

FUTURE CLIMATE IN OUR REGION & WHAT WE CAN DO



WITH ELIZABETH GOODFELLOW
Bowling Bookham Districts Landcare
Habitat Hops from Burrinjuck to Bango Project
YAN Climate Ready Vegetation Project,
Let's Try It! Climate Adaptation Project,

WINTER 2021 Conversations

Project: Climate Ready Revegetation in the Yass Area Network of Landcare Groups
slides by Gill Hall MLG

CLIMATE READY VEG UPDATE



Yass Area Network of Landcare Groups - YAN

May 6 at 4:48 PM · 🌐



A small group of enthusiastic volunteers helped to plant 126 native trees and shrubs at Rugosa between Gunning and Murrumbateman this morning. Everything was planted, watered, and protected with tree guards in just half a day. John augered the holes with a tractor which made the work easy, and we were then able to relax over a delicious lunch made by Michelle. This is one of several supporting trial sites in the Climate Ready Revegetation Project which will help us to understand the survival of plants grown from local seed versus plants grown from seed from other climates.

This planting was part of the Community Environment Program across our region. If you would like to participate in a future Community planting please email coordinator@yan.org.au



Yass Area Network of Landcare Groups - YAN

May 31 at 10:24 AM · 🌐



With all hands on deck, holes were dug and 84 trees and shrubs were planted, watered and protected with tree guards in no time flat! This planting yesterday was one of the supporting trial sites for YAN's Climate Ready Revegetation Project. The trial has been designed to test whether there is any difference in the survival of plants grown from locally sourced seed compared with plants grown from seed from other areas (including areas with climates similar to what is projected for the Yass region under climate change). You can find out more about the project here: <https://yan.org.au/projects/yan-climate-ready-project>



CLIMATE READY VEG – TRIAL SITES

Well done!

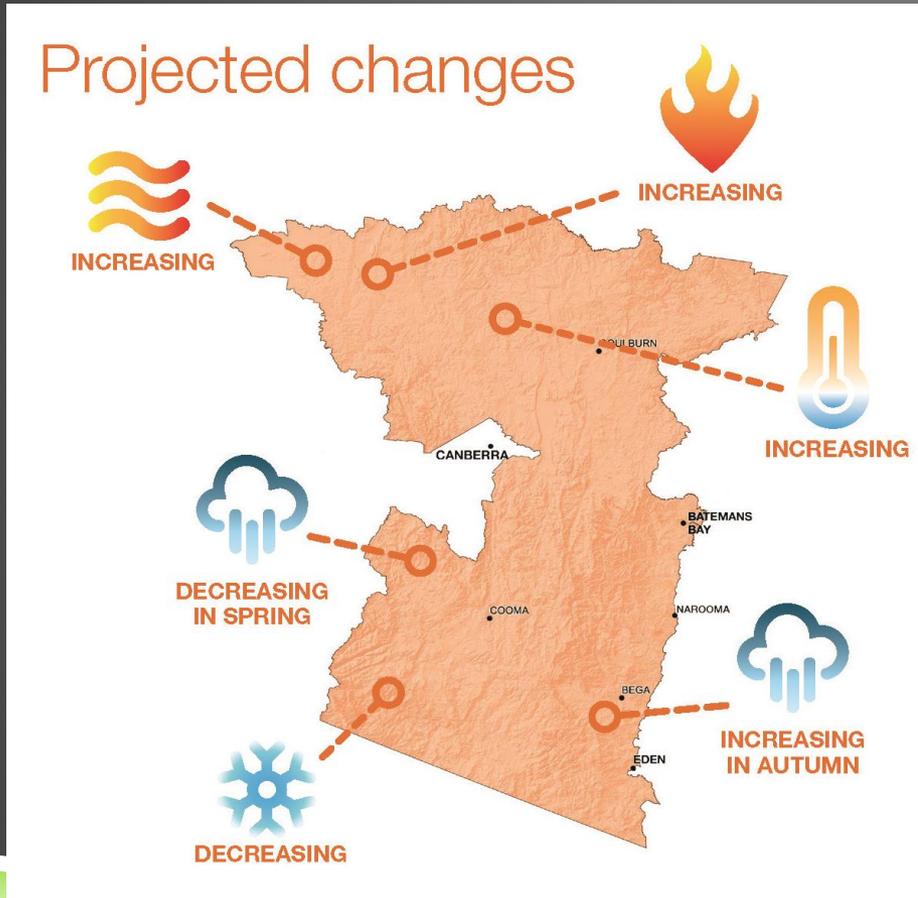
<u>Planting Group</u>	<u>Owners</u>	<u>Tubestock Planted</u>
A	Kath & Richard McGuirk	528
	Geoff McFarlane & Sheridan Roberts	552
	Ro McFarlane	84
B	John & Michelle Storey	126
	Jan Grubb	126
	Gill Hall	84
	Janette Hannan	126
	Linda Thane	84
	Melissa Cox	
	Kristee Attard	
	Jim Hutton	19
	Glenda Snape	
TOTAL		1729

WE'RE MOVING...

HOTTER AND DRIER &/OR WETTER AND LESS RELIABLE

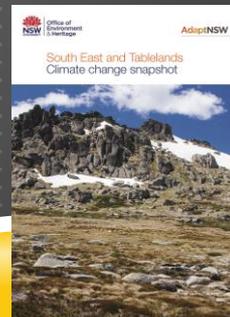


PROJECTED FUTURE CONDITIONS IN SE NSW: 2030-2070



- ▶ Maximum temperatures increase 1.8 to 2.5° and minimum temperatures increase 1.4 to 2.5°.
- ▶ With less rain in Winter and Spring but more rain in Summer and Autumn.
- ▶ And, more fire weather in general and more severe fire days in spring and summer with less frost days too.

Hotter and drier, uncertain amounts of rainfall, spread differently across seasons.



Climate Ready Revegetation in the Yass Area Network of Landcare Groups

In a nutshell

A new project aims to help indigenous plant species persist under climate change by increasing local genetic diversity. The project has five parts:

1. Understanding our changing climate.
2. Identifying which local species are most likely to survive future climate conditions.
3. Sourcing seed for these species from other regions, including where current climate matches expected future conditions in our region. By increasing genetic diversity in this way, we hope to help local species adapt to future changes.
4. Adopting this seed-sourcing practice in our local Landcare nurseries and revegetation efforts.
5. Running experimental trials to examine the short-term success of plants in the field.

For example, our research has shown that Dean's Wattle (*Acacia deanii*) grows well in areas that are hotter and drier than the current climate for the Yass region. By bringing seeds from other areas, we hope to establish local populations with greater genetic diversity that will develop more resistance to heat and drought. This species is being monitored in the trials.

Understanding our climate

- **Model Projections suggest:**
 - Temperatures around 2.5C hotter by 2070 (but range up to a possible 5C hotter)
 - Rainfall about 5% less (but range between lower to considerably more)
- **It is likely we will be more like current day Forbes, Young, Albury, Dubbo**
- **We can expect a shift in climate that will change our ecosystems**

Identifying which local species are most likely to survive future climate conditions

- **80 local species studied that were being grown in YAN nurseries**
- **Assessed for likely tolerance to hotter/drier, and to hotter/wetter conditions based on current distribution**
- **60 considered likely to be tolerant (all 60 grow currently in hotter regions, but many not in both drier and wetter regions)**

Sourcing seed from other regions for core Climate Ready Species for YAN nurseries and revegetation efforts

- **From the 60 species likely to be tolerant, 37 have been selected to get admix seed from other regions for the nurseries**
- **Seed acquisition proceeding now for species suitable for 3 habitat zones:**
 - **Top of ridges**
 - **Lower slopes**
 - **Damp and wet areas**
- **These species will be grown in all 4 YAN nurseries using admix seed**
- **These will be our core Climate Ready Species for revegetation activities**

Running experimental trials to examine the short-term success of plants in the field

We would like to know if admixture plantings would provide a seedling establishment rate that was comparable with local plantings, and was thus able to launch a wider array of genotypes (but not necessarily a greater number of plants) into the landscape.

Research question:

Is there a difference in short-term outcomes of plants from local compared with admixture seed provenances?

- **3 species:** *E. melliodora*, *Acacia deaneii*, *Dodonaea viscosa* with Local seed provenance vs Admix
- **Now planted 2 main sites of about 550 plants each and 6 supporting sites of 80 to 120 plants each**
- **For each species, a total of approx 300 local and 300 admix plants**
- **Monitor for 5 years**

Local plant species likely to have a moderate to high degree of tolerance to projected climate change in the Yass region

These species currently occur in the Yass region but also in areas that experience moderate to strong similarities in temperature and rainfall to what we expect in the Yass region in future years

Eucalypts: White Box (*Eucalyptus albens*), Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*Eucalyptus bridgesiana*), River Red Gum (*Eucalyptus camaldulensis*), Hill Redgum (*Eucalyptus dealbata*), Red Stringybark (*Eucalyptus macrorhyncha*), Yellow Box (*Eucalyptus melliodora*), Grey Box (*Eucalyptus microcarpa*), Inland Scribbly Gum (*Eucalyptus rossii*), Mugga Ironbark (*Eucalyptus sideroxylon*)

Other trees: Black She-Oak (*Allocasuarina littoralis*), Drooping She-Oak (*Allocasuarina verticillata*), Kurrajong (*Brachychiton populneus*), Black Cypress Pine (*Callitris endlicherii*), River She-Oak (*Casuarina cunninghamiana*)

Wattles: Box Leaf Wattle (*Acacia buxifolia*), Dean's wattle (*Acacia deanii* subsp. *paucijuga*), Western Silver Wattle (*Acacia decora*), Spearwood (*Acacia doratoxylon*), Hickory Wattle/ lightwood (*Acacia implexa*), Blackwood (*Acacia melanoxylon*), Kangaroo Thorn (*Acacia paradoxa*), Red Stem Wattle (*Acacia rubida*), Prickly Moses (*Acacia ulicifolia*), Varnish Wattle (*Acacia verniciflua*)

Other shrubs: Australian Blackthorn (*Bursaria spinosa* subsp. *lasiophylla*), Sweet Bursaria (*Bursaria spinosa* subsp. *spinosa*), Crimson Bottlebrush (*Callistemon citrinus*), Lemon Bottlebrush (*Callistemon pallidus*), River Bottlebrush (*Callistemon sieberi*), Cough Bush (*Cassinia laevis*), Shiny Cassinia (*Cassinia longifolia*), Broom Bitter Pea (*Daviesia genistifolia*), Narrow Leaf Bitter Pea (*Daviesia mimosoides*), Small Leaf Parrot Pea (*Dillwynia phyllicoides*), Narrow Leaf Hop Bush (*Dodonaea viscosa* subsp. *angustissima*), Sticky Hop Bush (*Dodonaea viscosa* subsp. *cuneata*), Australian Indigo (*Indigofera australis*), Kunzea/Burgan (*Kunzea ericoides*)

Flowers: Bulbine Lily (*Bulbine bulbosa*), Billy Button (*Chrysocephalum apiculatum*), Clustered Everlasting Daises (*Chrysocephalum semipapposum*), Blue Flax Lily (*Dianella revoluta*), Purple Coral Pea (*Hardenbergia violacea*), Hoary Sunray (*Leucochrysum albicans*), Sticky Everlasting (*Xerochrysum viscosum*)

Grasses: Wallaby Grasses (*Austrodanthonia* spp) (*Rytidosperma caespitosum*), Tall Sedge (*Carex appressa*), Redanther Wallaby Grass (*Joycea pallida*) (*Rytidosperma pallidum*), Spiny Headed Mat Rush (*Lomandra longifolia*), River Tussock (*Poa labillardierei*), River Club Rush (*Schoenoplectus validus*), Kangaroo grass (*Themeda triandra*)

Local plant species not so likely to tolerate projected climate change in the Yass region

These species do NOT currently occur in areas that experience temperatures and rainfall similar to what we expect in the Yass region in future years

Eucalypts: Argyle Apple (*Eucalyptus cinerea*), Silver Gum (*Eucalyptus crenulata*), Broad Leaved Peppermint (*Eucalyptus dives*), Long Leaved Box (*Eucalyptus goniocalyx*), Brittle Gum (*Eucalyptus mannifera*), Snow Gum (*Eucalyptus pauciflora subsp. pauciflora*), Red Box (*Eucalyptus polyanthemos*), Candlebark (*Eucalyptus rubida subsp. rubida*), Ribbon Gum / Manna Gum (*Eucalyptus viminalis*)

Wattles: Gold-dust Wattle (*Acacia acinacea*), Silver Wattle (*Acacia dealbata*), Spreading Wattle (*Acacia genistifolia*), Ploughshare Wattle (*Acacia gunnii*), Woolly Wattle (*Acacia lanigera*), Black Wattle (*Acacia mearnsii*)

Other shrubs: Dolly Bush (*Cassinia aculeata*), Hop Bitter Pea/ broad leaf bitter pea (*Daviesia latifolia*), Slender Bitter Pea (*Daviesia leptophylla*), Woolly Grevillea (*Grevillea lanigera*), Small Fruited Hakea (*Hakea microcarpa*), Silky Hakea (*Hakea sericea*), Prickly Tea Tree (*Leptospermum continentale*), Woolly Tea Tree (*Leptospermum lanigerum*), Silver Teatree (*Leptospermum multicaule*), River Tea Tree (*Leptospermum obovatum*), Rough-barked Honey-myrtle (*Melaleuca parvistaminea*)

Flowers: Blue Devil (*Eryngium ovinum*)

Core Climate Ready species with admix seed for YAN nurseries and revegetation activities

Habitat 1 Grassy Woodland lower slopes		Habitat 2 Dry Sclerophyll poor soils, upper slopes and ridges	
White Box	<i>Eucalyptus albens</i>	Red Stringybark	<i>Eucalyptus macrorhyncha</i>
Blakely's Red Gum	<i>Eucalyptus blakelyi</i>	Inland Scribbly Gum	<i>Eucalyptus rossii</i>
Apple Box	<i>Eucalyptus bridgesiana</i>	Drooping She-Oak	<i>Allocasuarina verticillata</i>
Yellow Box	<i>Eucalyptus melliodora</i>	Black Cypress Pine	<i>Callitris endlicherii</i>
Mugga Ironbark	<i>Eucalyptus sideroxylon</i>	Narrow Leaf Bitter Pea	<i>Daviesia mimosoides</i>
Kurrajong	<i>Brachychiton populneus</i>	Box Leaf Wattle	<i>Acacia buxifolia</i>
Hickory Wattle/ lightwood	<i>Acacia implexa</i>	Spearwood	<i>Acacia doratoxylon</i>
Blackwood	<i>Acacia melanoxylon</i>	Kangaroo Thorn	<i>Acacia paradoxa</i>
Red Stem Wattle	<i>Acacia rubida</i>	Shiny Cassinia	<i>Cassinia longifolia</i>
Dean's wattle	<i>Acacia deanii subsp. paucijuga</i>	Clustered Everlasting Daises	<i>Chrysocephalum semipapposum</i>
western silver wattle	<i>Acacia decora</i>	Habitat 3 Damp sites including streambanks, dams	
	<i>Acacia ulicifolia</i>		<i>Callistemon sieberi</i>
varnish wattle	<i>Acacia verniciflua</i>	Broom Bitter Pea	<i>Daviesia genistifolia</i>
Sweet Bursaria	<i>Bursaria spinosa subsp. spinosa</i>	Kunzea	<i>Kunzea ericoides</i>
Small Leaf Parrot Pea	<i>Dillwynia phyllicoides</i>	Tall Sedge	<i>Carex appressa</i>
Narrow Leaf Hop Bush	<i>Dodonaea viscosa subsp. angustissima</i>	River Tussock	<i>Poa labillardierei</i>
Australian Indigo	<i>Indigofera australis</i>	River Club Rush	<i>Schoenoplectus validus</i>
Bulbine Lily	<i>Bulbine bulbosa</i>		
Billy Button	<i>Chrysocephalum apiculatum</i>		
Purple Coral Pea	<i>Hardenbergia violacea</i>		
Sticky Everlasting	<i>Xerochrysum viscosum</i>		

HOW TO MAKE A DIFFERENCE

(Δ GHG EMISSIONS)



Use
Less
Resources
(50-70%
less !)

Grow More
Nature

Photo [126778507](#) / Justice Scales Unbalanced © Igor Zakharevich | Dreamstime.com

Anthropogenic emissions, less removal by sinks, of the greenhouse gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. (UN Climate Change Indicator Definition)

SE IN WEDDIN NATIONAL PARK (NEAR GRENFELL, ~200KM NW OF YASS)



NW FROM WEDDIN NATIONAL PARK (NEAR GRENFELL, ~200KM NW OF YASS)



Impact we've
already
had...

3 CLIMATE CHALLENGES & RESPONSES

1. LOSS >> CONSERVE



2. CHANGE >> ADAPT



3. ABUSE >> MINIMISE

What are we already doing about these?

PHOTOS

ANT. Photo 190104093 © Moshe Einhorn - Dreamstime.com

ROSELLA. By Jj Harrison (https://www.jjharrison.com.au/) - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=9428025>

BEACH. AA, Public domain, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Marine_debris_on_Hawaiian_coast.jpg

ROUGH MURRUMBATEMAN FOOTPRINT???

HOUSEHOLD FOOTPRINT
(per year)

APPROX MATURE TREES TO OFFSET
(treeproject.org.au)

- ▶ Car 20 000km travelled ~ 4 mature trees
- ▶ A short-haul flight, ~ 1 mature trees
- ▶ A medium-haul flight ~ 2 mature trees
- ▶ A long-haul flight ~ 4 mature trees
- ▶ AT LEAST 10...per household per annum...

1111 households (2016 Census)
= *at least* 11,110 mature trees *per annum*

OR

If planted 160-200 for each of the 3,219 people (2016 Census)
= 515,040 to 643,800 mature trees (total)

WHAT MLG IS DOING AND COULD DO?

▶ CONTINUE AND UPDATE

- ▶ Habitat Linkage / Tree Planting
- ▶ Nursery
- ▶ Reserves/Cemetery Management
- ▶ Climate Ready Vegetation

▶ JOIN IN

- ▶ Soils and grazing group/activities with Let's Try It (LTI)!, Boorowa or Upper Lachlan LC.
- ▶ Yass Landcare Paddock Trees Project & LTI Climate-wise Planting Events
- ▶ Yass Landcare Walks Program (TBC)
- ▶ Sutton Landcare Native Grass Seed Sharing

▶ TRY???

- ▶ Tree planting in Murrumbateman Village/Rec Grounds for shade/protection
- ▶ Community planting on farms
- ▶ Local seed collection
- ▶ Roadside remnant protection/markings
- ▶ Contribute funds to other projects and/or research
- ▶ What else?? LTI may help find a way to make it happen.



What
help/resources
do you need?

ROADSIDE VEG PROTECTION SIGNS



Near Goulburn River NP 16/5/21



Near the Gilgandra Native Flora Reserve 23/5/21

HOW TO CHANGE CLIMATE CHANGE (GHG EMISSIONS)

Grow More
Nature



Use
Less
Resources
(50-70%
less !)

Photo [126778507 / Justice Scales Unbalanced](#) © Igor Zakharevich | [Dreamsdme.com](#)

Anthropogenic emissions, less removal by sinks, of the greenhouse gases carbon dioxide (CO²), methane (CH⁴), nitrous oxide (N²O), and fluorinated gases. (UN Climate Change Indicator Definition)

3+2 WAYS EACH OF US MAKE A DIFFERENCE



1. Grow and protect... more plants/habitat, everywhere.
2. Use a lot less... of everything & waste nothing.
3. Invest...in emissions reduction/offset & climate-friendly actions/organisations.

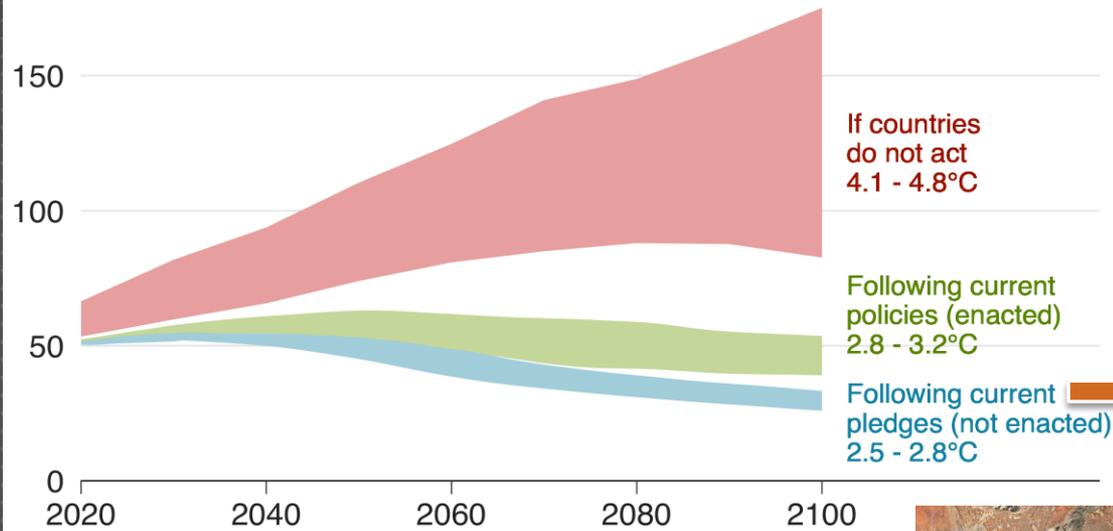
AND

1. Repeat...every month.
2. Try together...it's easier & multiplies impact.

NOW IS THE TIME... PSUH CURVE

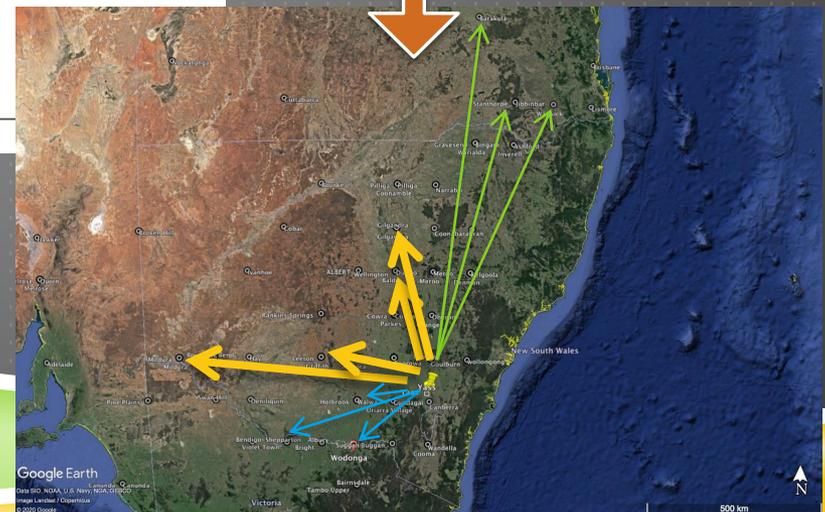
How much worse will the problem get?

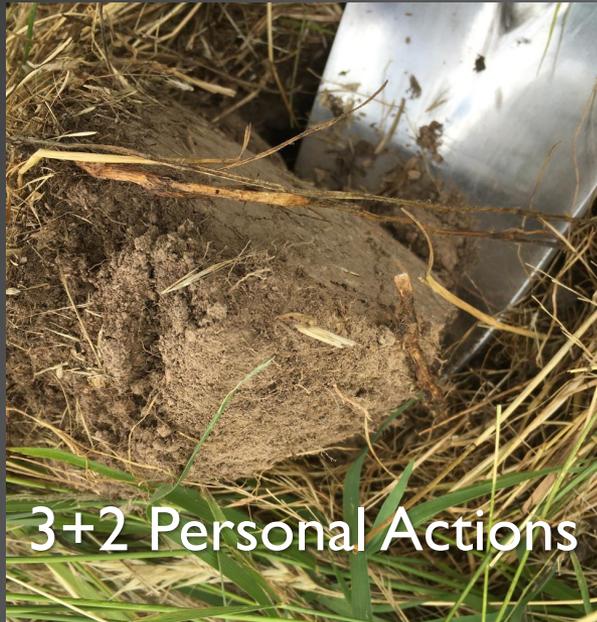
Emissions* and expected warming by 2100



*Emissions are in Gigatonnes of CO2 equivalent

Source: Climate Action Tracker





3+2 Personal Actions



Ant, Bird and Human
Collective Actions

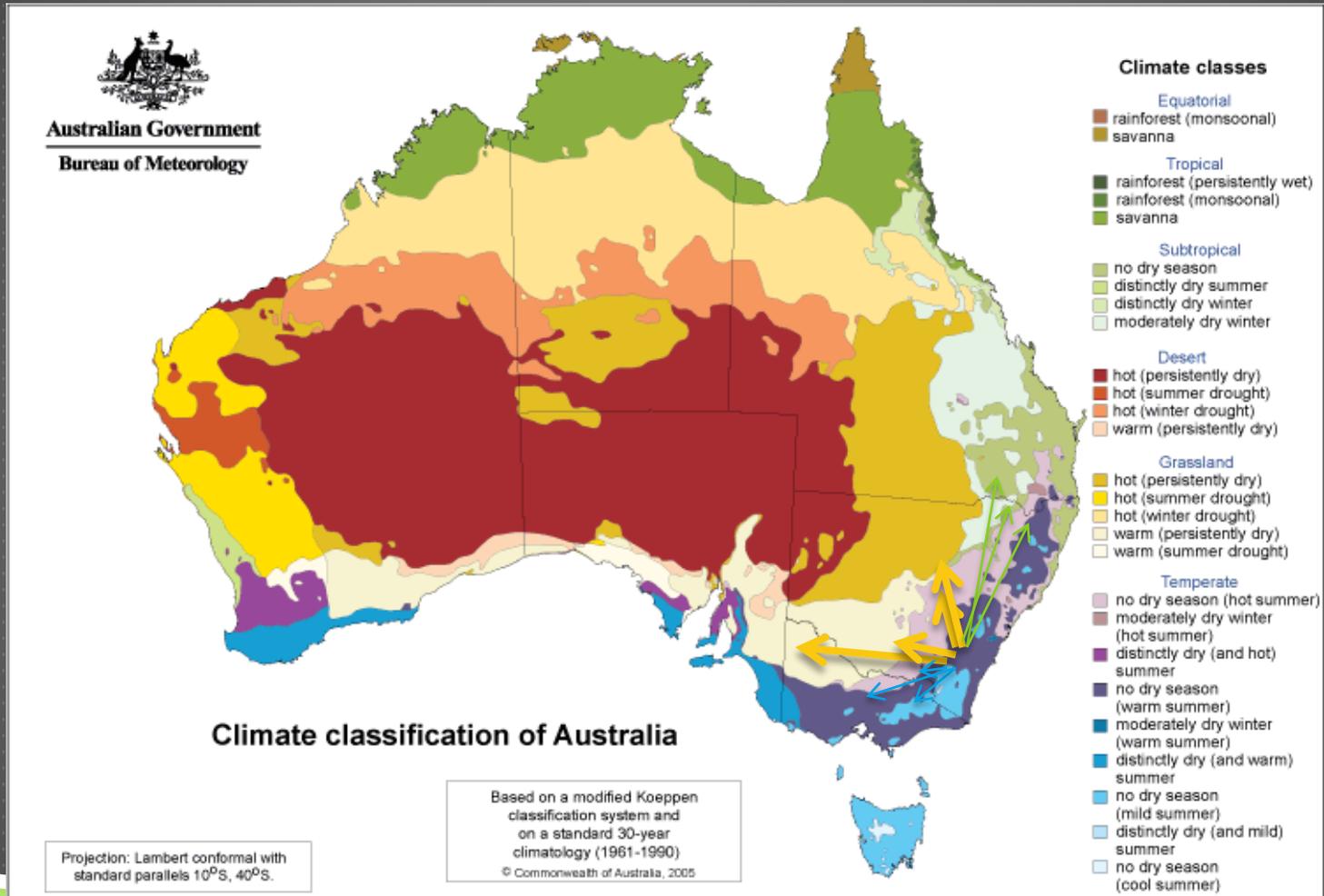


WHAT WILL MLG DO NEXT?

CLIMATE READY PLANTS...



CLIMATE FROM A PLANTS-EYE VIEW



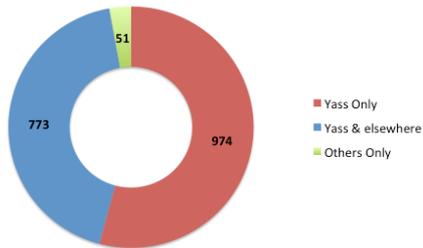


A PLANTS PERSPECTIVE

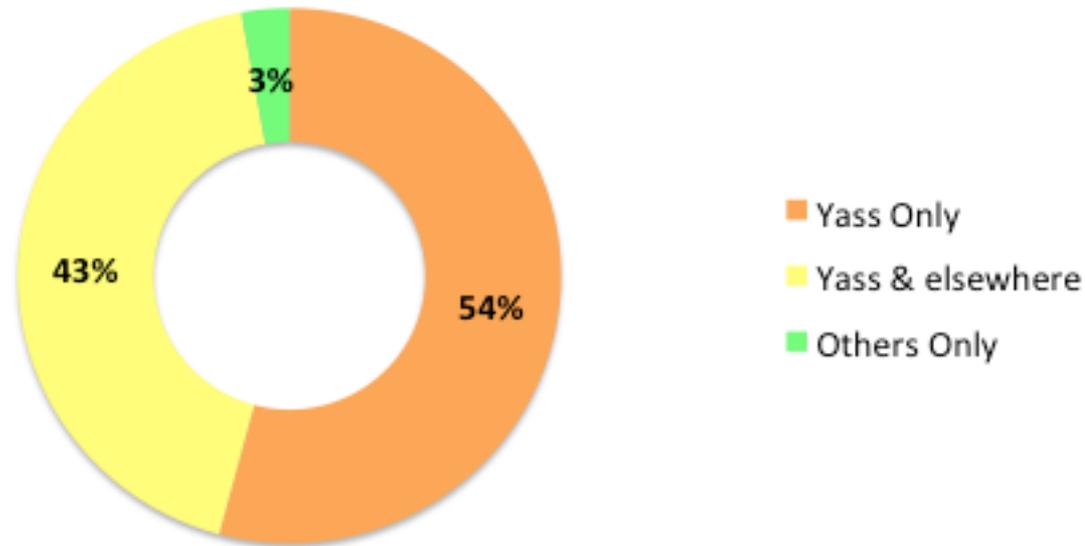
Climate Ready Vegetation

WHAT CHANGES MAY HAPPEN IN OUR LANDSCAPE?

Commonality of Plant Species across Yass Valley and Analogue Areas
(Species Count=1798)



Commonality of Plant Species across Yass Valley and Analogue Areas
(% of Total Number of Species)

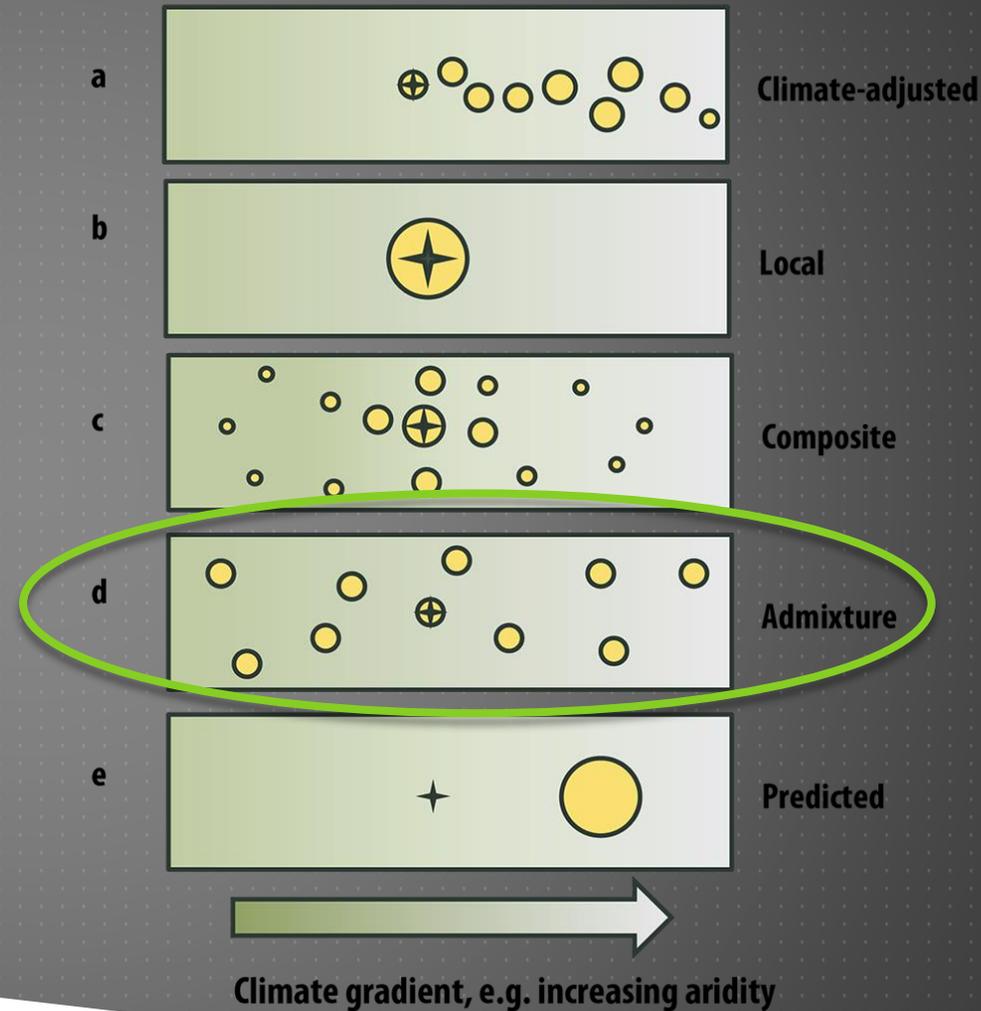


**If less than half of our plant species adapt to the climate changes,
*WHAT CAN WE DO?***

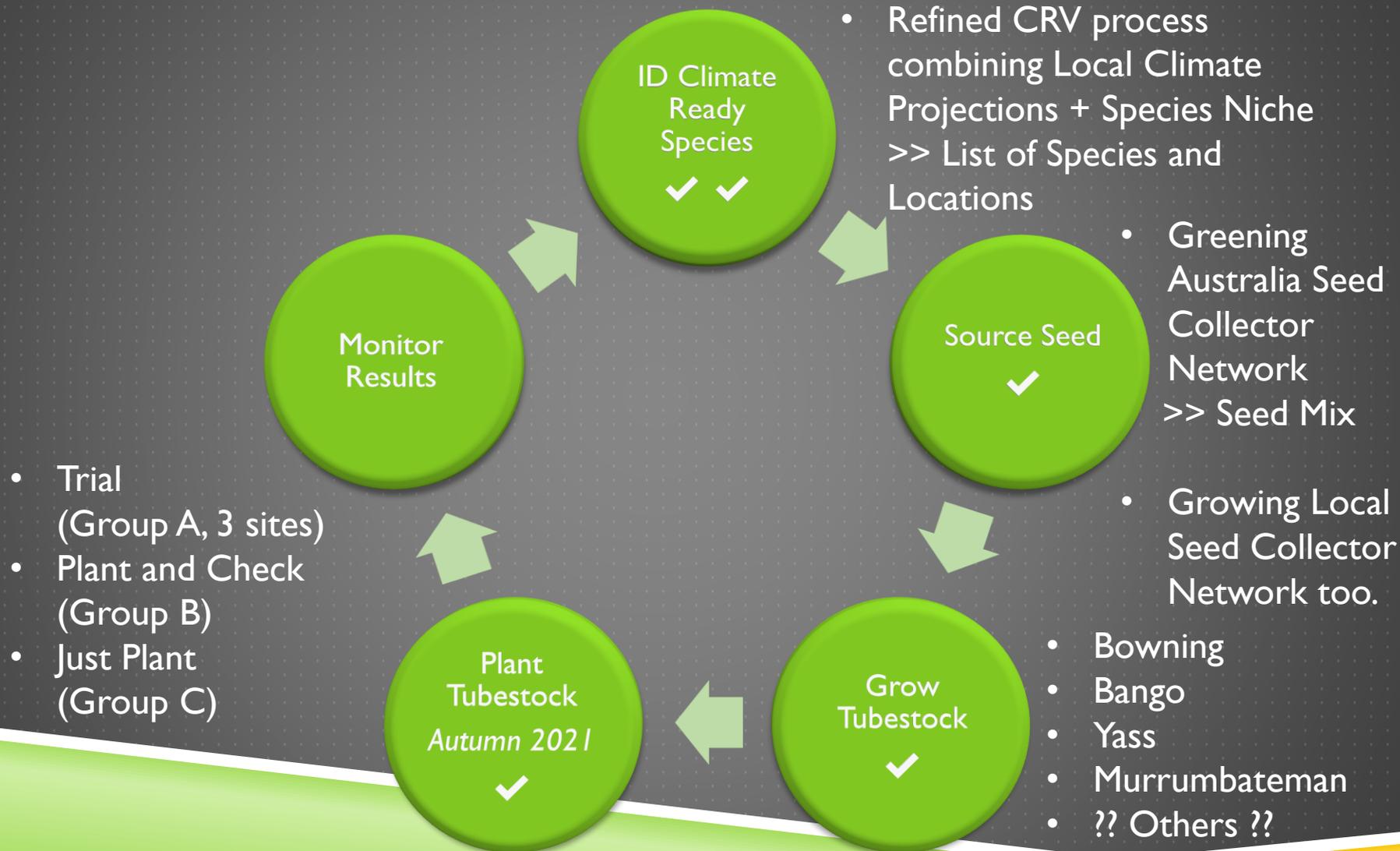
Note: Charts based on comparison and comparison of plant species identified as present in the Yass Valley with those of Bathurst, Cootamundra, Forbes, Gilgandra and Lachlan LGAs as published on www.nswnichefinder.net on 2 Feb 2019. Nichefinder includes only point occurrence data for all plant species in NSW were accessed from digitised, vouchered herbarium specimens held within the Australian Virtual Herbarium (AVH).

DON'T PANIC, HEDGE OR ADMIX

- ▶ The project aims to: assist the long-term survival of native plants in the Yass Valley under changing climatic conditions.
- ▶ The core premise in the work is that with greater genetic diversity, it is likely that plants will be better able to adapt as temperatures and rainfall become more variable and extreme.



CLIMATE READY VEGING



Hedging our bets or admixing using data, experience and practice...

THE WORKING YAN CLIMATE READY SPECIES LIST

(AS AT JUNE 2021)

- ▶ **Local plant species likely to have a moderate to high degree of tolerance to projected climate change in the Yass region**
- ▶ **Eucalypts:** White Box (*Eucalyptus albens*), Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*Eucalyptus bridgesiana*), River Red Gum (*Eucalyptus camaldulensis*), Hill Redgum (*Eucalyptus dealbata*), Red Stringybark (*Eucalyptus macrorhyncha*), Yellow Box (*Eucalyptus melliodora*), Grey Box (*Eucalyptus microcarpa*), Inland Scribbly Gum (*Eucalyptus rossii*), Mugga Ironbark (*Eucalyptus sideroxylon*)
- ▶ **Other trees:** Black She-Oak (*Allocasuarina littoralis*), Drooping She-Oak (*Allocasuarina verticillata*), Kurrajong (*Brachychiton populneus*), Black Cypress Pine (*Callitris endlicherii*), River She-Oak (*Casuarina cunninghamiana*)
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- ▶ **Other shrubs:** Australian Blackthorn (*Bursaria spinosa* subsp. *lasiophylla*), Sweet Bursaria (*Bursaria spinosa* subsp. *spinosa*), Crimson Bottlebrush (*Callistemon citrinus*), Lemon Bottlebrush (*Callistemon pallidus*), River Bottlebrush (*Callistemon sieberi*), Cough Bush (*Cassinia laevis*), Shiny Cassinia (*Cassinia longifolia*), Broom Bitter Pea (*Daviesia genistifolia*), Narrow Leaf Bitter Pea (*Daviesia mimosoides*), Small Leaf Parrot Pea (*Dillwynia phylloides*), Narrow Leaf Hop Bush (*Dodonaea viscosa* subsp. *angustissima*), Sticky Hop Bush (*Dodonaea viscosa* subsp. *cuneata*), Australian Indigo (*Indigofera australis*), Kunzea/Burgan (*Kunzea ericoides*)
- ▶ **Flowers:** Bulbine Lily (*Bulbine bulbosa*), Billy Button (*Chrysocephalum apiculatum*), Clustered Everlasting Daises (*Chrysocephalum semipapposum*), Blue Flax Lily (*Dianella revoluta*), Purple Coral Pea (*Hardenbergia violacea*), Hoary Sunray (*Leucochrysum albicans*), Sticky Everlasting (*Xerochrysum viscosum*)
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THE WORKING YAN CLIMATE READY SPECIES LIST

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- ▶ **Wattles:** Gold-dust Wattle (*Acacia acinacea*), Silver Wattle (*Acacia dealbata*), Spreading Wattle (*Acacia genistifolia*), Ploughshare Wattle (*Acacia gunnii*), Woolly Wattle (*Acacia lanigera*), Black Wattle (*Acacia mearnsii*)
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