

OPEN SESSION 9

Relative influence of habitat, species interactions and climate on the population dynamics of southern NSW coastal fauna after fire

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We used time-series data from coastal NSW spanning 28 years after a wildfire to investigate the relative influence of habitat structure, species interactions and climate on animal population dynamics. The fire had a large and immediate impact on habitat structure, which then went through post-fire successional change including an increase and plateau in tree canopy cover; an increase, stabilisation and then decline in shrub cover; and an increase in ground litter cover. Population dynamics of different animal species appeared to be influenced by different components of successional change. For example, lyrebird and bandicoot populations appeared to increase in association with an increase in shrub cover while potoroos appeared to increase in association with litter cover. However, following the increases the lyrebird population appeared to fluctuate around a carrying capacity, while the bandicoot population declined at a faster rate than a direct association with shrub cover would suggest. The feral cat population appeared to lag the bandicoot population. The feral fox population remained relatively constant throughout and neither cats nor foxes appeared affected by dingoes. Implications of the results and limitations of time-series data are discussed.

Examining small mammal communities: How much do we need to know to conserve communities effectively?

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With the increasing threat of biodiversity loss, the rush to conserve ecological communities may cultivate the oversimplification of their complex nature. If the information provided by researchers to managers in order to create conservation strategies is too limited, then the developed strategies cannot conserve communities effectively.

This research examined variation in a range of small mammal community structure aspects over a complete elevational gradient (from coast to main ridge) in the Otway ranges, Victoria. Lower elevations consist of sites with low small mammal abundance, yet these zones display high variation in composition between sites, increasing the overall zone richness. Beta diversity, and in turn the species richness of a zone, is reduced at high elevations, however, the sites in these zones display higher small mammal abundance.

This study provides an empirical case study that highlights how investigating a single aspect can provide a basic view of the community, but may not present adequate information to preserve ecological communities into the future.

Can returning the western quoll to fox-baited arid zone reserves assist recruitment of arid zone plants and ecosystem function in general?

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Recent research indicates that rabbit numbers as few as $<1\text{km}^{-2}$ are preventing recruitment of plants such as mulga, *Acacia aneura*, and at 0.5 ha^{-1} are preventing the recruitment of casuarinas. Reintroducing the western quoll

(*Dasyurus geoffroii*) to arid zone fox-baited reserves is proposed as a potentially useful biocontrol option for the rabbit. The theory of ‘trophic cascade’, as seen in the return of the wolf to Yellowstone NP (USA), is considered supportive of likely benefits of returning top-order predators such as quolls to ecosystems in general. Extensive collation of historical quoll accounts supports the rabbit predation capacity of quolls and offers an insight into reasons for their decline. Some of these accounts also state occasions of hyperabundance (“plague”), in what were probably *D. viverrinus*.

Learning from planned burning – monitoring fauna habitat at a landscape scale to assess change across space and time

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The fire-prone, but fire adapted landscape of Victoria results in a substantial proportion of the biota being dependent on fire. As such understanding the relationship between fire and biodiversity in an environment prone to unpredictable wildfire is a major challenge. The Department of Sustainability and Environment is committed to implementing state-wide long-term monitoring to increase knowledge about the landscape scale effects of both wild and planned fire on biodiversity. Changing times now call for agencies to be responsive and holistic in their approach to managing fire. Implementing fauna habitat monitoring at prescribed burns across Victoria including the new Landscape Mosaic Burns (LMBs) will contribute to fire planning in the future and aid DSE in achieving the dual objectives of protecting life and property while maintaining ecosystem resilience.

While flora has been central to understanding the effect of planned fire on fauna, a different way of interpreting and monitoring vegetation is breaking new ground in understanding the affect of fire on fauna. Furthermore, the new habitat monitoring protocols are significantly contributing to the development of new knowledge within an adaptive fire management approach to planning in Victoria.

Habitat is a crucial driver for fauna, providing critical feeding, breeding and shelter sites. Habitat monitoring shifts the focus from floristic species to structural features of the vegetation and other environmental components. As the habitat progresses through development stages the fauna species utilising the habitat will also change in response.

Applying fire across the landscape changes the development stage of the habitat which will in turn affect the species utilising the habitat. Fauna habitat monitoring protocols developed and tested through a state-wide pilot program involving staff from DSE and Parks Victoria will collect vital information about how habitat develops and responds to fire across space and time.

Is an idyllic sun-drenched island enough? Conservation actions for the Lancelin Island Skink

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The Lancelin Island Skink (*Ctenotus lancelini*) has first collected in 1961 on Lancelin Island, a tiny (7.2 ha) limestone and sand island off the mid-west coast of Western Australia. It was thought to have the smallest range of any Australian reptile. Concerns about its apparent decline in 1992, led to the formation of a recovery team and the launch of a research program to investigate its ecology and potential threatening processes (thought to be predation by seagulls and weed infestation) and to clarify its taxonomic identity. Detailed field study of the species was conducted on Lancelin Island. Toxicity trials tested the impacts on the skinks of the herbicide “Fusilade”. Concurrently, a captive breeding program at Perth Zoo was commenced to reduce the risk of extinction should the decline continue on the island. An analogue sibling taxon was used for captive breeding to hone techniques and then *C. lancelini* were bred for translocation to another island.

Research on Lancelin Island found that this cryptic skink was present in large numbers and that predation by seagulls and the spread of weedy grasses appeared to have no impact on the skinks. Other islands in the region were assessed for their suitability for a translocation. Favorite Island in Jurien Bay was selected and surveyed prior to the release of captive stock so that the impact of an added species to the island could be examined. Monitoring of the translocated population continued at twice-yearly intervals for over five years and indicated the successful survival and breeding of the skinks.

SYMPOSIA 4

Migratory birds: Their flyways, threats and their cost-effective conservation

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The allocation of conservation effort to the management of populations is largely focused on sedentary species. Very few studies consider how resources should be spent optimally managing habitat for migratory species within an economic framework, and those that do focus on the management of a habitat, not an entire flyway. Given the global threats to migratory birds (for instance, nearly all of Australia's long-distance migratory waders are in decline) developing frameworks for efficient and cost-effective conservation of flyway habitat is an urgent need. I will present a GIS based approach to flyway conservation. Studying the remarkable migrations of some of Australia's wader species, which have now become available with the advent of ultra light tracking devices, the intra-individual variation in migration strategies becomes apparent and therewith the potential of species to react to a changing world. This potential of changing migratory behaviour may require more sophisticated methods to their conservation than the GIS approach. Theoretical models are important in summarising knowledge of complex systems, such as, indeed, migratory behaviour, and providing insight in the functioning of these systems. As such they are ideal tools to describe the present and predict the future, notably in relation to hypothetical changes in model parameterization. Some of the explanatory power of these migration models will be shown as well as their application in conservation planning.

Distance does matter: Effects of boat approach distances on the behaviour of Indo-Pacific bottlenose dolphins

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The small, genetically distinct population of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in Port Stephens, New South Wales (NSW), is the target of the largest dolphin-watching industry in Australia and falls within the recently created Port Stephens - Great Lakes Marine Park. The effects of different distances of boat approaches on dolphin behaviour were investigated by controlled boat experiments between November and December 2009.

Results showed that the behaviour of the dolphins was altered when a boat was at a distance of 50 m compared to when it was at 150 m. Groups of dolphins spent significantly less time resting and feeding and more time milling when the boat was at a distance of 50 m. Additionally, the group dispersal was tighter and dolphins tended to avoid the boat when it approached to 50 m.

This study recommends that the existing NSW regulations, which stipulate that dolphin-watching boats keep a distance of 50 m to groups with adults only and 150 m to groups with calves, are maintained. It also aims to assist authorities with the development of a local management plan to maintain the long-term viability of the dolphin population and the sustainability of the local dolphin-watching industry.

Returning the balance: managing Hooded Plover nests on highly disturbed beaches in Victoria

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Hooded Plovers are Australian shorebirds that nest directly on the beach or dunes during late spring and summer, and are consequently highly impacted by human recreation. Threats include direct crushing of eggs and chicks by people, dogs, horses and vehicles, as well as impacts of disturbance leading to overheating of eggs, starvation of chicks and increased depredation rates. Poor breeding success is resulting in population decline within Victorian. Management efforts are being implemented to alleviate threats, including fencing nesting sites, signage, wardening and chick shelters. We monitored between 70 and 90 pairs of Hooded Plovers in Victoria across four breeding seasons (2006-2010). At each breeding territory, the presence and intensity of threats were recorded per visit, enabling a standardized comparison of the effectiveness of on-ground managements across sites. Managed nests experienced higher hatching rates, however, fledgling production appeared equal between unmanaged and managed nests. When site-based threats were accounted for, approximately 45% of fledglings came from remote and relatively undisturbed sites, 50% from highly disturbed sites that were managed and less than 5% from disturbed sites that were unmanaged. Chick shelters gave chicks a 42.8% increased chance of survival. This suggests that on-ground management efforts are effective at reducing human-based threats.

Response distances of shorebirds in south eastern Australia to human disturbance: towards ecologically meaningful buffers.

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Disturbance to shorebirds by people is growing in extent and intensity and is considered a conservation threat. Most management of disturbance to wildlife relies on the inverse relationship between animal responses and the distance between them and a stimulus (e.g., a person). Buffers are often used to separate threatening stimuli, such as humans, from wildlife but with few exceptions buffer widths are based on little empirical information. We measured the distance at which a response (i.e., flight initiation distance [FID]) occurred among 28 of Australia's 36 regularly occurring shorebird species when presented with an approaching human (n = 760 approaches in Victoria, south eastern Australia). Species differed in their FID, with species whose eyes were higher above the substrate (a surrogate for visual ability to detect threats) having longer FIDs ($F_{1,26} = 35.439$, $p < 0.001$; $R^2 = 0.557$). Mean FIDs for species were 18.6 - 126.1 m (n = 370 approaches by a walker). Depending on the species, FID was significantly influenced by the starting distance of the human approach, flock size, previous exposure to humans and stimulus type (walker, jogger, walker with dog). The FIDs reported suggest that current buffer designations will reduce disturbance to many but not all shorebird species tested.

Key words: Flight initiation distance (FID), shorebirds, buffers, human disturbance.

Human Dimensions of Managing Beach-nesting Birds

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The breeding success of beach-nesting birds is heavily impacted by human recreation on beaches. Awareness and understanding of threats, and minor adjustments to recreational behaviour are required to improve the conservation status of this suite of highly threatened birds. We investigated human attitudes and values regarding three elements of beach-nesting bird conservation through a series of questionnaires, using the Hooded Plover as a flagship species: 1) the characteristics people value about beaches; 2) understanding of threats to Hooded Plovers and acceptance of the different management strategies available, and; 3) attitudes toward leashing dogs on beaches. Our results show that beaches were regularly used by coastal residents of south-east Australia and that

they value uncrowded, clean beaches with opportunities to view wildlife. Within Victoria, there were high levels of awareness about Hooded Plovers but there was considerable variation in the levels of understanding about mechanisms of threat to breeding birds. Dog owners in particular commonly did not perceive their dog as a threat to beach-nesting birds, and their propensity to leash their dog was subject to how they valued unleashed exercise for their dog's health and social pressures. These findings provide important insight into designing and improving education and awareness campaigns for beach-nesting birds.