ANPC Member Profile

Melissa Millar (ANPC Secretary)

What is your current position?
I am a Research Scientist with the Science Division of the Western Australian Department of Parks and Wildlife (DPAW). I have been with the Department since 2008. My work involves utilising molecular genetic techniques for the circumscription (defining taxa), conservation, restoration and management of Western Australian flora. I work on a variety of projects ranging from examining the effects of recent and potential anthropogenic processes, such as habitat fragmentation and reduction in population size, on population genetic diversity and structure, determining mating systems and patterns of gene flow, examining patterns of phylogeographic structure, providing guidelines for provenancing and seed collection, and assessing the genetic success of restoration programs.

What are you working on at the moment?
My current work is mainly focused on delivering the Australian Research Council funded Linkage Project ‘Is Restoration Working? An Ecological Assessment.’ This project is a collaboration between the Western Australia Department of Parks and Wildlife, The University of Western Australia, the Western Australian Botanic Gardens and Parks Authority, and Gondwana Link Ltd.

It’s exciting to be working on the largest environmental restoration project ever tackled in Australia. The ambitious conservation and restoration initiative undertaken by Gondwana Link Ltd aims to provide habitat connectivity and integrated ecosystem function at a regional scale by restoring native vegetation across the south west of Western Australia, from the wet forests in the west to the dry woodland systems bordering the Nullarbor Plain to the east. Significant progress has already been made in this. Recent focus has been on the Fitzgerald River-Stirling Range region, a 70 km section of fragmented mallee and woodland remnant vegetation located between the Fitzgerald River National Park and the Stirling Ranges National Park. This is an area of exceptional plant species richness and endemism. Clearing of native vegetation has occurred relatively recently in this area and, although vegetation loss has been significant, the impacts of fragmentation on remnant vegetation remain mild and diversity within remnants is high. A number of ex agricultural properties in the region have been restored with seed from nearby remnants and with different restoration regimes. These properties are now valuable experimental sites at which to assess the success of state of the art restoration activities, in terms of both ecological and genetic viability.

Recently there has been greater recognition in the field of restoration ecology that the most ecologically and genetically viable restored populations will be those where reproductive outputs, plant pollinator interactions, genetic diversity, mating systems and patterns of pollen dispersal most closely mimic those found in natural or undisturbed remnant vegetation. The work we are conducting with the Gondwana Link project specifically aims to assess the ecological viability (reproductive output and pollinator behaviour) and genetic viability (genetic diversity, mating systems, patterns of pollen mediated gene dispersal) of a range of plant species at established Gondwana Link restoration sites in the Fitzgerald River-Stirling Range region and compare these processes with those maintained in nearby undisturbed natural vegetation. I think the great strength of this project is that it addresses the issue of poorly defined success criteria and lack of long term monitoring in many restoration projects and recognises the need to move measures of restoration success beyond that of population establishment and survival. By focussing on evaluating evolutionary processes we can get an idea of how successful restored populations may be in adapting to changing environments, persisting in both the short and long term, and functionally integrating into the broader landscape. Hopefully the results of the work will contribute to improved adaptive management outcomes at these and other sites both in the Gondwana Link network and elsewhere.
How did you end up working in plant conservation?

The first time I did plant tissue culture, completing a Science degree in Biotechnology, I knew I wanted to work somewhere in this field. I did my Honours year with Jen McComb, Margaret Byrne and David Coates at what was then the Western Australian Department of Conservation and Land Management. The work involved designing a field trial that would allow pollen flow to be tracked into and among Phytophthora resistant clones, and assessing the mating system of Jarrah. I found it hard to believe that until then no one had taken the time to assess this basic aspect of the biology of what is arguably one of our most iconic and valuable tree species. I found the experience and the people I worked with very inspiring. I then worked for a few years in the field of specialised tissue culture (somatic embryogenesis and doubled haploids), but did not find the focus on exotics for advanced breeding in agroforestry and agricultural programs to be rewarding. I returned to further study in molecular genetics research and completed a PhD creating a molecular based diagnostic test for identifying subspecific variants and assessing the mating system and patterns of intra and inter subspecific gene flow in the Acacia saligna species complex. Since then I have worked on the conservation of native species.

How long have you been involved with the ANPC?

I attended my first ANPC Annual Conference in Perth 2010. Since then I have attended and presented at several conferences, although I have not previously played a formal role in the Network. I was invited to join the ANPC committee and become the Secretary in early 2016 and am looking forward to becoming more involved with the members of the Network and its work.

News

Australasian Systematic Botany Society Conference 2015 in Canberra

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From 29 November to 3 December 2015 the annual conference of the Australasian Systematic Botany Society (ASBS) took place in Canberra. Organised by the Centre for Australian National Biodiversity Research and with the title “Building Our Botanical Capital”, it brought together plant systematists and taxonomists from all over Australia and New Zealand and attracted colleagues from as far as China and the United States.

Systematics and taxonomy are rapidly evolving and many new techniques are helping to unravel complex relationships among the world’s plants. While understanding the evolutionary relationships within and among species is the direct aim of systematics, it also provides a critical foundation for conservation management and policy. The Australasian and New Zealand floras are among the most diverse in the world and harbour numerous endemic species about which we still have much to discover. With evolving technology and the wealth of research happening in the region this was an opportune time to come together and discuss recent work.

The main program comprised three days of presentations at the CSIRO Discovery Lecture Theatre, with sessions designed to showcase recent developments in systematics and taxonomy. The session titles were Collections-based Science, Genomic Data in Plant Systematics, Online Keys and Electronic Floras, Assembly and Visualisation of Morphological Data, Species Delimitation, and Phylogenetics. Numerous talks, too many to name here, were directly relevant to plant conservation.

The collections science session started with an eye-opening keynote address from Vicki Funk, examining the past, present and future use of collections to gain new insights into systematics, biogeography, biodiversity and phylogenetic theory. Sarah Mathews examined global hotspots of conifer diversity, many of which are concentrated in East Asia, New Caledonia and New Guinea. Peter Heenan presented endemicism hotspots in the New Zealand flora along with an estimate of how well they are covered by existing nature reserves. The geologically young, alpine regions of the South Island are home to many recently evolved endemic lineages (neo-endemics) while the North Island carries many older lineages that are not found elsewhere (palaeo-endemics). The study also resolved some diversity hotspots that are potentially still at risk.

Genomic data are becoming ever more useful to the resolution of many research questions. In his keynote address, Craig Moritz provided an overview of methodologies for integrating numerous technological