have shown little increase. Maloney reviewed Black Stilt management and highlighted some of the problems of managing rare species in degraded habitats. Lessons from the past now make effective management possible and he predicted an increase in Black Stilt numbers in the next few years. He noted that braided rivers have little effective protection despite their unique biological associations and the threatened species relient on them.

The symposium concluded with two presentations that described some of the activities of Canterbury OSNZ members and the contributions local members have made to Canterbury ornithology.

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## Abstracts of talks from birds in Canterbury Symposium

#### The late Holocene avifauna of Canterbury

**Richard Holdaway** 

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Knowledge of the avifauna of Canterbury before human settlement has been expanded greatly in the past decade. New fossil sites have been found, excavated and interpreted. The faunas in major sites already known have been reinterpreted. The recognition, location and study of fossil deposits accumulated by laughing owls and falcons has resulted in a much better understanding of the former distribution of small species not well preserved in swamps or dune deposits. A picture is emerging of a diverse avifauna. A feature was the presence of colonies of several species of petrels, including storm petrels, diving petrels, gadfly petrels, and small shearwaters. The moa fauna was characteristic of the eastern South Island, and unlike that of the wet West Coast. Both large predators, Haast's Eagle (*Harpagornis moorei*) and Eyles's Harrier (*Circus eylesi*), were common. There was a full range of waterfowl, shags, and waders. Work is progressing on the ecology of extinct species, and the assemblages in the avifauna, such as guild structure. Several species that are still common elsewhere, such as the Tui, used to be abundant in Canterbury. Most of the species in some guilds, such as the terrestrial herbivores, are either locally or globally extinct.

#### Chemical tracers of former mainland seabird breeding colonies

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Seabird breeding brings large quantities of nutrients ashore. Palaeontological methods have shown widespread pre-human seabird breeding on the New Zealand mainland, implying that prehuman New Zealand was less oligotrophic than today. However, it is often hard to infer a species' absence and to estimate colony extent. Further, preservation of material is limited in humid, low pH environments. Because soils are often old, we looked for soil indicators of former seabird breeding. We used predator deposits to identify two former breeding sites on calcareous soils in North Canterbury, and a control in Nelson. Maori tradition was used to identify an acidic site on Banks Peninsula, to see if results agreed with the calcareous soils. High total P, total N, total Cd, and  $\delta^{15}$ N; and low C:N and Cd:P ratios were found at former breeding sites on calcareous soils, but results from the acidic site showed likely confusion with agricultural inputs. Total Cd showed no potential for confusion with agricultural inputs, but is only applicable to calcareous soils. We are presently investigating  $\delta^{13}$ C in deeper soil, where soil organic matter is older. The sole depth profile examined so far shows increasing  $\delta^{13}$ C with depth, consistent with former seabird breeding.

# Breeding of South Island Pied Oystercatchers (*Haematopus ostralegus finschi*) on farmland in mid Canterbury, New Zealand

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Breeding of South Island Pied Oystercatchers (*Haematopus ostralegus finschi*) on farmland in mid-Canterbury was studied during 1987 to 1996. Birds returned to breeding territories from early June, with females arriving about six days earlier than males. Laying dates extended from early August to mid November and were similar in all years. Most first clutches were laid from late August to mid September and up to two replacement clutches were laid. Clutch size averaged 2.26 (range 1 to 3 eggs) and declined through the breeding season, but was consistent from year to year. First clutches were larger than replacement clutches. About half the eggs

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hatched and 59% of these chicks survived to fledge. Both hatching and fledging rates declined through the season. About half the pairs which laid in any year failed to rear a fledgling. Hatching success was greater in cultivated than pasture sites, but fledging success was similar at both sites. Trampling by stock, farming activities, and unknown causes were the main causes of egg loss.

#### Skylarks on the Canterbury Plain - biological indicators?

Stefan Thomsen and S.D. Wratten Soil, Plant and Ecological Sciences Division, PO Box 84, Lincoln University, Canterbury.

The Skylark (*Alauda arvensis*) is one of fifteen species of farmland bird of which populations have declined markedly in Western Europe over the last 25 years. In the UK seven species have declined by more than 50% including the Skylark (58%). The Skylark was introduced to New Zealand by the Acclimatisation Societies in the 1860s and its populations appear to flourish. Work at Lincoln University, in collaboration with the Royal Society for the Protection of Birds (RSPB), UK, is determining Skylark winter and breeding densities and analysing the ecological factors influencing these. Multivariate and time-lapse video analyses have identified key paddock variables and nest predators, respectively. Winter variables significantly influencing Skylark abundance are field size, vegetation height, and boundary height. Nest predation rates are up to 90%. On typical farmland habitats in the Canterbury Plain there are 0.25 to 1 breeding pairs per hectare. This contrasts with 0.1 to 0.25 breeding pairs per hectare in lowland Britain. Key summer variables determining territory size are being identified currently.

## The feeding ecology of Kereru and Bellbird in a modified forest remnant, South Canterbury, New Zealand

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Exotic plant invasion threatens native plant populations, particularly in isolated forest remnants close to sources of exotic plant propagules. Ironically, exotic plants in forest remnants may provide additional food sources that allow the persistence of ecologically important species such as Kereru (*Hemiphaga novaeseelandiae*) and Bellbird (*Anthornis melanura*). This study investigated the use of exotic and native plant food sources by Kereru and Bellbird from February to June 1998 in a modified forest remnant in south Canterbury. The plants used by Kereru and Bellbird varied seasonally and reflected changes in plant phenology. For both species, the amount of fruit taken declined from autumn to winter, paralleling a decline in fruit availability.

Although exotic plants comprised only 4.3% of total basal area in the remnant, they comprised 18.4% and 12.6% of feeding observations for Kereru and Bellbird respectively. Exotic plants were fed on most extensively by Kereru during February

and by Bellbird in March, months when the availability of native fruit was low. Selection analyses revealed Kereru and Bellbird were positively selecting some plant species while avoiding others. This has allowed the identification of important plant resources such as kowhai (*Sophora microphylla*) and pate (*Schefflera digitata*) for Kereru, and kohuhu (*Pittosporum tenuifolium*) and kahikatea (*Dacrycarpus dacrydioides*) for Bellbird. Despite the strong selection for a few plant species, Kereru and Bellbird appear generalist feeders, both feeding on more than 70% of the plant species present. Given the diversity of plant species present in the remnant and low selection for exotic plants, removal of exotic plants is unlikely to limit the foods available for Kereru or Bellbird during autumn and winter. This research has also identified problems with identifying plant selection by native birds that future studies can improve on to enhance research into exotic plant management in forest remnants.

### Changes in Birdlife after Wetland Enhancement in Christchurch

Andrew Crossland

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At first impression, Christchurch represents an overwhelmingly modified landscape with apparently very little remaining in the way of indigenous flora and fauna. However, when it comes to birdlife, the combined habitats of Christchurch are surprisingly species rich. Since 1980, 120 bird species have been recorded in Christchurch. Of these, some 82 species (68%) can be classified as wetland/coastal birds, revealing the importance of waterways and wetlands as core habitats within the city.

Since the early 1990s, the Christchurch City Council has embarked on a programme of waterway and wetland enhancement. This programme has included the purchase and development of freshwater and tidal wetlands, creation of wastewater treatment and stormwater retention basins, and riparian enhancement along waterways. Formerly the freshwater birdlife of Christchurch was overwhelmingly dominated by Mallards (Anas platyrbynchos) and gulls. In recent years, species richness and native bird abundance have increased markedly. Peak numbers of wintering native ducks (7000-8500 Shoveler Anas rhynchotis, 3500-4000 Scaup Aythya novaeseelandiae, 2000-2500 Grey Teal Anas gracilis, 1200-1800 Paradise Shelduck Tadorna variegata, <500 Grey Duck Anas superciliosa) now almost balance numbers of introduced waterfowl (15000-20,000 Mallard, 2000-3000 Canada Goose Branta canadensis, 300-1100 Black Swan Cygnus atratus). Local populations of at least 21 native birds have shown recent expansions and species such as Little Cormorant (Phalacrocorax melanoleucos), Scaup, Shoveler, South Island Pied Oystercatcher (Haematopus ostralegus), Kingfisher (Halcyon sancta) and Bellbird (Anthornis melanura) now regularly occur at sites where they were rare or unknown in the 1980s.

#### **Changing fortunes of the White-flippered Penguin**

#### Chris N. Challies

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The White-flippered Penguin is the distinctive form of the Little Penguin (*Eudyptula* sp.) that breeds on Banks Peninsula and Motunau Island. These appear to be geographically isolated sub-populations. While the colony on Motunau Island is 'safe' and increasing in numbers at about 2% a year, those on Banks Peninsula have declined at an alarming rate during the last 20 years. This decline is the result of sustained predation of adult birds in their nesting areas during autumn and winter. Ferrets have been responsible for most of the deaths but feral cats and stoats may also be involved. Predators have had an impact on all the colonies monitored; the most accessible were eliminated during the 1980s, while the less accessible have continued to decline in numbers. The overall number of breeding pairs on Banks Peninsula declined by about 60-70% between 1980 and 1993. The two monitored colonies least affected during this period have since halved in size, and a third has been lost entirely. There is growing evidence that inaccessible colonies are also being affected as some of their young birds attempt to recolonize adjacent areas prone to predation.

During the 1996-98 Penguin CAMP process the White-flippered Penguin was treated separately and classed as "Endangered" under the new IUCN criteria. Despite the obvious deterioration in their conservation status it is not yet serious enough to attract government funding. In the meantime the penguins are benefiting locally from predator trapping undertaken privately by farmers and others interested in their conservation.

#### Present and future research and management of Black Stilts

**Richard Maloney and Dave Murray** 

#### Department of Conservation, Private Bag, Twizel.

Black Stilts (*Himantopus novaezelandiae*) are an endemic wetland species, found mainly in braided rivers of Canterbury. With the loss of quality braided river habitat through weed invasion, water abstraction, bank protection works and hydropower schemes, and with the introduction of mammalian predators, the range and number of Black Stilts have dramatically declined. Intensive management began in 1981 and has reversed the decline towards extinction, but in recent years the number of black stilts has remained constant. Management of mainland species such as Black Stilts is difficult. Black Stilts are now one of New Zealand's rarest species. There are now 37 wild (9-12 females) and 20 captive adults, and there are only 9 – 12 adult females and 25 males in the wild. This sex imbalance has increased levels of hybridisation with Pied Stilts (*H. bimantopus*), but despite the large numbers of Pied Stilts in New Zealand, Black Stilts remain genetically, morphologically and behaviourally distinct from Pied Stilts at the species level. We present a summary of the changes in management over the last 19 years, and show that these changes

have provided the tools to increase Black Stilt numbers in the wild in the next few years. However, all areas where black stilts breed have high densities of predators and continued habitat degradation, and none of these areas of land have Department of Conservation protection. Braided rivers remain the most neglected habitat type in New Zealand, and we call for an increased awareness of the importance of braided rivers for a range of bird species, and other fauna and flora.

## Breeding success of birds and intensive research and management at Ruataniwha Wetlands

Mark Sanders, Kerry Brown, Nikki Wells and Ian Fraser Department of Conservation, Private Bag, Twizel

We report results of the first two years of a six year management experiment. We compared waterbird nest numbers and success, and mammalian predator presence/ absence in the Upper and Lower Ruataniwha Wetlands (URW and LRW) near Twizel. We also piloted techniques for monitoring lizard abundance and chick survival. URW comprises 11 ha of ponds surrounded by an electric fence, and is trapped during Spring. In the first two years of the experiment, LRW had no ponds, no fence, and no trapping. Cats, weasels, rats, mice, and possibly stoats and ferrets, occurred at low densities within the fence at URW, and were rapidly trapped. Hedgehogs, a major egg predator, were absent from URW. URW contained 54 nests in 1997 and 34 in 1998, approximately 30 times more than LRW in both years. Mean nest success in URW was 92 % (70/76), significantly higher than that in LRW (25%; 1/4). Nest success of Banded Dotterels (Charadrius bicinctus) in URW was greater than that reported for 13 previous studies of Banded Dotterels in riverbeds in Canterbury (range: 32-87%; mean: 59%). The pilot studies showed that measuring lizard abundance was not feasible with our resources, but measuring chick survivorship is feasible, and will be done at both sites in future.

