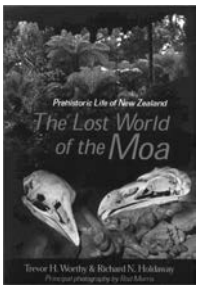
ABOUT BOOKS

Birds from the Land of the Long White Cloud



Mark Lynch

The Lost World of the Moa: Prehistoric Life of New Zealand. 2002. Trevor H. Worthy and Richard N. Holdaway. Bloomington and Indianapolis, Indiana: Indiana University Press.

No moa
No moa
In old Ao-tea-roa
Can't get 'em
They've eat'em
They're gone and there ain't no moa
[Poem by W. Chamberlain. Aotearoa is the Maori word for New Zealand meaning "land of the long white cloud."]

Imagine a world where birds were the dominant species in all habitats; where mammals were just an insignificant footnote in a complex encyclopedia of rich avian diversity. A land inhabited not by grass-grazing ungulates, but by immense, majestic flightless birds that browsed forest and savannah. A place where giant penguins dove along the coast and immense raptors ruled the skies. Here, large carnivorous flightless rails stalked through the underbrush, and the most striking case of sexual dimorphism to ever occur in birds was found. Sounds like every birder's idea of paradise.

Welcome to New Zealand before the coming of *Homo sapiens*. New Zealand is a unique case of island evolution. A small piece of Gondwana drifted off before the end of the age of dinosaurs and remained isolated for the next eighty million years. Mammals did not have an opportunity to invade these islands and diversify, so New Zealand became a land where bird species filled all the niches typically occupied elsewhere by mammals. It is one thing to marvel at simple descriptions that focus mostly on how big and how weird looking these birds were, but how did they live? What did they eat? What were their hunting and mating strategies? How did these species all fit into a coherent ecosystem?

Previous to the publication of *The Lost World of the Moa*, the most complete account of the moa, their fossils and history was *Prodigious Birds* by Atholl Anderson. Even though that wonderful book was published in 1989, it is already out of date. Trevor Worthy, a research associate at the Museum of New Zealand Te Papa Tongarewa (Birds Department), and Richard Holdaway, an extinction biologist, have assembled all the details and data of the latest research on the extinct fauna of New

Zealand to paint the most complete picture now known of this avian-centered island world. As is mentioned in the introduction, many ideas of just a decade ago about New Zealand's avifauna needed to be rethought and revised. Unlike other geographic locations, the fossil record for birds in New Zealand for the last 30,000 years is possibly "the best in the world" (p.11) so new discoveries are always being made.

It needs to be mentioned that this book is not just a simplified summary of what is known about New Zealand's extinct birds, geared for a general reader like the books of Errol Fuller. *The Lost World of the Moa* is a thorough scientific compendium of information, complete with numerous reproductions of fossils and remains, complex graphs about topics like femur length and estimated mass, and lengthy reviews of the literature. This is not to say that this is not an entertaining book for the nonornithologist, but if you cannot get through a paper in *The Auk*, then this might not be the book for you. This is also not a book you will read from cover to cover, but rather this is a book to dip into and explore.

The moa were probably the most striking component of this lost land of birds. The word "moa" is used for both the singular and plural, like "kiwi." *The Lost World of the Moa* has a lengthy discussion of the origin of the word "moa," a word used throughout most of Polynesia for domestic fowl. It seems a stretch to associate a word for a chicken for these gargantuan long-necked birds. One idea is that there was confusion with the word "movie," which was the first recorded name for the animal to which the fossils belonged. At least that's what a certain trader, John Harris, said a Maori had told him. Another theory is that there was confusion between the Maori name for the North Island and the name of the birds. Either way, by the mid-1800s, the word "moa" was in common usage.

Moa are known from fossils to have existed from the mid-Pleistocene to the late Holocene and the coming of humans to New Zealand. The authors recognize eleven species of moa in the order Dinornithoformes, in two families, Emeidae and Dinornthidae. Some moa were among the largest birds known, although the Elephant Bird of Madagascar was larger. On the other hand, some species were only the size of a turkey. Moa were heavier proportionately than most other ratites and quite stout. They weighed anywhere from 60-200 kg and could stand up to 3 meters tall if they stretched their neck vertically. Recent research has cast doubts on the common way in which moa are shown standing, which is with neck straight up like an ostrich, emphasizing their height. The cover of Errol Fuller's *Extinct Birds* features a chromolithograph based on a painting by George Edward Lodge that shows a moa with just such a posture. This is the way moa were shown standing for as long as I can remember. There is a humorous old photo taken in 1903 that I remember seeing as a child (and is reproduced as the frontispiece of *Prodigious Birds*) that also illustrates this point. Two graduate students of Otago University dressed in native Maori garb are shown flanking a restored moa in Woodhaugh Gardens, Dunedin. The idea was to capture what an ancient Maori moa hunt might look like. The moa holds its neck straight up, dwarfing the ersatz native hunters. This stance is based on old articulations of moa skeletons, which it turns out, were inaccurate. Most likely, moa had a more horizontal stance, like a cassowary. "Moa were very long birds, not tall

ones" (p. 163), with the head held just a bit above the top of the back. Still, *Dinornis giganteus* stood two meters at the back.

The amount that has been learned in recent years through sophisticated analysis of fossils about moa behavior is amazing. Males were larger than females, and they were long lived, with estimates that they lived either singly or in pairs for about fifty years. Clutch size was one to two eggs, and incubation was also long. The smallest species still laid eggs the size of an emu's egg. Originally it was thought that moa were grassland birds, but now it is believed that moa lived in a variety of habitats from dense grassland to shrubland and deep forest. Here they browsed on seeds and twigs of shrubs and trees. Different moa species had different shaped bills, which probably reflect differences in diet. An interesting section of the book discusses the possibility of the coevolution of plants and moa, and draws a connection between the extinction of the moa and the poor condition of some surviving areas of native shrubs and trees. There are a large number of species of divaricating plants (plants with interlocking branches) in New Zealand, and some researchers have suggested that these unique plants coevolved with the moa. As is pointed out by the authors, the browsing techniques of introduced deer and ungulates is very different from that of the moa, so these newcomers will not return New Zealand forests to their original state.

There is even a discussion of what a moa may have sounded like. Based on analysis of the syrinx and tracheal rings, moa may have emitted loud, low-pitched calls or even "drummed," sounds that would have carried great distances. Imagine what the predawn chorus of a group of Giant Moa would have sounded like, booming over the dense fog-shrouded forests of New Zealand.

As wild and wonderful as the moa were, they pale when compared with what ate them. Yes, even the gigantic moa had a predator. Haast's Eagle (*Harpagornis moorei*) was one of the most spectacular components of New Zealand fauna. They were top predators in the entire ecosystem. These were huge eagles that would have dwarfed a Harpy Eagle. Like the Harpy, Haast's Eagle was a raptor of the forests. Haast's Eagles had a long, deep, heavy beak, robust long legs, and long talons (75mm). Although their wingspan was almost three meters across, their wings seemed short in relation to the massive body (up to 13 kg), and there has been considerable discussion that perhaps they were flightless. Worthy and Holdaway weigh all the evidence, crunch the numbers, and carefully draw the conclusion that Haast's Eagle did indeed fly, and fly powerfully, though possibly it did not soar. Haast's Eagle was as large as an eagle can get and still function as an eagle. How did they feed on moa? Fossil evidence shows that they often initially caught the moa by the hindquarters and the resulting crushed bones caused massive bleeding.

> Once the prey was caught, the elongated beak allowed [the eagle] to reach into the carcass for the favored parts. Evidence from damage to moa pelves suggests that the eagle could open up the anterior intrapelvic cavity with its beak, to reach the kidney and kidney fat of the moa (p. 274).

The imagined scene of a monster eagle attacking a huge moa is worthy of Sir Arthur Conan Doyle's *Lost World*. The next question is obvious. Did the eagle ever eat humans? "Although it can never be known for certain, it is possible that eagles killed people just as people killed eagles" (p. 333). Now *that* would have put a whole new thrill into hawkwatching.

As powerful as they were, ultimately Haast's Eagles were vulnerable to the rapid loss of prey caused by the large-scale habitat destruction and direct killing of moa by the Maoris. By the fourteenth century, their population was drastically reduced, although there is some slim anecdotal evidence that they may have survived until the nineteenth century.

Of course, Haast's Eagle and the moa are only the most dramatic species that *The Lost World of the Moa* describes. There were quite a number of other large flightless birds. *Cnemiornis* was a beefy (one meter tall) flightless goose that survived until the arrival of the Maoris, and possibly until the coming of the Europeans. Like many island avifauna, there were flightless rails, of course. For instance, the massive Adzebills (*Aptornis* sp.) had no visible wings but did sport a huge, long downward curved Hornbill-like bill. It has been suggested that they fed on other rails and birds. There were other spectacular raptors, too. Eyles's Harrier (*Circus eylesi*) was the largest harrier known and preyed on birds, possibly even small moa.

Small species are no less fascinating than the large. *Dendroscansor decurvirostris* was a tiny New Zealand Wren species with a very long decurved bill like some Hawaiian Honeycreeper. The stunning Huia, with their uniquely dramatic difference in the shape and length of the bills of females and males, survived until the coming of the Europeans. This book also gives as much information as is known on all the species of birds of ancient New Zealand, big and small, and includes what is known from fossil evidence of species that still survive like the Kiwi and Kakapo.

So, what happened to all these wondrous birds? Worthy and Holdaway describe the "New Zealand Extinction Event" as occurring in three phases beginning about 2000 years B.P. In phase one, the Pacific rat arrives on the two main islands with the first visits by early Pacific island voyagers. This begins a course of destruction of small ground nesting species. In phase two, around the late thirteenth century, Polynesian peoples settle on the main islands. They hunted the moa and other species, as well as extensively altering the landscape with widespread fires. The moa became rare within 100 years after human settlement, even though the earliest human settlements were probably only 200 people. The main populations of moa were extinct by 1400. It is when you read these dates, that you realize that this was not some long-ago ancient world that existed at the time of mammoths and giant sloths, but an ecosystem that thrived during human historical times. In other words, when the Renaissance was starting in Italy, there were still Haast's Eagles gazing hungrily down on grazing Giant Moa. Finally, in phase three, the Europeans arrive. Not only do they further alter the landscape, but they bring with them species like horses, cattle, sheep, dogs, cats, ferrets, house mouse, rabbits, and hares – all of which contributed to the final and permanent altering of this land once ruled solely by birds.

The *Lost World of the Moa* is a landmark contribution to the sciences of paleoecology, ornithology, and extinction biology. One small shortcoming of the book is that there are only some black and white drawings of reconstructions of what these birds would look like in the flesh among the numerous technical illustrations of bones and remains. Readers with a desire to get a better idea of what the moa, rails, and eagles may have looked like in color can consult books like Gill and Martinson's *New Zealand's Extinct Birds*, although that book is extremely spare on written accounts of what is actually known about the species and is definitely geared for a general audience. *The Lost World of the Moa* is a wonderful, if ultimately sobering, detailed treatise on a natural world that was unique and endlessly fascinating, and sadly long gone, never to return. That's all there is, "there ain't no moa."

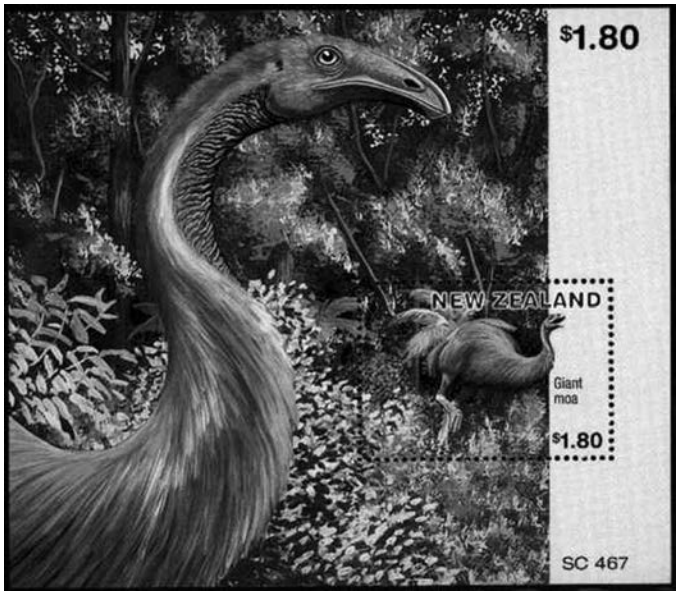
References

Anderson, A. 1989. *Prodigious Birds: Moas and Moa-hunting in Prehistoric New Zealand.* Cambridge, England: Cambridge University Press.

Fuller, E. 2001. *Extinct Birds.* Ithaca, NY: Comstock Publishing Associates.

Gill, B. and P. Martinson. 1991. *New Zealand's Extinct Birds.* Auckland, New Zealand: Random Century.

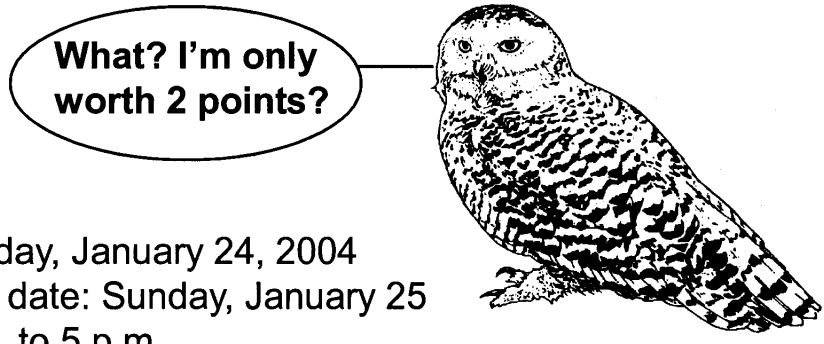
***Mark Lynch** is a teacher, trip leader, and ecological monitor at Massachusetts Audubon Society's Broad Meadow Brook sanctuary in Worcester. He also hosts a radio talk show on the arts and sciences on WICN (90.5FM). He still misses the moa.*



NEW ZEALAND COMMEMORATIVE POSTAL STAMP

THE FIRST ANNUAL

SUPERBOWL OF BIRDING



Saturday, January 24, 2004
Snow date: Sunday, January 25
5 a.m. to 5 p.m.

Winter birding in northeastern Massachusetts and southeastern New Hampshire is great! It is possible to record more than 120 species of birds at this time of year. In celebration of this season, the Joppa Flats Education Center is hosting a new team birding event. ***The Superbowl of Birding*** is a unique competition to find birds and earn the greatest number of points based on the rarity of the species recorded. **The Joppa Cup** will be awarded to the team that collects the most points. Strategy and planning will be essential in order to win this competition.

Can you put together a team that can compete with the best birders in the area? Are you ready for prime time?

For more information and registration materials, call 978-462-9998.

Presented by

JOPPA FLATS
EDUCATION CENTER
Newburyport, MA

Mass Audubon
Protecting the Nature of Massachusetts

SWAROVSKI
OPTIK