



Fire Management

An overview of DBCA's
prescribed burning program

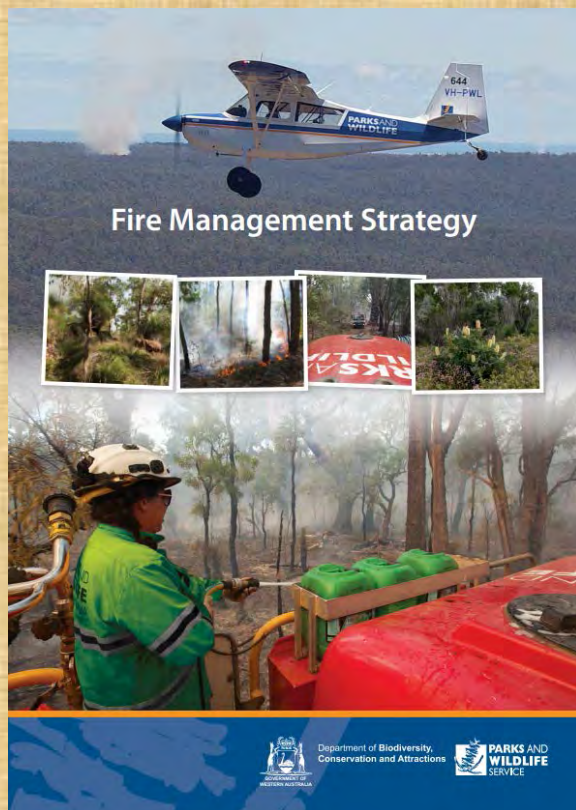


Department of Biodiversity,
Conservation and Attractions



Prescribed Burning and Fire Management

- The Department of Biodiversity, Conservation and Attractions' (DBCAs) Parks and Wildlife Service is responsible for using planned fire to achieve community and asset protection, and land, forest and wildlife management objectives.
- Lands are managed to protect communities, visitors and built and natural assets from bushfire damage and planned fire is used to achieve other land, forest and wildlife management objectives.
- Consistent with State Emergency Management Committee strategic control priorities for fire.



Vision

To manage lands for which the Department of Biodiversity, Conservation and Attractions (the department) has legislated responsibility to protect people and communities from the impacts of bushfire, and to apply planned fire as a management tool to maintain and enhance the natural environment.

Values

The department values its staff, the community, visitors and other stakeholders and provides collaborative delivery of services via a workforce based on integrity, accountability and diversity.

Fire management activities will be evidence-based, collaborative, pursue technological and operational innovation and apply risk management principles with a focus on delivering community protection and biodiversity outcomes.

For more details on the department's fire related policies and practices, please visit: pws.dbca.wa.gov.au/management/fire.

Context and Challenges

Western Australia's climate and vegetation make it naturally prone to bushfires that occur regularly across much of the State. The department through its Parks and Wildlife Service is responsible for managing fire on approximately 26.9 million hectares of conservation lands including national parks, State forests and other reserves. The department also contributes to bushfire risk mitigation actions on 91.4 million hectares of unallocated Crown land and unmanaged reserves.

This strategy addresses the management of risk from bushfire on lands managed by the department on social, economic and environmental values, according to priorities identified by the State Government.

This strategy recognises the following emerging challenges:

- A changing climate leading to changing fire regimes across the State resulting in increased bushfire risk.
- Increasing complexity in risks to the conservation of natural values, including threatened species and ecological communities.
- Increasing residential and other developments close to bushland.
- Increasing numbers of people using forests, parks and reserves.
- Increasing community expectations of land managers to keep communities and infrastructure safe from bushfires.
- Increasing community expectations, and departmental responsibilities, for the protection of natural values.
- An expanding community with an increasing divergence of experiences and expectations about bushfires and fire management needs.
- Changes in the department's workforce demographics through natural attrition with a consequent reduction in operational fire management knowledge and experience.



SEMC BULLETIN

Note: This bulletin supersedes SEMC bulletin No. 1 approved by the SEMC on 4 October 2016.

THE STATE STRATEGIC CONTROL PRIORITIES FOR ALL HAZARDS ARE:

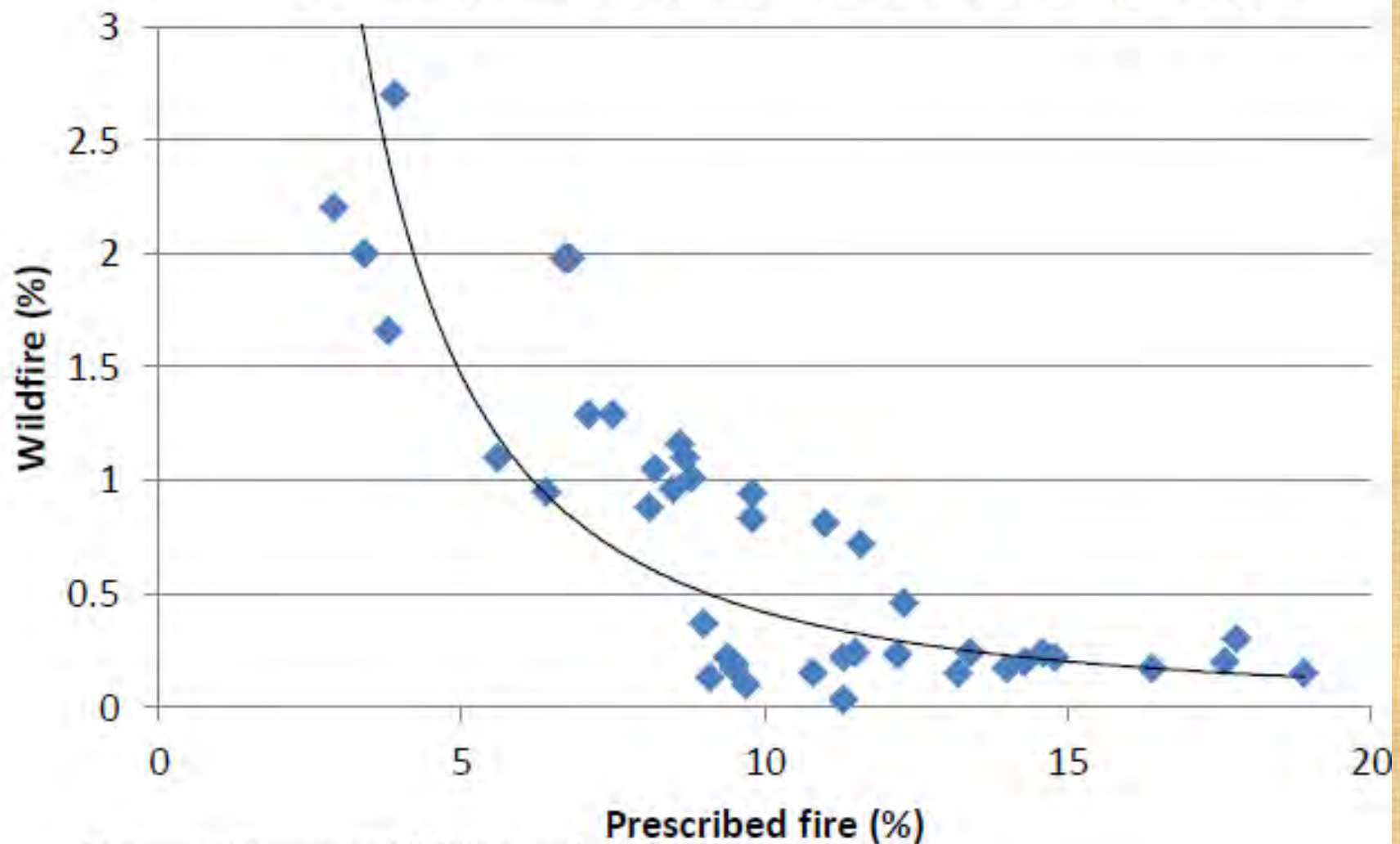
- **PROTECTION AND PRESERVATION OF LIFE:** This is the fundamental overarching priority for the State, and includes:
 - Safety of emergency services personnel.
 - Safety of community members including vulnerable community members and visitors/tourists located within the incident area.
- **Community warnings and information**
- **Protection of critical infrastructure and community assets**
- **Protection of residential property**
- **Protection of assets supporting individual livelihood and community financial sustainability**
- **Protection of environmental and heritage values.**

The above priorities are **not hierarchical**; however protection and preservation of life must be paramount when considering the State strategic control priorities that identify the priority roles and actions for the emergency management response, where there are concurrent risks or competing priorities.

Risk Based Approach

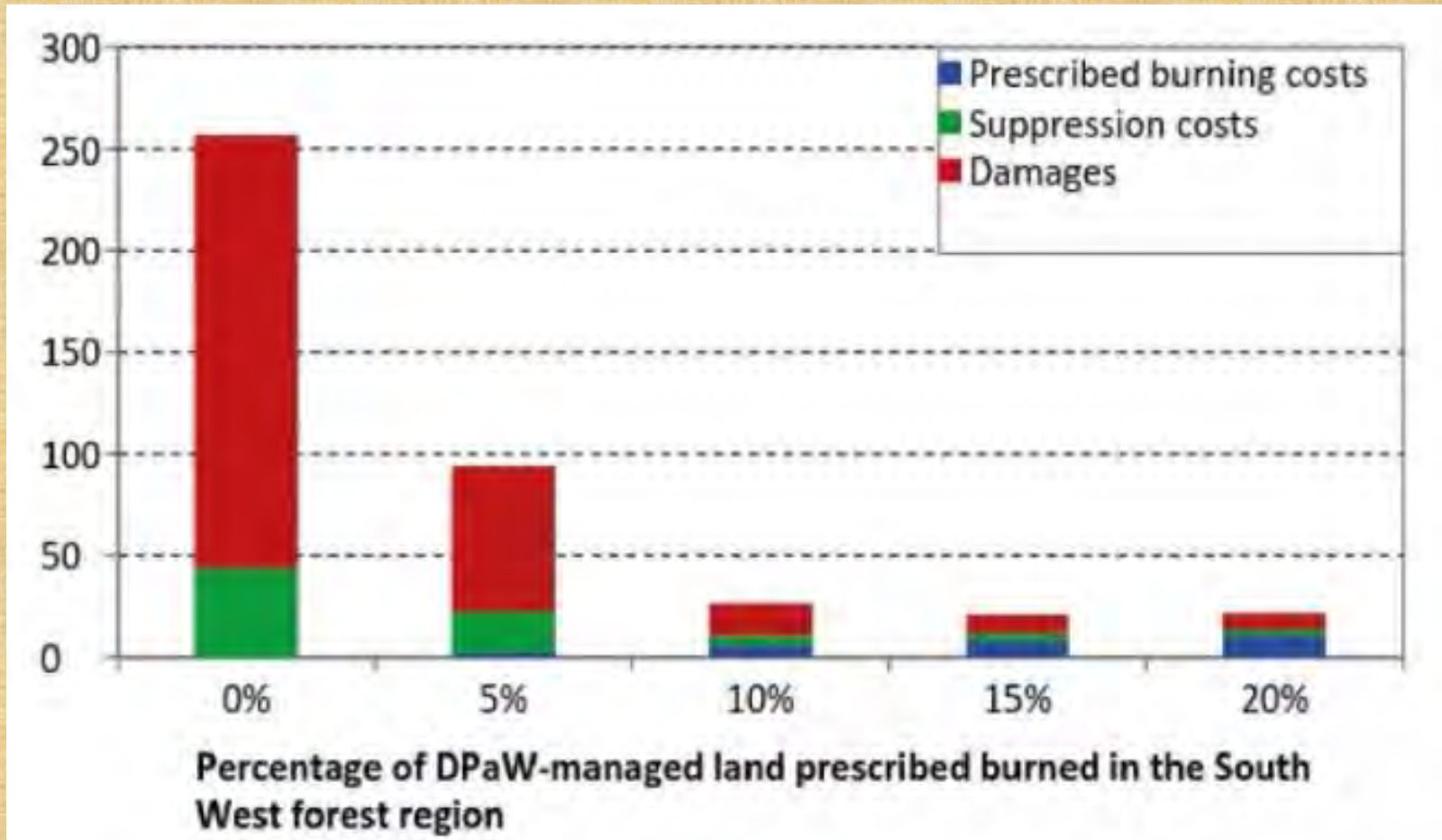
- Bushfire is a natural element of the WA environment,
- Impossible to eliminate bushfire risk
- DBCA aims to manage bushfire risk to an acceptable level – where risk is balanced against the cost, social and environmental effects of treatments.
- Other treatments also used to reduce bushfire risk, including
 - mechanical fuel reduction
 - weed control
- So what does a risk based approach mean in the context of developing and implementing a burn program?

Proportion of SW forest region (2.5 M ha) burnt by prescribed fire (mean of 4 yrs) with proportion burnt by wildfire (mean of succeeding 4 yrs)



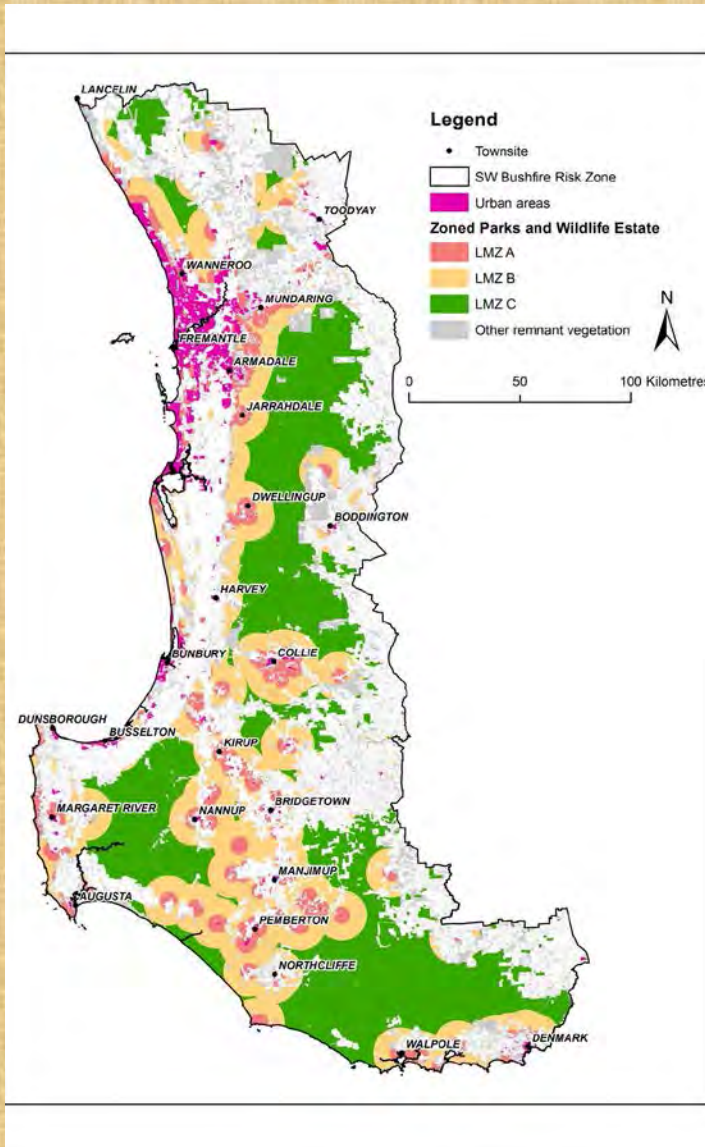
(Source: Sneeuwjagt 2008 + updates)

Cost of alternate strategies



Economic analysis of prescribed burning for wildfire management in Western Australia. Veronique Florec.

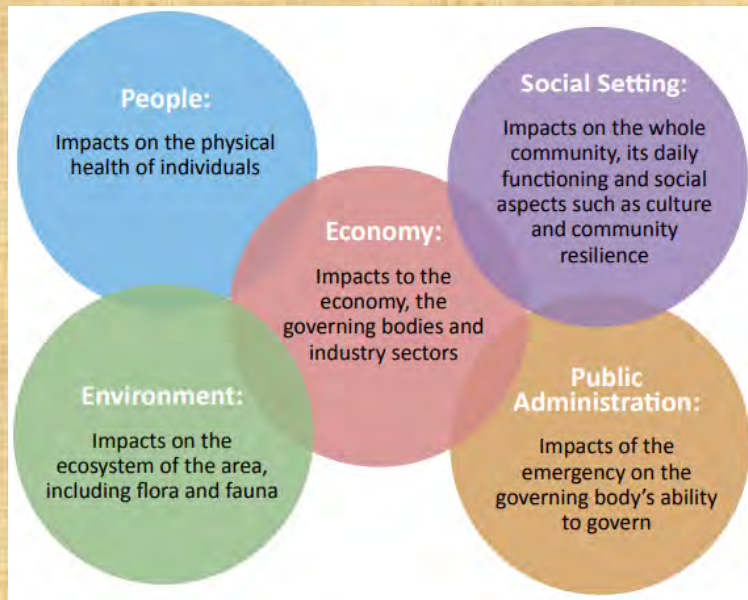
Targets for Prescribed Burning



- Target of 7.5% of the south west 'Forest' regions prescribed burnt annually adapted
- Based on scientific evidence, and >60 y of experience in conducting prescribed burning
 - = 45% of the landscape <6 years since last burnt
 - = 200,000 ha of burning annually
 - = 13.3 year average fire interval

Risk assessment

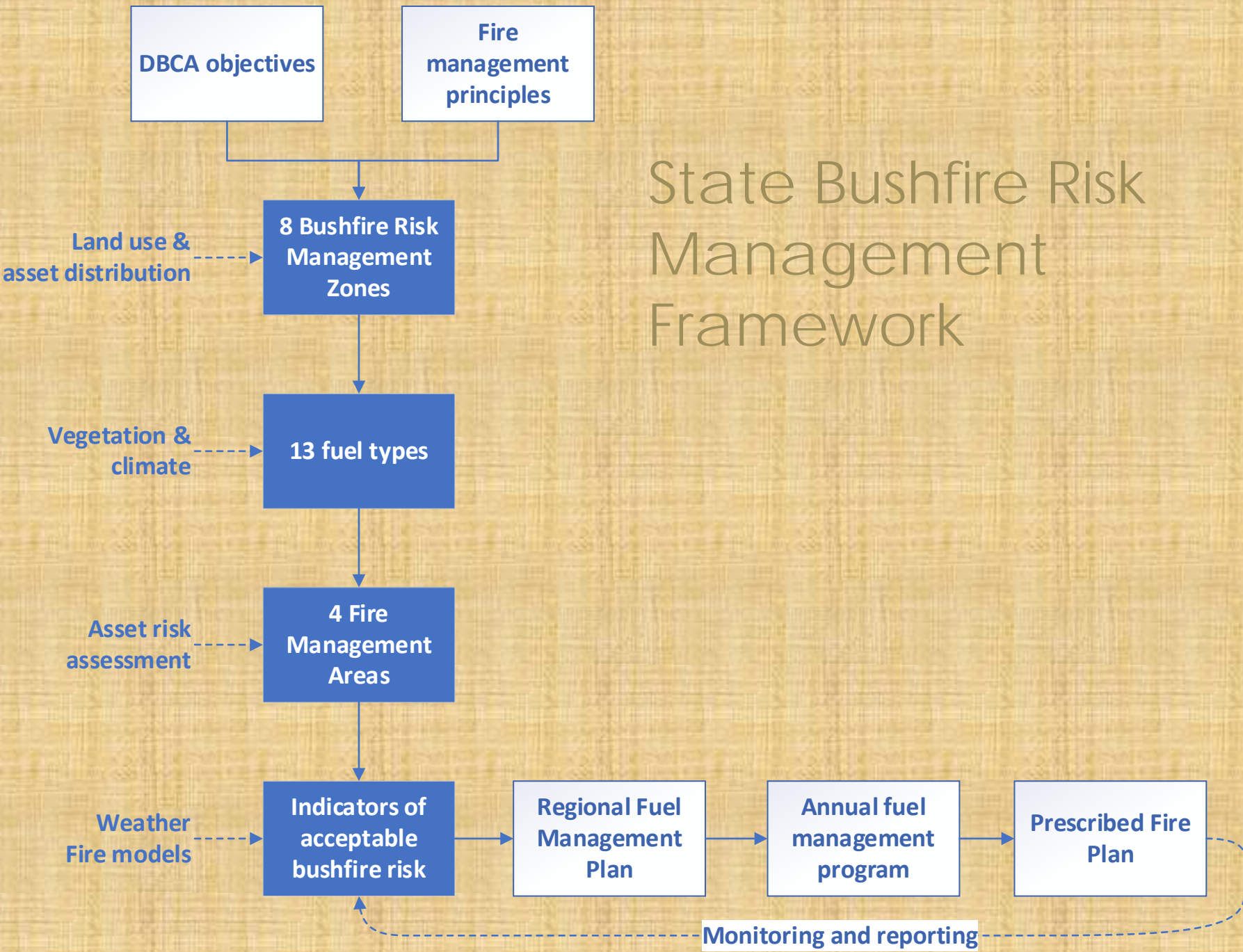
State Core Objectives for EM



Asset classification & prioritisation



Asset class	Priority
Settlements	1
Dispersed population	2
Critical Infrastructure	2
Susceptible habitat	2
Economic assets	3
Other assets	3



State Bushfire Risk Management Framework

Fire Management Areas

Fire Management Area	Purpose	Location	Extent
Settlement-Hazard Separation (SHS)	To protect human life by reducing potential exposure to direct flame contact, radiant heat or ember attack.	Surrounding fire vulnerable towns, settlements, subdivisions and camping areas.	5 km: Dry eucalypt forest, Wet eucalypt forest
			1 km: Pindan, sandplain shrubland, thicket, Banksia woodland
			500 m: Tropical savanna, hummock grassland, mallee-heath, P. pinaster plantation
Critical Infrastructure Buffer (CIB)	To protect critical infrastructure by reducing potential exposure to direct flame contact, radiant heat or ember attack.	Surrounding fire vulnerable critical infrastructure.	N/A: Acacia woodland, semi-arid woodland, chenopod shrubland
			100 m: Pindan, sandplain shrubland, thicket, mallee-heath, Banksia woodland, P. pinaster pine plantation
			50 m: Tropical savanna, hummock grassland, grassland
Landscape Risk Reduction (LRR)	To prevent the occurrence of large, intense bushfires that may threaten neighbouring lands, infrastructure or the natural environment within the LRR.	Surrounding property, individual livelihood community sustainability, and environmental assets	N/A: Dry eucalypt forest, wet eucalypt forest, Acacia woodland, semi-arid woodland, chenopod shrubland
			Remainder of South West BRMZ: Wet eucalypt forest, dry eucalypt forest
			5 km: Banksia woodland, P. pinaster plantation
Remote Area Management (RAM)	To provide ecologically and culturally appropriate fuel management where required and practicable.	Where there is a low density of fire-vulnerable assets.	1 km: Sandplain shrubland, thicket
			N/A: Tropical savanna, pindan, Acacia woodland, hummock grassland, mallee-heath, semi-arid woodland, chenopod shrubland
			All other Parks and Wildlife Service managed lands

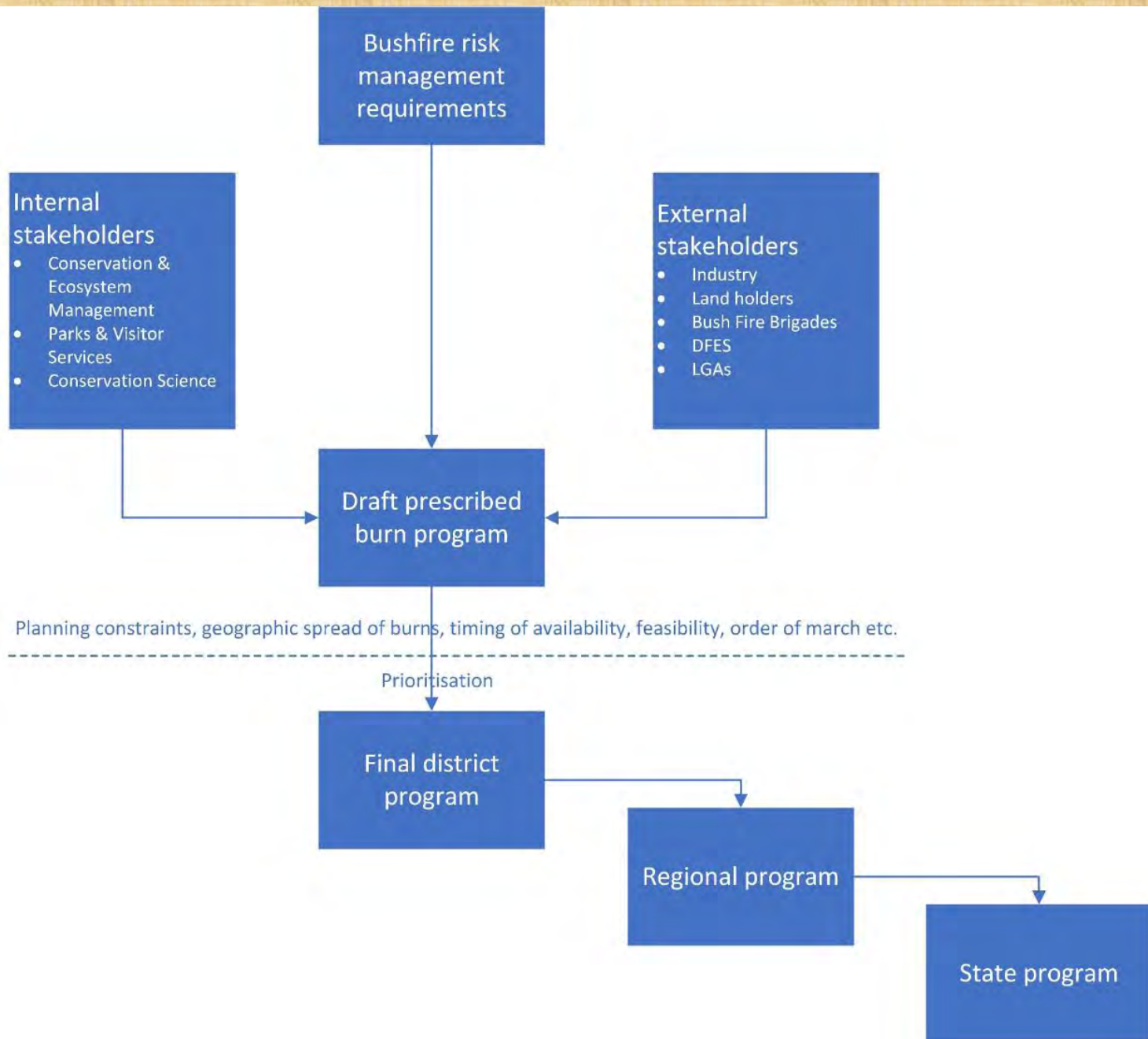
Targets

Fire Management Area	Fuel type	Location	Target
Settlement Hazard Separation	Dry eucalypt forest Wet eucalypt forest	5 km surrounding settlements	60% of fuel less than threshold intensity
	Pindan Sandplain shrubland Thicket Banksia woodland	1 km surrounding settlements	
	Tropical savanna Hummock grassland Mallee-heath	500 m surrounding settlements	
	Acacia woodland Semi-arid woodland Chenopod shrubland	N/A	No targets apply
	Critical Infrastructure Buffer	Pindan Sandplain shrubland Thicket Mallee-heath Banksia woodland	100 m surrounding critical infrastructure

Targets

FMA	Fuel type	Location	Target
Landscape Risk Reduction Fire Management Area	Dry eucalypt forest Wet eucalypt forest	Remainder of South West BRMZ	45% of fuel less than threshold intensity
	Banksia woodland	Within 5 km of private property interface	30% of fuel less than threshold intensity
	Sandplain shrubland Thicket	Within 1 km of private property interface	30% of fuel less than threshold intensity
	Tropical savanna Hummock grassland Mallee-heath Semi-arid woodland ...	N/A	No targets apply. Managed as required to meet land management objectives
Remote Area Management	Tropical savanna Acacia woodland Hummock grassland Sandplain shrubland Mallee-heath ...	All other Parks and Wildlife Service managed lands	No targets apply. Managed as required to meet land management objectives

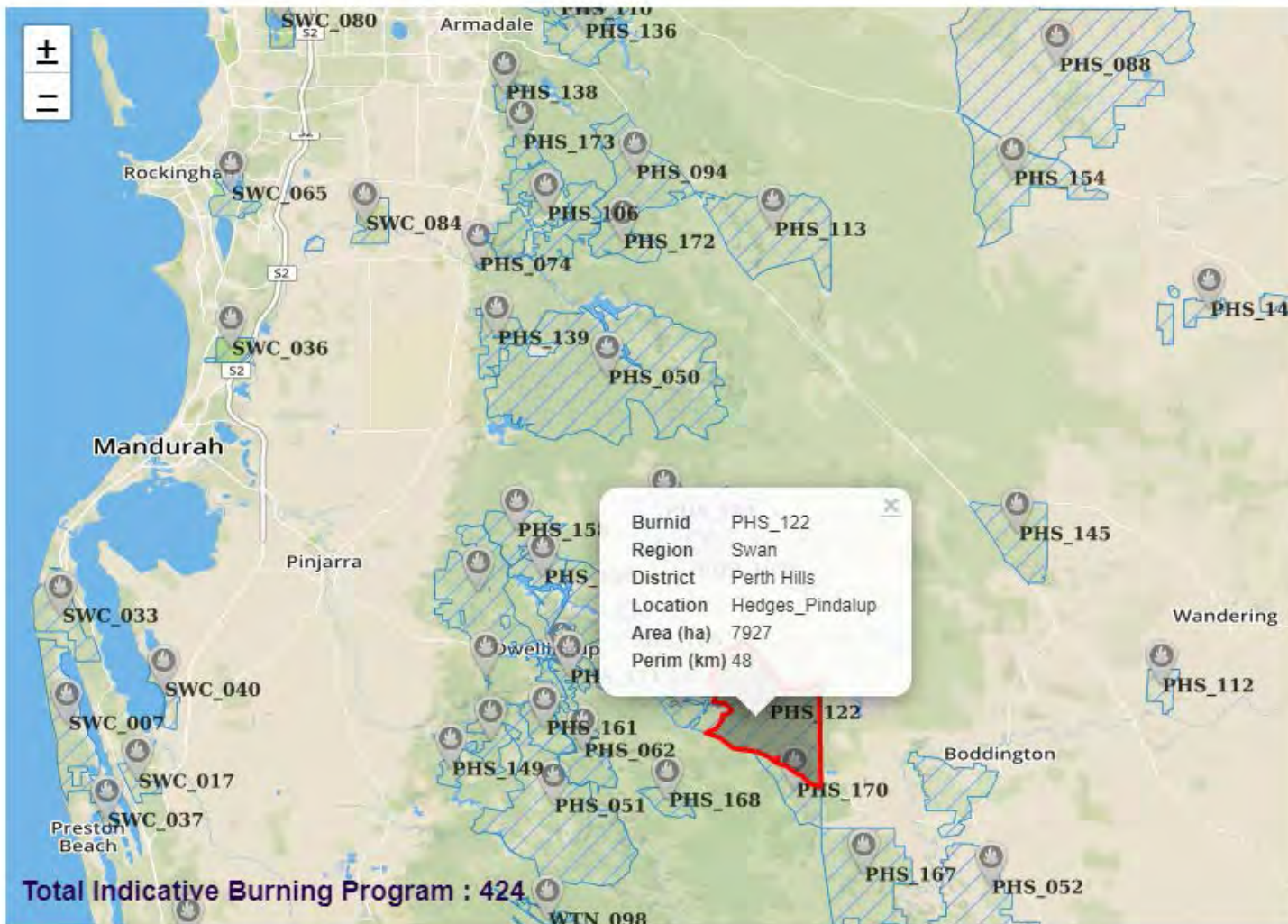
Burn program planning





Indicative Annual Prescribed Burns Program 2020/21

These are indicative plans that are subject to change depending on weather factors and changing works program priorities. The plans are current as at July 2020.



Orthophoto Map PHS_136 Churchman

2245.355 ha
35.021 km

- Burn Boundary (Already Treated Yes/No)**
- No
 - Yes
- Water Corp Proposed Buffer Burns (Prior to Main Core Cells)**
- Other Agency Towers
- Telstra Equipment**
- ★ Telstra Equipment
- Aplay Sites**
- Current
- Distribution Lines - Overhead (High Voltage)**
- Distribution Lines - Overhead
- Distribution Lines - Underground**
- Contour Channel
 - Water Flow
 - Water Dam
 - Swath Tracks
 - Swath Unsealed Roads
 - Swath Sealed Roads
 - No Track
- Carnaby Cockatoo Sites**
- Carnaby Cockatoo Sites
- Rare Flora Data (TPFL)**
- T
- Rare Flora Data (Herb)**
- ▲ T
- Scientific Study Sites**
- Quokka Habitat Areas
 - Exclusion Area
 - DFaW Managed Tracks and Trails - All
 - Bristle Trail
 - Walk Trail
 - Aboriginal Sites Register (Large Sites Removed)

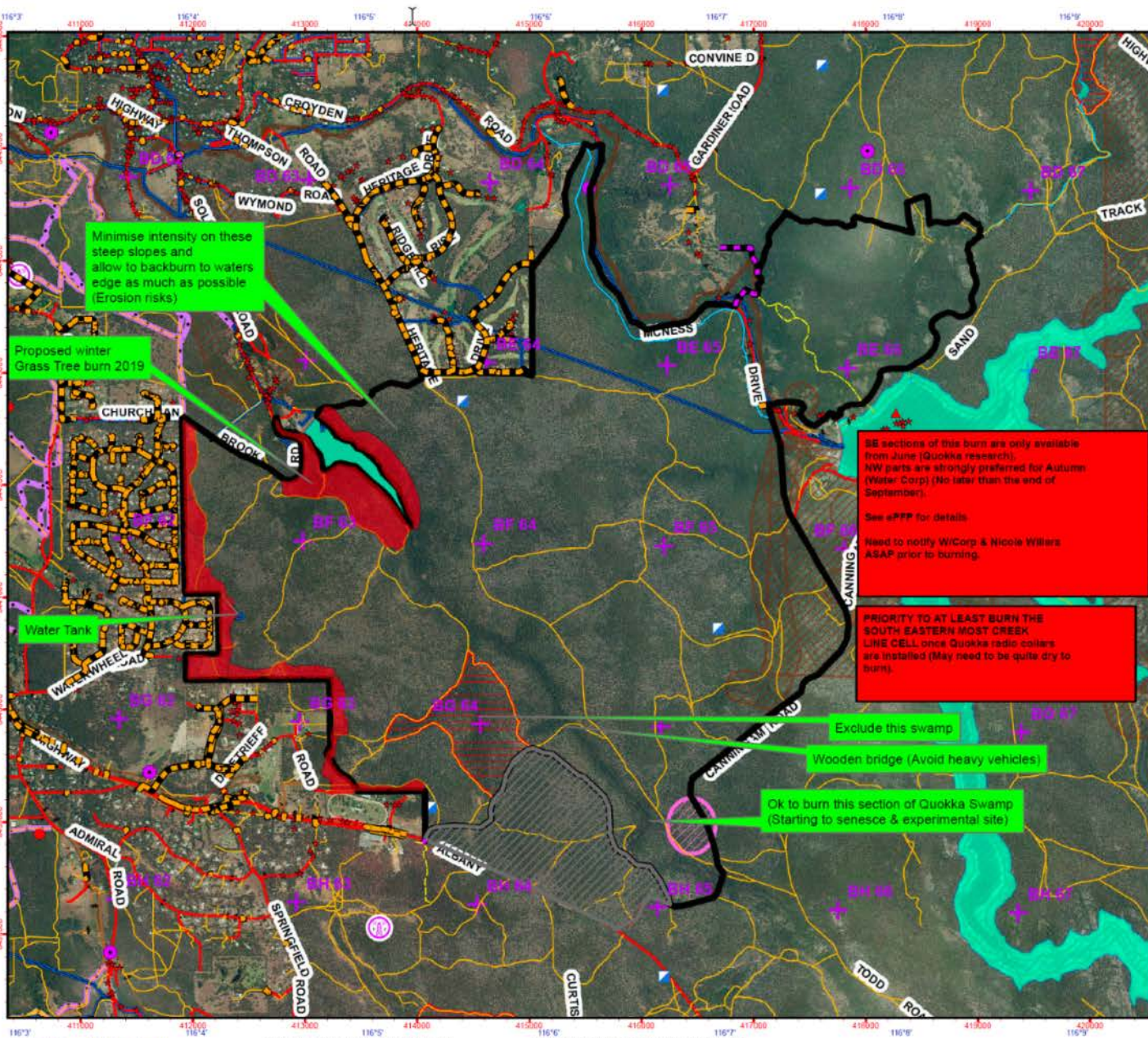


1:33,800 (A3)

Coordinate System: GDA 1994 MGA Zone 50
Projection: Transverse Mercator Datum: GDA 1994



Produced by the
Department of
Biodiversity, Conservation
and Attractions



Minimise intensity on these steep slopes and allow to backburn to waters edge as much as possible (Erosion risks)

Proposed winter Grass Tree burn 2019

Water Tank

SE sections of this burn are only available from June (Quokka research). NW parts are strongly preferred for Autumn (Water Corp) (No later than the end of September). See aPPP for details. Need to notify W/Corp & Nicola Willers ASAP prior to burning.

PRIORITY TO AT LEAST BURN THE SOUTH EASTERN MOST CREEK LINE CELL once Quokka radio collars are installed (May need to be quite dry to burn).

Exclude this swamp

Wooden bridge (Avoid heavy vehicles)

OK to burn this section of Quokka Swamp (Starting to senesce & experimental site)

Action Relevant? ▾	1st Action	* Action Details ▾	Pre burn ▾	Day of burn ▾	Post burn ▾	Relevant to Context Statement? ▾
<input checked="" type="checkbox"/>	Threatened or Specially Protected Fauna (7 of 8)	<p>Implement lighting strategies to create a mosaic of fire intensities and burnt and unburnt patches, maximising low intensities and unburnt areas within riparian vegetation to maintain refuge, food sources and habitat corridors</p> <p>Ensure any trees identified as habitat or nesting sites during the burn preparation process are protected from machine damage.</p> <p>Minimise scorch height across the burn area by attempting to keep crown scorch height under 40% and crown defoliation under 10% within the burn boundary to maintain canopy connectivity and improve survival in tree hollows.</p> <p>Avoid machine disturbance and use of foams or retardants in close proximity to creeklines and swamps as per the Bushfire Preparedness and Response Manual.</p>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Threatened or Specially Protected Fauna (8 of 8)	Advise Nat Cons team (R. Kay or B. Huston) when any significant ignitions have been completed in this burn so that post burn Quokka monitoring, fox baiting and feral pig control can be	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Threatened Species Management & Monitoring

<input checked="" type="checkbox"/>	Threatened or Specially Protected Fauna (2 of 8)	<p>NO IGNITIONS PRIOR TO JUNE 2019 in SE parts of the burn to ensure Quokka collars can be installed. Once collars are installed it is a priority to complete at least the research trial cell of this burn (SE creek line cell).</p> <p>NOTE: Sections around the properties in the NW of the burn (areas away from Quokka habitats) can be burnt in Autumn if required (But advise Nicole and Bec as traps may be present in nearby areas).</p>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Threatened or Specially Protected Fauna (3 of 8)	<p>EXCLUDE cell with healthy Quokka habitat as per the Operations maps (BG64) (See Part D for Quokka habitat survey report).</p> <p>Note: The other areas of Quokka habitat (along the Churchman Brook) should be burnt to prevent senescence & as part of the current experiment into Quokka behaviour.</p>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Monitoring, evaluation and reporting

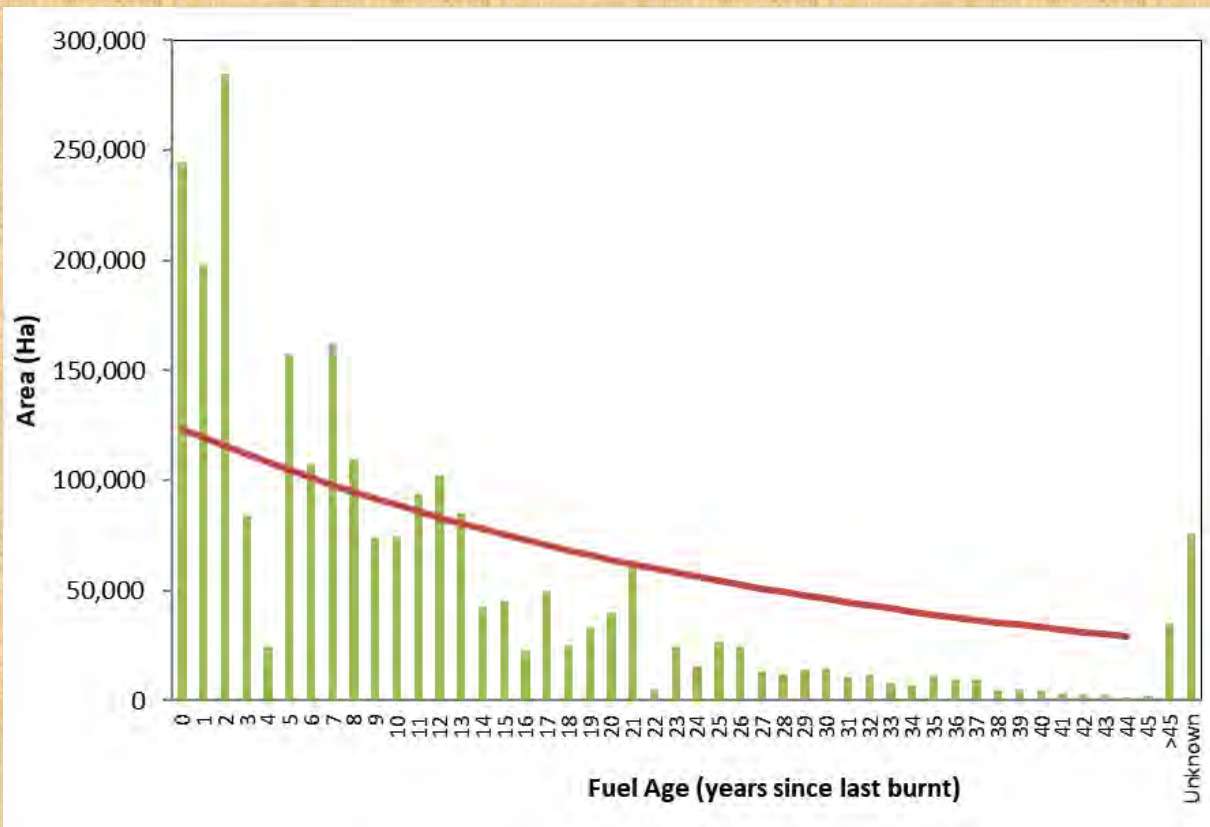
○ Scales

- bushfire risk management zone
- Fire Management Areas
- prescribed burn unit
- species / community / habitat element

○ Monitoring approaches

- remote sensing
- site-based monitoring systems (e.g. *Forestcheck*)
- targeted survey and monitoring
- long-term experimental studies

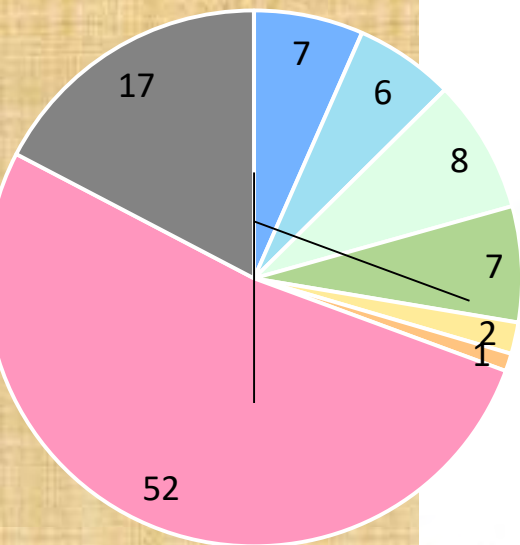
Time since fire distribution Forest Management Plan area (July 2017) Mid-term Performance Review



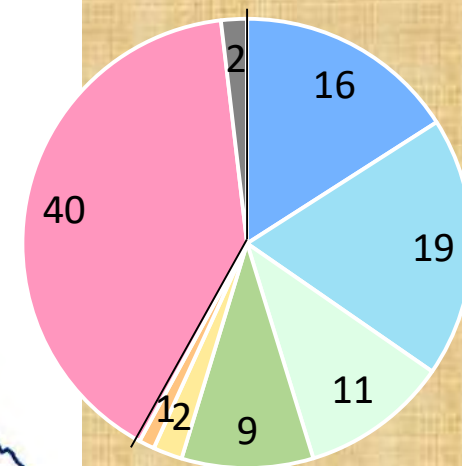
- Incorporates planned burning and bushfire
- Variation due to seasonal conditions and events

Swan Coastal

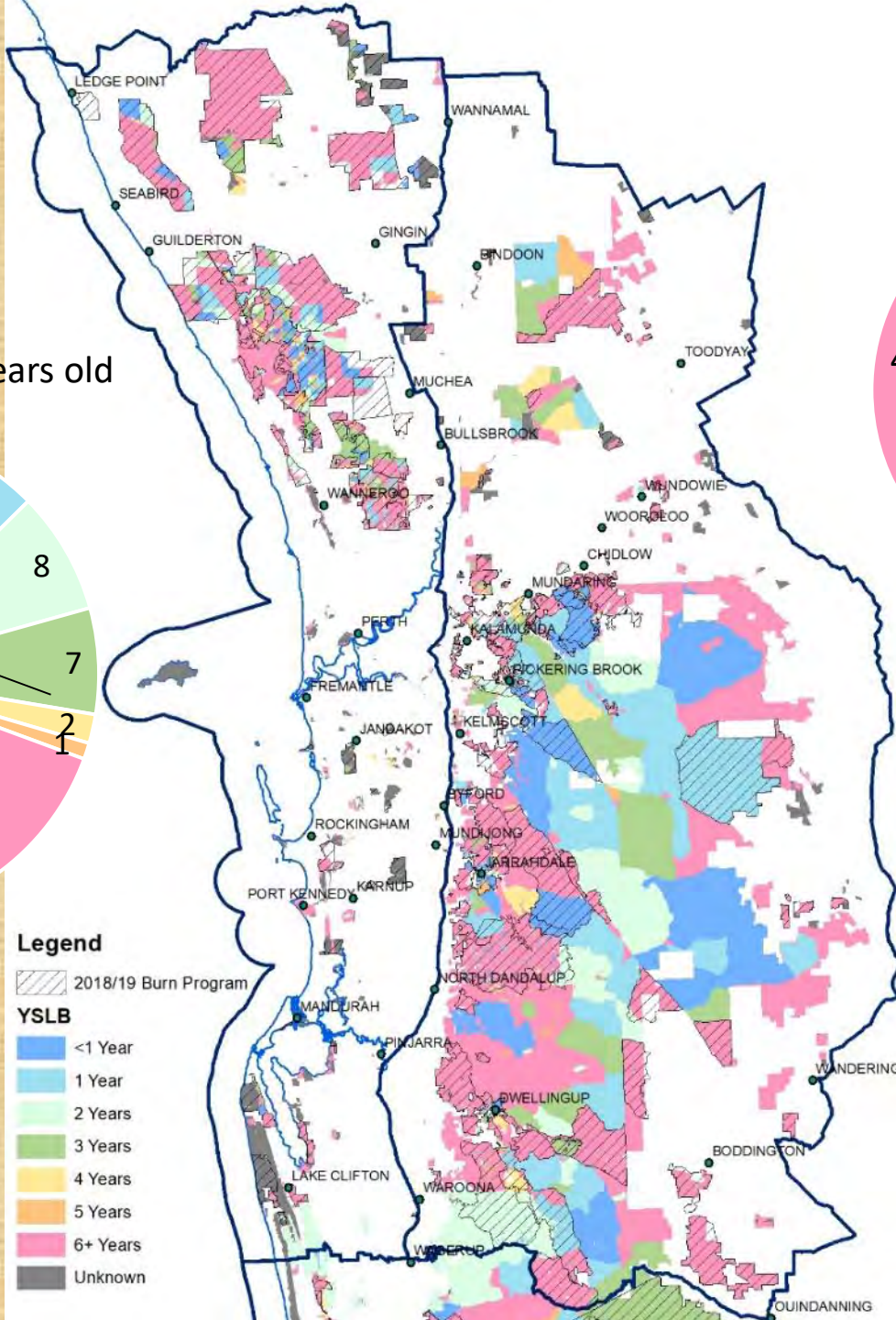
31% <6 years old



Perth Hills

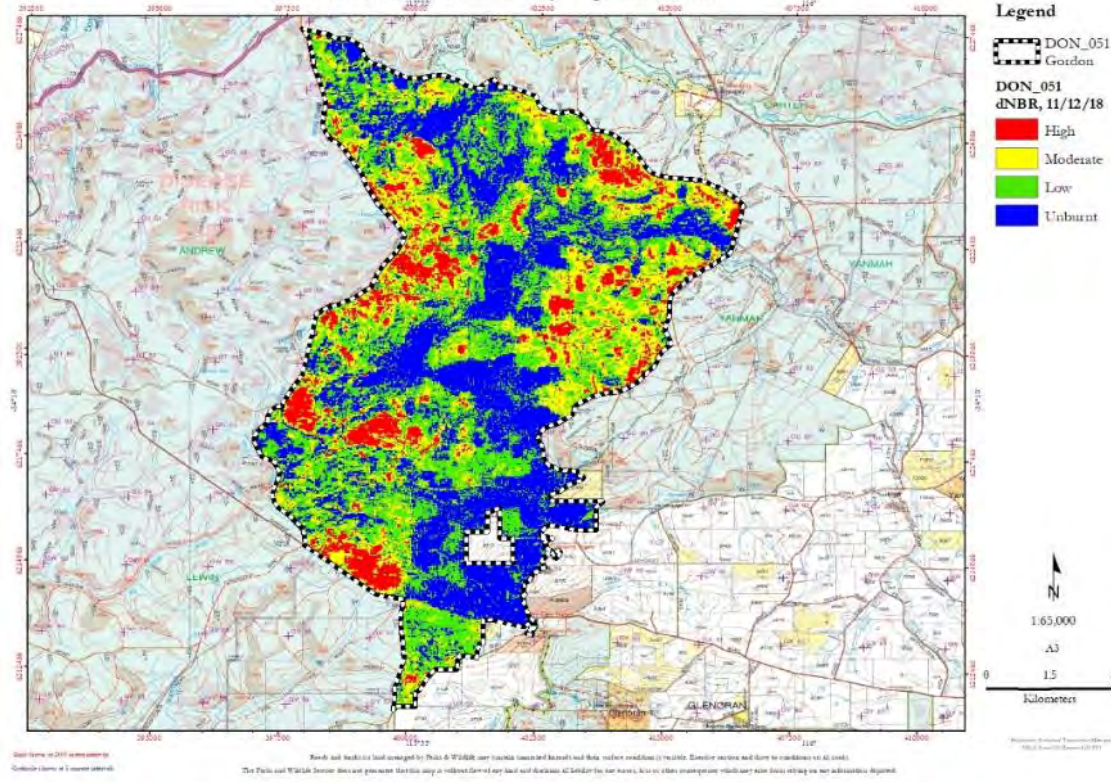


58% <6 years old



Monitoring at the burn unit scale

DON_051 Gordon, Burn severity map, 11 Dec 2018



○ Fire attributes

- scale
- patchiness
- burn severity

○ Sentinel satellite

- 5 day overpass
- higher resolution

○ Directions

- semi automated analysis of burn metrics
- linkage to ground based data

Site based monitoring

● *Forestcheck*

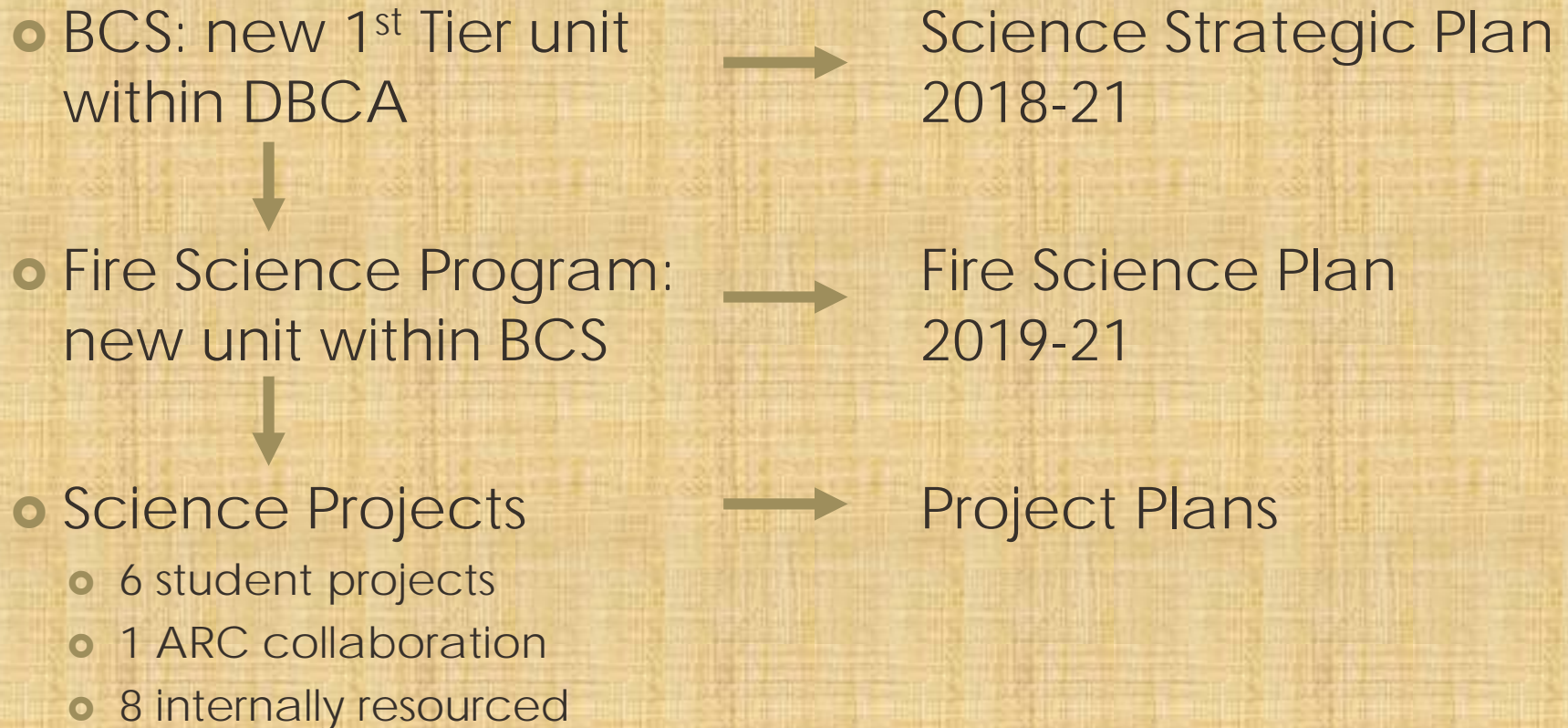
- 67 grids since 2001
- 30 burned by planned fire
- 9 burned by unplanned fire
- 11 burned twice
- baseline data for assessing change



● Attributes:

- forest structure
- understorey floristics
- invertebrates
- vertebrate fauna
- woody debris (C)
- leaf litter

DBCAs structure and strategy. A renewed focus on fire research





Department of Biodiversity,
Conservation and Attractions

Science Strategic Plan 2018–21

Vision

Scientific excellence informing biodiversity conservation.

Purpose

This Strategic Plan describes the key goals that science will deliver to support the Strategic Directions of the Department of Biodiversity, Conservation and Attractions. The Plan directs the underlying scientific programs, and describes the processes.

Values

The Department of Biodiversity... by providing excellent customer diversity and accountability. Science is ethical and outcome driven.

Strategic Intent

Science contributes to deliver Natural and Cultural Values, Fi



Biodiversity and conservation

Conserve, restore and manage flora and fauna, ecosystems and landscapes using world-recognised science and best practice management.

Strategic Theme	Strategic Goal	Approach
Biodiversity knowledge	Adequate knowledge of biodiversity is available to support the department's conservation and management of terrestrial, estuarine and marine ecosystems.	<ul style="list-style-type: none"> Conduct biological survey, including genetic survey, in priority management areas, and for key species and ecological communities. Maintain collections and undertake taxonomic research to support biodiversity knowledge. Effectively acquire and share knowledge of biodiversity.
Conservation of threatened species and ecological communities	Biodiversity conservation and recovery programs are based on scientific knowledge.	<ul style="list-style-type: none"> Undertake research to address knowledge gaps for threatened species and ecological communities. Assess conservation status of species and ecological communities. Provide scientific basis for monitoring of threatened species and ecological communities. Undertake ex-situ conservation.
Management of invasive species and pathogens	Invasive species and pathogen management methods are evidence based and effective.	<ul style="list-style-type: none"> Assess risks and threats of invasive species and pathogens. Improve effectiveness of monitoring and management of invasive species and pathogens. Identify and pursue advances in effective invasive species and pathogen management methods.
Pressures and threats to	Understanding of the effects and	<ul style="list-style-type: none"> Understand the pressures and threats acting on ecosystems, including

Fire management

Protecting communities and natural values from bushfires.

Strategic Theme	Strategic Goal	Approach
Fire science to inform fire management and biodiversity conservation	Best available scientific information is used for integrated fire management to protect communities and natural values.	<ul style="list-style-type: none"> Undertake science to guide evidence-based decision making and develop approaches to integrated fire management. Develop fire behaviour models for priority ecosystems. Understand effects of variation in fire regimes on species, ecosystems and landscapes. Understand interactions between fire regimes and other threatening processes, including climate change. Review prescribed burning and bushfire incidents to inform future decision making through scenario modelling.

Effective data management	Data is effectively captured, curated and accessible to support conservation, management and decision-making.	<ul style="list-style-type: none"> Continue development of up-to-date, integrated and accessible data catalogues and databases. Implement best practice techniques for capture, storage and reuse of data.
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Biodiversity and Conservation Science Fire Science Plan 2019-21

Role of the Fire Science Program

The Fire Science Program undertakes research to inform fire management and biodiversity conservation on lands across the State, especially those managed by the Department and its statutory authorities. The strategic goal of the program is to ensure that the best available scientific information is used for integrated fire management to protect communities and natural values. Understanding the effects of fire and varying fire regimes on species, ecosystems and landscapes and how these interact with threatening processes such as weeds, introduced predators and climate-change assists with managing fire and natural values. Understanding factors that determine the behaviour and spread of fires in the landscape is essential for managing fire risk, undertaking prescribed burning and managing bushfires in a safe and effective way. Important activities for the program include developing and validating decision support tools for fire management and monitoring the outcomes of prescribed burns and bushfires to inform future management under changed climate conditions.

Key themes for 2019-2021 include:

- Implementing findings from long-term fire ecology studies in south-west forests and the Great Western Woodlands;
- Developing and integrating long-term fire ecology experiments in Banksia woodlands, coastal shrublands and related vegetation types in urban and peri-urban areas;
- Undertaking research and monitoring to inform adaptive management of fire in the Kimberley region.

Collaborations

The Fire Science program works closely with other sections of the department including Fire Management Services Branch and operational staff based in Regions and Districts, Botanical Gardens and Parks Authority, and Rottnest Island Authority together with other land managers, including local councils. Our research partners include universities, cooperative research centres, CSIRO, the Bureau of Meteorology (BoM), the Australasian Fire and Emergency Service Authorities Council (AFAC), other government agencies, catchment councils and private sector providers.

Delivery of the Fire Science Program Plan

Biodiversity and Conservation Science Program Plans articulate how each Program will deliver the science goals of the Department of Biodiversity, Conservation and Attractions as outlined in the *Science Strategic Plan 2018-21*.

Strategic goal	Program approach	Activities	Key deliverables
Biodiversity and conservation			
Invasive species and pathogen management methods are evidence based and effective.	Investigate the effects of fire and fire regimes on the spread, impacts and management of invasive species through experimental studies, monitoring and modelling.	Document fire response traits and population dynamics for invasive species and pathogens to inform effective management. Develop conceptual models of population and ecosystem dynamics that incorporate fire and invasive species interactions.	Integrated management of fire and weeds to protect the community and natural values.
Impacts of climate change on biodiversity are better understood, and adaptation strategies are incorporated into conservation management and planning.	Undertake research to understand the consequence of climate change interactions for fire regimes, fire behaviour and fire risk, and the response and resilience of native species and communities.	Document population and community fire responses in relation to changing climate, including regeneration capacity, recovery times, fuel dynamics and potential flammability. Monitor and assess changes in fire vulnerable ecosystems such as wetlands and peat systems.	A mechanistic framework for understanding risk of changing fire season for conservation of species and ecosystems.
Science is innovative and agile in assessing and adopting new technologies and methodologies, where appropriate.	Continue to develop skills and techniques to improve capability, efficiency and delivery of information to support operations.	Work with the Remote Sensing and Spatial Analysis program to develop improved fire analysis and interpretation tools using satellite, aircraft and PAV mounted sensors to assess vegetation structure, fuel attributes, fire metrics (extent, patchiness, severity) and vegetation recovery. Continue to develop techniques to quantify and assess fire impacts on soils and plant tissues.	New tools for reporting on the outcomes of fire management. New tools for assessing fire temperatures in soils.
Data is effectively captured, curated and accessible to support conservation, management and decision-making.	Continue development of data catalogues and databases that are integrated with systems and processes managed by Fire.	Maintain and improve the State database of plant fire response attributes in NatureMap and other appropriate databases.	A consolidated trait database for WA flora including fire response attributes.