

OPEN SESSION 5

Effect of camera distance on the likelihood of detecting Southern Brown Bandicoots.

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Motion triggered, infrared “trail” cameras are increasingly being used to survey and monitor populations of small mammals in Australia. However, while there are considerable potential advantages to using this type of equipment, many of the commercially available camera models were designed to detect relatively large bodied, game species rather than small mammals. As yet there has been little formal assessment of the limitations and appropriate use of these game cameras when surveying for small mammals under Australian conditions. Here I report on trials conducted at the Royal Botanic Gardens Cranbourne to assess the relationship between camera distance and detection rate for the endangered Southern Brown Bandicoot (*Isodon obesulus obesulus*). Results of the trials indicate that the likelihood of detecting bandicoots and other small mammals declined rapidly with distance from the camera, to the point where many were unlikely to be recorded at distances greater than 3 meters. The implications for deployment of cameras in small mammal survey are discussed.

Field of View: F-stop inappropriate use of remote cameras in the field of wildlife management!

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Remote cameras are increasingly used in Australian wildlife research, monitoring and management, providing a more efficient and effective tool for researchers and managers in conducting resource-hungry surveys. Where species have distinctive marks and body features, cameras can be a valuable tool for identification and population enumeration. In situations where individuals or, even worse, species cannot be identified from images, their use is questionable. Here, we describe a program for monitoring Hastings River Mouse (*Pseudomys oralis*) and a small mammal remote camera trial in northern NSW. White-flash cameras were effective for collecting images of small mammals, but specialist skills were required to identify to species, especially where species of similar size and shape co-exist. We summarise survey effort comparisons between cameras and standard trapping, highlighting some of the pitfalls and knowledge gaps in their use. Functionality of cameras, models and results vary greatly and careful consideration of the end point data should drive the choice of cameras and not vice versa.

Using artificial cover object surveys to assess population trends for an endangered grassland pygopod, the Striped Legless Lizard, *Delma impar*

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We used arrays of artificial cover objects (recycled roof tiles) to monitor populations of the endangered Striped Legless Lizard, *Delma impar* at over 300 grassland sites in western Victoria and adjacent areas of South Australia. Tile-grids were monitored for the presence of *D. impar* and other herpetofauna over seven years. Statistical models allowing for imperfect detection, and for changing site-occupancy status due to local extinction and colonisation were used to assess temporal trends in site occupancy. The probability of detecting *D. impar* during inspections of tile grids was strongly influenced by season: surveys conducted during late spring had the highest probabilities of detection, while detection was least likely during winter. Multiple site inspections were found to be necessary for

inferring absence at a site with acceptable confidence. The number of occupied sites declined over the course of the study, with rates of local extinction exceeding rates of recolonisation. We conclude that *D. impar* is experiencing an ongoing decline across a large part of its geographic range.

Shannon Diversity for genetic estimates of wildlife dispersal and structure

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Shannon's entropy-based diversity is the standard for ecological communities. Entropy-based genetic diversity measures have many advantages over alternative methods. For making dispersal estimates from genetic data, entropy-based methods provide the best approach, being robust to very low or high population size and dispersal. They also excel in their ability to express diversity intuitively, and the hierarchical nature of entropy and information allows integrated investigation of genetic, species, and ecological diversity.

How to design and test a potential chemical deterrent vertebrate assay?

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Both visual and auditory stimuli do not have an exogenic chemical basis. Olfactory stimuli may signal the presence of a predator to prey. This fear based stimuli suggests the potential of imminent danger. Prey species may respond to this **chemical information** by altering their foraging behaviour if they recognise a predation threat. The dingo (*Canis lupus dingo*) is the largest mammalian predator in Australia and has been a primary predator of the western grey kangaroo (*Macropus fuliginosus*) since its introduction approximately 3500-4000 years ago. The potential for a chemical deterrent for kangaroos built on predator based recognition could benefit current management practice by providing an alternative to current culling practice, particularly in the recreational, agricultural and rehabilitated bushland locations. We set out to trial two new testing methodologies to determine if it is possible for free-ranging kangaroos to detect dingo urine and synthetic variants of dingo urine and if kangaroos alter their foraging behaviour when exposed to olfactory chemical stimuli mimicking predator scent. Two test designs are presented to analyse kangaroo response to a range of olfactory stimuli that could act as a chemical deterrent to normal behaviour: 1. a feeder-design and 2. a Y-maze design . The preliminary results of current deterrent field-trials will be presented and the complexities in interpretation and application of test design discussed.

Wildlife forensics & conservation in New Zealand

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Wildlife forensics in New Zealand covers a wide range of applications. At the border, detection of protected species is becoming more frequent due to increased demand for endemic species internationally. A variety of substances and materials are continually being brought into New Zealand that may contain a variety of CITES-listed species, usually associated with traditional Chinese medicines. Within New Zealand, many of native species are threatened with predation from introduced mammals, including domestic pets such as dogs and cats.

DNA-based evidence is increasingly used can support government agencies where evidence is required for cases that may result in legal action. Recent examples have been the identification of species such as Himalayan bear, Asian

cobra, and salmon shark contained within illegally smuggled samples. We are currently establishing a range of DNA-based methods that are ISO accredited, thereby providing the level of quality assurance required for any prosecution cases.

Within NZ, we are using these forensic methods to identify predators, particularly on nests where we can use saliva swabs from eggshell remains. Another recent development has been the individual identification of dogs that may be implicated in predation of kiwi. Prosecutions can be made under the Wildlife Act if it is shown that a domestic dog has been allowed to wander into 'kiwi zones' and subsequently killed a bird. We have developed a range of microsatellite markers that can be multiplexed and used to identify individual dogs from DNA obtained by swabbing wound sites during post-mortem examination. It is hoped that publicity of this methodology will be sufficient in raising public awareness and that more dog owners will take advantage of kiwi aversion training that is freely offered.

STUDENT SESSION 4

Are wildlife considered in weed management projects within Victoria?

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Weeds have been documented as one of the most significant threats to biodiversity. Subsequently, immense amounts of time and money are spent on their control. Yet, there is increasing literature suggesting that weeds can be of benefit to some wildlife species, but, generally, no indication to suggest this is taken into account in management programs. Questionnaires were sent out to land managers throughout Victoria to investigate whether wildlife were considered in management of weeds and to what extent. Although a high number of respondents were aware that wildlife use weeds and should be taken into account in weed management, fewer respondents indicated they adjusted weed control in the field to accommodate wildlife. To successfully conserve biodiversity through the management of weeds, the importance of weeds to wildlife should be considered during the weed management process. Managers need to decide if wildlife conservation is an intended outcome of weed management in the planning stages of a program. Pre-management site assessment, adaptation during implementation and post-management monitoring should continue to be carried out, with wildlife being considered throughout the entire process.

Do oblong turtles (*Chelodina oblonga*) use underpasses?

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The oblong turtle (*Chelodina oblonga*) is partly impacted by increasing urbanisation in Western Australia. Little is known about this species outside of the Perth metropolitan area. Populations of oblong turtles in the Stakehill Suite of Wetlands on the Swan Coastal Plain are at risk due to the recent construction of the Mandurah Entrance Road, which now separates two main water bodies, Black Swan Lake and Lake Marlee. This species can aestivate by burying in the mud of drying lakes, but residents had observed turtles moving between wetlands. It was hypothesised that turtles would move between wetlands as the lakes dried up and re-filled. To test this hypothesis we captured and microchipped 138 turtles and installed microchip readers in two underpasses that were built under the Mandurah Entrance Road. Turtles weighing over 800g were fitted with radio transmitters to detect their movements. When the lakes dried up turtles migrated only from Black Swan Lake to an adjacent dam that held water throughout the summer. Approximately 155 individuals reside in this 250m² dam over summer. After ten months of monitoring no turtles have yet used the underpasses to move between wetlands, preliminarily suggesting that these are metapopulations. This research is ongoing.

Managing the complex and wicked nature of wildlife systems

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Wildlife are present in complex systems, and often the issues surrounding their management are part of a broader complex social-environmental problem. These types of problems can be termed as 'wicked' and often managers find that issues around wildlife management are not being resolved through existing 'traditional' scientific approaches. In addition many of these approaches are often a) time inefficient, b) provide information with limited practical application, c) generate large amounts of data that managers find do not inform their management processes, and

d) fail to address the uncertainty characteristic of 'wicked' problems. Most papers concerned with the science-management divide come from the science perspective.

Using a combination of research methods this paper moves away from traditional approaches to examine the processes and information used by managers in managing for wildlife. The paper also considers the application of systems ideas and their value as an innovative method to explore and expand information provision to inform and modify management practices. The paper will unpack current ideas and ways of thinking about wildlife management from the perspective of stakeholders to present a model which addresses some of the shortcomings associated with current practices.

Altered ranging behaviour in female koala as a result of treatment with the GnRH agonist deslorelin

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In the southern areas of their distribution, koalas are relatively sedentary, showing strong site fidelity once adult, with small distances moved daily. We used radio-telemetry to monitor female koalas on French Island, Victoria, to assess whether ranging behaviour changed after deslorelin treatment. Ten animals given placebo implants and 19 given deslorelin (4.7 mg implants) were monitored. Before treatment, all animals ranging behaviour was consistent with previous studies in this population. After treatment a higher proportion of deslorelin treated koalas undertook long distance (>5 km) movements away from their site of initial capture, in comparison to placebo treated controls ($Z = 2.57$, $p = 0.01$). Long distance movements correlated strongly with the absence of back-young (odds ratio 6.9, 95% CI: 2.06 – 23.06). Timing of movement correlated strongly with oestrus activity (odds ratio 3.54, 95% CI: 1.34 – 8.93). In our study we could not determine whether long-range movements were a direct effect of deslorelin or a consequence of deslorelin's effects on reproduction. Changed patterns of movement are an important consideration in developing and assessing management strategies for wild populations. Our study shows the importance of trials in free ranging populations at appropriate spatial scales, to assess behavioural effects that may impact management outcomes.

Managing the fertility of female western grey kangaroos (*Macropus fuliginosus ocydromus*) with deslorelin – a word of caution.

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Isolated kangaroo populations within suburbia commonly breed up to problem levels. In these situations long-term management of female fertility may be preferable to repeated culling. We treated 12/23 female western grey kangaroos (*Macropus fuliginosus ocydromus*) on a golf course, in Perth, Western Australia, with Suprelorin[®], a slow-release implant of the gonadotrophin releasing hormone super-agonist deslorelin, to control breeding, and monitored their subsequent fertility. None of the Suprelorin[®]-treated females produced a pouch-young in the following breeding season whereas all the untreated females did. However, the maximum duration of infertility could not be determined because not all of the Suprelorin[®]-treated females produced a new pouch-young within the period of the study. Wide variations have been found in the response to Suprelorin[®] in other mammals and sensitivity to reproductive hormones responds to selection for fertility traits. If the phenotypic variation in duration of response to Suprelorin[®] has a genetic basis, repeated use of Suprelorin[®] within a population may select for individuals with a rapid return to fertility and lead to the development of resistance.

Suprelorin[®] effectively suppresses breeding in western grey kangaroos. We suggest its use be carefully targeted until the reasons for wide variations in response are better understood.

Rate of increase and vital rates of eastern grey kangaroos in south eastern Australia

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Demographics such as survival, growth and fecundity are important determinants of population growth rate and are often included in models forecasting population trends. However, there is a lack of studies demonstrating the relationship between population rate of increase and vital rates in eastern grey kangaroos (*Macropus giganteus*). We investigated the effect of rate of increase on adult sex ratio and fecundity in five populations of eastern grey kangaroos in the A.C.T., Victoria and Tasmania. Kangaroo density was monitored at each site over a span of at least 9 years and rate of increase varied between sites ($r = -1.1 - +0.62$). We collected demographic data from individuals culled at each site. Two culls were conducted at one site (Serendip Sanctuary, Victoria) enabling a comparison of demographics when the population was increasing and decreasing. Overall, there was a strong negative relationship between the rate of increase and proportion of adult females. There was also a lower proportion of females at Serendip when the population was increasing (66%) than decreasing (88%). Overall, the proportion of females breeding was positively related to rate of increase. Serendip also showed a higher proportion of females breeding when the population was increasing (50%) than decreasing (18%).

SYMPOSIA 3

Eat, shoot....or grieve? Could sustainable use of wildlife help avert the demise of our species and landscapes?

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The concept of sustainable use of wildlife as a tool for conservation is a controversial one, particularly where consumptive use is involved – how could killing wildlife help conserve it? This is particularly true in Australia, which since the 1970's has been (in general) staunchly protectionist in its formal conservation approach. But could it be time to reappraise this? In recent years sustainable use of wildlife has rapidly gained acceptance as a potentially powerful strategy for conservation in certain contexts. This talk examines the logic behind sustainable use as a conservation strategy and surveys examples of its successful deployment overseas. It then asks what potential this approach has for broader implementation in Australia, and what obstacles it faces.

Voluntary Conservation Hunting on public land in NSW – integrating pest management and sustainable use for community and biodiversity benefit

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Conservation hunting in NSW was initiated in 2004 after the declaration of public lands under the *Game and Feral Animal Control Act 2002*. Since its inception Conservation Hunting has accounted for more than 40,000 introduced animals from declared state forests and crown land reserves. This has included 20,997 rabbits, 1728 hares, 722 feral cats, 3921 foxes, 276 wild dogs, 5898 feral pigs, 7050 feral goats and 2067 wild deer. In addition a recently completed survey estimated that Game Council licenced hunters also removed more than 600,000 introduced animals from private property each year and that hunting related expenditure by these hunters was worth over \$60 million annually to the NSW economy.

Recently the concept of managing wild deer species in NSW sustainably has been developed (Ecological Deer Management). A significant component of this concept involves the sustainable use of these species, however not at the expense of environmental, agricultural or community values. Using knowledge of the density and impacts of introduced animal populations as the drivers for identifying and targeting a pest issue or allowing the sustainable harvest of a resource species within an adaptable harvest management framework will be discussed.

Is hunter education the key to successful hunting in the region?

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The South Pacific region is a wonderfully diverse collection of countries and peoples, biomes and biodiversity, with varying degrees of socio-political stability, ethnicity and religious beliefs. The region includes Australia and New Zealand, as well as Papua New Guinea and many island states, such as New Caledonia and Mauritius. The use made of wild animals in these countries also varies enormously, from the subsistence hunting practiced by the indigenous Australians to the modern deer farms of New Zealand and Australia. Focussing on hunting as a source of game meat, skins and trophies, there is clearly a significant amount of variation across the region in how that hunting is

managed. While there are a number of fundamental issues to be resolved, the way in which the “pest versus resource” debate has progressed is arguably one of the most important.

If a pest species is to be hunted rather than culled, this must involve a game management system that delivers safe, humane, ethical behaviour on the part of hunters. This can only be guaranteed if the hunters have access to the type of education programs provided by Game Council NSW, with programs such as Ecological Deer Management (EDM) in place to deliver the outcomes that hunters seek.

Enhancing Game Management Initiative - Promoting the value of wildlife habitats and monitoring of game populations in Victoria.

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Hunting game species: deer, duck and quail is a culturally important and legitimate activity for over 37,000 licensed game hunters in Victoria. The Department of Sustainability and Environment’s Game Managers have been working with hunters and other agencies on projects to enhance game habitat and game species populations across Victoria. This has been complemented by a communications project to promote these key principles to hunters.

The message that habitat is important is reinforced by collaborative conservation projects undertaken with hunter groups. These include revegetation of woodland and wetlands on public land. Private landholders are also being inspired to increase habitat across the landscape through the Property Based Game Management project.

To appreciate the importance of population monitoring, hunters are encouraged to be involved. Many hunters assist with relative waterfowl population counts each year. A project to educate and involve hunters in assessing population dynamics (recognising age, sex and moult in harvested waterfowl) has begun and will complement existing survey data.

Hunters contribute to harvest estimates by participating in telephone surveys. Scientific evaluation of the collected data is important and valid information is given back to hunters.

There are further opportunities for partnerships with agencies and universities for scientific analyses, education of hunters and to monitor biodiversity outcomes of increased and managed habitat from on-ground conservation works.