MER Network Pilot – the power of network science

Suzanne Prober | 23 November 2020

tern
Ecosystem Research Infrastructure

CSIRO

Australia's National Science Agency

Australian Government
Department of Agriculture, Water and the Environment

CSIRO project team

CSIRO core team:

Josie Carwardine

Suzanne Prober

Sam Nicol

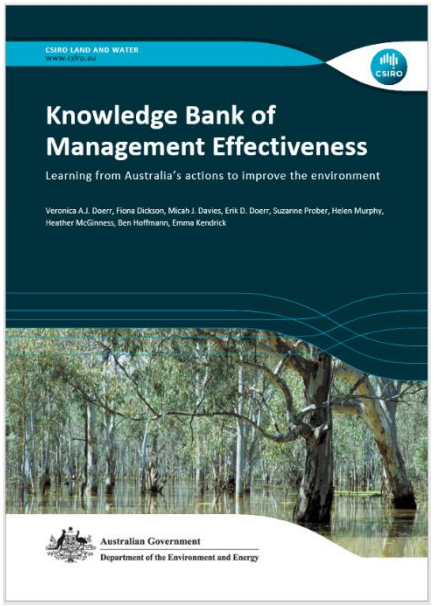
Jess Hodgson

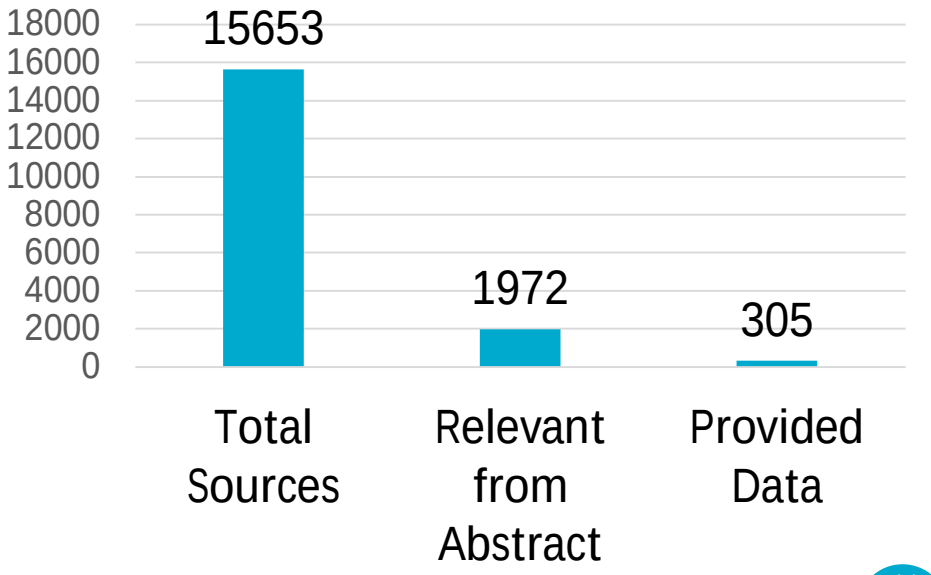
Linda Broadhurst

Advisory panel: Iadine Chadés (information science), Shaun Levick (remote sensing), Paul McInerney (aquatic ecosystems), Helen Murphy (rainforests), Chris Pavey (fauna), Gavin Rees (aquatic ecosystems, eDNA), Cathy Robinson (social science), Eric Vanderduys (fauna), Kristen Williams (forests, biodiversity assessment)

Knowledge Bank of Management Effectiveness

- Total volume of accessible direct evidence for effectiveness of management actions is surprisingly low





Griffith report

A long-term monitoring framework for the Regional Land Partnerships Program

Stage 2

FINAL REPORT

February 2020

Griffith UNIVERSITY
Queensland, Australia

Australian Government | National Landcare Program

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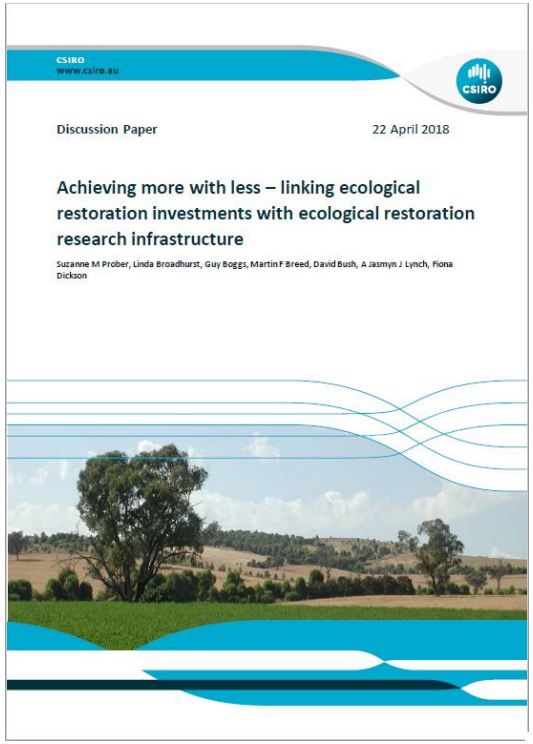
Platform for Ecological Restoration Research Infrastructure (PERRI) Discussion Paper



Suzanne Prober, Linda Broadhurst, Guy Boggs, David Bush, Jasmyn Lynch, Martin Breed, Fiona Dickson

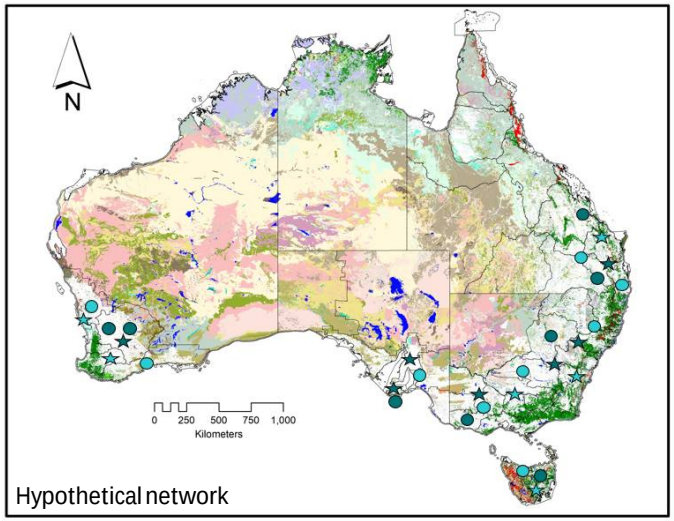
The Western Australian Biodiversity Science Institute

Australian Government
Department of Agriculture, Water and the Environment

CSIRO

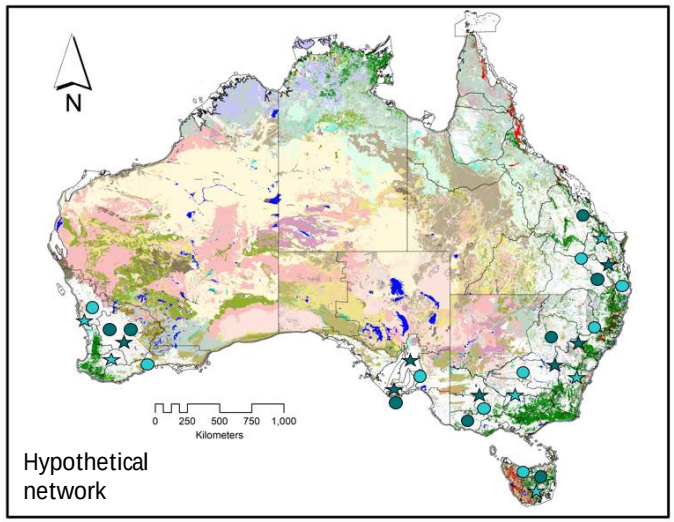
MER Network concept

Build co-ordinated, nationally distributed, embedded research infrastructure, specifically designed to answer key questions on ecological recovery and management effectiveness.



Hypothetical network

e.g. Revegetation plantings



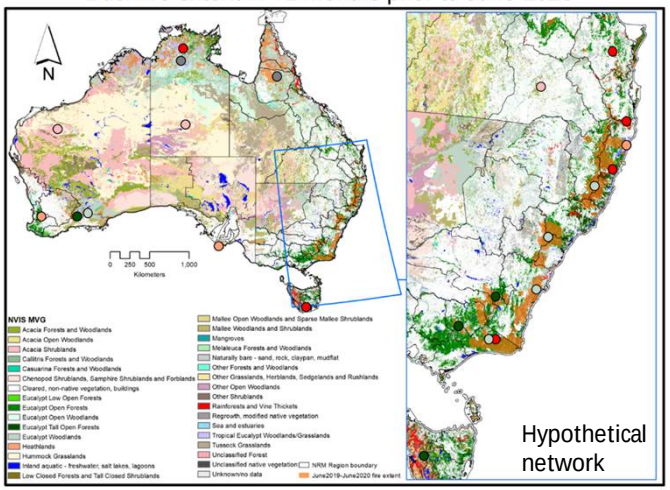
Hypothetical network

Potential themes

- Climate adaptation (provenancing, species selections, species diversity)
- Species and functional diversity
- Establishment technologies

e.g. Post-fire recovery

Bushfire extent in 12 months prior to June 2020

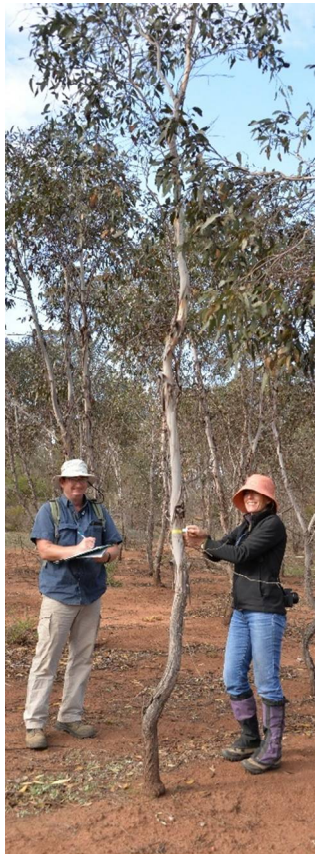


Potential questions

- What are the responses of vegetation communities, threatened species, and habitats to unplanned bushfire across space and time?
- Where have ecosystems crossed thresholds?
- Have interventions implemented through RLP actions minimised the impact of unplanned bushfires on RLP outcomes?

Embedded national monitoring infrastructure: Why?

- **Question focused:** designed answer key NRM questions
- **Embedded:** to capitalise on existing effort and answer questions in real world environments



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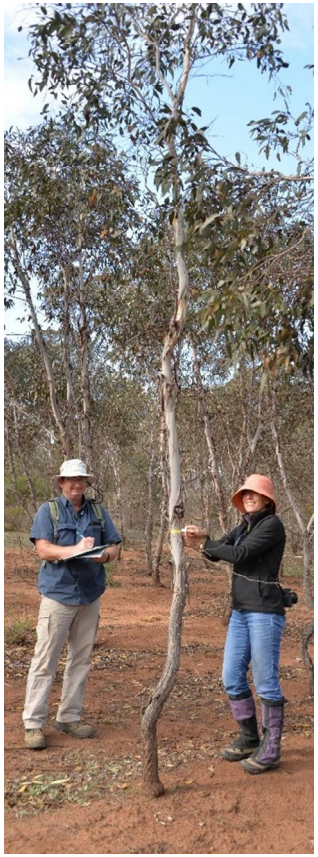
- **Distributed network experiments:** powerful tools to answer ecological questions at local to global scales

nutrient network **Nutrient Network: A Global Research Cooperative**

e.g. Nutrient Network: A decade of insights into grassland ecosystem responses to global environmental change.



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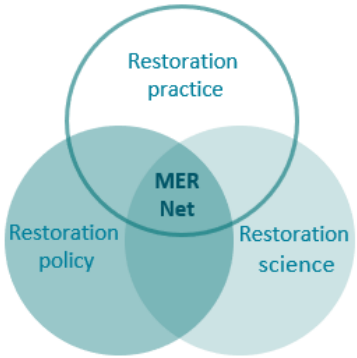

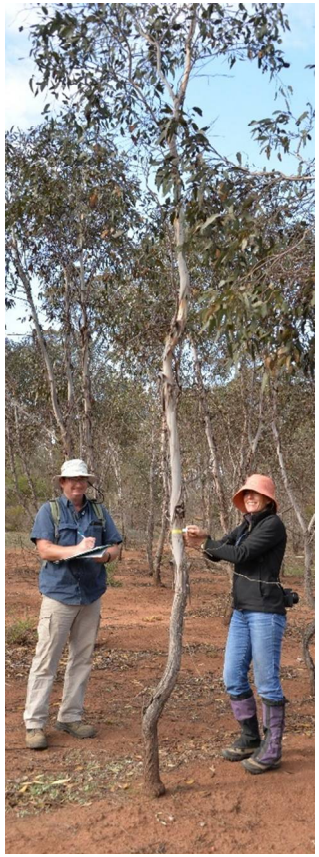

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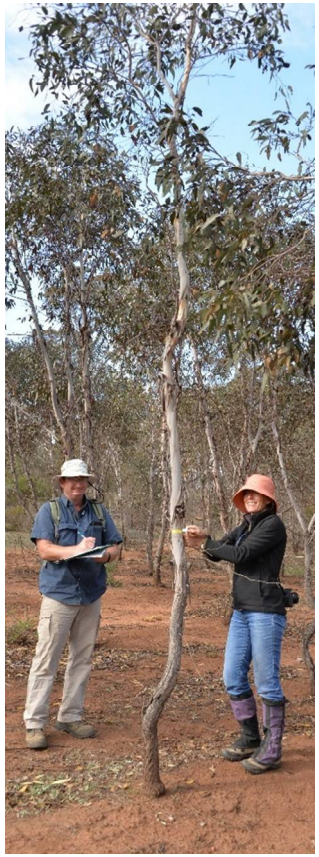
- **Addresses multiple needs**: evaluation, learning, surveillance



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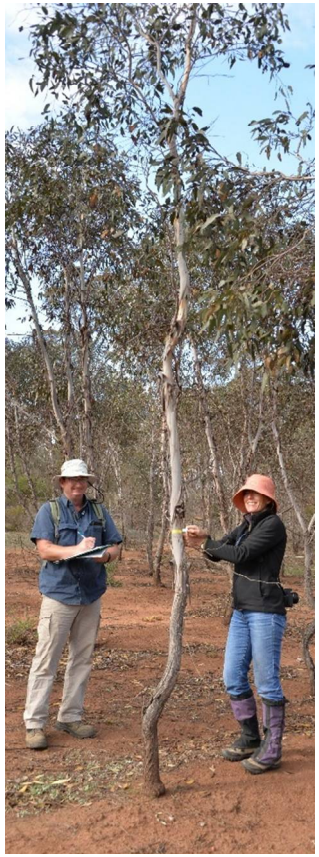
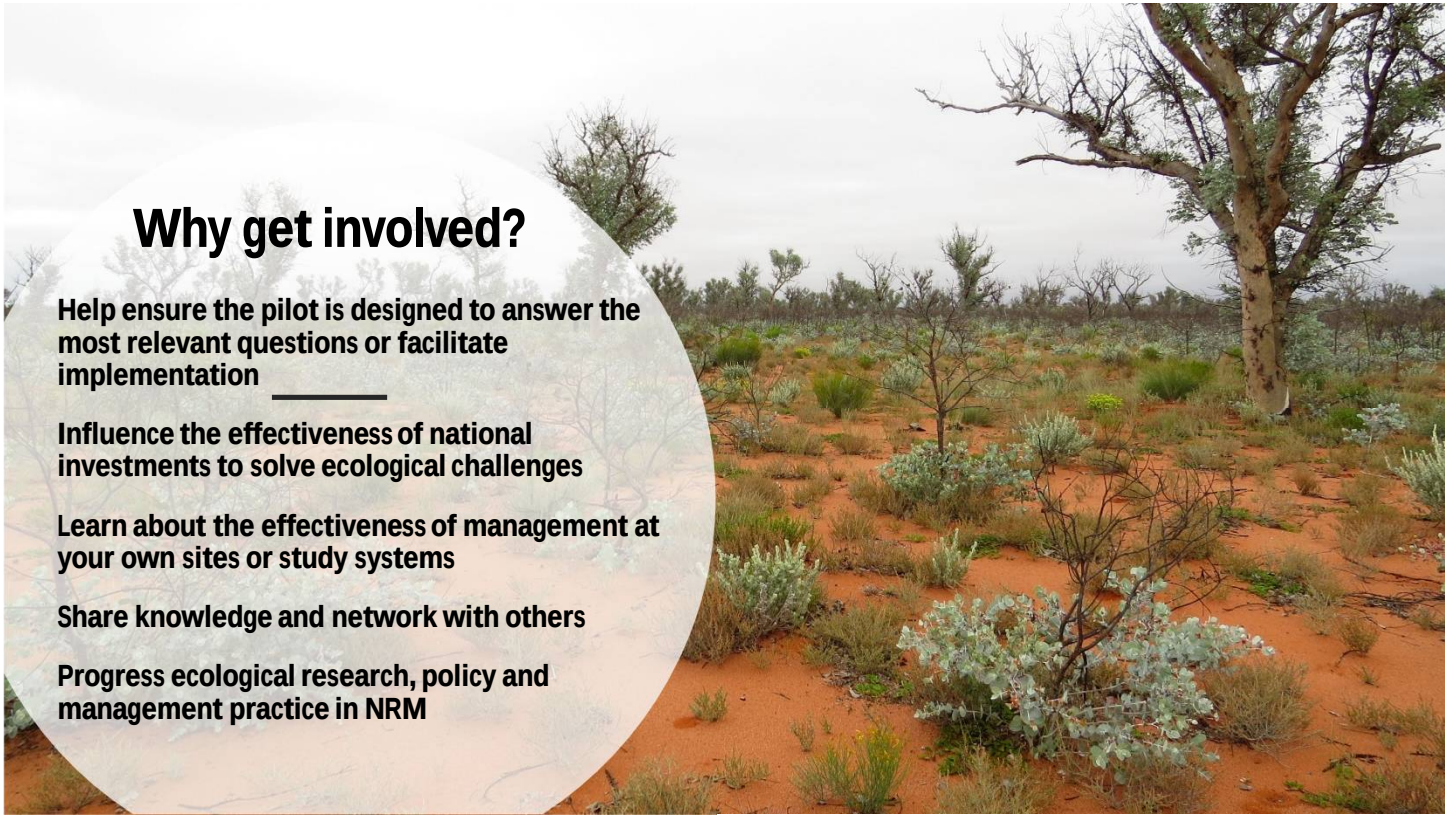
- **Shared knowledge development** to better link science with decision making and on-ground practice
- **Addresses multiple needs**: evaluation, learning, surveillance
- **Accessible data:** link with existing long-term data facilities (e.g. TERN, DAWE) and access to all





Why get involved?

Help ensure the pilot is designed to answer the most relevant questions or facilitate implementation

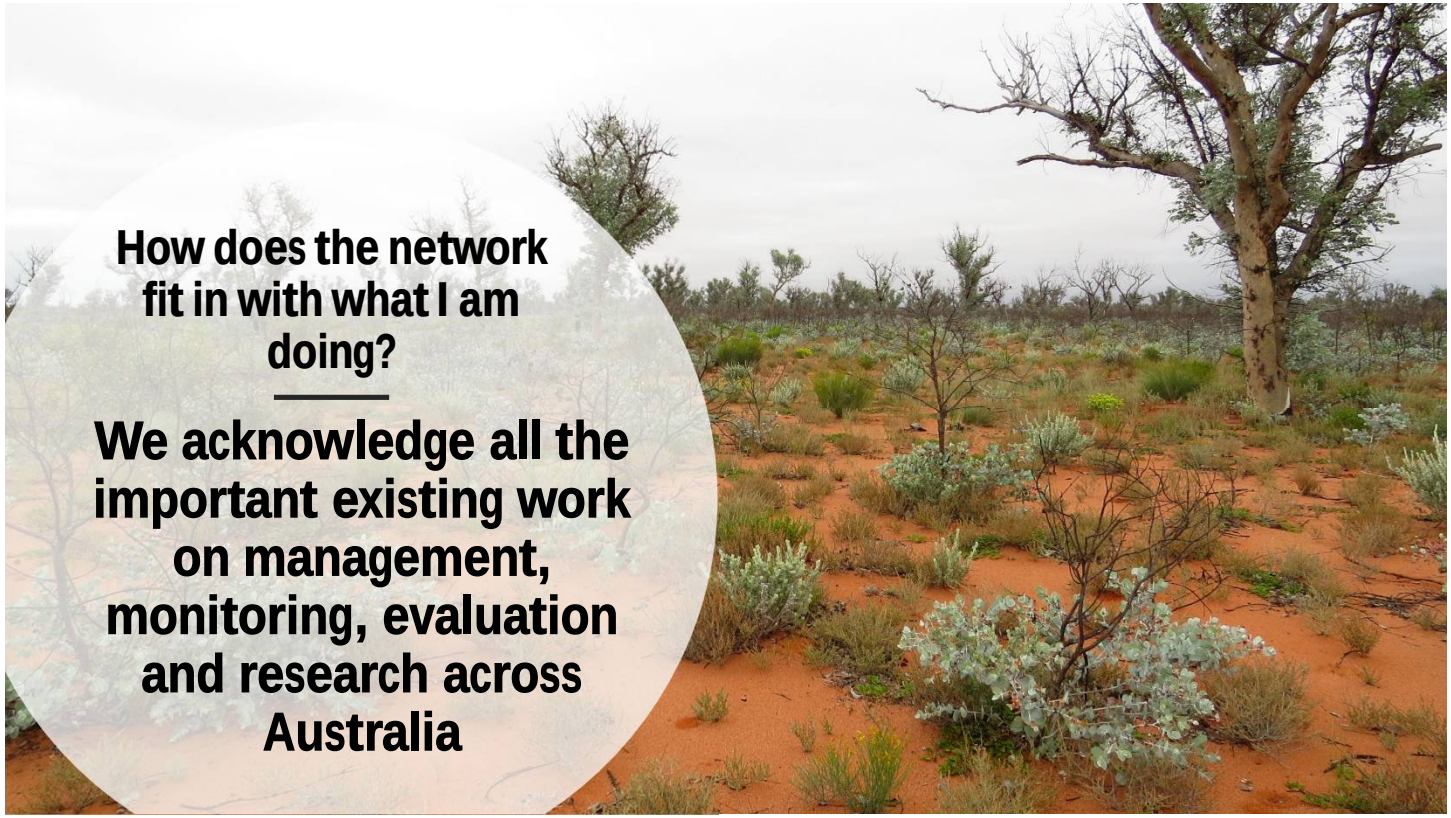
Influence the effectiveness of national investments to solve ecological challenges

Learn about the effectiveness of management at your own sites or study systems

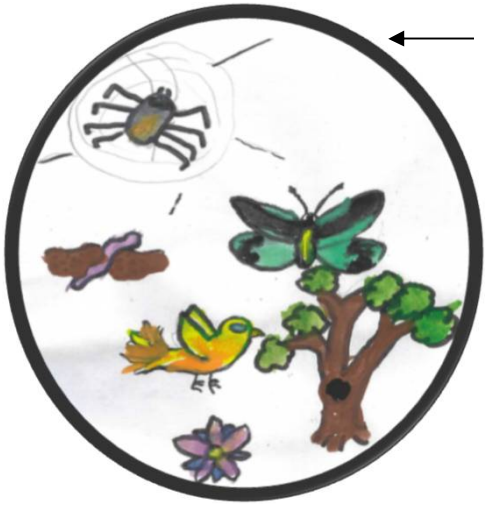
Share knowledge and network with others

Progress ecological research, policy and management practice in NRM

Ways to be involved
Contribute to planning workshops
Establish a monitoring site and contribute data
Measure new things across established sites
Come up with new questions to ask of the data
Analyse data
Write or contribute to publications


How does the network fit in with what I am doing?
We acknowledge all the important existing work on management, monitoring, evaluation and research across Australia

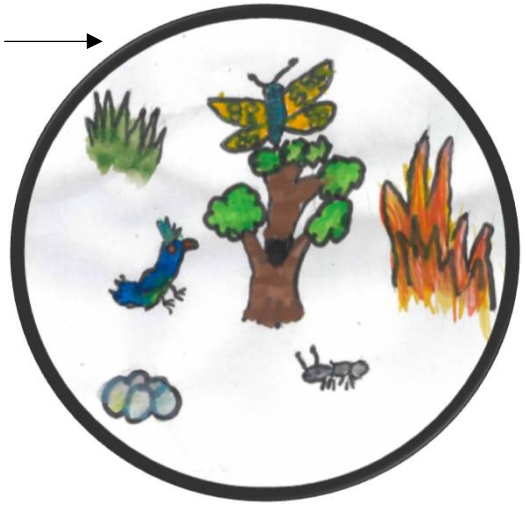
The network aims to bring out even more benefits of existing efforts and nest within the diversity of ecological assets and local values at sites



Site A – also monitors soil biota, spiders and flowers

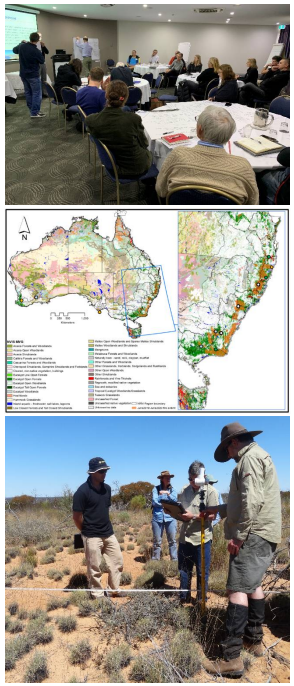
MER pilot network core ecological monitoring assets

- ❖Birds
- ❖Butterflies
- ❖Tree cover



Site B – also monitors ground cover, ants, and cultural burning outcomes

Project stages



Initiate and set up, engage and communicate

Co-develop MER network focal questions

Late 2020

Investigate relevant existing monitoring and data

Co-design network experiments and monitoring protocols

2021-2022

Implement a series of plots with partners

Training packages (TERN)

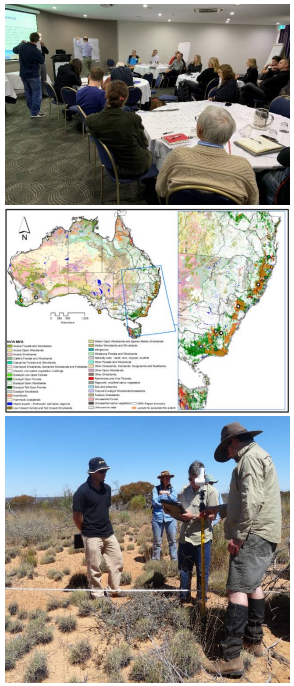
Manage and analyse data

Reporting and publication

2022-2023

Adaptive learning

Project stages



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Adaptive learning

Broad themes for monitoring questions

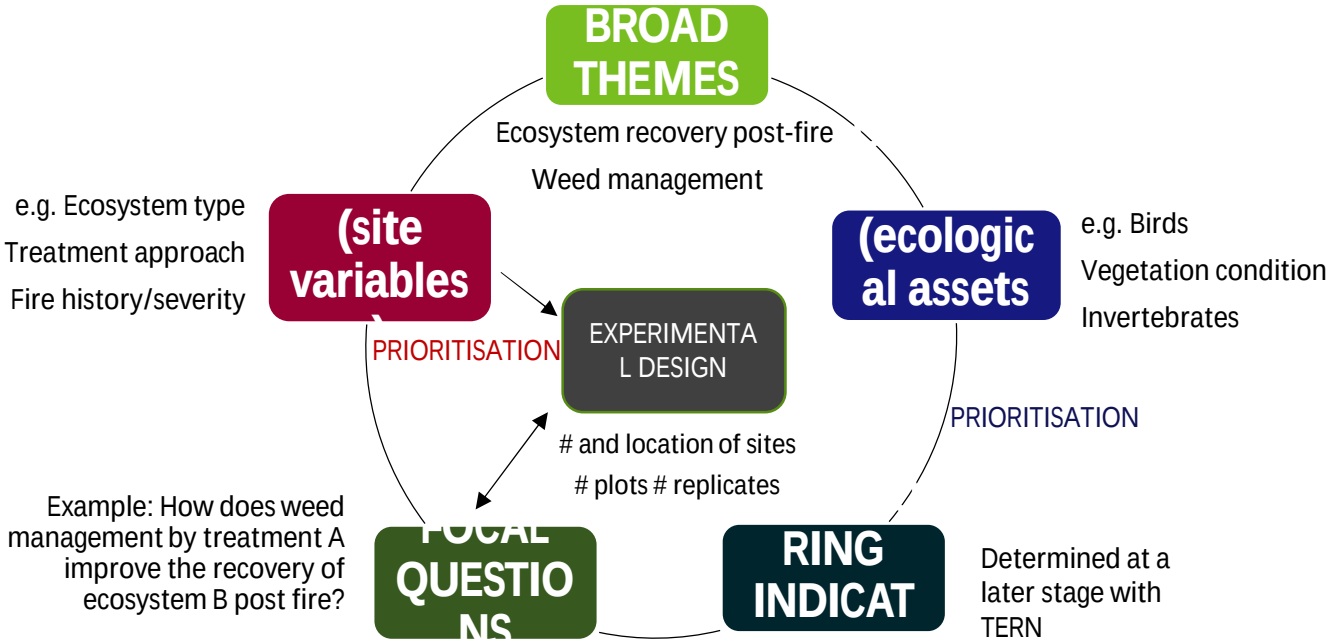
1. **How do ecosystems recover post-fire?**

- E.g. Comparison of burnt/un-burnt areas

2. **What is the (relative) effectiveness of management interventions to control weeds after fire?**

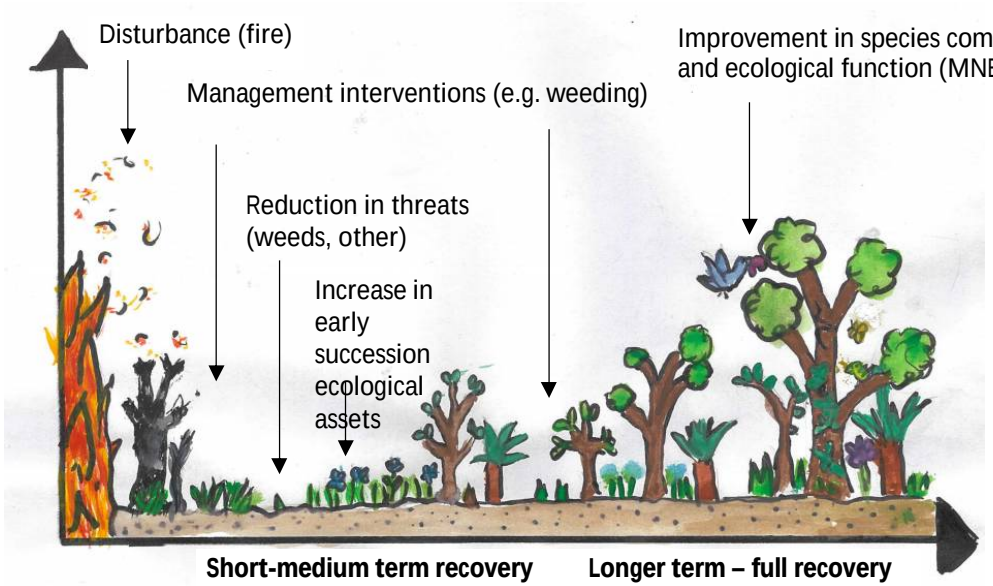
- E.g. comparisons within burnt areas of:
  - weed management vs no management
  - weed management under some range of site variables

Process for MER pilot network question design



Recovery of ecosystems – e.g. post-fire weedy ecosystem

❖Consider the ecological assets that are important in measuring the short- and longer-term time frames of ecosystem recovery



Ecological assets (outcomes) – brainstorm session

- Which ecological assets are important to monitor in post-fire ecosystem recovery?
- Which ecological assets are important to monitor for weed management?

- Try to keep this high level – specific monitoring indicators and protocol will be determined later
- More detailed input can be provided by emailing MERPilot@csiro.au

Ecological assets - examples

Native plant cover
Vegetation structure
Ants
Invertebrates
Birds
Plant composition
Cultural species
Threatened species

Drivers (site variables) – brainstorm session

- What site variables impact the effectiveness of weed management?
- What site variables impact the effectiveness in post-fire ecosystem recovery?

- Experiments in the pilot network could potentially investigate the effect of these variables (some examples below)
- More detailed input can be provided by emailing MERPilot@csiro.au

Site context	Threats	Target weed characteristics	Weed management intervention	Other management Intervention
Ecosystem type Ecosystem starting condition Weather Time since fire Recent fire severity	Invasive plants Changing fire regimes Invasive animals Invertebrate outbreaks and disease Climate change	Woody Non-woody Aquatic Transformer Non-transformer WONS	Mechanical Chemical Intensity – on site Frequency Extent – spatial coverage	Replanting Supplementary feeding for wildlife Limit disturbance (e.g. grazing) Cultural burning

Thank-you

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