AOC Conference 2017

List of Abstracts

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Plenary Talks

Author	Institution	Email address	Title
Burbidge, Allan H.	Depart. of Biodiversity, Conservation and Attractions	allan.burbidge@dbca.wa.gov.au	Conservation and management of threatened birds

Many threatened birds are under increasing levels of threat, and there are varied issues around conservation management for such species, ranging from social, economic and political issues through to the use of emerging technologies and, of course, the biology and ecology of rare species. I will illustrate the use of some emerging (and re-emerging) technologies such as the use of acoustic monitoring to survey or monitor rare and difficult to detect species, by reference to work on threatened birds in Western Australia. In the long term, however, human related factors seem much more critical in influencing success of recovery efforts.

Kleindorfer, Sonia	Flinders University	sonia.kleindorfer@flinders.edu.au	Female behaviour drives culture and evolution in songbirds

Many female songbirds produce complex song across the year and some female songbirds vocalise while inside the nest. How and why females vocalise is largely unknown. Here, I consider in-nest incubation calling and vocal learning in the Superb Fairy-wren (*Malurus cyaneus*) and Darwin's tree finch (*Camarhynchus spp*.). In the fairy-wren system, females vocally tutor their embryos with calls and their fledglings with song. In both cases, sons and daughters learned the unique vocal elements of the mother. The functions of female vocal tutoring remain to be explored, including its potential to create female cultural lineages based on vocal similarity. In the Darwin's finch system, females also called to their eggs but only one female produced complex song as an adult. Female mate choice in the Darwin's finch system was discerning and resulted in species-specific patterns of assortative pairing for population genetic assignment. In conclusion, the breadth and context of female vocalisation behaviour is just beginning to be explored but appears to involve vocal teaching and learning that may have cultural and evolutionary outcomes.

Legge, Sarah	University of Queensland, The Australian National University, NESP Threatened Species Recovery Hub	Sarah.Legge@anu.edu.au	The threat posed by cats to Australian birds

We estimated and mapped the number of birds killed by cats annually in Australia, by combining a spatial model of feral cat density with a comprehensive survey of cat diet studies. Feral cats killed birds at highest rates on islands, in arid Australia and in highly modified environments. The average feral cat in natural environments kills 129 birds/year; and on average feral cats kill 35.6 birds/km2/year, with total predation across Australia by feral cats of 272 million birds annually (95% CI 169-508 million). Adding tallies from pet cats and feral cats in highly modified environments, more than 1 million Australian birds per day (377 million birds per year) are killed by cats, with >99% being native birds. Feral cats have a higher proportion of birds in their diet than foxes and dingoes. From many sources, we collated records of over 350 Australian bird species (including over 70 threatened species listed under the EPBC Act) killed by cats. A bird is more likely to be preyed upon by a cat if it occurs on islands, feeds and nests on the ground and weighs 60-300 g. We conclude that cats are a major threat to many Australian bird species.

Roulin, Alexandre	University of Lausanne	Alexandre.Roulin@unil.ch	The barn owl: a predator that metamorphoses from a hawk into a dove

The barn owl is a fascinating bird that I am studying for more than 25 years. It is cosmopolitan, its plumage varies in coloration and this bird shows remarkable behaviour including cooperation between young siblings. In this talk I will highlight some key results our research group obtained on the study of (1) colour polymorphism, (2) reproductive behaviour and (3) social interactions between family members. This will be an opportunity to show that birds are not so different from human beings and can inspire us. To prove this statement I will present a project in the Middle East where we use wild barn owls to bring Israeli, Jordanians and Palestinians at the same table.

Steeves, Tammy	University of Canterbury	tammy.steeves@canterbury.ac.nz	Conservation genomics of threatened austral birds: innovating the implementation

For recovery programmes of threatened species, one of the most common questions asked by conservation scientists and practitioners across Australasia is: How can we manage captive and wild populations to ensure threatened species have sufficient genetic diversity to adapt to environmental change? Recent advancements in high-throughput sequencing technologies (HTS) promise to fundamentally change the way conservation geneticists characterise genetic diversity, from measuring genome-wide diversity based on tens of thousands of single nucleotide polymorphisms to detecting regions of the genome underlying phenotypic variation linked to fitness (i.e., adaptive variation). However, depsite having been available for well over a decade, a limited number of publications have applied HTS technologies to austral bird conservation. In this talk, I will discuss how forging cross-sector relationships with primary industry scientists is expediting my research group's transition from genetic to genomic technologies and enabling mutually-beneficial scientific advances in both sectors. I will also reflect on the role of kindness in building and maintaining these relationships, and pose the question: *Will embedding kindness lead to better conservation outcomes for threatened austral birds?*

Standard Length Talks

Authors (Presenting author in bold)	Institution	Email address	Title
Aulsebrook, Anne E.; Raoul A. Mulder; Therésa M. Jones; John A. Lesku	University of Melbourne	aulsebrooka@student.unimelb.edu.au	Illuminating black swan activity patterns

Over the past 140 years, electric lights have completely transformed our night environment. Exposure to light at night can disrupt day-night rhythms and shift the timing of animal behaviour. However, few studies have investigated the causes and consequences of these behavioural changes. For my PhD, I am researching the effects of anthropogenic light on urban black swans (*Cygnus atratus*). Every year, wild swans build nests at Albert Park Lake (Melbourne) and exposure to anthropogenic light at night varies among nest sites. Swan pairs also take turns incubating their eggs, with males often incubating during the day. To record swan behaviour during incubation, I fitted wild swans with miniature activity loggers and temperature loggers. I also recorded light intensity at swan nests and other locations around the lake. If anthropogenic light affects the daily timing of swan behaviour, there could be sex-specific costs, as well as implications for breeding success.

Baker, Lynn M.	NSW Office of Environment and Heritage	lynn.baker@environment.nsw.gov.au	Conservation detection dogs as an emerging technology for survey, monitoring and management of rare and difficult to detect bird species

Detection dogs are increasingly being used in threatened species programs across Australia and internationally. Two NSW Saving our Species (SoS) programs, the northern population of the endangered eastern bristlebird and the endangered coastal emu population in NE NSW, are utilising the expertise of a trained detection dog and handler team. The use of detection dogs is not a 'one size fits all'. They are a valuable tool to address certain survey, monitoring and management issues; however, their use is not necessarily appropriate for all programs. The efficacy of the use of detection dogs does depend on selection of an appropriate dog and the training and handling expertise of the detection dog team. Detection dogs can be focussed towards detecting threatened species and/or detecting threats such as feral pests and weeds. The presentation will provide a brief overview on the use of conservation detection dogs and the decision process used to determine whether to use a detection dog. The value of a conservation detection dog as a survey and monitoring technique for the SOS eastern bristlebird and coastal emu programs will be discussed. Incorporating a detection dog into the eastern bristlebird program was awarded an OEH innovation Excellence Award in 2015.

Balasubramaniam, Shandiya	Museums Victoria	sbalasubramaniam@museum.vic.gov.au	Non-psittacine reservoirs of beak and feather disease virus

Psittacine beak and feather disease, caused by infection with beak and feather disease virus (BFDV), is the most common and highly infectious viral disease among Psittaciformes (parrots and cockatoos). This disease is characterised by severe feather and beak deformities and is recognised as a key threatening process to many endangered Australian parrot species. While BFDV is known to be widespread in Australian psittacines, there is emerging evidence of unexpectedly high prevalence of the virus in non-psittacines. I present preliminary results from a study that aims to systematically screen non-psittacine tissues from museum collections for BFDV. By identifying the range of avian species potentially acting as reservoirs of BFDV in the wild, we may be better able to model the transmission dynamics of psittacine beak and feather disease and predict outbreaks in species of conservation interest.

Beckmann, Christa; Sonia M. Kleindorfer,	University of New England, Deakin University	cbeckman@une.edu.au	A review of in-nest vocalization behaviour in songbirds

In systems with immature offspring that require parental care, one would expect to observe adaptive parental behaviour that enhances offspring survival. Given that nest predation is the biggest cause of nesting failure in passerine birds, it is somewhat surprising that songbirds are increasingly reported to vocalise when in the nest (i.e. call to eggs or sing while in the nest), as this behaviour can attract predators and increase predation risk. Indeed, research has shown that nestling begging calls, adult incubation calls and adult female song in the nest increases the risk of nest predation. To quantify the ubiquitousness of this curious behaviour, we investigated the prevalence of in-nest vocalization behavior among adult songbirds of North America, Australia and New Zealand via a literature review. Using exacting criteria, we scored scored 233 (35%) species (representing 56 of 70 (80%) songbird families examined) for the presence of these vocalizations. This includes parent-to-parent and parent-to-offspring vocalizations. Our results are like to greatly underestimate the prevalence of this behaviour. In conclusion, we predict that the benefits of in-nest vocalization behavior by attending adults must be great, though as yet, they are largely unstudied.

Beggs, Richard	Fenner School of Environment & Society, Australian National University	richard.beggs@anu.edu.au	Native to nemesis: an environmental history of the noisy miner

"1878: “gallant little birds” (Wagga Wagga Advertiser)
1915: “the carol of the magpie is eclipsed by the song of the miner” (Emu)
2004: “the mafia of the bird world” (ABCRN)
2015: “I hate those f***ing things” (RedditAustralia)

The public image of the noisy miner has taken a severe beating in recent decades on account of its violent tendencies towards smaller woodland birds, many of them of conservation concern. Yet it is the loss, fragmentation and degradation of native habitat caused by another invasive species that has fostered the success of the noisy miner and the demise of small woodland birds. Nonetheless, the Department of the Environment issued a fatwa against noisy miners in 2014, opening the way for culling as a management response. In anticipation of a jihad against the species, there was jubilation amongst ecologists, and bird lovers celebrated, eager for that perfect experience of diversity and abundance during their Sunday outings before sitting down to their dinner of roast bird. This study presents an environmental history of the noisy miner, tracing the changes in cultural attitudes towards the species since European settlement and linking those to the extreme habitat modification that has occurred in eastern Australia since 1788. "

Bennett, Andrew T. D.; Reece Pedler; John McEvoy; Raoul Ribot	Deakin University	andy.bennett@deakin.edu.au	How do nomadic waterbirds find water in the desert?

In contrast to the predictable, seasonal migrations of birds in Europe and America, nomadic waterbirds in Australia travel to ephemeral waterbodies which are highly unpredictable in space and time. If the resources are sufficiently rich, they then breed, sometimes continuously. Waterbodies can be separated from coastal refugia wetlands by hundreds of kilometres of inhospitable terrain. How do birds locate these remote inland waterbodies? This is an enduring mysteries of bird navigation with implications for understanding waterbird movement globally and how birds may respond to environmental change. We used 110 satellite tracked individuals of three species (black swans, black duck and banded stilts) complemented by thermal imaging, remote sensing and aerial surveys. We reveal much nocturnal flight in otherwise diurnal birds; a key role for facultative nocturnality; and flight throughout the night not just around dawn and dusk as predicted from earlier work on waterbirds. Birds returned to inland or coastal refugia before ephemeral wetlands dried out, but with differing survival risks. Several meteorological variables predicted timing of departures towards distant water. We provide new insights into the navigational capabilities of birds, and adaptations of nomadic waterbirds for finding desert water.

Benshemesh, Joe; Darren Southwell; Tim Burnard	Malleefowl Recovery Team, La Trobe University	jbenshemesh@bigpond.com	Using an adaptive management approach to learn how to effectively manage Malleefowl

Malleefowl *Leipoa ocellata* are unique ground-dwelling birds renowned for constructing incubator mounds. The species is widely distributed across southern Australia and threatened by introduced predators, habitat clearing, fragmentation, changed fire regimes and habitat degradation. A rigorous monitoring program has been implemented by citizen scientists since the early 1990s to track Malleefowl trends. An on-line database facilitates all aspects of the monitoring effort. This program is currently being revamped within an adaptive management (AM) framework so that monitoring informs future management decisions. The AM framework has both passive and active components. In the passive AM component, citizen scientists will continue to collect data at over 100 sites across the continent to learn about which environmental factors and management actions are associated with changes in breeding populations. The active AM component will run simultaneously, but specifically aims to resolve uncertainty about the effectiveness of predator control for Malleefowl conservation. In this control-treatment experiment, additional monitoring sites are being established on a variety of land tenures with varying levels of predator control. We contend that AM provides a valuable approach to utilising the flow of monitoring data to learn how best to manage Malleefowl in light of multiple threats and a changing environment.

Justin R. Eastwood; Raoul F. H. Ribot; Lee Ann Rollins; Katherine L. Buchanan; Ken Walder; Andy T. D. Bennett; **Berg, Mathew L.**	Deakin University	mathew.berg@deakin.edu.au	Host genetic diversity is associated with viral infections in the crimson rosella (Platycercus elegans)

In many host-pathogen systems, host genetic diversity plays a major role in infection: greater heterozygosity may lower infection risk, as may genotype rarity if pathogens are co-adapted to common or local hosts. Few studies have investigated the relative importance of genotype rarity and heterozygosity in wild populations, or whether genetic differences within and between host populations cause different infection outcomes. Beak and feather disease virus (BFDV) is a common pathogen in Psittaciformes, and the source of considerable conservation concern. Over eight years, we studied natural infection by BFDV in the phenotypically variable crimson rosella (*Platycercus elegans*) subspecies complex. Prevalence and load of BFDV infection differed dramatically between subspecies. Inferring heterozygosity and genotype rarity of individual hosts from microsatellite markers, we show that heterozygosity was negatively associated with probability of infection, while rarer genotypes were associated with lower viral load in infected individuals. Age was also a strong predictor of infection, but viral phylogeny, geographic location, intraspecific host density, and parrot community diversity and composition, did not explain the differences in BFDV prevalence or load between subpopulations. Our study provides insight into the roles host genetic diversity can play in infection dynamics, and the implications for population divergence and conservation.

Black, Andrew; Kerensa McElroy; Gaynor Dolman; Philippa Horton; Leo Joseph	Australian National Wildlife Collection, CSIRO	abblack@bigpond.com.au	Molecules and morphology reveal complex variation within the Copperback Quail-thrush *Cinclosoma clarum*

The Copperback Quail-thrush *Cinclosoma clarum* occurs west of the Flinders Ranges. Two subspecies are recognized (*C. c. clarum, C. c. fordianum*). We analysed morphological and molecular diversity (plumage: 92 males, 58 females; mitochondrial and nuclear DNA diversity, n = 62) in the species. Browner, extensively copper-backed *C. c. clarum* (both sexes) is restricted to Central Australia and the Great Victoria Desert; greyer *C. c. fordianum* (narrower chestnut dorsal band in males; faint or no band in females) occurs in subhumid south-western WA and extends subcoastally south of the Nullarbor Plain into south-western SA. Populations west of the former's and north of the latter's range are highly diverse, some birds resembling either subspecies and others variably intermediate; there is no suggestion that their diversity is clinal. Eyre Peninsula populations, which DNA aligns with *C. c. clarum*, consistently show reduced dorsal copper and can thus deceptively resemble *C. castanotum*. Their taxonomic status is of interest. The mitochondrial genome of nominotypical clarum is shared with the Eyre Peninsula population and we consider whether that genome has introgressed south and west into the range of *C. c. fordianum* and its intergrades with nominotypical clarum.

Bradshaw, Michelle; Sandy Taylor	New Zealand National Bird Banding Scheme, Department of Conservation	michellebradshaw143@gmail.com	Bird banding: outdated, or in vogue?

New technologies complement but do not replace the ancient method of attaching unique numbered bands to birds. Bird banding is still regarded as an essential research tool for ornithologists, whether studying threatened, pest, or gamebird species. Banding and resight data contribute to estimating population size and trends, survival and recruitment rates, species distributions and migration, and comparing temporal and spatial trends. Such knowledge is fundamental to assigning IUCN threat categories and making sound conservation management and policy decisions when managing threatened birds. The long-term datasets held by national banding schemes represent a vastly under-utilised resource for threatened species management. However, the use of such data is often hampered because the data is not standardised nor accessible; this will be demonstrated through case studies. The New Zealand National Bird Banding Scheme is embarking on a new banding database with an online interface concept for data entry and interrogation that will enable a wider use of banding data while also facilitating citizen science contributions. Engaging with stakeholders, in particular the users of banding data, will inform decisions regarding the inclusion of data sharing moratoria, ancillary data (such as nesting success, disease screening, condition indices) and criteria for data collection and error-checking.

Gaynor Dolman; **Burbidge, Allan H.**	Department of Biodiversity, Conservation and Attractions	allan.burbidge@dbca.wa.gov.au	Evolution in fieldwrens (*Calamanthus*) - a new look at an old problem

Over the last century there has been ongoing controversy over the number of specific and sub-specific taxa within the fieldwrens (*Calamanthus sensu stricto*), with the number of species varying from one to four, and with up to 12 subspecific taxa being recognised. New phylogenetic analyses of genome-wide data confirm that Striated and Rufous Fieldwrens are different at species level, but suggest that *C. montanellus* (Western Fieldwren of south-western Australia) is not a valid taxon, and should be included in *C. campestris*. In contrast, there is greater variation across the Eyrean barrier rather than within south-western WA, in a way parallel to that found in some other bird taxa, but our analysis indicates a more complex pattern of variation. In addition, the Dirk Hartog Island Rufous Fieldwren *Calamanthus campestris hartogi* is at least genetically distinct from nearby mainland populations of the species; analyses of song types and morphology are being conducted to provide more insight on the degree of difference between this population and mainland birds. Some other sub-specific taxa within both *campestris* and *fuliginosus* seem less distinct than previously supposed.

Callaghan, Corey T.; Richard. E. Major; John M. Martin; Richard T. Kingsford	UNSW Sydney	c.callaghan@unsw.edu.au	Citizen science adds ecological value in urban greenspaces

Urban greenspaces are intensively used for multiple purposes, including biodiversity conservation. Citizen science projects (i.e., The Atlas of Australian Birds, eBird) are increasingly used to collect biodiversity data to inform conservation management. eBird is a global citizen science project, providing a potential long-term avian monitoring tool, however the validity of the data at small-scales remains largely unresolved. We tested eBird's ability to provide comparable avian biodiversity estimates compared to formal surveys in an urban greenspace in Sydney. We found that eBird provided higher species richness and Shannon diversity indices than structured surveys, as a result of increased effort (i.e., time spent surveying, number of observers, and spatial coverage). We then assessed eBird data from 30 unique urban greenspaces in North America over six years, and found that in order to estimate 90% of species richness at a site, ~16.7 ± 2.3 (mean ± sd) eBird checklists were required. We (1) demonstrate that eBird provides comparable biodiversity estimates to structured surveys, (2) a surprisingly low number of eBird lists are required to fully sample an avian community in an urban greenspace, and (3) eBird data can be used to answer ecological questions at spatial and temporal scales previously unrecognized.

Camprasse, Elodie C. M.; Grace J Sutton; Maud Berlincourt; John P. Y. Arnould	Deakin University	ecampras@deakin.edu.au	Changing with the times: little penguins exhibit flexibility in foraging behaviour and low behavioural consistency

IIndividual consistency is commonly seen in wild populations, even in species considered generalists. It may have important consequences on ecological processes, for individuals and populations. Within seabirds, data on timescales over which consistency is maintained is lacking, despite its potential to determine how adaptable individuals and populations are. Little penguins were tracked at colonies in south-eastern Australia during 5 years, using GPS and dive recorders. We investigated the presence of behavioural consistency, its persistence through time and the influencial factors on behaviour and consistency. Individuals showed high plasticity, with foraging metrics influenced by site, year, stage/clutch. Low to moderate short-term consistency in foraging metrics was highlighted. Over longer timescales, no consistency was detected. Mass and morphology are known to influence foraging behaviour and consistency, but seemed not to affect behavioural consistency, which varied with year and site instead. This highlights the plasticity of animals foraging on prey highly spatially and temporally variable in their distribution. We emphasize the importance of taking timescale into account when assessing behavioural consistency. Finally, mechanisms other than behavioural consistency seem to allow little penguins to find mobile food in the water column (e.g. group foraging, switching from short to long trips at specific times).

Cappadonna, Jessica L.; David M. Watson; Margot Brereton; Paul Roe	Queensland University of Technology	j.cappadonna@qut.edu.au	Bristle Whistle Project: Investigating how to design citizen science to increase the impact of acoustic monitoring to find elusive Eastern bristlebirds

Although acoustic monitoring can be an invaluable tool for detecting secretive and rare species, large-scale analysis of environmental audio recordings presents many logistical challenges. Automatic recognition software has limited effectiveness and manual review of acoustic recordings is often required. While some projects have relied on citizen scientists to review acoustic recordings, participation was relatively low. We investigated how to design engaging citizen science with acoustics to look for endangered Eastern bristlebirds (*Dasyornis brachypterus*). The Eastern Bristlebird Recovery Team and members of the broader citizen science community were involved in inquiries to co-design engaging ways to analyse environmental recordings collected in likely bristlebird localities. Challenges to learning and accurately identifying vocalisations were revealed, including that calls of this species are poorly-known to even experienced birders. To enable learning of vocalisations, sustained engagement, and correct analysis of bird calls, designs must include example target vocalisations, online communication between peers, and a means to review discoveries made by peers. Such a project developed with human computer interaction design strategies will empower people to learn about unfamiliar species through acoustics and result in increased impact of acoustic monitoring efforts.

Carlile, Nicholas; Terence O'Dwyer; Lisa O'Neill; Dean Portelli; Ben Hope	Office of Environment and Heritage (NSW)	nicholas.carlile@environment.nsw.gov.au	The impacts of rodents on seabirds breeding on Lord Howe Island

"The Lord Howe Group is located in the South Pacific Ocean, 780 km north-east of Sydney and 1560 km north-west of Auckland. The main island (1455 ha) is approximately 12 km long by up to 2 km wide. Although 14 species of seabirds breed within the Island Group many have restricted or have absent populations on the main island since ship rats were introduced in 1918. Worldwide, rodents are known to impact seabirds detrimentally, mostly from the birds' absence from islands where they previously bred before the incursion. Little data is available on how these impacts manifest themselves for seabird populations surviving in the presence of rodents. Joint funding for the Lord Howe Island rodent eradication is now available from the Australian Government and the Environmental Trust in New South Wales. To better understand the impacts of rodents on seabirds and provide a measure of the biodiversity benefits from their removal, studies have been ongoing here since 2013 on nesting terns and burrowing procellariforms. We review seabird studies since the late 1990s on Lord Howe Island and present new data on rodent impacts."

Nirosha Priyadarshani; Stephen Marsland; **Castro, Isabel**	Massey University	i.c.castro@massey.ac.nz	Advances in the automatization of analysis of autonomous acoustic recordings: from New Zealand to the world

The availability of programmable autonomous acoustic recorders has the power to improve bird conservation and wildlife managers and conservationists in New Zealand are increasingly using them to determine the presence, abundance and decline of various bird species from their calls. Although data acquisition is automatic, manual processing of recordings is labour intensive, difficult and tedious, as well as being prone to bias due to observer variations. Automating the birdsong recognition process to successfully extract song information from unattended field recordings will enable the real benefits of programmable acoustic recorders to be achieved. The main challenge of this automatization is getting rid of unwanted sounds and noise in the recordings; our team developed an effective way to eliminate noise from recordings using wavelets. Another challenge is species identification but there is a plethora of methods in the literature. However, despite the need for methods that are scalable to a wide variety of species, we found that where accurate recognition of individual species is essential, i.e. conservation work, only species-specific methods have been successful to date. Recently, we have developed a scalable, easy to train method using wavelets to extract specific species calls from recordings.

Champness, Brendan S.; Grant Palmer; Dave Kendal; James Fitzsimons	Federation University	brendanchampness@students.federation.edu.au	City slickers. Conserving or creating suitable habitat for urban birds.

As cities expand, managers must compromise between conserving urban remnants and creating new urban landscapes conducive to biodiversity conservation. This study investigated the effects of local streetscape and residential garden vegetation and landscape scale factors on bird community structure and composition across 98 1ha transects. Transect sites were randomly selected within the urban footprint of Ballarat, Australia, and included locations near remnant bushland, as well as new 'designer' suburbs. Linear regressions were used to identify local vegetation and landscape-level predictors of total and native bird species richness and abundance across the transects. Native plant species richness within the transects was the most important predictor in models of native bird species richness, native bird abundance, total bird species richness and total bird abundance. Since the composition of urban landscapes depends upon the actions of managers and residents, this highlights a benefit of encouraging residents to plant diverse native gardens, and local government to plant diverse native streetscape vegetation. Prioritising diversity in residential urban landscapes creates habitat for many native birds. Combining diverse native plantings with the conservation of urban remnants contributes to better outcomes for biodiversity conservation in expanding cities.

Choi, Chi-Yeung; He-Bo Peng; Peng He; Xiaotong Ren; Shen Zhang; Micha V. Jackson; Xiaojing Gan; Ying Chen; Zhijun Ma; Richard A. Fuller	The University of Queensland	choimo@yahoo.com	Are we protecting the habitats required by migratory shorebirds adequately at the local level?

Establishing protected areas at key stopping sites is regarded as an important mean to halt migratory shorebird population decline along the East Asian–Australasian. However, many of the existing coastal protected areas in China were established more than a decade ago, when our understanding of the local movement and the needs of shorebirds was limited. In this study, we investigated the effectiveness of current zoning system of the coastal wetland reserve by overlaying the home ranges of Great Knot *Calidris tenuirostris* (EN) in the Yalu Jiang National Nature reserve with the functional zone of the reserves. The results from our radio tracking study indicated that the low tide foraging areas are relatively well protected while high tide roosting areas are inadequately protected. This phenomenon is likely to be applicable to other migratory shorebird species and other sites along the Chinese coast. To conserve the shorebird habitats thoroughly, it is therefore important to identify these high tide roosting habitats in important shorebird sites and include them when establishing new protected areas, or work with local land owners if these habitats fall outside an established reserve's boundary.

Crino, Ondi L.; Sophia Jensen; Kate Buchanan; Simon Griffith	Deakin University	Ondi.Crino@deakin.edu.au	Reproductive plasticity in wild zebra finches: trade-offs between stress and reproduction in heterogeneous environments

Opportunistic breeding is a strategy used to maximize reproductive success in unpredictable environments. Birds that breed opportunistically are thought to maintain partial activation of the reproductive axis in order to rapidly initiate breeding when environmental conditions become suitable. However, the physiological mechanisms that influence reproductive readiness remain relatively unexplored. Australian zebra finches (*Taeniopygia guttata*) initiate breeding in response to unpredictable precipitation and are an ideal species to explore the physiological underpinnings of opportunistic breeding in a free-living system. We examined trade-offs between reproductive readiness and stress responsiveness in wild zebra finches at five field sites that varied in predictability with respect to rainfall in the Northern Territory. Zebra finches at sites that had recently received precipitation released lower levels of the stress hormone corticosterone) and were in better condition compared to zebra finches at sites with no local precipitation, suggesting a downregulation of stress responsiveness. In contrast, males at sites with no precipitation had signatures of testosterone release that suggest a downregulation of reproductive physiology. Sites without recent precipitation also had lower numbers of juvenile birds. Overall, these data suggest that zebra finches face trade-offs between stress responsiveness and reproductive readiness in relation to environmental conditions.

Cubrinovska, Ilina; Tammy Steeves; Dave Houston	University of Canterbury	ilina.cubrinovska@pg.canterbury.ac.nz	Conservation genomics of tuturuatu, a nationally critical shorebird

The ultimate goal of captive breeding for translocation programmes for threatened species is to prevent extinction by ensuring these species have sufficient genetic diversity to adapt to environmental change. A common challenge for these programmes is determining how best to supplement captive populations with individuals so that genetic diversity is maximised in captivity and in the wild. One such threatened species currently facing this challenge is the nationally critical tuturuatu (shore plover, *Thinornis novaeseelandiae*). Once widespread across New Zealand, this endemic bird is now confined to a single self-sustaining wild population on Rangatira Island in the Chatham Islands, two small translocated populations on predator-free islands (Motutapu and Waikawa), and a captive breeding for translocation population held jointly at the Isaac Conservation Park and Pukaha Mount Bruce National Wildlife Centre. The extent of genetic differentiation between, and the levels of genetic diversity within and between, captive and wild tuturuatu populations are unknown. Therefore it is currently difficult to assess conservation genetic management strategies to reduce extinction risk. Here, I will present preliminary results from my PhD research based on a relatively large set of genome-wide single nucleotide polymorphisms (SNPs) that will ultimately be used to inform the conservation genetic management of tuturuatu.

Dann, Peter; David Boyle; Douglas Cameron; Brian Goyen; Duncan Sutherland	Phillip Island Nature Parks, Victorian Ornithological Research Group Inc.	pdann@penguins.org.au	Uncovering the foraging and trans-equatorial migration patterns of Short-tailed Shearwaters

Short-tailed shearwaters (*Ardenna tenuirostris*) are Australia's most abundant seabird, breeding around the southern coastline in the Austral summer then migrating to the Northern Hemisphere in autumn. However, the conservation status of the World's seabirds is deteriorating faster than any other group of birds. The long-range foraging and migration movements of this species place it at the influence of multiple potential threats across multiple jurisdictions. Despite the ecological importance of this species, the long-range movements are poorly understood. Phillip Island in Victoria has a resident population of about 1.8 million breeding short-tailed shearwaters, making it one of the larger colonies. Between 2008 and 2016, light sensitive geo-locator tags were fitted by the Victorian Ornithological Research Group on the tarsi of 94 adult birds breeding in artificial nest-boxes (S) and natural burrows (CW). Data were recovered from 10 short-term deployments (12-15 days) and 28 long-term deployments including 56 equatorial crossings. The loggers recorded when the birds were on the water allowing the identification of important foraging areas. Interannual comparisons showed distinct differences in movement patterns between birds of different breeding status exposing each group to distinct resources and potential threats.

Davis, Robert A., Shaun W. Molloy	Edith Cowan University	robert.davis@ecu.edu.au	Banksia Woodland birds of South-western Australia: a declining community

The Banksia woodland bird community of Western Australia faces extinction debt caused by past clearing and ongoing clearing for urban development. Urbanisation is a key threat to Banksia woodland birds with approximately 63% of the pre-1750 extent of Banksia woodland cleared. This community is still subject to a high degree of threat from land clearing and other threats, including fire, *Phytophthora* dieback and a drying climate. We analysed an extensive dataset of Banksia woodland birds to identify the drivers of trends over time, in a subset of functionally important species. Relationships between indicated abundance for each species and changes in vegetation extent for the Perth metropolitan region and/or Normalised Digital Vegetation Index (NDVI), were examined for the period 1998-2012. 19 species responded to changes in vegetation condition and/or extent, especially Black-faced Woodswallow, Grey Shrike-thrush, Scarlet Robin and Western Spinebill. A large proportion of species were strongly reliant on the extent of suitable vegetation regardless of condition. In order to preserve all of these functionally important species there needs to be an emphasis on retaining a heterogeneous landscape comprised of vegetation with a range of NDVIs and patch areas.

Douglas, Tegan K.; Christine E. Cooper; Philip C. Withers	Curtin University	tegan.douglas@birdlife.org.au	It's not black and white: How dichromatric plumage affects heat load for the Western Magpie Gymnorhina tibicen dorsalis

Australian Magpies are widespread passerines found in a broad range of open habitats, but little is known about their physiological mechanisms for energy conservation in the cold. Physiological variables measured using open-flow respirometry demonstrated a typical avian endothermic response to low ambient temperature, with no evidence for energy savings from torpor. Field observations suggested magpies bask, using solar heat gain to reduce thermoregulatory costs. In southwest Australia, magpies are sexually dichromatic; males have white dorsal plumage and females and sub-adults black, so may experience different radiant heat loads. We measured thermal characteristics of plumage and quantified solar heat gain at the level of the skin. As expected, the reflectivity of the male's white dorsal plumage was greater than that of the dark females and sub-adults, but plumage of males, females and sub-adults showed similar patterns in thermal resistance, decreasing with increasing wind speed. There was substantially less variation in solar heat gain with increasing wind speed for males, compared with females and sub-adults. We suggest thermal properties of plumage and basking may have a considerable role in balancing the energy budget. Sub-species variation in plumage colouration may reflect differing interactions between solar heat load and plumage colour in different environments.

Eastwood, Justin R.; Simon Verhulst; Anne Peters	Monash University	justin.eastwood@monash.edu	Early-life telomere length and life-history in the purple-crowned fairy wren: survival, social dominance and lifetime reproductive success.

Adverse conditions during early development can have a profound effect on adult life-history. However, the physiological mechanisms that link early and late life-history are subject to debate. Telomeres could be one possible link because they are often associated with the aging process. Telomeres are repetitive sequences of DNA located on the end of chromosomes that shorten due to cellular replication (growth/repair) or stress (oxidative/inflammatory), and therefore, reflect biological age and life-time accumulated stress. In wild purple-crowned fairy-wrens (*Malurus coronatus*), we measured telomere length (TL) from erythrocytes collected seven days after hatching and monitored individuals throughout their lifespan to collect information on survival, longevity, dominance and lifetime reproductive success (LRS). We found that TL was not associated with early survival, however there was a positive association with adult survival and longevity. TL was not associated with gaining a dominance position nor the age of becoming dominant, although nestlings with longer telomeres tended to be dominant for longer. Interestingly, TL was positively related to LRS even when controlling for dominance duration and relative population reproductive success which was the most important predictor. These data indicate that early-life conditions as reflected by TL have life-history and fitness consequences.

Eden, John-Sebastian; Karrie Rose; Mang Shi; John H. O. Pettersson; Jan P. Buchmann; Edward C. Holmes	The University of Sydney, Westmead Institute for Medical Research	js.eden@sydney.edu.au	The meta-transcriptomic discovery of pathogens in neglected and undiagnosed disease syndromes of native Australian birds

In contrast to disease affecting humans and livestock, wildlife disease outbreaks are often neglected and their causes remain elusive. This has implications for efforts to preserve global biodiversity and the potential control of novel emerging infectious diseases. In this study, we investigated a number of neglected and undiagnosed disease syndromes affecting native Australian birds including clenched claw disease in rainbow lorikeets, and black and white bird disease in corvids. To identify potential infectious agents, total RNA from affected tissues was extracted and sequenced using a high-throughput RNA sequencing approach. RNA was pooled for library preparation based on tissue and disease type. The data was assembled and screened for potential pathogens by comparisons to existing databases with blast. A number of candidate viral pathogens were identified including highly divergent picornaviruses affecting black and white birds and rainbow lorikeets, as well as a novel avian paramyxovirus in cases of clenched claw disease. Interestingly, novel hepaciviruses were also identified that taken with other recently discovered viruses in novel vertebrate hosts highlight complex patterns of co-divergence and host switches at deep evolutionary timescales. Together, this study has identified a number of candidate pathogens but also reveals important aspects of viral diversity, emergence and evolution.

Ehmke, Glenn; Elisa Bayraktarov; Joris Driessen; James O'Connor; Ayesha Tulloch; John Woinarski; Stephen Garnett; Megan Barnes; Stephanie Avery-Gomm; Hoang Anh Nguyen	BirdLife Australia	glenn.ehmke@birdlife.org.au	Developing a national threatened bird index. First things first: Establishing acceptable practice for population monitoring data

Tracking change in populations is crucial for the effective management of threatened birds and their habitats, reporting on progress towards national and global biodiversity conservation targets and stimulating targeted responses to environmental threats. To date, most threatened bird monitoring and reporting is based on independent programs focused on individual threatened taxa. The Threatened Species Recovery Hub of the National Environmental Science Programme (NESP) and BirdLife Australia, in close collaboration with 20 organisations, committed to the establishment of an integrated headline national threatened bird index for Australia – analogous to other national performance indicators like BirdLife's Australian Bird Indices for common taxa. Here, methods for 1) vetting (rules for inclusion/exclusion of data), 2) pre-processing (assigning monitoring sites *a posteriori*, calculation of pseudo-absences for presence only data, estimating representativeness of sample data in respect to extent of occurrence), and 3) assessing suitability (based on standardisation of monitoring effort) of data for trend analyses, are presented. These methods are discussed and suggested as a best practice framework for dealing with data for single or multi-species trend analyses involving data from multiple sources and with disparate formats. The proposed best practice rules could also be applied to other taxonomic groups.

Ewart, Kyle M.; Rebecca Johnson; Rob Ogden; Leo Joseph; Greta Frankham; Nathan Lo	University of Sydney, Australian Museum Research Institute	Kyle.Ewart@austmus.gov.au	Clarifying the phylogeny and phylogeography of two commonly traded cockatoo species and the development of a wildlife forensic toolbox to identify illegal trade in these species

The Red-tailed Black Cockatoo (*Calyptorhynchus banksii*) and Pink Cockatoo (*Lophochroa leadbeateri*), both members of the family Cacatuidae, are among Australia's most iconic bird species. Both have threatened populations and/or subspecies, and are amongst the most highly sought after Australian bird species in the illegal pet trade. Illegal removal of individuals from the wild is a potential threatening process for both species and it also renders them vulnerable to animal cruelty. This research is using genome-scale data to facilitate the conservation of these two cockatoo species. As well as resolving the subspecies' phylogenetic relationships within each species, we will investigate the demographic processes that shaped their divergence, e.g., estimates of gene flow and phylogenetic relationships among populations, and genetic diversity within populations. Additionally, a suite of wildlife forensic tools will be designed to answers to many of the typical questions in a wildlife investigation, such as: subspecies ID, individualisation, pedigree reconstruction, and phylogeographic origin (source population). This will permit the detection of trade routes and poaching hotspots, testing of trade legitimacy and will provide robust evidence for associated prosecutions.

Eyck, Harry; Ondi L. Crino; Katherine L. Buchanan	Deakin University	hjeyck@deakin.edu.au	Transgenerational and fitness effects of developmental corticosterone in *Taeniopygia guttata*

The environment animals experience during development can have lifelong phenotypic effects. Recent research suggests that developmentally induced phenotypic changes can affect future generations, but few studies have examined the reproductive consequences of transgenerational effects. We sought to test if corticosterone (the dominant stress hormone) exposure during early development impacts reproductive timing and investment using zebra finches (*Taeniopygia guttata*). We administered corticosterone or a control treatment to nestlings from days 5 to 18 post hatch. Upon maturity, 10 individuals of each treatment group and sex were allowed to breed in a free choice breeding experiment. (n=2 replicates; 40 pairs total). Here, we report the effects of early developmental CORT exposure on measures including; latency to breed, nestbuilding effort, and egg and clutch size. Together these data address a key knowledge gap for this species regarding the transgenerational effects of early life CORT on life history trade-offs through altered reproductive timing.

Falk, Stephanie; Alexandra Pavlova; Craig White; Paul Sunnucks	Monash University	stephanie.falk@monash.edu	Genetics, respiration and climate adaptation in the Eastern Yellow Robin

Human induced climate change increases physiological stress naturally experienced by wildlife in extreme environments. Understanding the mechanisms of physiological adaptations that enable species to persist will help making informed conservation decisions. One proposed mechanism of adaptation to hot environments is more efficient energy utilization, resulting in less heat produced as a by-product. According to this mechanism, hot-adapted organisms are expected to have lower overall energy expenditure than cold-adapted ones at similar temperatures. The Eastern Yellow Robin is an excellent system to test this proposal. Its two divergent mitochondrial clades occur in different environments and show positive divergent selection in genes involved in cellular respiration. We hypothesized that divergent genes convey physiological differences in energy expenditure through changes at the molecular level. We tested if the inland clade, which normally occurs in more variable climates with hotter summers, has lower energy expenditure than the coastal clade, which predominantly inhabits more stable climates with cooler summers, when measured in the same climate. Preliminary analyses confirm our prediction. Similar adaptations may occur in other birds whose mitochondrial diversity is associated with climate. We anticipate that this study will inform conservation managers about the importance of considering variation in physiological adaptation in bird species.

Farrow, Lucy F.; Ahmad Barati; Paul McDonald	University of New England	lfarrow3@une.edu.au	True Individual Recognition Unveiled by the Transference of Habituation in Noisy Miners (*Manorina melanocephala*)

Mechanisms proposed to explain the evolution of cooperation (e.g. reciprocity or kin selection) assume that, as a minimum, individuals can distinguish between familiar group members and unfamiliar 'strangers'. However, in complex social systems, individuals interact with conspecifics of mixed kinship but equal familiarity, meaning that individual recognition capabilities would maximise fitness returns through cooperative interactions targeting kin or those who have provided help in the past. We investigated the acoustic individual recognition capacity of Noisy Miners (*Manorina melanocephala*), an avian species with a complex social system comparable to that of non-human primates and a vocal system characterized by functionally referential signals. Applying a habituation-dishabituation paradigm, we determined that miners habituate to unreliable signals and could differentiate between two different individuals using the same call type, regardless of their familiarity with the signaller. Importantly, we further demonstrated the ability of miners to transfer habituation across calls of different social contexts, providing the first avian example of 'true' individual acoustic recognition.

Forsdick, Natalie J.; Richard Maloney; Tammy Steeves; Michael Knapp	University of Otago	natalie.forsdick@postgrad.otago.ac.nz	Kakī conservation at the cutting edge: Using genomics to investigate hybridisation in the world's rarest wader

Accurate information is essential for species conservation, allowing appropriate decision-making to not just prevent extinctions, but to assist species recovery. New Zealand's endemic kakī (black stilt; *Himantopus novaezelandiae*) is considered the world's rarest wading bird, and is classed as Nationally Critical under New Zealand's Threat Classification System. Throughout kakī conservation, cutting-edge genetic techniques have been employed to inform conservation actions, resulting in the population increasing to ~100 wild adults today. One threat facing kakī is hybridisation with the congeneric self-introduced poaka (pied stilt; *H. himantopus leucocephalus*). When kakī numbers have been historically low, interbreeding between the two species has occurred resulting in fertile hybrids with intermediate plumage morphology. Previous research indicated that hybridisation has had no detectable impact on the kakī genome, but used only a small handful of genetic markers with low power to detect genome-wide admixture. In continuation of the use of cutting-edge techniques, advances in DNA sequencing now facilitate whole-genome sequencing of kakī. The greater resolution provided by new genomic data can be used to test the accuracy of previous results. This genomic assessment will be used to determine best-practice conservation management for kakī, and to assess impacts of hybridisation in other threatened species.

Galla, Stephanie J.; Marie L. Hale; Anna W. Santure; Richard F. Maloney; Tammy E. Steeves	University of Canterbury, School of Biological Sciences	stephanie.galla@pg.canterbury.ac.nz	Estimating relatedness in captive breeding for translocation programmes to enhance species recovery

Threatened species recovery programmes may utilise captive breeding for translocation as a technique to prevent extinction and enhance recovery. Captive pairing decisions are generally based on available pedigree data to minimise inbreeding and maximise genetic diversity in an effort to maintain the ability to adapt to environmental change. However, pedigrees available to captive breeding for translocation programmes are often shallow (<5 generations deep), incomplete or error-prone. Furthermore, pedigree-based relatedness estimates are probability-based, and therefore, may not reflect true relatedness. While genetic-based techniques (microsatellites) offer programmes a way to estimate genetic relatedness among individuals without a pedigree, emerging evidence indicates microsatellite markers may be insufficient for accurately estimating relatedness, particularly in genetically impoverished species. More accurate measures of relatedness should be obtained from thousands of independent genome-wide single nucleotide polymorphisms (SNPs), as they provide greater genetic resolution across the genome. Here, we compare genetic and genomic-based estimates of relatedness in captive kakī (*Himantopus novaezelandiae*), a critically endangered New Zealand bird, where parent-offspring and sibling relationships are known. This research is part of a larger effort to determine the best approach for making captive pairing decisions in threatened species, which can be used to inform ~400 captive breeding for translocation programmes worldwide.

Garnett, Stephen T.; Hayley M. Geyle; Alienor Chauvenet	Charles Darwin University	stephen.garnett@cdu.edu.au	Progress in knowledge and management of Australia's threatened birds

It is easy to feel gloomy about the conservation of threatened birds as the environment changes. However, while much work remains, we have already been remarkably successful at preventing extinctions and reducing the impact of many threats. Here, drawing on inputs from many Australian threatened bird experts, we present the results of the first national review of our progress in threatened bird conservation that isn't just a list of threatened birds. We summarise our level of knowledge of how to manage threats, how much we have achieved in applying that knowledge and, what is still to be done. We find that progress in threat management is correlated with a suite of factors related to the bird, the threat and the social and biological environment in which it lives. We list the birds and the threats about which we need to know more and those where we know enough but need to do more to effect change. We also list the taxa and threats for which we have achieved most given the impact that the threats can have if left unattended.

Gibb, Katie L. C.; Brett Gartrell; Phil F. Battley	Massey University	gibbka@gmail.com	Hepatic concentrations of three heavy metals in Mallards from New Zealand

Birds can accumulate environmental contaminants, which at high levels can be detrimental to health. The concentrations of three heavy metals (cadmium [Cd], copper [Cu] and lead [Pb]) were determined in the livers of 336 Mallards (*Anas platyrhynchos*) in two spatially separate regions of New Zealand (Waikato and Southland). All samples had detectable levels of the trace elements, with regional differences in mean levels observed for Pb (higher in the Waikato), and Cd (higher in Southland). All three metals varied with sex, with males having higher concentrations of Pb and Cu and females having higher Cd. Cd levels were higher in adults than juveniles at both sites, Pb was higher in adults in the Waikato, and Cu levels in Southland were higher in juveniles than adults. In a small percentage of birds, values indicative of adverse effects were present for Pb (3.9% of birds) and Cd (5.1% of birds). However, 23.1% of the livers reached reported levels of Cu toxicosis. Despite uncertainty in critical levels and thresholds of metals in waterfowl livers, this study showed that environmental exposure to increased levels of heavy metals may threaten, at least to some degree, New Zealand Mallards.

Gosbell, Ken; Clive Minton; Jon Coleman; Simeon Lisovski; Maureen Christie; Chris Hassell; Bethany Hoye; Marcel Klaassen	Victorian Wader Study Goup, Australian Wader Studies Group	ken@gosbell.id.au	A review of geolocators studies in Australia, 2009 – 2016. Where to now?

Australia was one of the first countries to utilise light-level geolocators for tracking the movements of migratory shorebirds. Since 2009 we have deployed these instruments on eight species, at overwintering locations around the country, including coastal Victoria, King Island, SE South Australia, NW Western Australia, and SE Queensland. This extensive program has gathered a wealth of information on the long-distance movements of these migratory species, with high retrieval rates, and, after some initial technical issues, high success of the units deployed. The data obtained, including several multi-year tracks, detail routes and strategies used along the East-Asian Australasian Flyway. Critically, this information allowed us to assess the relative importance of stopover sites. More recent geolocator units, in combination with novel analysis techniques, have also enabled assessment of breeding locations and incubation strategies, many of which were unknown given the remote, low density breeding sites used by these species. Collectively, these insights have informed conservation measures flyway-wide. The increased use of geolocators across multiple species offers exciting future possibilities for research. However, recognising the constraints of light-level geolocators we go on to discuss recent alternative technical developments and how these will extend our knowledge for species not currently suited to light-level geolocation.

Gosford, Bob; Mark A. Bonta; Erana Loveless; Dick Eussen; Nathan Ferguson; Maxwell Witwer	Ethnoornithology Research Group, Penn State	bgosford@gmail.com	Aboriginal knowledge of fire-spreading by raptors in northern Australia: assessing the evidence

Do *Milvus migrans*, *Falco berigora*, and *Haliastur sphenurus* spread fire intentionally to flush out prey by transporting burning woody material from bushfires and campfires to unburned locations? Though we do not possess unequivocal video or photographic documentation, we assert that they do, based on direct and repeated observations made by Aboriginal people, including traditional owners, land resource managers, and others. This paper discusses the history of documentation of this phenomenon in the Western ornithological and anthropological literature, evaluates arguments for and against intentional fire-spreading, and then presents our recent findings from Arnhem Land, based on oral interview sessions (2013-2017) and a 2017 collaborative ethno-ornithological workshop. Supporting documentation is provided by parallel data from direct observations made by qualified non-Aboriginal observers such as anthropologists and fire managers. We conclude by suggesting a collaborative framework for rigorous investigation of this phenomenon in the field at the site of active bushfires.

Marie C. Diquelou; **Griffin, Andrea S.**	University of Newcastle	andrea.griffin@newcastle.edu.au	Behavioural mechanisms of compensatory responses to population control in common mynas

The effects of anthropogenic predation pressure on demography, life history and behaviour are well documented within the context of fisheries and hunting. In contrast, little is known about compensatory responses to anthropogenic predation pressure in avian species targeted by population control programs despite potentially important consequences for the success of such interventions. The introduced common myna, *Acridotheres tristis*, is the target of heavy trapping efforts in some areas of its New South Wales distribution. Following evidence that capture rates are decreasing beyond what might be expected from reductions in abundance, and that heavily trapped myna populations show increased wariness compared with lowly trapped ones, we undertook to investigate two potential mechanisms by which such changes might occur. First, we tested whether trapping preferentially removed individuals with 'trap-friendly' personalities. Second, we tested experimentally under free-ranging conditions whether mynas learn to recognise and avoid stimuli associated with trapping activities. The studies' outcomes provide support for the conclusion that compensatory responses are linked to learning rather than to selective removal of trap-friendly birds. Ways in which such changes are likely to reduce the success of trapping programs but how they might worsen the environmental impact of common mynas will be discussed.

Griffith, Simon C.; Daisy Englert Duursma; Rachael V. Gallagher	Macquarie University	simon.griffith@mq.edu.au	The characterisation of opportunistic breeding in the zebra finch and over 300 other species of terrestrial bird

Australian birds, and the zebra finch in particular provide some of the most classic examples of opportunistic breeding. Conventional wisdom is that avian breeding is timed with the boom and bust cycles of the desert, and driven primarily by unpredictable rainfall. Here we present data collected across a thirteen year study of a zebra finch population breeding in the desert biome, and a broader set of all breeding records available for over 300 species of terrestrial birds across all biomes. Using these extensive datasets we characterise the pattern of breeding phenology and plasticity in timing, across all biomes for the first time at this scale. We show that surprisingly, birds in the desert biome are less opportunistic than those breeding in other biomes, and in particular seem to have their breeding constrained during the hotter months of the year. We also show that the effect of rainfall on breeding have largely been over-estimated. Our findings have important implications for our understanding of avian life history and evolution in Australia, and the capacity of our birds to deal with a changing climate.

Hansen, Birgita; Jodie Honan; Richard Chamberlain; Don Stewart; Lori Gould; Michelle Casanova; David Wilson	Federation University	b.hansen@federation.edu.au	Building an understanding of habitat use, movement and migration of Latham's Snipe

Latham's snipe *Gallinago hardwickii* is a cryptic migratory wader that breeds in Japan and spends its non-breeding season in south-eastern Australia. Many populations occur in association with small urban wetlands posing challenges for habitat protection, as these wetlands are under ongoing threat from development, particularly in coastal areas. This study is using a multi-faceted approach to investigate factors influencing non-breeding populations at stopover and terminus sites. Firstly, a series of surveys were initiated in 2014 in the Port Fairy region of SW Victoria to investigate the relative importance of urban wetlands. These surveys have grown in coverage and volunteer participation, such that over 80 sites across six states and territories are now surveyed three times each spring-summer season. Secondly, a capture-based program was established to understand both local and flyway movements, using radio tracking, geolocation and satellite tracking. Thirdly, a series of wetland assessments were conducted at key habitats around Port Fairy. Finally, collaboration with the Wild Bird Society of Japan is strengthening the knowledge sharing between the two countries, with the ultimate goal of repeating the Naarding breeding census from 30 years ago in order to improve population estimates for the species.

Harrisson, Katherine A.; Alexandra Pavlova; Neil Murray; Bruce Quin; Peter Menkhorst; Kim Miller; Karina Cartwright; Michael J. L. Magrath; Paul Sunnucks	La Trobe University, Arthur Rylah Institute for Environmental Research	k.harrisson@latrobe.edu.au	Do helmeted honeyeaters suffer inbreeding depression and what can we do about it?

The helmeted honeyeater *Lichenostomus melanops cassidix* is a critically endangered subspecies of the common yellow-tufted honeyeater that has declined to a single wild population of ~190 birds at Yellingbo in Victoria, Australia. Intensive population management over recent decades has resulted in only modest population growth and attempts to re-establish a population at another location proved largely unsuccessful. Failure of the helmeted honeyeater to thrive is likely due, at least in part, to lowered fitness as a result of inbreeding between related individuals (i.e. inbreeding depression). Our study combines fitness data from intensively monitored wild and captive populations of *L. m. cassidix* with estimates of individual inbreeding obtained from genomic markers. We use relationships between fitness and genomic measures of inbreeding to estimate the degree of inbreeding depression in the captive and wild populations. We demonstrate the value of genomic measures of inbreeding for informing future pairings in the captive breeding program that minimize kinship/maximize genetic diversity of parents and for monitoring the outcomes of genetic rescue trials between *L. m. cassidix* and the *L. m. gippslandicus* subspecies.

Hodder, Grace V.; David C. Paton; Daniel J. Rogers	University of Adelaide, Department of Environment, Water and Natural Resources	grace.hodder@adelaide.edu.au	Diamonds under Pressure: Ecological Processes affecting Diamond Firetail Longevity in the Mount Lofty Ranges, SA

Diamond Firetails (DFTs) have been declining throughout their range since the 1980s. In the Mount Lofty Ranges (MLR), the population has contracted and is isolated and fragmented. At a broad-scale habitat clearance is responsible, yet the patch-scale processes affecting the longevity of MLR DFTs remain unknown. Being ground-foraging granivores, DFTs are particularly susceptible to disturbances in the ground-layer. In the MLR, invasive annual grasses now dominate the understorey and produce masses of seed in spring. In this temperate system, these annual seeds mass-germinate with breaking autumn rains, leaving few for foraging birds. I present evidence that there is a shortage of food during winter which may affect DFT survival. To test this, I investigated their diet and food resource abundances in the MLR. Total seed mass, and the seed mass of annual weed species, was significantly lower during autumn and winter than during other seasons. During this time, DFTs selected native grass and sheoak seeds in proportions higher than expected given their scarce availability. Despite exotic annuals dominating their habitat, these seeds were eaten in lower proportions than their availability. Re-establishing sheoaks and native grasses that produce seed during winter would support the survival of DFTs in this region.

Hunt, Thomas J.; David C. Paton; Daniel J. Rogers	The University of Adelaide	thomas.hunt@adelaide.edu.au	Birds in Black Box: Community drivers in floodplain woodlands

The Black Box woodlands of the Murray River floodplains are thought to play a unique role for woodland birds in the region, providing key resources seasonally and during drought. These woodlands are threatened through modified flood regimes, and the current Murray Darling Basin Plan is unlikely to deliver enough environmental water to maintain them. To determine the importance of Black Box woodlands for birds, sites were surveyed in the Riverland region of South Australia to compare bird communities in healthy and degraded Black Box and adjacent Red Gum and mallee woodlands. Each woodland type supported unique bird communities each season, though there was greatest similarity between healthy Black Box and mallee communities. Degraded Black Box supported the least consistent bird communities, and the lowest species diversity and abundance. The foraging behaviours of Weebills and Chestnut-rumped Thornbills – key species that employ different foraging techniques – were also investigated. Foraging theory provided a framework to examine how the height, condition, density and canopy volume of trees drove changes in their foraging effort between woodland types. These surveys suggest diversity and abundance of bird communities will decline without adequate management of river flows to improve the health of Black Box woodlands.

Ingwersen, Dean; David Geering	BirdLife Australia	dean.ingwersen@birdlife.org.au	Unravelling the movements of a rich-patch nomad – what 25 years of colour-banding of Regent Honeyeaters has told us.

The Regent Honeyeater *Anthochaera phrygia* recovery team, currently administered by BirdLife Australia's Woodland Birds program, has been catching and colour-banding Regent Honeyeaters since the early 1990s. In that time over 700 birds have been caught, banded and released across the range of the species – from southern Queensland through NSW, and into central and north-east Victoria. This work has shown that Regent Honeyeaters are capable of long-distance movements, with a number of individuals moving over 500 kilometres between site of banding and resighting. Many examples exist of regular, shorter-distance movements between key areas for the species (e.g. interchange between the Capertee Valley and Lower Hunter Valley). Further, longevity data has been obtained over the course of the program, with one individual not seen again until more than 11 years after banding. Finally, in recent years genetic samples have been obtained during banding and initial results of analysis will be discussed. The team is now looking to satellite tracking technology to gain a better understanding of the apparently complex nature of the species' movements both within and between years, and address the key knowledge gaps that 25 years of colour-banding still haven't been able to answer.

Joseph, Leo	Australian National Wildlife Collection, CSIRO	leo.joseph@csiro.au	An update on evolutionary studies in Australian birds

Australian birds continue to provide a rich natural laboratory for the study of how an avifauna has come to be distributed across a continent. This intersects with how we name our birds and why decisions are made about which names and taxonomic ranks should be applied and debated. By way of introducing the symposium, I will review a number of recent studies that set the scene for the symposium and illustrate the many dimensions to these areas. Topics will run from "leaky" or porous genetic boundaries in clearly differentiated species; how knowing about selection on mitochondrial DNA can caution against changing taxonomy; the changing dimensions on hybridization and introgression, and the application of genomic tools.

Joyce, Meera; Chris Pulkkinen; Michael Wilson	Murray-Darling Basin Authority	meera.joyce@mdba.gov.au	Evaluation of Basin Plan impacts on waterbird outcomes in the Murray-Darling Basin

Since the 1980s aerial surveys have recorded a 70% decline in waterbird abundances across the Murray-Darling Basin, partly due to increasing water regulation. The Basin Plan aims to improve flow regimes to maintain diversity and improve waterbird abundance and breeding. The 2017 Evaluation of the Basin Plan, assesses how environmental water has influenced Basin waterbird populations. Through collating Basin-wide, State and regional datasets we have developed an understanding of current waterbird condition and compare water delivery, natural flow and waterbird data to isolate the impacts of environmental water. From July 2013-June 2016, 199 environmental water deliveries have supported waterbirds across the Basin. Flows are delivered strategically and we have assessed how effective planning has been in informing water use to maintain refuges, prime ecosystems, support and trigger breeding. At regional scales environmental water has had an observable impact on breeding and abundance outcomes. As this information is scaled up, the impacts of environmental water are less clear. Recent Basin-scale breeding appears to be partially attributable to the Basin Plan, however waterbird populations in the Coorong continue to diminish. This conference would provide an opportunity to socialise our analysis outcomes, communicate how research informs strategic planning and gain feedback on recommendations.

Katsis, Andrew C.; Mzuri H. Davies; Katherine L. Buchanan; Sonia Kleindorfer; Mylene M. Mariette	Deakin University	akatsis@deakin.edu.au	The effects of prenatal acoustic stimulation on song learning in the zebra finch

In precocial birds such as chickens, exposure to rhythmic sound can promote neural development in the developing embryo and enhance cognition later in life. This might also be true for more specialised forms of learning such as vocal learning, but very few studies have explored the effects of prenatal sound in songbirds. Using a captive population of zebra finches (*Taeniopygia guttata*), we tested whether embryos exposed to incubation calls—a temperature-dependent parental vocalisation produced on the nest—show improved song copying accuracy as adults. Individuals were exposed in ovo to either (1) incubation calls (treatment) or (2) contact calls (control). We then compared each male's adult songs to those of their social father, the typical tutor for song learning. Our data show that, as typically observed, a male's weight as a nestling and the complexity of his father's song affected song copying accuracy, but prenatal sound exposure had no effect. However, treatment males did acquire more song syllables from non-parental tutors, suggesting that prenatal acoustic stimulation can influence the song learning process. Our data demonstrate the impact of prenatal acoustic tutoring to affect vocal learning processes and adult communication.

Kirk, Holly; Annette Fayet; Akiko Shoji; Robin Freeman; Chris Perrins; Tim Guilford	RMIT University, Oxford University	hollylkirk@gmail.com	Evidence for carry-over effects between breeding and migratory behaviour in a UK breeding seabird: Results from multi-colony and multi-year tracking

Behavioural decisions (regarding timing, route and stopovers) made by individual migratory seabirds can have a critical impact on breeding success and condition. Analyses of multi-year behavioural datasets enable us to understand the interactions between the timing and outcome of different life-history events. Data from 126 individual Manx shearwaters (*Puffinus puffinus*) on five UK breeding colonies were collected over a seven year period. The annual behavioural cycles of these birds was described using light and saltwater immersion loggers, and machine-learning methods were used to identify the timing of key events. These data were used to investigate interactions between the timing of these events, the migratory route and the degree to which behavioural strategies are conserved between individuals. The timing of departure from the overwintering area had a strong carry-over effect on other events. Departure date largely dictated the route taken to the breeding colony and the subsequent body condition on return to the colony. Variation in the timing of many of these events was consistent within birds, indicating the presence of individual behavioural strategies. This information is crucial for our understanding of decision making in migratory seabirds and understanding how these populations will respond to environmental change.

Kuchinke, Diana	Federation University	diana@kuchinke.com.au	Impacts of prescribed burn severity on the woodland birds of Western Victoria

Victoria is on a drying tangent, with rainfall anomalies increasing over recent decades. Aligned with a drier climate is an increase in fire severity. Prescribed burns are widely used, to ameliorate the effects of bushfires. A broad literature base assumes that prescribed burns are of moderate severity, removing only a percentage of the fuel load. However, just like bushfires, prescribed burns can be of varying degrees of severity. In 2012, a series of prescribed burns was carried out in the woodlands of western Victoria. The burns ranged in severity from very low (30% burnt) to high (100%). A BACI based GLMM investigation modelled the potential impacts of severity. The analyses incorporated first and second year post-fire responses against monitoring undertaken in 2010. There was little response detected in either species richness or turnover. This result aligns to other studies that indicate a scarcity of early-successional stage species in eucalyptus woodlands. Ten individual species were also examined. Only one, the White-throated Treecreeper, illustrated a fire response. The BACI design illustrated that whilst the woodland birds were resilient to small-scale prescribed burns of any severity, that overall abundances were in decline. This aligned with the years of reduced rainfall in the region.

Lawrie, David; Bruce McKinlay; Keith Woodley; Tony Habraken; Adrian Riegen; Gillian Vaughan	Birds New Zealand, Pukorokoro Miranda Naturalists Trust	president@osnz.org.nz	The Manukau Harbour, New Zealand: Capital City for shorebirds in New Zealand

The Manukau harbour is a large (c30 000ha) enclosed harbour on the West Coast of the North Island, adjacent to Auckland. It is a complex matrix of substrates which supply a variety of habitats for birds. The harbour is an internationally significant site for non-breeding trans-equatorial waders. A total number of 32 000 waders reported in Winter 2016 and 29 000 in Summer 2016. In the winter, the harbour is a significant site for South Island pied oystercatcher, and endemic wrybill. The Harbour has been monitored as part of the Birds NZ national wader monitoring scheme since 1960 and this work has been summarised in various scientific publications. Despite the wide range of values present in the Manukau, it is under increasing pressure from constant development and the growth of Auckland, with poor water quality. We report on the values present and some of the trends from the wader counts and describe initiatives to engage with iwi and local and national government to raise awareness of the values of this harbour.

Leitao, Ana V.; Michelle L. Hall; Raoul A. Mulder	University of Melbourne	anamvleitao@gmail.com	The ecology and breeding biology of a tropical bird, the Lovely fairy-wren

The breeding biology of tropical birds is poorly known compared to their temperate zone counterparts, even though the tropics harbour considerable biodiversity. The Lovely fairy-wren (*Malurus amabilis*) is endemic to the wet tropics of Australia, and is one of the 12 species in the genus Malurus. Despite the large number of studies on fairy-wrens, little is known about the Lovely fairy-wren. Here we provide the first detailed description of the behaviour, breeding biology and social organisation of this tropical bird species, based on colour-banded population in the Cairns region, studied from 2013-2017. We highlight similarities and differences in life history and morphological traits between Lovely fairy-wren and other species of the Malurus genus, and we propose the Lovely fairy-wren as a model species to investigate the evolution of ornamental traits.

Lermite, Françoise; Salit Kark; Chloé Peneaux; Andrea S. Griffin	University of Newcastle. Australia	francoise.lermite@uon.edu.au	Does parenting style contribute to the success of alien avian species in urban environments?

Deforestation and urbanisation in Australia have dramatically reduced nesting sites for native secondary cavity-nesting avian species. Some species are increasingly exploiting nesting opportunities in urban environments where they have to compete with invasive cavity-nesters. How they cope with competitive pressures around nesting cavities might be influenced by their level of parental care. To determine whether different patterns of parental care are related to breeding success of native and alien birds in urban areas, we studied parental care in native parrots that share the same space in NSW, Australia, than one of the most common alien secondary cavity nesting species, the common myna. Using 174 nest boxes, we compared breeding success and nesting behaviour in common myna and in eastern rosella by examining parental nest presence, nest intrusions and nest defence. We discovered that species showed significant differences in nesting behaviour and parental care. Common mynas displayed significantly higher breeding success and more nest presence, fewer nest intrusions and a more vigorous nest defence than native parrots. These differences positively affect the breeding success of common mynas. Our findings underline the importance of incorporating parental behaviour when considering factors that influence the ability of invasive alien birds to outcompete native species.

Leseberg, Nicholas P.; Stephen Murphy; Allan Burbidge; James Watson	University of Queensland	n.leseberg@uq.edu.au	Understanding and detecting the night parrot

The night parrot is an extremely cryptic species that we are only just beginning to understand. Until now, the primary obstacle to researching the night parrot has been finding populations of the bird that can be studied, meaning reliable detection methods are a critical component of any research. Continuing research in Queensland and emerging research from Western Australia is slowly revealing some details of the parrot's ecology, which for the first time is allowing us to understand how the bird uses the landscape, what it's habitat requirements are, and therefore, how best to detect it. This has led to novel application of acoustic monitoring devices which enable large areas to be covered with relatively limited field resources. This presentation will outline the difficulties of detecting and researching a species for which acoustic monitoring has proven the only reliable method of detection, and how this ongoing research is helping to improve our understanding of the ecology and true status of this iconic threatened species.

Lilleyman, Amanda; Danny I. Rogers; Stephen T. Garnett	Charles Darwin University, Arthur Rylah Institute for Environmental Research	amanda.lilleyman@cdu.edu.au	If you weigh more, you fly further: body mass of migratory shorebirds varies latitudinally on the non-breeding grounds

Migratory shorebirds that travel between hemispheres undergo dramatic changes in mass and body composition through the year. Substantial mass gain immediately before migration enables birds to build the fuel reserves required for several continuous days of non-stop flight. Mass is much more consistent during the breeding season (when shorebirds inhabit near-arctic tundra or grasslands) and during the non-breeding season (when they spend at least 6 months along Australasian coastlines and wetlands). We demonstrate that body mass of non-breeding shorebirds is lower in tropical northern Australia than it is in southern temperate Australia. Hypotheses that may explain this include 1) optimal non-breeding mass differs in tropical and temperate regions, potentially because of thermoregulatory costs or predation risk; 2) fuel deposition rates and biomass of potential prey are lower in tropical than in temperate regions, limiting the non-breeding mass attained by shorebirds; if so, food availability would probably also limit the migratory range of tropical shorebirds, and their capacity to recover from environmental change. We compare climate conditions, prey availability and temporal mass changes of shorebirds in northern and southern Australia to assess whether differences in non-breeding mass are more likely to be strategic, or driven by constraints of food availability.

Loyn, Richard H.; Danny I. Rogers; Peter W. Menkhorst; Robert J. Swindley; Kasey Stamation; Suelin Haynes; Guy Dutson; Jeff Davies; William K. Steele	Eco Insights, La Trobe University, Arthur Rylah Institute (formerly)	richard.loyn@bigpond.com	Managing habitat for 100,000 waterfowl: the roles of continental weather patterns and treatment process in a large Ramsar-listed treatment plant (Western Treatment Plant at Werribee).

The Western Treatment Plant treats wastewater for half of Melbourne (a city with ~5 million residents) on 10,500 ha of coastal habitats, listed under the Ramsar Convention. Waterbirds were monitored systematically since 2000 to determine the impact of a major treatment upgrade. The plant attracts >100,000 waterfowl, with numbers fluctuating inversely to inland wetland availability. Waterbirds remained numerous after the upgrade but one section of the plant (Lake Borrie) supported fewer birds after it was excised from the treatment process, as predicted by modelling. Consequently, a new pipeline was built to restore delivery of partly treated sewage to Lake Borrie, and multiple outlets were constructed to distribute effluent more effectively on tidal mudflats, as part of a broader conservation program. Waterfowl numbers increased at Lake Borrie, and they spent more time feeding there, and sewage treatment also improved. Inland flooding continues to be the main driver of bird numbers but our results show that innovative use of nutrient-rich effluent has enhanced the value of this treatment plant for waterfowl. Active collaborations between managers, scientists, engineers and the community were critical to success. Sensitively managed treatment plants can play important roles in waterbird conservation.

Magrath, Michael J. L.; Bruce Quin; Bronwyn McCulloch; Tom Rowell; Robert Magrath | Wildlife Conservation and Science, Zoos Victoria | magrath@unimelb.edu.au

Improving the reintroduction success of captive-bred helmeted honeyeaters

Reintroduction of captive-bred animals is a key component to many threatened species recovery programs. However, a common concern is that individuals bred in captivity may perform poorly when released to the wild. Here we evaluate the survival and breeding success of more than 250 helmeted honeyeaters, released over a 25-year period, and compare their performance to wild-reared individuals. This critically endangered bird has an extremely restricted distribution and a wild population of less than 200. We found that post-release survival was lower than for similar-aged, wild-reared birds. The survival of released birds varied between sites and with time of year and bird age, but not bird sex, release group size, or whether the release site was already occupied by conspecifics. Releases contributed to persistence of the wild population, but high post-release mortality, due primarily to predation, has limited the effectiveness of this recovery action. Consequently, pre-release predator awareness training has been implemented, experimentally, over the last four years, involving the presentation of a trained bird of prey. Preliminary results suggest a dramatic improvement in post-release survival over this period and we discuss to what extent the training has contributed to this improvement.

Magrath, Rob; Francesca Dawson Pell; Dominique Potvin; Sean Cunningham; Chaminda Ratnayake; Andrew Radford | Australian National University | robert.magrath@anu.edu.au

Joining the information web: alarm call meaning and heterospecific eavesdropping

Many birds eavesdrop on the alarm calls of other species and so gain valuable information about predators. However, few studies have assessed whether heterospecifics decode the detailed information on danger gained by conspecifics. We used field experiments to study communication about danger in noisy miners, *Manorina melanocephala*, and eavesdropping on them by Australian magpies, *Gymnorhina tibicen*. Raptor model presentation and acoustic analysis showed that miners produce distinct alarm calls for airborne compared to perched raptors: 'aerial' versus 'mobbing' alarms. Playback then showed that listeners responded appropriately to these alarm calls, such as fleeing to aerial alarms and approaching mobbing ones. Miners therefore communicate about the type of threat. We then used playback and blind scoring of video to test if magpies 'understood' miner alarms. Magpies responded appropriately to miner alarms, including showing a more elevated gaze to aerial compared to mobbing alarms. We conclude that eavesdropping magpies 'understand' the type of threat communicated by miner alarms. These findings add to growing evidence that natural communities form 'information webs' in which valuable information is gained by eavesdropping on other species' signals. Such information webs are important for individual survival, and may affect the resilience of communities to changes in species' composition.

Mariette, Mylene M.; Katherine L. Buchanan | Deakin University | m.mariette@deakin.edu.au

Prenatal acoustic communication and thermal adaptation in birds

In many species, including birds and humans, embryos can perceive, learn and even produce sounds. Surprisingly however, the implications of such embryonic capacities for phenotypic adaptation have not been recognized. Here, we reveal a novel function of prenatal communication by showing that the Australian Zebra finch acoustically signals high ambient temperatures to its embryos. In a large playback experiment, we show that exposure of embryos to these acoustic cues alone adaptively alters subsequent nestling growth in response to nest temperature, and influences individuals´ thermal preferences as adults. Further, we investigate the possible underlying mechanisms of such developmental programming by investigating the development of thermoregulation in embryos and nestlings. We find that exposure to hot incubation calls did not delay the onset of thermoregulation in embryos, as measured by metabolic rate. However, at the nestling stage, as expected, nestlings exposed to incubation calls prenatally maintained lower body temperature than controls, and also conserved more water. Together, our data demonstrate that the effect of prenatal acoustic environment on development is considerably greater than currently acknowledged. Our study also sheds light on a novel behavioural mechanism for thermal adaptation in birds, which is particularly critical for avian resilience under climate change.

Hannah Fraser; Jeremy Simmonds; Alex Kutt; **Maron, Martine**	The University of Queensland	m.maron@uq.edu.au	Evaluating the status and trend of Australia's temperate and subtropical woodland bird community for its nomination as a threatened ecological community.

Almost all documented and formally protected ecological communities are vegetation communities, defined and described based largely on geology, hydrology and floristic composition. However, intact plant communities can persist where many faunal components of the ecosystem are degraded or lost, and a depauperate or degraded faunal community may itself be a threat to vegetation communities, given the functional roles of fauna in pollination, predation, seed dispersal and invertebrate population control. We propose that faunal communities are often the most relevant focal unit for protection and conservation. We present an approach to describing and evaluating trends in the condition of a functionally-important ecological community - the woodland birds of Australia's highly modified temperate and sub-tropical zone. We describe 1) the process of identifying and describing a recognisable, consistent community of woodland birds; and 2) the process of evaluating the community against the criteria for listing as a threatened ecological community a —the Temperate and Sub-tropical Woodland Bird community—under Australia's Environment Protection and Biodiversity Conservation Act 1999. Our analyses suggest that the community warrants listing as Endangered.

Martini, Denise; Neil Gemmell; Bruce Robertson; Michael Knapp	University of Otago, Department of Anatomy	denise.martini1406@gmail.com	Conservation Genomics of the New Zealand Kaka

Kaka (*Nestor meridionalis*) is a large parrot endemic to New Zealand. The species is at risk of extinction (Endangered in IUCN Red List), primarily due to competition with and predation by invasive pest species. There are currently two recognized subspecies: the North Island Kaka and the South Island Kaka, defined by morphological and behavioural differences (e.g. size, plumage colour, diet). Previous genetic studies have not found enough variability to discriminate between the subspecies, even with high levels of overall genetic diversity, which has led to a degree of taxonomic uncertainty regarding this subdivision. This study aims to further investigate this issue by extending our knowledge into the adaptive variation of the species with a genome-scale analysis. Samples representative of different populations across the species geographical distribution were tested using GBS (Genotyping-by-Sequencing). The comparison at the genome level will enable us to determine whether functional differences have resulted in local adaptation to the diverse biotas that Kaka encounters in its vast latitudinal range across New Zealand. The results of this project will help to better define conservation units for the management of this species, while contributing to our global understanding of the evolutionary mechanisms underlying adaptation and evolution to different environments.

McCarron, Victoria; David Paton	The University of Adelaide	victoria.mccarron@adelaide.edu.au	The Use of Artificial Perches by Birds in the Restoration of a Degraded Coastal Environment

Artificial perches are implemented in restoration projects to overcome seed dispersal limitations. These perches encourage seed-dispersing birds to fly out from remnant areas to rest and defaecate seed in degraded areas, thereby increasing seed dispersal. The ability of artificial perches to increase seed deposition depends upon the ability to attract seed-dispersing birds. The birds in turn influence seed deposition through their ability to disperse seed, diet preferences and perching behaviour. Many studies that investigate artificial perches use fail to quantify the bird use of perches and adequately consider the influence birds have on restoration. We aimed to research this gap in knowledge by investigating the use of artificial perches by birds in the temperate coastal scrublands of the Younghusband Peninsula. Specifically, we aimed to investigate (1) the bird assemblages occupying the perches (2) their ability to disperse seed and how their diet preferences effects the seed deposition to perches and (3) the behavioural traits of birds that influence perch use. In addition, perches can assist with the recovery of other ecosystem services, such as hunting sites for raptorial and insectivorous species, which is briefly considered by this study.

Galen Davitt; Kim Maute; Richard E. Major; **McDonald, Paul G.**; Martine Maron	University of New England	paul.mcdonald@une.edu.au	The short-term response of small woodland birds to the removal of a despotic competitor

Intraspecific aggression by noisy miners (*Manorina melanocephala*) is the key determinant of avifaunal communities in woodlands of eastern Australia. We tested if their large-scale removal can rapidly increase suitable habitat for susceptible bird species from remnants (16 - 49 ha) assigned randomly as either control or treatment (miner removal) sites (n = 12 each). Standardised bird surveys were conducted before and after removal. Despite effective removals, surveyed densities of miners remained high in all sites just 14 days after treatment application. Surprisingly, relative to control sites, there was an increase in richness of all bird species, and an increase in the richness and abundance of small birds in treatment sites that was independent of environmental variables. We suggest that miner removal reduced the ability of recolonising miners to exclude small birds, even at normal miner densities, due to the breakdown of social structures central to the species' despotic behaviour.

McKinlay, Bruce; David Lawrie; Keith Woodley	Department of Conservation, The University of Melbourne	bmckinlay@doc.govt.nz	Protecting estuarine values for migratory birds in New Zealand

In New Zealand estuaries are used by birds in complex and site specific ways and these are subject to change and variation according to multiple factors. The usage of different habitats within and between tidal cycles drives the need to have a range of protective mechanisms to take account of this. They are not land so attempting to create traditional Reserves is not straight forward. Multilateral arrangements such as Ramsar designations are more designed for this space but these do not have the same level of domestic enforcement as a reserve. The East Asian-Australasian Flyway has developed the concept of a Flyway Site network as a mechanism to highlight the connected nature of the Flyway and concept of migrating birds needing resources along the Flyway. Using the Manukau Harbour as an example we describe the current developing work programme for investigating improved protected status for the Harbour and further international recognition as part of the EAAFP Flyway Site Network. Using both domestic migrants as well as Trans-equatorial migrants as focus points allows for engagement with multiple partners surrounding the Harbour. We describe a hierarchy of protective mechanisms that respond to the differing needs.

McQueen, Alexandra; Kaspar Delhey; Anne Peters	Monash University	alex.mcqueen@monash.edu	The cost of seasonal colour change in superb fairy-wrens, Malurus cyaneus

It is generally expected that attractive male ornaments are costly. If this is the case, investment in elaborate ornaments should come at the expense of the resources available for survival. However, testing this is difficult as individuals differ in their total available resources. For example, those with plentiful resources may display the most elaborate ornaments with no evidence of a costly trade-off, while those with limited resources may have both poor ornamentation and poor condition. Male superb fairy-wrens (*Malurus cyaneus*) undergo annual colour change, moulting from dull brown to a bright blue breeding plumage each year. The time of colour change varies from before winter to late spring, and females strongly prefer extra-pair males that become blue earliest in the year. With this in mind, our study used testosterone implants to stimulate males to invest in the early display of blue plumage. This allowed us to test whether the timing of seasonal colour change in superb fairy-wrens is a costly ornament. While there were no obvious adverse effects on survival, behaviour or social status, we predict that the early moult will come at the expense of energetic and immune resources.

Meillère, Alizée; François Brischoux; Frédéric Angelier	Centre d'Études Biologiques de Chizé (CEBC), Deakin University	alizee.meillere@gmail.com	Growing up in a noisy world: does noise pollution influence avian phenotypic development?

Expanding urbanization dramatically transforms natural habitats and exposes birds to novel environmental challenges (e.g., habitat degradation, increased noise, light and chemical pollutions), often leading to reduced species richness and diversity in cities. However, the proximate mechanisms through which urbanization affects birds are still poorly understood. Among other anthropogenic stressors, noise pollution has recently received great attention because of increasing evidence that high noise levels can have major impacts on birds. While the effects of noise exposure on adult birds have been widely studied, surprisingly, the effects on developing birds have received very little consideration. In this study, we experimentally exposed free-living house sparrows (*Passer domesticus*) breeding in nest-boxes to either traffic noise or rural background noise during the whole breeding period and focused on the impact of such disturbance on nestling phenotypic development (growth, stress physiology, metabolism, telomeres). Importantly, we found that despite the absence of any obvious immediate consequences (growth and fledging success), nestlings reared under noisy conditions showed shorter telomeres compared to their unexposed neighbours. Since telomere (the protective ends of chromosomes) length appears to be a promising predictor of longevity, these results indicate that noise pollution can affect avian development with possible life-long consequences for developing birds.

Merigot, Hayley J.; David C. Paton	The University of Adelaide	hayley.merigot@adelaide.edu.au	Strategic revegetation: Rebuilding landscapes for nectarivorous birds

In the heavily cleared Mt Lofty region most remnant woodland patches produce floral resources only suitable for honeyeaters for parts of the year. As floral resources in an area wane honeyeaters are forced to move in search of nectar elsewhere. In highly fragmented landscapes such movements are risky. Remnant woodlands typically consist of 1-3 prominent eucalypt species. Although these species may flower at different times of the year, the quantities of flowers produced from one year to the next can be highly variable (or absent). To reverse current honeyeater declines, revegetation programs should aim to reduce the frequency with which honeyeaters have to move and ensure more reliable access to nectar resources. Two planting strategies could be used: (1) plant eucalypt species that have complementary flowering times to those of nearby remnant woodlands; and (2) plant new woodlands with a much higher diversity of eucalypts to provide year-round flowering whereby poor flowering in one species is offset by the flowering of others. An example of this is the Monarto woodlands where 15 main species of eucalypts provide year-round nectar supplies. Although honeyeater numbers fluctuate in this area, they are present year-round.

Meyers, Kimberley; Raoul Mulder; Michelle Hall	The University of Melbourne	kmeyers@student.unimelb.edu.au	How do sex, personality and context influence song complexity in superb fairy-wrens

The vocal repertoires of many songbird species are highly complex. Comparing vocal complexity between species and between individuals has shed light on the role song plays in mate-attraction and intrasexual competition. However, few studies have tested variations in repertoire use to determine in what contexts an individual songbird might sing with low diversity (low switching rate) or high diversity (high switching rate). We studied repertoire use in superb fairy-wrens (*Malurus cyaneus*) by comparing the switching rates of males and females of different personality types. Switching rates during spontaneous song did not differ between the personality types or between the sexes overall. However, males and females differed in switching rates in different contexts. We also tested experimentally whether the personality types responded more aggressively to playback of low or high switching rates. This included comparing a subject's switching rates during simulated territorial intrusion to their switching rates during spontaneous singing. With an improved understanding of how switching rates vary among individuals and in different contexts, the function of complex vocal repertoires in songbirds will be better understood.

Karina Cartwright; **Miller, Kim**	Healesville Sanctuary	kmiller@zoo.org.au	Matchmaking for Helmeted Honeyeaters: Optimising pairing decisions to improve reproductive outcomes

A captive breeding program for the critically endangered Helmeted Honeyeater (*Lichenostomus melanops cassidix*) has been running since 1989, resulting in the release of ~250 birds to the wild. Decisions on pairing and re-pairing of birds within and among breeding seasons has varied greatly over the 28 years' of the program. Re-pairing is typically initiated based on the lack of breeding activity of a pair, but no formal assessment of the data underlying these re-pairing decisions has been undertaken. In this study, we looked at breeding outcomes of individual pairs of Helmeted Honeyeaters over a 15-year period to optimise pairing decisions and reproductive output within the program. The number of days between pairing and nest building was not correlated with breeding outcome. As the number of failed clutches produced by a pair increases, the chance of producing viable clutches decreases. Further, as the number of years a pair fails to produce eggs increases, the chance of producing eggs decreases. Pairs that had 100% egg failure for a year had less than 50% chance of producing chicks in another year. These results enable more effective decision-making, which can improve the productivity of the captive population and support the wild population.

Miltiadous, Anna; Ondi L. Crino; Katherine L. Buchanan	Deakin University	amilt@deakin.edu.au	CORT as a mediator of maternal reproductive performance in the Zebra Finch (*Taeniopygia guttata*)

In response to changing environmental conditions, avian mothers have been shown to adaptively affect their offspring's phenotype, behaviour and physiology via hormone deposition to the egg. However, the role of maternal stress for determining embryonic development remains largely untested. In this study, Zebra Finch females were remotely dosed with either corticosterone (CORT), the principle avian stress hormone, at around the time of ovulation (treatment), or with the oil vehicle alone (control). We tested the effects of this experimental treatment on the timing of breeding and evaluated the impact on egg size and composition. Females each produced two clutches of eggs, in a balanced order, one under each treatment. The data show that treatment affected reproductive performance in terms of latency to lay and egg mass. Female zebra finches initiated a clutch more quickly when exposed to CORT at ovulation, than when breeding under control conditions, and also produced lighter eggs. Furthermore, our data shown that CORT was transferred to the egg yolk, demonstrating the potential for maternal CORT allocation to affect embryonic development, with implications for the offspring. These data demonstrate the potential for maternal stress to affect reproduction, with considerable implications for conservation management, through captive breeding programs.

Morgan, Dai K. J.; Oliver J-P. Ball; Nathan Arcus; Darren Gash; Tanya Cook; Jenny Gillanders	NorthTec	dmorgan@northtec.ac.nz	The effect of habitat type and edges on the composition of exotic and native bird species across an urban landscape

Urban landscapes are a mosaic of different habitat types that range from heavily modified residential and industrial zones to contiguous forests. Few studies have investigated the change in species composition as habitat transitions from modified 'urban' areas to forest fragments. We conducted five-minute bird counts in Whangarei city along a series of urban–forest gradients such that exotic and native species composition in urban count stations >150m, 50-150m and 0-50m from a forest fragment were able to be compared to the same variables collected from forest fragment count stations 0-50m, 50-150m and >150 from urban areas. Exotic species richness was greatest in urban areas with abundance highest at distance bands furthest from forest fragments and lowest >150m from urban habitat. The opposite was true for native species; however, some native species (sacred kingfisher and pukeko) were most abundant between habitat types. Our results showed that native species richness and abundance increased as distance from modified habitat increased; therefore, management of larger urban fragments should have priority over smaller fragments. Research into mitigating the negative impact edge effects have on native species should be undertaken to promote diversity in these areas.

Newman, Mike	omgnewman@bigpond.com		Status of Rufous Scrub-bird at Gloucester Tops, NSW

An isolated population of Rufous Scrub-birds *Atrichornis rufescens* in a high altitude area of the Gloucester Tops has been surveyed in spring annually since 2010. The species is classified as Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Thirty-seven Scrub-bird territories were identified in the survey area. Twenty of these territories had long-term occupancy, with records from at least three successive years and in most cases, records from all or most years. The other territories were more transitory, occupied for one or two years, but then with no further records, or else a long gap between records. Usually, Rufous Scrub-bird territories were well-spaced, with separations of 300-400m or more between the territory centres. Under apparently favourable conditions, territories sometimes were clustered more closely together, but this seemed unsustainable. In each case, one of the clustered territories eventually was abandoned. Our findings at Gloucester Tops are compared with other studies, both contemporary and 30 years earlier, throughout the species' range. At Gloucester Tops scrub-bird numbers have been sustained over a 35 year period, but its status may be more precarious elsewhere. Reasons for concern and the future outlook for the species will be discussed.

Onley, Isabelle R.; Matthew R. E. Symonds; Janet L. Gardner	Deakin University	ionley@deakin.edu.au	Effects of climate change on morphology of Australian Whistlers and Shrike-thrushes

Bird bills have many functions, including feeding, defence and communication. These keratinized structures also play a part in thermoregulation; by pumping blood through the bill, heat can be lost to the external environment through radiation, a process which also occurs through the tarsus. Using measurement data from museum specimens of eight species of Australian Whistlers and Shrike Thrushes, we aimed to test whether the thermoregulatory properties of the bill and tarsus have resulted in geographical variation in appendage size in accordance with Allen's Rule, where larger appendages correspond with warmer climates to increase the efficiency of thermoregulation. We also examined whether rising temperatures in the past 100 years have resulted in an increase in average bill and leg size, potentially indicating an impact of anthropogenic climate change on avian morphology.

Paton, David C.	University of Adelaide	david.paton@adelaide.edu.au	Developing more effective monitoring programs for woodland birds

Woodland birds are usually monitored using 2-hectare 20-minute surveys. This method often fails to efficiently detect changes in abundances and distributions, in part because many woodland birds have home ranges much larger than two hectares. This standard method simply counts birds detected in 20 minutes without recording behaviour. I propose an alternative survey method that encompasses a larger area and employs a systematic searching technique. This method involves mapping the location of each bird sighted and recording bird behaviour and the plant species being used. Recording the locations of birds allows other parameters such as "area of occupation" and "extent of occurrence" within patches of vegetation to be calculated, along with a measure of abundance. Furthermore, repeating the counts at different times of the year allows seasonal changes in abundances, distributions and use of resources to be determined, providing a better understanding of changes over time. These systematic and detailed area searches identify patterns in the locations and resources that different birds are using, allowing a greater understanding of causes of population change; information that simple counts of birds cannot provide.

Paton, Fiona L.; David C. Paton	University of Adelaide	fiona.paton@adelaide.edu.au	The consequence of unregulated flows in the Murray Darling Basin for shorebirds in the Coorong

The Coorong is a wetland of international importance, providing a drought and summer refuge for thousands of waterbirds. During these periods, the presence of extensive areas of gently-sloping shoreline, covered with shallow water, makes the Coorong particularly important for shorebirds (migratory and endemic waders) that wade in shallow water to forage. However, in summer 2011 and 2017, water levels in the Coorong were so high that water encroached upon the terrestrial fringing habitat and the amount of mudflat covered by no more than a few centimetres of water was considerably reduced. Consequently, areas of suitable foraging habitat for shorebirds, particularly shorter-legged species like sandpipers, stints and plovers, was scarce. Over these summers, the Coorong supported far fewer shorebirds, including fewer stilts, sandpipers, and plovers, with abundances in January 2017 of Banded Stilt and Sharp-tailed Sandpiper equivalent to just 1% of their long-term medians. These high water levels were a consequence of a constricted Murray Mouth, caused by low flows during the intervening years and a dredging program that failed to provide easy egress of natural and unregulated flows. Under current management, this will continue and so identifying and managing alternative wetlands to support shorebirds may be required in high-flow years.

Annika Mae Lamb; Han Ming Gan; Chris Greening; Leo Joseph; Yin Peng Lee; Alejandra Morán-Ordóñez; Paul Sunnucks; Pavlova, Alexandra	Monash University	alexandra.pavlova@monash.edu	Climate-driven mitochondrial selection: a test in Australian birds

Diversifying selection between populations that inhabit different environments can promote lineage divergence within species and drive speciation. The mitochondrial genome can be a target for climate-driven selection because it encodes essential proteins of the oxidative phosphorylation system. We investigated whether Pleistocene climate changes drove mitochondrial selection and evolution within Australian birds. First, using phylogeographic analyses of a mitochondrial ND2 gene for 17 bird species, we identified mitochondrial clades (mitolineages). Second, using distance-based redundancy analyses, we tested whether climate predicts variation in intraspecific genetic divergence beyond that explained by geographic distances and geographic position. Third, we analyzed 41 complete mitochondrial genome sequences representing each mitolineage of 17 species using both codon models and a biochemical approach to identify signals of selection on mitochondrial protein-coding genes and test for parallel selection in mitolineages of different species existing in similar climates. Of 17 species examined, 13 had multiple mitolineages. Climate was a significant predictor of mitochondrial variation in eight species. At least two codons could have evolved under positive selection in specific mitolineages of two species. These findings support climate-associated selection driving evolution of the avian mitochondrial genome, and call for direct tests of the functional and evolutionary significance of mitochondrial protein variation.

Marion Chatelain; **Pessato, Anaïs**; Adrien Frantz; Julien Gasparini; Sarah Leclaire	Deakin University	pessato.anais@gmail.com	Pollution and communication: effects of trace metals on feather colouration and odour in the feral pigeon

Trace metals are chemical pollutants emitted in great amount by human activities and are a major environmental issue nowadays. Previous studies demonstrated their negative or positive effects on body condition, immunity and reproductive success in birds. Because of their effects on bird condition, trace metals are likely to influence the production of condition-dependent plumage colours and odours that may be used as quality signals during sexual display. We used an emblematic urban species in Europe, the feral pigeon (*Columba livia*), to investigate the effects of lead and zinc (experimental and natural exposition) on two types of colourations (iridescent and melanic) and on odour. Both experimental and correlative studies showed that lead exposure decreased iridescent feather brightness and melanic feather reflectance in the green-wavelength. By contrast, zinc exposure increased melanic feather reflectance in the violet-wavelength. Lastly, zinc, but not lead, increased odour richness. Our study suggests that exposure to environmental pollutants altered iridescent and melanic colourations as well as odours, probably by affecting the ability of birds to produce feathers and to cope with feather bacteria. However, future studies should investigate whether these metal-induced modifications of plumage colouration and odour affect behaviours involved in sexual selection.

Peters, Andrew	Charles Sturt University	apeters@csu.edu.au	Love and the dove: how columbid biology, ecological entrapment, spill-over and deep time gave rise to one of humanity's most prevalent STIs

Trichomonas gallinae is amongst the earliest known avian pathogens and can be the bane of pigeon fanciers and falconers alike, causing fatal oral abscesses in their birds. *Trichomonas vaginalis* is the most prevalent non-viral sexually transmitted infection of people and is implicated in obstetric complications and the spread of HIV. What could the origin of these two congenerics possibly have in common? The story of *Trichomonas* origin and evolution begins early in the Palaeogene and is deeply intertwined with radiation and ecological adaptation of columbids in post-Gondwanan Sahul. The association of this protist genus with columbids is no accident and may relate to their peculiar method of rearing young. Host entrapment in the fruit-doves associated with dietary change appears to have preserved the earliest lineage of *Trichomonas* while continental-scale diversity and abundance of columbids, columbid population structure and plate tectonics of the late Tertiary have shaped *Trichomonas* diversity and expansion and, ultimately, have given rise to the establishment of Trichomonas in a rather unusual niche: the human reproductive tract.

Potvin, Dominique A.; Kasha Strickland; Joel W. G. Slade; Elizabeth A. MacDougall-Shackleton; Celine Frère	University of the Sunshine Coast	dpotvin@usc.edu.au	Using social network analysis to interpret song dialects and song sharing in passerines

In many biological fields, technological advancements that facilitate data acquisition often precede our ability to analyse the collected data effectively. In the case of studying animal vocalizations such as birdsong, our capacity to record and interpret acoustic data has opened up many opportunities for objective studies of behaviour, evolution, physiology and ecology. However, the analysis of such datasets is often very context-dependant. Thus, there is no universal consensus in the field of bioacoustics as to how such data should be partitioned and analysed statistically, especially when incorporating ecological or life history data. We test the application of a new technique – that of social network analysis – to categorical bird song datasets and compare our results to previously employed methods. We show how our understanding of cultural evolution, song sharing and the ecology of birdsong can benefit from the application of this technique. Furthermore, this exercise provides another excellent example of the advantages of sharing methodologies across disciplines within behavioural ecology and ornithology, and the value of collaborative approaches.

Pritchard, Rachel A.; Michael Magrath; Kristy Penrose; Steven Davidson; Craig Morley; Paul Rushworth; Christine Hartnett; David Williams; Andrew Silcocks	Department of Environment, Land, Water and Planning	Rachel.Pritchard@delwp.vic.gov.au	A Beacon of Hope? Trial releases of Orange-bellied Parrots in their non-breeding range as a method to improve survival of naturally migrating birds

The migratory Orange-bellied Parrot is perilously close to functional extinction in the wild. Recovery is dependent on effective population supplementation combined with measures to improve low survival in the wild for juveniles and adults. In particular, juvenile survival during the non-breeding season has become critically low in recent years. This change is not explained by deterioration of non-breeding habitat. However, in a species where adults show high site fidelity in the non-breeding range, and juveniles are believed to migrate without the company of adults, could the presence of conspecifics be an important cue in habitat choice for young birds? Here, we report on the first year of a four-year trial to release Orange-bellied Parrots into non-breeding habitat, with the dual intent to trial an alternative population supplementation strategy and create occupied habitat to serve as a beacon to attract naturally migrating juveniles. Eight of the eleven birds released in April survived at least two months post-release, and remained at the release site. Encouragingly, this loose flock was joined by five naturally migrating birds: two adults known to overwinter at that site, one adult not previously recorded at that site, and two juveniles.

Reece D. Pedler; **Ribot, Raoul F. H.**; Andrew T. D. Bennett	Deakin University	raoul.ribot@deakin.edu.au	The mysterious nomadic banded stilt: long-distance flights and high-risk breeding on desert salt lakes

Banded stilts (*Cladorhynchus leucocephalus*) are extreme nomads, breeding colonially on remote salt lakes of inland South and Western Australia after spatially and temporally unpredictable rainfall. How they do this is an enduring mystery. Individuals were hypothesized to have only one or two chances to breed during their long lifetime, when flooding rain fills desert salt lakes and triggers mass brine shrimp hatching. Over 6 years, we satellite-tagged 57 individuals, conducted aerial surveys over numerous desert salt lakes to detect nesting colonies and analyzed 3 decades of satellite imagery to quantify salt lake flood frequency and extent. We found that within days of distant inland rainfall, individuals flew 1,000-2,000 km to reach remote flooded salt lakes. We detected nesting episodes across the species' range at seven times the frequency reported during the previous 80 years. Satellite imagery revealed twice as many flood events sufficient for breeding-colony initiation as recorded nesting episodes. Banded stilts took risks on uncertain breeding opportunities by responding to frequent minor flood events between infrequent extensive flooding, exemplifying the extreme adaptability of species exploiting unstable environments. We will discuss physiological and navigational mechanisms that could enable their nomadic strategy and conservation challenges that threaten banded stilts.

Rogers, Danny I.; Peter Menkhorst; Kasey Stamation; Richard Loyn; Maarten Hulzebosch; William K. Steele	Arthur Rylah Institute for Environmental Research	drogers@melbpc.org.au	Challenges and opportunities in managing shorebird habitat in Western Port Phillip Bay

The Werribee-Avalon complex supports internationally significant shorebird numbers on the western side of Port Phillip Bay, Victoria. It includes (1) the Western Treatment Plant (WTP), a large active sewage treatment facility managed by Melbourne Water; (2) Avalon Saltfields (Avalon), formerly a commercial saltworks, but 'mothballed' in recent decades; in 2017 much of Avalon was transferred to Parks Victoria and future management plans are unresolved. The WTP and Avalon are ~ 10 km from one another, shorebirds sometimes move between the two, and in some respects they provide similar habitats for shorebirds (notably Red-necked Stint, Curlew and Sharp-tailed Sandpipers), with a complex of small tidal flats and constructed non-tidal ponds in which water levels can be managed. However shorebird usage of the two sites is influenced by marked differences in salinity, nutrient enrichment and constraints on water level management. We summarise how shorebirds select their preferred habitats within the WTP and Avalon, and discuss knowledge gaps and the habitat management challenges in retaining or enhancing the conservation values of these sites for shorebirds. We suggest complementary habitat management of the WTP and Avalon could be beneficial to shorebirds, expanding the current program of sequential management of conservation ponds at the WTP.

Rollins, Lee Ann; Katherine Buchanan; Phillip Cassey; Craig D.H. Sherman; William B. Sherwin	University of New South Wales	l.rollins@unsw.edu.au	21st Century starlings: an emerging model for evolutionary studies in the Homogocene

Starlings (*Sturnus vulgaris*) are one of the most commonly studied avian species worldwide and one of only three birds included on the IUCN's list of the "World's Worst Invasive Alien Species". The combination of our rich understanding of starling biology and ecology, together with its incredible success at colonizing and adapting to new environments, makes it ideal for the study of evolution. Further, the starling genome has recently been sequenced, improving our ability to identify genes underlying these adaptations. To date, starlings have been best utilized as a model for rapid evolution during invasion in Australia, where they have prospered over the past 160 years since introduction. Here, I will review our knowledge of their current global distribution and evidence of their evolution in Australia and abroad, and describe current evolutionary research we are conducting. The latter includes analyses of full genome sequences from 30 individuals taken from the native range and two invasions, which will be used to investigate the presence of signatures of selection, deepen our knowledge of recent selection on the invasion front in Western Australia and test hypotheses generated by our current reduced representation sequencing data from individuals sampled across Australia. Finally, these data will enable us to conduct a comparative genomics project in collaboration with researchers working on Indian mynas *(Acridotheres tristis*), another key Australian invasive avian invader.

Roman, Lauren; Elizabeth Bell; Chris Wilcox; Denise Hardesty; Mark Hindell	University of Tasmania, CSIRO	lauren.roman@utas.edu.au	Plastic ingestion in Australasian seabirds

Australasia is the seabird capital of the world, home to 66 Procellariiforme seabird species. Procellariiforme seabirds are the world's most threatened group of birds, with nearly half of the world's species experiencing population declines, and almost 40% threatened with extinction. The ingestion of marine debris, particularly plastics, is a rapidly increasing threat to seabirds worldwide. Recent marine debris risk modelling has highlighted the oceanic region between the Southern Ocean and the Tasman sea as the highest risk region for marine debris and seabird interaction globally. Despite the potentially significant conservation issue that marine debris ingestion poses to Procellariiformes globally, very little is known of extent and impact of plastic ingestion among Australasia's 66 Procellariiforme species, and nothing is known about the mortality that results from marine debris ingestion. Here I will present the largest study of plastic ingestion globally in Procellariiforme seabirds to date. The data collected results from autopsies conducted over the past four years on over 1700 individual seabirds of 53 species. We will present the findings of the study, discuss the implications for seabird populations, and make world first mortality predictions using the current incidence of marine debris ingestion among Australasian seabirds.

Schultz, Hendrik; Rebecca Hohnhold; Graeme Taylor; Sarah Bury; Stefanie Ismar; Anne Gaskett; Craig Millar; Todd Dennis	School of Biological Sciences, The University of Auckland	hsch167@aucklanduni.ac.nz	Sex-specific differences in space-use and diet of Chatham Island brown skuas

Sexual size dimorphism is thought to drive sex-related differences in foraging behaviours of seabirds. In this study, we used high-resolution GPS telemetry in combination with stable isotope analysis to study movement patterns and dietary preferences of brown skua (*Catharacta antarctica lonnbergi*), a reversed sexually dimorphic seabird. We collected 102 high-resolution GPS tracks (at five-minute intervals) and blood samples from 64 individual brown skuas across three consecutive breeding seasons. We show that males and females consistently differed in space-use patterns and dietary signatures. While females foraged extensively on sheep carcasses on nearby farmland, males were more inclined to hunt at sea and prey on burrow nesting petrels. Our findings suggest that, during breeding, differences in foraging behaviour may be at least partly driven by the pronounced size differences among the sexes, a result with potential conservation implications for this population.

Simmonds, Jeremy; James Watson; Martine Maron	The University of Queensland	j.simmonds1@uq.edu.au	How much have we lost? Estimating losses of terrestrial bird habitat in Australia

Many Australian birds are threatened with extinction, and are recognised as such in national- and state-level legislation. The number of listed threatened species is frequently used as a metric to quantify and compare human impacts on biodiversity. But many species have been locally extirpated from most places within their range, even if they remain classified as 'least concern'. These species—the majority of our avifauna—contribute substantially to ecosystem function and integrity, and yet their loss is rarely captured by metrics that describe the status of and threats to biodiversity. We test a more inclusive way to measure human impacts on biodiversity. By using two continental-scale spatial vegetation datasets, and a database of Australian bird habitat associations linked to these spatial data, we produce species-specific local extirpation maps for 463 terrestrial bird species. Based on these maps, we present simple, easily-understood metrics of lost habitat for Australia's land birds, and for subcomponents of the assemblage. This index allows for objective comparisons of human impacts on multi-species assemblages, and has potential as a tool for communicating and tracking declines of habitat for all species, common and rare.

Smith, David	Charles Sturt University	davidgregsmith@gmail.com	Using long-duration acoustic data to track irruptive species—a comparison of analytical approaches to localise needles in haystacks

Acoustic recorders are becoming increasingly popular for monitoring acoustically active fauna, allowing high-resolution data to be collected at previously unattainable scales. Resultant 'big data' presents a significant challenge for analysis, necessitating reliable and efficient methods of automating or streamlining workflow. Automated classification approaches are effective for monitoring many species, however not all species' vocalisations are suited to these techniques and reliable classifiers must often be built by software engineers. False-colour spectrograms are a recently developed technique for visualising long-duration audio recordings that use various acoustic indices to accentuate biological signals, allowing confirmation of species' presence in a 24-hour period by reviewing a single image. Here I have used these visualisations to detect Black Honeyeaters *Sugomel niger* and Pied Honeyeaters *Certhionyx variegatus*, poorly known, irruptive nectar nomads, using acoustic data collected continuously over 3 years from four passive sensors in Northwestern NSW. Results suggest that this technique has the potential to provide reliable records of species presence, allowing large acoustic datasets to be reviewed in a timely manner without requiring specialised skills. Having generated hourly presence/absence data across multiple years, I discuss emergent insights on determinants of distribution, scalability, and wider relevance of acoustic monitoring for ecological research and environmental reporting.

Steven, Rochelle	The University of Queensland	r.steven@uq.edu.au	Citizen Science and Australian Threatened Species Recovery - reviewing current programmes and practices

Professional researchers do not have the capacity and resources to adequately monitor all threatened species in Australia. Thus, the effectiveness of recovery efforts to stem population declines cannot be evaluated or measured accurately for all species. Citizen science is increasing in popularity to act as both a tool for deeper engagement with science, nature and conservation, while also alleviating the burden of collecting data about a species or recovery actions in its habitat. Despite the clear potential of citizen science to play a key role in reversing the concerning trends in biodiversity loss, and demonstrated benefits to environmental awareness, it remains unclear what attributes make a citizen science programme effective for delivering threatened species recovery. We will present a review of citizen science programmes that assist in threatened species recovery and are administered by a broad range of stakeholders and governmental and non-governmental organisations. By using a mixed-methods approach, our findings give a cross sectional analysis of the role of citizen science in conservation and build a best practice framework for optimising the capacity of future citizen science programmes to achieve their objectives and deliver benefits for threatened species.

Stone, Zoe; Elizabeth Tasker; Martine Maron	The University of Queensland	z.stone@uq.edu.au	Understanding habitat requirements for successful reintroduction and persistence of the Northern Eastern Bristlebird (*Dasyornis brachypterus*)

The northern population of the Eastern Bristlebird has declined by 80% since the early 1980s. Today the estimated wild population size is 40 individuals. A captive breeding programme is currently underway, and future reintroductions are imminent. For reintroductions to be successful, understanding threats that continue within habitat, and habitat characteristics that allow for persistence, is vital. We aimed to identify habitat elements that are associated with persistence of wild birds in order to assist with determining suitable reintroduction sites and management needs. Bristlebird presence was most strongly influenced by grassy forest habitat patch size, grass structure and fire history. Large habitat patches with tall, thick grass structure were identified as important habitat characteristics. Persistence was also related to recent fire history, with shorter mean fire intervals for the last 3 fires associated with bristlebird presence. The association of grassy forest with frequent fire with bristlebird presence contrasts markedly to the heath habitats and less frequent fire needed by the southern Eastern Bristlebird population. We suggest that reintroduction sites for the Northern population should focus on large habitat patches close to existing territories with tall grass structure. If these characteristics are maintained through appropriate fire management, bristlebird recovery may be achieved.

Stuart, Alan		almarosa@bigpond.com	An altitudinal study of the birds of the Gloucester Tops

The Gloucester Tops in NSW are part of the 76,512ha Barrington Tops National Park. They comprise essentially natural habitat ranging in altitude from around 300m to above 1500m. Very little has previously been documented about the birds which occur in this isolated remnant island of alpine woodland. Annual surveys in spring since 2010 involving a large team of volunteers completing more than 300 surveys overall have allowed comparisons of the bird populations at high altitude (above 1200m) and low to mid-altitude (300-500m) in the Gloucester Tops. Several species, such as the Rufous Scrub-bird *Atrichornis rufescens*, Crescent Honeyeater *Phylidonyris pyrrhopterus* and Olive Whistler *Pachycephala olivacea*, were only recorded at high altitude. Conversely there were a number of lower altitude specialists including Russet-tailed Thrush *Zoothera heinei*, Green Catbird *Ailuroedus crassirostris* and Regent Bowerbird *Sericulus chrysocephalus*. There were also many generalist species which were more widely distributed. Key findings from the annual surveys will be presented as well as preliminary results from surveys at altitudes between 500m and 1200m. The study highlights the extent to which species like Olive Whistler, Rufous Scrub-bird and Crescent Honeyeater are restricted to a diminishing habitat island.

Sunnucks, Paul; Alexandra Pavlova	School of Biological Sciences, Monash University	paul.sunnucks@monash.edu	Incorporating evolutionary processes into avian conservation

Human impacts on bird populations worldwide overwhelmingly result in reduction of the numbers of individuals, geographical ranges, and increased isolation of population fragments. The ecological consequences of these impacts have received much attention, whereas their evolutionary genetic consequences have been subject to much less consideration. In fact, there is no sensible distinction between ecology and evolution in biological conservation. The key evolutionary processes of concern in conservation are the fitness consequences of genetic variation for individuals and populations, and the potential for adaptation to environmental pressures. It is an exciting time in conservation biology in this regard, owing to a genuine technical revolution in our ability to understand, quantify and monitor evolutionary processes. We present some examples of how evolutionary processes have been assessed in bird species, and scope how such information can be incorporated into practical avian conservation.

Symonds, Matthew R. E.; Gabrielle Pavlovic; Michael A. Weston	Deakin University	symonds@deakin.edu.au	Evolution of thermoregulatory behaviours in birds

Birds have a range of behaviours that they use to adapt to their thermal environments. These may include distinctive postural behaviours that alter the proportion of exposed to insulated body surfaces: standing on one leg, and back rest (where the bill is tucked under the plumage). These behaviours have long been assumed to be used to reduce heat loss from exposed appendages (legs and bills) in cold conditions, but we have almost no knowledge of their prevalence across bird species, nor the ecological factors which have driven their evolution. Using an ornithological expert elicitation approach we collated data on the use of back rest and standing on one leg behaviour for 852 bird species. Using a phylogenetic comparative analysis we identified significant phylogenetic signal in both behaviours, being common to certain bird orders, but rare in others. Back rest has evolved more frequently in species at higher latitudes and in species with relatively larger bills. Standing on one leg is associated with species with relatively longer legs but smaller bodies. Both results indicate the evolution of these behaviours is related to environment and morphology, and mostly likely is associated with the need to mitigate heat loss across exposed body surfaces.

Trewin, Kate; Raoul Mulder; Karen Rowe	University of Melbourne, Museums Victoria	trewink@student.unimelb.edu.au	Cockatoo screams suddenly useful

Automating the process of species identification in long-duration audio field recordings can greatly improve the speed and reliability of ongoing monitoring, particularly for species of conservation concern. However, creating robust automated identifiers is challenging, as most attempts result in high error rates. In this study we test the performance of three different vocalisation template-matching algorithms (Hidden Markov Models, Binary Point Matching, and Spectrogram Cross Correlation) using an array of south-eastern Australian parrots. Many Australian parrots have shown population declines over the past 14 years, suggesting a greater need to monitor the population dynamics of individual species. For each species, we created automated identifiers using the three algorithms separately based on vocalisations recorded in the field. We then tested the performance of each identifier using a standardised field recording, quantifying identification errors and evaluating the trade-offs for each identifier in terms of specificity and sensitivity. Results from this analysis will be used to determine which algorithm works best for each species, enabling recommendations for identifier use in parrot monitoring. More generally, these results can inform us how automated recognition can be used to address a range of questions relating to monitoring and management efforts for species of conservation concern.

Udino, Eve; Thierry Raclot	Deakin University, Université de Strasbourg	evudie@gmail.com	The level of body reserves and environmental constraints affect the reproductive output in Adelie penguin

According to life-history theory, long-lived birds tend to maximize the current reproductive attempt as long as their survival is not compromised. This tradeoff could be unbalanced by environmental constraints, particularly harsh in Polar Regions. In most seabirds, including Adélie penguins, reproduction involves long-term fasting. Below a threshold in body reserves, metabolic and endocrinal changes occur that stimulate a refeeding behavior and lead to a nest desertion. The aim of our study was to determine how body reserves influence the reproductive output of Adélie penguins in relation to environmental constraints. We analyzed data collected at Dumont d'Urville (Adélie Land, Antarctica) from 2005 to 2015. We found that reproductive success varied greatly between years (0% to 93%). These variations are tightly linked to sea ice conditions, particularly extended from 2011 to 2014. In addition, body mass at the beginning of the breeding season and at departure to sea (to refeed) differed significantly regarding the reproductive output between years. By contrast, the rate of body mass loss was similar. Therefore, the initial level of body reserves is critical for sustaining fasting, and hence for reproductive output. Interestingly, environmental conditions also affect the stage at which birds failed their breeding attempt.

Veltheim, Inka; Michael McCarthy; Richard Hill; Simon Cook	Federation University	Inkaveltheim@students.federation.edu.au	Single wetlands are not enough – brolgas (*Grus rubicunda*) use multiple wetlands within their breeding home ranges

Built infrastructure such as wind farms and power lines can impair wildlife movement. These barriers may displace individuals from key habitats due to direct mortality or disturbance. An understanding of animal movements can help avoid such impacts and manage population level effects. In south-west Victoria, the threatened brolga is at risk of collisions and habitat displacement due to wind farm infrastructure. Avoiding impacts and implementing mitigation strategies is difficult because of a lack of information on the species' movements and home range requirements. We address this knowledge gap and present findings that should be incorporated into management of brolga breeding habitat. We deployed 11 GPS transmitters on pre-fledged brolga chicks in 2010–2012, including one at a wind farm. The chicks moved 442m on average, to and from night roost wetlands, within a 24-hour period (range: 0m–1964m). The average breeding home range size was 228 ha (Brownian Bridge movement model 95% UD) but varied greatly between individuals (51ha–521ha). Brolgas used either single or multiple wetlands, and those using multiple wetlands either switched between them or relocated permanently. Within their breeding home ranges brolgas appeared to select against buildings and watercourses but showed no selection for land use type.

Verdon, Simon J.; Simon J. Watson; Michael F. Clarke	La Trobe University	s.verdon@latrobe.edu.au	Saving the mallee emu-wren: Translocations, burning and everything between

In fire dominated systems, fire is the main tool for land managers to promote biodiversity. The theory goes that by maintaining a mix of fire age classes, more species will have their preferred fire age available as habitat. Recently, managers have adopted the geometric mean of relative abundance (GMA) to determine the mix of fire ages which most effectively promotes biodiversity. This metric assumes that the effect of fire is uniform within a vegetation type and a region. However, we have found that *Triodia scariosa* exhibits multiple post-fire succession pathways, based on small-scale changes in elevation. Failing to incorporate multiple succession pathways for *Triodia scariosa* will undermine the GMA results for many species. In this study, we focussed on the mallee emu-wren which is an endangered*, Triodia* dependent bird species. We found evidence that the mallee emu-wren also has multiple fire-responses based on elevation, as it tracks *Triodia* vegetation. The accuracy of GMA outputs may be increased by developing separate fire response curves at different elevations for the mallee emu-wren. This study highlights the need to understand the mechanisms underlying the fire responses of fauna.

Watkins, Abigail M.; Michelle Green; Christa Beckmann	Deakin University	awatk@deakin.edu.au	Does the use of spider web as nest material result in higher nest predation rates in the Grey Fantail (*Rhipidura albiscapa*)?

Given that nest predation is the leading cause of nest failure in most songbirds, we would expect birds to adopt behaviours that minimise nest predation rates. For example, placing nests in concealed locations, reducing activity levels near nests to avoid attracting predators and using camouflaged nest materials. Although many birds use spider web to bind camouflage material to nests, grey fantails coat the outside of their nest with spider web but do not cover it with camouflage material, leaving the web visible. Spider web reflects UV light and most birds (including nest predators) can see in the UV spectrum. Therefore, leaving exposed spider web on the outside of nests might enhance the nest's visibility to avian predators, thereby increasing nest predation rates. To test if spider web wrapped nests experience higher rates of nest predation, we placed 200 artificial nests in the field, half of which were wrapped in spider web. Each nest contained one real egg and one plasticine egg. We found that daily nest survival was consistently higher for control nests than nests wrapped in spider web, indicating there is a predation cost in the use of spider web as an external nest covering in the grey fantail.

Watson, David M.; Annie Hobby	Institute for Land, Water and Society; Charles Sturt University	dwatson@csu.edu.au	Measuring resource availability for ground-foraging insectivores

Most terrestrial birds are insectivores, but obtaining comparable estimates of food availability is challenging, constraining our understanding of resource-based determinants of occurrence. Ground-foraging insectivores have undergone widespread declines and, while food availability has been implicated, definitive data are lacking. Here, I review existing approaches to measure epigeic invertebrates, demonstrating key shortcomings in their resultant estimates of prey availability. I compare existing methods used to measure nectar and fruit availability, illustrating the need for exclosures to partition the standing crop into available, consumed and remaining resources. I then describe a novel application of small-scale mesh exclosures to measure epigeic invertebrate availability in woodlands, generating repeatable estimates of available, consumed and remaining prey. In addition to enabling direct comparisons of prey availability in different microhabitats and habitats, this approach yields an overall estimate of community-level insectivory in both quantitative (total biomass) and qualitative (main prey groups preferentially consumed) terms. I conclude with a detailed series of hypotheses to drive further work on ground-foraging insectivores, highlighting their key roles in connecting below-ground and above-ground food webs.

Westerhuis, Erin; Christine Schlesinger; Keith Christian; Catherine Nano; Steve Morton	Charles Darwin University	erin.westerhuis@cdu.edu.au	Bird assemblages in the river red gum woodlands of central Australia: distinct and predictable?

Ephemeral desert rivers dominated by river red gums (*Eucalyptus camaldulensis subsp. arida*) are considered resource rich ecosystems in the broader arid matrix and are particularly important for many arid zone birds, particularly hollow nesting and canopy dwelling species. In recent decades, invasive grasses and associated increasing fire frequency and intensity have become a significant issue for the long term value of these rivers in the MacDonnell Range Bioregion in central Australia. Despite the importance of these woodlands for arid zone bird assemblages, the temporal patterns in central Australian river red gum bird assemblages remain poorly understood. Our aim is to investigate patterns in bird assemblages across periods of contrasting resource availability within desert river systems and identify important structural drivers of bird assemblages. We use data from seasonal bird surveys in river channels, floodplains and adjacent mixed Acacia woodland across the MacDonnell Range Bioregion to investigate how stable and distinct riverine bird communities are over time. Our results are discussed in relation to the importance of riverine woodlands for biodiversity in the MacDonnell Range Bioregion.

Wille, Michelle; Simeon Lisovski; Marcel Klaassen; Aeron Hurt	WHO Centre for Reference and Research on Influenza, Peter Doherty Institute for Infection and Immunity	michelle.wille@influenzacentre.org	Serological analysis in migratory shorebirds to assess exposure risk and incursions of highly pathogenic avian influenza into Australia

Highly pathogenic avian influenza (HPAI) H5 viruses are continuing to cause outbreaks in poultry and wild birds globally, with devastating economic consequences. While most outbreaks are linked to poultry trade, outbreaks outside Asia have been linked to viral introductions by wild migratory birds. Shorebirds (Charadriiformes) are a known reservoir for avian influenza viruses, and migrate to Australia via East and Southeast Asia each year. We aim to quantify the exposure of Red-necked Stint (*Calidris ruficolis*) to HPAI H5 viruses following their annual southward migration. Red-necked Stint are a model study species as an individual using a stop-over site in Hong Kong recently tested positive for HPAI H5 virus. Over 1000 blood samples were collected from 2011-2017 from Red-necked Stint in Australia and screened for anti-NP antibodies against influenza. 18.8% (244/1296) of the population contained antibodies against avian influenza. Using a panel of antigenically different HPAI H5 viruses, positive samples will be further assessed for evidence of previous exposure to H5 viruses. HPAI H5 viruses have never been detected in Australia, and whether the barrier is (1) birds no longer shed virus when arriving in Australia, (2) birds die following exposure, or (3) birds are not exposed, is unknown.

Williams, Emma M.; Colin F. J. O'Donnell, Doug P. Armstrong	Massey University, Matuku Ecology, Department of Conservation	bittern.wills@yahoo.com	Cost benefit analysis of acoustic recorders and other methods as solutions to sampling cryptic species

Monitoring species that are difficult to detect (cryptic) is challenging as sampling designs often become dictated by what is feasible rather than what is desired. We trialled several monitoring options including the use of scent dogs and acoustic count methods to develop a monitoring method for use on Australasian bitterns (*Botaurus poicilioptilus*) in New Zealand. Specifically, we conducted a cost benefit analysis of several acoustic recorder options being considered as solutions to sampling restrictions limiting the monitoring of bitterns at large wetland complexes (>7000 ha). We found that recording devices provided call count data comparable to those collected by field observers but at a fraction of the cost, meaning 'idealistic' sampling regimes, previously thought to be too expensive, become feasible. Scent dogs and other acoustic methods also showed promise. However, we found that each method had its own strengths and weaknesses, and that these needed to be balanced in relation to several site-specific logistic constraints and species-specific cryptic characteristics. Our study is one of the few to show the monetary value of recording devices in the context of data quality, as well as to indicate how a range of monitoring options can be applied to threatened cryptic species programmes.

Wilson, Caroline M.; Beth Mott; Janelle Thomas; Holly Parsons	BirdLife Australia	caroline.wilson@birdlife.org.au	The Powerful Owl Project: understanding Sydney's nocturnal residents

Despite their vulnerable status, Powerful Owls can survive within major cities within their range; though increasing urbanisation is likely to impact their long-term persistence. Using citizen science, the Powerful Owl Project has monitored Powerful Owls in Sydney since 2011, providing detailed information on their ecology and breeding behaviour. Here we provide results from the project and discuss management implications. Within 81 Powerful Owl breeding territories across Sydney, breeding success was 80% in 2016/17, with an average fledging rate of 1.24 chicks/year; comparable to previous breeding seasons. Powerful Owls commonly nested within *Angophora costata* and the average width of hollow entrances was 44.2cm. Radio-tracking revealed that owls in highly urbanised areas travelled greater distances within 24 hours than owls in less urbanised areas, and highlighted the importance of urban green spaces for commuting owls. Powerful Owl diet varied seasonally and with levels of urbanisation, and car strikes were the main cause of mortalities. The Powerful Owl Project has incorporated 350 volunteers to date, and engaged the wider community through education and media outlets. The project has been successful in driving management recommendations, including identifying critical nesting habitat, and mapping mortality hot spots in conjunction with local land managers.

Zhao, Meijuan; Robyn Atkinson; Margaret Bennett; Maureen Christie; Ken Gosbell; Bethany J. Hoye; Penny Johns; Simeon Lisovski; Clive Minton; Rob Patrick; Marcel Klaassen	Deakin University	meijuanzhao1@gmail.com	Shifting migratory behaviour along a rapidly changing flyway: Ruddy Turnstones of the East Asian-Australasian Flyway

Spatial and temporal adjustments to movement patterns are critical for long-distance migrants to overcome rapid environmental changes. Yet few studies have investigated the extent of phenotypic flexibility, in both timing and site use, of migratory behaviour. Using individual movement records from over 60 Ruddy Turnstones (*Arenaria interpres*) we found that, at the population-level, pre-breeding migration has advanced significantly over the last seven years, with notable changes to site use during both pre- and post-breeding migration. However, we also investigated changes in individual timing and site use by examining individuals tracked over at least two successive annual cycles. Although population patterns suggest considerable phenotypic flexibility, this pattern may be confounded by the initial attachment of geolocators, which affected pre-breeding departure date in the first year of deployment. Evidence from one individual tracked over four consecutive years also suggests such initial geolocator effect. Individual Ruddy Turnstone showed considerably less change in stopover site use between years than seen at the population level. Given that migratory behaviour was highly repeatable at the individual level, but rapidly changing at the population level, we suggest that microevolutionary processes, rather than phenotypic flexibility, may have led to the observed changes in migration behaviour.

Speed Talks

Authors (Presenting author in bold)	Institution	Email address	Title
Amaya-Perilla, Catalina; Sean Walls	Lotek Wireless Inc	camaya@lotek.com	Tracking bird migration: What technology is out there and what can we do with it

For four decades VHF radio tracking has offered a much deeper insight into avifauna than binoculars and a notebook can offer. Since the turn of the century, new technologies have reduced in size and power consumption to the extent that they are becoming suitable for use on progressively smaller species. Tracking highly-migratory or dispersing species becomes a reality where it was difficult-to-impossible using beeper radio tracking. Improved location accuracy and reduced power consumption allow much finer spatial and temporal scale studies to be conducted. For small migratory species, the Motus Wildlife Tracking System provides an international collaborative research network that uses a coordinated array of automated logging radio-receivers to track the movement and behaviour of small flying organisms. Geolocators and Store on Board GPS provide a solution for small migratory species that can be recaptured after a long term study. For bigger migratory species, GPS with remote download and PTT Satellite tags can provide a solution. However, the challenge of a wider range of options can make the selection of the most appropriate technology difficult. In this talk we look at the different technologies and discuss how they can be used for migratory birds no matter what their size is.

Dickerson, Ashton L.; Michelle L. Hall; Therésa M. Jones	The University of Melbourne	ashtond@student.unimelb.edu.au	The effect of the lunar cycle on nocturnal song in the willie wagtail, Rhipidura leucophrys

Song is integral to the fitness of birds as it functions to attract mates and defend territories, yet it is unknown why some day-active species sing at night and whether nocturnal song is affected by variation in natural levels of light at night over the lunar cycle. Understanding how nocturnal song is affected by light at night is a pressing issue as recent global shifts in urbanisation have created an artificial night-time environment that is often ten times brighter than nature. We recorded the nocturnal song of willie wagtails, *Rhipidura leucophrys*, over full lunar cycles in dark areas during the breeding season. By using automatic song detection software, we extracted the song rate of wagtails and examined whether there was a relationship between song rate and moon phase while controlling for environmental factors. Our research highlights the effectiveness of automatic song detection software and will reveal the effect of natural light at night upon nocturnal song behaviours. This project will next expand to understand whether nocturnal song is influenced by artificial light at night.

Ekanayake, Kasun B.; Michael A. Weston; Peter Dann; Duncan Sutherland		kasun.irawana@gmail.com	A Corvid Congregates to Exploit the Eggs of a Colonially Breeding Burrow-nesting Seabird

This study tested the hypotheses that Little Ravens (*Corvus mellori*) are major egg predators of a burrow-nesting Little Penguin (*Eudyptula minor*) colony at Phillip Island, Victoria and that ravens congregated to the penguin colony during the penguin breeding season to prey on eggs. Predation was monitored using remote-sensing cameras at burrows and raven abundance was estimated by conducting counts on 15 line transects once every month for one year. Overall, clutches in 61% of monitored burrows (n = 203) were depredated by ravens. Analysis of burrow characteristics revealed two distinct types of burrows, only one of which was associated with egg depredation by ravens. A distinct temporal shift in raven abundance coinciding with the penguin breeding season was evident with the abundance peaking at 407 ravens in October. The lowest abundance estimate of 100 ravens was in February, during the non-breeding season of penguins. The high rate of clutch loss highlights the need for population viability analysis of the penguin population to assess the effect of egg predation on population growth rates. The congregation of little ravens at the little penguin colony implies that ravens may have learnt to exploit the plentiful sub-surface food resource of penguin eggs.

Hamilton, Neil; Allan H. Burbidge; Sarah Comer; Tegan Douglas	WA Department of Biodiversity, Conservation and Attractions	neil.hamilton@dbca.wa.gov.au	Safe radio-tracking harnesses for a variety of birds using elastic rubber bands

Radio-tracking can provide information on foraging routines, roosting behaviour, dispersal, territorial boundaries, survival of translocated birds and social interactions both within and between species of birds. It is particularly useful for the study of cryptic species and in dense habitats. Harnesses have been used to attach transmitters successfully for many species, particularly larger birds where attachment is relatively simple and effective. On smaller birds, it is harder to get the tension right – too tight can cause injury, while too loose increases the risk of snagging, especially for birds inhabiting dense vegetation. Our objective was to develop a harnessing technique for small-moderate sized birds, such as Noisy Scrub-birds (*Atrichornis clamosus*), that would allow longer and safer retention times, particularly in dense vegetation. We required a novel approach to radio-track a variety of birds for longer periods to obtain maximum return for effort in answering a range of different management questions. We tested rubber-band harnesses in aviary trials for small/medium ground-dwelling birds, using King Quail (*Coturnix chinensis*) as a surrogate for species using dense vegetation. This technique has since been used successfully on a variety of bird species including Noisy Scrub-bird, Western Yellow Robin (*Eopsaltria griseogularis*) and Cocos Buff-banded Rail (*Gallirallus philippensis*).

Labbe, Aurelie M. T.; Nic Dunlop; Michael Calver; Mike van Keulen	Murdoch University	aurelie.mt.labbe@gmail.com	Age effects on the breeding performance of bridled terns (*Onychoprion anaethetus*) breeding in south Western Australia

The effects of age on the breeding performance of marine birds has been documented in many species and have implications for using seabirds as monitors of their environment. Age effects on the breeding performance of bridled terns (*Onychoprion anaethetus*) had yet to be researched and was the topic of this study. Two approaches were used: the breeding performances of birds from the Penguin Island colony in south western Australia were recorded along with egg and chick variables across three consecutive breeding seasons, and the chicks' diet was investigated using faecal DNA meta-barcoding methods. No difference in the egg and chick variables was found between parents of different ages and no difference in diet was found either. This could indicate a lack of effect of age and associated breeding experience on the breeding performance of bridled terns post-egg-laying which contrasts with many other species of marine birds. Furthermore, there appeared to be a possible decoupling of biological and chronological age in this species as found in the low levels of pentosidine-containing collagen, a biological marker of age, in patagial skin samples.

Martens, Johanne M.; Helena S. Stokes; Mathew L. Berg; Ken Walder; Shane Raidal; Michael Magrath; Andy T. D. Bennett	Deakin University	j.martens@deakin.edu.au	Beak and Feather Disease Virus in wild Australian psittacine birds

Infectious diseases are of major concern to conservationists, because they can have profound effects on host reproduction and survival resulting in severe population declines. Beak and Feather Disease Virus (BFDV) affects many parrot species world-wide and is listed as a "key threatening process to biodiversity" by the Australian Commonwealth Government. It leads to chronic and usually fatal disease. Little research has been done on BFDV prevalence, transmission dynamics and fitness impacts in the wild. We therefore aim to determine prevalence and impacts of infection in wild Crimson Rosellas (*Platycercus elegans*) and other psittacine birds. We collected blood samples from adult breeding *P. elegans*, as well as their offspring at two ages, which gives us unique data on infection status and reproductive success. We recorded weight, size and mortality to estimate body condition and fledging success. The presence of BFDV was determined using real-time PCR, and the results give new insights into prevalence, transmission dynamics from parent to offspring and the fitness costs of infection. This study provides the first robust test of these effects in wild Australian parrots. We discuss how the results could aid the development of new tools to manage the risks posed by BFDV to biodiversity.

Mula Laguna, Juan	James Cook University	juan.mulalaguna@my.jcu.edu.au	Habitat requirements of the endangered Black-throated Finch southern subspecies

The Black-throated Finch southern subspecies (*Poephila cincta cincta*) is an endangered bird endemic to open woodlands in north-eastern Australia. Over the last four decades, this subspecies has suffered an 80% contraction in its extent of occurrence due to changes in land use, primarily linked to the expansion of pastoralism. These changes, aggravated by proposed development projects within remaining Black-throated Finch habitat, pose major threats to the future persistence of the southern subspecies. Urgent conservation action is needed, yet available information is still scarce. The increasing rarity of southern Black-throated Finches, often found in low numbers and patchily distributed, has hindered the study of their remaining population size, distribution and habitat requirements. This lack of data has limited effective conservation management. Our research, targeting the habitat characteristics of the Black-throated Finch southern subspecies across its known range, reveals its most fundamental habitat requirements. Additionally we test the success of bioacoustic monitoring techniques in the detection of Black-throated Finches, which could aid in the identification of important conservation areas disregarded in the past. Outcomes of our study provide tools for researchers and managers to learn more about the Black-throated Finch southern subspecies and design conservation plans to aid its conservation.

O'Neill, Lisa; NIcholas Carlile	Office of Environment and Heritage, NSW	lisaoneill@westnet.com.au	Disaster calls for the Love Machine

In June 2015, a fox went on a killing spree in the Endangered Population of Little Penguins in Manly, Sydney at the start of the breeding season. In less than a week, 27 penguin bodies were found. In response, people and resources came from everywhere. Local community members kept a vigil on site for weeks. Eventually five foxes were killed in the immediate area. While the loss of so many individuals was catastrophic in a small population of less than 100 pairs, the impact reached further as breeding areas were disturbed by the necessary human interventions and long term penguin pair bonds were broken necessitating new mates to be found over time. Breeding fell by 40% that season, and all activity at one site ceased. After a second silent season at this site, a sound attraction system (the love machine) is now filling the breach. An emergency response plan has also been shaped with the benefit of hindsight. Monitoring for feral incursion is now constant and rapid response times for application of trapping and removal of feral pests have been developed. A recent fox incursion at the start of this season was detected and the animal eliminated within two nights.

Roper, Erika M.; Michael Craig; Richard Hobbs	The University of Western Australia	erika.roper@research.uwa.edu.au	Diet and novel food resource use of a threatened black-cockatoo in the urban environment

The traditional habitat of the threatened forest subspecies of the red-tailed black-cockatoo (*Calyptorhynchus banksii naso*) is the Jarrah forest of south-western Australia. Since 2000, *C. b. naso* has occurred with increasing frequency in the heavily urbanised Perth Metropolitan Area, adjacent to the Jarrah forest. There are now several resident urban populations. Urbanisation alters the landscape, changing the availability of important resources. This can lead to behavioural adaptations in animals that reside in urban areas. The traditional food of *C. b. naso* is the seeds of Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*), which are the dominant tree species in the Jarrah forest. The recent range expansion of *C. b. naso* is believed to be due to their discovery and exploitation of a novel food source, the exotic ornamental tree Cape Lilac (*Melia azedarach*), which is commonly planted on streets and in gardens around Perth. This talk will present findings of the diet and foraging behaviour of urban and forest cockatoos. Processing times of traditional and novel foods will be discussed. The findings of this study provide detailed information on behavioural modification caused by urbanisation, and will increase our understanding of the effect of urbanisation on the forest red-tailed black-cockatoo.

Rowell, Thomas A. A. D.; Michael Magrath; Bronwyn McCulloch; Bruce Quinn; Robert Magrath | Australian National University | u4568679@anu.edu.au | Novel predator awareness training in captive-bred Helmeted Honeyeaters

Captive-bred individuals often suffer predation after release into the wild, in part because of loss of anti-predator behaviour. Conservation programs therefore often train captive individuals to recognize predators. We suggest that individuals could also be trained to recognise alarm signals of species resident at the release site. Many birds give alarm calls to warn of predators, and often learn to recognise other species' calls, thereby giving them additional warning of danger. We used such a training strategy on the critically endangered helmeted honeyeater. First, we tested the response of wild helmeted honeyeaters to playbacks of their own alarm calls and those to two common heterospecifics. Birds responded to heterospecific alarm calls in the same way as to conspecific alarm calls, implying that call recognition training could enhance survival of released birds. Second, we trained independent young in captivity by subjecting them to alarm call playbacks paired with appearance of a live predator. Preliminary results suggest that both trained and control birds responded similarly to alarm calls, probably because aviaries are adjacent to a natural environment including alarm calling species and their predators.

Ryeland, Julia; Ricky Spencer; Kate Umbers; Clarissa House | Western Sydney University | julia.ryeland@westernsydney.edu.au | The disappearance of the iconic emu

The emu (*Dromaius novaehollandiae*) is a national symbol, occurring across the entire continent. In urban and semi-urban areas however, emus are now rare, particularly along the east coast of Australia. Through VHF tracking of adults and chicks, monitoring of nests, and camera trapping, we aim to determine the role of predation in limiting populations in the east by understanding the role of predation in reproductive success. Predation is both a threat during incubation and at the fledging stage of the emu, and the role of feral predators to the persistence of the emu in the east of Australia is vital in understanding eastern population viability. This information will be used to conduct a population viability analysis for four east coast New South Wales population of emu. Re-establishing emus in many semi-urban areas may have significant implications for dispersal of seeds of native plants, influencing ecological community structure and composition, as well as having value for environmental education and public engagement (being an iconic Australian emblem).

Stokes, Helena S.; Johanne Martens; Mathew Berg; Yonatan Segal; Ken Walder; Andy Bennett | Deakin University | hsstokes@deakin.edu.au | Investigating transmission of zoonotic infections between parrots and poultry

Chlamydia psittaci is a pathogen that causes disease in many bird species globally. It is also transmissible to humans, where it causes a severe respiratory disease ('psittacosis'), and has caused disease outbreaks in the poultry industry. Despite these threats, little is known about *C. psittaci* prevalence and transmission dynamics involving wild birds, and thus the health impacts on wild populations and risk of disease transmission to other species remain largely unquantified. *C. psittaci* is particularly prevalent in the Psittaciformes order, with more than 45% of parrot species susceptible. In Australia, parrots are hypothesised to be the main natural hosts. We collected blood, feather and swab samples from the abundant crimson rosella (*Platycercus elegans*) and other wild parrot species, and tested for *C. psittaci* using PCR. We have also sampled free-range layer chickens on six farms in the same region. We present our findings on *C. psittaci* prevalence in both parrots and poultry, and discuss the potential for transmission between these wild hosts and domestic species. Our results will inform the conservation and agricultural threat posed by *C. psittaci* on wild and domestic avian hosts.

Vieco, David; Isabel Castro; Patrick Morel; Wei Hang Chua	Massey University	d.vieco@massey.ac.nz	Incubation ecology of Kiwi: From the egg structure to nest architecture

The incubation ecology of Kiwi (*Apteryx*) is still a perplexing subject, being particularly difficult to study due to the threatened status of the different kiwi species. Using scanning electron microscopy and spectrophotometry we have measured the thickness, the mammillary density, pore density and coloration of 48 eggshells of four different species of kiwi correlating our findings to environmental variables. Thickness of the eggshell increases in southernmost species but cuticle thickness increases inversely in northernmost species, we identified pore protein meshes that regulate gas exchange. We describe the egg thermodynamics in relation to the nest insulation properties and environmental temperatures for Brown kiwi (*Apteryx mantelli*) determining the cooling rate of the egg and the nest in relation to the male attendance patterns. Kiwi presents very unique incubation patterns and its peculiar biology make is a fundamental species to study to understand the evolution and constraints of incubation in birds.

Znidersic, Elizabeth; Michael Towsey; Anthony Truskinger; David M. Watson; Paul Roe	Institute for Land, Water and Society. Charles Sturt University	eznidersic@csu.edu.au	Sounding out wetland birds—automated classification techniques for acoustic data

Wetland bird species such as rails and bitterns are detected primarily from their vocalizations. Survey reliability depends on surveyor skill, effort, calling behaviour of target species and weather conditions, with prolonged surveys and multiple visits needed before an absence can be reliably inferred. Long-duration acoustic monitoring has the potential to extend survey effort, reducing disturbance and allowing high resolution monitoring of multiple sites simultaneously. Resultant data, however, necessitate a reliable automated process for analysis and interpretation. Here, we compare approaches of automated classification in terms of both reliability and cost using a notoriously secretive marsh bird, Lewin's rail *Lewinia pectoralis brachipus* in Tasmania, Australia. Acoustic sensors were deployed at 4 known breeding locations of Lewin's rail for 10 days, collecting continuous audio data, recordings reviewed with a customized species-specific call recognizer and false-colour index spectrograms. Although the contact 'kek kek' call were readily detected, high rates of false positives necessitated manual reviewing of all detections to ensure accuracy. On several occasions where rails were known to occur (detected with camera traps), no vocalizations were identified by the recognizer. We recommend semi-automated acoustic monitoring as an effective means to increase detection probabilities of rails, bitterns and other low-detectability species.

Posters

Authors (Presenting author in bold)	Institution	Email address	Title
Awan, Mahmood A.; Zahid Bahtti;	Lahore High Court, Lahore Pakistan	786fightforright@gmail.com	Presence and efficacy of birds protection and management law at Pakistan

Pakistan is occupying such a geographically important position that makes it an ideal location for diverse biodiversity especially for birds. The diverse habitats of Pakistan from plans to mountain peaks along with network of wetlands are inhabited by numerous resident and migratory birds. The present research work was planned to access the existing laws and their efficacy for conservation and management of avian diversity. Last ten years data of avian diversity was analyzed for this purpose. Field trips, meeting with local community and concerned departments were also arranged. Findings revealed that annually 700, 000 to 1, 200,000 birds including some threatened species like White Headed Duck (*Oxyura leucocephala*), Houbara Bustard (*Chlamydotis undulata*) and Siberian Crane (*Grus leucogeranus*) visited different habitats of Pakistan. Different threats like population decline, degradation of habitat, land retrieval, hunting and dearth were also noticed. Different organization for conservation and management of birds like IUCN, RAMSAR, Wildlife Acts, National Conservation Strategy (NCS) and WWF-P were also working here. Pakistan is signatory to numerous worldwide initiatives and is running schemes to save avian diversify. Due to noncompliance of existing law avian diversity is at risk thus strict implementation of birds' protection and management act is need of hour.

Bansal, Natasha; Isabel Castro; William Pomroy	Massey University	tashu.vet@gmail.com	Effects of ectoparasite removal on health parameters in wild occurring north island brown kiwi chronically infested with ticks: a preliminary analysis

Kiwi are endemic to New Zealand and populations are on the decline due to introduced predators. Most high density populations of North Island Brown Kiwi also have large ectoparasites infestations, the effects of which are unknown. In the only population where tick burdens have been quantified (Ponui Island) these can reach up to a couple of hundred ticks per adult bird. The impact of such high concentrations of ticks on adult and kiwi chicks is unknown. The observed infestation levels on kiwi may cause morbidity due to anaemia as well as affect normal physiological processes. Furthermore, *Ixodes anatis* (kiwi tick) is a carrier of haemoprotozoa such as *Babesia kiwiensis* and *Hepatozoon kiwi*, which could also impact the health of the birds. To detect clinical effects of ectoparasites on the host requires a naïve host with no parasites to which the parasites are eventually introduced and health parameters measured. However, the ethical costs of such experiments are high, particularly for endangered animals. Therefore we used ectoparasiticide to successfully manipulate and reduce the tick loads of already infected birds and found there was a significant difference in total protein levels between treated and untreated birds. Other tested parameters and future research options are discussed.

Barati, Ahmad; Rose L. Andrew; Jamieson C. Gorrell; Paul G. McDonald	University of New England	abarati@myune.edu.au	Kin selection and genetic mating system in the noisy miner (*Manorina melanocephala*)

We asked how the genetic relatedness of helpers to breeders and frequency of extra-pair paternity shaped cooperative breeding in the noisy miner (*Manorina melanocephala*). Helpers were primarily male (93%, n=96), despite males comprising only 69% (n=199) of the study population. Helpers across the full spectrum of relatedness, as determined by examination of variance across 14 microsatellite loci, provisioned young. However, the amount of help provided by individual birds increased with an individual helper's average relatedness to breeding pairs. Within breeding pairs, inbreeding avoidance appeared prominent, with 86% (n=25) of breeding pairs being significantly less related to each other than the general population. Noisy miners were not entirely genetically monogamous, as extra-pair mating was detected in 14% (n=11) of offspring, or 27% (n=8) of broods. Extra-pair mating was independent of the degree of relatedness between the breeding pair and was not associated with the recruitment of extra helpers to a nest. Overall, we conclude that kinship is an important driver of helping behaviour in noisy miners, although other types of direct benefits likely play a role in maintaining cooperation in this highly complex social system.

Burbidge, Allan; Neil Hamilton; Tegan Douglas; Bruce Greatwich	Department of Biodiversity, Conservation and Attractions	allan.burbidge@dbca.wa.gov.au	Conservation of the enigmatic and rare Night Parrot in Western Australia

The Night Parrot is an enigmatic and rare nocturnal species of the Australian arid zone that has, until recent years, eluded searchers, hence surrounding it in mystery and giving it the status of the 'Holy Grail' for bird watchers. Recent sightings of this little-known species in WA have raised its profile. Conservation management is complex and made harder because of the lack of data relating to the biology and ecology of the species - it has a high profile, but is highly cryptic and occurs at very low densities and is very poorly known. It occurs on multiple land tenures, and presumed threats are diverse (altered fire regimes, introduced predators, introduced herbivores, loss or degradation of habitat through deliberate disturbance and climate change). There are also multiple groups of stakeholders, including Native Title claimants, DBCA, the mining and pastoral industries, and NGOs (especially BirdLife, BHA and WWF), along with bird watchers chasing the 'holy grail'. Management to date has involved liaison with land owners/managers, protection of sites from fire and predators, and formulation of guidelines for surveys, particularly for EIA. Good relationships between Traditional Owners and other stakeholders will be essential for lasting conservation outcomes.

Cassels, Renee J.	James Cook University	renee.cassels@my.jcu.edu.au	A rare case: Habitat specialisation and cooperative breeding facilitates the persistence of an understory insectivore in rainforest fragments

Habitat loss and degradation are among the greatest threats to biodiversity. Within rainforest communities, understory insectivores are disproportionately impacted. Consequently, populations are declining globally. The Pale-yellow Robin (PYR) *Tregellasia capito* is a territorial, understory insectivore known to inhabit small forest fragments where other species have been lost. The literature provides two possible explanations. The most likely being that while not immediately detrimental, a post-fragmentation crowding effect will ultimately lead to extinction. However, fragmentation is not negative for all species. Traits that confer protective or competitive advantages can facilitate persistence. PYR populations in complex notophyll vine forest fragments (n = 16) on the Atherton Tablelands were studied. No significant changes in territory characteristics or defence behaviour due to a reduction in overall fragment size were found. Group size (n = 65) showed cooperative breeding was employed throughout fragments of all sizes, with no increase in incidence as size decreased. Habitat surveys (n = 112) revealed stem density and ‘wait-a-while’ – both abundant features of disturbed habitat – were significantly related to presence / absence. Contrary to the literature, my results showed PYRs to be a disturbed habitat specialist, with the ability to utilise a cooperative breeding strategy to maximise use of preferred habitat.

Castro, Isabel; Sian M. Reynolds; Maurice R. Alley; Susan J. Cunningham	Massey University	i.c.castro@massey.ac.nz	Apteryx possess a uropygial gland: anatomy and pathology

The uropygial gland is a prominent feature of the avian anatomy but there is limited information on its structure and function. The gland provides a source for volatile chemicals that could be used in communication. The Apteryx gland was located immediately caudal to the cloaca and surrounding the coccygeal bone providing an explanation for its relatively recent recognition. The gland was bilobar with eight primary sinuses, each opening through its own orifice. Primary ducts were compact and branches of connective tissue extending from the capsule internally formed interfollicular septae that grouped follicles into discrete lobules. Striated muscle was present in the capsule, a characteristic unique to Apteryx that may be used in controlling secretion discharge. There were significant differences in the architecture of the follicles between species and sexes suggesting that production, storage and availability of uropygial gland secretion varies. This was supported by changes in live bird’s gland volume between two years of sampling. Atrophy of the gland was seen in two birds in poor condition suggesting that health impacts the functioning of the gland, and providing a possible way for birds to communicate their health status through the production or composition of the secretion.

Connelly, Farley; Raoul Mulder; Michelle Hall	University of Melbourne	connellyc@student.unimelb.edu.au	Street Smarts: impact of anthropogenic noise pollution on cognition in Australian magpies (*Cracticus tibicen*)

Urban areas worldwide are expanding at unprecedented rates, often with devastating consequences for wildlife. Humans generate various forms of urban pollution that may impact wildlife, including anthropogenic noise, artificial light, and chemical toxins. The effect of such pollutants on wildlife physiology and behavior has been extensively studied, but their impact on animal cognition remains poorly understood. Recent evidence suggests that birds from urban and rural environments differ in cognitive performance. This outcome is plausible because anthropogenic stressors are known to disrupt developmental processes including cognitive development, but no study has yet investigated the relationship between anthropogenic pollution and cognitive development. My research examines whether anthropogenic noise pollution alters cognitive performance in Australian magpies (*Cracticus tibicen*) and if it influences health and cognitive development. Utilizing field based cognitive testing and experimental manipulation, I am exploring the effect of anthropogenic noise on cognitive performance and development. Cognitive function directly impacts every aspect of an animal's fitness. It is therefore imperative that we disentangle the mechanisms driving changes to cognition in urban environments, and explore possible solutions to mitigate these impacts.

Cosgrove, Anita J.; Todd J. McWhorter; Martine Maron	The University of Queensland	anita.cosgrove@uqconnect.edu.au	Determinants of food availability for a ground-foraging insectivore differ when the nutritional value of prey is considered

Habitat modifications are causing population declines of Australian woodland-dependent birds. However, little is known about the mechanisms driving these declines. Insectivores are particularly vulnerable, suggesting that reduced arthropod availability may be one such mechanism. However, it may be misleading to assess food availability based on total invertebrate abundance since prey vary in nutritional value. We conducted invertebrate pitfall trapping to examine how eastern yellow robin (*Eopsaltria australis*) prey availability was related to characteristics of the habitat, landscape, and local climatic conditions, and how these relationships changed once the dominant, but less-nutritious, Formicidae were excluded. Robin populations are more vulnerable to declines at sites with less surrounding woodland, so we also assessed how the density of individual prey groups was related to woodland extent. When considering all arthropod taxa, prey abundance was higher in landscapes with less woodland and fewer patches. However, this result was primarily driven by Formicidae responses. Once Formicidae were excluded, soil moisture and, to a lesser degree, grass cover showed the strongest associations with prey availability. Formicidae and Coleoptera were generally inversely related to woodland extent, while Orthoptera showed a positive association. Our results suggest that this species does not experience reduced food availability in less-wooded landscapes.

Etezadifar, Farzaneh; Rose Andrew; Paul G. McDonald	University of New England	fetezadi@myune.edu.au	How genetic structure and sex ratio shape re-colonization patterns of an aggressive species, the Noisy Miner (*Manorina melanocephala*)?

The Noisy Miner (*Manorina melanocephala*) is a widespread, native honeyeater present throughout south-eastern Australia. It is described as a 'reverse keystone' species, given that it has a severe negative impact upon avian diversity through aggressively excluding other species from areas that it occupies. Understanding population dynamics, gene flow between colonies and the importance of relatedness in shaping successful Noisy Miner colonies across fragmented woodlands is therefore an important research priority, to ensure that amelioration methods for Noisy Miner control can be most effective. Experimental culls of Noisy Miners in two focal regions have seen rapid re-colonisation of the cleared sites within 24 hours, indicating that gaining a firm understanding of gene flow and population viscosity between fragments is urgently needed to inform management practice. We present our findings concerning the objective of this study, which is to understand how relatedness and sex ratio variations both within and between colonies shape population movements and dispersal in this social bird.

Garnett, Stephen T.; Stephen Garnett; Brett Murphy; Reid Tingley; John Woinarski; Jenny Lau	Charles Darwin University	stephen.garnett@cdu.edu.au	Anticipating and preventing Australian bird extinctions

Some threatened birds are closer to extinction than others. Identifying those in greatest peril will allow us to prevent it happening. Here we describe the results of a range of modelling and expert elicitation processes to identify how many Australian birds we might expect to go extinct in the next 20 years and which are the most likely taxa. We then describe the actions needed to prevent those extinctions and estimate costs both of preventing extinction and of improving the status of each bird type so that extinction becomes much less likely. Fortunately the numbers of both imperilled taxa and the cost of their rescue are relatively low. We end by describing how BirdLife Australia's Preventing Extinctions program intends to make sure that the predicted extinctions do not come to pass.

Hanke, Petra U.; Diane Colombelli-Négrel; Sonia M. Kleindorfer	Flinders University	petra.hanke@flinders.edu.au	Calling on the kids: Prenatal vocal tutoring by Superb Fairy-wren mothers

The Superb Fairy-wren is a territorial passerine endemic to south-eastern Australia. Using cross-fostering, we have previously shown that the begging call of Superb Fairy-wren chicks is learnt; it consists of one element of a certain call that the female produces during incubation. The higher the copy accuracy achieved by the chicks, the more the chicks get fed. To date, this "incubation call" has not been described in detail. In this study, we look at the similarities and differences between the incubation calls of different females. We examine call structure, element structure and call syntax of females of three study populations in the Mount Lofty Ranges, South Australia. For this, we analysed recordings of 25 incubating females on the nest. We extracted 5 incubation calls per female, and 5 examples for each element type per female. The vocalizations were visualized as spectrograms with RavenPro. We examined call structure (minimum frequency, maximum frequency, bandwidth, duration), element structure (ditto) and call syntax (element order, total number of elements, number of each element). In this paper, we report about our findings, and provide the first comprehensive description of the female incubation call in the Superb Fairy-wren.

Hill, Richard; Vicki-Jo Russel; Tim Burnard; Bronwyn Perryman; Peter Copley; Kerry Gilkes; Martine Maron; David Baker-Gabb; Rachel Pritchard; Paul Koch	Department of Environment, Land, Water and Planning, Victoria	Richard.Hill@delwp.vic.gov.au	Conservation of the South-eastern Red-tailed Black-Cockatoo

The South-eastern Red-tailed Black-Cockatoo, SERTBC, is the rarest sub-species of this widespread cockatoo, restricted to a small region in south-eastern Australia. It feeds almost exclusively on the seeds of two stringybark eucalypts and one *Allocasuarina*. It is endangered nationally. Since 1997 field studies have confirmed that the total population size is a minimum of 1404 birds. The most critical threat are shortages of high quality food crops birds need to breed successfully. Feeding habitat extent is reduced by 46% (stringybark) and over 97% (*Allocasuarina*). The most important threats to quality of remaining feeding habitat is fire (stringybark) and agricultural intensification (*Allocasuarina*). A critical longer-term threat is shortage of large tree hollows. A species recovery program has worked for 20 years with all levels of government, NRM agencies and farming groups to improve statutory protection of key habitats, reduce impacts of fire, protect, enhance and restore habitats in priority areas, identify and protect nesting trees from predators, and increase public awareness and interest in the conservation of this iconic bird. The bird has become an important 'flagship' species leading to improved conservation of the remnant woodlands and paddock trees on public and private lands throughout its 18,000 km2 range.

Kandasamy, Gaya; Devaka K. Weerakoon; Abyerami Sivaruban; H. B. Jayasiri	University of Jaffna, University of Colombo, National Aquatic Research and Resources Agency (Sri Lanka)	vadhana.gk@gmail.com	Spatial variation of coastal waterbirds in eight selected sites in the Northern Province, Sri Lanka

Sri Lanka has a rich marine and coastal biodiversity along its 1760 km coastline. The coastline of the northern region is the longest coastline (403 km) in Sri Lanka. The present study was done to determine spatial variations of waterbirds in eight selected sites in the coastal area from December 2016 to May, 2017. Five of these study sites, Mandaitivu, Mankumban, Kayts, Kapputhu and Nagarkovil are located in the Jaffna District while the other three, Pallai windfarm, Thadduvankoddy and Kavutharimunai are located in the Kilinochchi District. A line transect was established in each site, the entire transect was divided into three counting blocks of 500 m x 500 m. Counting of waterbirds was done by walking along the transect line. Altogether 17 waterbird families were recorded. The highest and the lowest Shannon-Wiener diversity Indices were found in Mandaitivu (3.22) and Kavutharimunai (1.92) respectively. Altogether 16 individuals of the critically endangered Spot-billed Ducks were recorded in the study area, suggesting the importance of conservation of these habitats. It can be concluded that both Thadduvankoddy and Kapputhu are excellent places to observe both migrant ducks and Greater Flamingoes. Large numbers of migrant ducks were recorded in Mandaitivu, Mankumban and Kayts. These are excellent places for avitourism in the region.

Khan, Bushra Nisar; Zulfiqar Ali	University of the Punjab	bushrank2007@gmail.com	Assessment of avian species under peril and threats to their survival at Mangla Dam AJK

The Mangla Dam of Azad Jammu and Kashmir is the 9th biggest dam of the world. This deep fresh water lake is located (33.12 N, 73.39 E) 30 Km North West of Punjab province in Pakistan and emerged as an important water-bird habitat. When considering the significance of wetlands and their conservation status particular emphasis is given to water-birds. To observe avian species under peril and threats to their survival the Mangla dam wetland was visited for three years. During birds' population assessment 188, 186 and 187 species of birds were recorded in three subsequent years through point count method. Among these birds *Sterna acuticauda* was endangered. Some birds were near threatened like *Anhinga melanogaste*, *Prinia burnesii, Aythya nyroca* and *Circus macrourus*. The vulnerable species of site were *Ficedula subrubra*, *Saxicola macrorhyncha* and *Haliaeetus leucoryphus*. The different direct and indirect threats observed here included water pollution, illegal hunting, unsustainable fisheries, deforestation, lack of awareness, poor law enforcement, poverty, illiteracy, uprooting of woody trees and livestock grazing at shoreline and buffer zone. A sustainable management plan has also been designed to manage and protect avian species of Mangla dam.

Kraft, Fanny-Linn H.; Ondi L. Crino; Andy T. D. Bennet; Kate L. Buchanan	Deakin University	f.hovringkraft@deakin.edu.au	Transgenerational effects of stress in song birds

Stress experienced during development can have effects, several of which can last throughout an animal's lifetime. Previous research, both with avian and non-avian models, has shown that some developmental stress effects can even be transferred to the next generation. My PhD research will investigate whether this is the case for avian vocal learning, an important cognitive function in songbirds. I will work on an Australian songbird, the zebra finch (*Taeniopygia guttata*), on which the effects of developmental stress have been extensively studied. Female zebra finches use song to assess male quality, preferring longer and more complex songs. Males finches that have been stressed during early development sing songs with less complexity and shorter motifs, and are less preferred by females, with possible fitness consequences for these males. I will assess the growth and development of birds experiencing elevated stress hormone (corticosterone) levels during early life. I will then assess if experimentally manipulated parental experience has similar impact on their sons' vocal performance. These data could have interesting implications for how we think about vocal learning and song evolution, within the context of sexual selection. My project will test the impact of epigenetic processes on vocal learning, for the first time.

Lermite, Françoise; Salit Kark; Keilah Netto; Andrea S. Griffin	University of Newcastle	francoise.lermite@uon.edu.au	Do noisy miners play a role in the common myna invasion range expansion?

The noisy miner is a highly aggressive bird species whose abundance is negatively correlated with avian abundance and diversity. The species is common in rural areas, but also in urban habitats where introduced birds predominate. The introduced common myna is an evolutionary recent and increasingly common occupant of NSW coastal landscapes. To determine how noisy miner/common myna behavioural interactions might affect the ongoing myna range expansion, we compared noisy responses to the territorial intrusion of a common myna, a conspecific and an unfamiliar bird in both urban and rural environments. We selected noisy miner territories in both long-established (>40 years) and recently-established (<10 years) myna locations. Urban noisy miners displayed higher levels of aggression towards the common myna than towards a conspecific in both long- and recently-established myna locations. We also found that noisy miners did not respond to an unfamiliar bird, or to any species in rural habitats. Overall, rather than forming a barrier to range expansion, noisy miner aggression might help to drive the common myna invasion by repelling mynas from occupied areas and not repelling them from unoccupied ones.

Kyle Ewart; Andrea Griffin; Rebecca Johnson; Salit Kark; Nathan Lo; Tali Magory; **Major, Richard**	Australian Museum	richard.major@austmus.gov.au	Two-speed ecology: Genetic analysis of 150 years of invasion by the Common Myna

The Common Myna is listed as one of the world's top three invasive birds, and after their introduction in 1868, Mynas quickly colonized multiple locations along the east coast of Australia. Recently, the Australian Myna population has experienced a rapid expansion, prompting appeals for their active management. A key element of an effective pest-control strategy is an understanding of dispersal. The aim of this study is to analyse the population structure and demographics of Mynas across eastern Australia to investigate: 1) the accuracy of our current assumptions of historic colonization events, 2) the mode of dispersal in Australia – constant diffusion or sequential-jump dispersal, and 3) the connectivity between the front populations. We used DArTseq to generate genome-wide SNP markers to genotype 445 Mynas from 26 populations across the Australian range. Our results show that historic translocations still account for most population structuring, but there are misconceptions in the historical record regarding the source of some populations. Genetic diversity tends to decline away from the points of introduction, but genetic diversity of populations near the NSW/Qld border is higher due to an admixture event, and this increases the evolutionary potential for Mynas to adapt to new environments.

Mott, Rowan; Ashley Herrod; Rohan H. Clarke	Monash University	rowan.mott@monash.edu	Transboundary priorities for protection of seabird non-breeding habitat in a heavily impacted region

Species that inhabit spatially-distinct regions at different stages of their lifecycle pose challenges to conservation managers, particularly when distributions span international or jurisdictional boundaries. We used global positioning system tracking devices to determine the non-breeding movements of Great Frigatebirds, *Fregata minor*, and Lesser Frigatebirds, *F. ariel*, across much of southeast Asia. These data were analysed with MaxEnt modelling to identify important habitat features for non-breeding frigatebirds and inform priorities for addition to the marine protected area network. Habitat suitability for non-breeding frigatebirds was positively linked to proximity to small islands. Other environmental variables were of only minor importance for determining habitat suitability. The importance of small islands to non-breeding frigatebirds is likely related to the use of this resource for overnight roosting. The existing protected area network contains only a small proportion of habitat identified as optimal for non-breeding frigatebirds. Small islands are a spatially-static habitat feature. Consequently, areas proximate to small islands are likely to remain important for non-breeding frigatebirds into the future provided threats do not intensify. Addition of habitat in close proximity to small islands to the marine protected area network represents a viable strategy for achieving long-term conservation benefits for frigatebirds in this region.

Nugent, Daniel	La Trobe University	d.nugent@latrobe.edu.au	What are the effects of grassland management practices on food resources for the critically endangered Plains-wanderer (*Pedionomus torquatus*) and other birds?

Victoria's Northern Plains Grasslands are an endangered ecosystem and one of the last remaining strongholds for the critically endangered Plains-wanderer (*Pedionomus torquatus*). Over the past 20 years, much of the remaining high-quality grasslands of the Northern Plains have been acquired for conservation and are managed using livestock grazing and planned burning to promote and maintain suitable vegetation structure for the Plains-wanderer. These types of management practices have been shown to significantly influence food resources for birds within other grassland systems, however on the Northern Plains their impact in this regard remains unstudied. This study will determine the effects of livestock grazing and planned burning on food availability and habitat suitability for the Plains-wanderer and other grassland birds on Victoria's Northern Plains. Experimental grazing and burning regimes will be implemented to assess the impacts of different management practices on grassland birds and their food sources. How the Plains-wanderer forages and utilises its habitat will also be explored by tracking individual birds with miniature GPS technology. Understanding how the Plains-wanderer utilises its habitat, and the impacts of management practices on their habitat and food resources, will help guide conservation efforts for this globally significant species.

O'Dwyer, Terence W.; Nicholas Carlile	Office of Environment and Heritage, NSW	Terry.O'Dwyer@environment.nsw.gov.au	Demographic studies of the threatened Lord Howe Currawong in preparation for the eradication of rodents from Lord Howe Island

There is a proposal to eradicate rodents from Lord Howe Island using the anticoagulant, brodifacoum. One species assessed to be at risk from secondary poisoning, is the Lord Howe Currawong *Strepera graculina crissalis*, through the consumption of poisoned rodents. To mitigate the risk to this threatened sub-species it is proposed to put 50-60% of the population into captivity while baiting occurs. This project aimed to estimate the current size of the population and to assess movements of individuals across the island. The results will be used to determine how many currawongs will be taken into captivity and inform the choice of capture locations. The results will also be used as a baseline to assess the fate of currawongs after the baiting program. Mark-recapture methods estimated that the size of the currawong population is 240 ± 10, which is higher than previously published estimates but comparable to a similarly executed study in 2006. Sightings of currawongs distant from their banding location (often soon after) showed that individuals range widely across the island when not in breeding territories. Monitoring is expected to continue after the eradication of rodents to assess how this species responds in the absence of a potentially important competitor.

Perrin, Mike R.; Louise Warburton; Tiwonge Mzumara; Henry Ndithia	University of KwaZulu-Natal	perrin@sai.co.za	Conservation Ecology of African Woodland Lovebirds

Rosy-faced Lovebirds are confined to fragmented, arid woodland savannah in Namibia dominated by *Acacia karroo*. Arid conditions and food security (graminivory) influence sociality and seasonal mobility. Usually breed in the communal nests of Sociable Weavers. Commensalism protects from predation and harsh environment. Black-cheeked Lovebirds are confined to Mopane woodland where they breed in a loose non-cooperative association in Mopane trees with numerous cavities. Main nest predators are snakes, otherwise raptors. Recent declines in range and local extirpations associated with natural aridification and human disturbance at water holes. No captures for trade but for food. Sorghum and millet farming favour them. The near-threatened Nyasa Lovebird has a small population, with a patchy distribution confined to Mopane woodland. Cavity breeders with no double clutching. Feed on fallen grass and herb seeds in the wet season in grassy wetland in in summer in grasslands with tree cover. Incidental poisoning occurs at water holes, and hunting in maize, sorghum and millet fields. In conservation areas the foraging habitat is protected but early season burning is a threat. Climate change causing aridification, and habitat loss and fragmentation, rather than illegal trade, are the main threats to demographic viability.

Pike, Kyana N.; Kate Morgan; Benjamin Ashton; Amanda Ridley	The University of Western Australia	kyana.pike@my.jcu.edu.au	How much do helpers help? Variation in helper behaviour in the cooperative Western Australian magpie

In cooperatively breeding species, the level of investment in young can vary considerably between individual helpers. The causes of variation in helper contributions are a relatively unexplored area of cooperative breeding, and how and why helper effort varies remains unclear. To investigate variation in helper contributions, we assessed patterns of helping behaviour in the cooperatively breeding Western Australian magpie (*Cracticus tibicen dorsalis*). Observations of 29 broods from 11 different groups over two consecutive breeding seasons revealed substantial variation in helper behaviour both within and between groups. Our results suggest that the level of investment in young by helpers is strongly influenced by group size, chick age and helper traits (including foraging efficiency, age and sex). Helping behaviour was facultative, and individuals from smaller groups were more likely to invest in helping behaviour. Overall, the number of broods receiving help was lowest during the nestling phase and highest during the fledgling phase. Female helpers provided more care than both male and juvenile helpers. Helper care was additive to parental care and therefore potentially benefits both parents and the brood. These findings indicate that individual variation in helping behaviour best represents adaptive decision-making in terms of the costs versus benefits of helping.

Retallick, Richard W. R.; Dan Hutton; Linda Broekman	GHD Pty Ltd	Richard.Retallick@ghd.com	The Koondrook-Perricoota State Forest – Waterbird responses to forest flooding

Forestry Corporation of New South Wales undertook flood enhancement works in Koondrook-Perricoota Forest (2011-13) to allow artificial hydrological management of the forest (The Living Murray initiative, MDBA). Water was delivered to the forest in 2014, then to the northern section (the Pollack) in 2015. In 2016, above-average regional rainfall resulted in a large overbank event through the forest. As part of a long-term project, waterbird responses have been monitored annually (aerial and on-ground assessments), documenting bird functional groups (abundance, species richness). Ducks were the most numerous group and the only group to breed (all years) broadly throughout the forest when water was available. Water in 2014 failed to attract colonial-nesting species (large wading birds and piscivores), but water in the Pollack in 2015 attracted small numbers. Water in 2016 flooded the entire forest including the Pollack, and attracted large numbers of these species, but only at the Pollack, rather than other flooded sites. Waterbird use of KP forest appears atypical of Icon sites. Continued monitoring will determine patterns in waterbird use of this red gum forest. Historical accounts suggest the 2016 numbers of breeding Nankeen Night Herons and White-faced Herons may be unprecedented.

Richardson, Emily C.; Kylie Robert; Peter Dann; Ursula Ellenberg; Lauren Tworkowski	La Trobe University, Phillip Island Nature Parks	e.richardson@latrobe.edu.au	Human disturbance effects on little penguins (*Eudyptula minor*): providing baseline data for anticipatory management decisions

The little penguin colony at Phillip Island is Victoria's largest colony, and leading ecotourism attraction. Phillip Island Nature Parks have been monitoring and conducting research on the colony for over 30 years. During this time there have been some studies that suggest that tourism and research may have detrimental impacts. The primary aim of my research is to investigate the costs and consequences of exposure to tourists and researchers, to assist in the management of little penguins on Phillip Island. This will be achieved by measuring penguin heart rate responses, investigating changes in behaviour during energetically challenging times, and by investigating the health and reproductive success of individuals with varying levels of exposure to tourists and researchers. My project will also investigate the effects of tourists on the St Kilda little penguin colony. By comparing these two colonies, results can be applied to and facilitate the conservation of other little penguin populations.

Roast, Michael J.; Marie Fan; Niki Teunissen; Nataly Hidalgo Aranzamendi; Anne Peters	Monash University	michael.roast@monash.edu	Extrinsic drivers of individual variation in baseline immunity in purple-crowned fairy-wrens – a preliminary analysis

Baseline (innate) immune function is presumed to be crucial for survival, however the immune system can be a costly system to operate. Individual investment into immunity may therefore vary according to various extrinsic factors such as parasite pressure, resource availability and environmental conditions. We investigated how extrinsic factors likely to drive variation in immune investment were related to baseline immune function in individual purple-crowned fairy-wrens (*Malurus coronatus*) from an individually colour-banded wild population in the Kimberley region. Blood samples were collected as part of a long term study in May and November each year from 2012-2017, from which the following innate immune parameters were quantified: lysis complement, natural antibodies, haptoglobin (an acute phase protein) and leukocyte profiles. During this period, estimates of parasite pressure, resource availability and environmental conditions, have been made, enabling an assessment of their relation to baseline immune function. Preliminary analyses indicate that group size, and parasite presence in other social group members (i.e. parasite pressure), as well as maximum ambient temperatures are significantly related to some, but not all, immune parameters. Territory quality however, seemed to be unrelated to all immune parameters.

Stenhouse, Peri	University of Adelaide	peri.stenhouse@adelaide.edu.au	Mallefowl in a Changing Climate

Malleefowl are listed as threatened in all states in which they occur. The drivers of their decline include habitat loss, predation and wildfire. Climate change is expected to increase these pressures, exacerbate the decline and even lead to localised extinction. We aim to understand how a drying climate may impact malleefowl and whether they can adapt by recolonising new areas by studying their movement and dispersal abilities within and between habitat patches. We also aim to identify the appropriate size of habitat corridors or patches they use to move, study methods for improving resilience such as reducing herbivore competition and the effects of parasites on malleefowl ecology. We will concentrate on the Eyre Peninsula where large intact areas of habitat are interspersed with smaller patchy areas.

Taylor, Jennifer E.; Murray Ellis	Australian Catholic University	jennifer.taylor@acu.edu.au	Woodland birds in a temperate agricultural landscape

Woodlands in the central wheatbelt of NSW often exist as strips along roads and stock routes, with some larger areas in state forests, but no conservation reserves exist in the area. We determined what bird species were supported by woodlands in this relictual landscape during and after the Millenium drought (2005 to 2014). Repeat bird surveys were used to assess occupancy of 142 randomly-selected 1-ha sites that varied from treeless to continuous vegetation in strips or patches. Almost 200 bird species were detected but 25% of these were found less than three times. Species richness was highly variable among sites but generally low. Noisy Miners were widespread across the area and the most frequently detected species. Some of the co-operative species (Apostlebirds, Grey-crowned Babblers and White-winged Choughs) were widespread and frequently detected. Conversely, Brown Treecreepers were rarely detected, restricted to large remnants or riparian areas and declined through the study period. Most small insectivorous and nectarivorous species were rare, and often restricted to denser, larger, or riparian areas, but some species did show increased reporting rates after the drought broke. While the landscape is now dominated by larger, generalist species, the remnants still hold many species of conservation interest.

Teixeira, Daniella; Richard Hill; Martine Maron; Berndt van Rensburg	The University of Queensland	d.teixeira@uq.edu.au	Bioacoustic monitoring of breeding in the threatened glossy black-cockatoo and the south-eastern red-tailed black-cockatoo

The glossy black-cockatoo and the south-eastern red-tailed black-cockatoo are listed threatened species, the latter being included in the Australian Government's list of top 20 birds for priority conservation. While some populations are monitored annual for flock sizes, monitoring of breeding is usually not undertaken in a formal capacity. This owes largely to the challenges of requiring human observers at nests throughout the breeding season, since these birds tend to be rare, cryptic and often occur on private land. As such, we currently have a limited understanding of the dynamics of breeding and success rates in these birds. Bioacoustic methods may offer a novel alternative for monitoring breeding. As part of my PhD research, I will combine an investigation of vocal behaviour at nests with the development of methods for automated data extraction from sound recordings to detect key vocalisations and behavioural events (e.g. fledging). Moreover, since food is thought to limit breeding success, I aim to examine whether food availability within critical areas affects vocalisations at nests and whether this predicts nest outcome. If successful, the methods developed here will be applicable to the ongoing monitoring of breeding in the glossy black-cockatoo and the south-eastern red-tailed black-cockatoo.

Thomas, Janelle; Bruce Quin; Sue Tardif; Merryn Kelly	BirdLife Australia	janelle.thomas@birdlife.org.au	Strong partnerships: working to secure the Helmeted Honeyeater's future

The Helmeted Honeyeater (*Lichenostomus melanops cassidix*) is listed as 'Critically Endangered', under the Environment Protection and Biodiversity Conservation Act 1999, due to its limited population size and restricted distribution. Starting in 1989, the Helmeted Honeyeater Recovery Program has reduced the threat of extinction of this taxon through research, monitoring, adaptive on-ground management and extensive community engagement. Key objectives guiding the recovery include, increasing the wild population size via releases of captive-bred individuals and securing, improving and increasing suitable habitat. Since 2013 the wild population has tripled, growing to approximately 190 individuals; the highest recorded population since 1989. Contributing factors include improved habitat quality, an expanded supplementary feeding program, the introduction of predator awareness training to captive released birds and spring releases. Importantly, the success of this program owes much to its significant volunteer contribution, which provides the capacity to deliver essential recovery actions and community engagement. Future project objectives will include, focusing on securing a sustainable population at Yellingbo, whilst identifying and establishing new reintroduction sites. Enhancement and expansion of suitable habitat will be a priority, through hydrology works, revegetation and landholder partnerships. Increasing the genetic diversity of the Helmeted Honeyeater will continue to be a crucial recovery action.

Tworkowski, Lauren A.; Ursula Ellenberg; Peter Dann; Kylie Robert	La Trobe University, Phillip Island Nature Parks	l.tworkowski@latrobe.edu.au	Anthropogenic climate change: Are little penguins feeling the heat?

During recent heat waves, increased little penguin mortalities have been observed at Phillip Island, Victoria. Though well insulated for foraging in cold waters, little penguins have a low heat tolerance and can become hyperthermic when temperatures persistently exceed the upper limits of their thermoneutral zone (~27 °C). Impacts of heat stress on little penguins are further exacerbated during incubation and moult, where penguins are constrained to land in the hottest months of the year. This study will compare microclimates of artificial and natural burrows across Phillip Island, and determine whether burrow type or location influences reproductive success. Using novel technology to examine heat stress in a minimally intrusive way effects of ambient temperature on thermoregulatory costs of breeding and moulting penguins will be assessed. Findings will facilitate effective mitigation of extreme nest microclimates through vegetation management, burrow insulation and strategic nest box placement. In southern Australia, mean temperature increases of 2.7 - 4.2 °C are predicted by 2090. However, we are already observing increased maximum temperatures, higher frequency of hot days and longer duration of heat waves. Given current projections, a better understanding of how this species will be impacted by climate change is required.

Whitehead, Edin A.; Anthony J. Hickey; James C. Russell; Katie M. O'Reilly; Brendon J. Dunphy | The University of Auckland | ewhi650@aucklanduni.ac.nz | First insights into age effects on haematology in petrels

Seabirds are extraordinarily long-lived, but studying the implications of this longevity is challenging due to the inability to accurately age birds. Unprecedented access to a Grey-faced petrel (*Pterodroma gouldi*) colony on Auckland's west coast has enabled a comprehensive long-term monitoring project since the late 1980s. This presents a unique opportunity to investigate potential age effects on physiology with birds of known age. As one of northern New Zealand's most common endemic petrels, Grey-faced petrels are a robust study species in which to investigate physiological parameters. Haematology offers a wealth of information about the condition of a bird, and can be assessed easily from small blood samples. Breeding age birds between 5-30 years old were sampled to compare haematological condition indices across ages. Results show no significant decline in haematological parameters across the age range of Grey-faced petrels sampled, suggesting that there exist physiological minima of oxygen delivery which must be met regardless of age. Such results provide important insights into baseline physiological measurements and the implication of these findings is discussed in relation to the life history and ongoing conservation of Procellariiformes in general.