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Decision Support Tools for Analysis and Management of Bushfire Risk
End User - Land Management Perspective
Femina Metcalfe
 Fire Management Services, Department of Environment and Conservation*, Western Australia (WA)

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*The Department of Environment and Conservation (Western Australia) was established on 1 July 2006, bringing together the Department of Environment (DoE) and the Department of Conservation and Land Management (CALM).

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→ **Context**
Objective
 Manage prescribed fire and wildfires, on terrestrial estate managed by the Department, to Protect the environment and people's amenities; Protect, conserve and promote the conservation of biodiversity and natural values; Provide protection of human life and community assets; and Promote fire management that protects biodiversity on lands not managed by the Department.

Responsibility
 Provide skills, resources and equipment to effectively manage **23,900,723 hectares** of terrestrial estate in WA. In addition, responsible for addressing fire prevention (excluding fire suppression) on **approx. 83 million hectares** of non metropolitan, non townsite Unallocated Crown Land (UCL) and Unmanaged Crown Reserves (UMR) across the state.

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→ DEC's Bushfire Risk Management Base



Australian/New Zealand Standard AS/NZS 4360:2004 - Risk Management.

1. **Establish the context:** Identify strategic and community issues; and develop the risk evaluation criteria.
2. **Identify risks:** Identify the fire vulnerable values.
3. **Analyse risks:** Examine the likelihood of occurrence and the consequences of a bushfire event; and assign the levels of risk.
4. **Evaluate risks:** Classify the values at risk, using risk evaluation criteria, and prioritise the order of treatment.
5. **Treat risks:** Decide on and implement appropriate treatment to prevent/mitigate undesirable bushfire events.

→ Broadly Grouped the Decision Support Tools in to 4 categories

➤ Research



Illustrations for Discussion

- ✓ Remote Sensing (RS),
- Landscape Ecology,
- Fire Behaviour Models, etc

➤ Knowledge Management



- Fire Management Plans,
- Fauna Management Guidelines,
- Fuel Models, etc

➤ Computer Science





- ✓ Wildfire Threat Analysis (WTA),
- ✓ Master Burn Plan (MBP),
- AIMS ICS - Situation Unit Mapping,
- Fire Support System, etc.

➤ Sensor & Communication



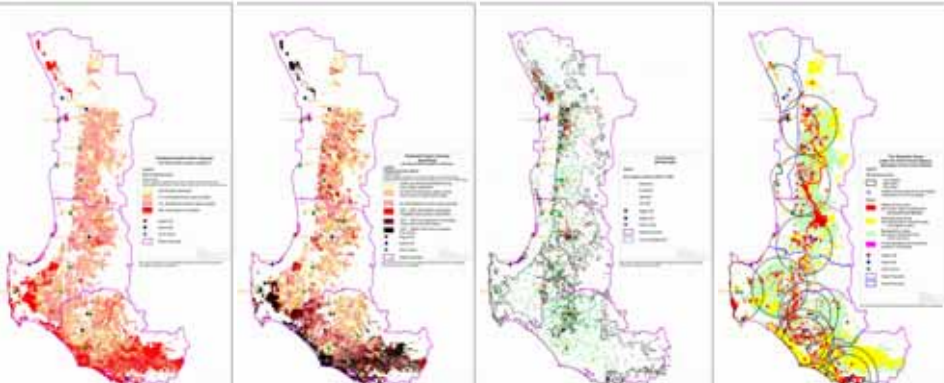
- Sentinel/ FireWatch/ NAFI,
- Aerial Navigation System, etc.

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Static Outputs - Not built for "What ifs?" and 2-D/3-D/4-D Spatial-temporal Visual Simulation

→ **WTA - Where are we now?**



Muller's 2001 WTA Model for CALM's Southwest Forest Regions being extended for FESA/LGA requirements and Statewide coverage

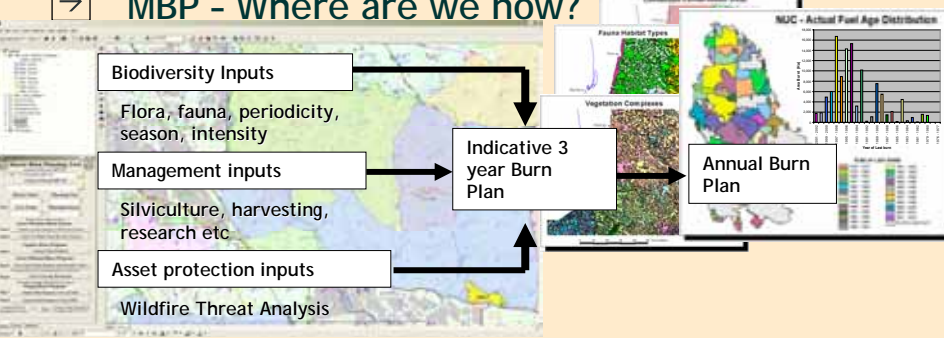
Model the Predicted Headfire Rate of Spread, Predicted Fire Intensity, Risk of Fire Starting, Values at Risk and Capacity to Respond with Suppression Action

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Dynamic output - Modular, standardised, integrated and does basic "What ifs?"

→ **MBP - Where are we now?**



- Evaluate the Prescribed Burn Timetables - Actually Completed and Previously Planned.
- Determine the Subsequent Indicative Burn Program - In Consultation with Stakeholders.
- Integrate and Assess the District/Region/State-wide Burn Program - takes into account Legislations, Fire Management Policy, Corporate Plan and Resources (people, equipment and funds).

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Implementing research into operations - yet to exhaust use of passive & active sensor technology

→ **RS - Where are we now?**

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Tools are not modular, standardised or integrated

→ **Relationship between tools**

<p>Master Burn Plan (MBP)</p> <p>Evaluate, Treat and Review</p> <p>Modeled Data</p>	<p>Modeled Data</p>	<p>Wildfire Threat Analysis (WTA)</p> <p>Identify and Analyse</p> <p>Modeled Data</p>
<p>Remote Sensing (RS)</p> <p>Detect and Monitor</p>		

Dissimilar: software programs (off the shelf customisation/ built from scratch); modeling standards and algorithms; spatial-temporal data simulation software engine (static/dynamic); computer processing load; user access method; user software interface; user training, skill and competency; un-modeled/modeled data standards, availability, quality, currency, resolution and format; etc.

Similar: Identical decision makers need to access some/all of the functions for their Planning, Prevention, Preparedness, Response and Recovery operations.

→ **How can the Bushfire CRC help?**

- Benchmarks for qualitative and quantitative computations used in software tools for bushfire risk analysis and management. Needs to be flexible and transparent. (e.g. 95 percentile weather conditions, fire behaviour equations)
- Multi-platform software engine for 3-D/4-D spatial-temporal simulation. Most commonly used commercial software are not geared for efficient computer processing and effective visual simulation. Hardware, software and user skill needs to be matched.

→ **How can the Bushfire CRC help?**

- Bringing together researchers working on active and passive sensor technology for fire management. Multiple fire agencies are undertaking similar research in remote sensing technology. Need to reduce duplication of effort and strengthen partnerships.
- Spatial and a-spatial data standards and database models for fire history, vegetation (e.g. NVIS), weather and topography information - need to involve commonwealth agencies (e.g. Geoscience Australia, BoM, Dept. of Environment and Heritage)



NATURE -VS- TECHNOLOGY