DESERT KNOWLEDGE CRC

The Working Paper Series

Workshop proceedings: Fire management for conservation reserves in central Australia

Angus Duguid
Kasia Gabrys
Jock Morse
Michelle Rodrigo

Working Paper
21

February
2008

PARKS AND WILDLIFE SERVICE NORTHERN TERRITORY
ULURU – KATA TJUTA NATIONAL PARK
Northern Territory Government
Department of Natural Resources, Environment and the Arts
CRC AUSTRALIA
DESERT KNOWLEDGE CRC

Workshop proceedings:

Fire management for conservation reserves in central Australia

at Witchetty's, Araluen Cultural Precinct

Alice Springs

5–6 December 2005

Angus Duguid

Kasia Gabrys

Jock Morse

Michelle Rodrigo

PARKS AND WILDLIFE SERVICE NORTHERN TERRITORY

ULURU – KATA TJUTA NATIONAL PARK

Northern Territory Government
Department of Natural Resources, Environment and the Arts

CRC AUSTRALIA

DESERT KNOWLEDGE CRC

Contributing author information

Angus Duguid: Biodiversity Conservation Unit, Parks and Wildlife Service of the Northern Territory, NT Department of Natural Resources, Environment and the Arts (NRETA)

Kasia Gabrys: Biodiversity Conservation Unit, Parks and Wildlife Service of the Northern Territory, NT Department of Natural Resources, Environment and the Arts (NRETA)

Jock Morse: Private Consultant to Desert Knowledge CRC

Michelle Rodrigo: Alice Springs Regional Natural Resource Management Facilitator, NT Department of Natural Resources, Environment and the Arts (NRETA) and workshop facilitator.

Desert Knowledge CRC Working Paper #21

ISBN: 1 74158 055 2 (Web copy)

ISSN: 1833-7309 (Web copy)

Citation

Duguid A, Gabrys K, Morse J, Rodrigo M 2008, *Fire management for conservation reserves in central Australia*, Workshop proceedings 5–6 December 2005, Working Paper 21, Desert Knowledge CRC, Alice Springs.

The Desert Knowledge Cooperative Research Centre is an unincorporated joint venture with 28 partners whose mission is to develop and disseminate an understanding of sustainable living in remote desert environments, deliver enduring regional economies and livelihoods based on Desert Knowledge, and create the networks to market this knowledge in other desert lands.

Acknowledgements

The Desert Knowledge CRC receives funding through the Australian Government Cooperative Research Centres Programme; the views expressed herein do not necessarily represent the views of Desert Knowledge CRC or its Participants.

For additional information please contact

Desert Knowledge CRC

Publications Officer

PO Box 3971

Alice Springs NT 0871

Australia

Telephone +61 8 8959 6000 Fax +61 8 8959 6048

www.desertknowledgecrc.com.au

Table of contents

Introduction

Background and context

The workshop was held as part of two concurrent fire management projects: Desert Fire and the Consultancy to produce a Fire Management Strategy for Uluṟu–Kata Tjuṯa National Park (UKTNP).

Both projects were developed in the context of widespread wildfires in 2001–2002 which followed high rainfall in 2000, and also for some areas in 2001.

The Desert Fire Project is a collaborative research project under the Desert Knowledge Cooperative Research Centre. Desert Fire is a broad ranging project which includes a sub-project that is documenting the best way of managing fire on conservation reserves in central Australia. This endeavour has been described in terms of defining 'best practice'. The Parks and Wildlife Service of the Northern Territory has been undertaking this sub-project of Desert Fire, with a combination of park rangers and scientists from the Biodiversity Conservation Unit and the Bushfire Council. The work is also being carried out in association with the Parks and Wildlife committee that overseas fire management on the parks (Southern Region Fire Task Group), which is Chaired by Mr Chris Day (Chief District Ranger – West).

In response to a recent major review of fire management in UKTNP (Jan Williams, 2002 – *Waru Work*, *A Review of Fire Management in Uluṟu–Kata Tjuṯa National Park*, Consultancy report to Parks Australia North, Department of the Environment and Heritage), Parks Australia North (which manages the park) has contracted the Desert Knowledge CRC to develop a Fire Management Strategy for UKTNP. The work is being carried out by a team of sub-contractors, including Grant Allan, Steve McAlpin, Patrick Hookey, Vanessa Chewings and Jock Morse using a contract brief prepared by Emma Lee, Natural and Cultural Resource Manager in the park. When completed, this strategy will give fire managers in the park a coherent and systematic tool for planning and implementing fire management in the park for the first time since *Anticipating the Inevitable – a patch burning strategy for Uluṟu National Park*, edited by E. Saxon, was published in 1984. While variably effective deliberate patch burning has been undertaken in the park in the intervening 20 or so years, practitioners have rarely, if ever, made use of the Saxon document, and its use as a practical guide to fire management is limited. Nevertheless, most of the principles described in Saxon are still relevant, and the new strategy – currently in development – will build on that solid foundation of theory and practice. One of the most important areas which the new strategy will address will be the involvement of senior Traditional Owners (TOs) in planning and implementing annual burning programs in the park. This workshop is one activity in the consultancy process for developing the UKTNP fire management strategy, and is an important and useful process for bringing together many of the most experienced and knowledgeable fire management practitioners in the central Australian region and compiling their combined opinions into a single document.

Various workshops have been previously held on fire management in central Australia, including three associated with Desert Fire. The first of these was in August 2003, in Alice Springs, to establish issues and set priorities for the broader Desert Fire project. The second was a Parks and Wildlife workshop in May 2004 at Arltunga, which focussed on sharing information on current practices. The third was a scientific workshop to document current knowledge on the interactions between fire and vegetation in central Australia and was held in November 2005.

Purpose of this workshop

i) Determine a common understanding of what is best practice fire management on parks in central Australia

ii) Identify steps towards achieving best practice

iii) Contribute towards a Parks and Wildlife Services NT (PWSNT) report which will document best practice fire management (potentially a basis for a new fire management manual/training materials)

iv) Contribute to the development of UKTNP fire management strategy.

Workshop methods

The workshop agenda was developed by the convenors. A draft was circulated to invitees for comment and a final agenda circulated in the week before the workshop.

The workshop program was structured into predetermined topics; however, much of the first morning was spent canvassing opinions on the concepts of 'best practice' and 'fire management' and associated issues. The list of issues generated was checked against the predetermined topics and, where necessary, incorporated into the agenda.

Each major session of the workshop focussed on a particular topic or group of related topics. Sessions began with brief presentations from key experts which were aimed at focusing participants' thoughts for the subsequent discussion groups. The presentations were not intended to be comprehensive summaries of their topics, as the main aim was to obtain information from the participants.

Discussions were structured into small group sessions of 5–10 people per group as well as facilitated large group discussions involving all participants.

Overview of the structure of these proceedings

The proceedings follow the original agenda reasonably faithfully, with only a few minor additions and omissions. Material presented in the proceedings is from four main sources:

1. summaries of speakers presentations derived from their power point presentations and workshop participants notes
2. verbatim presentations of whiteboard summaries of group discussions recorded by our facilitator, Michelle Rodrigo
3. verbatim records of small group summaries of their discussions in relation to the session topics
4. verbatim records of participants notes written on pieces of paper in the brainstorm session on topics relevant to fire management in the region.

Editing has been limited to summarising presentations, some minor clarification, grouping of the brainstorm material into topics, and layout for the report.

Please note that a list of all participants is included at the end and can be used to decode initials in the text.

The convenors may, depending on various factors, develop the proceedings, along with further material, into a concise summary document for later publication, possibly in conjunction with another proposed publication on fire/vegetation interactions in central Australia.

Summary of outcomes

The original concept for the workshop was to convene a small working group of people with relevant fire management experience in order to collate and review current information on the best way to manage fire in central Australian conservation reserves. During the development of the agenda this concept was broadened out due to the level of interest and corresponding increase in the number of participants. As a result, the workshop also embraced a broader agenda of identifying issues and sharing information and experience. This resulted in a good breadth of information based on practical on-ground experience. The outcomes of the workshop include a framework for developing more detailed descriptions of 'best practice'.

Acknowledgements

Ange Vincent organised the catering and Kathy McConnell typed up the written material generated at the workshop.

Session 1 (Monday: pre-morning tea)

Workshop introduction

Angus Duguid introduced the workshop and convenors and outlined the aims and structure. He also explained the context of the Desert Fire Project. Jock Morse then spoke about the context of the Uluru fire project (both projects are summarised in the introduction to these proceedings).

Whole group discussion – establishing common purpose

Michelle facilitated a discussion on what the participants wanted to gain from the workshop.
What participants want from workshop (whiteboard record)

- Communicate parks experience
- Communicate our role
- Understand other organisations' roles
- Discuss mistakes made, understand others' experiences
- Not much written down – research gaps
- Seriously engage with other agencies
- Traditional fire practices
- Limited knowledge – how can others contribute
- Discuss impediments and solutions
- Fire is the biggest threat to conservation of flora and fauna
- Major project in central/Barkly district
- Synthesise knowledge

Whole group discussion – What is best practice?

Michelle facilitated a discussion on what is "best practice"?
What is best practice? (whiteboard record)

- Standards for process, e.g. ISO, particularly relevant to data management
- Synthesising different approaches to suit local situations
- Reflects different values
- Resource limited – absolute?/reality checks
- Achieving the optimal aims (According to who? – conservation?)
- Planning
- Integrated approach
- Monitoring and reporting and evaluating – adaptive learning – identifying knowledge gaps
- Always changing with new knowledge, making mistakes, climate change, political changes, cultural changes
- Contextual and responsive

Fire management in southern NT Reserves – Setting the scene

Presentation by Chris Day: *Overview of PWSNT fire management experience*

(summary by Chris Day)

Parks and Wildlife Service deliberate use of fire to manage the threat of fire and enhance biodiversity commenced (to my knowledge) in 1983, when Peter Latz came out to Finke Gorge and guided me on doing some patch burning around some remnant mulga stands on the Krichauff/James Range adjacent to the Finke River, just south of the Ellery Creek/Finke River junction. This burning involved very small patches (less than 10 ha) controlled by laboriously chipping rakehoe lines, then lighting very carefully late in the afternoon just using matches, and relying on overnight frosts to put the fire out.

I believe this move was prompted by Lazty's and others' observations of the damage done by the late '70s fires and the impact that the ceasing of traditional patch burning practices had on biodiversity, especially the loss of 'critical weight range' mammals.

During the early to mid-1980s, Parks and Wildlife Service had a Fire management committee that included Peter Latz, Noel Preece, Dennis O'Byrne and Harry Portlock (Senior Fire control Officer with BFC).

It was normal practice to charter a high-winged aircraft and do a survey of the major central Australian parks and reserves, assessing areas of high fuel, mapping any summer fires that had occurred, and developing plans for burning during the coming winter.

Mapping work in those days was restricted to tracing lines onto 1:80,000 black and white aerial photography, or onto 1:250,000 topo maps.

The biophysical mapping work conducted by Brenda Pitts at Finke Gorge and the western end of the West MacDonnell Ranges was a major turning point in how burning was approached. Dennis Matthews moved to Finke Gorge in May 1990 and used the biophysical mapping data to plan a more strategic approach to burning based on spinifex distribution and density and the location of the most biologically diverse vegetation communities.

Dennis identified that up until then, burning had been targeting the spinifex range country and probably over-servicing this community. He proposed the use of a complex of strategic linear breaks dividing the park into blocks, with different priority ratings depending on location, access and protection of biodiversity (conservation significance) of a particular block.

Other major changes

- Staff training – all staff now trained to minimum Level 1 Bushfires, a nationally recognised competency. In the 1980s I got no training other than that provide by Latzy.
- Better equipment, especially protective clothing (in 1980s there was little use even of overalls).

Equipment and technology

- Use of computers for mapping and recording of data
- Use of GPS for mapping
- Weather station and internet for access to weather forecasting
- Petrol-powered blowers (still to be fully appreciated, I believe); may be really important in the next big fire events, especially in mopping up soft grass fires
- Gas torches – seen by some staff as more effective/efficient for rapid and sustained fire lighting. Many still prefer the drip torches
- Better slip-on fire units, including foam injection units, which have been standard on southern- and eastern-state units for a long time. These help ensure more effective use of water, and are proving really effective in mopping up buffel grass fires (only in use since the 2002 fires).
- Scotty's back sprays (also use foam) allowing access where vehicle unit can't get. Allows a team to knock down flames and then get in to extinguish with hand tools
- Use of flappers, in addition to the McCloud tool (rakehoe); with practice, staff can rapidly extinguish soft grass fires with a well-made flapper. Several designs in use.
- UHF radios and satellite phones for better communications between staff on the fire ground, and command and control staff
- Quikspray high pressure low volume slip-on units. Yet to be fully tested, but anticipated to be really useful in controlling fires in heavy fuel such as buffel grass
- Use of tractors and graders to create breaks to burn off from.

The challenges and opportunities

- Knowing where and when to burn. Staff still rely on gut instinct and experience (including past mistakes) rather than science and knowing the optimum fire regime for a particular community.
- Being able to predict (model) vegetation (fuel load) response to particular rainfall.
- Resources – Fire Management time coincides with peak visitor times and peak work loads for Rangers.

- Budgets – Rarely extend to being able to make good use of helicopters, including for ignition, control, delivering crews to remote park areas to carry out prescribed burns.
- Scratching the surface – we are only working with a very small area of land – to be really effective, need to be able work on adjoining land areas.
- Move to joint management may enable this to happen to a greater extent.
- Making the best possible use of available technology, especially satellites, for mapping of fires and identifying unburnt areas and fuel build up.
- Having appropriate fire prescriptions for all vegetation communities outlined in a long-term fire management strategy document.
- Having biophysical mapping for all parks which can be used to define all the areas of key biological value and help to determine the priorities for fire management and control effort.
- The use of aerial incendiaries and helitorches when conditions are right, e.g. in the high fuel build up years such as 2000–01.
- There may need to be an acceptance that some parks will need to have more management tracks constructed to allow for access for fire management.
- Buffel grass – as it dramatically alters the fire regime in some parks.
- Convincing government of the need for appropriate, flexible resourcing in years of high fire risk.
- Staff turnover and retaining knowledge and experience.
- Balance between recording data and keeping good accurate records on park and making sure that staff time available for implementing burning is maximised.

Presentation by Grant Allan: *A history of fire management at UKTNP*

(summary by Angus Duguid from notes made at workshop – corrections and additions welcome)

Grant worked for CSIRO on developing the fire management program for UKTNP beginning in 1982. At that time the park was managed by the Conservation Commission of the Northern Territory (CCNT). The project was a response to the extensive wildfires in 1976 including a large fire which started between the park and Lake Amadeus. In 1982 and 1983 CSIRO did management burning on the park. In 1984 some management burning was done by CCNT prior to the Commonwealth Government (Australian National Parks and Wildlife Service [ANPWS]) taking over park management in 1985. Some patch burning was done in the years following hand-back, and Grant undertook a review of the program in 1987 at the request of ANPWS. His assessment was that the program was burning too few patches; they were poorly mapped and too small to have the desired outcome of reducing the extent of inevitable future wildfires. Following the 1987 review, various rangers coordinated the burning program (David Carter and Lynne Baker) and in 1990 Patrick Hookey commenced his involvement. Patrick's efforts built up over a few years and led to a dramatic increase in the annual area being burnt. Patrick and his co-workers (?many of whom were A<u>n</u>angu) had a big impact from the mid-1990s to 2000, with the areas burnt developing strategic fire breaks. During that period burning was actively undertaken beyond the park boundary. Weaknesses in the strategic lines occurred where issues such as sickness and weather prevented burning. Although the gaps were known, the program was unable to 'fill' them prior to the 2002 wildfires. A fire database exists at the ranger station but has not been effectively managed. Grant has also had an involvement in fire management at Yulara when working for CCNT, particularly in 1989–90 and has continued to have an advisory role to the UKTNP managers.

Important statements made in the discussion following Grant's presentation

- Shane Wright said that the Anangu perspective is different from the non-Anangu perspective. He worked with Patrick and observed that rain made some of firebreaks ineffective at stopping fire within a year. He mentioned 'ecological burns' and described 'traditional burning' where the fire is ignited by carrying a burning stick rather than a drip-torch.
- Steve Anderson explained how the 2002 wildfires were different from those in 1976. In 1976, 60–80% of the park burned out in three consecutive days. In 2002, 60% of the park was burnt, but by 50 separate fires. Traditional owners had said they didn't want one big fire to burn the park and that was achieved through (?both previous management burning and?) a big effort which went into fighting the

50 fires. The fire management included a strategy of protecting Mulga. Old men (Anangu) involved in fire management were proud of being able to burn, and miss mulga.
- Jock made a controversial statement asserting that much of the past burning practices at the park should be considered implementation of a burning program rather than 'fire management'.

Whole group discussion – review key issues so far

Michelle facilitated a brief discussion to review issues raised so far and encouraged further discussion in the tea break.

Reflection on speakers (including solutions) (whiteboard record)
- Ranger capacity to deal with rare events vs. commitments to visitor management
- Occasional big rain year generates big fires
- Knowledge gaps, but still learning
- Why are we not successfully implementing strategies?
- Lot of fire management activity with serious intent
- Ranger psyche (concerns) regarding killing wildlife when burning is legitimate
- Corporate memory loss, little transfer of knowledge
- Flash gear no good if long term strategy is poor – high staff turnover
- Aware of risk but may not be able to deal with it (resources or other reason)
- Understanding fire behaviour in vegetation types

Turning points – reflection on speakers (butchers' paper record)
- Early '80s active management by ranger, institutional organisation, because of big rains
- Resource mapping designed to give rangers good information – absolutely essential
- Inclusion of community and Tjukurrpa in programs (Early '80s ignored Tjukurrpa)
- Threat – used as a tool, cultural shift
- Shift towards including maintenance of landscape integrity as outcome

Reflection on speakers (butchers' paper record)
- Good opportunities for improvement
- Longer-term strategy gives leverage to request extra resources and policy support at high level
- Monitoring model to trigger the alarm – risk assessment must underpin strategy
- Documentation of fire management decision-making and on-ground activity – keep simple
- Need to fill knowledge gaps in regimes appropriate for vegetation types
- Consistent messages to on-ground staff

Session 2 (Monday: morning tea to lunch)

Whole group discussion – Re-focus

Michelle continued facilitating a brief discussion of key issues so far. Issues raised included: (following comments recorded in convenor's notebook)

- need to engage remote communities and Indigenous Protected Areas (IPA) areas as well as core focus on land managed specifically for conservation
- many parks are bordered by Aboriginal Land Trusts which cover much more land than the parks do
- pastoralism is also an important neighbouring land use which can impact on parks.

Whole group discussion – What is fire management? (whiteboard record)

- Using fire to meet your objectives:
  - prevent damaging wildfires
  - maximise biodiversity- HARD!
  - care for country
  - protect infrastructure and life
- Clearly defining objectives – what are we managing for?
- 2 streams-
  - using fire to manage – burn to create fire breaks, influence vegetation condition
  - managing fire
- Actions are deliberate and explicit
- Reduce cost of fighting fires later on
- Process – planning, implementation, monitoring, evaluation, and review
- Starting and stopping fire – when do you stop it and when do you let it go?
- Can't assume ability to control or need to control
- Responsiveness to unpredictability/responsive

Small group discussions: to address the following questions in relation to fire management:

- *Why do we do it ?*
- *What can it achieve?*
- *Can fire management ALONE achieve these things?*
- *What does it not do?*

Group 1: (DB, SM, TK, AD) (butchers' paper record)

Why do we do it?

- Maintain biodiversity – small mammals, vegetation structure/patterns, threatened species
- Protect infrastructure and people (legal)
- Protect culture
- Cultural activity/identity
- Feral management
- Response to climate
- Hunting/signals
- Limit extent of wildfires
- Regenerate pattern from blank slate

What can it achieve and how does it do this?

- Proper data collection, analysis, and management
- TOs – knowledge and skills maintenance and intergenerational transfer
- Increase biodiversity, break up fuel loads, increase habitat structure
- Protect infrastructure by creating breaks/fuel load decrease
- Opportunities to improve joint management/employment/community input/listening and learning
- Increase our understanding (knowledge gaps)/goals/tool/learning experience
- Set standards (World Heritage)

- Concentrating feral population for control
- Improve budget situation and security

What does it not do?

- **It will not stop all wildfires –** but enhances likelihood
- Can't use for things we know too little about
- Education of general public about fire in the environment and why we burn
- Doesn't cross land-tenure boundaries
- Doesn't endear us to all stakeholders
- Doesn't ensure permanent protection

How might the way we do fire management change in the future?

- Different technology
- Biodiversity may be targeted
- Improved skills and resources in remote areas

Group 2: (KM, SN, PL, JS) (butchers' paper record)

Why do we do it?

- Legislative imperative
- Biggest threatening process
- Potential to be best management tool
- Prevent major wildfires/limit damage
- Cultural, biodiversity and ecological objectives

What can it achieve and how does it achieve it?

- Reduced impact of wildfires by reducing fuel loads and creating mosaic country
- Increase awareness and understanding by government of fire impacts and resources needed – a good evaluation process communicates what we've achieved

What does it not do?

- Automatically manage the land and increase/protect biodiversity
- Control Buffel grass
- Raise the awareness and understanding of general public/communicates achievements
- Assure historical lessons learnt

How might the way we do fire management change in the future?

- More knowledge to on-ground staff
- Greater links between science and practice
- Use of choppers/aerial burning
- Climate change and Buffel will change our practices in ways we can't imagine

Group 3: (RH, MJ, GA, VC, PD, CS) (butchers' paper record)

Why do we do it?

- Protection of life and infrastructure
- Maximise biodiversity or single species or communities
- Reduce fuel loads – prevention/reducing risk of wildfire
- Create mosaic of differing fire regimes
- Site protection – cultural; maintenance of cultural tradition
- As a tool to manage for weeds
- We believe it is a part of the ecosystem
- Because it is enjoyable/fun?

What can it achieve and how does it do this?

- Can decrease risk of wildfire by reducing fuel loads and creating breaks
- Increase understanding and knowledge of effects from fire
- Change vegetation communities: Good or Bad??
- Sense of purpose/doing something with visible results

What does it not do?

- Provide absolute protection or results/goals

- Provide certainty of knowledge of ecological processes
- Will not maximise biodiversity as a tool on its own
- It's not the silver bullet/answer?

How might the way we do fire management change in the future?

- It will evolve with what we learn and tools/technology/knowledge increases
- According to OHS, liability, public attitude, risk management
- Political input/direction
- More integrated and strategic
- Climate change?
- Corporate and public memory
- Joint management
- Resources availability

Group 4: (SA, LL, JM, CB, SW) (butchers' paper record)

Why do we do it?

- Legal obligations – life, property
- To create a range of vegetation patches with different structural characteristics and fire regeneration stages
- We always have
- To benefit/control certain species – feral, bush tucker, rare species, fire sensitive species

What can it achieve?

- All of the above

What does it not do?

- Cannot stop **all** wildfires
- Can't be used to achieve objectives for which we know little about the relationship between fire and the objectives

Group 5 (RE, DS, MS, CD, EL) (butchers' paper record)

Why do we do it?

- Life and infrastructure, biodiversity, caring for country
- Reproducing burn strategies
- Fire regimes have changed; hotter, larger fires
- Small mammal loss through changing regimes and habitat

What can it achieve and how does it do this?

- Positives: safety, employment, increase habitat and diversity, bush tucker and strengthening links to country, enhance knowledge and understanding of landscape
- TO's skills and knowledge passed to next generations
- Western systems gaining knowledge of new techniques to complement traditional knowledge

How?

- Engaging people in land management: land and non-land; scientist and non-scientists; listening and learning
- Knowledge gaps filled through strategy/flow charts, etc – retention of corporate memory
- Budgets, resources, funding
- Data access and appropriate storage of knowledge
- WHA standards and getting those international and national obligations

What does it not do?

- Doesn't guarantee success, but enhances likelihood
- General education of public and others on fire and use
- Doesn't cross boundaries across land tenure
- Doesn't endear us to all stakeholders e.g. tourism
- Doesn't attract consistent funding or regional approaches
- A good burn doesn't give overall security; consistent monitoring or management

How might the way we do fire management change in the future?

- Global climate change
- Skills and resources in remote areas; boundaries not so rigid for land tenure

Issues from the Wailing Wall – Brainstorm of fire management issues and fire management strategy contents

Whole group discussion *(notes on paper created individually by workshop participants)*

Participants were asked to list issues/content on sheets of paper and stick them to the wall. The scope for this was broad and included issues for fire management as well as the categories of content required in either a fire strategy or the best practice document. The pieces of paper were grouped by convenors over Monday lunchtime, into the headings and sub-headings below.

> **Headings level 1 –** (these were added to the wall notes later when workshop convenors grouped the notes into coherent subject headings/groups)
> Sub headings – (also added to the wall notes later by organisers)
> points – (what was written by workshop participants on yellow pieces of paper)
> sub points (where points on one piece of paper were structured in point form)

Fire management and biodiversity

- management of biodiversity:
  - how to monitor? – simple methods on-ground
  - management of single species vs multiple species or communities
  - optimal fire regimes
- knowledge gaps
- environment
  - climate
  - flammable plants
- do some biodiversity values need high intensity fires ?

Flora

- vegetation communities
- current situation
  - vegetation
  - fire history
  - cultural aspects
- optimal fire regime recommendations
  - preface – changes with conditions
  - major community types and their optimal strategy
  - synthesis of existing scientific knowledge
- guidelines for fire regimes for:
  - broad veg communities
  - key species
  - rare, relict and fire sensitive sp.
- protecting mature habitat trees

Fauna

- reconciling co-occurring species with different habitat requirements
- mulgara, bilby, great desert skink, striated grass wren, other RandT spp.

Weed ecology and management

- weed seed banks and modern fire management
- fire and weed management:
  - good/bad ?
  - tool or not
  - if not a tool – make sure it is communicated

Joint management

Community and Indigenous engagement

- joint management – Aboriginal responsibilities, Aboriginal history
- how to protect tjukurrpa?
- traditional knowledge (x2)
- traditional burning – what do we know, what can we learn still?
- traditional weather knowledge
- significance of fire to Indigenous people
- recognition of traditional peoples' contribution through bibliography
- values: natural, cultural
- how, why, when, what does it mean to people
  what effect on the landscape?
- how best to involve communities today
- Anangu rangers teaching others, i.e. going to other communities
- Western rangers teaching Anangu; Anangu teaching western rangers

Information and record keeping

Types of information

- land tenure
- weather (and climate)
- climate
- identification of existing biophysical assets

vegetation distribution
fuel loads and types
fire history – vegetation fire readiness
history:
- weather
- bio
- fire scars
history (broad fire history in central Australia in the past)
historical knowledge
fauna status and distribution
rare and threatened spp. locations
metadata
maps
- satellite
- aerial surveys
- ground truthing
resources:
- technology
- info
- equipment/how to use
- people
people:
- demographic
- stakeholders
- impact

Information management tools

data collection and storage – how to, standard formats
GIS
corporate memory – how to keep?
data management and retention of corporate knowledge
maps
ICIP and know-how

Information: collecting and using it

data collection and mapping:
- why to collect
- what to collect
- how to collect
- what does the data mean
what is the minimum amount of data to collect to provide maximum output?
why collect info
what to collect (what not to collect) detail, precision, density, frequency
how to analyse, store and present info
how to use available info
baseline data:
- creation
- maintenance
- updating
- managing
information management
simple clear info, process, knowledge sharing

Monitoring evaluation and review

monitoring:
- goals/objectives/indicators
- establish system/techniques
- process – who monitors
minimum monitoring required – most effective
monitoring tools:
- satellite images
- GIS databases → vegetation, fire …
monitoring and review
monitoring and evaluation, review:
- simple methods
- (sharing of information), communication of results
- able to be done in park
- regular review and comment from wider scientific and land management community
monitoring/assessment:
- permanent plots
- opportunistic plots
- schedule of assessment
- schedule of analysis
- feedback to strategy
strategies for evaluation, reassessment
evaluation:
identify gaps/deficiencies/successes
- timeframe
- process – who evaluates, what responsibilities do they have?
plan performance indicators:
- documentation
- reporting
- monitoring
desired outputs
- reporting
timetable for inter-agency review panels

Research

investigate new ideas that could save $, hrs, cost (open to ideas)
predicting fuel loads based on rainfall and vegetation type
post fire, estimating at what age a vegetation type will carry fire again, relative to rainfall, i.e. a model, graph or table format?
better post-fire documentation, info on all (most) fires (tendency to focus on a dramatic fire event)

Planning and strategies

Aims and objectives

management objectives
objectives
outline desired goals and outcomes

planning: set goals/objectives → strategic actions
- identify stakeholders/responsibilities
- identify available info/limitations
- identify boundary/scope
- timeframe

Planning processes

planning → implementation → monitoring → evaluation → revise and amend
triggers and protocols
limitations
fire management 'hot spots' [where] control of wildfire [is] essential.
ways of incorporating biological information into plans/strategies.
response to unplanned fires:
- assessment of risk
- access of available info – fuel/vegetation/weather, hotspots
- containment options
- notification/cooperative agency

risk assessment:
- seasonal conditions → rain, temp …
fuel loads
fire history
ROS [rate of spread] models

Location and size of prescribed burns for strategic outcomes (lines – location and width, etc)

annual burning plans:
- assessment of risk
- prioritise actions
- specify conditions and timing of burns

broad scale burning – aerial ignition, where and when
lines vs patches (and patch size)

Resourcing $ $ $ $ $

sourcing funds and resources
equipment and resources
resourcing
resource options: who/where
access to extra/outside resources:
- staff
- equipment
- funding

Implementation

current practice
current practices – what are they and are they working
methodology
methods of achieving goals, objectives:
- tools required
- documentation/monitoring
- resources – people, equipment, money

burning techniques
burning techniques and skills – fostering and passing on these skills
control techniques
safety, training, equipment
OHandS
handbook to use in the field:
- fire fighting best practice
- training
- skills
- traditional knowledge

where/when management is to be performed:
- maps, GIS
- schedules
- resources required

work plans
contingency plans

Session 3 (Monday: lunch to afternoon tea)

Fire management and biodiversity

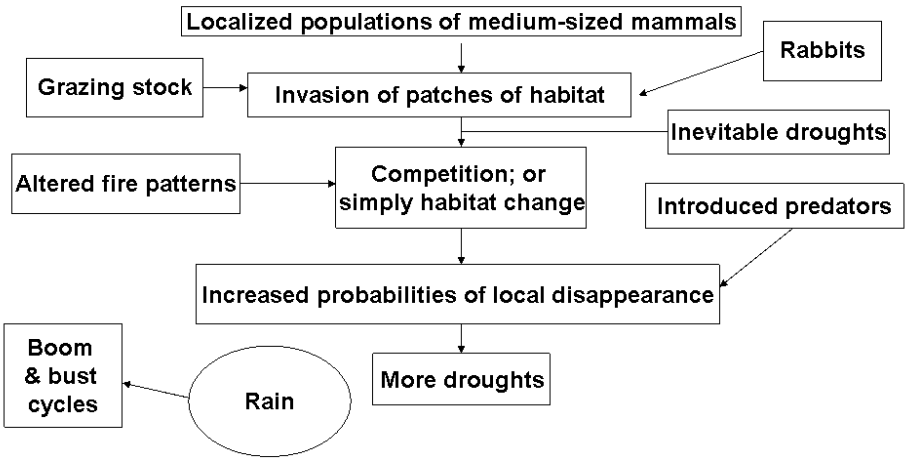
Presentation by Peter Latz: *Fire and Vegetation*
(what key vegetation values can be influenced by fire management)
(key points by Angus Duguid from notes made at workshop – corrections and additions welcome)

> Big fires have occurred at an interval of about 25 years since the 1920s and always following years of above average rainfall. Biodiversity has changed due to changing fire regimes, ferals, pastoralism and drought; significant extinctions have occurred. A major impact of fire is on the soil, which will be eroded at an accelerated rate by wind and water when vegetation is removed by fire. If the rivers run clean then the country is well managed. Fire can also kill soil-crusting organisms, which leads to accelerated erosion. Fire management involves both the protection of some places from fire and the active use of fire to create a mosaic of fire ages (particularly in spinifex). If assets are protected (infrastructure and fire-sensitive biodiversity) by fire breaks or fuel reduction, then patch burning can be undertaken more boldly. Fire management should focus on rare communities rather than just rare species. Managers need to know where priority communities are (i.e. map them). Community composition may change with climatic changes. Three categories: fire sensitive (e.g. *Acacia ammobia*), fire lovers (e.g. spinifex) and intermediates. Areas of old growth are important and fire management should aim to foster and conserve them. Fire sensitive communities can be identified by the presence of indicator species (combinations of 2 or more species).

Presentation prepared by Kasia Gabrys (presented by Angus Duguid): *Fire and Fauna*
(what key fauna values can be influenced by fire management)
(text derived from PowerPoint presentation)

Limitations of what fire can do
- It is difficult to analyse the effects of fire on fauna, as fire is overshadowed largely by climate
- Research that has been done has been largely short term, making it difficult to make sound conclusions from the study findings
- Some animals will be advantaged and some disadvantaged by fire
- The overriding theory is that pre-European settlement, Aboriginal people burnt regularly, creating mosaic upon mosaic patterns which produced different habitat age classes for different animals
- Some researchers, however (Dr Mike Smith), have shown that there were long periods when there was no Aboriginal occupation in central Australia, which meant that fire regimes were "natural" – leading to the conclusion that the animals in central Australia either left or adapted to these regimes
- Yet probably what most scientists agree on is that large, hot (as well as frequent) fires are not good for the majority of animals, particularly mid-sized mammals

You can not talk about the effect of fire on fauna in isolation
- There are other key effects that need to be taken into consideration
- The flow chart below (adapted from Morton's model 1990) shows some of the various factors that are believed to have influenced the extinction of medium-sized mammals since European arrival in arid Australia (60%):



When you talk about fauna and fire you are actually talking about habitat change

- Large mammals like kangaroos benefit from the nutritious green shoots after fire, yet this is dependent on rain (otherwise you end up with just a sandy desert)
- There are also some species, such as the emu and bustard, that have favoured fruits that grow in freshly burnt country
- Yet these species also need adjacent areas with denser ground cover for their protection from predators and for nesting (Paltridge)
- 3 major habitats that I will briefly discuss, with examples are:
  - rocky outcrop
  - mulga
  - (including mixed mulga) and spinifex (mallee) communities

Rocky range habitat

- Rocky range habitat, which supports 20% of our rare plant communities, serves as a fauna refuge
- These are the areas where the larger mammals like wallabies and possums migrate to, particularly during drought and fire times
- They contain important plant foods for animals such as the Black-Footed Rock Wallaby whose major food source is the fire-sensitive spear bush
- They also serve as corridors for animals such as the possum, that move between links of these gorges and mulga communities up to 20–30kms per day
- From the survey work done by rangers at Ormiston Gorge, possum communities decreased after the large 2002 fires, as mulga communities that were used by them to get into these rocky areas were broken up

Mulga communities

- Mulga and different plants that grow underneath it, like spinifex, make it the most tricky in fire management
- Generally mulga communities do not like fire, yet timely fire can stimulate germination
- The mallee fowl uses Mulga for protection from predators, nesting and sleeping, and has been found to be slow to come back to areas that are burnt (Benshemesh)
- Large and sedentary bird populations have been regularly found in Mulga communities at Uluru (McAlpin)

Spinifex habitat

- Different species prefer different spinifex burning patterns
- Desert mouse and mulgara show a general preference for mature spinifex, while the spinifex hopping mouse show a general preference for recently burnt habitat (McAlpin)
- There is some evidence to suggest that certain species require long-unburnt spinifex habitat such as the striated grass wren, spinifex bird and central pebble mound mouse (Paltridge)
- In 5–8-year-old spinifex, more reptiles have been found than in 25-year-old spinifex (McAlpin)

- Ideal patch size of fires in spinifex countries is likely to be highly variable among species, depending on their home-range size, mobility, social dynamics and capacity for dispersal as well as the number of patches burnt
- As much as habitat needs to be considered, it is also very important to build a safety factor into the fire and fauna model
- For example: even though an animal may favour old spinifex as a habitat, you can not just keep old spinifex, because when a big, hot fire comes through, the habitat (and species) perish

Geology and soil

- Apart from flora, it is important to take into consideration the importance of geology and soil which is so different from place to place
- Different soil types have been found to support different species and species numbers, such as at the recent experiments done at Uluru by Steve McAlpin
- Hard and soft sites (heavier soils and sandy soils) were chosen
- The hard sites showed relatively stable survey results with mainly sedentary birds in mulga habitat and few mammal and reptile
- The mulga habitats of the hard sites are far less prone to fire than the soft sites, and will only burn completely in very exceptional circumstances
- The soft sites showed extensive suites of reptiles and greater amount of mammals
- These sites were found to burn regularly
- Recently burnt spinifex habitat also showed an increase in mainly mammal and bird populations

What do we (think we) know?

- An increase in potential for wildfires can be predicted by the patterns of rainfall
- It is very difficult to determine fire frequency for individual species, yet alone multiple species
- Even though you may not know the long-term effects of fire on communities, we should still aim to protect them from wildfires and simultaneously create a range of different habitats
- By burning multiple small fires over time over a large scale, you are diminishing the risks of big fires and allowing for more fauna to reach protected sites
- Spatial and temporal biodiversity increases when fires occur in a variety of seasonal conditions and sizes over time
- There is a big gap between researching a species to managing a whole National Park (and biosphere), therefore land managers and scientists need to work closely together
- The longer a study runs (20–30 years) the more you can really learn about the bigger picture

What next? Active Adaptive Management – learning by doing

- Have to change your management according to your learning
- On parks, it is vital to know where your fauna is in relation to your plant communities and geology (biophysical mapping)
- It is necessary to continue to collect all fauna records on parks
- This assists rangers (and scientists) to know what is on park and in understanding pre- and post-fire patterns
- Mapping and recording of all burns is particularly important for further research where you are trying to implement and understand different habitat age groups
- There is a need to synthesise on a larger scale beyond just parks' tenure, with a proactive study and applied management on all lands
- Collaboration between land mangers is where the real challenge lies

Whole group discussion – fire management for flora and fauna values

(Reflection on speakers' presentations) (whiteboard record)

- Communities and habitats instead of individual species
- Got to know where they are
- It's the soil, stupid!
- More research – parks and scientists working together – long-term research needed.
- Need to prioritise target communities

- 'Significant' communities might change over time
- Using indicator species to decide what communities are important
- Get infrastructure protection done and then get on with landscape protection
- Importance of retaining old growth
- Need diversity of habitat for fauna and flora

Small group discussions

Group 1: Biodiversity – weed ecology (environmental weeds, especially buffel grass)
(TK, EL, DB, RE, PL, AD) (butchers' paper record)

What role for fire in weed management for biodiversity outcomes?

- Eradication – changed fuel loads, cannot be ignored
- Hot fires encourage buffel and probably most other weeds (? some woody exotics can be managed by fire)
- But can be part of control by reducing seed loads (only if sufficient follow up)
- Don't bite off (burn more) than you can chew (follow up control – herbicide/manual removal)
- Couch: burning will invigorate, so herbicide is more effective, but in riverine areas must protect old trees.
- If burning grassy weeds for eradication – protection of older/bigger trees and shrubs (e.g . Riverine)
- Containing these fires can be hard – may need mechanical (slashing?) control lines

Is it best practice? (working hard within resources)

- Are we being effective?– mostly/hopefully
  - so perhaps this is best practice?
  - Latz- most places better **not** to use fire for buffel control (some others may not agree)
  - more clear role in couch eradication (if that is possible)

What we need for best practice

- Monitoring and research (are we being effective?)
- Need mapping and strategy for controlling priority areas
- When to use fire for buffel: relatively small areas (a few hectares) and low values (e.g. don't need to protect trees)
- Buffel generates hot fires – need research about how to reduce wildfire damage
- Communications on importance in fire

Group 2: Flora: Biodiversity
(JS, CS, CD, JMS, VC, DS) (butchers' paper record)

What role does fire have in protecting flora values?

- We know what we *don't* want. Work towards reducing probability of what we don't want
- Use adaptive management to focus on *What We Want*
- Strategically, we need to know what and where our main assets are (including ecological assets)
- Concern over frequency of burns required to focus on *What We Want*
- Strategic breaks vs. patch/ecological burns
- ? Sacrificial areas to define/focus on
- We need to know how big burns need to be
- Currently leaning towards strategic linear breaks to enhance old growth, increase mosaic edge effect – 'If we stuff up, we burn a block, not whole area'

What is best practice?

- Process-based approach versus outcome
- Best possible knowledge of resources
- Knowing where communities are/require
- Work around that (mapping/data management)
- Needs continuity, transferable, standardised

How do we get there?

- Resource mapping
- Prioritising (zones)
- Consultation with stakeholders
- More research:
  - Identify and fill knowledge gaps
  - Synthesis of existing knowledge
- Feed back info to 'collectors'

Group 3: Biodiversity session
(PD, CD or CB? , GA, SA, KM) (butchers' paper record)

Now: What flora values can be managed by fire?

- Low-intensity fires within
- Primarily fire exclusion; exploit fire tolerant spp; neighbouring burns
- Insufficient burning
- Insufficient knowledge of spatial locations (esp. fire-sensitive)

Is it best practice?

NO

Where to:

- Survey of fire sensitive/significant locations
- Extended fire management across landscape with ACB – linked to fire tolerant vs. fire sensitive
- Extend fire knowledge to more individuals/empowering
- Cross-tenure application and engagement
- Defining fire tolerant vegetation
- Compromising on philosophies/values across tenure and land uses to facilitate burning – significant effort (not short-term and/or part time)
- Overcoming fear of burning/developing confidence to burn – both individual and corporate basis
- Better risk assessment – high frequency of review and action – responsiveness

Group 4: Biodiversity session - fauna management
(RP, MH, RH, MJ) (butchers' paper record)

What role does fire have in protecting fauna values?

- Changes habitat – food resources, vulnerability to predation, shelter, nesting
- Changes species composition or condition of animals
- Links between populations (fragmentation)
- Protection of Tjukurrpa animals

What is done now?

- Patch burning – the current philosophy
- Protecting certain areas – rocky areas, sacred sites, threatened species
- Break up country to protect from large, hot wildfires
- Cool fires to reduce damage and keep them patchy
- Management limited to parks – not bioregions (cross-tenure)

Is this best practice?

- Lack of information on communities/species and their requirements
- Protective burns have sometimes failed to keep out hot, large fires

What is best practice?

- Protecting whole habitats
- Better knowledge on community/species needs
- Longer studies
- Management to maximise spatial and temporal biodiversity – lots of temporal and spatially variable patch burns as a risk management strategy
- Monitoring, evaluation, and review – adaptive management'

How do we get there?

- Environmental economics – to place a monetary value on fauna?
- Monitoring designed specifically to investigate the effects of fire
- Longer studies – individual species and communities
- Mapping/inventory of populations – baseline data

Group 5: Biodiversity – all fauna

(SA, MS, SW, LL, JM, SM) (butchers' paper record)

- Soil
- Tjakura, skink, mala – roo, mulgara, birds (mulga), bustard, striated grass wren, goanna, snakes, Emu, kuniya, rabbits, camels, (ferals?)

Current Practice:

- Tjakara/mulgara
- Species specific management burns
- Yearly monitoring program? and report
- External consultant – park staff and TOs
- Their habitats protected from wildfire
- Senior TOs' assistance is limited but important
- Management burns – cool burn, goal
- 2–4 year age class/small area

Is this best practice?

NO – knowledge gap in relation to specific habitat requirements

Where to go from here?

- Know more about population response to wildfire (and management burns)
- Dissemination of information in reports to rangers – process of this –under how
- Have better knowledge of population status and distribution
- Protect populations from summer wildfire

How to get there?

- Having interpreters when consultants present reports
- Continue seminar presentation of results
- Develop other policies and practices for better information dissemination, e.g. scan documents and make available on intranet
- Examine and address research gaps
- More community surveys – systematic

Session 4 (Monday: afternoon tea to close)

Joint management

Presentation by Emma Lee and Mick Starkey:
Joint management at UKTNP and the Cultural Management Database
(key points by Angus Duguid from notes made at workshop – corrections and additions welcome)

> Emma spoke about the background to the current review of fire management at UKTNP and the vital role of traditional owners. Mick Starkey spoke about a database which the park has developed for cultural management.

Presentation by Sean Moran:
Central Land Council perspective on joint management
(key points by Angus Duguid from notes made at workshop – corrections and additions welcome)

> Sean spoke about the importance of people knowing the legal basis for land ownership of Aboriginal Land Trusts – The Aboriginal Land Rights Act. Aboriginal language skills are essential for effective work between non-Aboriginal land managers and traditional owners. Bush trips to visit country are important and better value than workshops for sharing information.

Whole group discussion – joint management (Reflection on speakers' presentations)
(whiteboard record)

Questions for small groups discussion:

1. Putting two systems (Aboriginal and western) together; a way of working together that's bigger than either by themselves and respects both ways
2. Strategies for achieving/engendering trust for good fire management outcomes

Other points raised:

- Protecting cultural sites from fire can also have biodiversity outcomes – ask the right people
- Community consultation – ask the local people
- Engaging right people in right way
- Aboriginal people (and their knowledge) will be here longer than non-Aboriginal people
- People fed up with newcomers asking same questions
- Implementation – doing it on the ground

Small group discussions:
(butchers' paper records)

Groups 1: Joint management strategies for engendering trust for good fire management outcomes
(participants not recorded)

- Finding connections, i.e. how does fire relate to other issues such as jobs
- United front within organisation for goals
- Talk to others who have worked in communities
- Work with young people so they can influence their families
- Using visual aids for information presentation
- Individual consultation
- Serious capacity building
- Junior Rangers/Community Rangers
- Rewards from Agency to Rangers/others who stay in the job
- New and innovative ways, may be as simple as rewording the question
- Celebrations for real program/project outcomes; BBQs

- Team-building exercises
- Valuing traditional knowledge/western science together
- Involvement in all levels of training

Mistrust:

- Selective opinion shopping
- Burning country without consultation/permission
- Employment regimes, i.e. contract labour, no long service leave or super
- Gender balances
- Loss of corporate knowledge – repetitive consults with TOs
- OHandS, PPE – sharing with Anangu (only rangers being kitted out.)

Group 2: Joint management: putting two systems together – that's bigger than either
(DB, CS, SA, MJ, MS, LL, GA, MM)

Now (Uluru):

- Respect, trust – people and knowledge
- Learn 'on the job.' Important to get out and do it – 'malpa' system – each other on traditional and western ways and knowledge
- Operations officer and deputy swap roles
- Use of interpreters when necessary
- Discuss burns on site with tjilpis
- Burn together, sometimes carry out instruction from tjilpis
- Men's/women's sites
- Get the younger people out on burns – obligation – tjilpis want to teach the younger – high priority for them
- Still do formal fire plan and use fire history data
- Involve in control burns and wildfires – seek advice
- 'Hands on' is paramount – learning by doing as well as formal theory/courses
- Biodiversity and tjukurpa/tradition. Goals usually overlap inside the park
- Safety gear required now, before anything goes for TOs on the burn. People accept most of the time.

How we can improve:

- Committee approach to fire planning
- Less turnover of staff to enable better relationships and trust with TO and knowledge retention
- Data management and communication of information
- NT Parks policy of moving staff 2–3 years, makes it difficult for TOs to build relationships
- Check NT Sacred Sites Register

Group 3: Joint management: putting two systems together – that's bigger than either and respects both ways
(RH, PL, KM, SN, JMS, RE, PD, DS, JM)

Current system:

- Joint management starting in NT Parks – plans of management
- Aboriginal people have good observation skills and local knowledge – quick to take on

Aspiring to:

- Engage people in flexible employment program – assist, observe, feedback, planning, fire strategies

What's working well:

- Willing participants
- Annual fire action plans (endorsed by experienced employee)

What's not working well:

- New staff
- Funding to keep employing Aboriginal people

Other points

- Joint management will provide opportunity to engage people.

- Aboriginal people probably never had a fixed fire management plan – happened automatically as they travelled.
- Aboriginal people have a good knowledge of fire that can be adapted to protect assets.
- Getting people (rangers/TOs) out on country together – doesn't have to involve burning!

How?:

- Well known, committed, facilitates **whole** process (planning to implementation)
- Difficulty in getting younger people involved
- Fire has capacity to engage young people
- Strategies/activities to engage young people
- Learn by being shown (both ways)
- Need to know if cultural sites need protection
- TOs make decisions about cultural sites
- Consultation
- Systems for involvement (e.g. College kids)
- Feedback/reporting/monitoring
- Corporate memory
- Jobs, careers, superannuation etc.
- Training (appropriate) – (practical e.g. mapping)
- 'No substitute for local knowledge'

Session 5 (Tuesday: start to morning tea)

Information and record keeping

Presentation by Grant Allan: ***Mapping and analysing fire history for better fire management***
(text derived from PowerPoint presentation – doesn't include any of the important maps or diagrams or description of them)

Fire history, issues and opportunities

- Scale and resolution of fire history data
- Validation/accuracy assessment
- Fire characterisation
- Fire regime analysis
- Fire risk assessment

Scale and resolution of fire history data

- NOAA AVHRR: Regional perspective, freely available, locally inaccurate
- Landsat: local perspective, not free, increased accuracy

Validation – accuracy assessment

- Landsat mapping to validate NOAA AVHRR: only 60–80% accurate
- Aerial transects and/or ground data for Landsat: only 80–90% accurate
- Potential for Ikonis/Quickbird images for validation of Landsat or simply higher resolution mapping (but at increased costs)

Fire Characterisation

- NOAA AVHRR data: generally not individual fire specific; approximate area burnt only
- Landsat: should be individual fire specific; approximate date of fire occurrence +/- 16 days intervals
- Important fire statistics (resolution dependent): number of fires/patch size; ire age of patches burnt; potential patch shape characteristics

Fire regime analysis

- Fire age
- Fire frequency
- Fire interval: including species sensitivity analysis
- Time since fire
- NOT fire intensity
- Mean and variance of area burnt and probability of burning: COMPLEX spatial concepts

Fire risk assessment: The interpretation and assessment of spatial fire history in combination with landscape and seasonal conditions

- **Inputs:**
  Current fire history
  Landscape stratification by fuel type
  Fuel state by fuel type
  - Ground or model-based values
  Rate of spread models for each fuel type
  Weather conditions
  - Both current and future

- **Outputs:**
  Spatial representation of fire potential:
  -e.g. NIL/Low/Moderate/High
  Associated evaluation:
  - WILL IT BURN ?
  - SHOULD IT BURN ?

BUT : what are the limitations of our current fire history datasets?
Relatively short-term fire history relative to many species' life span
Incomplete fire history from the 1970s
Limited spatial extent of good fire history data
- many areas are without a mapped fire history
The current spatial pattern of many vegetation communities is not explained by available fire data
The spatial patterning of individual species is below the spatial scale of Landsat fire history
Requires money, software, remote sensing skills

Presentation by Vanessa Chewings: *DEH contract: Uluru Fire and Vegetation Strategy GIS datasets* (prepared by Vanessa Chewings and Joe Breen).

- DKCRC has a contract with DEH to develop a fire and vegetation strategy for UKTNP. CSIRO's role is to develop an inventory of datasets; the project required data layers to a standardised mapbase (GDA 94), fill some data gaps and develop documentation.
- We acknowledge the considerable expertise of present and former Park staff and Grant Allan in developing information layers over the last 20 years.
- Inventory of datasets: infrastructure, roads, tracks, CAD surveyed (roads, tracks, buildings, walking tracks), GA topographic data, fauna/flora sites and attribute data, satellite imagery – mainly acquired for fire scar mapping. Also AGO dataset 14 time periods 1972–2004. Fire history mapping (1950 and 1976), the Park has been getting fire scars mapped mostly on an annual basis since the 1990s. These layers were used to generate a 'time since fire' map, using 0–2 years, 3–6, 7–9, 10–20, and 20+ years. However, individual fires are not separated for each time period.
- Given the large number of datasets obtained from UKTNP, we will concentrate on the ones needed for this project.
- A data gap is good, regional-scale vegetation mapping. Mapping is patchy within the Park. We are creating a composite map using 2003 mapping of buffel grass and existing land unit mapping (mulga) and sanddune layers to create a spinifex/non-spinifex data layer.
- Example of rare community map: area south-east corner of Park. landunit 5e1, Ac Ammobia on dune crests. 1976 fire burnt one area, most of this burnt again in the last few years.
- As far as possible we are using existing standards for data management protocols. Metadata (information about data) is a boring but essential part of capturing organisational knowledge, but it can be difficult to get user buy-in. The metadata standard used by ERIN and DEH is ISO 19115. ESRI Arccatalog is used to create metadata.

Questions posed:

- Which are essential datasets that managers are likely to need/use?
- What sort of interface do users require for accessing/updating this information?
- Can we identify data management protocols which will assist corporate memory and cross-tenure management?

Presentation by Jon Marsden-Smedley: *Information for fire management – a Tasmanian example*

Summary from Jon

- The most important thing is to just get out there and do fire management.
- In parallel, observe what happens and use the information to refine future management (i.e. adaptive management).
- TOs can play a major role through their on-the-ground knowledge and observational skills.

- Even if we have incomplete knowledge of where we want to end up, we know where we don't want to be. So, if all we do is reduce the chances of adverse outcomes, we should be moving in the right direction.
- The example for the Tasmanian Parks Service showed that it is possible to design a system which has a relatively simple user interface so staff with only moderate GIS skills can get useful data out of it. The Tasmanian system also allows users to get more info as their skills improve.
- A similar system could be easily developed for central Australia. The system could be developed to include a vegetation map based on functional groups and a fire history map.

(The following text was derived from Jon's PowerPoint presentation but doesn't include any of the important maps or diagrams or description of them)

Tasmanian Parks and Wildlife Service fire management mapping system

- make map data available for fire management
- summarise the huge amount of data into a format usable by field staff
- targeted to land management outcomes
- typically non-expert users
- major issue with continuity and corporate knowledge
- MapInfo workspaces
- standardised databases
- 'drag and drop' maps
- system widely adopted for general management

Fire management

- fully acknowledged that our knowledge of desired outcomes is less than optimal
- biodiversity, cultural management, public safety???
- BUT
- our knowledge of what we don't want is more than adequate: large, frequent, high intensity fires leaving few areas unburnt, burning alpine and rainforest, expensive suppression
- if all we do is reduce the probability of adverse outcomes then we will have gone a long way to achieving our goals

Tasmanian fire management mapping system

- information provided at a range of levels
- top level: simple and easy to use
- full data available for experienced users
- user-driven and controlled
- 'mature' technology: reliable
- internet capable but not internet dependent
- easily updated
- current data
- fire management data: November each year

Fire management planning

- range of plans developed
- Tasmanian Wilderness World Heritage Area
- Freycinet National Park
- Rocky Cape National Park
- Arthur-Pieman Conservation Area
- Snug/Coningham Nature Recreation Areas
- plans updated as required
- current information
- distributed electronically
- full map data
- low cost

Prescribed burning

- schedule and areas planned for burning
- assets, hazards, boundaries

Wildfire control operations

- stand-alone system
- full range of map data on computer
- remote and/or non-networked areas
- community centres, fire stations, vehicles

Planning section of IMT

- fire mapping and prediction
- optimum locations for fire operations
- Incident Action Plan and Situation Reports
- rapid production of maps
- 30–60 minute time frame

Map outputs

- paper
- fire crews
- geographic features
- fire location
- control lines, sectors
- hazards
- map grid, labels
- appropriate scale
- electronic

- email, CD, data-stick
- jpg, tab, shape files

Map information

- MapInfo: 6300 files, 11 GB
- 'drag and drop' maps
- base information
  - topographic maps
  - contours, drainage, grid
  - roads, 4wd tracks, walking tracks
  - cadastral, tenure
- flora and fauna
  - vegetation functional groups
  - fire sensitivity and flammability
  - rare and/or threatened species
- cultural heritage – European and Aboriginal sites
- geology– simplified types, erosion potential
- fire information
  - fire history
  - water points, fire trails, control lines
  - machine exclusion zones
  - standardised map symbols
    * tenure
    * vegetation type
    * functional groups
    * fire history
    * flammability

Transfer information with GPS units

- rapid two-way data transfer
- standarised GPS units, software, cables, Garmin
- firelines, fire behaviour, hot spots, control lines

Information transfer

- burn files to CD or data-stick
- effective transfer of information
- in-coming Incident Management Team
- archiving information

Whole group discussion – reflections on speakers' presentations (whiteboard record)

Information and record keeping

Main topics for small group discussion:

1. *Interpretive parts of GIS – lot of money spent gathering data but not well used – what support systems are required?*
2. *What are the bits of data that need to be converted to fuel, flammability (layers with/data that people want to work with)*

Other points raised:

- Monitoring- including fuels
  - What is best practice?
  - What are the barriers?
  - How do we do it better?
  - What do we need to monitor?
  - How is info collected and fed back- adapt management
- Resources – what's real?
- Flammability linked to vegetation types

Small group discussions on associated issues (butchers' paper records)

Group 1. What do people need to do best practice fire management?
(RE, EL, JS, JM, AD, GA, SA, CD, MH, MJ, SB, MS, LL)

- Fuel information
- Important info gap – judging readiness to burn/likelihood of burning under different conditions
- What info contributes to this assessment:
  - Fire history, weather, vegetation types, past experience, time since fire
- Graph of fuel accumulation vs. time for different weather patterns and temperatures
- SA – calibrating Grant's 'Flammability threshold' graph.
  – (This has the potential to be used in risk assessment.)

What's collected now

- Currently **not** collecting fuel data – **observing** but not **measuring**
- PWSNT: base-burning strategy on locations of breaks
  - fuel assessed on this basis
  - burning program based on strategy, rainfall, what happened last year
  - based on gut instinct rather than any measurements
- This is qualitative, dependent on experience = highly unreliable/variable
  - critical missing info is assessment of likelihood of x-year-old burnt sections to hold in various wildfire situations, i.e. threshold available in different plant communities

Want to get to ability to predict when vegetation [burnt] in past will get to a critical burn ability state.

What are research needs for assessing thresholds?

1. What can GIS do at present? The species ROS model requires measured inputs, i.e. people collecting it on the ground.
2. What other data do we need to collect?

Best practice

- = rangers/operational staff doing on-ground measurements
  - crown separations, vegetation height, species, quantity of bare ground
  - how **much** sampling needs to be done; will this reduce over time?
  - are there other surrogate measures e.g. 'greenness index' we can use?
- Proposal: to put this problem up as a research proposal, e.g. to be carried out in key communities (such as 3 parks)
  - problematic occurrence of rainfall – time series can be derailed by lack of rain during research project
- Another way is to start with an approximation (as a model) to be tried and refined and recalibrated
  - at UKNTP the tjilpis and young rangers like Mike Starkey, have this model in their heads as an **accurate** system; this cannot be captured/downloaded
- Problem of patchy info (e.g. spatiality in terms of localised rainfall)
  - need further weather observations (e.g. set up automatic weather station somewhere along the Yulara–Kata Tjuta road)
- Contrast between Anangu knowledge and scientific approach – need ways of bringing these together and of ensuring skills/knowledge transfers and continuity. Need to consider IP, language barriers, different value systems, continuity and problem of brevity of ranger tenure in light of the great value of personal knowledge and experience.
- Need to integrate scientific and Anangu systems of knowledge, e.g. is there a way of developing a pseudo-intuitive knowledge base using a pseudo-scientific approach, e.g. using internet weather information, photo points.
- Knowledge of spinifex responses to rainfall is poorly known
  - too many variables, too long time intervals involved, too much variation between spinifex, species and sites, etc.
  - need to balance information collection effort against the utility/value of the information collected.

- use of videotaping of interactions between tjilpis and rangers in relation to fire management

Group 2. Better utilisation of GIS on parks/support systems required
(RH, JMS, SN, CB, DS, CS, DB, TK, VC)

Now:

- Using fire history to judge where to go and burn
- A map doesn't adequately tell you the whole story
- Being there, on-the-ground, learning and experience
- Maps are in a format field staff are using
- Maps are generated by trained rangers
- Stand alone tech (Tasmania), on-ground printing
- Different agencies dealing with their own patch – resources not being pooled, no cross-agency communication
- PWSNT lack strategies that could be developed with data we have now
- Lack of IT support

Where to:

- One standard system for central Australia
- We all use ESRI
- Capacity to get the info out to those who require it (field staff/fire staff)
- Get something that works for one and distribute to regional agencies
- Making data/system simple; easy to use systems
- Incorporating GIS within Rangers' projects
- Feeding data and the analysis back to collectors
- IT support – important; on the ground
- Minimal IT support system
- Basic training and continual use
- Customise user interface – easy data input/map creation
- Reporting mechanism – link with current data collected/responses to fire report generated- how many man hours/tools used/money spent

How to get there:

- IT/GIS communication strategy – deal with all levels of management from field to office management
- Making GIS a priority – within organisation and within each work centre. Top down and bottom up. Push for GIS funding.
- Regional strategy – one major set of data that is shared: standards.
- Regional Land Management Forum – how to use the resources we have.
- When workshopping – formal actions and delegated officer to follow up.
- GIS more accessible: Jon's CD; PWSNT: when you have two computers and five rangers, resource dependent.
- Use mature technology
- Making databases simple – options to concentrate or redirect money for temp. time with an outcome; targeting time in an opportunistic way, e.g. large rainfall events important to focus on fire plan.
- Proposals that explicitly state what the outcomes and positive benefits will be to aid in redirecting funds (can also be cross agency)
- Maintaining ranger training camps and ensuring GIS is an important part of the camps.

Session 6 (Tuesday: morning tea to lunch)

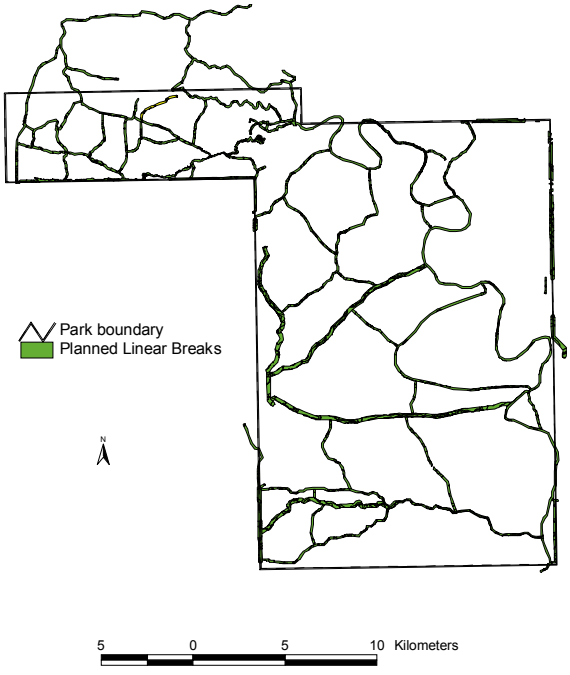
Planning and strategies

Presentation by Angus Duguid: *PWSNT current planning and strategy practice*
(text derived from PowerPoint presentation)

- Need agreed terminology:
  Planning = Making decisions about w*here* and h*ow* to burn (for controlled/prescribed burns) and decisions about associated fire activities

  Strategies = Organisation of resources to attain a desired outcome (note military origin of term)
  Strategies are related to 'planning' and include
  ' ways of manipulating fuels and vegetation'
  - (e.g. strips vs patches)
  - (e.g. location of strips)
  - (e.g. proximity of burns to 'fire sensitive' vegetation)
  - (e.g. timing of burn with respect to fuel accumulation)

  Strategies may also be in the form or long-term planning documents.
  PWSNT currently has: Annual Fire Action Plans for each Reserve
  Some parks have longer term plans (~10 year span) = strategy documents
  - these are mostly old or in draft form and are often short on specifics
  - some have relatively detailed mapping of strategic fire break locations (e.g. FGNP)



  Annual action plans - PWSNT
  Template of desired content
  Summary description of each intended burn (*based on a) d*atabase of information about proposed burns and GIS data on proposed locations
  Summary table of priorities (*including)* requirement for low intensity fire weather conditions

  Descriptions of proposed burns include:
  - priority
  - assets the burn will protect (infrastructure and biol.)
  - width and length; or patch size
  - need for reconnaissance
  - control lines: need for, location, whether flagged, preparation method
  - terrain and fuel characteristics
  - location of fall back control lines/contingencies and risk assessment
  - estimate of resources needed

Long-term strategy documents for individual reserves
- currently no template

Suggested questions for group discussion:
Q. What is the essential information for planning?
(a) long-term (b) annual
Q. Can we devise a checklist of planning actions/steps?
Q. What is the required content of long-term strategy documents?
Q. What fuel management strategies – when and where to use:
- (e.g. strips vs patches)
- (e.g. location of strips)
- (e.g. proximity of burns to 'fire sensitive' vegetation)
- (e.g. timing of burn with respect to fuel accumulation)

Presentation by Chris Brock:

Using Biophysical mapping to prioritise fire management on parks

(text derived from PowerPoint presentation – doesn't include any of the important maps or diagrams or description of them)

Biophysical mapping

- Provides land information
- Provides a botanical overview of the park
- Provides a platform for management decisions
- The corner-stone of best practice fire management

Information layers
Information related to fire

- Fuel loads
- Natural fire breaks
- Fuel-accumulating species
- Fuel-producing habitats
- Fire tolerance of species or habitats
- Fire-sensitive species or habitats
- Minimum fire return time/period

Watarrka Vegetation communities
Fire sensitivity

- Fire sensitive species usually refers to long-lived obligate seeders such as mulga, hill mulga, Thryptomene (Aluta)

Fire-sensitive indicator species

- Species whose presence indicate a history of infrequent fire
- Many of these species can accumulate as time since last fire gets longer
- Areas that have more of these species have a history of less frequent burning

Fire tolerant

- Defining fire tolerant areas gives certainty to managers burning for fuel management purposes
- These are the most preferable areas to position fire breaks as the vegetation is generally little effected floristically by short term fire regimes
- Fire tolerant habitats are full of re-sprouters or short-lived seeding species.

Defining fire tolerant areas

Working with fuel loads

- We want to know:
  - Fuel loads
  - Potential of an area to carry high fuel loads
  - Where are natural fuel breaks
  - Are there areas where heavy fuel loads and fire sensitive zones exist in close proximity?

Fuel load attributes

- Fuels accumulate at different rates depending on the species present and the productivity of the habitat
- Fuel reduction can be long lasting depending on the habitat; compare spinifex hill to a grassy valley

Different approaches

- Defining important areas

Rating cells for particular values related to fire planning

- Fuel load (High, medium, low)
- last time burned (>50, 20–50, 10–20, 5–10, 0–5)
- fuel type; 'will it burn' (spinifex, soft)
- regime for communities

Biodiversity burning

Fine scale biodiversity management

Planning for changed conditions

- coverage showing soft grass covers

Confirming choices

- Point plant records
- rare fauna records
- Satellite imagery

Rare fauna

- Reptiles, birds, mammals

Presentation by Jock Morse: *Background and proposed structure of new UKTNP fire management strategy*

(text derived from PowerPoint presentation)

The process: 1 – Review of fire management to date

- Review past fire management – what was done and how and assessment of effectiveness of fire management against objectives
- Consult with traditional owners and experienced Anangu fire practitioners
- Discuss fire management with rangers and other relevant parties
- Review fire management schemes in place elsewhere
- Use case studies to analyse past practice

The process: 2 – Develop new approaches

- Clarify fire management objectives applying in the UKTNP region
- Identify effective ways of doing fire management
- Clarify roles of different players
- Identify elements of effective fire management missing from the current UKTNP approach

- Integrate the various streams and elements into a new scheme

The strategy – Basic principles

- The bedrock of joint management
- Overriding objectives –
  - protection of Tjukurpa sites,
  - biodiversity conservation
  - wildfire control/attenuation
  - protection of life and property
  - regional scale management.
- No management without planning and monitoring

Fostering traditional burning

- Central role for senior Anangu fire practitioners in planning and implementation
- Effective inter-generational knowledge and skills transmission
- Senior TOs to take responsibility for protection of Tjukurrpa sites
- Build working relationships with neighbouring land trusts

The strategy – main elements

- Monitoring and information management using GIS and targeted data collection
- Annual planning cycle based on fire history, rainfall and vegetation characteristics
- Recognition of the need to respond to occasional high rainfall periods
- Increased patch burning – more fires and larger area burned each year
- Strategy to concentrate on burning spinifex, protecting mulga and other special vegetation and creating habitat diversity
- Dealing with buffel grass around the monoliths

Whole group discussion – reflections on speakers' presentation (whiteboard record)

Planning and strategies – topics for small group discussion:

1. Contents/components of fire management (individual burn) plan (how to do it on the ground) that is:
   - maintaining impetus/commitment for fire management
   - loss of corporate knowledge/high turnover
   - risk analysis/assessment for priority setting

2. Contents of fire management longer term strategy
   -how to make objectives clear and unambiguous
   -terminology better defined
   -risk analysis/assessment for priority setting

Other topics discussed

- Resources:
  - temporal considerations – how to convince managers to allocate funds for future
  - best use of
  - linked to priorities
  - $ biophysical

Small group discussions (butchers' paper records)

Group 1. Contents of a fire management plan and how to do it on-the-ground
(GA, MA, TK, CB, RP, DS, SA, MH)

Level 1 priority contents

- Collection of individual burn plans to meet season objectives/park
- Seasonal condition in lead up:
  - Rainfall, fuel loads, access, resources
  - Priority, type, and location of fuel loads
- Feedback mechanisms – annually
- Annual updates of database – costed/budget
- Report on previous year's outcomes/wildfires

Level 2 priority contents

- Next level – information to enact each burn plan
- Optimum weather conditions required to conduct burn
- Format: map, written, electronic
- Rationale for burn plan/fire management plan
- Incorporate where info came from which is used to base decisions on (e.g. TOs, Latzy)
- Qualifications/experience standards for people making decisions
- Contingency plans – something to fall back on
- Notifications – neighbours, stakeholders – fire checklist of actions
- OHS check and safety briefing
- Communicate objective to crew
- Record climatic info on the day
- Record burn effectiveness – GPS, debrief staff, TOs
- Report on and feedback outcome to staff
- Master copies and field copies of maps
- Exchanging roles/define roles
- Consultation with experts - recorded
- met Bureau, flora, fauna, NT Bushfire Council, TOs
- 4-day weather forecast
- GPS in field to map fire boundary when patrolling boundary/blacking out
- Photopoints
- Reconnaissance pre-burn, post burn fire
- Opportunistic observations recorded
- 'Flags' on map – priority things to protect e.g. ROS Sp.

Barriers/future opportunities:

- No defined fire planning officer in park (UKTNP)
- No fire management strategy (UKNTP)
- Some of our group's suggestions may be a barrier – acceptance, additional paperwork?
- Local weather info – portable weather station?
- Post-fire aerial obliques for accuracy and evaluating fires and/or video
- Video traditional fire/burning techniques
- Record unusual fire observations

Group 2. Contents of fire management strategy (long term)
(JMS, VC, DB, CS, JS, SA, CB)

Now: Dusty, dog-eared

Content:

- Regional Level Strategy
- Park Fire Management Strategy

- Background data*:* refer to other docs; maps
  - Summary of veg communities and response to fire
  - Cultural mapping/areas not to burn

How:

- Scope (motherhood statement)
- Key Performance Indicators (timeframes)
- Technology and monitoring and resources to get KPI
  - human; data; tools; $; helicopters
  - training requirements
- Prioritisation and justification:
  - Specific objectives and specific burns over 10(?)-year period
  - Refer to annual plan – outline process/timeframe/refer to plan template
- Data collection and protocols
  - (Appendices) – metadata, naming, attributes
- Monitoring and review

How to achieve model – What is the best model and how to get there?

Action:

- Scope a range of inter- and intrastate and international fire strategy
- Internal park staff?
- External consultants?
- Ensure integration with all stakeholders
- Dedicated Fire Officer within parks? Should they write or just
- input?
- Fire Task Group – corporate knowledge; project manager; overseer

Other points

- Proper funding and resourced (cost of producing strategy is significant!)
- Access and support and interaction with specialists/scientists.
- Resource sharing – make more strategies (within the strategy)
  – formal agreements/arrangements
- Ownership of the strategy/model

How do we know it's the best model?

- People are using it.
- It's being reviewed/updated.
- Not dusty.

Group feedback: that TOs had been consulted on range of options available, most appropriate chosen on the day.

Tasmania: Regional example – World Heritage Area Management Plan:

- Big picture across all land/cultural management areas
- Strategic Fire Plan – covers broad areas; has detailed info
- Site Specific Detailed Plans – for specific issues/problems
- Fire Action Plans – technical level plans
- Individual Burn Plan – burn specific; detailed number of litres required/vehicles/people/equipment.

Group 3. Long-term strategy for fire management

(EL, JM, SB, MS, LL, RH, RE, AV)

- Statement of scope (coverage, applicability, time span)
- Explicit value statement
- Glossary
- Background – context from all relevant cultural perspectives

- Summary of strategy/overview of explicit aims and actions, objectives, roles and responsibilities, budget and timelines
- Justification/support documentation
- Implementation of action plan!
- The Warburton experience: Lack of resources and support – same strategy process as Uluru? Yes

Some relevant questions

- Strategy covers all vegetation?
- How do you present information about what you burn when? (vegetation sp.)
  - JM – by creating zones in the park with specific management actions/outcomes attached to vegetation types/management needs/fauna sp.
- How do you make decisions as to resource allocation and prioritising?
  - Actions – legislative imperatives and TO Consultations and abutting land use consultation and agency/organisation culture/priority
- How do you include surrounding areas into a park strategy?
- To manage fire you must manage on the scale of wildfires
  - (i) Consultations with neighbours/relevant agencies
  - (ii) Protocols for facilitating 'other' land managers
  - (iii) Training on regional levels?/Community rangers

Session 7 (Tuesday: lunch to afternoon tea)

Implementation

Presentation by Angus Duguid: ***Introduction and brain-storm***

Doing more with less
Training/Enabling New Staff
Maximum gain for minimum effort (**not** maximum gain for minimum area burnt)
Checklist of things to check before burning

Whole group discussion – reflections on speakers' presentation (whiteboard record)

- Implementation
- Training of new staff – what areas do they need to be trained in?
- Buffel grass – what can we do in buffel grass fuel to control fire risk (Simpson's Gap)?
- Burning techniques – what works and in what situations?
- Fuel breaks – how wide?

Small group discussions (butchers' paper records)

Group 1. Buffel Grass Simpson's Gap model – implementation
(RH, CS, CD, JMS, TK)

- Series of linear (width 100 metres +) breaks, not patches, based on roads, fence lines, creeks, and slashed spray breaks (sacrifice areas that may be burnt frequently)
- Initial reduction of biomass – burn with resulting loss of mature vegetation – River Red Gums, Corkwoods
- After reducing biomass can use mechanical and chemical means (slashing, brush cutters around assets – labour intensive). Currently use Roundup, but experimenting with residuals, Velmac. Velmac trials need to be assessed/written up before expanding
- All about fire management (hazard reduction) not weed management
- Right time to burn buffel – when? Time of day, moisture content
- Hard to control and put out once it gets going
- Not enough mechanical application (slashing etc.)
- Catch 22 – increase buffel by disturbing the area through burning and disturbing soil. (This is why linear breaks, not patches.)
- Risk of spreading buffel into other parts of park through lack of hygiene, cleaning down quads and vehicles, contractors, wallabies, ferals, etc.
- OH&S risk if we don't control buffel; high distribution coincides with assets and major visitor attractions
- Don't burn repeatedly if you want to retain other biodiversity. Fire is not an effective control.
- Insufficient breaks – number and width. What is the right width for high intensity buffel fire – CSIRO Nth NT Paper?
- Knowledge gap – need cost effective alternate controls
- The overall aim of buffel burning is to reduce the risk of large scale, hot, uncontrolled, damaging wildfires.
- Protect assets – provide control lines to back burn from in the event of wildfire
- Current methodology refined after 2001/02 fire events, so as yet not fully tested
- Same methodology being used to protect Alice Springs from fire

Techniques and equipment:

- Buffel fires easier to control if using foam
- Blowers useful to mop up buffel fires and control prescribed burns.

Assessing buffel burn effectiveness:

- Initial assessment of impact on other species
- Assess % of buffel burnt
- Can't be effective without follow up – slash or spray
- Whether breaks will carry a summer fire.

Group 2. Rocky Ranges
(AD, SA, SN, CB, JS, GA, MJ)

Now:

- Timing dictated by fuel type, load, greenness
- Soft grass – afternoon
- Spinifex – morning, afternoon
- In-between times is the problem: too little fuel to burn/too much and will carry fire (soft grasses)
- Trial and error but can be more strategic by quantifying fuel loads and moisture, diurnal sampling, etc.
- Record fuel moisture for future assessment of fire success
- May need to settle for small successes that require numerous burns/maintenance.
- Very hard to record, conditions change so quickly so always have backup plans.
- Who's making decisions? Adequate training, Bushfire Level 2 training
- Test the fuel in 2nd priority burn and if it is all going ok then burn critical burn.
- Summary of prevailing weather patterns of the park to transfer knowledge of weather patterns to new staff
- Record weather conditions – local (kestrel?), not just because you need them to assess success in future
- Ring local forecaster for specific report – define situations where it is mandatory

Best practice:

- Burn breaks on both sides of tracks to enable use in fires
- Record weather, fuel moisture, fuel load
- Speak to neighbours
- Get forecast
- When a break fails, go back and analyse why
- Watch fire behaviour and record it
- Line placement to avoid danger vegetation.

Group 3. Implementation – Sandhill country (Tali)
(RE, DS, JM, EL, SW, LL)

Current situation: 'Foot Falcon'

- Talk to senior people first to assess right area to burn
- Look at maps
- Discuss what's achievable by assessing what will burn, conditions, etc.
- Backburn to establish a line along dune – allows for scouting for artefacts, etc – and judge fire behaviour
- Women establish breaks/clean areas and men walk towards women's smoke, lighting as they go
- Very dependent on wind conditions
- Use drip torch, firestick (corkwood/mulga), spinifex, matches, rake-hoes, (trialled gas burners)
- Rely on thryptomene and low vegetation on dune tops to provide initial breaks
- Light up early in morning – lunch, also night time
- Depending on intensity – mop up in 24 hrs post-burn
- Rake-hoe to clear fuel from below desert oaks pre-burn

- Identify high risk areas, e.g. desert oaks for spot-overs, increase density of mulga
- Use natural – topography, e.g. dune tops
- Breaks – vegetation types, e.g. thryptomene
- Use man-made: tracks, breaks, roads
- Cultural sites are not mapped – TOs hold that info and are involved in managing those sites through consultation
- TOs involved in defining zone boundary in on-ground planning
- Contingencies discussed and recorded
- Hunting afterwards; monitoring at same time

Best practice – How could we do things better?

- Review what we do
- TOs be given opportunity to take on active responsibility to be involved in site management
- Recognise there is no need to map cultural sites – speak to TOs
- Joint activity can help PWSNT and TOs do fire activities on adjoining pastoral properties.
- Improve follow up: mapping, recording, rehabilitation (vehicle tracks)
- Electronic recording and use of intranet to improve access to info and park database
- Actively engage senior/younger people in planning/conduct of burns
- Record indicators of a successful burn
  - animal tracks
  - regrowth/no weeds
  - minimal soil disturbance/erosion
  - Tjilpis are happy: w*aru wiru*
- Monitor and maintain fire lines post-burn
- Increased confidence in traditional practices by education/videos?
- Better orientation and training for new rangers
- Minimum fire break in sand hill country: (~2 m on normal day with low wind)
- Extend burn plans beyond park boundary and involve communities

Group 4. Factors influencing how wide a burn break is?
(participants not recorded)

- Purpose?
  – is it to hold up under all conditions?
  – fuel break
  – un-staffed containment line
  – control line – something to work off
- How long does it have to last?
- What vegetation type is adjacent?
- Line placement – take substrate into account
- Thick spinifex/thick spinifex adjacent, mallee/mulga over-storey
  - hold up under all conditions, recommend 200–250m at least for breaks; won't hold everything so patch burning is more reliable to contain wildfires.
- Lines do provide points of operation and control.
- Patchy burns enable diversity of habitat – associated with high frequency of ignitions. Protect sensitive habitats and burn out the rest in low intensity fires.
- Try to protect big, hollow habitat trees. Where resources allow, choose low intensity conditions to protect them instead.

Session 8 (Tuesday: afternoon tea to close)

Whole group discussion – Final: Workshop evaluation

What did we miss?

- Training information package
- Research possibilities, i.e. what areas can research assist?
- Institutional arrangements/organisational culture – what needs to change to support best practice fire management? E.g. policy support to make fire management more responsive to big events.
- Individual species requirements – still a big knowledge gap that managers need
- Communication
- Fire/fauna interactions
- What can interstate/international strategies offer? e.g Karen Smith, SA Parks-standards, western NSW mallee, Western Australia spinifex examples (Neil Burrows)

What will you do now?

- Outcomes will go into Uluru Management Plan – Jock
- Maybe run a similar workshop for TOs
- Discuss resource shuffling with managers to improve data management (PWS)
- Vegetation/fire interactions (Jon MS) paper – possibly publish with report of this workshop
- PWSNT fire task group has picked up lots from Uluru experience
- Uluru mob has learned from PWSNT experience
- Follow up workshop to review how best practice fire management is tracking
- Make a DVD
- Facilitate cross-boundary fire management (CLC) between Aboriginal lands and Parks
- Warburton TOs to visit Uluru mob to share experiences

List of participants

Name	Organisation	Mon 5	Tues 6
Grant Allan	BFC scientist	✓	✓
Steve Anderson	UKTNP ranger	✓	✓
Danny Barrow	PWSNT ranger	✓	✓
Chris Brock	PWSNT scientist	✓	✓
Vanessa Chewings	CSIRO	✓	✓
Shane Brumby	BFC Regional Fire Control Officer	part am	
Jocelyn Davies	Desert Knowledge CRC Research Leader	pm – joint management session	
Chris Day	PWSNT ranger (CDR)	✓	✓
Peter Donohoe	CLC – Joint Management	✓	
Angus Duguid	PWSNT scientist	✓	✓
Rodney Edwards	Ngaanyatjarra Land Management Officer	✓	✓
Kasia Gabrys	DKCRC Researcher	part am	
Rod Herron	BFC Regional Fire Control Officer	part am	
Michael Heywood	PWSNT ranger (CDR)	✓	✓
Rick Hope	PWSNT ranger (SPR)	✓	✓
Mim Jambrecina	UKTNP ranger	✓	✓
Tom Konieczni	UKTNP ranger	✓	✓
Peter Latz	Ecologist	✓	
Emma Lee	UKTNP NCRM Manager	✓	✓
Leroy Lester	UKTNP ranger and TO	✓	✓ am
Jon Marsden-Smedley	Fire Ecologist		✓
Karen May	NRETA Natural Resource Management	✓	✓
Sean Moran	CLC – Joint Management Officer	✓	
Jock Morse	Consultant – DKCRC	✓	✓
Mac Moyses	PWSNT – park planning and joint management	pm – joint management session	
Steve Nicholson	PWSNT (CDR)	✓	✓
Rachel Paltridge	Environmental Consultant – attending for specific sessions	✓ part	✓part
Michelle Rodrigo	NRETA Natural Resource Management Facilitator	✓	✓
Dianne Scopel	CLC – Joint Mangement Officer	✓	✓
Mick Starkey	UKTNP ranger and TO		
Carly Steen	PWSNT – Spatial Information and Land Management Support	✓	✓
Jessica Stokes	PWSNT ranger	✓	✓
Ange Vincent	Desert Knowledge CRC	✓	✓
Shane Wright	UKTNP ranger and TO	✓	✓

DKCRC Partners

AIATSIS

Australian Government
Department of Families, Community Services and Indigenous Affairs

ANU
THE AUSTRALIAN NATIONAL UNIVERSITY

Centre for Remote Health
A joint centre of Flinders University and Charles Darwin University

CHARLES DARWIN UNIVERSITY

CSIRO

Curtin
University of Technology

desert peoples centre

Government of South Australia
Department of Water, Land and Biodiversity Conservation

Government of Western Australia

Griffith
UNIVERSITY

JCU
JAMES COOK UNIVERSITY

MURDOCH
UNIVERSITY
PERTH, WESTERN AUSTRALIA

Northern Territory Government

NEWMONT
The Gold Company

NSW DEPARTMENT OF PRIMARY INDUSTRIES

Southern Cross
UNIVERSITY

TANGENTYERE COUNCIL

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

University of South Australia

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

THE UNIVERSITY OF WESTERN AUSTRALIA

University of Wollongong