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Introduction

Australia is an ancient, weathered landscape of amazing beauty. Once home to polar dinosaurs and dramatic megafauna that included giant flightless birds (the dromornithids), the environment has been steadily drying since separation from Gondwanaland, and the isolation has proved a fertile ground for high levels of endemism. This book provides an introduction to 280 bird species found in Australia, which have been chosen to show representative examples from all of the bird families in the country, as well as to demonstrate the diversity in some of the endemic families. The focus has also been on birds found within striking distance of the capital cities of the east coast, and those with widespread distributions that reflect the diversity of the landscapes of Australia. Further to this, information is provided on the climate and biogeography that has helped shape the avifauna now present, as well as tips on some of the best spots in Australia to see birds.

Climate

The climate of Australia is defined by the fact that the continent is broad, flat, largely geologically stable, and in a zone of many atmospheric highs and low rainfall. The rainfall across much of Australia is so low that the vast majority of the continent is classified as being arid or semi-arid, with about 50 per cent of the land mass estimated to receive less than 300mm of rainfall per annum. However, tied to this is the fact that the rainfall that does arrive in these areas is infrequent and irregular, and at times those annual rainfall figures can be obtained in one storm event.

Around the coast the climate is somewhat more predictable, with the northern regions of Western Australia, the Northern Territory and Queensland having a tropical climate with large rainfall over the hot and humid austral summer (the 'wet season'). This is followed by a mild austral autumn–winter period (the 'dry season'), which is characterized by lower rainfall and drying vegetation. However, this region is also subject to cyclones every year, which can flatten vegetation and make survival of many birds difficult – at these

times birds like cassowaries can be found wandering through gardens in search of food. Along the eastern seaboard the climate on the coastal side of the Great Dividing Range is wetter than inland of the ranges, with the central regions of the east coast being subtropical and mild. In the south-west and south-east of the mainland, and in Tasmania, the climate follows more traditional and predictable patterns, with four seasons recognized (spring, summer, winter and autumn). Rainfall typically arrives in cold fronts from the southern ocean in winter and spring, with summer heat waves determined by hot winds blown in from arid northern regions.

Droughts wrought by El Niño-Southern Oscillation events, where changes to ocean currents and atmospheric conditions across the Indo-Pacific basin impact temperature and rainfall in Australia and elsewhere, have severe impacts on the country. Rain-producing tropical systems tend to fall over the ocean rather than land, warming the seas, and causing dry 'wet seasons' in the north of Australia and hotter summers in the south. This leads to increased frequency of water shortages and bush fires, both of which impact wildlife populations. During these events birds inhabiting temperate areas can suffer to the point where they fail to breed or even moult, while arid-zone species tend to get pushed to coastal refuges.

VEGETATION

Australia has been geologically stable for a very long time. As a result the soils across the continent are very old and thin, and many nutrients have been leached out of the system so that there is very low fertility in most regions. The vegetation has therefore had to adapt to obtain nutrients, and nitrogen-fixing leguminous plants have become key to ecological communities. Given the vastness of the land mass, at over 7.7 million sq km, and the wide climatic envelope of the country, there has been considerable opportunity for evolution to shape the vegetation.

It is often considered that Australia is the land of eucalypts, and at least in temperate regions this is supported by the fact that *Eucalyptus* is the dominant tree genus. 'Gum' trees of one form or another are found across many areas, from Snow Gums (*E. pauciflora*) of the Alpine Regions, to the Karri (*E. diversicolour*) forests of south-west Western Australia and the Northern White Gum (*E. brevifolia*) of northern Australia. One of the eucalypts is among the tallest flowering plants in the world – the Mountain Ash (*E. regnans*) of the wet forests of the south-east mainland and Tasmania.

While eucalypts are often recalled when discussing Australian vegetation, the wattles (*Acacia* spp.) are more numerous and widespread, particularly across arid and semi-arid zones. The most widespread *Acacia* species include Brigalow

Spotted Gum forest, southern NSW

(*A. harpophylla*) and Mulga (*A. anuera*), both of which can form vast woodlands and associated arid scrubs, intermixed with a number of key arid plants such as *Eremophila* that support nomadic birds like Black and Pied Honeyeaters. Acacias also occur in temperate to arid regions, and several species have evolved to thrive in rainforest environments.

Both of these plant families are known as sclerophyllous, where the thick-skinned leaves are adapted to retain moisture in harsh, dry weather. In some species of acacia the leaves are even rolled to keep the stomata from being too exposed to drying conditions. It is also worth noting that the vegetation of Australia is evergreen. Due to a lack of harsh winters like those in the northernmost regions of the northern hemisphere, Australian vegetation has not suffered the evolutionary pressure to deal with extreme cold. Because of this, most habitats in Australia look superficially identical all year round.

The northern regions of Australia share flora with New Guinea and Southeast Asia, but the flora is generally typical of tropical regions across the globe – large trees with broad leaves to catch available sunlight, and various thickets of vines, shrubs, ferns and epiphytes in the understorey. Food availability for fauna is more dependent on fruiting trees in these regions, although savannah still retains flowering eucalypts that produce nectar flows. Across the arid interior there is also a suite of species adapted to irregular rainfall, such as the bluebushes (*Chenopodium* spp.) and saltbush (*Atriplex* spp.), which form integral components of vegetation communities.

Savannah woodland, northern Australia

As a general rule, particularly outside the tropical regions of Australia, the Myrtaceae plant family dominates the Australian landscape. Along with the aforementioned *Eucalyptus*, genera such as *Callistemon*, *Melaleuca* and *Leptospermum* are widespread and contribute a large proportion of the country's flora. Many members of the Proteaceae, such as *Banksia* and *Grevillea*, are also found widely across Australia. Common to most of these species is the delivery of nectar flows within their inflorescences, which is an evolutionary strategy to attract birds and mammals. This in turn has helped to shape the fauna of Australia, with a radiation in animals like honeyeaters and possums to allow access to the floral resources.

In relation to terms used for the descriptions of habitat used by birds in the species accounts, terminology follows the widely accepted classification first developed by Specht (1970), where canopy cover determines the name given. Treed habitat with a percentage canopy cover of more than 30 per cent is known as forest (over 70 per cent is closed forest); under 30 per cent is woodland; 'treeless' shrubby habitat with a percentage canopy cover of more than 30 per cent is known as scrub (or heath if under 2m tall), while under 30 per cent is known as shrubland.

BIOGEOGRAPHY

As the continents of the world started to drift apart during the Cretaceous period, Australia was linked to a number of continents – embracing South America, Africa, Madagascar, Antarctica, India, New Zealand and New Guinea – in the giant land mass known as Gondwanaland. At that time the land mass was much further south than it is today, and the climate was much wetter. Over the subsequent 135 million years the continents of Gondwana have drifted north, and for Australia and other countries this has resulted in a significant drying of the landscape.

Much of Australia's biota has its roots in that time, and as a result many families of plant and animal are also found across the aforementioned countries. For example, the flightless family of birds known as ratites has representatives in South America (rheas), Madagascar (extinct elephant birds), Africa (ostriches), Australia and New Guinea (cassowaries and Emus), and New Zealand (extinct moas). Other bird families, such as parrots, share similar origins and distributions.

When Europeans first arrived in Australia the species they encountered shared similar appearance and ecology to common birds of England and other parts of Western Europe, and names such as robin, thrush and warbler were bestowed upon the newly discovered species. It was also thought for a long time that the northern hemisphere was the basal point from which all songbirds evolved. However, molecular studies in recent decades have flipped this notion on its head, with songbirds of the northern hemisphere now accepted by most to have evolved from Australian, or at least Gondwanan, ancestors. Subsequently the songbird families in Australia are all very old, or are mostly descended from old lineages.

Within Australia itself, the gradual northwards drift and drying has seen once-fertile forests and swamplands replaced by vegetation adapted to lower fertility driving speciation. The role of bush fires as part of this cycle is also important, with many plants evolving strategies to survive fire events. As a result of these factors the fauna of the country needed to adapt, resulting in high levels of endemism across Australia. Songbirds in particular, like grasswrens, fairy-wrens and honeyeaters, are all a product of the shifting geographic envelope of Australia.

The drying of the continent has driven evolution further within already endemic families. As an example, the Nullarbor Plain, a vast, treeless arid region that straddles the middle of the southern part of the mainland now separates the temperate eucalypt forest and woodland of south-west Western Australia from structurally similar vegetation in south-east Australia. With a lack of a viable vegetation connection between those two regions, the flora and fauna of a once-contiguous region have been able to evolve independently – in the case of south-west Western Australia to the point of being recognized internationally as one of the major biodiversity hotspots. There are congeners on both sides of the Nullarbor Plain – Rufous Treecreepers in Western Australia and Brown Treecreepers in the east; Western Yellow Robins and Eastern Yellow Robins; and white-tailed black-cockatoos of Western Australia and Yellow-tailed Black-Cockatoos of the south-east. Again, there are high levels of endemism due to long isolation, with species such as Red-capped Parrot, Western Thornbill and Noisy Scrub-bird being found nowhere else on the planet.