SWIFFT meeting notes 23 July 2009

BIRD: linking the biodiversity community

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SWIFFT meeting notes are a summary of the video conference and not intended to be a definitive record of presentations made and issues discussed.

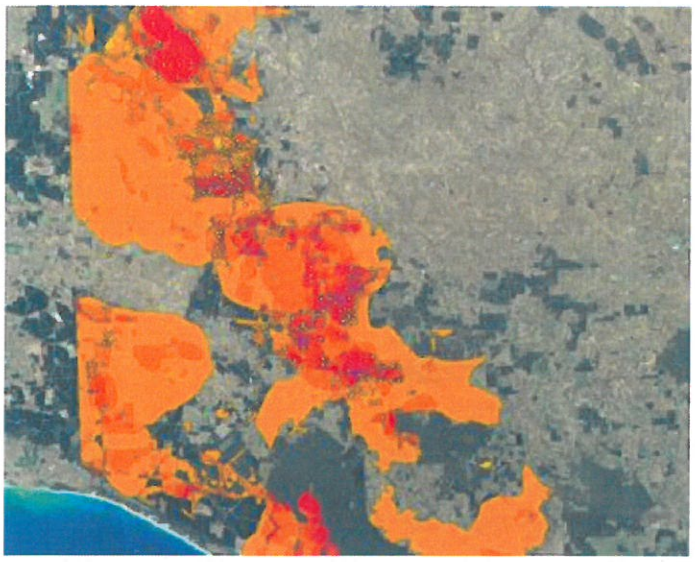
The third video conference for 2009 was held on 23 July with 67 participants connected across south-western Victoria, Melbourne and South Australia. The theme was *Fire and Biodiversity* Those attending included participants from; Melbourne University – (Creswick Campus), Local Government (City of Greater Geelong, Surf Coast Shire, Ballarat City), Western Coastal Board, Field Naturalist Clubs (Ballarat, Hamilton, Geelong, Ararat, Portland), Parks Victoria, Dept. Primary Industries South Australia (Mt Gambier), DSE/DPI locations across south-west Victoria, Nicholson Street Melbourne and Arthur Rylah Institute - Heidelberg. See Participants & Apologies SWIFFT 23 July 2009

What grows where – predicting plant distributions in native forests

Thomas Duff - School of Forest and Ecosystem Science, The University of Melbourne

Tom introduced the topic by saying he is undertaking a PhD under the supervision of Alan York and Tina Bell, his project is being conducted as a collaborative project between the University of Melbourne and Department of Sustainability and Environment.

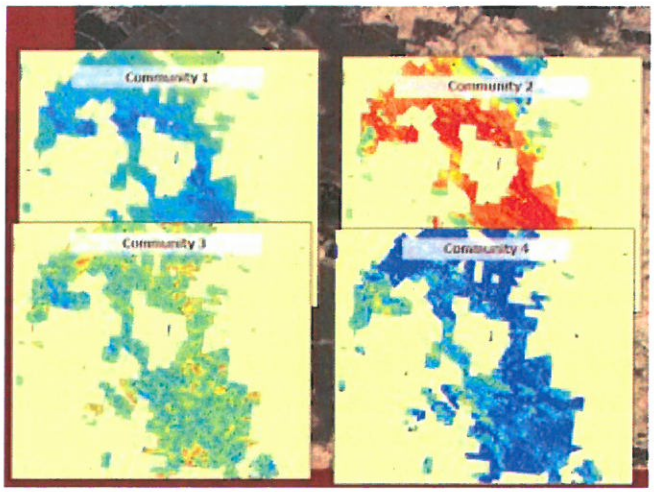
Tom spoke about the complexities in managing the Australian landscape and the competing objectives such as management for a single species or for all species and the way we perceive the landscape should look. He mentioned the landscape is influenced by a variety of disturbance event such as drought, storms, flood and fire and how many plants and animals tolerate frequent disturbances and can actually rely on them to maintain ecological processes.



Study site with fire history and monitoring sites

Predictive maps of plant communities

Fire is an integral component of ecosystems; it is a means of making landscape level changes, either by removing fire or adding it to the landscape is a powerful management tool. Tom stressed the management of the physical entity of fire is straightforward, but the ecological entity is not so easily managed and we are faced the dilemma of understanding how we trying to emulate fire in natural systems to conserve biodiversity.



Tom spoke about vital attributes for plants and animals and how we need to understand the biology of the species and recognise their minimum fire period (shortest period between fires before damage occurs) and maximum fire period (longest period between fires before damage to the ecosystem occurs). Using vital attribute information the frequency of burning can be determined to avoid either burning an area too frequently or not enough. Vital attribute information can be combined to develop mosaic patterns within the landscape to ensure a diverse more complex environment which has a greater capacity to support biodiversity.

Tom spoke about other factors which need to be taken into account with managing fire such as how hot to burn, what season to burn, topographic position, soils, climate change and measuring response from fire. He introduced his specific project in the Cobbobonee National Park in south-west Victoria which uses vegetation quadrates to model natural patterns found within the landscape to predict plant patterns (what grows where), this involves field sampling of vegetation and linking plants to environmental influences e.g. soils, topography, fire history etc. This is a vast improvement on EVC mapping which tends to only look at overstory species. By targeting the information which is needed and then optimising the use of this by multivariate modelling Tom is developing improved ways to manage complex landscape systems using predictive mapping of plant communities.

Key points from questions

- The use of vital attribute data needs to be incorporated into burn plans.
- The principles of Tom's modelling work could be applied to other areas provided the field data is collected for the particular area.
- Predictive modelling could assist in revegetation planning.

Beetles burns and biodiversity – Exploring resilience in fire prone temperate woodlands

Catherine Nield, – Department of Forest & Ecosystem Science, University of Melbourne

Catherine introduced her research which forms part of the Casterton Biodiversity Project being conducted by the University of Melbourne Forest & Fire Ecology group.

She said the rationale behind this research was based on the fact that temperate eucalypt woodlands are poorly conserved, highly fragmented and modified. She said understanding the effect of fire regimes is crucial for the management of biodiversity in these areas.

The case study was focused on heathy stringybark woodlands in south-west Victoria which comprise sandy soils, brown stringybark overstory together with *Xanthorrhoea* and a mixed heath understory. Management of forests in the study area has been aimed at conserving feeding habitat for the Red-tailed Black Cockatoo which is directed at minimising woodland areas less than 10 years since last fire. (i.e. the objective of the Portland and Horsham FMA plans has been to maintain 85% of Stringybarks with a greater than nine years cycle since being burnt). Catherine pointed out that although the stringybark woodlands have been managed to conserve Red-tailed Black Cockatoo habitat there needs to be a greater understanding of implications for other biodiversity.

Study design

The research fits into the larger Casterton project and is a landscape scale project with 33 sites being stratified according to two components of fire history: time since last fire and fire frequency. There were 5 replicates of each category spread across the landscape to avoid clustering in any one area.

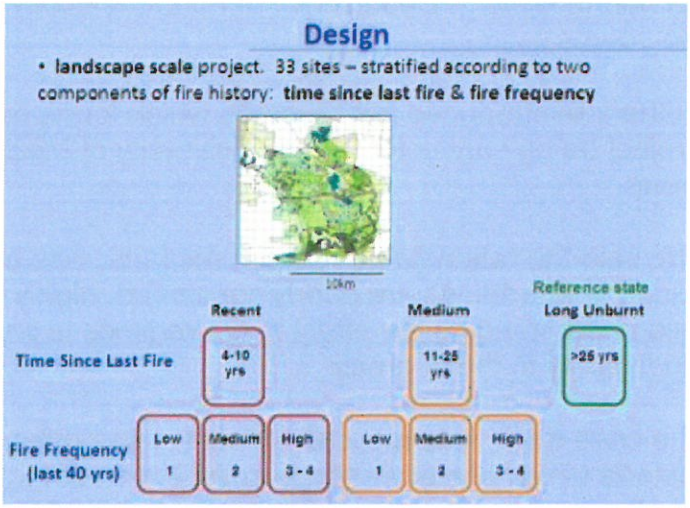
Beetle research

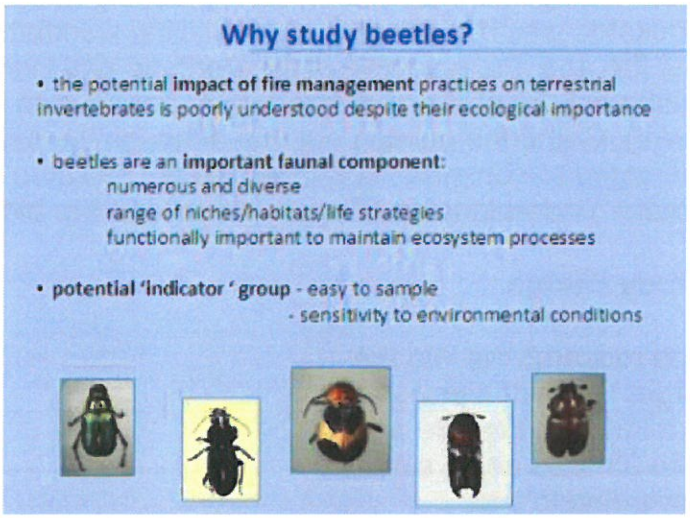
Catherine explained why beetles were chosen to be studied as part of the Casterton project. She said that the impacts from fire management are poorly understood. Beetles comprise an important faunal component, for example in one particular forest area you can find beetles that are predators,

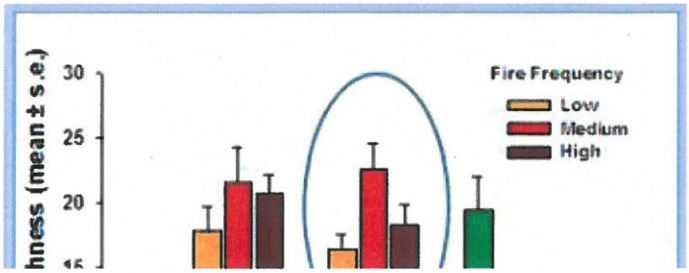
herbivores, fungivores, detritivores and omnivores. Beetles can also be used as an indicator group as their sensitivity to environmental conditions can provide a fine grain view of ecological change.

Field work involved sampling of ground-active beetles using pitfall traps (9 traps per site - open for 7 days during December 2006). Laboratory work involved sorting 2055 individual beetles from 29 families. These were divided into 136 morphospecies based on morphological distinctions.

Catherine pinned and mounted a reference collection for the preservation and future reference of these samples. These were verified and named by Geoff Williams of the Australian Museum.







Results

- In the study area the fire history (time since last fire and fire frequency) was found to have had no significant effect on overall beetle abundance.
- Species richness was not affected by time since last fire but there was a weak effect on beetle species richness associated with the

'medium time since last fire' category and the low – medium fire frequency.

- Beetle community composition changed with time since last fire but did not change with fire frequency.
- There was no effect of time since last fire or fire frequency on feeding group dynamics.
- At a species level there was a variable response to time since last fire with changing conditions favouring certain species at a particular point in time.
- Time since last fire and understory habitat structure are the most significant drivers of species composition but there is still a significant percentage (78%) of unknown reasons for species composition.

Conclusions

- data suggests a high degree of resilience to the current fire regime at the study area -
- potential disturbance thresholds have not been reached.
- there is inherent spatial variation in community composition – fire regime is only part of the story but the beetle community has changed since time of last fire.
- continued exclusion of fire or an increase in prescribed burning may eventually disrupt competition dynamics and resource requirements necessary for the maintenance of beetle diversity.
- landscape heterogeneity (having a large number of structural variations) may enable various community assemblages to persist

Key points from questions

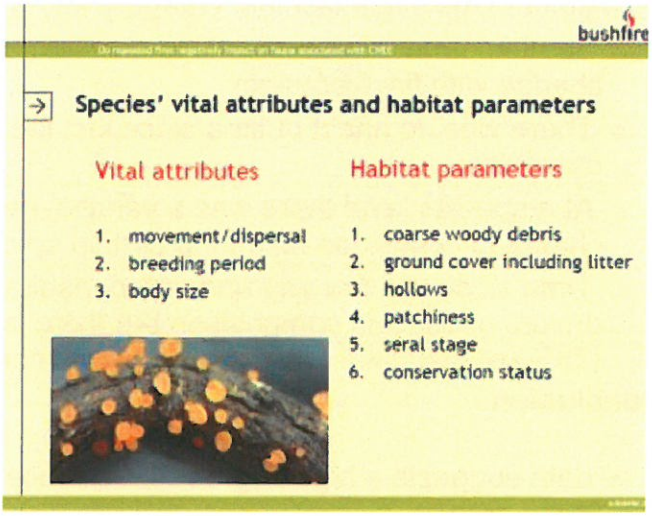
- There has been analysis done on the ant fauna by other members of the Fire Ecology Group.
- The focus of the study was on ground dwelling beetle fauna.
- There was no analysis of beetle species longevity.
- The dataset contains information on the Carabidae beetles which could be of use to those studying orchid pollination.
- Management of the forest for Red-tailed Black Cockatoo does not appear to conflict with the beetle faunal but care needs to be exercised to ensure threshold levels are not exceeded which requires further research.
- Beetles can be an important part of the ecology by distributing seeds and fungi but there needs to be a lot more work done on their ecological role.
- The research did not differentiate between native/introduced species.

Do repeated fires negatively impact on fauna associated with course woody debris – a case study from south-west Victoria

Ann Miehs - Department of Forest and Ecosystem Science, University of Melbourne, Victoria This research was carried out in conjunction with Alan York, Tina Bell and Kevin Tolhurst.

Ann provided a background
of fire pointing out that fires

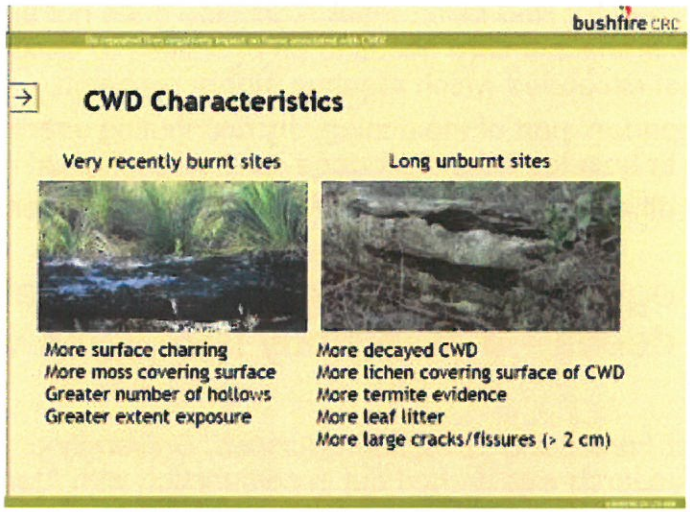
are predicted to increase in frequency and extent; they are also listed as a potentially threatening process under the Flora & Fauna Guarantee Act 1988. At present most burn plans are focused on the vital attributes of flora which may not necessarily take the needs of fauna and fauna habitat into account, for example the time intervals used to regenerate flora diversity may be too short for many fauna species.

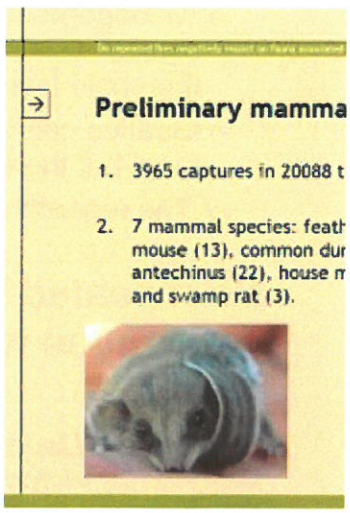


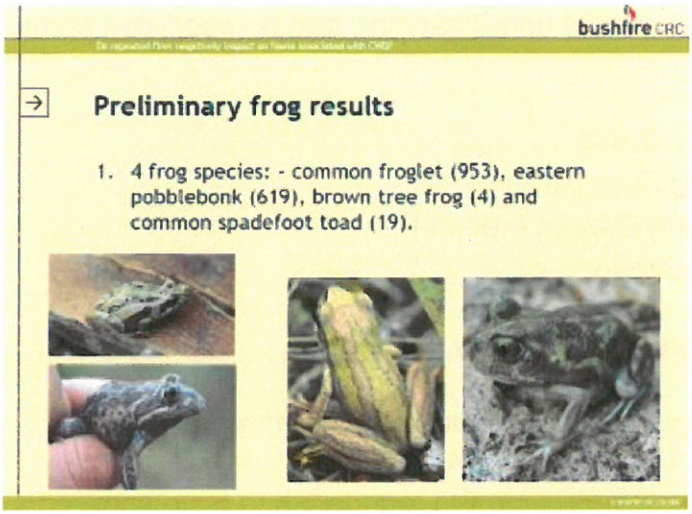
Ann discussed the need for more work to determine vital attributes for fauna and fauna habitat. She said the focus of this research based in the Casterton area has been to determine the impact of fire frequency on small vertebrates associated with course woody debris.

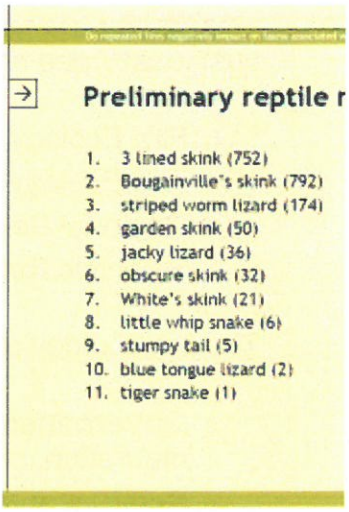
Ann said course woody debris forms an important part of the carbon cycle in forests, it adds complexity to the forest floor and provides micro habitat for many invertebrate and vertebrate species, e.g. sheltering, basking, perching, hibernating, nesting and feeding.

Ann pointed out that fire can both destroy and create course woody debris. Fire can also alter the surface characteristics allowing colonisation by fungi and invertebrates which become foraging areas for other species. Depending on the frequency, fire can produce hollows but if too frequent it may also lead to the loss of hollows. Course woody debris can also form important functions both during and post fire in terms of providing refuge during fire and creation of islands of micro habitat and flora post fire.









Ann's study site selection included control sites, fire frequency and times since fire (4-10 years since fire, 11-25 years since fire and 25+ years since fire. Fifty by fifty metre grids were set up at study sites which included a combination of pitfall and Elliot traps. Habitat assessment included amount of cover and characteristics of course woody debris and Xanthorrhoea cover. Tree height, basal area and ground cover abundance and structure were also recorded.

Summary findings

- Fauna appears resilient to fire in the study area.
- Course woody debris is unlikely to be the main habitat utilised in this system.
- *Xanthorrhoea* sp. may be the more important habitat type.

Key points from questions

- Recapture rates were low.
- There does not appear to be much research on the value of smaller woody debris for biodiversity.
- The focus of this research was not looking at the direct effects on habitat immediately after fire but at least 4-10 years after fire.
- The course woody debris cover at sites was relatively low, only about 3 percent cover.
- At this stage there are no plans to replicate this study at other sites even though it would be very beneficial to increase our understanding of the role of course woody debris in the environment.

Fire Ecology Program

Lawrance Ferns – Senior Policy Officer, Terrestrial Biodiversity and Sustainable Ecosystems, Department of Sustainability & Environment, Arthur Rylah Institute

Laurie introduced the topic by saying important partnerships have been established since 1998 with Department of Sustainability & Environment, Parks Victoria and the Country Fire Authority. Several new groups have been

established to ensured ownership, understanding and co-operation across businesses and agencies;

- Fire Ecology Working Group
- Fire Ecology Steering Committee
- Regional Co-ordinating Groups (several)
- Scientific Reference Group

The fire ecology program comprises 5 key elements

- **Governance Arrangements** to provide structured management, integration, information flow and decision-making.
- **Science and Research** to provide the foundation to build knowledge; monitoring and reporting
- **Integrated Planning and Management** to provide the principles, standards and planning procedures for ecological burning on public land
- **Information Management** to facilitate management and access to information which is critical to all facets of fire planning and management
- **Stakeholder Engagement and Communication** to develop and maintain partnerships and promulgate key messages about fire and biodiversity to stakeholders and the broader community

Science achievements up to 2008/9 which include;

Development of new Ecological Vegetation Divisions (EVD's) based on Ecological Vegetation Classes (EVC's) and fire regime information which has enable minimum and maximum tolerable fire intervals to be assigned across Victoria. This is still work in progress.

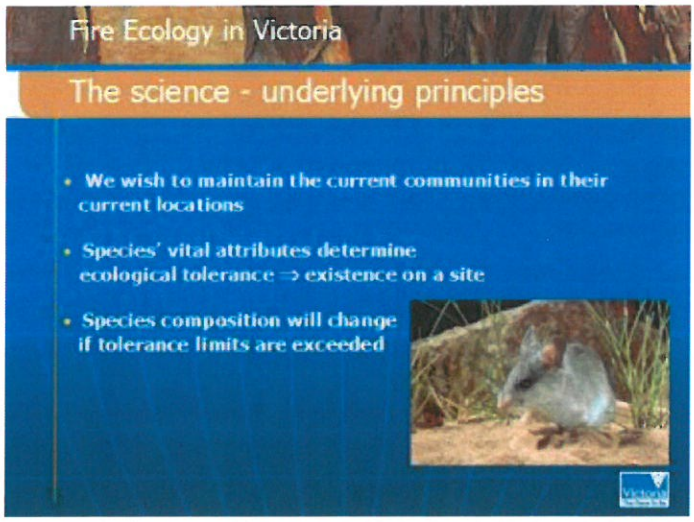
Scientific reference group, this has been established to provide guidance to the above and other projects.

Attributing flora with fire history characteristics, this is being undertaken and tapping into an expert opinion database where experts provide their opinion as to the sensitivity of plants to fire.

Life history and characteristics of fauna and habitat (fauna vital attributes project) in relation to fire is being studied and expert opinion sourced in order to better understand how various successional life stages are utilised throughout the landscape. This information is going into a database which should be ready within the next year.

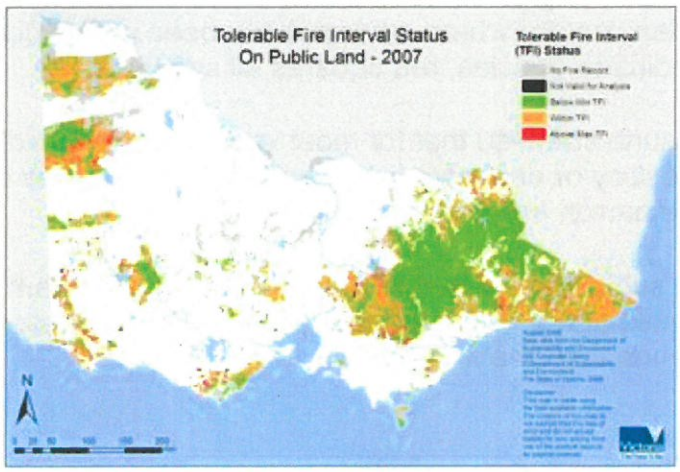
Flora & Fauna monitoring

protocols, flora protocols have been published and are being rolled out. Fauna protocols are currently being developed. Flora protocols are designed to measure how fire changes EVC composition.

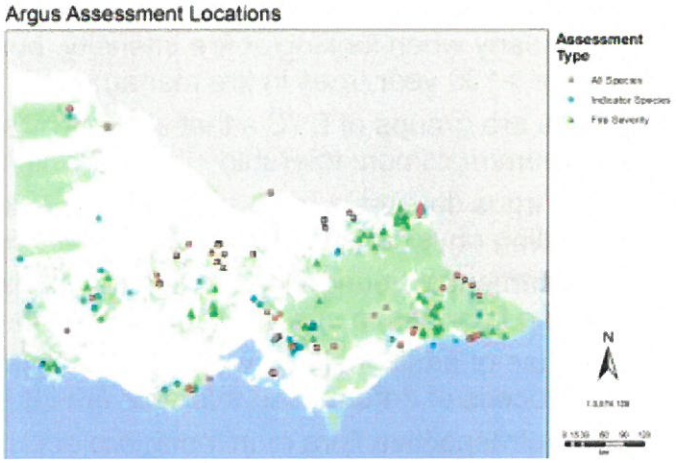


Laurie spoke about how the program operates on a scientifically-based process based on:

- the life history (vital) attributes of key fire response species (currently more advanced with plant data than fauna)
- analysis of known fire history and age-class distributions within 'Ecological Vegetation Classes' (EVCs)
- comparison with 'theoretical' age-class distributions
- monitoring of status or outcomes



The main outcome is to determine how often and where to burn within ecological limits



Laurie provided an example of how EVD information combined with a forests seral stage can be included in GIS with the fire history database to determine if an area is within or outside the tolerable fire intervals (TFI). The Tolerable Fire Interval map on Public Land 2007 shows the green areas

are below minimum TFI, orange is between minimum and maximum TFI and red is above maximum TFI.

He also spoke about how various maps can be prepared to display TFI's and seral stages of vegetation across Victoria. The Post Fire Seral stages 2002 map shows green representing the various younger stages, orange to brown are the various maturity stages while the reds are the over-maturity stages. The data can also be expressed in histograms showing age-class distribution of various EVDs in terms of land area by seral stage which can be related to fauna composition.

Key fire response species are useful in monitoring because if the most sensitive species to fire are in adequate numbers it is an indication that fire management is ecologically in the right direction. Using key fire response species in monitoring is also a more simplistic way of getting stakeholders interested in monitoring. Land & Fire management have developed a web based database called Argus which has been going since 2007 and enables data to be added and retrieved. The green triangles are where surveys have been conducted for fire severity, blue dots for indicator species, red squares all species plots.

Laurie stressed that for most vegetation and wildlife fires do not necessarily destroy or decimate biodiversity because if they did our landscapes would already be barren and they are not.

A subject of interest to the Fire Ecology Program is the impact of predation from foxes and cats on native fauna post fire because this is possibly a greater threat to fauna than the fire itself.

Discussion points

- Richard Loyn spoke about the huge lack of information that still remains particularly when looking at fire intensity, burn mosaics and the role of mature >100 year trees in fire management.
- There are groups of EVC's that share similar fire history/properties i.e. minimum/maximum tolerable intervals which have been grouped into EVD's.
- The Argus dataset is to be expanded to collect a wider range of data regarding physical and habitat data from a fuel management perspective.
- The numerical abundance of bushland birds could be a useful means of building information into the fire management model.
- The use of additional information such a climate modeling could be built into the process of determining tolerable fire intervals.
- The retrospective flora monitoring project is going to be implemented which aims at updating species assessment from historical records (site have not yet be determined).
- There is a presentation on ecological recovery after fire. In most cases there is no need for people to do supplementary planting in burnt areas but surveillance for weeds, predator control, erosion control are some areas to be focused on. Contact Stephen Platt at DSE for a copy of the presentation.
- An update from Sharn Smith (Mt Gambier PIRSA) covered an increase in funding fire management in the Dept. Environment & Heritage South Australia, they will also be adopting the DSE flora monitoring protocols,

PIRSA Forestry may also adopt the same protocols into the future. The DEH South-eastern Regional Fire Management Plan will be released for public comment by the end of August

- DSE flora monitoring protocols for planned burning – technical reports
- Argus database

The next SWIFFT video conferences will be on Thursday 29 October 2009 (Theme: Managing small reserves).

- SWIFFT meetings

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