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BIRDS OF THE CUMBERLAND PLAIN:



Past distributions, present studies and the outlook for their future

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Birds of the Cumberland Plain – What was there? What have we lost?

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Many dry woodland bird species, which were once common in the shale areas of Sydney, are now absent or declining. The declining species are generally found at only a few sites in the Cumberland Plain of western Sydney. Several papers have reported the changes that have occurred over the past 50 years (e.g. Keast 1995; Egan *et al.* 1997; Farrell *et al.* 2015). This group of species is also found on the western slopes of NSW and is declining over much of their range. Many of them are also threatened species listed for NSW under the TSC Act.

The lost species include Black-eared Cuckoo *Chalcites osculans*, Southern Whiteface *Aphelocephala leucopsis*, Hooded Robin *Melanodryas cucullata* and Diamond Firetail *Stagonopleura guttata*. The declining species include Turquoise Parrot *Neophema pulchella*, Brown Treecreeper *Climacteris picumnus*, Speckled Warbler *Chthonicola sagittata*, Black-chinned Honeyeater *Meliphreptus gularis*, Jacky Winter *Microeca fascinans*, Red-capped Robin *Petroica goodenovii* and Zebra Finch *Taeniopygia guttata*, with another 20 other woodland bird species identified as also declining in the area.

There has been much speculation about the causes for these losses and declines, but the trends were well underway before likely causes could be studied. Suggested causes include habitat loss, fragmentation and degradation, invasion of weeds and feral animals, trapping and changed management within reserves. Some native species i.e. Noisy Miner *Manorina melanocephala* and Pied Currawong *Strepera graculina* have also been implicated as impacting on several small bird species and their abundance and distribution have changed during the past 50 years. It is interesting to note that many of the lost and declining species are also ground foragers. And it may be that this foraging mode makes them more vulnerable to changing habitat conditions.

The Cumberland County Bird Database, managed by CBOC Inc., reveals that there have been extensive surveys of areas where these species are or were recorded in western Sydney. The paucity of records suggests that some of these species have probably been lost for good and that further declines can be expected. We need to examine the threatening processes that occur throughout the range of these species and apply adaptive management strategies to the remnant populations and their habitats within the Cumberland Plain of western Sydney.

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Is woodland reconstruction bringing back the birds?

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Southeastern Australia's grassy woodland ecosystems support a unique and diverse flora and fauna, however millions of hectares of these ecosystems have been cleared, including more than 90% of Cumberland Plain Woodland in western Sydney. To restore some of this woodland, a thousand hectares were planted with locally native trees and shrubs between 1992 and 2002. The aims of our study are to: (a) compare the bird communities in revegetated woodland with those in remnant woodland and untreated pasture; and (b) examine which factors influence any differences, including age of plantings, vegetation structure, patch size and connectivity, invasive species, remnant trees, grazing and fire.

We surveyed sites in each of 35 patches, comprising 25 revegetated patches (10-21 years old), five remnant patches, and five pasture patches. Two independent observers visited the sites three times each in spring/summer of 2013, and again in winter of 2014. On each visit, one point count survey (centred on a 20 x 20 m vegetation quadrat) was conducted per site for 20-min within 3.5 hours of sunrise.

A total of 107 species was recorded in the surveys. The avian communities of revegetated and remnant woodland both differed from those in untreated pastures. There were also some differences between revegetated and remnant woodlands.

The results suggest that within 20 years of establishment, plantings of native flora help to restore some of the avifauna characteristic of remnant woodlands. Our findings on how the composition varies with stand and site attributes should help to improve the outcomes of restoration projects.

Factors influencing bird species diversity in Blacktown's bushland reserves

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In 2012-13 we surveyed the fauna and flora of seven bushland reserves in Blacktown Local Government Area for Blacktown City Council. Survey areas varied from 1-10 ha. Most reserves had a depauperate bird fauna dominated by medium to large-sized birds, especially Noisy Miner, Rainbow Lorikeet, Galah, Eastern Rosella, Australian Magpie, Grey Butcherbird, Pied Currawong, Australian Raven, Magpie-lark and the introduced Spotted Turtledove and Common Myna. Many once common breeding species of the Doonside woodlands (Allan Keast's records, 1930-60), mostly small passerines, were not recorded: Painted Button-quail, Pallid Cuckoo, Southern Boobook, Brown Treecreeper, White-throated Treecreeper, Yellow-rumped Thornbill, Striated Thornbill, Brown Thornbill, Southern Whiteface, Speckled Warbler, Jacky Winter, Red-capped Robin, Diamond Firetail and Zebra Finch. On the other hand, many native species recorded in at least three of the seven reserves in 2012-13, most of them larger non-passerine birds, were not recorded in 1930-60, including four of the dominant species listed above (marked by asterisks) plus Crested Pigeon, Brown Goshawk, Sulphur-Crested Cockatoo, Little and Long-billed Corellas, Australian King-Parrot, Musk Lorikeet, Eastern Koel, Red Wattlebird, Yellow-faced Honeyeater and Welcome Swallow.

Two reserves stood out as having a much richer bird fauna than the others: Cudgong Reserve and northern Nurragingy Reserve (55-57 native terrestrial species recorded, versus 17-22 species in the other reserves). Native birds recorded in both reserves but not in any other reserve, most of them small passerines, were: Fan-tailed Cuckoo, Shining Bronze-Cuckoo, Sacred Kingfisher, Superb Fairy-wren, Yellow Thornbill, White-throated Gerygone, Weebill, Striated Pardalote, White-plumed Honeyeater, Grey Shrike-thrush, Crested Shrike-tit, Golden Whistler, Rufous Whistler, Olive-backed Oriole, Dusky Woodswallow, Grey Fantail, Willie Wagtail, Eastern Yellow Robin, Rose Robin, Silvereye and Red-browed Finch. These two reserves also had the richest frog and reptile fauna of the seven reserves, the richest native mammal fauna, and the richest native flora. Their diversity of native fauna and flora would appear to be a result of the relatively large amount of bushland in the surrounding landscape (173-264 ha of bushland within 2 km, versus 27-67 ha for the other five reserves). Sympathetic management of the reserves themselves will be important to preserve their biodiversity, but it will not be sufficient. Protection and management of bushland in the surrounding area, and provision of effective corridors linking bushland remnants, will be critical. Cudgong Reserve is located within the North West Growth Centre and the surrounding bushland is now being cleared for housing. At only 3.9 ha, Cudgong Reserve will continue to provide valuable habitat for some native fauna species such as the endangered Cumberland Land Snail, but is too small to preserve its current rich biodiversity without the surrounding bushland. Unless

connected to other bushland remnants, its bird fauna can be expected to collapse to the depauperate condition of other small, isolated bushland reserves in Blacktown. The bird diversity of Cudgong Reserve and northern Nurragingy Reserve is further threatened by the recent establishment of colonies of aggressive Bell Miners in both reserves.

Results, vegetation trends and outside influences on a long-term banding project at the Australian Botanic Garden, Mount Annan

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A long-term banding project was commenced in June 1986 on the then proposed site for the Mount Annan Native Botanic Garden, now the Australian Botanic Garden, Mount Annan. This site is located on the south-eastern edge of the Cumberland Plain near Campbelltown. The native vegetation is Cumberland Plain Woodland and listed as endangered ecological community under the Threatened Species Conservation Act 1995 as of June 2002. It is listed as Shale Hill Woodland and consists of Grey Box *Eucalyptus moluccana*, Forest Red Gum *E. tereticornis* and Narrow-leaf Ironbark *E. crebra* with an understorey of *Bursaria spinosa* and *Acacia implexa*. (Tozer 2003). As a result of the 200 years of agricultural activities numerous exotics and agricultural weed species occur throughout the site, especially African Olive *Olea europaea* subsp. *cuspidata*. The specific aims of the study were to examine trends in the species populations over time, to determine the status of species along with any trends in decline or increase of species, site fidelity and movements both within the gardens and away from the site. Over the 30 years period of the study 13 226 birds of 86 species were banded, with 2905 (22.0%) being retrapped 5527 times. Three hundred and eighty nine banding visits were undertaken with 2180 hours of mist netting being carried out. The mean capture rate was 7.71, with a range of 3.47 to 14.06 birds/100m net/hour over all banding visits. Major physical changes have occurred within the gardens over the period of the study and there has been very significant residential and industrial development around the gardens. Numbers of typical Cumberland Plain species have declined, these include the Weebill *Smicromis brevirostris*, Brown Gerygone *Gerygone mounki*, Yellow Thornbill *Acanthiza nana*, Yellow-rumped Thornbill *Acanthiza chrysorrhoa*, White-winged Triller *Lalage sueurii*, Eastern Yellow Robin *Eopsaltria australis*, Silvereye *Zosterops lateralis* and Double-barred Finch *Taeniopygia bichenovii*. Other small species demonstrate a much stronger ability to survive in the modified habitats at the Australian Botanic Gardens Mount Annan. Long-term continuous banding studies provide a valuable base line for the future monitoring of avian species within the Cumberland Plain.

The recent psyllid outbreak and its effect on the Cumberland Plain Woodlands bird community

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The Cumberland Plain Woodlands (CPW) is a critically endangered ecological community. It spans across Western Sydney from Kurrajong in the north to Picton in the south and from Ryde in the east to Penrith in the west. Only 6% of the original 125,000 hectares of woodlands remain, mostly as fragmented pockets. These fragments are threatened by urbanisation, livestock grazing and species such as the Noisy Miner, Common Myna

and foxes. A common tree species in the CPW is the Grey Box Eucalypt (*Eucalyptus molucana*), however a recent psyllid outbreak between Blacktown, Windsor and Bringelly has impacted tree health significantly. Psyllids are small (<5mm) insects from the *Psyllidae* family, whose young are covered by a protective 'lerp' while they develop on Eucalypt leaves. The Australian native lace lerp species responsible for the decline in tree health is from the genus *Cardiaspina* (*Hemiptera, Psyllidae*) and feeds specifically on Grey Box Eucalypts. This is of importance as the CPW's complex and already threatened bird community depends on the vegetation to survive.

A study was conducted in 2013 for the Honours research project titled 'Bird-psyllid interactions in the Cumberland Plain Woodlands' at Western Sydney University. It aimed to assess and monitor the extent and impact of the damage that these invertebrates were having on bird communities across the CPW, through the defoliation that they cause. Although it is believed that there is a direct predator-prey relationship between some avian and psyllid species, a random 40°C day at the commencement of the study is thought to have caused a severe decline in *Cardiaspina* numbers. Therefore, focus was on the indirect effects, if any, of psyllid-caused defoliation on bird communities. Nine sites with various vegetation densities were surveyed across the CPW, including Nurragingy Reserve, Windsor Downs Nature Reserve, Claremont Meadows, Plumpton Park, Bligh Park, Peppermint Reserve, Mount Annan Botanic Gardens, Rossmore Park and Craik Park. Monthly at each site, tree health and canopy cover were measured to assess psyllid damage; *E. moluccana* leaves were harvested and sticky traps were installed to measure *Cardiaspina* abundance; and point-count bird surveys were performed.

Results showed that well-structured sites have the highest bird abundance and the greatest species diversity. Site location, psyllid stage, psyllid abundance, tree health, *E. moluccana* density, date, temperature and total monthly rainfall may be contributing to the state of CPW bird communities, but they are not exclusively influencing abundances of bird niches. That is to say that bird communities are not easily predicated by the conditions that were measured. Psyllid abundance throughout the duration of the study were highest at the relatively recently infested sites (Rossmore Park and Craik Park), suggesting that psyllid abundance is dependent on canopy cover leaf resource availability. Despite a decline in psyllid numbers at a given site though, they do not need to be actively present for the lasting defoliation to impact bird communities. As this is such a complex system of cause-and-effect relationships, there is ample room for further study of bird-psyllid interactions in the CPW. Faecal analysis of bird species potentially consuming *Cardiaspina* would be a worthwhile pursuit.

Bell Miners and their impact

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The Bell Miner, *Manorina melanophrys*, is thought to be the most aggressive species of the *Manorina* genus. The social organisation of this species is complex, involving a coterie, a group of individuals containing one or more breeding pairs and helpers and a colony comprising of 20 to 200 individuals that populate and defend an area intra and inter specifically from avian intruders. Coterie generally interact only to defend the territory from a predator. These colonies inhabit wet and dry

sclerophyll forest along the east coast of Australia from Gympie, Queensland to Melbourne, Victoria. Although the boundaries of a coterie can shift, Bell Miner colonies may occupy an area for a long period of time. Recently, we discovered that colonies have distant boundaries where other avian species can occupy the area that Bell Miners are not inhabiting. We also found preliminary evidence that suggests this species is influencing the insect canopy assemblage. Overall insect abundance was higher in areas where Bell Miners were found and herbivores (*Lygaeidae*) were associated with colonies, whereas, predatory insects (*Staphylinidae*) were not associated with colonies. Interestingly, no psyllids were present in any tree sampled. Bell Miners also choose to nest in the dense understorey, regardless of the plant species, including exotics like *Lantana camara*. No preference for plant species was identified and colonies were found to relocate after *Lantana* removal but only at one site near Kyogle, NSW. In other sites, *Lantana* was removed but native rainforest species grew in its place forming a thick understorey suitable for nesting. All of my results in association with other studies on dieback suggest that each site is different in terms of stressors and Bell Miners are merely a symptom and not the primary cause.

Current surveys of avian communities across the N-W sector of the Cumberland Plain

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Published records by a number of authors have documented the decline of species diversity over the last 70 years as urbanization spread across the Cumberland Plain. With great swaths of land around Penrith, Kellyville, Rouse Hill and near Riverstone currently being turned into massive housing developments continued impact on the remaining nature bushland is inevitable. The aim of our research was to set up six monitoring sites across the N-W sector of the Cumberland Plain to document the bird communities present and then to monitor any changes over time.

Our data show that the insectivores Superb Fairy-wrens, Yellow Robins and one or both Whistlers plus the granivore Red-browed Finches were the mainstays of all communities surveyed. But there is considerable variation in the composition of the community at each of the sites particularly in the number of different honeyeaters present and their respective percentage composition of the total resident community.

At Agnes Banks Nature Reserve the three most numerous honeyeaters (Eastern Spinebill, White-cheeked and White-eared Honeyeaters) made up 30% of the resident community. In 2012-13 with the addition of the Brown-headed and New Holland Honeyeaters, this was increased to 60%. The Fuscous Honeyeater was the most prevalent honeyeater at Nurragingy Reserve in 2001-2002 (18%) but declined in 2013-2014 (6%) when Bell Miners appeared. Wianamatta Nature Reserve features four species of honeyeater (New Holland, White-cheeked and White-eared honeyeaters and Eastern Spinebill) which combined registered 49% of the community. No resident honeyeaters were recorded at Prospect Nature Reserve except for a small number of Noisy Miners. The most dominant honeyeater at Windsor Downs was the Fuscous with small numbers of Scarlett and Brown-headed honeyeaters and Eastern Spinebill. These totalled 27% of the community. At Scheville National Park honeyeaters

have been severely reduced in numbers with the increase prevalence of the Bell Miner which now represents 45% of the community.

No movements have been recorded from one of our sites to any of the others implying that these communities are somewhat insular.

What changes are occurring in bird communities across the Sydney region?

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As cities grow and expand, the urban environment replaces and modifies a large proportion of the natural habitat. This habitat loss is resulting in some of the highest rates of local extinction of a range of native fauna, including local extinctions in bird assemblages. Cities in Australia have a comparatively shorter history than many of those in Europe and the USA (where the majority of urban bird research has been conducted) and therefore, the colonisation of birds may also be at an early stage.

By comparing the pre-1900 bird community determined from the ornithological databases of the Australian Museum and Museum Victoria, with the bird community of 1998–99 determined from BirdLife Australia's Atlas database, we can look at these changes in the bird community of Sydney since European settlement. The major difference in the bird community between the two periods was a shift in body size, with large species comprising a greater proportion of the recent bird community than small birds. The source of this difference was a result of both a relative decline in the small species within bird groupings (e.g. small insectivores) and to a relative increase in groupings dominated by larger species (e.g. parrots and vertebrate feeders). The bird community of Sydney has undergone a dramatic change since European settlement.

Change in these bird communities is, of course, ongoing. BirdLife Australia's State of Australia's Birds Report has recently looked at trends in bird guilds across a range of regions in Australia from 1999-2013. It shows that along the East Coast of Australia most of guilds examined show a decrease in their reporting indices – this even includes hollow-nesters like Galahs and Laughing Kookaburras, and common species like Crested Pigeons and Willie Wagtails. Recent analysis of surveys from Sydney reinforces these trends with Australian Magpies, Spotted Doves and Pied Currawongs amongst species showing a decline in reporting rates whilst Rainbow Lorikeets and Bell Miners show an increase and small species such as the Superb Fairy-wren and Eastern Spinebill showing no significant change.

With even common species showing declines in Sydney and urban sprawl ongoing, the use of these long-term monitoring databases is essential.

The outlook for bush bird species on the Cumberland Plain

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This presentation considers the factors driving bush bird declines in the Cumberland Plain, likely short-term projections and the opportunities for improving this outlook.

The *State of Australian Birds* confirms a decline in diversity and abundance of East Coast birdlife between 1999 and 2015 (Birdlife Australia 2015). ABBS records for the Cumberland Plain (1968-2012) show even stronger declines in woodland specialists; the Cumberland Plain is losing its *uniqueness* faster than its *diversity*. A major driver of declines is habitat loss. Approx. 91% of the Cumberland Plain Woodlands (CPW) have been cleared (Tozer 2003). The outlook is not promising with over 70% of the remaining woodlands approved for future offset-based clearing. Extrapolating recent performance (OEH 2015) suggests a continuing loss of 300 ha CPW/year and offset protection of 60 ha CPW/year (plus other vegetation). On that basis CPW clearing will largely conclude within 25 years with 3,000 ha remaining (protected) - a loss of 66% on current extent. Whilst 91% of Western Sydney residents support regulatory protection (OEH 2012) government does not (IBLRP 2014) and the \$3.2 Billion sale value of the remaining woodlands precludes us 'offsetting' a significant conservation future (LPI data 2015).

Urbanisation may pose an even greater threat than clearing. Most CPW remnants are smaller than 3 ha (Tozer *et al.* 2006), at which scale avifauna composition is strongly influenced by landscape context (Hodgson 2005). CPW remnants in rural Cobbitty still support Speckled Warbler, Peaceful Dove, and Jacky Winter while these species are absent from equivalent urban remnants (ALA 2015).

Whilst major improvements to this outlook require policy change there are other opportunities for significant improvement. Protection of habitat corridors should move from thin riparian corridors (undevelopable land) to wide woodland corridors between major remnants. This may be particularly important for East-West altitudinal migrants (Scarlet Robin). Shifting conservation focus from habitat loss to rural landscape preservation may benefit woodland birds. Mulgoa, Cobbitty and the Razorback Range are the last rural landscapes not dedicated to a development future.

Local support for conservation is strong (OEH 2012), but there are few regional-scale engagement programs. Education and engagement facilities similar to those in the UK/US would benefit the long-term outlook for bush birds. Lastly, predator-proof reserves have restored avian populations in other urbanised woodlands (e.g. Mulligans Flat, ACT), assisting both remnant and reintroduced species. The 550 ha Shanes' Park property provides an ideal opportunity for such 'rewilding'.

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