SEQ Fire & Biodiversity CONSORTIUM

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Translating science into practice for improved fire management and biodiversity conservation in South East Queensland

Fungi and fire in Australian ecosystems

By Dr Sapphire McMullan-Fisher

Fire ecology is acknowledged as complex and highly variable with specific fire responses usually being dependent of on site characteristics. Not surprisingly, the effects of fire on the numerous fungal components of ecosystems are also complex, but are not as well understood as those of their vascular plant counterparts.

Fungi play important roles in ecosystems including being food for animals, particularly invertebrates and small terrestrial macropods and also facilitate the production of hollows which are important for vertebrates.

Figure 1. Common after fire are Geopyxis carbonaria, a mycorrhizal ascomycete and fire moss Funaria hygrometrica (© David Catcheside)

They act as decomposers of plant material and other organic matter and thereby contribute to nutrient recycling.

Soil structure, nutrient availability, organic and inorganic substrates and other biotic components with which fungi interact, particularly mycophagous animals (animals that feed on fungi e.g. bandicoots) are all affected by fire.

The review paper by McMullan-Fisher *et.al.* 2011 summarises 30 Australian field studies that consider fungi and the effects of fire. It also considers the effects of fire on different trophic and substrate groups of fungi to facilitate management based on different types of fungal substrate. The fungal trophic groups include saprotrophic fungi (fungi that feeds on dead material), parasitic and endophytic fungi (living within an organism), mycorrhizal fungi and lichenised fungi. The interactions between fungi–vertebrate and fungi-invertebrate with effects of fire are also discussed. The specific implications for fire management from this article have been summarised on page four.

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Dr Samantha Lloyd and Craig Welden

Editorial

Welcome to the SEQFBC first newsletter for Phase 4 of SEQFBC. The Consortium started back in August of 2010 after a long gap of inactivity for 18 months following the departure of the former Coordinator Cuong Tran and the subsequent hosting arrangements with Griffith University. Our new host SEQ Catchments provides the Consortium with generous administrative support and an office to work from and we are grateful for their support. SEQ Catchments hosting of SEQFBC provides even greater partnership opportunities as SEQ Catchment staff are very well connected with land owners and land managers alike in SEQ, and these networks together with those established in research and NRM circles, will provide even greater scope for awareness and education of fire and biodiversity management planning and applied fire ecology research in SEQ.

Dr Samantha Lloyd was appointed at the start of Phase 4 and has made a significant impact on the work that the consortium is involved with. Samantha is currently on maternity leave and will be returning in March 2012. I have been fortunate to act in Samantha's role during the majority of 2011.

Phase 4 saw for the first time every Local Government in SEQ contributing to SEQFBC and we are also grateful for the continued funding from Powerlink, Department of Environment and Resource Management, Queensland Fire and Rescue Service, the Department of Transport and Main Roads and the National Parks Association of Queensland.

In this edition we look at the relationships of fire and fungi, the unusual and largely unknown plant community patterned fens of the Sunshine Coast, a meteorological forecast and many other interesting happenings in fire and biodiversity within our region.

Samantha and I would like to acknowledge the support that has been given to us by SEQ Catchments, SEQFBC Steering Committee, the working groups and our sponsors/partners over the past 19 months. We are very pleased with how well this newest phase of the SEQFBC has been received and look forward to your continued support and involvement

I hope that you enjoy reading this edition of the SEQ Fire and Biodiversity Consortium newsletter and I welcome any feedback.

Kind Regards

Craig Welden

A/SEQ Fire and Biodiversity Consortium Coordinator

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.

Contact SEQFBC

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Runs on the Board

Snapshot of what we have achieved since the start of Phase 4 in August 2010

By Craig Welden

Three Fire and Biodiversity Forums attended by over 290 people:

- Redlands Indigiscapes, Capalaba, Speakers included Waminda Parker from the NSW NCC Hotspots Program on community participation in fire management to create healthy landscapes, Andrew Blackett from the Department of Sustainability and the Environment of Victoria on the Fire Ecology Program, SEQ Catchments Shannon Mooney and Greg Leach on a Coordinated Fire management planning project in Grandchester, Diana Vikki PhD candidate from Griffith University on fire regimes and small mammal and reptile assemblages, Paul Storrs of Queensland Fire and Rescue Service on the prepare act survive campaign and the Bernie Trembath also of QFRS on the Victorian Royal Bushfire Commission report and its implications for Queensland.
- Walkabout Creek, The Gap. The Hon Kate Jones MP, then Minister for Environment and Resource Management opened the forum. 110 people were treated to talks from Luke Collins, a PhD candidate from University of Wollongong about the role topography plays in creating spatial heterogeneity in fire impacts on fauna and their habitat, Murray Haseler and Dr Paul Williams on the management of vegetation structure and fire regimes for the Bush Heritage sites in Queensland, and Peter Leeson from DERM on lessons learnt from a case study on planned burns and fire behaviour. Participants then headed off to the nearby D'Aguilar NP in which Dave Kington and Mark Burnham from DERM lead a discussion on understory composition and fire management.
- The University of the Sunshine Coast (USC) - Our rebadged forum called the Fire and Biodiversity Spring Forum was attended by over 90 people. Detailed information is on page 5.

Presented fire ecology talks at extension programs such as the Cows Creeks and Weeds Workshops coordinated by SEQC, the Queensland Farmer Federation Vegetation Series, the Private Forestry Service Native Forest and Plantation Workshops, Millmerran Landcare Fire Workshop, individual property fire management workshops for Land for Wildlife members in association with Sunshine Coast Regional Council, Redland City Council coordinated fire management workshop, and Agforce's beyond the floods workshop.

The new look SEQFBC website was launched in June this year after much work from Samantha Lloyd, and Kingfisher Design and myself. The website provides free public access to all of our publications, (excluding those that are under review), news about upcoming coming and past events, links to our supporting organisations, research we are and have been involved with, reports and submissions. Since May last year we have had over 8000 page visits from visitors both locally and worldwide.

Training was provided for our sponsors on the application of the overall fuel hazard assessment guide 4th edition by Francis Hines of the Department of Sustainability and Environment Victoria. Francis provided a very engaging training day for over 45 participants. It was so well received that participants have asked if we can hold this again this year for those that missed out.

Work is continuing on our new look fact sheets with efforts focused on level 1 and 2 fire and biodiversity and fire and protected vegetation management.

Industrial placement students David Walker and Yoon Song from the University of Queensland completed projects such as a literature search on all fire and biodiversity related papers books and articles in the last three years from 2008 to the end of 2011, literature reviews and assisted with research on the accuracy and currency of our fact sheets. I would like to thank David and Yoon for their time and efforts.

Northern Rivers Fire and Biodiversity Consortium involvement. This is a great opportunity to work with agencies across the border involved with the promotion of appropriate fire management practices. This partnership carries on from the work that Cuong Tran and Samantha Lloyd started with our Colleagues across the border. See more on page four.

SEQFBC is a participant on the NSW Hotspots Advisory Committee which provides another link to the work that our Colleagues are involved with over the border.

Mark Schuster (Logan City Council) and Samantha Lloyd facilitated a Bushfire Hazard planning, policy and mapping workshop held in December 2010. Recommendations from this workshop were presented to the Policy and Legislative Reform Branch of the Department of Community Safety. SEQFBC are also participants on the State Planning policy 1/03 Review Bushfire Advisory Group which met in December 2011.

We have provided submissions to Queensland Governments Biodiversity Strategy, the independent Threatened Species Scientific Committee (TSSC is established under the EPBC Act 1999) on the assessment of the nomination to list 'Fire Regimes that cause biodiversity decline' as one of Australia's key threatening processes on the 31 March 2011. The decision due 30th September 2012.

Northern Rivers Fire and Biodiversity Consortium

Stakeholders from a range of agencies and NGO's (including SEQFBC) over the border in Northern Rivers met in August 2011 in Lismore seeking a coordinated and landscape level approach to fire management for biodiversity across the region.

It was proposed that a NSW Northern Rivers Fire and Biodiversity Consortium should be established to provide a forum for:

1. Information exchange between member stakeholders, and with other relevant networks;
2. Encouraging a consistent landscape approach to managing fire for biodiversity; and
3. A collaborative approach to the identification and/or undertaking of projects and on ground action.

Principal outcomes resulting from the Consortium will revolve around:

- Collaboration;
- Research;
- Informing Legislative and Planning Processes; and
- On-ground Action.

The NSW NCC has generously provided one day per week employment of an interim Coordinator to establish the Consortium.

This is great news for SEQFBC as it will create opportunities for collaborate projects, research, and information sharing. One such project is for on ground fire management action for both sides of the border for the conservation of Eastern Bristlebird habitat in the border ranges region, through a joint funding application. We look forward to working with the new Northern Rivers Fire and Biodiversity Consortium.

| Article continued from page 1

Fungi and fire in Australian ecosystems - Specific fire management implications

1. Many fire management goals for natural systems include supporting biodiversity by having a mosaic of different fire ages and intensities across the landscape. The resulting heterogeneity from the various fire regimes is thought to develop landscape diversity, which may in turn stimulate local biodiversity. This is likely to be a reasonable management strategy for the requirements of different fungal groups as many fungi have specific preferences for specific substrates or hosts. Also, some fungi are stimulated to reproduce after fire, while other fungal assemblages have been found associated with different seral stages of vegetation. A full range of seral stages, including long-unburnt areas, should be aimed for within each regional ecosystem. To maximize biodiversity for the fungi, fire management regimes need to include appropriate patch sizes and connectivity to facilitate successful dispersal of fungi.
2. Management to maintain a diversity of the different fungal substrates may be a good interim strategy, particularly for decomposer fungi. For example, coarse woody debris (logs, branches etc) should be maintained and ideally these should come from a range of plant species and debris at different stages of decay.
3. Pyrophylous species (species that are reliant on fire) need periodic fires to stimulate their sexual reproduction.
4. Orchids and their mycorrhiza (symbionts) are affected by fire. While some orchid species need fire to stimulate flowering, for other threatened orchids fire is considered one of the processes threatening their survival. Thus, specific knowledge of requirements and sensitivities of the local orchids and their mycorrhiza is needed for base fire management strategies.
5. For long term ecosystem heath space, land managers need to consider the value of common mycophagist species (species that eat fungi) as vectors for mycorrhizal fungi (plant symbionts). It is important to protect mycophagus species where possible and consider the re-introduction of mycophagous mammals into habitats where they have been lost.
6. Efforts should be made to allow litter layer re-development even where frequent repeated burns are necessary.
7. Land managers should include fungi in current systems for long term monitoring and to allow for adaptive management so as to allow for a rich diversity of species that includes fungi and species that are mycophagus.

This is a synopsis of the findings from the recent article:

McMullan-Fisher SJM, May TW, Robinson RM, Bell TL, Lebel T, Catcheside P, York A (2011) Fungi and fire in Australian ecosystems: a review of current knowledge, management implications and future directions. Australian Journal of Botany 59, 70-90.

Dr Sapphire McMullan-Fisher is currently working as an environmental consultant based in the Perth, WA and was a past President of the Queensland Mycological Society of Queensland. For more information about the Queensland Mycological Society follow this link: www.qldfungi.org.au

Fire and Biodiversity Spring Forum 2011

The newly themed forum held in November last year was attended by over 90 participants. The talks were well received and included key note speaker Associate Professor Alan York's account of the 2009 Victorian Bushfires Royal Commission and its implications for biodiversity conservation. Associate Professor York raised concerns about the arbitrary targets based only on area burnt and associated prevention measures with severe local impacts on plant and animal communities. You can view the full presentation free on our website.

Dr Sapphire McMullan-Fisher challenged the forum participants to think of the role of fungi in the ecosystem and in particular the relationship between fungi, fire ecology and fire management regimes and to consider fungi when developing fire management strategies and fire plans.

Other talks included Dr Sanjeev Kumar Srivastava (the University of the Sunshine Coast - USC) fire mapping and its implications on management for natural areas; Robert Preston (Department of Community Safety) update on State Planning policy 1/03 Review and the State wide Natural Hazards Risk Assessment; Gabriel Conroy (USC), the effects of fire and fragmentation upon co-occurring threatened coastal heath plants in southern Queensland; David Sheville (Queensland Parks and Wildlife Service), QPWS Planned Burn Guidelines – SEQ Region and the Climate Q project update.

Participants were also treated to a field trip to Beerwah's Fire Experimental plots that are managed by QPWS and form part of the longest running fire experimental plots in Australia. The site at Beerwah has been studied since 1972, with fire regimes of 3, 5 and long unburnt. The sites are still being used by researchers and are valuable for long term research within Queensland. Dr Tom Lewis (Department of Employment, Economic Development and Innovation) lead participants one a tour of the site to show the long unburnt areas and the recently burnt areas and the contrast in the vegetation types.

Dr Alison Shapcott (University of the Sunshine Coast) guided participants through a compensatory habitat relocation project located on the grounds of the SCU. The project which was part of an arrangement between Sunshine Coast Regional Council, the University and a developer, transferred topsoil together with heathland plants from the site to be developed "across the road" to the University site by scraping the topsoil and vegetation with large buckets (1.5 X 2 metres) buckets. The wallum plant community has since the completion of the project in 2007 flourished, and the University is still studying the effects on fauna species.

Some feedback on the success of the forum included:

"The forum is a real credit to SEQFBC."

"Great diversity of speakers and information not too scientific and easy to digest and interesting."

Dr Alison Shapcott from The University of the Sunshine Coast explaining to participants the finer details of the relocation of heathland at the Sippy Downs site.

NSW Hotspots Program

Hotspots is a partnership program hosted by the Nature Conservation Council of NSW, with fire agencies, land managers and other interested organisations being involved in the project.

The Hotspots Team a new website last year and provides a central point for landholders and the general community within NSW to view new workshops, download fact sheets and access resources and guidelines for fire management planning.

The Hotspots Team were winners in the 2011 Australian Safer Community Awards in the Education, Training and Research category. A well-deserved award!

The Team are currently looking at workshops within six Catchment Management Authority (CMA) areas including the Northern Rivers, Namoi, Hunter-Central Rivers, Central West, Hawkesbury-Nepean and the Southern Rivers.

SEQFBC, SEQ Catchments and the Hotspots Program are partnering in a grant application to Caring for our Country for on ground action for improved fire management practices to improve the habitat requirements of the Eastern Bristlebird in the Border Ranges Region. Let's hope we are successful with this application.

Queensland Bushfire Consortium 2011 Summit

Queensland Bushfire Consortium (QBC) 2011 Summit in June at Walkabout Creek Brisbane provided participants from Queensland Fire and Rescues Service, Natural Resource Management Officers, and other State and Local Government personnel an opportunity to discuss relevant fire management issues that affect each region within the state. The 2011 Summit followed on from the Mackay Summit in 2010 and progress on the following topics were discussed:

1. Establish a QBC to promote better fire management through partnerships.
2. The QBC will promote better fire management by aligning with, and supporting, the IDC (inter-departmental committee on Fire Management). As a priority, fire plans at the regional fire management group, and operational brigade levels need to be supported and progressed. The development of guidelines for each bio region provide the basis for agreement between land managers on when and where fire should be used for hazard reduction, primary production and conservation purposes. Progress to date includes the Central QLD Coast; Cape York Peninsular, and soon to be finalised Brigalow Belt (North). In areas where the guidelines are not developed we offer the partnership of fire science and practitioners for specific needs. SEQ Fire and Biodiversity Consortium naturally accommodates the needs in SEQ.
3. Communicate the results and recommendations of the Mackay Fire Summit to the SIDC. QBC have met with the SIDC and developed up a draft protocol.
   The changes in QFRS Rural Operations at the senior executive level means we are in a transitional phase until these positions are finalised.
4. Set up a Queensland consortium website to facilitate information sharing. Reef Catchments hosts a site for information sharing and can be found at - www.queenslandbushfireconsortium.net.au
5. Continue to develop fire guidelines for Queensland's ecological communities, and for public safety, and present these in a usable format.
   - Cape York Peninsula Fire Management Guidelines (Draft Version 1).
   - Central Queensland Coast Fire Management Guidelines.
   - Fire Management Guidelines for the Brigalow Belt North – currently under construction.
6. Provide a forum (e.g. annual workshop) for on-ground fire practitioners (implementers) to exchange information ideas and experiences. This will run in conjunction with our annual State meeting. We are still in the planning phase for this year (2012) but will aim to have a day of science and a one day practitioner based workshop.
7. Re-establish the Queensland Fire Workshops (a forum that was previously successful for developing partnerships, exchanging information and coordinating fire activities) We are hoping that this will mature out of a growing relationship between NRM groups; other interested parties and the QFRS at the Regional Level where it is most appropriate. This will take time to develop (and dependant on funding).

Seasonal weather update

By Vikash Prasad, A/Senior Meteorologist, Qld Disaster Mitigation, BOM, February 23 2012.

The Bureau of Meteorology announced the end of the 2010/2011 La Niña on 25th May, 2011. This event will go down in the record books as one of the strongest. The Southern Oscillation Index (SOI) remained near normal until about October, 2011. Since then, the SOI returned to higher positive values and peaked during early January, 2012. Over the past fortnight, the SOI has continued to drop but remains above La Niña thresholds.

The majority of climate models predict a gradual decline in the strength of the La Niña over the coming months, with most models suggesting a return to neutral conditions during the southern autumn.

La Niña periods are usually, but not always, associated with above normal rainfall and below normal daytime temperatures through summer across eastern and northern Australia.

The rainfall outlook for March to May indicates 60% and 70% chance of above average falls for most of Queensland.

The temperature outlook for March to May indicate 60% to 80% chance of warmer than normal night-time temperatures and 60 to 75% chance of cooler than normal daytime temperatures over Queensland.

For further information, visit Bureau of Meteorology web site: www.bom.gov.au/climate.

Patterned fens in the subtropics

By Russell Fairfax, Botanist, Queensland Herbarium.

Patterned fens are unique ecosystems that exist on the western footslopes of the Fraser Island and Cooloola sand masses, and are said to be the only known subtropical examples of patterned fens in the world. They are a type of wetland mire that exists in a highly acidic and anaerobic environment where decomposition of organic matter is very slow and peat is created. Peat taken from a core 3m below the fen surface has been dated at 18,000 years old. Water emanating from the dunes moves slowly through the system and the patterns of the patterned fens consist of open pools of water more or less 'trapped' by vegetation and the peat that has formed under it.

Several national and international threatened species exist within the patterned fens including the threatened wallum sedge frogs, fish and the water mouse. The water mouse might inhabit the edge but would not be a permanent resident of the Fens. The fens may possibly be high tide refuges for migratory birds. Other interesting species not known to be tolerant of acidic environments have been found in the fens including swamp crayfish and earthworms. The dominant plant species is a sedge whose roots grow up and out of the water in a strategy to obtain oxygen.

There is a lot more yet to be learned about this unusual ecosystem and its management including hydrology of the fens and the aquifer, and the use of fire. The Burnett Mary Regional Group (BMRG) has received funding to coordinate research to assist in filling the knowledge gaps that were highlighted in an Ecological Character Description workshop held in February last year on the Great Sandy Strait Ramsar Site.

To find out more information or if you are able to contribute to the work that the BMRG is conducting please contact Mary-Alice Swan of the BMRG via email maryalice.swan@bmrn.org.au or phone 07 4181 2999.

Figure 1. A patterned fen community as seen from the air (courtesy of DERM 2009)

CAFS Road Show

By Bruce Bunkum, Moreton Bay Regional Council

The Institute of Fire Engineers in conjunction with Queensland Fire and Rescue Service held a workshop on the use of Compressed Air Foam Systems (CAFS) in June last year.

CAFS is a mix of compressed air, Class A Foam and water delivered through a smooth bore nozzle. There are generally three types of mixes wet, medium and dry. CAFS can be used to great effect in the following applications, direct attack, control lines, property protection, and remote areas and mop up. The advantages of each of these are; in direct attack, quicker knockdown of fire and less water use, control lines will last longer and can be easily seen. Also, structures can be coated with foam offering better protection from the fire front, and in remote areas less use of water and mopping up offering quicker knock down of hot spots and water conservation. It has also been reported that the hoses are lighter thereby reducing operator fatigue.

CAFS systems in Australia use Class A foam which is said to be safer for the environment than Class B.

Some of the disadvantages mentioned relate to CAFS requiring more training and skills maintenance than other methods of fire fighting and increases to the cost of retrofitting existing fire fighting units. CAFS can also destroy evidence that a fire investigator may require. The resistance to change, lack of management support and lack of awareness of CAFS by incident control teams can also limit the effectiveness of CAFS.

However CAFS is increasingly been seen as an important tool in fighting bushfires particularly in the I-Zone (interface zone between natural areas and the built environment).

Bruce Bunkum is a Supervisor Natural Areas with the Moreton Bay Regional Council and a volunteer Rural Fire Fighter.

Reviews

Fire management on private conservation lands: knowledge, perceptions and actions of landholders in eastern Australia.

Published by the International Journal of Wildland Fire, 2012.
Authors: HALLIDAY, L. G., CASTLEY, J. G., FITZSIMONS, J. A., TRAN, C. and WARNKEN, J.
www.publish.csiro.au/paper/WF10148

Halliday *et.al.* explores the public perceptions surrounding the use of fire for biodiversity conservation and risk reduction in private conservation lands. It was found that while the greater percentages of landowners believe that fire is an important landscape-scale process, there was poor understanding of its use in the landscape to improve biodiversity conservation. It was also found that many lacked the skills, knowledge, resources and capacity to implement fire management on their properties. Fire management for landholders was ranked fifth among all the conservation management actions taken with weed control and the facilitation of natural regeneration being the most frequent actions taken.

The authors recommended that at a minimum, fire management plans at a property level should be introduced for the private conservation lands, with landscape/regional fire planning being optimal.

Prescribed burning: how can it work to conserve the things we value?

Published by the International Journal of Wildland Fire, 2011.
Authors: PENMAN, T. D., CHRISTIE, F. J., ANDERSEN, A. N., BRADSTOCK, R. A., CARY, G. J., HENDERSON, M. K., PRICE, O., TRAN, C., WARDLE, G. M., WILLIAMS, R. J. and YORK, A.
www.publish.csiro.au/paper/WF09131

In this paper the authors critically examine the effectiveness of prescribed burning across the landscapes of Australia. Some of the key messages include suggestions for land managers to use adaptive management frameworks for prescribed burning. The authors call it "learning by doing", and stress the use of meaningful objectives in management plans that provide effective environmental management. The authors have provided examples of how a land manager/planner could set these objectives and also stress the importance of identifying priority species and communities to help set these objectives. Other key messages include the often unstated associated costs in fire management (including costs of community engagement), and the importance of the transfer of knowledge from scientists to land managers (which highlights the important role SEQFBC plays).

Interactions between climate change, fire regimes and biodiversity in Australia - a preliminary assessment.

Authors: WILLIAMS, R. J., BRADSTOCK, R. A., CARY, G. J., ENRIGHT, N. J., GILL, A. M., LIEDLOFF, A. C., LUCAS, C., WHELAN, R. J., ANDERSEN, A. N., BOWMAN, D. M. J. S., CLARK, P. J., COOK, G. D., J., H. K. and YORK, A.

CSIRO led a consortium of Australian researchers for the Australian Governments Department of Climate Change and the Department of Environment, Water, Heritage and the Arts.

The report provides key findings from the current research that includes (but is not limited to) information on modelling on severe fire weather, impacts on biodiversity, insights into future fire regimes and risks to people and property.

There are seven priority areas for action:

1. Determine Australia's fire regimes.
2. Determine the potential impact of climate change on fire weather in more regions of Australia.
3. Evaluate the relative importance of elevated fire danger, elevated atmospheric CO2, and changing moisture availability as determinants of future fire regimes.
4. Examine the vulnerability of fauna to changes in fire regimes.
5. Review and assess current capacity to accommodate change.
6. Explore approaches to domain and thresholds of concern.
7. Undertake benefit and cost-analysis of potential management responses.

Book to look out for

Flammable Australia - Fire Regimes, Biodiversity and Ecosystems in a Changing World

Edited by: Ross Bradstock, Malcolm Gill and Richard J Williams – CSIRO Publishing, www.publish.csiro.au/pid/6836.htm

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