

Growing plants that will survive climate change: Results from the Climate Ready Revegetation trial plantings

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Photos: Janette Hannan

Acknowledgments



- Trial site hosts and planters
- Nursery managers and teams
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 - Michael King

Today's Discussion Topics



- The Climate Ready Revegetation Project in a nutshell
 - Yass Valley Climate
 - Species assessment
 - Seed sourcing
- Trial
 - Background and aim
 - Trial design
 - Trial sites
 - Results so far...
- Discussion

Getting Started

Climate-ready revegetation

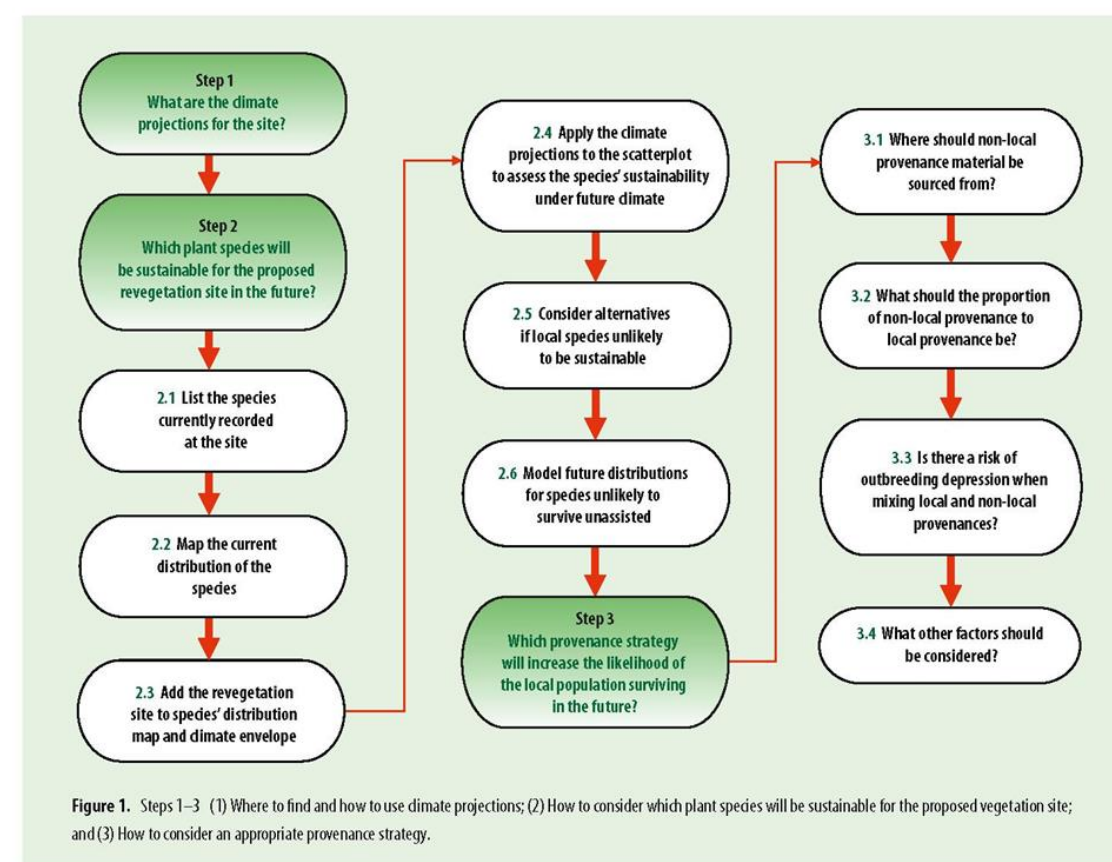
A guide for natural resource managers. Version 2

Overview

This Guide represents a first attempt at compiling online tools available to assist natural resource managers incorporate the inherent uncertainties associated with climate change when planning revegetation activities. The information in the Guide is based on the premise that survival and resilience will be enhanced for species and local populations with large, genetically diverse populations. Species differ in their vulnerability to climate change. Species that cannot evolve and adapt to new environmental conditions *in-situ* as fast as the climate changes, or disperse to more suitable climates, will be more vulnerable than those with the evolutionary potential and/or the capacity to disperse. In theory, plants with wide distributions are more likely to cope with climate change than those with narrow distributions. However, even if a species' distribution indicates that it is able to tolerate a broad range of climate conditions, survival of local populations is not guaranteed.

Small populations may require genetic rescue (incorporating non-local genetic material) to boost their capacity to adapt to a rapidly changing environment.

The Guide provides step-by-step instructions on where to find and how to use climate projections and how to consider the suitability of species and provenances for revegetation projects (Figure 1). The consideration of factors other than climate change to determine the suitability of species and provenance selection (e.g. soil characteristics, topography and aspect) are covered in other publications and are not addressed in this Guide (e.g. the Standards for the Practice of Ecological Restoration in Australia (SERA) <http://www.seraustralia.com/pages/standards.html>, or look for regional examples such as www.biodiversitygateway.com.au/SWSR_Guide/home.html).



Hancock, N., Harris, R., Broadhurst, L. and Hughes, L. 2018. *Climate-ready revegetation: A guide for natural resource managers. Version 2.*

Macquarie University, Sydney. Accessible from:

<https://www.anpc.asn.au/climate-ready-revegetation/>

Some key concepts:

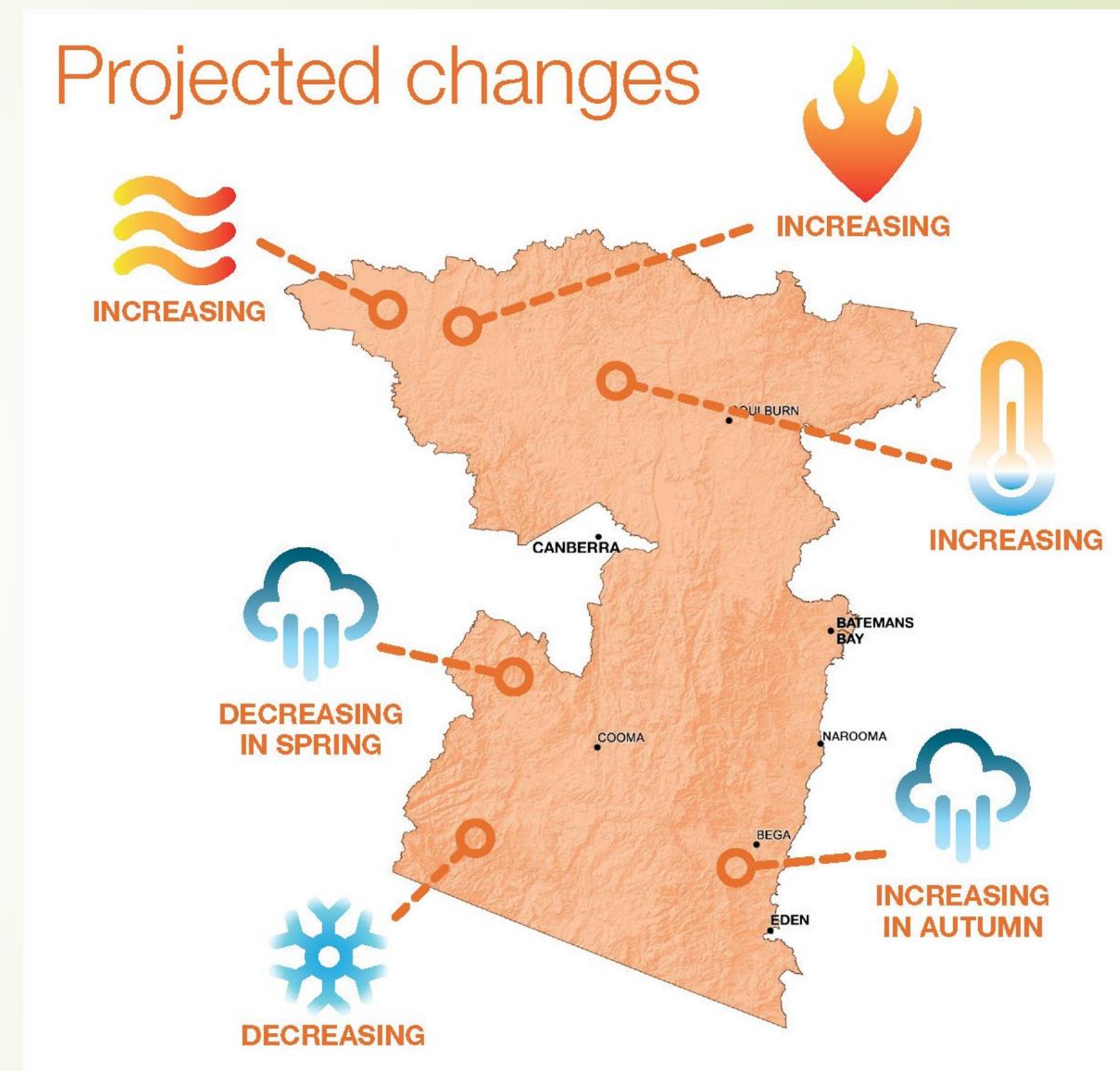
- We can't predict the future, but we do know that change is inevitable, and that we will face hotter conditions
- Many plants are likely to struggle to survive and thrive as there is not enough time for them to adapt, especially considering fragmentation of habitats
- Increasing genetic diversity of local plant populations will enhance adaptive capacity

Climate Ready Revegetation in the Yass Valley

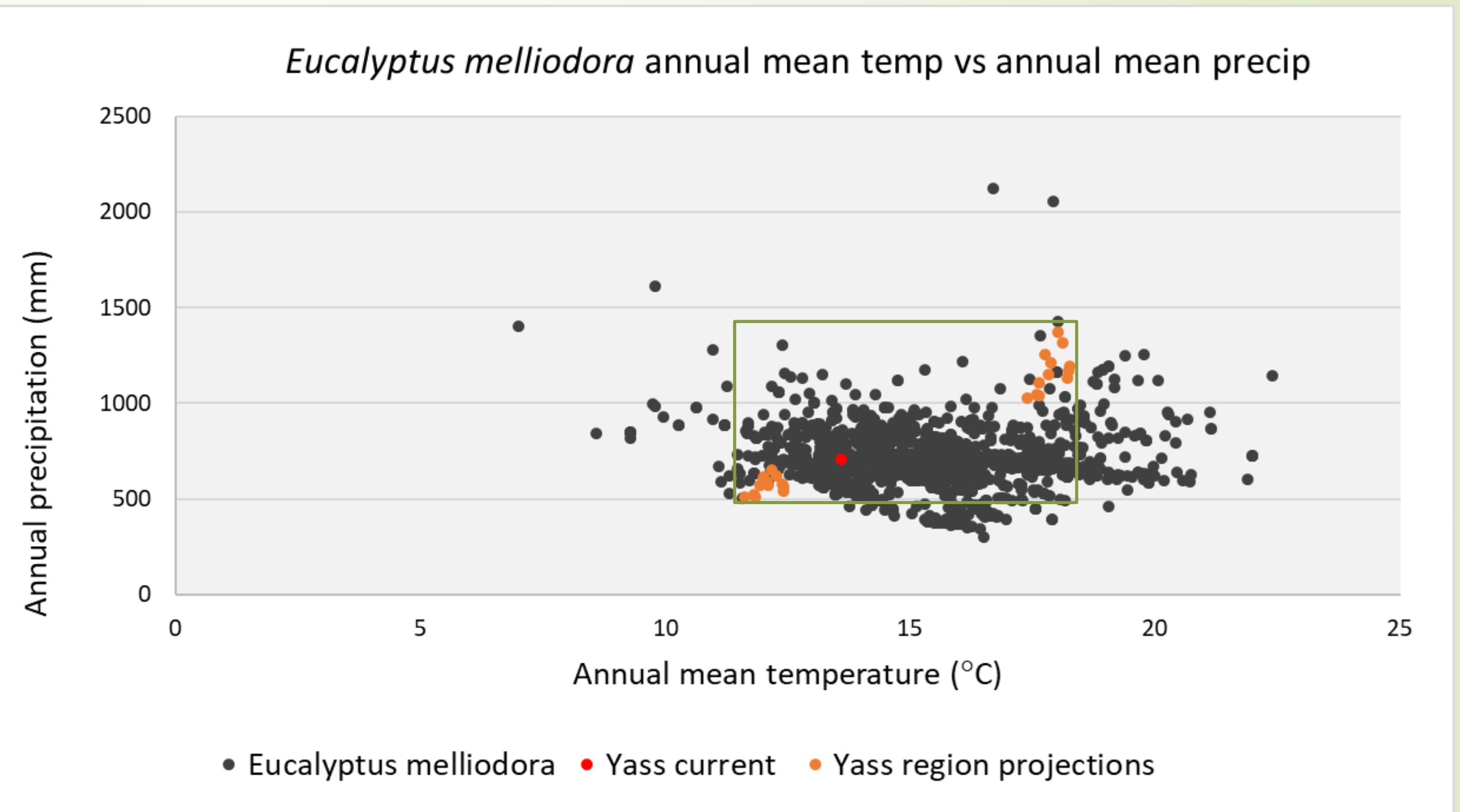
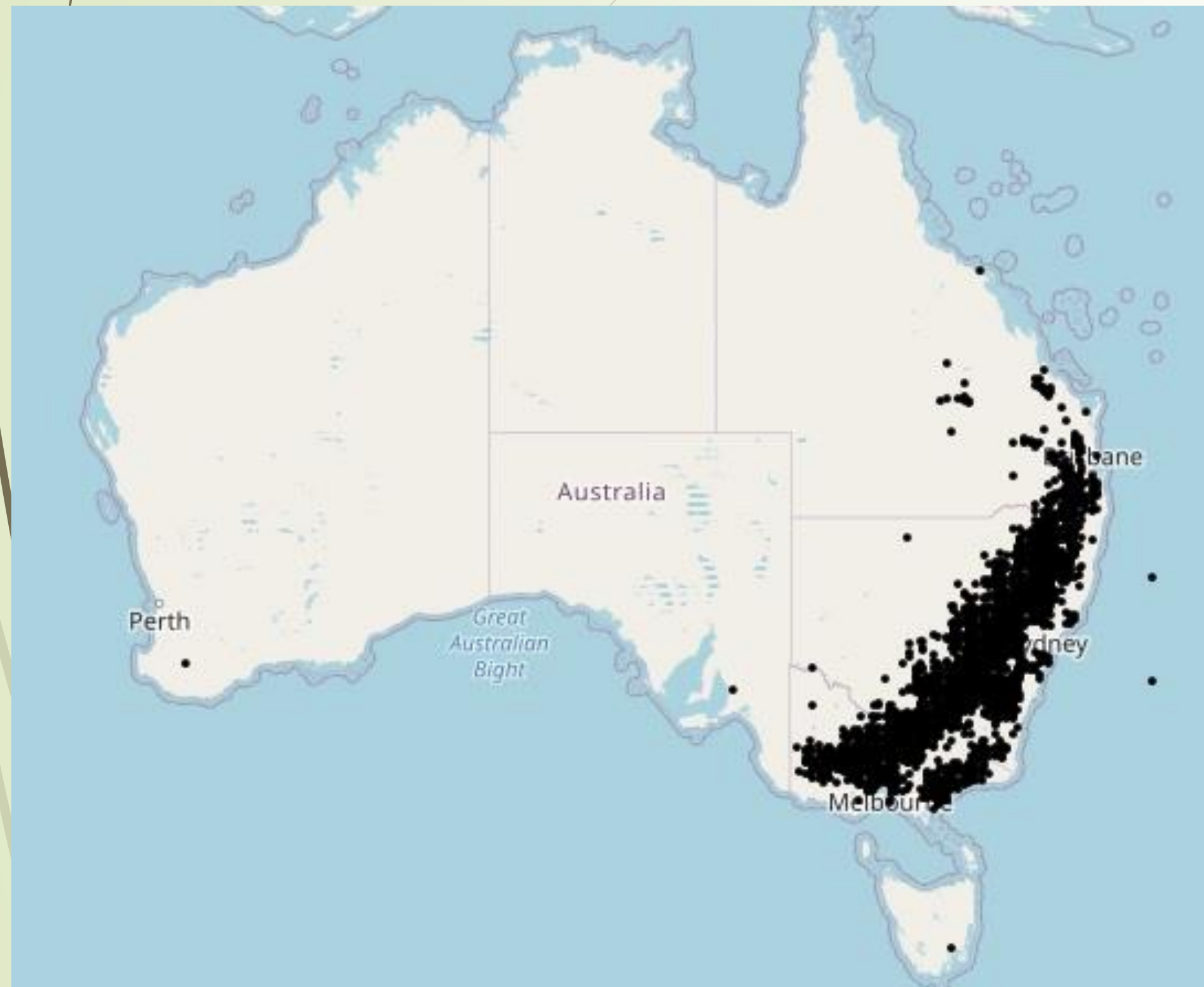
- Project started in ~2018
- Initiated and led by volunteers
- Aims to assist the long-term survival of native plants in the Yass Valley under changing climatic conditions
- Involves:
 - Understanding historical and projected future climate for Yass region
 - Assessing which local species are likely to survive in our region
 - For those species, boosting genetic diversity so plants have the best potential to adapt to climate change over successive generations
 - Incorporate Climate Ready seed into YAN's four nurseries
 - Run a small trial...

Recent and Projected Climate

- In essence: our cool temperate climate will get hotter, and drier and/or wetter
- Yass region modelled projections from NSW and Australian Regional Climate Modelling (NARClIM)

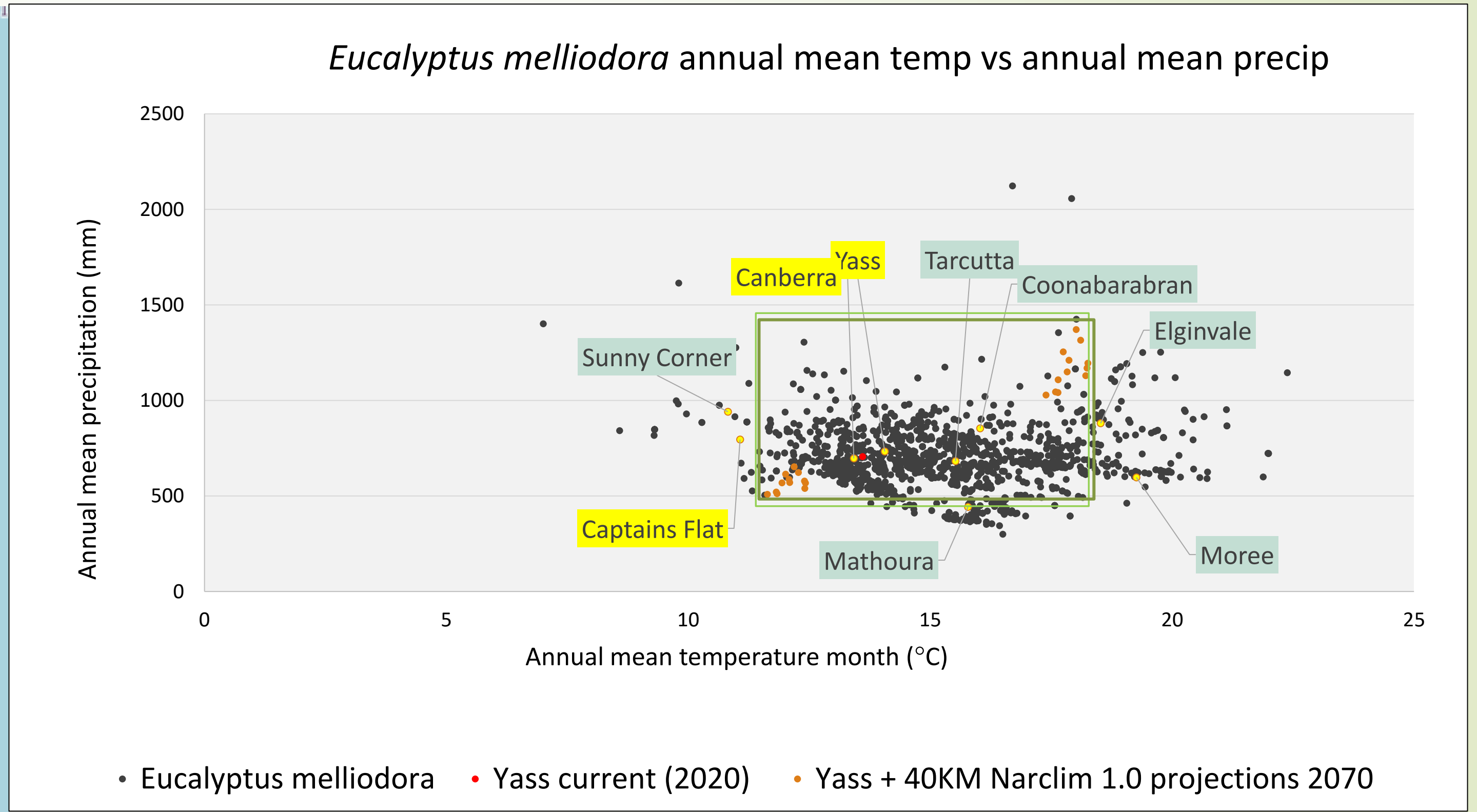
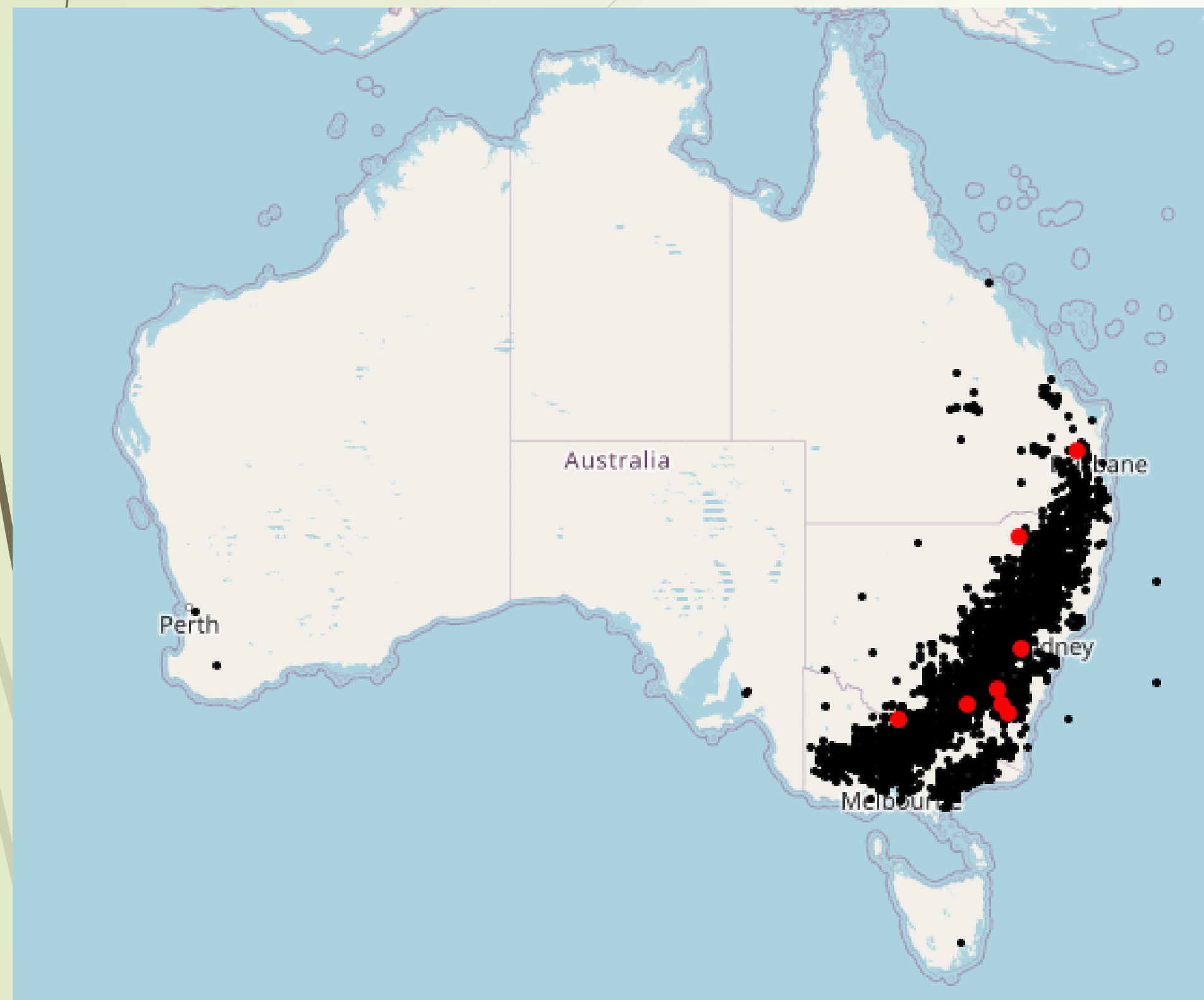


Species Assessment



Example: *Eucalyptus Melliodora* (Yellow Box)

Seed sourcing

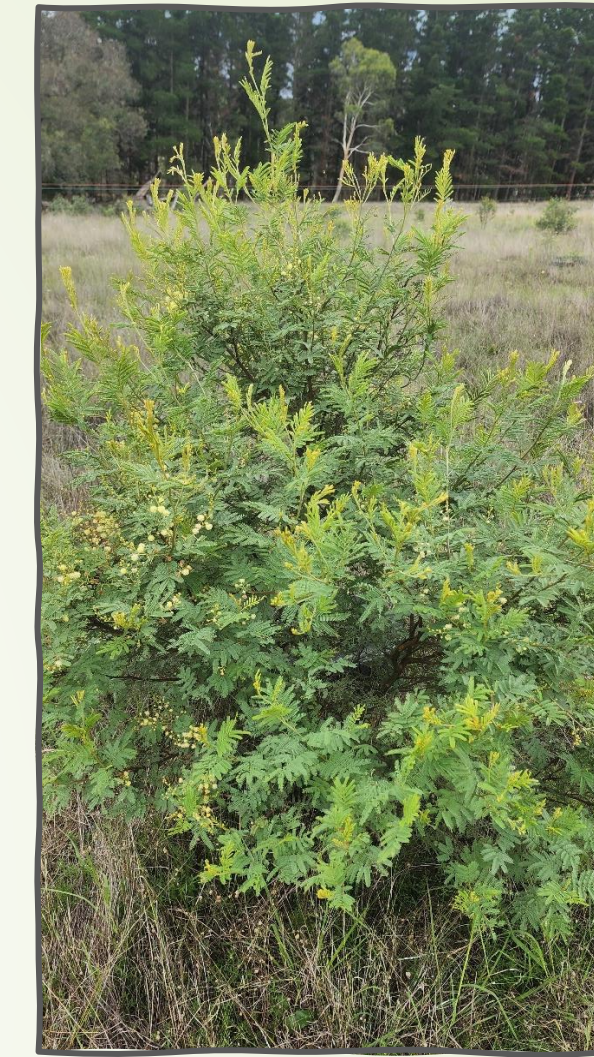


Example: *Eucalyptus Melliodora* (Yellow Box)

Climate Ready Revegetation Trial: Research question

Is there a difference in the 3-5 year survival rate between plants grown from local and non-local seed sources?

Climate Ready Revegetation Trial: The plants



The plants:

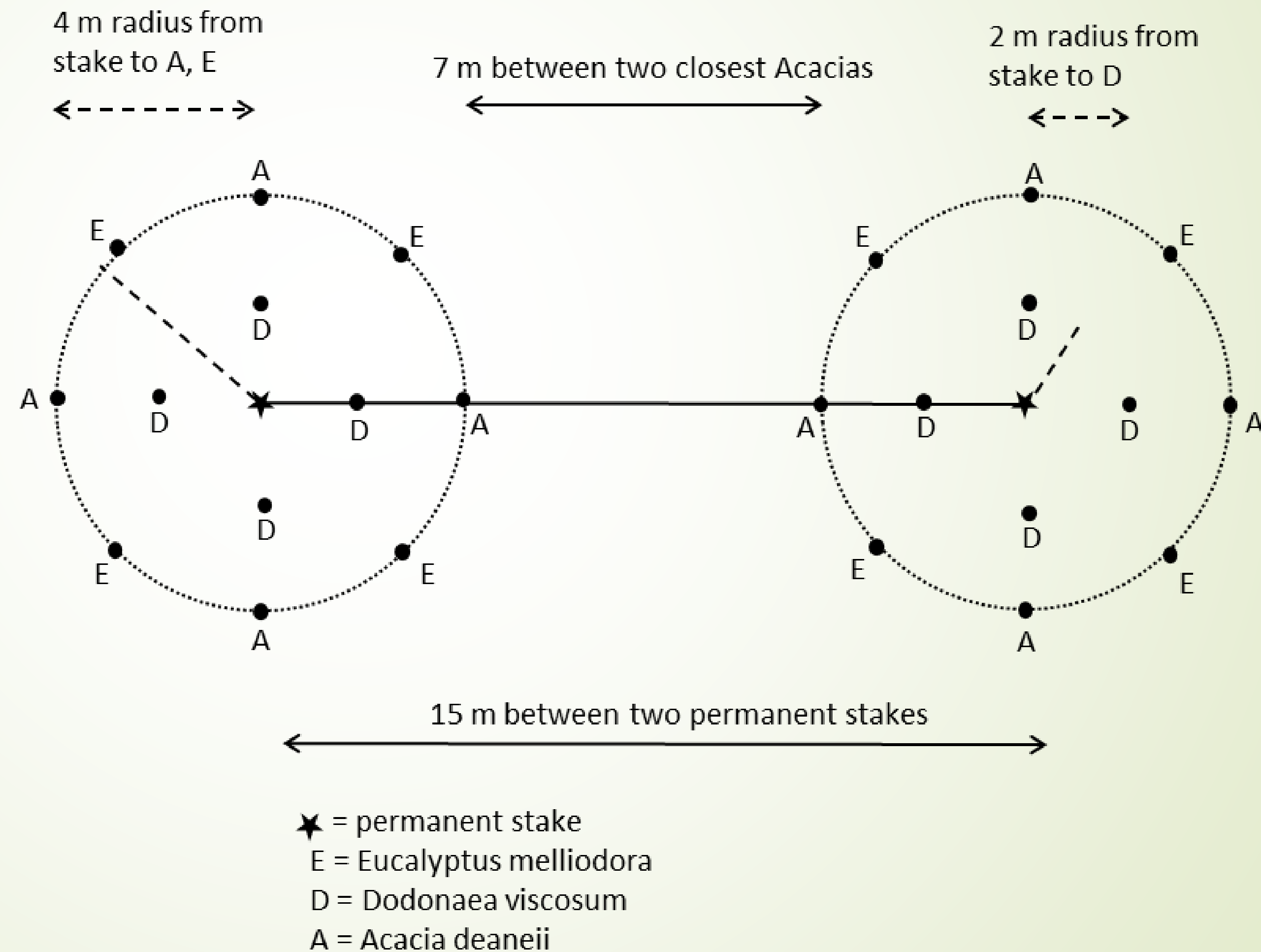
Species	No. local provenance sites	No. Non-local provenance sites
<i>Eucalyptus melliodora</i>	3	6 across 5 bioregions
<i>Acacia deanei</i> subsp. <i>paucijuga</i>	1	3 across 3 bioregions
<i>Dodonea viscosa</i> subsp. <i>angustissima</i>	3	5 across 3 bioregions

Climate Ready Revegetation Trial: The nurseries



Climate Ready Revegetation Trial: Trial design

Planting design at the two 'main' sites

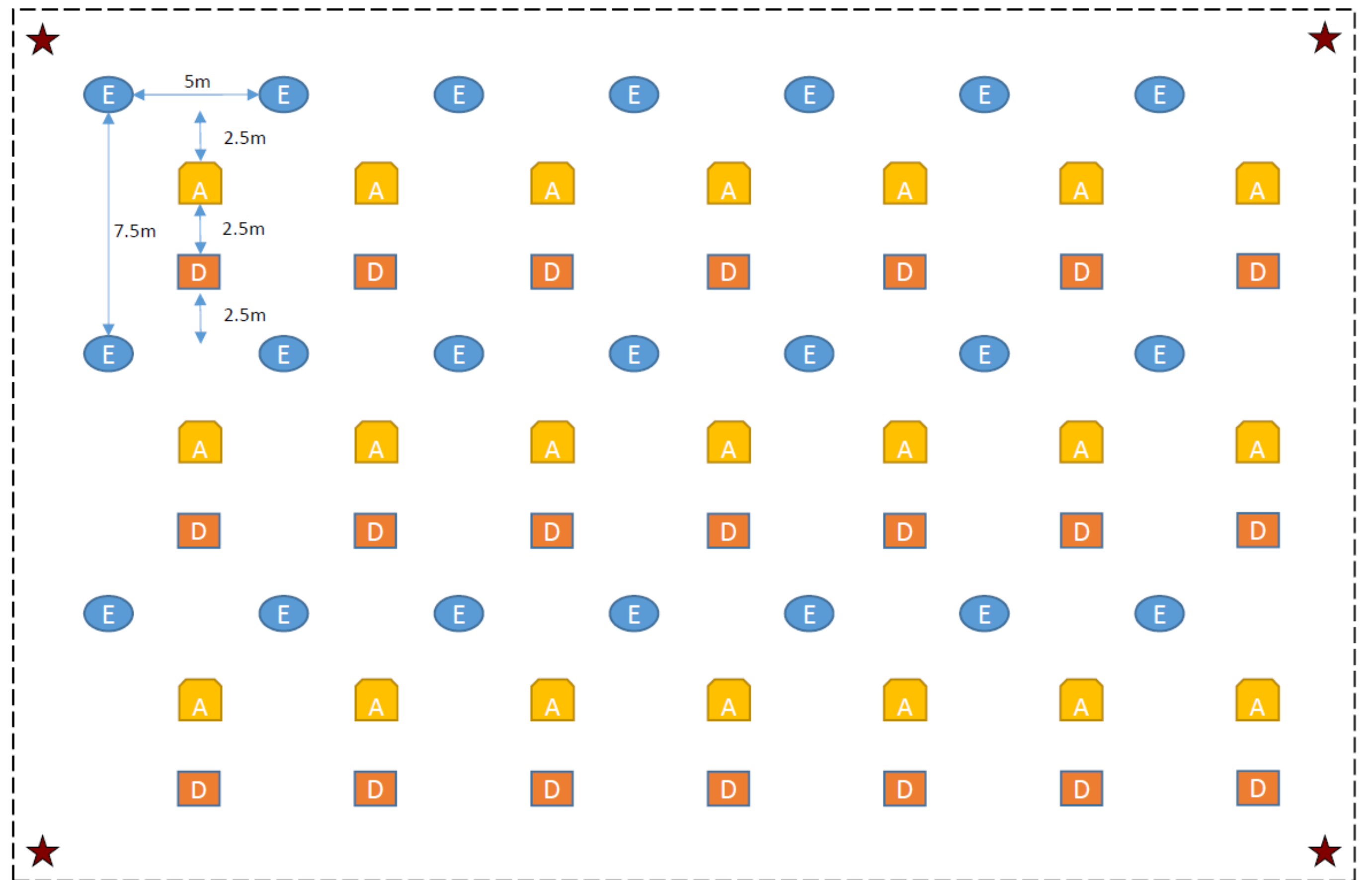


Climate Ready Revegetation Trial: Trial design

Planting design at the six 'supporting' sites

Three Species Planting Design (approx. 25 x 35m)

This is the basic layout of one planting section – please see over page for the layout options of your two sections



E *Eucalyptus melliodora*

D *Dondonea viscosa*

A *Acacia deanei*

★ *Star pickets to mark the corners of each planting section*

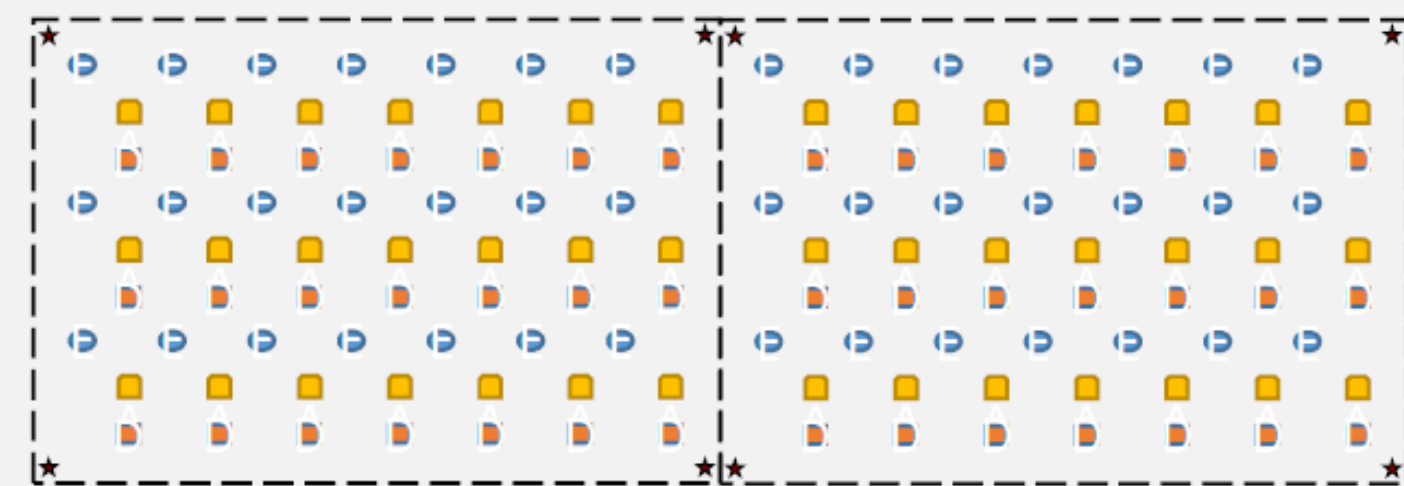
Climate Ready Revegetation Trial: Trial design

Planting design at the six 'supporting' sites

Three Species Planting Design – three layout options

Please note that it is important to have the two planting sections on very similar sites - considering soil, aspect, proximity to other plantings etc. The side by side layout is the preferred option if your property allows for it.

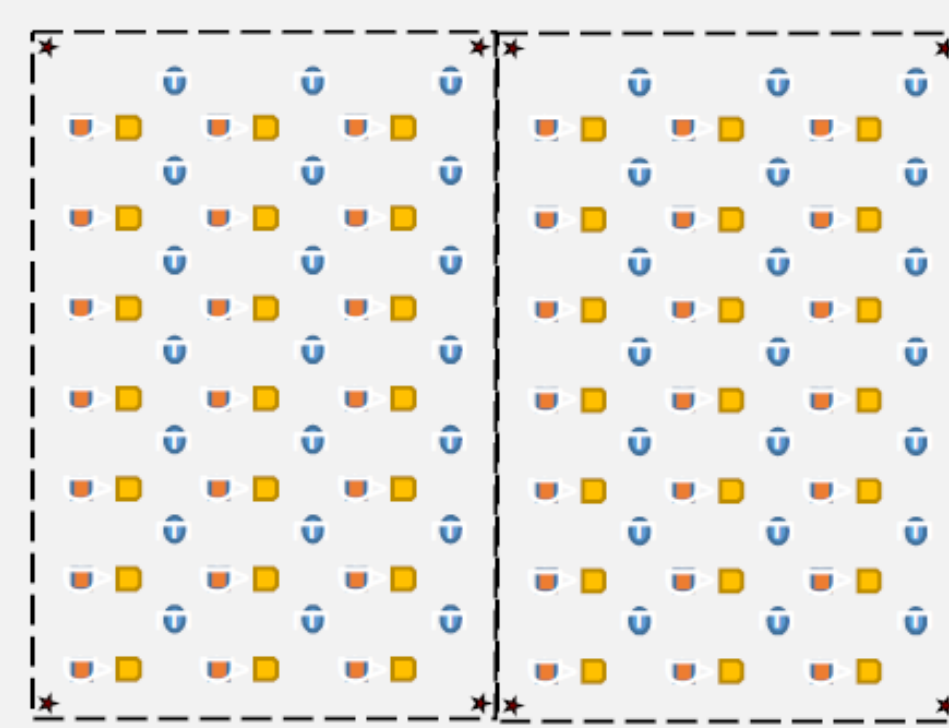
Longways layout



Section 1 - Local

Section 2 - Admix

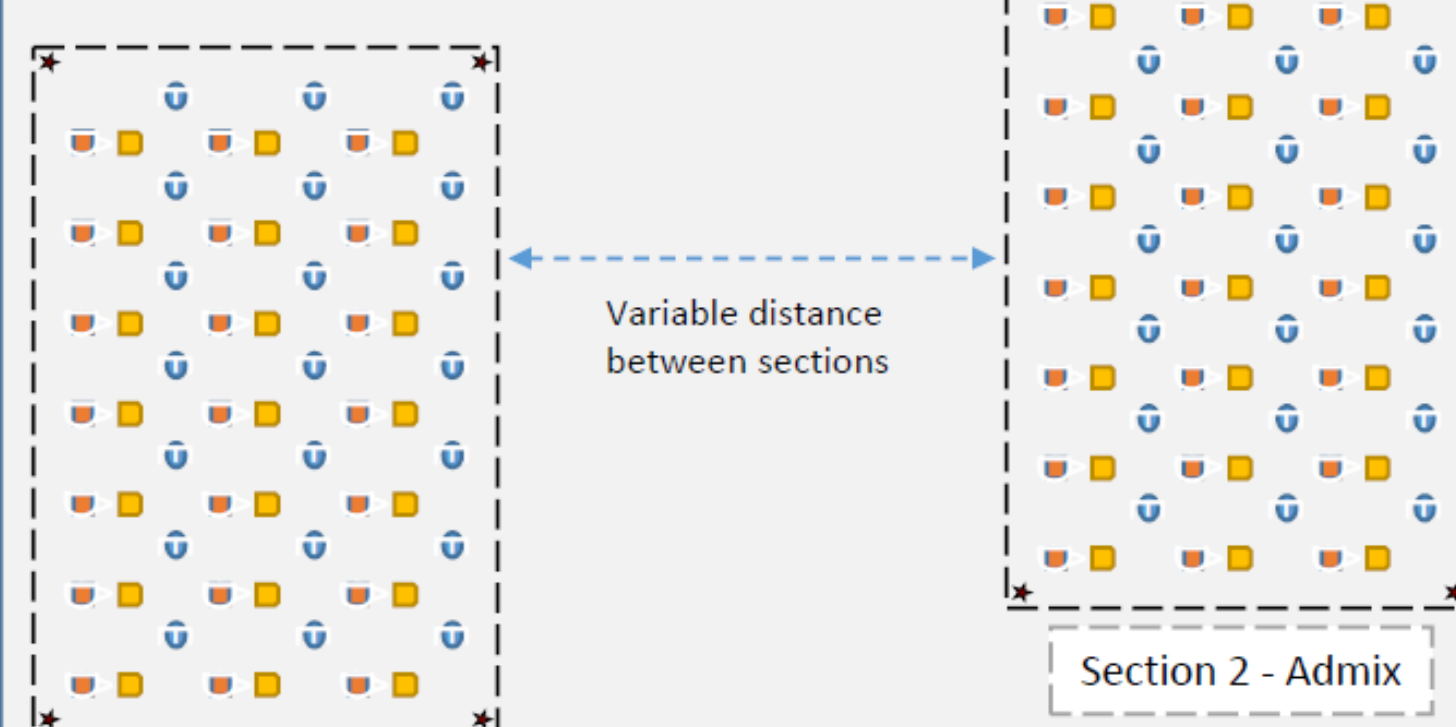
Side by side layout



Section 1 - Local

Section 2 - Admix

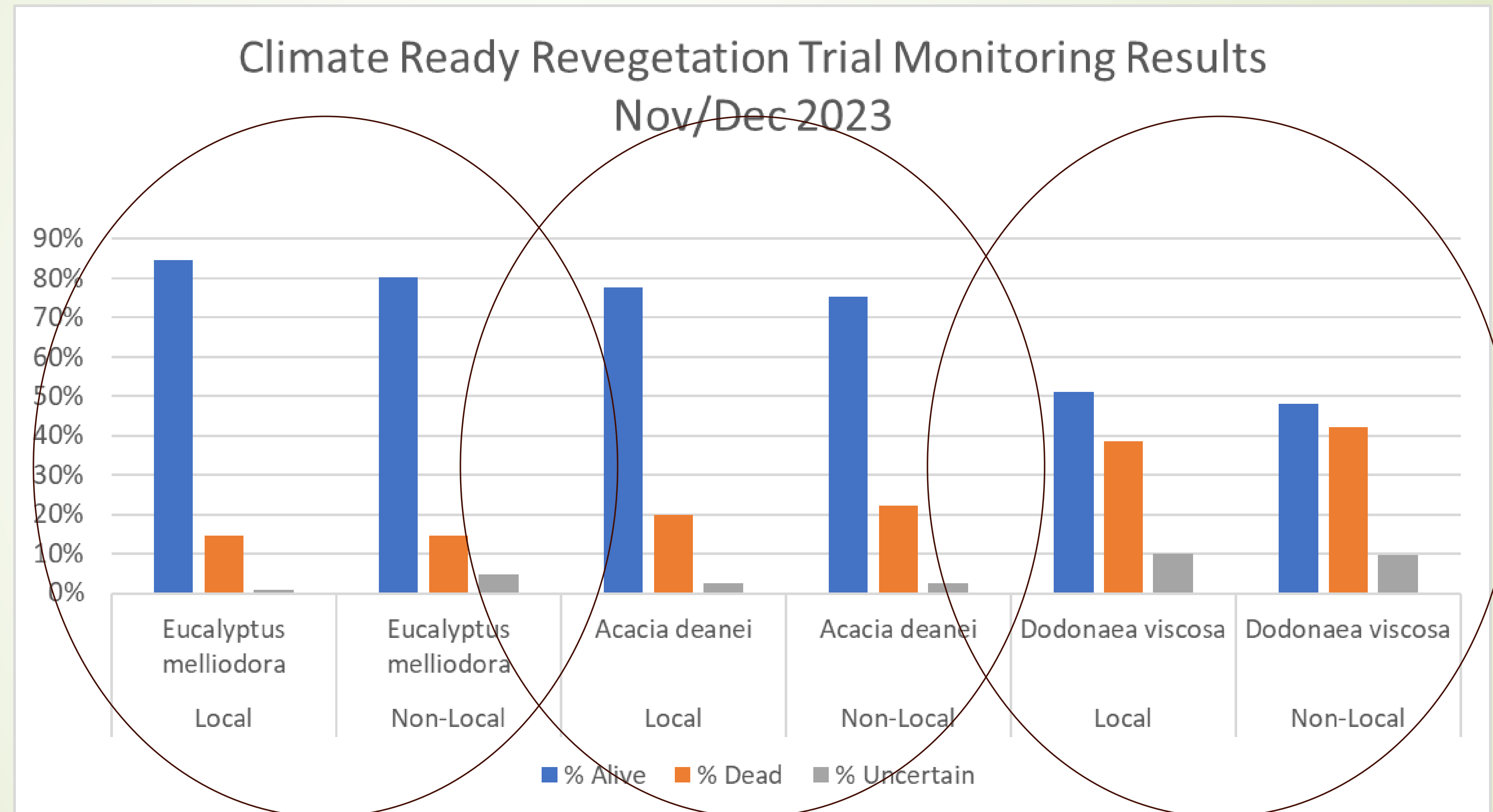
Separated layout



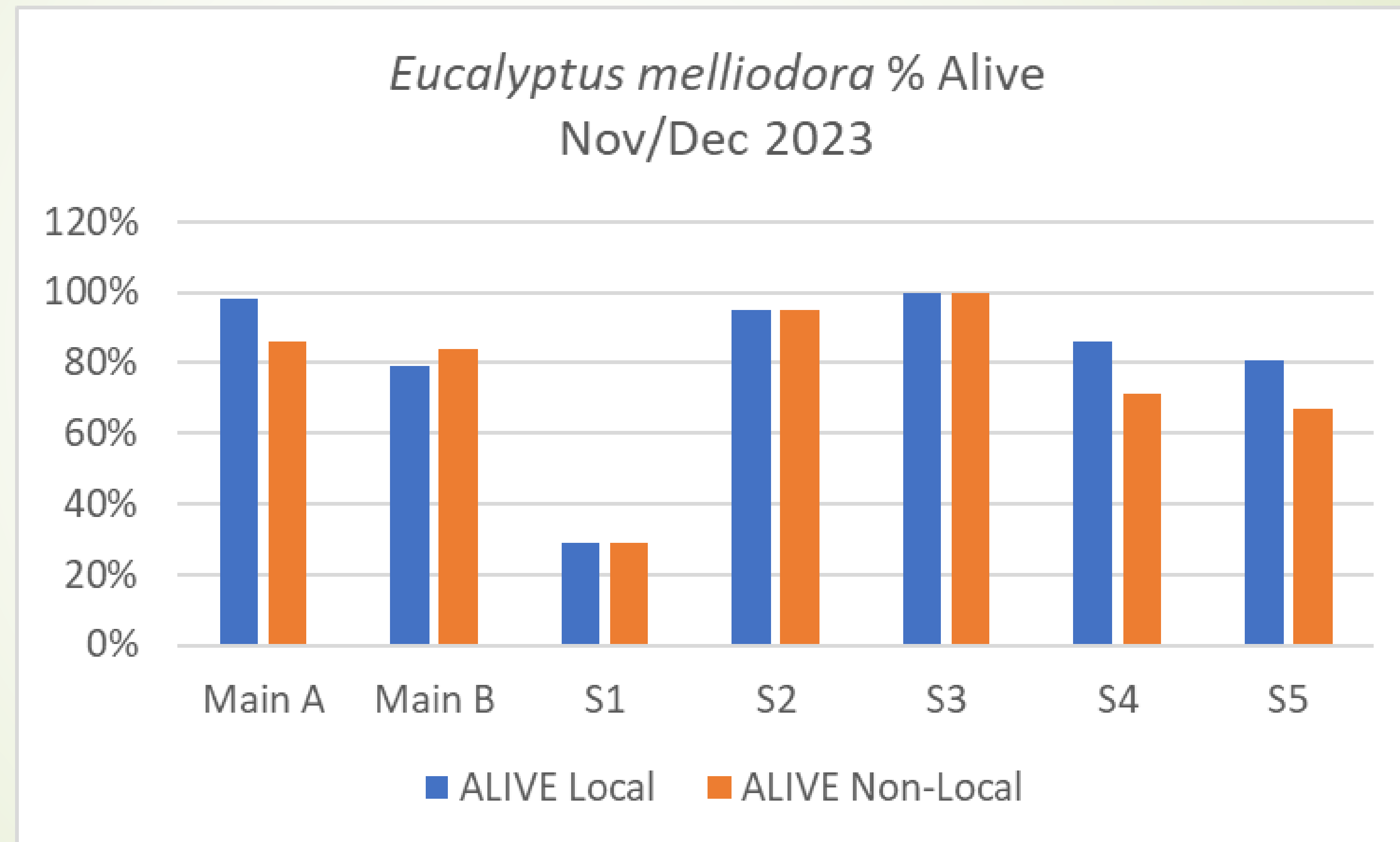
Section 1 - Local

Section 2 - Admix

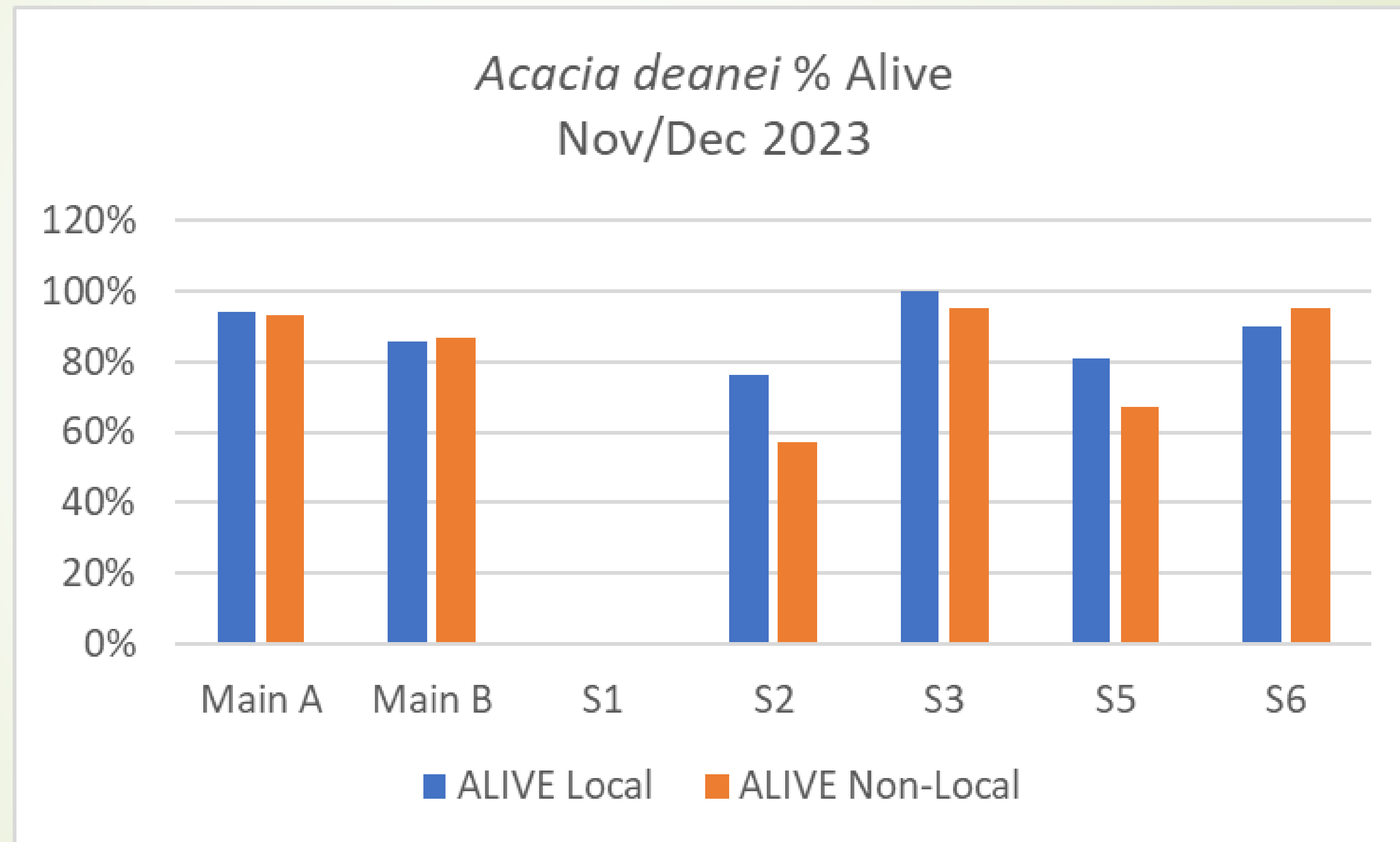
Climate Ready Revegetation Trial: The overall results



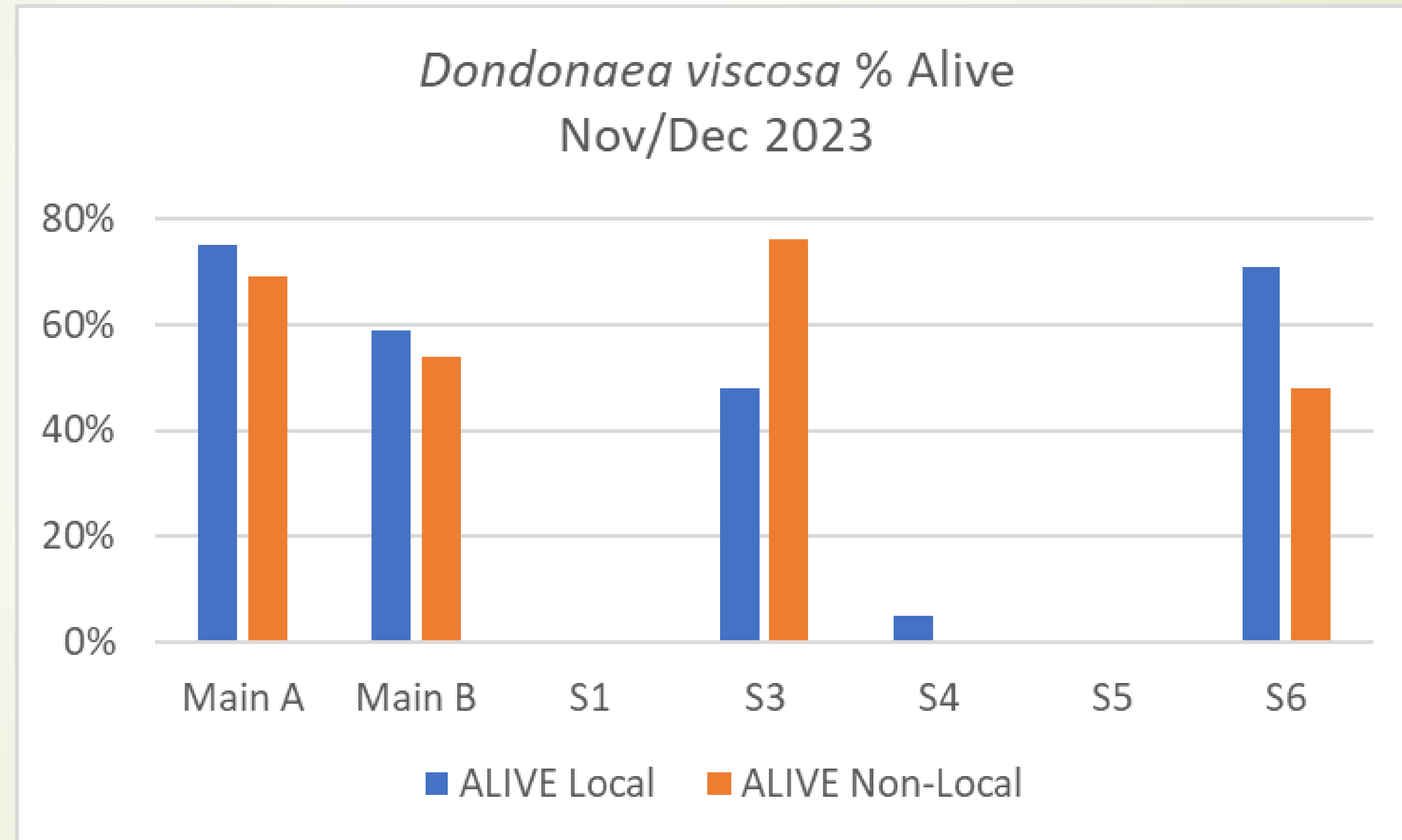
Climate Ready Revegetation Trial: More results



Climate Ready Revegetation Trial: More results



Climate Ready Revegetation Trial: More results



Climate Ready Revegetation Trial: Comments

- These results show that, to date, there is no real difference between the survival of tube stock grown from local and non-local seed
- Still need more time to see what happens with some of the 'uncertains'
- Reasons for plant death can be variable
- Landscape position is critical
- Diversity of sites means we need to be wary about lumping them together
- Finding plants can be tricky
- Still honing photo monitoring requirements
- Collaboration with Royal Botanic Gardens may shed more light in time



Questions & Conversations...

more info: yan.org.au/projects

email us: climateready@yan.org.au

follow us: [@YAN.Landcare.Groups](https://www.facebook.com/YAN.Landcare.Groups)

