

THE AVIFAUNA OF THE EUNGELLA REGION, CENTRAL COASTAL QUEENSLAND, AUSTRALIA

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The Eungella region of the Clarke Range, located in central coastal Queensland, Australia, represents a 'bridge' between the avifauna of the tropics and that of the subtropics. In this paper, we collate species records from automated acoustic recordings and field observations made during the Griffith University and Queensland Museum surveys of Eungella National Park and Pelion State Forest in 2013 and 2014, bird observations uploaded to the eBird database, and information available from local birders. So far, 236 bird species have been recorded in the Eungella region, representing 67 families – 36.4 per cent of the total of 648 species known from Queensland. Eungella National Park protects the core range of a species endemic to the Clarke Range, the Eungella Honeyeater (*Bolemoreus heinwoodi*), as well as numerous endemic subspecies and isolated populations of subtropical species. Many of these species and subspecies are restricted to cool upland rainforest and, as a consequence, are seriously threatened by climate change.

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INTRODUCTION

Eungella National Park (ENP) and the adjoining forests of the Clarke Range represent the largest continuous areas of remnant rainforest on the central Queensland coast. ENP protects approximately 50,800 hectares of largely upland rainforest and was established in 1941 (Moon & Moon, 2002). The immediate surrounds comprise a mixture of wet and dry sclerophyll forest, as well as farmland, settlements and open country. Moving further afield, the landscapes to the north and south of ENP are characterised by lowland zones of warm, open and dry habitats that are unsuitable for rainforest species (Bryant & Krosch, 2016). The landscape to the west becomes increasingly arid with distance from the Great Dividing Range. The Clarke Range and ENP, then, can be seen as relatively cool, moist mountain refugia of the formerly widespread Miocene rainforests that dominated the Australian landscape 5.3 million years ago (Weber *et al.*, 2014; Bryant & Krosch, 2016).

The inhospitable lowland habitats to the north and south of Eungella are known as the Burdekin Gap

and the St Lawrence Gap, respectively, and represent biogeographic barriers to the dispersal of rainforest species. As a consequence, ENP is effectively isolated from other extensive tracts of rainforest: the southernmost areas of the Wet Tropics bioregion are some 300 kilometres to the north, and the Conondale Ranges are approximately 650 km to the south. We note, however, that the St Lawrence Gap is only approximately 100 km wide (Bryant & Krosch, 2016) and that there are smaller remnant rainforest patches within that 650 km expanse (e.g. Kroombit Tops), that may have provided 'stepping stones' for the historical dispersal and/or contraction of rainforest species. Due to this biogeographic history, the avifauna of the Eungella region is made up of a unique mix of subtropical and tropical species.

Despite the obvious biological significance of the Eungella region, there had been few systematic biodiversity surveys conducted in the area (with some notable exceptions – see Anderson (2011) and Crouther & Crouther (1999) for examples) until the Eungella Biodiversity Survey (EBS) of 2013–14 – a

joint project of Griffith University and the Queensland Museum. The aim of this project was to quantify the biodiversity of birds, plants and selected invertebrate groups along an elevational gradient from 200 m to 1200 m asl within ENP and the adjacent Pelion State Forest (Ashton *et al.*, this volume). Here we describe the avifauna of the Eungella region, based on the results of surveys made during the EBS by EL in 2013 and 2014, incidental observations made by EL and CJB during the same time period, records from the eBird database, and records from local observers. We discuss the elevational distribution of the avifauna within ENP, include notes on the distributions of the species and subspecies occurring in the broader Eungella region, and conclude with a general discussion of the region's avifauna.

METHODS

Records from ENP and Pelion State Forest (SF) made during the EBS are included here, along with records from Eungella village, Crediton SF, the upper Pioneer Valley and the area around Eungella Dam. These areas are included in an attempt to represent accurately the avifauna of the broader Eungella region. The methodology employed by EL during the EBS is described in detail in Leach *et al.* (2015). Briefly, field work was conducted in two sessions between 4 November and 1 December 2013, and between 19 March and 15 April 2014. Automated acoustic recordings were made of the soundscape at each of 24 sites in ENP and Pelion SF. Sites were situated in six elevational bands; each elevational band was separated by 200 m. Therefore, there were four replicate sites at 200 m, 400 m, 600 m, 800 m, 1000 m and 1200 m above sea level (asl). EL also conducted multiple-point visual and aural counts at each site throughout each survey period. Incidental observations were recorded by EL and CJB during travel to and from sites during the survey periods. EL interrogated the eBird database and included records of species from hotspots within the areas described above, and those from Marion Crouther's 2010 bird list for Eungella (see www.eungella.info/birds.htm and Crouther & Crouther, 1990).

RESULTS AND DISCUSSION

Based on our surveys, published literature and observational records obtained from eBird, a total of 236 bird species representing 67 families have been reliably recorded in the broader Eungella region (Table 1). A synopsis of each family given in taxonomic order is presented below; the taxonomy adopted is the IOC

Checklist v 9.1 (Gill & Donsker, 2019). The synopsis is followed by Table 1, which provides detailed notes on the species found in the region. Where possible, information is given at the subspecific level; this information is taken from Menkhorst *et al.* (2017) and supplemented by Simpson & Day (2004). In certain cases, the relevant edition of the *Handbook of Australian, New Zealand and Antarctic Birds* was also consulted.

Casuariiformes

Casuariidae

Australia's largest bird, the Emu (*Dromaius novaehollandiae*), is the sole surviving member of its genus. Found throughout most of Australia, Emus are mainly restricted to the dry country west of the Clarke Range in the Eungella region.

Anseriformes

Anseranatidae

The Anseranatidae or magpie-geese are an ancient lineage of waterfowl, which diverged before all other ducks, geese and swans (Sraml *et al.*, 1996). There is only one extant species in the family, the Magpie Goose, *Anseranas semipalmata*. Magpie Geese are common in freshwater wetlands throughout tropical and subtropical regions of Australia.

Anatidae

The Eungella region is home to nine anatids, most of which are widely distributed in Australia. Some species, such as the pygmy geese (*Nettapus* spp.) and the Rajah Shelduck (*Tadorna raja rufitergum*) are not commonly found in the subtropics to the south.

Galliformes

Megapodiidae

The megapodes are an ancient avian clade, and are represented in the Eungella region by two species – the Australian Brushturkey (*Alectura lathami lathami*) which is distributed along most of the east coast, and the Orange-footed Scrubfowl (*Megapodius reinwardt tumulus*), occurring here at the southern limit of its range. The elevational distributions of the two species potentially reflect their broader distributions, with the widespread Brushturkey occurring at all elevations and the Scrubfowl restricted to the warm, moist forest in the lowlands. Males of both species build large nest mounds of leaf litter and other organic matter that they collect from the forest floor (Jones & Goth, 2008).

Phasianidae

Brown Quail (*Coturnix ypsilophora*) and King Quail (*Excalfactoria chinensis victoriae*) are known to occur sporadically in Eungella township as part of irruptive events in the summer wet season, along with several species of buttonquail (Turnicidae – see below) (Crouther & Crouther, 1999). Stubble Quail (*C. pectoralis*) also has potential to irrupt, but is yet to be reliably recorded in the region.

Podicipediformes

Podicipedidae

The grebes are freshwater diving birds. Three species are known to occur in the Eungella region: Australasian Grebe (*Tachybaptus novaehollandiae*), Great Crested Grebe (*Podiceps cristatus australis*) and Hoary-headed Grebe (*Poliiocephalus poliocephalus*). The former may be found on a range of freshwater wetlands including small farm dams, while the latter two species probably only occur regularly at Eungella Dam.

Pelicaniformes

Threskiornithidae

The ibises and spoonbills are well represented in Australia, with five species typically inhabiting freshwater wetlands. All five species – Australian White Ibis (*Threskiornis molucca*), Straw-necked Ibis (*T. spinicollis*), Glossy Ibis (*Plegadis falcinellus*), Royal Spoonbill (*Platalaea regia*) and Yellow-billed Spoonbill (*P. flavipes*) – can be found around Eungella.

Ardeidae

The herons and egrets found in the Eungella region are widespread species that occur over much of the eastern half of Australia. They include the Nankeen Night-heron (*Nycticorax caledonicus*), the Eastern Cattle Egret (*Bubulcus coromandus*), White-necked and White-faced Herons (*Ardea pacifica* and *Egretta novaehollandiae*, respectively) and Great, Intermediate and Little Egrets (*A. alba*, *A. intermedia* and *E. garzetta*, respectively).

Pelicanidae

In Eungella, as well as Australia more broadly, there is only one member of this widespread family – the Australian Pelican (*Pelecanus conspicillatus*).

Suliformes

Phalacrocoracidae

Five species of cormorant are found in mainland Australia. Four of these – Great (*Phalacrocorax carbo*),

Australian Pied (*P. varius*), Little Pied (*Microcarbo melanoleucos*) and Little Black (*P. sulcirostris*) Cormorants – can be found in the Eungella region.

Anhingidae

The Australasian Darter (*Anhinga novaehollandiae*) is the only member of this family found in Australia.

Accipitriformes

Pandionidae

The Eastern Osprey (*Pandion haliaetus*) is the only member of this family found in the Eungella region.

Accipitridae

Many of Australia's diurnal birds of prey belong to this family, the largest within the Accipitriformes, and thirteen species (five kites, a baza, an eagle, two goshawks, a sparrowhawk, two harriers and a sea eagle) can be found in the Eungella region. The high diversity of raptors, with varied habitat requirements and foraging strategies, reflects the wide variety of habitats found around Eungella. For subspecific information, see Table 1.

Otidiformes

Otididae

The Australian Bustard (*Ardeotis australis*) is the only member of this family found in Australia, and records in the Eungella region are restricted to open woodland or grasslands in the western extremities of the area.

Gruiformes

Rallidae

The rails have an almost cosmopolitan distribution. There are seven representatives of this family (a rail, a bush-hen, a crake, a swamphen, a moorhen, a native hen and a coot) occurring in the Eungella region – all with fairly widespread distributions in Australia. The diversity in the Rallidae reflects the diversity of habitats available in the region – a pattern that is repeated for many other families. For subspecific information, see Table 1.

Gruidae

The Brolga (*Grus rubicunda*) is the only representative of the crane family in the Eungella region.

Charadriiformes

Turnicidae

There are seven Australian buttonquail species, and some are prone to irruptive events. Crouther & Crouther

(1999) described semi-annual irruptions of buttonquail and true quail in Eungella township in the summer wet season. During irruption events, they are presumably attracted to lights of the township while travelling after dark. Red-backed (*Turnix maculosa*), Red-chested (*T. pyrhhothorax*), Painted (*T. varia varius*) and Little (*T. velox*) Buttonquails have all been recorded in the region.

Burhinidae

Bush Stone-curlew (*Burhinus grallarius*) is the only member of its family to occur in the Eungella area.

Recurvirostridae

The White-headed Stilt (*Himantopus leucocephalus*) is the only member of this family occurring around Eungella. Surprisingly, there are no records from Eungella Dam.

Charadriidae

Plovers and dotterels are well represented in Australia, with 20 species, four of which occur in the Eungella region: Banded (*Vanellus tricolor*) and Masked Lapwings (*V. miles*), and Red-kneed (*Erythrogonys cinctus*) and Black-fronted Dotterels (*Elseyornis melanops*). Eungella is in the Masked Lapwing hybrid zone: intermediate forms between the subspecies *V. miles miles* and *V. m. novaehollandiae* may occur in the region.

Scolopacidae

The snipes and sandpipers are a large family, with many migratory species. Including vagrants, 45 scolopacids have been recorded in Australia. The only regularly occurring member of this family in the Eungella region is Latham's Snipe (*Gallinago hardwickii*). Sharp-tailed Sandpipers (*Calidris acuminata*), along with other calidrids, may occur but have yet to be officially recorded. This is probably more a function of the lack of survey effort in the region as opposed to true absence.

Laridae

Four representatives of this widespread family occur in the Eungella region: Silver Gull (*Chroicocephalus novaehollandiae*), Gull-billed Tern (*Gelochelidon nilotica*), Caspian Tern (*Hydroprogne caspia*) and Whiskered Tern (*Chlidonias hybrida*).

Columbiformes

Columbidae

Pigeons are diverse in the Eungella region and are represented by 17 species in 11 genera. These include seven

species associated with rainforests: Wompoo Fruit-dove (*Ptilinopus magnificus keri*), Rose-crowned Fruit-dove (*P. regina regina*), Superb Fruit-dove (*P. superbus*), Pacific Emerald Dove (*Chalcophaps longirostris chrysochlora*), White-headed Pigeon (*Columba leucomela*), Brown Cuckoo-dove (*Macropygia phasianella robinsoni*), and Topknot Pigeon (*Lopholaimus antarcticus*). Seven other species are more commonly found in drier, open habitats such as woodlands and exotic gardens: Crested Pigeon (*Ocyphaps lophotes lophotes*), Peaceful Dove (*Geopelia placida placida*), Bar-shouldered Dove (*G. humeralis humeralis*), Diamond Dove (*G. cuneata*), Squatter Pigeon (*Geophaps scripta scripta*), Wonga Pigeon (*Leucosarcia melanoleuca*) and Common Bronzewing (*Phaps chalcoptera*). Two introduced species, Spotted Dove (*Streptopelia chinensis*) and Rock Dove (*Columba livia*), are also commonly recorded in the region, along with the migratory Torresian Imperial Pigeon (*Ducula spilorrhoa*).

Cuculiformes

Cuculidae

The cuckoos are largely nest parasites. Eleven species occur in the Eungella region. Some, such as the Pacific Koel (*Eudynamis orientalis subcyanocephala*), Channel-billed Cuckoo (*Scythrops novaehollandiae*) and Oriental Cuckoo (*Cuculus optatus*) are migratory and are only present in the summer months. Others are year-round residents. Some species, such as Shining Bronze-cuckoo (*Chrysococcyx lucidus*), Little Bronze-cuckoo (*C. minutillus minutillus*), Fan-tailed Cuckoo (*Cacomantis flabelliformis*) and Brush Cuckoo (*Cacomantis variolosus variolosus*) prefer rainforest and associated wet sclerophyll forest. Others, like Black-eared Cuckoo (*Chrysococcyx osculans*), Pallid Cuckoo (*Cacomantis pallidus*), Horsefield's Bronze-cuckoo (*Chrysococcyx basalis*) and 'Gould's Bronze-cuckoo' (*Chrysococcyx minutillus russatus*) prefer the more open habitat to the west of Eungella. The final cuckoo species found in the region, the Pheasant Coucal (*Centropus phasianinus phasianinus*), is not a nest parasite and can be found anywhere in association with tall, dense grasses.

Strigiformes

Tytonidae

The 'Tytos', or barn owls, recorded in Eungella include the Greater Sooty Owl (*Tyto tenebricosa*), mostly restricted to eastern Australia and southern Papua New Guinea, and the widely distributed Eastern Barn Owl (*T. delicatula*). The occurrence of Greater Sooty Owl in

the region is of interest as the population is isolated from those to the south (Conondale Range, south-eastern Queensland) and north (Papua New Guinea). There is potential for two other *Tyto* species to occur in the region: Australian Masked Owl (*T. novaehollandiae*) and the Eastern Grass Owl (*T. longimembris*).

Strigidae

Another owl genus, *Ninox*, is well represented in Eungella, with four species recorded: Rufous Owl (*N. rufa queenslandica*), Powerful Owl (*N. strenua*), Southern Boobook (*N. boobook boobook*) and Bark-ing Owl (*N. connivens connivens*).

Caprimulgiformes

Podargidae

The podargids are represented in Eungella by a single species: Australia's most common frogmouth, the Tawny Frogmouth (*Podargus strigoides strigoides*).

Caprimulgidae

Three species of nightjar can be found in the Eungella region: White-throated Nightjar (*Eurostopodus mystacalis*) and Large-tailed Nightjar (*Caprimulgus macrurus*) in relatively moist habitats, and Spotted Nightjar (*Eurostopodus argus*) in drier western areas of the region. The spectacular calls of each species are often the best way to detect their presence; they are very well camouflaged, with cryptic plumage patterns.

Apodiformes

Aegothelidae

The Australian Owlet-nightjar (*Aegotheles cristatus*) is the only species from this family to be found in Australia. Owlet-nightjars are often detected by call, or seen resting on tracks or roads at night.

Apodidae

The swifts and swiftlets are aerial insectivores that spend much of their life on the wing. Two species found in Eungella are migratory: the White-throated Needle-tail (*Hirundapus caudacutus*) and Pacific Swift (*Apus pacificus*) are present only in the austral summer. The other apodid found in the region is a breeding resident. Small colonies of the Australian Swiftlet (*Aerodramus terraereginae terraereginae*) inhabit and breed in two caves in Finch Hatton Gorge (D. Barnes, *pers. comm.*).

Coraciiformes

Coraciidae

The Oriental Dollarbird (*Eurystomus orientalis*) is

a migratory species present in the Eungella region in summer. Dollarbirds are often seen perched on telephone lines, or the exposed branches of dead trees.

Alcedinidae

The kingfishers are represented by seven species in the Eungella region. The migratory Buff-breasted Paradise Kingfisher (*Tanysiptera silva*) breeds only in terrestrial termite mounds in the lowland rainforests and is present during summer. Laughing and Blue-winged Kookaburras (*Dacelo novaeguineae* and *D. leachii*) usually select arboreal termite mounds or tree hollows for breeding, and can be found in the rainforest and open country in the Eungella region. Azure Kingfishers (*Ceyx azureus azurea*) are sometimes seen along rainforest streams. Moving away from the rainforest, into the drier country around Eungella Dam or down the Pioneer Valley, may lead to sightings of three *Todiramphus* species: Forest Kingfisher (*Todiramphus macleayi incinctus*), Sacred Kingfisher (*T. sanctus sanctus*) and, more rarely, Red-backed Kingfisher (*T. pyrhhopygius*).

Meropidae

The Rainbow Bee-eater (*Merops ornatus*), a bird of watercourses and open country, is the only bee-eater present in Australia. Bee-eaters construct nest tunnels in earthen banks, and are acrobatic in their aerial pursuit of insect prey.

Falconiformes

Falconidae

The regularly occurring falcons of the Eungella region include the Nankeen Kestrel (*Falco cenchroides*), Australian Hobby (*F. longipennis*), Brown Falcon (*F. berigora*) and Peregrine Falcon (*F. peregrinus*). Black Falcon (*F. subniger*) has the potential to occur in the region, but there are no records to date.

Psittaciformes

Cacatuidae

Six species of cockatoo have been recorded in the Eungella region. Three are widespread in Australia: the Galah (*Eolophus roseicapilla kuhli/albiceps*), Little Corella (*Cacatua sanguinea gymnopsis*), and Sulphur-crested Cockatoo (*Cacatua galerita galerita*). Three species of black-cockatoo – the frequently occurring Red-tailed Black-cockatoo (*Calyptorhynchus banksii banksii*), and the infrequent Glossy and Yellow-tailed Black-cockatoos (*C. lathami erebus* and *C. funereus funereus*, respectively) – are also found in the region.

Psittaculidae

Parrots occurring in the Eungella region include seven species: the Australian King Parrot (*Alisterus scapularis*) and Red-winged Parrot (*Aprosmictus erythropterus*), Crimson and Pale-headed Rosellas (*Platycercus elegans* and *P. adscitus*), and the primarily nectivorous lorikeets represented by Rainbow (*Trichoglossus moluccanus moluccanus*), Scaly-breasted (*T. chlorolepidotus*) and Little (*Parvipsitta pusilla*) Lorikeets. Crimson Rosellas are restricted to high-elevation rainforest in the region. The subspecies occurring in Eungella was described as a distinct subspecies, *Platycercus elegans filewoodi*, by McAllan & Bruce (1989). Schodde & Mason (1997), however, subsequently synonymised *P. e. filewoodi* with *P. e. elegans*. The uncertain status of the subspecies continues to this day: Menkhorst *et al.* (2017) treat it as an isolated population of the Wet Tropics subspecies *P. e. nigrescens*. Photographs of Crimson Rosellas from Eungella, as well as the two specimens from the Eungella region in the Queensland Museum examined by EL and CB, show extensive black mottling on the mantle, and a slightly darker red tone to the plumage compared with the southern, nominate subspecies *P. e. elegans* – both features shared with *P. e. nigrescens*. However, dedicated genetic work on the Eungella population will be required in order to determine its status.

Passeriformes

The passerines are the largest order of birds, including more than half of all extant species. They are distinguished by the arrangement of their toes, with three forward-facing toes and one backwards-facing toe facilitating perching – this is why the passerines are sometimes referred to as ‘perching birds’.

Pittidae

The pittas are represented in the Eungella region by a single species: the Noisy Pitta (*Pitta versicolor intermedia*). Noisy Pittas are very common in the rainforests around Eungella, perhaps due to a lack of competition from Logrunners or Chowchillas.

Ptilonorhynchidae

The bowerbirds are an ancient lineage of passerines, famous for the male’s construction of a bower, an elaborate structure to attract females during the breeding season. In the dry country to the west of Eungella, Great Bowerbirds (*Chlamydera nuchalis orientalis*) may be found. In the rainforest, above 1000 m elevation, an

isolated population of Regent Bowerbirds (*Sericulus chrysocephalus*) exists. These birds are at the extreme northern limit of their distribution, and as such, Regent Bowerbirds in the Eungella region are under significant threat from climate change. Continued climatic warming may lead to the local extinction of this species (Anderson, 2011).

Climacteridae

The treecreepers are represented by a single species in Eungella: the White-throated Treecreeper (*Cormobates leucophaea intermedia*). The subspecies which occurs in Eungella is restricted to the Clarke and Connors Ranges, and occurs between the northerly subspecies *minor* (Wet Tropics) and the *metastasis* subspecies of south-eastern Queensland and north-eastern New South Wales (Boles & Longmore, 1983).

Maluridae

The Australian wrens include the fairywrens, emu-wrens and grasswrens. In Eungella, the only malurid that occurs is the Red-backed Fairywren (*Malurus melanocephalus melanocephalus*).

Meliphagidae

Australia is home to roughly half (77) of the species in this family. In the Eungella region, 19 species of honeyeater, representing 14 genera, occur. The Eungella Honeyeater (*Bolemoreus hindwoodi*) was described in 1983 and is endemic to the region (Longmore & Boles, 1983). In general, the species is restricted to higher-elevation rainforest (above approximately 800 m asl) and is threatened by climate change. There is some evidence that the Eungella Honeyeater undertakes seasonal elevational migration (D. Barnes, *pers. comm.*), moving into lower elevations of ENP and Crediton State Forest in winter, though more data is required to understand its seasonal movements. For subspecific information on the rest of Eungella’s honeyeaters, see Table 1.

Pardalotidae

Two of Australia’s four pardalote species occur in Eungella: Spotted (*Pardalotus punctatus punctatus*) and Striated (*P. striatus melanocephalus*) Pardalotes. Interestingly, *P. punctatus militaris* (the subspecies from the Wet Tropics) may occur in sympatry with the nominate subspecies in the Eungella region.

Acanthizidae

The ‘Australasian warblers’ are represented in the Eungella region by two scrubwrens (*Sericornis* spp.),

four *Gerygone* species, the Weebill (*Smicrornis brevirostris brevirostris*) and three thornbills (*Acanthiza* spp.). The subspecific status of some acanthizid species in the region is poorly known, and there are several isolated subspecies. The White-browed Scrubwren (*S. frontalis laevigaster*) that occurs in Eungella is in the middle of the distribution of this subspecies on the Queensland coast. Large-billed Scrubwrens in the region are likely to be the nominate subspecies *magnirostra*, here at the northern limit of its range. We note, however, that the population here is also isolated by biogeographic barriers. Conversely, Large-billed Gerygone (*G. magnirostris cairnsensis*) appears to be near the southern limit of its range in the region. White-throated and Fairy Gerygones (*G. olivacea olivacea* and *G. palpebrosa flavida*) are fairly common in suitable habitat along the Queensland coast. The Brown Gerygone (*G. mouki amalia*) occurring in Eungella is another isolated subspecies. Brown Thornbill (*A. pusilla*) has a similar distribution to Large-billed Scrubwren; the population at Eungella is an isolated northern outlier of the southern subspecies *A. p. dawsonensis*. Weebills occur to the west of Eungella Dam, and Buff-rumped Thornbills (*A. reguloides squamata*) occur in drier sclerophyll forests to the south of ENP, such as Crediton SF. Records of Striated Thornbill occurring in Eungella on eBird are almost certainly misidentified Brown Thornbills or Yellow Thornbills (*Acanthiza nana modesta*) which occur here at the northern limit of the subspecies' range.

Psophodidae

The Eastern Whipbird, *Psophodes olivaceus olivaceus*, is the sole member of this family occurring in the Eungella region and is an isolated population. Their distinctive whip-like call is probably the easiest way to detect their presence.

Artamidae

The family Artamidae contains the woodswallows, the butcherbirds and their phylogenetic allies. Woodswallows can be highly irruptive: of Australia's six species, only one (Little Woodswallow *Artamus minor*) has yet to be recorded in the region. Black (*Cracticus quoyi rufescens*), Grey (*C. torquatus torquatus*) and Pied (*C. nigrogularis nigrogularis*) Butcherbirds can all be found in Eungella; Pied is by far the most common. The artamid list for the region is completed by the Australian Magpie (*C. tibicens*) and Pied Currawong (*Strepera graculina graculina*).

Campephagidae

The cuckooshrikes and allies are a family largely confined to the tropics and subtropics. In Eungella, there are six representatives: three cuckooshrikes (*Coracina* spp.), the Common Cicadabird (*C. tenuirostris tenuirostris*) and two trillers (*Lalage* spp.). See Table 1 for subspecific information.

Neosittidae

One species from this family, the Varied Sittella (*Daphoenositta chrysoptera*), occurs in Australia. In the Eungella region, the subspecies *D. chrysoptera leucocephala* is at the northern limit of its range; however, Eungella is a hybrid zone, where intergrades between *D. c. leucocephala* and *D. c. striata* could occur.

Pachycephalidae

This is a large Australasian family. In Eungella, four species representing two genera can be found. Both Golden (*Pachycephala pectoralis pectoralis*) and Rufous (*P. rufiventris rufiventris*) Whistlers are common in suitable habitat, as are Little (*Colluricincla megarrhyncha synaptica*) and Grey (*C. harmonica harmonica*) Shrikethrushes.

Oriolidae

Two of Australia's three oriolid species can be found in the Eungella region: the Olive-backed Oriole (*Oriolus sagittatus sagittatus*) and the Australasian Figbird (*Sphecotheres vieilloti vieilloti*).

Dicruridae

The single representative of this family in Australia, the Spangled Drongo (*Dicrurus bracteatus bracteatus*), occurs at Eungella.

Rhipiduridae

The fantails are well represented in Eungella, with three of Australia's six species occurring in the region. These include the Willie Wagtail (*Rhipidura leucophrys leucophrys*), and Grey and Rufous Fantails (*R. albiscapa keasti*, and *R. rufifrons intermedia*, respectively).

Monarchidae

The Eungella region hosts six species of this family, representing five genera. Spectacled (*Symposiachrus trivirgatus melanorrhoea*), Black-faced (*Monarcha melanopsis*) and White-eared (*Carterornis leucotis*) Monarchs can all be found in the rainforests; the

Magpie-Lark (*Grallina cyanoleuca cyanoleuca*) is a bird of open country; and, Leaden and Restless Flycatchers (*Myiagra rubecula yorki* and *M. inquieta*) can be found in sclerophyll forests.

Corvidae

Two corvids can potentially be found in Eungella: the Torresian Crow (*Corvus orru*) and the Australian Raven (*Corvus coronoides coronoides*). However, recent records of *C. coronoides* in the eBird database examined by EL were misidentified *C. orru*: the status of the former in the region is therefore questionable (though we note that Marion Crouther (2010) includes it in her bird list for Eungella).

Corcoracidae

Both mud-nesters, the White-winged Chough (*Corcorax melanorhamphos melanorhamphos*) and the Apostlebird (*Struthidea cinerea dalyi*), occur in the dry country around Eungella Dam.

Petrociidae

The Australian robins are a large family but have only three representatives in the Eungella region: White-browed Robin (*Poecilodryas superciliosa*), Eastern Yellow Robin (*Eopsaltria australis chrysorrhoea*) and Jacky Winter (*Microeca fascians fascians*).

Alaudidae

A single lark, Horsfield's Bushlark (*Mirafra javanica horsfieldii*), occurs in the dry country to the west of Eungella.

Hirundinidae

The swallows and martins are represented in Eungella by three common species: Welcome Swallow (*Hirundo neoxena neoxena*), Fairy Martin (*Petrochelidon ariel*) and Tree Martin (*P. nigricans neglecta*).

Locustellidae

The Tawny Grassbird (*Megalurus timoriensis*) is the only member of this family to occur in the Eungella region, and can be seen singing in display flights above grassy areas in late spring and summer.

Cisticolidae

The Golden-headed Cisticola (*Cisticola exilis diminita*) is the only member of this family to occur in the Eungella region.

Zosteropidae

The Silveryeye (*Zosterops lateralis cornwallis*) is the only member of this family to occur in the Eungella region.

Sturnidae

There are potential historical records of Common Myna (*Acridotheres tristis*) occurring around Eungella, but we found little reliable information on the occurrence of the species in the region.

Turdidae

Only one thrush species occurs in the Eungella region: the Russet-tailed Thrush (*Zoothera heinei*). During the Eungella Biodiversity Survey, Russet-tailed Thrush was observed at sites at 400 m, 1000 m and 1200 m asl, and was recorded using automated acoustic recorders at 200 m, 400 m and 800 m asl sites. The lack of records at 600 m may be habitat-driven and mediated by fire: there is a band of wet sclerophyll forest running through the drier ridges of the 600 m contour line on the forested slopes of the mountains. Above this elevation, the rainforest is usually kept moist by a blanket of cloud; below this elevation, gullies and creeks trap moisture moving downslope. The occurrence of Russet-tailed Thrush above 1000 m in Eungella probably reflects the warmer climate at this latitude compared with that of the southern populations. In the Gondwanan Rainforests of the Queensland/New South Wales border, for example, Russet-tailed Thrush is generally restricted to elevations below 700 m (Leach, 2016).

Dicaeidae

The Mistletoebird (*Dicaeum hirundinaceum*) is the only member of this family to occur in the Eungella region, and may be found wherever mistletoes (Loranthaceae or Santalaceae spp.) are in flower.

Estrildidae

Four finches occur in the Eungella region, representing three genera: *Neochmia*, *Taeniopygia* and *Lonchura*. For subspecific and habitat information, see Table 1.

Motacillidae

The Australian Pipit (*Anthus australis*) is the only motacillid to occur in Eungella, though vagrant motacillids, such as the Eastern Yellow Wagtail (*Motacilla tschutschensis*), may go undetected in the region due to a relative lack of survey effort.

TABLE 1. The birds of Eungella in taxonomic order, including notes on elevational distribution in Eungella National Park if recorded during the Eungella Biodiversity Survey, and notes on habitat, distribution and likelihood of occurrence within the broader region. Taxonomy follows IOC Checklist v 9.1 (Gill & Donsker, 2019).

Scientific name	IOC English name	Elevational distribution	Notes
Casuariiformes			
Dromaiidae	Emu		
<i>Dromaius novaehollandiae</i>	Emu		Potential in dry country around Eungella Dam
Anseriformes			
Anseranatidae	Magpie Goose		
<i>Anseranas semipalmata</i>	Magpie Goose		Wetlands, paddocks
Anatidae	Ducks, Geese & Swans		
<i>Dendrocygna eytoni</i>	Plumed Whistling Duck		Wetlands, farm dams
<i>Dendrocygna arcuata</i>	Wandering Whistling Duck		Wetlands, farm dams
<i>Cygnus atratus</i>	Black Swan		Wetlands, Eungella Dam
<i>Tadorna radjah rufitergum</i>	Raja Shelduck		Wetlands; uncommon
<i>Chenonetta jubata</i>	Maned Duck		Wetlands, paddocks; common
<i>Nettapus coromandelianus</i>	Cotton Pygmy Goose		Eungella Dam
<i>Nettapus pulchellus</i>	Green Pygmy Goose		Eungella Dam
<i>Anas superciliosa</i>	Pacific Black Duck		Wetlands, farm dams
<i>Anas gracilis</i>	Grey Teal		Wetlands, Eungella Dam
<i>Aythya australis</i>	Hardhead		Eungella Dam, farm dams
Galliformes			
Megapodiidae	Megapodes		
<i>Alectura lathami lathami</i>	Australian Brushturkey	200 m–400 m	Occasionally seen in forest
<i>Megapodius reinwardt tumulus</i>	Orange-footed Scrubfowl	200 m–400 m	More often heard than seen
Phasianidae	Pheasants, Fowl & Allies		
<i>Coturnix pectoralis</i>	Stubble Quail		Irruptive
<i>Coturnix ypsilophora</i>	Brown Quail		Rank grass
<i>Excalfactoria chinensis victoriae</i>	King Quail		Irruptive
Podicipediformes			
Podicipedidae	Grebes		
<i>Tachybaptus novaehollandiae</i>	Australasian Grebe		Eungella Dam, farm dams
<i>Poliiocephalus poliocephalus</i>	Hoary-headed Grebe		Eungella Dam, farm dams
<i>Podiceps cristatus</i>	Great Crested Grebe		Eungella Dam, farm dams
Ciconiiformes			
Ciconiidae	Storks		
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork		Occasional in paddocks and around Eungella Dam

Scientific name	IOC English name	Elevational distribution	Notes
<i>Pelecaniformes</i>			
Threskiornithidae	Ibises, Spoonbills		
<i>Threskiornis moluccus</i>	Australian White Ibis		Eungella Dam, farm dams, paddocks
<i>Threskiornis spinicollis</i>	Straw-necked Ibis		Eungella Dam, farm dams, paddocks
<i>Plegadis falcinellus</i>	Glossy Ibis		Eungella Dam, farm dams, paddocks
<i>Platalea regia</i>	Royal Spoonbill		Eungella Dam, farm dams
<i>Platalea flavipes</i>	Yellow-billed Spoonbill		Eungella Dam, farm dams
Ardeidae	Hérons, Bitterns		
<i>Nycticorax caledonicus</i>	Nankeen Night Heron		Creeklines
<i>Bubulcus coromandus</i>	Eastern Cattle Egret		Paddocks, grasslands with cattle
<i>Ardea pacifica</i>	White-necked Heron		Farm dams and swamps
<i>Ardea alba</i>	Great Egret		Eungella Dam, farm dams
<i>Egretta intermedia</i>	Intermediate Egret		Eungella Dam, farm dams
<i>Egretta novaehollandiae</i>	White-faced Heron		Eungella Dam, farm dams
<i>Egretta garzetta</i>	Little Egret		Eungella Dam, farm dams
Pelecanidae	Pelicans		
<i>Pelecanus conspicillatus</i>	Australian Pelican		Eungella Dam
Phalacrocoracidae	Cormorants, shags		
<i>Microcarbo melanoleucos</i>	Little Pied Cormorant	200 m	Eungella Dam, Owens Creek, Finch Hatton Gorge
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	200 m	Eungella Dam, Owens Creek, Finch Hatton Gorge
<i>Phalacrocorax varius</i>	Australian Pied Cormorant		Eungella Dam
<i>Phalacrocorax carbo</i>	Great Cormorant		Eungella Dam
Anhingidae	Anhingas, darters		
<i>Anhinga novaehollandiae</i>	Australasian Darter		Eungella Dam
<i>Accipitriformes</i>			
Pandionidae	Ospreys		
<i>Pandion cristatus</i>	Eastern Osprey	200 m	Owens Creek (occasional), Pioneer Valley
Accipitridae	Kites, Hawks & Eagles		
<i>Elanus axillaris</i>	Black-shouldered Kite		Open country, paddocks and farmland
<i>Lophoictinia isura</i>	Square-tailed Kite		Eucalypt forests (e.g. Crediton)
<i>Aquila audax</i>	Wedge-tailed Eagle	All elevations	Sometimes seen soaring above canopy
<i>Accipiter novaehollandiae</i>	Grey Goshawk	All elevations	Occasionally seen in forest

Scientific name	IOC English name	Elevational distribution	Notes
Accipitriformes (cont.)			
Pandionidae	Ospreys		
<i>Accipiter fasciatus fasciatus</i>	Brown Goshawk		Rainforest fringe, eucalypt forest
<i>Accipiter cirrocephalus</i>	Collared Sparrowhawk	200 m	Once seen along Owens Creek but probably occurs at all elevations
<i>Circus approximans</i>	Swamp Harrier		Farmlands, especially associated with water bodies
<i>Circus assimilis</i>	Spotted Harrier		Farmlands, grassy areas
<i>Milvus migrans</i>	Black Kite		Dry country to the west of Eungella
<i>Haliastur sphenurus</i>	Whistling Kite		Occasionally recorded in Pioneer Valley
<i>Haliastur indus</i>	Brahminy Kite		Occasionally recorded in Pioneer Valley; once seen along Owens Creek
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle		Eungella Dam, upper Pioneer Valley
Otidiformes			
Otididae	Bustards		
<i>Ardeotis australis</i>	Australian Bustard		Dry country around Eungella Dam
Gruiformes			
Rallidae	Rails, Crakes & Coots		
<i>Gallirallus philippensis mellori</i>	Buff-banded Rail		Rank vegetation, creeklines and farm dams
<i>Amaurornis moluccana</i>	Pale-vented Bush-hen		Rank vegetation, creeklines at lower elevations
<i>Porzana pusilla</i>	Baillon's Crake		Occasionally recorded at Eungella Dam
<i>Porphyrio porphyrio melanotus</i>	Purple Swamphen		Wetlands, farm dams
<i>Gallinula tenebrosa</i>	Dusky Moorhen		Wetlands, farm dams
<i>Tribonyx ventralis</i>	Black-tailed Nativehen		Wetlands, farm dams
<i>Fulica atra</i>	Eurasian Coot		Eungella Dam
Gruidae	Cranes		
<i>Grus rubicunda</i>	Brolga		Farmlands, grasslands
Charadriiformes			
Turnicidae	Buttonquail		
<i>Turnix maculosus</i>	Red-backed Buttonquail		Irruptive
<i>Turnix varius</i>	Painted Buttonquail		Irruptive
<i>Turnix pyrrhotorax</i>	Red-chested Buttonquail		Irruptive
<i>Turnix velox</i>	Little Buttonquail		Irruptive

Scientific name	IOC English name	Elevational distribution	Notes
Charadriiformes (cont.)			
Burhinidae	Stone-curlews		
<i>Burhinus gallarius</i>	Bush Stone-curlew		Occasionally recorded in Pioneer Valley
Recurvirostridae	Stilts, Avocets		
<i>Himantopus leucocephalus</i>	White-headed Stilt		Farm dams and watercourses
Charadriidae	Plovers		
<i>Vanellus tricolor</i>	Banded Lapwing		Dry country grasslands
<i>Vanellus miles miles / novaehollandiae</i>	Masked/Black-shouldered Lapwing		Grasslands, farmlands
<i>Erythrogonys cinctus</i>	Red-kneed Dotterel		Eungella Dam, farm dams
<i>Elseyonnis melanops</i>	Black-fronted Dotterel		Eungella Dam, farm dams
Scolopacidae	Sandpipers, Snipes		
<i>Gallinago hardwickii</i>	Latham's Snipe		Farm dams, swamps and watercourses
Laridae	Gulls, Terns & Skimmers		
Chroicocephalus novaehollandiae	Silver Gull		Eungella Dam
<i>Gelochelidon nilotica</i>	Gull-billed Tern		Eungella Dam
<i>Hydroprogne caspia</i>	Caspian Tern		Eungella Dam
<i>Chlidonias hybrida</i>	Whiskered Tern		Eungella Dam
Columbiformes			
Columbidae	Pigeons, Doves		
<i>Columba livia</i>	Rock Dove		Towns
<i>Columba leucomela</i>	White-headed Pigeon	800 m–1200 m	Prefers higher elevation rainforest; uncommon
<i>Spilopelia chinensis</i>	Spotted Dove		Towns
<i>Macropygia phasianella robinsoni</i>	Brown Cuckoo-Dove	All elevations	Common in rainforest
<i>Chalcophaps longirostris chrysochlora</i>	Pacific Emerald Dove	800 m	Uncommon at most elevations; relatively common around Sky Window
<i>Phaps chalcoptera</i>	Common Bronzewing		Occurs in dry eucalypt forest (e.g. Crediton)
<i>Ocyphaps lophotes lophotes</i>	Crested Pigeon		Farmlands, grasslands
<i>Geophaps scripta scripta</i>	Squatter Pigeon		Dry country around Eungella Dam
<i>Geopelia cuneata</i>	Diamond Dove		Dry country around Eungella Dam
<i>Geopelia placida placida</i>	Peaceful Dove		Dry country around Eungella Dam, towns
<i>Geopelia humeralis humeralis</i>	Bar-shouldered Dove	200 m	Finch Hatton Gorge, dry eucalypt forest

Scientific name	IOC English name	Elevational distribution	Notes
Columbiformes (cont.)			
Columbidae	Pigeons, Doves		
<i>Ptilinopus magnificus keri</i>	Wompoo Fruit Dove	All elevations	Common in rainforest
<i>Ptilinopus superbus</i>	Superb Fruit Dove	All elevations	Common in rainforest
<i>Ptilinopus regina regina</i>	Rose-crowned Fruit Dove	All elevations	Fairly common in rainforest
<i>Ducula spilorrhoa</i>	Torresian Imperial Pigeon	200 m–400 m	Summer migrant; common around Finch Hatton
<i>Lopholaimus antarcticus</i>	Topknot Pigeon	400 m–1200 m	Prefers higher elevation rainforest (>800 m)
Cuculiformes			
Cuculidae	Cuckoos		
<i>Centropus phasianinus phasianinus</i>	Pheasant Coucal		Rank vegetation, creeklines at lower elevations
<i>Eudynamys orientalis subcyanocephala</i>	Pacific Koel	200 m	Summer migrant; prefers lower elevations
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo		Summer migrant; occurs near nesting areas of hosts
<i>Chrysococcyx basalis</i>	Horsfield's Bronze Cuckoo		Dry country, paddocks and farm dams
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo		Dry country around Eungella Dam
<i>Chrysococcyx lucidus</i>	Shining Bronze Cuckoo	400 m–1200 m	Common in rainforest
<i>Chrysococcyx minutillus minutillus / russatus</i>	Little/Gould's Bronze Cuckoo		Potential to occur in most forested habitats, particularly near water
<i>Cacomantis pallidus</i>	Pallid Cuckoo		Dry country around Eungella Dam and further west
<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo	All elevations	Common in rainforest
<i>Cacomantis variolosus</i>	Brush Cuckoo		Eucalypt forests (e.g. Crediton)
<i>Cuculus optatus</i>	Oriental Cuckoo		Occasional visitor; summer migrant
Strigiformes			
Tytonidae	Barn Owls		
<i>Tyto tenebricosa</i>	Greater Sooty Owl	200 m, 1000 m	Survey records at 200 m and 1000 m but probably occurs at all elevations; uncommon
<i>Tyto delicatula</i>	Eastern Barn Owl	800 m, 1000 m	Recorded on forest verge along road
Strigidae	Owls		
<i>Ninox rufa queenslandica</i>	Rufous Owl		Creeklines and gallery forest
<i>Ninox strenua</i>	Powerful Owl		Eucalypt forests
<i>Ninox connivens connivens</i>	Barking Owl		Rare
<i>Ninox boobook boobook</i>	Southern Boobook	200 m–1200 m	Forested habitats; fairly common in rainforest

Scientific name	IOC English name	Elevational distribution	Notes
Caprimulgiformes			
Podargidae	Frogmouths		
<i>Podargus strigoides strigoides</i>	Tawny Frogmouth		Fairly common
Caprimulgidae	Nightjars		
<i>Eurostopodus argus</i>	Spotted Nightjar		More easily detected by call; may be seen resting on roads and tracks at night; most likely to the west of Eungella village
<i>Eurostopodus mystacalis</i>	White-throated Nightjar		More easily detected by call; may be seen resting on roads and tracks at night
<i>Caprimulgus macrurus</i>	Large-tailed Nightjar		More easily detected by call; may be seen resting on roads and tracks at night
Apodiformes			
Aegothelidae	Owlet-nightjars		
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar		Fairly common in most habitats with hollow-bearing trees
Apodidae	Swifts		
<i>Aerodramus terraereginae terraereginae</i>	Australian Swiftlet	200 m, 1200 m	Common over canefields in Pioneer Valley; breeds in caves in Finch Hatton Gorge
<i>Hirundapus caudacutus</i>	White-throated Needletail	1000 m, 1200 m	May occur overhead spring–summer
<i>Apus pacificus</i>	Pacific Swift		May occur overhead spring–summer
Coraciiformes			
Coraciidae	Rollers		
<i>Eurystomus orientalis</i>	Oriental Dollarbird		Summer migrant; often perches on exposed branches or telephone wires
Alcedinidae	Kingfishers		
<i>Tanysiptera sylvia</i>	Buff-breasted Paradise Kingfisher	200 m–600 m	Breeding migrant; nests in terrestrial termite mounds at low elevations
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	All elevations	Common in open habitats; also occurs in rainforest
<i>Dacelo leachii</i>	Blue-winged Kookaburra		Dry country around Eungella Dam and further west
<i>Todiramphus macleayii incinctus</i>	Forest Kingfisher		Common
<i>Todiramphus sanctus sanctus</i>	Sacred Kingfisher		Open country, eucalypt forest
<i>Todiramphus pyrrhopygius</i>	Red-backed Kingfisher		Dry country around Eungella Dam and further west
<i>Ceyx azureus azureus</i>	Azure Kingfisher	200 m–1200 m	Creeklines

Scientific name	IOC English name	Elevational distribution	Notes
Coraciiformes (cont.)			
Meropidae	Bee-eaters		
<i>Merops ornatus</i>	Rainbow Bee-eater	600 m	Occasionally above rainforest canopy; common elsewhere in suitable habitat
Falconiformes			
Falconidae	Caracaras, Falcons		
<i>Falco cenchroides</i>	Nankeen Kestrel		Paddocks, grassland
<i>Falco longipennis</i>	Australian Hobby		Grasslands, margins of lakes and forests
<i>Falco berigora</i>	Brown Falcon		Most open habitats
<i>Falco peregrinus</i>	Peregrine Falcon		Occasional; sometimes seen from summit of Mt Dalrymple
Psittaciformes			
Cacatuidae	Cockatoos		
<i>Calyptorhynchus banksii banksii</i>	Red-tailed Black Cockatoo	All elevations	Large flock often flies over the Clarke Range in the morning and afternoon
<i>Calyptorhynchus lathami erebus</i>	Glossy Black Cockatoo		Rare visitor to the region
<i>Calyptorhynchus funereus funereus</i>	Yellow-tailed Black Cockatoo		Rare visitor to the region
<i>Eolophus roseicapilla kuhli / albiceps</i>	Galah		Common around towns and open country
<i>Cacatua sanguinea gymnopsis</i>	Little Corella		Towns
<i>Cacatua galerita galerita</i>	Sulphur-crested Cockatoo	400 m–1200 m	Common
<i>Nymphicus hollandicus</i>	Cockatiel		Dry country to the west of Eungella
Psittacidae	Parrots		
<i>Trichoglossus moluccanus moluccanus</i>	Rainbow Lorikeet	600 m	In the rainforest, only occur in association with the eucalypt band at 600 m; uncommon
<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet		Possible at flowering eucalypts
<i>Glossopsitta pusilla</i>	Little Lorikeet		Possible at flowering eucalypts
<i>Platycercus elegans</i>	Crimson Rosella	800 m, 1000 m	Infrequently seen in rainforest
<i>Platycercus adscitus</i>	Pale-headed Rosella		Possible in sclerophyll forest
<i>Alisterus scapularis</i>	Australian King Parrot	200 m, 400 m, 600 m, 1000 m	Common in rainforest
<i>Aprosmictus erythropterus</i>	Red-winged Parrot		Dry country to the west of Eungella
Passeriformes			
Pittidae	Pittas		
<i>Pitta versicolor intermedia</i>	Noisy Pitta	All elevations	Common

Scientific name	IOC English name	Elevational distribution	Notes
Passeriformes (cont.)			
Ptilonorhynchidae	Bowerbirds		
<i>Sericulus chrysocephalus</i>	Regent Bowerbird	1000 m, 1200 m	Restricted to high-elevation rainforest
<i>Chlamydera nuchalis orientalis</i>	Great Bowerbird		Dry country to the west of Eungella
Climacteridae	Australasian Treecreepers		
<i>Cormobates leucophaea intermedia</i>	White-throated Treecreeper	All elevations	Fairly common in rainforest
Maluridae	Australasian Wrens		
<i>Malurus melanocephalus melanocephalus</i>	Red-backed Fairywren		Scrubby and grassy habitat
Meliphagidae	Honeyeaters		
<i>Myzomela obscura harteri</i>	Dusky Myzomela		Eungella village and surrounds
<i>Myzomela sanguinolenta</i>	Scarlet Myzomela	200 m–800 m	Blossom migrant
<i>Acanthorhynchus tenuirostris tenuirostris</i>	Eastern Spinebill	400 m, 800 m, 1200 m	Probably occurs at all elevations
<i>Lichmera indistincta ocularis</i>	Brown Honeyeater		Creeklines and eucalypt forests
<i>Phylidonyris niger niger</i>	White-cheeked Honeyeater		Isolated population; northernmost limit
<i>Philemon citreogularis citreogularis</i>	Little Friarbird		Possible in sclerophyll forest
<i>Philemon yoriki</i>	Hornbill Friarbird		Occurs around Eungella Dam
<i>Philemon corniculatus corniculatus</i>	Noisy Friarbird	600 m	Occurs in eucalyptus band in the rainforest
<i>Entomyzon cyanotis cyanotis</i>	Blue-faced Honeyeater		Eucalypt forests
<i>Melithreptus gularis gularis / laetior</i>	Black-chinned Honeyeater		Subspecific hybrids may occur
<i>Melithreptus albogularis inopinatus</i>	White-throated Honeyeater		Eucalypt forests
<i>Melithreptus lunatus</i>	White-naped Honeyeater		Eucalypt forests (prefers wetter habitats)
<i>Ramsayornis fasciatus</i>	Bar-breasted Honeyeater		Small number of records from Broken River
<i>Bolemoreus hindwoodi</i>	Eungella Honeyeater	400 m, 800–1200 m	Seen only once at 400 m; common above 800 m
<i>Caligavis chrysops barroni</i>	Yellow-faced Honeyeater		Eucalypt forests, high elevations
<i>Manorina melanocephala lepidota</i>	Noisy Miner		Eucalypt forests (e.g. Crediton)
<i>Manorina flavigula flavigula</i>	Yellow-throated Miner		Occurs around Eungella Dam and further west
<i>Stomiopera flava addendus</i>	Yellow Honeyeater		Eucalypt forest, rainforest margins, creeklines

Scientific name	IOC English name	Elevational distribution	Notes
Passeriformes (cont.)			
Meliphagidae	Honeyeaters		
<i>Meliphaga lewinii mab</i>	Lewin's Honeyeater	All elevations	Scarce above 1000 m, where Eungella Honeyeater might outcompete; common elsewhere
Pardalotidae	Pardalotes		
<i>Pardalotus punctatus punctatus</i>	Spotted Pardalote	400 m, 600 m	Associated with wet sclerophyll band
<i>Pardalotus striatus melanocephalus</i>	Striated Pardalote		Most common in eucalypt forest and scrub
Acanthizidae	Australasian Warblers		
<i>Sericornis frontalis laevigaster</i>	White-browed Scrubwren	All elevations	Common
<i>Sericornis magnirostra magnirostra</i>	Large-billed Scrubwren	All elevations	Most common around 400 m
<i>Sericornis brevirostris brevirostris</i>	Weebill		Dry country to the west of Eungella
<i>Gerygone mouki amalia</i>	Brown Gerygone		Common, particularly above 800 m
<i>Gerygone magnirostris cairnsensis</i>	Large-billed Gerygone		Uncommon; occurs around creeklines in Pioneer Valley
<i>Gerygone olivacea olivacea</i>	White-throated Gerygone		Eucalypt forests (e.g. Crediton)
<i>Gerygone palpebrosa flavida</i>	Fairy Gerygone	200 m, 400 m, 600 m	Uncommon
<i>Acanthiza pusilla dawsoneis</i>	Brown Thornbill	All elevations	Common
<i>Acanthiza reguloides squamata</i>	Buff-rumped Thornbill		Eucalypt forests
<i>Acanthiza nana modesta</i>	Yellow Thornbill		Eucalypt forests
Psophodidae	Whipbirds, Quail-thrushes		
<i>Psophodes olivaceus olivaceus</i>	Eastern Whipbird	All elevations	Common
Artamidae	Woodswallows, Butcherbirds and allies		
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow		Open country, towns, farms
<i>Artamus personatus</i>	Masked Woodswallow		Vagrant; associated with dry country to the west
<i>Artamus superciliosus</i>	White-browed Woodswallow		Vagrant; associated with dry country to the west
<i>Artamus cinereus</i>	Black-faced Woodswallow		Vagrant; associated with dry country to the west
<i>Artamus cyanopterus</i>	Dusky Woodswallow		Vagrant; associated with dry country to the west
<i>Cracticus quoyi rufescens</i>	Black Butcherbird	All elevations except 800 m	Uncommon in rainforest
<i>Cracticus torquatus torquatus</i>	Grey Butcherbird		Open country, towns, farms
<i>Cracticus nigrogularis nigrogularis</i>	Pied Butcherbird		Open country, towns, farms

Scientific name	IOC English name	Elevational distribution	Notes
Passeriformes (cont.)			
Artamidae	Woodswallows, Butcherbirds and allies		
<i>Gymnorhina tibicen</i>	Australian Magpie		Open country, towns, farms
<i>Strepera graculina graculina</i>	Pied Currawong	All elevations except 200 m	Common in rainforest
Campephagidae	Cuckooshrikes		
<i>Coracina novaehollandiae melanops</i>	Black-faced Cuckooshrike		Eucalypt forests, open country
<i>Coracina lineata</i>	Barred Cuckooshrike	200 m	Creeklines; Finch Hatton Gorge and Owens Creek
<i>Coracina papuensis artamoides</i>	White-bellied Cuckooshrike		Dry country around Eungella Dam and further west
<i>Coracina tenuirostris tenuirostris</i>	Common Cicadabird	All elevations except 1000 m	Mainly seen, not heard; uncommon
<i>Lalage tricolor</i>	White-winged Triller		Dry country to the west of Eungella
<i>Lalage leucomela leucomela</i>	Varied Triller	400 m, 600 m	Most frequent at 400 m, but not commonly encountered
Neosittidae	Sittellas		
<i>Daphoenositta chrysoptera leucocephala</i>	Varied Sittella		Subspecies <i>striata</i> also has the potential to occur in the region
Pachycephalidae	Whistlers and Allies		
<i>Pachycephala pectoralis pectoralis</i>	Australian Golden Whistler	200 m, 800 m–1200 m	Only seen once at 200 m; most common above 1000 m
<i>Pachycephala rufiventris rufiventris</i>	Rufous Whistler		Eucalypt forest, rainforest margins
<i>Colluricincla megarhyncha synaptica</i>	Little Shrikethrush	200 m–800 m	Most common below 600 m
<i>Colluricincla harmonica harmonica</i>	Grey Shrikethrush	800 m–1200 m	Uncommon
Oriolidae	Figbirds, Orioles		
<i>Sphecotheres vieilloti vieilloti</i>	Australasian Figbird	800 m, 1000 m	Only seen twice in rainforest
<i>Oriolus sagittatus sagittatus</i>	Olive-backed Oriole		Eucalypt forest, rainforest margins, creeklines
Dicruridae	Drongos		
<i>Dicrurus bracteatus bracteatus</i>	Spangled Drongo		Fairly common in eucalypt forest and rainforest margins
Rhipiduridae	Fantails		
<i>Rhipidura leucophrys leucophrys</i>	Willie Wagtail		Open country
<i>Rhipidura albiscapa keasti</i>	Grey Fantail	All elevations	Common
<i>Rhipidura rufifrons intermedia</i>	Rufous Fantail	All elevations	Uncommon

Scientific name	IOC English name	Elevational distribution	Notes
Passeriformes (cont.)			
Monarchidae	Monarchs		
<i>Symposiachrus trivirgatus melanorrhoea</i>	Spectacled Monarch	200 m–800 m	Common
<i>Monarcha melanopsis</i>	Black-faced Monarch	200 m–1000 m	Only recorded once at 1000 m; common at lower elevations
<i>Carterornis leucotis</i>	White-eared Monarch	200 m–600 m	Uncommon
<i>Grallina cyanoleuca cyanoleuca</i>	Magpie-lark		Open country, towns, farms
<i>Myiagra rubecula yorki</i>	Leaden Flycatcher		Eucalypt forest, rainforest margins
<i>Myiagra inquieta</i>	Restless Flycatcher		Eucalypt forests (e.g. Crediton)
Corvidae	Crows, Jays		
<i>Corvus orru</i>	Torresian Crow		Open country, towns, farms
<i>Corvus coronoides</i>	Australian Raven		Old records from Eungella village
Corcoracidae	Australian Mudnesters		
<i>Corcorax melanorhamphos melanorhamphos</i>	White-winged Chough		Dry eucalypt forest
<i>Struthidea cinerea dalyi</i>	Apostlebird		Dry country to the west of Eungella
Petroicidae	Australasian Robins		
<i>Poecilodryas superciliosa</i>	White-browed Robin		Records from upper Pioneer Valley and eastern slopes
<i>Eopsaltria australis chryshorrhoea</i>	Eastern Yellow Robin	All elevations	Common
<i>Microeca fascinans fascinans</i>	Jacky Winter		Dry country to the west of Eungella
Alaudidae	Larks		
<i>Mirafra javanica horsfieldii</i>	Horsfield's Bush Lark		Dry country to the west of Eungella; Lizzie Creek Road
Hirundinidae	Swallows, Martins		
<i>Hirundo neoxena neoxena</i>	Welcome Swallow		Common
<i>Petrochelidon ariel</i>	Fairy Martin		Common
<i>Petrochelidon nigricans neglecta</i>	Tree Martin		Common
Locustellidae	Grassbirds and allies		
<i>Megalurus timoriensis</i>	Tawny Grassbird		Wetlands, rank grassland
Cisticolidae	Cisticolas and allies		
<i>Cisticola exilis diminuta</i>	Golden-headed Cisticola		Wetlands, rank grassland
Zosteropidae	White-eyes		
<i>Zosterops lateralis cornwallis</i>	Silvereye	All elevations	Common

Scientific name	IOC English name	Elevational distribution	Notes
Passeriformes (cont.)			
Sturnidae	Starlings		
<i>Acridotheres tristis</i>	Common Myna		Introduced and invasive; some recent records from Eungella, but appears not to have become established
Turdidae	Thrushes		
<i>Zoothera heinei</i>	Russet-tailed Thrush	All elevations	Uncommon; mostly detected using acoustic recorders; seen occasionally around 1000 m
Dicaeidae	Flowerpeckers		
<i>Dicaeum hirundinaceum</i>	Mistletoebird		Could occur anywhere with flowering mistletoes
Passeridae	Old World Sparrows		
<i>Passer domesticus</i>	House Sparrow		Towns
Estrildidae	Waxbills, Munias & Allies		
<i>Neochmia temporalis temporalis</i>	Red-browed Finch		Common in grasslands
Taeniopygia guttata	Zebra Finch		More likely to occur to the west of Eungella village
<i>Taeniopygia bichenovii bichenovii</i>	Double-barred Finch		Grasslands; often near water
<i>Lonchura castaneothorax</i>	Chestnut-breasted Mannikin		Grasslands; often near water
Motacillidae	Wagtails, Pipits		
<i>Anthus australis</i>	Australian Pipit		Paddocks, open country

CONCLUSIONS

The effects of the biogeographic barriers to the north and south on the flora and fauna of ENP are clearly evident. The upland rainforest contains many subtropical plant species despite Eungella's location well north of the Tropic of Capricorn (Ashton *et al.*, 2019), and the avian community of the region is also made up of a combination of tropical and subtropical species. For example, the tropical Black Butcherbird (*Cracticus quoyi rufescens*), Buff-breasted Paradise Kingfisher (*Tanysiptera sylvia*) and Orange-footed Scrubfowl (*Megapodius reinwardt tumulus*) are all close to the southern limit of their distributions in the Eungella region and typically inhabit the warm, humid rainforests of the lowlands. These species occur in the same area as small populations of Regent Bowerbird (*Sericulus chrysocephalus*), Russet-tailed Thrush (*Zoothera heinei*) and Greater Sooty Owl (*Tyto tenebricosa*) – all subtropical species at the extreme northern limits of their distribution, and all essentially restricted to the cool, cloudy upland

rainforest of ENP. These latter species effectively occupy tolerable cool 'islands' in a warmer 'sea' of unsuitable habitat and, accordingly, should be regarded as threatened by ongoing climatic change (Anderson, 2011; Shoo *et al.*, 2005).

Given the overlap between tropical and subtropical fauna and flora in Eungella, there are some surprising bird species that are absent from the region. Riflebirds, catbirds and logrunners have representative species to the north of the Eungella region: Victoria's Riflebird (*Ptiloris victoriae*), Spotted Catbird (*Ailuroedus melanotis*) and Chowchilla (*Orthonyx spaldingii*) are all endemic to the Wet Tropics. To the south, Paradise Riflebird (*P. paradiseus*), Green Catbird (*A. crassirostris*) and Australian Logrunner (*O. temminckii*) occupy the subtropical Gondwanan Rainforests. Despite this, there are no representative species belonging to these groups in the Eungella region. This pattern is also evident at the subspecific level: one example is of the Yellow-throated Scrubwren (*Sericornis citreogularis*), which is absent from the Eungella region but

has subspecific representatives in the Wet Tropics (*S. c. cairnsi*) and the Gondwanan Rainforests (*S. c. intermedia*). Whether or not these patterns in distribution can be linked to the historical biogeographical isolation of the central Queensland rainforests and/or extinction debt remains speculative; it is difficult to determine why these groups and subspecies, in particular, are absent from the region.

Such absences are offset by the presence of numerous endemic species and subspecies belonging to many faunal groups in the Eungella region. Perhaps the most famous endemic bird in the region, the Eungella Honeyeater (*Bolemoreus hindwoodi*) was only recognised as a distinct species in 1983, when it was split from the closely related Bridled Honeyeater (*B. frenatus*) of the Wet Tropics (Longmore & Boles, 1983). Similarly, Boles & Longmore (1983) described a novel subspecies in the White-throated Treecreeper complex, *Cormobates leucophaea intermedia*, that is restricted to the Clarke and Connors Ranges. Additionally, there are endemic frog, reptile and invertebrate species

that occur in the region (see other contributions in this volume). The unique biodiversity of the Eungella region, like that of many other mountain refugia on the east coast of Australia, is seriously threatened by ongoing climatic change (Williams *et al.*, 2003). Ongoing warming in the study region is predicted to lead to average mean temperatures 0.4 to 1.3°C above the climate of 1986–2005 by 2030 (CSIRO and Bureau of Meteorology, 2015). By late in the century (2090), under a high-emissions scenario, the average increase in mean temperatures could be 2.5 to 5.0°C (CSIRO and Bureau of Meteorology, 2015). For the Eungella Honeyeater, as well as species currently at the northern limit of their distributions (e.g. Regent Bowerbird), warming of this magnitude is almost certain to lead to local extinction (Anderson, 2011; Leach, 2017). It is imperative that we gain a better understanding of the distributions, elevational preferences and environmental tolerances of Australian birds if we are to predict and manage the impacts of climate change on their populations effectively.

LITERATURE CITED

- Anderson, A. (2011). *Influences of the past, present and future climate on the structure and diversity of rainforest bird assemblages in north-eastern Australia*. Ph.D. thesis, James Cook University.
- Ashton, L. A., Leach, E. C., Odell, E. H. & Kitching, R. L. (this volume). The Eungella biodiversity study: filling the knowledge gap. *Proceedings of the Royal Society of Queensland* **125**.
- Boles, W. & Longmore, N. (1983). A new subspecies of tree-creeper in the *Climacteris leucophaea* superspecies. *Emu* **83**, 274–275.
- Bryant, L. & Krosch, M. (2016). Lines in the land: a review of evidence for eastern Australia's major biogeographical barriers to closed forest taxa. *Biological Journal of the Linnean Society* **119**, 238–264.
- Crouther, M. & Crouther, K. (1999). Quail that go bump in the night. *Corella* **23**, 43–47.
- Crouther, M. (2010). *Birds of Eungella* [Online]. Available: www.eungella.info/birds.htm [Accessed March 2018].
- CSIRO & Bureau of Meteorology (2016). *Climate change in Australia* [Online]. Available: www.climatechangeinaustralia.gov.au [Accessed April 2018].
- Gill, F. & Donsker, D. (Eds). (2019). *IOC World Bird List (v9.1)*. doi: 10.14344/IOC.ML.9.1.
- Jones, D. & Goth, A. (2008). *Mound-builders*. Collingwood, Victoria: CSIRO Publishing.
- Leach, E. (2016). Notes on the *Zoothera* thrushes in the Tweed Range of north-eastern New South Wales. *Australian Field Ornithology* **33**, 240–243.
- Leach, E. C. (2017). *Monitoring the effects of climate change on the rainforest birds of eastern Australia*. Ph.D. thesis, Griffith University.
- Leach, E. C., Burwell, C., Ashton, L. A., Jones, D. & Kitching, R. L. (2016). Comparison of point counts and automated acoustic monitoring: detecting birds in a rainforest biodiversity survey. *Emu* **116**, 305–309.
- Longmore, N. & Boles, W. (1983). Description and systematics of the Eungella Honeyeater *Meliphaga hindwoodi*. A new species of honeyeater from Central Eastern Queensland, Australia. *Emu* **83**, 59–65.
- McAllan & Bruce (1989). *The Birds of New South Wales: a Working List*. Biocon Research Group, Turrumurra, New South Wales.
- Menkhorst, P., Rogers, D., Clarke, R., Davies, J., Marsack, M. & Franklin, K. (2017). *The Australian Bird Guide*, CSIRO Publishing, Collingwood, Victoria.
- Moon, R. & Moon, V. (2002). *Discover Australia: National Parks*, Hema Maps, Brisbane, Queensland.

- Schodde, R. & Mason, I. (1997). Aves (Columbidae to Coraciidae). *In*: (K. Houston & A. Wells, eds). *Zoological Catalogue of Australia*, vol. 37.2. Melbourne, Victoria: CSIRO Publishing.
- Shoo, L., Williams, S. & Hero, J.-M. (2005). Climate warming and the rainforest birds of the Australian Wet Tropics: using abundance data as a sensitive predictor of change in total population size. *Biological Conservation* **125**, 335–343.
- Simpson, K. & Day, N. (2004). *Field guide to the birds of Australia*, 7th Edition, Penguin, Camberwell, Victoria.
- Sraml, M., Christidis, L., Easteal, S., Horn, P. & Collet, C. (1996). Molecular relationships within Australasian waterfowl (Anseriformes). *Australian Journal of Zoology* **44**, 47–58.
- Weber, L., VanDerWal, J., Schmidt, S., McDonald, W. & Shoo, L. (2014). Patterns of rain forest plant endemism in subtropical Australia relate to stable mesic refugia and species dispersal limitations. *Journal of Biogeography* **41**, 222–238.
- Williams, S. E., Bolitho, E. E. & Fox, S. (2003). Climate change in Australian tropical rainforests: an impending environmental catastrophe. *Proceedings of the Royal Society of London B: Biological Sciences* **270**, 1887–1892.