Australia's National
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DRAFT Monitoring Protocols Manual for the MER Pilot Network

Post-Fire Monitoring Module

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Contributions

J. Hodgson led the coordination, drafting and editing of this document. She also led the field trials and contributed to the design of the protocols. S. Prober, B. Sparrow, L. Broadhurst and N. Gellie led the design of the protocols and provided revisions. L. Broadhurst also assisted in conducting field trials. N. Gellie and the TERN protocols team provided drafts, revisions and conducted field trials of the protocols. J. Carwardine and S. Nicol provided revisions.

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CSIRO and TERN acknowledge the traditional Country and custodians of the lands on which we operate. We pay our respects to their ancestors and their descendants who continue the connection to Country. We celebrate the stories, culture and traditions of Aboriginal and Torres Strait Islander Elders of all communities who also work and live on this land.

Contents

Introduction

Monitoring of fire severity and post-fire responses was deemed important by ecological experts and practitioners at the MER Network consultation workshops, hence the core data streams collected by the Fire and Weeds Pilot MER Network include a module on post-fire monitoring.

This post-fire monitoring module details three protocols, each a related but independent survey, to gather information on various aspects of the recovery of the vegetation community after fire.

Part One of this module is a fire severity assessment. The fire severity assessment is a visual assessment of the severity of the most recent fire, based on observed vegetation characteristics and following the method of Chafer et al 2004. It is best done soon after the fire.

Part Two of this module describes a seedling recruitment survey. This part involves counting three classes of seedlings along belt transects.

Part Three of this module describes a resprouting assessment survey. This part requires visually estimating the percentage of mature individuals with substantive resprouting for three dominant classes of vegetation.

Data for all three parts of the module are currently collected in the Fulcrum app "MER Pilot Plot Monitoring Module" (the Fulcrum app is available from the Play store (Android) or the App store (iOS)). For each part of the Module the standard survey procedure is described.

It is assumed that the plot set up has been completed and tapes have been laid out prior to completing these modules.

Note that an appendix is yet to be added to detail any adapted procedures for difficult vegetation types i.e. rainforest – these are still in trial.

Glossary

Term	Definition
Site	A Site is a cluster of one set of plots. These may occur in a single reserve or property or be spread across areas with differing tenures.
Plots	Plots are within sites and each plot falls into one of the two or three experimental treatments.
Blocks (Triplets or Pairs)	Within a Site, all plots are grouped into either a Triplet or Pair (depending on whether two or three treatment types exist for the Site). One plot in each Triplet (or Pair) represents one of the treatment groups. Also referred to as a 'Block.'

Part I Fire Severity Assessment

A fire severity assessment provides an estimate of the severity of the most recent fire at the plot. The assessment is based on visual observation of vegetation indicators of fire severity. This is scored for burnt plots only, with burn severity classified using categories based on Chafer et al 2004.

1 Fire severity

1.1 Equipment

- Mobile device with the Fulcrum app downloaded, accessible and synced before commencing (syncing must happen in network range)

1.2 Procedure

Using the Fire Severity Protocol on the Fulcrum App complete the form by providing a visual estimate of vegetation damage for each burnt plot. This is best done within 6 months of fire, otherwise make the best possible estimate, using additional evidence if possible (e.g. post-fire photos, dead leaves in canopy or litter layer suggesting crown scorch but not crown fire). Categories are described in Table 1.

Table 1. Use these categories and descriptors (modified from Chafer et al. 2004) to categorise the fire severity at your burnt plots (note: scale description still under development). See separate scales for grasslands, shrublands and forests/woodlands

Scale for grasslands

Fire severity rating	Description of vegetation damage
Low	Patchily burnt swards/tussocks with >20% unburnt swards/tussocks remaining
Moderate	Continuously burnt sward or most tussocks burnt, but with many scorched leaves remaining unconsumed
High	Ground vegetation including grass tussocks incinerated, with little vegetation remaining unconsumed

Scale for shrublands

Fire severity rating	Description of vegetation damage
Low	Mostly ground fuels and low shrubs burnt, usually patchy
Moderate	Ground fuels burnt; shrub canopy exhibits a mixture of scorched and green crown.
High	Shrub crowns mostly scorched (dead leaves still attached after fire)
Very High	Most green vegetation including shrub canopies burnt (crown fire); leaves and some woody vegetation <5mm diameter consumed by fire
Extreme	Extensive crown fires; all green vegetation burnt and fine diameter twigs (e.g. <5-10mm diameter) consumed by fire

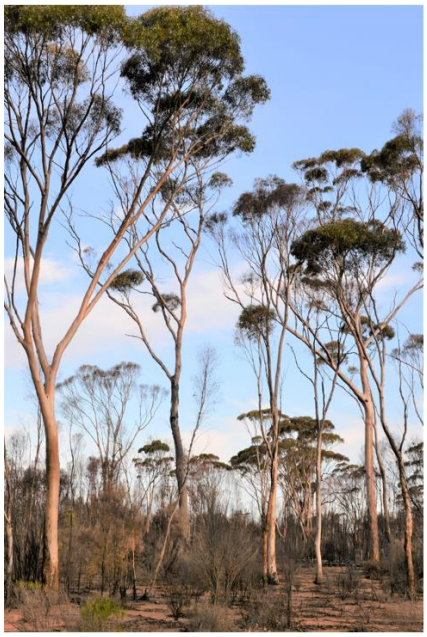
Scale for forests and woodlands

Fire severity rating	Description of vegetation damage
Low	Only ground fuels and low shrubs burnt (little canopy scorch)
Moderate	Most ground and shrub vegetation burnt (little canopy scorch)
High	Ground and shrub vegetation incinerated; most tree canopies scorched
Very High	Most green vegetation including tree canopies burnt (crown fire); leaves and some woody vegetation <5mm diameter consumed by fire
Extreme	Extensive crown fires; all green vegetation burnt and fine diameter twigs (e.g. <5-10mm diameter) consumed by fire

1.3 Indicative examples of burn severity

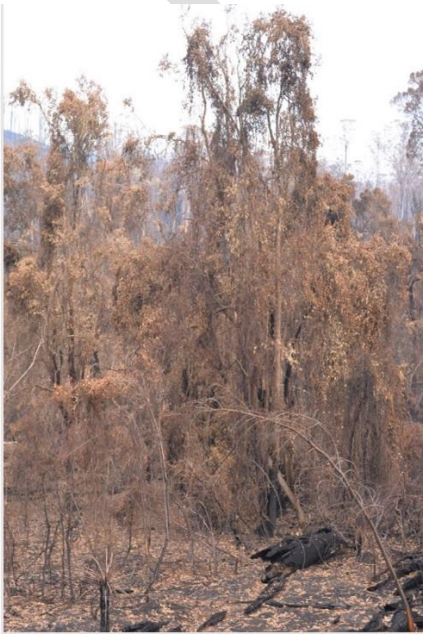
Low:

Moderate:



High:





Very high:

Extreme:

(Image credits: Robert Huston, Lachie McCaw, Suzanne Prober, Anna Richards, Jon Schatz)

Part II Seedling Recruitment Assessment

The seedling recruitment assessment involves counting the number of seedlings from three classes along linear belt transects to provide estimates of seedling density in the plot. Total counts are obtained by summing seedling numbers in three north-south transects of 2 m width and across the full plot length. Where seedlings are very dense, like in the picture below, a stopping rule may be applied and length of transect required to count 100 seedlings is recorded.

2 Seedling recruitment protocol

2.1 Definitions for the purpose of this study

- Seedling = An individual plant that has recently grown from seed. Transition from seedling to sapling or mature shrub is somewhat arbitrary so we recommend the following size classes: 30cm tall for medium to tall shrubs, 1m tall for trees, usually with poorly developed side branching.

2.2 Equipment list

- Mobile device with the Fulcrum app downloaded, accessible and synced before commencing (syncing must happen in network range)
- Tape measure for laying transect (NB: use existing transects laid for the *Cover* module)
- 1m or 2m rod for defining the width of the belt transects (optional)
- Notepad and pen for tallying counts

2.3 Procedure

1. Choose three of the N-S transects laid for the *Cover* module as shown in Figure 2.1. Expand each transect to 2m width along the full plot length and only count seedlings within the width of this belt. Note that 2m width can be eyeballed by walking along the centre line, preferably using a 1 or 2 m rod for guidance.
2. For improved representation over the plot, start the survey of each transect at alternate ends of the plot, i.e. start the first transect from southern end, second transect from northern end etc.
3. From the start of the transect, count the number of seedlings for each of three classes:
    i. eucalypts,
    ii. dominant non-eucalypt trees,
    iii. shrubs
4. Record the number of seedlings per class in each belt transect, with some exceptions. Specifically:
    a. where there are few seedlings, count each seedling across the whole belt transect as normal.
    b. For large numbers of seedlings, i.e. hundreds, you can choose to apply some stopping rules.
        i. if 100 seedlings (in any one class) are counted in a transect AND the remainder of the transect appears relatively representative you can choose instead to record the distance walked to reach 100 seedlings so this can later be multiplied up to the full transect length. In this scenario, if you reach 100 seedlings for one class, stop counting for that class and record the distance reached in the

App (later the result will be extrapolated). Continue counting along the transect for other relevant classes.

ii. If 100 seedlings (in any one class) are counted in a transect AND the remainder of the transect does *not* appear representative you can choose to count using estimation for each class, e.g. in tens, 50s or 100s but still give the full numeric estimate (e.g. 10, 20, 30, 40 etc if counting in 10s) for each transect.

2.4 Plot layout

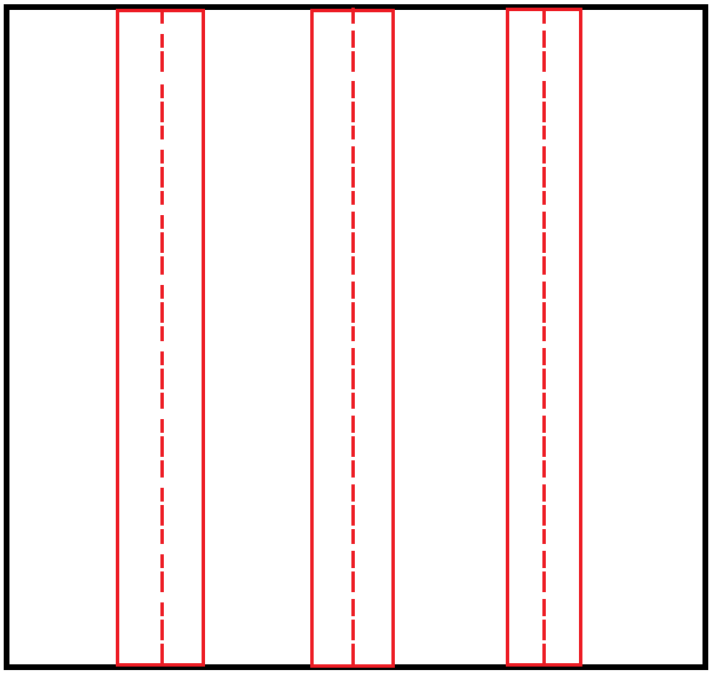


Figure 2.1. Indicative representation of the arrangement of belt transects across the plot (use 3 of the transects laid out for cover).

Part III Resprouting Assessment

The resprouting assessment tracks the frequency and position of resprouting on three classes of shrubs and trees, using a visual scale. The scale involves estimating the relative percentage of individuals in each of 5 classes.

3 Resprouting assessment protocol

3.1 Definitions for the purpose of this study

- Substantive resprouting: Resprouting (growth of post-fire shoots from woody parts of the plant) is visually evident

3.2 Equipment

- Mobile device with the Fulcrum app downloaded, accessible and synced before commencing (Sync must occur whilst in network coverage)

3.3 Procedure

1. Complete this procedure for each of three dominant vegetation classes:
    - eucalypts,
    - dominant non-eucalypt trees,
    - shrubs

2. For each vegetation class, complete the Resprouting assessment section of the Fulcrum app. This requires visual estimates of the percentage of all mature individuals in the following categories (see Figure 3.1 for examples). Note that the sum of the classes does not need to equal 100 as a individuals may sprout in several positions, such as base and stem).

    The following classes need to be recorded in the Fulcrum app:

i) Percentage of all mature individuals in the plot that are dead or defoliated

Percentage of the dead/defoliated individuals which were dead prior to fire (0-100 constrained; includes a don't know/can't tell option), evident for example, from significantly reduced branching, silvered stems etc. This percentage should be estimated from the total number of dead individuals, not from the total number of individuals in the plot. This category is not recorded for shrubs.

ii) Percentage of mature individuals that are alive but not resprouting

iii) Percentage of all mature individuals in the plot that are showing basal resprouting

iv) Percentage of all mature individuals in the plot that are showing main stem resprouting

v) Percentage of all mature individuals in the plot that are showing canopy resprouting

Figure 3.1. Examples of types of resprouting (left to right: basal, stem, canopy)

Reference

Chafer CJ, Noonan M, Macnaught E (2004) The post-fire measurement of fire severity and intensity in the Christmas 2001 Sydney wildfires. International Journal of Wildland Fire 13, 227-240.

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