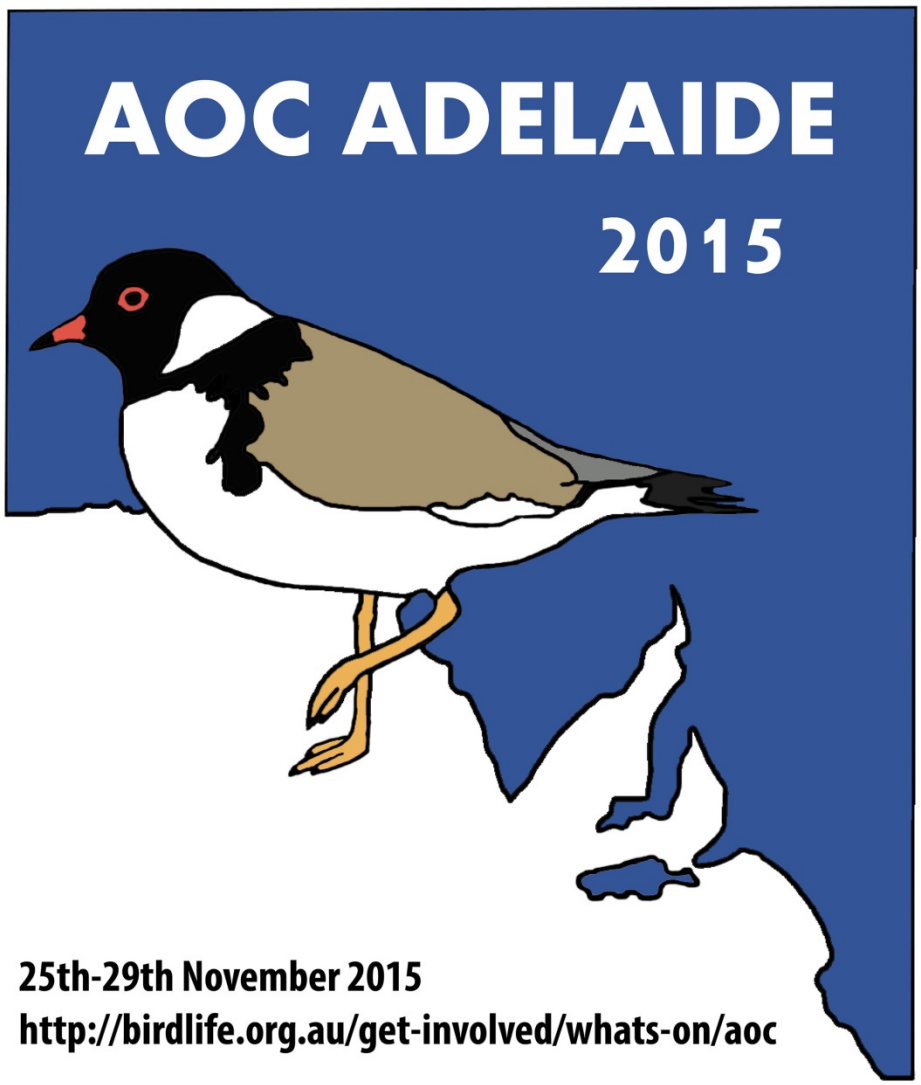
AUSTRALASIAN ORNITHOLOGICAL CONFERENCE 2015

Flinders University, Adelaide, South Australia



birdlife AUSTRALIA

Birds New Zealand

Birds SA
Linking People with Birds

Flinders UNIVERSITY

THE UNIVERSITY of ADELAIDE

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Fri 27 November

Welcome to Adelaide!

It is with great pleasure that the AOC 2015 local organising committee, BirdLife Australia, Birds New Zealand and Birds SA welcome you to Adelaide. We are looking forward to an excellent scientific program, with 130 presentations from around 185 attendees. We have six symposia on offer, spanning a range of topics including seabirds, fire and birds, evolution, monitoring, Coorong wetlands and woodland birds. We are especially excited about our extensive plenary and special lecture program, and hope that you appreciate the breadth of expertise and perspective brought by these nine distinguished speakers. Be sure to not miss Steve Murphy's special lecture on night parrots on Thursday evening. We hope that in addition to the scientific program, you take advantage of some of the excellent birding opportunities in South Australia, whether as part of a conference field trip or on your own. Finally, thanks to all of our presenters for contributing oral presentations and posters across an astonishing range of ornithological topics- it's your work that will truly make the scientific program valuable and enjoyable.

Warm regards,
Dr. Todd McWhorter (Scientific Program Chair)
Prof. Sonia Kleindorfer (Local Convenor)
Assoc. Prof. David Paton (Field Trip Coordinator)

The local organising committee would like to thank the following sponsors:

BirdLife Australia	http://birdlife.org.au/
Birds New Zealand	http://osnz.org.nz/
Birds SA	http://www.birdssa.asn.au/
Flinders University	http://www.flinders.edu.au/
University of Adelaide	http://www.adelaide.edu.au/
Banrock Wine & Wetland Centre	http://www.banrockstation.com.au/

Conference information

BirdLife Australia, in collaboration with Birds New Zealand, is committed to holding biennial conferences that provide a regular forum for the exchange of information and ideas between avian-based researchers and conservationists throughout the Australasian region. The conferences are held in a variety of venues to give attendees an opportunity to explore the diverse birdlife in the region. The 2015 AOC is being held on the campus of Flinders University in beautiful Adelaide, South Australia.

Venue

Flinders University Campus, Sturt Road, Bedford Park 5042, South Australia.

Registration will be in **Anchor Court** (adjacent to Car Park 7 off Biology Road), and all oral presentations will be held in **South Theatre 1** and **South Theatre 2** which are just off of Anchor Court.

Registration will open from 7:30 AM on Wed 25 November.

Poster sessions will be held in the **SILC building** (adjacent to Car Park 9; we will walk there from South Theatre 1).

Refreshments are provided if you have registered, and include:

- **Tea/Coffee (served in Anchor Court)- morning & afternoon**
- **Lunch (served in Anchor Court)**

Poster session wine and cheese (Wed 25 November, 3:30 PM to 5:30 PM):

- Wine donated by Banrock Station & Wetland Centre
  (served in the **SILC Building**)

Exhibitors

Exhibitors will be set up in **Anchor Court**.

A campus map is available on page viii of this document.

Getting to campus

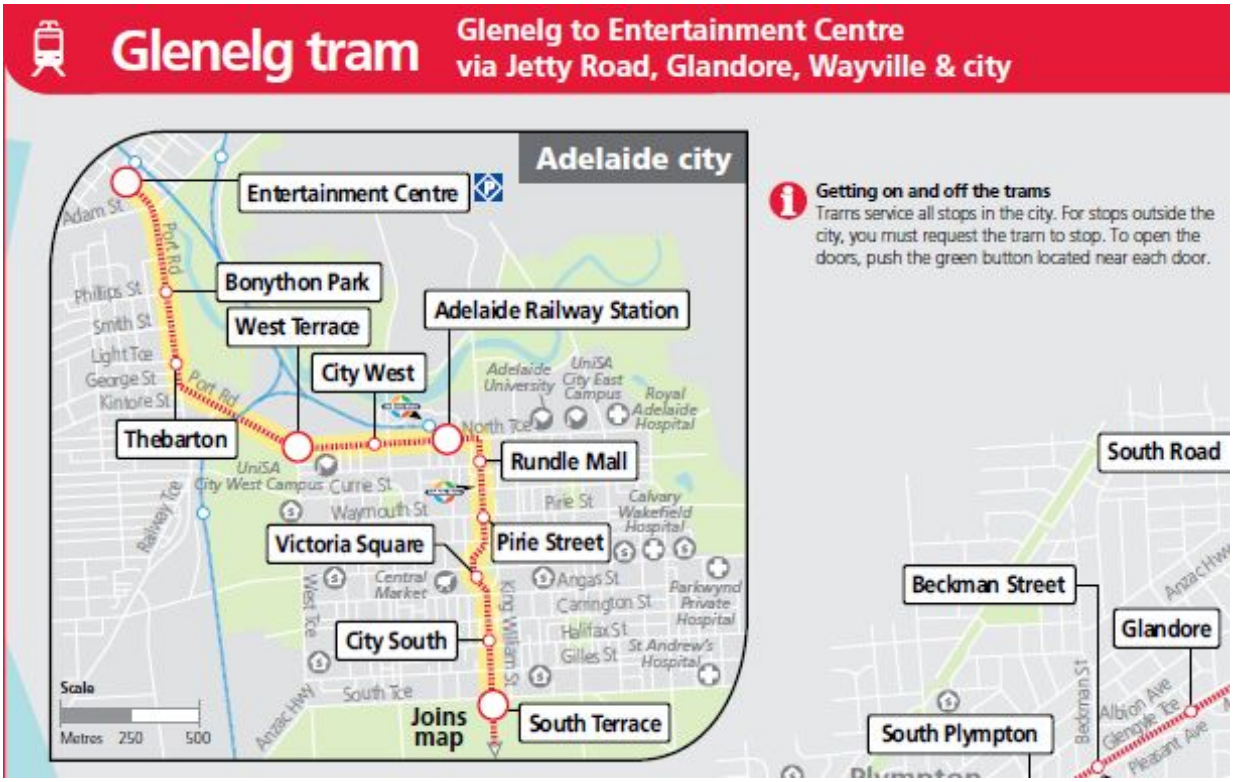
Conference buses are available to transport delegates from the following locations departing at 8:00 AM each day (please arrive 10 min early):

- Adelphi Terrace and Canning Street (Glenelg)
- 208 South Terrace (Sage Hotel), Adelaide CBD

Return will be 6:00 or 6:30 PM (depending on conference schedule) leaving from Flinders University car park 8.

Bus transport will also be provided to/from the conference dinner venue on Thursday.

The **Adelaide Metro Tram** runs between Glenelg and the Adelaide Entertainment Centre and can be used to access the South Terrace conference bus stop from many areas of the CBD (free of charge within the CBD) and along the route out to Glenelg (fare charged outside of CBD).



The full route and timetable can be access on the Adelaide Metro website:

https://www.adelaidemetro.com.au/routes/Tram

Parking on campus

Delegates can park in Car Parks 8, 9a, or 9. Cost $5 per day using metre.

Take University Drive 1 km to Biology Road; turn left (sign indicates Biology Road Car Parks 7 and 8); to access Car Parks 9a and 9 take first right off of Biology Road; park anywhere. Daily parking fees apply.

Conference dinner

The conference dinner will be held at Regattas Bistro, which is part of the Adelaide Festival/Conference Centre complex, situated between North Terrace and the River Torrens in the Adelaide CBD.

Tickets are by presale only (now closed) but outdoor seating is available for those wishing to just buy a drink.

Dinner attendees can take the free conference bus to/from the Flinders University campus, use the Adelaide Metro Tram from Glenelg or areas within the CBD (Adelaide Railway Station stop), or self-drive (parking available at Adelaide Festival Centre and Adelaide Convention Centre).

Arrival is 7:00 to 7:30 PM (please bring your conference badge).

http://www.regattas.com.au/

Presenter information

Oral presentations- speakers should report to their venue (South 1 or South 2) in the break before their session (at the latest) to load their presentation files onto the lecture theatre computers.

Format and uploading talk:

- **Bring ppt on USB stick compatible with PC or Mac.**
- **Talks can be uploaded from 8 AM onwards every day (also during breaks)**
- **Talk duration 12 min (except plenaries & short talks); strictly enforced**

Poster presentations- presenters are requested to post their posters (numbered poster boards in the **SILC Building**) during the morning tea break on Wed 25 November, and leave them posted through the end of Thurs 26 November. Recommended poster size is A0 (portrait or landscape); A1 size is also acceptable.

****Presenters should attend their posters during the poster session from 3:30 to 5:30 PM on Wed 25 November****

(Refreshments provided, including wine donated by Banrock Station Wine & Wetland Centre)

Field trips

Conference field trips will be held on Sat 28 and Sun 29 November. Options include local wetlands, woodlands and Lower Lakes & Murray River mouth region. Registration was by online presale (now closed) but some seats may be available at the conference on a first-come first-served basis.

For those delegates booked on field trips, detailed information will be available at the conference. If you need details prior to this contact David Paton (david.paton@adelaide.edu.au).


BEDFORD PARK CAMPUS MAP
Flinders UNIVERSITY
inspiring achievement
TONSLEY PRECINCT (APPROX 3KM)
STURT ROAD
MAIN SOUTH ROAD
SPORTS FIELDS
FMC Staff Parking
Public Parking
Flinders Private Hospital
Margaret Tobin Centre
FMC Research Foundation
Flinders Medical Centre
FMC Loading Dock
Medical Library
School of Medicine
Lecture Theatres
FLINDERS MEDICAL CENTRE
FLINDERS LIVING PRECINCT
STURT PRECINCT
SHEPHERDS HILL ROAD
STURT DRIVE
UNIVERSITY DRIVE
HALL DRIVE
LINK ROAD
FIRST TCE
FLINDERS TRAIL
FOREST
LAKE
REGISTRY RD
HUMANITIES RD
BIOLOGY RD
RING ROAD
PARK
SOUTH RIDGE PRECINCT
AOC ADELAIDE 2015
South 1 = Plenary & Talks
Adjacent to car park 7
Access via car park 7, 9 or 9a
South 2 = Talks
Adjacent to car park 7
Access via car park 7, 9 or 9a
Anchor court = Registration
Car park 7, 9 or 9a
SILC = Poster Session
Car park 9 or 9a
Take University Drive to Biology Road to enter car park 7, 9 & 9a (conference bus arrives car park 8)
KEY
CARPARK
CARPARK NUMBER
ACCESS PARKING
LIFT
SECURITY
BUS STOP
LOOP BUS STOP
TONSLEY LOOP BUS
TRAFFIC LIGHT
BUILDING NUMBER
MAJOR LECTURE THEATRE
BUILDING ENTRANCE
BICYCLE PATH
ACCESS PATH
THE LOOP TRAIL
THE STURT CREEK TRAIL
STUDENT HUB & PLAZA REDEVELOPMENT CONSTRUCTION ZONE (SEE NORTH RIDGE MAP FOR ACCESS ROUTES AROUND CONSTRUCTION ZONE)
BUILDINGS - Precinct
45 Earth Sciences
36 Education
48 Engineering
49 Flinders Press
30 Function Centre
20 Health Sciences
33 Pendopo
43 Physical Sciences
44 Physical Sciences Workshop
26 Plaza (Currently under redevelopment)
23 Registry
52 SILC
34 Social Sciences South
21 Sports Centre
1 Sports Pavilion
22 Student Centre
6 Sturt East
4 Sturt Library
2 Sturt North
7 Sturt South
5 Sturt West
3 Sturt Gymnasium
25 Union (Access from Western side only)
Theatres: FMC Lecture Theatres
53 HSLTC 1.01
36 Multi Purpose Centre
31 N1 & N2
32 N3
41 S1 & S2
2 Sturt
7 Sturt (S202, S210)
50 Universities Research Repository
18 University Hall
24 Yunggorendi Mande

Australasian Ornithological Conference (AOC) 2015- Adelaide, South Australia

PROGRAM OVERVIEW

Wednesday 25th November, 2015		
8:40 am–9 am	Welcome & opening remarks (logistics, field trips, etc.) • Local committee • AOC advisory committee • BirdLife Australia • Birds New Zealand • Birds SA	**South 1**
9 am–9:30 am	Opening plenary- Mike Webster ***Sexual signals and speciation in Australasian birds.*** Sexual signals, like song and plumage in birds, are thought to be important to the development of reproductive isolation between populations (i.e., speciation), and studies of Australasian birds have been central to development of these ideas. Yet the behavioural mechanisms underlying the process of population divergence generally are not well understood. I will summarize our recent work, aimed at understanding these processes in the red-backed fairy-wren, an Australian passerine. Broad geographic sampling has revealed strong divergence across populations in male sexual signals, including both plumage coloration and song, and genomic approaches similarly uncovered a strong cline of genetic divergence separating eastern from western populations. This genetic cline is concordant with variation in songs, but differs significantly from the cline in plumage signals, indicating that plumage traits, but not song traits, are introgressing across populations. Field experiments that manipulated both signal types reveal that female mating preferences promote introgression of plumage traits, and also that male-male competition limits introgression of song but allows introgression of plumage. Together these results call for increased attention to the behavioural responses of conspecifics to divergent sexual signals, as these responses will determine the patterns of reproductive isolation that result.	**South 1**

9:30 am–10 am	Plenary- Peter Dann ***The economic value of penguins and their tenuous conservation status: why aren't we investing in penguin futures?*** Global tourism generates $1.2 trillion annually and economically rivals many industries including mining and fishing in some areas. Penguins are the most popular seabird involved in wildlife tourism (20-40% of all tourism). Tourism associated with penguins ranges from visits to colonies or landing sites to being integral parts of broader experiences as well as visits to zoos and aquaria where penguins are often a drawcard. Preliminary estimates of the value of penguin-related tourism worldwide indicate that it is in excess of several billion to regional economies. Penguin popularity and their capacity or potential to generate wealth would seem to ensure their protection in perpetuity. However this is far from what is happening. According to the IUCN (2013), 11/18 species of penguin (60%) are threatened. Trathan et al (2014) listed pollution, habitat loss and impacts of fishing as primary threats to penguins worldwide; all factors humans can readily mitigate. Increased threats from climate change are also predicted and at their current rate of becoming threatened, penguins will disappear from much of their range relatively soon. Why the disparity between our efforts to protect penguins and their economic value? In this presentation I will examine the status, and management of Little Penguins in relation to the tourism benefits they provide in Australia and New Zealand with a view to determining what we have learnt and what we do next to afford better protection for the world's penguins.	**South 1**
10 am–10:30 am	**Tea/coffee** ***Poster presenters to put up posters (SILC building poster boards)***	**Anchor Court**

Symposium overview abstracts for Wed 25th November

S1- The Australasian Seabird Group (ASG) seabird symposium

Convenor: Kerry-Jayne Wilson

Globally seabirds are perhaps one of the most threatened group of birds. Climate change and the insidious threats posed by plastics entering the marine environment can only make the situation ever more dire. For seabirds the Australasian region is species rich; about 10% of the world's species breed only in New Zealand with further species endemic to Australia and yet others restricted to the neighbouring western Pacific. This symposium addresses some recent and current developments in seabird conservation. Starting with an example of the fundamental research necessary to develop conservation strategies followed by consideration of the challenges in obtaining that information. The symposium continues by highlighting two recent developments in reducing fisheries bycatch then concludes with two examples of endangered seabird conservation. One describing research needed to understand threats, the last paper reviewing the techniques developed in saving a critically endangered petrel.

S2- Burning and Birds: Fire management for birds

Convenors: Dr. Rob Davis and Dr. Martine Maron

Australian ecosystems are often regarded as being shaped by fire or even fire-adapted, yet the extent, nature and severity of fires varies considerably across the continent and has changed since European settlement. Fire is increasingly used to manage the risk to humans from wildfire, and this has led to renewed focus on understanding the impacts of fire on birds. In general, many birds, particular insectivores, require areas of longer unburnt vegetation—areas which are lacking in many landscapes. There are many complex and additive interactions between fire and factors such as weeds, human disturbance, dieback, grazing and predators to be considered when managing fire. This symposium draws together a number of studies that attempt to present perspectives on how fire influences bird populations and how it can be managed to achieve the best outcomes for avifauna, as well as protecting human populations.

10:30 am– 12 pm	Wed 25th Nov- Morning Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
South 1		**South 2**	
	Seabirds symposium- convenor Kerry-Jayne Wilson		**Burning & birds symposium**- convenors Rob Davis & Martine Maron
10:30 am	**S1.1- Mattern**, **T.**; Ellenberg, U.; Houston, D.; Seddon, P.; van Heezik, Y.; Thompson, D.; Sagar, P.; Morrison, K.; Otley, H.; Hiscock, J.A. and Amey J. ***Comparative population ecology of New Zealand's* Eudyptes *and* Megadyptes *penguins.***	10:30 am	**S2.1- Davis, R.**; Doherty, T.; Van Etten, E.; Radford, J.; Holmes, F.; Knuckey, C and Davis, B. ***Long unburnt vegetation is important for bird species, guilds and diversity: a case study in semi-arid shrublands.***
10:45 am	**S1.2- Ellenberg, U.** and Mattern, T. ***What have we done? Effects of researcher disturbance on nesting seabirds.***	10:45 am	**S2.2- Burgess, E.**; Maron, M. and Haseler, M. ***Local- and landscape-scale drivers of bird assemblages in a fire-prone landscape.***
11:00 am	**S1.3- Baker**, **G.B.**; Candy S.G. and Rollinson, D. ***Efficacy of the 'Smart Tuna Hook' in reducing bycatch of seabirds in the South African Pelagic Longline Fishery.***	11:00 am	**S2.3-** Fox, E.; **Douglas, T.K.**; Gosper, C.R.; Watson, S.J. and Chapman, A. ***Fire and the bird communities of the Great Western Woodlands: 300 years in the making.***
11:15 am	**S1.4- Shet R.**; Lea M.-A.; Baker, B. and Hindel, M. ***Assessing the importance of net colour as a seabird bycatch mitigation measure in gillnet fishing.***	11:15 am	**S2.4- Kuchinke, D.** ***Can we use common birds as tools for rapid assessments?***
11:30 am	**S1.5- Bennet, D.G.**; Goldstien, S.; Horton, T. and Briskie, J. ***Hutton's shearwater foraging behaviour interpreted by time-depth logger data and stable isotope analysis.***	11:30 am	**S2.5- Rogers, D.J.** and Paton, D.C. ***Bird Community Responses to Fire and Drought in a semi-arid heathland, Ngarkat Conservation Park, over a 21 year period.***
11:45 am	**S1.6- Wilson, K.-J.**; Gummer, H.; Taylor, G. and Rayner, M.J. ***Recovery of the endangered Chatham petrel (*Pterodroma axillaris*): a review of conservation management techniques from 1990 to 2010.***	11:45 am	***Break***

12 pm–1:30 pm	Lunch	Anchor Court
1:30 pm–3:30 pm	**Wed 25th Nov- Early Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions)** (Presenter listed in **bold font** with student presenters **highlighted**)	

South 1		South 2	
	Seabirds contributed papers- session chair Kerry-Jayne Wilson		**Habitat use contributed papers-** session chair Guy Castley
1:30 pm	**1.7- Mott**; **R.** and Clarke, R. ***Contrasted foraging strategies of frigatebirds ranging from nearby inshore and offshore islands.***	1:30 pm	**2.7- Trezise, J.**; Vine, S. and Lindsay, B. ***Improving national recovery plans and safeguarding critical habitat for threatened species.***
1:45 pm	**1.8- Shephard, J.**; Dunlop, N.; Pearce, A.; Fearns, P. and Bouten, W. ***Linking foraging strategy to ocean productivity in tern species: proof of concept and first data.***	1:45 pm	**2.8- Simmonds, J.**; Maron, M. and van Rensburg, B. ***Accounting for differences in landscape type when exploring the relationship between bird species richness and vegetation area.***
2:00 pm	**1.9- Colombelli-Négrel, D.** ***Investigating low breeding success as a possible cause for the decline of the little penguins on Granite Island.***	2:00 pm	**2.9- Louter M.**; Slender, A.; Leu, S.; Gardner, M. and Kleindorfer, S. ***Habitat restoration from grazing predicts presence but not home range size in thick-billed grasswrens.***
2:15 pm	**1.10- Galbraith, M.**; Krzyżosiak, J.; Aguilar, G. and Jones, G. ***Changes in the breeding status of the southern black-backed gull (*Larus domincanus*) on Rangitoto Island (Hauraki Gulf, New Zealand) since the 1920s.***	2:15 pm	**2.10- Lill, A.**; Hales, E. and Vines, A. ***Factors facilitating urban colonization by Little Ravens.***
2:30 pm	**1.11- Reinhold, S.-L.**; Goldsworthy, S. and Colombelli-Négrel, D. ***An investigation of Long-Nosed Fur Seal diet: identifying the importance of little penguins and predation on commercially fished species*** **Session continues next page.**	2:30 pm	**2.11- Castley. J.G.** and Symes C.T. ***Stable isotope analyses reveal regional site fidelity linked feeding resources for Glossy Black-Cockatoo.*** **Session continues next page.**

1:30 pm–3:30 pm	Wed 25th Nov- Early Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
South 1		**South 2**	
	Seabirds contributed papers CONT'D- session chair Kerry-Jayne Wilson		**Habitat use contributed papers CONT'D-** session chair Guy Castley
2:45 pm	**1.12- Bool, N.** (Short talk- 5 mins) ***Keeping track: investigating foraging responses of short-tailed shearwaters to a changing environment.***	2:45 pm	**2.12- Veltheim, I.**; Cook, S.; McCarthy, M.; Palmer, G. and Hill, R. ***GPS tracking reveals two movement strategies of brolgas,* Antigone rubicunda*, within a restricted range.***
2:50 pm	***10 minute break***		
	Shorebirds contributed papers- session chair TBD		
3:00 pm	**1.13- Maguire, G.**; Weston, M.; Ehmke, G.; Cullen, M.; Mead, R. and Ekanayake, K. ***A flagship for coasts: where are we after nine years of intensive recovery efforts for the Hooded Plover?***	3:00 pm	**2.13- Roper, E.**; Hobbs, R. and Craig M. ***The adaptation of the forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*) to the urban environment on the Swan Coastal Plain.***
3:15 pm	**1.14- M. Estrella, S.**; Davis, R. and Horwitz P. ***Quality of supratidal habitats in Western Australia for migratory shorebirds during post and pre-migration.***	3:15 pm	**2.14- Stirnemann, R.**; Enoka, F.; Uili, M.; Jalloh, I.; Potter, M.; Butler, D. and Minot, E. ***A tropical island story: the Ma'oma'o and Manumea only in Samoa.***
	Poster session starts at 3:30 PM in SILC Building- see next page.		

Wednesday 25th November, 2015		
3:30–5:30 pm	**Poster session** (posters available for viewing during all breaks today and on Thurs- authors will attend posters during this time) (tea & coffee, wine & cheese, light refreshments)	**SILC Building**

Insights from monitoring (posters accompanying symposium)

P1.1- Morgan, D.; Arcus, N. and Gash, D.
Results of the first city-wide survey of birds in Whangarei, Northland, New Zealand.

P1.2- Harrington, J.; Hutchinson, G. and Irvine, J.
Breeding behaviour of White-bellied Sea-Eagles on the Parramatta River. Life can be hard.

P1.3- Barth, M. and Berris, K.
Can individual female South Australian glossy black-cockatoos be identified by facial plumage patterns?

Introduced species

P1.4- Felemban, H.
The occurrence of the Indian House Crow in Jeddah, Saudi Arabia: Their environmental and health problems.

Conservation

P1.5- Boulton, R. and Lau, J.
Threatened mallee birds conservation action planning: Strategies & actions.

P1.6- Gama, V.F.; Mills, M; Szabo, J.; Fuller, R.A.; Blomberg, S.P. and Possingham, H.P.
How does data availability bias the extinction risk assessments of migratory birds?

P1.7- Thomas, J.; Cullen, M.; Hedger, D. and Wilson, C.
Evaluation of volunteer participation in threatened bird recovery projects.

Avian habitat/landscape use

P1.8- Castley, J.G. and Gould, L.
Mapping essential habitat for the threatened Glossy Black-Cockatoo using citizen science data.

P1.9- Howse, N.
Patterns of behaviour in mix-species captive birds.

P1.10- Warrener, H. and Andrew, M.
Exploring the influence of woody vegetation connectivity on the dispersal and occurrence of the Powerful Owl (*Ninox Strenua*) within the Greater Sydney Region, NSW.

P1.11- Suarez Castro, A.F.; Mitchell, M.G.E.; Maron, M. and Rhodes, J.
Predicting the effects of landscape structure on bird functional diversity patterns: the importance of spatial configuration.

Physiology, pathology and microbiology

P1.12- Cosgrove, A.J.; McWhorter, T.J. and Maron, M.
Predicting ongoing population persistence within dynamic systems.

P1.13- Htut, Z.W.; Xie, S. and **McWhorter, T.J.**
Leukocyte ratio responses to heat exposure differ between diamond doves and budgerigars.

P1.14- McWhorter, A.R.; O'Loughlin, T.; Hay, S.; McLelland, D. and Woolford, L.
Molecular and histological assessment of captive Gouldian Finches (*Erythrura gouldiae*) for evidence of mycobacteriosis.

Shorebirds

P1.15- Friends of Shorebirds SE; Christie, M. and **Trudgen, W.**
Shorebirds and beach-wrack.

P1.16- Zhao, M.; Gosbell, K.; Minton, C.; Lisovski, S.; Colman, J. and Klaassen, M.
Body size effects on long-distance migration evaluated using migratory tracks of Arctic breeding shorebirds.

Seabirds (posters accompanying symposium)

P1.17- Nicholls, D.G.
Variation in the size of Short-tailed Shearwater pulli prior to departure.

Reproductive biology and nesting

P1.18- Buckley, S.
Egg colour and nest type predict nest predation: an experimental study.

P1.19- Young, C.M.; Cain, K.E.; Svedin, N.; Backwell, P.R.Y. and Pryke, S.R.
Nest success in crimson finches.

P1.20- Beckmann, C.; Biro, P. and Martin, K.
Testing hypotheses on the function of repeated nest abandonment as a life history strategy in a passerine bird.

Communication, signalling and cognition

P1.21- Hanke, P.; Colombelli-Négrel, D. and Kleindorfer, S.
What makes a mother's call to her embryo unique?

Coorong Wetlands (posters accompanying symposium)

P1.22- McGuire, A.; Dittmann, S.; Dadd, D. and Dadd, M.
Should I stay or should I go? Shorebird phenologies over a decade of drought and flood extremes in the Coorong, South Australia.

Wednesday 25th November, 2015		
Business meetings and information sessions held concurrently with poster session:		
4:30–5:30 pm	**ABBBS Information session** David Drynan, Senior Project Officer ***Data entry requirements for the Australian Bird & Bat Banding Scheme*** This talk is aimed primarily at banders that are enrolled in the Australian Bird & Bat Banding Scheme that are actively collecting banding data, or for people intending to enrol into the ABBBS to start their own project in the future.Trainee (C-class) banders are also encouraged to attend. The data entry requirements for bird banding data collected under the ABBBS will be explained and the on-line tools available to facilitate this process will be demonstrated. Each of the mandatory data fields and why we require these data are explained. Finally, the practicalities of formatting electronic submission files and error handling will also be explained in detail.	**South 1**
4:30–5:30 pm	**AOC Advisory Committee meeting**	**South 2**
5:45 pm	**Buses depart to Glenelg and South Terrace (Adelaide CBD) accommodation**	

Thursday 26th November, 2015		
9 am– 9:30 am	Plenary- Leo Joseph ***Digging ever deeper into the evolution of birds: a brief review of things in the age of genomics.*** We live in exciting times for the study of evolution in birds. The revolution in DNA-based methods continues, especially methods under the umbrella of “genomics”. Interesting papers applying these methods to birds emerge almost daily. Undoubtedly, new windows are opening into how we can study the evolutionary detail of what we thought were well-known families and species. December 12, 2014, a red-letter day in avian biology, saw 28 papers resulting from one genomic data set of the world’s birds. Highlights of that work will be reviewed including refinements of the entire avian evolutionary tree. We are learning spectacular details about topics as diverse as how some species have diverged from their common ancestors, selection within single species, and paternity and family-level structure within populations. Similarly, fossils continues to reveal surprises and fill in details. Complimentary molecular and fossil research is a rich and important area to develop. Australian birds exemplify all of these kinds of work and, perhaps surprisingly to some, show why taxonomic refinements even at the species level are needed as we reach the “higher hanging taxonomic fruit”. Nonetheless, it is instructive to review cases where data show why further work is needed in some cases before taxonomic changes might be made. Finally, I will review some research from my group to understand adaptation in birds. For that, we are using Australian finches and the different climates in which they live.	**South 1**

Thursday 26th November, 2015		
9:30 am–10 am	Plenary- Trevor Worthy ***Recent advances in avian palaeobiology in New Zealand.*** The New Zealand archipelago is the emergent part of the drowned continent Zealandia lying some 2000 km east of Australia. After separation from Gondwana between 80 and 55 Ma land area was progressively reduced reaching a minimum during the Oligocene sea level highstand, but sufficient islands remained to allow terrestrial faunas including birds to persist. Subsequent complex tectonic-driven geographic changes have resulted in complex phylogeographic patterns. Understanding how the unique present day avifauna evolved and was assembled in space and time has been limited by an avian fossil record which until recently has been biased to the Quaternary for most taxa apart from penguins. Here, I summarize significant new discoveries of fossils from several major periods of the Tertiary, which have the potential to constrain when groups evolved or entered the Zealandian area. New fossils have extended seabird diversity in the Paleocene. The early Miocene 19-16 Ma deposits yielding the St Bathans Fauna, the subject of intense research since 2001, have revealed minimally some 40 species of birds including moa, kiwi, a diving petrel, waterfowl, palaelodid, accipitrids, ardeids, gruiforms, charadriiforms, pigeons, parrots, Aegotheles, Collocalia, and passerines. These taxa reveal a complex mix of vicariance and staged dispersal derived colonisation for the NZ avifauna, and the extinction of major groups. Important Pliocene faunas reveal the potential to assess the seabird diversity 3-4 Ma. Finally, the Quaternary, while with very well-known avifaunas, is still attracting attention. A trend towards multidisciplinary studies combining morphology and molecular analyses has led to major new insights in diversity and relationships demonstrating that avian palaeobiology in New Zealand remains a vibrant area of research.	**South 1**
10 am–10:30 am	**Tea/coffee**	**Anchor Court**

Symposium overview abstracts for Thurs 26th November

S3- Evolution

Convenor: Leo Joseph

For the last 35 years there has been a revolution in biology and ornithology has been right there at its forefront. It concerns how DNA sequences can be recovered and analysed to study evolution. This revolution has affected study of the deepest levels of the history of life right down to study of relationships within and between species and even to parentage and family-level studies within a population. At AOC meetings we have been establishing a tradition of having a symposium session tailored for ornithologists who may not be working directly in this field but who may wonder what the fuss is about. The aim is always to showcase some interesting work being done in this area but to present it in such a way that all can share in the excitement and some of the challenges of what is happening, and which with the advent of genomics technologies, shows no sign of slowing down anytime soon. The birds of Australia, New Guinea and New Zealand and research on them have always been at the forefront of the ornithological contributions to this revolution and once again we are pleased to assemble another symposium. But it is not just about DNA. Palaeontological work on birds has also been undergoing something of a revolution and it is especially pleasing to include in our session some papers alerting us to how that area of research is progressing and complimenting molecular studies.

S4- Insights from Monitoring

Convenors: Dai Morgan and Nigel Adams

One of the fundamental concepts in ecology revolves around the ability to count the number of individuals in a population. Unfortunately, it is also one of the most difficult assignments to undertake. This is especially true in ornithology as our subjects are often small, cryptic, gregarious or solitary and spatially isolated, or live in habitats that make observation difficult. Furthermore, many of the monitoring protocols commonly employed are time-consuming, expensive to implement, or require observers with specialised skills. Despite these limitations, the collection of robust estimates of bird populations has never been more important, as birds are often being used as indicators of ecosystem health, or to quantify the success of other management initiatives (e.g. pest control or revegetation activities). Furthermore, a significant amount of conservation work is being done through the acquisition of externally sourced revenue. These funders want to know that their money is having positive impacts; providing evidence of increasing bird populations is one that conservation managers can show that their programs are successful.

This symposium highlights some of the most current Australasian bird monitoring research. Presentations will cover issues such as the development of new protocols to monitor birds, adapting established protocols for traditionally hard to monitor species, using long-term datasets to detect temporal changes in species composition, and the use of birds as indicator species. In addition, to further highlight the importance of bird monitoring across all levels of organisation, these presentations will be delivered by researchers and managers representing academic, non-government and government organisations and community groups.

10:30 am–12 pm	Thurs 26th Nov- Morning Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
	South 1		**South 2**
	Evolution symposium- convenor Leo Joseph		**Insights from monitoring symposium**- convenors Dai Morgan & Nigel Adams
10:30 am	**S3.1- Austin, J.J.**; Joseph, L.; Toon, A.; White, L.C. and Burbidge, A.H. ***Speciation or subspeciation in the southern Australian whipbirds long recognized as the Western Whipbird* Psophodes nigrogularis*?***	10:30 am	**S4.1- Morcombe, F.**; Hamilton, N.; Mills, H. & Algar, D. ***Population estimate and habitat usage of the Christmas Island Hawk-Owl.***
10:45 am	**S3.2- Berg, M.L.**; Eastwood, J.R.; Ribot, R.F.H.; Buchanan, K.L. and Bennett, A.T.D. ***Molecular evidence for incipient ring speciation in the crimson rosella complex (*Platycercus elegans*).***	10:45 am	**S4.2- Berris, K.** and Barth, M. ***Successful management of the South Australian glossy black-cockatoo and emerging issues for their long-term survival.***
11:00 am	**S3.3- Dolman, G.** and Burbidge, A.H. ***Using phylogenetics of fieldwrens and heathwrens to inform conservation management in Western Australia.***	11:00 am	**S4.3- Harrington, J.**; Hutchinson, G. and Irvine, J. ***An on-going study of Breeding White-Bellied Sea-Eagles on the Parramatta River – looking at some of the questions raised.***
11:15 am	**S3.4- Dolman, G.** and Joseph, L. ***Bringing together genotype and phenotype: how to delimit species barriers in the Chestnut and Copperback Quail-thrush?***	11:15 am	**S4.4- Szabo, J.** and Barnes, M. ***Shorebirds decline more than any other species in the Wet Tropics based on 14 years of Atlas data.***
11:30 am	**S3.5- Peñalba, J.V.**; Mason, I.J.; Schodde, R.; Joseph, L. and Moritz, C. ***Divergence in an avian suture zone.***	11:30 am	**S4.5- Leach, E.**; Jones, D.; Burwell, C. and Kitching, R. ***Learning to listen: the use of bioacoustic recorders for avian community monitoring.***
11:45 am	**S3.6- Louter, M.**; Slender, A.; Gardner, M. & Kleindorfer,S. ***Using RADseq and video images to study paternity and parental care in Thick-billed Grasswrens.***	11:45 am	**S4.6- Morgan, D.**; Sharp, H. and Sullivan, L. ***Comparing the relative abundance of bird species detected during five-minute bird counts with data collected from automated acoustic recorders.***
12 pm–1:30 pm	**Lunch**		**Anchor Court**

1:30 pm–3 pm	Thurs 26th Nov - Early Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
	South 1		**South 2**
	Evolution symposium CONT'D- convenor Leo Joseph		**Insights from monitoring symposium**- convenors Dai Morgan & Nigel Adams
1:30 pm	**S3.7- Peters, K.J.** and Kleindorfer, S. ***Biodiversity curse or cure? Hybridisation driven by female mate choice in Darwin's tree finches.***	1:30 pm	**S4.7- Joshi, K.A.**; Mulder, R.A. and Rowe K.M.C. ***Detecting species from digital audio recordings: man vs. machine.***
1:45 pm	**S3.8- Slender, A.L.**; Louter, M.; Bradford, T.; Gardner, M.G. and Kleindorfer, S. ***The ecological context of genetic differences in the Thick-billed Grasswren.***	1:45 pm	**S4.8- Rowe, K.M.C.**; Adams, A.L. and Joshi, K.A. ***Automated recognition of birds: a test of their performance and implications for study design.***
2:00 pm	**S3.9- Taggart, P.L.**; Bradford, T.; Smith, R.; Gardner, M.G. and Kleindorfer, S. ***Bacteria in ticks collected from birds: effects of habitat area and human activity.***	2:00 pm	**S4.9- Murphy, S.** and Harrington, G. ***Working with uncertain detection probabilities to estimate a population trajectory for Carpentarian Grasswrens.***
2:15 pm	**S3.10- De Pietri, V.L.**; Scofield, R.P.; Camens, A.B.; Tennyson, A.J.D.; Hand, S.J. and Worthy, T.H. ***How Australasian 'Plains-wanderer' fossils are reshaping our understanding of the evolutionary history of shorebirds.***	2:15 pm	**S4.10- Burbidge, A.H.**; van Dongen, R.; Ball, J. and Ford, S. ***Monitoring and modelling the distribution of rare birds on Dirk Hartog Island: how threatened are they?***
2:30 pm	**S3.11- Handley, W.D.**; Chinsamy, A.; Yates, A.M. and Worthy, T.H. ***Sexual dimorphism in the late Miocene mihirung* Dromornis stirtoni *(Aves: Dromornithidae) from the Alcoota Local Fauna of central Australia.***	2:30 pm	**S4.11- Maurer, G.** ***Increasingly Important Bird and Biodiversity Areas.***
2:45 pm	**S3.12- Scofield, R.P.**; De Pietri, V.L. and Mayr, G. ***How New Zealand's Waipara Greensand is changing our understanding of the early evolutionary history of the core waterbird assemblage.***	2:45 pm	**S4.12- Ehmke, G.** and O'Connor, J. ***Composite Indices for reporting on trends in Australian terrestrial birds.***
3 pm–3:30 pm	**Tea/coffee**		**Anchor Court**

3:30 pm–5 pm	Thurs 26th Nov - Late Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
South 1		**South 2**	
	Evolution symposium CONT'D- convenor Leo Joseph		**Introduced species contributed papers-** session chair Diane Fraser
3:30 pm	**S3.13- Shute, E.**; Prideaux, G.; Worthy, T.H. ***How many megapodes? The increasing diversity of Australia's fossil mound-builders.***	3:30 pm	**4.13- Fraser, D.L.**; Aguilar, G.; Nagle, W.; Galbraith, M. and Ryall. C. ***Modelling suitable habitat for the house crow in New Zealand.***
3:45 pm	**S3.14- Worthy, T.H.**; Mitri, M.; Handley, W.; Lee, M. ***Assessing the phylogenetic relationships and aspects of the biology of the extinct* Sylviornis neocaledoniae *(Aves: Sylviornithidae)***	3:45 pm	**4.14- Galbraith, J.A.**; Beggs, J.R.; Jones, D. N. and Stanley, M.C. ***Bird feeding: risks for urban bird communities.***
4:00 pm	**S3.15- Nguyen, J.** ***Evolution of the Australian passerine avifauna: insights from the fossil record.***	4:00 pm	**4.15- Clancy, G.** ***The distribution and abundance of the Common Myna* Acridotheres tristis *in the Clarence Valley LGA, north Coast New South Wales.***
	Evolutionary ecology contributed papers- session chair Leo Joseph		**Reproductive biology contributed papers-** session chair TBD
4:15 pm	**3.16- Black, A.** and Horton P. ***Subspeciation in the Brown Thornbill* Acanthiza pusilla *and hybridisation with the Inland Thornbill* A. apicalis *in South Australia.***	4:15 pm	**4.16- Edworthy, A.** ***Native fly parasites are the principal cause of mortality in endangered forty-spotted pardalotes.***
4:30 pm	**3.17-** Coetzer, W.G.; Downs, C.T.; **Perrin, M.R.** and Willows-Munro, S. ***Historical biogeography: The influence of ancient and contemporary habitat changes on the endemic South African Cape Parrot (*Poicephalus robustus*).***	4:30 pm	**4.17-** Johnson, A. and **Meyer, D.** ***It takes a village…group size as a determining factor of maternal investment, feeding rate and fledging success in the variegated fairy wren (*Malurus lamberti*).***
4:45 pm	**3.18- Lombal A.**; Wenner, T.; Burridge, C. ***Demographic history and population genetics of Providence petrels (*Pterodroma solandri*).***	4:45 pm	**4.18- Beckmann, C.** and Martin, K. ***Does singing on the nest increase nest predation rates in a passerine bird?***

Thursday 26th November, 2015		
5:15 pm–5:45 pm	Plenary- Martine Maron ***Drastic times and drastic measures: the native noisy miner as a key threatening process.*** We rarely consider native species within their normal range to be a threat on par with introduced pests. Yet aggressive exclusion of woodland birds by the native noisy miner is Australia's most recently-listed Key Threatening Process under the EPBC Act. No other single factor causes such a predictable, assemblage-wide shift in bird composition of remnant woodlands across such a vast region. The influence of this remarkable species is played out within the territories defended by noisy miner groups, hectares in extent, yet the consequences include changes to patterns of species richness at the landscape level, with cascading effects on ecological function. Noisy miners have recently increased markedly in many bioregions, and climate change may trigger increasingly pervasive domination by this despotic species. I will summarise the work that led to the listing, the most important knowledge gaps that remain, and explore the challenges of effectively tackling the threat.	**South 1**
5:45 pm–5:50 pm	Scientific publication perspective- James Fitzsimons, **Allan Burbidge**, Rohan Clarke, Alan Lill, Peter Menkhorst, James O'Connor, Frank Rheindt ***Taking Australasian ornithology to the world:* Australian Field Ornithology *goes online from 2016*.** The world of print and publishing is changing. The desire to access information immediately and from around the globe means that a strong online presence is essential. Australian Field Ornithology is a peer-reviewed journal publishing articles on the ecology and natural history of the birds of Australia and its Territories, Wallacea, New Guinea and Melanesia. It has been published continuously since 1959 (previously as The Australian Bird Watcher), and in recent years it has seen a number of important changes: a new, experienced and expanded group of subject editors, a renewal of the Editorial Board, and expanded geographic scope, along with an increasing number of submissions. In 2016, Australian Field Ornithology will become primarily an online journal. The journal will continue to be distributed to universities and other research institutions via Informit and a digital distribution 'agent' for international institutions. Access online will become free to all 12,000 BirdLife Australia members. Two years after publication, articles will also become 'open access', available for download to anyone, anywhere in the world. These access arrangements will ensure that the journal maintains its relevance to the scientific community, the BirdLife Australia community and all other interested parties. Here we outline the key advantages to going online, including dramatically increased readership for articles, more rapid publication times and greater flexibility in publishing (such as relevant colour photographs). These changes will ensure Australian Field Ornithology as the place for publishing articles on the ecology and natural history of the birds of the Australasian region.	**South 1**

5:50–6:20 pm	Special lecture- **Stephen Murphy**, John Young, Rachel Barr and the Night Parrot Recovery Team ***The emerging ecological picture of Night Parrots, and the conservation strategies to help save them.*** The Night Parrot (NP) is an endangered, little-known bird that inhabits Australia's arid zone. Their rediscovery in 2013 in south-western Queensland coincided with a requirement to write and implement a research plan approved by the Commonwealth under an EPBC Condition. Broadly, the objectives of the research are to (i) refine detection methods (ii) understand habitats and threats and (iii) identify new populations. This presentation focuses on aspects of habitat use and ranging behaviour as revealed by radio-telemetry. A single NP was followed for approx. 21 days in April 2015, during which time it made nightly forays into non-Triodia habitats at distances of up to 7 km from its daytime roost. Plans for further telemetry using more sophisticated technology will be presented. Other aspects of NP biology will also be discussed that, when considered together, are starting to build an ecological picture of this most elusive bird. The strategy for long-term conservation efforts for the species will also be outlined.	**South 1**
6:35 pm	**Buses depart to Conference Dinner and Glenelg and South Terrace (Adelaide CBD) accommodation**	

The AOC 2015 Conference Dinner will be held at Regatta's Bistro, on the River Torrens near the Adelaide Convention Centre.

http://www.regattas.com.au/

(Start time 7:30 PM; tickets by presale only through Eventbrite [NOW CLOSED]; outdoor seating available for those wishing to just buy a drink)

****The Serventy and Hobbs Medals will be presented at the dinner****

Friday 27th November, 2015		
9 am–9:30 am	Plenary- Katherine L. Buchanan ***Early developmental effects in songbirds: does parental investment determine your long term fitness?*** We know from a range of studies that early life conditions have profound effects on adult life. Avian offspring seek to maximise their fitness through parental manipulation and extract maximum resources for survival, fledging and reproduction. However, experiencing poor environmental conditions in the nest may program individuals onto particular developmental pathways, with repercussions for individual neural development and behaviour. Here, I review the potential role of early developmental stress in determining song and brain development in nestling birds. Experimental studies from our group have confirmed the long lasting effects that early exposure to elevated stress hormones, dietary restriction or parasites have on brain development and song production. In addition, exposure to ecologically relevant levels of endocrine disrupting chemicals also has long term effects in adult songbirds. These results have implications for our management of the disposal of these chemicals. The developmental pathways which promote flexible expression of song traits also allow for phenotypic down regulation as a result of environmental perturbations. This suggests that genes allowing for stress resistance may be under selection when sexual traits, such as song production, are affected and I will discuss the heritability of the song control brain structures. Although we know that the quality of parental care provided affects long term development, we also know that even from before eggs hatch, parents can determine the outcomes of their reproductive investments. I will therefore also discuss recent research from our group examining the effects of parental calling behaviour to their eggs before hatching, on subsequent offspring development. Together, these studies show the highly dynamic trade-offs mediated during early development in young birds.	**South 1**

Friday 27th November, 2015		
9:30 am–10 am	Plenary- **Megan Barnes** and Hugh Possingham ***The power of long-term ornithological monitoring in the Mount Lofty Ranges: 16 years and counting.*** Almost 90% of the original woodlands of the Mount Lofty Ranges of South Australia has been cleared, modified or fragmented, most severely in the last 60 years, and affecting the avifauna dependent on native vegetation. As a result of past actions, currently there is an extinction debt - extensive habitat restoration and management is necessary to slow this down. The Mount Lofty Ranges woodland bird-monitoring program is one of few long-term regional-scale studies on Australian birds. It is a collaborative long-term project between many partners, especially: The University of Queensland, Nature Conservation Society of SA and the Adelaide and Mount Lofty Ranges NRM board (primary funders) that has run annually since 1999. It consists of over 150 regularly visited sites throughout the Mount Lofty Ranges. The aim of the project is to document changes in woodland birds and facilitate research to understand the proximate causes of those declines, and has yielded both ecological and analytical advances. The program was designed experimentally to optimise accuracy and ensure sufficient and efficient monitoring – it has been shown that six repeat visits can overcome false-negative errors, but that 3 visits per site (per season) are sufficient for most taxa. Repeat sampling is more useful than adding sites when error rates are low, while greater efficiencies are gained by adding more site when error rates are high. Comparison of structured studies and unstructured volunteer data illustrated that weakly structured data can detect similar trends to structured surveys, and be used to generate robust estimates of occupancy and minimum population size, creating new opportunities to track change in birds where structured monitoring has not been conducted. Like in other woodland systems of Australia, small insectivores are declining significantly in the MLR, while increasers are generally large-bodied generalists. Some of the species showing a significant decline are those we consider currently common – such as Brown Thornbill and White-browed Scrubwren. Refuting suggestions that declines were a result of drought, our research found little impact of drought on winter rainfall events. Also, insectivores have not recovered with the return of wetter periods – though they may have stabilised at lower density. Recent research linked proscribed burning to increasingly homogenised birds communities across the region. The Mount Lofty Ranges can be regarded as a ‘canary landscape’ for temperate woodlands elsewhere in Australia – without immediate action, their bird communities are likely to follow the trajectory of the Mount Lofty Ranges avifauna.	**South 1**
10 am–10:30 am	**Tea/coffee**	**Anchor Court**

Symposium overview abstracts for Fri 27th November

S5- Coorong wetlands

Convenor: Jody O'Connor

The Coorong is an iconic Ramsar-listed wetland that supports one of the most diverse and abundant waterbird communities in Australia. Its unique complex of saline to hypersaline lagoons provide critical mudflat foraging habitat for migratory shorebirds over summer and also serve as an important drought refuge and nesting site for Australian species. One of Australia's greatest challenges in conserving Coorong habitats for waterbirds lies in its location at the termination of the Murray Darling Basin system. The Coorong wetlands are highly reliant on adequate flow regimes from upstream, and have undergone considerable changes in response to long-term declines in water reaching the system. Further challenges are faced by Coorong waterbirds that migrate at a continental or international scale and are also affected by the availability and conditions of wetlands across Australia and parts of Asia. This symposium explores the response of waterbirds to changing flow regimes and habitat conditions at the local, continental, and international scale. The talks provide new insights into the importance of Coorong wetlands for a range of waterbird species, and discuss the use of both established and novel monitoring techniques to inform management.

S5- Woodland bird communities in eastern Australia – where and why are they declining and what can we do about it?

Convenor: Hannah Fraser

Australia's woodlands have been decimated, largely to make way for agriculture and urban development. Unsurprisingly, many birds that rely on these areas are threatened or declining. Woodland bird declines are the most severe in South Australia and Victoria but have spread to include New South Wales, Australian Capital Territory and Queensland. Although habitat destruction is the primary reason for these declines, a number of additional threats are contributing such as altered fire regimes, grazing pressure, urbanisation and aggressive exclusion by Miners. Most researchers agree that woodland birds are in decline but there is no consensus on exactly what constitutes a woodland bird and little protection for the woodland bird community. In this symposium we will examine the state of woodland birds and explore the different threats faced by woodland birds along the east coast of Australia. Finally we will discuss a possible solution - listing the woodland bird community as a Threatened Ecological Community under the Environment Protection and Biodiversity Conservation (EPBC) Act.

ASSOCIATED WORKSHOPS WILL BE HELD DURING THE LUNCH BREAK FOLLOWING THE SYMPOSIUM (PRELIMINARY DISCUSSIONS) AND AT FLINDERS UNIVERSITY ON SUNDAY NOV 29TH.

Hannah Fraser hannahsfraser@gmail.com

10:30 am–12 pm	Fri 27th Nov- Morning Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
	South 1		**South 2**
	Coorong wetlands symposium- convenor Jody O'Connor		**Woodland birds symposium**- convenor Hannah Fraser
10:30 am	**S5.1- Rogers, D.J.**; Paton, D.C. and Bailey, C.P. ***Of droughts and flooding rains: regime shifts in the waterbird community of the Coorong South Lagoon.***	10:30 am	**S6.1- Ingwersen, D.** ***The state of Australia's woodland birds.***
10:45 am	**S5.2- Paton, D.C.**; Paton, F.; Bailey C. and Rogers, D. ***Using the behaviour of waterbirds to assess the condition of wetlands: a case study of the Coorong, South Australia.***	10:45 am	**S6.2- Haslem, A.**; Nimmo, D.; Radford, J. and Bennett, A. ***Landscape properties mediate the effect of severe drought on woodland birds in fragmented landscapes.***
11:00 am	**S5.3- Clemens, R.S.**; Rogers, D.; Hansen, B.D.; et al. ***The power of continental-scale monitoring: patterns of decreasing shorebird populations point to needed conservation action.***	11:00 am	**S6.3- Ikin, K.** and Rayner, L. ***Birds on the boundary in the Bush Capital.***
11:15 am	**S5.4- Pedler, R.**; Ribot, R.; Paton, D.C. and Bennett, A.T.D. ***Tracking reveals long-distance nomadic flights between inland and coastal refuges by Banded Stilts.***	11:15 am	**S6.4- Watson, D.M.** ***Facilitating recovery: how bottom-up processes can minimise further woodland bird declines.***
11:30 am	**S5.5- Paton, F.**; Paton, D.C.; Bailey, C. and Delean, S. ***The impact of drought on Fairy Terns (*Sternula nereis nereis*) in the Coorong, South Australia.***	11:30 am	**S6.5- Kutt, A.S.** and Eyre, T.J. ***The Last Bastion – A review of the patterns and threats in Queensland's woodland bird community.***
11:45 am	***Break***	11:45 am	**S6.6- Fraser, H.**; Garrard, G.E.; Rumpff, L.; Hauser, C.E. and McCarthy, M.A. ***The next step towards protecting woodland birds.***
12 pm–1:30 pm	**Lunch**	*****Woodland birds preliminary workshop time during lunch- details TBD (South 2)*****	**Anchor Court**

1:30 pm–3 pm	Fri 27th Nov - Early Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
	South 1		**South 2**
	Wetland birds contributed papers- session chair TBD		**Woodland birds contributed papers**- session chair Hannah Fraser
1:30 pm	**5.7- Hansen, B.**; Honan, J. and Stewart, D. ***What is the relative importance of urban wetlands for Latham's Snipe in south-west Victoria?***	1:30 pm	**6.7- Hunt, T.**; Paton, D.C. and Rogers, D. ***Birds in Black Box: Avian community drivers in floodplain woodlands.***
1:45 pm	**5.8- Loyn, R.H.**; Swindley, R.J.; Stamation, K.; Rogers, D.; Hulzebosch, M.; Menkhorst, P.W. and Steele, W.K. ***Constructed wetlands as drought refuge: waterfowl at the Western Treatment Plant during and after the Millennium Drought.***	1:45 pm	**6.8- Hodder, G.**; Paton, D.C. and Rogers, D. ***Diamonds aren't forever: The ecology of the Diamond Firetail in the Mount Lofty Ranges.***
2:00 pm	**5.9- Chamberlain, R.**; Weisner, S.; Strand, J. and Ehde, P.-M. ***Can patterns in breeding records from citizen science data be explained by existing ecological knowledge: a case of Tufted Duck and Eurasian Teal.***	2:00 pm	**6.9- Andrew, M.E.** and Fox, E. ***Modeling the dynamic distributions of the birds of the Great Western Woodlands.***
2:15 pm	**5.10- Ferenczi, M.**; Beckmann, C.; Ierodiaconou, D.; Lisovski, S.; Roshier, D. and Klaassen, M. ***Non-seasonal and long-term AIV dynamics in Australia's arid interior suggest bird numbers, age structure and immunocompetence as potential drivers.***	2:15 pm	**6.10- Hall, M.**; Nimmo, D. and Bennett, A.F. ***Give it to me straight: what makes a vegetated linear strip appealing for woodland birds within agricultural environments?***
	Session continues next page.		**Session continues next page.**

	Communication, signalling and cognition contributed papers- session chair Sonia Kleindorfer		
2:30 pm	**5.11- Zdenek, C.N.**; Heinsohn, R. and Langmore, N.E. ***Vocal complexity in the Palm Cockatoo.***	2:30 pm	**6.11- Cook, M.**; Watson, D.M.; Murray, B.R. and Leigh A. ***Spatial memory, search images and environmental cues: how do frugivores find ripe fruits?***
2:45 pm	**5.12- Masco, C.**; Mennill, D.J. and Pruett-Jones, S. ***Song overlapping: distinguishing between intention and chance.***	2:45 pm	***Break***
3 pm–3:30 pm	**Tea/coffee**		**Anchor Court**

3:30 pm–5 pm	Fri 27th Nov - Late Afternoon Sessions (each talk 10-12 min with 3-5 minutes questions) (Presenter listed in **bold font** with student presenters **highlighted**)		
	South 1		**South 2**
	Communication, signalling and cognition contributed papers- session chair Sonia Kleindorfer		**Conservation and physiology contributed papers-** session chair Todd McWhorter
3:30 pm	**5.13- Johnson, A.** and Pruett-Jones, S. ***Know thy heterospecific neighbor: heterospecific coalitions mediated by song recognition in two fairy-wren species.***	3:30 pm	**6.13-** Coetzer, W.G.; Downs, C.T.; **Perrin. M.R.** and Munro A.W. ***Molecular systematics of the Cape Parrot* Poicephalus robustus*: implications for taxonomy and conservation.***
3:45 pm	**5.14- Custance, G.**; Peters, K.J. and Kleindorfer, S. ***Parasite-induced beak deformation lowers vocal performance in Darwin's tree finches.***	3:45 pm	**6.14- Rycken, S.**; Shephard, J.; Warren, K. and Yeap, L. ***Human-wildlife conflict in urban ecology: defining a mutually beneficial approach to conservation management of the endangered Black Cockatoo.***
4:00 pm	**5.15- Evans, C.** and Kleindorfer, S. ***The role of parental vocal tutors for male and female song learning in the superb fairy-wren (*Malurus cyaneus*).***	4:00 pm	**6.15- Steven, R.**; Smart, J.C.R.; Morrison, C. and Castley, J.G. ***Birder preferences revealed using a choice experiment can guide bird conservation funding and management.***
4:15 pm	**5.16- Young, C.M.; Cain, K.E.; Svedin, N.; Backwell, P.R.Y., Pryke, S.R.** ***Dominance, aggression and social structure in crimson finch groups.***	4:15 pm	**6.16- Champness, B.**; Palmer, G.; Kendal, D. and Fitzsimons, J. ***The birds next door. How do residents think about their avian neighbours?***
4:30 pm	**5.17- Mathew, S.-L.** and Kleindorfer, S. ***Does embryonic aural discrimination predict vocal copy accuracy after hatching?***	4:30 pm	**6.17- Douglas, T.K.**; Cooper, C.E.; Withers, P.C. and Davies, S.J.J.F. ***This robin is more superhero than sidekick: Thermoregulatory physiology of the Western Yellow Robin* Eopsaltria griseogularis*.***
	Sessions continue next page.		

4:45 pm	**<u>Special perspectives-</u>** <u>session chair Sonia Kleindorfer</u> **5.18- Breed, W.** ***The Edward Grey Institute for Field Ornithology during the Spring and Summer of 1961 - reflections of a field assistant at that period of time.*** **Closing plenary starts at 5:15 pm- see next page.**	4:45 pm	**6.18- van de Pol, M.** and McLean, N. ***Can we predict which species are most sensitive to climate change?***

Friday 27th November, 2015		
5:15–5:45 pm	Closing Plenary- Stephen Debus (**2015 Serventy Medal winner**) ***Life after uni: gainful employment while staying engaged in research.*** This talk provides a case history of academic and career paths that enabled employment in the field of ecological consulting (mainly fauna surveys for EISs and the like) while maintaining an active role in bird research. Throughout, from a Bachelor's degree and graduate diploma (wildlife management), to bird-focussed Masters and PhD in zoology at ten-year intervals thereafter and a postdoc after the PhD, what worked well were: (i) developing field naturalist skills (e.g. fauna ID, survey, capture and marking – including bird banding) early on; (ii) volunteering (e.g. bird atlases, field survey trips, editing publications, engaging with community groups, refereeing promptly); (iii) taking any jobs at first, while maintaining an interest in bird research on the side; (iv) doing applied (management-oriented) MSc and PhD/postdoc research topics; (v) publishing at every opportunity (formal research plus other useful observations); (vii) having great supervisors who were also good at getting grants to employ a research assistant/research fellow; (viii) approaching potential employers; (ix) continuing research on threatened species, e.g. (after the PhD) an annual spare-time study project on a little-known species, and having an honorary position (office and research facilities) at UNE; (x) writing or contributing to books. Basically, it meant getting a name for oneself as being knowledgeable on certain significant bird groups or threatened species, and topical issues (e.g. old-growth forests, woodland fragmentation) relating to them. Living frugally in lean times (thus also minimising ecological footprint) has helped, and working part-time hours since the PhD has left time to do research.	**South 1**
5:45–6:20 pm	**Closing ceremony** • Conference wrap-up- Local Committee & BirdLife Australia • Student awards • Announcement of location for AOC 2017	**South 1**
6:30 pm	**Buses depart to Glenelg and South Terrace (Adelaide CBD) accommodation**	

Oral presentations- Wednesday 25 November

Seabirds symposium- convenor Kerry-Jayne Wilson

S1.1- Mattern, **T.**; Ellenberg, U.; Houston, D.; Seddon, P.; van Heezik, Y.; Thompson, D.; Sagar, P.; Morrison, K.; Otley, H.; Hiscock, J.A. and Amey J.

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Comparative population ecology of New Zealand's* Eudyptes *and* Megadyptes *penguins.

Of the world's 18 extant penguin species six species live and breed in New Zealand. Four of these are *Eudyptes* species, namely the Fiordland (*E. pachyrhynchus*), Snares (*E. robustus*), Erect-crested (*E. sclateri*) and Southern Rockhopper penguins (*E. chrysocome*); the former three species and the Yellow-eyed penguin (*Megadyptes antipodes*) are all endemic to New Zealand. With exception of the Snares penguin, the populations of all these species are believed to have undergone significant declines in the past decades. In comparison with most other penguin species world-wide, New Zealand penguins – particularly those breeding on the remote sub-Antarctic islands – have received little scientific attention which hampered interpretation of determined and assumed population trends. However, in recent years a handful of studies have started to gather first information on the marine ecology of various species and provide us with some insights of potential factors driving population developments. For the Yellow-eyed penguin on the mainland a picture emerges which puts anthropogenic alterations of the marine habitat at the forefront of factors negatively affecting population developments in recent years. Rockhopper and Erect-crested penguins struggle with decreasing oceanic productivity in the sub-Antarctic region. This, however, seems to be of lesser concern for Snares and (presumably) Fiordland penguins that breed in subtropical water closer to the NZ mainland. In the light of increasing selective pressure as a result of anthropogenic influences in the marine environment (e.g. fisheries interactions, habitat alteration, climate change) behavioural flexibility and adaptability seem to be the key for success for penguins in New Zealand.

S1.2- Ellenberg, U. and Mattern, T.

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What have we done? Effects of researcher disturbance on nesting seabirds.

Seabirds have been studied by humans for centuries. Highly mobile and very visible, they are treasured indicators of environmental change. Since the first global assessment of the conservation status of birds in 1988, seabirds have been identified as the group deteriorating fastest. Today, 28% of seabird species are classified as globally threatened by the IUCN and about half of all species are known or suspected to experience population decline.

Continued monitoring and research is vital for species conservation and to improve our understanding of the marine systems they (and we all) rely on. Given their fragile conservation status it is essential to minimise any associated negative effects. Whereas effects of tourist disturbance are increasingly being studied to improve visitor management guidelines, the potential effects of researcher disturbance are often neglected when reporting results of research or

monitoring efforts. However, even monitoring regimes that are considered low-impact, such as on-off nest counts, have the potential to cause nest abandonment and failure.

It is imperative to quantify and ultimately minimise human disturbance related effects, not only to reduce potential impact on productivity but also to gather reliable long-term monitoring data. Here we summarise our current knowledge about the effects of researcher disturbance on nesting seabirds and suggest methods to quantify disturbance related effects during future research and monitoring efforts. We encourage case-by-case the re-assessment of best practice protocols to minimise research related disturbance effects.

S1.3- Baker, **G.B.**; Candy S.G. and Rollinson, D.

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Efficacy of the 'Smart Tuna Hook' in reducing bycatch of seabirds in the South African Pelagic Longline Fishery.

While considerable progress has been made in mitigating bycatch in demersal longline fisheries proven and accepted seabird avoidance measures in pelagic fisheries require substantial improvement. We report on an at-sea experiment to test the efficacy of a mitigation method known as the Smart Tuna Hook (STH). This method uses a modified tuna longline hook which accepts a specially designed shield that disarms the hook once it has been baited, preventing ingestion and making it impossible for any seabird to be hooked. The shield is released within 15 minutes after the hook has been immersed in salt water, allowing fish to be caught after the baited hook has passed beyond the normal diving and feeding depths of most seabirds. After release from the hook the shield sinks to the seafloor where it corrodes within 12 months, leaving no pollution or toxic residue. The by-product is iron oxide and carbon.

Our experimental work was conducted on pelagic longline vessels targeting tuna and swordfish out of Cape Town, South Africa during the Austral spring of 2014. Seabird bycatch was high and a total of 13 birds were caught across the three trips. Eleven of these birds were caught on the control treatments and 2 birds on the STH treatments. The use of the Smart Tuna Hook led to a reduction in the bycatch of seabirds of between 81.8% – 91.4% in one of the highest-risk fisheries to seabirds in the world. Importantly, there was no detectable difference between setting methods in the catch rates of commercially valuable species, indicating no detectable detrimental effect on fish catch for any species. In a fishery where the bycatch rate of seabirds exceeded 1 bird/1000 hooks (this study), and where the capture of more than 25 birds by a vessel each season leads to a suspension of fishing activity for that vessel, the Smart Tuna Hook clearly provided a significant deterrent to seabirds attacking baits, and offers a feasible option for pelagic fishers to significantly reduce the level of interactions with seabirds and hence remain active in the fishery.

S1.4- Shet R.; Lea M.-A.; Baker, B. and Hindel, M.

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Assessing the importance of net colour as a seabird bycatch mitigation measure in gillnet fishing.

Gillnets are widely used in fisheries across the world and have been associated with the capture of a range of bycatch/non-target seabirds and other marine organisms. Fishing practices with gillnets typically involve the setting of a mesh to trap fish by their gills by forming a wall in the water column, held up by a buoy on top and weights and/or anchors at the bottom to ensure a vertical alignment. Gillnet-related fisheries bycatch is now a major conservation issue affecting many species of seabirds. A total of 81 species of seabirds have been identified as being impacted by gillnet fishing practices and many others are considered to be susceptible to this fishing method. Little penguins (Eudyptula minor), a species common in both Australia and New Zealand, are regularly caught as bycatch in gillnets. Most bycatch species, including little penguins, captured in gillnets are caught as the nets are not clearly visible to them. Therefore, a sensory approach in minimising bycatch was considered in this study to investigate and identify colours that are more visible to non-target species. The aim of the study was to assess the visibility of different coloured gillnets to little penguins at the Melbourne Zoo. The experiment involved a repeated-measures approach, where penguins were exposed to a number of experimental treatments (coloured materials creating a 'gillnet mimic') and a control (no gillnet mimic). The results of this research will be used to design an at-sea experiment to test the efficacy of coloured gillnets in minimising seabird bycatch.

S1.5- Bennet, D.G.; Goldstien, S.; Horton, T. and Briskie, J.

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Hutton's shearwater foraging behaviour interpreted by time-depth logger data and stable isotope analysis.

Every August, Hutton's shearwater (*Puffinus huttoni*) returns from its Australian winter foraging grounds and breeds in the Seaward Kaikoura mountains and at a predator-proof enclosure on Kaikoura Peninsula. Monitoring this species is challenging as they spend most of their life at sea, where it is difficult to directly observe behaviour such as migration, feeding, and moult. At sea, large flocks are observed "rafting" and flying about, but they are rarely seen to forage. To investigate their foraging behaviour, we deployed time-depth loggers on 8 adults between November 2014 and January 2015. Individuals were observed for periods of 12 to 36 days. Diving depth differed in the incubation (average 16.5 m) and posthatching (average 13.6 m; df=1,197, F= 9.158, P<0.002) periods. Stable isotopic analysis of shearwater prey allows foraging patterns to be followed indirectly. To determine the isotopic composition of the prey, prey species were sampled during the breeding season by monthly oblique tows in the near-shore waters off Kaikoura, from October 2014 to March 2015. The stable carbon and nitrogen isotope ratios of plankton and larval fish samples provide an isotopic baseline for the near-shore Kaikoura system from which to interpret isotopic measurements on the birds themselves. Preliminary data from the October plankton tows and the October to March larval fish samples showed their isotopic ratios to be between 6.22–13.58‰ δ15N and -17.70 to -24.41‰ δ13C. Isotopic analysis of Hutton's shearwater feathers, should provide

information on whether the geographically and isotopically distinct food-webs can be used to interpret individual shearwater movement and feeding behaviour.

S1.6- Wilson, K.-J.; Gummer, H.; Taylor, G. and Rayner, M.J.

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Recovery of the endangered Chatham petrel (*Pterodroma axillaris*): a review of conservation management techniques from 1990 to 2010.

Gadfly petrels are some of the most threatened seabirds whose conservation is frequently dependent on long-term research and management. Here we review 20 years of a conservation program to prevent the extinction of the Chatham petrel (*Pterodroma axillaris*), a New Zealand endemic showing population decline in 1990 due to intense burrow competition from another native seabird. Research during the early 1990s indicated that breeding success was low and unsustainable (10–30%). Recovery measures started in 1992 when broad-billed prion (*Pachyptila vittata*) eggs and chicks were removed from Chatham petrel burrows and entrances were blockaded to exclude prions. Artificial burrows were used to secure nesting sites and enhance pair and burrow fidelity, though prions continued to pose a threat during Chatham petrel chick-rearing. Breeding success improved when prions were culled, however a less intensive and less contentious solution was the introduction of neoprene burrow flaps in 2001 which reduced interference from prospecting prions. Subsequently, breeding success increased to a mean of 80% per annum. Finding burrows, primarily using radio-telemetry, increased the number under management from eight in 1990 to 217 in 2010, at which time spotlight surveys indicated 72% of juvenile birds had been reared in managed burrows. Chick translocations to two other islands and increasing population size (from 200–400 birds in 1990 to an estimated 1400 birds by 2010) has allowed the species IUCN status to improve from Critically Endangered in 1990 to Endangered in 2013.

Seabirds contributed papers

1.7- Mott; **R.** and Clarke, R.

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Contrasted foraging strategies of frigatebirds ranging from nearby inshore and offshore islands.

The restrictions imposed by central-place foraging mean that the waters surrounding large seabird colonies are often heavily exploited by foraging individuals. Different foraging strategies are exhibited by different species thereby acting to partition resources. Similarly, nearby colonies of conspecific individuals often target different areas for foraging. We sought to investigate patterns of resource partitioning between species at a single location, and between inshore and offshore breeding sites located in close proximity to one another. Two species of frigatebirds were investigated using a combination of GPS tracking data, stable isotope analysis and regurgitated prey sample collection. Frigatebirds are pelagic foragers consuming a diet primarily consisting of flying fish. This diet specificity limits opportunities for partitioning of resources. The foraging ecology

of frigatebirds then poses the challenging question – how does such a large degree of ecological overlap reconcile with traditional niche partitioning theory?

This research is significant because the study sites were located off the north-west coast of Australia in the understudied eastern Indian Ocean. A number of BirdLife International Important Bird Areas are located in the area and the tracking data indicate that frigatebirds frequently forage well beyond existing marine protected area boundaries and cross international borders. This suggests that current management measures are not sufficient to adequately protect the resources utilised by frigatebirds.

1.8- Shephard, J.[1]; Dunlop, N.[2]; Pearce, A.[3]; Fearns, P. and Bouten, W.[4]

[1]School of Veterinary and Life Sciences, Murdoch University, WA. ;[2]Conservation Council of Western Australia; [3]School of Science, Curtin University, WA.; [4]Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, the Netherlands.

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Linking foraging strategy to ocean productivity in tern species: proof of concept and first data.

Many species are susceptible to changing climates, including seabirds. Given this susceptibility, it is proposed seabirds may have an important role as bioindicators of climate and ocean condition. Seabirds are closely linked to marine foodwebs, and foodweb stability is strongly dependent on ocean condition. Within Australia, the El Niño Southern Oscillation (ENSO) is the strongest driver of natural climate variation across years. Extreme El Niño events can have devastating effects on seabird survivorship, as fish move from their usual ranges to cope with changing ocean temperatures. This can lead to the collapse of marine foodwebs with effects on ocean fisheries, and confirms the link between marine ecosystems and climate shifts. The economic costs can be enormous. In Western Australia over the past decade the western rock lobster, scallop, abalone and tuna fisheries have experienced substantial change as a result of altered oceanic processes. In the face of continued oceanic change, it is therefore vital to develop new bio-indicators to serve as tools in fishery and biodiversity management. In this study we use GPS telemetry and remote sense data to determine if seabird foraging strategies can be linked to areas of ocean productivity as well as to gain an understanding of potential foraging distances. Here we present preliminary data on two species of dark tern at different stages in the breeding season.

1.9- Colombelli-Négrel, D.

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Investigating low breeding success as a possible cause for the decline of the little penguins on Granite Island.

Over the past decade, populations of little penguins (*Eudyptula minor*) have been seriously declining across South Australia. A number of factors have been suggested to explain this decline such as mortality at sea, emigration to other sites, low reproductive success and/or poor juvenile survival. But to date, the role of these variables is still not fully understood. In addition, to fully understand population decline, it is important to disentangle mortality of adults (which decrease

population size) versus mortality of offspring (which suppress population dynamics). In this study, I investigated breeding performance and return rates of little penguins on Granite Island for 17 years in relation to patterns of population decline. I focused on the impacts of human disturbance, breeding site, abandon and predation on breeding success. Despite drastic population decline since 2001, breeding success on Granite Island has increased significantly from 0.54 fledglings per breeding pair in 1990 to 1.50 in 2013. Breeding site was the main factor affecting breeding success, but I also found a negative impact of predation and human disturbance. However, I found that both fledgling and adult return rates were extremely low, suggesting little survival between years – perhaps due to low survival from parasites, starvation, or marine predators.

1.10- Galbraith, M.; Krzyżosiak, J.; Aguilar, G. and Jones, G.

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Changes in the breeding status of the southern black-backed gull (*Larus domincanus*) on Rangitoto Island (Hauraki Gulf, New Zealand) since the 1920s.

The southern black-backed gull (*Larus domincanus*) is a familiar species throughout New Zealand, and has a significant presence in Auckland City. Within the Auckland region, the species usually breeds in scattered locations around the coast, either as solitary pairs or in small groups, and occasionally atop buildings within the city. Large breeding colonies are present on Rangitoto Island only 8 km from the city's Central Business District (CBD). The proximity of these colonies provides access to a rich supply of anthropogenic resources, and, consequently, the colonies are influenced by changes in these resources. We compare the current status of the breeding population on Rangitoto Island with historical data, particularly those of studies carried out in the 1970s. The population exhibited rapid growth throughout the early 20th century, a pattern that is attributed to the environmental changes associated with European settlement favouring the species. Since the 1970s, the population has reduced, a trend that is correlated with environmental mitigation actions. This pattern of population change is consistent with other populations nationwide, and with gull species globally. The availability of organic waste, and changes in the practices for treating the waste, are implicated as key drivers in the population changes. Field observations indicate that human-sourced foods are still a significant component of the gull's diet.

1.11- Reinhold, S.-L.; Goldsworthy, S. and Colombelli-Négrel, D.

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An investigation of Long-Nosed Fur Seal diet: identifying the importance of little penguins and predation on commercially fished species

Little penguins are currently classified as "common" across South Australia, however some populations have been seriously declining over the past decades. Whilst there are several threats that need to be considered recovering long-nosed fur seal populations have more than trebled within South Australia since the 1980's, leading to increased concerns regarding their impact on little penguin populations. To date, fur seal dietary studies have only focused on breeding colonies, with little investigation of non-breeding animals, which are most likely to interact with little penguins, fisheries and other species of conservational significance in coastal waters. This study examined

the diet of long-nosed fur seals (*Arctocephalus forsteri*) at 10 haulout sites and two breeding colonies across three regions (Kangaroo Island, Fleurieu Peninsula, Yorke Peninsula) in South Australia using hard part analysis of 326 faecal samples. This study focused on the predation of little penguins and importance of commercially fished species and compared the dietary profiles between fur seals at breeding colonies versus haulout sites. In total, 21 taxa (species, genera or family) were identified. Key prey species varied regionally, however leatherjackets (Monocanthidae) (39.9% overall prey biomass) and garfish (*Hyporhamphus melanochir;* a commercially fished species) (12.3% of overall prey biomass) were the most common taxa consumed by fur seals using Kangaroo Island and Yorke Peninsula haulout sites. Comparatively, little penguins (*Eudyptula minor)* were the most important prey in terms of estimated biomass for Fleurieu Peninsula. This study identified marked variation in the importance of little penguins in fur seal diet across the regions; evidence of penguin predation was found in 4% of scats from Kangaroo Island, 10% Yorke Peninsula and 42% Fleurieu Peninsula. These results suggest that little penguin predation may be opportunistic and the abundance of little penguins within each region may not be the only factor driving their importance in long-nosed fur seal diet.

1.12- Bool, N.

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Keeping track: investigating foraging responses of short-tailed shearwaters to a changing environment.

During the breeding season seabirds must find a balance between sustaining their body condition and providing their chicks with enough energy to successfully fledge. As such, seabirds are heavily influenced by marine environmental variability as changes in the distribution and abundance of prey could lead to increased foraging effort and trip duration. The short-tailed shearwater (*Ardenna tenuirostris*, STSH) is the most abundant seabird in Australia, with an estimated population of 23 million. Due to their high biomass they are an important upper trophic predator of the Southern Ocean. Therefore, understanding the mechanisms driving STSH foraging decisions provides an integrated signal of environmental conditions in the Southern Ocean. To examine STSH foraging behaviour during the breeding season we deployed light weight geo-locators (GLS) on STSHs breeding on Wedge Island, Tasmania, during the 2011 - 2014 breeding seasons (n=66). The tracking component of this study revealed that regions associated with the Antarctic Polar Front are important foraging areas for STSHs. In addition, trip length and duration varied year to year due to environmental conditions. Our findings suggest that the predicted warming of sea surface temperatures in the Southern Ocean could have implications for both long-term breeding success and population viability of this wide ranging seabird.

Shorebirds contributed papers

1.13- Maguire, G.; Weston, M.; Ehmke, G.; Cullen, M.; Mead, R. and Ekanayake, K.

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A flagship for coasts: where are we after nine years of intensive recovery efforts for the Hooded Plover?

Struggling to raise their young in a habitat loved by all Australians for recreation, beach-nesting shorebirds, like the Hooded Plover, are at a major disadvantage. They are widely dispersed, experience a myriad of threats and are incredibly cryptic. Hooded Plovers also are highly specialised in their coastal habitat requirements, with no alternative to avoiding heavily disturbed habitats. Their conservation relies on having many, dispersed volunteers to monitor the birds, interpret their behaviour, find cryptic nests and record site-based threats. Significant effort is put into training these 'citizen scientists' so that efforts to assist are not damaging. Furthermore, fundamental to successful conservation outcomes is not merely volunteer involvement but ensuring data is collected in a consistent way. An online portal allows for standardised data capture and to trigger real time management responses. Significant effort goes into protecting individual nest sites and adapting site protection post hatching. Results are reviewed each season and management responses adapted over time. Alongside citizen science involvement, scientists and students carry out research projects to close key knowledge gaps. This multi-faceted approach of research, nest protection and education of beach users is turning the tide for these beach birds, boosting their breeding success and stabilising population numbers. Long term effectiveness is measured in terms of behavioural change among recreationists. There are still critical research needs to address in order to improve effectiveness of on-ground management responses, and top-down support in the way of sympathetic coastal policy and legislation around dog and vehicle access remain largely absent.

1.14- M. Estrella, S.; Davis, R. and Horwitz P.

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Quality of supratidal habitats in Western Australia for migratory shorebirds during post and pre-migration.

The East Asia-Australasia Flyway has experienced ongoing major intertidal habitat loss that appears to be related to an alarming rapid shorebird population decline. However, shorebirds have the capacity to use supratidal habitats such as salt works or salt lakes as alternative or complementary foraging sites. Although numerous studies on the utilisation of supratidal habitats by shorebirds have occurred in other regions of the world, especially in temperate zones (e.g. Europe and USA), there is a lack of knowledge about shorebird foraging ecology and utilisation of supratidal habitats in the East Asia-Australasia Flyway. We evaluate the quality of foraging grounds during post and pre-migration in three supra-tidal sites in Western Australia; Lake MacLeod (a natural salt lake) and Port Hedland and Dampier salt works (anthropogenic salt production sites). We discuss the significance of these sites for regional shorebird populations and present the results of foraging ecology studies in order to build a conceptual understanding of why these sites are important for shorebirds. Our results indicate that all three supratidal sites can act as alternative feeding grounds

for migratory shorebirds during post-migration. However, only in Lake MacLeod were shorebirds able to fulfil their energetic demands in preparation for migration, indicating that the other two sites can act as complementary feeding grounds. This study is derived from a collaborative research project between Dampier Salt Ltd.-Rio Tinto and Edith Cowan University.

Burning & birds symposium- convenors Rob Davis & Martine Maron

S2.1- Davis, R.; Doherty, T.; Van Etten, E.; Radford, J.; Holmes, F.; Knuckey, C and Davis, B.

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Long unburnt vegetation is important for bird species, guilds and diversity: a case study in semi-arid shrublands.

Landscape-level wildfires have a major role in structuring faunal assemblages, particularly in fire-prone regions. Impacts to fauna occur through changes to resources required for shelter, feeding and breeding, and are primarily a result of changes to vegetation structure and species composition. We investigated the response of a semi-arid shrubland bird community to landscape-level wildfires in Western Australia by examining bird abundance, diversity and guild structure in relation to time since fire. We were also interested in how vegetation structural attributes varied with time since fire. We surveyed 32 sites, with eight sites in each of four age classes: 12-14 years since last fire (YSLF; 'young'); 19-29 YSLF ('medium'); 34-50 YSLF ('old'); and > 50 YSLF ('very old'). A total of 845 birds from 40 species were recorded. Vegetation structure varied with fire history with old and very old sites characterised by less bare ground, more leaf litter cover and greater canopy cover. Bird community composition varied between fire-age classes with young sites being significantly different from old and very old sites. Insectivores were primarily associated with older post-fire vegetation and old and very old sites were associated with higher abundances of golden whistler, grey shrike-thrush and red-capped robin. Bird species richness increased with time since fire, with old and very old sites having higher species richness than young sites. Decadal impacts from intense landscape-scale fires transform the landscape into homogeneous young shrublands which may render vegetation unsuitable for several species and guilds and we discuss the management implications of this.

S2.2- Burgess, E.; Maron, M. and Haseler, M.

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Local- and landscape-scale drivers of bird assemblages in a fire-prone landscape.

Disturbances such as fire affect landscape heterogeneity and are important influences on the distribution and abundance of biota across a range of scales. A key challenge for biodiversity conservation in fire-prone ecosystems is thus to understand the influence of fire on biotic communities. We investigated the importance of variable fire regimes, spatial heterogeneity, extent of habitat, and local- and landscape-responses on birds and their habitat in the fire-prone sub-tropical woodlands of central Queensland. We found bird species richness at both the site- and landscape-scale was most strongly associated (positively) with measures of landscape

heterogeneity, but predominantly topographic complexity rather than factors which can be manipulated through management. Fire-mediated diversity was of limited importance. Instead, the extent of longer unburnt habitat was found to be important, particularly influencing bird species composition and assemblage structure at the landscape scale. Although conservation management strategies often aim to introduce heterogeneity to boost biodiversity, our findings suggest a need to ensure an appropriate extent of longer-unburnt habitat to promote bird richness

S2.3- Fox, E.[1]; **Douglas, T.K.[1]**; Gosper, C.R.[2,3]; Watson, S.J.[4] and Chapman, A.[1]

[1]BirdLife Australia, Perth, WA, Australia; [2]CSIRO, Perth, WA, Australia; [3]Department of Parks and Wildlife, Perth, WA, Australia; [4]La Trobe University, Melbourne, VIC, Australia.

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Fire and the bird communities of the Great Western Woodlands: 300 years in the making.

Fire is a major disturbance process influencing bird abundance, richness, and diversity, so understanding how bird community composition changes with post-fire age is critical for appropriate land management. Assessing species' responses to fire in ecosystems with fire return intervals of decades or centuries can be challenging as fire events pre-date accurate record keeping, so age of vegetation can be unknown. In Gimlet *Eucalyptus salubris* woodlands however, the almost complete mortality of trees following fire events allows stands to be aged reliably, making it ideal for chronosequence studies. As part of a broader bird research project in the Great Western Woodlands, bird surveys were repeated in Gimlet woodland sites (n = 57) of various ages since fire (5 – 300 years). Analysing changes in community composition using PERMANOVA highlighted substantial differences in bird communities between young, intermediate and mature Gimlet woodland sites. Responses of individual bird species were also analysed, using generalised additive mixed models. Four types of responses between a species' probability of occurrence and post-fire age were identified: incline, decline, bell, and delayed. Birds exhibiting a delayed response, such as Rufous Treecreeper *Climacteris rufa*, were largely absent from young Gimlet stands, and in the case of treecreepers only began to reoccur in sites that were at least 150 year post-fire. This study reinforces the value of old growth woodlands, identifies the time scales over which old-growth habitat features important to birds develop, and highlights a number of species that are at risk of significant population declines if inappropriate fire regimes occur.

S2.4- Kuchinke, D.

Science and Technology, Federation University, Mt Helen, VIC, Australia.

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Can we use common birds as tools for rapid assessments?

Australian woodlands have for decades been fragmented due to urban expansion. In recent times we have seen prescribed burning periods extended from autumn and spring prescribed burns to spring/summer and summer/autumn burns. Combined fragmentation and burning protocol changes have placed enormous pressure on our native birds. Add to this the issue of a changing climate.

The *State of Australia's Birds Report July 2015* has highlighted this quite frighteningly; some of our most common and in some cases iconic of species of birds are declining in abundance.

In this research birds were monitored on 84 woodland sites in Victoria over two spring/summers and two winters. Modeling incorporated predictor variables of time-since-fire age classes and fire frequency, run independently against response variables of individual species and foraging guilds. Simper analyses indicated the same group of 11 species driving >75% of the variations.

Can we consider this group of 11 species to be indicator species for the entire woodland assemblage? We might consider selection of these birds as indicator species because they are 1) Most common, 2) Sensitive to fire, 3) Indicate a particular environmental condition, or are 4) Iconic species. The Laughing Kookaburra is one species that is driving specific patterns in our woodlands. It has been highlighted in the *State of Australia's Birds Report* as being in decline along the east coast of Australia. Can we begin to undertake some rapid assessments of woodlands using these 11 species as a tool for determining some meaningful results?

S2.5- Rogers, D.J.[1,2] and Paton, D.C.[1]

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Bird Community Responses to Fire and Drought in a semi-arid heathland, Ngarkat Conservation Park, over a 21 year period.

Fire regime plays an important role in structuring avian communities across many Australian ecosystems. However, the response of birds to fire can also depend on the climatic context within which fire events occur (and particularly post-fire climate), and the spatial configuration of fire regime. Using 21 years of annual survey data, here we investigate the postfire response of avian communities to fire in a semi-arid heath system. The spatial and temporal extent of these data allowed us to investigate the postfire response of birds under different climatic conditions and fire frequencies. While seral age was a strong determinant of community composition, postfire rainfall also explained variation in the response of birds among different fire events. These results allow managers to account for climate-derived variation in postfire response when establishing desirable fire regime metrics for ecological fire management.

Habitat use contributed papers

2.7- Trezise, J.[1]; Vine, S.[2] and Lindsay, B.[3]

[1]Healthy Ecosystems Program, Australian Conservation Foundation, Canberra, ACT, Australia; [2]Birdlife Australia; [3]Environment Justice Australia

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Improving national recovery plans and safeguarding critical habitat for threatened species.

Threatened Species Recovery Plans, developed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* are the Australian Government's key instrument for bringing threatened species back from the brink. They bring together the knowledge, science, and actions needed to recover threatened species and ecological communities.

One of the very reasons the EPBC Act exists is to prevent extinction – to identify the species at risk and the actions that we can and must take to turn their fate around. Yet, for the majority of species it is failing at this most fundamental task.

Analysis completed by the Australian Conservation Foundation, Birdlife Australia and Environment Justice Australia has examined whether recovery plans are working to protect the habitat of our most endangered animals, including some of our most threatened birds. It highlighted that despite habitat loss being listed as key threat for the majority of fauna listed under the EPBC Act, very few recovery plans placed any form of prescriptive limit to the loss of critical habitat for our most threatened species.

This talk will seek to discuss some of the key findings of this analysis and implications for some of Australia's most threatened birds. It will also aim to outline and discuss potential improvements to the recovery planning process and improving the protection of critical habitat under our national environmental law, and some of the barriers to achieving this.

Further detail can be found in the report: Recovery Planning: Restoring life to our threatened species - https://www.acfonline.org.au/sites/default/files/resources/Recovery_Planning_Report.pdf

2.8- Simmonds, J.; Maron, M. and van Rensburg, B.

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Accounting for differences in landscape type when exploring the relationship between bird species richness and vegetation area.

Understanding how species richness relates to the area of native vegetation in a landscape can inform the management of modified environments, by guiding targets for habitat protection and restoration. Typically, the effect of landscape-scale vegetation area on species richness is ascertained by plotting the relationship for multiple landscapes, and examining the shape and form of the species-area curve. However, if the effect of vegetation area on species richness varies for landscapes characterised by particular abiotic attributes, combining data from these different landscape types may mask separate, underlying species-area relationships, resulting in an inaccurate representation of the how richness varies with area. In this study, we examined species-area relationships for birds dependent on woody vegetation, where landscapes were classified by abiotic attributes such as range in elevation, to determine whether the shape and form of the relationships differed in these different types of landscape. Furthermore, we explored the underlying ecological processes that may explain why area affects bird species richness differently in landscapes characterised by particular factors. These analyses were undertaken for two regions – south-east Australia and north-east South Africa – to decipher commonalities and differences in landscape-scale patterns of bird species richness. Through this study, we highlight that the underlying properties of a landscape, which bear influence on ecological processes and patterns of anthropogenic land use, should be accounted for when exploring the influence of area on species richness in modified environments. Failure to consider this may result in an inaccurate understanding of the influence of area, and ineffectual management prescriptions.

2.9- Louter M.[1]; Slender[1], A.; Leu, S.[1]; Gardner, M.[1,2] and Kleindorfer, S.[1]

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Habitat restoration from grazing predicts presence but not home range size in thick-billed grasswrens.

The movement of organisms through their environment is an intrinsic component of an animal's ecology and lies at the heart of ecological field research. When human activity impacts a habitat, understanding the effects of human disturbance on a species' presence/absence and home range size is important for successful biodiversity management. We compare home range size in thick-billed grasswren (*Amytornis modestus raglessi*), a bird of conservation concern, in arid zone habitat that is recovering from intensive sheep grazing. We used telemetry study to record home range size in areas with previously low and heavy grazing impact in Witchelina Reserve, South Australia. Grasswrens were absent from areas recovering from heavy grazing. In areas with moderate grazing, thick-billed grasswren across 14 territories was comparable and large 6.6ha ± 4.1 . Areas recovering from heavy versus moderate grazing intensity differed significantly in ecological variables: sites recovering from heavy grazing impact had less vegetation cover and fewer insects. In conclusion, thick-billed grasswrens were more likely to occur in areas recovering from moderate grazing impact, and home range size was comparable across territories in areas recovering from moderate grazing impact.

2.10- Lill, A.; Hales, E. and Vines, A.

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Factors facilitating urban colonization by Little Ravens.

Urbanization drastically transforms natural environments. Some bird species thrive in the changed conditions, but others cannot adjust to them. Corvids are notorious for their ability to colonize cities. It has been hypothesized that three features of their natural ecology and behaviour are crucial to this capacity: they are ecological generalists, can use innovative feeding behaviours to exploit human food waste, and can adjust to the high levels of urban disturbance, particularly pedestrian traffic.

Little Ravens have successfully colonized Melbourne, Adelaide and some other SE Australian conurbations. We compared the nest site characteristics, foraging ecology, involvement in interspecific food competition and tolerance of human proximity of urban and exurban Little Ravens to elucidate the roles of phenotypic plasticity and inherent suitability in facilitating urban colonization by this species.

Nest tree characteristics were similar in urban and exurban environments (suggesting inherent suitability), although urban nests were more concealed. Urban ravens manipulated human food waste and gleaned food from sealed surfaces more than exurban conspecifics (behavioural flexibility), but foraging behaviour and foraging substrate use were broadly similar in both environments (inherent suitability). Aggressive, interspecific competition for food was limited and not

influential in food acquisition in either environment. Urban ravens were more tolerant of human proximity than exurban conspecifics (behavioural flexibility).

Thus inherent suitability for the urban environment, a capacity for innovative feeding behaviour, a low level of interference competition for food with other urban birds, and an ability to adaptively adjust to human disturbance have probably all facilitated urban colonization by Little Ravens.

2.11- Castley, J.G.[1] and Symes, C.T.[2]

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Stable isotope analyses reveal regional site fidelity linked feeding resources for Glossy Black-Cockatoo.

The Glossy Black-Cockatoo (*Calyptorhyncus lathami*) is widespread yet uncommon across eastern Australia. Within this range it has specialised habitat requirements, breeding in hollow-bearing trees and feeding on seeds of she-oaks, *Allocasuarina* and *Casuarina.* Feed tree species differ from one region to the next across both latitudinal and longitudinal gradients. Specific food plants are therefore favoured by different metapopulations of the species where the availability of preferred foods within a region may drive regional movement patterns. We used stable isotope analyses to investigate the potential for regional site fidelity in the Glossy Black-Cockatoo by sampling both feed trees and feathers along a longitudinal gradient in southeast Queensland. Specifically, we asked whether the $\delta^{13}C$ and $\delta^{15}N$ ratios in feed tree species across the range correspond to those found within feathers from these regions. We sampled ripe cones from five known feed trees species (*Allocasuarina littoralis, A. torulosa, A. inophloia, Casuarina equisetifolia* and *C. cristata*) along the gradient. We also collected moulted tail feathers (n=12) along this gradient for comparison with feed tree isotopic signatures. We used captive Glossy Black-Cockatoo control feathers (n=16) to determine diet-tissue fractionation values. Glossy Black-Cockatoo from coastal regions fed predominantly on the seeds of only *A. littoralis* and *C. equisetifolia*, whilst birds feeding further inland also showed strong fidelity to *C. cristata*. Our data suggest that there may be little mixing within the larger Glossy Black-Cockatoo metapopulation at a regional scale and this may have importance for regional conservation and management strategies for the species.

2.12- Veltheim, I.[1,2]; Cook, S.[1]; McCarthy, M.[2]; Palmer, G.[1] and Hill, R.[3]

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GPS tracking reveals two movement strategies of brolgas,* Antigone rubicunda*, within a restricted range.

Resource availability and distribution influences annual movement strategies of animals. Many resources are seasonally available and often linked to changes in weather. Breeding and non-

breeding resources may be separated by large distances and many species undertake seasonal movements or migration to access them. Resource distribution can thus influence when and how far animals move. Individuals within populations may also have different movement strategies, often depending on the age of the individual, local resource quality and social group associations. In some species, populations may consist of both resident and migratory individuals. The brolga, Antigone rubicunda, undertakes seasonal movements between breeding and non-breeding areas, but their movement patterns, routes taken, and distances travelled are unknown. We colour-banded 9 pre-fledged brolga chicks between 2010 and 2012 to study movements from breeding to non-breeding areas. We used GPS platform terminal transmitters (PTTs) to investigate seasonal movement patterns and distribution of brolgas in more detail. We deployed 23 GPS PTTs on five adult, six juvenile and 12 pre-fledged brolgas between April 2010 and October 2012, in south-west Victoria. The timing of movements generally followed seasonal patterns reported for brolgas in literature. However, we found many exceptions to a strictly seasonal pattern of movement. In addition, the GPS-tracking revealed two annual movement strategies – some individuals moved about 100 km, and others about 20 km on average, between non-breeding and breeding areas. We discuss the possible influence of age, spatial memory, social cues and local resource patterns on these movement patterns.

2.13- Roper, E.; Hobbs, R. and Craig M.

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The adaptation of the forest red-tailed black-cockatoo (*Calyptorhynchus banksii naso*) to the urban environment on the Swan Coastal Plain.

The traditional habitat of the threatened forest subspecies of the red-tailed black-cockatoo (*Calyptorhynchus banksii naso*) is in the Jarrah forest of south-western Australia. Since 2000, red-tailed black-cockatoos have occurred increasing frequency in the Perth Metropolitan Area on the Swan Coastal Plain. The heavily urbanised Perth Metropolitan Area lies adjacent to the Jarrah forest, and supports a few remnant patches of Banksia woodland. While it is believed most urban red-tailed black-cockatoos commute daily to the Metropolitan Area, there are several urban populations believed to be resident year round. Urbanisation alters the landscape, causing changes to the availability of resources (e.g. food, water, nests), predation, and the sensory environment (e.g. noise, artificial light). This in turn can lead to behavioural adaptations in animals that reside in urban areas.

This project will investigate how the forest red-tailed black-cockatoo has adapted to the urban environment. It will focus on the range expansion into urban areas, the use of novel resources such as exotic foods, the modification of anti-predator behaviours, and the urban environment as novel habitat for red-tailed black-cockatoos. The findings of this study will 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.

2.14- Stirnemann, R.[1,2,4]; Enoka, F.[3]; Uili, M.[3]; Jalloh, I.[4]; Potter, M.[1]; Butler, D. and Minot, E.[1]

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A tropical island story: the Ma'oma'o and Manumea only in Samoa.

There is a worldwide decline in biodiversity. Yet, few studies have explored the processes that underlie biodiversity decline in the tropics, particularly in the oceanic islands, despite the disproportionately high number of threatened species and the endemic richness of this region. Indeed, basic biological information is lacking for many oceanic island species. The Ma'oma'o, an endangered honeyeater and the critical endangered Manumea or Toothbilled pigeon are both endemic to Samoa, and are examples of this. We investigated: 1) the breeding biology of the Ma'oma'o, 2) how Ma'oma'o survival varies with life history stage, 3) how the sex of this monomorphic species can be determined in the field, 4) how landscape-scale factors and local-scale vegetation features influence nest predation of cup nesting birds in Samoa, 5) how to monitor and determine detectability of the Manumea, 6) factors driving spatial usage of the Manumea and their seasonality, and 7) the influence of hunting on the decline of the Manumea. Our findings shed new light on why these two bird species are disappearing. We have also developed new and successful methods for population monitoring which could be used on other rear species. Our results highlight potential management strategies that may need to be implicated to stop these species disappearing all together.

Poster presentations- Wednesday 25 November

Insights from monitoring (posters accompanying symposium)

P1.1- Morgan, D.; Arcus, N. and Gash, D.

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Results of the first city-wide survey of birds in Whangarei, Northland, New Zealand.

Urban areas are regularly overlooked for ecological research as they are often viewed as being of low conservation value. This is unfortunate because cities are made up of a mosaic of different habitat types, many of which can support viable populations of native animals and plants. Furthermore, approximately 75% of New Zealanders and 68% of Australians live in urban areas and it is in this environment that people often have their first or the majority of ecological experiences. Birds are frequently used as indicators of environmental health and surveys conducted in several New Zealand cities have demonstrated re-colonisation and distribution patterns of native birds over time. Here, we report on the first city-wide bird survey in Whangarei in order to establish an inventory of bird species and their relative abundances. We established 214 stations across representative habitat types (forest, green space, residential) within Whangarei city and birds were counted using the five-minute bird count method in December 2014. Thirty-one species were detected during counts, of which, 13 were native. House sparrows (*Passer domesticus*) were the most abundant bird across all habitat types; however, native species made up six of the top 10 most abundant species. The results from this survey will act as baseline data for future surveys to be compared against.

P1.2- Harrington, J.; Hutchinson, G. and Irvine, J.

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Breeding behaviour of White-bellied Sea-Eagles on the Parramatta River. Life can be hard.

There has been a Sea-Eagle nest in the Newington Nature Reserve at Sydney Olympic Park by the Parramatta River for many years, with a succession of eagle pairs renovating the nest in the breeding season. There are few early records of successful breeding however and several eagles have been found dead. Following the death of a pair of breeding eagles in 2004, necropsy and chemical analysis of tissues was undertaken in order to determine the cause of death. Further study was recommended.

The current study continues to observe and record the breeding relationships, behaviour and diet of the White-bellied Sea-Eagles using video CCTV cameras and by limited physical observation from the time of nest renovation to fledging. Their breeding success is improving compared with past years, though has not been successful each year. The current pair has been studied since 2008 and have raised to fledging an average of one eaglet each year. Their success or failure appears to be closely linked with environmental conditions, particularly the accumulated persistent organic pesticides in Homebush Bay and the Parramatta River.

Live-streaming and back-up of all recorded behaviour has revealed a wealth of information, from the antics of the eaglets, their changing diet and observations of shared parental duties.

The study continues to reveal much information on the breeding behaviour of Sea-Eagles as well as a source of information for the public, through live-streaming of nest activity and valuable Education resources.

P1.3- Barth, M. and Berris, K.

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Can individual female South Australian glossy black-cockatoos be identified by facial plumage patterns?

The endangered South Australian glossy black-cockatoo (*Calyptorhynchus lathami halmaturinus*; GBC) is only found on Kangaroo Island, and a Recovery Program initiated in 1995 has resulted in an increase in the population from less than 200 birds to a minimum of 356 birds in 2014. Repeatedly identifying known individuals contributes to the collection of important life history and demographic data. Over 400 GBCs have been banded as nestlings since 1995; however, reading band numbers in the field is difficult as they are often obscured by vegetation or the bird's body, and require the observer to use high-powered spotting scopes. Taking close-up photographs of birds is comparatively easier.

Female GBC plumage differs from males as they have distinct yellow feathers around the head and neck, the quantity and pattern of which can vary greatly between individual females. We are photographing adult females while also recording their band numbers over multiple years to investigate: 1) whether females can be identified from plumage patterns alone, and 2) if plumage patterns remain the same over a number of years through the moulting process. Although the current sample size is small, this pilot study indicates that individual females can be identified from plumage patterns, and that these patterns are consistent between years. Accordingly, using plumage markings to identify individual adult females may be a reliable alternative for un-banded birds or when band numbers cannot be read. This technique may also be useful for studies of GBC's in eastern Australia where few if any birds are banded.

Introduced species

P1.4- Felemban, H.

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The occurrence of the Indian House Crow in Jeddah, Saudi Arabia: Their environmental and health problems.

The spread of the indian House crow (*Corvus splendens*) outside its natural distribution range is known and mentioned by several authors (Bundy et al.; 1989, Jennings; 1982, and Gallagher; 1979).

Introduction of this bird species to Saudi Arabia has been reported from most coastal cities of the Arabian Peninsula: Kuwait, Bahrain, United Arab Emirates, Oman, Yemen, and Saudi Arabian

coastal cities (Ras Tanura and Dahran by the Arabian Gulf; and Jeddah, Jizan, and Yanbu by the Red Sea coast.)

In Jeddah; Pest status for this bird species is acquired since the increasing of numbers of individuals was recorded. A successful breeding season was observed, and spreading of crows through-out most parts of Jeddah was established.

Field observations were carried out with collaboration of Jeddah Municibality team-work during different months of 2013.

Environmental and health problems were discussed, reviewed, and considered for this bird species. Thus a scientific research results was concluded to define and solve such a problem.

Conservation

P1.5- Boulton, R. and Lau, J.

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Threatened mallee birds conservation action planning: Strategies & actions.

The Murray Mallee provides habitat for six nationally-listed threatened species: Mallee Emu-wren (Endangered), Black-eared Miner (Endangered), Regent Parrot (eastern) (Vulnerable), Red-lored Whistler (Vulnerable), Malleefowl (Vulnerable) and Western Whipbird (eastern) (Vulnerable). Fire is a major threat to these species as all six exhibit one, or all, key life-history components within relatively long-unburnt mallee. Their vulnerability to fire was highlighted in early 2014 when large wildfires burnt an 'insurance' population of the Black-eared Miner in Victoria, and the South Australian population of Mallee Emu-wren. In addition, fires destroyed large tracts of habitat for other nationally threatened mallee species.

Experts in fire and mallee species from universities, zoos, non-government organisations and representatives from State and Federal governments came together to determine the immediate and ongoing strategies, actions and funding required to prevent threatened mallee birds from becoming extinct. The Open Standards for the Practice of Conservation were used to systematically identify threats affecting one or more taxa and outline actions to be implemented within an adaptive management framework. The result is an efficient and cost effective Conservation Action Plan (CAP) for the six taxa.

Very high threats to the conservation targets, as assessed by the CAP Implementation Team, were catastrophic wildfire, inappropriate fire management, past habitat loss and fragmentation and drought. From here the team developed 12 strategies aimed at reducing these threats to achieve clearly defined conservation goals for each species.

P1.6- Gama, V.F.; Mills, M; Szabo, J.; Fuller, R.A.; Blomberg, S.P. and Possingham, H.P.

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How does data availability bias the extinction risk assessments of migratory birds?

Migrants extinction risk assessments might be disproportionally impacted by the amount and quality of data used, and a higher proportion of migrants (compared to non-migrants) might be threatened than currently estimated by the IUCN Red List, specially in data poor regions. Globally, less migrants are listed threatened than non-migrants, which could be reflecting the data scarcity in some countries. We think this could be true because in countries with more data availability for birds, the proportion of migrants listed threatened in IUCN Red List is higher than in countries with less data availability. Here we tested the sensitivity of IUCN Red List methods to data in the two groups of migratory and non-migratory birds to discover how the proportion of migrants and non-migrants threatened change when controlling for data availability. We chose a subset of bird species in a data-poor region, Brazil, for which we produced more data, and another subset in a data-rich region: Australia, for which we simulated less data. We re-assessed these species' extinction risk using the new baseline data and expert elicitation and evaluated how the proportion of migrants and non-migrants threatened changed in the two regions. In the process, we produced valuable data for Brazilian birds, and our methods for the species assessment might subsequently be used for the official Brazilian national assessment. Migratory birds have experienced precipitous declines in recent years and if these species extinction risk is being overlooked, it means they are lacking the protection they need.

P1.7- Thomas, J.; Cullen, M.; Hedger, D. and Wilson, C.

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Evaluation of volunteer participation in threatened bird recovery projects.

The Threatened Bird Network (TBN), established in 1996, is a national volunteer based program aimed at encouraging community participation in threatened bird recovery projects. TBN links community members with a range of opportunities (e.g. bird surveys, recovery programs, training workshops) to build the capacity and skills of volunteers and enhance the efforts of bird conservation projects. In October 2013, an anonymous survey was sent out to all TBN members to evaluate current member demographics, level of involvement and volunteering motivation and preferences.

A total of 551 members responded to the survey. Survey results demonstrated that members were enthusiastic to participate, and a majority of respondents had previously volunteered with TBN projects. A large proportion of survey respondents were between 55 and 74 years old, and most had a good level of volunteering experience. One of the strongest motivators for volunteer participation was 'making a difference to the environment'. Volunteering preferences included: short-term (one day) activities, field-based activities, short travel distance, and more regional or local volunteer opportunities.

The information from this survey highlights the importance of volunteer evaluation, in improving projects such as TBN to enhance volunteer experiences, provide rewarding volunteer opportunities,

and continue to effectively engage the community in conservation. Results from this survey will guide the future direction of both TBN and its partner threatened bird projects, and thereby help improve conservation outcomes for threatened species conservation.

Avian habitat/landscape use

P1.8- Castley, J.G.[1] and Gould, L.[2]

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Mapping essential habitat for the threatened Glossy Black-Cockatoo using citizen science data.

The Glossy Black-Cockatoo, *Calyptorhynchus lathami*, is a threatened species with a relatively widespread distribution across eastern Australia. The species has very specialised habitat requirements and definition of these areas is critical to informing conservation and management. In 2010 the Glossy Black Conservancy established an online data portal to improve knowledge and understanding of the distribution of this species in south-east Queensland and north-east New South Wales through the collection of citizen science data. The data portal enables citizen scientists to report sightings of birds as well as evidence of their feeding activities, as these are also reliable indicators of habitat use. Each record submitted is validated before being released on a scalable mapping platform. Validation is completed by Conservancy members contacting recorders, but also through an auto-validation process once citizen scientists are recognised as being reliable in their species identification. Almost 1900 records have been submitted online by over 450 citizen scientists since 2010, including sightings of more than 6000 Glossy Black-Cockatoo and over 200 feed trees. The data portal has improved the spatial accuracy of these citizen science data by automating the capture of location information. The improved database allows more complete analysis of cockatoo demographics. These records and high precision records from other databases have been used to develop essential habitat maps for the Southeast Queensland bioregion. Complementary citizen science initiatives, such as the annual Glossy Black-Cockatoo Birding Day, assist to raise awareness, engage citizen scientists and provide a regional snapshot of cockatoo numbers and distribution.

P1.9- Howse, N.

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Patterns of behaviour in mix-species captive birds.

It has been noted in the past that the processes of domestication often changes the behavioural traits observable in species, and that interactions between unrelated species may be formed due to this human domestication. This study measures agonistic and affilitiave behaviours within and between five finch species in captivity. We predict more affiliative and fewer agonistic behaviours within species, and fewer affilitiave and more agonositic behaviours between species. Using a standardised data collection approach with focal observation, we observed 100 colour-banded

individuals each for 5 minutes. For each 5 minute observation period (agonistic, affiliative), we scored the frequency of agonistic behaviours (chase, attack, peck, supplant) and affiliative behaviours (preen, feed, display, copulate) in two ways: as the number received from others by the focal bird, and as the number donated by the focal bird to other species. The differences are analysed per species to inform management of captive aviary birds.

P1.10- Warrener, H. and Andrew, M.

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Exploring the influence of woody vegetation connectivity on the dispersal and occurrence of the Powerful Owl (*Ninox Strenua*) within the Greater Sydney Region, NSW.

Fragmentation and isolation of remnant vegetation patches is an increasing consequence of urban land use change, affecting the overall connectivity and resilience of the ecological network within these complex landscapes. The Powerful Owl (*Ninox strenua*) is one of many species affected by urbanisation. This study investigated the influence woody vegetation connectivity has on the occurrence of the powerful owl within the Greater Sydney Region, NSW. Firstly a land cover map was generated from high resolution (50cm pixels) aerial photographs of the study area. Landscape connectivity was analysed using the Circuit Theory, with resistance layers indicating landscape permeability developed from the woody vegetation land cover map and other ecological variables (roads, water bodies, effective dispersal distance from source habitat). Lastly a novel approach to evaluate the connectivity surfaces with species distribution modelling was developed using presence data of powerful owl observations.

Of the ecological variables evaluated in competing connectivity models, only woody vegetation cover and effective dispersal distance achieved a high model performance (AUC >0.75). The reliance of powerful owl occurrences on connected woody vegetation and effective distance from source habitats indicate that this species is sensitive to land use disturbance. Thus, continued removal and alteration of natural vegetation within developed landscapes is expected to reduce the ecological resilience of powerful owl populations in urban areas. Landscape connectivity modelling should be incorporated into conservation and urban development plans to increase the dispersal habitat and ecological resilience of the powerful owl and other species utilising natural areas within an urban landscape.

P1.11- Suarez Castro, A.F.; Mitchell, M.G.E.; Maron, M. and Rhodes, J.

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Predicting the effects of landscape structure on bird functional diversity patterns: the importance of spatial configuration.

A crucial task in conservation biology consists in predicting how land-use change can drive the response trajectories of species diversity and functional diversity (i.e. the variation or dispersion of functional traits in an assemblage). Although the potential of managing landscape structure has been highlighted to protect bird assemblages, the application of predictive models that explore the

relationship between bird functional diversity and species diversity in spatially explicit ways is still rather limited. Furthermore, the underlying mechanisms that account for patterns of bird trait diversity after urban land use change remain largely unknown. Here, we present a model that shows how the interaction between functional traits and landscape structure influence bird species diversity and its potential to maintain ecosystem functions. We illustrate how the hypotheses generated by our model are being tested empirically using bird species data collected in Brisbane, Australia. Two major factors influence the potential of habitat configuration to mitigate the effects of habitat loss on the capacity of bird assemblages to provide functions: the size of the species pool and the distribution of functional traits within the community. However, since spatial patterns of functional diversity respond differently to large-scale filters and fine-scale filters, we highlight the importance to evaluate bird species diversity–functional diversity relationships at different spatial scales simultaneously. This information will provide predictions that may lead to more informed management of land use change impacts on biodiversity.

Physiology, pathology and microbiology

P1.12- Cosgrove, A.J.[1]; McWhorter, T.J.[2] and Maron, M.[1]

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Predicting ongoing population persistence within dynamic systems.

Species distribution models work under the assumption that populations are stable. However, this is not always the case, such when there is ongoing faunal relaxation following habitat loss. Physiological indicators could be useful, alternative predictors of population declines long before local extinctions are evident in presence/absence data. However, using individual stress levels to assess population health is a relatively untested process. In 2009/2010, a pilot study revealed that eastern yellow robin site occupancy within the Brigalow Belt South bioregion was most influenced by grass cover and the presence of gilgai. In contrast, variations in chronic stress levels were best explained by the amount of woodland in the surrounding landscape. It was predicted that the sites containing robins with elevated chronic stress levels would show higher rates of local extinctions than those sites containing birds exhibiting lower stress levels. We assessed the performance of the occupancy model and tested the prediction by surveying the original 42 sites plus 43 new sites for robin presence. We found that the original occupancy model was fair at predicting current occupancy with an area under the receiver operating curve of 0.69. However, the percentage of woodland in the surrounding landscape was now an important predictor of occupancy. We found no evidence that previous chronic stress levels were correlated with recent localised extinctions. These results highlight the changing nature of systems within highly fragmented landscapes, and emphasise that more work is needed before using chronic stress indices to predict population health.

P1.13- Htut, Z.W.; Xie, S. and **McWhorter, T.J.**

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Leukocyte ratio responses to heat exposure differ between diamond doves and budgerigars.

Following the global trend, Australia's average continental temperature has been on the rise over the last few decades, and with the increased duration and frequency of extreme weather events like heat waves, Australian native birds may be under serious threat. It has been suggested that heterophil to lymphocyte (H/L) ratio can be a reliable indicator for chronic stress in wild birds compared to corticostrone as the latter changes rapidly. However, the direct response of leukocyte ratios to heat stress is not well studied. Our study aimed to determine the effect of temperature on H/L ratio of native Australian birds- diamond dove (*Geopelia cuneata*) and budgerigar (*Melopsittacus undulatus*). Summer acclimatised birds were exposed to 35 and 45 °C for 2 hours, with blood samples collected before and after exposure. Total leucocyte counts and white blood cell differentials were done manually at 400x. Both species showed an average increase in H/L ratio after each heat exposure, which was statistically significant at both exposure temperatures for budgerigars and at 35 °C for diamond doves. There was a significant effect of species on the change in H/L ratio at both 35 and 45^0C. The effect of exposure temperature order (which was randomly assigned) on ΔH/L was not significant for either species. Our results show that budgerigars undergo a measurable physiological stress response as indicated by the change in H/L ratio in response to heat exposure, regardless of exposure temperature, indicating that they may be highly sensitive to climate change. Diamond doves may not be as sensitive as budgerigars to climate change, based on observed changes in H/L ratios.

P1.14- McWhorter, A.R.[1]; O'Loughlin, T.[1]; Hay, S.[1]; McLelland, D.[2] and Woolford, L.[1]

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Molecular and histological assessment of captive Gouldian Finches (*Erythrura gouldiae*) for evidence of mycobacteriosis.

The Gouldian Finch (*Erythrura gouldiae*) is an iconic Australian native passerine species, popularly kept in captivity as pets or in zoos world-wide. Captive Gouldian finches are highly susceptible to many pathogens, in particular *Mycobacteria* species. Over the past four years, consistent mortalities have occurred within the Gouldian Finch population at the Adelaide Zoo. Post-mortem tissue samples were collected for histological assessment. Microscopic evidence of mycobacterial infection was detected in 24 out of 27 birds. Several finches were also infected with multiple fungal species (*Candida* spp, *Macrorhabdus ornithogaster*) and parasites (*Cryptosporidium* spp.). Thirty faecal and environmental swabs were collected from the Gouldian Finch enclosure to determine the level of mycobacterial contamination of their enclosure. Additional swabs of other avian enclosures uninhabited by Gouldian finches were also collected for comparison. PCR amplification of the *hsp65* gene was used to confirm the presence of *Mycobacterium.* Four Gouldian finch enclosure samples and two swabs from other enclosures tested positive for *Mycobacterium*. These findings indicate that *Mycobacterium* is likely endemic within the avian enclosures leading to continuous exposure of

birds to these bacteria. Moreover, infection with *Mycobacterium* likely increases their susceptibility to secondary infections. It is currently unknown if this susceptibility observed in captive Gouldian Finches is a consequence of immuno-incompetence due to inbreeding and requires further investigation. Wild Gouldian Finch populations are suffering serious decline, thus collection of wild individuals for contributing genetic heterogeneity to captive breeding programs is prohibited.

Shorebirds

P1.15- Friends of Shorebirds SE; Christie, M. and **Trudgen, W.**

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Shorebirds and beach-wrack.

South Australian Beach-Cast Marine Algae Fishery

This fishery has gone from a cottage industry harvesting less than 100 wet tonnes of Marine Algae a year to aiming for 2,000 dry tonne per year. The current licence permits the harvest of 100% of algae from 50% of the beach between Cape Jaffa and Rivoli Bay (approx 100 kms). An application to extend this to the Victorian border (an additional 100 kms) is pending.

Issues we wish to explore:

- the effect this rate of harvest will have on both beach and inshore marine food webs
- effectiveness of proposed seasonal closures
- impacts on both migratory shorebirds and resident beach nesting shorebirds

P1.16- Zhao, M.; Gosbell, K.; Minton, C.; Lisovski, S.; Colman, J. and Klaassen, M.

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Body size effects on long-distance migration evaluated using migratory tracks of Arctic breeding shorebirds.

Migration is a common phenomenon across many animal taxa. Understanding how migration scales with size is fundamental in the development of migration theory and in making size-related predictions. Although aerodynamic theory has assisted greatly in generating such predictions for flying migrants, verifications of these scaling predictions have been limited by a lack of migration data across a range of body sizes. The recent advent of ultra-light tracking devices and its rapid application to migration now allows us to put theory to the test.

We used tracking data of seven species of closely related migratory sandpipers (family Scolopacidae) to compare their migratory behaviour towards the breeding grounds as a function of size (50-800 g). We found a stronger than predicted decline of migration speed (km/day) with size. Besides migration speed, the number of migratory legs, departure date from the non-breeding (i.e. wintering) ground and arrival date at the breeding ground also scaled negatively with size. Overall migration duration, migration distance, the number of days staying at stopover sites and the number of days in flight were not significantly related with size.

There exists a clear scaling with size in several aspects of migration behaviour and notably in relation to migration speed, in qualitative support of theoretical predictions, albeit much stronger. The strong scaling of migration behaviours with size improves our basic understanding of inter-specific variation in migration behaviours. Size differences affect the capabilities and constraints of migrants and may consequently have a bearing on their vulnerability to environmental disturbances en route.

Seabirds (posters accompanying symposium)

P1.17- Nicholls, D.G.

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Variation in the size of Short-tailed Shearwater pulli prior to departure.

Short-tailed shearwaters breed in coastal and island sites in southern Australia in colonies. One small breeding colony (of a few 1000 burrows) on Tortoise Head of French Island Western Port Victoria, one of many colonies in or near Bass Strait, southeastern Australia. The Tortoise Head colony has been monitored for twenty two years. At the end of the breeding season, the adults forage in Antarctic seas, many near the ice edge. It is assumed that the success of the parental foraging determines the growth of the chick.

A sample of the young of the year have been weighed and measured just prior to their departure (15-22 April) in 14 years.

The body size as measured by the culmen, tarsus, wing lengths are constant each year and are within a few percentage points of the adult size.

The mass of the pulli fluctuates widely with significant differences between years. There was a decline between 1993 and 2013 (the year of the last sample) that is statistically significant.

Hypothesies that might explain the variation in chick body size based on the known foraging region are discussed.

Reproductive biology and nesting

P1.18- Buckley, S.

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Egg colour and nest type predict nest predation: an experimental study.

Predation at the nest is the predominant cause of mortality in avian eggs and chicks and selection should favour traits that reduce nest predation. To reduce egg predation, birds may reduce conspicuousness by camouflaging the egg through colour or nest type. To date, there have been mixed findings for the relative importance of egg colour and nest conspicuousness on egg predation. Here, we experimentally test if egg colour (white, brown, speckled) predicts egg predation for two artificial nest types (open-cupped, domed). Predation was scored as egg damage or egg removal from the artificial nest and was recorded at day 3, 7 and 14 (average incubation

duration in ~15g songbirds is ~14 days). To control for possible effects of vegetation concealment on nest predation, we statistically compared vegetation (% concealment above and below the nest) and grass height. There were two main findings: (1) There was a significant effect of egg colour on predation, but only in open-cupped nests. White eggs had highest predation compared with brown and speckled eggs. (2) Egg predation was significantly higher in open-cupped nests than domed nests. These findings underscore the role of egg conspicuousness for egg predation. From an evolutionary perspective, the findings generate testable hypotheses about pathways to reduce egg conspicuousness including increased parental attentiveness to cover eggs at open-cupped nests.

P1.19- Young, C.M.; Cain, K.E.; Svedin, N.; Backwell, P.R.Y. and Pryke, S.R.

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Nest success in crimson finches.

The most significant cause of nest failure for most passerine birds is nest predation. Therefore we expect that any mechanism reducing predation risk will be favoured by breeding birds. This might include behavioural modifications such as active nest defence or adjustment of nest site selection, for example concealing nests. The relative importance of behavioural vs site selection strategies is not always clear and may differ with life history traits. For instance birds in tropical regions are thought to invest less in nest defence than birds in temperate areas. We monitored a population of crimson finches (*Neochmia phaeton*), over two breeding seasons in the Australian tropics. Within this population we found that nest success was related to both visibility of the nest and the structure of the vegetation. Nevertheless adults re-building after a predation event did not build in less vulnerable locations. One explanation may be that birds are simply limited in their nest-site options i.e. high quality nest-sites are dominated by high quality individuals although we found no evidence for this. We also found no effect of nest defence behaviour towards a model predator on the likelihood of nest success. Additionally we found no evidence that the intensity of nest defence was related to characteristics of nest site (e.g. visibility). Therefore it seems that neither behavioural or nest site selection decisions by adult crimson finches are influenced by predation risk. Instead multiple nesting attempts within and between seasons may be seen as a strategy for dealing with high predation pressure.

P1.20- Beckmann, C.; Biro, P. and Martin, K.

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Testing hypotheses on the function of repeated nest abandonment as a life history strategy in a passerine bird.

Nest structures are essential for successful reproduction in most bird species. Constructing nests has been shown to be costly in terms of time and energy, and most bird species typically build one nest per breeding attempt. Some species, however, build more than one nest, and the reason for this behaviour is often unclear. In the grey fantail (*Rhipidura albiscapa*), nest abandonment prior to egg laying is common. Fantails will build up to 7 nests within a breeding season, and abandon up to 71% of their nests prior to egg laying. Here we describe multiple nest-building behaviour in the grey fantail, and test five hypothesis to explain nest abandonment in this species.

Communication, signalling and cognition

P1.21- Hanke, P.; Colombelli-Négrel, D. and Kleindorfer, S.

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What makes a mother's call to her embryo unique?

Selection acts on variation and favours phenotypes most suited to prevailing conditions. In this study, we compare variation in maternal call characteristics. We have previously shown that Superb Fairy-wren mothers call to their eggs, and the embryos learn one call element and use it as their begging call after hatching. The more similar the call, the more the chicks get fed. Embryos vary greatly in their copy accuracy. Here, we focus on variation in the vocal tutor. Our study populations are based in the Mount Lofty Ranges, South Australia. We recorded vocalizations of 10 incubating females on the nest for 2 hours per female. 5 incubation calls per female were extracted from the recordings and visualised as spectrograms using AmadeusPro and RavenPro software. Call syntax data (element order, total number of elements, number of element A, number of element B) were determined and statistically analysed. We found that the total number of elements per incubation call differed by ~400% across females, and mothers produced significantly different numbers of Element A and B per call. There were also striking similarities in the incubation calls: 90% of females began their call with ~5 repeats of Element A, and changed between Element A and Element B about 5 times per call. These findings show that there is ample variation in maternal calls for natural selection to act upon, and suggest that the consistency in call structure may be the outcome of selection for efficient vocal tutoring, which is yet to be measured.

Coorong Wetlands (posters accompanying symposium)

P1.22- McGuire, A.; Dittmann, S.; Dadd, D. and Dadd, M.

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Should I stay or should I go? Shorebird phenologies over a decade of drought and flood extremes in the Coorong, South Australia.

The Coorong is a Ramsar listed wetland of international relevance to migratory shorebirds, who frequent this estuary and lagoon during their overwintering period in the southern hemisphere. We analysed long term data from shorebird monitoring covering periods of drought, flows and a flood. Most of the migratory shorebirds showed a typical phenology, arriving in the southern spring and departing in autumn. Yet, this phenology was mostly apparent in years with moderate flows. During a prolonged drought from 2007 to late 2010, the phenology indicated that many migratory waders stayed at this overwintering site over the southern summer. When a flood event occurred and foraging habitats were inundated, few shorebirds were recorded. Resident shorebirds showed similar patterns of phenology and were also more frequently observed over longer times of the year during the drought.

Oral presentations- Thursday 26 November

Evolution symposium- convenor Leo Joseph

S3.1- Austin, J.J.; Joseph, L.; Toon, A.; White, L.C. and Burbidge, A.H.

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Speciation or subspeciation in the southern Australian whipbirds long recognized as the Western Whipbird* Psophodes nigrogularis*?

The Western Whipbird, *Psophodes nigrogularis*, has a highly disjunct west-east distribution across southern Australia (SW Western Australia in the west and the Eyre Peninsula-Kangaroo Island-Yorke Peninsula-Murray Mallee region of South Australia and western Victoria in the east). Morphological analyses have recognised two subspecies in SW WA, *P. n. nigrogularis* and *P. n. oberon*, and two subspecies in eastern Australia*, P. n. leucogaster* of the Eyre and Yorke Peninsulas and the Murray Mallee, and *P. n. lashmari*, restricted to Kangaroo Island. These four forms fall into two groups. One is represented only by nominotypical *P. n. nigrogularis*. The second comprises all eastern forms and the western *P. n. oberon* and has been separated as a second species *P. leucogaster*. Subsequent mtDNA analysis has raised questions about this arrangement. We used mtDNA sequence data derived from the few available cryo-preserved samples as well as from DNA extracted from toe-pads and feathers of specimens representing all four taxa in an attempt to derive a more stable view of species limits within the *P. nigrogularis sensu lato* group. The samples fell into two strongly divergent geographically structured groups, completely reflecting the eastern and western components of the distribution. Thus we see merit in treating the two geographical groupings as two species, *P. nigrogularis* in the west and *P. leucogaster* in the east, each having two subspecies. The new data shift the balance in favour of this hypothesis. Nuclear data could test whether the two western subspecies in particular are genetically isolated or currently exchanging genes.

S3.2- Berg, M.L.; Eastwood, J.R.; Ribot, R.F.H.; Buchanan, K.L. and Bennett, A.T.D.

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Molecular evidence for incipient ring speciation in the crimson rosella complex (*Platycercus elegans*).

Ring species offer an excellent opportunity to study the processes involved in speciation, because they have the potential to show how clinal variation across interbreeding populations may eventually lead to species-level differences, even in the face of gene flow. However, proposed cases of ring species are extremely rare, and to date conclusive molecular evidence for the existence of ring species has remained elusive. We tested key predictions of the ring species hypothesis in the crimson rosella (*Platycercus elegans*) complex, which forms a near-continuous geographic ring in south-eastern Australia and was first hypothesised to be a ring species in the 1950s. Hitherto, populations of this complex have been defined by the striking variation in yellow/orange/red plumage, supplemented by recent efforts to analyse other phenotypic and genetic traits. We used clustering analyses of microsatellite data, and compared this to previous analyses of mtDNA variation. Our data provided support for several key predictions of the ring species hypothesis,

including: two clearly distinct genetic clusters representing the terminal populations of the hypothesised ring, gradual genetic change around the ring between the terminal populations, a genetic discontinuity where the terminal populations meet and overlap with reduced gene flow, and isolation-by-distance. Our data were not consistent with alternative allopatric models for the evolution of this complex, and suggest the phenotypic traits may reflect recent selection from habitat differences. However, our data show there is incomplete reproductive isolation between the terminal populations, suggesting that the speciation is not yet complete in *P. elegans*.

S3.3- Dolman, G. and Burbidge, A.H.

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Using phylogenetics of fieldwrens and heathwrens to inform conservation management in Western Australia.

The Dirk Hartog Rufous Fieldwren (*Calamanthus campestris hartogi*) is one of three threatened bird subspecies endemic to Dirk Hartog Island. To improve our understanding of the genetic relationships between these island birds and their mainland relatives, a collaboration was forged between a conservation manager from Department of Parks and Wildlife and a geneticist from the Western Australian Museum. The outcome of this collaboration aims to resolve taxonomic confusion in the fieldwrens, so that the Dirk Hartog subspecies can be placed in broader phylogenetic context. Here we present the first stage of the project: a clarification of the broad taxonomic relationships using mitochondrial DNA analyses. We will demonstrate how we plan to use genomic data to improve understanding of diversification processes in this group of birds. Information on evolutionary processes, gene flow and future evolutionary potential will directly inform priorities for conservation management.

S3.4- Dolman, G. and Joseph, L.

Molecular Systematics Unit, Western Australian Museum, Perth, WA, Australia.

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Bringing together genotype and phenotype: how to delimit species barriers in the Chestnut and Copperback Quail-thrush?

There are 26 (and counting) different concepts of how species are defined. How and why we decide on a method for delimiting species is a topic of heated debate, particularly as more powerful genetic data sets become available. In our February 2015 paper in *Emu*, we recognized two species within the Chestnut Quail-thrush based on mitochondrial DNA, nuclear DNA and plumage patterns (including differences in sexual dimorphism), causing a minor stir amongst ornithologists. Genetically, the turn-over between the western species, the Copperback Quail-thrush (*Cinclosoma clarum*), and the eastern one, the Chestnut Quail-thrush (*Cinclosoma castanotum*), is at the Eyrean Barrier (Flinders Ranges–Lake Eyre Basin). However, within *C. clarum* two subspecies are recognized and intergradation among them, which we weren't able to fully address in our paper, is reported in locations such as the Gawler Ranges and Eyre Peninsula. We will review what studies of the genome have told us about this case, the further work we are doing, where and how species limits are drawn and how gene flow is studied and assessed. Much of this should clarify how subspecies within *C. clarum* fit into the picture.

S3.5- Peñalba, J.V.; Mason, I.J.; Schodde, R.; Joseph, L. and Moritz, C.

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Divergence in an avian suture zone.

Australia boasts a diverse array of endemic bird fauna. The diversification of many of these birds has been greatly influenced by prominent historical and modern barriers to dispersal. During various stages of evolutionary time these barriers aided in isolating certain populations into pockets of refugia. For some species, these periods of allopatry resulted in genomic and phenotypic divergence of populations. Through time, some of these barriers have contracted, resulting in shared areas of secondary contact between pairs of populations. These "suture zones" can serve as a natural experiment to test the influence of the periods of allopatry in reproductive isolation. In this study we focus on two putative suture zones in northern Queensland: the Torresian barrier and the Burdekin barrier. The Torresian barrier separates Cape York Peninsula populations from Cairns-Atherton populations while the Burdekin barrier separates Cairns-Atherton populations from populations of the southern rainforest tracts. The project aims to characterize the genomic and morphological divergence of 27 meliphagoid species complexes influenced by these barriers. We used a target enrichment method to sequence dozens of genetic markers in order to characterize genomic divergence and used morphological measurements to characterize phenotypic divergence of the populations. We found the populations on either side of these barriers show a wide variety of genomic and phenotypic divergence. Genomic divergence and locations of biogeographic breaks reflect initial characterization using only phenotypic data. This study provides the foundation to later study the speciation dynamics of the diverging populations in an avian suture zone.

S3.6- Louter, M.; Slender, A.; Gardner, M. & Kleindorfer,S.

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Using RADseq and video images to study paternity and parental care in Thick-billed Grasswrens.

Although the majority of bird species form socially monogamous pair bonds, females of many species copulate with extra-pair males with whom they often sire offspring. The highest rates of extra-pair paternity (EPP) are observed in several species of fairy- wren (Maluridae). Cooperative breeding species are known to have high frequencies of EPP and thereby avoid inbreeding. We investigate the social and genetic mating system of a close relative of the fairy-wrens within the Maluridae, the threatened Thick-billed Grasswren (*Amytornis modestus raglessi*). Like most other grasswrens, *A. m. raglessi* is shy and elusive and it has cryptic plumage and secretive behaviour. Behavioural studies are therefore challenging and time-consuming. For this reason, baseline ecological data, such as their social organization and mating system, are lacking for most grasswren species. From 2013-2014, our video analysis of parental care at nests of Thick-billed Grasswrens confirmed cooperative breeding for the species. During the same time period, we collected blood samples (n=47 birds, 6 nests) and used Restriction-site associated DNA (RAD) sequencing to estimate genetic relatedness among nestlings in a brood and assign putative fathers. Preliminarily analysis suggests low levels of EPP in this species.

S3.7- Peters, K.J. and Kleindorfer, S.

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Biodiversity curse or cure? Hybridisation driven by female mate choice in Darwin's tree finches.

The evolutionary significance of hybridisation has long been controversial since it has the potential to both increase and decrease biodiversity. There is evidence for reverse speciation by different species collapsing into a hybrid swarm, but biodiversity can also increase through the formation of novel species via hybrid speciation. To determine its ecological consequences, we need to identify the mechanisms that drive hybridisation. Rare species are more likely to hybridize due to the scarcity of conspecifics, and female mate choice has been proposed as a driver of hybridisation in systems where females are the discriminating sex. We investigated these ideas to identify the drivers of hybridisation between the common small tree finch (*Camarhynchus parvulus*) and the critically endangered medium tree finch (*C. pauper*) on Floreana Island (Galápagos Archipelago) using microsatellite analysis and pairing observations. We found that females of the common species (small tree finch) preferred to pair with males that were genetically similar to them, while females of the rare species (medium tree finch) showed no such preference. This resulted in an asymmetrical pattern of introgression with unidirectional gene flow from the medium tree finch into the small tree finch/hybrid cluster. The small tree finch therefore is likely being genetically swamped by the medium tree finch, but at the same time acts as a beacon of conservation for the genes of this critically endangered species. Consequently, the tree finch group on Floreana Island should be regarded as one conservation management unit in order to maintain species diversity.

S3.8- Slender, A.L.; Louter, M.; Bradford, T.; Gardner,

M.G. and Kleindorfer, S.

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The ecological context of genetic differences in the Thick-billed Grasswren.

Factors that impede gene flow have significant effects on evolutionary processes. Defining fine scale population structure is the first step to understanding these factors but is challenging when populations are not geographically distinct. Two subspecies of the threatened thick-billed grasswren (*Amytornis modestus*) have significantly divergent mitochondrial haplotypes but they are parapatric. This study tests whether habitat type is associated with genetic patterns across the landscape between these subspecies. We collected DNA and vegetation data from samples across the range of the two subspecies.

A next generation sequencing method, RAD sequencing, will allow us to compare individuals across >3000 loci using markers that are 65 base pairs in length. Preliminary results showed differences in vegetation type across the landscape and asymmetric occurrence of each grasswren haplotype. Only the haplotypes of *A. m. indulkanna* were found in an area dominated by the shrub species *Atriplex nummularia omissa*, *Maireana aphylla* and *Ptilotus obovatus*. Haplotypes of both *A. m. raglessi* and *A. m. indulkanna* occurred in habitat dominated by the shrub species *Maireana*

pyramidata, *Atriplex vesicaria* and *Acacia* spp. Within the area of parapatry, no grasswrens occurred in habitat dominated by the grass species *Zygochloa paradoxa*. These findings point to ecological correlates of haplotype occurrence in two parapatric subspecies, as well as presence/absence predicted by sand dunes (barrier to gene flow) in habitat dominated by *Z. paradoxa*. The analysis of gene flow using RAD sequencing will be added for the presentation.

S3.9- Taggart, P.L.; Bradford, T.; Smith, R.; Gardner, M.G. and Kleindorfer, S.

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Bacteria in ticks collected from birds: effects of habitat area and human activity.

Pathogenic bacteria are a health concern that may impact humans and wildlife. In this study, we test whether habitat area predicts bacterial diversity in avian ticks (*Ixodes hirsti*), and whether the prevalence of pathogenic bacteria is predicted by human impact (settlement size, distance to rubbish dump). We collected ticks from 91 songbirds across six study sites in South Australia. The results showed that avian ticks from larger conservation parks had lower bacterial diversity compared with ticks collected from smaller conservation parks. There was also an effect of distance to nearest rubbish dump, a greater prevalence of pathogenic bacteria being closer to these sites. Another key finding was that *Rickettsia* was found in all 91 avian tick samples (100% prevalence), showing that certain pathogenic bacteria are widespread in avian ticks. Combined, these data show the importance of conservation areas and human activity for bacteria in avian ticks.

S3.10- De Pietri, V.L.; Scofield, R.P.; Camens, A.B.; Tennyson, A.J.D.; Hand, S.J. and Worthy, T.H.

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How Australasian 'Plains-wanderer' fossils are reshaping our understanding of the evolutionary history of shorebirds.

Australia and New Zealand's remarkable avifauna evolved in isolation from other landmasses for millions of years, yet little is known about the evolutionary history of endemic avian lineages on these continents. The Plains-wanderer *Pedionomus torquatus* is an enigmatic quail-like shorebird that occurs exclusively in sparse native grasslands of south-eastern Australia. It is the only known species of its family (Pedionomidae) and its closest relatives are the South American seedsnipes (Thinocoridae). Our research shows that representatives of the "Plains-wanderer lineage" have been in Australia for at least 26 million years, but unlike the recent Plains-wanderer, they were good fliers and inhabited well-wooded habitats. The speciation events leading to the evolution of *P. torquatus* were probably triggered by the spread of grasslands across Australia *ca* 10 million years ago. A new record of an endemic and previously unknown lineage from the Miocene of New Zealand indicates that the sister taxon to pedionomids was in all likelihood a wading bird. This supports an ancestral wading ecology for the clade comprising pedionomids and thinocorids, and reinforces our hypothesis that terrestrial adaptations in seedsnipes and the Plains-wanderer are convergent. Although vicariant events probably contributed to the evolution of pedionomids and the New Zealand taxon, their sister taxon relationship indicates that the split of this group from seedsnipes must have occurred independently from Australia's and Zealandia's separation from the

rest of Gondwana. These new findings improve our understanding of Gondwanan phylogeography and the evolutionary trajectories of shorebird clades in the Northern and Southern Hemispheres.

S3.11- Handley, W.D.; Chinsamy, A.; Yates, A.M. and Worthy, T.H.

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Sexual dimorphism in the late Miocene mihirung* Dromornis stirtoni *(Aves: Dromornithidae) from the Alcoota Local Fauna of central Australia.

The dromornithids were giant flightless birds endemic to Australia from the late Paleogene to the late Pleistocene. Dromornithids are currently considered to be divergent members of the Anseriformes, but they display many convergent features with extant ratites. In this study we investigate *Dromornis stirtoni*, a species for which little biology is known, from the late Miocene (*ca* 8 Ma) Alcoota Local Fauna. We used traditional methods of comparative morphology, mass estimation, landmark-based morphometrics, and histological investigations to assess the possible presence, form and extent of sexual dimorphism in *D. stirtoni*. Two morphological groups were identified for each main leg element, which differed primarily in relative robustness. Histological studies of samples from femora and tibiotarsi revealed medullary tissue in the less robust morph indicating that these were females. Mass estimates based on our preferred measurement of least-shaft circumference of tibiotarsi were significantly different between males (mean 528 kg, range 451–610 kg) and females (mean 451 kg, range 370–543 kg). Therefore, males were more robust but not much taller than females and were the most massive birds ever known to have existed. Sexual dimorphism, where males were larger in this largest of all dromornithids, was therefore like that of extant Anseriformes. We infer long-term monogamy, mutual display, shared parental care, female incubation and aggressive defence of nests in these birds. The techniques of geometric morphometrics applied in this study maximises the use of fragmentary material, helping to overcome the common palaeontological challenge of limited sample sizes.

S3.12- Scofield, R.P.; De Pietri, V.L. and Mayr, G.

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How New Zealand's Waipara Greensand is changing our understanding of the early evolutionary history of the core waterbird assemblage.

Our understanding of the early evolutionary history of Neoaves in Australasia and the origins of the base of the "core waterbird assemblage" has been fundamentally changed in the last 20 years. The discovery and description of the world's oldest penguins (Sphenisciformes) *Waimanu manneringi* and *Waimanu tuatahi* and the more recent description of a tropicbird and a diving bird of unknown affinities, *Australornis lovei,* have shed light on the evolutionary history and origins of the waterbird clade. These fossils have been excavated from the Cretaceous to early Eocene-aged Waipara Greensand and are part of a shelf-deposited marine fauna that includes a diverse array of sharks, turtles and fish as well as a bizarre coralline species *Waiparaconus*. This fauna has strong similarities to that that of early Eocene communities from the Antarctic Peninsula. Here we discuss the implications of this fauna for the marine origins of the core waterbird assemblage.

S3.13- Shute, E.; Prideaux, G.; Worthy, T.H.

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How many megapodes? The increasing diversity of Australia's fossil mound-builders.

Australia has three extant species of megapode (mound-builder): the Malleefowl *Leipoa ocellata*, the Australian Brush-turkey *Alectura lathami*, and the Orange-footed Scrubfowl *Megapodius reinwardt*. Both *Alectura* and *Leipoa* are monotypic and are endemic to Australia, but the fossil record shows that Australia had a greater diversity of endemic megapodes during the Pleistocene. 'Giant' megapodes in the genus *Progura* have been described from fossil sites in eastern and south-eastern Australia, and these birds have been popularly christened 'giant malleefowl'. However, relationships between members of this genus and other megapode genera are uncertain, as is the number of species within the genus. Two species have been described: *P. gallinacea* from eastern Australia, and *P. naracoortensis* from south-eastern South Australia. It has variously been suggested that these two 'giant' megapode species do not belong in the same genus, or conversely, that they are conspecific, and are the ancestral form of *Leipoa ocellata*, which then underwent 'Late Pleistocene dwarfing'. We will examine this issue in forthcoming work, but meanwhile, new fossil evidence from the Thylacoleo Caves on the Nullarbor Plain shows that two further species of megapode inhabited southern Australia during the Pleistocene. One was a large species, a little smaller than *Progura* specimens from Naracoorte, and the other was a small but robust species of similar size to *Leipoa ocellata*. We will conduct a phylogenetic analysis that includes all the extinct Australian megapode species, which will provide a better understanding of the past diversity, distribution, and evolutionary history of megapodes in Australasia.

S3.14- Worthy, T.H.; Mitri, M.; Handley, W.; Lee, M.

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Assessing the phylogenetic relationships and aspects of the biology of the extinct* Sylviornis neocaledoniae *(Aves: Sylviornithidae).

New Caledonia is relatively long-lived continental island within Oceania northeast of Australia. Its age is correlated with a high rate of endemism in its biota and, within the avifauna, none is more notable than the extinct *Sylviornis neocaledoniae*. This, the largest bird in the fauna, was first considered to be a ratite, then a megapode, but is now placed in its own galliform family Sylviornithidae. Here we report phylogenetic analyses of 285 morphological characters for a comprehensive array of galloanserine and outgroup taxa that reveal *Sylviornis* is a stem galliform which may be sister to *Megavitiornis altirostris* from Fiji. The mihirung *Dromornis planei*, which has similar cranial features, including an unusual rostral articulation, is also found to be a stem-group galliform but one more basal than *Sylviornis*, rather than an anseriform as currently understood. Investigations of the pelvic limb skeletal morphology, especially that of the foot, show that *S. neocaledoniae* had poorly developed muscles on the tarsometatarsus, short and stout pedal phalanges, and short laterally compressed ungual phalanges. These features contrast with the highly muscular tarsi, elongate toes and elongate dorsoventrally flattened unguals of the mound-building megapodes to show that the digging ability of *Sylviornis* was no better than that of *Gallus*

gallus and that it was most unlikely to construct large mounds for incubating its eggs as do megapodes. Our phylogenetic assessment and these morphological observations support the contention that ectothermic incubation is an autapomorphy of Megapodiidae and that the mysterious tumuli (mounds) of New Caledonia have nothing to do with *Sylviornis*.

S3.15- Nguyen, J.

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Evolution of the Australian passerine avifauna: insights from the fossil record.

The Australian fossil record is crucial to our understanding of the evolutionary history of passerines as much of their early evolution is presumed to have occurred in the Australo-Papuan region. However, the passerine fossil record is scarce and poorly studied relative to those of other bird orders. Identifying passerine fossils is highly challenging both because of the large number of species (>5500) and because of the uniformity in their skeleton relative to other avian orders. This is problematic because phylogenetically informative characters are essential for identifying the systematic positions of fossils, resolving their relationships with living taxa, and understanding morphological evolution.

In this talk, I will address some of the shortcomings in our knowledge of the fossil record for passerines. I will present new fossil passerine material that I have described from the Riversleigh World Heritage Area in Queensland. Many of the Riversleigh fossils represent the oldest known records of several extant passerine families. These fossils add to the growing diversity of passerines known from the pre-Pleistocene and help to elucidate the evolutionary history of the world's largest radiation of birds.

Evolutionary ecology contributed papers

3.16- Black, A. and Horton P.

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Subspeciation in the Brown Thornbill* Acanthiza pusilla *and hybridisation with the Inland Thornbill* A. apicalis *in South Australia.

Hybridisation between the similar but non sister species Brown *Acanthiza pusilla* and Inland *A. apicalis* Thornbills has been reported from three regions in south-eastern Australia. A single subspecies of Brown Thornbill *A. p. pusilla* is recognised from this part of the mainland.

In this study we have reviewed field observational and museum specimen evidence for the nature of such hybridisation in two of the reported zones of contact between the two species, the Upper Southeast of South Australia and the eastern coast of Gulf St Vincent South Australia.

The distribution of Brown Thornbills on mainland South Australia is disjunct and the two allopatric populations are phenotypically distinct. One and possibly both warrant subspecific recognition.

There is evidence that the Mount Lofty Ranges population of Brown Thornbill but not the Southeast population has hybridised with the Inland Thornbill. Hybridisation in the Upper Southeast appears to

be limited but in the mangroves and subcoastal shrublands of eastern Gulf St Vincent there is a substantial hybrid population extending over at least 30 km.

3.17- Coetzer, W.G.; Downs, C.T.; **Perrin, M.R.** and Willows-Munro, S.

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Historical biogeography: The influence of ancient and contemporary habitat changes on the endemic South African Cape Parrot (*Poicephalus robustus*).

The effect of habitat fragmentation on species, which live in naturally patchy habitats, has rarely been examined. The Cape Parrot (*Poicephalus robustus*) is the only endemic parrot species in South Africa. There are less than 1 600 Cape Parrots left in the wild. The Cape Parrot is a habitat specialist, restricted to forest patches in the Eastern Cape, KwaZulu-Natal and Limpopo provinces of South Africa. Although current overexploitation of forests in southern Africa is certainly an important driver of fragmentation, this is not solely responsible for the relic nature of South African forests. In the Pliocene, periods of climate change driven aridity and increased fire frequency, contributed towards 'natural' fragmentation of the forests in southern Africa. In this study, modern (n = 85) and archival (n = 29) samples were used to investigate the historical and contemporary genetic structure of Cape Parrots using 16 microsatellite loci. Bayesian clustering analysis identified three geographically correlated genetic clusters. A southern group restricted to forest patches in the Eastern Cape, a central group including birds from Kwazulu-Natal and a genetically distinct northern Limpopo cluster. Results suggest that Cape Parrots have experienced at least two population bottlenecks. An ancient decline during the mid-Holocene (~1800-3000 years before present) linked to climate change, and a more recent bottleneck, associated with logging of forests during the early 1900's. This study highlights the effects of climate change and human activities on the population genetics of an endangered species associated with the naturally fragmented forests of eastern South Africa.

3.18- Lombal A.; Wenner, T.; Burridge, C.

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Demographic history and population genetics of Providence petrels (*Pterodroma solandri*).

The Providence Petrel (*Pterodroma solandri*) is IUCN listed as Vulnerable because of the extinction of the largest breeding colony on Norfolk Island by the late 18th century and its restricted breeding range. This pelagic seabird breeds only on Lord Howe Island (~32,000 pairs) and Phillip Island, adjacent to Norfolk Island (~30 individuals). Re-establishment of a Norfolk Island colony using Lord Howe Island individuals has been proposed to reduce the extinction risk of this species and to provide key nutrients for the regeneration of threatened native forests and associated species. However, the translocation of these individuals may erode any distinctiveness of the perilously small adjacent Phillip Island colony. Our study used a 872-bp fragment of the mitochondrial cytochrome b gene and 14 nuclear intron loci sequenced for 52 individuals in addition to 11 microsatellites loci genotyped for 183 individuals to elucidate population dynamics, connectivity and genetic distinctiveness of these colonies. Through the analysis of these genetic data using three methods of bottleneck detection (BOTTLENECK, M-ratio, MsVar), we show extensive population declines in

colonies followed by a recovery period as shown by the appearance of new haplotypes with a high global nucleotide diversity. No genetic structure among colonies was detected (Global Fst= 0.002, P>0.05, STRUCTURE K=1). Our results demonstrate that gene flow is high between the two populations and provide a positive insight regarding the success of the proposed translocation.

Insights from monitoring symposium- convenors Dai Morgan & Nigel Adams

S4.1- Morcombe, F.; Hamilton, N.; Mills, H. & Algar, D.

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Population estimate and habitat usage of the Christmas Island Hawk-Owl.

The Christmas Island hawk-owl (*Ninox natalis*) is a species endemic to Christmas Island and currently listed as vulnerable under the 1999 EPBC Act. The last thorough survey was conducted from 1994 to 1996 with an estimate of 562 ± 105 occupied owl territories across the island (Hill & Lil 1998a). However a brief survey of the island carried out in 2011 (Low & Hamilton 2013) suggested that current owl numbers are significantly lower than past estimations. There are many aspects of the ecology of the Christmas Island hawk-owl that are currently unknown. Possible changes in habitat usage and range due to ecological changes such as food resources and vegetation structure since the 1990s remain unstudied. Moreover, we do not have a good understanding of the relative impact of current threatening processes including the yellow crazy ants (*Anoplolepis gracilipe*) invasion, predation by feral cats and rats, human activity such as vehicle collisions and mining operations and recent loss of prey such as endemic geckoes, skinks and the pipistrelle bat. This study looks at the current population estimate, density and habitat usage of the CI hawk owl and provides an up-to-date review of population trends in the species.

S4.2- Berris, K. and Barth, M.

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Successful management of the South Australian glossy black-cockatoo and emerging issues for their long-term survival.

The South Australian subspecies of the Glossy Black-cockatoo (*Calyptorhynchus lathami halmaturinus*; GBC) is only found on Kangaroo Island, and is classed as *Endangered.* The population has been intensively managed since a Recovery Program commenced in 1995 to identify and mitigate threats to survival of the species. Through an annual census and monitoring of breeding success the Recovery Program now has a long-term dataset detailing breeding productivity, nest hollow use and population increase. Here we present insights gained from this data.

There are currently 100 artificial hollows installed across Kangaroo Island. The use of these has increased since 1995, with up to 60% of breeding attempts in recent years in artificial hollows. The rate of artificial hollow use is markedly higher in some regions than others, indicating hollow availability may still be a limiting factor for these flocks. There is no evidence that artificial hollows are any less productive than their natural counterparts.

Although all known nests are protected from common brushtail possum (*Trichosurus vulpecula)* predation, the nest success of monitored nests varies considerably between years. *Reconyx* wildlife cameras deployed to monitor activity at several nests have provided evidence that little corellas (*Cacatua sanguinea*) and galahs (*Eolophus* rosiecapillus) are causing significant disturbance to nests, particularly in winter at the start of their breeding season when there are still some late nesting glossy black-cockatoos. Both species have self-colonised Kangaroo Island within the last century, and are increasing in abundance, therefore it is envisaged their impact on GBC nests may increase also.

S4.3- Harrington, J.; Hutchinson, G. and Irvine, J.

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An on-going study of Breeding White-Bellied Sea-Eagles on the Parramatta River – looking at some of the questions raised.

This ongoing study by BirdLife SNSW continues to observe and record the breeding behaviour of a pair of White-bellied Sea-Eagles on the Parramatta River using video CCTV and limited physical observation from nest renovation to fledging. Breeding success is improving compared with past years, with an annual average of one eaglet since 2008.

In 2013, the eagles renovated their existing nest, laying 2 eggs in early July. Incubation (from the literature and previous observations) is around 40-42 days. When the eggs failed to hatch by the expected date, permission was obtained to retrieve the eggs and test for fertility and for toxicity. Their success or failure appears to be closely linked with environmental conditions, particularly the accumulated persistent organic pesticides in Homebush Bay and the Parramatta River. The two current eaglets appear to indicate a successful year.

Our study raises some interesting questions. Though the current eggs were laid about 78 hours apart, the second eaglet hatched very close to the first and was considerably bigger. Is this an example of delayed incubation? The first took a long time from “pip” to emerging from the shell. Was this because it was smaller and weaker or was it weaker because it took a long time to emerge? Our observations reveal changing shared parental behaviour on the nest, with the female spending much less time in incubation just after the first egg was laid. The female alone incubates at night.

The study continues, revealing a great deal about the breeding behaviour of these magnificent raptors.

S4.4- Szabo, J. and Barnes, M.

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Shorebirds decline more than any other species in the Wet Tropics based on 14 years of Atlas data.

We estimated trends in bird species populations in the Wet Tropics bioregion of Queensland based on data from the New Atlas of Australian Birds in 1998-2012 using List Length Analysis within a Bayesian framework. Of 391 species recorded, we estimated change in prevalence for 277 species.

Of 147 species that changed significantly, 54 species increased and 63 declined, while the remaining 130 seemed relatively stable. All common birds were increasing or stable. The 21 endemic species for which trends were estimated were stable. We found no overall pattern for hollow-, or ground-nesters. Looking at feeding guilds, unlike in the rest of Australia, where insectivores are declining because of past and current land clearing, inappropriate fire regimes or invasive alien species, most species, with the exception of the white-throated needletail were doing well. Among fruit pigeons and honeyeaters some species were declining, while others were stable. All threatened species (sarus crane and long-distance migratory shorebirds) declined significantly, meaning that more (or more effective) management actions are necessary. In fact, most worrying declines were seen in these shorebirds: with the exception of the increasing wood sandpiper and the stable grey plover all remaining 17 species declined significantly. The largest decliners were great knot, black-tailed godwit and common greenshank. We find it worrying that even though these surveys were mostly opportunistic and not specific to shorebirds, among all species less and less long-distance migratory birds visit this part of Australia - perhaps precursor to collapse as seen in other parts of the country.

S4.5- Leach, E.; Jones, D.; Burwell, C. and Kitching, R.

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Learning to listen: the use of bioacoustic recorders for avian community monitoring.

In order to monitor the effects of climate change on assemblages of animals, scientists need to be able to quickly and easily detect and record the distributions of species within target areas. In recent years, the development of automated acoustic recorders (AAR) has led to substantial research interest, mainly in the United States and Europe. So far, AAR have been used to monitor species that are rare or difficult to detect using traditional survey methods, as well as for behavioural studies, the detection of migrating birds and community-level diversity studies. In this presentation, I review the use of AAR for wildlife monitoring purposes, discuss the associated challenges, and present a case study focused on the rainforest bird community of Eungella National Park, QLD. I demonstrate that measures of diversity and community structure that can be generated by AAR are similar to those obtained through traditional survey methods, in this case, point counts. I conclude by discussing the possible future applications of automated acoustic monitoring of birds in Australia, particularly with regards to climate change.

S4.6- Morgan, D.; Sharp, H. and Sullivan, L.

Applied and Environmental Sciences, NorthTec, Whangarei, New Zealand.

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Comparing the relative abundance of bird species detected during five-minute bird counts with data collected from automated acoustic recorders.

Monitoring bird populations is a time consuming and ongoing activity that can require considerable resources and observers with bird identification expertise. For these reasons, community conservation groups are often reluctant to conduct bird monitoring; however, monitoring is an important activity as it can help quantify the success of other management actions (such as pest

control). If a monitoring method could be developed that was easier to implement and conduct, yet still provided accurate information on bird presence and abundance, it may be employed by more community groups. Here, we report on a study that compared data collected by automated acoustic recording devices capable of capturing bird vocalisations with data collected using the traditional five-minute bird count method. We found that acoustic recorders had bird detection rates comparable to the five-minute bird count method. Furthermore, 75% (9/12) bird species used in a pair comparison analysis had relative abundance estimates that were not significantly different to the five-minute bird count estimates. However, the relative abundance of three species was slightly underestimated using acoustic recorders. Despite this, we suggest that the use of acoustic recorders may be a viable alternative to the five-minute bird count for some species in podocarp-broadleaf forest for some species.

S4.7- Joshi, K.A.; Mulder, R.A. and Rowe K.M.C.

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Detecting species from digital audio recordings: man vs. machine.

Conservation management requires standardized and efficient survey methods to determine species presence at a site over time. Human-based visual surveys are used most frequently to assess bird community composition. However, there are substantial challenges associated with their widespread use, including time, cost and observer bias. The use of automated digital recorders provides a potentially time- and cost-effective alternative to obtain hours of unbiased audio recordings of biological communities, which can then be queried to obtain species presence data. Digital audio recordings can be analysed in two ways: human-based listening and visual scanning of spectrograms or automated species recognizers. We compared the reliability and efficiency of these two species detection methods to identify the presence of four species of forest bird within the Grampians National Park, Victoria. Automated recognizers were statistically as reliable as listening and visually scanning spectrograms in terms of the number of sites in which the target species were detected. However, time and cost efficiency for the first detection of a target species within a survey depended on the species; automated recognizers were more efficient for the Fan-tailed Cuckoo and White-throated Treecreeper, whereas listening and visual scanning was faster for the Spotted Pardalote. Both methods of detection worked equally well for the Grey Fantail. We suggest that automated recognizers may be most beneficial for detecting cryptic, threatened and/or nocturnal species. While both methods have the potential to greatly increase survey reliability and efficiency, greater transparency and method comparability is undoubtedly needed to facilitate further development.

S4.8- Rowe, K.M.C.; Adams, A.L. and Joshi, K.A.

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Automated recognition of birds: a test of their performance and implications for study design.

Effective conservation and management planning requires accurate assessment of species' presences across their distribution, but traditional survey methods can be prohibitively costly. Automated recording units have the potential to greatly enhance the collection of data on bird species' presences while reducing several sources of observational bias associated with traditional methods. While species presences can be identified within field recordings by manually scanning spectrograms, species-specific recognizers that can autonomously detect vocalizations of a target species have the potential to improve the efficiency of acoustic monitoring. However, most investigations into their performance to date suggest that high false positive and false negative rates relative to manually scanning spectrograms make them unreliable for their widespread use in monitoring. We investigated the use of the Song Scope (Wildlife Acoustics, USA) to generate species-specific recognizers for a range of species. Specifically, we tested whether the implementation of second-pass recognizers, which incorporated known vocalizations identified in the field recordings by the first-pass recognizer, improves their performance. We present the performance of first- and second-pass recognizers and discuss how detectability varies by recognizer method. We suggest that the decision to use first- or second-pass recognizers can have important implications for study design, specifically the balance between the number of surveys and sites. We also suggest ways to improve the efficacy of self-generated automated recognizers and their application for a range of users.

S4.9- Murphy, S. and Harrington, G.

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Working with uncertain detection probabilities to estimate a population trajectory for Carpentarian Grasswrens.

Carpentarian Grasswrens represent a formidable challenge for survey and monitoring – they are shy, move quickly through low, thick vegetation, and inhabit remote and often inaccessible places. Past surveys have used call-playback to determine site occupancy, although it is not known how effective this is as a survey tool. In particular, without an empirical understanding of detection probability, it is difficult to interpret survey results, especially when no birds are detected at sites.

In this talk, we present a relatively simple approach to deal with this uncertainty when analysing survey results gathered over a 6-year period from historically occupied sites. We applied several estimates of detection probability to survey results, and also calculated the detection probability required for there to be no change in site occupancy. We then applied this probability to the raw survey results to gauge whether or not such a low level of detection is realistic.

Using this approach, we suggest that the detection probability required for no change in occupancy would need to be as low as 0.07, which, when applied to raw survey results, leads to an unrealistically high number of encounters. As such, the true detection probability for Carpentarian Grasswrens is likely to be higher than 0.07. If one applies a 0.25 detection probability to survey

results, declines are in the range of 33-73%, which supports the need to reassess the conservation status of the species.

S4.10- Burbidge, A.H.[1,2]; van Dongen, R.[1]; Ball, J.[3] and Ford, S.[4]

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Monitoring and modelling the distribution of rare birds on Dirk Hartog Island: how threatened are they?

Dirk Hartog Island is a large (62,000 ha) island in the Shark Bay World Heritage Property. Three endemic subspecies (of Rufous Fieldwren, black and white White-winged Fairy-wren and Southern Emu-wren) are listed as threatened, but little is known of their ecology and status. The endemic subspecies of the Western Grasswren is considered extinct. As part of an ecological restoration project set up following conversion of the pastoral lease to national park, we commenced a multi-faceted monitoring program to provide predictive models of species distribution on the island, using presence data from 30 sampling sites, and estimates of density from 30 two kilometre transects using distance sampling. Vegetation structural data and nadir photographs that could be calibrated with Landsat images were collected from the sites for subsequent spatial modelling. Preliminary results indicate that vegetation cover and a 'weediness' index, both drerived from Landsat imagery, were significant variables in data driven models when identifying suitable habitat for the Southern Emu-wren and White-winged Fairy-wren ($p < 0.001$). The regular and free availability of Landsat data means that the model can be rerun as required to monitor changes in the extent of suitable habitat. As a result of the program, the conservation status of each taxon is being reassessed, with a recommendation to remove one taxon from the threatened list. Continued monitoring and modelling will also provide insights for conservation management of the bird fauna of the island.

S4.11- Maurer, G.

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Increasingly Important Bird and Biodiversity Areas.

Ten years ago BirdLife Australia started identifying the country's Important Bird Areas (IBAs) to ensure the protection of Australia's, endemic, congregational and most threatened species. After the recognition of 314 IBAs in 2009 volunteer monitoring started with BirdLife Australia support. Here we present a volunteer audit of the status of IBA Pressure-State-Response monitoring ('Health Checks') and bird surveys in spring 2015. We also assessed the aspirations of volunteers for 'their' IBAs and the program itself. Thirty-six volunteers responded to the audit for 42 IBAs (> 12%). It revealed the IBA program as an integral and vibrant part of Australia's conservation movement. Per IBA the community contributes on average 152 hrs p.a. through monitoring and 585 hrs p.a. through on-ground works. The program successfully engages government and NGO conservation partners in the protection of bird habitats in 90% of IBAs sampled. The main threat to IBAs of 15 threats listed in BirdLife Australia's conservation strategy were: 'Climate Change' and 'Invasive Weeds' occurring in > 50% of all IBAs sampled; Recreational activity, Inappropriate water and fire regimes

and introduced predators were reported for 1/3 of IBAs. Globally, IBAs are recognised as increasingly significant 'Key Biodiversity Areas' for threatened fauna and flora that should be afforded protection. Australian IBAs are no exception with 76% of all IBAs sampled harbouring at least one non-avian threatened taxon. To support IBA conservation volunteers identified 'Raising Awareness' and Workshops for Bird ID and IBA Health Checks for c. 50% and 25% of IBAs respectively as future priorities.

S4.12- Ehmke, G. and O'Connor, J.

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Composite Indices for reporting on trends in Australian terrestrial birds.

Biological indicators have been identified as a key gap in the National Environmental Accounts. A landmark partnership project of the National Environmental Science Program has developed methods for reporting on population trends for terrestrial Australian birds based on the BirdLife Australia atlas survey methods, recently published in the 2015 *State of Australia's Birds: Headline trends for terrestrial birds* report. Here we present composite indices of population trends for dozens of species in seven Australian bioregions, discuss some of the methodological issues and forecast future work on development of indices for Australian birds.

Introduced species contributed papers

4.13- Fraser, D.L.; Aguilar, G.; Nagle, W.; Galbraith, M. and Ryall. C.

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Modelling suitable habitat for the house crow in New Zealand.

The house crow *(Corvus splendens)* a gregarious noisy commensal bird originating in the Indian subcontinent, has spread extensively across Eastern Africa, the Arabian Peninsula, Europe and Asia. It is regarded as an important pest species with significant potential for further global invasion. Australia regards this bird as an 'Extreme threat' as an invasive species of significant impact. Although there is no record of it being present in New Zealand potential for invasion exists. Using ecological data and geographic information systems (GIS) software, a niche-based model was developed to determine the potential spatial distribution of *C. splendens* within New Zealand. The results indicate that New Zealand, particularly the northern regions of North Island are suitable for the establishment of the house crow. As the main mode of transport of this invasive bird is via shipping, the ports of Whangarei, Auckland and Tauranga were identified as high risk points of entry of the house crow to New Zealand.

4.14- Galbraith, J.A.[1]; Beggs, J.R.[1]; Jones, D. N.[2] and Stanley, M.C.[1]

[1]School of Biological Sciences, University of Auckland, Auckland, New Zealand; [2]Environmental Futures Research Institute, Griffith University, Nathan, QLD, Australia.

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Bird feeding: risks for urban bird communities.

Millions of people worldwide engage in the practice of bird feeding. Why? What makes it such a popular activity? More importantly, what is it doing to bird communities? Scientific interest in the effects of bird feeding is a very recent development compared to the history of the practice. There is ongoing debate in many parts of the world as to whether we should or shouldn't feed birds, but little evidence – experimental or otherwise – exists to inform this discussion. There are many purported impacts of feeding – some viewed as positive, some negative. These include supporting populations of threatened species, improving winter survival, dependence, increased aggression, and disease outbreaks. We carried out a nationwide survey of feeding practices, followed by an 18-month feeding experiment in urban Auckland, to quantify the current feeding practices in New Zealand and examine the potential impacts of typical feeding practices. We identified a number of risks from our survey, some of which we confirmed as part of our experimental study. Our feeding experiment caused changes in avian community structure at feeding versus nonfeeding properties, with a significant shift to communities dominated by a few introduced bird species. There was a detrimental effect on one native insectivorous species which was not utilising the feeders. In addition, disease risks were identified, with some evidence parasite dynamics were influence by the feeding regime.

4.15- Clancy, G.

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The distribution and abundance of the Common Myna* Acridotheres tristis *in the Clarence Valley LGA, north Coast New South Wales.

The Common Myna, *Acridotheres tristis*, sometimes called the Indian Myna, has colonised parts of the Clarence Valley, north coast New South Wales, since 1998, with pioneers observed as early as 1993 (pers. obs., Morris & Burton 1995). Trapping has been carried out at a number of sites and approximately 6,500 birds have been trapped and euthanased since 2011 (when co-ordinated trapping and record keeping began). An unknown number were trapped by independent trappers prior to this date and there are reports of landowners shooting Mynas when the opportunity arises. Despite this effort, the effectiveness of these control measures is not known. This survey aimed to gather baseline data on the distribution and abundance of the species in the Clarence Valley to allow future control methods to be assessed in the context of the known local population and to identify areas where control efforts need to be implemented or initiated. Other biological and ecological data were collected during the survey. Mynas were recorded at 94 discrete sites scattered throughout the LGA which were primarily in agricultural land or urban areas adjacent to agricultural land. Very few birds were observed in larger urban centres such as Grafton and Maclean, except at their extremities.

Reproductive biology contributed papers

4.16- Edworthy, A.

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Native fly parasites are the principal cause of mortality in endangered forty-spotted pardalotes.

Parasites are an emerging threat to bird populations as host-parasite dynamics shift in response to environmental change. In 2012, I discovered larvae of a screwworm fly (*Passeromyia longicornis*) parasitising and causing mortality in nestlings of the endangered forty-spotted pardalote (*Pardalotus quadragintus*). To assess the impacts of these subcutaneous, blood-feeding larvae on pardalote reproductive success, I conducted a parasite elimination experiment using a permethrin-based insecticide. I also compared the effects of parasite load on mortality and development across nestlings of forty-spotteds and their common congeners, striated pardalotes. In untreated nests, nestling mortality was 85%, but in fumigated nests, mortality declined to just 10% of nestlings; thus, 75% of mortality was caused by parasites. Fledge rate decreased with increasing parasite load, and this relationship was similar in both pardalote species. However, forty-spotted nests had higher mean parasite loads than striated nests. There was also a slight reduction in development rate of forty-spotted nestlings in response to increasing parasite load, but none detected in striated pardalotes. Interestingly, I found that older siblings within broods were more vulnerable to parasites, creating a reversal of the usual sibling dynamics associated with hatching asynchrony. Together, these results reveal a major threat to forty-spotted pardalotes, but also point the way toward new conservation strategies for the species.

4.17- Johnson, A. and **Meyer, D.**

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It takes a village…group size as a determining factor of maternal investment, feeding rate and fledging success in the variegated fairy wren (*Malurus lamberti*).

Whether the presence of auxiliary group members in cooperatively breeding species actually increases the fitness of breeders has been a topic of great discussion. Previous studies performed on the superb fairy-wren (Malurus cyaneus, Cockburn et al. 2008) have shown that reduced maternal investment in egg size in the presence of helpers can obscure helper effects and increases the survival of the breeding female. Here we provide support for that finding in a related species, the variegated fairy-wren (Malurus lamberti). Between 2012 and 2014 we monitored 127 breeding attempts, recording group size, clutch size, egg volume, chick weight, feeding rates, and fledging success. From this data we have learned that maternal investment in egg volume decreases when auxiliary group members are present. Additionally, the dominant male and female decrease nestling-feeding rate in the presence of auxiliaries while chick weight is maintained across group sizes. The presence of auxiliary group members is also correlated with increased fledging success, despite smaller egg volume in these groups. This suggests that the presence of helper individuals may benefit breeders by compensating for reduced investment, while increasing breeding success.

4.18- Beckmann, C. and Martin, K.

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Does singing on the nest increase nest predation rates in a passerine bird?

Nest predation is a leading cause of reproductive failure for most birds. Most birds are thought to be silent while incubating, as vocalizations can attract predators and thereby increase predation risk. In the grey fantail (*Rhipidura albiscapa*), both parents have been observed to sing on the nest during both incubation and brooding. We monitored nests of 50 pairs of fantails. Of these, 49 females and 48 males were recorded to sing on the nest on day one of incubation. The frequency of singing varied greatly both within and between pairs. We describe the frequency and timing of singing on the nest by male and female fantails, and test if song frequency influenced nest predation rates. We also test if nest concealment influenced song production rates, where we predict birds with more concealed nests to have higher rates of song production.

Oral presentations- Friday 27 November

Coorong wetlands symposium- convenor Jody O'Connor

S5.1- Rogers, D.J.[1,2]; Paton, D.C.[1] and Bailey, C.P.[1]

[1]School of Biological Sciences, University of Adelaide, Adelaide, SA, Australia; [2]Department of Environment, Water and Natural Resources, South Australian Government, Adelaide, SA, Australia.

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Of droughts and flooding rains: regime shifts in the waterbird community of the Coorong South Lagoon.

The ecology of the Coorong South Lagoon is relatively simple, but has historically supported a high diversity and abundance of waterbirds. During the recent Millennium Drought, the trophic ecology of the South Lagoon underwent a significant regime shift, in response to the fact that key ecophysiological thresholds for key species were crossed. This subsequently resulted in a rapid shift in the composition of the waterbird community, with significant declines in piscivorous and herbivorous species in particular. In response to a massive increase in the abundance of brine shrimp, however, Banded Stilt underwent dramatic increases in abundance, and bred in the Coorong for the first time in recorded history. While some elements of the South Lagoon's ecology were restored following the breaking of the drought in 2010, waterbird community composition has not returned to a pre-drought state. While the regime shift observed in the Coorong South Lagoon was triggered by these extremely dry conditions, longer-term decline in ecological resilience (through loss of redundancy) in response to Basin-wide extraction of water, was ultimately responsible for this regime shift.

S5.2- Paton, D.C.; Paton, F.; Bailey C. and Rogers, D.

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Using the behaviour of waterbirds to assess the condition of wetlands: a case study of the Coorong, South Australia.

A wetland of international importance registered under the Ramsar Convention is expected to be managed to maintain its ecological character, which is often assessed by two criteria – waterbird numbers and diversity. However, waterbird species and numbers are influenced easily by events away from a wetland and so do not necessarily provide a good measure of the wetland's capacity to support waterbirds. Thus, additional criteria are required to assess wetlands from a waterbird perspective. The time waterbirds allocate to foraging seems a suitable criterion on the premise that birds will spend less time foraging to secure the resources they need in a good-quality habitat with abundant food. A case study of the Coorong – a coastal, Ramsar-listed wetland in South Australia - illustrates how this additional criterion can be measured and why it is a more informative measure of habitat quality than simply waterbird numbers and diversity. Results illustrated that during both the height of the millennium drought and post drought, waterbird numbers fluctuated considerably in the Coorong. Furthermore, while common herbivorous waterfowl and piscivorous birds generally spent less than half their day foraging, common shorebirds spent up to 90% of the day foraging. Consequently, with so much time allocated to foraging, food resources and hence habitats for shorebirds in the Coorong are likely to be poor. These findings suggest management should focus

on improving the food resources and habitats for shorebirds in the Coorong and highlight the importance of using time allocated to foraging as an additional criterion for assessing wetlands.

S5.3- Clemens, R.S.; Rogers, D.; Hansen, B.D.; Gosbell, K.; Minton, C.; Straw, P.; Bamford, M.; Woehler, E.J.; Milton, D.; Weston, M.A.; Venables, B.; Weller, D.; Hassell, C.; Rutherford, B.; Onton, K.; Herrod, A.; Studds, C.E.; Choi, C.-Y.; Dhanjal-Adams, K.; Skilleter, G. and Fuller, R.A.

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The power of continental-scale monitoring: patterns of decreasing shorebird populations point to needed conservation action.

The conservation of non-breeding habitats for migratory species is critical for the long-term viability of populations. However, for highly mobile or migratory species, population increases or decreases at a local scale may or may not be related to local conditions. Conservation efforts at local wetlands are confounded when species populations may have declined due to factors outside those local wetlands. Using a continental-scale citizen science count dataset, we explore factors related to differences in trends among shorebird populations in wetlands throughout Australia. For migratory shorebirds we found widespread decreases that were not correlated to local variables, but did show geographic patterns of decrease that varied by species. Four resident shorebirds most common at Australian inland wetlands were also decreasing overall, and at greater rates in areas with inappropriate water levels. Our results are consistent with other studies indicating that migratory shorebird population decreases in Australia are most likely being driven primarily by factors outside the continent, while degradation of wetlands in Australia's interior are impacting resident shorebird populations. Despite these widespread patterns, trend comparisons highlight how areas such as the Gulf of St Vincent, Moolap Saltworks, the Hunter Estuary, and the Coorong are retaining the fewest shorebirds. Therefore, while for migratory shorebirds there is a clear need for increased advocacy for conservation actions overseas, the substantial variability in trends at individual sites across the continent combined with the evidence of inland resident shorebird declines indicate there remains an important role for effective management of shorebird habitat in Australia.

S5.4- Pedler, R.; Ribot, R.; Paton, D.C. and Bennett, A.T.D.

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Tracking reveals long-distance nomadic flights between inland and coastal refuges by Banded Stilts.

In contrast to well-studied migratory species in temperate and predictable environments, birds in unpredictable climates face major challenges in exploiting stochastic, rich, yet short-lived resource pulses in vast landscapes. Without regular seasonal cues used by migrants to prepare for spatially and temporally predictable annual movements, these species must somehow detect unpredictable resource pulses from afar and move there to take advantage, before successfully timing their retreat to suitable refuge areas, provided that these are available. The Banded Stilt *(Cladorhynchus leucocephalus)* is one such species that exploits unpredictable filling cycles at inland salt lakes following infrequent flooding rains, nesting opportunistically in colonies totalling tens of thousands. Little detail is known regarding the factors important to this complex and risky ecological life-history

strategy, but inland weather cycles and the condition of temperate coastal refuge wetlands are presumably both critical components. We fitted 47 Banded Stilt with 5 g solar-powered satellite tags at three ephemeral inland salt lakes and three coastal refuge wetlands (including the Coorong) and then tracked movements between 2012 - 2015. Tracked individuals at times moved over vast spatial scales, with long distance flights of 300 – 2,200 km towards inland lakes following flooding and rapid retreat flights of up to 800 km back to coastal or temperate refuges as ephemeral arid-zone wetlands dried. Movement data demonstrate that individual Banded Stilts using coastal refuges such as the Coorong may exploit ephemeral opportunities across much of the southern and western parts of the Australian continent, yet rely on suitable conditions at multiple refuge sites during intervening periods.

S5.5- Paton, F.; Paton, D.C.; Bailey, C. and Delean, S.

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The impact of drought on Fairy Terns (*Sternula nereis nereis*) in the Coorong, South Australia.

The Millenium drought in the Murray-Darling Basin saw increased salinities in the Coorong, South Australia. The increases in salinity for the South Lagoon exceeded the salinity tolerances of the small-mouthed hardyhead (*Atherinosoma microstoma*), the most salt-tolerant fish species in the Coorong. The absence of fish from the South Lagoon had repurcussions for the distribution of the Fairy Tern (*Sternula nereis nereis)* of which the small-mouthed hardyhead is an important food resource. Fairy Terns breed on Islands in the South Lagoon and responded to the loss of fish by shifting their distribution northwards, where salinities were lower and small-mouthed hardyheads still occurred. However, without the protection that the breeding islands of the South Lagoon offered from ground predators, any breeding attempts of the Fairy Tern around the Murray Mouth on Younghusband Peninsula from 2007-2011 were quashed by fox predation and disturbance by humans. Furthermore, poor recruitment rates of pullus to adult breeding birds of about 6% for much of the last decade suggests that the population is likely to be tipped toward older birds. Consequently, the future viability of the Fairy Tern population in the Coorong is at risk. The aim of this paper is to present an analysis of census and banding data of Fairy Terns in the Coroong over the last 15 years and to discuss the management implications of the findings.

Wetland birds contributed papers

5.7- Hansen, B.; Honan, J. and Stewart, D.

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What is the relative importance of urban wetlands for Latham's Snipe in south-west Victoria?

Latham's snipe *Gallinago hardwickii* is a cryptic migratory wader that breeds in Japan and spends its non-breeding season in south-eastern Australia, where it is scattered across shallow vegetated wetlands. In south-western Victoria, a stronghold for the species, internationally significant numbers

of birds have previously been observed in association with small urban wetlands. However, these urban wetlands are under ongoing threat from urban development. This study sought to determine the relative importance of urban wetlands for latham's snipe during daylight in the Port Fairy region. Four urban, three peri-urban and eight rural wetlands were simultaneously surveyed by volunteers on a single day, over five months during the 2014-2015 spring-summer season. Line transects were walked through wetlands and birds counted as they flushed from the vegetation. The largest counts of snipe were obtained in small (<1 hectare) wetlands in Peterborough (207) and Port Fairy (133), in November and October 2014, respectively. This compared to maximum counts at rural wetlands of four birds (December 2014). Linear mixed effects modelling revealed significant differences between counts from wetlands pooled across landscape contexts (urban, peri-urban and rural), as well as a significant interaction with month of survey and wetland vegetation height (P<0.0001). These urban wetlands continued to support the majority of the counted snipe population throughout the season even as wetlands dried up. The ongoing loss of wetlands in western Victoria highlights the critical need to protect or augment urban wetlands in conjunction with other wetland areas already afforded protected status.

5.8- Loyn, R.H.; Swindley, R.J.; Stamation, K.; Rogers, D.; Hulzebosch, M.; Menkhorst, P.W. and Steele, W.K.

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Constructed wetlands as drought refuge: waterfowl at the Western Treatment Plant during and after the Millennium Drought.

We monitored waterbirds at the Western Treatment Plant (WTP) from 2000, to help Melbourne Water conserve biodiversity while treating half the sewage for Melbourne (4+ million people) and reducing nutrient inputs to Port Phillip Bay. The WTP is part of a Ramsar-listed wetland: an Environmental Improvement Program (EIP) was implemented from 2003-05 subject to the Commonwealth EPBC Act.

Waterfowl were counted six times per year across all 150 separate waterbodies at the WTP. 88.6% of waterfowl were found on treatment ponds rather than coastal habitats or conservation ponds (where water levels were manipulated for shorebirds or frogs. Numbers varied seasonally, even during the Millennium Drought (1997-2009) when there were few known alternative wetlands. No significant changes in numbers occurred with EIP implementation. A massive change occurred in 2010 after the drought broke: inland-breeding birds vanished as they left presumably to breed at newly filled ephemeral wetlands. They returned later, at record levels for some species (e.g. coot, grebes and Hardhead).

Towards the end of the drought the WTP supported 70% of the waterbirds counted in Victoria by aerial surveys (Kingsford et al.) or the Summer Waterfowl Count (DELWP). Maximum counts included 50,991 Pink-eared Duck, 17,433 Australasian Shoveler, 554 Freckled Duck, 11,897 Blue-billed Duck, 17,800 Hardhead, 37,200 Australian Shelduck, 25,600 Hoary-headed Grebes and 65 Cape Barren Geese. Constructed wetlands can help conserve Australian waterfowl, enabling thousands to survive during inevitable periods of drought. We should embrace this opportunity to mitigate some of the damage caused by removing water upstream.

5.9- Chamberlain, R.; Weisner, S.; Strand, J. and Ehde, P.-M.

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Can patterns in breeding records from citizen science data be explained by existing ecological knowledge: a case of Tufted Duck and Eurasian Teal.

In the modern world citizen science offers a powerful tool for the environmental scientist or ecologist to access large data sets over increasingly greater time scales. But it's not a new concept. What has changed is the ease of which information can be reported or shared through online websites such as the one used in this study. The ability of this type of data to reflect patterns in the presence and absence of breeding records of Tufted Duck (*Aythya fuligula*) and Eurasian Teal (*Annas crecca*) through habitat selection within constructed wetlands in Southern Sweden was tested in this study. Physical and biological characteristics of each wetland were collected and compared with existing ecological knowledge of the two duck species. It was found that the proportion of shoreline bordered by *Phragmites australis* and small trees was significantly higher in wetlands with Tufted Duck breeding records than Eurasian Teal records. There was no significant difference between the proportion of shoreline bordered by *Typha sp.,* large trees, *Juncus sp.,* other low grass or two other combined groups "low" and "high" emergent vegetation between the wetland groups. Tufted Duck wetlands were also significantly closer to the coast than Eurasian Teal wetlands and Eurasian Teal wetlands were significantly closer to a natural freshwater body than Tufted Duck wetlands. There was no significant difference in the proximity to forest between the two wetland groups. Other variables including; the area of wetland, surroundings and disturbance level was not found to differ significantly between wetland groups. In conclusion, patterns in citizen science data do, for the most part, reflect existing ecological knowledge. Given thoughtful consideration, it provides a powerful tool for scientists and natural resource managers and helps to engage the general public in scientific studies.

5.10- Ferenczi, M.; Beckmann, C.; Ierodiaconou, D.; Lisovski, S.; Roshier, D. and Klaassen, M.

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Non-seasonal and long-term AIV dynamics in Australia's arid interior suggest bird numbers, age structure and immunocompetence as potential drivers.

Our knowledge of Avian Influenza Virus (AIV) infection dynamics in wildlife is partially understood in some species and biomes yet poorly understood in many others. The seasonal AIV dynamics observed in a number of mainly temperate, northern hemisphere studies have been attributed to (i) seasonal increases in bird density, (ii) seasonal influx of juveniles and (iii) variations in energy-demand. In contrast to most northern biomes, ecological and environmental conditions in many southern biomes, such as central Australia, are less predictable and resources are more patchily distributed. Australian desert wetland systems provide one of the most extreme environments in which AIV dynamics can be studied and the generality of hypothesized drivers evaluated. In this four-year study, we investigated AIV dynamics in a wild bird community in Australia's interior from the peak of a wet period until an almost complete drying out of the system. Similar to other parts of the world, we confirm in this system *Anseriformes* and *Charadriiformes* are the main carriers and

possibly reservoirs of AIV. Across a range of waterbird species we found that as the extent of local surface water decreased, AIV antibody prevalence increased, suggesting increased chances of an AIV epizootic when this desert system starts to dry. Given the key role of water availability to bird productivity and condition in this biome, we suggest that the drivers responsible for long-term AIV dynamics in Australia's arid interior are essentially the same as the suggested drivers of the annual seasonal dynamics observed in the temperate northern hemisphere.

Communication, signalling and cognition contributed papers

5.11- Zdenek, C.N.; Heinsohn, R. and Langmore, N.E.

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Vocal complexity in the Palm Cockatoo.

Parrots are renowned for their capacity for vocal learning and production of diverse sounds in captivity, yet little is known about why such advanced vocal capabilities have evolved. Here, we provide a detailed description and statistical classification of the vocal repertoire of wild palm cockatoos Probosciger aterrimus and investigate the behavioural contexts of vocalisations. We show that palm cockatoos produce vocalisations that conform to most of the common vocalisations described for wild parrots but also produce a variety of additional syllables in a phonological syntactic manner in the contexts of display and vocal-exchange with neighbouring individuals. These additional syllables are mainly produced by males and are often combined to form long, complex sequences. Unlike most parrots, palm cockatoos defend large, multipurpose territories and we speculate that the large vocal repertoire and vocal assemblages of palm cockatoos may function in territorial defense.

5.12- Masco, C.[1]; Mennill, D.J.[2] and Pruett-Jones, S.[1]

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Song overlapping: distinguishing between intention and chance.

In many species of songbirds, individuals often sing simultaneously, overlapping each other's songs. Although many studies have suggested that song overlapping functions as a signal, the majority of these studies fail to address the possibility that overlapping is a chance occurrence. Part of the difficulty in determining whether overlap is intentional or accidental lies in the lack of compelling null models for estimating chance levels of song overlap. We have developed the Song Overlap Null model Generator (SONG), a software package for R. SONG uses resampling randomization to predict the expected amount of overlap due to chance, and is applicable to any system in which individuals engage in signaling interactions. To evaluate the effectiveness of SONG, we examined the overlapping behavior of three avian species: black-capped chickadees (*Poecile atricapillus*), rufous-and-white wrens (*Thryophilus rufalbus*), and long-tailed manakins (*Chiroxiphia linearis*). We believe that SONG will prove to be a valuable tool for understanding signal timing in songbirds as well as other taxa.

5.13- Johnson, A. and Pruett-Jones, S.

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Know thy heterospecific neighbor: heterospecific coalitions mediated by song recognition in two fairy-wren species.

Positive heterospecific associations (e.g. mutualisms) are common in animals. However, such interactions are often broad and non-specific to individual members of the species participating. We have studied a novel case of heterospecific interaction between variegated and splendid fairy-wrens (*Malurus lamberti* and *splendens*, respectively). These species often share and co-defend overlapping territories, travel together, and jointly respond to threats. We asked if these species gain from these associations and whether the interactions are mediated by song recognition. Using playback experiments, we documented that variegated and splendid fairy-wren males respond differently to songs of co-resident heterospecifics than to those from a neighbouring or a foreign territory, demonstrating individual discrimination. We also compare daily movements as well as nesting behaviour and success of the two species to investigate the consequences of association. We suggest that individual discrimination facilitates cooperative territory defence between these two species, and that the formation of coalitions may benefit both species.

5.14- Custance, G.; Peters, K.J. and Kleindorfer, S.

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Parasite-induced beak deformation lowers vocal performance in Darwin's tree finches.

Across taxonomic groups there is ample evidence of parasite-induced phenotypic and behavioural changes. In birds, males with high parasite loads may suffer loss of bright plumage colouration and symmetry, which are both indicator traits used by females to choose a quality mate. As well as these traits, song is another reliable signal that females use to choose quality mates within a species, and also plays a significant role in maintaining species barriers, particularly between recently diverged taxa. This study investigates whether parasite-induced beak deformation, affects (a) song phenotype, and (b) the relationship between beak deformation and pairing outcome within and between species. Our study system is located on the Galapagos Islands and includes Darwin's tree finches (*Camarhynchus parvulus*, *C. pauper*, *Camarhynchus* hybrids) and the newly introduced haemophatagous nest parasite *Philornis downsi.* Male tree finches with larger parasite-induced beak deformation produced song with lower vocal performance, and pairing success within and between species was predicted by vocal performance. This is the first study to show morphological effects of a parasite on bird song and highlights the long-term fitness consequences that survivors of parasites may experience across a lifetime. The findings are used to interpret contemporary hybridisation in this system.

5.15- Evans, C. and Kleindorfer, S.

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The role of parental vocal tutors for male and female song learning in the superb fairy-wren (*Malurus cyaneus*).

Young male songbirds learn to sing from adult singing males that act as vocal tutors. The integral role of vocal tutors for song learning has been well documented for species where song is a male-specific trait. Young birds often learn from more than one tutor, which increases their song complexity or song repertoire. Female song has recently been recognised as a widespread trait in songbirds yet there is a lack of understanding about the role adult vocal tutors plays in song learning by males and females. We examine the ontogeny of song learning in the superb fairy-wren (*Malurus cyaneus*). Both males and females sing solo song to defend the year-round territory. We test if song learning occurs via same-sex vocal tutors and if there are sex differences in fledgling song, as measured by song element repertoire in parents and offspring. First, we compared song element repertoires per male and female pair. We found that pairs had comparable element diversity whereby the songs per pair had shared elements (same element found in male and female) and unique elements (different element in male versus female). Next, we examined fledgling song elements in relation to parental song elements and fledgling sex. The fledgling song contained shared elements and unique elements from both male and female vocal tutors, and had similar complexity in sons and daughters. Surprisingly, the fledgling song had a significantly higher proportion of unique female song elements, which suggests that females are more effective vocal tutors than males.

5.16- Young, C.M.; Cain, K.E.; Svedin, N.; Backwell, P.R.Y., Pryke, S.R.

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Dominance, aggression and social structure in crimson finch groups.

One notable feature of most group-living species is their lack of aggressive behaviour. Although conflicts do occur within groups, for example over access to limited breeding sites, mates and food, these disputes are often resolved before they escalate to physical fights. Birds may use signals, such as plumage colouration or vocalisations to signal their dominance or fighting ability to other individuals and avoid potentially costly interactions. Within groups these signals may vary between age and sex classes as well as with the time of year (breeding or non-breeding seasons). Additionally the benefits of aggressive behaviour depend on the extent to which those behaviours will influence the outcome of a contest as well as the level of reward gained from winning. We explored how conflict is mediated in crimson finch (*Neochmia phaeton*) groups in both the breeding and non-breeding season. Crimson finches not only live and breed colonially, but are also notorious for their overt aggression and frequent physical fights, which, given the high fitness costs of fighting, appears maladaptive. We found that in the breeding season, age and body size were the most important factors in determining the level of aggression shown towards a model bird placed near the focal birds nest. We also examined conflict resolution among adult males in the non-breeding season. Within this group, the red colouration of the bird's plumage acts as a signal of dominance.

While manipulating this colour signal increased the number of interactions needed to determine dominance.

5.17- Mathew, S.-L. and Kleindorfer, S.

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Does embryonic aural discrimination predict vocal copy accuracy after hatching?

There is growing evidence that prenatal perceptual learning enhances survival after birth, given that chemical cues experienced as an embryo can be used for subsequent habitat selection, spawning, and predator avoidance. Here we study prenatal aural discrimination in a songbird that must learn to produce a complex song as an adult. Our study system is the superb fairy-wren (*Malurus cyaneus*). Previous research showed that fairy-wren mothers vocally tutor their embryos with a simple incubation call consisting of Element A and Element B; embryos learn the Element B and produce this element as their begging call after hatching. In this study, we test if embryos show aural discrimination to female incubation calls, and if the level of prenatal aural discrimination predicts subsequent vocal copy accuracy after hatching. To measure aural discrimination we quantify change in embryonic heart rate during habituation/dishabituation trials. To measure copy accuracy, we compare Element B between chick and vocal tutor (mother). Embryos that had greater aural discrimination had higher vocal copy accuracy as hatchlings.

Special perspectives

5.18- Breed, W.

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The Edward Grey Institute for Field Ornithology during the Spring and Summer of 1961 - reflections of a field assistant at that period of time.

It was Dr David Lack, the second director of the EGI, who asked me to work, in my gap year, as a field assistant for spring and summer of 1961. The work involved population ecological studies on three disparate bird species. They were on (1) The Great Tits in Wytham woods, (2) The Swifts in Oxford University natural history museum tower, & (3) Mute Swans on the River Thames. It also included a study on swift movement from over the North Sea.

Key question being asked for projects (1)-(3) was - What is the reproductive effort of each species and how is it determined? This involved ascertaining time of breeding, clutch size, chick growth rates, fledgling success with the underlying hypothesis being that natural selection optimises brood size above and below which there is reduced number of chicks surviving.

The tit study involved regular inspection of nest boxes to determine hatching time and chick growth rate, creation of artificially large and small broods by cross-transfer of chicks, and banding so their survival rate could be subsequently ascertained.

The Swift study involved checking nest sites for breeding pairs, determination of chick hatching time and growth rates, whereas the Mute Swan study involved assisting in catching, weighing and banding to determine breeding success. For the second investigation, two weeks were spent on a

north Norfolk cliff top determining bird movement from over the North Sea around dawn with observations being matched to images tracked on a local radar screen.

Conclusion – This experience was a great introduction to long term bird population studies. It was an exciting time to be at the EGI due to the controversy at that time over individual versus group selection determining reproductive effort.

Woodland birds symposium- convenor Hannah Fraser

S6.1- Ingwersen, D.

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The state of Australia's woodland birds.

Across Australia 30% of woodlands and 80% of temperate woodlands have been cleared and much of what remains is degraded. As a result, many (more than one in five) of the bird species that depend on woodlands are now threatened.

The recent State of Australia's Birds report shows that, while woodland birds appear to be holding steady across the east coast, arid, tropical savannah and Brigalow belt regions, they are experiencing marked declines in the mallee and south-eastern mainland regions where clearing and degradation has been most severe.

The Woodland Birds for Biodiversity team is working to mitigate these declines by supporting conservation of the iconic Swift Parrot and Regent Honeyeater as well as improving habitat extent and connectivity on both public and private land.

I will give a run-down of the most up-to-date BirdLife data on woodland birds, discuss their prevalence and threats across Australia and talk about some of the conservation successes achieved through the Woodland Birds for Biodiversity project.

S6.2- Haslem, A.; Nimmo, D.; Radford, J. and Bennett, A.

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Landscape properties mediate the effect of severe drought on woodland birds in fragmented landscapes.

Woodland birds have experienced widespread declines across south-eastern Australia, largely due to habitat loss. However, woodland birds in fragmented landscapes face many additional threats that also influence their persistence. We investigate the effect of severe drought on woodland birds in north-central Victoria, and examine whether a capacity to withstand drought is affected by landscape patterns. Empirical data on woodland birds were collected from 24 landscapes (each 100km^2) at the start, middle and after the 'Millennium Drought'. Measures of the resistance, resilience and stability of woodland birds over drought were related to key properties of study landscapes: habitat extent and configuration, land-use composition, landscape productivity and context. Habitat extent was the strongest driver of species richness in all time periods, but the relative influence of other landscape properties depended on climatic conditions. Habitat configuration was influential at the start of the drought; landscape productivity was more important

during the middle of the drought. Landscape productivity also had the strongest effect on *change* in richness over time, influencing the resistance, resilience and stability of woodland bird communities over drought. Landscapes with more riparian vegetation retained a larger proportion of woodland species during drought, and were more stable over the duration of the drought. Results show that landscape properties influence the static ("snapshot") occurrence of woodland birds, and moderate their response to extreme climatic events. Importantly, they identify management actions to enhance the ongoing persistence of woodland birds: protect, restore and enhance native vegetation in fragmented landscapes, especially along streams and watercourses.

S6.3- Ikin, K. and Rayner, L.

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Birds on the boundary in the Bush Capital.

The temperate eucalypt woodlands of the ACT, including endangered yellow box - red gum grassy woodland, have been surveyed by the Canberra Ornithologists Group since 1999. Over 120 woodland bird species have been recorded, of which 11 are listed as threatened in the ACT. Analyses of long-term trends (1999 – 2012) show that five native woodland birds, including one threatened species, have declined. These species show no sign of increasing in post-drought years. Eleven species have increased and 39, including two threatened species, have remained stable. A further 61, including eight threatened species, are too uncommon to analyse. Whilst woodland birds in the ACT face many similar threats to other parts of Australia, one threat of particular importance is urbanisation. Canberra has long identified itself as the "Bush Capital", and a prominent feature of its urban form is the interface between residential suburbs and reserved woodland – the urban edge. Rapid urbanisation has increased both the extent and intensity of the urban edge, increasing pressure on the woodlands and the birds they support. Approximately half of the ACT's woodland birds are strongly linked to the proximity of the urban edge, with 24 species declining with urban proximity and/or rapid change at the urban edge. A combination of case-by-case management and strategic urban policy can help address the threat of urbanisation on woodland birds. Strategies include planting eucalypt streetscapes, targeted management of large old trees, and habitat enhancement in urban greenspace.

S6.4- Watson, D.M.

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Facilitating recovery: how bottom-up processes can minimise further woodland bird declines.

At the Armidale AOC, I introduced the productivity-based hypothesis for woodland-dependent bird declines, explaining why ground-foraging insectivores are disproportionately susceptible (altered nutrient and litter inputs driving diminished litter-dwelling prey), southern Australian woodlands are more sensitive (winter-dominant rainfall regions experience regular periods of food limitation in hot dry summers), and Eucalypt-dominant woodlands experienced more pronounced declines (more sensitive to altered nutrient inputs than woodlands dominated by Acacias and other N-fixing

trees). Rather than solely an Australian phenomenon, similar declines in ground-foraging insectivores have been noted world-wide, consistent with pervasive changes to productivity mediated by production agriculture and overabundant herbivores (both exotic and native). Parasitic plants are key components of many habitats, boosting availability and heterogeneity of nutrient inputs by shedding large quantities of enriched litter. Here, I synthesize recent findings demonstrating their disproportionate influence on ground-foraging insectivores via litter-fall. Compared to uninfected trees, litter beneath otherwise comparable trees containing mistletoe had consistently greater numbers of those arthropods preferentially consumed by ground-foraging insectivore. These differences were confirmed with litterbag experiments, maximum numbers of arthropods associated with 15% mistletoe litter (approximately one mistletoe per eight trees) equating to a doubling of arthropod prey compared with pure eucalypt litter. In many regions where remaining woodland occurs primarily as roadside stands and isolated fragments, high densities of Acacias and mistletoes may explain the continued persistence of many ground-foraging insectivores. In other regions where continuous woodlands remain and where revegetation and natural regeneration is ongoing, targeted inoculation with parasitic plants may improve resource availability for many species of conservation concern. By increasing the quantity, quality and heterogeneity of nutrient returns in low productivity systems, parasitic plants facilitate food webs from the bottom up, with increased Carbon sequestration providing a possible revenue stream to make this economically viable in many regions.

S6.5- Kutt, A.S.[1] and Eyre, T.J.[2]

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The Last Bastion – A review of the patterns and threats in Queensland's woodland bird community.

The subtropical and tropical woodlands of Queensland are vast, and constitute the largest remaining intact woodlands in eastern. As a consequence the relative impact of threatening processes upon woodland birds are variable across eastern Australia, as is the relative abundance of different bird species. Many species that have severely declined in south-eastern Australia (e.g. grey-crowned babbler, brown treecreeper) are relatively common in the woodlands of Queensland. However, there is a clear gradient of clearing and fragmentation also within Queensland, from severe in the subtropical south to largely intact in the tropical north. Consequently, we have found that some species that are common in northern woodlands are threatened in the south (e.g. weebill). Tree-clearing, fragmentation, noisy and yellow-throated miners, grazing, fire and weed incursion are the major threatening processes, and either interact or change in relative effect across this large spatial scale. Woodland bird communities are being slowly homogenised. Using a large systematic bird survey data set, we examine the broad patterns of woodland birds in Queensland, the major threats to woodland birds (and their relative effect), the consequence of these threats to woodland bird assemblage and woodland ecosystem function. We conclude with a suite of species that could constitute Queensland's threatened woodland bird community.

S6.6- Fraser, H.; Garrard, G.E.; Rumpff, L.; Hauser, C.E. and McCarthy, M.A.

Quantitative and Applied Ecology, BioSciences, University of Melbourne, Melbourne, VIC, Australia.

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The next step towards protecting woodland birds.

In this symposium we have outlined the state of woodland birds across eastern Australia, acknowledged their major threats and discussed their decline. While there is broad agreement about the threats to woodland birds and their resultant decline, studies variously support or refute these expectations. For example, the most recent State of the Australia's Birds report finds equivocal evidence of a decline despite the weight of evidence supporting a decline in woodland birds. I will argue that a major cause of these discrepancies is our disagreement about what a 'woodland bird' actually is.

I will prove that researchers are classifying woodland birds differently and show that depending on how you classify woodland birds your answer to a question as simple as "how do woodland birds respond to fragmentation" varies dramatically.

Uncertainty about which birds we think are 'woodland birds' effects how we perceive what is threatening them and how they are performing through time. If we truly want to conserve this group we need to agree on which species are woodland birds so that our research and management is consistent. A unified classification of woodland birds will also allow us to address the major threats to woodland birds and work towards preventing ongoing decline.

Following this symposium, we will be holding a workshop to define the 'woodland bird community' for the purposes of listing it as a Threatened Ecological Community under the Environment Protection and Biodiversity Conservation (EPBC) Act. If we are successful, the EPBC Act will provide legal protection from the ongoing loss or degradation of woodland bird habitat.

Woodland birds contributed papers

6.7- Hunt, T.[1]; Paton, D.C.[1] and Rogers, D.[2]

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Birds in Black Box: Avian 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 MDBA plan is unlikely to deliver enough environmental water to maintain them.

To determine the consequences of this for birds, we surveyed and compared avifaunal assemblages at 36 sites in the Riverland region of South Australia. Sites were divided between healthy and degraded Black Box and adjacent Red Gum and mallee woodlands, surveyed seasonally from 2013-2015 using 2ha 30 minute area searches.

Analysis showed that each woodland type supported a unique bird assemblage over each season, though there was greatest similarity between healthy Black Box and mallee communities. Degraded Black Box supported the least consistent bird assemblage, and the lowest species diversity and

abundance. Certain bird species, particularly honeyeaters, pardalotes and whistlers, showed shifts in abundance between woodland types, following changes in seasonal resources (eucalypt flowering, invertebrate abundance); in effect a temporal habitat complementarity.

Healthy Black Box woodlands do play an important ecological role in the landscape, sustaining unique bird assemblages and providing resources that drive seasonal bird movements and abundance between woodland types. Critically, there is a considerable deterioration of the bird community as Black Box degrades, with implications for woodland birds regionally if hydrological deficiencies are not addressed.

6.8- Hodder, G.; Paton, D.C. and Rogers, D.

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Diamonds aren't forever: The ecology of the Diamond Firetail in the Mount Lofty Ranges.

The Diamond Firetail (DFT) is a spectacular finch, popular amongst naturalists and the general community due to its brilliant plumage and social demeanour. It is one of a suite of ground-foraging birds with rapidly declining population abundance in the Mount Lofty Ranges (MLR) region, where it is now considered vulnerable. The complete disappearance of this charismatic bird from the MLR is inevitable, should appropriate remedial action not be taken. Whilst DFTs are known to be adversely affected by clearing for agriculture and urban development on a broad-scale, it is not known exactly which ecological processes directly affect the MLR population. One hypothesis is that a shortage of food, particularly during winter, when breaking rains cause seeds to germinate and become unavailable to foraging birds, is limiting juvenile recruitment into the adult population.

This study aims to test the hypothesis that a food shortage at critical periods is affecting DFT survival. The project examines aspects of the DFT diet through a combination of crop sampling, natural foraging observations, and measurements of changing food resource quantities through seasons. Temporal phenology changes in food species are also documented to determine those providing the most sustainable food sources. Additonally, the survival of DFTs at sites supplemented with food and at control sites (no supplementary feeding) is tracked over consecutive years, along with sub-population numbers and demographic data. This field-based study will provide critical ecological information from the monitoring of wild populations, to inform management plans targeting DFTs.

6.9- Andrew, M.E.[1] and Fox, E.[2]

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Modeling the dynamic distributions of the birds of the Great Western Woodlands.

A potential source of error in many species distribution models is a temporal mismatch between the species occurrence records and the environmental predictor variables that are used to model habitat relationships. Mismatches arise when environmental variables are either single-time snapshots or temporal averages that poorly represent the conditions actually experienced by a species at the particular time it occurred at that location. Temporal mismatches may be especially

problematic in dynamic systems, such as arid and semi-arid environments, where weather patterns and resulting resource pulses are unpredictable in space and time and where, consequently, vagile organisms are often relatively nomadic.

We modelled the distributions of >30 bird species in the Great Western Woodlands (GWW) of Western Australia. The GWW are of considerable conservation importance regionally and globally: They are the largest remaining intact Mediterranean woodland worldwide and are part of the southwest Australia global biodiversity hotspot. The temporal dimension was added to distribution models with two types of environmental predictor variables: (1) time-specific estimates of gross primary productivity (GPP) and precipitation (aggregated over 1-, 3-, or 6-month periods prior to the survey date), and age of last fire; and (2) estimates of the temporal stability of GPP over the 14-year MODIS archive, providing an index of the degree to which sites might function as refugia from drought, fire, or other disturbances. Predictions were mapped out for several exemplary dates/conditions. Comparisons with traditional, static-environment distribution models emphasize the importance of explicitly considering time in dynamic landscapes.

6.10- Hall, M.; Nimmo, D. and Bennett, A.F.

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Give it to me straight: what makes a vegetated linear strip appealing for woodland birds within agricultural environments?

Increasing pressure from human land use has caused loss and degradation of woodland ecosystems around the world, leading to isolation of remaining habitat patches for wildlife. Woodland dependent biodiversity, such as woodland birds, are faced with finding suitable habitat that provides food and shelter resources adequate to sustain their populations. In heavily modified regions, remnant woodlands often take the form of linear roadside and river networks. Despite their ubiquity, these linear networks are poorly understood for their role in landscape-scale conservation. This study aimed to identify the role of linear networks for the conservation of woodland birds in a heavily modified agricultural landscape of southeastern Australia. We used a whole of landscape approach, with 30 large 10x10km landscapes chosen from an existing data source. Within these landscapes, 120 sites were selected along roads and creek lines where birds had previously been surveyed. We specifically examined the effects of the following characteristics of linear vegetation networks on woodland bird communities within 3km of the site; 1) the overall amount of vegetation within a landscape, 2) the width of the linear strip, 3) the connectivity of linear networks, 4) the grain size (how tightly linear networks are configured within a landscape and 5) the density of scattered trees surrounding linear strips/networks, providing stepping stones for movement. We tested these on woodland birds, examining differences between species richness and diversity. Our results are discussed in relation to applied conservation and management of linear vegetation networks around the world.

6.11- Cook, M.; Watson, D.M.; Murray, B.R. and Leigh A.

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Spatial memory, search images and environmental cues: how do frugivores find ripe fruits?

In complex and dynamic environments like woodlands and forests, how do birds determine where and when to locate their preferred foods? For popular foods consumed by many groups, do they use the same cues, or do they employ different strategies?

In our experimental research, we investigated the strategies used by birds of differing dietary breadth foraging on fruiting mistletoe, a plant hemiparasite, to identify the cues influencing those strategies. To differentiate between mistletoe-use based on host-association from a search image of the mistletoe *versus* the use of spatial memory; fruiting Grey Mistletoe plants were removed from their original host and moved to one of three locations: 1) a new tree of the same host species; 2) a species that never hosts Grey Mistletoe; and 3) replaced in the original host (control). Birds observed visiting the mistletoe were divided into three functional groups based on their reliance on mistletoe fruits: specialist, generalist and opportunist. Spatial memory was used extensively overall, especially by the generalists who visited the control mistletoe significantly more frequently than the two other treatments. Individually, specialists and opportunists did not vary significantly in visitation frequency to the three treatments, but all three functional groups were influenced by different characteristics: specialists visited mistletoes with more fruit; opportunists, taller trees with more canopy cover, while generalists preferred trees already hosting mistletoe. Our work is novel in demonstrating the importance of spatial memory for frugivores, suggesting both prior learning and resource cues inform foraging.

Conservation and physiology contributed papers

6.13- Coetzer, W.G.; Downs, C.T.; **Perrin. M.R.** and Munro A.W.

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Molecular systematics of the Cape Parrot* Poicephalus robustus*: implications for taxonomy and conservation.

The global population of the Cape Parrot in the wild approximates 1400-1600 birds. It is variously classified as Endangered or at Least Concern since its taxonomy has been confused. Its afromontane habitat is threatened, it is infected with beak and feather disease and may be illegally traded. While its morphology, ecology and behaviour suggested it is a separate species from the closely-related Brown-necked and Grey-headed Parrots, IUCN and BirdLife International were not convinced, necessitating the current study. We used 11 microsatellite markers, two mtDNA and 1 nuclear intron markers and employed sophisticated numerical analyses. Genetic distances between the three taxa are higher than observed between other well-established parrot species. The Cape Parrot is a distinct taxonomic unit / good species. It meets all criteria to be listed as an Appendix 1 species under CITES regulations.

6.14- Rycken, S.; Shephard, J.; Warren, K. and Yeap, L.

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Human-wildlife conflict in urban ecology: defining a mutually beneficial approach to conservation management of the endangered Black Cockatoo.

The endangered Black cockatoo is threatened by multiple processes exacerbated by the rapidly increasing urban and industrial development in the Perth-Peel region and the south-west of Western Australia. Habitat loss is considered the major threatening factor for black cockatoos, but flock movements, habitat use and critical feeding and breeding sites remain largely unknown despite early attempts using direct observation. This has created a mismatch between legislative intent and management action as insufficient knowledge exists about basic behavioural ecology. Strong penalties exist for clearing more than 1 ha of potential black cockatoo feeding habitat under the EPBC Act (1999), yet it is currently unclear which habitats in the southwest of Western Australia are important.

In this study I will use novel satellite and GPS tracking technology, field observation and computer simulations using a Geographic Information System (GIS) to model population movement and habitat use for Black cockatoos focusing on the Swan Coastal Plain and agricultural regions of southwest Western Australia. The GPS tracking data will include movement during seasonal breeding migrations. In addition using a GIS, I will model the population distribution data obtained in the tracking study under a range of perturbation scenarios including: habitat modification as a function of climate shifts, agricultural, industrial and urban extension. These data will be used to identify: 1) key food resources; 2) critical feeding/watering and breeding sites; 3) important remnant vegetation; 4) movement corridors; 5) zones of strong potential human-cockatoo conflict; and 6) critical habitats robust to a range of perturbation scenarios.

6.15- Steven, R.; Smart, J.C.R.; Morrison, C. and Castley, J.G.

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Birder preferences revealed using a choice experiment can guide bird conservation funding and management.

Natural area resource management relies on an understanding of tourist preferences. Stated preference methods (e.g. choice experiments - CE) are increasingly used to provide these data for natural ecosystem values. Here we use a CE to calculate birders' willingness to pay for different levels of bio-ecological attributes (threatened species, endemic species and diversity) of birding sites, with hypothetical entry fees. The CE was delivered at popular birding and avitourism sites in Important Bird and Biodiversity Areas in Australia and the United Kingdom. Latent class modelling results revealed heterogeneous preferences among birders, with correspondingly variable willingness to pay. We were able to distinguish four clear groups from the sample; 'quantity driven birders', 'special bird seekers', 'confused respondents' and 'price is not object birders'. Quantity driven birders are attracted to sites that deliver high levels of diversity and endemic species. Special bird seekers value threatened species and high levels of endemics most. Confused respondents'

preferences were difficult to determine, but showed most objection to the hypothetical cost parameters, unlike the price is no object birders who were not at all sensitive to cost. Our findings demonstrate that birders are amenable to paying for their preferred birding experience. These payments could provide an alternative source of funding in some avitourism sites, on both public and private land. These alternative revenue streams should be explored and given full consideration in increasingly competitive conservation financing environments.

6.16- Champness, B.; Palmer, G.; Kendal, D. and Fitzsimons, J.

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The birds next door. How do residents think about their avian neighbours?

Interest in how humans interact with and respond to fauna is increasing with awareness of the importance of human contact with nature in cities. However, little is known about how people conceptualise and think about faunal taxa, including birds. This study uses a photo-based multiple sorting technique to explore patterns in the way people think about birds. Participant sorted photographs of well-known local and international bird species, as well as several less familiar local woodland birds. Each participant undertook two undirected sorts, in which the birds were sorted into groups according to a feature important to the participant. The most common groups included “type of bird”, colour and place of origin (Australian versus non-Australian species). A multi-dimensional scaling ordination showed that participants discriminated between birds primarily based on size and “nativeness” (local vs international). There were several clear features of birds that were important to people. Small, native woodland passerine species were grouped together, while small non-native passerines also formed a well-defined group. Participants also sorted by less visual features such as ecology and behaviour. However, some groups of birds that are clearly distinct to ornithologists, such as raptors, were not grouped together. These results indicate that people do think about birds in terms of a range of characteristics, such as nativeness, size, behaviour and appearance; however, it also suggests that in some cases a lack of knowledge may influence the way people think about birds and this can differ from the way scientists classify species.

6.17- Douglas, T.K.[1]; Cooper, C.E.[1,2]; Withers, P.C.[1,2] and Davies, S.J.J.F.[1]

[1]Department of Environment & Agriculture, Curtin University, Perth, WA, Australia; [2]School of Animal Biology, University of Western Australia, Perth, Australia

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***This robin is more superhero than sidekick: Thermoregulatory physiology of the Western Yellow Robin* Eopsaltria griseogularis.**

Small endotherms experience significant heat loss to the environment, so the adaptive pressure for energy-saving mechanisms, such as nocturnal hypothermia or torpor, is great. At 18g, the small, territorial Western Yellow Robin is in the size range of passerines predicted to use torpor (<20g), and despite below-freezing overnight winter temperatures in their temperate woodland habitat, they roost singly in foliage. Here we examine the physiological and behavioural adaptations used by robins to meet daily energy requirements during winter. Skin temperatures of wild, free-living robins (n = 7) were measured in the field using temperature-sensitive radio transmitters attached with backpack harnesses. There was no evidence for nocturnal hypothermia or torpor in free-living

robins, even at ambient temperatures as low as -3.95 °C. In the laboratory, open-flow respirometry measurements of metabolic rate, evaporative water loss and body temperature at a range of ambient temperatures (10 °C – 32.5 °C) showed that robins had typical endothermic responses to low ambient temperature, with no evidence of torpor. Mean body temperature of birds in the laboratory at 10 °C was only 1.9 °C lower than that at thermoneutrality (38.6 °C, n = 7), achieved by an 51% increase in metabolic rate and an 23% decrease in thermal conductance. Behavioural observations of wild robins suggest that they make only minimal alterations to their daily activity patterns to incorporate thermoregulatory behaviour. A low energy foraging strategy and low thermal conductance are likely essential in helping these small passerines meet their energy demands during winter.

6.18- van de Pol, M. and McLean, N.

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Can we predict which species are most sensitive to climate change?

For most species we have no data to make reliable predictions about how they will respond to climate change. How should we then prioritize conservation efforts to the species most likely to be affected? Ecological (e.g. habitat type) and life-history (e.g. lifespan) characteristics of species have been suggested to be able to explain variation in a species' sensitivity to environmental change. Species characteristics thus could provide an urgently needed tool to predict which species are most sensitive to climate change without first having to perform detailed monitoring and ecological studies. Here we will review the scientific evidence for how well we are able to predict birds' climate sensitivities from species characteristics. This review highlights that there are limitations with this approach and that as usual little is known for species outside the northern hemisphere. We will illustrate some of the difficulties using large comparative datasets on climate sensitivities of both northern hemisphere and Australian birds. Finally, we will discuss the implications of these findings for Australia's only comprehensive attempt so far to assess the impact of climate change on birds.

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