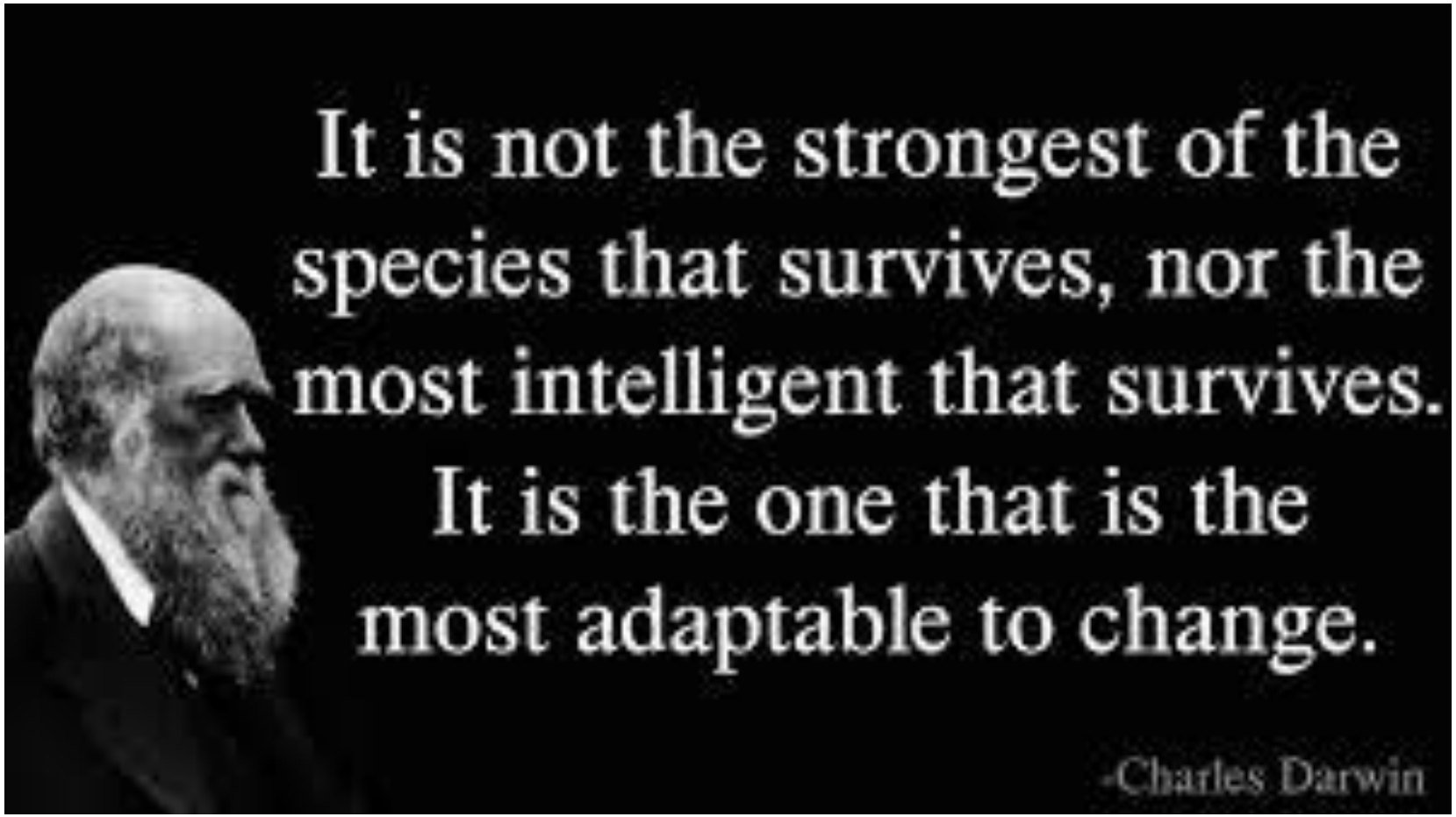
Swamps Rivers and Ranges, 3rd June 2022

Wangaratta

www.necma.vic.gov.au

Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY



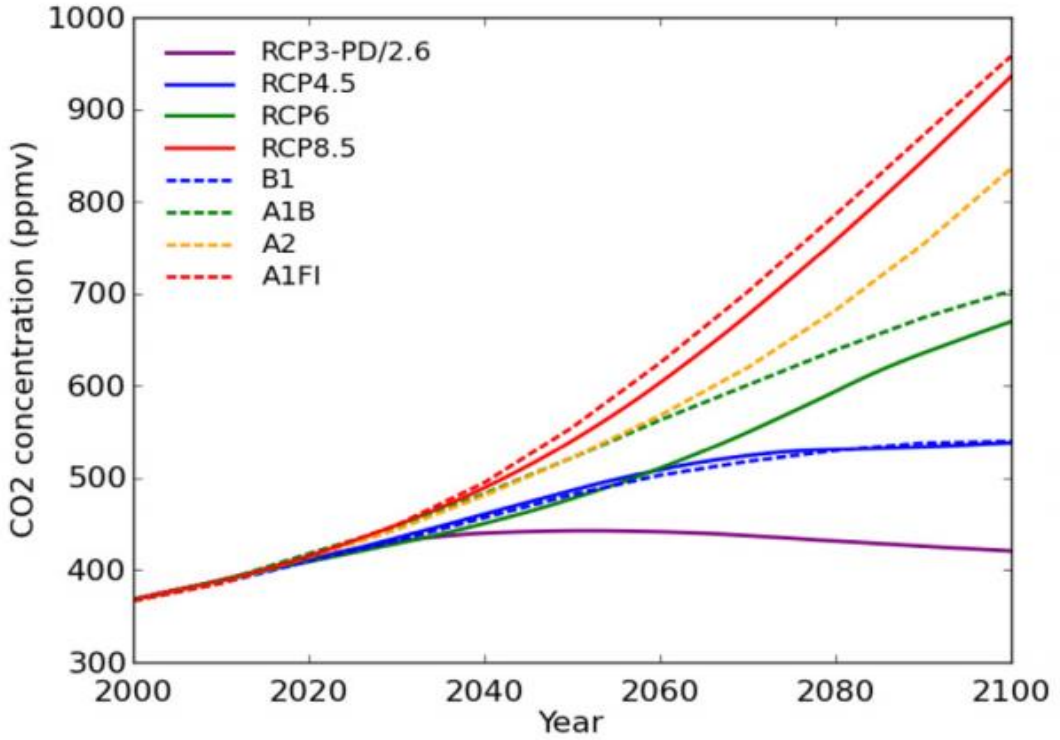
Embedding Climate Adaptation in Agriculture in North East Victoria

- The project aims to increase the capacity of landholders, communities and local government to adapt to changes in regional climatic conditions.
- This first part of a five year project has developed a Spatial Tool to help guide discussions about climate adaptation pathways
- *This project is supported by North East CMA, through funding from the Australian Government's National Landcare Program.*

The four-year Securing North East Soils Through Knowledge Exchange project is support by the North East CMA through funding provided by the Australian Government's National Landcare Program

Australian Government | National Landcare Program | NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Spatial Tool underpinnings – climate data



- Used latest CSIRO climate modelling & data
- IPCC RCP 8.5 selected as most realistic scenario
- Used real data for historic time-frame (1986-2005)
- Modelled CSIRO data for 2030 and 2050

Australian Government | National Landcare Program
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Climate trends

MAX TEMPERATURES

- Generally hotter in all months, esp summer
- E.g. 3 more days above 35C in January in most areas; 6 more hot days in January on the plains
- Means increased heat stress for plants and animals

MINIMUM TEMPERATURES

- Winter min temps warmer
- Oct-May increased min temps by 1-2C

PEOPLE AND ANIMALS

- Catchment wide - additional heat stress day in each of January and February
- more extreme on the plains around Rutherglen- two more heat stress days in Jan-Feb
- Less change in the high country

Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Agricultural production modelling - caution

Results are:

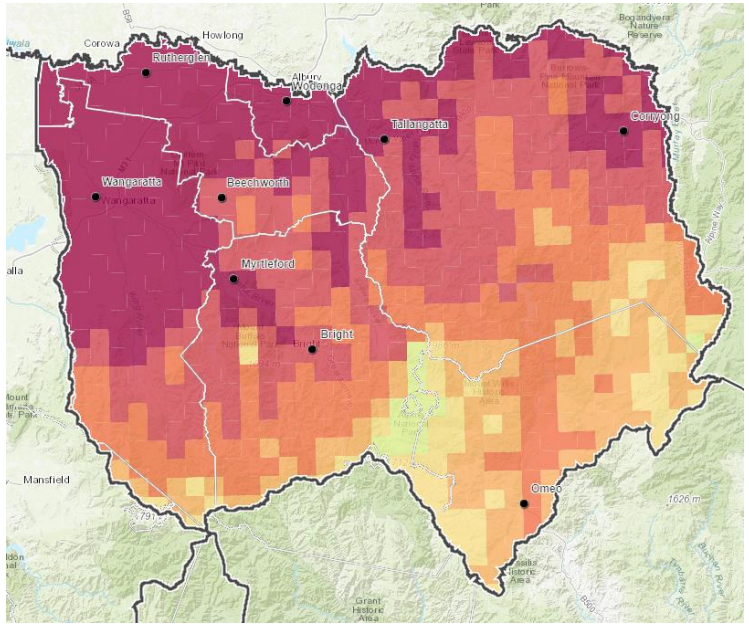
- Preliminary
- Accompanied by significant uncertainty

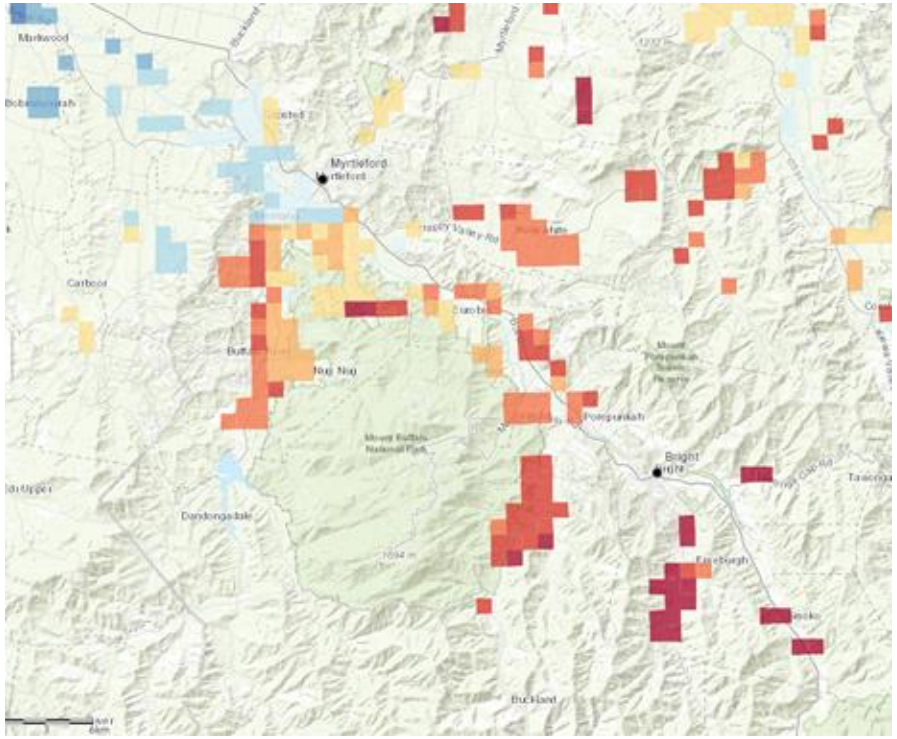
Whereas the modelling adopted a daily time-step and incorporated the daily future climate provided by CSIRO, the future impact (intensity and frequency) of extreme events is not accommodated and these events could have significant effects on future predictions.

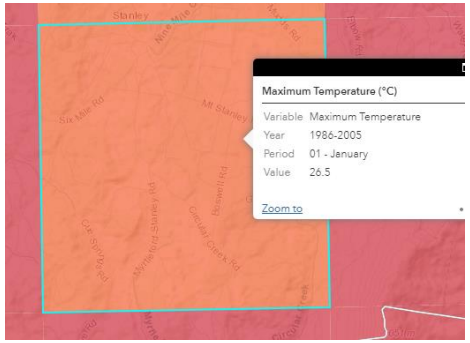
Predictions can be used as a basis for guiding discussion and future planning, not as the 'truth'

Australian Government | National Landcare Program
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Scaling





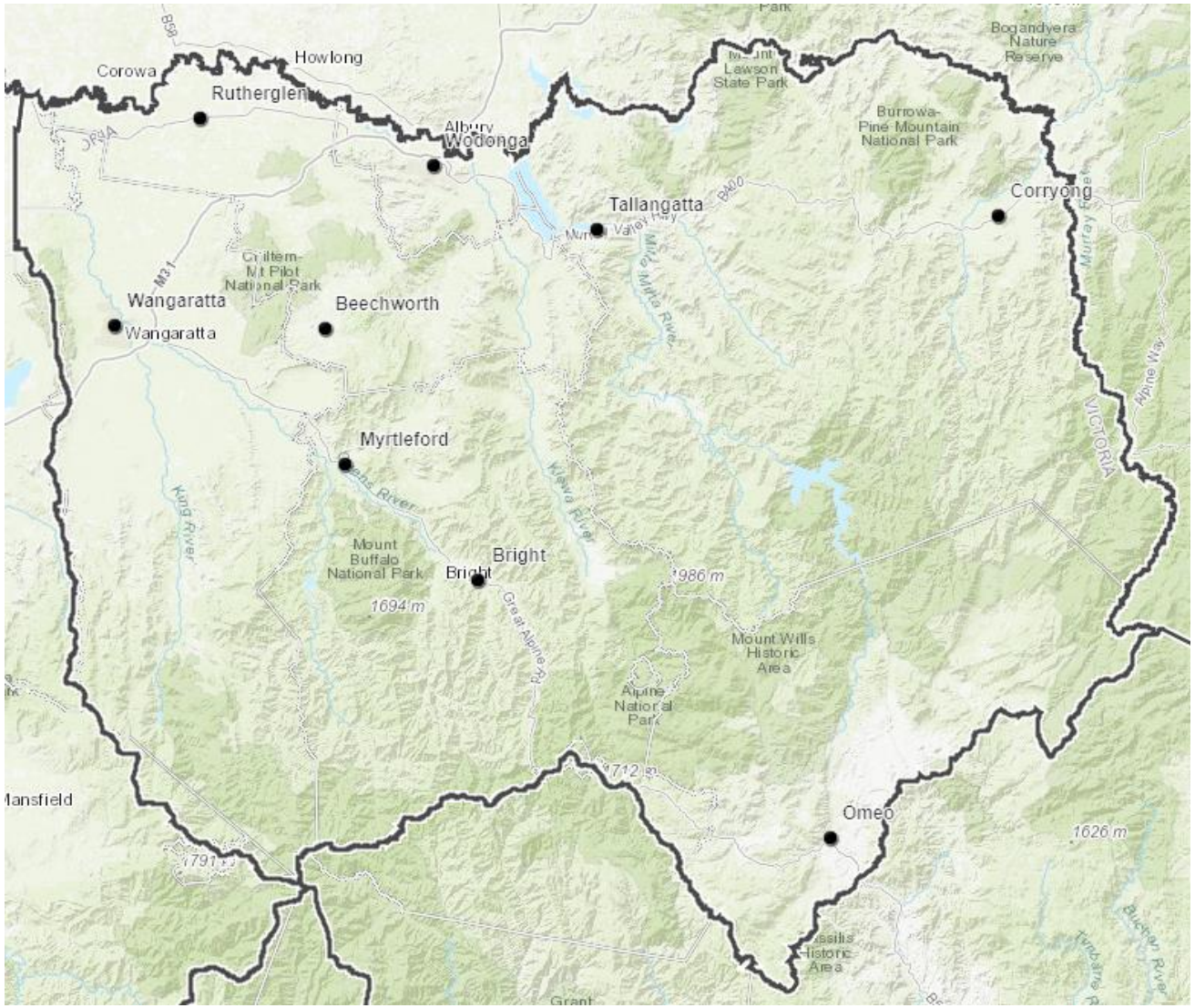


Australian Government
National Landcare Program
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

	Climate Variables	Annual	Month	Dairy	Grazing	Crop	Cherry	Chest	Vit	Forest	L Gov
	Temperature										
1	Mean Daily Maximum Temperature (Temp Max)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Mean Daily Minimum Temperature (Temp Min)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Extreme Temperature – Max										
3	Days with Temp Max > 40C – very hot days		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes
4	Days with Temp Max > 35C – hot days		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Days with Temp Max > 30C – very warm days		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Days with Temp Max > 24C – warm days		Yes				Yes	Yes	Yes		
	Extreme Temperature – Min										
7	Days with Temp Min < 13C – cold days		Yes	Yes	Yes		Yes	Yes	Yes		
8	Days with Temp Min < 7.2C – chill days		Yes	Yes	Yes		Yes	Yes			
9	Days with Temp Min < 2C – frost days		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
10	Days with Temp Min < 0C – very cold days		Yes	Yes		Yes	Yes	Yes	Yes	Yes	
	Livestock and Growing Conditions										
11	Days with Temp Min>10C and Temp Max <35C – growing days		Yes						Yes		
12	Days with variation in Temp Min and Temp Max > 20C – stressful days		Yes	Yes	Yes	Yes					
13	Days with Temp Max > 25C and Daily Rainfall > 0.0mm – warm/moist days (in lieu of Relative Humidity)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
	Extreme Temperature – Heatwaves										
14	Three or more consecutive days of Temp Max > 35C – Heatwaves	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	Three or more consecutive days of Temp Max > 40C – Heatwaves	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	Days with Temp Max>35C and Temp Min>20C – Heat stress		Yes								Yes
	Rainfall										
17	Total Precipitation (mm) for period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
18	Days with no Daily Rainfall – dry days		Yes				Yes	Yes	Yes	Yes	Yes
19	Days with Daily Rainfall > 10mm – wet days		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
20	Days with Daily Rainfall > 20mm – very wet days									Yes	
Number of climate variables of interest per sector		**3**	**18**	**16**	**14**	**13**	**17**	**17**	**17**	**14**	**10**

Australian Government | National Landcare Program

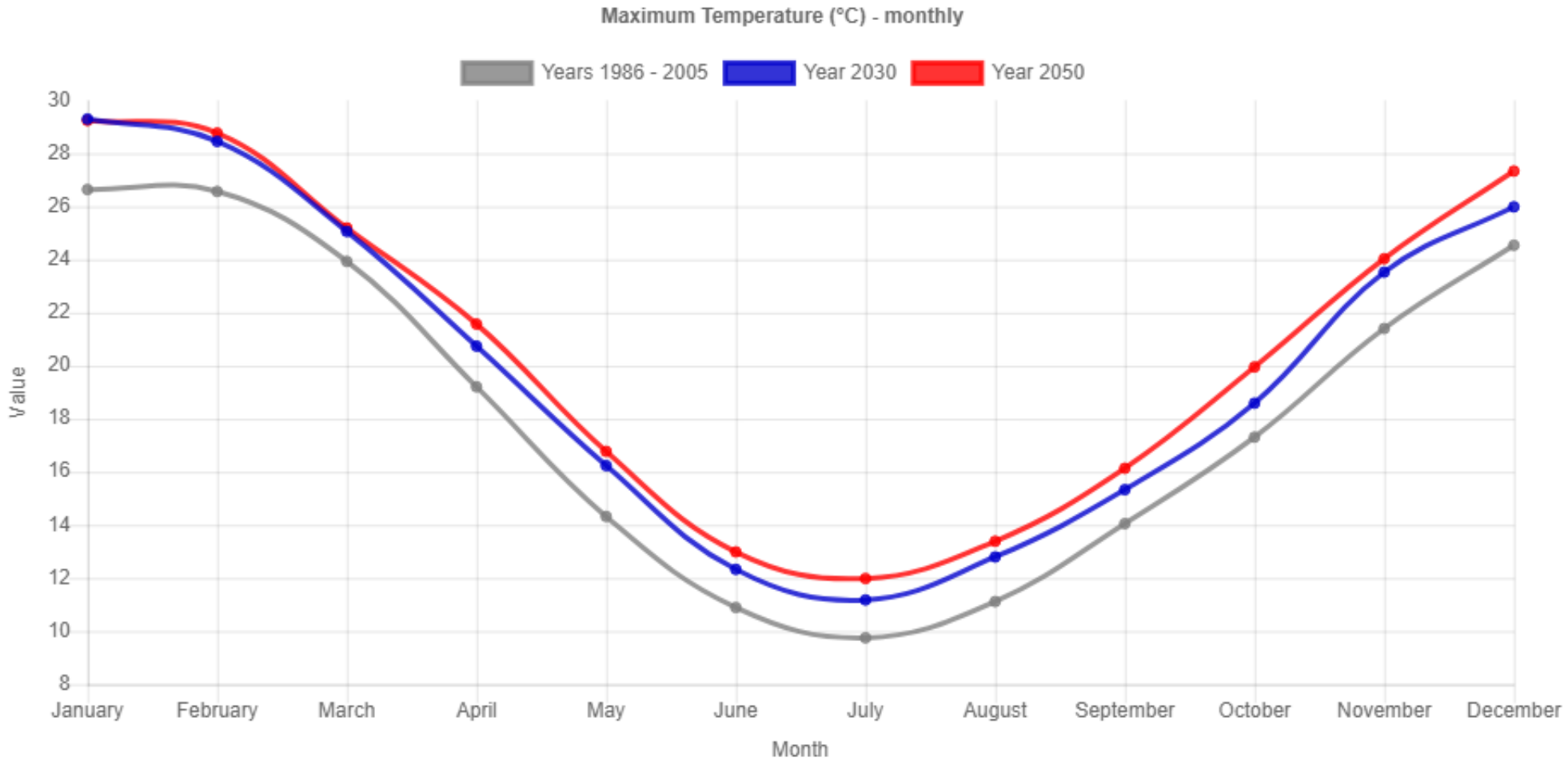
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY



Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

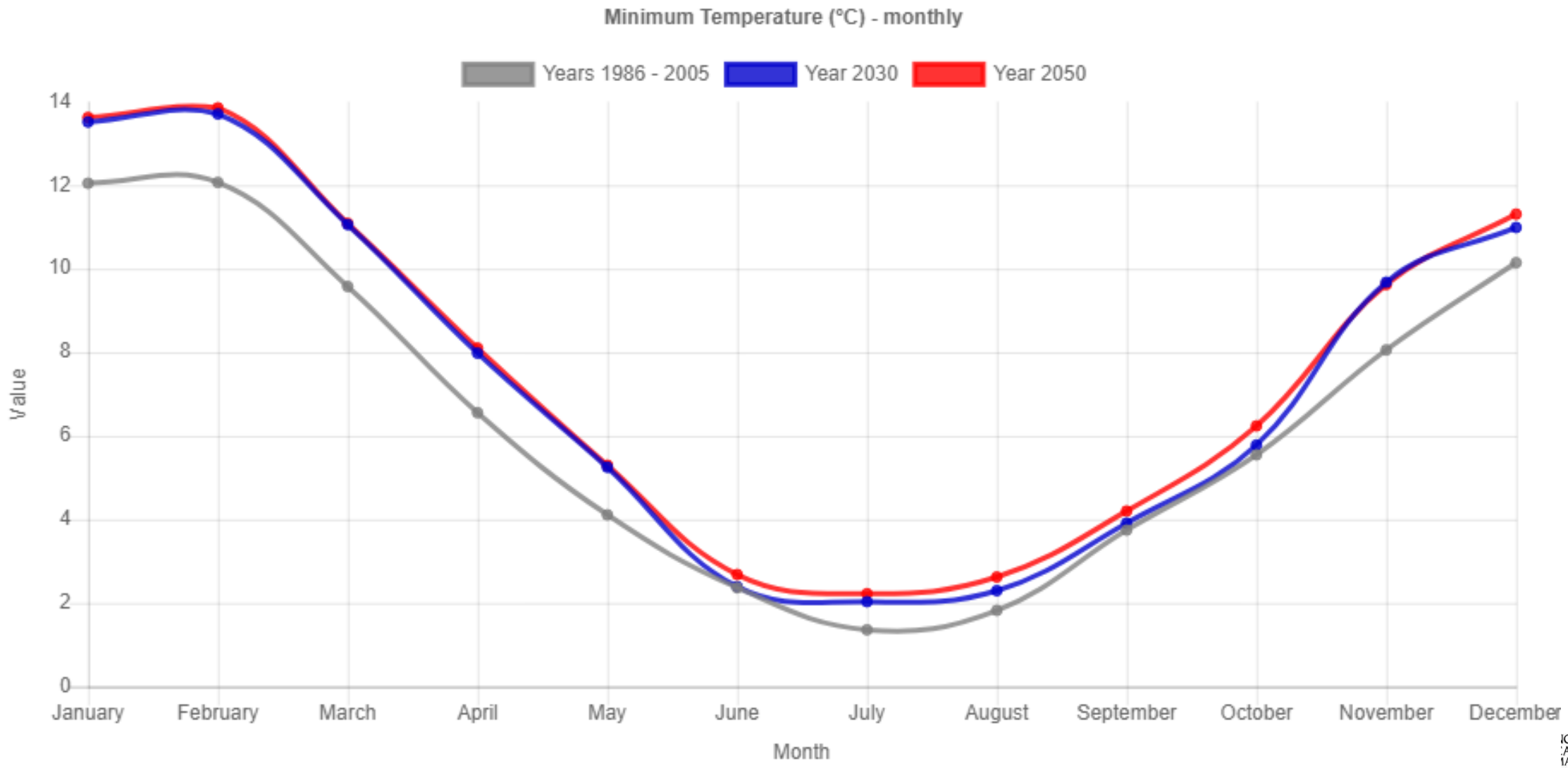
NECMACharting



Print Chart

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

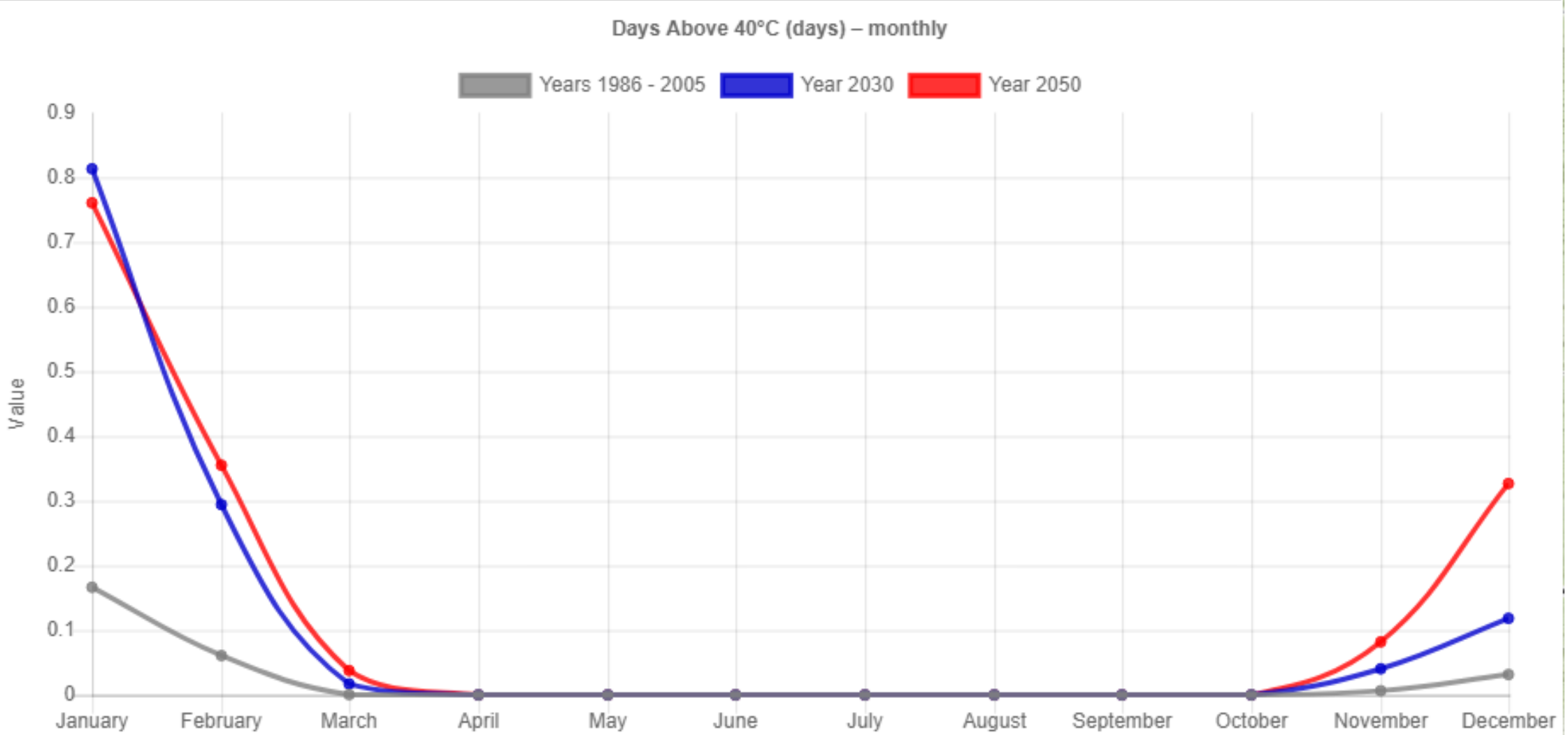
NECMACharting



Print Chart

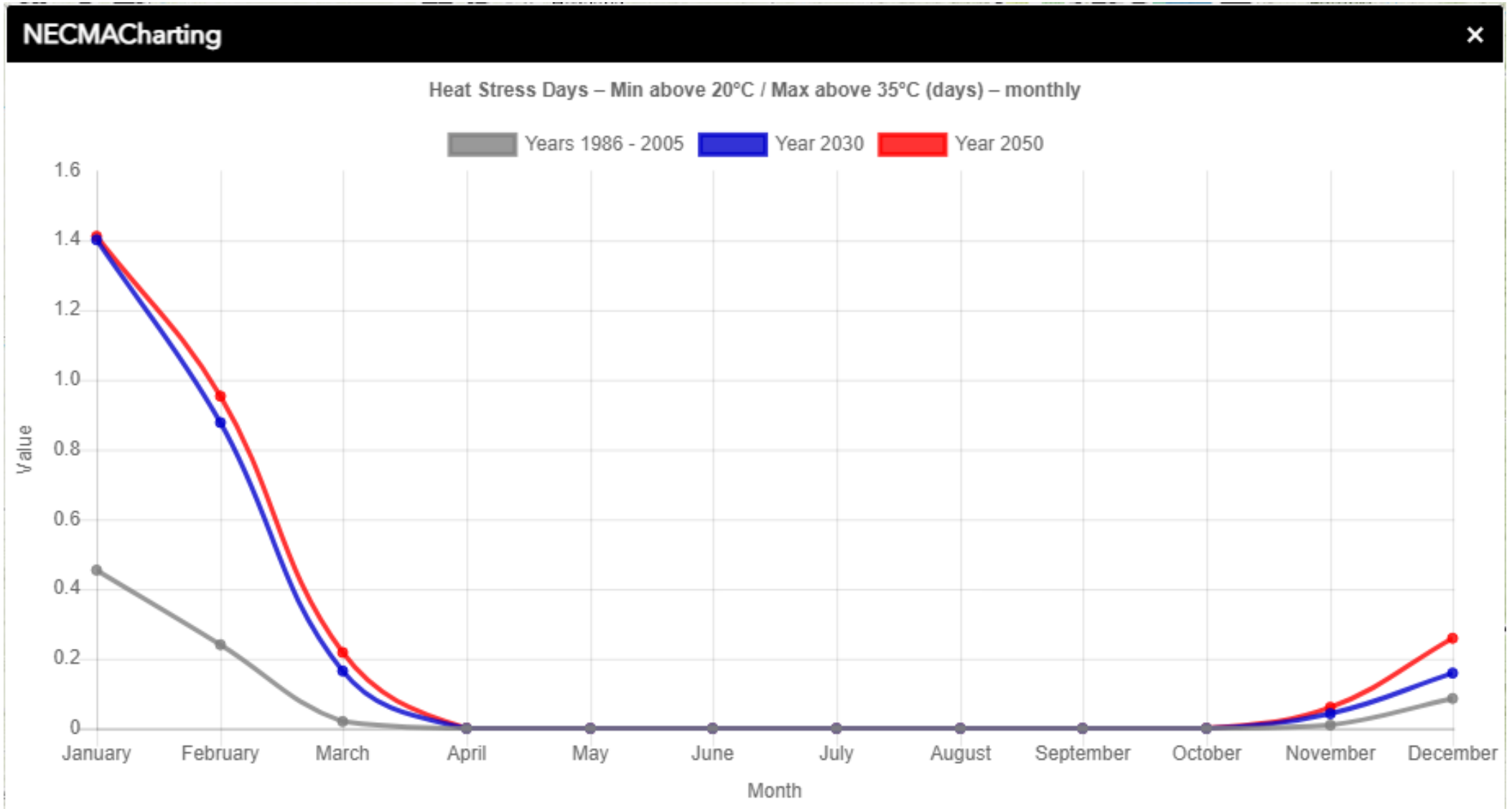
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

NECMACharting



Australian Government | National Landcare Program

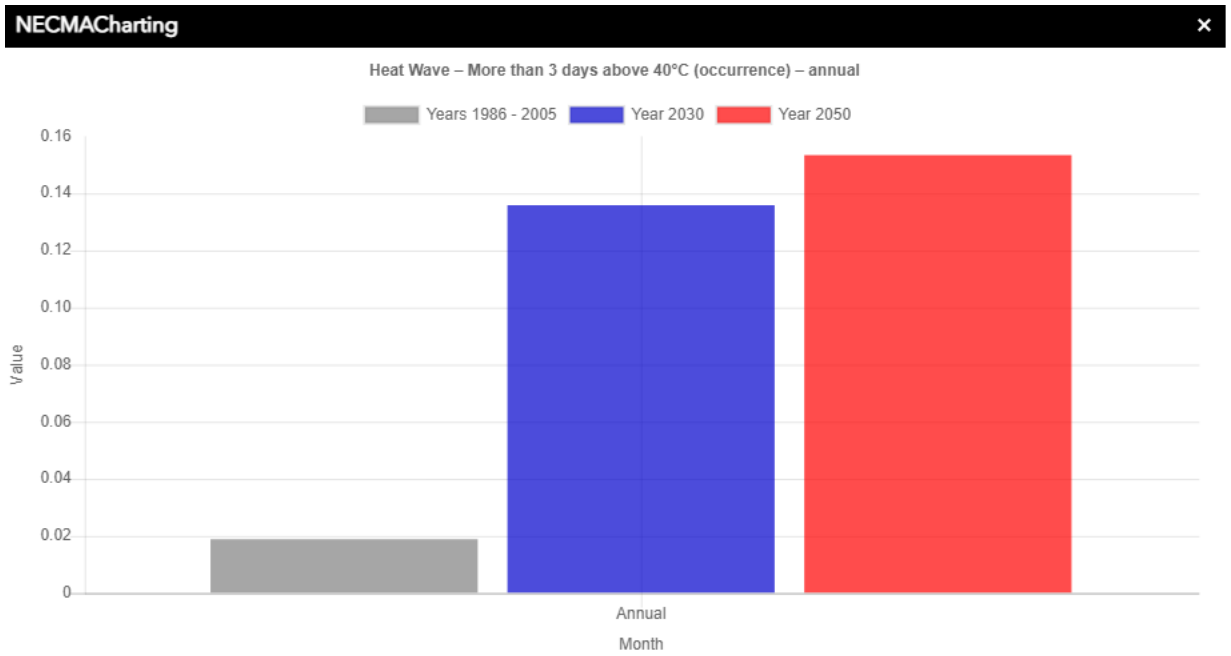
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY



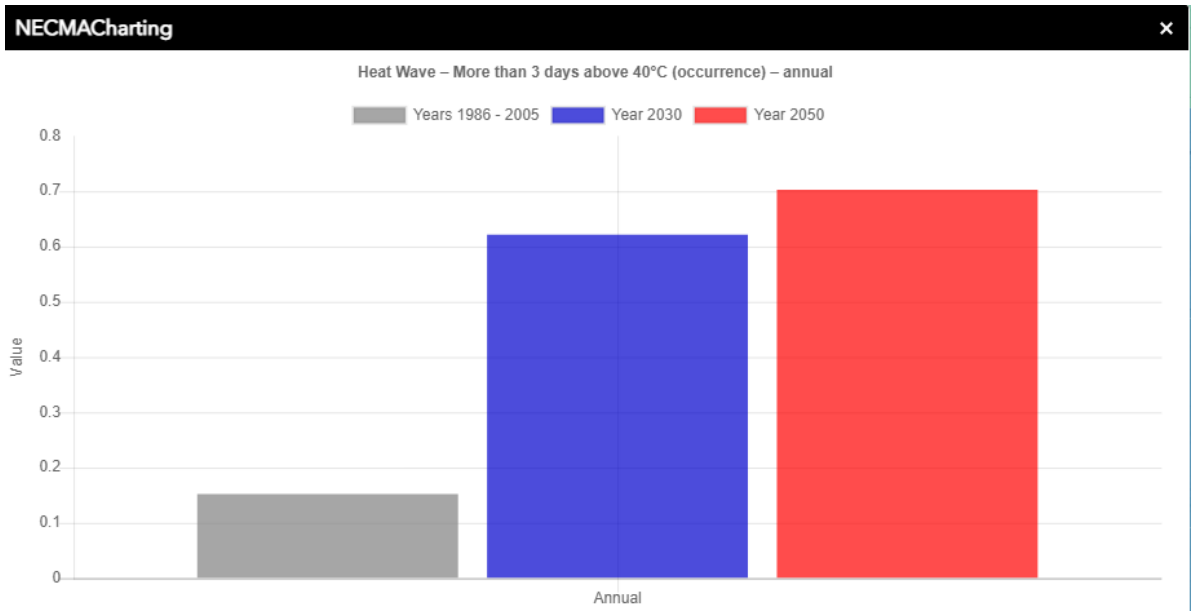
Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Whole catchment



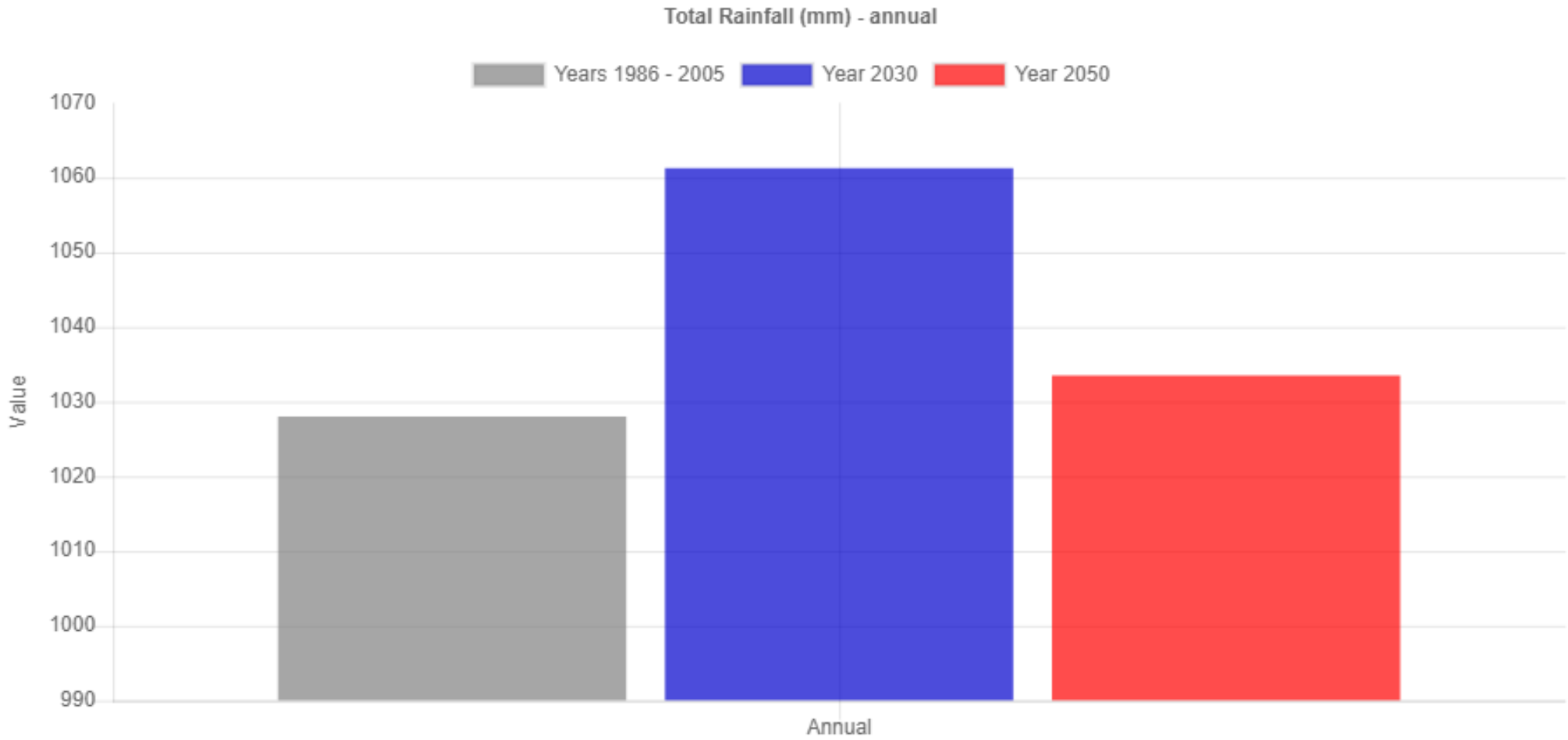
Rutherglen area



Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

NECMACharting

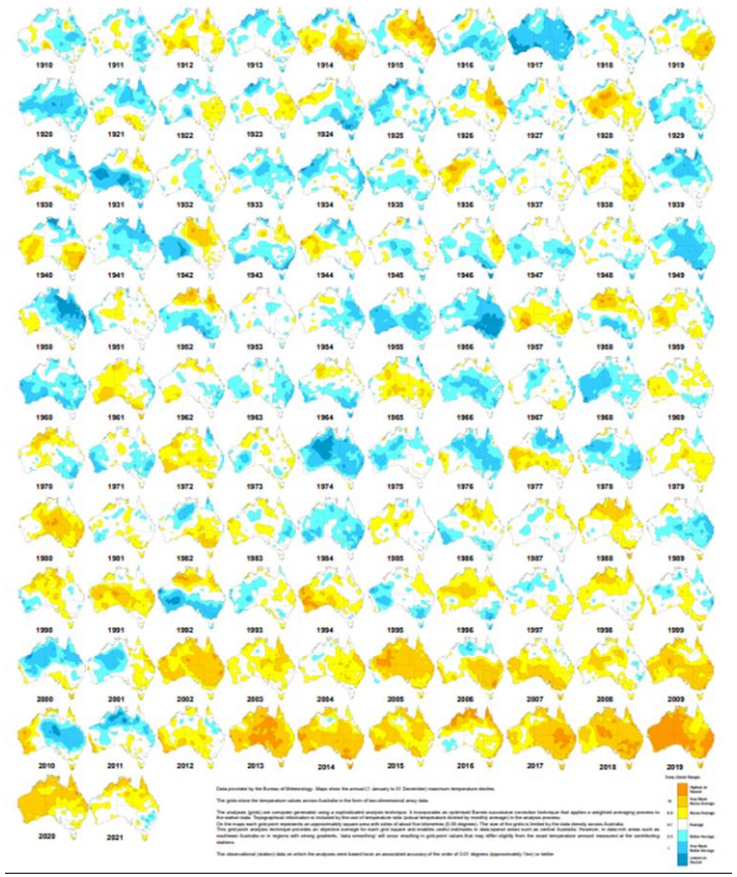


Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

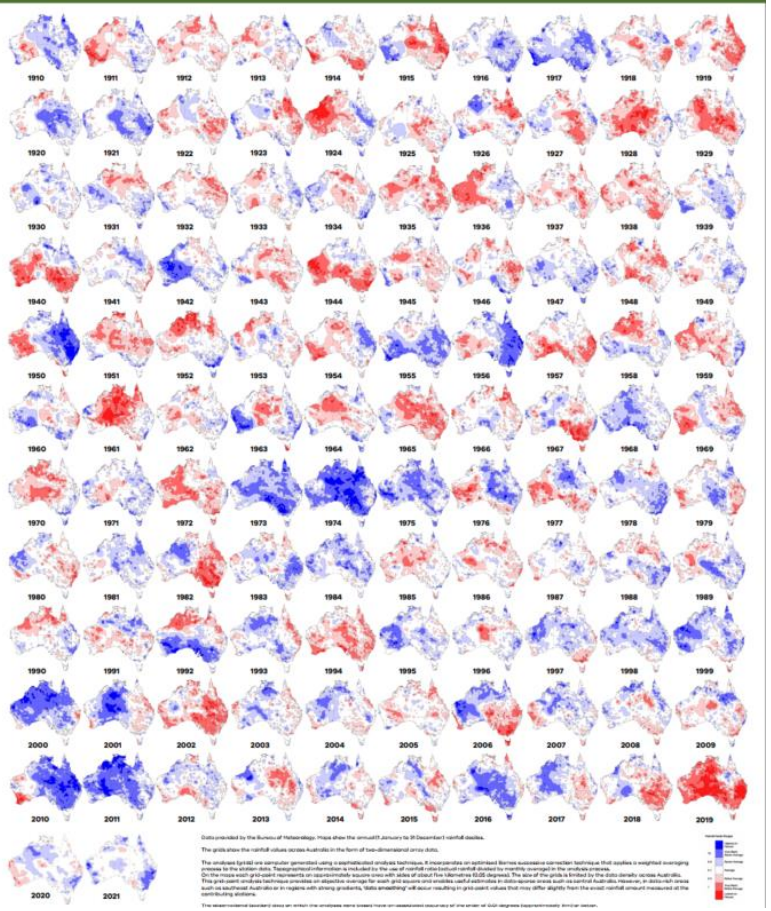
Annual maximum temperature deciles 1910 to 2021

AGRICULTURE VICTORIA



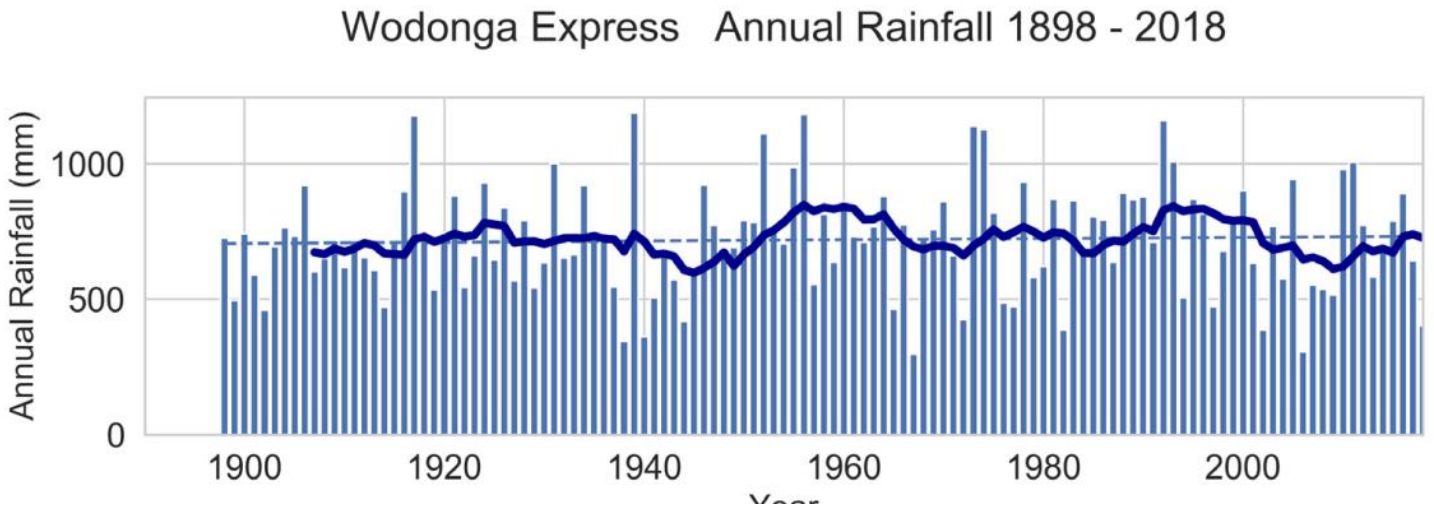
Annual rainfall deciles 1910 to 2021

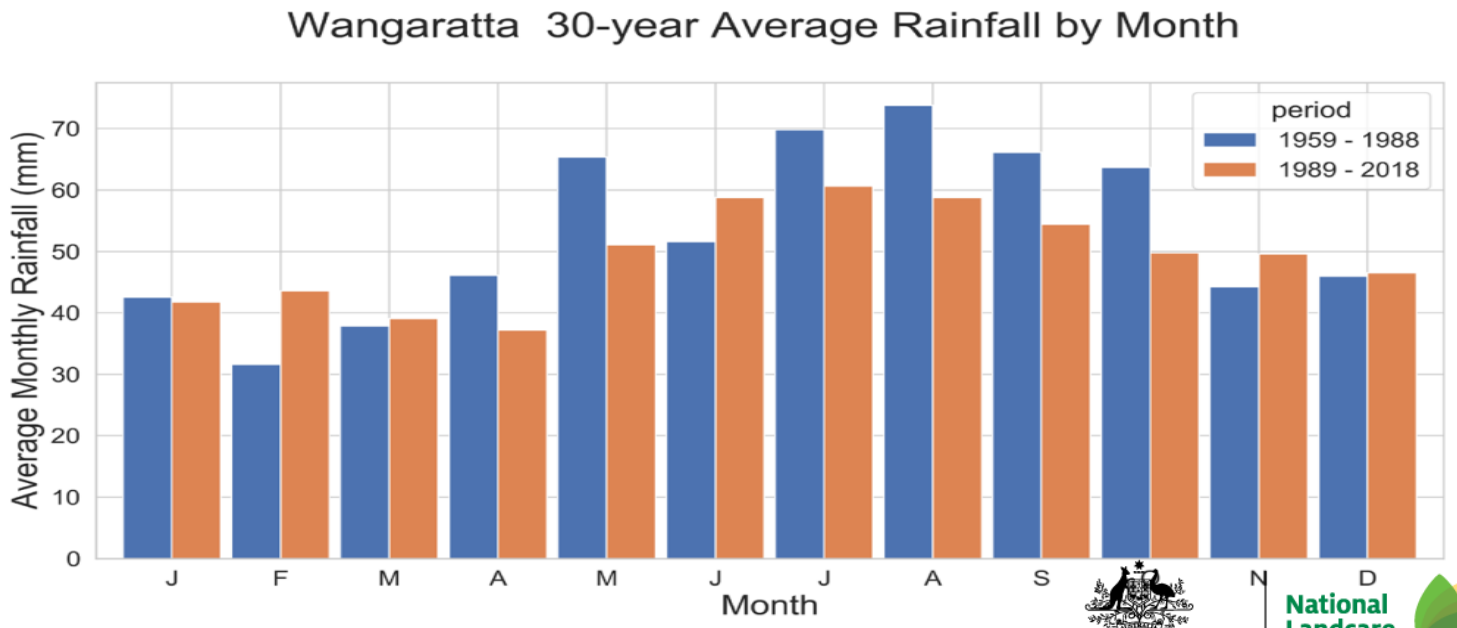
AGRICULTURE VICTORIA



NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Regional weather climate guide. CSIRO

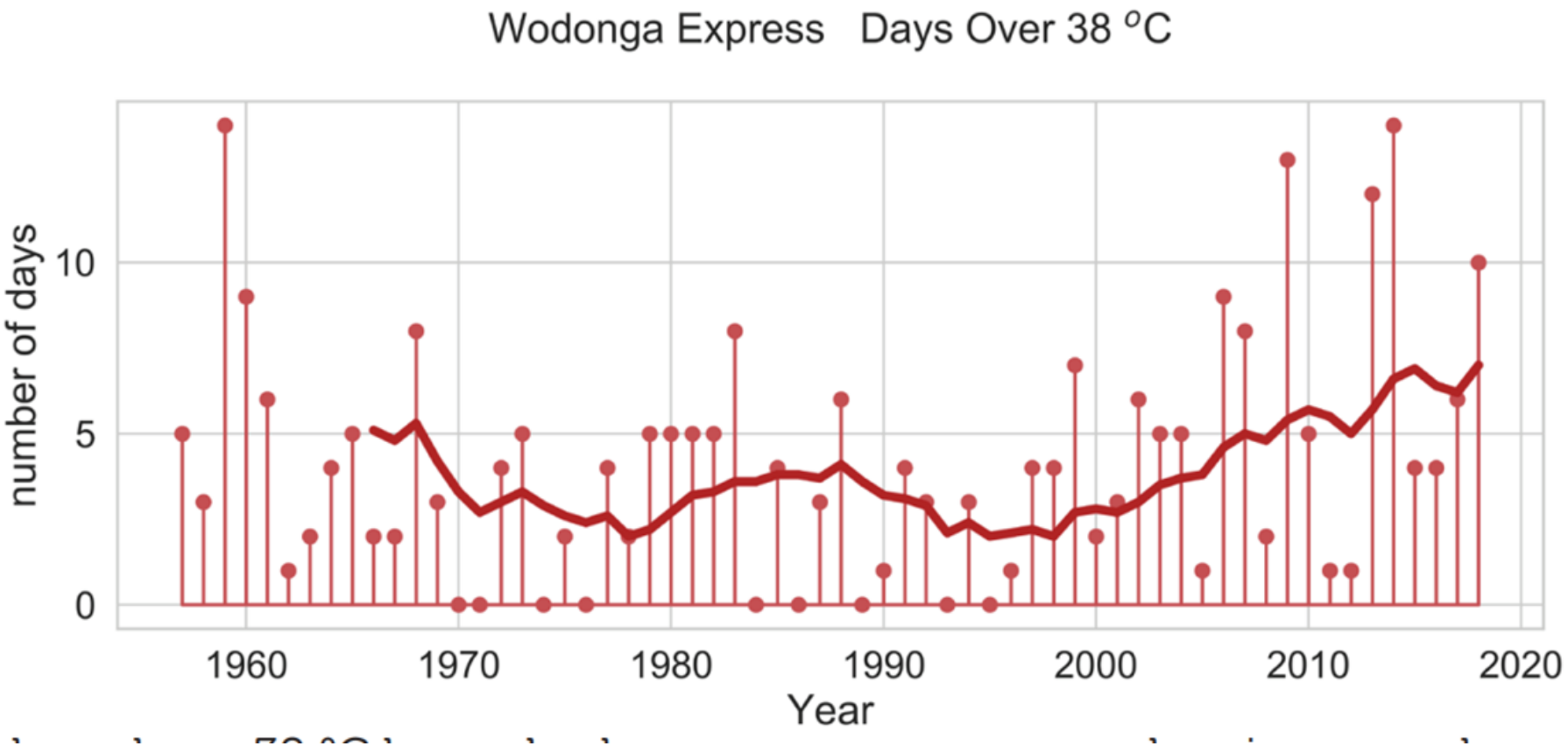


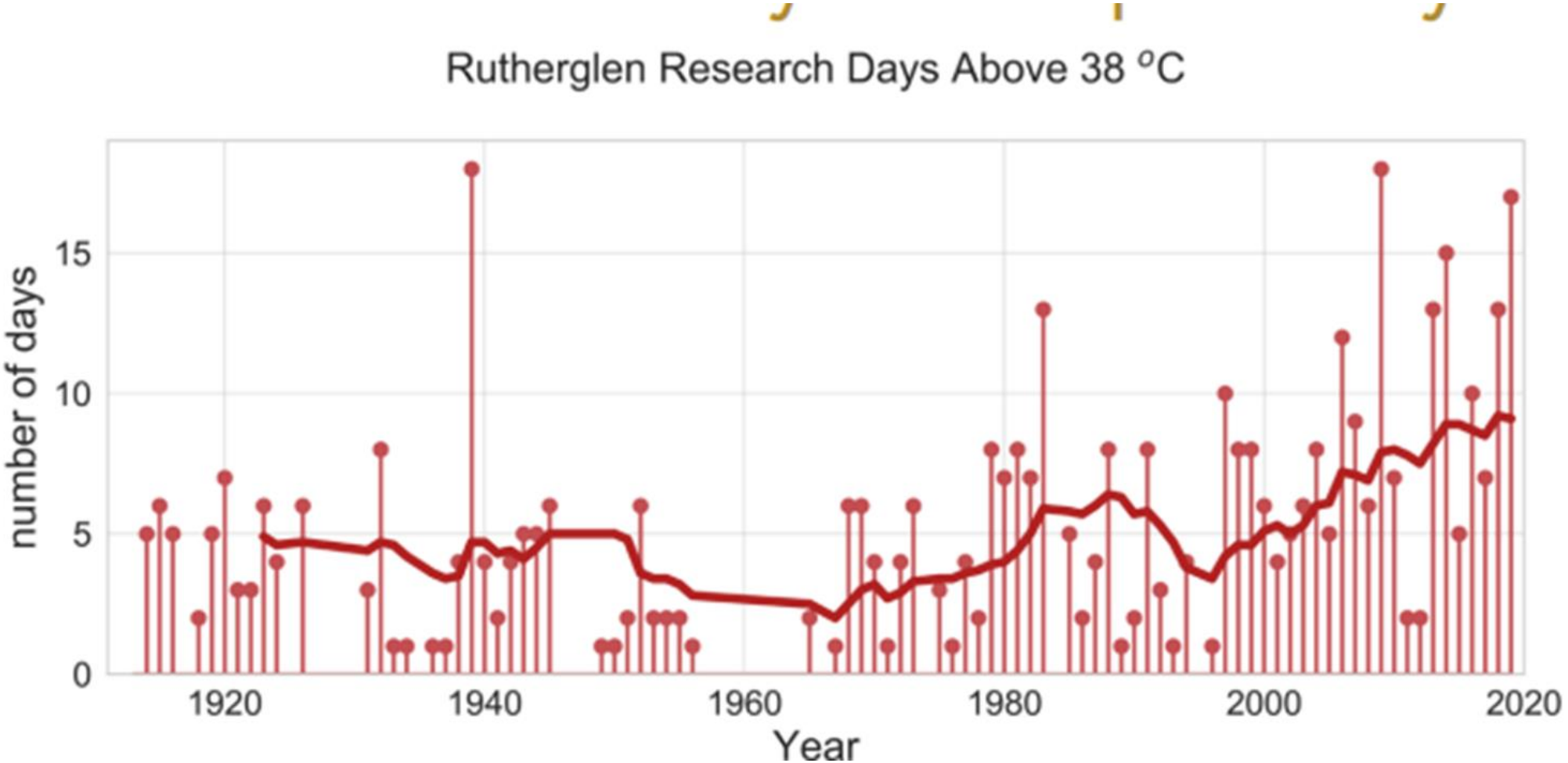


Australian Government

National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

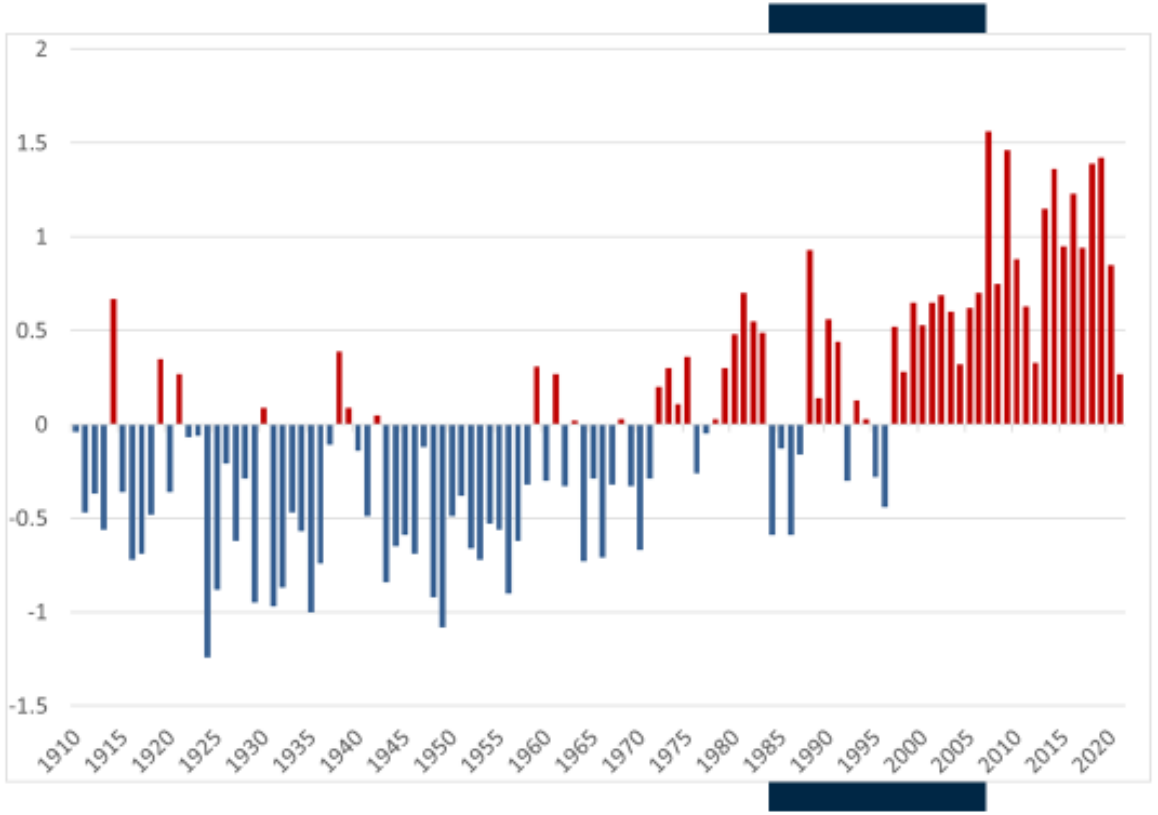




NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Temperatures are increasing in the North East.

North East Victoria annual temperature anomalies since 1910



Australian Government
Bureau of Meteorology

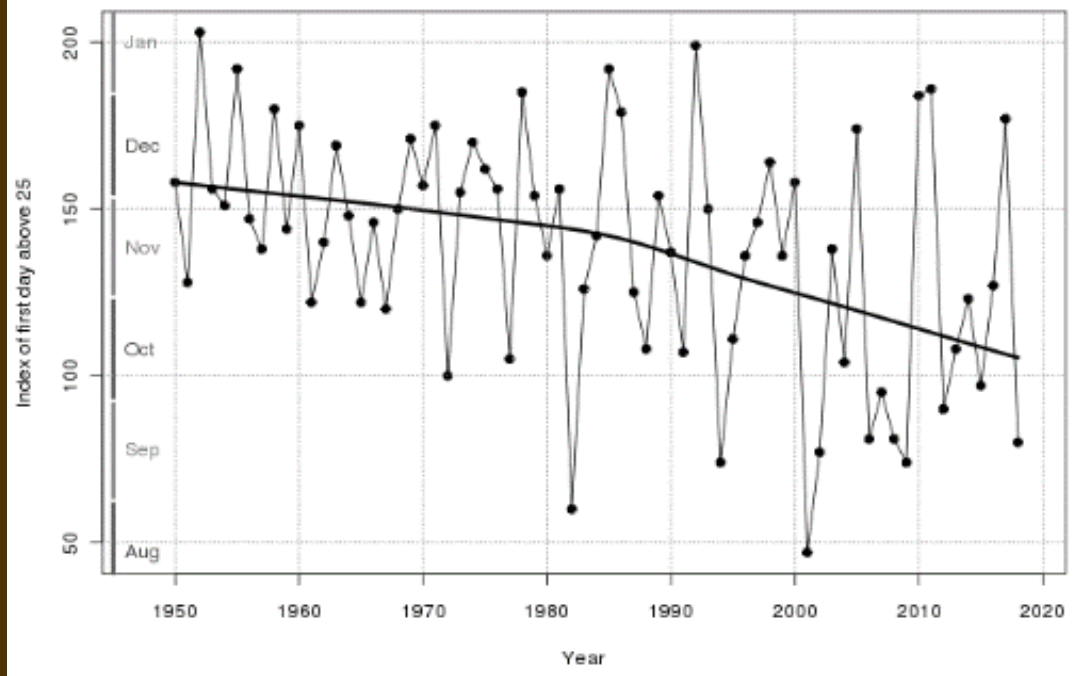
Australian Government
National Landcare Program

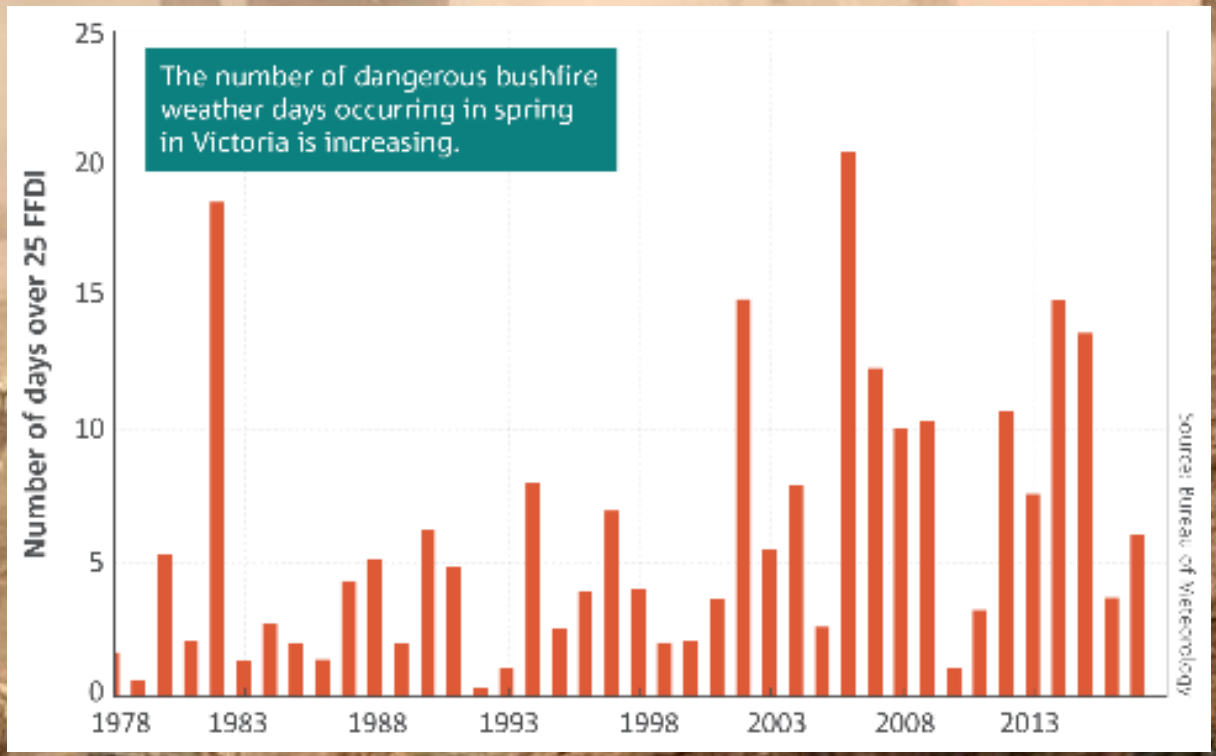
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Longer more intense fire seasons

The **Forest Fire Danger Index** (developed by CSIRO scientist, A. G. McArthur) combines a measure of vegetation dryness with air temperature, wind speed and humidity. If you add the daily FDI values over a year for a location, you get what is called the annual accumulated FDI.

Earliest day with northeast Vic daily FFDI > 25





Australian Government
Bureau of Meteorology

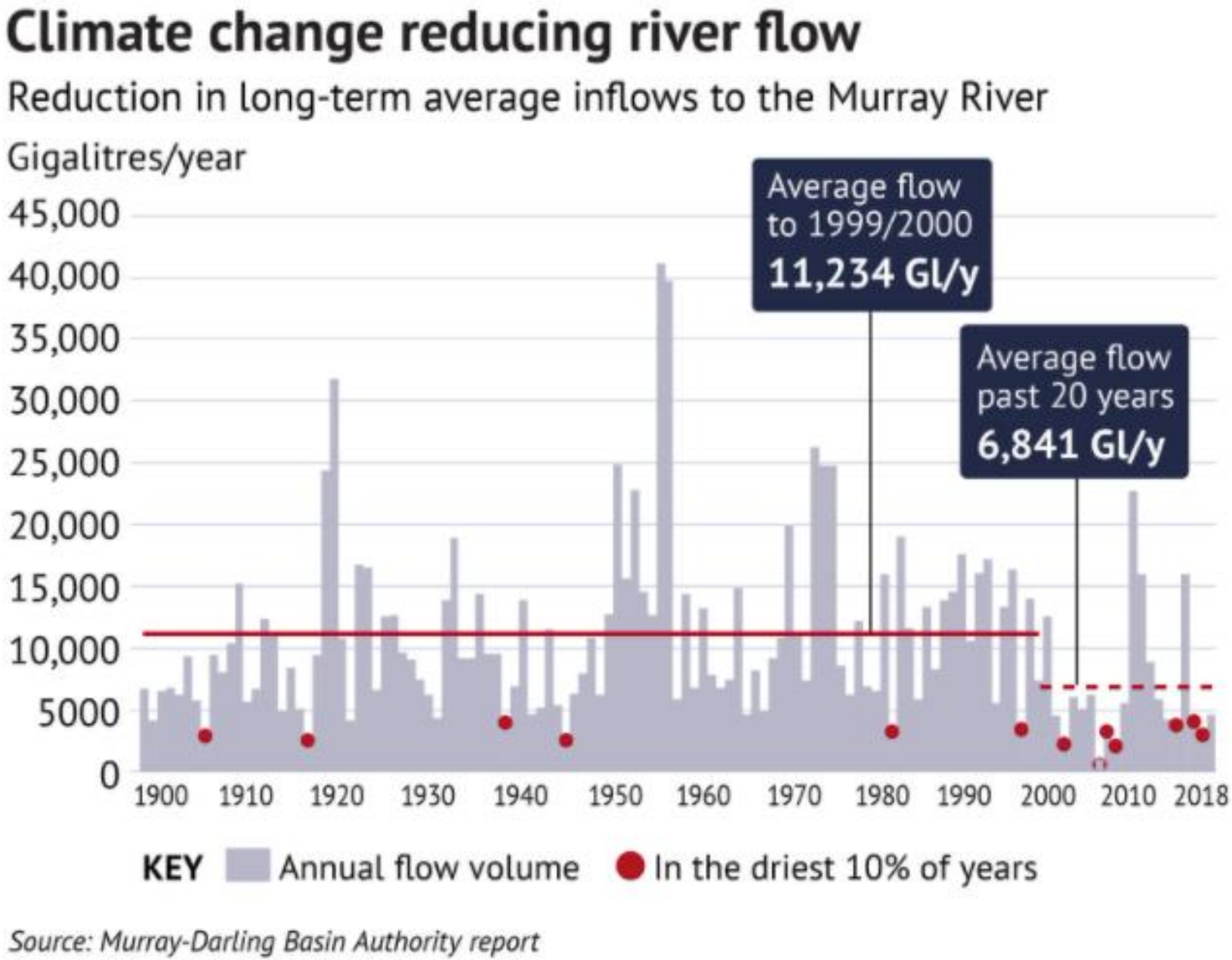
Data Reference: Dowdy (2018), *J. Applied Met. Climatol.*

Water balance

- The North East CMA region is the largest source of water inflow to the Murray-Darling Basin
- From a land mass of only 2% of the Murray Darling Basin, it provides 38% of the Murray Darling Basin's available water for downstream uses, including town consumption and irrigation
- Until now there has been a lack of readily publicly available information to inform discussion on the implications of climate change on water resources and downstream climate change adaptation measures.

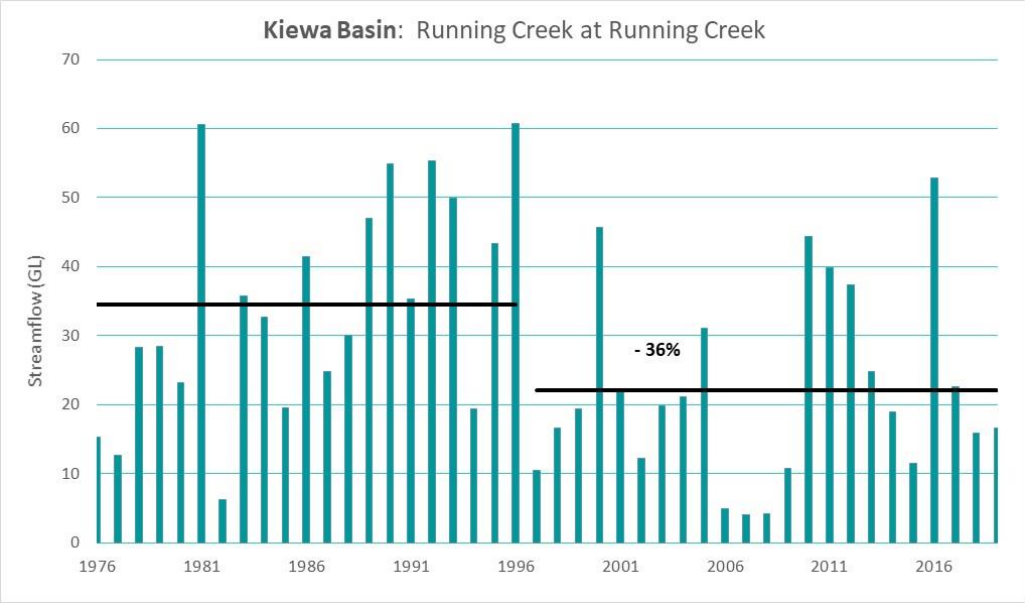
Australian Government | National Landcare Program
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

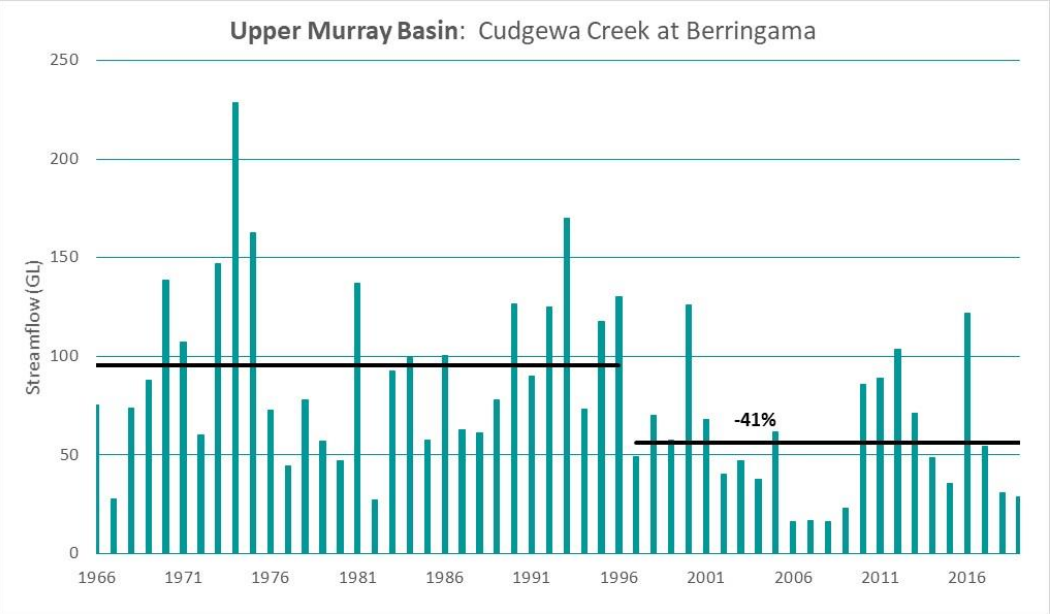
- On a region wide basis, rainfall, runoff, deep drainage, recharge and surface flow to streams is predicted to decrease
- In the order of 20% decreases in surface flow to streams, deep drainage and recharge is predicted by 2030
- Greater than 30% decrease predicted by 2050
- Raises major concerns for already scarce water resources in the Murray-Darling Basin
- Linked surface-groundwater modelling is important to better understand impacts

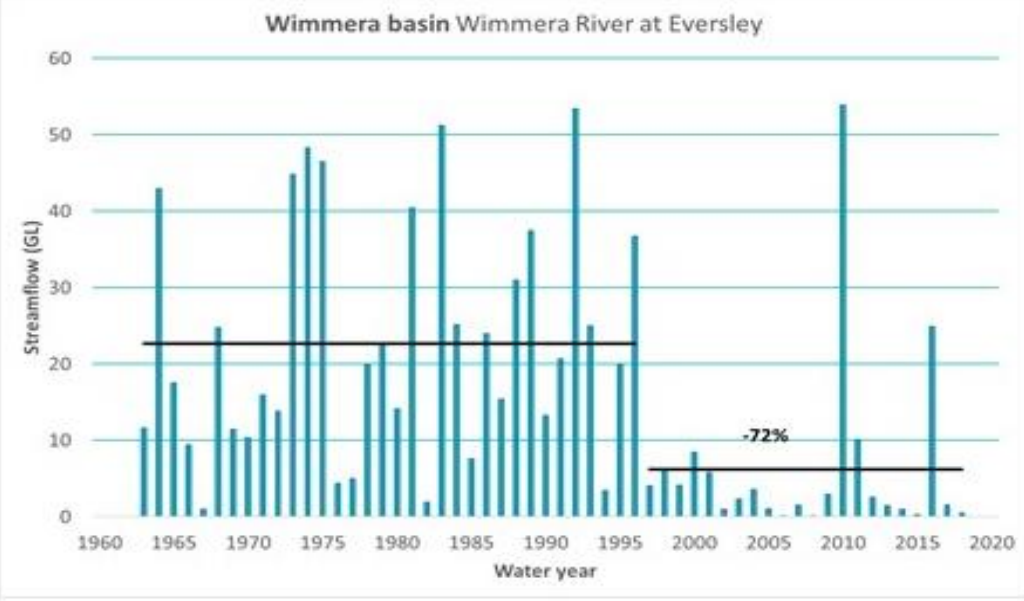


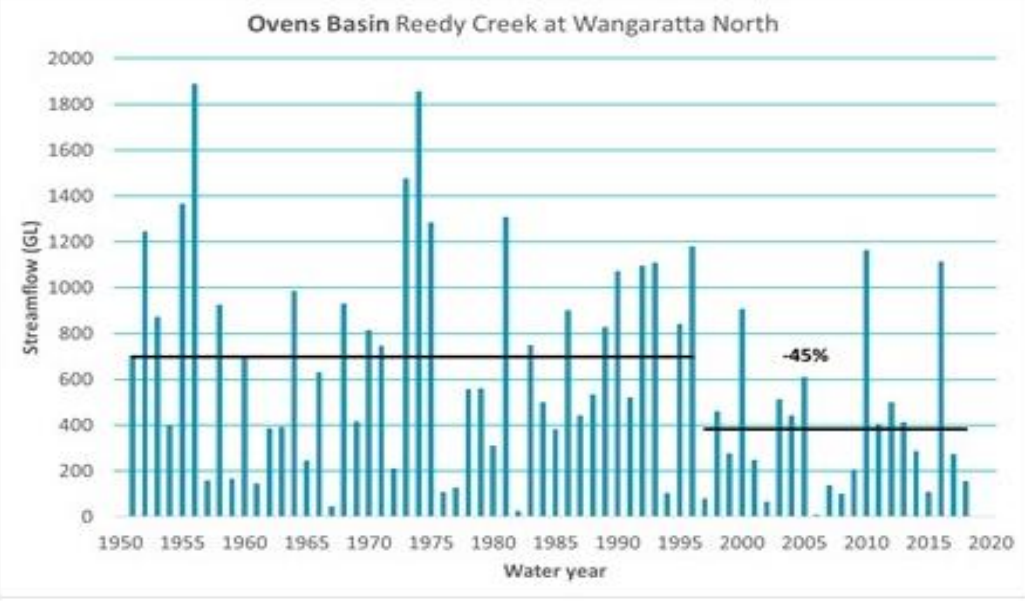
39% reduction

Large streamflow reductions experienced since 1997; during drought and continuing…

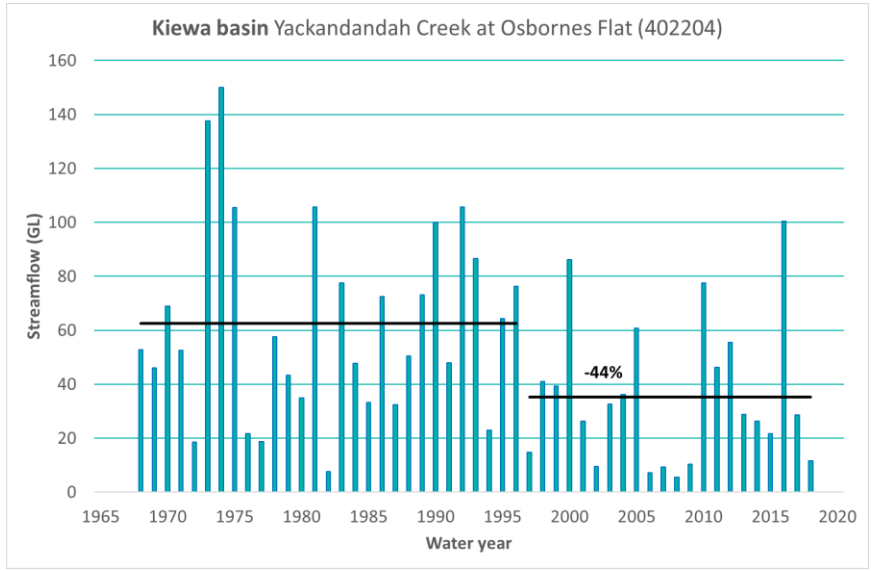


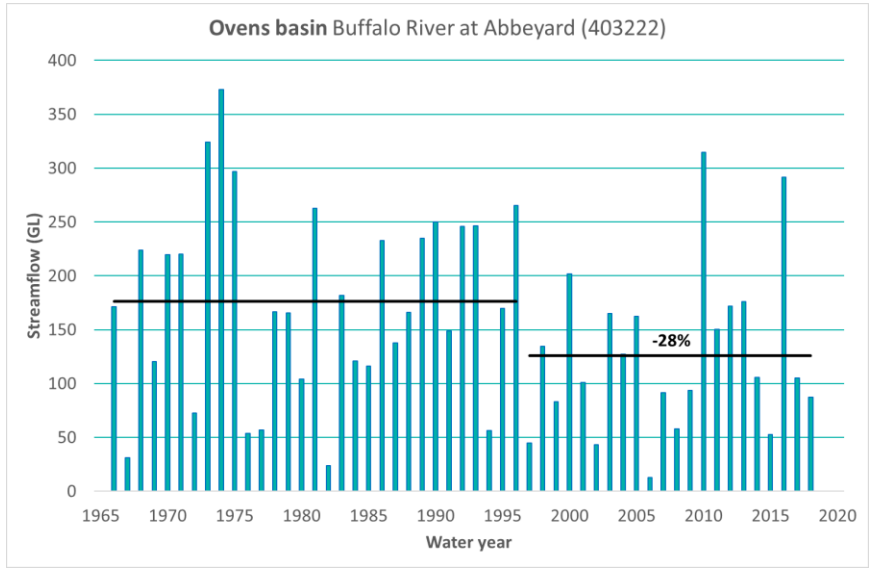


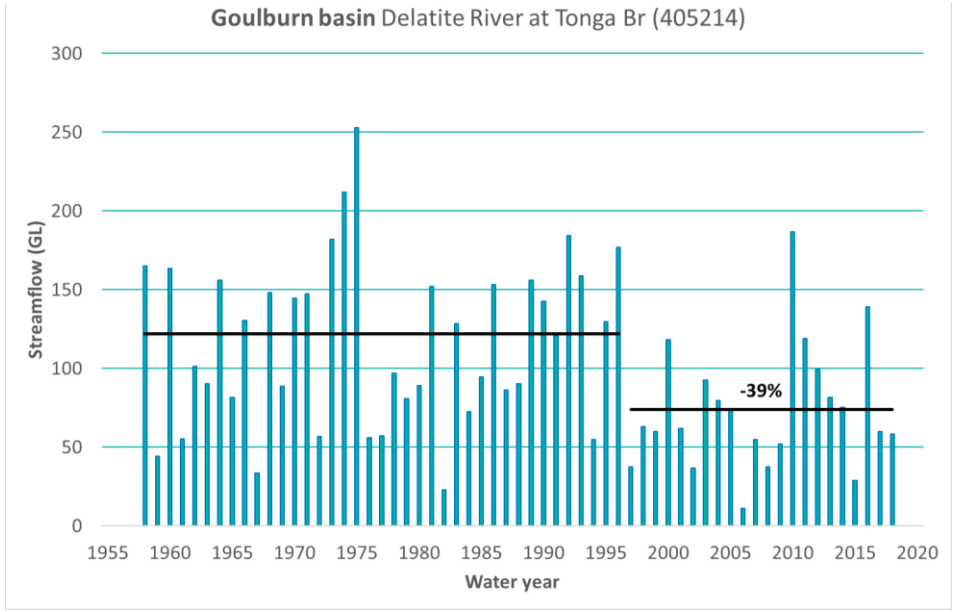


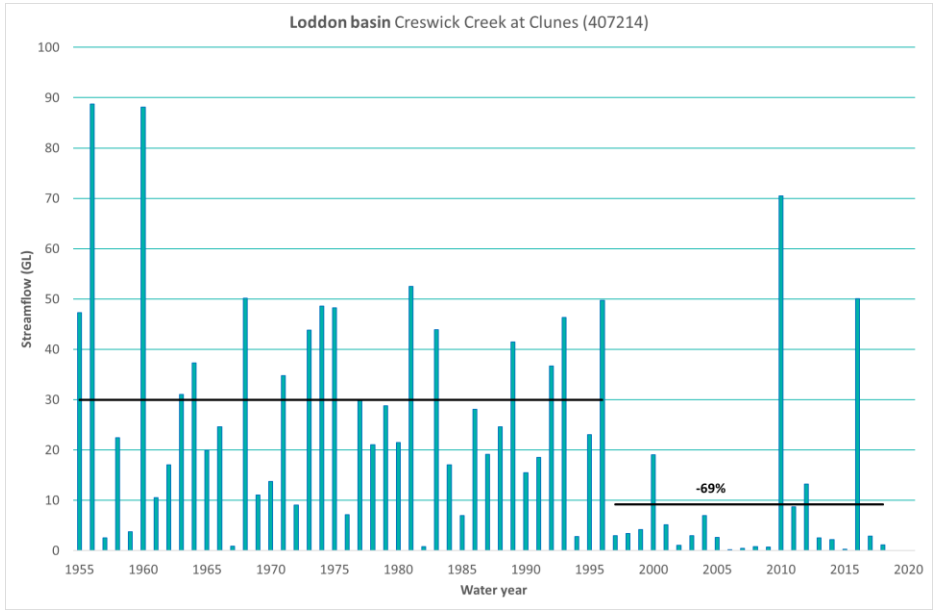


Large streamflow reductions experienced since 1997; during drought and continuing…





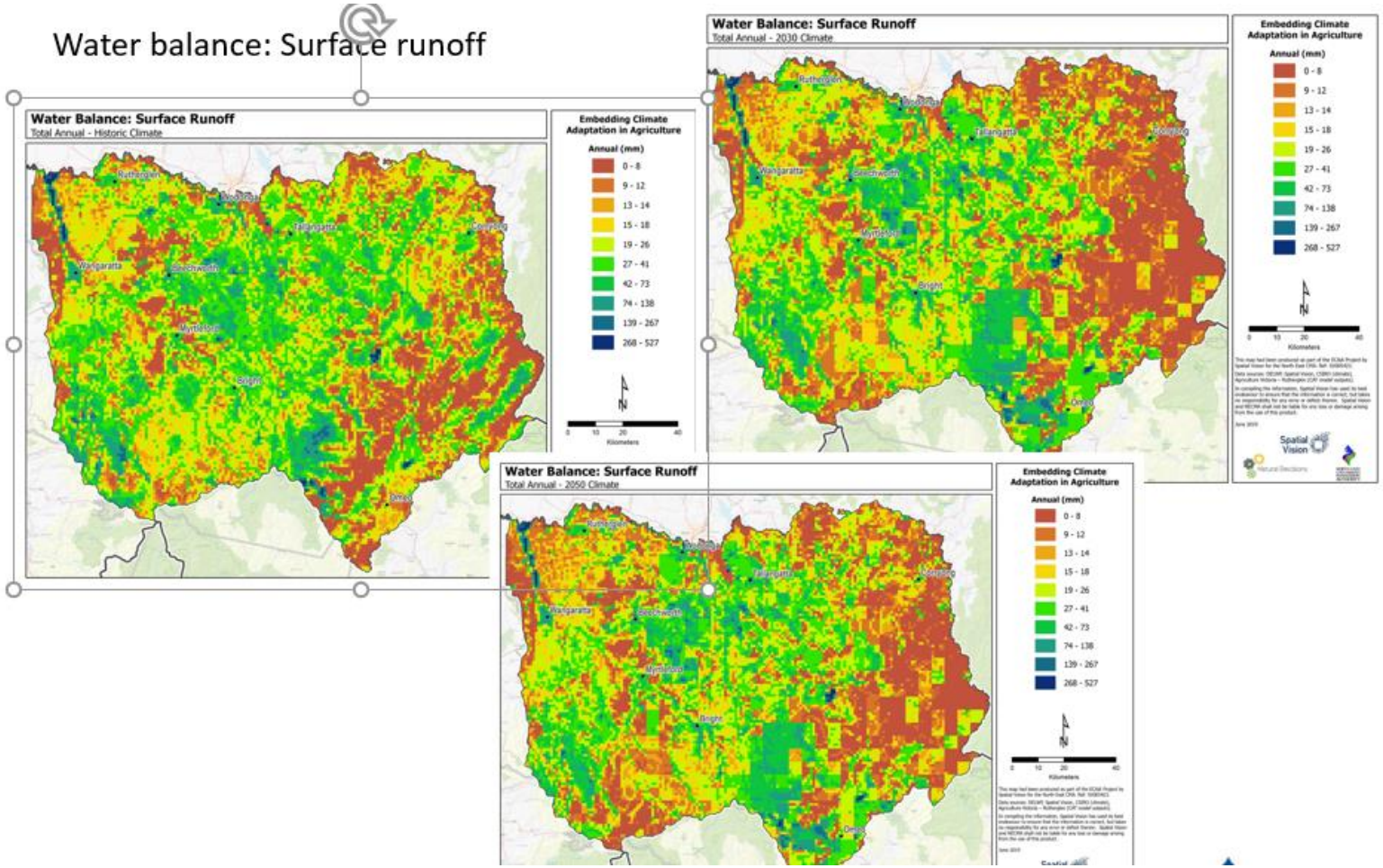




Spatially averaged annual figures in mm	Historic	2030	2050	2030 % change from historic	2050 % change from historic
Rainfall	1064	1051	1022	-1.2	-3.9
Runoff	27	25	24	-7.3	-11.1
Deep drainage	396	303	259	-23.5	-34.6
Surface flow to streams	331	255	220	-23.0	-33.7
Recharge	92	74	64	-20.3	-30.3

Australian Government | National Landcare Program
NORTH EAST CATCHMENT MANAGEMENT AUTHORITY

Water balance: Surface runoff



Questions?

Thank you.

Australian Government | National Landcare Program

NORTH EAST CATCHMENT MANAGEMENT AUTHORITY