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NEWSLETTER 145



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Image: Brown Thornbill by Darryl McKay

Editorial

Before it was cancelled, the 2020 Conference was going to focus on the technologies of bird research. As Committee decided recently to not risk investing in a possible Conference in 2022, we will continue to bring technological solutions to research problems to you via this newsletter.

In this issue are four articles, the first on acoustic sound sampling as a survey technique. The second is on DNA sampling from the air. The third is a higher level look at using environmental DNA (eDNA) as a barcoding system, and the fourth is on MOTUS, a co-operative radio tracking system using base stations to detect tagged birds (or anything else), with shared data and network.

We welcome Amy Tipton as the new Manager of the Mist Net Service (MNS) , and thank her for taking on this role for the Association. The MNS provides both a vital service to researchers in

need of equipment for research projects, both in terms of familiarity with the needs of researchers, and the handy discount that members get when purchasing goods from the MNS.

But it also plays a key role in the finances of the Association, supplementing the membership fees, and keeping our books in the black each financial year. You will understand the urgency of the Committee's quest for a new manager to continue this vital service in the recent period.

ABSA's Mist Net Service

Amy Tipton has agreed to take on the role of Mist Net Service Manager for the Association. We extend a huge vote of thanks to the outgoing Manager Tony Hunt, who doubled up for two years as both president and MNS manager, for his dedication in the role, and to Amy for taking over the role.

Using acoustic recorders to survey birds: an introduction

Have you ever considered using acoustic recorders to survey birds? They are being used increasingly in scientific studies to detect the presence of species in a range of natural habitats. Survey methods incorporating these devices have been shown to detect species at least as well as traditional observer-based methods, given equal survey time.

The devices

Portable, battery operated acoustic recording devices are typically built into a weatherproof case with one or more external microphones. The case has attachment points for placing on a tree or post in the field using straps or cables. The devices are usually programmable, so they can be set to start and stop recording at specific times and automatically save sound files to a removable memory card.

Advantages

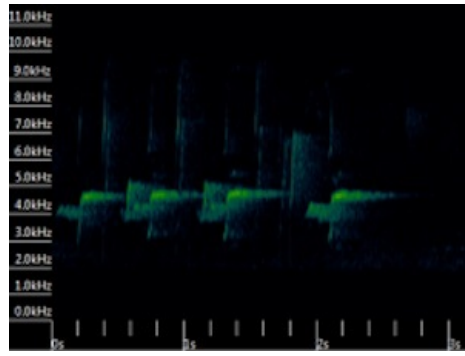
Acoustic recorders offer several advantages over traditional observer-based survey methods for projects conducted in natural areas, particularly when study sites are remote. Fieldwork is efficient with these devices, because multiple devices can be rapidly deployed in a single day, then sites are sampled simultaneously on subsequent days, leaving the investigator free to attend to other tasks. When the surveys are complete, memory cards containing sound files can be collected from devices, then the devices can be redeployed in new sites on the same day with fresh cards. In this way, it is possible to collect field data for an entire study in a short period of time. Costs associated with fieldwork can therefore be reduced with recorded acoustic surveys, because overall time spent in the field is less than that required for equivalent observer-based methods. However, the devices themselves can be expensive, although the cost can be offset against several studies.

An important advantage is that disturbance to birds is minimised, because the time spent in a study site to deploy and later retrieve a recorder is very brief. Furthermore, human presence is not required during recording, so any effects of the observer on birds while surveys are underway are eliminated. Finally, a permanent record of the survey is obtained, enabling close inspection and verification of species identification as required.

Sound file processing

It is relatively easy to collect environmental sound recordings, but the species information, i.e. presence/absence of species, needs to be obtained through file processing at the desktop. There are two main approaches to processing: manual and automated, although hybrid approaches have been taken. Manual processing involves viewing bird calls in a spectrogram of call frequency over time (see image), while listening to recordings. Free software is available that can be used for manual processing. Automated processing involves using software to search through the dataset to find matches to calls that have previously been tagged as belonging to a particular species by the analyst. Currently, manual is better than automated processing when the aim is to detect all species present, because it is generally more accurate. Automated processing has been used effectively in studies of single or a few species. Advances in processing are ongoing, with the recent issue of several packages for processing recorded animal vocalisations in R, which is free software for statistical computing.

Image:
Spectrogram view
(frequency over
time) of an Eastern
Spinebill call.



A method for the dry sclerophyll forests of south-eastern Australia

The development of methods that incorporate these devices is proceeding around the world at a steady rate. Recent studies using the technology have been conducted in ridge-top/plateau forests of the Greater Blue Mountains World Heritage Area by Michael Franklin. Michael found that on average, 70% of total species present in a site could be detected by manually processing 100 minutes of recordings taken immediately following dawn, on each of two consecutive days.

Michael Franklin

Michael is a PhD student investigating the fire ecology of birds with the Centre for Environmental Risk Management of Bushfires, University of Wollongong.

Sea-eagle Cam

A reminder that the live monitoring of a Sea-eagle's nest within Sydney's Olympic Park continues at <sea-eaglecam.org/video.html>. There are currently two nestlings, about seven weeks old, in the nest.

Musk Duck Talking?

Ask anyone to name a bird that talks, and the last thing you will hear is a duck. But the enigmatic Musk Duck (*Biziura lobata*) has joined the ranks of parrots, hummingbirds and some songbirds as a bird that learns its vocalisations. This bird was raised by a wildlife volunteer, and reputedly repeats a phrase it heard many times in its childhood - "You bloody fool".

Full story: <https://www.newscientist.com/article/2289245-listen-to-an-australian-duck-say-you-bloody-fool-like-a-human/>

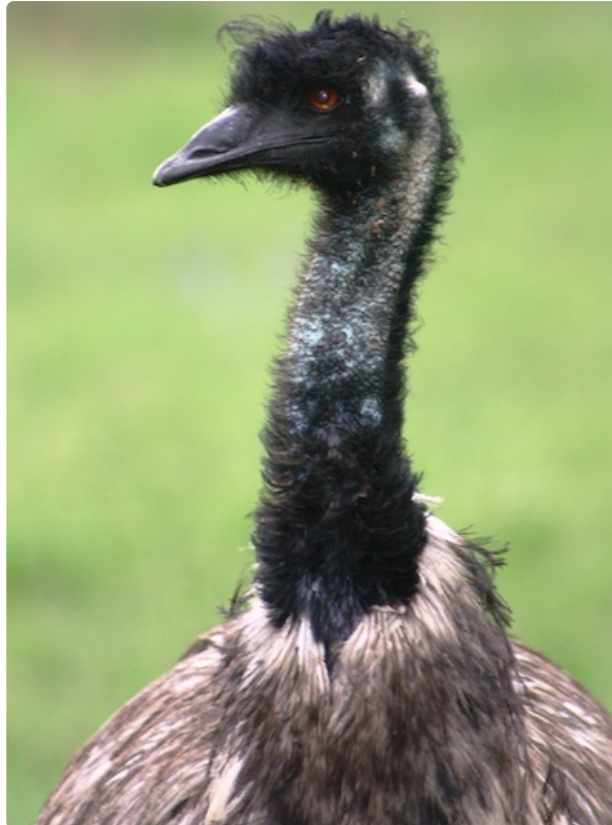


Image: Emu by Darryl McKay

Flamingos and "Standing-on-one-leg".

Mechanical evidence that flamingos can support their body on one leg with little

Abstract

Flamingos (*Phoenicopteridae*) often stand and sleep on one leg for long periods, but it is unknown how much active muscle contractile force they use for the mechanical demands of standing on one leg: body weight support and maintaining balance. First, we demonstrated that flamingo cadavers could passively support body weight on one leg without any muscle activity while adopting a stable, unchanging, joint posture resembling that seen in live flamingos. By contrast, the cadaveric flamingo could not be stably held in a two-legged pose, suggesting a greater necessity for active muscle force to stabilize two-legged versus one-legged postures. Our results suggest that flamingos engage a passively engaged gravitational stay apparatus (proximally located) for weight support during one-legged standing. Second, we discovered that live flamingos standing on one leg have markedly reduced body sway during quiescent versus alert behaviours, with the point of force application directly under the distal joint, reducing the need for muscular joint torque. Taken together, our results highlight the possibility that flamingos stand for long durations on one leg without exacting high muscular forces and, thus, with little energetic expenditure.

Measuring biodiversity from DNA in the air

Elizabeth L. Clare, Chloe K. Economou, Frances J. Bennett, Caitlin E. Dyer, Katherine Adams, Benjamin McRobie, Rosie Drinkwater, Joanne E. Littlefair
doi: <https://doi.org/10.1101/2021.07.15.452392>

This article is a preprint and has not been certified by peer review

Abstract

Impacts of the biodiversity crisis far exceed our ability to monitor changes in terrestrial ecosystems. Environmental DNA has revolutionized aquatic biomonitoring, permitting remote population and diversity assessments. Here we demonstrate that DNA from terrestrial animals can now be collected from the air under natural conditions, a ground-breaking advance for terrestrial biomonitoring. Using air samples from a zoological park, where species are spatially confined and unique compared to native fauna, we show that DNA in air can be used to identify the captive species and their potential interactions with local taxa. Air samples contained DNA from 25 species of mammal and bird including 17 known (and distinct) terrestrial zoo species. We also identified food items from air sampled in enclosures and detected four taxa native to the local area, including the Eurasian hedgehog, endangered in the UK, and the muntjac deer, a locally established invasive species. Our data provide evidence that airDNA is concentrated around recently inhabited areas (e.g., indoor enclosures) but that there is dispersal away from the source suggesting an ecology to airDNA movement which highlights the potential for airDNA sampling at distance. Our data clearly demonstrate the profound potential of air as a source of DNA for global terrestrial biomonitoring and ecological analysis.

Significance Statement The global decline in biodiversity requires rapid non-invasive biomonitoring tools applicable at a global scale. In this study we collect environmental DNA from mammals and birds from air samples collected in a natural setting. Using only air, we identified 25 species of mammal and bird known to be in the area. Our dataset detected species at risk of local extinction and several confirmed predator-prey interactions. This approach will revolutionize terrestrial biodiversity surveys.



Image: Brown Goshawk by Darryl McKay

Past, present, and future perspectives of environmental DNA (eDNA) metabarcoding: A systematic review in methods, monitoring, and applications of global eDNA

Abstract

Environmental DNA (eDNA) metabarcoding is a novel method of assessing biodiversity wherein samples are taken from the environment via water, sediment or air from which DNA is extracted, and then amplified using general or universal primers in polymerase chain reaction and sequenced using next-generation sequencing to generate thousands to millions of reads. From this data, species presence can be determined, and overall biodiversity assessed. It is an interdisciplinary method that brings together traditional field-based ecology with in-depth molecular methods and advanced computational tools. As an emerging monitoring method, there are many pitfalls and roadblocks to be considered and avoided, but the method may still have the ability to revolutionize modern biodiversity surveys for the molecular era. In this paper, we review the basic methodology, benefits, and concerns of eDNA metabarcoding, and systematically cover the applications of the method in global ecology thus far, including biodiversity monitoring across all habitats and taxonomic groups, ancient ecosystem reconstruction, plant-pollinator interactions, diet analysis, invasive species detection, pollution responses, and air quality monitoring. We also discuss the future applications of the method as well as expected technological advances and how they may impact the way that eDNA metabarcoding may be used in the future. eDNA metabarcoding is a unique method still in development and will likely remain in flux for some time as technology advances and procedures become standardized. However, as metabarcoding is optimized and its use becomes more widespread, it is likely to become an essential tool for ecological monitoring and global conservation study.

MOTUS

The MOTUS Wildlife Tracking System uses automated radio telemetry to record the presence of tagged species as they come within range of a MOTUS receiving station. It is a collaborative project between Birds Canada and several other organisations.

Each bird (or bat, or insect or bandicoot etc) is tagged with a radio chip, and whenever it comes within a certain distance of a tracking station (determined by antenna chosen), its identification is logged by the station, and uploaded to a central data server, which can be accessed from anywhere in the world by the registered owner of the tag. Some data is made public, and some reserved for the researcher. Base stations may be bought for a particular project, but once operating, they record any animal with a MOTUS tag, so it becomes more useful as time goes by, and more and more tracking stations are brought online. The most densely served areas so far are eastern USA, whilst Africa has none so far, and Asia only one, in Taiwan.

It is already used in Australia, with a waterbird project in the Port Stephens area of NSW, a bat project in the far north-west near Newmann, and a Charles Darwin University Finch project near Wyndham.

For more information, go to: <https://motus.org/> There is much information on the world map of receiver stations if you click on any receiver.



Image: Double-barred Finch by Darryl McKay

Guardian Bird of the Year

The popular Guardian/Birdlife Australia "Bird of the Year" is being held again this year, and voting will start on the 27th November. In tribute to the people enduring endless lock-downs, this year's competition will focus on those birds most commonly seen during lock-down - the birds in your backyard.

<https://www.theguardian.com/australia-news/commentisfree/2021/aug/19/australian-bird-of-the-year-2021-nominate-your-favourite-for-the-shortlist>

Victorian Forest Information Portal (FIP)

This interactive map allows you to view forest related data anywhere in Victoria, such as vegetation types, boundaries, recreation locations, and data from forest programs such as the Forest Protection Survey Program (FPSP).
<https://maps.ffm.vic.gov.au/fip/index.html?viewer=fip>

Penguins Killed by Bees

ABC News reports that 63 endangered African Penguins were found dead on a South African beach near Capetown, presumed to have died from multiple bee stings, according to David Roberts, who is the clinical veterinarian for the South African Foundation for the Conservation of Coastal Birds (SANCCOB). The bodies of the birds had multiple beestings around the eyes, and no other injuries. Toxicology tests are under way.

Full story: <https://www.abc.net.au/news/2021-09-20/bees-kill-penguins/100475876>

The Swift Parrot and the EPBC

On August 25, Radio National's "Rear View" program delved into the ins and outs of the EPBC Act, bouncing off the predicament of the Swift Parrot, and ending with a critique of the proposals to devolve EPBC powers to the states in the interests of "One-Stop-Shop" development approvals.

<https://www.abc.net.au/news/2020-08-25/environment-protection-laws-fail-swift-parrot-conservationists/12574398>

Bird - Window Collisions

Each year, billions of birds die from collisions with glass around the world. And this killer is indiscriminate—taking the strong as well as the weak, creating environmental devastation. A new book, *Solid Air | Invisible Killer: Saving Billions of Birds from Windows*, by the world's leading expert on this issue, Daniel Klem, Acopian Professor of Ornithology and Conservation Biology at Muhlenberg College, Pennsylvania, USA, highlights decades of his research and summarizes both the challenges and solutions.

Klem's research shows it is actually the year-round collisions at residential and low-rise commercial buildings that account for the greatest number of bird/glass deaths annually.

VIDEO: [Saving Billions of Birds from Windows with Daniel Klem](#)

Solutions:

- Make glass visible to birds using stickers, strings or film in a 2"x4" pattern. Other DIY and affordable options for homeowners and renters include closing blinds and keeping screens on windows year round.
- For new construction or replacement windows, current options include acid etched and fritted glass. Select manufacturers currently have and others are developing new solutions using ultraviolet (UV) spectrum light since it is visible to birds but invisible to us. A UV film to retrofit windows is over 90% effective in field tests and soon to be available commercially. Walker Glass in Canada and Guardian Glass in the U.S. recently released a UV glass for new construction.
- Advocate! While the actions of individuals make a difference, larger-scale efforts are needed to save birds from this fate. We can achieve this by working together to influence city, state and federal governments to require bird-protective legislation and building requirements.

Unlike the complexities of other environmental challenges, such as climate change, this important conservation issue can be solved right now. Homeowners, renters, architects, developers, legislators, legal professionals and urban planners alike can use this book as a blueprint to create a more bird-friendly world.

Trip Reports

Banding seems to have shut down for the duration of the epidemic, with severe curtailment of travel within and between several states. Anyone still going out is welcome to send in a report for the next Newsletter.
<info@absa.asn.au>

Image: Painted Button-quail by Darryl McKay



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