Memorial Bush) as well as revegetation at Black Valley Stream, St Arnaud and the Friends of Rotoiti and the Friends of Flora.

**Key activities:**

Planting, weeding and pest control.

**Contact:**

Helen Campbell, Chair

*email: maccam@ts.co.nz, tel: (03) 521 1148*

► **Murchison Environmental Care Group**

**Ecosystem under management:**

Lowland forest and riparian systems

**Main purposes:**

- Restoration of riparian vegetation along Domain Creek. Working bees are held in the nursery and the domain, details are published in the Murchison News.
- The control or elimination of mustelids over 650 acres of private and DOC land in the Matakita and Maruia Valleys. Traplines on the Six Mile walkway are checked weekly in summer and monthly in winter by volunteers. Traplines on private property are checked regularly by landowners.

**Key activities:**

Trapping; growing seedlings in a nursery, fencing, tree planting and weeding.



**Contacts:**

Riparian:  
Nick Perkins  
tel: 027 610 0775  
Ricky Leahy  
tel: (03) 523 9354

**Mustelids:**

Steve and Wendy Wood  
email: [steve@korimako.co.nz](mailto:steve@korimako.co.nz), tel: (03) 523 9763

### ► Wakefield Bush Restoration Society

**Ecosystem under management:**

Lowland forest

**Main purpose:**

The Wakefield Bush Restoration Society is a community group working to restore and enhance areas of remnant tall podocarp forest at three sites in the Wakefield area: Faulkner Bush Scenic Reserve, Edward Baigent Memorial Bush Scenic Reserve and Robson Scenic Reserve. Regular working bees are (weeding, track work, planting) held every second Saturday of the month 10.00am to 12.00 noon. Anyone is welcome to assist.

**Key activities:**

Tree planting, weeding and track work.

**Contacts:**

Doug South  
email: [tuiville@xtra.co.nz](mailto:tuiville@xtra.co.nz), tel: (03) 541 8980  
Barbara Grant  
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### ► New Zealand Landcare Trust [www.landcare.org.nz](http://www.landcare.org.nz)

The NZ Landcare Trust is a non-governmental organisation facilitating sustainable land management and biodiversity initiatives with rural communities.

The Trust, funded by the Ministry for the Environment and a corporate sponsor, Transpower New Zealand, consists of a team of co-ordinators and support staff. Regional co-ordinators work with 'Landcare Groups' around the country, providing support and information to assist them manage their land more sustainably.

There are currently 25 Landcare Groups operating within the Tasman District.

**Contact:**

Barbara Stewart, Nelson Coordinator  
[Barbara.stuart@landcare.org.nz](mailto:Barbara.stuart@landcare.org.nz), tel: (03) 545 0443

### ► Queen Elizabeth II National Trust [www.openspace.org.nz](http://www.openspace.org.nz)

The Trust is a statutory organisation independent from Government and managed by a Board of Directors. It was established in 1977 under visionary legislation to aid conservation on private land.

The Trust enables landowners to protect special features on their land through its open space covenants of which there were 2889 registered protecting 86,000ha nationwide, and a further 600 being processed toward registration at 30 June 2008. For Tasman District the figures are 103 registered and 21 approved for a total area of 2210 ha.

**QEII offers:**

- Expertise in legal protection
- Expertise in monitoring programmes
- Field representatives working with landowners
- An independent relationship with landowners
- A reputation of trust, respect and partnership with landowners.

QEII also owns 28 properties, which collectively protect over 1,582 hectares of significant habitat. These have mostly been gifted to the Trust.

**Contact:**

Philip Lissaman, Regional Representative  
email: [plissaman@xtra.co.nz](mailto:plissaman@xtra.co.nz), tel: (03) 526 6114

### ► Friends of the Cobb Inc. (FoC)

**Ecosystems under management:**

Subalpine forest and some alpine areas.

**Main purpose:**

FoC was formed in 2006 with the main purpose of trapping stoats and rats in the Cobb Valley and along the track to Asbestos Cottage, working in conjunction with DOC, to protect birds and other native wildlife. Some traps are also laid along the alpine/bush edge and in Henderson Basin where a study of Rock Wrens has been underway for eight years.

**Key activity:**

Trapping for stoats and rats.

**Contact:**

Chris Petyt  
email: [cpetyt@xtra.co.nz](mailto:cpetyt@xtra.co.nz) tel: (03) 525 8154

## Appendix 4: *Powelliphanta* land snails of Tasman District

Taxon	Altitude Zone (metres a.s.l.)	Distribution	Conservation Ranking <sup>1</sup>	Private land <sup>2</sup>	Main threats <sup>3</sup>
<i>P. h. hochstetteri</i>	Upland (750-1200)	Arthur, Pikipiruna and Lockett Ranges in Kahurangi and Abel Tasman N.P.'s.	Gradual decline	Yes	Feral pigs; possums; logging.
<i>P. hochstetteri anatokiensis</i>	Upland (610-1240)	Parapara Peak, Devil and Anatoki Ranges and headwaters of Anatoki River.	Nationally endangered (two coloured forms). Gradual decline (two forms combined).		Possums; feral pigs.
<i>P. hochstetteri consobrina</i>	Upland (880-1280)	Richmond and Bryant Ranges	Gradual decline		Pigs, possums; habitat degradation by pigs, goats, deer.
<i>P. g. gilliesi</i>	Lowland (1-640)	Burnett Range.	Nationally endangered	Yes	Possums, pigs; habitat loss (dolomite mining) and degradation by pigs, goats and cattle.
<i>P. gilliesi "Haidinger"</i>	Upland (c.620)	Mt Haidinger, Burnett Range.	Nationally critical		Past habitat loss, small population size.
<i>P. gilliesi montana</i>	Upland (830-1100)	Wakamarama Range	Nationally endangered		Possums; habitat degradation by goats.
<i>P. gilliesi subfusca</i>	Coastal, Lowland (1-200)	Forest remnants north of Westhaven Inlet (Kaihoka Lakes, etc.)	Gradual decline	Yes	Habitat loss and degradation by cattle & goats; rats and thrushes.
<i>P. gilliesi aurea</i>	Lowland (50-300)	West of Mangarakau	Nationally endangered	Yes	Past habitat loss; rats, pigs and possums.
<i>P. gilliesi brunnea</i>	Coastal (1-50)	Paturau River mouth	Nationally critical	Yes	Past habitat loss & degradation by stock; rats, (and thrushes, hedgehogs).
<i>P. gilliesi kahurangica</i>	Coastal Lowland (1-300)	Kahurangi Point	Nationally endangered	Yes	Pigs, possums, rats; habitat loss and degradation by stock and pigs.
<i>P. gilliesi jamesoni</i>	Upland (610-762)	Gouland Downs	Nationally endangered		Possums (and rats).
<i>P. gilliesi compta</i>	Upland (c.610)	The Castles, Rocky River	Nationally vulnerable		Past habitat clearance; rats and possums; habitat degradation by goats.
<i>P. gilliesi fallax</i>	Lowland (1-600)	N. and E. Flanks of Parapara Peak.	Gradual decline	Yes	Rats, pigs, thrushes, and possums; forest loss.
<i>P. "Parapara"</i>	Upland (600-900)	Higher slopes of Parapara Peak	Nationally endangered		Possums and pigs.
<i>P. s. superba</i>	Upland (800-1150)	Wakamarama and Haupiri Ranges, Aorere Valley	Serious decline		Possums; past forest loss and fires.
<i>P. superba richardsoni</i>	Upland (850-1220)	N. end of Gouland Range	Nationally endangered		Possums.
<i>P. superba harveyi</i>	Upland (c 760)	Mackay Downs, Heaphy Track	Nationally endangered		Possums.

Taxon	Altitude Zone (metres a.s.l.)	Distribution	Conservation Ranking <sup>1</sup>	Private land <sup>2</sup>	Main threats <sup>3</sup>
<i>P. superba mouatae</i>	Upland (600-900)	Headwaters of Saxon River, Heaphy Track.	Nationally endangered		Possums.
<i>P. superba proueorum</i>	Lowland (450-610)	Between Anaweka and Heaphy Rivers.	Nationally endangered		Possums, pigs and rats.
<i>P. lignaria oconnori</i>	Lowland Upland (180-900)	Karamea River.	Nationally vulnerable		Possums, rats and thrushes.
Poorly known taxa					
<i>P. superba</i> "Goulard Range"	Upland (1000-1200)	Goulard Range.	Nationally endangered		Possums.
<i>P.</i> "Anatoki Range"	Mountain (c.1500)	Anatoki Range.	Nationally critical		Habitat degradation by hares, goats and deer.
<i>P.</i> "Lodestone"	Upland (1100-1400)	Arthur Range.	Range restricted		Thrushes and possums.
<i>P.</i> "Owen"	Upland Mountain (1250-1500)	Mt Owen area.	Nationally Endangered		Predation and habitat destruction by pigs.
<i>P.</i> "Nelson Lakes"	Upland Mountain (1200-1600)	Robert Ridge, St Arnaud Range, Mt Murchison	Range restricted		Habitat degradation by hares and deer; thrushes.
<i>P.</i> "Baton"	Upland (1100-1200)	Headwaters of Baton River	Nationally critical		Habitat degradation (fires in past, goats currently); thrushes.
<i>P.</i> "Garibaldi"	Upland (1200-1400)	Garibaldi Plateau	Range restricted		Thrushes.
<i>P.</i> "Matiri"	Upland Mountain (1200-1500)	Matiri Range	Range restricted		Pigs, possums, rats; habitat degradation by pigs and goats.
<i>P.</i> "Matakitaki"	Upland Mountain (1000-1700)	Ranges bordered by Buller, Maruia and D'Urville Rivers.	Range restricted		Thrushes; rats in some years.

<sup>1</sup> Ranking from Hitchmough and Bull (2005)

<sup>2</sup> 'Yes' indicates that some of the distribution is private land.

<sup>3</sup> Threats are listed in order of their likely importance. Where species are listed by name only, the threat they pose is as predators.

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