RIAWA
Revegetation Industry Association of WA

Revegetating the Future

Meet the Challenge with the Experts

The 2014 Revegetation Industry Association of WA Seminar

PROGRAM

Tuesday 23rd September 2014

Landscape Ecology	
08:15 – 09:00	**Registrations**
09:00 – 09:15	Welcome and Introduction by David Venning (Chairperson)
09:15 – 09:45	***Prof Hans Lambers*** – Phosphorus Nutrition of Phosphorus-sensitive Australian Native Plants: Threats to Plant Communities in a Global Biodiversity Hotspot.
09:50 – 10:20	***David Venning*** – Seed Accreditation Project Launch
10:20 – 10:50	**Morning Tea**
Seed and Arid Lands Restoration	
10:50 – 10:55	Introduction by Dr Markus Mikli
10:55 – 11:15	***Dr Geoff Woodall*** – Systems Approach to Reliable Direct Sowing of Native plants: Implications for the Revegetation of Mined and Agricultural Landscapes
11:20 – 11:40	***Nathan McQuoid*** – Woodland and Landscape Relationships
11:45 – 12:05	***David Collins*** - Shade, Shelter, Fodder: Positive Environmental Outcomes Combined with Production Benefits
12:10 – 12:30	***Renee Hartley*** - Improving Accuracy and Efficiency in Rehabilitation Monitoring
12:30 – 13:30	**Lunch**
Fire and Climate Change	
13:30 – 13:35	Introduction by Luke Sweedman
13:35 – 13:55	***Sue Brand*** – Urban Bushland and Fire Management
14:00 – 14:20	***Geoffrey Lush & Dr Markus Mikli*** – Bushfire Risk Management and how it Affects Revegetation Design
14:25 – 14:45	***Ian Foster*** – WA Climate Trends and Projections
14:45 – 15:05	**Afternoon tea**
Weeds and Pathogens	
15:05 – 15:10	Introduction by Dave Hancock
15:10 – 15:30	***Anna-Marie Penna*** – Mine Development Weed Hygiene and Management
15:35 – 15.55	***Joe Grehan*** – Phytophthora Dieback Management for Land Rehabilitation and Revegetation Projects
16:00 – 16:20	***Colin Crane*** – Emerging Pathogens in the Revegetation Industry: new Phytophthora species, canker and Myrtle rust

PROGRAM

Wednesday 24th September 2014

Seed Collecting	
08:15 – 09:00	**Registrations**
09:00 – 09:05	Welcome and Introduction by Sam Atkinson
09:05 – 09:35	***Dr Paul Gibson-Roy*** – Using Seed Production to Enhance Restoration Outcomes
09:40 – 10:00	***Alice Quarmby presented by Geoff Cockerton*** – Seed Quality vs Quantity and Value for Money
10:05 – 10:25	***Brad Stokes*** – Sowing the Seeds for Success
10:25 – 10:55	**Morning Tea**
The Pilbara Experience	
10:55 – 11:00	Introduction by Geoff Cockerton
11:00 – 11:20	***Adam Pratt*** – Key Drivers for Rehabilitation Success in the Pilbara
11:25 – 11:45	***Michael Robinson, Rhona Wardman & Peter Golos*** – Pilbara Waste Rock Dump Closure Planning – Erosion and Vegetation Studies
11:50 – 12:10	***Dr David Merritt*** – Developing Seed Technologies for Landscape-scale Restoration
12:10 – 13:10	**Lunch**
Mine Closure and Rehabilitation	
13:10 – 13:15	Introduction by Alex Growden
13:15 – 13:35	***Dr Danielle Risbey*** – Rehabilitation of Mine Sites in WA – DMP's View on the Present and Future
13:40 – 14:00	***Rory Haymont*** – Landform Design to Ensure Revegetation Success
14:05 – 14:25	***Nick Sibbel*** – The Cooljarloo Experience
14:25 – 14:45	**Afternoon tea**
The Revegetation Experience	
14:45 – 14:50	Introduction by Ben Croxford
14:50 – 15:10	***Damian Grose*** – The Melaleuca Park Offset Experience
15:15 – 15:35	***Veronica Newbury*** – Restoring a Coastal Banksia/ Tuart Woodland. The Bold Park Experience
15:40 – 16:00	***Patrick Courtney*** – Kings Park in Saudi Arabia
16:05 – 16:20	Conference close by David Venning

Speaker Profiles

Tuesday 09:15 - 09:45

Professor Hans Lambers *FAA FRNAAS*

Hans' key areas of research have been plant respiration, plant growth analysis, and plant mineral nutrition. He invariably aims for integration of the fields of physiology and biochemistry at whole plant and vegetation levels. In research begun subsequent to his emigration to Australia in 1998, his group have contributed significantly to our understanding of the mineral nutrition of Australian plants, especially Proteaceae, and crop legumes. In this work, he discovered why fertilisation with phosphorus so readily leads to "phosphorus toxicity" in several species of the Proteaceae. Apart from numerous primary papers and authoritative reviews, he also edited 12 books in all his key research areas, and he has trained successful young researchers, at undergraduate level, as PhD students and as Postdoctoral Fellows. His primary research appears in leading journals, and he has written several invited reviews as well as a major textbook in plant physiological ecology which has been translated into Chinese and Persian. His H-index is 53. High international regard for his research contributions in the national and international research community is evidenced by his appearance on the very first ISI list of highly cited authors in plant and animal science. Among others, his Honorary Professorship at China Agricultural University, Beijing, China (2002), and election as Fellow of the Royal Netherlands Academy of Arts and Sciences (KNAW) (2003) and the Australian Academy of Science (2012) all testify to his international standing.

ABSTRACT

Phosphorus nutrition of phosphorus-sensitive Australian native plants: threats to plant communities in a global biodiversity hotspot

Hans Lambers - School of Plant Biology, The University of Western Australia

South-western Australia was a part of Gondwanaland, and some of the most ancient parts of the Earth' crust can be found here. Other parts of the landscape, such as the Swan coastal plain, originated more recently from calcareous marine deposits. Therefore, the soils of south-western Australia are amongst the most heavily leached and nutrient-impoverished in the world. The ancient landscape of south-western Australia is also one of the world's hotspots of higher plant species diversity. Therefore, this environment offers a unique opportunity to study plant adaptations to nutrient-poor conditions as well as threatening processes (Lambers, 2014).

A relatively large proportion of species from the phosphorus-impoverished environments in Western Australia cannot produce an association with mycorrhizal fungi. Instead, they produce specialised root adaptations, for example cluster roots, dauciform roots, capillaroid roots or sand-binding roots. These roots are an adaptation both in structure and in functioning; they release large amounts of exudates, in particular carboxylates. Cluster-root-bearing Proteaceae in south-western Australia occur on the most phosphorus-impoverished soils, whereas mycorrhizal species tend to inhabit the less impoverished soils in this region (Lambers, 2014).

Speaker Profiles

Many of the highly phosphorus-efficient Proteaceae are also very sensitive to only marginal increases in soil phosphorus availability. This is due to their very low capacity to down-regulate their phosphorus-uptake system. As a result, any activity that increases the soil phosphorus availability threatens our biodiversity. Examples include run-off from agricultural land, increased fire frequency and the use of phosphite to combat Phytophthora cinnamomi, because phosphite is readily converted into phosphate by soil micro-organisms (Lambers, 2014).

Lambers H., ed (2014) Plant Life on the Sandplains in Southwest Australia, a Global Biodiversity Hotspot. University of Western Australia Publishing, Crawley, Australia.

Tuesday 09:50 - 10:20

David Venning *Ass Dip Bus (Acc)*

David is a business systems and management specialist with over 45 years of international experience. He has spent more than 20 years working in the environmental industry based in Perth and has built up specialist knowledge of the Australian Native Seed Industry. David is well known and regarded in the revegetation industry and through his efforts as a founder member establishing the Revegetation Industry Association of WA (RIAWA) in 2002. He is currently the chairman of the association committed to working with all industry stakeholders to improve the quality and standards within the revegetation and seed collection industry.

ABSTRACT

Seed Accreditation Project Launch

RIAWA have been engaged in setting up a Seed Accreditation project in WA for the last four years. An enormous amount of time has been spent through voluntary work to provide a viable framework through which an Accreditation program may be implemented. Many experts and stakeholders within the industry have participated in this process through workshops and meetings providing technical advice with which to design the project. This is a first for an Australian State and will provide a work in progress opportunity upon which to improve and build the quality standards within the native seed industry.

Speaker Profiles

Tuesday 10:55 - 11:15

Dr Geoff Woodall

Dr Geoff Woodall works as a native plant agronomist, specialising in sandalwood species, native food, biodiversity, fodder and native plant forestry. He also runs a small family farm and works as a part-time research fellow at the University of Western Australia's Centre of Excellence in Natural Resource Management in Albany, on WA's south coast. He has a background in native plant biology and physiology but has also been a direct seeding practitioner since 1992. The aim of Geoff's work has been to develop new industries based on our diverse local flora. Geoff pioneered the commercial direct sowing of native legumes (80 species) as host for Santalum spicatum and has personally established over 2000ha to date in the 320-500mm rainfall zone. He has domesticated two new native vegetable crops and developed systems for establishing native forestry and fodder crops from sown seed. During one of the driest periods on record, Geoff and collaborators have been able to continually improve direct seeding systems, enabling high success rates in years of differing climate. In addition, on his property in the Great Southern Geoff has also direct seeded many species on about 160ha. Dr Woodall is a passionate about the potential of direct seeding, but he is a realist and recognises that the technique does have limitations and that there are many gaps in our current understanding of the process. Direct seeding in agricultural landscapes can be a cheap way to establish native woody perennials, often 10-30% of establishment via tube stock. In its present form, direct sowing is considered by many to be unreliable and research is needed to develop more robust and seed use efficient direct seeding systems. Reducing the cost of perennial plant establishment and increasing reliability is critical to broader adoption and to the national agenda which aims efficiently roll out perennial vegetation into an increasingly arid agricultural landscape. The scale of the task is enormous and in WA for example, the area which is increasingly marginal because of climate change is around 5 Mha.

ABSTRACT

Systems Approach to Reliable Direct Sowing of Native plants: Implications for the Revegetation of Mined and Agricultural Landscapes

In this presentation Geoff discusses how direct seeding practitioners have adopted the approaches outlined in the previous RIAWA conference. A modified systems approach to direct sowing of native plants is outlined. Case studies are used to highlight key learning's and broader implications for the revegetation industry.

Speaker Profiles

Tuesday 11:20 - 11:40

Nathan McQuoid

Nathan developed an early interest in nature in the 1960's and 70's enhanced by the bush and creeks of the Perth hills and the Hardy Inlet and the Southern Ocean at Augusta. Started his working life in the late 1970's in building and construction, later moving to agriculture in the Burracoppin/Westonia area where he enjoyed the agricultural lifestyle and community as well as the area's remarkable nature. Public Service land management beckoned; initially in Agriculture protection in the Victoria Plains District and then as National Park Ranger with the Department of Conservation and Land Management, mostly in Fitzgerald River National Park based at Hopetoun and Jerramungup, otherwise D'Entrecasteaux/Shannon, Yanchep and briefly at Cape Range. A couple of years as Kings Park and Botanic Garden's Bushland Manager for Kings Park and Bold Park saw the move towards ecological restoration management, which later evolved into developing restoration programs with the NGO sector in the south coast and wheatbelt regions. Since 2008 he has enjoyed self-employment as a landscape ecologist working across the south coast, wheatbelt and southern goldfields on nature investigation and interpretation, and conservation and recreation planning.

Nathan has honed his interests in the southwest Australian ecology by living in natural landscapes, observing, investigating, collaborating and publishing on eucalypt taxonomy and landscape ecology. As well, he continues involvement with agencies, organisations, community groups and Noongar people with interests in nature and culture conservation, ecological design and community development. His particular passion is the nature, landscapes and communities of the Fitzgerald Biosphere and the nearby south coast, southern wheatbelt and goldfields.

ABSTRACT

Woodland and landscape relationships

Lifting the Bonnet on Wheatbelt woodlands – a guide to the relationship between landscape and vegetation in Southwest Australia (Nathan McQuoid 2014, WWF Australia), explores the relationship between woodlands and the ancient Southwest Australian landscape. The book investigates the diversity of woodland types of the Wheatbelt and nearby landscapes; their tree species, communities, distribution patterns, broad-scale functions, landscape position preferences and regeneration processes; and by drawing analogies with the restoration of charismatic machines.

This presentation shares examples from the book of patterns of woodland distribution, their landform relationships and differing regenerative functions. It suggests alternative methods of developing ecological understanding for better cultural attachment and management design.

Speaker Profiles

Tuesday 11:45 - 12:05

David Collins

I was raised on a wheat and sheep property in the Southern Mallee of Victoria and completed an associate degree in Agriculture in Mildura before moving to Western Australia in 1977. I began working for the WA Agriculture at Salmon Gums and stayed there for 12 years becoming manager of the research station for 8 years. In 1990 moved to Northam and coordinated the regional field trial program, pedigree seed production and pulse industry development. In 1997 began work at Curtin University at the Muresk campus where I was involved in conducting tutorials and research projects namely the national Biosolids project and PhD projects including work in Uganda and Ethiopia. For the past 4 seasons have worked for Greening Australia as project development officer for the native species fodder shrub project.

ABSTRACT

Shade, Shelter, Fodder: Positive Environmental Outcomes Combined with Production Benefits

Greening Australia has established over 700ha of a Sustainable native plant fodder system in the Wheatbelt of WA since 2011. Building on work conducted by the CSIRO Enrich project, DAFF and Geoff Woodall , screening species for suitability as fodder plants GA has developed an establishment and design system, expanded species list and management protocols. We target any land that is considered unproductive for annual crops such as saline or frost prone areas as well as non-wetting soils or areas with poor access for large machinery.

This presentation will give details of the background to the project, research findings, lessons learnt and future direction of the work.

Speaker Profiles

Tuesday 12:10 - 12:30

Renee Hartley

Since 2002 Renée has been working professionally as an Environmental Scientist, working with government agencies, universities, community groups and industry in Western Australia. Her roles have included rehabilitation planning and monitoring, invasive species management, threatened species management, Phytophthora dieback management and biological surveys.

Renée's research experience includes the impact of herbivores on vegetation recovery in Western Australia's semi-arid rangelands. This included investigation of the efficacy of fencing and goat removal from ex-pastoral leases and the subsequent effects on plant growth, survival and reproduction. Her research also assessed the effect of goat control on the presence and abundance of other herbivores in the landscape.

Renée has also conducted research into the control of Phytophthora cinnamomi in natural ecosystems. She had a lead role in the first eradication of a Phytophthora cinnamomi infestation in a natural area on Western Australia's south coast, having great significance for dieback management. The role combined the use of on-ground and remote sensing tools and employed novel hydrological and chemical controls. The knowledge and techniques developed have since been incorporated into disease management by industry and government.

As a Senior Scientist for Astron Environmental Services' Rehabilitation Unit, Renée plays a key role in rehabilitation planning, implementation and monitoring for the mining and oil and gas sectors. Her projects have included developing rehabilitation strategies and success criteria, landform preparation, seed collection, plant propagation, nursery management, approvals and licencing, weed management, scientific monitoring design, reporting and adaptive management processes. As part of her role, Renée is interested in working with industry and government to develop improved rehabilitation strategies and measures.

ABSTRACT

Improving Accuracy and Efficiency in Rehabilitation Monitoring

Rehabilitation monitoring techniques have improved greatly over the last 20 years with the development of a number of quantitative tools to measure progress towards completion criteria. Typically these tools combine measures of vegetation composition and landform stability to indicate the development of ecological function. While many monitoring programs collect volumes of data, the traditional measures can provide results that may not lead to improved understanding of the site or efficiently demonstrate progress towards rehabilitation targets. Inadequate rehabilitation monitoring occurs as a result of three key issues: rehabilitated sites are often compared to inappropriate analogues; the sampling design generally offers poor site coverage and is not representative of an often heterogeneous area; and field-based monitoring is expensive and therefore can be inadequate. This presentation discusses these issues and offers an approach that uses modern monitoring techniques to improve the spatial and temporal monitoring frame which provide appropriate analogue comparisons. This approach offers more accurate measures of success, a whole of site coverage and good value for money while better informing site management.

Speaker Profiles

Tuesday 13:35 - 13:55

Sue Brand

Sue is an environmental scientist with more than 18 years experience in consulting and the tertiary training sector. She holds a number of tertiary qualifications, including a Bachelor of Science, a Post Graduate Diploma in Environmental Impact Assessment and a Master of Science (Environmental Science).

Since leaving the TAFE sector, Sue has worked as an environmental consultant, currently working at Natural Area Consulting Management Services as the Senior Environmental Scientist. Typical project work activities include undertaking a range of assessment and survey activities, including those relating to flora, fauna, and fire management. Activities associated with fire management include undertaking fire fuel load assessments, fire hazard assessments and the preparation of fire management plans in local bushland areas or reserves and as planning approval conditions required by a local council or the West Australian Planning Commission to ensure the consideration of fire management during the planning process.

ABSTRACT

Urban Bushland and Fire Management

This presentation will discuss bushfire management from both a local bushland management and an urban planning perspective. It will look at some of the implications of bushfire management from each of those perspectives, highlighting some of their similarities and differences.

Tuesday 14:00 - 14:20

Geoffrey Lush

Geoffrey is a bushfire management consultant and town planner. He has extensive experience in private practice and in local government. He has worked predominantly in rural areas which have been substantially impacted by bushfires in both Western Australia and Victoria.

In preparing bushfire management plans and assessing subdivision designs he has become very conscious of the practical issues being faced by many developers and agencies. The inability to recognise and incorporate the growing bushfire policy and regulatory requirements is causing delays and in some cases even preventing projects from progressing.

There is an increasing desire for people to live in closer contact with natural landscape, particularly on the urban fringe. For many of these communities and government agencies the substantial modification of the native vegetation is not acceptable. Many traditional fire mitigation measures are not always consistent

Speaker Profiles

with the 'light touch' approach to the landscape which is likely to be an essential component of environmental approvals. Therefore it is important to integrate fire management with environmental, landscape, community and residential design objectives. Current and proposed bushfire management measures are imposing more stringent development requirements and setbacks. In many instances these are difficult to retro fit once environmental approvals; revegetation or landscaping strategies have been prepared. The recent release of the revised Bushfire Risk Management Framework will further promote the consideration of fire management in the planning and urban design processes.

Dr Markus Mikli

Associate Environmental Scientist / Restoration Ecologist
B.sc. (Biol.), Pgd, M.ba, Phd

Markus has been involved for over ten years in the environmental industry both as a consultant and contractor. As a consultant, he has been the project manager for a wide range of environmental management plans, including weed control and rehabilitation, and has been in many flora surveys in the throughout Western Australia. As a contractor, Markus has supervised various restoration projects, directing work teams in revegetation, weed control and in the collection and supply of native seeds. Markus has an extensive history of study in the fields of environmental science and business management. He has completed a doctorate thesis on revegetating acidic coal overburdens in the Collie Region, a postgraduate diploma thesis on restoring native perennial grasses in the Fortescue floodplain, and an Masters in Business Administration. During his studies he focused on revegetation practices, terrestrial ecology and small business management. As a result, Markus is highly knowledgeable and practically experienced in restoration ecology throughout the state, as well as providing high quality service to clients.

ABSTRACT

Bushfire Risk Management and how it Affects Revegetation Design

The release of the Planning for Bushfire Risk Management State Planning Policy by the Western Australian Planning Commission is promoting the integration of bushfire management principles in urban design. The application of the Policy has a number of spatial design issues to be considered in the planning process. In many instances these are difficult to retro fit once environmental approvals; revegetation or landscaping strategies have been prepared. The draft Planning and Development (Bushfire Risk Management) Regulations 2014 will become operable from May 2015 and will apply to all Planning Schemes in the State and these add another layer of provisions to be considered. The presentation will highlight the implications and issues of the Guidelines and Regulations on revegetation planning, its challenges and suggested approaches.

Speaker Profiles

Tuesday 14:25 - 14:45

Ian Foster

Ian has a background in many aspects of atmospheric science, covering the development of tropical cyclones in the northwest of WA, transpiration and energy budgets of trees, as well as pollutant dispersion modelling.

Ian's work as a climatologist with the Department of Agriculture Western Australia covers the effects of climate on agriculture in WA, with emphasis on climate variability and change. He also supervises the Department's network of automatic weather stations and their application to agricultural decision-making.

ABSTRACT

WA Climate Trends and Projections

Climate trends over Western Australia in recent decades have been markedly different between north and south. While southern and especially south-western WA (SWWA) has dried significantly, the north of the state has seen increasing rainfall. Temperatures have been generally increasing across the state, though trends have been mitigated in the north by rainfall.

Impacts on water availability through surface catchment or groundwater have been severe in SWWA, with mean decadal streamflow into major metropolitan dams being less than 30% of pre-1975 flows. Depth to groundwater in shallow aquifers has increased strongly as well.

These observed climate trends are consistent with climate change projections, first made for WA in 1988. Subsequent updates by Bureau of Meteorology, CSIRO and IPCC have continued the same outlook, only with increasing confidence.

Impacts on annual crops made using downscaled future daily climate indicate strong variation in productivity across regions, and by soil type. Potential growth benefits from higher CO2 concentration are outweighed in low rainfall areas of the south west land division, particularly on clay soils. Consideration of plant bioclimatic similarity shows future climate to be very different from current environments for parts of the south and across much of inland and northern Australia.

The overall picture of WA climate is a steady drift away from historical and current patterns to a combination of recognisable but shifted climates, and emergence of novel climates. This is driven by the ongoing shift in weather patterns and intersection with changing temperature regimes. This clearly presents major challenges to revegetation efforts, not only for establishment and survival but also for selection of plant communities.

Speaker Profiles

Tuesday 15:10 - 15:30

Anna-Marie Penna

Anna-Marie Penna is a Senior Environment Advisor at Calibre Global and is based in the Perth office in Western Australia. Anna-Marie currently works on major iron ore projects, with her main activities focussed on liaising with the client and project engineering personnel to obtain required project approvals as well as construction phase implementation.

Anna-Marie has been involved in the project management and provision of technical advice for a number of weed management and hygiene, weed surveillance and weed control programs throughout the Pilbara and South Western regions in Western Australia. This includes work for local government, the NRM sector as well as the oil and gas, mining and infrastructure sectors covering both project development and operational aspects for a range of clients.

In a professional context Anna-Marie has nearly 20 years experience working for environmental consultancies, Government Agencies, Local Government Authorities and Non-Government Organisations (NGO's). During this time she has been responsible for overseeing the delivery of a wide range of environmental projects, and involvement with diverse stakeholder liaison for delivery of environmental programs.

Anna-Marie is also the current Vice-President of the Weeds Society of Western Australia (WSWA) and the President of the Council of Australasian Weeds Societies (CAWS), and also has a history of volunteer involvement in a range of weed and bushland management roles and activities.

ABSTRACT

Mine Development Weed Hygiene and Management

This presentation provides an illustration of 'what good looks like' through an overview of the partnership between Calibre as the EPCM (Engineering, Procurement, Construction and Management) company and the client, in this case Rio Tinto Iron Ore (RTIO). The overview covers weed hygiene and management processes and tools that are implemented during project design and construction phases for iron ore mining projects in the Pilbara, Western Australia.

This scope encompasses:

- Design phase and project environmental approvals – both external Regulatory approvals and RTIO internal approvals;
- Construction phase – risk assessments, kick-off and management of implementation.

Speaker Profiles

Tuesday 15:35 - 15:55

Joseph Grehan

Joe is an Ecologist over eleven years' experience in both the public and private sectors. He has worked as a Dieback interpreter, ecologist, environmental consultant and government regulator with the former Departments of Conservation and Land Management and the Department of Environment and Conservation. He has also worked in the mining sector as Senior Environmental Advisor with Iluka Resources. He has specialist skills in Phytophthora Dieback interpretation, mapping and management planning and is a registered Dieback Interpreter with DPaW. Joe has undertaken Dieback assessments in the Jarrah forest, on the Swan Coastal Plain, Southern Kwongan vegetation in the Geraldton Sandplains biogeographic regions of WA over the past ten years. In 2012 Joe established 'Terratree', an environmental consultancy specialising in ecological assessment and management and has been undertaking Dieback assessment and management planning work for clients including Iluka Resources, Western Power, Main Roads WA and Bauxite Alumina Joint Venture.

ABSTRACT

Phytophthora Dieback Management for Land Rehabilitation and Revegetation Projects

Today's presentation is on Dieback management in rehabilitation and revegetation. Dieback or the disease caused by the plant pathogen Phytophthora is a major threat to biodiversity in the Southwest and Midwest regions of WA, and more broadly across the southern states of Australia. There are a lot of misconceptions and misinformation about the threat posed by Dieback and how to manage it. Dieback in the context of land rehabilitation and revegetation can be very complicated depending on the site location, history of soil disturbance and biodiversity values at risk. How well this threat is managed can ultimately decide the success or otherwise of land rehabilitation projects in Dieback prone areas where the aim is to revegetate the land with native species that have varying degrees of susceptibility to the pathogen but are necessary to provide ecological function.

Speaker Profiles

Tuesday 16:00 - 16:20

Colin Crane

Three decades ago, Colin began providing technical support for a Forests Department program breeding Phytophthora resistant Pinus radiata designed to secure future timber resources for the rapidly growing state of Western Australian.

Since that time he has provided similar roles within Department of Parks and Wildlife (and predecessors) in research projects covering aspects of the structural, functional and genetic diversity of fungal plant pathogens and their hosts within the South Western Australian Floristic Region. Since that first days employment in the Forests Department he was and has remained fascinated by fungi. Colin currently manages the Vegetation Health Service which provides plant disease identification and advice on diseases of natural systems of Southwest WA.

ABSTRACT

Emerging Pathogens in the Revegetation Industry: new Phytophthora species, canker and Myrtle rust.

Disease causing plant pathogens that have helped shape the plant communities of the South Western Australian Floristic Region, fall into three main groups: soil borne Phytophthora species, air borne canker fungi and basidiomycete mushrooms. Overlying the impacts of these pathogens are emerging disease issues. Improving detection and identification techniques are elucidating novel Phytophthora species both globally and locally, providing a better understanding of the genus. A mixture of changing environment and exotic introductions appear to be driving an increasing canker impact. The establishment of Myrtle rust in eastern Australia has Western Australia on high alert. The revegetation industry is uniquely placed to both protect plant communities adjacent to revegetation projects and contribute to the disease information base required to underpin plant disease management strategies within our state.

Speaker Profiles

Wednesday 9:05 - 9:35

Dr Paul Gibson-Roy

Paul Gibson-Roy is Lead Scientist for Greening Australia's Eastern Region. His PhD investigated the restoration of complex, biodiverse grassland. Since 2004 he has led the Grassy Groundcover Research Project, developing methods for restoring grassy ecosystems, including the use of native Seed Production systems, and his current focus is on Cumberland Plain Grassy Woodland. He is an Honorary Fellow at the University of Melbourne, Adjunct Professor at La Trobe University, and Vice President of the Australian Network for Plant Conservation.

ABSTRACT

Using Seed Production to Enhance Restoration Outcomes

Grasslands and grassy-woodlands contain many rare and threatened species. Clearing for agriculture and continued grazing have reduced the extent and complexity of these ecosystems throughout their natural ranges of south eastern and south western Australia. Experience has shown that grassy-herb component is problematic to restore or re-introduce at-scale in particular due to limitations on seed. Access to seed may also be restricted because species have threatened status. Establishing seed production areas (SPAs) can reduce or overcome problems of species availability and seed volume, including for threatened species. While establishing a successful seed production area (SPA) takes time and significant resources in materials, labour and infrastructure, it can go a long way to assuring supply of appropriate quantities of seed of diverse species. This presentation will give an overview of current activities in southern Australia relating to the use of seed production to grow ground layer species for restoration.

Speaker Profiles

Wednesday 9:40 - 10:00

Alice Quarmby

Alice Quarmby has been involved in seed collecting and seed biology since 2001. During this time she has gained extensive knowledge of seed collecting and germination biology issues across a broad range of species occurring in South Australia, Northern Territory and Western Australia. Alice is currently the Manager of Western Botanical's Seedlab.

ABSTRACT

Seed Quality vs Quantity and Value for Money

Seeds play a very important role in rehabilitation and restoration projects. In the past the best 'value for money' was considered as the cheapest $/kg, with little consideration for intrinsic purity, viability or germination quality assurance. In order for there to be a sustainable industry and get the best rehabilitation and restoration outcomes possible, there needs to be a shift towards consideration of quality of seed provided when determining best value for money.

Speaker Profiles

Wednesday 10:05 - 10:25

Brad Stokes

Brad graduated from the University of Western Australia with a degree in Natural Resource Management (Honours) in 2005. He then moved to Boddington to work at the bauxite mine with Worsley Alumina as the Environmental Research Advisor. In his role there he was exposed to research projects across all aspects of seed management from collection, storage, data management, treatment methods and ultimately germination and establishment in rehabilitation. In 2010 he moved to BHP Billiton Iron Ore where he now works as a Senior Rehabilitation Advisor based in the Pilbara. Brads role covers rehabilitation across 5 operating mining hubs and the Port and Rail operations. He is still actively involved in seed research, primarily through the Restoration Seedbank with the Botanic Gardens and Parks Authority (Kings Park), while also coordinating the seed management practices of BHP Billiton Iron Ore in the Pilbara from an operational side.

ABSTRACT

Sowing the Seeds for Success

BHP Billiton Iron Ore is committed to returning its disturbed lands to an agreed final land use that includes the reintroduction of native vegetation. To enable this, there will be times when the application of native seed is required to support the re-establishment of a self-sustaining ecosystem. This ensures that certain species, which may not have otherwise established from the topsoil alone, are present in the rehabilitation. In order to successfully and cost effectively establish native plants in scaleable rehabilitation from a seed mix there are a number of steps which must be closely managed. These steps include; seed procurement, seed storage, seed testing and treatment, data management, preparation of seed mixes, seed broadcasting and R&D. Effective seed management is a journey where continuous improvement and adaptive management is critical to success. This presentation will outline the BHP Billiton Iron Ore seed management journey.

Speaker Profiles

Wednesday 11:00 - 11:20

Adam Pratt

Adam Pratt is the Director and Principal Soil Scientist of Soilwater Consultants (SWC), a Perth-based soil and water resource consultancy. Adam has over 20 years' experience in the mining industry specialising in minesite rehabilitation and closure planning. He has undertaken rehabilitation and closure projects throughout Australia and internationally for major mining companies including BHP Billiton, Rio Tinto, AngloGold Ashanti, Barrick Gold, Goldfields Limited and Fortescue Metals Group (FMG). Adam has specific expertise in soil and waste characterisation, unsaturated zone hydrology, ecosystem functioning, mine planning and design, geochemistry (including acid rock drainage – ARD and acid sulfate soils - ASS), and solute and contaminant fate and transport. Currently, a large portion of his work now involves the development of achievable rehabilitation and closure objectives and criteria.

ABSTRACT

Key Drivers for Rehabilitation Success in the Pilbara

The climate of the Pilbara region, hot arid zone with summer cyclonic events, and predominately gravelly soils, represents unique challenges to rehabilitation. An understanding of these factors and there influence on the hydraulic functioning of surface soils is therefore critical if rehabilitation is to occur successfully resulting in stable and sustainable post-disturbance landforms. Given the water deficit nature of the region, whereby rainfall is significantly lower than evaporation, the surface soils exist in a dry (high matric suction) condition throughout most of the year. Under such 'dry' conditions the permeability of the soils is very small, and well below the rainfall intensity during storm or cyclonic events; hence infiltration into the soil profile is limited, resulting in appreciable surface water overland flow. This excess surface water must be managed through drainage structures (i.e. contour ripping) or through the use of competent rock or gravels which effectively rock armour sloping surfaces; otherwise significant erosion and sediment loss will occur, impacting on the stability and overall performance of rehabilitation.

In addition, the gravelly nature of the soils results in them have low overall plant available water contents, which means that the native vegetation is required to root deep into the profile to access sufficient volume of stored moisture to meet their transpiration requirements. Subsequently, the shoot/root ratios of most native plants in the Pilbara, and broader arid zone, typically exceeds 1:2 (i.e. for every 1 m above ground the plants will have a root system that extends 2 m into the profile). This has important implications for revegetation of post-disturbance and reconstructed landforms in that in order to achieve a sustainable rehabilitation the vegetation must access an appreciable volume of the reconstructed soil profile, and any physical or chemical limitations to this root growth will impact on the overall success and performance of rehabilitation.

This presentation will highlight how an understanding of the unsaturated permeability and water retention properties of surface soils can be used to develop more appropriate and achievable completion criteria for mine closure. Examples from nature and good and poor rehabilitation will be presented to highlight these concepts.

Speaker Profiles

Wednesday 11:25 - 11:45

Michael Robinson & Rhona Wardman

Rhona Wardman (Environmental Advisor) and Michael Robinson (Environmental Manager) have been involved with Nifty for over four years. Along with all of the typical environmental demands (water management, flora/fauna surveys…) akin to 'herding cats' on a mine site, this small environmental team has managed the closure studies and planning from its inception to its current status. We love working in the east Pilbara and appreciate that a day as an enviro at Nifty is never dull.

Peter Golos

Peter completed his PhD in 2012 at The University of Western Australia and has worked as a restoration ecologist at Kings Park and Botanic Garden since 2009. During his Ph.D. and employment with Kings Park he has worked at a number of mine sites across Western Australia in particular the Pilbara region. Peter's research focus has been on vegetation restoration to waste dumps with the emphasis on reconstructing soil profiles that will maximize seedling emergence and plant establishment from the topsoil seed bank and/or sown seed.

ABSTRACT

Pilbara Waste Rock Dump Closure Planning – Erosion and Vegetation Studies

The Birla Nifty Copper Operation is located in the East Pilbara, a six hour drive east of Port Hedland near the Telfer and Woodie Woodie mines and exports copper concentrate to a smelter in India owned by Hindalco. We have been working on our closure planning for four years, and a big part of that work has focused on the rehabilitation of our waste rock dumps. Nifty has undertaken significant work in materials characterisation, constructed a waste dump slope trial to monitor and eventually design the future rehabilitated batters, and have been conducting vegetation trials on the waste dump top and slopes in order to understand what types of vegetation will establish on this difficult landform. This presentation will discuss these project findings, difficulties, and future works towards the closure of the waste rock dumps.

Peter will present research being undertaken at Birla Nifty's copper mine, found in the western part of the Great Sandy Desert, highlighting the challenges in finding a substrate that is both suitable for seedling emergence and survival, and for constructing a stable waste dump landform.

Speaker Profiles

Wednesday 11:50 - 12:10

Dr David Merritt

Dr David Merritt is a Senior Research Scientist at the Botanic Gardens and Parks Authority (BGPA). David manages BGPA's seed research programs that focus on progressing fundamental and applied aspects of seed biology and technology to improve how seeds are used for conservation and restoration. Research programs cover diverse ecosystems across Western Australia and include collaborations with the university sector, NGO's, and the resources industry.

A seed scientist for more than 15 years, David's research interests include seed storage physiology and longevity, seed dormancy and germination, and the development of seed enhancement technologies. A particular focus of David's work is the integration of these sub-disciplines of seed science to improve techniques for the seed-based conservation of plant biodiversity and the restoration of degraded habitats.

(1) Kings Park and Botanic Garden, West Perth, Perth 6005, Western Australia

(2) The University of Western Australia, School of Plant Biology, Nedlands 6009, Western Australia

ABSTRACT

Developing seed technologies for landscape-scale restoration

International agendas for biodiversity protection including the Global Strategy for Plant Conservation 2020 and the Millennium Development Goals now include restored landscapes among their targets. GSPC 2020 Targets specify a minimum of 15% of each ecological region or vegetation type be secured through effective management and/or restoration. These lofty targets highlight that restoration is clearly a global undertaking. Yet hundreds of millions of hectares requiring billions of plants are required to restore landscapes at this scale. Large-scale, precise use of seeds of wild species underpins the achievement of these restoration targets. Currently a significant limitation to the effectiveness of direct seeding is the poor conversion of seeds into established seedlings. Across a range of habitats, commonly less than 10% of seeds delivered to site result in an established seedling. Failed seedling establishment is therefore a significant contributing factor to the challenges surrounding the re-establishment of biodiverse wild plant communities. Co-ordinated seed science underpinned by ecological principles and the adaptation of advances in seed technology to wild species is necessary to fulfil restoration targets. Seed enhancement treatments to increase seed germination performance and seedling establishment are routinely applied through the agricultural and horticultural industries, but have not yet been widely adopted in the native seed industry. The development of such technologies along with strengthening of interactions and synergies between seed scientists and restoration practitioners will help to ensure that seeds are deployed to their full potential in landscape scale restoration.

Speaker Profiles

Wednesday 13:15 - 13:35

Dr Danielle Risbey

Team Leader, Environment Division, Department of Mines & Petroleum

After completing a PhD on the impact and control of feral cats 14 years ago, Danielle changed fields and commenced working in the mining industry as an Environmental Consultant focusing on rehabilitation on mine sites in the Goldfields. She then joined the Department of Mineral & Petroleum Resources (now Department of Mines & Petroleum) in Kalgoorlie as an Environmental Officer in 2002 and gained experience in assessing and inspecting exploration and mining operations. In 2004 & 2005 she co-ordinated DMP's Golden Gecko Awards for Environmental Excellence and was exposed to mining and petroleum companies striving to be the best of the best. Danielle has been managing the minerals team that regulates the northern half of Western Australia since 2007 and has a keen interest in the rehabilitation of mine sites.

ABSTRACT

Rehabilitation of Mine Sites in WA – DMP's View on the Present and Future

DMP is the lead agency on mine closure and regulates the rehabilitation of mine sites operating under the Mining Act 1978, and also provides advice to the Office of the Environmental Protection Agency on mine closure plans for mines that operate under a State Agreement Act. I will be presenting on the status of "Rehabilitation of mine sites in WA – DMP's view on the present and future."

Speaker Profiles

Wednesday 13:40 - 14:00

Rory Haymont

Rory Haymont came to the mining industry 16 years ago after studying land management and working in National Parks, agriculture, manufacturing and tourism. He has worked as an Environment and Community Affairs Manager, a closure and rehabilitation closure Projects Manager and a Senior Technical Advisor on closure issues within large mining companies.

The experiences Rory most values from his mining career to date are:

- Project Management of the planning and implementation large closure projects in Queensland, Northern Territory and Western Australia in some cases through the entire mine life cycle
- Negotiation and relationship building for land access processes with Aboriginal People for major mine approval projects in the Western Australian goldfields
- Benchmarking mine rehabilitation and closure performance and dozens of mine sites through Australia and the world
- Establish Ruggies Recycling in 1997 which is a mine site recycling initiative in Western Australia which is currently generating and average of $700 000 per year for the Princess Margaret's Children's Hospital in Perth.

Rory is now the Director of a small consultancy which focuses on closure and rehabilitation planning, landform design and liability understanding. He enjoys the process of critically analysing projects and joining in collaborations to find lasting solutions.

ABSTRACT

Landform Design to Ensure Revegetation Success.

Landform design must respond to a number of considerations in order to realise a successful rehabilitation outcome. These include the infiltration, erosivity and nutrient characteristics of the growth strata, the relationship between climate periodicity and the revegetation ecology targeted, the drainage control, slope configuration and armouring requirements and the presence or absence of organic matter, soil microbes, timber debris and soil stored native and weed seed. If any one of these considerations is not adequately addressed it can lead to sub optimal performance, patchiness or proneness to weed infestation.

Speaker Profiles

Wednesday 14:05 - 14:25

Nick Sibbel

Environmental Approvals Manager for Tronox Management Pty Ltd

Nick is an environmental scientist with broad range of environmental management experience. For the last 15 years Nick has worked in mineral sands and pigment mining and production, and resources industry more broadly. A significant proportion of Nick's experience has been gained at the Cooljarloo minesite which is located in the biodiverse region of the Northern Sandplain of Western Australia. During this time Nick has planned and delivered all aspects of mine rehabilitation, from initial project planning and approvals through to post rehabilitation performance monitoring; muddy boots to strategic planning. From this he has an excellent understanding of the essential aspects of mine rehabilitation and the pragmatics of using limited resources to deliver successful outcomes.

ABSTRACT

The Cooljarloo Experience

Tronox's Cooljarloo operation encompasses dry and dredge mining, and rehabilitation is undertaken progressively. Given the environmental values of the area expectations regarding rehabilitation outcomes are high. Having rehabilitated for over 15yrs there is a wealth of knowledge within Tronox to available regarding rehabilitation of the diverse heaths and woodlands of the coast plain. In his talk Nick will relay some key learnings obtained from this.

Speaker Profiles

Wednesday 14:50 - 15:10

Damian Grose

Damian is a director of Tranen Revegetation Systems, and responsible for overseeing the planning and design aspects of all Tranen projects. Since graduating from UWA as an Environmental Engineer he has spent the last 16 years in the local revegetation industry, with several international assignments in Indonesia and New Caledonia. As a founding director of Tranen, since the company was established in its current form in 2002, he has been involved with over 600 separate revegetation projects focussing mostly on the greater Perth metro area, and south-west. Although he never formally studied botany, he has developed a passion and solid understanding of our native flora, and enjoys applying that knowledge with his practical project management and problem solving skills.

ABSTRACT

The Melaleuca Park Offset Experience

The Melaleuca Park offset project is one of the first major offset projects undertaken in WA, centred around a wetland in the Gnangara Pine Plantation, immediately adjacent to Melaleuca Park. The project involves 37 hectares of wetland buffer and Banksia woodland revegetation on a recently logged former pine plantation. It is a test case for the Department of Parks and Wildlife to determine whether acceptable outcomes can be achieved on large scale offset projects, and to therefore help guide future offset planning. The project commenced in 2010 and will be officially handed over in October 2014.

This presentation focusses on the more practical aspects of the project, from the initial planning and design phases, through to implementation and maintenance, including resourcing issues, techniques and their relative successes, and progress towards established goals.

Speaker Profiles

Wednesday 15:15 - 15:35

Veronica Newbury

Veronica has a background in restoration, having worked for Greening Australia in the New England helping to establish their farm forestry program for farmers wanting to introduce biodiversity and shelterbelts as well as those wishing to diversify their income. Moving to south east Queensland in the late 1990's, she was involved in the development and management of the Community Bush Care program with the Toowoomba Regional Council restoring endangered dry rainforest ecosystems with the community, a program which continues to run today.

Veronica is the Environmental Manager at Bold Park working for the Botanic Gardens and Parks Authority, responsible for the restoration and management of this 437ha coastal park together with a small and very dedicated team.

ABSTRACT

Restoring a Coastal Banksia/Tuart Woodland. The Bold Park Experience

Revegetation of a coastal Banksia / Tuart Woodland has its challenges. Bold Park has been under the management of the Botanic Gardens and Parks Authority since 1998 and is managed under the Botanic Gardens and Parks Authority Act 1998. The principal management objective for Bold Park is "To ensure that native biological diversity of Bold Park bushland is conserved and enhanced, that public risk is well managed, and that passive recreation, education and scientific activities consistent with conservation are facilitated." Planning, establishment and ongoing monitoring of restoration sites is key to the success of this adaptive management approach.

Speaker Profiles

Wednesday 15:40 - 16:00

Patrick Courtney

Patrick Courtney, Manager Horticultural Development, at Kings Park and Botanic Garden in Perth, Western Australia

Patrick is a specialist in horticulture, and conservation and plant development. He has over 20 years' experience in project management, plant R&D, selection and breeding, germplasm collection and storage, nursery management, landscape design and development; and botanic gardens and public amenity management. In his current role Patrick has been working in the Middle East, primarily in Saudi Arabia, developing urban horticulture, conservation and restoration programs.

ABSTRACT

Kings Park in Saudi Arabia

The Middle East is one of the world's most water-scarce regions. Arid land ecosystems are fragile and under pressure from a range of factors including overgrazing, population increase and climate change, all of which contribute to increased desertification globally.

In Saudi Arabia, the Botanic Gardens and Parks Authority (Kings Park), as part of its role in the global community of Botanic Gardens, has developed a program of extension and research initiatives working with the Arriyadh Development Authority. The main aim of the program is to identify low cost, scalable and science-based solutions to repair and enhance landscapes and ecosystems in the Arriyadh region of Saudi Arabia.

Since 2011, a science-based program that includes restoration ecology and natural resource management has been developed, undertaking major ecological studies relating to restoration and management at a landscape-scale. The current study focuses on the restoration of framework species in arid lands. This investigation is significant not only in Saudi Arabia where the candidate genus (Acacia) is under pressure from overgrazing, firewood collection and loss of habitat, but it has a broader significance in terms of methodologies and approaches to restoration in arid lands globally.

Patrick shares Kings Park's Arabian experience.

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