inhabit the lowland podocarp forest and subalpine tussock of the Haast Range, living at altitudes from near sea level to c. 1500 m. Since monitoring began in 1997 no recruitment has been detected and the population is estimated to be 250-300 birds. Although adult tokoeka can successfully defend themselves against stoats (*Mustela erminea*), all confirmed chick deaths have been by stoat predation. Since 2001, extensive predator control has been undertaken in the newly-created Haast Tokoeka Sanctuary, one of 5 kiwi sanctuaries supported by the Biodiversity Strategy and sponsorship from the Bank of New Zealand. Predator control within the sanctuary is aimed at reducing the stoat population to a level at which sufficient kiwi chicks survive to allow the population to be self-sustaining. A minimum chick survival rate of 25% is needed for population replacement. Because the predator trapping effort needed for chick survival of ≥ 25% is unknown, present management is based on an experimental approach. Radio tracking of tokoeka allows study of breeding success and chick survivorship in response to predator control. In addition, ecosystem response is being measured to give an indication of the wider impacts and long-term sustainability of this type of management.

Westland petrel (taiko) (*Procellaria westlandica*) management

G.C. WOOD
Westland Conservancy, Department of Conservation, Punakaiki
Cwood@doc.govt.nz

The Westland petrel (*Procellaria westlandica*) is endemic to New Zealand and breeds only near Punakaiki on the South Island's West Coast. The birds return in winter to breeding colonies in the coastal foothills south of Punakaiki. The colony areas within the Paparoa National Park have "Specially Protected Area" status, and access is restricted. The Westland petrel is listed as 'Vulnerable" by the IUCN because of the restricted breeding distribution and small population size (*c.* 20,000 birds ± 5,000). Westland petrels are among the last of many petrel species that formerly bred on the mainland, surviving despite the threats posed by introduced mammalian predators, human exploitation, and habitat loss. The breeding success of the Westland petrel has been studied for many years, with efforts focusing on a selected number of study burrows. Gridded areas are being set up to monitor burrow density, occupancy, and breeding success. The rapid increase of tourism on the West Coast, and particularly in the Punakaiki area, brings with it new pressures on the Westland petrels. Particular problems are increased levels of lighting near flight paths (that disorientate petrels), land subdivision (which results in greater numbers of uncontrolled pets), and powerlines.

Burrow occupancy by Westland petrels (*Procellaria westlandica*)

S. M. WAUGH
H. CABRERA
Department of Zoology, Otago University, P.O. Box 56, Dunedin
Susan.waugh@stonebow.otago.ac.nz

G.C. WOOD
Westland Conservancy, Department of Conservation, Punakaiki

L.S. DAVIS
Department of Zoology, Otago University, P.O. Box 56, Dunedin

Westland petrels (*Procellaria westlandica*) nest in a restricted area on the West Coast of the South Island of New Zealand, and are classified by the IUCN as vulnerable. They are thought to number *c.* 2000 breeding pairs. However, no systematic survey of burrow densities or numbers of breeding birds has been made. During the incubation period in 2001, we examined burrow occupancy in 2 quadrats of 1250 m^2 and 560 m^2 at 2 sub-colonies in Scotchman's Creek, using burrow scopes. We found an average burrow density of 0.24 burrows m^{-2}, with burrows on average 1.1±0.4-1.2±0.5 m deep at the 2 colonies respectively. An average of 21% (range 19-22%) of burrows were occupied by breeding pairs. The implications of these findings are discussed.

Status, patterns, and threats in West Coast forest bird communities

COLIN F. J. O'DONNELL
Science & Research Unit, Department of Conservation, Private Bag, Christchurch
codonnell@doc.govt.nz

The West Coast of the South Island is the most extensively forested part of the country. Thus, the region is an important centre of forest bird biodiversity in New Zealand. Extensive forest bird surveys, particularly in the 1970s and 1980s, provide a comprehensive baseline with which to monitor changes in distribution and status in the future

(see bibliography below). Over 31 bird species were characteristic of West Coast forests when Europeans arrived in the 1800s. Six are now extinct but 25 indigenous (and 11 introduced) species still occur. Over 40 coastal, wetland and open country species are also associated with forest margins. West Coast forests contain representative fauna communities, rare and distinctive species, and birdlife that is important in maintaining ecological processes (e.g., pollination and seed dispersal). The region supports bird communities representative of forests dominated by podocarps (e.g., kahikatea, rimu, mountain totara), beech (red, hard, mountain, silver beech), and broad-leaved evergreen trees (e.g., southern rata, kamahi, tawheowheo). Many species are characterised by seasonal movements in relation to changing climatic conditions or food availability. Forests are important for maintaining populations of threatened species (3 kiwi taxa, kaka, falcon, mohua, yellow-crowned parakeet, orange-fronted kakariki, blue duck, Westland petrel, weka). Major threats to forest bird communities include predation of nesting birds by introduced mammals, and loss of components of the forest structure important for food, shelter and nest sites through selective browsing by mammals, predation by exotic wasps, and logging.

Short bibliography of forest bird research in Westland

See items listed for full bibliography

Best, H.A.; Harrison, M. 1976. An assessment of the proposed biological reserves in the West Coast beech project area with respect to the avifauna of the region. *New Zealand Wildlife Service Fauna Survey Unit report no. 7.* Wellington, Department of Internal Affairs.

Best, H.A.; Ogle, C.C.; O'Donnell, C.F.J.; Jolly, J.M. 1986. Habitats, reserves and corridors for wildlife in North Westland. *Unpubl. New Zealand Wildlife Service report.* Department of Internal Affairs, Wellington.

Buckingham, R.P. 1997. *Bird and bat survey of beech working circle 4, Maruia Valley, North Westland, New Zealand.* Greymouth, Timberlands West Coast Ltd.

Buckingham, R.P.; Brown, K 1996. *Bird and bat survey of beech working circle 2, Eastern Paparoa Range, North Westland, New Zealand.* Greymouth, Timberlands West Coast Ltd.

Buckingham, R.P.; Nilsson, R. 1994. *Seasonal variations in bird counts and a search for yellowheads and bats in beech working circle 3, Mid Grey Valley, North Westland.* Greymouth, Timberlands West Coast Ltd.

Coker, P.M.; Imboden, Ch. 1980. Wildlife values and wildlife conservation in South Westland. *New Zealand Wildlife Service Fauna Survey Unit report no. 21.* Wellington, New Zealand Department of Internal Affairs.

Crook, I.G.; Best, H.A. 1974. Diversity and numbers of bush birds in some forests in the West Coast beech project area. *New Zealand Wildlife Service Fauna Survey Unit report no. 2.* Wellington, New Zealand Department of Internal Affairs.

Crook, I.G.; Best, H.A.; Harrison, M. 1977. A survey of the native bird fauna of forest in the beech project area in North Westland. *Proceedings of the New Zealand Ecological Society 24*: 113-126.

Dawson, D.G.; Dilks, P.J.; Gaze, P.D.; McBurney, J.G.R.; Wilson, P.R. 1978. Seasonal differences in bird counts in forests near Reefton, South Island, New Zealand. *Notornis 25*: 257-278.

Imboden, Ch.; Crook, I.G. 1977. Principles of wildlife habitat conservation and their application in the forests of Westland. *New Zealand Wildlife Service Fauna Survey Unit report no. 8a.* Wellington, New Zealand Department of Internal Affairs.

McLay, C.L. 1974. The species diversity of New Zealand forest birds: some possible consequences of the modification of beech forests. *New Zealand journal of zoology 1*: 179-195.

Morse, P.M. 1981. Wildlife values and wildlife conservation of Buller and North Westland. *New Zealand Wildlife Service Fauna Survey Unit report no. 29.* Wellington, New Zealand Department of Internal Affairs.

O'Donnell, C.F.J. 1991. Application of the wildlife corridors concept to temperate rainforest sites, North Westland, New Zealand. Pp. 85-98 *In:* Saunders, D.A.; Hobbs, R.J. (*ed.*) *Nature conservation 2: the role of corridors.* Chipping Norton, NSW, Surrey Beatty & Sons.

O'Donnell, C.F.J. 1996. Predators and the decline of New Zealand forest birds: An introduction to the hole-nesting bird and predator programme. *New Zealand journal of zoology 23*: 213-220.

O'Donnell, C.F.J. Monitoring mohua (yellowhead) populations in the South Island, New Zealand, 1983-1993. *New Zealand journal of zoology 23*: 221-228.

O'Donnell, C.F.J.; Dilks, P.J. 1986. Forest birds in South Westland. Status, distribution and habitat use. *New Zealand Wildlife Service occasional publication No. 10.* Wellington, New Zealand Department of Internal Affairs.

O'Donnell, C.F.J.; Dilks, P.J. 1987. Preliminary modelling of impacts of logging on forest birds in South Westland. *New Zealand Department of Conservation, Science & Research internal report no. 1.*

O'Donnell, C.F.J.; Dilks P.J. 1989. Sap feeding by kaka (*Nestor meridionalis*) in South Westland, New Zealand. *Notornis 36*: 65-71.

O'Donnell, C.F.J.; Dilks P.J. 1989. Feeding on fruits and flowers by insectivorous forest birds. *Notornis 36*: 72-76.

O'Donnell, C.F.J.; Dilks, P.J. 1990. A model for predicting the impacts of logging on forest birds in temperate rainforest, New Zealand. p. 390 *In:* Programme and abstracts, *Acta XX Congressus Internationalis Ornithologici* supplement. Christchurch, New Zealand.

O'Donnell, C.F.J.; Dilks, P.J. 1994. Foods and foraging of forest birds in temperate rainforest, South Westland, New Zealand. *New Zealand journal of ecology 18*: 87-107.

Onley, D.J. 1980. Bird counts in lowland forests in the western Paparoas. *Notornis 27*: 335-362.

Onley, D.J. 1983. The effects of logging on winter bird populations near Karamea. *Notornis 30*: 187-198.

Overmars, F.; Norton, D.; Miskelly, C.; O'Donnell, C.; Buckman, I. 1992. North Westland wildlife corridors research programme. Report to the Minister of Conservation. *West Coast Conservancy technical series no. 1.* Hokitika, Department of Conservation.

Rose, A.B.; Pekelharing, C.J.; Platt, K.H.; O'Donnell, C.F.J.; Hall, G.M.J. 1990. *Impact of brush-tailed possums on forest ecosystems, South Westland.* Forest Research Institute Contract Report FWE 90/52. FRI, Christchurch.

Spurr, E.B.; Warburton, B.; Drew, K.W. 1992. Bird abundance in different aged stands of rimu (*Dacrydium cupressinum*) - Implications for coupe-logging. *New Zealand journal of ecology 16*: 109-118.

Warburton, B.; Kingsford, S.J.; Lewitt, D.W.; Spurr, E.B. 1992. Plant species preferences of birds in lowland rimu (*Dacrydium cupressinum*) forest - Implications for selective logging. *New Zealand journal of ecology 16*: 119-126.

Wilson, P.R.; Taylor, R.H.; Thomas, B.W. 1988. Effect of topography on seasonal distribution of forest birds in the Ohikanui, lower Buller and Inangahua Valleys, North Westland. *Notornis 35*: 217-243.

The South Island kokako: some thoughts on mystery birds, pieces of moss, feathers and skeptical audiences

RON J. NILSSON
South Island Kokako Investigation Team,
80 Domain Terrace, Spreydon, Christchurch

The South Island kokako *Callaeas cinerea cinerea* was widely dispersed throughout South Island and Stewart Island forests at the time of European colonisation. Following the arrival of additional mammalian predators the birds had become rare by the end of the nineteenth century. The species was last confirmed as extant in 1967, but until the 1980s circumstantial reports of kokako continued to be made. Sufficient evidence for their survival prompted the formation of the South Island Kokako Investigation Team (SIKIT), an informal group of ornithologists dedicated to verifying the bird's existence. Evidence comprised glimpses of birds, kokako-like calls, moss-grubbing not associated with any other animal, and most convincingly, a feather found on Stewart Island in 1986 and shown to belong to a member of the family Callaeatidae (New Zealand wattlebirds). Since 1990, on the West Coast alone, 51 people have reported sightings, calls, or moss-grubbing from 22 locations. SIKIT continues to search for the birds throughout their original range. Publicity about these searches has resulted in a steady stream of new reports. Search effort is handicapped by a shortage of resources and, despite the encouragement of some officials, by the reluctance of government agencies to assist. This reluctance perpetuates a history of institutional skepticism about rare species, exemplified by the private rediscoveries of Chatham Island taiko, takahe, and other "officially extinct" species. SIKIT now considers the fate of South Island kokako to rest with a few widely scattered pairs and individuals. As time passes and numbers dwindle further, conservation management by official agencies will become significantly more likely to fail.

Palaeobiological perspectives on Westland birds

RICHARD N. HOLDAWAY
Palaecol Research, P.O. Box 16 569, Christchurch

DAVID J. HAWKE
Christchurch Polytechnic Institute of Technology, P.O. Box 540, Christchurch

TREVOR H. WORTHY
Palaeofaunal Surveys, 2a Willow Park Drive, RD 11, Masterton

Traditionally, fossil bones have been seen as static evidence for the former presence and possibly structure of a species in a particular area. In addition to providing material for dating individual bones, the bones can contain information on the diet and feeding sites of some extinct species. Ongoing research suggests that even aspects of the ecosystem dynamics and palaeoenvironments might have left signals in the bones. Mass spectrometry of stable and unstable isotopes promises a revolution in palaeobiology in New Zealand. Some of the first of the new data have been obtained from bird fossils from the West Coast. Palaeobiological studies can provide insights into a variety of issues. For example fossils of the upland moa *Megalapteryx didinus* may provide information on the return of the West Coast forest after the most recent glaciation. A possible palaeo-rainfall indicator resides in bone protein, and this could also indicate where in West Coast forests some moa fed. Although the Westland petrel is an icon species on the Coast today, before humans reached New Zealand, several other species of petrel bred in large numbers in these forests and their effects may still be detectable in the present environment. The variety of new information from old bones demonstrates the potential of palaeobiology to give an historical and evolutionary context to present ecological and conservation studies on the West Coast and the rest of New Zealand.