



Australian Research Data Commons

Bushfire Data Commons Forum

7 April 2022

Facilitators:

Stefanie Kethers

Adrian Burton



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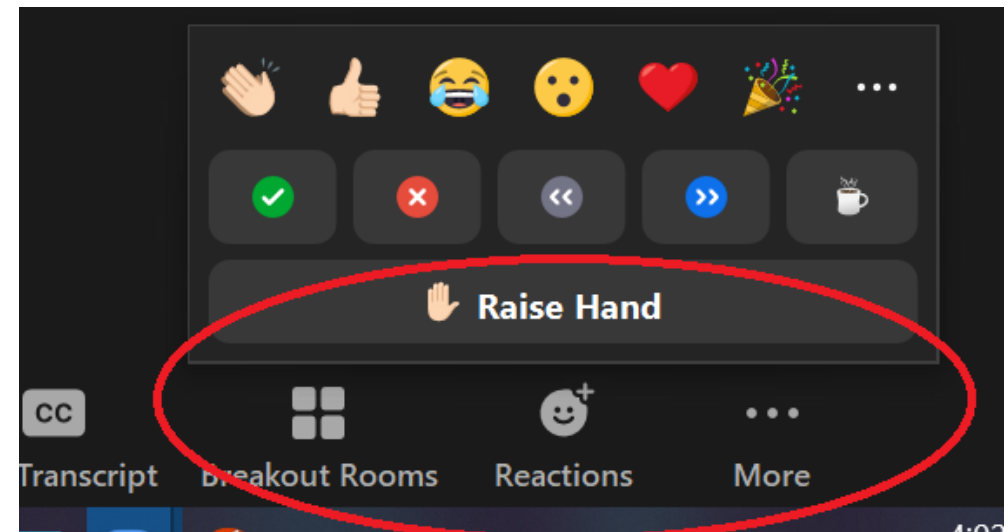
**We acknowledge and celebrate the
First Australians on whose traditional
lands we meet, and we pay our respect to
the elders past and present.**

Agenda

- Welcome and Introduction - Stefanie Kethers and Adrian Burton
- Presentations: Fuel projects (10 mins each)
 - Aggregating and harmonising fuel data on a national scale (BDC02) - Siddeswara Guru
 - Improving remote sensing fuel data on a national scale (BDC03) - Marta Yebra
 - Aggregated and Harmonised Fuel Data on a National Scale (BDC06) - Deb Sparkes
- Q&A and discussion (15 minutes)
- Presentations (10 mins each):
 - A fire behaviour modelling platform (BDC04) - James Hilton
 - Q&A and discussion (5 minutes)
 - Fire History: Aggregated and harmonised burnt extent fire history data on a national scale (BDC01) - Norman Mueller
 - Q&A and discussion (5 minutes)
 - Framework for sharing bushfire data and tools between jurisdictional agencies (BDC05) - Madeleine Kelly
 - Q&A and discussion (5 minutes)
- General discussion and closing remarks - Stefanie Kethers and Adrian Burton

Housekeeping

- This session will not be recorded, but we will share the slides after the event
- Please mute during presentations, but feel free to leave your camera on, if you are happy to do so and if your bandwidth supports this
- To ask your questions, please
 - Type your question into chat or
 - Raise your hand during Q&A times if you prefer to ask your question verbally



Bushfire Data Commons Forum

- First Bushfire Data Commons Forum today:
 - Understanding Bushfire Behaviour (6 projects)
- Next Bushfire Data Commons Forum planned for June 2022:
 - Understanding Bushfire Impact (7 projects)
- Purpose of the forum:
 - Part of the overall program coordination efforts
 - Connect partners to each other
 - Enable external stakeholders to learn about projects and provide insights and suggestions
 - Create collaborations and coordination between projects and with external stakeholders

Bushfire Data Commons

Objective: Establishing a national bushfire data infrastructure for translational research, to improve bushfire management and understand risk.

- Bushfire data challenges in 2 areas:
 - Understanding bushfire behaviour
 - Understanding bushfire impact
- Collaboration and alignment with researchers, state agencies, commonwealth departments

Translational research data challenges program



START
WITH A SOCIETAL
PROBLEM

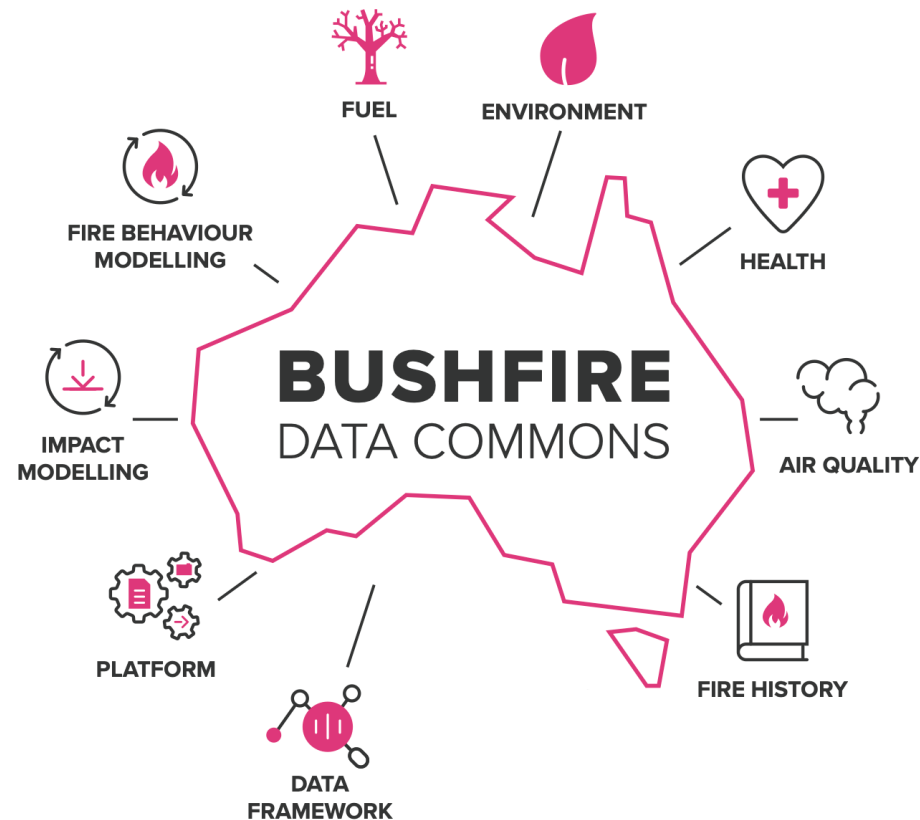


IDENTIFY
THE DATA
CHALLENGE



BUILD
AND APPLY DIGITAL
INFRASTRUCTURE

Bushfire Data Commons Outputs and Outcomes



Research resilience, response and recovery



Australian Research Data Commons



- Shared values
- Shared objectives
- Shared approaches

Project Presentations

Aggregating and harmonising fuel data on a national scale project 2

Bushfire Data Commons Forum, 7 April 2022

Dr Siddeswara Guru, TERN Australia

s.guru@uq.edu.au



Australian Government
Department of Agriculture,
Water and the Environment



tern

Ecosystem Research Infrastructure

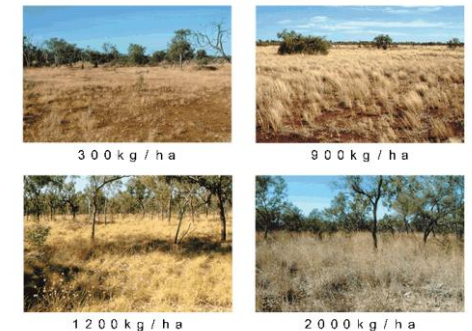
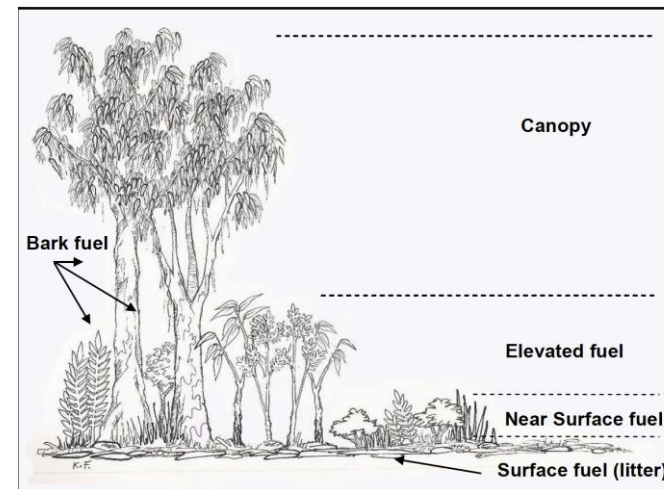


Overview - Aggregating and harmonising fuel data

1. Introduction
 - I. Fuel load
 - II. Challenges
2. Project Objectives
3. Project stakeholders and beneficiaries
4. Work plan
5. Work package 1 progress
6. Next steps
7. Acknowledgements

Fuel load

- The total amount of combustible material in a defined space
 - Live and dead vegetation (coarse woody debris, grass, trees, fallen bark, litter and branches etc.)
 - Calculated as tonnes per ha
- Different types of fuel, e.g.,
 - Grass fuel
 - State of the grass poses significant threat
 - Grass curing
 - Forest fuel



Source: Wildfire Behaviour 2014

Challenges

1. Fuel load is dynamic and requires multi-scale & multi-temporal data collection
2. Fuel load data are collected, collated and derived across jurisdictions at multiple scales
- hardly any data are openly accessible
3. Data are collected using disparate methods
4. Data are not widely accessible
5. There is no one place to search and access fuel load data
6. There are no data sharing agreements between custodians
7. There is a lack of coordination for sharing data across jurisdictions
8. There is no community standard to share and access fuel load data
9. No organisation is mandated or resourced to collate and publish the data at national scale



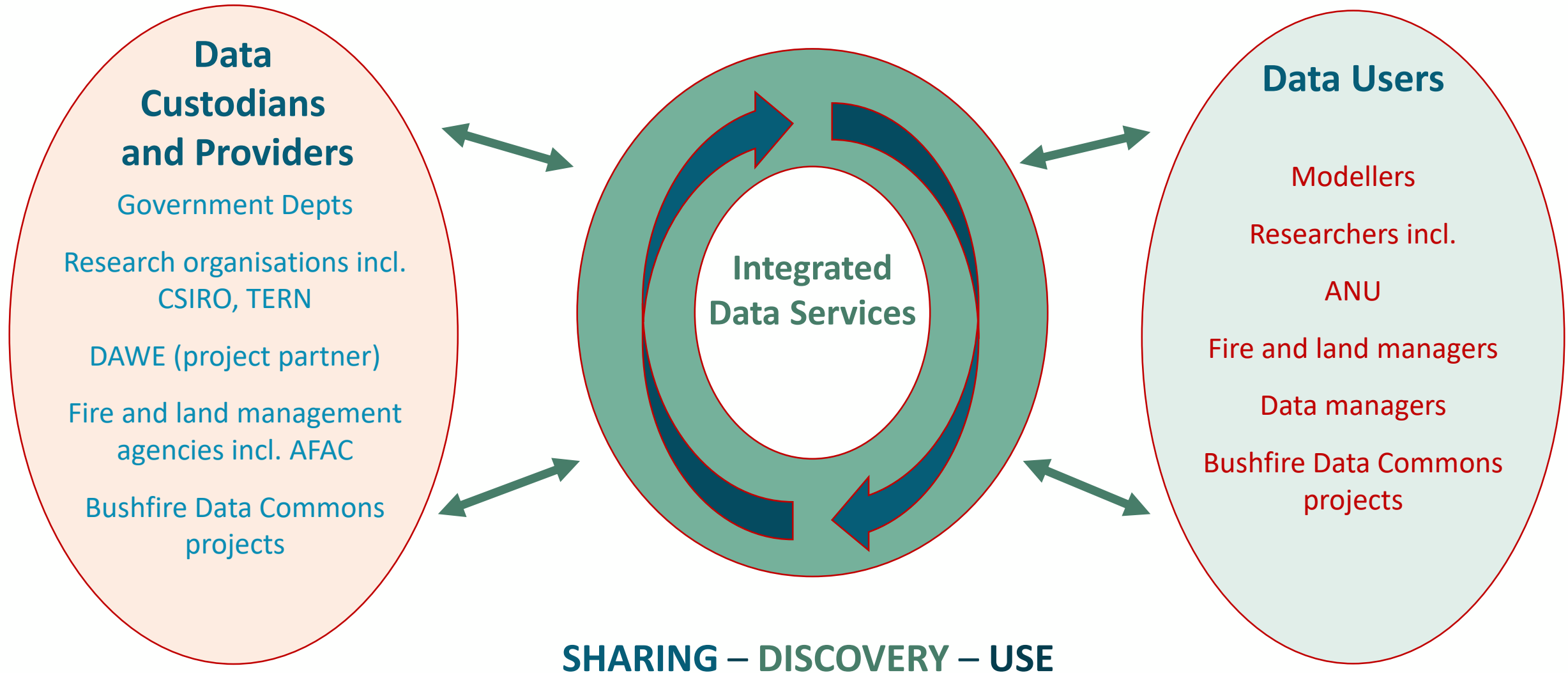
Project 2: Objective

Objective: build an open access data management framework to enable sharing and discovery of integrated fuel load data and fuel-related parameters to enhance Australia-wide bushfire response and preparedness



SHARING – DISCOVERY – USE

Project Stakeholders and Beneficiaries



Workplan

To build a Roadmap for open access to fuel load data to enable Australia-wide bushfire response and preparedness

WP1 - Undertake gap analysis:

- Identify key stakeholders in the fuel load data supply chain e.g., state agencies, Commonwealth departments and NCRIS facilities, universities, CRCs and centre of excellences.
- Investigate sources of data to cover the entire Australian landscape, and their repeatability and reliability
- Investigate current data availability, access and cost
- Investigate different sources of fuel load data e.g. field survey, sensors, lidar, remote sensing
- Identify barriers for data sharing - social, technical, political, cultural, economic, ethical, legal, financial
- Identify the needs of the users in pilots and other fuel projects

WP2 - Establish a framework for sharing fuel load data:

- Determine data supply chain including data sharing and integration
- Explore operational lead incl. 'ownership', management and publication of various 'products'
- Explore participation and commitment from major data providers
- Identify different value propositions and benefits for data sharing among different organisations
- Policies and standards for data management, sharing, citation, access
- Governance mechanisms to oversee sustainable collaborative delivery incl. shared responsibilities
- Collaboration with other fuel load and data sharing projects in the Bushfire Data Challenge

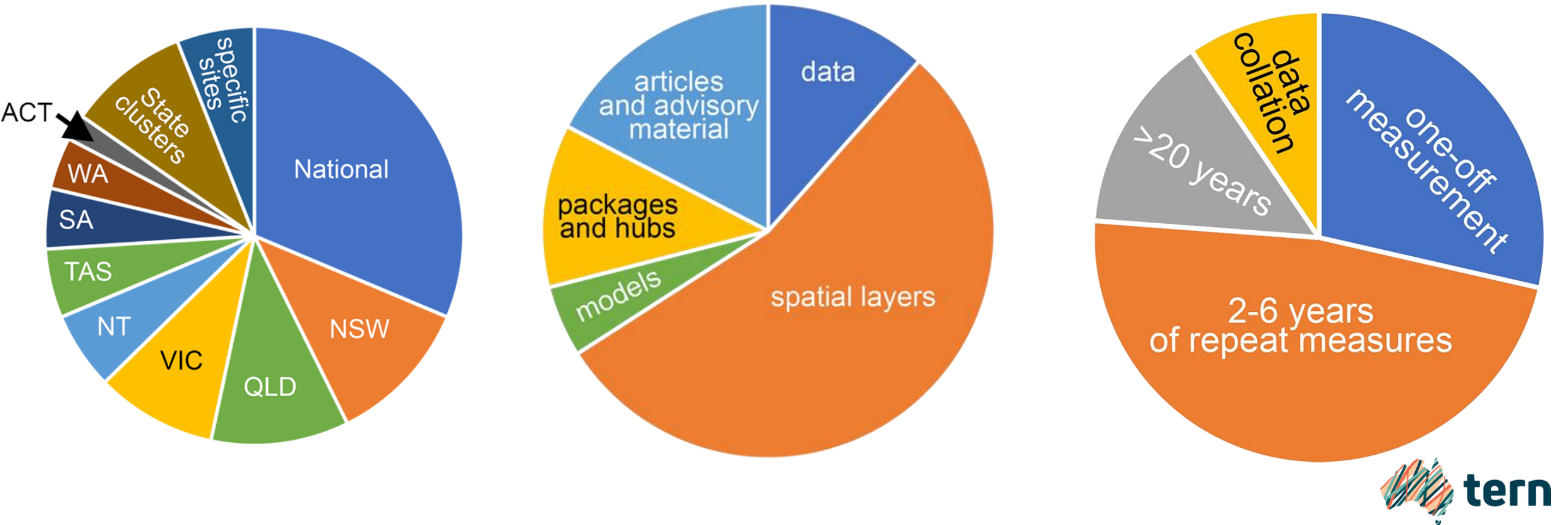
WP3-4 Comprehensive Roadmap and implementation of systems and processes to share fuel data:

- Application of data sharing framework that includes a sustainable data supply chain to ongoing publication of fuel load data
- Demonstrate a pilot implementation
 - Providing input data for Cal/Val of remote sensing product for ANU pilot
 - Access aggregated fuel load parameters data feed to SPARK framework
- Develop Integrated Data Services to enable data integration, publication and sharing
- Establish granularity and the mechanisms and pathways for data integration
- Align with data analysis capability to enable decision making

WP1 progress

Systematic analysis of existing fuel attribute data (observed and derived):

- identify the existence and custodianship of data
- identify existing fuel load and fuel-related parameters
- assess data quality characteristics (e.g., ground validation and consistency across data providers)



Challenges and Opportunities for future work

- There are still untapped resources on fuel load parameters
- Work closely with AFAC on fuel load parameters and to develop the data sharing framework
- Opportunity to contribute towards fuel parameters data gathering and harmonisation
- Opportunity to explore research data collections related to fuel load
- Opportunity to build automatic data pipelines for periodic data updates

Image credit: Sean Gladwell/Getty Images



- The project will report again at the next Bushfire Data Commons Forum
- If you want to contribute any fuel load related data, please contact us at esupport@tern.org.au

Acknowledgements

The Project Partners are DAWE, ANU, CSIRO and AFAC through BDC fuel projects
TERN project team: Ali Curtis, Alison Specht and Nina Zazali



We at TERN acknowledge the Traditional Owners and Custodians throughout Australia, New Zealand and all nations. We honour their profound connections to land, water, biodiversity and culture and pay our respects to their Elders past, present and emerging.

TERN is enabled by NCRIS.

Our work is a result of collaborative partnerships with many Universities and institutions.

To find out more please go to tern.org.au.



STREAM 2- BDC - F

FUEL DATA ON A NATIONAL SCALE

Improving remote sensing fuel data on a national scale

A/Prof Marta Yebra

Abolfazl Abdollahi

Fenner School of Environment & Society
School of Engineering



Australian
National
University



Project objective and vision

1. **Identify the fuel attributes** known to influence fire behaviour processes and, therefore, could be key inputs to the fire behaviour platform (stream 3).
2. Detail the standard protocols to **collect information on the key fuel attributes** on the field to validate remote sensing data.
3. **Determine the suitability of the data sources** identified by BDC002 fuel projects to represent those key attributes and validate remote sensing products.
4. Develop a pipeline for the **validation of remote sensing** fuel attributes with on ground data



Work packages and progress

WPs	Deliverable	Description
WP1	D2.1. Purpose-built validation dataset	<ul style="list-style-type: none">• Requirements gathering process• Literature review• Conduct gap analysis• Initial list of fuel attributes• Current methods to retrieve fuel parameters (field-based and remote sensing)
WP2	D2.2. Fuel attributes data suitability	<ul style="list-style-type: none">• Received compiled data sources of fuel attributes by project BDC02• Review the suitability of initially identified data sources to validate remote sensing products• Final list of fuel attributes that are suitable to validate remote sensing products
WP3	D3. Remote sensing fuel products validation	<ul style="list-style-type: none">• Identify remote sensing data repositories• Application of ML/DL for fuel attributes mapping• Validation of remote sensing fuel attributes with field data• Workflow developed to validate remote sensing products with field observations

Literature Review - Work in progress

Fuel Attribute	Remote sensing	Scale	Challenges	Opportunities
Fuel Moisture Content	✓ Multispectral sensors (e.g., Modis, Sentinel-2)	Continental Regional scale	<ul style="list-style-type: none"> Cloud cover may limit the use of this data Optical data limited to canopy 	<ul style="list-style-type: none"> Improve accuracy Merge with different RS Use active microwave images Use airborne hyperspectral data for local/regional studies
Fuel classification	<ul style="list-style-type: none"> ✓ Multispectral sensors ✓ Airborne hyperspectral data 	Regional scale	<ul style="list-style-type: none"> Inability to penetrate forest canopies Indirect relationship with vertical structure Airborne hyperspectral data are limited to the reduced spatial coverage 	<ul style="list-style-type: none"> Integrate multispectral and LiDAR data to improve fuel characterization Use active sensors to account for the vertical forest structure
Quantity	<ul style="list-style-type: none"> ✓ Optical remote sensing (e.g., ASTER, Landsat, SPOT-HRV, and aerial photo) ✓ Airborne radar system 	Regional scale	<ul style="list-style-type: none"> Inability to penetrate the canopy Have limitations in estimating fuel load that requires very fine spatial resolution 	<ul style="list-style-type: none"> Terrestrial and airborne LiDAR data can be used to provide a continuity of spatial variation in surface fuel depth and cover, topography and canopy density. Extend to large-scale and various fuel types
Arrangement orientation: horizontal vertical	<ul style="list-style-type: none"> ✓ Forest Inventory data ✓ Landsat Thematic Mapper ✓ Modis ✓ Airborne LiDAR ✓ Airborne laser scanning 	Regional	<ul style="list-style-type: none"> Does not yield full spatial coverage Costly/time-consuming Restricted to a few species and small sites Optical data tend to lose sensitivity to forest structure variation Less effective in denser areas 	<ul style="list-style-type: none"> Integration of multispectral/hyperspectral and LiDAR data Terrestrial LiDAR is an option and may be able to gather more accurate below-canopy data Drone-acquired photogrammetry and structure-from-motion
Fuel element size and shape	_____	Local	<ul style="list-style-type: none"> Difficulty of characterising these attributes Given the relatively coarser resolution of most current remote sensing systems 	<ul style="list-style-type: none"> Recent development of airborne full-waveform systems/Multispectral LiDAR/Hyperspectral techniques has resulted in increased recent application of this technology for estimation of fuel attributes
Chemical composition(e.g., cellulose, essential oils, and incombustible components such as water and minerals)	_____	Local/regional	<ul style="list-style-type: none"> The remote sensing of this sub-fuel element is currently limited Difficulty of measuring such attributes in the field or laboratory 	



Next steps

WPs	Breakdown	Activities	Project completed by: June 2023																
			A	M	J	J	A	S	O	N	D	J	F	M	A	M	J		
WP1	D2.1a	Requirements gathering process																	
	D2.1b	Literature review																	
	D2.1c	Conduct gap analysis																	
	D2.1d	Initial list of fuel attributes																	
	D2.1e	Current methods to retrieve fuel parameters (field-based and remote sensing)																	
WP2	D2.2a	Received compiled data sources of fuel attributes by project BDC02																	
	D2.2b	Review the suitability of initially identified data sources to validate remote sensing products																	
	D2.2c	Final list of fuel attributes that are suitable to validate remote sensing products																	
WP3	D3a	Identify remote sensing data repositories																	
	D3b	Application of ML/DL for fuel attributes mapping																	
	D3c	Validation of remote sensing fuel attributes with field data																	
	D3d	Workflow developed to validate remote sensing products with field observations																	
Project title: Improving remote sensing of fuel data on a national scale																			
Contracting organisation: The Australian National University																			

Note: There will be two iterations between WPs. ■ Iteration 1 ■ Iteration 2

Partners

Name	Organisation	Role
Dr Guru Siddeswara	Terrestrial Ecosystems Research Network (TERN)	Data contributor
Dr Belinda Allison	Department of Agriculture, Water and Environment (DAWE)	Data contributor
Dr Mahesh Prakash	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Adviser
Dr James Hilton	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Adviser

Project stakeholder and beneficiaries

Name	Organisation	Involvement
Norman Mueller	Geoscience Australia (GA)	Operational agency for remote sensing products
Dr Adam Leavesley	Australian Capital Territory Parks and Conservation Service (ACT Parks)	Agency collecting fuel information on the ground and user of remote sensing fuel products
Agnes Kristina	Department of Fire and Emergency Services (DFES)	Agency collecting fuel information on the ground and user of remote sensing fuel products
Dr Stuart Matthews	New South Wales Rural Fire Service (NSW-RFS)	Part of the team developing the AFDRS. He will provide feedback on the fuel inputs needed for the AFDRS
John Bates	Natural Hazards Research Australia	Data end user for the validation of satellite products developed in his program
Dr Yang Chen	Department of Environment, Land, Water and Planning (DELWP)	Scientist working on deriving fuel attributes using remote sensing



*AFAC is the Australian and New Zealand
National Council for fire and emergency services*

ARDC

BDC06

Aggregated and Harmonised Fuel Data on
a National Scale (Linked to BDC02)



BDC06: Aggregated and harmonised fuel data on a national scale

Project objective and vision

- To deliver key elements towards a bushfire fuel data commons supporting the use of national fuel data in national bushfire simulation and other fire prediction systems
 - Nationally agreed doctrine surrounding calculated fuel attributes, storage and sharing
 - A centralised capability to connect to the various jurisdictional datasets in an enduring manner including the continuous improvement of standards.
- Partners
 - AFAC Predictive Services Fuel Working Group
 - AFDRS and Spark Operational/Spark Research projects
 - This project is linked to BDC02, led by TERN and DAWE

BDC06: Aggregated and harmonised fuel data on a national scale

Project stakeholders:

AFAC Council (on behalf of State & Territory Fire & Land Management Agencies)

AFAC Research Committee

Predictive Services Group

Predictive Services Data Working Group

AFDRS/Spark Operational Projects

Project Governance Group

Data Governance Group

TERN/DAWE

Other ARDC Streams

ARDC

Beneficiaries include:

Predictive Services Group

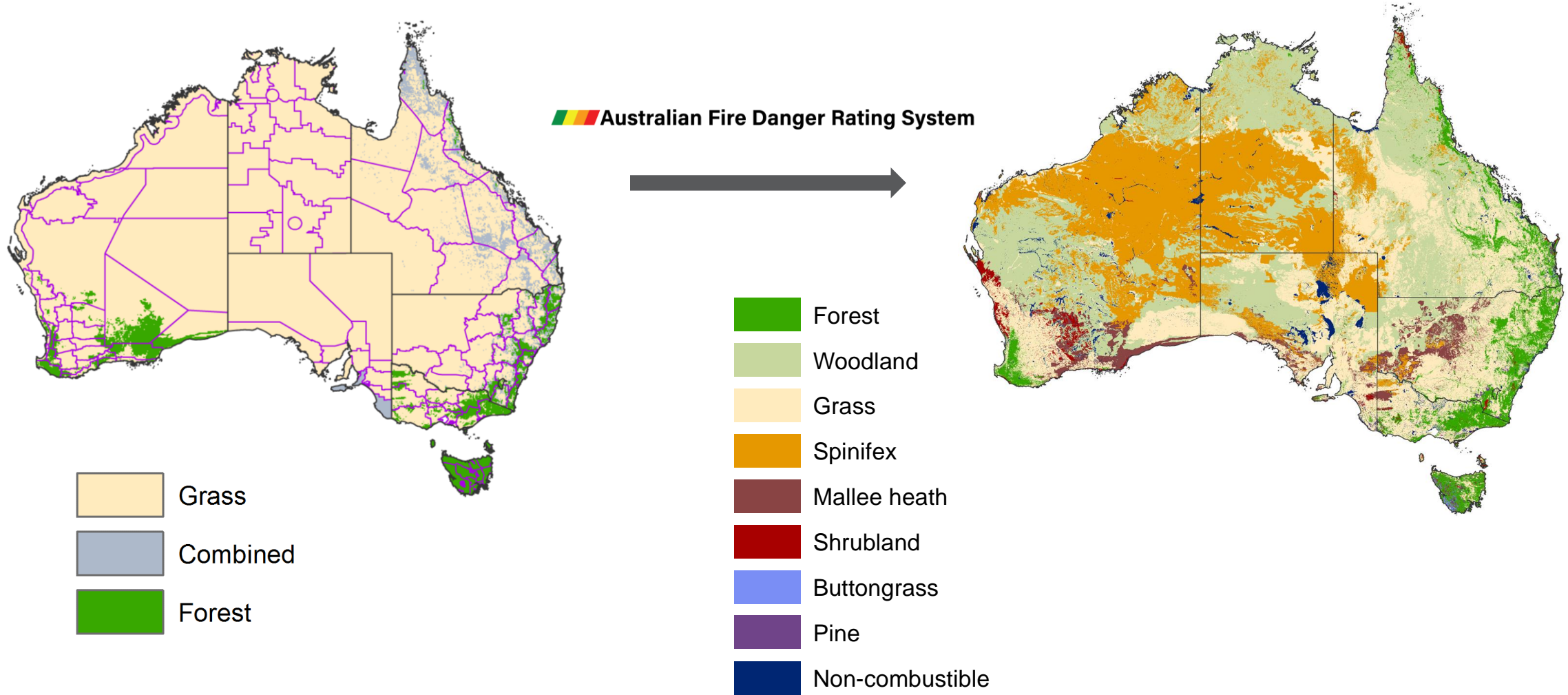
Universities

Land Management and Fire Agencies

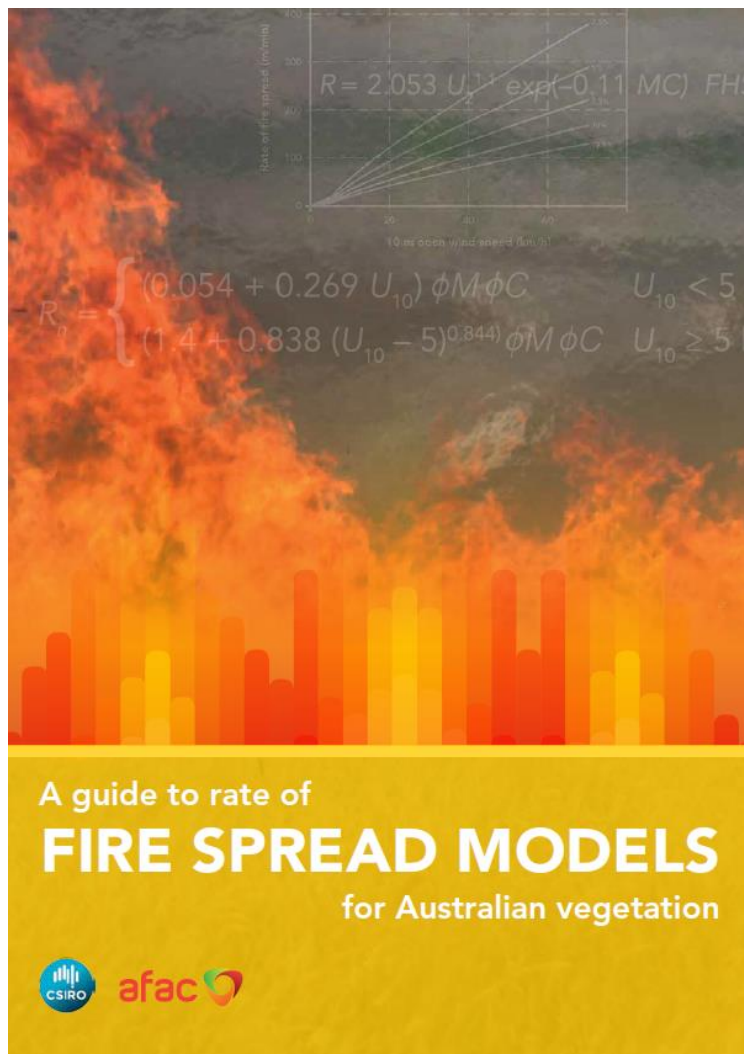
Commonwealth Agencies

Researchers that can improve national systems

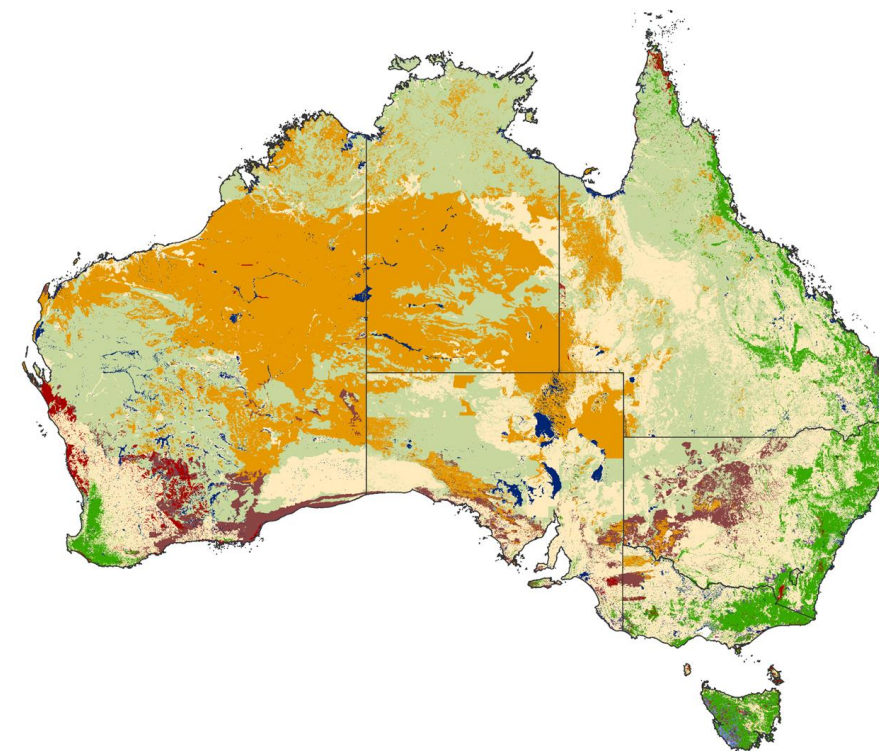
Fuel Types Australia



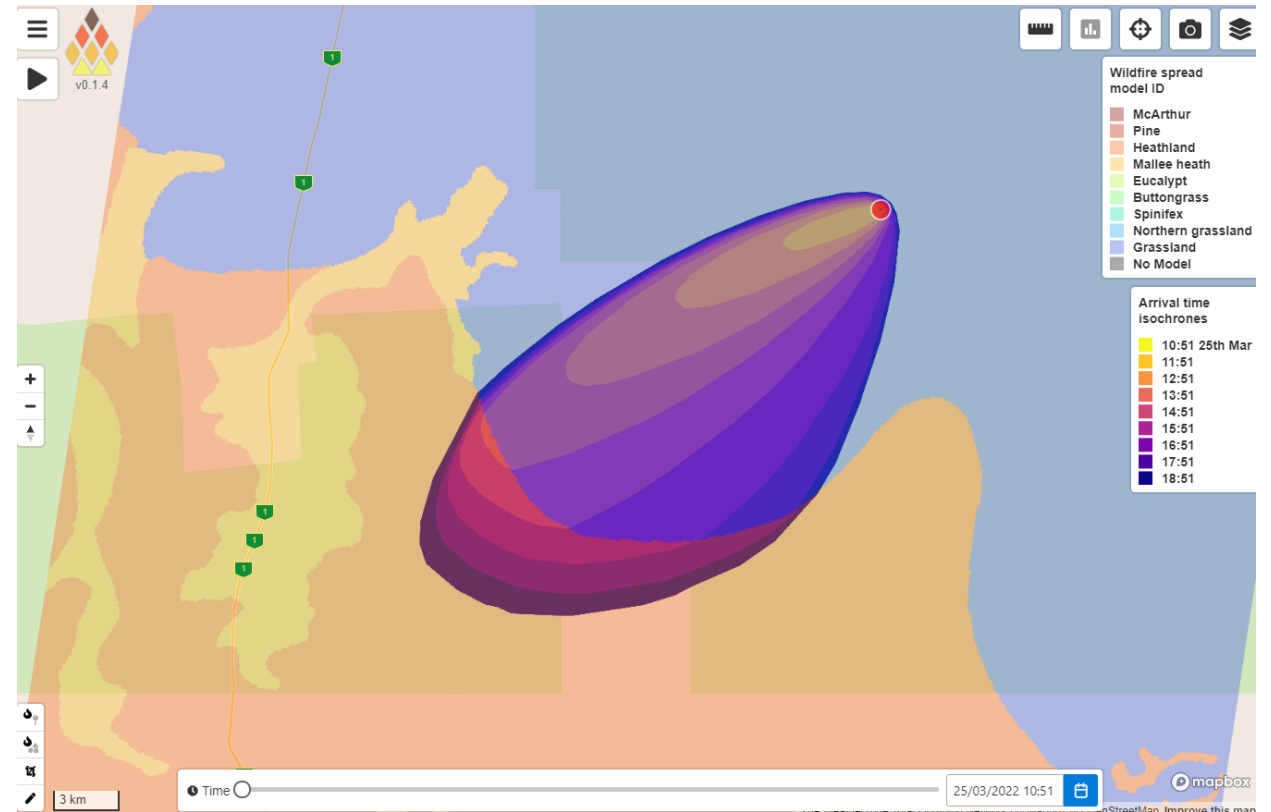
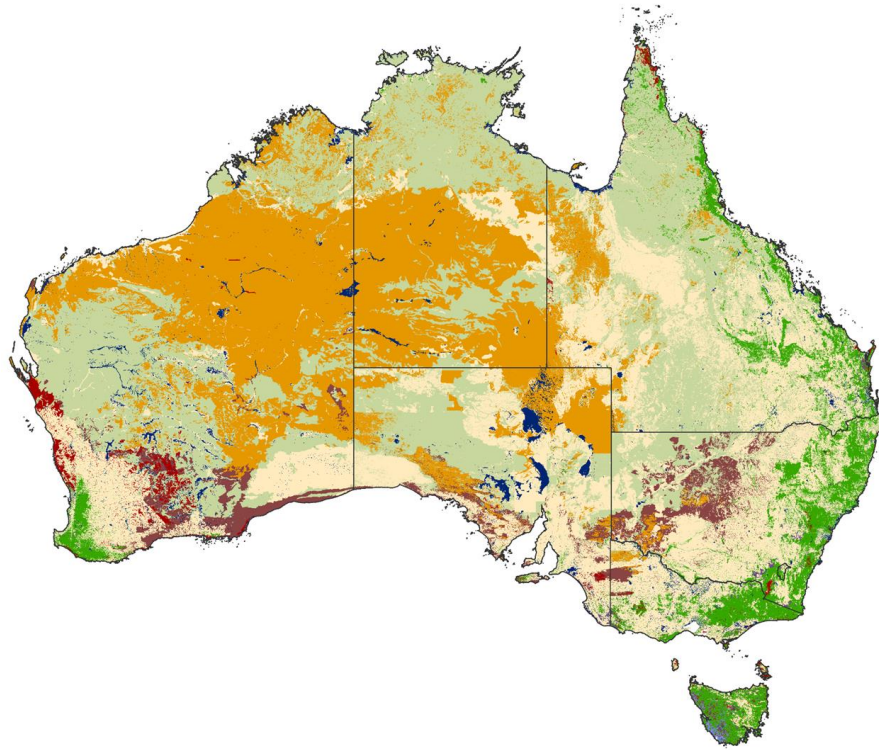
Fuel Types Australia

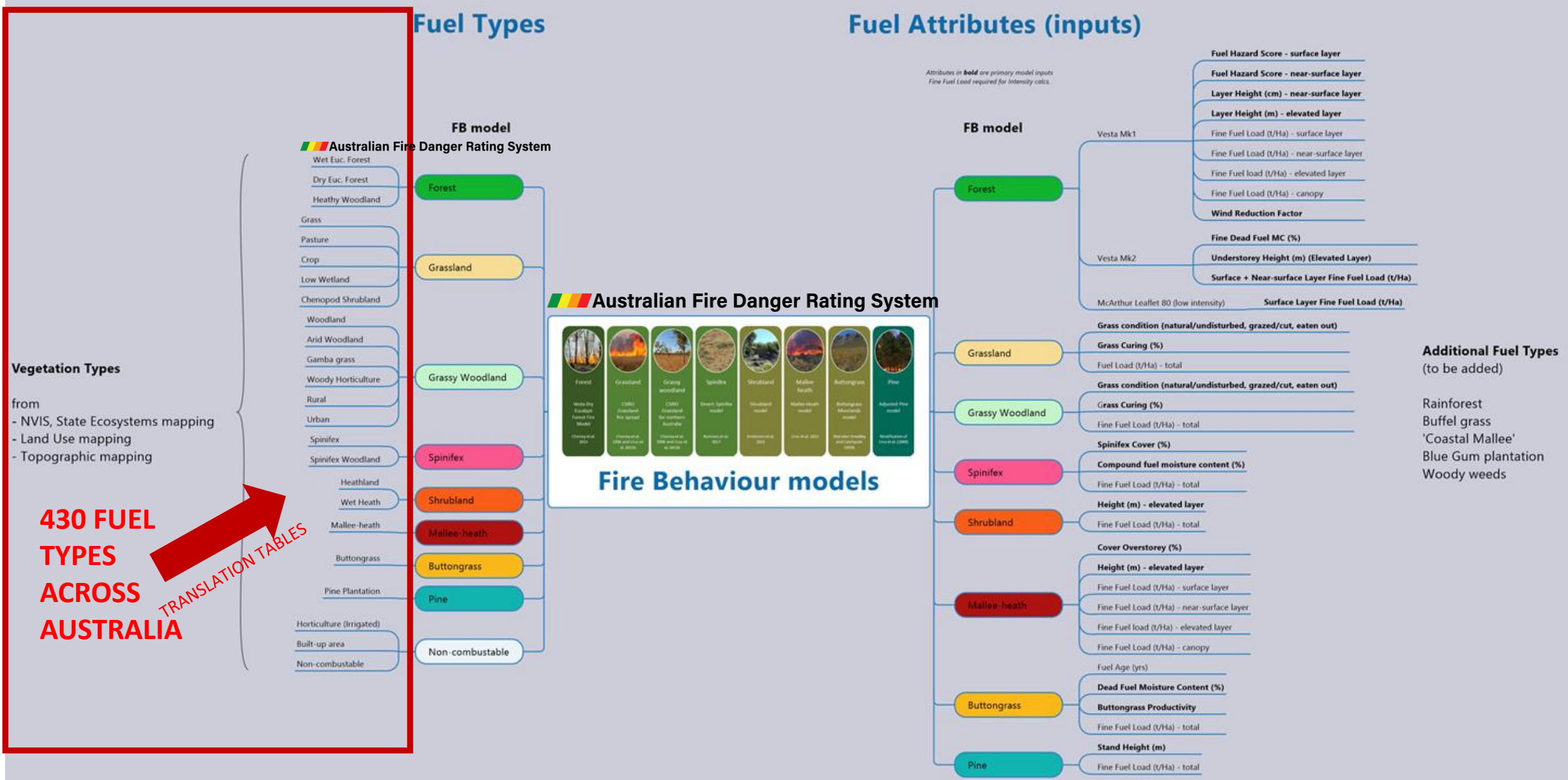


- Forest
- Woodland
- Grass
- Spinifex
- Mallee heath
- Shrubland
- Buttongrass
- Pine
- Non-combustible

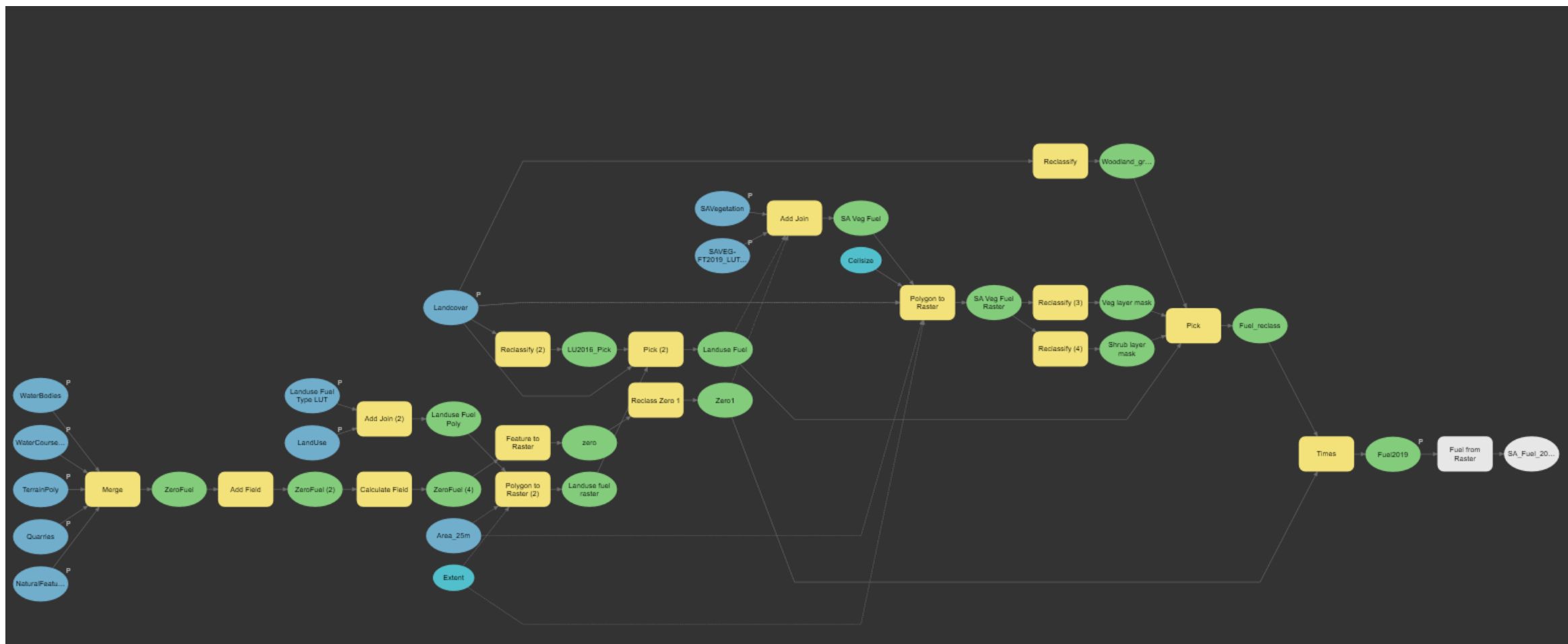


Fuel Types Australia





Fuel Types Australia



Fuel Types Australia



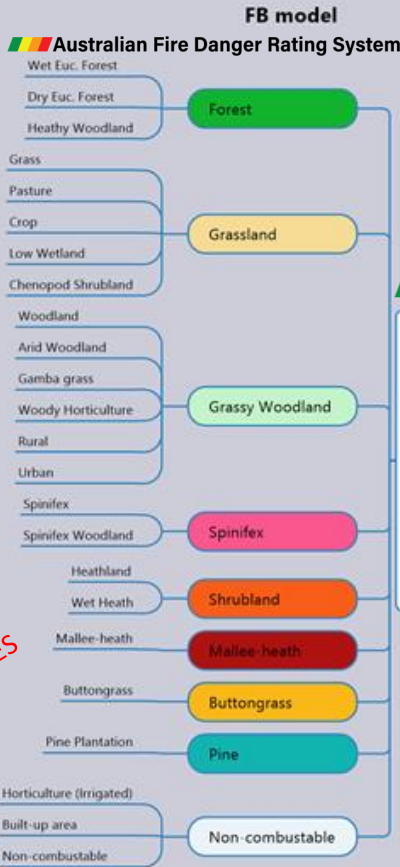
Fuel Types

Fuel Attributes (inputs)

Vegetation Types
from
- NVIS, State Ecosystems mapping
- Land Use mapping
- Topographic mapping

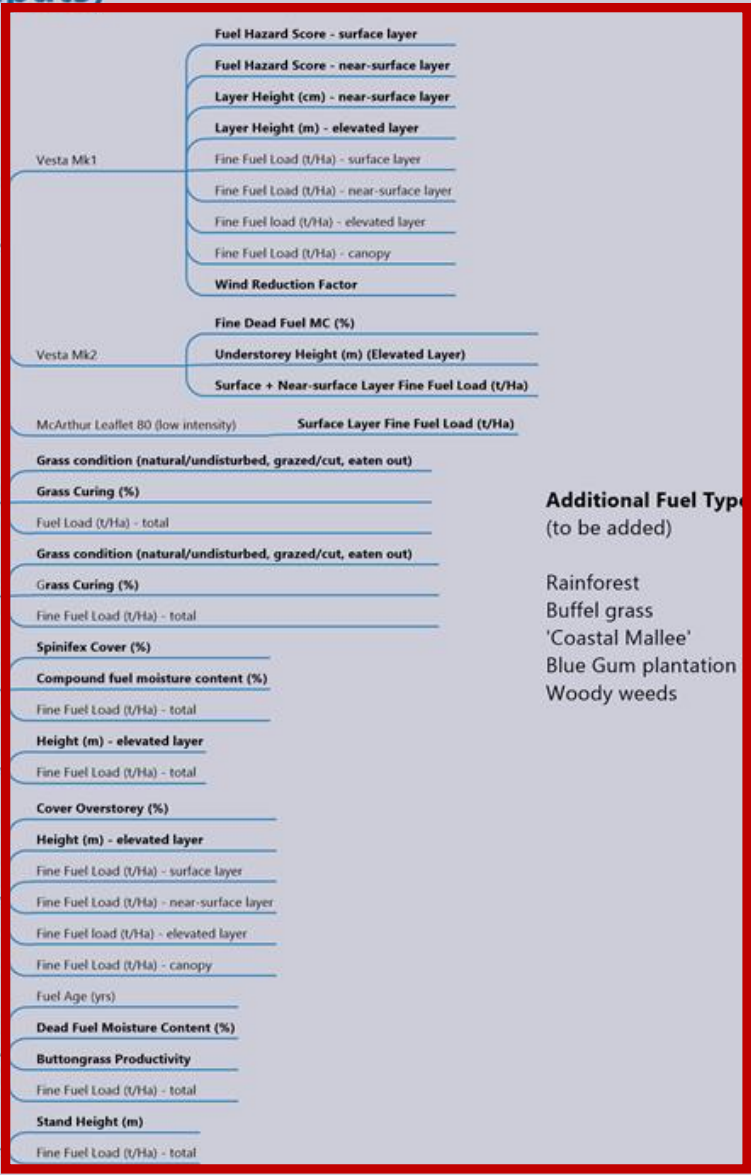
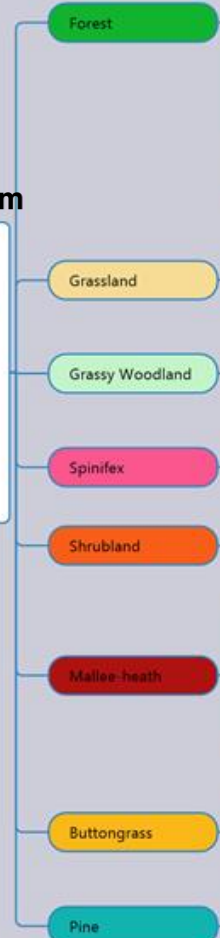
430 FUEL TYPES ACROSS AUSTRALIA

TRANSLATION TABLES



Attributes in **bold** are primary model inputs
Fine Fuel Load required for intensity calcs.

FB model



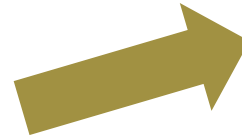
Additional Fuel Types
(to be added)

- Rainforest
- Buffel grass
- 'Coastal Mallee'
- Blue Gum plantation
- Woody weeds

Fuel Types Australia



Attribute_Name	Fuel_Attribute_Code	FBS_s	FBS_ns	FBS_el	FBS_b	FL_s	FL_ns	FL_el	FL_b	FL_o	FL_total	FI_s	FI_ns	FI_el	FI_b	FI_o	FI_total	FK_s	FK_ns	FK_el	FK_b	FK_o	FK_total	H_ns	H_el	H_o	Hk_ns	Cov_o	WF_Sav	WF_Heath	WRF_For	Spotting	Prod_BG
Fuel_Type(Fuel_AFRS)	Attribute_Unit	score_(0-5)	score_(0-5)	score_(0-5)	score_(0-5)	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	t/Ha	#_(0-1)	#_(0-1)	#_(0-1)	#_(0-1)	#_(0-1)	#_(0-1)	cm	m	m	#_(0-1)	%	#_(0-1)	#_(0-1)	#_(0-10)	#_(0-1)	#_(0-3)
Forest	Vesta	Y	Y			Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y		Y				Y	Y	
Wet_forest	Vesta	Y	Y			Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y		Y				Y	Y	
Pine	Pine																																
Woodland	Savannah										Y						Y						Y						Y				
Acacia_woodland	Savannah										Y						Y						Y						Y				
Gamba	Gamba										Y						Y						Y						Y				
Woody_horticulture	Savannah										Y						Y						Y						Y				
Rural	Savannah										Y						Y						Y						Y				
Urban	Savannah										Y						Y						Y						Y				
Spinifex	Spinifex																												Y				
Spinifex_woodland	Spinifex																												Y				
Mallee	Mallee heath					Y	Y	Y	Y	Y		Y	Y	Y	Y	Y		Y	Y	Y	Y	Y				Y		Y					
Chenopod_shrubland	Grassland										Y						Y						Y										
Heath	Heathland										Y						Y						Y		Y					Y			
Wet_heath	Heathland										Y						Y						Y		Y					Y			
Buttongrass	Buttongrass										Y						Y						Y										Y
Low_wetland	Grassland										Y						Y						Y										
Grass	Grassland										Y						Y						Y										
Pasture	Grassland										Y						Y						Y										
Crop	Grassland										Y						Y						Y										
Horticulture	NA																																
Non_combustible	NA																																
Built_up	NA																																



STANDARD TERMS



DATA DEFINITIONS

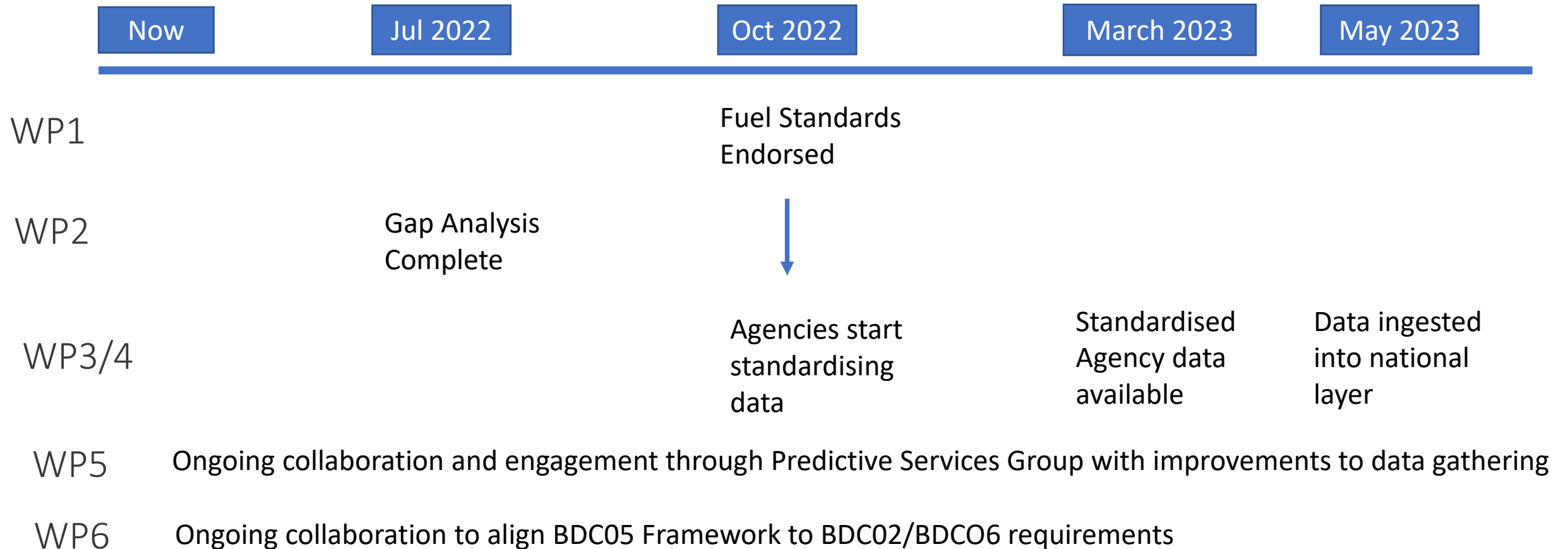


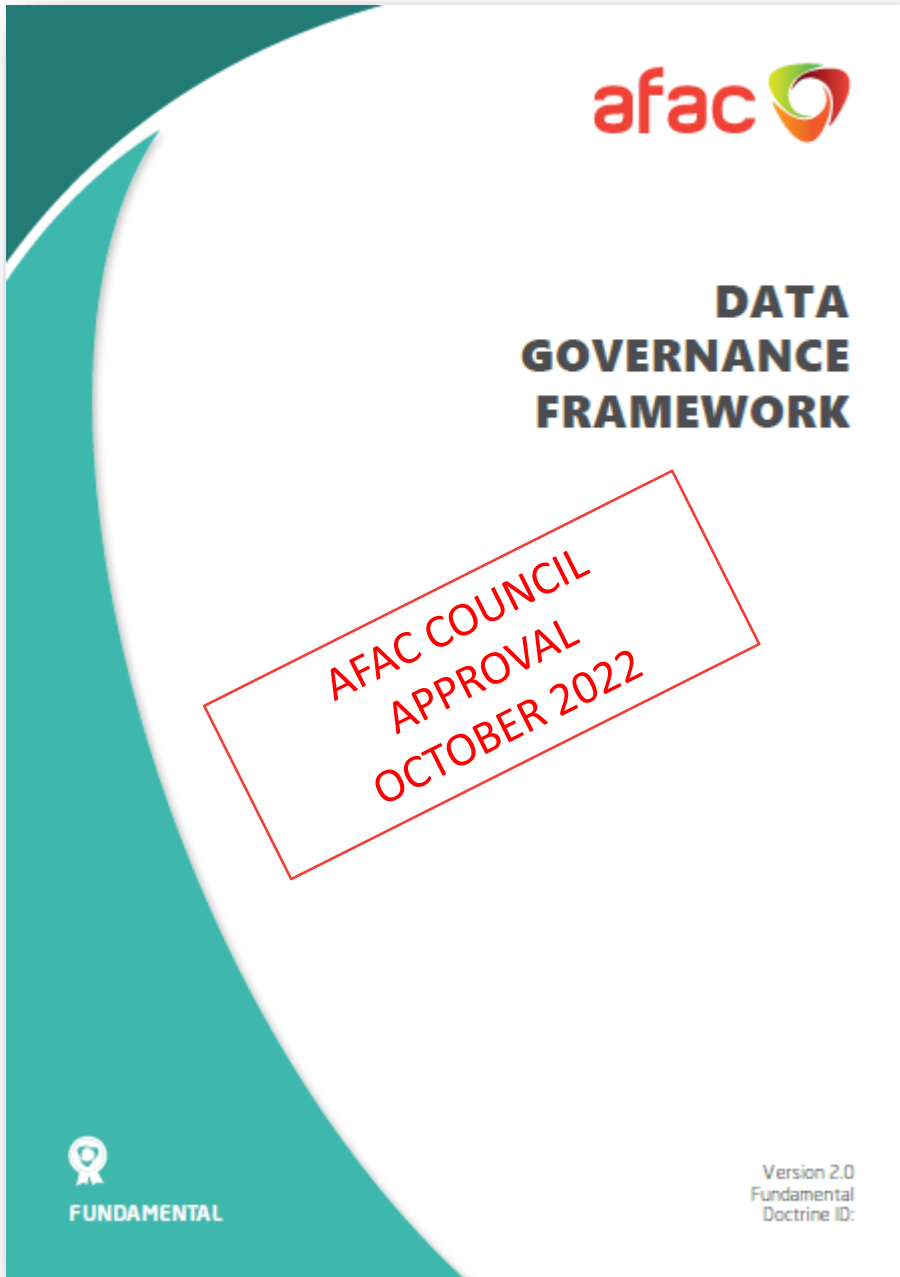
STANDARDISED COLLECTION METHODS

USERS:

NBIC, AFDRS, SPARK OPERATIONAL, PLANNING,
RESEARCH SANDBOXES

Timelines





- Data content standards
- Access and authorisation
- Licencing



- Privacy
- Provenance and attribution
- Programmatic access
- Governance arrangements
- FAIR data principles



FIRE HISTORY DATA AS TEMPLATE

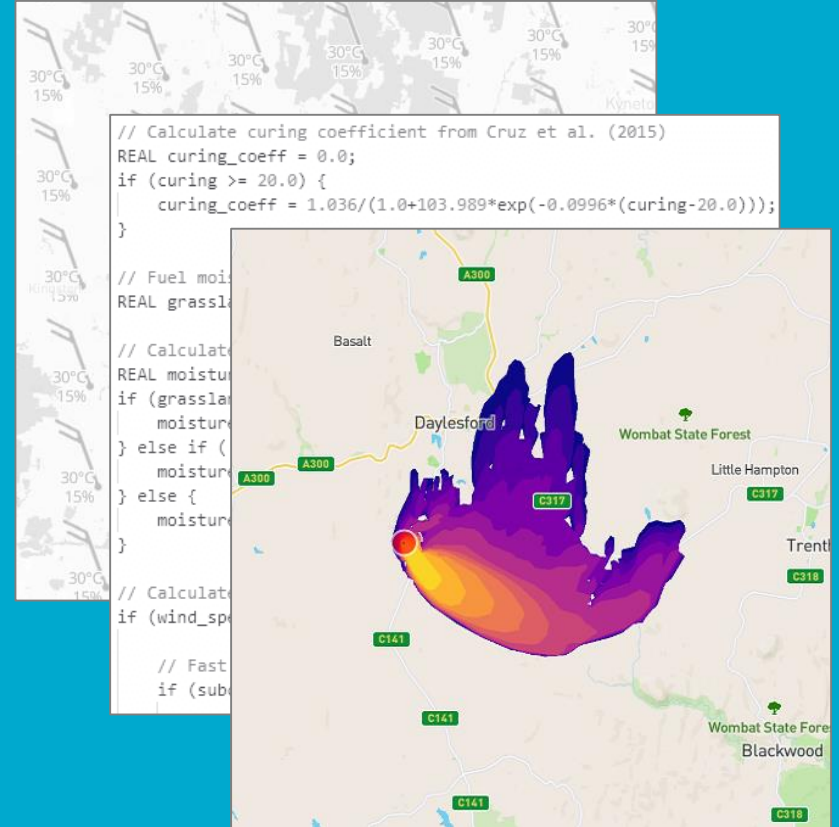


Bushfire Data Commons Forum

Spark Research - Wildfire Behaviour Modelling Platform

Thursday 7th April, 2022

Australia's National Science Agency



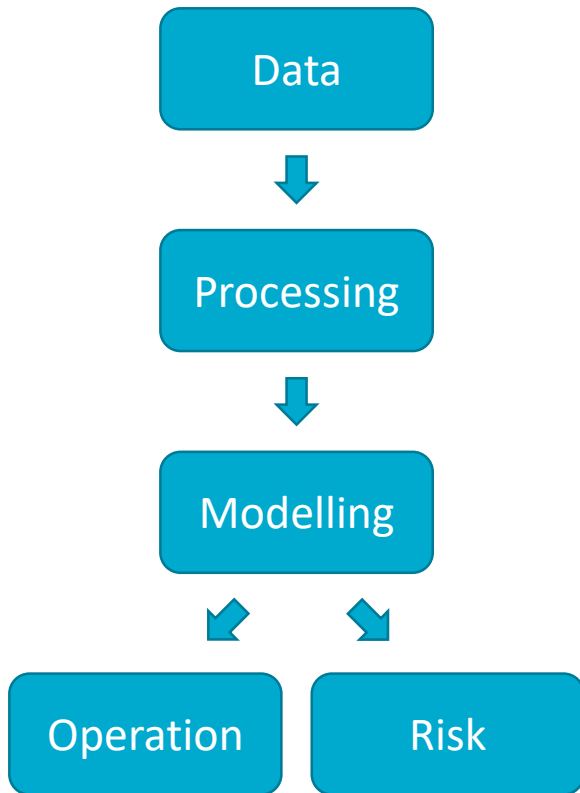
Acknowledgement of Country

I would like to begin by acknowledging the Traditional Owners and Custodians of the land on which I am hosting this presentation, the Peoples of the Kulin Nation. I also pay my respects to their Elders past and present.

Motivation

Significant high-quality wildfire research

- Challenges:
 - *Operationalisation pathway*
 - *Common platform*
- Vision:
 - *Collaborative, open platform for researchers and stakeholders*
 - *Allow testing of data processing, analytics and models*
 - *Testing ground for operationalisation*
 - *Freely available to researchers and agencies*
 - *Easy to use web-based system*



Partners and beneficiaries

Trial partners spanning wildfire research space

- *ANU/Monash: remote sensing*
- *VU/UNSW: wildfire behaviour modelling*
- *CSIRO L&W: data interoperability*

Not an exclusive list, further partners will be added

Also work with ARDC streams

- *Data interoperability/operational trials*



Work Package overview

Stage	Work Package (WP)	Time Frame	Progress
Planning	WP 1: System Architecture	Oct 21 – April 22	95%
Execution	WP 2: Infrastructure build	April 22 – Nov 22	5%
	WP 3: Input data interoperability		
Integration	WP 4: Integration of wildfire modelling	Nov 22 – June 23	
	WP 5: Business model development		

Development

- WP1
 - *Approached partners, initial implementation on Nectar*
 - *Requirements/feedback at upcoming workshop*
- WP2/WP3
 - *Synthesise requirements, technical development*
 - *Understand data landscape, technical integration*
- WP4/WP5
 - *Delivery of system, provision of access, training of end-users*
 - *Planned continuation of system*
- Workshops every 4 to 6 months to update partners and end-users
- Technical WPs will integrate updates back into the platform

Next steps

- First version of platform ready for demonstration
 - *Demonstrator of partner research to be implemented in system*
 - *Workshop early May for partners/ARDC*
 - *Gathering of requirements post-workshop*
- ARDC sibling streams
 - *Coordinate and collaborate around data interoperability*
 - *Technical meetings to be held*
- Gather further end-users and use cases

Workshop

- Demonstration of research/data expressed in the system
 - *New fire spread models for different fuel types*
 - *Integration of data inputs into bushfire models*
 - *Implementation of landscape-scale models for fire risk*
 - *Application of remote sensing models for data processing*
- Expectations and outcomes
 - *Deep dive on demonstration of the platform*
 - *Articulation of capability and knowledge gaps*
 - *Feedback on future research, needs and requirements*



Thank you

For further information

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<https://research.csiro.au/spark>

Australia's National Science Agency

WP1: System Architecture

- Consult relevant stakeholders and end users
- Gather partners/beneficiaries for system
- Provision and create of demonstration system
 - *Implement demonstration models*
 - *Workshop for partners*
- Requirements gathering and feedback for WP2

WP2: Infrastructure build

- Update system with requirements from WP 1
 - *Technical development, coding, testing and documentation*
- SparkDev, hosted on Nectar Cloud
 - *Web portal to read, process and use wildfire data*
 - *Front-end web-based user interface for loading and configuring data sets*
 - *Support basic geospatial operations and user-defined models*
 - *Integrated instance of Spark to run fire growth models*
 - *Back-end multi-core geospatial processing engine based on Geostack*
 - *Scalable server/network for multiple users/large groups*
- Open access by end of WP2

WP3: Input Data interoperability

- Understand data landscape
 - *Input and output data formats required*
 - *Implement remote data access*
- Integration of relevant data streams
 - *Weather*
 - *Terrain*
 - *Fuel classification*
 - *Fuel state (in parallel with sibling ARDC streams)*
 - *Raw remote sensing data*
 - *Ignition conditions*

WP4: Integration of wildfire modelling systems

- Integrate fire modelling systems into the infrastructure
 - *'Sand-pit' to test fire models and operationalisation in Spark*
- Wildfire modelling development
 - *Cover any research gaps found using the system*
 - *Improvements to handle data sets and new model types*

WP5: Business model development

- Focus on developing an ongoing sustainable business model
 - *Ongoing hosting, training and support*
 - *Maintenance and updates to the platform*



Australian Research Data Commons

Aggregated and harmonised burnt extent fire history data on a national scale



The Australian Research Data Commons is enabled by NCRIS.



Objectives

Provide a Nationally consistent and standardised fire history dataset for Australia

- Develop feeds which can be used in national products
- Undertake a gap analysis for operational fire boundaries and fire history
- Develop a data dictionary for fire history and the operational fire boundary
- Develop a near real time national burnt area product from satellite imagery

Partners and stakeholders



Australian Government
Geoscience Australia



Australian Government
Attorney-General's Department
Emergency Management Australia



AUSTRALIAN RESEARCH DATA COMMONS

Work packages 1:

Gap Analysis



WP1: Gap analysis:

- expand on 2019/20 gap analysis by performing a second national bushfire history audit which includes:
 - Identify state and territory capabilities in relation to:
 1. current fire areas,
 2. year to date fire history,
 3. fire history and
 4. fire severity
 - Gap analysis of associated metadata, standards

Current Incident Feed (extent)

Table 1: Current incident point and polygon data and feeds

Jurisdiction and Lead Agency	Current Incident point feed	Incident Polygon (near real time)	Polygon Creation for season	Single State Polygon Feed Available to Commonwealth	Public warning system with fire shapes (eg Fires Near Me app)
ACT (ESA)	Yes	Yes	Yes	Yes	Yes
NSW (RFS)	Yes	Yes	Yes	Yes	Yes
NT (PFES)	Yes	No	Yes	No	No
QLD (QFES)	Yes	Partial	Yes	Partial	Yes
SA (CFS)	Yes	Yes	Yes	Yes	Yes
VIC (DELWP)	Yes	Yes	Yes	Yes	Yes
WA (DFES)	Yes	Partial	Yes	No	Yes
TAS (TFS)	Yes	Yes	Yes	Yes	Yes

Fire History Gap Analysis

Jurisdiction and Agency	Near realtime Linescan availability	Field data integration into Systems	Operational/ unvalidated Fire history season to date	Yearly fire history - fire scar	Yearly fire history - severity	Single State - combined agency fire history	Automated Fire severity available	Viewable on web by public	Digitally Downloadable	EMLink
ACT	Yes	Partial	Yes	Yes	Partial	Yes	No	No	No	No
NSW	Yes	Partial	Yes	Yes	Yes	No	Partial	Yes	No	Partial
NT	No		Yes	Yes	No	No	No	Yes	Yes	No
QLD	Partial	Partial	Partial	Partial	No	No	No			Partial
SA	No	Partial	Partial	Partial	Partial	Partial	No	Partial	Partial	Partial
VIC	Yes	Partial	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes
WA	Yes	Yes	Partial	Partial	No	No	No		No	No
TAS	No	Limited	Yes	Yes	No	Yes	No	Yes	Yes	Yes

Work package 2:

Continuation of the AFAC fire history dataset review to identify and agree on proposed the national framework

Deliverables WP2:

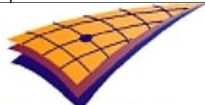
- Phase 1: Stakeholder list, historical analysis, challenges
- Phase 2: Governance agreement
- Phase 3: Specification for national product, operational scenarios, licencing

Data dictionary has been endorsed by AFAC PSG for Fire History

7 Fire history attributes have been agreed

Data sharing frequency and products are agreed

Sharing is via emLINK and CCBY

Attribute	Data Type	Example	Description and business rules
<i>start_date</i>	Date format dd/mm/yyyy	28/01/1990	The date of the ignition of a fire event
<i>capt_method</i>	string	MODIS Satellite Imagery 250m	Categorical variable to describe the source of data used for defining the spatial extent of the fire. <i>Refer to Table 3. For capture methods</i>
<i>ID</i>	string	12345	ID attached to fire (e.g. incident ID, Event ID, Burn ID)
<i>Name</i>	String	Incident name	Incident Name
<i>fire_type</i>	string	Bushfire or Prescribed Burn	Binary variable to describe weather a fire was a bushfire or prescribed burn. <i>Refer to Table 2. For fire type definition</i>
<i>State</i>	string	ACT (Australian Capital Territory)	Custodian of data
<i>Ignition_cause</i>	string	Arson	 EMSINA
<i>Shape_Area</i>	double	2 Ha	
<i>Shape_length</i>	double	2 Km	

Work package 3: State Capability Uplift



Deliverables WP3:

1. **current fire areas,**
2. year to date fire area,
3. fire boundary (yearly fire history) and
4. severity (yearly fire history including severity)

Work package 4:

National Fire Boundaries and History

WP4: National fire history

- Curated and harmonised fire history data, aggregated across borders
- Harmonisation tools and methodology publicly available
- Public delivery via web services and data downloads

Work Package 5:

National burnt area products analysed from satellite imagery

Deliverables:

National burnt area products - Near Real Time (NRT) and Historic - from Landsat and Sentinel 2 satellite imagery.

Collaborative approach drawing best available algorithms from state and federal agencies. Combination of serving existing state data and developing ongoing burn mapping workflows.

Phase 1: Near Real Time, Phase 2: Historic

- WMS + WCS (vector) + Raster (image) classification
- Landsat 8 + Landsat 9 adaptation + Sentinel 2a + 2b support
- Open-source software enabling input by third parties / access for researchers

Next Steps



- Work with states on capability uplift for burnt areas
- Sign off for data dictionary by AFAC executive
- Gap analysis for fire history
- Continue working on harmonisation and aggregation of burnt area data and fire history
- Finalise selection of contributing datasets for EO fire extents and history and begin implementation into Digital Earth Australia

Challenges

- Funding
- Resources (staff, time)



*AFAC is the Australian and New Zealand
National Council for fire and emergency services*

ARDC

BDC05

Framework for sharing bushfire data and
tools between jurisdictional agencies
(linked to BDC01)



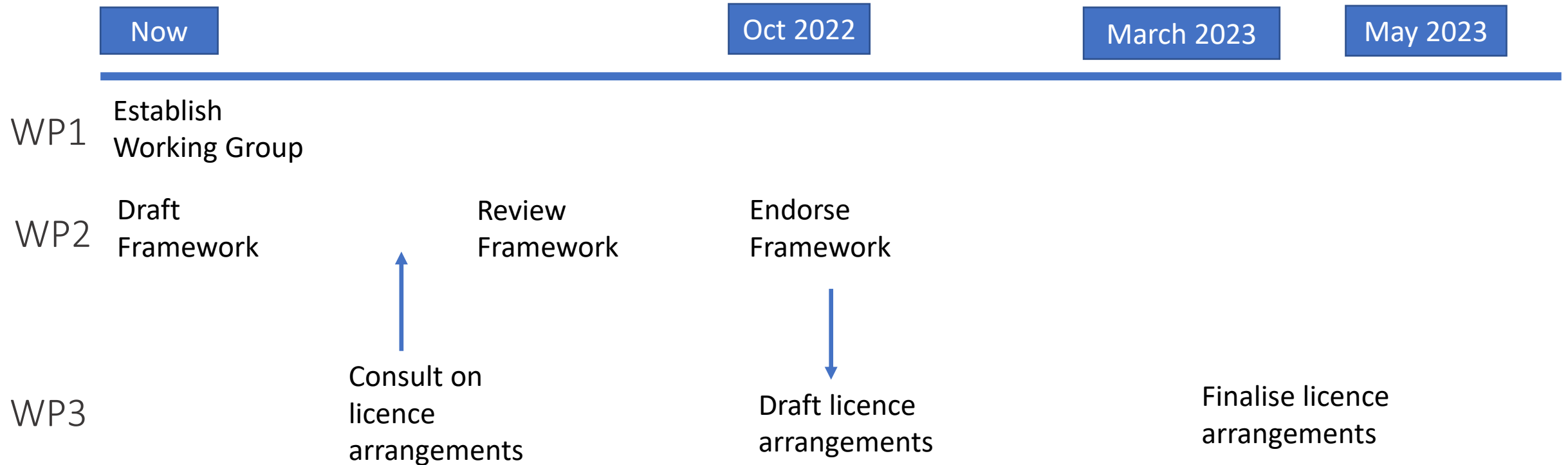
Project objective and vision:

To deliver a robust and enduring framework to facilitate the development of new understanding of bushfire behaviour through simple access to core data sets.

Partners:

- AFAC Predictive Services Data Working Group
- This project is linked to BDC01 Aggregated and harmonised burnt extent fire history on a national scale, led by EMSINA and GA.
- The governance framework will also be used to develop data sharing arrangements for BDC06, Aggregated and Harmonised Fuel Data on a National Scale

Timelines





AFAC DOCTRINE

ALIGNED TO OUR 6 KEY STRATEGIC DIRECTIONS 2022 - 2026

Our most significant intellectual property asset is our suite of doctrine publications. They are evidence-based and vested as the official view by the AFAC National Council.

Learn more about our doctrine classification and strategic directions.

[AFAC.COM.AU/DOCTRINE](https://afac.com.au/doctrine)



1 RESILIENT COMMUNITIES

- » Bushfires and Community Safety
- » Classifying Bushfire Fuels in Australia
- » Fire Risks from the Management of Tundra Grass in Northern Australia
- » Fire Safety in the Built Environment
- » National Position on Prescribed Burning
- » Wind Farms and Bushfire Operations
- » Residential Fire Safety Position
- » Change Your Clock, Change Your Smoke Alarm Batteries
- » Common Safety Messaging, Catastrophic Bushfires, Black Saturday Lessons*
- » Fire Safety for Impulse (jet) Fairs in Car Parks
- » Fire Safety Principles for Massive Timber Building Systems
- » Fire Safety for Road Tunnels
- » Fire Safety Requirements for Automated Vehicle Parking Systems
- » Intervention Programs in Australia for Juveniles Who Display Fire Risk Behaviours
- » People in Cars During Bushfires
- » Prevention, Preparedness and Response to Buildings w/ Combustible Cladding*
- » Principles for Educating Children in Natural Hazards and Emergencies
- » Smoke Alarms in Residential Accommodation
- » Design, Installation and Maintenance Requirements for Dry Hydrants
- » Community Safety Messaging: Use of NBN in Emergency Events
- » Assist with Prescribed Burning
- » Conduct Complex Prescribed Burns
- » Conduct Simple Prescribed Burns Plans
- » Develop Complex Prescribed Burns Plans
- » Develop Simple Prescribed Burns Plans

2 TRUSTED RESPONSE

- » Australian Inter-service Incident Management System (AIMS 2017)
- » Class A Recycled Water for Firefighting Purposes
- » Firefighting Water Point Markers
- » Unauthorised or Illegal Use of RPA in or near Emergencies
- » Use of Chemicals in Bushfire Control and Prescribed Burning
- » Use of Lockouts, Awareness, Controls, Escape Routes, Safety Zones (EACES)
- » Use of Personal Fire Shifters in Wildfires
- » Framework for Risk Management and Workplace Health and Safety for Emergency Responders*
- » Acetylene Cylinder Incidents
- » Compressed Air Foam Systems (CAFS)
- » Emergency Medical Response
- » Emergency Planning and Response to Protect Life in Flash Flood Events
- » Emergency Services Support Role to Multihazard High Threat Incidents
- » First Responders Attending a Built Water Incident
- » Managing the Risk of Exposure to Bushfire Smoke
- » Managing Bushfire at the Urban-Rural Interface
- » Managing Fatigue in Emergency Response
- » Smoke Alarms in Residential Accommodation
- » Managing Heat Stress in Emergency Response
- » Managing Hydration in Emergency Response
- » Managing Tree Hazards
- » PV Arrays Systems
- » Responding to Incidents Involving Landfill Gas Leaching
- » Use of Temporary Flood Barriers
- » Vertical Rescue
- » AIMS 2017 manual
- » AIMS ebook
- » AIMS Aides memoire
- » AIMS Awareness Training Resources KIT
- » AIMS Principles Training Resources KIT
- » AIMS Decision Making Under Pressure
- » Building Simulation Capability for Incident Management Teams Research Insights and Training Resources KIT
- » Respond to Wildfire
- » Suppress Wildfire
- » Respond to Urban Fire
- » Suppress Urban Fire
- » Respond to Isolated Structure Fire
- » Drive Vehicles under Operational Conditions
- » Navigate to an Incident
- » Operate Breathing Apparatus
- » Operate Communications Systems and Equipment
- » Operate Pumps
- » Protect and Preserve Incident Scene

3 CREDIBLE INFORMATION

- » Classifying Bushfire Fuels and Storing Bushfire Fuels Information
- » Bushfire Fuel Classification
- » Case Studies: Sharing and Retaining Knowledge by Practice and Research
- » Conducting Independent Operational Audits
- » Data Quality Assessment Guideline
- » Landscape Fire Performance Measures Data Dictionary
- » National Damage Assessment Data Set and Dictionary, Phase 2 Assessments
- » Incidents Involving PV Arrays and Battery Energy Storage Systems
- » AFAC / AIDR Glossary of Standardised Industry Terms
- » Conducting Successful Debriefs
- » Interpret and Analyse Fire Weather Information
- » Report on VET Statistics 2015-2020 on the Fire, Emergency Services and Emergency Management Qualifications
- » Take Local Weather Observations

4 SAFE, CAPABLE AND DIVERSE WORKFORCES

- » Climate Change and the Fire and Emergency Service Sector
- » Coaching and Mentoring for RMTs
- » Eligibility Criteria for the National Emergency Services Memorial
- » Endorsement of Level 3 Incident Controllers
- » Role of Chiefs in the Context of AFAC
- » Aerial Appliance Maintenance
- » Emergency Service Vehicle Working Devices
- » Fire Aviation Training and Assessment
- » Heavy Tanker Cab Chassis
- » Identification of Portable Fuel Containers
- » Maintaining Positive Mental Health and Wellbeing for Early Emergency Services Volunteers
- » Medium Tanker Cab Chassis
- » Operational Response Vehicle Type Management
- » Optimising the Service Life of Operational Response Vehicles
- » Rural Firefighting Vehicles Burn-over Protection
- » Selection of Appropriate Respiratory Protective Devices During Bushfires
- » Selection, Use, Care and Maintenance of Personal Protective Equipment
- » Volunteer Inclusion Guideline
- » Selection, Use, Care and Maintenance of Operational Equipment - General Requirements
- » Selection, Use, Care and Maintenance of Operational Equipment - Part 1: Water Delivery
- » Assist with Formulation and Implementation of Plans and Policies
- » Communicate in the Workplace
- » Lead, Manage and Develop Teams
- » Manage Financial Resources
- » Manage Marketing Requirements
- » Manage Organisational Communication Strategies
- » Work Autonomously
- » Work in a Team

5 KNOWLEDGE, INNOVATION AND RESEARCH

- » All AFAC doctrine is informed by research
- » AIDR HANDBOOK COLLECTION
- » The AIDR Handbook Collection is developed through consultation with a broad range of stakeholders from the emergency management and disaster resilience sectors.
- » Australian Emergency Management Arrangements
- » Community Engagement for Disaster Resilience
- » Communities Responding to Disasters Planning for Spontaneous Volunteers
- » Community Recovery
- » Disaster Resilience Education for Young People
- » Emergency Planning
- » Evacuation Planning
- » Flood Emergency Planning for Disaster Resilience
- » Health and Disaster Management
- » Incident Management
- » Land Use Planning for Disaster Resilient Communities
- » Lessons Management
- » Managing Evacuation
- » Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia
- » National Emergency Risk Assessment Guidelines (NERAG)
- » Public Information and Warnings
- » Safe and Healthy Crowded Places
- » Systemic Disaster Risk
- » Tauxand Emergency Planning in Australia

6 EFFECTIVE AND TRANSPARENT GOVERNANCE

- » Strategic Directions for Fire and ES in Australia and New Zealand 2022-2026
- » What is Operational Success for Fire and Emergency Services?
- » Leadership Capability Framework
- » Fundamentals of Doctrine: Best Practice Creation
- » Member and Stakeholder Consultation

DOCTRINE — CLASSIFICATION

CAPSTONE FUNDAMENTAL
PROCEDURAL TECHNICAL
AIDR HANDBOOK

*Accurate as of January 2022. Some titles are abridged.



FIRE HISTORY DATA DICTIONARY

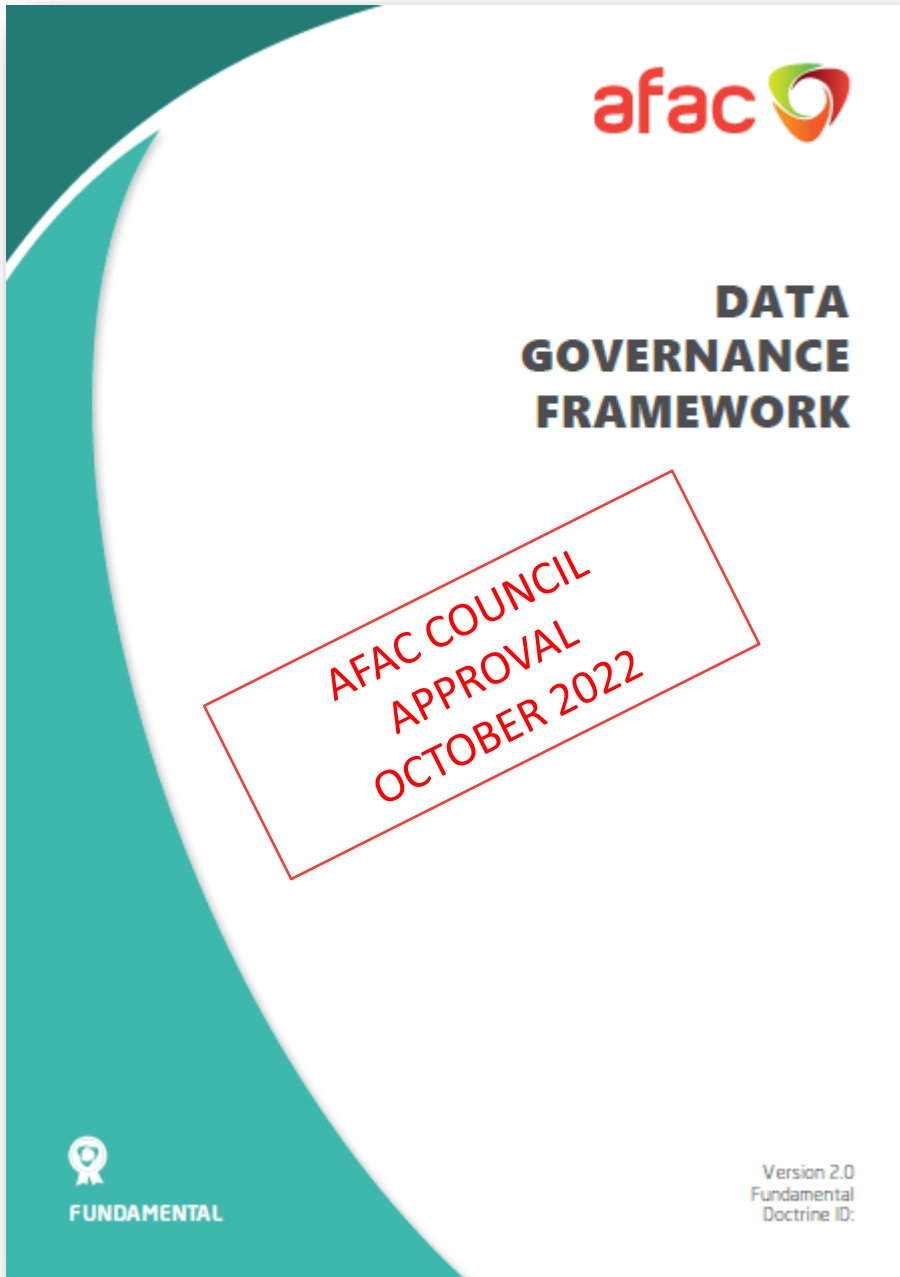
AFAC COUNCIL
APPROVAL
MAY 2022



PROCEDURAL

GUIDELINE
Version 2.0
May 2021
Procedural
Publication ID:





- Data content standards
- Access and authorisation
- Licencing



- Privacy
- Provenance and attribution
- Programmatic access




- Governance arrangements
- FAIR data principles



Australian Research Data Commons

Thank you

www.ardc.edu.au

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