



Intelligent Fire: How can fire research and knowledge better connect with drip torches?

Panel discussion at Bushfire 2016 By Dr Sam Lloyd

Bushfires are a uniting force within Australian communities and in an ever-increasing peri-urban zone, land managers and community often seek a balance between land management, biodiversity values & fire management. To further exacerbate the challenge, dangerous bushfire weather is predicted to worsen with climate change, placing landowners, land managers and firefighting services under increasing pressure to improve land and fire management (Climate Council, 2015). Add to this many ecosystems and species at risk due to inappropriate fire regimes (both too little and too much fire) and we are faced with a monumental challenge.

Fortunately, Australia has a wealth of world-class fire scientists to contribute to a solution and a plethora of highly skilled onground fire operators and managers. But...how well do these two groups work together? How effective are we at communicating and sharing this information in formats useable by land managers. Moreover, with a great many knowledgeable and skilled Indigenous fire specialists, how well do we partner with Traditional Owners to better tackle fire and land management challenges? Finally, how well do we partner with private landowners, who manage the vast majority of Australian bushland? There is an enormous amount of research and knowledge available but communication is not always "fit for purpose" and certainly there is inconsistency in how this information is shared and used.

At Bushfire 2016 we will hold a panel discussion to look at some of the key barriers to communicating and sharing fire science, what sort of information land managers would like to see and how to build effective multi-stakeholder partnerships.

We are very fortunate to have Dr Simon Heemstra (Manager Community Planning, NSW Rural Fire Service) as Chair of the panel and joining him are the following world-class fire specialists:



Photo: Image. C Welden

- Mick Blackman, Managing Director, Friendly Fire Ecological Consultants, Qld.
- Oliver Costello, Co-founder of the Firesticks Initiative and Visiting Fellow at Jumbunna Indigenous House of Learning, University of Technology Sydney, NSW.
- Dr Malcolm Gill OAM, CSIRO - retired fire ecologist, Fenner School of Environment and Society, Australian National University, ACT.
- Dr John Kanowski, National Science and Conservation Manager, Australian Wildlife Conservancy, Qld.
- Dr Richard Thornton, Chief Executive Officer, Bushfire and Natural Hazards CRC, Vic.
- Dr Elizabeth Tasker, Principal Scientist Fire Ecology, NSW Office of Environment and Heritage, NSW.

Join us for Bushfire 2016!

Editorial

Welcome to the first edition for the year.

Sam and I and the Bushfire 2016 Organising Committee have been very busy with Bushfire 2016. We are very excited to have so many leading fire scientists, students, land managers and fire practitioners attend Bushfire 2016. We are fortunate to have Dr Simon Heemstra led one of the discussion panels on linking fire science with on ground application and joining Simon are some well-respected fire specialists. You can read more about it in the lead article by Sam.

Mark Grant of TERN is featuring the work being done by TERN in fire research and we at SEQFBC are very pleased to have TERN as a silver sponsor of Bushfire 2016. We have three articles from the SEQFBC scholarship program (which is an annual scholarship program). Two are current scholarship award recipients and last year's recipient Martyn Elliott Martin.

Susie Chapman from Healthy Waterways and Catchments (The SEQFBC is hosted by Healthy Waterways and Catchments (the regional NRM body for SEQ) and Richard Brittingham, NSW Firesticks Project co-ordinator have provided an insight into the work being done in re-introducing traditional owner fire management into the Sunshine Coast and the NSW Northern Rivers Areas. I was privileged to participate and learn during the Sunshine Coast burn. One of the Ten themes at Bushfire 2016 is "Cultural Burning and Traditional Custodian Fire Practices (full day)" and you can hear from Susie at Bushfire 2016 and some of the Traditional Owners that Richard works with.

Dr Phill McKenna talks about the perils of excluding fire in mine rehabilitation land in Queensland.

We also will be highlighting our achievements in the last 6 months.

I hope that you enjoy reading the newsletter. We welcome any feedback.

Kind Regards

Craig Welden

SEQ Fire and Biodiversity Coordinator

Contents

- 1 Intelligent Fire: How can fire research and knowledge better connect with drip torches? - Panel discussion at Bushfire 2016
- 2 Editorial
- 3 Runs on the board - Snapshot of what we have achieved since December 2015
- 4 TERN to showcase fire research and management infrastructure at Bushfire16
- 5 South East Queensland (SEQ) Fire and Biodiversity Consortium's Research Student Scholarship updates: - Investigating the responses of litter invertebrate fauna communities to fire-induced litter carbon : nitrogen : phosphorus ratio shifts
Fire for Biodiversity Conservation and Asset Protection
- 6 Measuring Rehabilitation Responses to Fire using Remote Sensing: Implications for Mine Closure Criteria in Queensland.
- 7 Protecting the high ecological and cultural values of Busbys Flat
Using Cerambycid Beetles as Bioindicators of Environmental Change Associated with Fire Affected Habitat
- 8 Cultural fires on the Sunshine Coast



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Who are we?

Established in 1998, the South East Queensland Fire and Biodiversity Consortium (SEQFBC) is a network of land managers and stakeholders devoted to providing a coordinated response and best-practice recommendations for fire management, fire ecology and the conservation of biodiversity in the South East Queensland (SEQ) region through education, community engagement and applied research.

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Runs on the board

Snapshot of what we have achieved since December 2015

By Craig Welden

In the last 8 months we have been very busy preparing for Bushfire 2016 with 77 presentations, grouped into ten key themes, 10 key sponsors and 8 exhibitors and promotional sponsors. We are expecting over 250 people to attend the three day conference. Extra activities that provide development opportunities and networking include the poster session, conference dinner and two field trips. We have also provided a session dedicated to *"Cultural Burning and Traditional Custodian Fire Project"*, which has been extended to an entire day due to demand, comprises eleven talks and is to be Chaired by Bundjalung Traditional Custodian, Oliver Costello.

Our electronic newsletter "SEQFBC E-news" is still proving to be popular with over 900 people subscribed which is up 300 since our last newsletter. Since December we have sent 22 issues with an average of 35.4% open rates which is well above the industry average. If you are not subscribed then why not?, and if you are registered why not tell your colleagues about us. Register here <http://www.fireandbiodiversity.org.au/contact.html>

The Overall Hazard Fuel Training for 2016 was well attended with over 120 people attending the one day training course that was presented by Francis Hines of DELWP and Tim Killen QPWS. We provided a number of venues across SEQ including Crows Nest, Sunshine Coast and Brisbane.

Some of the comments from participants include: *"Professional, entertaining, valid information, relaxed."*; *"Great audience involvement, Fantastic descriptions of the fuel factors to be assessed"*; *"Great wealth of experience possessed by presenters"*; *"Easy to digest material, suitable for all levels of technical skill and practical experience"*.

We have attended and facilitated 10 workshops and talks to over 431 people. Seqwater came on board as an additional sponsor this year and we have so far delivered two workshops to Seqwater's leaseholders and neighbours with

more planned for later this year. Seqwater delivers water to SE Queensland and has landholdings that amount to over 65,000 hectares that extend from the NSW border to the base of the Toowoomba ranges and north to Gympie.



Photo: Participants of the SEQFBC 2016 Overall Hazard Fuel Hazard one day training at Lake Perseverance in the field completing their field assessment. Multiple agencies and consultants are represented in this series of workshops every year. Image C Welden.

SEQFBC facilitated a forum on "Fire operational systems" that demonstrated local and one interstate fire system. Demonstrations included Victoria's Fuel Management System by Francis Hines Department of Environment, Land Water and Planning (DELWP), Queensland Parks and Wildlife Services' (QPWS) new Flame Fire Management System by Tim Killen (QPWS) Moreton Bay Regional Council's (MBRC) Risk Management System by Bruce Bunkum of MBRC, Queensland Fire and Emergencies Services (QFES) Predictive Services by Andrew Sturgess (QFES), QFES Redi-Portal by James Haig and Robert Preston (Rural Fire Service Queensland) and a generated discussion on Fire Management Zoning— suggestions for a common language by Joshua Bull, Fireland Consultancy. Attendance was kept to a minimum (20 people) to allow for genuine discussion and sharing of ideas from each of the respective agencies and consultants represented across SEQ.

We also want to acknowledge a new sponsor for 2016, the Department of Main Roads Downs Region. SEQFBC worked with the Downs Region in 2012 as part of the South East Queensland Roadside Burning Project in which the Downs Region had implemented a Coordinated Agency Model (CAM) for roadside burning is worked very well in the Toowoomba region. See more here: <http://www.fireandbiodiversity.org.au/submission.html> and hear about the project as a presentation at Bushfire 2016.

This is but a snapshot of what we have been up to since December last year.



Photo: RFSQ Inspector Paul Storrs demonstrating how fire travels across the landscape using a purpose built bushfire simulation table for an SEQFBC Individual Property Fire Management Workshop for Seqwater Wivenhoe and Somerset lessees. www.fireandbiodiversity.org.au SEQ Fire and Biodiversity Consortium have been running these workshops for multiple agencies since 2002. Image C Welden.



Photo: Adam Leavesley of ACT Parks & Conservation and Dr Marta Yebra, a member of the ANU's Water and Landscape Dynamics group and Bushfire & Natural Hazards CRC, discuss hazard reduction burns near Googong Dam in March 2015 (photo courtesy of Geoff Cary, ANU). A recent case study in the ACT by the ANU group used TERN's climate data, alongside a number of other dataset and spatial resources, to assess the feasibility of providing fuel, water and carbon estimates at an unprecedented high spatial resolution of 25 m.



TERN to showcase fire research and management infrastructure at Bushfire16

By Mark Grant - TERN

TERN's diverse research infrastructure and open data continues to be used by our nationally networked science and management partners to advance our understanding of fire and fire management in this country, now and in the future.

TERN infrastructure and open data are facilitating:

- improved bushfire behaviour models and helping better manage future fire crises;
- open data on past and forecast projections of severe fire danger across large parts of south-eastern Australia;
- new science on prescribed burning targets in Australia and the effects of fuel reduction burns on soil greenhouse gas exchange;
- the mapping bushfires, their impacts and future hazards;
- ecologically appropriate and economically viable fire management in the Top End;
- the provision of more accurate, up-to-date information about the environmental variables that influence fire risk;
- improved ability for the community to remotely-track fires near and far;
- and many more practical fire research and management applications.

Tern are pleased to announce that many of these TERN facilitated projects and activities will be showcased at the Bushfire 2016 conference.

TERN are sponsoring this national bushfire conference, at the University of Queensland. Hosted and coordinated by the South East Queensland Fire and Biodiversity Consortium.

Our collaborations and partnerships director, associate professor Nikki Thurgate, will be presenting on the suite of fire related datasets collected and published by TERN and its partners and the use of this information for the effective management of fire.

Building on this overview, TERN associated researcher, Stefan Maier of Maitec, will be presenting on the next generation of TERN fire remote sensing datasets and how they are capturing and quantifying fire characteristics including: ecological impact, fuel consumed, severity, patchiness and greenhouse gases released. Stefan's presentation will introduce TERN's remotely sensed datasets and explain their relation to field measures and discuss accuracies, advantages and limitations.

In addition to these presentations, many TERN associated researchers will be on hand to answer questions and show how you can use our open infrastructure and data to facilitate your research.

We're looking forward to seeing you there!

South East Queensland (SEQ) Fire and Biodiversity Consortium's Research Student Scholarship updates:

Investigating the responses of litter invertebrate fauna communities to fire-induced litter carbon : nitrogen : phosphorus ratio shifts

By Orpheus Butler - Phd Candidate Griffith University

The likely increases in the extent and frequency of wildfires and prescribed burns associated with climate change may have strong yet disproportionate effects on the amounts of biologically important elements like carbon (C), nitrogen (N) and phosphorus (P) in soil and plant material in ecosystems. These effects may have important consequences for the invertebrate fauna on the forest floor, given that many of these animals depend on organic material in soil and litter as a source of food. Soil and litter invertebrates represent an enormous proportion of forest biodiversity and contribute to litter decomposition, which influences fuel loads for future fires. Further, some invertebrates, particularly beetles, are used as indicators of ecosystem health or resilience to disturbance. However, the controls on long-term invertebrate responses to fire are not well-understood, and links between fire-altered food characteristics and the diversity, abundance and activities of invertebrate communities have rarely been investigated.

This study aims to determine whether fire-induced changes in the characteristics of forest floor invertebrate communities at Peachester State Forest are linked to the effects of fire on soil and litter elemental content. It will also assess the role of invertebrate fauna in leaf litter decomposition processes, and the ways in which fire frequency affect this role.



Photo: Orpheus Butler (SEQFBC Scholarship recipient) setting up research plots in Peachester state forest.

The study will enhance our knowledge of fundamental ecological processes, improve our ability to use invertebrates as indicators of appropriate prescribed burning frequencies, and thereby assist in the management of forested landscapes and the conservation of species within them.

Orpheus Butler is presenting at Bushfire 2016.

Fire for Biodiversity Conservation and Asset Protection

By Brooke Williams - Honours Student The University of Queensland

Meeting conservation objectives in fire dependent ecosystems can be very difficult for land managers. Firstly, it is important that ecosystems experience fire at appropriate intervals to maintain health. An absence of fire can have severe negative consequences such as increasing the chance of shift in vegetation type or localised extinction of species. Burning too frequently can also have negative effects on the recruitment and survival of characteristic plant species. Second, hazard reduction burning to protect assets such as houses (wildfire mitigation), often takes precedence over conservation goals as land managers have societal responsibilities and are subject to budget and time constraints.

A mosaic burn is considered critical to maintaining healthy Australian forest and woodland ecosystems. A heterogeneous ecosystem (mixture of different successional stages) is likely to cater for a wider variety of species and is also an effective way of lowering the chance of a high intensity wildfire spreading. However, a substantial challenge for land managers is how to design burn strategies that maintain appropriate fire regimes for conservation while meeting asset protection goals.

The aim of this research is to develop a method for helping managers with the challenging task of selecting where to burn while considering outcomes for both biodiversity conservation and the protection of infrastructure. We are developing a decision support tool through mathematical optimization,

using the Dry Sclerophyll Forest ecosystem within the City of Gold Coast conservation network as a case study. We hope that our decision support tool will help managers better navigate the difficult decision of where to burn and deliver efficient and transparent decisions based on the best available information.

Brook Williams is presenting at Bushfire 2016.



Photo: Dry Sclerophyll forest in two different states. Pictured top – Grassy state after a recent conservation burn, Lamington National Park. Pictured bottom – Shrubby state, Moggill Conservation Park. Photo Cedit: Brooke Williams.



Photo: Experimental fire in 21 year old mine site rehabilitation dominated by buffel grass (*Cenchrus ciliaris*). Whistling Kites (*Haliastur sphenurus*) gathered to collect locusts and other insects in front of the fireline. Photo credit: Phill McKenna.

Measuring Rehabilitation Responses to Fire using Remote Sensing: Implications for Mine Closure Criteria in Queensland.

Written by Phill McKenna - University of Queensland

Rehabilitated lands created by open-cut coal mines in Queensland are generally protected from fire and grazing disturbances to reduce negative impacts, such as erosion, on the developing ecosystems. As a consequence, fire could be a major risk to such communities, particularly when high biomass, mono-dominant grasses form a major component of these new ecosystems. Mine site rehabilitation is required by law to be safe, self-sustaining, non-polluting and stable, and the rehabilitation objective of many mine sites are generally aligned with 'native bushland' using local reference communities as targets. However, the ability of these rehabilitated systems to withstand and respond to challenges such as fire and drought is a key requirement for lease relinquishment, and a minimum expectation from the community and future land managers. The risk that fire poses to mine site closure goals are particularly relevant given predictions of a dryer, hotter climate; more prone to extreme fire events and longer fire seasons. Given such climate change predictions, it is increasingly likely that rehabilitation managers will experience the occurrence of wildfire on rehabilitated lands, and it is increasingly relevant for managers to understand the threats (or opportunities) faced by such events.

The practice of excluding fire from mine site rehabilitation has been a key feature of mine management in Australia. However, a number of studies have shown the potential fuel hazards associated with the policy of fire exclusion. Generally, managers actively avoid fire impacts on developing rehabilitation, with the obvious reason to protect site infrastructure. As a consequence they have limited site specific knowledge of how fire will impact on the development of the vegetation community, or how the landform will react to sudden loss of erosion protection.

Some of the questions that managers need to deal with towards mine closure include:

- Does mine site rehabilitation have the resilience to withstand fire impact?
- Do rehabilitation methods impact on future fire risk?
- How does established rehabilitation respond to varying intensities of fire disturbance?
- How does fire affect existing success criteria and future site relinquishment?
- Can tools such as remote sensing assist decision makers to manage post-fire impacts in rehabilitation?

The overall aim of this project is to assess the response and resilience of established mine site rehabilitation following the incidence of fire. An understanding of fire behaviour on ungrazed buffel grass will be undertaken, and the role that remote sensing technologies can play in the monitoring of the disturbance and subsequent recovery of mine site rehabilitation will be explored.

Remote sensing technologies are currently underutilised by rehabilitation managers, and recent advances in this area offer new opportunities for mine operators, regulators and other stakeholders in an objective and quantitatively robust assessment process. The focus of this project is on Central QLD and the Bowen Basin; however the approach and principles of the remote sensing work will be applicable across other mining commodities, different landscapes, and different industries such as forestry and agriculture.

Phill McKenna is presenting at Bushfire 2016.

Protecting the high ecological and cultural values of Busbys Flat

By Richard Brittingham - NSW Firesticks Project co-ordinator

On Wednesday the 22nd June a prescribed burn was carried out on a Casino Local Aboriginal Land Council (LALC) property located at Busbys Flat. The burn has been planned and implemented by members of Casino Boolangle LALC Green Team, Gudgin Guddaba LALC, Ngulingah Nimbin Rocks Rangers and Minyumai Indigenous Protected Area (IPA) rangers with support from the Nature Conservation Council of NSW (NCC) Firesticks Project staff, Rural Fire Service Brigades from Woodburn and Sextonville and neighbouring landholders.

The burn is part of an ongoing collaborative project between Casino Boolangle LALC, neighbouring landholders the NSW Nature Conservation Council NCC Firesticks Project and the Northern Rivers Fire and Biodiversity Consortium (NRFABCON). It is part of a three-year project the NRFABCON is delivering, "Protecting the high ecological and cultural values of Busbys Flat" and is funded under the NSW Environmental Trust with in-kind support from the NCC Firesticks Project.

The Busbys Flat property contains significant ecological and cultural values that are important to the local Aboriginal community to maintain and protect. Through integrated fire and weed management the project is aiming to restore and protect native vegetation communities and cultural sites.

The 24-hectare burn that was commenced this week is part of a broader initiative through the NCC Firesticks Project to re-instate low-intensity burns into the landscape to protect



Photo: Minyumai Indigenous Protected Area (IPA) rangers and Rural Fire Service Brigade Volunteer Firefighters from Woodburn and Sextonville ready to work the control lines to maintain the fire.

important cultural sites, restore native plant communities and associated habitat and reduce the likelihood of wildfire.

Want to know more about FireSticks? Find out at Bushfire 2016. Many of those involved in the burn above will be presenting at Bushfire 2016.

Using Cerambycid Beetles as Bioindicators of Environmental Change Associated with Fire Affected Habitat

By Martyn Elliott - University of the Sunshine Coast

Insects are recognised as a reliable tool for monitoring environmental change due to their sensitivity to disturbance, diversity and abundance. We tested whether cerambycid beetles (Coleoptera: Cerambycidae) may be effective bioindicators in relation to changes in fire regime by determining whether there is a link between fire regime and the abundance and diversity of cerambycid beetles. We sampled cerambycid beetles using flight intercept panel traps baited with two known cerambycid attractants (a pheromone and a pair of host odours) over a twelve week period within four long-term fire treatments (annually burnt, triennially burnt, unburnt and wildfire) at Bauple State Forest, Queensland. Vegetation structure surveys (including coarse woody debris, tree health) were also conducted within each treatment, and records of soil and climate data were also used in the analyses. The abundance of cerambycid beetles significantly declined over the study period, and was significantly lower in the unburnt treatment compared to the annual and triennial treatments. Total abundance of cerambycid beetles was influenced strongly by the dominance of three common species; *Bethelium tillides*, *Adrium* sp. and *Bethelium signiferum*. Species richness significantly decreased over the study period and was significantly lower in the unburnt compared to the



Photo: Martyn setting up his field site within Bauple State Forest.

triennial and wildfire treatments. *Bethelium tillides* and *B. signiferum* show potential to be used as indicators of forest habitat change associated with fire regime. Not all cerambycid beetles responded in the same way to fire treatments, certain species (e.g. *B. signiferum*) preferred habitat affected by wildfire, while other species (e.g. *Adrium* sp. and *B. tillides*) preferred the frequently burnt areas. This study has provided a better understanding of the impacts of different fire regimes to guide improved forest management and provided some indication of the potential role of cerambycid beetles as bioindicators of vegetation change.

Martyn Elliot has submitted a poster for Bushfire 2016.

Cultural fires on the Sunshine Coast

By Susie Chapman - Healthy Waterways and Catchments

For the first time on the Sunshine Coast, Rural Fire Brigades and Queensland Fire and Emergency Services supported Traditional Owners to undertake a controlled ecological burn following the ancient cultural practices of Indigenous Australians.

Stockland Development provided the land at their Aura development and support through their Community Stewardship Programme for training of local Kabi Kabi and Bunya Bunya Country Aboriginal Corporation members by traditional fire experts.

Facilitated by Healthy Waterways and Catchments, the cultural training and subsequent burn brought together five local fire brigades, Queensland Fire and Emergency Services, Stockland and the South East Queensland Fire and Biodiversity Consortium to support the fire trainers and local indigenous community members to undertake a low energy burn with well-considered spot ignition points to promote biodiversity in the heavily modified coastal ecosystem.

Victor Steffensen, cultural fire trainer and filmmaker from Cape York, joined with Firesticks facilitator from northern NSW Oliver Costello to empower local indigenous people in their understanding of cultural values associated with fire, land assessment, ignition techniques, seasonal timing and frequency of burns.

Previously under pine plantation and grazing, the future Environment Protection Zone of Aura was becoming dominated by melaleuca and casuarina regeneration with a high fuel load of introduced grasses.

"It's important to understand that when the land is sick, spot burns can occur every year. Ideally with a healthy landscape, appropriate burns would normally occur every three to five years," Victor said.

Kabi Kabi man Kerry Jones was excited to be part of the first burn on the coast since traditional times.

"It was a great experience really connecting with country and doing things how they're supposed to be done," Kerry said.

"I'm looking forward to working with the Rural Fire Brigades more and carrying the practice on for future generations."

Kerry Jones and myself will be presenting the rich learnings from the experience at the upcoming Bushfire 2016 conference.

Susie works for Healthy Waterways and Catchments. The SEQFBC is hosted by Healthy Waterways and Catchments (the regional NRM body for SEQ).



Photo: Victor Steffensen, cultural fire trainer and filmmaker from Cape York discussing the burn objective and tactics with Bunya Bunya Country Aboriginal Corporation members, Healthy Waterways and Catchments, Rural Fire Service Volunteers and SEQ Fire and Biodiversity Consortium staff.

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Opinions expressed by contributors to the SEQ Fire and Biodiversity Consortium newsletter are not necessarily those of the SEQ Fire and Biodiversity Consortium nor any of the supporting agencies.