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SHORT NOTE

Size and scope of the bird collections of New Zealand museums

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Bird collections have been accumulating in New Zealand museums for nearly 150 years. Not surprisingly, these collections in combination are among the largest available in the world for the study of New Zealand birds, with particular strengths in oceanic birds, waders, endemic land birds, and extinct species represented by Pleistocene and Holocene fossil bones ("subfossils"). New Zealand museums also hold major collections of birds from Antarctica and the islands of the south-west Pacific. At the start of the new century and millennium it is timely to review the size and scope of the country's main bird collections, which together represent a national resource of international importance.

New Zealand material held at foreign museums is beyond the scope of this note, but there are particularly important holdings of New Zealand birds at: The Natural History Museum, London (fossils, skins and skeletons held at Sub-department of Birds, Tring, Hertfordshire); the Naturhistorisches Museum Wien, Austria (including most of the Andreas Reischek collection); the American Museum of Natural History, New York (which obtained much New Zealand material by purchase of Lord Rothschild's collection, which in turn included one of Walter Buller's collections); the Carnegie Museum, Pittsburgh, Pennsylvania (which acquired another Buller collection).

New Zealand has 4 main museums that include significant natural history collections. They are widely dispersed geographically in 4 major cities (institutional acronyms after Leviton *et al.* 1985): Auckland Museum, Auckland (AIM); the Museum of New Zealand Te Papa Tongarewa, Wellington (NMNZ); Canterbury Museum, Christchurch (CMC); and Otago Museum, Dunedin (OM). All hold comprehensive bird collections including mounts, study-skins, contemporary osteological material, fossil bones, eggs, and spirit specimens.

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There are smaller, non-comprehensive bird collections in local and university museums. Two of these collections, both with large holdings of fossil bird bones, are included in this report: the Department of Geology, University of Auckland, Auckland (AU) and the Waitomo Museum of Caves, Waitomo Caves (WMC).

Recent publications on the bird collections of New Zealand museums include lists of type specimens (Gill 1983; Freeman & Tunnicliffe 1997), other inventories of specimens (Gillette & Bartle 1982; Gill 1984), a history of the bird collection at Auckland Museum (Gill 2000) and a guide to the bird exhibits at Canterbury Museum (Tunnicliffe 1998).

This report provides estimates of the total sizes of the main New Zealand bird collections, and breakdowns of the totals according to type of preparation (including mounts, study-skins, bones, eggs), ordinal classification, and the broad geographic origin of the specimens.

I asked collection managers to tally or estimate the number of specimens as accurately as current systems of cataloguing allowed. No collections have complete computer catalogues and not all sub-collections are even well enough sorted that all totals could be exact. It was impossible for all collection managers to provide totals or good estimates for taxonomic groups and geographic origin.

Totals were rounded to the nearest 50 specimens. "Fossil bones" are tallied as "units of registration", which may be partial or complete skeletons of individuals, or bone lots (usually containing bones of several individuals, occasionally some dozens, of a species). "Contemporary bones" are a mixture of partial and complete skeletons of individuals. "Eggs" are a mixture of single eggs and partial or complete clutches.

Table 1 shows the size of each museum collection. In aggregate, the New Zealand museums have about 112,000 registered specimens or lots. NMNZ has by far the largest collection, comprising about 57% of the total, CMC the 2nd largest (20%), with OM and AIM

Table 1 Estimated numbers of specimens of birds in New Zealand museums according to type of preparation, as at October 1999. (NMNZ, Museum of New Zealand Te Papa Tongarewa; CMC, Canterbury Museum; OM, Otago Museum; AIM, Auckland Museum; AU, Department of Geology, University of Auckland; WMC, Waitomo Museum of Caves.)

	NMNZ	CMC	OM	AIM	AU	WMC	Total
Bones (fossil)	38000	8000	3650	1100	1500	950	53200
Study-skins	19000	4000	1350	5000	-	-	29350
Eggs	2100	4000	3800	2500	-	-	12400
Bones (contemporary)	3200	5100	1550	900	100	-	10850
Mounts	1000	500	2150	1200	-	-	4850
Spirit specimens	400	300	250	200	-	-	1150
Others	-	150	-	300	-	-	450
TOTAL	63700	22050	12750	11200	1600	950	112250

third equal (11% and 10%, respectively). The remaining 2% of specimens are held by AU and WMC. Table 1 includes subtotals for types of preparation. Fossil bones are the largest component of the holdings (47%), with the greatest number held by NMNZ, followed by CMC. Study-skins are the 2nd most numerous type (26%), most again held by NMNZ, followed by AIM. Third most numerous are eggs (11%), with the largest collection at CMC and OM. Contemporary bones are 4th most numerous (10%; largest collection at CMC, followed by NMNZ). Mounted birds are 5th (4%; most at OM, followed by AIM). Relatively few spirit specimens are held (1% of all specimens).

The storage of bird tissues in ultra-cold freezers is increasingly important as a basis for biomolecular research on birds. Currently, none of the 4 main New Zealand museums maintains an avian tissue collection. Such material is, however, held at various New Zealand universities, according to the research interests of staff members.

Table 2 shows the distribution of specimens at AIM, OM, and NMNZ across the main orders represented. The numbers include foreign species but are largely influenced by holdings of New Zealand species (Table 3). Specimens of kiwis (Apterygidae), and large numbers of fossil bones of moas (Emeidae, Dinornithidae) make ratites one of the most important elements in New Zealand collections, being over-represented relative to the number of species involved. Procellariiform seabirds and waders, gulls, and terns (Charadriiformes) are numerically important in the New Zealand avifauna, and correspondingly well-represented in collections. Passerines are numerous in collections, as expected for the largest single bird group. No major order found in New Zealand appears to be seriously under-represented in collections.

The distribution of specimens at AIM and OM according to their broad geographic origin (Table 3), probably also suggests the trend in the other collections. Not surprisingly, New Zealand museums contain mostly New Zealand birds (c. 70%): holdings from other areas are small.

Table 2 Estimated numbers (%) of specimens of birds at AIM, OM and NMNZ by major taxonomic group. The value for Anseriformes at NMNZ is inflated by fossil bones from Hawke's Bay for which individual bones were registered separately.

Order	AIM	OM	NMNZ
Ratites	11	31	16
Galliformes	2	3	1
Anseriformes	4	7	26
Sphenisciformes	3	5	3
Procellariiformes	14	4	13
Pelecaniformes	6	3	2
Ciconiiformes	2	2	1
Falconiformes	2	2	2
Gruiformes	4	5	4
Charadriiformes	14	5	6
Columbiformes	2	3	3
Psittaciformes	6	5	4
Cuculiformes	2	2	1
Strigiformes	1	1	1
Coraciiformes	2	1	1
Passeriformes	23	19	15
Other orders	2	2	1

Table 3 Estimated numbers (%) of specimens of birds at AIM and OM, by broad geographic origin. "Pacific Islands" includes New Guinea. "Others" includes specimens with no data and aviary specimens.

	AIM	OM
New Zealand	71	72
Pacific Islands	7	3
Australia	5	4
Europe	3	5
North America	3	1
Asia	2	2
Others	9	13

The bird collection of each of the 4 main city museums is inevitably biased in favour of material from its local region. Thus the Auckland, Wellington, Christchurch and Dunedin metropolitan museum collections are complementary, with little duplication.

Hence, students of geographic variation in birds must examine material in all 4 collections to appreciate properly the full range of variation.

In summary, the 112,000 specimens (and lots) of birds held in the 6 main New Zealand collections together represent a major resource, which is nationally and internationally important for ornithological research. At the local level, the collections are important for exhibition (public education) and as tools for identification. The geographic dispersal of the main New Zealand collections is fortuitous in a country prone to seismic and volcanic activity, in addition to the universal institutional threats of fire, and water and insect damage.

This survey shows that most types of preparation of specimens are well represented, but that more attention probably could be given to preserving birds whole in alcohol. More detailed analysis of the collections is needed to determine gaps and weaknesses in taxonomic and geographic coverage. This will probably not be possible until all the collections have complete computer databases. In the past decade, great strides have been made in transferring collection records to computer systems, but the task is far from complete.

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