

VE-08: Freshwater, forest ecosystems and climate change

VE-08.1, July 9, N111, 10:45

Forecasting the availability of old-growth habitat features in relictual eucalypt woodlands

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Understanding development time for habitat features that are critical to biodiversity is fundamental to management and restoration of relictual ecosystems. Our aim is to be able to predict changes in habitat features (e.g. tree hollows) in woodlands that are the focus of restoration in highly cleared agricultural landscapes. In semi-arid woodland in south-east Australia we measured habitat variables at 105 one-hectare sites to determine the availability of hollows and dead standing timber. At 40 sites we assessed stand condition and measured five-year growth for 1059 trees. Growth in diameter at breast height varied among six widespread *Eucalyptus* tree species and varied among sites. Growth was much more variable than described in previous studies and decreased with increasing canopy cover despite tree densities being low. Approximately 1% of trees died during the study period, and recruitment rate was <4% and was patchy. Modelling indicates potentially large variations in future tree densities even at these low mortality rates, and that large trees will be the major contributors to biomass production. In this environment with these rates of growth, we estimate it will take between 100 and 200 years for young trees to reach sizes where they have a 50% chance of containing hollows, and twice as long for large hollows. This demonstrates the length of time it will take to address the habitat needs of hollow-dependent fauna through restoration plantings.

VE-08.2, July 9, N111, 11:00

Restoration in highly degraded habitats: plant regeneration following ungulate exclusion and invasive plant control in a remnant semi-dry forest on Rapa Iti (South Pacific)

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Anthropogenic disturbances and introductions of non-native plants and ungulates have dramatically altered the composition, structure and dynamics of island ecosystems, making restoration of these degraded habitats challenging. The combined effects of deforestation, fires, grazing and trampling by cattle, horses, feral goats and pigs have reduced the native forests of Rapa Iti, the southernmost inhabited island of French Polynesia (South Pacific), to 13% of its total land area. In 2011, a 1,200 m² fenced enclosure was built to protect a semi-dry forest remnant invaded by the small tree *Psidium cattleianum* (Myrtaceae). To evaluate the effectiveness of different kind of restoration interventions, we established sixteen 12x12 m permanent plots in which we applied four replicates of four treatments: manual removal (tree cutting) of *Psidium*, fencing without removal, fencing with removal, and an un-manipulated control. In each plot, native and alien plant species diversity and cover were evaluated in 24 randomly located 2x2 m quadrats in each plot. There was no effect of treatment type on plant recruitment after 6 months or 12 months. However, after 18 months, native plant species richness was significantly higher in the fenced plot with *Psidium* removal. Alien plants richness also



declined, but their cover remained higher than natives in all treatments. Preliminary results suggest that fencing and *Psidium* removal may be an effective restoration strategy for increasing native plants richness. Long-term monitoring (2 years or more) is needed to confirm these results before planning other restoration measures such as rare endemic plant reintroduction in the fenced area.

VE-08.3, July 9, N111, 11:15

An island of woodland in an ocean of wheat: endangered marsupials as egg-predators of endangered birds

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This study was carried out in a 27,000 ha woodland island within a 14,000,000 ha ocean of wheat – Dryandra Woodland in south-western Australia. Woodland birds are of special interests within Australian ecology, because they have declined alarmingly in association with clearing for agriculture. This decline is amplified in ground nesting birds. I studied nesting ecology in woodland birds at a site where: foxes and cats were controlled, endangered native birds and marsupials remained in ecologically functional numbers and some marsupials, which are extinct from the mainland, were reintroduced. While 43 bird species with 542 nests were monitored over 11,200 nest-days only 7 nests built on the ground were detected. Therefore, artificial ground-nests were used (50 nests/year, over two years) to identify if marsupials might be potential predators of ground-nests. These nests collected imprints in clay eggs, which identified three marsupial predators and found that birds played a relatively minor egg-predatory role. The primary marsupial predators were: Brushtail Possum (*Trichosurus vulpecula*), Woylie (*Bettongia penicillata*) and Boodie (*B. lesueur*). In addition, The Bilby (*Macrotis lagotis*) depredated a natural an active burrow-nest of a Rainbow Bee-eater (*Merops ornatus*). Because the veracity of artificial nest procedures has been questioned, I use *A priori* evidence (knowledge deduced from the literature) to suggest that the role of these marsupials requires further investigation and must be considered in future conservation management.

VE-08.4, July 9, N111, 11:30

Community profiling and bioactive secondary metabolite potential of unexplored microbialites across Australia and implications for their conservation

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The present study is the first to report microbial community composition of extant microbialites from hitherto unsampled sites and to assess their potential role in novel drug discovery. Microbialites are accreted structures that host microbes exhibiting a variety of metabolic pathways. Having been the dominant life forms on Early Earth, living microbialites can now only be found in systems that exclude eukaryotic competition due to extreme conditions such as high salinity. Microbialites from various environments were sampled: Caves in New South Wales and ephemeral hypersaline lakes along the coasts of South Australia and Western Australia. The microbial community composition was examined by next generation sequencing of the 16S rRNA region. Denatured primers targeting polyketide synthetase (PKS) and nonribosomal peptide synthetase (NRPS) domains were successfully used to screen for the occurrence of secondary metabolite producing regions. A wide array of microbial taxa harbouring a high percentage of unknown sequences has been unveiled, including groups known to have effective means of osmoregulation by metabolite production. With the ephemeral lakes frequently falling dry and

