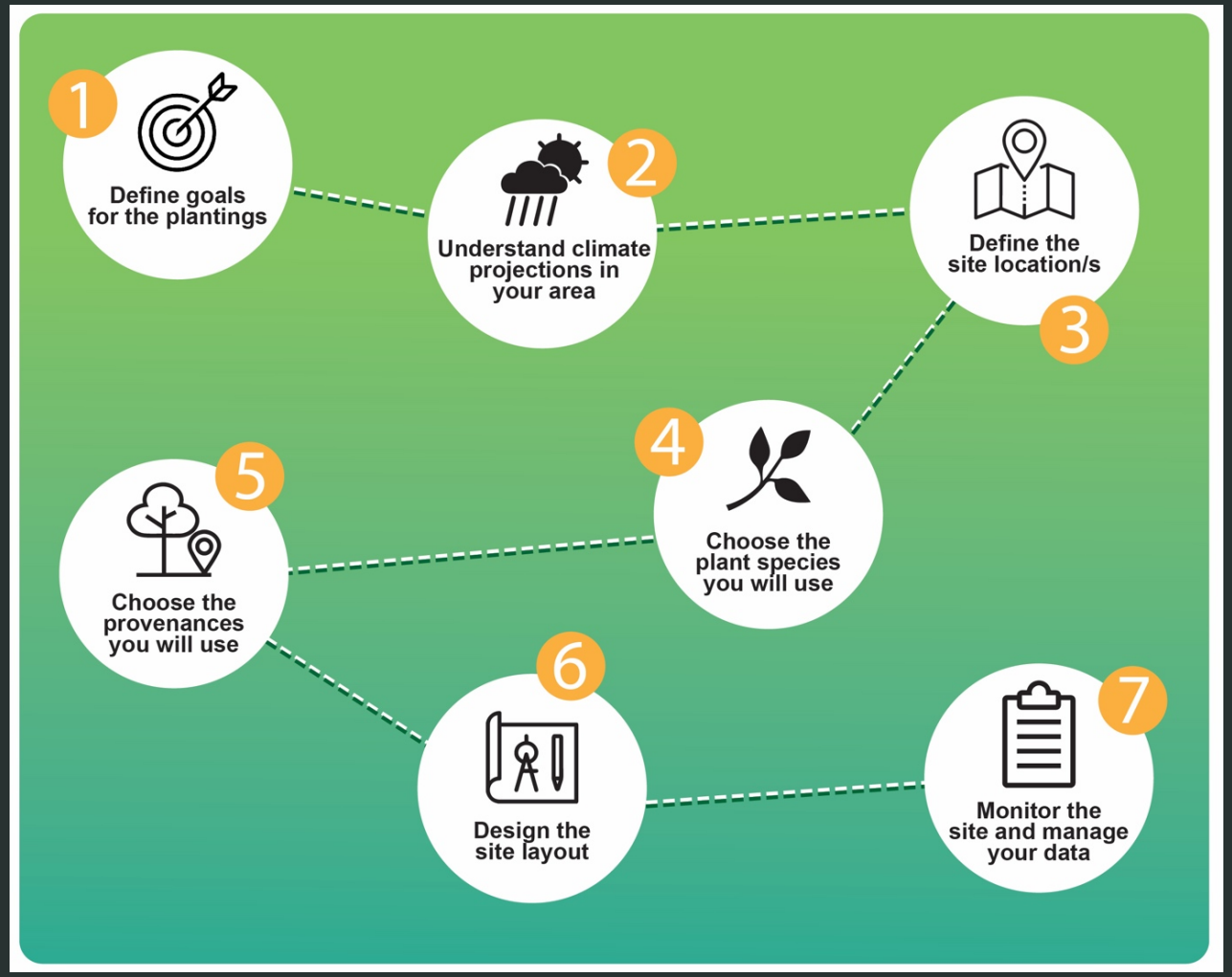
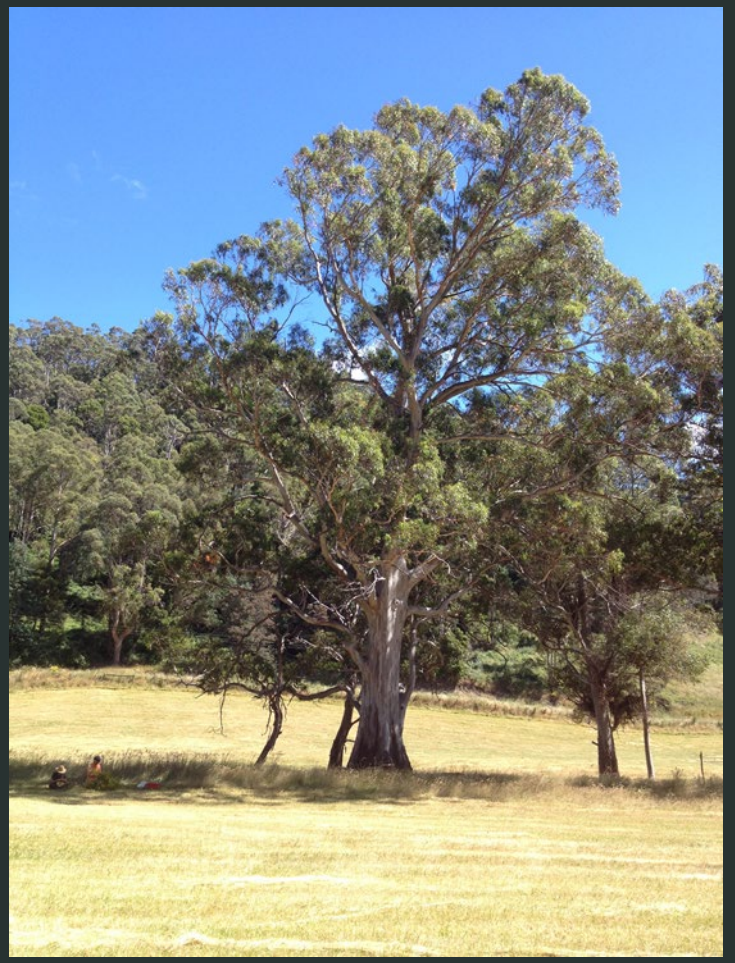
Establishing Victoria's Ecological Infrastructure: Guidelines for Building Climate Future Plots





4. Choose the plant species you will use

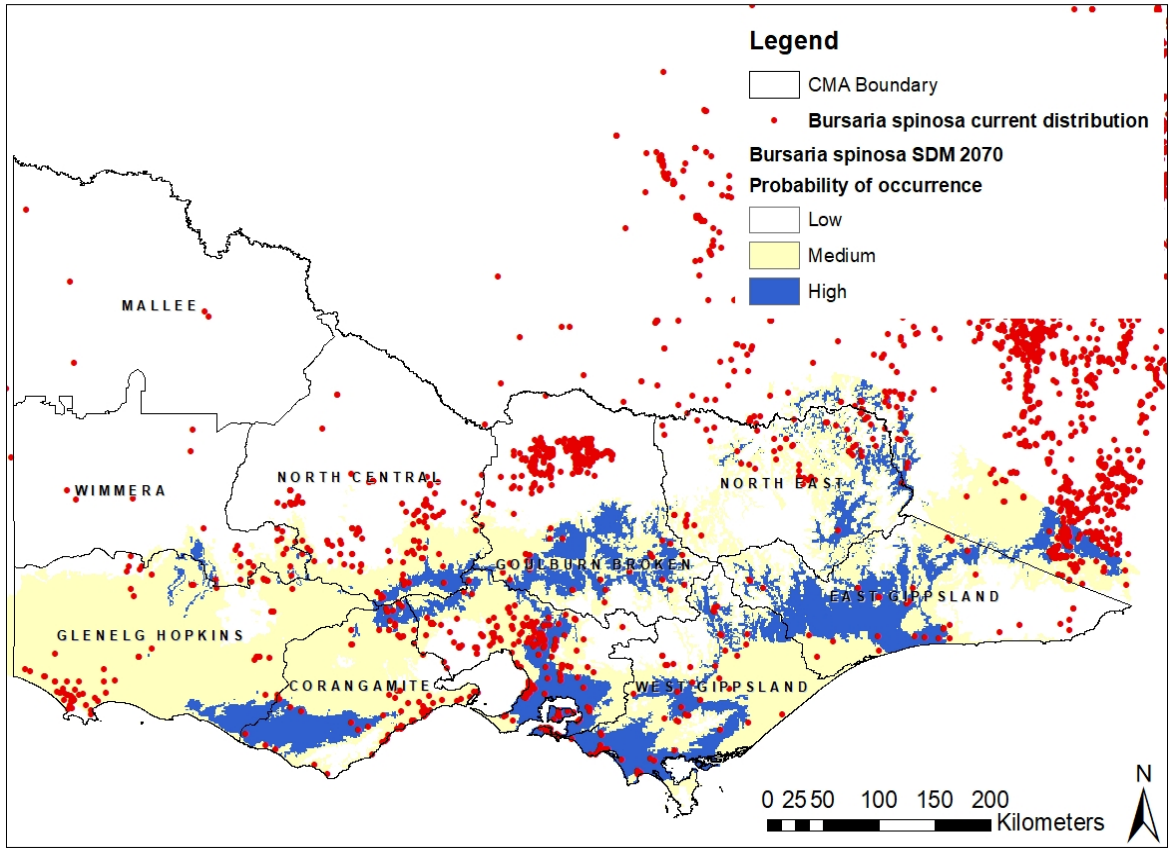
Species choice: factors to consider

To achieve the best possible outcomes, choose plant species likely to survive, grow and reproduce in your plot by considering their traits and how they are likely to cope under the changing climate.

- Try to base your revegetation activities around local Ecological Vegetation Classes (EVCs) – they are more likely to grow, survive, and achieve the best outcomes
- However, we shouldn't assume that EVCs will remain the same into the future

➢ Consider how likely that species is to survive under future climatic conditions

Sweet Bursaria



The current distribution of Sweet Bursaria and its projected distribution in 2070

Incorporating genetics from hotter and drier parts of the state and from interstate may improve the likelihood of this species persisting in its current range

Introducing new species?

- Local species may not survive under future climate scenarios so introducing new species may be necessary
- **However**, introducing a new species should be done with **caution**
    - they may not provide the same function or habitat
    - they may become over abundant
- Genetic risks associated with using native species for large-scale revegetation, even within their natural range - Byrne at al 2011 - Genetic risk protocol

➢ Highly recommended when planting in or near native vegetation

Top revegetation plant species

100 most commonly used revegetation plant species in Victoria

- Species with a broad distribution – easier to obtain climate adjusted seed

Appendix 2 in Guidelines pages 44-46

10 of the most widely distributed revegetation species

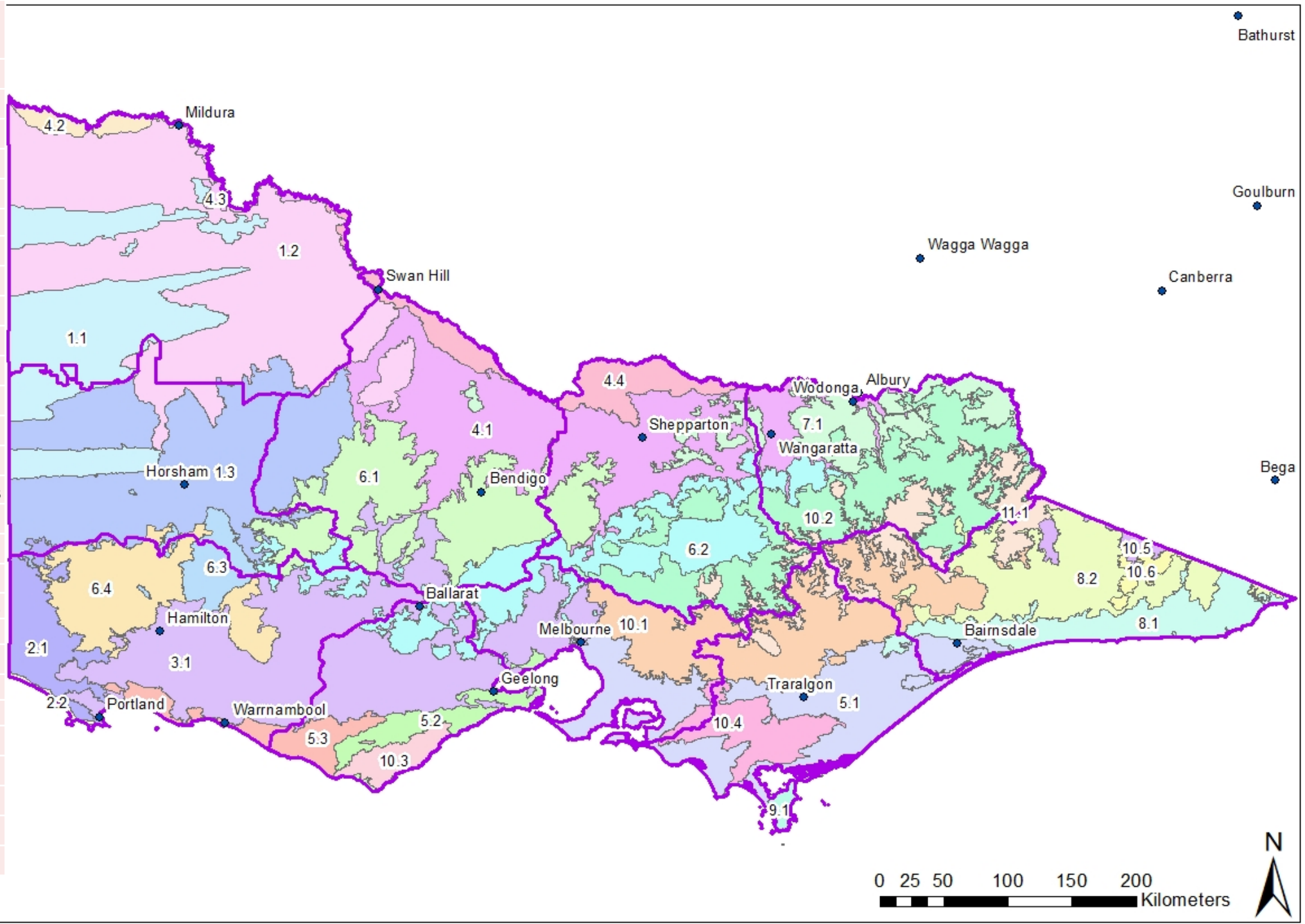
- Work with nurseries, Landcare or other local groups to obtain suitable seed

Species Name	Common Name	Form
Acacia pycnantha	Golden Wattle	Shrub
Allocasuarina luehmannii	Buloke	Tree
Allocasuarina verticillata	Drooping Sheoak	Tree
Banksia marginata	Silver Banksia	Shrub
Bursaria spinosa	Sweet Bursaria	Shrub
Dianella revoluta	Black-anther Flax-lily	Tussock
Dodonaea viscosa	Sticky Hop-bush	Shrub
Eucalyptus camaldulensis	River Red-gum	Tree
Eucalyptus viminalis	Manna Gum	Tree
Lomandra longifolia	Spiny-headed Mat-rush	Tussock

Create a shortlist of species

- Widely distributed across the state
- Commonly used in revegetation
- Used in other Climate Future Plots, so we can how species persist
- Occurs in target EVCs - component of the natural environment
- Diverse lifeforms (depending on EVC) to provide habitat for native wildlife

BIOREGNO	BIOREGION
1.1	Lowan Mallee
1.2	Murray Mallee
1.3	Wimmera
2.1	Glenelg Plain
2.2	Bridgewater
3.1	Victorian Volcanic Plain
4.1	Victorian Riverina
4.2	Murray Scroll Belt
4.3	Robinvale Plains
4.4	Murray Fans
5.1	Gippsland Plain
5.2	Otway Plain
5.3	Warrnambool Plain
6.1	Goldfields
6.2	Central Victorian Uplands
6.3	Greater Grampians
6.4	Dundas Tablelands
7.1	Northern Inland Slopes
8.1	East Gippsland Lowlands
8.2	East Gippsland Uplands
9.1	Wilsons Promontory
10.1	Highlands - Southern Fall
10.2	Highlands - Northern Fall
10.3	Otway Ranges
10.4	Strzelecki Ranges
10.5	Monaro Tablelands
10.6	Highlands - Far East
11.1	Victorian Alps



Greening Australia

Identifying the distribution of plant species

Box 2 in Guidelines page 19

I. Go to the Victorian Government website (other states and territories should have equivalent resources on ecological communities): www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks

II. Determine the Ecological Vegetation Classes (EVCs) that occur within your Bioregion. This will give you a list of dominant plant species in each EVC.

III. Go to the DELWP NatureKit website:
maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit
to identify the EVCs located within your area:

a. Zoom into the area of interest and click on the 'Ecological Vegetation Classes' tab

b. Click on the shaded EVC areas you are interested in to identify what the vegetation is likely to be

c. Use the list from Step II to identify the species you are likely to plant based on your EVC.

IV. Cross reference the species identified in Step IIIc with the species list in Appendix 2 for an idea of the likelihood of species being available from nearby nurseries. Note that this is not an exhaustive list, and that different nurseries will grow a variety of species.

Identifying the distribution of plant species (cont)

Box 2 in Guidelines page 19

V. Based on your above list of species, choose five to ten species to search for to see if they are located in your analogue areas

a. Go to *Atlas of Living Australia* www.ala.org.au,
enter first species of interest (scientific name) and choose the correct species from list provided.

b. On the 'Occurrence records map' that appears, click on the 'View Records' and then the 'Map' tab. You can use the tabs on the left-hand side panel to 'Narrow Your Results'.

c. Using the map, identify whether your species is in your climate analogue. If it is, see if there are suitable nurseries in that area. If it does not occur there or in the nearby region, you may need to consider another species

d. As an alternative, if you want a species list for a certain area, at the home screen go to the 'Search and analyse' dropdown and select 'Explore your area'. Type in your location in the box provided and select a 10 km radius. This will display all of the plants and animals recorded in selected area.

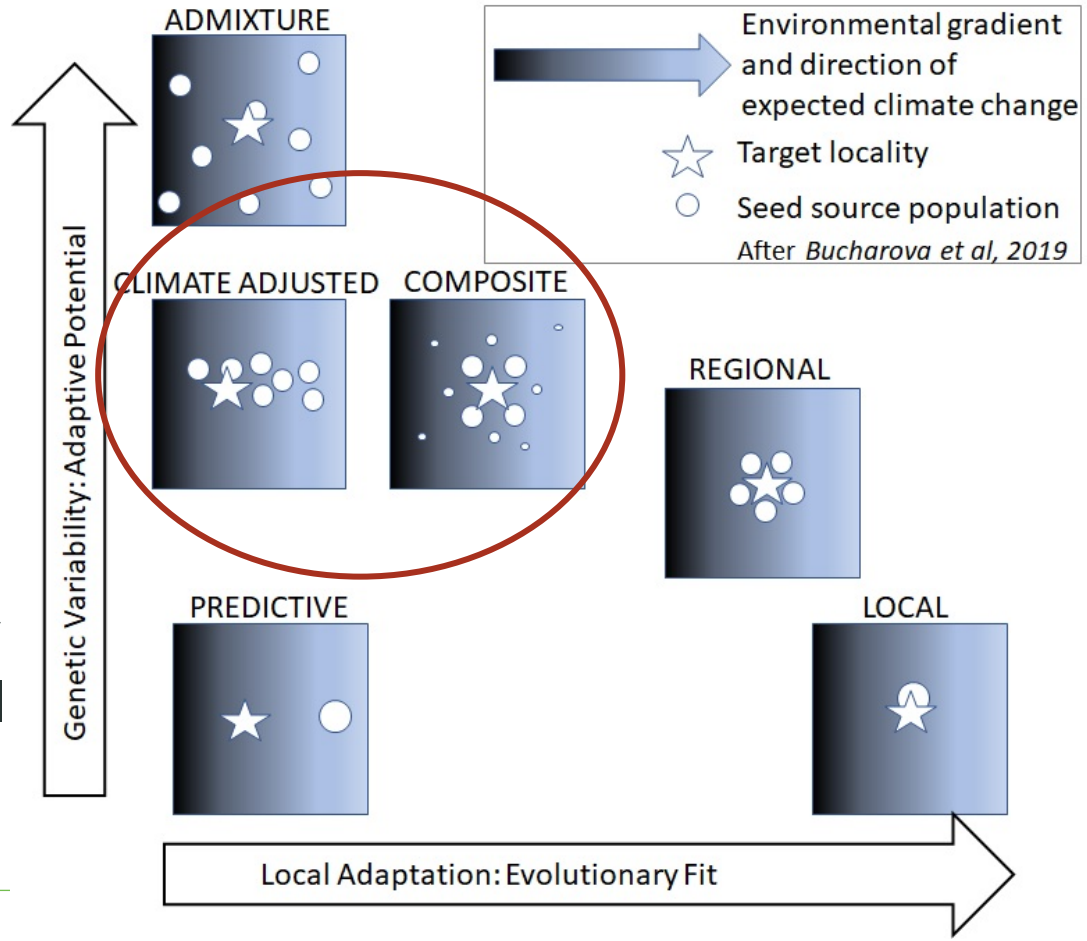
e. See Hancock et al. (2018) if you wish to define the climate limitations of your species.

5. Choose the provenances you will use

Seed Provenancing

The provenances of the plants you use, and the availability of seed from those provenances, will contribute to how successful you are in developing climate resilient plant communities

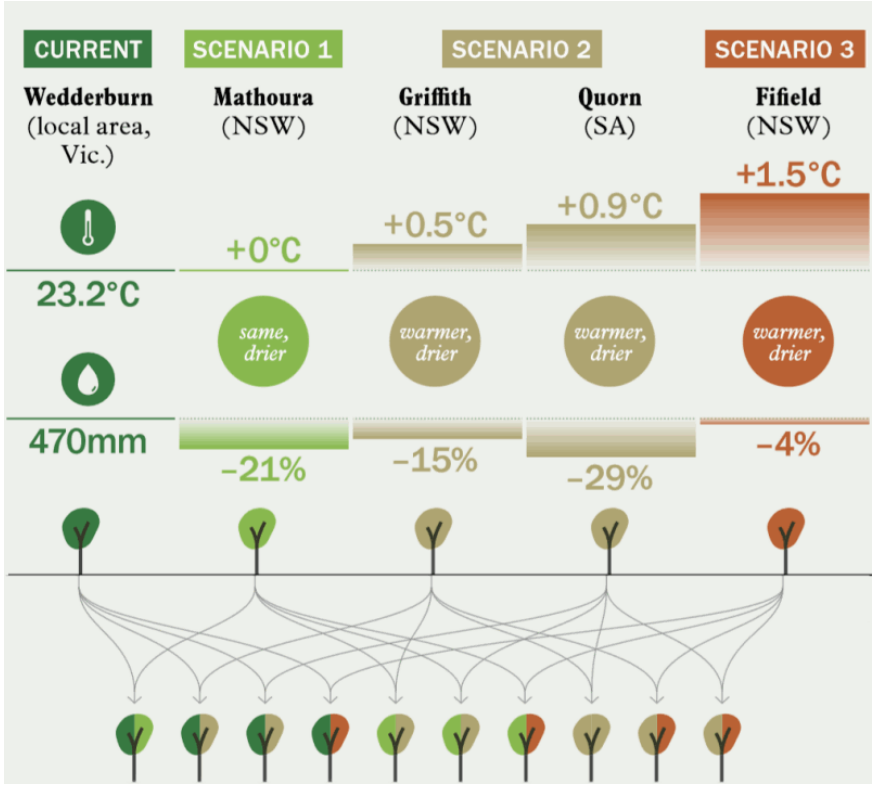
- Seed from local sources may not be able to keep up with the rapid rate of climate change
- Other provenances - ‘pre-adapt’ habitats to future climates/enhance the genetic diversity
- Recommended - combination of ‘composite’ and ‘climate-adjusted’ provenancing when selecting seed sources
  - ➢ mostly local with smaller proportions from future climate analogues
- **Important to note:** climate change is only one driver of plant survival and growth, and other environmental factors, such as soil conditions, competition, and pest animals, need to be considered



Provenance proportions

For a basic plot we suggest planting four or five provenances per species in case some fail to thrive, using:

- One local provenance (aim for about 60 to 70 % of the seed you use to comprise this)
- One provenance being from a wetter, cooler climate (10 %)
- Two or three provenances from hotter and drier climates (e.g. 10% from 2030 analogues, 10% from 2050 analogues and 10% from 2070/2090 analogues)
- If you have strong concerns about the viability or genetic diversity of local provenance seed, you can increase the proportions of climate adjusted seed.



Nardoo Hills project: 5 Grey Box provenances
Temperature and rainfall adaptations

https://www.bushheritage.org.au/newsletters/2019/spring/antidote-to-despair

How to collect high quality seed

List in Guidelines page 23

Where seeds come from and how they are collected is very important.

- Collect from a wide range of plants (at least 10 plants from each provenance)
- Avoid collecting from dead or diseased plants but include seed from plants that are not perfect specimens
- Collect widely from within the source patch
- For plants of the same species within a patch, try to collect from plants separated by at least twice the plants' height
- Avoid collecting from isolated patches or combine it with seed from other plants in the area
- Keep a record of where the seed was collected from, how many and from which mother plants were sampled at that location, and when it was collected
- If establishing a research or seed orchard plot maintain separate seed lots from each mother tree (family)

Future seed orchards

- Seed collection from field trials as well as designated seed production areas
- Facilitates local distance flow of diverse pollen
- Local provenance plots provide local seed supplemented by diverse pollen
- The most fit plants add most to seed collection
- Will act as a source for establishment of future restoration plantings
- Hybridisation of cross compatible species may be a problem