ADELAIDE HILLS FLEURIEU KANGAROO ISLAND

Regional Drought Resilience Plan

A Framework to Guide Future Effort and Investment
to Support Sustainable Primary Production

DROUGHT RESILIENT
ADELAIDE HILLS
FLEURIEU PENINSULA
KANGAROO ISLAND

Acknowledgement of Country

The Adelaide Hills, Fleurieu and Kangaroo Island Drought Resilience Steering Committee acknowledges the Traditional Custodians of the land on which we work, live and play and their continuing connection to land, sea, culture and community. We pay respect to Elders past and present, and we extend that respect to all Aboriginal and Torres Strait Islander people in our community.

In particular, we acknowledge the Traditional Owners of the Adelaide Hills, Fleurieu and Kangaroo Island region covered by this Plan, including the Kaurna, Peramangk, Ngarrindjeri and Ramindjeri peoples.

Contents

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This plan has been prepared by URPS for the Adelaide Hills, Fleurieu and Kangaroo Island (AHFKI) Regional Drought Resilience Steering Committee. The Steering Committee was chaired by Steve Shotton, Regional Development Australia Adelaide Hills, Fleurieu & Kangaroo Island (RDA AHFKI) with members including Brett Mayne (RDA AHFKI), Graeme Martin (Southern and Hills LGA), Jo Sullivan (Kangaroo Island Landscapes Board), Lyn Doyle (PIRSA), John Butler (Hills and Fleurieu Landscape Board) Stephanie Wurst (RDA AHFKI Board), Tom Cosentino (RDA AHFKI Board) and Tony Randall (SA Drought Hub)

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01 Introduction

The Adelaide Hills, Fleurieu and Kangaroo Island (AHFKI) region produces world-renowned food, fibre and wine and its scenic landscapes attract significant numbers of tourists. The diverse and highly productive agriculture, horticulture and viticulture industries established early in the settlement of South Australia depends on reliable winter rainfall and warm, dry summers. Recent decades have seen declines in annual, winter and spring rainfall across the region and an increase in average maximum temperatures. Climate projections indicate these trends will continue to the end of the century, including more time spent in drought.

Drought resilience refers to the ability of individuals, communities, industries, or environments to adapt, reorganise or transform in response to changing temperature, increasing variability and scarcity of rainfall, and changed seasonality of rainfall, to maintain or improve economic, environmental, or social wellbeing.

Building, maintaining and enhancing drought resilience as the climate changes and rainfall patterns change and become more variable and unpredictable is essential for the future of the region's agriculture and supporting industries and communities. Actions to strengthen drought resilience need to reflect the diversity in the region's landscapes, community and climate and the unique challenges their communities face.

In the last 10 years, the region has been impacted by significant disruptions. Drought during 2018-19 was followed by bushfires that burnt across the Adelaide Hills and nearly half of Kangaroo Island (2019-20). The ensuing COVID-19 pandemic saw further disruption to the economy and community.

Enhancing drought resilience will also help the AHFKI region prepare for, respond to, and recover from other stresses or pressures.

This Plan has been prepared as a framework or prospectus to guide future efforts and investments in regional drought resilience. It focuses on primary production and allied industries, communities and landscapes. Its preparation has been led by the Adelaide Hills, Fleurieu and Kangaroo Island (AHFKI) Regional Drought Resilience Steering Committee and informed by the ideas and experiences of stakeholders from across the region.

1.1 Preparing this Plan

This Plan was informed by information collated through the following tasks:

- Literature review.
- Regional in-person engagement with 55 people across the AHFKI region.
- Key informant interviews with 12 local subject matter experts
- Key informant interviews with drought resilience planners from other regions
- Regular Steering Committee meetings.

All parts of this Plan have been informed by the literature review and engagement. The key findings of these tasks have been analysed, summarised and integrated to prepare the content of the plan and set out a robust vision for a more drought resilient AHFKI region. Further detail and findings from all tasks are described in the Background Paper (included as an attachment to this Plan).

The regional engagement helped the project team to understand:

- How has/does drought impact the AHFKI region?
- What makes individuals, communities, and regions resilient to drought?
- How can the resilience of the AHFKI region to drought be maintained and enhanced?

Community members and stakeholders shared a wide diversity of perspectives, experiences and priorities. These are summarised in the Engagement Summary Report that is included as an Appendix to the Background Paper and embedded through this Plan.

Quotes from community members and stakeholders collected through the engagement activities are included in the green speech bubbles throughout this Plan reflecting personal experiences and views of drought in their own words.

02

Summary of Goals

Our vision for the AHFKI region

Primary producers that understand drought risks and are taking action to build drought resilient farms, communities, economies and environments.

Our Goals

Primary Production

Innovative, diversified and sustainable primary producers prepared for a variable and changing climate.

Community Health and Wellbeing

Strong, healthy individuals and connected communities learning and working together for a positive future.

Financial Management

Business owners managing climate and other risks for long term financial success, contributing to regional economic growth.

Environmental Management

Healthy and resilient soil, water and biodiversity that sustain productive landscapes.

Infrastructure & Services

Infrastructure and services that support businesses and communities to connect, function and thrive.

Drought Plan Governance

Effective resilience building initiatives that reflect the region's unique needs, led locally and are informed by local knowledge and community input.

03

The AHFKI Region

The AHFKI Regional Drought Resilience Plan covers the Adelaide Hills, Fleurieu Peninsula, McLaren Vale and Kangaroo Island as shown in Figure 1 below.

The following pages summarise key features of the AHFKI region that influence its resilience to drought. Please refer to Attachment 1 Background Report for more information about these features.

Figure 1 Location Map

The Adelaide Hills' cooler climate provides ideal growing conditions for vineyards and apple, pear and cherry orchards. The Adelaide Hills' picturesque agricultural, natural landscapes, high-quality local food and wine production attract tourists from around the world. Significant population growth has occurred over the past decade and further growth particularly around Mount Barker is projected.

On the Fleurieu Peninsula vineyards and the wine regions of McLaren Vale, Langhorne Creek and Currency Creek, cropping and dairy and livestock farms flourish alongside a thriving tourism industry. The Fleurieu Peninsula's population has grown at a rate double the state average over the past decade.

Kangaroo Island, Australia's third-largest island, lies off the coast of Fleurieu Peninsula. The island is noted for its wildlife, conservation areas, and agriculture, particularly sheep, grain and beef cattle farming. The island is separated from the Fleurieu Peninsula by Backstairs Passage, requiring a ferry transfer or plane flight to access from the mainland.

3.1 Key features of the AHFKI region

Through research and engagement, a number of key features of the AHFKI region relating to agriculture and communities have been identified. These are summarised below and described further in the following sections.

- A growing population – growing faster than the rest of the State and projected to continue to grow until 2041.
- Low rates of unemployment.
- Higher rates of volunteering, particularly on Kangaroo Island.
- A diverse economy at a regional scale but Kangaroo Island in particular is less diverse where 21% of employment is in the agricultural sector, and 33% of economic output is from agriculture.
- 44% of land in the region used for livestock farming.
- Very high proportions of State apple, pear, cherry and strawberry production, established and reliant on milder climates, irrigation and reliable rainfall.
- Internationally renowned grape growing and wine production, in scenic landscapes attracting significant numbers of tourists.
- Significant cropping production including wheat, canola, beans, barley and oats.
- Declining annual rainfall and increasing average maximum temperatures from the period 1964-1983 to 1984-2023.
- Although crop yields are generally better when growing season rainfall is high, there have been some seasons when other factors contributed to higher yields despite lower rainfall.
- Mainland communities are generally well serviced by electricity, water, telecommunications and transport infrastructure however Kangaroo Island communities are less well serviced.
- Kangaroo Island industries are highly reliant on road and ferry transport which can be disrupted by extreme weather and mechanical issues.

3.2 People and economy

The region's population varies between sub-regions. The Adelaide Hills' proximity to the city means residents can work in Adelaide and live in the hills. The population is larger and younger than other sub-regions, with higher levels of education and higher average income. The Fleurieu Peninsula has an older population with a larger proportion of the population needing assistance with core activities, and high projected growth. Kangaroo Island has a smaller population, high rates of volunteering and lower income.

The economy of the sub-regions is similarly diverse, dominated by household service industries, agriculture, construction, and manufacturing.

Agriculture, forestry, & fishing is the top industry of employment on Kangaroo Island, accounting for 21% of jobs and nearly 33% of economic output. The sector provides 8% of jobs in the Fleurieu Peninsula and 6.3% of jobs in the Adelaide Hills. 7.7% of jobs in McLaren Vale are within agriculture, forestry and fishing.

Table 1 Key demographics for the AHFKI region and SA [1,2,3]

	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	McLaren Vale	Total AHFKI region	South Australia
Resident population 2021	79,723 people	50,704 people	4,894 people	13,677 people	148,998 people	1,781,516 people
Projected population 2021 - 2041 – medium growth scenario	34.5% increase	37.1% increase	20.0% increase	Not available for this area	35.0% increase (excluding McLaren Vale)	22.0% increase
Median age	42 years	56 years	50 years	47 years	47 years	14.1%
Volunteering rate	19.7%	19.6%	27.7%	18.1%	19.8%	14.1%
Employment in agriculture, forestry and fishing	1,440 (6.3% of sub-region labour force)	1,508 (7.9%)	486 (21.2%)	553 (7.7%)	3,987 5.7% of region	31,637

3.3 Agriculture, horticulture and viticulture

Agriculture is a significant contributor to the region. Viticulture, horticulture, livestock and cropping contribute through both their outputs and employment and the reputation of the area as a premier food and wine destination. Around 57% of the region's land is used for agricultural purposes. Viticulture and horticulture across the Adelaide Hills and Fleurieu rely on irrigation from groundwater, surface water captured and stored in dams, recycled water and water pumped from watercourses.

There is very little irrigated agriculture on Kangaroo Island, however irrigated production of certified disease-free seed potatoes supplies 25% of the Australia's total seed potato production[4].

In 2021/22, the sector generated $1.47 billion in gross revenue across the region, accounting for 11.2% of total regional output (Table 2). On Kangaroo Island, the sector contributes one-third of regional output.

Table 2 Output from agriculture, forestry & fishing 2021-22 [5]

	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island
Agriculture, forestry and fishing output ($)	$595.96 million	$647.12 million	$227.74 million
Agriculture as proportion of regional output	7.4%	14.8%	33.0%

Livestock, wool and dairy

Sheep and lambs (for meat and wool) and beef cattle are raised on farms across the region, with a number of dairy farms (cows), mostly on the Fleurieu Peninsula and a small number of goat dairies. In 2022/23 there were 86 dairy farms in the Central region (Adelaide Hills, Fleurieu Peninsula, Murray Swamps & Meningie Lakes) producing 34% of the State's milk production.[6] Other livestock raised in the region include poultry and pigs.

Grapes

The AHFKI includes six recognised wine grape growing regions:

- Adelaide Hills
- McLaren Vale
- Southern Fleurieu
- Currency Creek
- Langhorne Creek
- Kangaroo Island.

These regions produce grapes for internationally recognised wines. The differing climate between regions results in different varieties planted and different strengths and challenges. Historically, irrigation water supply for vines in McLaren Vale relied on groundwater however alternate supply of treated wastewater from the Willunga Basin Water Company now supplies around 65% of irrigation demand.[7]

Cropping

The most common dryland (non-irrigated) crops produced in the region include wheat, canola, beans, barley and oats, predominantly on Kangaroo Island and the eastern Fleurieu Peninsula.

Apples, pears, cherries and strawberries

Centred on the Lenswood Valley, the Adelaide Hills region is South Australia's most important and longest established apple growing area, with nearly 80% of the State's growers in this region.[8] The Adelaide Hills is also the main region for pear orchards in South Australia.[9]

The Adelaide Hills region produces 90-95% of South Australia's cherry production. Microclimate variations across the Hills mean maturity can vary for the same variety which is beneficial as cherries are picked ripe and cannot be stored as long as apples and pears.

Nearly all strawberries grown in South Australia are grown within the region, with a number of farms in the Adelaide Hills and Fleurieu.

Food and wine manufacturing

Across the AHFKI region food and wine manufacturing using regional produce creates wine, gin, beer, juice, milk products, jams and condiments, bakery products and more for local, national and international markets.[10]

3.4 Climate

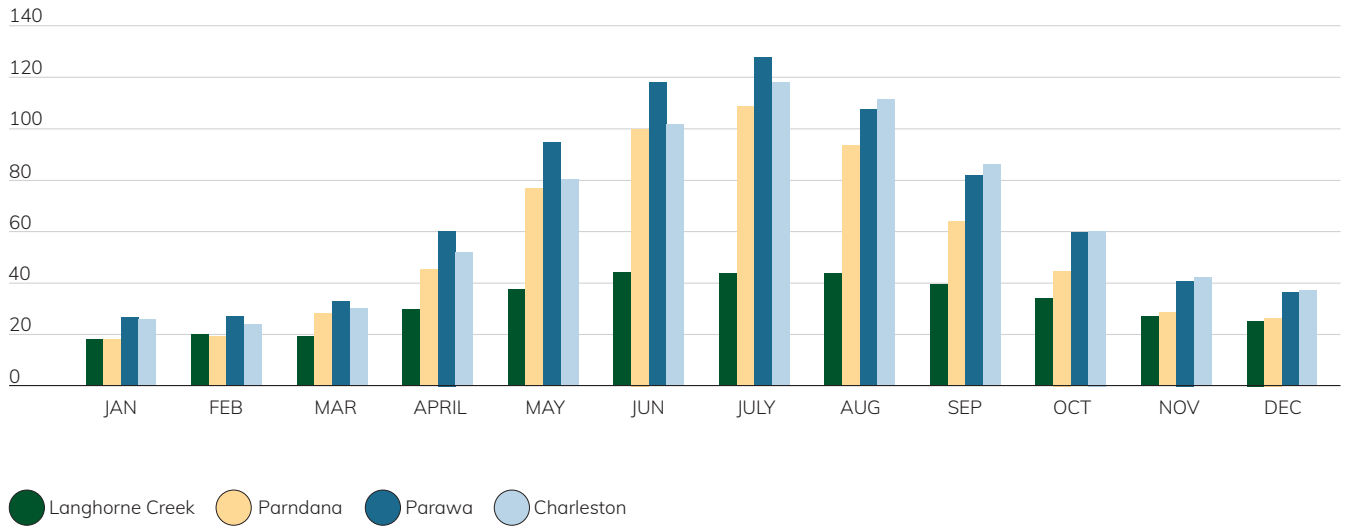
Rainfall

The region experiences a Mediterranean climate characterised by warm, dry summers and mild wet winters. The Adelaide Hills, due to its elevation, tends to be cooler and wetter compared to the coastal areas, with more significant rainfall supporting vegetation and agriculture. The Fleurieu Peninsula enjoys a moderate climate, with coastal areas benefiting from proximity to the ocean which moderate temperatures and provides consistent rainfall. Kangaroo Island's climate is similarly moderated by the surrounding ocean, leading to mild temperatures year-round and historically reliable winter rainfall.

Rainfall reduces moving east across the region due to the influence of the Mt. Lofty Ranges, with annual rainfall in Langhorne Creek less than half of that at Parawa.

Figure 2 shows the average monthly rainfall at four locations in the region from 1964 to 2023. Winter rainfall is significantly lower at Langhorne Creek.

Figure 2 Average monthly rainfall 1964 to 2023



Rainfall has been decreasing in recent decades. Data from myclimateview.com.au shown in Table 3 shows rainfall has reduced from the period 1964-1983 to 1984-2023.

Table 3 Rainfall change 1964 to 2023[11]

Location	Average annual rainfall 1964 – 1993 (mm)	Average annual rainfall 1994 – 2023 (mm)	Change (mm)	Change (%)
Langhorne Creek	373	335	38	-10.2%
Parndana	672	634	38	-5.7%
Parawa	838	787	51	-6.1%
Charleston	794	743	51	-6.4%

Temperature

The AHFKI region experiences moderate temperatures, with most of the region experiencing average annual maximum temperatures of approximately 19-22°C.[12]

Temperature has been increasing in recent decades. Table 4 shows the increase in average annual maximum temperature from the period 1964-1983 to 1984-2023.

Table 4 Temperature change 1964 – 2023[10]

Location	Average annual maximum temperature 1964 – 1993 (°C)	Average annual maximum temperature 1994 – 2023 (°C)	Change (°C)	Change (%)
Langhorne Creek	21.6	22.2	+0.6	+2.7
Parndana	18.7	19.3	+0.6	+3.2
Parawa	18.4	18.9	+0.5	+2.7
Charleston	19.2	19.9	+0.7	+3.6

3.5 Water resources

Water resources are critical to support agricultural and other economic, community and environmental needs in the region. Table 5 summarises key features and characteristics of water resources in the AHFKI region. The taking of surface water and groundwater is controlled through several water allocation plans that apply to Western Mount Lofty Ranges (WMLR) and Eastern Mount Lofty Ranges Water Resource Areas (EMLR) and Prescribed Wells Areas (PWAs) including Angas-Bremer, McLaren Vale (partly), Central Adelaide (partly). Water resources on Kangaroo Island are not prescribed, but are managed through a Water Affecting Activities Control Policy.

Table 5 Water resources – key features and characteristics

Water resource	Key features and characteristics
Surface water	Surface water is used extensively through the region for stock and domestic use and irrigation of pastures, grapes and horticulture. Farm dams are important to many farms, allowing for storage of surface water for stock use and irrigation, and often supplemented with groundwater. The Onkaparinga and Torrens Rivers in the Adelaide Hills are key sources of water for the Adelaide population. Their catchments include large water storage reservoirs fed by catchment inflows and supplemented by water piped from the River Murray. The River Murray, in addition to its drinking water supply, provides irrigation water along the River and Lower Lakes.
Groundwater[13,14]	Groundwater is an important irrigation water source in the Adelaide Hills and Fleurieu Peninsula particularly in areas where surface water availability is limited. The Eastern Mount Lofty Ranges contain aquifers that are utilised for both agricultural and domestic purposes. The McLaren Vale region historically relied upon groundwater resources for irrigation however expansion of the irrigated area has driven a need for an alternate supply to supplement the use of groundwater. Groundwater resources on Kangaroo Island are limited and generally saline.
Wetlands	Wetlands in the region play critical roles in biodiversity conservation and water purification. The Fleurieu Peninsula is home to nationally and internationally significant wetlands such as Fleurieu Swamps and parts of the Ramsar-listed Coorong and Lower Lakes system. Kangaroo Island has 15 wetlands of national significance including the Flinders Chase River Systems, American River Wetland System, and Murray Lagoon.

3.6 The AHFKI 'system'

The AHFKI region is a complex system of connections and interactions between people, industries and the natural environment. These connections and interactions mean that when one feature is impacted, flow-on effects will be experienced by other features in the system. Considering these connections and interactions is called 'systems thinking'. Systems thinking helps to identify the factors that make the system resilient or vulnerable to change.

Figure 3 illustrates key features and interactions of the AHFKI system as they apply to drought resilience. Water resources are a critical feature, reflied on by primary production, the environment and community. In turn, primary production supports employment, exports and tourism. Healthy soil is critical to enabling productive cropping and livestock, and healthy biodiversity contributes to good soil health. River Murray water from outside the region supplies some areas, as well as providing inflows to the Lower Lakes, some of which is used for irrigation.

When one of these features is impacted by drought, these impacts can then be felt through the system. Similarly, when one feature's resilience to drought is strengthened, this will benefit the wider system. This is particularly apparent on Kangaroo Island where the agricultural system plays a larger role in the wider economy, community and landscape.

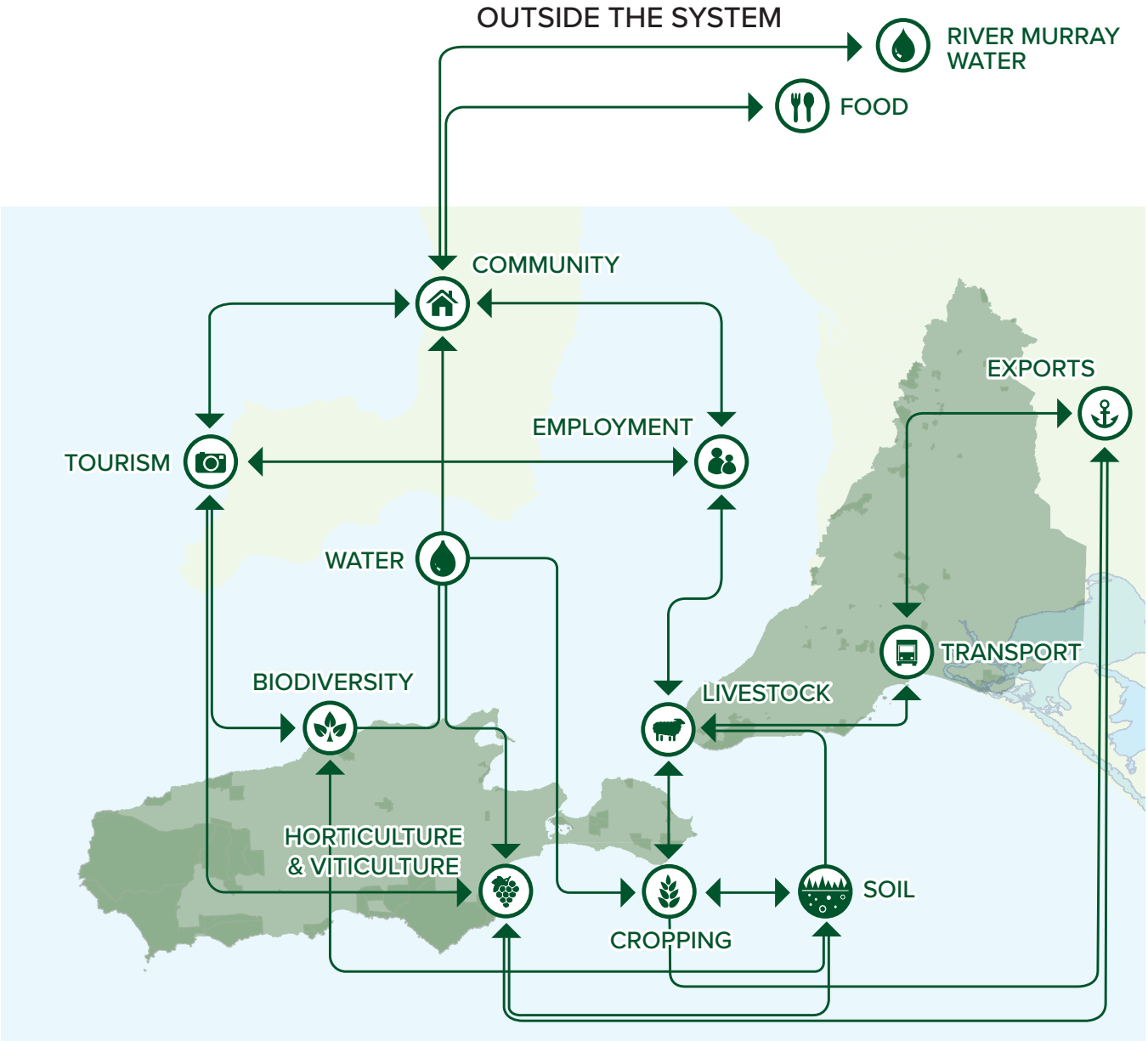
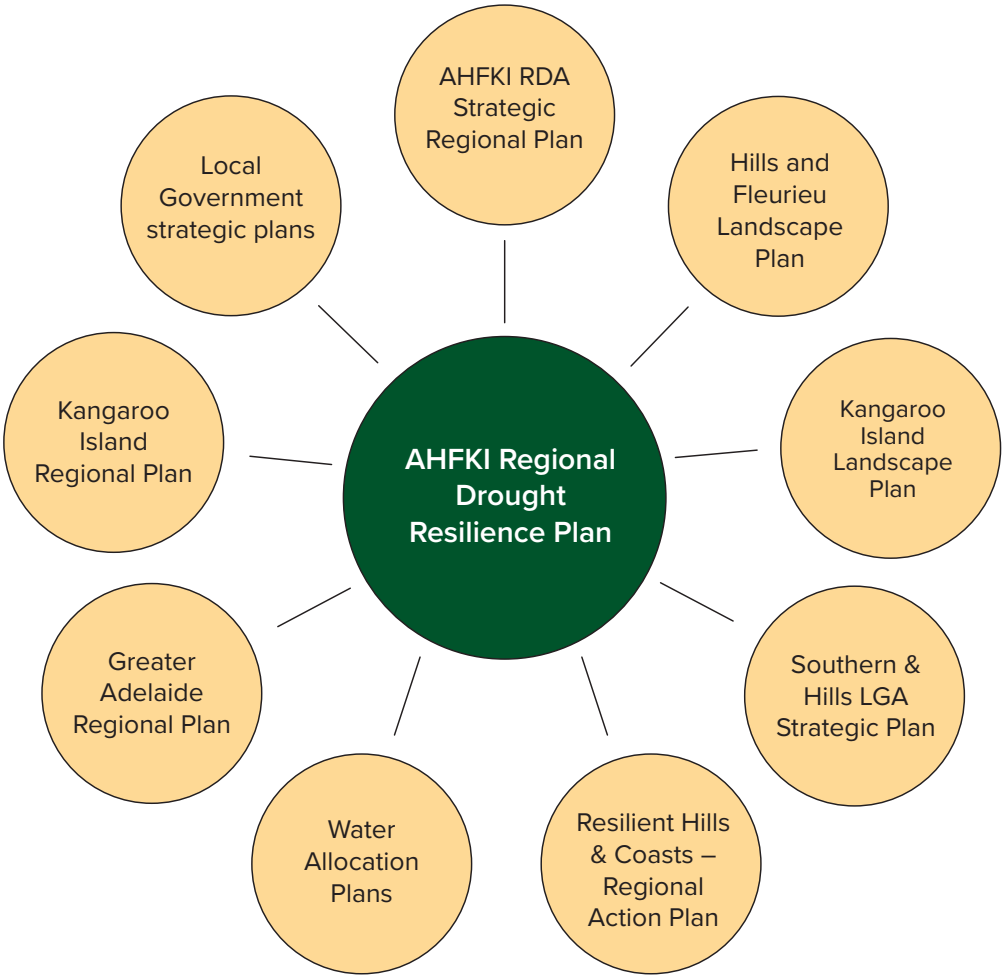


Figure 3 The AHFKI 'system'

3.7 Strategic context

The AHFKI Regional Drought Resilience Plan has been prepared to align with and complement other regional strategic plans. Planning for the implementation of the opportunities in this Plan will consider alignment with these other plans to maximise efficiency and minimise duplication of effort.



Implementation of the Plan will lean into the strengths and focus of each Steering Committee member organisation. Organisations will lead actions that most closely align with their areas of expertise which are summarised below.

Steering Committee member	Impact
Regional Development Australia Adelaide Hills, Fleurieu & Kangaroo Island (RDA AHFKI)	Regional economic development
Southern and Hills LGA	Service and leadership for councils to serve their community
Kangaroo Island Landscape Board	Sustainable natural resource management
Hills and Fleurieu Landscape Board	Sustainable natural resource management
Department of Primary Industries and Regions South Australia (PIRSA)	Primary industries and regions
SA Drought Hub	Drought resilience of farmers and regional communities

04

Drought

Drought is not simply low rainfall. Drought is a comparatively dry period compared to normal conditions, when people, businesses and the environment that rely on that water are affected.

For this plan, drought is defined as:

A period of abnormally dry conditions that impacts negatively on a region's water availability, the environment and agricultural production and, consequently, impacts negatively on the economy and the health and wellbeing of its residents.


AUSSIE FEEDERS

4.1 Drought in the AHFKI region

Drought in the AHFKI region is caused by several natural atmospheric conditions including the Positive Indian Ocean Dipole and El Niño-Southern Oscillation. Anthropogenic climate change is also projected to influence drought conditions.

The Background Paper in Attachment 1 summarises information on these climate drivers developed by the Bureau of Meteorology.

Before European colonisation, the region would have experienced numerous drought periods. Since meteorological records began, the region has experienced a number of significant declared droughts including:[15]

- The Federation drought: 1895 to 1902
- The 1914 to 1915 drought
- The World War II drought: 1937 to 1945
- The 1965 to 1968 drought (particularly affecting the Adelaide Hills and Fleurieu Peninsula)
- The 1982 to 1983 drought
- The Millennium drought: 1997 to 2009
- The 2017 to 2019 drought (the Tinderbox drought).

The 2017 to 2019 drought, whilst one of the shortest on record, was severe in eastern South Australia including the AHFKI region. The region experienced rainfall deciles that were very much below average and high temperatures. The drought caused significant stress on water resources, agriculture, and natural ecosystems in the area. The hot conditions further combined with the dry landscape and strong winds to produce dangerous fire weather conditions from December 2019 into early January 2020, including the 2020 Adelaide Hills and Kangaroo Island bushfires.

Green Drought

From February 2024 to May 2024 as this plan was being prepared, rainfall across the region was well below average. Average rainfalls through June were enough for green cover to establish however below average rain fell in July leading to conditions referred to as a green drought.

A green drought can occur when there is enough rainfall to grow grass, but there is not enough deep-soil moisture for crop and pasture growth.[16]

New green growth with high water content does not provide adequate nutrition for stock, especially young and breeding animals. Although the land may look green, supplementary feeding to meet nutrition needs may be required for some time until pastures mature.

4.2 Drought impacts on the AHFKI region

Through the stakeholder engagement undertaken for this project, the impacts of drought on the region described in Table 6 were identified.

Refer to Attachment 1 for a more comprehensive summary of these impacts, including Section 3.3 and 3.5 of the Key Insights Paper and Section 2.2 of the Engagement Summary Report.

> *"The drought caused significant financial costs, stree and mental health challenges"*

Table 6 Drought impacts

Theme	Impact
Social impacts	Reduced self-confidence, increased anxiety and mental stress, leading to physical health issues, increased family and relationship breakdowns, and higher suicide rates. Withdrawal from community settings which leads to reduced social interaction and division within the community. Reduced feelings of positivity and optimism associated with living in a drought affected landscape. Decrease in holidays and time off, with people working seven days a week, leading to increased workload and burnout and less time for friends and family.
Agricultural impacts	Decrease in water availability for stock consumption, irrigation, milking shed hygiene and potential increase in salinity of water sources. Livestock health deteriorates due to inadequate feed and water. Exacerbated impacts of heat, resulting in increased fruit/crop damage from extreme heat and reduced yields. Increased spending on buying feed, trucking water, and other essential resources and lower income can lead to debt and reduced financial stability, making it difficult to manage regular expenses and invest in future operations. Farmers often engage in 'fire sales' to get rid of stock and then have to buy back at a premium or have lost herd genetic diversity.
Environmental impacts	Changes in distribution and number of pest plants and animals and increased grazing pressure. Increase in bushfire risk caused by dry vegetation. Adverse impacts on the condition of native plants and animals. Reduced land cover leads to increased erosion risk, a decrease in topsoil and a decline in soil health. Decrease in quality and availability of surface water, reduced flows and impacts on native plants and animals Increase in wildlife and human interaction, increase in biosecurity risk.
Economic impacts	Lower farm incomes lead to decreased spending in local shops and businesses that provide services and supplies to farms. Increase in the need for off farm jobs. Job losses in primary production, with people leaving the area to seek employment elsewhere. Serious strain on Kangaroo Island's logistics, affecting the transport of goods and resources.
Infrastructure impacts	Damage to farm infrastructure and equipment from poor roads worsened by drought conditions. Deterioration of infrastructure due to compounding natural hazards following drought, including bushfire and floods. Decrease in on-farm capital and repairs.

> "Drought taught me a huge lesson. It was a very hard time"

In late December 2019, catastrophic bushfires started in Cuddlee Creek (Adelaide Hills) and Kangaroo Island which had significant impacts on the environment and regional economy. Research following these events and other bushfires across eastern Australia at the same time has investigated the impacts of weather conditions leading to the fires. The research concluded that:

"the drought and heatwave conditions experienced in the lead up to and during the Kangaroo Island fires were a key factor in priming the landscape for extreme fire behaviour, but local weather conditions were also important when combined with the very dry vegetation."[17]

4.3 Climate projections and drought

Climate projections describe what the future climate could be, sourced from multiple climate models, and based on numerous assumptions about the factors that influence climate and the trajectory of change in greenhouse gas emissions in the atmosphere. Each model uses different assumptions and algorithms to project how climate variables such as temperature, rainfall and evapotranspiration will respond in different emissions scenarios over different time frames. The projections presented in online tools and viewers each use a different combination of global climate models and show slightly different results.

For this Plan, we have used the regional projections described by the CSIRO and Bureau of Meteorology in Climate Change in Australia. Location specific projections have been taken from MyClimateView which downscales these regionals projections to provide location specific projections.

Climate change is projected to increase time spent in drought in the region. Annual rainfall is projected to decrease, and temperatures to increase.

Climate Change in Australia provides the following climate projection statements for large "cluster" areas across Australia. Most of the AHFKI region (including western Adelaide Hills, western Fleurieu Peninsula and Kangaroo Island) is within the Southern and South-Western Flatlands East sub-cluster which has the following climate projections.

Table 7 Climate projections for the AHFKI region[18]

Weather event		Projection	Confidence*
Rainfall	**Annual rainfall**	Decreasing annual rainfall	High
	Winter rainfall	Decreasing winter rainfall	High
	Spring rainfall	Decreasing spring rainfall	High
	Summer and autumn rainfall	Unclear, although downscaling results suggest a continuation of the observed autumn declines.	Low
Drought		Increasing time spent in drought	High
Extreme rainfall events		Increasing intensity of extreme rainfall events	High
Average, maximum and minimum temperatures		Substantial increase in mean, maximum and minimum temperatures	Very High
Hot days and heatwaves		More hot days and warm spells	Very High
Frost		Fewer frost risk days	High
Potential evapotranspiration		Increased potential evapotranspiration in all seasons	High
Bushfire		Harsher fire-weather climate	High

*NOTE – Climate Change in Australia refers to confidence in a climate projection as a measure of how plausible the projected range of change is for a given emission scenario. High agreement of numerous, high-quality lines of evidence is needed to have high confidence.

A portion of the eastern Adelaide Hills and eastern Fleurieu Peninsula are captured within the Murray-Basin sub-cluster. Key climate projection messages for this cluster include:

- Time spent in drought is projected, with medium confidence, to increase over the course of the century.
- By late in the century, less rainfall is projected during the cool season, with high confidence. There is medium confidence that rainfall will remain unchanged in the warm season.
- Increased intensity of extreme rainfall events is projected, with high confidence.
- More hot days and warm spells are projected with very high confidence.

Climate projections for particular locations in the region can be sourced from myclimateview.com.au.

Rainfall and temperature projections for four locations in the region in the 2050s using RCP 8.5 are shown in Table 8.

Table 8 Selected climate projections for three AHFKI region locations

Climate variable	Langhorne Creek		Parndana		Parawa		Charleston	
	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average
Total annual rainfall	373 mm	335 mm	634 mm	591 mm	787 mm	731 mm	743 mm	737 mm
Summer rainfall	64 mm	52 mm	68 mm	54 mm	91 mm	75mm	86 mm	75mm
Autumn rainfall	90 mm	82 mm	140 mm	139 mm	174mm	161mm	151mm	149mm
Winter rainfall	130 mm	120 mm	294 mm	275 mm	343 mm	331 mm	329 mm	337 mm
Spring rainfall	98 mm	86 mm	130 mm	122 mm	178 mm	162 mm	177 mm	172 mm
Average maximum temperature	22.2°C	23.6°C	19.3°C	20.4°C	18.9°C	20.1°C	19.9°C	21.3°C
Annual hot days (over 35°C)	17 days	24 days	5 days	6 days	5 days	8 days	11 days	18 days

An increasing frequency and intensity of drought will further exacerbate regional drought impacts, with flow on impacts on productivity, yield and profitability. Various agricultural practices that are currently considered leading edge will provide some measure of adaptation in the short term. However, long-term adaptation may require more transformational responses.

05

Other drivers of changes

Global, national and regional influences are driving changes in markets, technology, governance arrangements, values, and social factors. Key drivers and their implications for the AHFKI region are described in Table 9 Drivers of change, with additional information available in the Background Report.

Table 9 Drivers of change

Global drivers [19,20,21]	
Climate change and decarbonisation	Responding to climate change requires a shift in the global economy to reduce carbon emissions and Australia has committed to reducing its greenhouse gas emissions. In the region, agriculture and transport are key sources of emissions that are likely to see transformation change over the next thirty years.
Technological disruption	A digital world provides opportunities for online work and study, telehealth, commerce and digital currency. A greater reliance on technology for work, business and study means that outages and service issues can have a significant impact on operations.
Trade disruptions	Sudden and unexpected widespread trade disruptions brought through global pandemics, conflict, geopolitical tensions, or similar events can have significant impacts on supply chains, demand, and commodity prices. The COVID-19 pandemic had a significant impact on the tourism industry and agriculture globally, with impacts also felt across the whole region.
Consumer focus	Globally there is a strong consumer push for decision-makers to consider trust, transparency, fairness, and environmental and social governance. Demand for sustainable meat is growing and in response, the Australian red meat and livestock industry has set a target to be carbon neutral by 2030. On Kangaroo Island their GM-free status allows them to access Japan's high-priced market for GM-free grain[22] (Hough, 2020).
Increased demand for meat	As many developing countries become wealthier and individuals receive more income, demand for meat is increasing. In the AHFKI region, pastoralists have the opportunity to contribute to meeting this demand.

National and state drivers [23,24]	
Increased cost of living	Increasing costs of living is placing pressure on Australians to fund their everyday needs. There is high variability in the income security of the AHFKI community and this driver will be felt differently in different communities.
Health challenges	One in five Australians report high or very high levels of psychological distress. Responding to our health risks and improving health outcomes is becoming more and more important. The research and engagement for this project highlighted the significant adverse impacts on the mental health of the people and communities experiencing drought and the need for increased services.
Regional drivers [25,26,27,28]	
Ageing population and labour force shortage	There is a growing demand for highly qualified workers and healthcare professionals, driven by the increasing need to support an ageing population. The COVID-19 outbreak positively impacted population growth, but there is a risk of losing younger working-age residents as cities draw people back.
Increased tourism	Tourism is a key contributor to the region's economy however tourists also place increased pressure on natural resources, landscapes and infrastructure. Tourism visitation to the region is increasing twice as fast as the state average. Ensuring infrastructure improvements keep up with growing visitation is critical to the sustainability of the region.
Export-oriented industry growth	The region has experienced strong growth in its highly competitive export-oriented industries including agriculture and food and beverage manufacturing, which has increased job creation, economic value, and productivity.
Education and training	The region benefits from a diverse educational landscape, including a blend of public and private secondary schools. Additionally, the presence of TAFE campuses in Mount Barker and Victor Harbor, a Flinders University campus and a university study hub at Victor Harbor, and the availability of online courses provide valuable opportunities for vocational and skills training, supporting the region's educational and workforce development needs.
Managing bushfire risks and recovery	Catastrophic bushfires are an increasing risk in the AHFKI region. Managing this risk without compromising biodiversity values requires careful and strategic changes in land and fire management.
Demand for transport and freight	The AHFKI region, particularly Kangaroo Island, is experiencing increasing demand for transport and freight services. Investment in transport infrastructure and logistics is crucial to support the region's economic growth and connectivity with broader markets.
Urbanisation and population growth	The entire region is projected to experience an increase in population. This growth, particularly in the Adelaide Hills and Fleurieu Peninsula, will result in an increased demand for residential and commercial land.

06

Drought resilience

6.1 A definition of drought resilience

The term ‘resilience’ is used in numerous domains, from health and wellbeing to natural resources and the economy. For this Plan, drought resilience is defined as the following:

Drought resilience means the ability to adapt, reorganise or transform in response to changing temperature, increasing variability and scarcity of rainfall and changed seasonality of rainfall, for improved economic, environmental and social wellbeing.[29]

Resilience is more than just bouncing back. In some cases, disruption can be seen as an opportunity to move in a new direction, not just recover back to a previous state. Resilience is about proactively changing in order not to be changed involuntarily.

Building resilience will help the AHFKI region to endure droughts with fewer negative impacts and recover from them sooner.

The AHFKI Drought Resilience Plan is focused on drought resilience. However, enhancing drought resilience will help the region respond to and recover from other stresses or pressures such as bushfires, flooding rains, pandemics, and economic market changes.

6.2 The importance of drought resilience

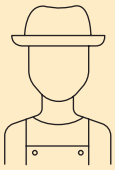
Past droughts have had major consequences for jobs and income, mental health and wellbeing, agricultural productivity, and the health of the environment. With climate projections predicting more frequent and more intense droughts, building resilience is crucial.

Resilience is about taking action to try to avoid or minimise these negative impacts before they happen rather than waiting until they do occur to act or just focusing on recovery. Building resilience can help to create economic, social, and environmental development opportunities.


"Planning from previous experiences helps as well as on farm strategies such as confinement, paddock subdivison & water infrastructure."

6.3 Characteristics of drought resilience

It is important to consider resilience at a variety of scales from the individual to the community and the whole region. Resilience looks different for every community depending on its unique experience, attributes, risks, and characteristics. Common attributes of drought resilience identified by stakeholders, community (see Appendix A – Regional Engagement Summary Report) and the literature are described below:[30,31,32]

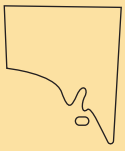


Drought resilient individuals are or have:

- Strong social connections, networks and relationships with friends, family, and the wider community, having multiple touch points.
- Willingness to try doing things differently, learn from past droughts and adapt to different conditions.
- Diverse sources of household or farm income, long-term financial planning and capacity to save for more difficult times.
- Embracing innovation and implementation of new techniques, tools, and technology.
- Implementing soil water efficiency practices and increasing soil carbon.
- Understand drought is likely to occur and proactively prepare for it
- Access to good education, healthcare, and digital connectivity.

Drought resilient communities are or have:

- Strong, connected, caring communities that help each other in times of need.
- Access to regional centres with health, education, and support services.
- Sharing knowledge and celebrating sustainable practices.
- Investment in projects that give good return to the community and employ local people.
- Local employment opportunities that support people to stay in the community.
- Community spaces that enable people to come together.
- Access to efficient community services and affordable commodities.
- Good education and career pathways in agriculture.
- Efficient transportation and special needs services during crises.
- Place-based collaborative, long-term approaches and support from external agencies in ways that meet the unique needs of each community.
- Implementing community-led initiatives with engagement at all levels.



Drought resilient regions are or have:

- Strategic investment in infrastructure (e.g., water, transport, power, telecommunication, etc.).
- Access to a good platform for information and updates on drought including weather forecasting.
- Diverse economies
- Low populations of pest/overabundant animals through proactive management before drought.
- Workers attracted to and retained in the region.
- Strategic and proactive preparation for drought.
- Policies that reflect regional needs and support community-driven solutions.

The AHFKI region, communities and individuals already display many of these characteristics. The way this looks differs across the region. Those communities and businesses with connection to mains water are generally less vulnerable to drought. Many people who work in the region live outside the region or vice versa, impacting on the way drought affects their lives. Close proximity to the infrastructure and services found in metropolitan Adelaide can enhance aspects of resilience, while also reducing sense of community and self-reliance.

Kangaroo Island has a number of characteristics that make it more vulnerable to drought and other shocks. These include its isolation from the mainland and subsequent reliance on ferry services and shipping, less infrastructure and services, lack of ability to source water from other regions, and less diverse economy with a higher reliance on agriculture.

However, their smaller community, prominent community leaders and ability to be self-reliant enhance their drought resilience in other ways.

Particularly in the Adelaide Hills, primary producers have not historically considered themselves as particularly drought prone. While the region has experienced periods of reduced rainfall, extreme droughts have not been common. This means that lived drought experience in the region is limited, influencing their level of resilience to drought. However, drier conditions over the last few years have helped the region to better recognise drought as a threat to the primary production industry in the Adelaide Hills. Awareness, experience and research and development in this area continues to increase.

6.4 A new approach to resilience through the National Drought Agreement

In the past, the Government of South Australia made declarations of drought with associated Exceptional Circumstances support and focused the majority of their drought programs on the 'during' and 'after' phases of drought.

This approach has recently changed, through the new National Drought Agreement (2024-2029).[33]

All Australian, state and territory governments have agreed to and signed this Agreement which explains how they are working together to help Australian agriculture better withstand drought.

A key feature of the agreement is a greater focus on enhancing drought resilience before drought, to enable farms, people, businesses and the environment to minimise the impact of drought rather than waiting until drought hits to act.

Another is the elimination of drought and Exceptional Circumstances declarations. Previous drought declarations necessitated the drawing of lines on maps to identify regions in drought. Community and stakeholders recognised that this approach was challenging, in many cases inaccurate, and resulted in farmers in need being ineligible to access support. The new approach recognises that support needs are highly variable, and eligibility should be based on need, not activated by drought declarations.[34]

The development of this Plan is consistent with the Agreement's objectives to prioritise objectives and outcomes that enhance long-term preparedness, sustainability, resilience and risk management for farming businesses and farming communities in Australia.

07

The Drought Resilience Strategy

Vision

The AHFKI region's vision is for:

Primary producers that understand drought risks and are taking action to build drought resilient farms, communities, economies and environments.

Delivery principles

Through community and stakeholder engagement, a number of ideas were consistently raised and have been used to inform the following drought resilience planning and delivery principles, all of which are consistent with the principles of the National Drought Agreement:

The region is diverse, and communities have different needs. Planning, design and delivery of drought resilience building projects must be tailored to each community or landscape, reflecting their unique characteristics and needs. Local community involvement facilitated through active and ongoing engagement is key to providing each community with what they need to be resilient.

Communication and collaboration are critical to success and means the region can take advantage of existing networks. There are many organisations, associations, groups and agencies working on projects that can contribute to drought resilience. Ensuring all these groups are working together and there is no duplication of effort means more can be done with the resources available.

Investment in drought resilience projects will focus on enhancing long-term preparedness and resilience. Resilience building outcomes will be optimised when project delivery occurs when times are good and the community has energy and focus.

Support will be available to everyone who needs it. Sometimes even the most prepared and resilient need support and they will not be disadvantaged.

Delivery arrangements

It is proposed that the AHFKI Regional Drought Resilience Steering Committee established to develop this plan will lead the implementation of the opportunities identified in this Plan. Individual leads will be identified once the plan is approved and ongoing governance arrangements confirmed.

Goals, strategies and opportunities

The goals, strategies and opportunities to build drought resilience in the AHFKI region are described in the following sections. The strategies seek to leverage existing strategic planning and avoid duplication of effort by referring to the implementation of other regional plans. Strategies are high level to provide flexibility to accommodate changing circumstances, new evidence and evolving knowledge while remaining accountable to stated goals, vision, and regional values.

The vision and goals were developed collaboratively by the Steering Committee using information collected through the first phase of engagement. These were then tested with the community through the second phase of engagement.

The strategies and opportunities for action have been developed directly from the ideas raised by stakeholders and the community throughout the engagement, as the actions they believe will be most effective for their region. These have been supplemented and strengthened by the literature review and discussion with the Steering Committee.

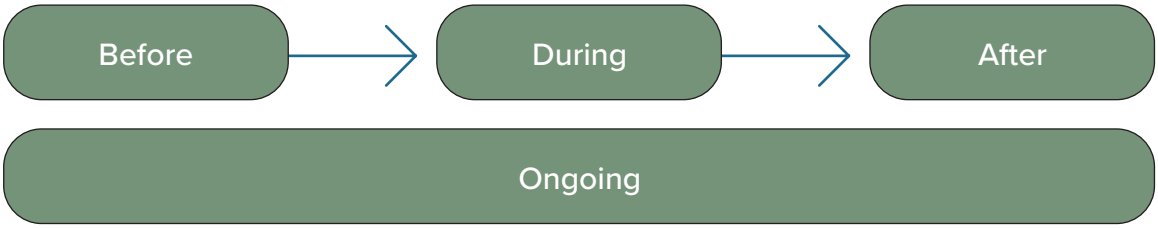
While targeted at the impacts of drought, this support provides co-benefits for broader resilience and adaptation.

The goals, strategies and opportunities are presented under the following themes:

- Primary production
- Community health and wellbeing
- Financial management
- Environmental management
- Infrastructure and services
- Drought plan governance

Timing

The timing for delivery of each opportunity has been categorised according to when it would fit within the drought cycle:



The Plan places a focus on actions to be undertaken before drought hits. By focusing effort and investment in this phase, farmers, communities, businesses and environments across the region will be better set up to minimise the impacts of drought, rather than bearing them when they come. This approach will help to support the long-term preparedness, sustainability and resilience of farm businesses and communities. Nonetheless, it is recognised that support will still be needed during and after drought, and this plan will help deliver this support particularly during extended severe droughts.

Priority strategies

Priority strategies that have the potential to have the greatest influence in building drought resilience are identified with a **star icon**. These priorities have been identified by stakeholders through engagement on the draft plan and refined by the Steering Committee.

Individual action

Opportunities in the plan have been scoped as actions to be taken at an organisational, regional or sub-regional level. However, many of these can also be progressed at an individual level. For example, while regional organisations may provide training and grants for household income diversification, farms and families would also be able to diversify their income themselves without external support. These sorts of actions are identified with a **person icon**.

New initiatives

Many of the strategies relate to work that is already underway, and either needs to be extended, expanded, promoted or accelerated to have greater benefit. Other strategies present opportunities that are limited in their current application or are not at all part of current action in the region. These present new opportunities that could lead to significant or transformational change for the region and are flagged with a **lightbulb icon**.

Primary production

Seasonal variability and extreme weather have always influenced primary production in the region. Different sectors have adapted differently however managing soil health, water use efficiency monitoring and selecting drought resilient varieties are common to most.

Holistic land management approaches that aim to enhance sustainability and resilience, such as regenerative, biodynamic and permaculture farming, are being applied across the region and demonstrating improvements in soil and livestock conditions. Regenerative agriculture aims to protect and enhance topsoil by regenerating key landscape functions.[35]

The World Economic Forum and the United Nations have identified biodiversity loss as a major risk to businesses and financial capital.[36] Global conservation organizations, institutes, and business and finance coalitions are seeking a target of nature-positive by 2030.[37] A market for biodiversity credits is emerging and may present opportunities for regional landholders to receive financial benefits from taking nature-positive action.

Agriculture and transport are the two highest greenhouse gas emitting sectors in the region. For the region to contribute to state emission reduction targets, action to reduce or avoid emissions generation must accelerate. In 2020 Meat and Livestock Australia set a target to be carbon neutral by 2030, recognising the multiple benefits that can be achieved through action to deliver carbon neutrality including improved drought resilience.[38]

Carbon farming projects are being initiated across South Australia that include practices that increase the amount of carbon stored in soil and vegetation (sequestration) or avoid or reduce greenhouse gas emissions. These can be achieved through revegetation or rotational grazing with extended rest spells that allow vegetation cover to recover. Carbon farmers can receive revenue from carbon farming by selling carbon credits through the Australian Government's Emissions Reduction Fund or to private investors or businesses, providing an opportunity for alternative on-farm income.[39]

Landscapes SA (Hills and Fleurieu and Kangaroo Island), PIRSA and the Drought Hub all have a role to play in providing education and support to land managers to build drought resilience, through supporting and delivering capacity-building and promoting research and innovation.

Implementation of the opportunities for this theme will benefit from partnerships with organisations, associations and groups including Adelaide Hills and McLaren Vale Wine Regions, Wine Grape Council of SA, Grain Producers SA, Livestock SA, SA Dairyfarmers' Association, Apple and Pear Growers Association of SA, Horticulture Coalition of SA, regenerative agriculture farmer groups, and Landcare groups.

"Financial assistance and support for creating a drought preparation plan would be useful."

GOAL: Innovative, diversified and sustainable primary producers prepared for a variable and changing climate

Strategy	Opportunity for action	Timing
Support capacity building, planning and implementation of farm and land management actions that build resilience	Support primary producers to prepare property/farm management plans that guide land management and resource use efficiency to deliver profitable production, including triggers or thresholds to support decision-making leading into and during drought and actions to prepare for, respond to and recover from drought and other adverse weather events (eg frost, heatwave, bushfire or flood)	Before
	Support, promote and build the capacity of land managers to implement techniques that will enhance productivity and resilience including pest and overabundant native plant and animal and disease control, planting low water use or more drought resilience varieties, establishing shelterbelts and native vegetation corridors, adoption of alternate farming systems, clay spreading and biochar application.	Before
	Support fodder management practices that increase resilience, for example sowing permanent pastures and summer fodder crops, rotational grazing and resting paddocks with net zero grazing losses, feed budgeting, and increasing fodder stores, for example through silage or hay storage.	Before

"Long-term resource planning and careful water management helped me get through the drought."

"Using strategies from previous experiences, such as confinement, paddock subdivison and improving water infrastructure, has been effective"

GOAL: Innovative, diversified and sustainable primary producers prepared for a variable and changing climate		
Strategy	**Opportunity for action**	**Timing**
	Support land managers to improve on-farm data measurement and monitoring to make informed decisions and identify opportunities for improvement, for example installing soil moisture monitoring and seasonal evaluation of crop performance.	Before
	Provide support including financial incentives, extension programs and research and development to assist farmers to improve on-farm water security through installation of water tanks and other innovative water storage options to reduce reliance on pumping from watercourses and dams.	Before
	Provide support, including financial incentives for other infrastructure improvements that enhance drought resilience, such as environmental covers and netting, farm-scale water infrastructure, containment feedlots, on-farm crop and grain storage, on-farm weather stations or renewable energy generation and storage.	Before
	Facilitate opportunities to learn from previous drought experiences, including documenting case studies, compiling research findings and holding events to share experiences and connect more and less experienced primary producers.	Before and after
	Investigate opportunities for the production of new crops or varieties to meet current or changing market demand and consumer preferences and, support research, trials and application.	Before
	Investigate and support on-farm circular economy opportunities including reuse of waste products.	Before
	Support the development of tourism and food and beverage manufacturing that add value to the region's primary production and support diversification.	Before
Undertake local research and development	Identify and communicate research and development priorities and support research, extension and application of action to adapt or improve productivity, including relating to plant/crop varieties, agronomic management and better use of weather forecasts to develop solutions to frost, heat stress and drought.	Ongoing
Enhance integration of biodiversity-positive land management	Investigate and support the uptake of agricultural practises that increase biodiversity and take advantage of emerging opportunities to benefit from biodiversity credits and nature positive outcomes.	Before
Support opportunities to transition to net zero that deliver environmental and financial benefits	Investigate and support primary producers to measure their farm emissions profile and develop strategies to reduce emissions.	Before
	Support the adoption of technologies that deliver emissions reduction and benefit primary producers, for example, renewable energy generation and storage, use of methane-reducing supplements and fertiliser efficiency.	Before
	Build carbon farming literacy through the delivery of workshops, demonstration sites and accessible information.	Before
Develop community cooperatives and shared infrastructure	Investigate models for new community cooperatives and collaborative and shared farm infrastructure such as community-owned and run feed storage facilities, that reduce costs and benefit communities.	Before
Share and celebrate stories about resilience building	Celebrate farming and community successes, promoting good practices that are or will strengthen drought resilience.	Ongoing

Community health and wellbeing

The AHFKI region is home to nearly 150,000 residents. On Kangaroo Island and further from Adelaide, more residents have lived in their local area for many years, often following generations of family members. In these areas, communities have higher rates of volunteering and strong connections, characteristics of a resilient community.

The Cuddlee Creek and Kangaroo Island bushfires had a profound impact on local communities, with homes, livelihoods and the environment damaged and destroyed. Through the fires and in their aftermath, individuals and groups came together to support each other through the crisis and the recovery process.

Community and stakeholders across the region shared the lasting impacts of droughts on the community and acknowledged that drought-breaking rains do not mean the impacts of drought are immediately reduced. Recovery can take significant time – individuals, families and businesses can still be recovering well after the environment has recovered.

The LGA and councils, and RDA all have a role to play in maintaining and strengthening community connections and supporting community health and wellbeing. Implementation of the opportunities for this theme will benefit from partnerships with organisations, associations and groups including the local community, sporting and special interest groups, schools and other education services and health services.

"Talking with others affected and seeking support from the local council has helped"

GOAL: Strong, healthy individuals and connected communities learning and working together for a positive future		
Strategy	**Opportunity for action**	**Timing**
Foster community collaboration and strengthen social connection	Work with community groups and organisations to prepare and deliver a program of free or low-cost events and activities that bring the community together, tailored to community needs and different audiences, for example workshops, presentations, comedy shows, family fun days, sport and art initiatives.	Ongoing
	Foster coordination and collaboration between organisations in the region including not-for-profit organisations, government agencies, health and education service providers and financial institutions.	Ongoing
	Support local sport and cultural events in the region during drought periods and ensure ongoing maintenance of community infrastructure.	During
Support mental health and wellbeing before, during and after drought	Build and strengthen initiatives to support mental health and create awareness of support options for the whole community.	Ongoing
	Promote the importance of self-care during drought, including available counselling or support services and importance of physical and mental health, exercise, sleep, and time away from work.	During
	Develop and implement a communications strategy that promotes support, initiatives or resources that can contribute to drought resilience, including government and industry programs, business information and resources, community health services	Before and ongoing
Foster and support community leaders	Invest, support and promote community leadership programs that empower community leaders to take proactive roles in strengthening connections and supporting communities during and after drought.	Ongoing

Financial management

The long termlong-term economic success of the region relies on the financial sustainability of regional businesses. Businesses that understand the risks, including climate risks, to their operations, supply chains and markets, and take proactive steps to prepare for shocks or market changes will be better able to get through when challenges arise.

Through the engagement for this project, primary producers from across the region talked about the benefits of being able to access independent financial advice and the difficulties for many people to access this. While the Australian Government's free Rural Financial Counselling Service (RFCS) is available to primary producers experiencing, or at risk of, financial hardship, proactive business planning advice is needed earlier.

Regional Development Australia Adelaide Hills, Fleurieu and Kangaroo Island (RDA AHFKI) has a key role to play in developing a more successful, resilient and sustainable economy through their work in supporting existing businesses and attracting new business and infrastructure investment. The RDA's Strategic Plan identifies agriculture, tourism and manufacturing as the three most competitive industries in the region and a focus for effort.

Implementation of the opportunities for this theme will benefit from partnerships with organisations, associations and groups including councils, industry groups and associations, business and commerce groups and networks, and individual businesses.

GOAL: Business owners managing climate and other risks for long term financial success, contributing to regional economic growth

Strategy	Opportunity for action	Timing
Enhance regional business' financial and risk management literacy and planning	Support and promote education and training initiatives to enhance primary producers and related businesses' financial and business management skills with an aim to prepare a business plan that addresses risk management, debt reduction, tax management and forward and succession planning, for example through the 'Our Farm Our Plan' project.	Before
	Support programs to increase the digital literacy of people employed in primary production and related businesses	Before
	Support the provision of independent financial advice and counselling services to enable farms and other businesses to make timely business decisions	Ongoing
	Support networking of industry, businesses, and the financial sector to focus on drought preparedness, building reserves and building greater adaptability to seasonal conditions.	Before
Advocate for changes to financial mechanisms and Support provision of business advice for communities and businesses	Advocate for changes to financial mechanisms including mechanisms to build savings and manage tax.	Before
	Advocate for expansion of the Rural Financial Counselling Service and its ongoing provision after June 2026.	Before
	Support regional finance representatives in understanding drought impacts on individuals, supporting customers with high drought risk and adopting different roles during drought stress periods, including business planning guidance and direction to mental health support.	Ongoing

Environmental management

The AHFKI region's natural environment includes a diversity of forests, shrub lands, and grasslands, and coastlines that create a unique and ecologically rich environment that supports both biodiversity and primary production. The Mount Lofty Ranges is one of Australia's 15 biodiversity hotspots and Kangaroo Island is home to more endemic plant species than any other region in the state.

Biodiversity can contribute to drought resilience. Biodiverse landscapes can have more efficient nutrient cycling and improved soil health, water retention and greater resilience to pests and diseases and provide habitat for agricultural crop pollinators. .

The Kangaroo Island and Hills and Fleurieu Landscape Boards plays a key role in managing the region's natural resources. Working in partnership with Landscape Groups, local organisations and landholders and Traditional Owner groups, the Boards delivers programs and projects to improve land and water management, biodiversity and pest animal and plant control. The Department for Environment and Water through the National Parks and Wildlife Service are responsible for the management of the 77 conservation reserves and national parks that cover just over 15% of the region. Biodiversity is also protected on private land through Heritage Agreements and on a number of privately owned or managed reserves and sanctuaries.

GOAL: Healthy and resilient soil, water and biodiversity that sustain productive landscapes		
Strategy	**Opportunity for action**	**Timing**
Manage pest and over-abundant native plants and animals	Implement a regional approach to pest plant and animal management (including insects) that impacts primary production and the environment, including the provision of bait for pest animals, support for netting or environmental covers, and culling of overabundant native species.	Ongoing
Build resilience of biodiversity and valued natural and cultural sites	Increase awareness and build respect for cultural and spiritual values of Country and take action to protect areas of significance from drought impacts.	Before
	Support action to minimise threats to and build resilience of biodiversity to maintain ecologically healthy communities during drought	Before
Support regional bushfire risk management	Monitor vegetation condition, drying and fuel loads to inform vegetation (fuel load) management that balances biodiversity conservation and asset protection.	Ongoing

Infrastructure and services

The resilience of the AHFKI region is dependent on infrastructure that can function effectively, deliver essential services and support supply chains under all conditions.

Infrastructure provision for essential services (power, water and telecommunications) is generally good however opportunities to improve telecommunications and water security on Kangaroo Island have been identified and are being progressed through SA Power Network's construction of an undersea fibre optic cable from Cape Jervis to Kangaroo Island, and SA Water's construction of a desalination plant at Penneshaw.

There are multiple organisations with responsibility for regional infrastructure. Implementation of the opportunities for this theme will require the region to advocate for or work in partnership with these organisations.

GOAL: Infrastructure and services that support businesses and communities to connect, function and thrive		
Strategy	**Opportunity for action**	**Timing**
Improve regional water security	Support work to enhance water security, through initiatives to augment water storage and delivery infrastructure, demand management and identification of alterative alternative water sources.	Before
	Optimise the use of fit for purpose water by industries and communities including wastewater reuse in towns to irrigate green spaces	Before
	Advocate for policy that requires cost-benefit analysis for regional water infrastructure to consider future climate and water quality implications.	Before
	Ensure water resource planning at all scales considers recent trends in rainfall, runoff and water demand with future projections of rainfall, and is evaluated against scenarios of increased time spent in drought.	Ongoing
Improve regional weather and soil moisture data collection and forecasting	Advocate for interpretation of available short- and long-term weather forecasts that support agricultural decision-making in the region.	Before
	Expand the soil moisture monitoring network and make data available to all land managers to inform decision-making.	Before
Improve the services and infrastructure that support and maintain communities	Communicate with service providers and infrastructure owners about emerging drought issues and implications for effective service function and delivery.	Before
	Explore opportunities to expand localised, reliable, renewable energy generation and storage	Before
	Provide efficient road networks and reliable and cost-effective freight services, including strategies to increase capacity and subsidies for sea freight during critical periods.	Before and during
	Advocate for improved communications infrastructure to support reliable region-wide digital access	Before

Drought plan governance

Successful implementation of this plan will require effective governance that facilitates efficient and effective resource use without duplication of effort. With clear leadership, coordination and communication the plan can deliver on its goals in a way that delivers what is most needed on the ground. Engagement with communities to understand what they need and how to deliver this in a way that suits them is central to this. Continuing the Drought Resilience Steering Committee is a vital mechanism for this.

"Our region has missed out on support in the past due to being a high rainfall region despite having been greatly impacted by dry conditions"

Effective resilience building initiatives that reflect the region's unique needs, led locally and informed by local knowledge and community input.

Strategy	Opportunity for action	Timing
Establish effective drought governance to support drought plan implementation and local decision-making	Continue the AHFKI Drought Resilience Steering Committee and explore opportunities to expand membership to include the health sector and regional climate partnership. Drive implementation, monitoring and evaluation of this plan including: • Advocate for and support long-term funding, review, learning and improvement processes to ensure partner organisations and agencies learn from drought experiences. • Collaborate with other government agencies, not-for-profit organisations and private companies to identify opportunities for resource sharing and inter-agency implementation of this plan, particularly where organisations have shared/common goals. • Engage with and obtain support from regional primary production and other stakeholder groups to implement this plan. • Regularly review, identify learnings, revise and report on the Drought Plan	Ongoing
	Seek funding for a project officer to coordinate and support the delivery of drought resilience project funding applications and project delivery, and improve the coordination and funding of programs from different agencies to maximise efficiency and effectiveness.	Ongoing
	Clarify and document accountabilities, shared responsibilities, regional governance and coordination arrangements and share with the community	Before
	Prepare a communications strategy to build awareness of drought, share information about drought resilience projects, promote investment and support during drought for example through campaigns to support local businesses.	Before
Understand opportunities to work in partnership with First Nations to build drought resilience	Engage and collaborate with First Nations individuals and groups to understand their needs and what would assist in enhancing the drought resilience of the environment and support the delivery of identified projects.	Ongoing

08

Implementation, monitoring and evaluation

8.1 Implementation

This Plan has been prepared as a framework or prospectus to guide future effort and investment in regional drought resilience.

The opportunities identified in this Plan are unfunded and some may only be progressed with further investment. It is the intention that the implementation of this Plan will be addressed by several different delivery partners. The AHFKI community will be able to address some, while others will require coordination and cooperation between government agencies, non-government organisations and the private sector.

Through the engagement to support the development of this Plan we have heard clearly that farmers and communities want to be involved in the decisions that affect them. Planning the delivery of all projects will include the community from the start, to get buy-in and support and more beneficial outcomes.

8.2 Governance

It is proposed that the AHFKI Regional Drought Resilience Steering Committee established to develop this plan will continue to coordinate and support project funding applications and project delivery to avoid duplication of effort and maximise local and regional benefits. Additional membership may be investigated, particularly to support community health and wellbeing projects.

Steering Committee organisations will take the lead/oversight role for all of the actions in the Plan. This means they will lead and coordinate funding applications, identify delivery partners and report back to the Drought Resilience Steering Committee. The lead organisation may or may not be involved in the on-ground delivery, and will in many instances partner with others for this.

It is proposed the group meets regularly to maintain an ongoing shared understanding of emerging issues as well as being ready to support funding applications from any available source.

8.3 Monitoring, evaluation and reporting

This Plan and its implementation will be monitored, evaluated and reported on according to the Regional Monitoring, Evaluation and Learning Guide prepared by the Department for Primary Industries and Regions for the South Australian Regional Drought Resilience Plans.

Monitoring and evaluation are essential parts of delivering any plan, project, or program. Undertaking monitoring and evaluation will help the Steering Committee, stakeholders and the community understand if the vision and goals are being progressed. An adaptive learning approach will be taken, with successes and limitations of past and current actions reviewed and used to assist in refining future approaches to optimise project outcomes. It also ensures accountability and provides information to share with partners and stakeholders to demonstrate program value.

The Steering Committee will coordinate monitoring, evaluation, learning and reporting processes. Delivery partners will provide data and insights to support this. Findings will be looped back to delivery partners to inform their future actions.

This monitoring and evaluation framework is based on a program logic approach. Program logic illustrates cause and effect relationships to provide an understanding of how program resources are used to produce outputs and deliver outcomes in the short to long term. The model also acknowledges the interaction of assumptions and external factors with outputs and outcomes. The elements of the program logic model shown in Figure 4 is defined below.

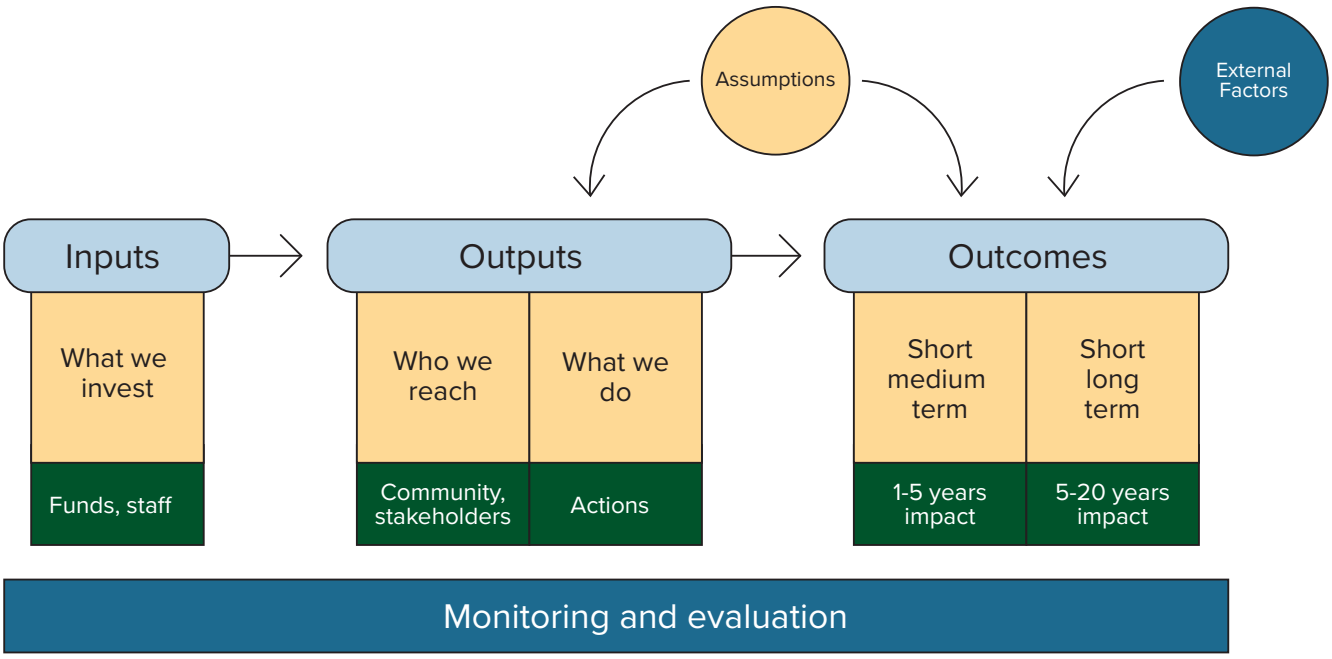


Figure 4 Program logic model for the delivery of the Plan

Outputs: measurement of the direct actions taken, for example the activities and events delivered, the services provided, and the funds spent. Output measures include both activities and associated participation.

Assumptions: the expectations we have that the actions we take, and the participants involved will lead to the outcomes or change we seek to achieve.

Outcomes: the desired results of direct actions on individuals, groups, communities, organisations and the environment in the short-medium and medium-long term. Outcomes in the medium-long term are often influenced more by external factors (actions undertaken by others or changes in environmental, social or governance factors).

External Factors: the uncontrollable factors in the wider environment surrounding our programs that may interact with and influence outcomes.

The program logic and monitoring indicators for the priority strategies of the AHFKI Regional Drought Resilience Plan are provided in Appendix A. This will be reviewed and revised as projects are funded and planning for delivery commences.

As projects are scoped for funding and then implemented, an evaluation process will be established that will consider:

- How effective was the project/program in achieving its intended outputs and outcomes?
- To what extent did the project/program contribute to the relevant goals, and what other things helped or hindered its implementation?

Once implementation commences, a biannual evaluation of the AHFKI Drought Resilience Plan itself will be initiated that will consider:

- To what extent has the Plan been implemented and has impacted on regional stakeholders' capacity and resources to better plan, manage and recover from drought?
- What changes/support are/is needed to ensure that the Plan best provides an effective framework for action and that stakeholders can effectively work together towards implementing those actions?

09

Glossary

Adaptation	Adjustment or modification in natural and/or human systems in response to actual or expected shocks and stresses to moderate harm, reduce vulnerability and/or exploit beneficial opportunities.
Climate projection	A scenario of future climate, generally resulting from running a global climate model with a specified greenhouse gas concentration scenario (or RCP). A projection differs from a prediction in that it is conditional on the representation of a particular global climate model and the uncertain assumptions of the model inputs (primarily the greenhouse gas concentration scenario, or RCP).[41]
Carbon farming	Carbon farming includes: • sequestering carbon in the landscape through regeneration and planting of native vegetation; farm and plantation forestry; and improving soil management to ensure that carbon inputs exceed outputs • reducing emissions, such as livestock methane emissions; fertiliser emissions and through manure management.[42]
Decarbonisation	The removal or reduction of carbon dioxide and other greenhouse gases output into the atmosphere.
Drought	A period of abnormally dry conditions that impacts negatively on water availability and agricultural production in a region and, consequently, impacts negatively on the economy and environment of the region and the health and wellbeing of its residents.
Drought resilience	The ability of communities, economies and environments to withstand the impacts of drought and adapt and find new and potentially transformational ways of doing things, enabling functions and values to be sustained over the longer term.
El Niño-Southern Oscillation	El Niño refers to the extensive warming of the central and eastern Pacific Ocean that leads to a major shift in weather patterns across the Pacific. In Australia (particularly eastern Australia), El Niño events are associated with an increased probability of drier conditions.[43]
Governance	Governance is the structures and processes by which individuals, groups and agencies in a society share power and make decisions. It can be formally institutionalised, or informal.

Indian Ocean Dipole	The Indian Ocean Dipole (IOD) is defined by the difference in sea surface temperatures between the eastern and western tropical Indian Ocean. A negative phase typically sees above average winter-spring rainfall in Australia, while a positive phase brings drier than average seasons.[44]
Transformational change	The process of radically changing or building a new system with different structure, functions, feedbacks and identity.
Trigger point	A pre-agreed situation or event, that when met, activates a management intervention. Trigger points are usually defined in the planning phase.

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Injured Wildlife

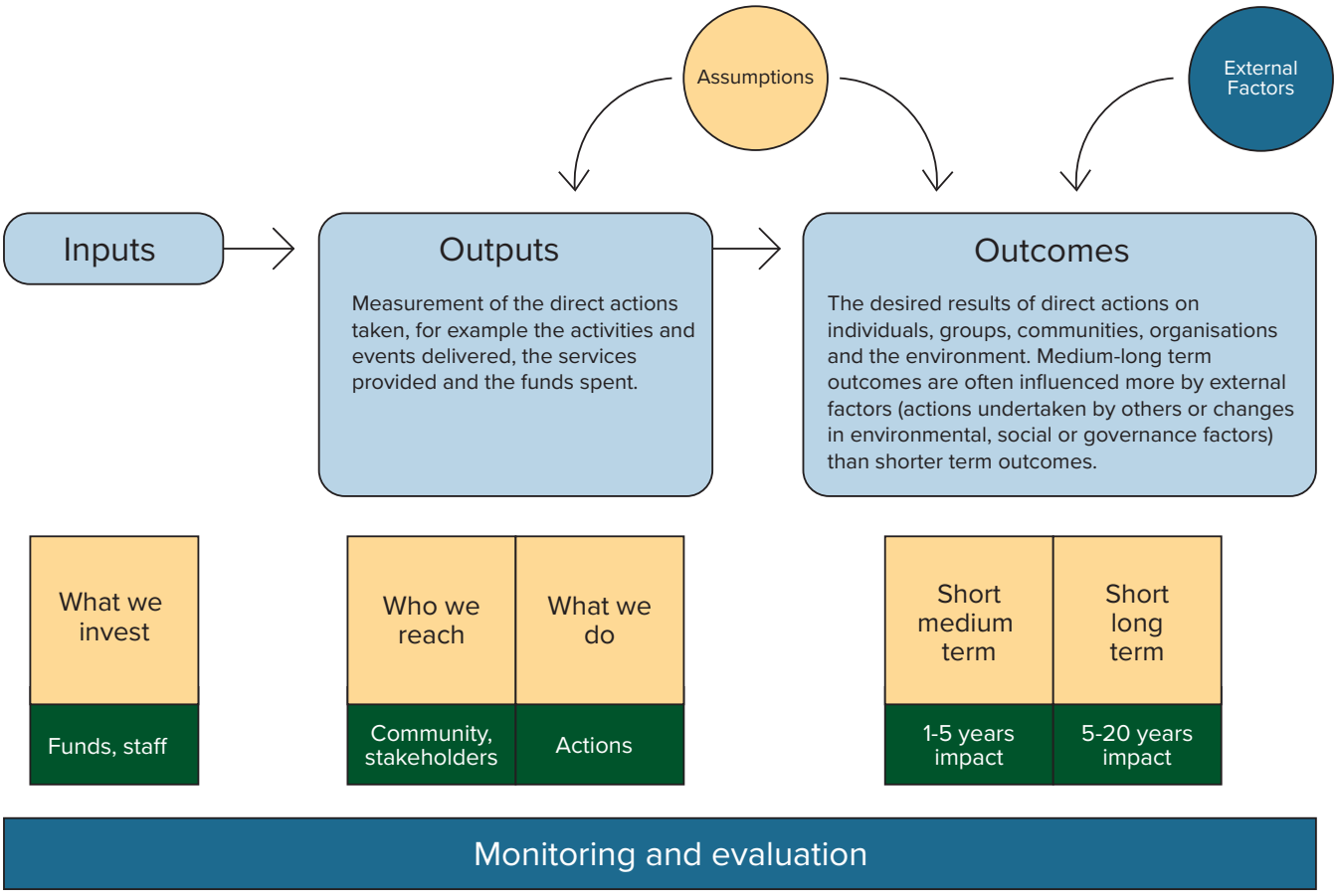
11

Appendix A

Program logic and monitoring indicators for priority strategies

The table below describes the program logic for the priority strategies in the Adelaide Hills, Fleurieu and Kangaroo Island Regional Drought Resilience Plan and identifies proposed monitoring indicators for outputs and outcomes.

Program logic illustrates cause and effect relationships to provide understanding of how program resources are used to produce outputs and deliver outcomes in the short to long term. The elements of the program logic model are shown in the figure below.



PRIORITY STRATEGY - SUPPORT CAPACITY BUILDING, PLANNING AND IMPLEMENTATION OF FARM AND LAND MANAGEMENT ACTIONS THAT BUILD RESILIENCE

Opportunities for action

- Property/farm management planning courses or support
- Land management capacity building activities
- Support fodder management practices
- Improve on-farm data monitoring
- Support installation of drought-resilient infrastructure
- Facilitate learning from drought experiences
- Investigate new crops and circular economy opportunities
- Support tourism and value-added production

POTENTIAL OUTPUTS Activities and participation	DESIRED OUTCOMES Related goal	OUTCOME INDICATORS	
		1-5 years	5-15 years
• Number of farm management plans developed by primary producers • Percentage of land managers implementing learned practices. • Number and value of infrastructure grants or subsidies provided • Number of regional forums or conferences facilitated. • Number of capacity building workshops and training sessions held.	Innovative, diversified and sustainable primary producers prepared for a variable and changing climate	• Pest and overabundant species populations and distribution (target decrease) • Adoption of resilient fodder practices (target increase) • Farms using soil moisture monitoring systems (target increase) • Circular economy practices adopted by farms (target increase) • Agritourism ventures and revenue (target increase) • Grain research (target increase)	• Farm productivity and profitability (target increase) • Soil health (target increase) • Condition and extent of biodiversity on private land (target increase)

PRIORITY STRATEGY - FOSTER COMMUNITY COLLABORATION AND BUILD SOCIAL CONNECTION

Opportunities for action

- Organise program of regional community events and activities
- Provide opportunities for regional organisations to come together and identify opportunities to collaborate
- Support local sport and cultural events
- Invest in community infrastructure

POTENTIAL OUTPUTS Activities and participation	DESIRED OUTCOMES Related goal	OUTCOME INDICATORS	
		1-5 years	5-15 years
• Number of community events held and attendance at events • Number of meetings or networking opportunities facilitated • Investment in community clubs and organisations • Investment in community infrastructure	Strong, healthy individuals and connected communities learning and working together for a positive future.	• Number of people participating in targeted community events (target increase) • Collaborative project delivery involving multiple partners (target increase) • Community satisfaction with local events and facilities (target increase).	• Community volunteering (target maintain or increase) • Community physical and mental health (PHIDU* self-reported (target increase) *Public Health Information Development Unit – Torrens University

PRIORITY STRATEGY - ENHANCE BUSINESS, FINANCIAL AND RISK MANAGEMENT LITERACY AND PLANNING

Opportunities for action

- Provide education and training to build business owners' financial management skills
- Provide education and training in digital literacy
- Provide independent financial advice
- Support industry networking for drought preparedness

POTENTIAL OUTPUTS Activities and participation	DESIRED OUTCOMES Related goal	OUTCOME INDICATORS	
		1-5 years	5-15 years
• Number of businesses accessing education and training • Number of businesses adopting new digital tools and practices • Increase in collaborative initiatives or partnerships resulting from networking	Business owners managing climate and other risks for long term financial success, contributing to regional economic growth.	• Number of primary production businesses implementing business management plans (target increase) • Adoption of digital tools and practices among businesses (target increase) • Business confidence in financial decision-making and risk management (target increase) • Participation in drought preparedness networks and forums (target increase)	• Small business closures (target decrease) • Business financial failures or insolvencies (target decrease) • Industry collaboration supporting drought preparation, response and recovery (target increase) • Business owners accessing Rural Financial Counselling Service or similar programs (target decrease)

PRIORITY STRATEGY - ESTABLISH EFFECTIVE DROUGHT GOVERNANCE TO SUPPORT DROUGHT PLAN IMPLEMENTATION AND LOCAL DECISION-MAKING

Opportunities for action

- Continue and expand AHFKI Drought Resilience Steering Committee
- Secure funding for a project officer
- Document and socialise drought roles, responsibilities and governance
- Prepare and implement drought communications strategy

POTENTIAL OUTPUTS Activities and participation	DESIRED OUTCOMES Related goal	OUTCOME INDICATORS	
		1-5 years	5-15 years
• Number of Steering Committee meetings held annually • Number of advocacy submissions • Increase in community and stakeholder awareness of drought management efforts • Number of funding applications submitted	Effective resilience building initiatives that reflect the region's unique needs, led locally and informed by local knowledge and community input.	• Funding applications and value of funding received (target increase) • Community and stakeholder satisfaction with project delivery and support (target increase)	• Success of drought resilience project delivery on time and on budget • Reputation of cross-agency group to support, deliver and advocate (target increase) • Community informed and engaged in drought resilience efforts (target increase)

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ATTACHMENT 1

Adelaide Hills, Fleurieu and Kangaroo Island Regional Drought Resilience Plan – Background Report

Background Report

8 January 2025

Lead consultant	URPS 27 Halifax Street Enter via Symonds Pl Adelaide SA 5000 (08) 8333 7999 urps.com.au
In association with	Richardson Consulting
Prepared for	Adelaide Hills, Fleurieu & Kangaroo Island Drought Resilience Steering Committee
Consultant Project Manager	Anna Pannell, Associate Director apannell@urps.com.au
URPS Ref	24ADL-0489

Document history and status

Revision	Date	Author	Reviewed	Details
V1	12/07/24	R. Liew, A Pannell	A. Pannell	Draft report for Steering Committee review
V2	30/08/24	R. Liew, A Pannell	Steering Committee, E. Mansfield	Final report following Steering Committee review
V3	08/01/2025	R. Liew, A Pannell	E. Mansfield	Minor updates following CSIRO review

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DROUGHT RESILIENT
ADELAIDE HILLS
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KANGAROO ISLAND

Contents

Acknowledgement of Country

The Adelaide Hills, Fleurieu and Kangaroo Island Drought Resilience Steering Committee acknowledge Aboriginal people as the First Peoples and Nations of the lands and waters we live and work upon. We pay our respects to Elders past, present and emerging. We acknowledge and respect the deep spiritual connection and the relationship that Aboriginal and Torres Strait Islander people have to country and commit to working with the First Nations people of the region as we deliver the Regional Drought Resilience Plan.

1. Introduction

The Adelaide Hills, Fleurieu and Kangaroo Island (AHFKI) region has diverse and highly productive agriculture, horticulture and viticulture, established in a temperate climate which has had generally reliable winter rainfall and warm, dry summers. This production and the agricultural landscape support world-renowned food, fibre and wine manufacturing and significant tourism activity.

Recent decades have seen declines in annual, winter and spring rainfall across the region and an increase in average maximum temperatures. Climate projections indicate these trends will continue to the end of the century with increasing frequency and duration of drought conditions.

Drought resilience refers to the ability of individuals, communities, industries or environments to adapt, reorganise or transform in response to changing temperature, increasing variability and scarcity of rainfall, and changed seasonality of rainfall, to maintain or improve economic, environmental or social wellbeing.

Building, maintaining and enhancing drought resilience as the climate changes and rainfall patterns change and become more variable and unpredictable is essential for the future of the region's agriculture and supporting industries and communities.

In last 10 years the region has been impacted by significant disruptions. Drought during 2018-19 was followed by bushfires that burnt across the Adelaide Hills and nearly half of Kangaroo Island in 2019-20. The ensuing COVID-19 pandemic saw further disruption to the economy and community.

Enhancing drought resilience will also help the AHFKI region prepare for, respond to and recover from other stresses or pressures.

1.1 Regional drought resilience planning

The Australian Government established the Future Drought Fund (FDF) to provide secure, continuous funding for drought resilience initiatives. Through the FDF, the Australian Government is working with the South Australian Government to support the AHFKI region in developing a Regional Drought Resilience Plan to prepare for and manage future drought risks.

The AHFKI Drought Resilience Steering Committee is guiding the preparation of the Regional Drought Resilience Plan for the AHFKI region. URPS has been engaged to work with the Steering Committee to develop the Plan.

The AHFKI Drought Resilience Plan will document how the region's agricultural sector might be impacted by drought, describe a desired future or vision that acknowledges more frequent or severe drought and greater rainfall variability, and identify strategies and actions to build resilience to ensure agricultural production and farming landscapes are maintained and economic and social development opportunities are optimised.

This Background Report will be the foundation for preparing the AHFKI Drought Resilience Plan.

1.2 Preparing the Background Report

This Background Report was prepared through the following tasks:

- **Literature review**: collation and synthesis of published information about the region and shared values, challenges, and opportunities through review of regional plans and strategies and other relevant regional documents. The review also looked at literature on leading resilience practice, planning and implementation from elsewhere to identify 'lessons learnt' or ideas for action. The literature review considered a range of sources from peer-reviewed scientific articles to regional, state and federal strategic plans, website articles and technical reports. These sources have been referenced throughout the Background Paper.
- **Regional engagement** with 55 people across the AHFKI region to understand how drought has or could impact the agricultural sector, what makes people, communities and regions resilient to drought, and what actions or initiatives could be put in place to increase drought resilience in the region. Workshops were held in the following locations at the end of June 2024:
  - Charleston
  - Parndana
  - Strathalbyn
  - Mount Compass
- **Key informant interviews with local subject matter experts** to understand how drought has impacted the AHFKI region in the past, what programs have worked well to build drought resilience and how the Regional Drought Resilience Plan can best be implemented.
- **Key informant interviews with drought resilience planners from other regions** to learn from the experiences of other regions and gain insights into how the Regional Drought Resilience Plan can be prepared most effectively.

Appendix A contains the Regional Engagement Summary Report

2. The Adelaide Hills, Fleurieu and Kangaroo Island Region

The AHFKI Regional Drought Resilience Plan covers the Adelaide Hills, Fleurieu Peninsula, McLaren Vale and Kangaroo Island as illustrated in Figure 1.

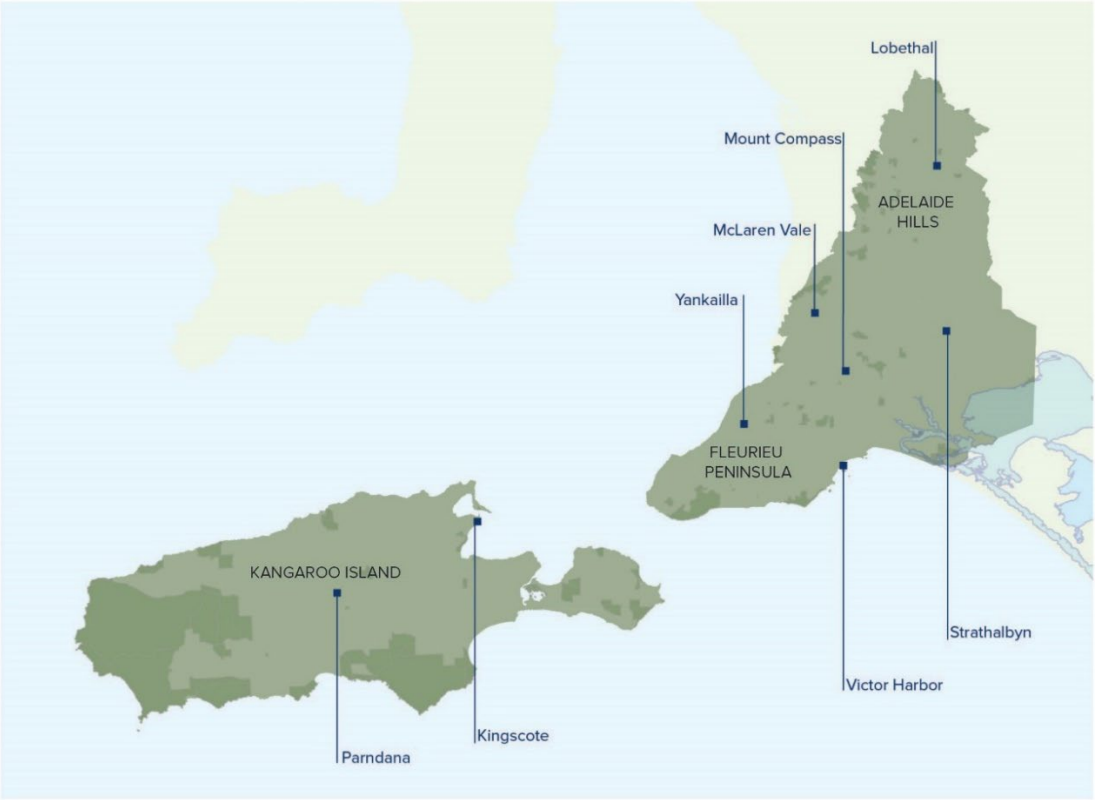


Figure 1 Location map

The Adelaide Hills' cool climate and rolling terrain make it ideal for viticulture and apple, pear and cherry orchards. The Mount Lofty Ranges to the east provide a natural boundary from metropolitan Adelaide. The Adelaide Hills attracts visitors with its picturesque agricultural and natural landscapes and high-quality local food and wine production. Significant population growth has occurred over the past decade and further growth particularly around Mount Barker is projected.

The Fleurieu Peninsula is home to dairy and livestock farms, viticulture including the wine regions of Langhorne Creek and McLaren Vale, and a thriving tourism industry. The Fleurieu Peninsula population has grown at a rate double the State average over the past decade.

Kangaroo Island, Australia's third-largest island, lies off the coast of Fleurieu Peninsula. It features natural wilderness, broadacre grazing and stunning coastal scenery. The island is separated from the Fleurieu Peninsula by the Backstairs Passage, requiring a ferry transfer or plane flight to access from the mainland. Kangaroo Island is noted for its unique wildlife, conservation areas and sustainable agriculture, particularly in sheep, grains, beef, horticulture and viticulture.

Further information on the region is provided in the following sections.

NOTES on demographic data and economic data

Demographic and economic data is presented for the AHFKI region as a whole (except where specified), as well as for Adelaide Hills (the area within the Adelaide Hills Council, Mount Barker Council), Fleurieu (Alexandrina Council, District Council of Yankalilla and the City of Victor Harbor), Kangaroo Island and McLaren Vale.

Demographic data for the McLaren Vale Character Preservation District has been approximated from the three Statistical Areas Level 2 (SA2s) (Clarendon, McLaren Vale and Willunga) that comprise the majority of the district as illustrated in Figure 2. SA2s are medium-sized geographic areas used by the Australian Bureau of Statistics (ABS) for the Census and other statistical purposes. They are designed to represent a community that interacts socially and economically, such as a town, suburb or a group of neighbouring suburbs.

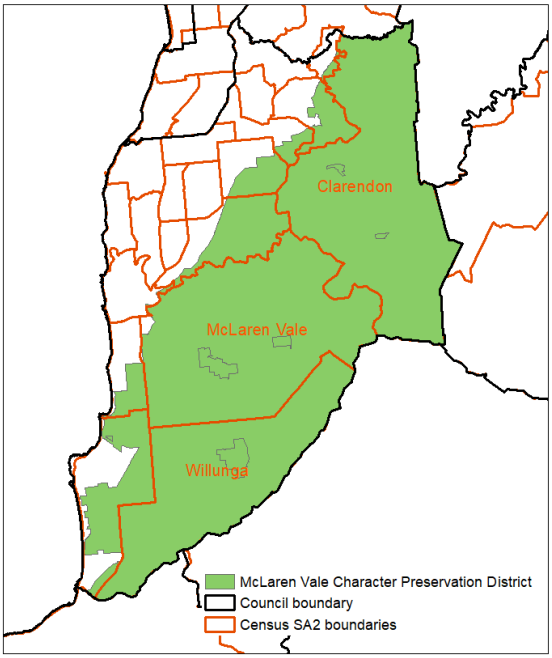


Figure 2 McLaren Vale Character Preservation District, approximated by using demographic data from the Clarendon, McLaren Vale and Willunga SA2s

2.1 Population

The region's population varies between sub-regions. Key features of the region's population include:

- A growing population – growing faster than the rest of the State and project to continue to grow to 2041.
- An older population overall compared to South Australia.
- An older population on the Fleurieu Peninsula with a greater proportion of residents requiring assistance with core activities.
- A greater proportion of younger people in the Adelaide Hills, with a greater proportion of the population with university qualifications and more households in high income brackets.
- A less culturally and linguistically diverse community than the State as a whole.
- A low proportion of residents identifying as Aboriginal and Torres Strait Islander.
- Low rates of unemployment.
- Higher rates of volunteering, particularly on Kangaroo Island.

Key demographic statistics from the Australian Bureau of Statistics 2021 Census and REMPLAN Community have been summarised in Table 1.

Table 1 Key demographics for the AHFKI region and SA (REMPLAN Community 2021; ABS 2021)

	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	McLaren Vale	Total AHFKI region (including McLaren Vale)	South Australia
Resident population 2021	79,723 people	50,704 people	4,894 people	13,677 people	148,998 people	1,781,516 people
Population change 2011 - 2021	17.1% increase	20.9% increase	10.8% increase	17.5% increase	18.2% increase	11.6% increase
Projected population 2041 – medium growth scenario (PlanSA)	35.8% increase	39.5% increase	22.6% increase	Not available	36.4% increase (excluding McLaren Vale)	22.0% increase
Median age	42 years	56 years	50 years	47 years	47 years	41 years
Ages cohorts as compared to SA	Higher proportion of 0-19	Lower proportion of	Lower proportion of	Higher proportion of young people	Lower proportion of labour force	N/A

	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	McLaren Vale	Total AHFKI region (including McLaren Vale)	South Australia
	years and people aged 40-74 years Lower proportion of 20-39 years and older people aged 75+	people aged 0-54. Higher proportion of people aged 55+	people aged 0-49 years Higher proportion of older people aged 50-84 years	aged 5-19 years and people aged 45-84 years Lower proportion of labour force aged 20-44 years and people aged 85+	aged 20 to 44 Higher proportion of people aged 45 to 84	
Aboriginal and Torres Islander peoples	1.0%	1.6%	1.7%	0.9%	1.2%	2.4%
Households where a non-English language is spoken	7.2%	11.5%	5.3%	4.3%	4.3%	19.0%
Most common language other than English used at home	German (0.6%)	German (0.4%)	German (0.6%)	Italian (0.8%)	German (0.5%)	Mandarin (1.8%)
Highest level of education						
Bachelor degree level and above	27.8%	13.1%	17.2%	19.1%	18.8%	22.7%
Certificate III & IV Level	18.3%	17.7%	19.3%	16.9%	16.2%	17.6%
Year 12	14.2%	36.4%	13.4%	45.1%	43.2%	15.2%
Year 10	7.6%	17.6%	10.0%	12.6%	13.4%	9.4%
Labour force (includes	42,406 people	20,097 people	2,375 people	7,169 people	72,047 people	887,193 people

	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	McLaren Vale	Total AHFKI region (including McLaren Vale)	South Australia
employed and unemployed)						
Unemployment rate	3.5%	1.9%	3.6%	1.9%	1.9%	5.4%
Population that needs assistance with core activities	4.5%	8.4%	4.4%	4.6%	5.8%	6.7%
Volunteering rate	19.7%	19.6%	27.7%	18.1%	19.8%	14.1%
Proportion of households earning less than $650 per week	13.3%	24.6%	27.1%	14.0%	18.2%	19.6%
Proportion of households earning more than $3000 per week	25.8%	9.8%	10.2%	23.3%	19.0%	17.7%

2.1.1 First Nations people

The First Nations of the AHFKI region include Peramangk, Kaurna and Ngarrindjeri. Just over 1% of the region's population identifies as Aboriginal and/or Torres Strait Islander.

2.2 Economy

The economy of the region as a whole is diverse, however on Kangaroo Island nearly 25% of employment is in the agricultural sector, and nearly 33% of economic output is from agriculture.

The AHFKI region's economy is dominated by household service industries, agriculture, construction, and manufacturing. The agriculture industry ranked sixth in employment and second in economic value generation. This agricultural focus not only supports local employment but also draws tourists, further supporting the region's economic stability. Notably, the agriculture and tourism industry's share of total economic value in the region was significantly higher than the South Australia average (Regional Development Australia (RDA) AHFKI 2022a).

The economic data provided in Table 2 is taken from the RDA Adelaide Hills Fleurieu & Kangaroo Island April 2022 Regional Economic Health Update and REMPLAN Economy unless otherwise specified.

Table 2 Economic characteristics of the AHFKI region (RDA AHKFI 2022a, ABS Census 2021, Profile.id 2021, REMPLAN Economy 2023)

	Adelaide Hills	Fleurieu Peninsula	McLaren Vale (Onkaparinga)	Kangaroo Island	Total AHFKI Region
Top 3 industries of employment (and agriculture) Source: ABS Census 2021, REMPLAN Economy 2023	Health care & social assistance (13.5), retail trade (12.7%) and accommodation & food services (10.1%) Agriculture, forestry & fishing – 7th (6.3%)	Health care & social assistance (17.1%), retail trade (12.1%) and agriculture, forestry, & fishing (11.0%)	Health care & social assistance (17.1%), retail trade (9.7%) and construction (8.4%) Agriculture, forestry & fishing – 17th (1.1%)	Agriculture, forestry, & fishing (24.0%), accommodation & food services (11.8%) and health care & social assistance (9.5%)	Health care & social assistance (14.6%), retail trade (12.3%) and accommodation & food services (10.4%) Agriculture, forestry & fishing – 6th (8.9%)
Gross Regional Product (GRP) Source: REMPLAN Economy 2023, Profile.id 2021	$4.1 billion (2.9% of SA's GSP)	$2.4 billion (1.7% of SA's GSP)	Not available	$362 million (0.3% of SA's GSP)	$6.8 billion Excluding McLaren Vale (4.8% of SA's Gross State Product)
GRP per capita Source: REMPLAN Economy 2023	$51,201 per capita	$50,703 per capita	Not available	$73,894 per capita	$50,405 per capita
GRP per worker Source: REMPLAN Economy 2023	$160,434 per worker	$160,615 per worker	Not available	$162,243 per worker	$160,591 per worker

2.3 Agriculture, horticulture and viticulture

Agriculture is a significant contributor to the region. Viticulture, horticulture, livestock and cropping contribute through both their outputs and employment and the reputation of the area as a premier food and wine destination.

2.3.1 Livestock, wool and dairy

Sheep and lambs (for meat and wool) and beef cattle are raised on farms across the region, with a number of dairy farms (cows) mostly on the Fleurieu Peninsula and a small number of goat dairies. In 2022/23 there were 86 dairy farms and 23,2000 cows in the Central SA region (Adelaide Hills, Fleurieu Peninsula, Murray Swamps & Meningie Lakes) producing 34% of the State's milk production (Dairysafe 2023). Other livestock raised in the region include poultry (for meat and eggs) and pigs.

Agriculture on Kangaroo Island is predominantly centred around sheep, with two-thirds of local farmers engaged in wool production. The Island is home to over 500,000 sheep, 73,300 poultry birds, 20,000 cattle, and other livestock (Authentic Kangaroo Island 2024).

2.3.2 Cropping

The AHFKI region contributes 116,670 tonnes of crops to South Australia's total production, representing approximately 1.3% of the State's overall crop yield. The most common dryland (non-irrigated) crops produced in the region include wheat, canola, beans, barley and oats, predominantly on Kangaroo Island and the eastern Mount Lofty Ranges.

In the Central Hills and Fleurieu area, cropping primarily involves wheat, canola, and barley, covering over 29,400 hectares. This area is known for its high-quality cereal grains, which yield around 55,500 tonnes annually (PIRSA 2024a).

Kangaroo Island is known for its pure grain production, with a strong commitment to remaining free from genetically modified crops. The Island specialises in canola, wheat, and barley, with about 18,300 hectares under cultivation. The Island's cropping sector generates around 36,000 tonnes annually, bolstered by favourable conditions for canola production (PIRSA 2024a).

2.3.3 Grapes

The AHFKI region includes six recognised winegrape growing regions.

The **Adelaide Hills** wine region is one of the coolest and most elevated regions in Australia, allowing grapes to ripen slowly. The higher rainfall benefits grape production however rainfall and humidity can lead to greater pest and fungal disease than in drier areas (Adelaide Hills Wine Region 2024).

The **McLaren Vale** wine region was the first area in South Australia to be planted with vines. The Mediterranean climate with moderate winters and warm summers and moderating influence of the Mount Lofty Ranges and Gulf St Vincent on climate extremes has allowed the region to develop an international reputation for premium red grape varieties. In recent years Mediterranean alternative red and white varieties have been planted, many of which have a lower water demand (McLaren Vale Wine 2024). Historically, irrigation water supply for vines in McLaren Vale relied on groundwater. However, alternate supply of treated wastewater from the Willunga Basin Water Company now supplies around 65% of irrigation demand (coNEXA 2023).

Further south from McLaren Vale, the **Southern Fleurieu** wine region experiences a long, cool growing season and like the other regions, the Gulf St Vincent and the Southern Ocean provide natural protection

from excessive heat (South Australian Wine Industry Association (SAWIA) 2024b). The **Currency Creek** wine region has a slightly cooler climate than McLaren Vale. Lake Alexandrina and the Southern Ocean moderate climate extremes. The region's lower rainfall is supplemented by irrigation from the River Murray and groundwater (SAWIA 2024a).

The **Langhorne Creek** wine region has a similar climate to Currency Creek, moderated by cool summer and autumn breezes that come across Lake Alexandrina. In winter and spring, flood waters often flow down the Angus and Bremer Rivers, providing excellent deep irrigation for the following growing seasons (Langhorne Creek Wine Region n.d.).

The **Kangaroo Island** wine region is relatively new, being officially registered as a wine region by Geographic Indication in the year 2000. Like the other Fleurieu Zone wine regions, the temperate climate and moderating ocean influences ensure long, slow ripening of the grapes.

2.3.4 Apples, pears, cherries and strawberries

Centred on the Lenswood Valley, the Adelaide Hills region is South Australia's most important and longest established apple growing area, with nearly 80% of the State's growers in this region (Aussie Apples n.d.). The Adelaide Hills is also the main region for pear orchards in South Australia (Australian Pears 2019).

The Adelaide Hills region produces 90-95% of South Australia's cherry production. Microclimate variations across the Hills mean maturity can vary for the same variety which is beneficial as cherries are picked ripe and cannot be stored as long as other fruits.

Almost all South Australian strawberries are grown in the region, with a number of farms in the Adelaide Hills and Fleurieu Peninsula.

2.3.5 Food and wine manufacturing

Across the AHFKI region, food and wine manufacturing using regional produce creates wine, gin, beer, juice, dairy products, jams and condiments, bakery products and more for local, national and international markets (RDA AHFKI 2024a).

2.3.6 Economic contribution of the agriculture sector

In 2021/22, the agricultural sector generated $1.47 billion in gross revenue across the region, accounting for 11.2% of total regional output. On Kangaroo Island, the sector contributes one third of regional output.

Table 3 summarises the value of the agriculture, forestry and fishing sector's outputs in 2021. This data has been sourced from REMPLAN (RDA Adelaide Hills, Fleurieu and Kangaroo Island) with data for the McLaren Vale Character Preservation District sourced from the City of Onkaparinga's economic profile (.id community).

NOTE – figures for the McLaren Vale Character Preservation District have assumed all agricultural production in the City of Onkaparinga occurs within this area.

Table 3 Value of agriculture, forestry, and fishing industry sector output / gross revenue generated by businesses/organisations in $ millions (REMPLAN Economy 2023; profile.id 2021)

Outputs (product)	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	Total AHFKI region (excluding McLaren Vale)	McLaren Vale) 2020/21
Sheep, Grains, Beef and Dairy Cattle	$200.9M (2.5% of Adelaide Hills output)	$419.1M (9.6% of Fleurieu output)	$171.3M (24.8% of Kangaroo Island output)	$791. M (6.0% of regional output)	$1.4M (excluding Milk) $2.3M (including Milk)
Other Agriculture	$302.7M	$153.7M	$4.3M	$460.6M	$60.9M
Poultry & Other Livestock	$34.5M	$26.9M	$17.7M	$79.2M	$4.8M
Forestry & Logging	$28.3M	$0	$9.1M	$37.5M	N/A
Fishing, Hunting & Trapping	$0	$9.2M	$4.2	$13.5M	N/A
Agriculture, Forestry & Fishing Support Services	$26.2M	$36.3M	$10.4M	$72.9M	N/A
Aquaculture	$3.4M	$1.9M	$10.7M	$16.0M	N/A
Totals	$596.0M (7.4% of Adelaide Hills output)	$647.1M (14.8% of Fleurieu output)	$227.7M (33.0% of Kangaroo Island output)	$1,470.8M (11.2% of total regional output)	$68.5M

The proportion of residents employed in agricultural industries varies from 3% of Adelaide Hills residents, to 18% of Kangaroo Island residents. Table 4 shows the top five agricultural sectors of employment for each of the subregions.

Table 4 Number of regional residents employed in the agricultural industry (top five) (REMPLAN Economy 2023; ABS 2021)

Sector Rank	Adelaide Hills	Fleurieu Peninsula	Kangaroo Island	Total AHFKI region (excluding McLaren Vale)	McLaren Vale (Onkaparinga Economic id)
1	Beef Cattle Farming (Specialised) (179 people)	Beef Cattle Farming (Specialised) (242 people)	Sheep Farming (Specialised) (203 people)	Beef Cattle Farming (Specialised) (441 people)	Grape growing (301 people)
2	Grape Growing (171)	Dairy Cattle Farming (226)	Grain-Sheep or Grain-Beef Cattle Farming (44)	Sheep Farming (Specialised) (402)	Other Agriculture and Fishing Support Services (56)
3	Agriculture, nfd* (157)	Grape Growing (177)	Sheep-Beef Cattle Farming (43)	Grape Growing (348)	Agriculture, nfd (38)
4	Apple and Pear Growing (119)	Agriculture, nfd (142)	Agriculture, nfd (38)	Agriculture, nfd (335)	Nursery Production (Outdoors) (37)
5	Vegetable Growing (Outdoors) (85)	Sheep Farming (Specialised) (131)	Poultry Farming (Eggs) (21)	Dairy Cattle Farming (281)	Beef Cattle Farming (Specialised) (17)

* nfd = Not further defined – refers to inadequately described or non-specific responses (ABS Census Dictionary 2021)

2.3.7 Land use

The region includes a total of 494,500 hectares of land used for agricultural purposes, comprising 57% of the total region.

Agricultural land use

(Data SA 2023)

	Area (ha)	% of region
Livestock and pasture	379,702	44%
Agriculture	72,957	8%
Horticulture (inc viticulture)	41,818	5%

2.4 Natural environment

The AHFKI region's environment is made up of a blend of forests, coastlines, and agricultural land that creates a unique and ecologically rich environment that supports both biodiversity and agriculture. Farmers play a key role in maintaining biodiversity, with many farmers allocating significant areas of their property to native vegetation retention and revegetation. Key features and characteristics of the region's natural environment are described in Table 5.

Table 5 Natural environment - key features and characteristics (Data SA 2020, NatureMaps 2024)

Theme	Key features and characteristics
Protected areas	77 conservation reserves and national parks, accounting for 16% of the region
Species with conservation status	• 49 flora species and 61 fauna species with national conservation ratings) under the *Environment Protection and Biodiversity Conservation Act 1999* • 362 flora species and 144 fauna species with state conservation ratings under the *National Parks and Wildlife Act 1972*

2.4.1 Water resources

The AHFKI region contains several sources of water that supports primary production including:

- surface water (e.g. River Murray, local watercourses and dams)
- groundwater
- desalinated water and
- recycled water.

Table 6 summarises key features and characteristics of water resources in the AHFKI region.

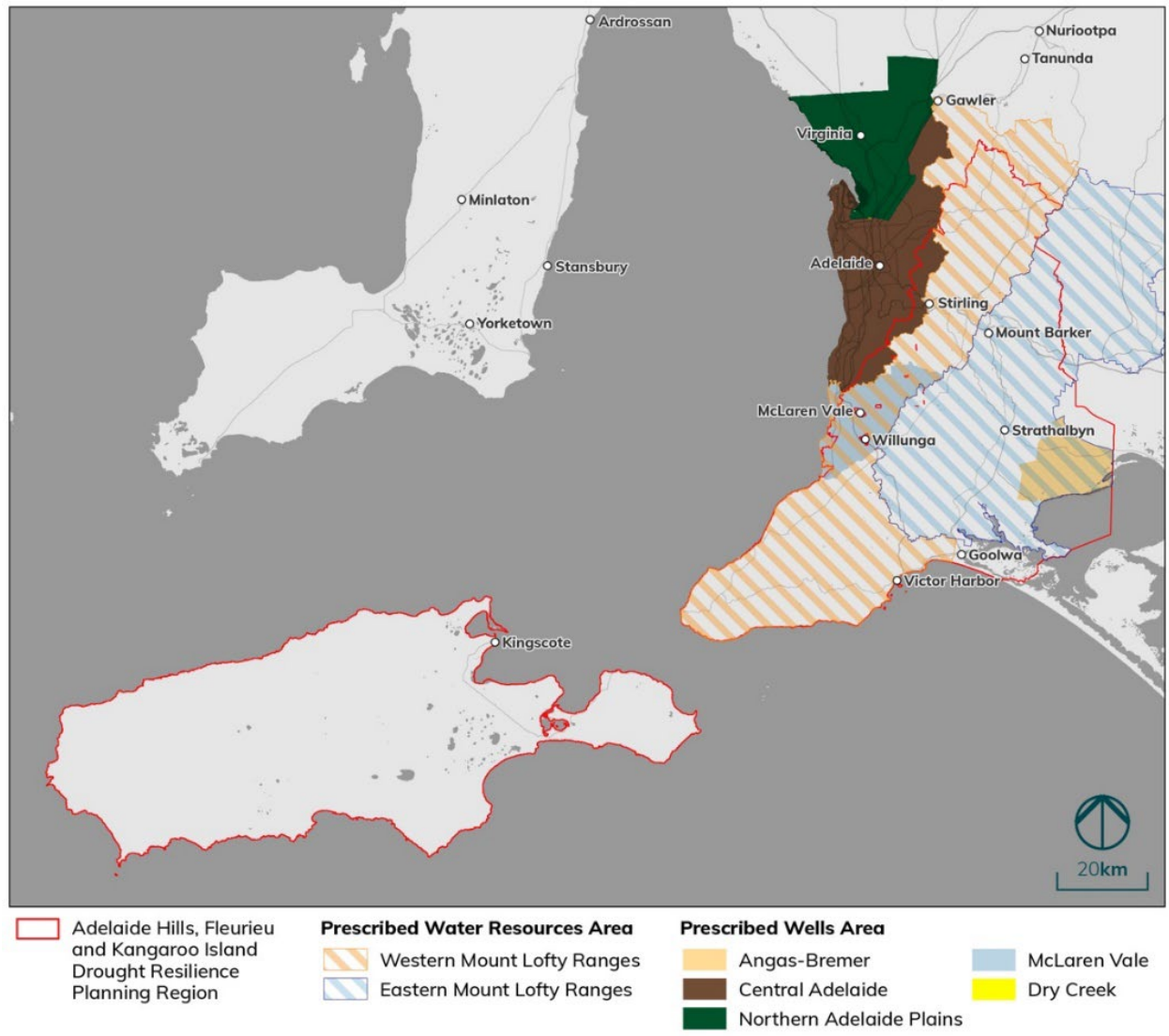
Table 6 Water resources – key features and characteristics

Water resource	Key features and characteristics
Groundwater	Groundwater is a vital resource in the AHFKI region, supporting agricultural activities. The region contains several aquifers, with groundwater reserves found in (for example) fractured rocks of the Adelaide Hills, Permian Sands on the Fleurieu and limestone aquifers in the Angas-Bremer and McLaren Vale regions. • The Adelaide Hills and Fleurieu Peninsula areas rely heavily on groundwater sources due to limited surface water availability, particularly during dry seasons. • The Eastern Mount Lofty Ranges contain notable aquifers that are tapped for both agricultural and domestic uses. • The McLaren Vale region historically relied upon groundwater resources for irrigation however expansion of the irrigated area has driven a need for an alternate supply to supplement the use of groundwater. • Groundwater resources on Kangaroo Island are very limited and generally saline.

Water resource	Key features and characteristics
	(Hills and Fleurieu Landscape Board 2021, Kangaroo Island Landscape Board 2021) Groundwater conditions are generally stable in the region although there is some gradual decline in groundwater levels in McLaren Vale and localised salinity increases (DEW, 2022c). A managed aquifer recovery scheme operates in the Angas Bremer with around 0.8 GL of surface water injected in 2020-21 (DEW, 2022b).
Surface water	Surface water and groundwater resources are used extensively through the region for stock and domestic use and irrigation of pastures, grapes and horticulture. Most of the Adelaide Hills and Fleurieu region is in the Prescribed Water Resources Area. Surface water is captured through diversions from watercourses and off-stream storage. Several notable rivers traverse the AHFKI region. • The Onkaparinga River in the Adelaide Hills is one of the largest and most significant, flowing through to the coast and supporting diverse ecosystems along its course. • The Murray River, although more associated with regions further east, influences the Lower Lakes and Coorong wetlands on the Fleurieu Peninsula, providing critical water inflows that maintain ecological health. • On Kangaroo Island, the Cygnet River is the largest river, supporting local ecosystems and agriculture.
Prescribed Water Resources Areas and Wells Areas	The taking of surface water and groundwater in the region is controlled through several water allocation plans that apply to Western Mount Lofty Ranges (WMLR) and Eastern Mount Lofty Ranges Water Areas (EMLR) and Prescribed Wells Areas (PWAs) (Department for Environment and Water, 2020a). PWAs are designated zones where groundwater extraction is regulated to ensure sustainable use. PWAs in the region include Angas-Bremer, McLaren Vale (part), Central Adelaide (part) and Dry Creek. Around 104 gigalitres (GL) of licenced surface water was used in 2020-21 in the WMLR (DEW, 2022a). Around 22 GL of licenced surface water and 9 GL of groundwater was used in 2020-21 in the EMLR (DEW, 2022b). Around 4 GL of groundwater extracted from the McLaren Vale area in 2020-21(DEW, 2022c). Water resources on Kangaroo Island are not prescribed (although the NRM Plan provides some limits on use) but holds surface water resources used for stock

Water resource	Key features and characteristics
	and domestic (Middle River reservoir operated by SA Water provides around 0.5 GL/year) and limited groundwater supplies. Stock and domestic use is not licenced.
Wetlands	Wetlands in the region play critical roles in biodiversity conservation and water purification. These wetlands support diverse ecosystems, offering habitats for migratory birds and other wildlife. • The Fleurieu Peninsula is home to nationally and internationally significant wetlands such as Fleurieu Swamps and parts of the Ramsar listed Coorong and Lower Lakes system. • KI has 15 wetlands of national significance including the Flinders Chase River Systems, American River Wetland System, and Murray Lagoon.
Water infrastructure	Much of the region is serviced by mains water. Expansion of the irrigated area in the McLaren Value has driven a need for an alternate supply to supplement the use of groundwater. Around 7 GL of recycled water is now delivered to the McLaren Vale region each year for irrigation of high value wine grapes. There has also been investment in new pipelines to deliver River Murray water to irrigated regions such as The Creeks Pipeline Company delivering water to the Langhorne Creek and Currency Creek areas.

Figure 3 Prescribed water resources areas and prescribed wells areas intersecting the region



2.5 Climate

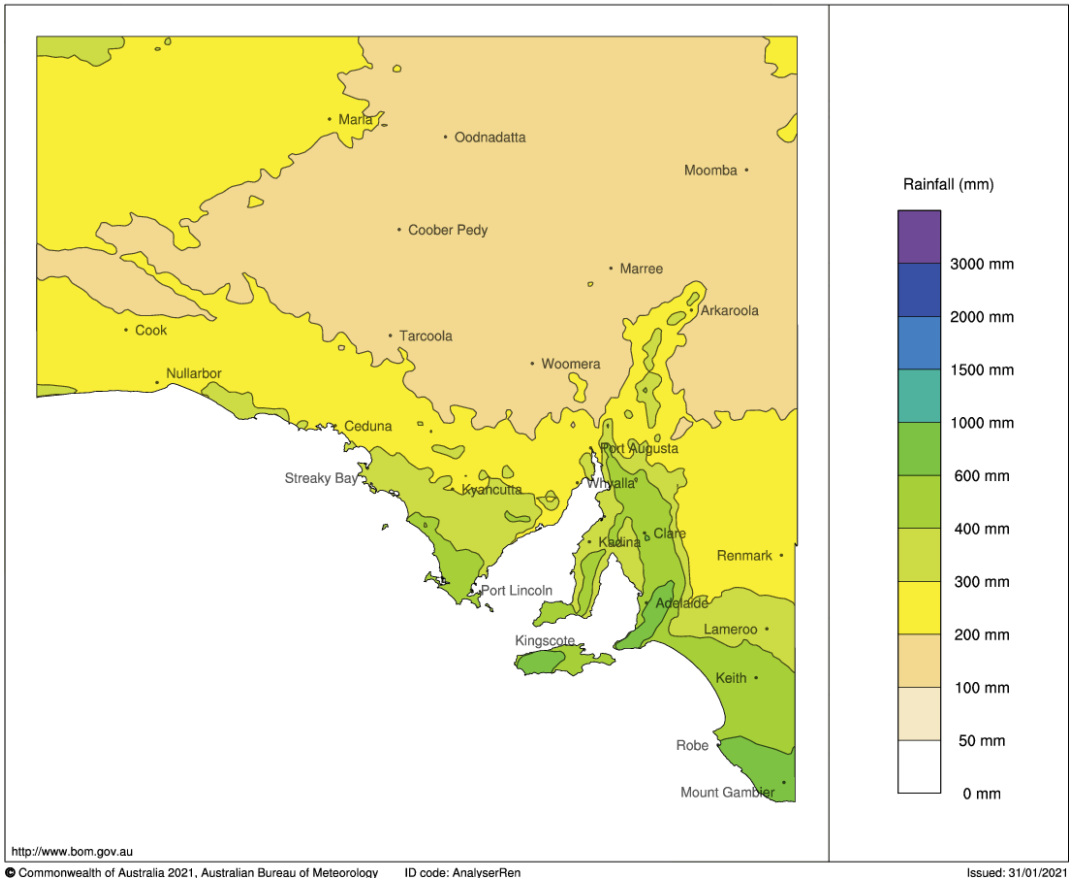
2.5.1 Rainfall

The AHFKI region experiences a Mediterranean climate characterised by warm to hot, dry summers and more mild wet winters. The Adelaide Hills, due to its elevation, tend to be cooler and wetter compared to the coastal areas, with more significant rainfall supporting vegetation and agriculture. The Fleurieu Peninsula enjoys a moderate climate, with coastal areas benefiting from maritime influences that moderate temperatures and provide consistent rainfall. Kangaroo Island's climate is similarly moderated by the surrounding ocean, leading to mild temperatures year-round and traditionally reliable winter rainfall.

Rainfall reduces moving east due to the influence of the Mount Lofty Ranges, with annual rainfall in Langhorne Creek less than half of that at Parawa.

Figure 4 shows that majority of the AHFKI region receives on average 400-1000mm of rainfall per year (Bureau of Meteorology 2021).

Figure 4 Average annual rainfall 1991 – 2020 (Bureau of Meteorology 2021)



The AHFKI region is all within the same rainfall zone, experiencing winter-dominant rainfall. The whole region experiences dry summers with little rainfall, especially in western Kangaroo Island (refer Figure 5 and Figure 6, BOM 2021).

Figure 5 Percentage of annual average rainfall occurring in summer 1991 to 2020 (Bureau of Meteorology 2021)

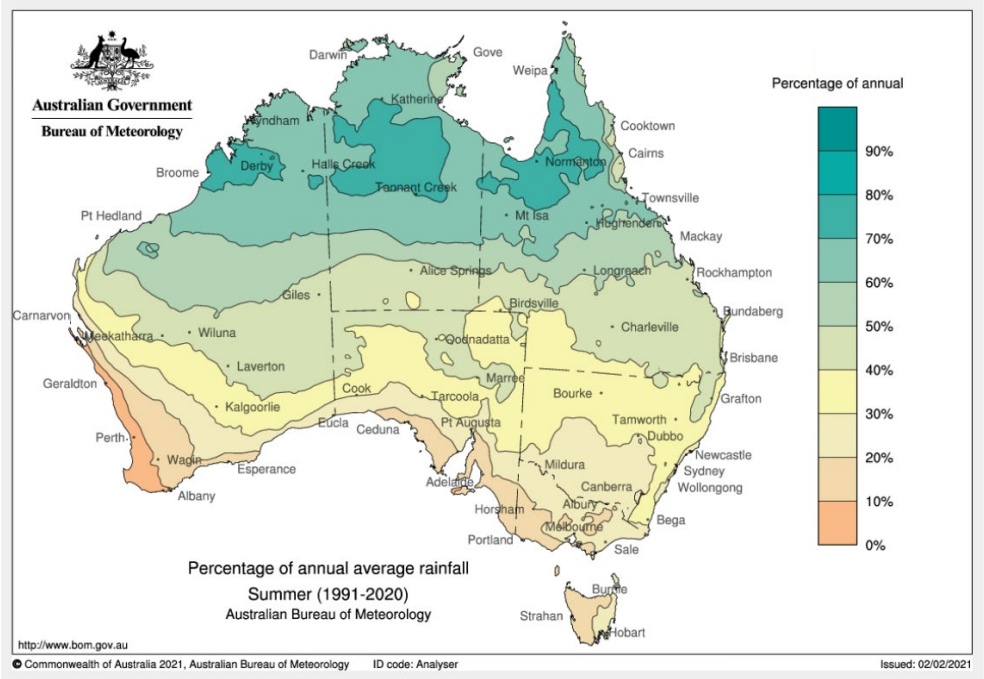


Figure 6 Percentage of annual average rainfall occurring in winter 1991 to 2020 (Bureau of Meteorology 2021)

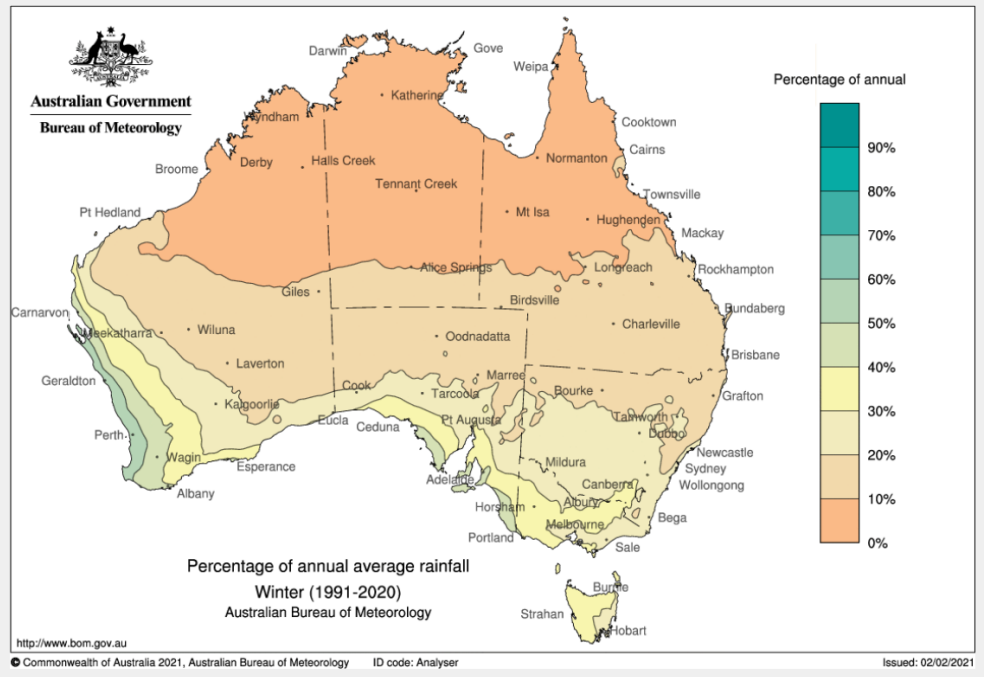
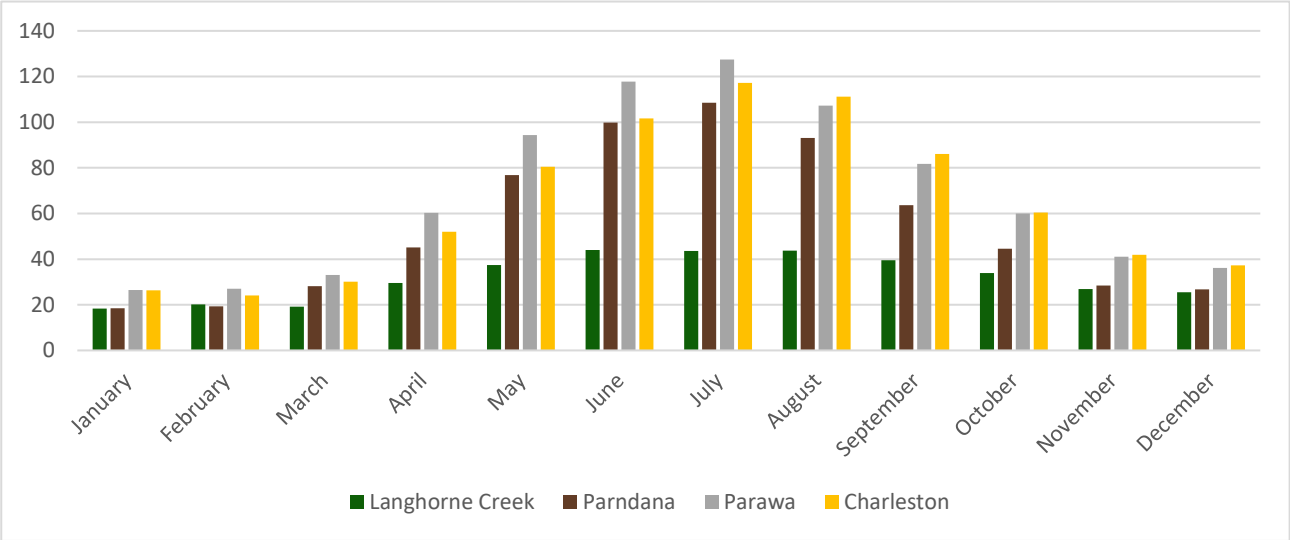


Figure 7 shows average monthly rainfall at four locations in the region from 1964 to 2023. Rainfall is significantly lower at Langhorne Creek, especially during the winter months.

Figure 7 Average monthly rainfall 1964 to 2023



Rainfall has been decreasing in recent decades. Data from myclimateview.com.au shown in Table 7 shows rainfall has reduced from the period 1964-1983 to 1984-2023.

Table 7 Rainfall change 1964 to 2023 (myclimateview.com.au)

Location	Average annual rainfall 1964 – 1993 (mm)	Average annual rainfall 1994 – 2023 (mm)	Change (mm)	Change (%)
Charleston	794	743	51	-6.4%
Mount Torrens	739	683	56	-7.6%
Mount Compass	876	810	66	-7.5%
Strathalbyn	499	463	36	-7.2%
Parawa	838	787	51	-6.1%
Parndana	672	634	38	-5.7%

2.5.2 Temperature

The AHFKI region experiences moderate temperatures, with most of the region experiencing average annual maximum temperatures of 15 to 24°C and average summer maximum temperatures of 18 to 27°C (see Figure 8 and Figure 9).

Figure 8 Average annual maximum temperature 1991 to 2020 (Bureau of Meteorology, 2021)

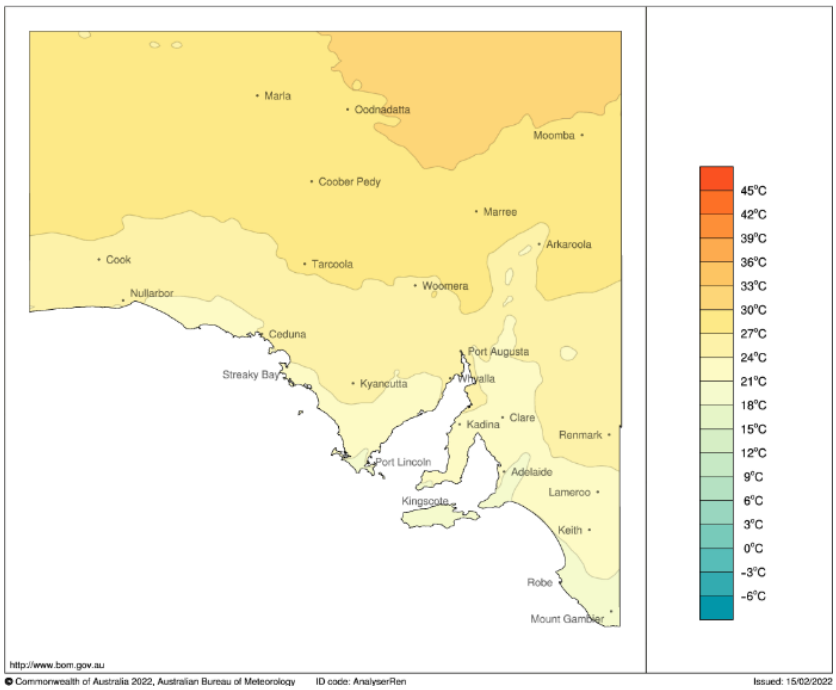
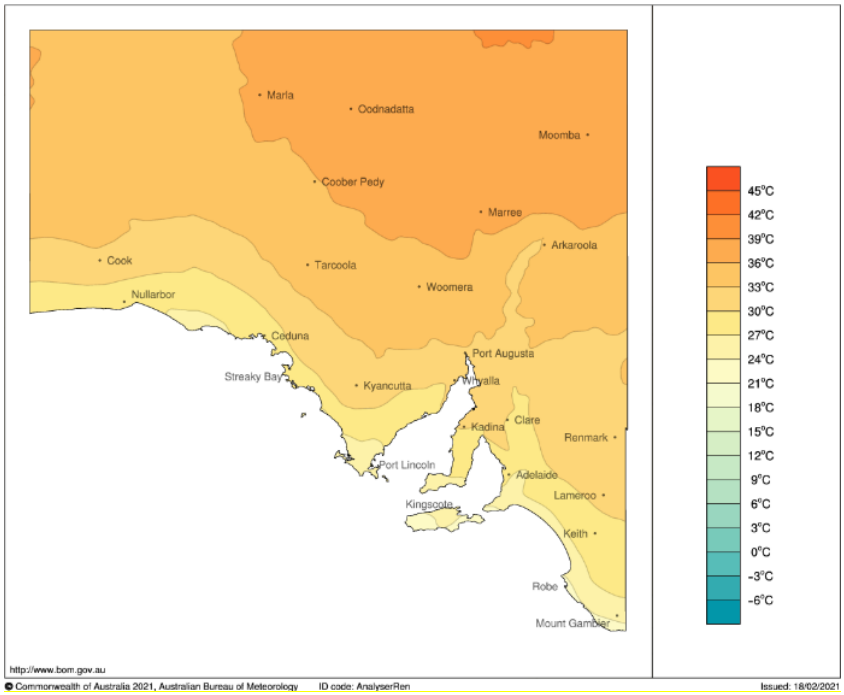


Figure 9 Average summer maximum temperature 1991 to 2020 (Bureau of Meteorology, 2021)



Temperature has been increasing in recent decades. Data from myclimateview.com.au shown in Table 8 shows the increase in average annual maximum temperature from the period 1964-1983 to 1984-2023.

Table 8 Temperature change 1964 – 2023 (myclimateview.com.au)

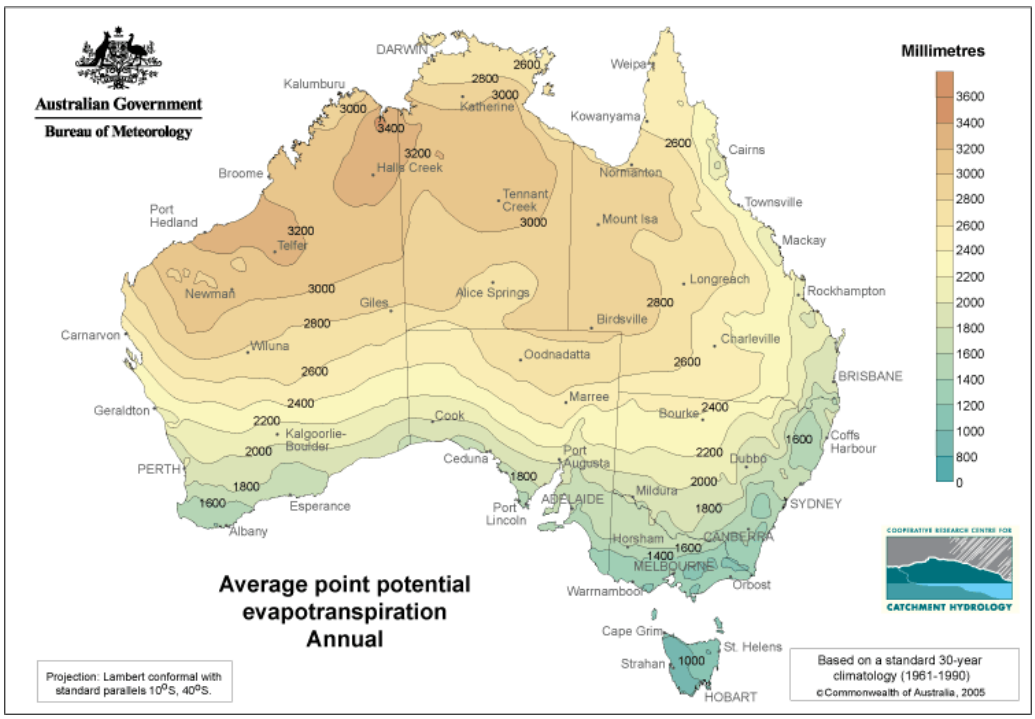
Location	Average annual maximum temperature 1964 – 1993 (°C)	Average annual maximum temperature 1994 – 2023 (°C)	Change (°C)	Change (%)
Charleston	19.2	19.9	+0.7	+3.6
Mount Torrens	19.3	20.0	+0.7	+3.6
Mount Compass	19.3	19.8	+0.5	+2.6
Strathalbyn	21.1	21.7	+0.6	+2.8
Parawa	18.4	18.9	+0.5	+2.7
Parndana	18.7	19.3	+0.6	+3.2

2.5.3 Evapotranspiration

Evapotranspiration is a collective term for the transfer of water, as water vapour, to the atmosphere from both vegetated and un-vegetated land surfaces. It is affected by climate, availability of water, vegetation type and abundance, and soil type.

Point potential evapotranspiration in the region is between 1.4 and 1.8 meters (refer Figure 10) (BOM 2005).

Figure 10 Average point potential evapotranspiration (annual) (Bureau of Meteorology, 2005)



2.5.4 Impact of rainfall on agricultural yield

The impact of reduced rainfall on agricultural and horticultural yield has been noted in the region for some time.

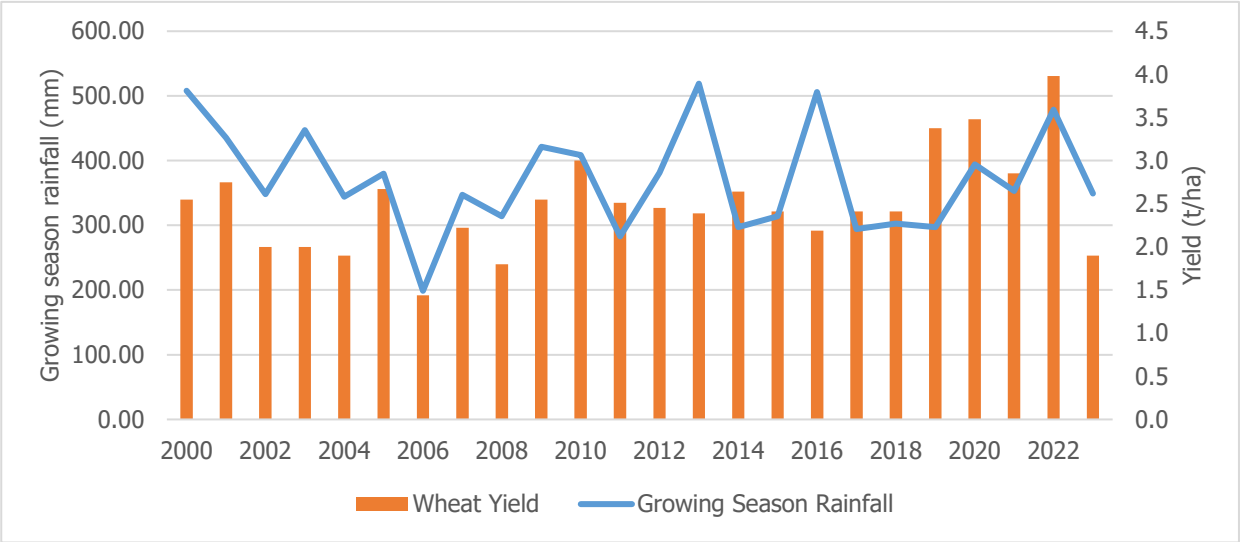
In 2016 the need for more sustainable irrigation for McLaren Vale grape production led to the construction of a large water storage dam. At the time the Chair of the McLaren Vale Irrigators Council Jock Harvey noted:

> *"Demand for winter irrigation and additional water during the growing season are now commonplace – substantially increasing demand for economically and environmentally sustainable irrigation water beyond projected over the last decade"* (McLaren Vale Wine 2016).

Using data reported in PIRSA crop and pasture reports, analysis of growing season rainfall and yield for key crops on Kangaroo Island and the Central Hills and Fleurieu since 2000 has been undertaken. Figure 11, Figure 12, Figure 13 and Figure 14 show that while yields follow rainfall trends in most years, for example lower growing season rainfall in 2006 saw lower yields, there have been some years when high yields occurred when rainfall was lower (2022) and other years when high rainfall did not see higher yields (2013 and 2016) (PIRSA 2024a).

It is important to note that some high rainfall areas of the Fleurieu Peninsula tend to benefit from drier years as a result of less water logging of poorly draining soils which in turn improves crop and pasture growth.

Figure 11 Kangaroo Island wheat yield vs rainfall 2000 - 2023



DROUGHT RESILIENT
ADELAIDE HILLS
FLEURIEU PENINSULA
KANGAROO ISLAND

Figure 12 Kangaroo Island canola yield vs rainfall 2000 - 2023

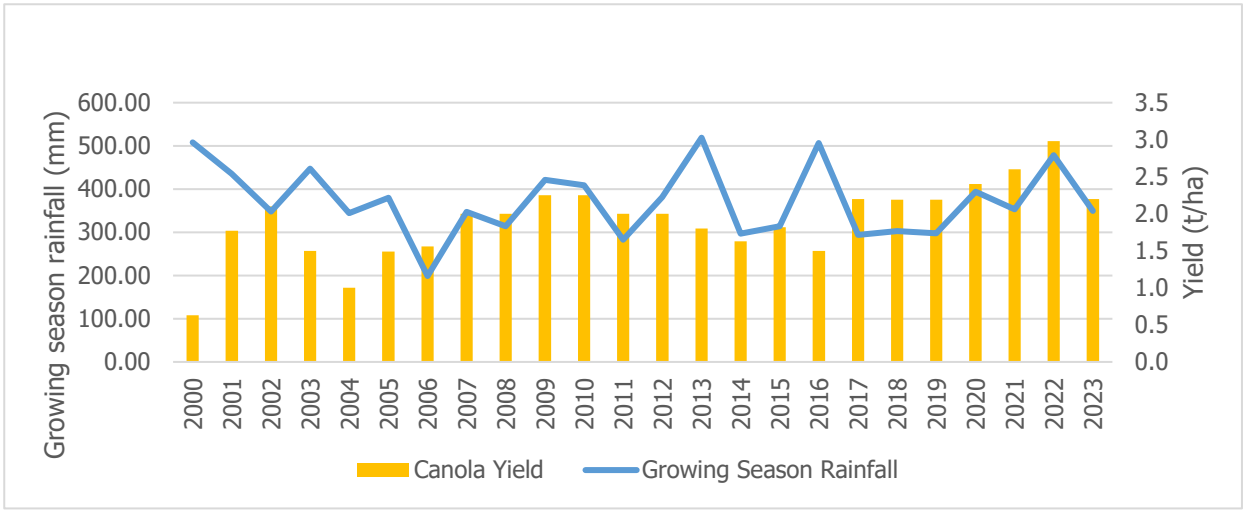


Figure 13 Central Hills and Fleurieu canola yield vs rainfall 2000 - 2023

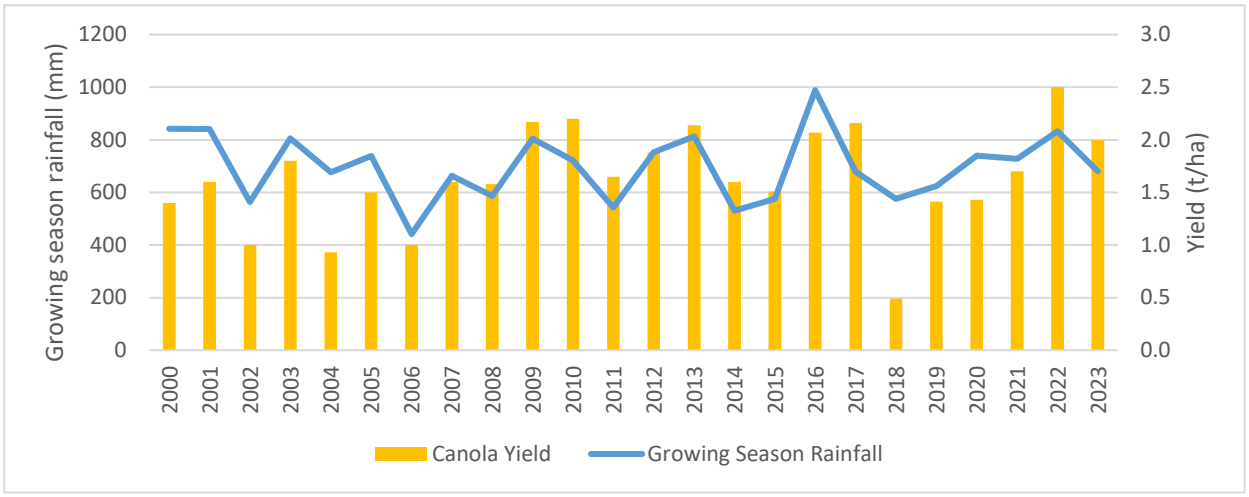
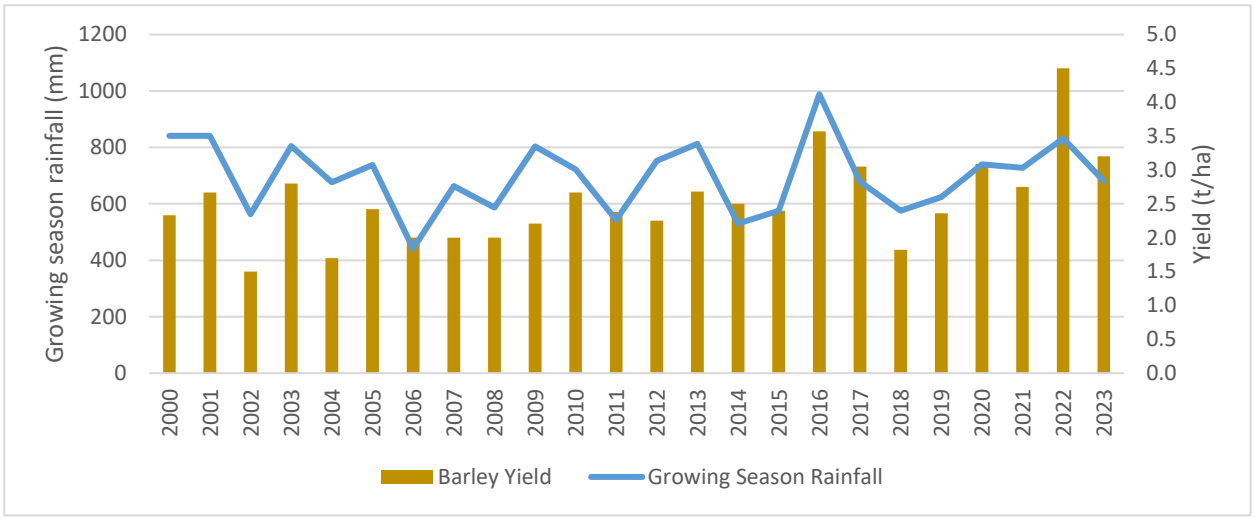


Figure 14 Central Hills and Fleurieu barley yield vs rainfall 2000 - 2023



2.6 Assets and infrastructure

The AHFKI region benefits from infrastructure that supports individuals, communities and industries. Infrastructure provision for essential services (power, water and telecommunications) is generally good. However, opportunities to improve telecommunications and water security on Kangaroo Island have been identified. These are being progressed through SA Power Network's construction of an undersea fibre optic cable from Cape Jervis to Kangaroo Island, and SA Water's construction of a desalination plant at Penneshaw.

Critical infrastructure assets of the AHFKI region are described in Table 9.

Table 9 Key infrastructure in the AHFKI region

Infrastructure	Description
Road transport	State maintained roads that provide key freight routes include: AH: South Eastern Freeway, Onkaparinga Valley Road, Strathalbyn Road FP: Victor Harbour Road, Main South Road KI: Playford Highway, West End Highway, and South Coast Road
Rail transport	Rail transport passes through the region however there is no internal freight transport via rail in the region as there are no freight stops. AH: Adelaide to Melbourne railway line FP: Passenger heritage railway between Mount Barker and Victor Harbour (Steam Ranger Heritage Railway)
Ferry	Kangaroo Island residents and businesses are reliant on the ferry between Cape Jervis and Penneshaw to transport goods between the Island and mainland including agricultural exports. Two new ferries with more frequent services and upgrades to the ferry terminal check-in and loading infrastructure at both Cape Jervis and Penneshaw are currently under construction.
Air transport	Adelaide Airport (outside the region) is the only international airport in South Australia. Kingscote Airport on Kangaroo Island is the only commercial domestic airport in the region and is operated by Kangaroo Island Council. Sealed airstrips are located across the region: AH: Woodside FP: Goolwa, Hindmarsh Island, Strathalbyn KI: Vivonne Bay, American River

Infrastructure	Description
Energy generation	Large scale renewable electricity generation in the region occurs at the Starfish Hill Wind Farm near Cape Jervis on Fleurieu Peninsula. Small scale (household) solar generation is common. Kangaroo Island is currently powered by a 15km undersea electricity cable from the mainland and a back-up 6MW diesel generator at the main town of Kingscote. About one-quarter of the 3,000 homes on Kangaroo Island already have rooftop solar, and there are two larger installations of 14kW at the council chambers and 50kW at the airport (Parkinson 2016).
Mains water	Mains water on the Fleurieu Peninsula is sourced from the rainfall fed Myponga Reservoir. Across the Adelaide Hills most mains water comes from the River Murray via the Balhannah treatment plant. On Kangaroo Island, Middle River Reservoir and a small desalination plant at Penneshaw supply mains water to most of the Island. A new desalination plant is currently under construction near Penneshaw. Significant parts of the Adelaide Hills and Fleurieu Peninsula are not connected to mains water or sewerage, and instead rely on rainwater and on-site effluent disposal.
Tele-communications	Telecommunications in the region are generally reliable, especially in more populated areas. However there are pockets with limited access on the southern Fleurieu Peninsula and on Kangaroo Island. Telecommunications on Kangaroo Island will improve following SA Power Network's construction of an undersea fibre optic cable from Cape Jervis to Kangaroo Island due for completion in 2024.
Community infrastructure	The region is well-serviced by community infrastructure including hospitals and healthcare and education facilities. However, there is a significant shortage of early childhood education and childcare across the region.

2.7 Governance

There are a range of organisations with responsibilities that include aspects that do or could contribute to drought resilience in the region. A selection of these organisations are described in Table 10.

Table 10 Roles and responsibilities of regional organisations

Organisation	Roles and responsibilities
RDA AHFKI (RDA AHFKI 2024b)	General role – • Ensuring good regional productivity and liveability by providing appropriate infrastructure (public transport, housing, freight) • Enhancing regional innovation and resilience by addressing key issues and disruptions (climate change, demographic change, digitisation, demand for skilled workforce) • Strengthening the region's three most competitive industries (tourism, manufacturing, agriculture), increasing exports and growing employment • Ensuring our region and government will be well connected and informed to make the most of economic development opportunities by providing regional economic advice and promoting/delivering government programs
	Drought related – • Improving agriculture practices by promoting AgTech awareness programs • Identifying and promoting funding options for the region's communities and business to act on climate change • Continuing support for Resilient Hills & Coasts
Landscape Boards (Hills and Fleurieu; Kangaroo Island) (Hills and Fleurieu Landscape Board 2024; Kangaroo Island Landscape Board 2024)	General – • Facilitating the sustainable management of natural resources and biodiversity conservation in each region • Connecting people to knowledge, expertise, and funding • Providing education and support to landholders on best practices • Promoting the formation of long-term and meaningful partnerships to better manage the region's landscapes
	Drought – • Providing grants and funding for environmental and agricultural projects. • Supporting sustainable, low-emissions agriculture • Preparing properties for fire and extreme weather events
Southern and Hills LGA (Southern & Hills Local Government Association (SH LGA) n.d.; SH LGA 2023)	General – • Undertaking a regional coordinating, representational, advocating and marketing role on behalf of its member councils • Facilitating information sharing and collaboration among councils
	Drought – • Advocating for climate change related relief and recovery

Organisation	Roles and responsibilities
	• Supporting the development and implementation of regional drought response plans • Fostering collaboration among stakeholders
SA Drought Hub (SA Drought Hub 2024)	General – • Serving as a central resource for drought resilience and preparedness - related information and support services • Coordinating applied and practical research and innovation efforts to improve drought resilience
	Drought – • Supporting a wide range of projects with the objective of enhancing drought resilience across all farming sectors, along with the industries and communities they support • Facilitating access to drought-related research, tools and technologies • Disseminating up-to-date information and resources
PIRSA (PIRSA 2023; PIRSA 2024b)	General – • Maintaining the prosperity and support the development and sustainability of the State's primary industries and regions • Promoting research and innovation to enhance industry productivity and sustainability
	Drought – • Collaborating across government and industry to help the State adapt, prepare, and respond to climate change – including drought • Providing technical and financial assistance to farmers and agribusinesses • Promoting carbon farming/sequestration • Providing information on how to manage drought • Coordinating the Regional Drought Resilience Planning Program and Farm Business Resilience Program funded through the Australian Government's Future Drought Fund.
Resilient Hills and Coasts Climate Partnership (Resilient Hills & Coasts n.d., Resilient Hills & Coasts 2022)	General – • Developing and implementing regional climate adaptation and resilience strategies • Facilitating collaboration among councils and stakeholders on climate resilience projects (through Regional Climate Partnerships network) • Promoting series of expert webinars on sustainable homes • Undertaking bushfire and biodiversity projects
	Drought – • Building on and spreading regional best practice in enabling agriculture that is regenerative, water smart, resilient to a variable climate, and supports carbon farming as part of a zero emissions pathway.Leveraging our leadership and networks to encourage

Organisation	Roles and responsibilities
	residential and infrastructure development that avoids natural hazards, is built to maximise resilience, and is energy efficient and water sensitive.
Councils	General – • Providing local governance and deliver essential services to communities • Managing local infrastructure, planning, and development projects • Supporting community well-being through health, recreation, and cultural programs
	Drought – • Supporting the integration of drought resilience into local planning and policy frameworks
Australian Government Department of Agriculture, Fisheries and Forestry	General – • Maintaining and creating agricultural export opportunities, to provide gains for Australian agriculture, fishing and forestry. • Managing biosecurity risks to Australia to protect our multi-billion-dollar industries and our way of life. • Engaging with international counterparts to reinforce Australia's role in shaping how the global agriculture and fibre sector addresses food security, productivity, trade, sustainability and the impacts of climate change.
	Drought – • Coordinating the Future Drought Fund and range of other drought related programs before, during and after drought to support the primary production industry.
Industry bodies and farming systems groups	General – • Partnering with government and industry to develop policies and programs that promote the social, economic, and environmental sustainability of primary production. • Presents a united voice on behalf of their membership in advocacy and representative activities.
	Drought – • Supporting industry to implement best practise drought resilience action.

2.8 Defining features of the AHFKI Region

Through the collation of information in the previous sections, a number of defining features of the AHFKI region have been identified:

- A growing population – growing faster than the rest of the State and projected to continue to grow until 2041.
- Low rates of unemployment.
- Higher rates of volunteering, particularly on Kangaroo Island.
- A diverse economy at a regional scale but less diversity on Kangaroo Island with nearly 25% of employment and 33% of economic output in the agricultural sector.
- Agriculture ranked sixth in industry of employment and second in economic output generation for the region as a whole.
- 44% of land in the region used for livestock farming.
- Very high proportions of State apple, pear and cherry production, established and reliant on cool climates and reliable rainfall.
- Internationally renowned grape growing and wine production.
- Significant cropping production including wheat, canola, beans, barley and oats.
- Annual rainfall declining and average maximum temperatures rising from the period 1964-1983 to 1984-2023.
- Although crop yields are generally better when growing season rainfall is high, there have been some seasons when other factors contributed to higher yields despite lower rainfall and vice versa.
- Mainland communities are generally well serviced by electricity, water, telecommunications and transport infrastructure however Kangaroo Island communities are less well serviced.
- Kangaroo Island industries are highly reliant on road and ferry transport which can be disrupted by extreme weather and mechanical issues.
- Strong tourism offerings with close proximity to Adelaide.

3. Drought

3.1 A definition of drought

Because people use and view water in so many different ways, there is no universally agreed definition of drought. It is measured in different ways and at different timescales, for example (Kirono et al, 2020):

- Meteorological drought – below-normal rainfall.
- Agricultural or soil moisture drought - below-normal water storage in the saturated soil zone.
- Hydrological drought - below-normal water availability in streams, lakes and/or groundwater.
- Socioeconomic drought – when water needs cannot be met.

This lack of a clear definition can present a barrier to effective drought planning (Hughes et al. 2022). Governments often select meteorological indicators (such as rainfall and temperature) to serve as drought policy triggers due to their objectivity and transparency. However, this fails to capture the socio-economic outcomes of drought, which in the past has lead to some non-drought affected areas receiving assistance and vice versa.

The Bureau of Meteorology defines drought as *a prolonged, abnormally dry period when the amount of available water is insufficient to meet our normal use* (Bureau of Meteorology, 2024).

Drought is not simply low rainfall. Rather, drought is a comparatively dry period compared to normal conditions. It also considers the ability of those affected to cope with drier than usual conditions. It may be for a short period or a long period of time.

For the purpose of the AHFKI Regional Drought Resilience Plan, drought is defined as:

> *A period of abnormally dry conditions that impacts negatively on a region's water availability, the environment and agricultural production in a region and, consequently, impacts negatively on the economy and environment of the region and the health and wellbeing of its residents.*

3.2 Causes of drought

Drought in the AHFKI region is caused by a number of natural atmospheric conditions including the Positive Indian Ocean Dipole and El Niño-Southern Oscillation. Anthropogenic climate change is also projected to impact on drought conditions. The following descriptions have been adapted from the Bureau of Meteorology website.

3.2.1 Positive Indian Ocean Dipole

The Indian Ocean Dipole is one of the strongest climate drivers for the AHFKI region. The Indian Ocean Dipole refers to sustained changes in the difference between sea surface temperatures of the tropical western and eastern Indian Ocean (Bureau of Meteorology 2021). The Indian Ocean Dipole has three phases: neutral, positive, and negative.

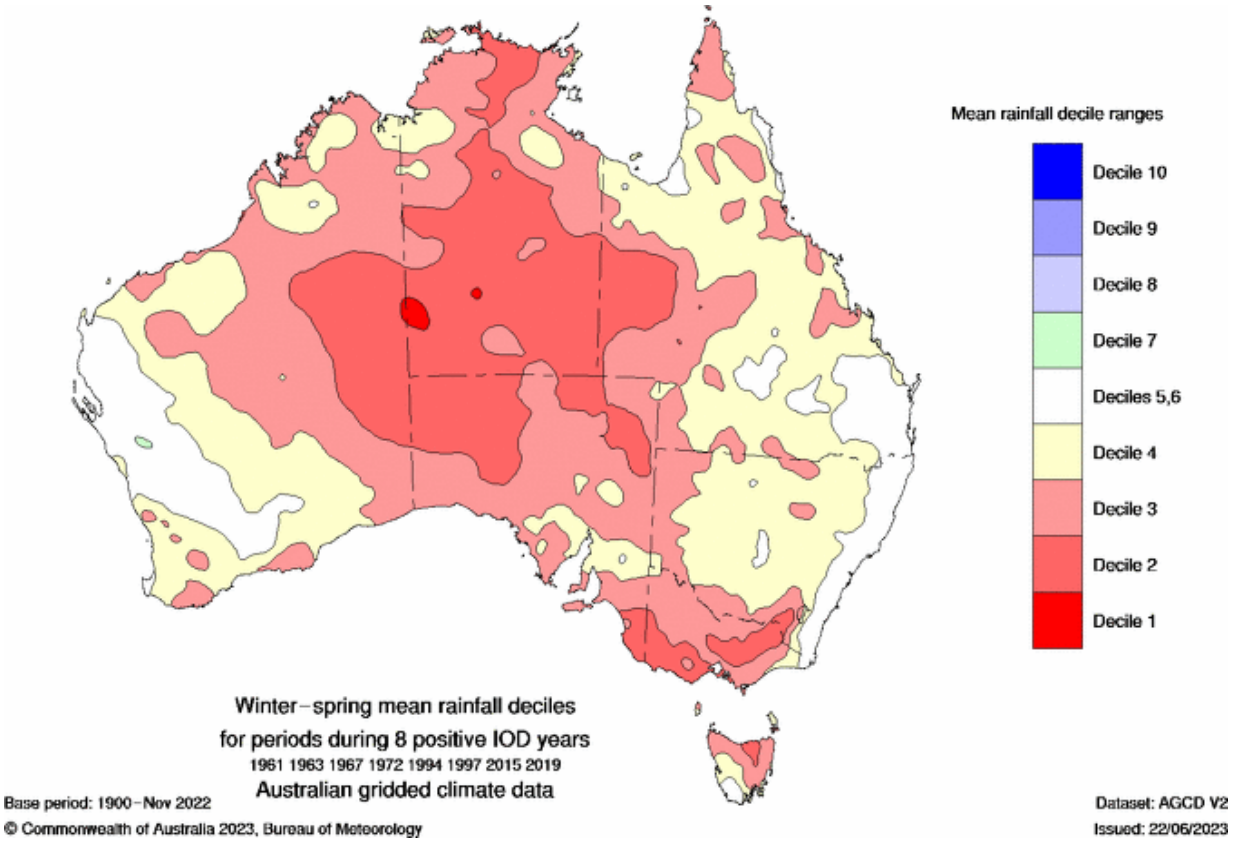
During the positive Indian Ocean Dipole phase, westerly winds weaken along the equator allowing warm water to shift towards Africa. Changes in the winds also allow cool water to rise up from the deep ocean in the east. This sets up a temperature difference across the tropical Indian Ocean with cooler than normal water in the east and warmer than normal water in the west. Generally, this means there is less moisture

than normal in the atmosphere to the northwest of Australia. This changes the path of weather systems coming from Australia's west, often resulting in less rainfall and higher than normal temperatures over parts of Australia during winter and spring.

A positive Indian Ocean Dipole typically means:

- Less rainfall across the region (see Figure 15)
- Higher than normal temperatures during winter and spring in the region.

Figure 15 Winter-spring mean rainfall deciles during positive Indian Ocean Dipole years (Bureau of Meteorology, 2021)



3.2.2 El Niño–Southern Oscillation (ENSO)

El Niño and La Niña also influence drought conditions in the AHFKI region (Bureau of Meteorology 2021a). They are a part of a natural cycle known as the El Niño–Southern Oscillation (ENSO) and are associated with many months of warming (El Niño) or cooling (La Niña) in the central and eastern tropical Pacific. The ENSO cycle loosely operates over timescales from one to eight years.

El Niño typically results in:

- Reduced rainfall across the entire the AHFKI region (refer Figure 16)
- Warmer temperatures
- Shift in temperature extremes

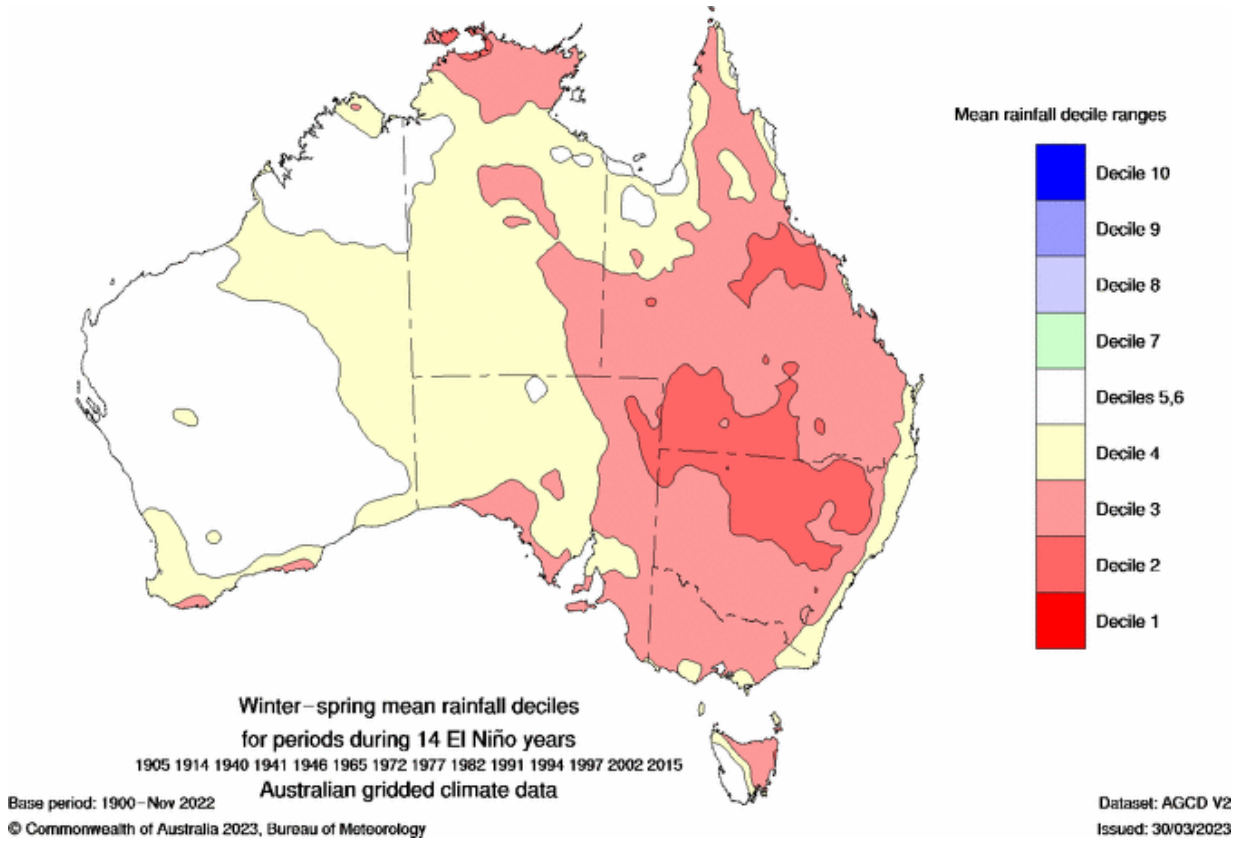
- Increased frost risk
- Reduced tropical cyclone numbers
- Later monsoon onset
- Increased fire danger in southeast Australia.

An El Niño occurs when sea surface temperatures in the central and eastern tropical Pacific Ocean become substantially warmer than average, which causes a shift in atmospheric circulation. Typically, the equatorial trade winds blow from east to west across the Pacific Ocean. El Niño events are associated with a weakening, or even reversal, of the prevailing trade winds.

The shift in rainfall away from the western Pacific, associated with El Niño, means that Australian rainfall is *usually* reduced through winter–spring, particularly across the eastern and northern parts of the continent.

Although most major Australian droughts have been associated with El Niño, analysis of past El Niño events shows that widespread drought does not occur with every event, and the strength of an El Niño is not directly proportional to the rainfall impacts.

Figure 16 Winter-spring mean rainfall deciles during El Niño years (Bureau of Meteorology, 2021a)



3.3 Past droughts

Before European colonisation, the region would have experienced numerous drought periods. Since meteorological records began, the region has experienced a number of significant declared droughts including (Bureau of Meteorology 2020):

- The Federation drought: 1895 to 1902
- The 1914 to 1915 drought
- The World War II drought: 1937 to 1945
- The 1965 to 1968 drought (particularly affecting the Adelaide Hills and Fleurieu Peninsula)
- The 1982 to 1983 drought
- The Millennium drought: 1997 to 2009
- The 2017 to 2019 drought (the Tinderbox drought)

The 2017 to 2019 drought, whilst one of the shortest on record, was extremely severe in eastern South Australia including the AHFKI region. The region experienced rainfall deciles that were very much below average and high temperatures. The drought caused significant stress on water resources, agriculture, and natural ecosystems in the area. The hot conditions further combined with the dry landscape and strong winds produced dangerous fire weather conditions during December 2019 into early January 2020, including the severe 2020 Adelaide Hills and Kangaroo Island bushfires.

Green Drought

From February 2024 to May 2024 as this Plan was being prepared, rainfall across the region was well below average. Average rainfalls through June were enough for green cover to establish, however below average rainfall in July lead to conditions referred to as a green drought.

A green drought can occur when there is enough rainfall to grow grass, but there is not enough deep-soil moisture for crop and pasture growth (Bureau of Meteorology 2019).

New green growth with high water content does not provide adequate nutrition for stock, especially young and breeding animals. Although the land may look green, supplementary feeding to meet nutrition needs may be required for some time until pastures mature.

3.3.1 Past impacts of droughts

Through the stakeholder engagement undertaken for this project, the impacts of drought on the region described in Table 11 were identified.

Table 11 Drought impacts

Theme	Impact
Social impacts	Drought erodes self-confidence, increases anxiety and increases mental stress, leading to physical health issues, increased family and relationship breakdowns, and higher suicide rates
	Relationships get strained as people focus on immediate situations and cannot think about the future
	Withdrawal from community settings which leads to reduced social interaction and division within the community
	Children are affected by the loss of family income, increased stress and reduced family time
	Reduced feelings of positivity and optimism (e.g. caused by having to get rid of stock or wastages or financial stress), leaving people feeling out of control
	Declines in visual amenities and lifestyle, leading to a reduction in services and infrastructure
	Decrease in holidays and time off, with people working seven days a week, leading to increased workload and burnout
Agricultural impacts	Reduced agricultural production
	Farms incur greater debt, impacting their financial stability and long-term viability, and reducing cash flow, making it difficult to manage regular expenses and invest in future operations
	Farmers often engage in 'fire sales' to get rid of stock and then have to buy back at a premium or have lost herd genetic diversity
	Increased fruit and crop damage from extreme heat
	Decrease in water availability for stock consumption, irrigation of pastures and milking shed hygiene and potential increase in salinity
	Increased spending on buying feed, trucking water, and other essential resources
	Livestock health deteriorates due to inadequate feed and water
	Consolidation of smaller farms, reducing the number of individual farm operations
	Reduction of ability to grow feed
	Immediate demands of drought conditions make it difficult for farmers to plan for the long term

Theme	Impact
Environment	Increase in grazing pressure
	Different timing of pests during drought
	Increase in bushfire risk due to dry conditions and lack of water resource access
	Adverse impacts on native plant and animal health/condition
	Reduced water flows, with impacts on water dependent species including native fish
	Increase in erosion risk, decrease in topsoil, decline in soil health
	Decrease in water quality and availability of surface water
	Increase in wildlife and human interaction, increase in biosecurity risk
Economy	Lower farm incomes lead to decreased spending in local shops and businesses
	Increased economic strain due to insufficient government funding and assistance
	Larger companies can afford to pay higher wages, making it difficult for smaller businesses to compete
	Decrease in local economy (in towns and also individual farms/agribusiness) – an increase in debt and decrease in equity
	Businesses that provide services and supplies to farms, such as machinery suppliers and resellers, experience reduced demand and financial stress
	Labour demands – increase in workloads but decrease in motivation and productivity
	Increase in need for off farm income jobs
	Job losses, with people leaving the area to seek employment elsewhere
	Serious strain on Kangaroo Island's logistics, affecting the transport of goods and resources
	Decrease in tourists, impacting the local tourism industry
	Increase in prices for essential goods and services
	Fall in market prices for agricultural products
Infrastructure	Deterioration of infrastructure due to compounded effects of drought
	Damage to farm infrastructure and equipment from poor roads worsened by drought conditions
	Decrease in on-farm capital and repairs
Governance	Highlights the need for local decision-making to be managed locally to effectively address the unique challenges posed by drought

3.4 Future climate and drought projections

Climate projections describe what the future climate could be like, sourced from multiple climate models, and based on numerous assumptions about the factors that influence climate and the trajectory of change in greenhouse gas emissions in the atmosphere.

The CSIRO and Bureau of Meteorology have used up to 40 global climate models to develop projections for different parts of Australia. Each model uses different assumptions and algorithms to project how climate variables such as temperature, rainfall and evapotranspiration will respond in different emissions scenarios over different time frames. The projections presented in online tools and viewers each use a different combination of global climate models and so show slightly different results. Three of the projections tools most commonly used in South Australia are described in the following sections:

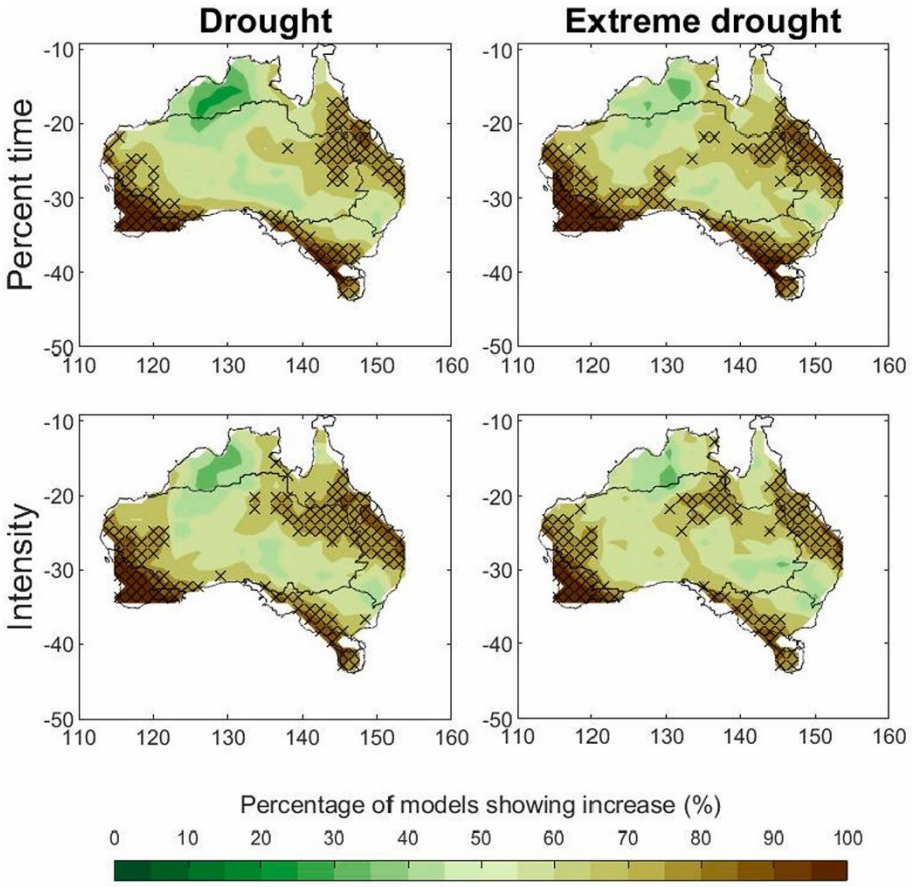
1. My Climate View (national focus)
2. Climate Change in Australia (national focus)
3. DEW South Australian Climate Projections Viewer (SA focus).

Analysis of multiple global climate model simulations of rainfall and soil moisture for the historical (1900–2005) and future (2006–2100) climates undertaken by Kirono et al (2020) indicated that under climate change, Australia will spend more time under drought conditions, with longer drought duration and more intense drought, particularly across southern and eastern Australia. Kirono et al (2020) defined drought as when the Standardised Precipitation Index (SPI) and Standardised Soil Moisture Index (SSM) were negative for a period of 3 months or more, and reached a value of -1.0 to define drought and -2.0 to define extreme drought. Drought intensity is defined by the cumulative SPI or SSMI from all events. The more negative the value, the more intense the event.

Figure 17 shows the percentage of models showing a projected increase in percentage of time spent in drought and extreme drought, and the intensity of drought and extreme drought in the 21st century (2006–2100) under RCP8.5, relative to the 20th century (1900–2005).

Model results in southern Australia showed lower levels of uncertainty than the rest of Australia with high model agreement on the increase in time spent in drought.

Figure 17 Increase in percentage of time spent in drought and intensity of drought (from Kirono et al., 2020).



3.4.1 My Climate View (myclimateview.com.au)

My Climate View is a collaboration between Australia's national science agency CSIRO and the Bureau of Meteorology and has been designed together with Australian farmers as part of the Climate Services for Agriculture program with funding from the Australian Government's Future Drought Fund. Climate trends for specific commodities at a local scale are presented to support decision making.

My Climate View presents projected future rainfall, temperature, and relative humidity data from Climate Change in Australia (see following section), using its Application-Ready dataset. It also presents seasonal forecast data from the Bureau of Meteorology.

My Climate View allows users to select a location and if desired, a commodity (for example sheep or wheat). Projections include key commodity climate factors, for example for sheep it will include winter rainfall for pasture growth and cold exposure at lambing. For wheat it will include growing season rainfall, frost at flowering and heat damage at flowering and grain fill. A default growing season is defined for each location but can be altered in the tool.

Data is presented for each location and commodity at 2050 for a medium emissions scenario (RCP 4.5) as a default, with users able to explore 2030, 2050 and 2070 at a medium or high (RCP 8.5) emissions scenario.

Rainfall and temperature projections for four locations in the 2050s using RCP 8.5 are shown in Table 12.

Table 12 Selected climate projections for four AHFKI region locations

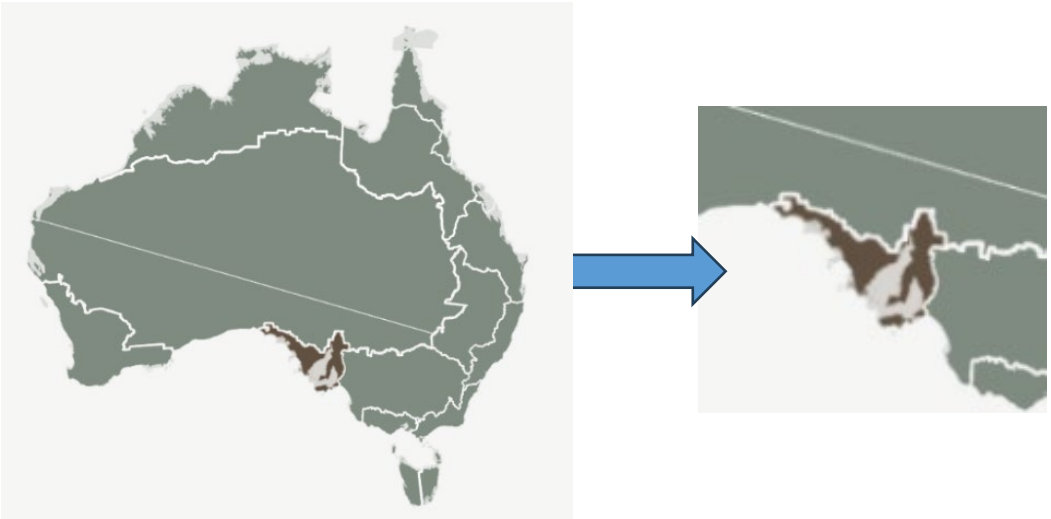
Climate variable	Langhorne Creek		Parndana		Parawa		Charleston	
	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average	(1994 – 2023)	2050s average
Total annual rainfall	373 mm	335 mm	634 mm	591 mm	787 mm	731 mm	743 mm	737 mm
Summer rainfall	64 mm	52 mm	68 mm	54 mm	91 mm	75 mm	86 mm	75 mm
Autumn rainfall	90 mm	82 mm	140 mm	139 mm	174 mm	161 mm	151 mm	149 mm
Winter rainfall	130 mm	120 mm	294 mm	275 mm	343 mm	331 mm	329 mm	337 mm
Spring rainfall	98 mm	86 mm	130 mm	122 mm	178 mm	162 mm	177 mm	172 mm
Average maximum temperature	22.2°C	23.6°C	19.3°C	20.4°C	18.9°C	20.1°C	19.9°C	21.3°C
Annual hot days (over 35°C)	17 days	24 days	5 days	6 days	5 days	8 days	11 days	18 days

3.4.2 Climate Change in Australia (climatechangeinaustralia.gov.au)

Climate Change in Australia was developed by the CSIRO and the Bureau of Meteorology and provides a number of data products and tools that present projections at different scales for four timescales (2030, 2050, 2070 and 2090) and three emissions scenarios (RCPs 2.5, 4.5 and 8.5).

The Regional Climate Change Explorer provides a summary of projections across large "cluster" areas. Most of the AHFKI region is within the Southern and South-Western Flatlands East sub-cluster as shown in Figure 18.

Figure 18 Southern and South-Western Flatlands East sub-cluster



Key climate projection messages for the cluster are described below:

- Average temperatures will continue to increase in all seasons (*very high confidence*).
- More hot days and warm spells are projected with *very high confidence*. Fewer frosts are projected with *high confidence*.
- A continuation of the trend of decreasing winter rainfall is projected with *high confidence*. Spring rainfall decreases are also projected with *high confidence*. Changes in other seasons unclear, although downscaling results suggest a continuation of the observed autumn declines.
- Increased intensity of extreme rainfall events is projected, with *high confidence*.
- Mean sea level will continue to rise, and height of extreme sea-level events will also increase (*very high confidence*).
- A harsher fire-weather climate in the future (*high confidence*).
- On annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.

The eastern part of the region (a portion of the eastern Adelaide Hills and eastern Fleurieu Peninsula) is part of the Murray Basin sub-cluster.

Figure 19 Murray-Basin sub-cluster (BOM & CSIRO 2019)

Key climate projection messages for the Murray-Basin sub-cluster are described below:

- Time spent in drought is projected, with *medium confidence*, to increase over the course of the century.
- By late in the century, less rainfall is projected during the cool season, with *high confidence*. There is *medium confidence* that rainfall will remain unchanged in the warm season.
- Increased intensity of extreme rainfall events is projected, with *high confidence*.
- More hot days and warm spells are projected with *very high confidence*.

3.4.3 DEW South Australian Climate Projections and Viewer (https://www.environment.sa.gov.au/climate-viewer/)

The *Guide to climate projections for risk assessment and planning in South Australia* (DEW 2022) provides a summary of the changes in climate and sea levels likely to occur in South Australia, together with guidance

on the use of climate projections for risk assessment and planning. Projections are presented for landscape management regions, including the Hills and Fleurieu (HF) and Kangaroo Island (KI) Landscape Regions.

The guide identifies that time spent in drought (over a 20-year period) is projected to nearly double in the HF and KI Landscape Regions. This means that up to 65% of time could be in drought by 2030. Also, by 2030 the frequency of extreme drought will more than double.

By 2050, time spend in drought is projected to more than double within the HF and KI Landscape Regions. This means that up to 70% of time could be in drought by 2050.

By 2030 annual mean daily maximum temperatures are projected to increase by 1.0 °C in the KI and HF Landscape Regions.

The South Australian Climate Projections Viewer is a new online tool for climate projection maps and data. The interactive maps display projected changes to temperature and rainfall across South Australia for a range of future time periods. The climate data can be displayed in 10km and 50km grids or for individual SA landscape regions for a range of future time periods, climate variables and parameters.

3.5 Impacts of drought on water availability

Drought can lead to a range of changes to the availability of water over shorter timeframes and can be better characterised by factors such as (Fowler et al. 2023):

- Increasingly less run-off for a given rainfall.
- Changes in rainfall seasonality.
- Increased time spent in spells of little or no rainfall.
- Decreases in frequency of high-rainfall events.
- Increases in evaporative demand.

The effect of a drier climate on water resources is measurable. For example, inflows to the River Murray in the last 20 years averaged 4820 GL/year compared to 9407 GL/year over the last 100 years (Walker et al. 2021). It is estimated that that a 10% change in average annual rainfall will be amplified as a 20–35% change in the catchment runoff (as well as in streamflow, and inflow into storages) for parts of southeastern Australia (Walker et al. 2021).

The impact of climate extremes has been investigated for some parts of the AHFKI area. For example, the Department of Environment and Water (DEW) (2019) classified climate related risks across the Eastern Mount Lofty Ranges (EMLR) and found a medium level of risk to economic uses of groundwater in the Marne Saunders area and a medium level of risk to human needs and economic use of surface water in the southern part of the EMLR as a result of climate extremes.

DEW has undertaken annual assessments of water resources across the State and have noted relationships between lower rainfall and lower run-off. The assessments of the Western Mount Lofty Ranges (WMLR) for the 2018-19 year indicated widespread lower than average rainfall (Figure 20) and below average and 'very below average' streamflow (Figure 21). This would indicate dry conditions do not need to persist for long periods to impact surface water resources.

Given that surface water resources in the region are prescribed it is possible that in extended dry conditions access to water entitlements is reduced. This occurred for River Murray licences during the Millenium Drought that were reduced to a few percent of the annual allocation (Cock 2023).

Figure 20 Distribution of rainfall for the period 1986-2015 (left) and 2018-19 (right). This shows lower rainfall over the majority of the WMLR (DEW, 2020b).

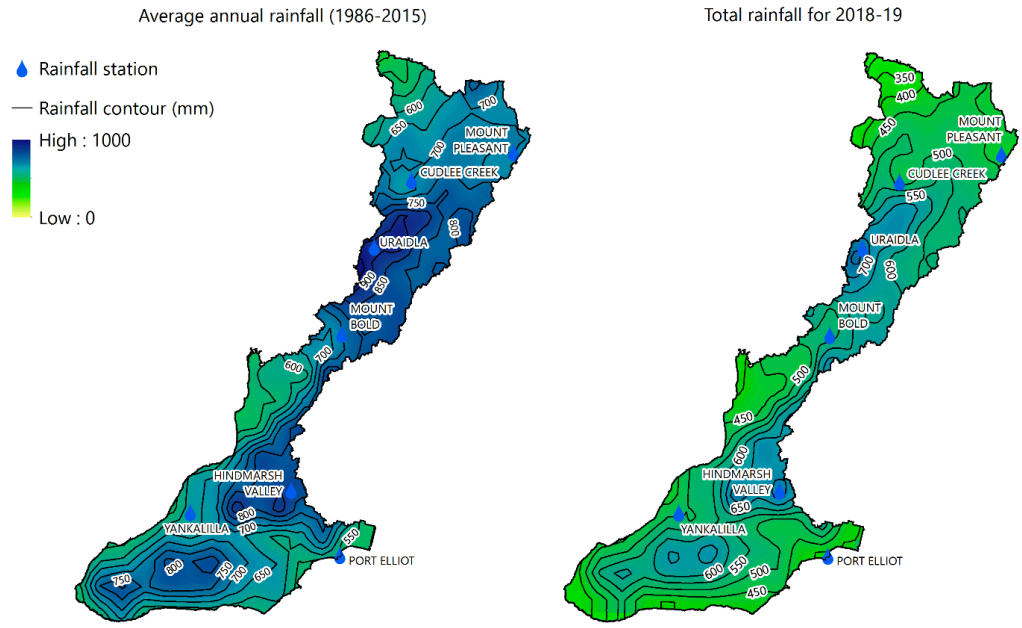
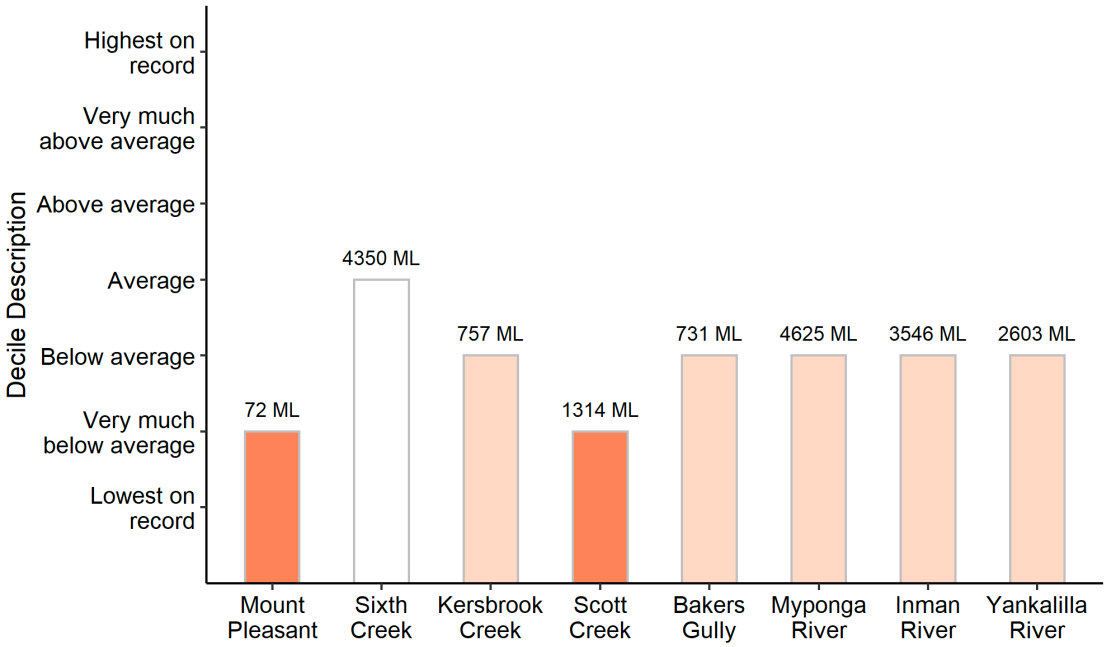


Figure 21 Streamflow decile descriptions for eight gauging stations in the WMLR, which shows where average (white), below average (pink) and very below average (orange) flows were measured (DEW, 2020b).



A reduction in cool-season rainfall is likely to reduce recharge to groundwater systems. Higher temperatures and lower rainfall will lead to higher potential evapotranspiration, which may affect groundwater demand and evaporative discharge. This, together with reduced recharge, will place greater pressure on groundwater systems possibly causing groundwater levels to fall and groundwater salinity to rise. Water resource assessments by DEW generally indicate an acceptable condition of groundwater resources across the region.

3.5.1 Implications for agriculture, horticulture and viticulture

The impact of drought on agriculture, horticulture and viticulture is varied and depends on many factors including (but not limited to):

- Current climate regime (e.g. drier climates are usually more susceptible).
- Type of water source and availability of alternatives (e.g. groundwater resources can be more resilient than surface water resources in extended dry periods).
- Type of crop/stock, including whether there is irrigation or dryland agriculture.
- Soil type and ability to retain moisture.
- The condition of the farming enterprise leading into drought, including the availability of reserves and financial position.

In irrigated areas drought can generally mean higher evaporative demand from crops. Dry spring and autumn conditions mean irrigation seasons can be longer. This can present issues where annual allocations are limited and temporary trade of water is needed to meet demand.

Where water sources become severely limited such as during the Millenium Drought, irrigation may not be possible and strategies to save more valuable perennial crops may be put in place. Irrigators in the Langhorne Creek area had to invest in strategies to access and store water supplies. This included dredging channels to water that had receded in Lake Alexandrina, storing water via managed aquifer recovery schemes and building new pipelines to the River Murray.

Regions that have access to better quality groundwater such as McLaren Vale appeared to be more resilient to drought. Access to a diversity of water resources, for example groundwater, surface water and mains water, also generally have higher levels of resilience.

It has been reported that irrigation with higher salinity water has occurred in times of severe water shortage (e.g. Langhorne Creek) resulting in a build-up of salt in the root zone. It takes several years of subsequent irrigation to return soil salinity to healthy levels.

Extended or seasonal dry conditions in dryland agricultural areas can deplete soil moisture storage leading to lack of production of crops, and reduction in feed for stock and livestock which causes loss of condition where feed cannot be imported and destocking is not undertaken. Drought also reduces the availability of sources of water for stock watering.

Soil health can deteriorate during drought making production following a drought more difficult. Lack of cover on dry soils increases erosion potential, causes compaction (creating problems for root penetration) and potentially leads to increased water repellence. It can reduce soil carbon stocks, with consequences for landowners engaged in soil carbon sequestration projects.

An increasing frequency and intensity of drought will further exacerbate these impacts.

4. Other drivers of change

A number of other economic, social and environmental trends may influence the resilience of the AHFKI region to drought. These are occurring at different scales and have different implications for the region.

4.1 Global drivers of change

Table 13 describes global drivers of change (CSIRO 2022, PwC 2022, Taylor et al. 2017) and how they are or have potential to influence the AHFKI region.

Table 13 Global drivers of change

Global trend	Description
Climate change and decarbonisation	Rising greenhouse gas levels in the atmosphere are causing temperatures to rise, annual rainfall to reduce, and extreme weather events to become more frequent and more severe. Responding to climate change requires a shift in the global economy to reduce carbon emissions and action to adapt to a new and changing climate. In the region, agriculture and transport are key sources of emissions that are likely to see transformation change over the next thirty years.
Technological disruption	A digital world is filled with opportunities for online work and study, telehealth, online shopping, and digital currency. With technology and automation come consequences for jobs and security. A lack of access to technology due to a lack of infrastructure can lead to disadvantages compared to those with access. In the AHFKI region, access to digital technology is reliable for most residents, providing increased opportunity to work from home and access health and education services. It also supports commerce and industry. A greater reliance on technology for work, business and study means that outages and service issues can have a significant impact on operations.
Urbanisation and population growth	The global population is rapidly expanding, a trend that is projected to be mirrored in the AHFKI region. This growth, particularly in the Adelaide Hills and Fleurieu Peninsula areas, will result in an increased demand for residential and commercial spaces.
Trade disruptions	Sudden and unexpected widespread trade disruptions brought through global pandemics, conflict, geopolitical tensions, or similar events can have significant impacts on supply chains, demand, and commodity prices. The COVID-19 pandemic had a significant impact on the tourism and agricultural industry globally, with impacts also felt across the whole region.
Consumer focus	Globally there is a strong consumer and citizen push for decision makers to consider trust, transparency, fairness, and environmental and social governance. Demand for sustainable produce is growing. Across the region, an increasing number of farmers

	are trialling and converting to sustainable production techniques, such as use of biological rather than chemical fertilisers and on Kangaroo Island their genetically modified (GM)-free status allows them to access Japan's high-priced market for GM-free grain (Hough, 2020).
Increased demand for meat	As many developing countries become wealthier and individuals receive more income, demand for meat is increasing. In the AHFKI region, pastoralists have an opportunity the contribute to meeting this demand.
Disease	Disease outbreaks and other biosecurity risks can threaten the agricultural industry.

4.2 National and state drivers of change

Table 14 describes national and state drivers of change (CSIRO 2022, Australian Bureau of Statistics 2021) and how they are or have potential to influence the AHFKI region.

Table 14 National and state drivers of change

National and/or state trend	Description
Environmental targets and limits	Australia has committed to reducing its greenhouse gas emissions. This may have significant impacts on high emissions industries including mining and agriculture. It also presents opportunities to build renewable energy and low pollution economies and limit the scale of climate change. The AHFKI agricultural and manufacturing industries that are key sources of emissions will require transformational change to contribute to emissions reduction targets.
Increased cost of living	Increasing costs of living is placing pressure on Australians to fund their everyday needs. There is high variability in the income security of the AHFKI community and this driver will be felt differently in different communities.
Health challenges	The post-pandemic world has exacerbated existing health challenges posed by an ageing population and growing burden of chronic disease. One in five Australians report high or very high levels of psychological distress. Responding to our health risks and improving health outcomes is becoming more and more important. The research and engagement for this project highlighted the significant adverse impacts on the mental health of the people and communities experiencing drought and the need for increased services.

5. Drought resilience

5.1 A definition of resilience

The term 'resilience' is commonly used in a number of subject areas from health and wellbeing to natural resources and the economy. A range of Regional Drought Resilience Plans and literature were analysed to compare their definitions of 'drought resilience'. These are presented in Table 15. From this analysis, the following definition of drought resilience was selected from the Future Drought Fund (Drought Resilience Funding Plan 2020 to 2024) Determination 2020:

> ***Drought resilience means the ability to adapt, reorganise or transform in response to changing temperature, increasing variability and scarcity of rainfall and changed seasonality of rainfall, for improved economic, environmental and social wellbeing.***

Resilience is more than just bouncing back. In many cases, the intent is to use disruption as an opportunity to move in a new direction, not just recover back to a previous state. Resilience is about proactively changing in order not to be changed involuntarily.

Building resilience will help the AHFKI region to endure droughts with fewer negative impacts and recover from them sooner.

Table 15 Definitions of resilience from various drought plans

Source		Definition of resilience/excerpt
Regional Drought Resilience Plans (Department of Agriculture, Fisheries and Forestry 2024)	South West Queensland	'Resilience' is harder to define. The World Bank has defined resilience as the ability "… to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner". Australia's CSIRO perhaps more specifically states: "drought resilience will result in a regional Australia that can endure deeper, longer droughts, and recover from them sooner. This will allow our food and agribusinesses to boost national farm income, increase food security, and protect the regional jobs that rely on agriculture. It will increase the resilience of rural and regional communities that depend on agriculture and improve environmental outcomes
	Murraylands & Riverlands	Resilience is more than just bouncing back. In many cases, we want to use disruption as an opportunity to move in a new direction, not just recover back to exactly where we were.
	Northern & Yorke	Resilience has multiple definitions; common traits of resilience include the ability of a system, organisation or individual to withstand adversity and bounce back. For the purpose of the NYRDRP, the definition of resilience has been taken from the Drought Resilience Funding Plan 2020 to 2024 and is described as: *"the ability to adapt, reorganise or transform in response to changing temperature, increasing variability and scarcity of rainfall and*

Source		Definition of resilience/excerpt
		changed seasonality of rainfall, for improved economic, environmental and social wellbeing". (Australian Government, 2019). Also includes a quote from a participant: Resilience is the ability to withstand bad times or disasters – not to just get back up, but figure out how to move forward, progress and grow in capacity to prevent it from happening again. Must be able to adapt to prevent. - Anita Kuss, Unihub Spencer Gulf
	ACT	While resilience can be defined as "The capacity of a system to absorb disturbance and reorganise so as to retain essentially the same function, structure and feedbacks", rather than framing resilience as "bouncing back", it could be more accurately described as adapting or transforming as needed in response to change.
	Gippsland Victoria	Walker (2020) defines resilience as the capacity of a system to absorb a disturbance and reorganise so as to keep functioning in the same kind of way. Rather than just 'bouncing back,' resilience is all about changing and adapting to circumstances, rather than having them change you. For the purpose of this document, *resilience* is used to describe the ability to respond positively to the known impacts of drought and maintain business functions. It is about being able to adapt, thrive and take advantage of opportunities when encountering change. Rather than 'persistent maintenance' of the current situation, or being stoic, resilience includes the ability to adapt and be decisive during uncertainty and change.
	Wimmera Victoria	For the purpose of this document, resilience is defined as the ability of a system to effectively respond to disruptions, like drought, while maintaining function. It is about being able to consistently and collectively develop, hone and create the tools to adapt, thrive and take advantage of opportunities when encountering change. Rather than 'persistent maintenance' of the current situation resilience includes the ability to adapt and potentially transform the way things are done during periods of uncertainty and change.
	Mid West WA	The capacity of a rural community and landscape as a social-ecological system to absorb disturbance, reorganize, maintain or change functions and feedbacks so as to continue to deliver values.
	Southern Wheatbelt WA	The capacity of a rural community and landscape as a social-ecological system to absorb disturbance, reorganize, maintain or change functions and feedbacks so as to continue to deliver values.
Maru et al. 2017		The capacity of a linked social-ecological system to absorb disturbance and reorganize so as to retain essentially the same function, structure, and

Source	Definition of resilience/excerpt
	feedbacks – to have the same identity. Resilience thinking embraces the ideas of adaptation of the current system, and also transformation to a different kind of system when the existing one is in an irreversibly undesirable state, or on a trajectory towards such a state.
Walker 2020	The simplest definition of resilience is the ability to cope with shocks and to keep functioning in much the same kind of way. It is a measure of how much an ecosystem, a business, a society can change before it crosses a tipping point into some other kind of state that it then tends to stay in. Possibly the most common misinterpretation of resilience is "bouncing back." Resilience is in fact the ability to adapt and change, to reorganize, while coping with disturbance. It is all about changing in order not to be changed. A resilient system responds to a disturbance by changing the relative amounts of its different parts and how they interact, thereby changing the way it functions. It stays the same kind of system by learning from a disturbance, to be able to better cope with a similar disturbance in the future. It does not bounce back to look and behave exactly like it did before. Resilient systems are learning systems. Resilience is largely about learning *how* to change in order not to *be* changed. Trying to protect a system by keeping it in a constant state reduces its resilience.
Carpenter et al. 2012	Resilience, in the context of environmental management and sustainability, is the capacity of a social-ecological system to absorb disturbance, reorganize, and thereby retain essential functions, structures and feedbacks.
South Australian Fire and Emergency Services Commission, 2019	The ability to survive, adapt and grow, no matter what happens.
Macbeth, 2024	"Resilience is the capacity to really build your future on your own terms and to get on the front foot… The whole notion of resilience depends on adaptive capacity - the ability to adapt to new conditions as the world changes. We've come to realise that drought is a reality of life in Australia - so it shouldn't be a shock." – Professor John Cole, former Executive Director of the University of Southern Queensland's Institute for Resilient Regions. Resilience is not just about how a community responds to a shock or a challenge such as drought. It also involves a community that's stronger for the everyday - that is socially connected and inclusive, and that is capable of working together in good times to prepare for tougher times. This involves developing a shared awareness of what future challenges might be, and

Source	Definition of resilience/excerpt
	planning and adapting accordingly so that infrastructure and services can withstand future shocks.
Arbon, 2024	How people, communities, and businesses cope in the face of change and uncertainty and build capacity to survive better through (often unexpected and cascading) consequences of disruptions that threaten our complex and interconnected social systems.

The AHFKI Regional Drought Resilience Plan is focused on drought resilience. However, enhancing drought resilience will help the region respond to and recover from other stresses or pressures such as bushfires, flooding rains, pandemics, and economic market changes.

5.2 The importance of drought resilience

Past droughts have had big impacts on the AHFKI region. They have resulted in major consequences for jobs and income, mental health and wellbeing, agricultural productivity, and the health of the environment. With climate projections predicting more frequent and more intense drought, building resilience is crucial.

Resilience is about taking action to try to avoid or minimise these negative impacts before they happen rather than waiting until they do occur to act, or just focusing on recovery. Building resilience can help to create economic, social, and environmental development opportunities.

5.3 Characteristics of drought resilient individuals, communities, and regions

It is important to consider resilience at a variety of scales from the individual to the community and the whole region. Resilience looks different for every community depending on its unique experience, attributes, risks and characteristics. However, there are a number of common attributes of a drought resilient region that have been identified by stakeholders, community (see Appendix A – Regional Engagement Summary Report) and the literature (Council of Australian Governments 2011; South Australian Fire and Emergency Services Commission 2019; Walker 2020).

5.3.1 Individuals

Characteristics of resilient individuals are described in Table 16.

Table 16 Characteristics of resilient individuals

Theme	Key characteristics
Social characteristics	• Having strong social connections, networks and relationships with friends, family, and the wider community. • Learning from past droughts and having knowledge of drought management. • Openness to share struggles with others, being willing to ask for help and access mental health support, seeking opportunities for breaks and respite.

Theme	Key characteristics
	• Awareness of available resources and knowledge for primary producers and communities.
Financial characteristics	• Diverse sources of household income. • Access to and awareness of financial support available. • Sustainable long-term business planning and risk management.
Environmental characteristics	• Adapting, innovating, and adopting new practices and technology.
Agricultural characteristics	All economic and environmental characteristics as well as: • Embracing innovation and implementation of new techniques, tools and technology. • Proactive preparation for drought.
Assets and infrastructure characteristics	• Access to good education, healthcare and digital connectivity. • Strategic investment in reliable water infrastructure that maximises water capture and minimises water loss.

5.3.2 Communities

Characteristics of resilient communities are described in Table 17.

Table 17 Characteristics of resilient communities

Theme	Key characteristics
Social characteristics	• Strong, connected, caring communities that help each other in times of need. • Proximity to regional centres with health, education and support services. • Sharing knowledge and celebrating sustainable, resilient practices. • Supporting community leaders as conduits for information. • Promoting and supporting volunteering opportunities that provide a sense of purpose.
Economic characteristics	• Diversification of local economies. • Access to community grants and training for individuals to pursue off-farm income. • Investment in projects that give good return to the community. • Local employment opportunities that support people to stay in the community.
Agricultural characteristics	• Uptake of new and adapting technology and practises. • Industry diversification. • Best practise soil and water efficiency practices. • Flexible water supply options. • Understanding seasonality for holistic primary production planning.
Environmental characteristics	• Low populations of pest/overabundant animals through proactive management before drought.

Theme	Key characteristics
Assets and infrastructure characteristics	• Reliable access to water, power, energy, digital connectivity and food. • Community spaces that enable people to come together. • Access to efficient community services and affordable commodities. • Good education and career pathways in agriculture. • Efficient transportation and special needs services during crises.
Governance characteristics	• Place-based, collaborative, long-term approaches and support from external agencies in ways that meet the unique needs of each community. • Implementing community-led initiatives with engagement at all levels.

5.3.3 Regions

Characteristics of resilient regions are described in Table 18.

Table 18 Characteristics of resilient regions

Theme	Key characteristics
Infrastructure characteristics	• Reliable and effective critical infrastructure (e.g., water, transport, power, telecommunication) • Strategic investment in infrastructure across the region. • Access to reliable transport/freight and movement (e.g., inputs, stock, fodder, people). • Effective local and regional weather forecasting.
Economic characteristics	• Strong agricultural commodity market conditions. • Access to financial institutions, interest rate support, grants, emergency funds, and financial education. • Workers that are attracted to and retained in the region. • Promoting local products and supporting businesses.
Governance characteristics	• Good communication and provision of information about drought updates, information and available grants and programs. • Strategic and proactive preparation for drought - investing in good times to increase resilience during bad times. • Policies that reflect regional needs (e.g. water usage, land usage, etc.). • Effective protocols for triggering funding and response strategies. • Meaningful government dialogue with the community to understand needs and challenges. • Comprehensive government understanding of drought impacts across stakeholders. • Scientific and observational lenses in policy development. • Agencies and government bodies that adopt values that support community-driven solutions.
Environmental characteristics	• Policies and practices for sustainable land and water use.

6. Approaches to drought resilience planning

6.1 Learnings from other planning regions

Many other regions across Australia have already prepared draft or final Regional Drought Resilience Plans through the Regional Drought Resilience Planning program. A desktop review of these plans and online meetings with a number of plan leaders has helped to:

- Understand what has worked well or not worked well in the process of preparing Regional Drought Resilience Plans in other regions around Australia, including in engagement, research, reporting and review phases.
- Identify the types of strategies and actions proposed for other regions and the collated evidence that suggests they will be successful in building drought resilience.

The key findings of this review and engagement are summarised in Table 19.

Table 19 Key learnings from other planning regions

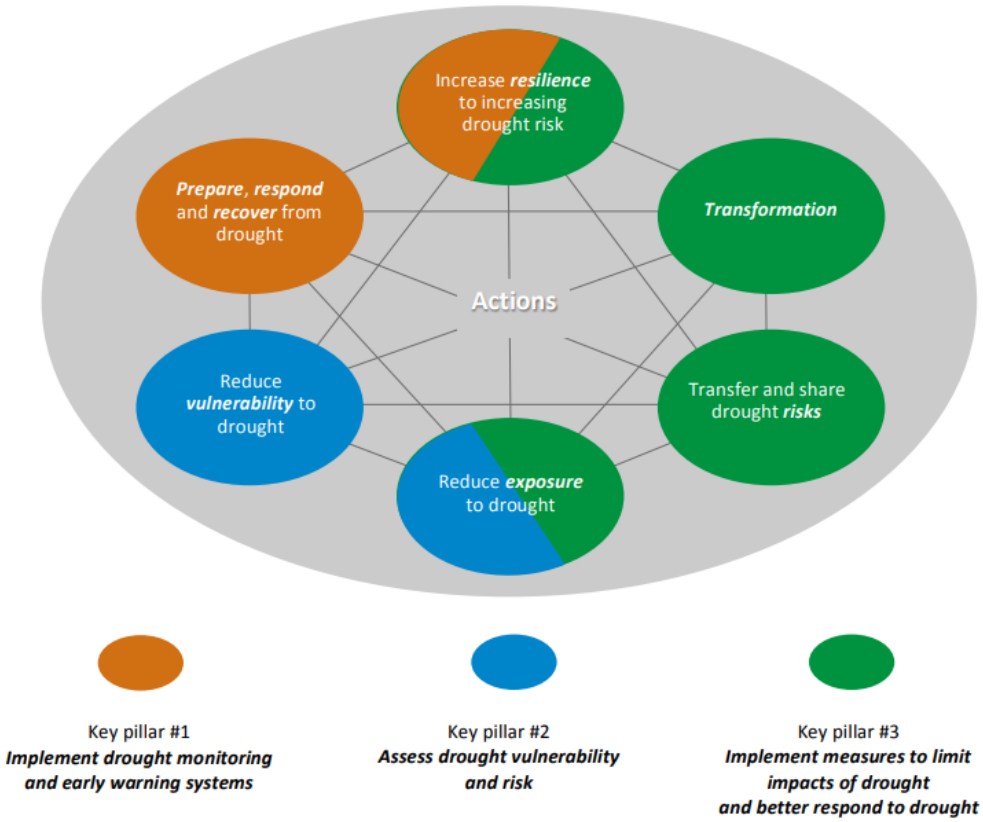
Planning element	Key findings
Structure of plan	• Short, simple, easy to read plans with lots of graphics are more effective than long, context-heavy plans. • Ensure the plan is written for the target audience (ie the people who make decisions about what to do about drought, from community based organisations and local business owners through to local, state and federal agencies). • Drought resilience plans should be high level to enable flexibility in implementation. The 'how to actually do it' is critical but this sits separately to the plan itself. • Including some tools such as My Climate View can be useful for those who want something more tangible from the plan. • Providing a list of potential partners is more effective and achievable than identifying particular responsibilities for each goal/action. • Preparing a 'plan on a page' summary of the plan is a useful approach for those who do not want to read the entire plan.
Strategies and actions	• Strategies and actions should be grouped by themes. • The plan should take a social focus – social/people/community actions are often the most effective in building drought resilience. • The plan should be viewed through a primarily agricultural lens, noting that impacts on agriculture then flow through the wider system. • Supporting/funding community clubs/organisations to deliver their own community programs is a very successful approach and helps to ensure the community can continue to implement the plan themselves, and that actions are led by and designed

Planning element	Key findings
	for the community. This needs to be managed appropriately to avoid volunteer burnout. • Actions should be considered across the range of change types (eg maintaining, modifying, and transforming) with some in each category.
Engagement	• Leverage existing relationships and networks to increase engagement, including for First Nations engagement. • Tailor engagement messaging to ensure you reach all parts of the community. • Online engagement can work well.
Approach	• A risk assessment framework approach is an effective approach. • Using the Drought Resilience, Adaptation and Management Policy (DRAMP) Framework (Crossman, 2018) is an effective approach.

6.2 The Drought Resilience, Adaptation and Management Policy (DRAMP) Framework

The Drought Resilience, Adaptation and Management Policy (DRAMP) Framework (Crossman, 2018) published by the United Nations Convention to Combat Desertification (UNCCD) takes an integrated, multi-pronged approach to reduce risks and impacts of drought. The Framework includes six goals, aligned with three pillars of drought risk reduction illustrated in Figure 22.

Figure 22 The Drought Resilience, Adaptation and Management Policy (DRAMP) Framework (Crossman, 2018)



The six goals of the DRAMP Framework are:

1. Reduce exposure to drought: reduce the potential for loss of people, livelihoods, ecosystem services and resources, infrastructure, as well as economic, social or cultural assets in places that could be adversely affected by drought.
2. Reduce vulnerability to drought: reduce tendency to be adversely affected by drought.
3. Increase resilience to drought risk: strengthen the ability of communities, ecosystems and economies to anticipate, absorb, accommodate or recover from the effects of drought quickly and efficiently by ensuring the preservation, restoration or improvement of natural capital.
4. Transformation: alter fundamental attributes of social, economic and ecological systems, including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems.
5. Prepare, respond, and recover from drought: the backbone of management and planning approaches to reduce drought risk, including development of comprehensive drought monitoring and early warning systems.
6. Transfer and share drought risks: distribute risks among wider section of society to include those who benefit directly and indirectly from robust drought risk management.

6.3 South Australia's Disaster Resilience Strategy

South Australia's Disaster Resilience Strategy was prepared to provide a foundation upon which state and local government, non-government organisations, businesses, and communities can work together to make a safer, more resilient South Australia. The Strategy includes eight guiding principles described in Figure 23 for building disaster resilience that are applicable to drought resilience planning.

Figure 23 Guiding principles for building disaster resilience (Government of South Australia, 2019)

6.4 Types of change

Building the resilience of the AHFKI region to drought will require various change in practices and processes. There are many ways and scales in which change can be approached. Three types of change often referred to in resilience planning are described below (Roggema et al, 2012):

- Incremental change – associated with slow processes and small adjustments, which modify the landscape only slightly. They are often associated with ongoing improvements in current practice. For the AHFKI region, providing more frequent ferries between Kangaroo Island and the mainland would be an example of this change type.
- Transitional change – associated with moving from one way of doing things to another in a deliberate way, for example transitioning from tradition to regenerative agricultural practices.
- Transformational change – associated with a fundamental shift in the system. They are usually multi-actor, multi-scale processes, where the change is highly non-linear. Examples may be initially controversial or cause wide-spread apprehension, for example if there was no further extraction of groundwater for irrigation (NOTE – this is not proposed, it is provided as an example of something that would be transformational).

7. Opportunities to strengthen drought resilience

7.1 Opportunities from other regions

A review of drought resilience plans from other regions with similar climate and agriculture has identified a number of opportunities that could be trialled or applied in the AHFKI region.

Table 20 Opportunities from other regions to strengthen drought resilience

Region	Plan theme	Opportunity
ACT (ACT Government 2023)	Environment	- Land Management – develop resilient land management practices - Vegetation Management – promoting native vegetation - Enterprise Selection – point to drought-tolerant species and enterprises which could be appropriate for future ACT climates - Water Management – soil and water conservation methods and new systems - Stock Management – interlinked with land management - Infrastructure – dams, rainwater storage tanks, etc.
	Social	- Improve/support wellbeing - Knowledge sharing and information provision
	Governance	- Recognise the important role rural land plays in providing food and fibre - Support biodiversity and provide a buffer zone for managing bushfire risk - Provide clear agriculture policy that articulates these themes and acknowledges the importance of rural land.
Wimmera Southern Mallee (Agriculture Victoria 2023b)	Communities and People	- Continue investment in community leadership programs - Ensure local sport and cultural events in the region remain organised during drought periods and ensure the infrastructure remains serviced - Promote events and activities to share drought experiences - Maintain access to recreational water and park areas during times of drought when their impact on community mental and physical health, environment and recreation is most critical - Build and strengthen programs to support mental health and create awareness of support options for the whole community - Ensure continuing training and education on the use of digital tools, to reduce the digital divide - Increase awareness and build respect for cultural and spiritual values of Country and protect areas of significance from drought impact - Build awareness of the actions that can be taken to increase resilience to drought

Region	Plan theme	Opportunity
		- Continue to include drought resilience, preparation and response options in regional education and training, particularly as it applies in a local context
	Farming Enterprises	- Advocate for support of financial advice and counselling services to enable farm and other businesses to make timely business decisions - Assist farm businesses with whole of farm planning, including drought preparedness, treatment of drought as a business risk, system and income diversification, and alternative income streams, especially in periods of non-drought - Encourage and support community members to access and utilise financial advice and counselling services - Encourage and support on farm drought preparedness activities related to land, crop and livestock management that are specific to the Wimmera Southern Mallee farming systems, climate and environment - Strengthen and expand locally specific and relevant agricultural research, development and extension - Support youth and careers in agriculture through workshops, career days, meet and greets and on-farm traineeships - Encourage entrepreneurship in farming businesses, both in family farms and enterprises through 'skilling up'
	Industry and Business	- Advocate for support for financial advice and counselling services to enable industry and small businesses to make timely business decisions - Support for commercial services to provide a drought lens to discussions with all businesses, including larger firms - Promote and retain local business leadership/management located in the region for better informed decision making and early detection of drought impact - Support networking of industry, businesses, and the financial sector to focus on drought preparedness - Work closely with the financial sector to support customers with high drought impact risks
	Governments and Agencies	- Maintain and regularly review plans for drought response and recovery - Promote inter-agency planning for preparation and response to drought periods - Focus government and agency preparations on being pro-active - Maintain formal and informal networks of key stakeholders on drought preparedness and resilience building - Ensure that any funding provided is targeting the needs of local communities

Region	Plan theme	Opportunity
	Infrastructure	- Investigate further support for investments to increase efficiencies in water distribution and management - Strengthen communications infrastructure to support digital access - Explore opportunities to expand localised, reliable, renewable energy generation and storage - Further expand mobility options and public transportation to support opportunities for social interaction for isolated or vulnerable groups of people - Maintain the road networks to enable economic activity despite lower rate income during droughts - Ensure community halls and houses are safe and accessible for everyone in the community
	Landscape	- Support an interconnected network of drought refuges for flora and fauna to maintain an ecologically healthy community during drought - Encourage the establishment of stock containment areas and promote planned grazing management to reduce soil erosion - Promote the maintenance of ground cover to support healthy soils that are more resilient during droughts - Support Landcare and Caring for Country practices based on traditional land management approaches
Gippsland (Agriculture Victoria 2023a)	Resilient, Connected and Empowered Communities	- Foster and support our community leaders - Improve community health and wellbeing by raising awareness of, and access to, community health services - Foster coordination and collaboration between not-for-profit organisations
	Sustainable Management and Use of Natural Resources	- Accelerate the adoption of innovative resilient and adaptive farming systems - Diversify water storage and supply options on farm and in communities - Improve management of natural resources on public and private land
	Resilient Local Businesses and Regional Economies	- Improve decision making enhanced by holistic business planning and business skill development - Encourage businesses to build resilience in good years and build greater adaptability to seasonal conditions - Improve business continuity through succession plans and transition pathways - Promote diversification of local businesses and economies
	Innovation, Research,	- Farm systems innovation through information and technology targeted to the needs of Gippsland.

Region	Plan theme	Opportunity
	Knowledge Sharing and Skills Development	- Industry innovation through collaborative research and knowledge sharing. - Building regional capability through skill development pathways, recruitment and local employment opportunities.
	Key Enablers Essential to Effective Collaboration and Collective Action	- Clarify drought accountabilities, shared responsibilities, regional governance and coordination (including service offering from various organisations) - Consult with community groups and other existing regional and local networks to inform drought resilience programs. - Improve digital connectivity to support community connection

7.2 Opportunities in stakeholder plans and projects

Through a review of stakeholder plans and projects, and engagement with stakeholders through the key informant interviews, a number of opportunities that could be further progressed or accelerated through the Regional Drought Resilience Plan have been identified.

Table 21 Opportunities from stakeholder plans and projects to strengthen drought resilience

Plan	Plan theme / project	Opportunity
AHFKI RDA – Strategic Regional Plan 2022-2025 (RDA AHFKI 2022b)	Agriculture	- Promotion of carbon capture in agricultural systems - 5G providing reliable connectivity for mobile tools and machines – smart farming
	Community	- Development of value-adding agriculture and industry utilising the regions wastewater to maximise potential of this resource - Continuous development of effective and efficient freight routes suited to evolving transport needs - Mapping the region's mobile blackspots against population and industry - Encouragement of upskilling of workers and supporting businesses to increase digital literacy - Investigation and encouragement of collaboration with local suppliers who can support uptake of new technology - Supported access to business information and resources - Increased awareness of government and industry programs - Connection with government, markets, customers, researchers and other stakeholder

Plan	Plan theme / project	Opportunity
Hills and Fleurieu Landscape Plan 2021-2026 (Hills and Fleurieu Landscape Board 2021)	Agriculture/ Land management	- Embracing regenerative agriculture: Supporting landholders to integrate regenerative agriculture principles by developing networks, sharing learnings and applying them locally. - Develop a Hills and Fleurieu Pest Management Strategy to prioritise management and compliance efforts. - Developing a circular economy - Supporting and maintaining circular economy opportunities in food, wine and agriculture industries to maximise economic, social and environmental benefits within the Hills and Fleurieu region. - Carbon Farming Roadmap: Providing pathways for uptake of emissions reduction and carbon sequestration opportunities in soils, vegetation, forestry and livestock management. - Supporting landholders to integrate regenerative agriculture principles by developing networks, sharing learnings and applying them locally. - Collaborating and information sharing to clarify responsibilities and improve control of priority weed species on roadsides.
	Viticulture	- Enhancing biodiversity in vineyards by implementing Biodiversity Action Plans on individual properties - McLaren Vale Water Security Planning - Planning for how native and alternative water sources can support industries in the face of projected climate change impacts.
	Climate change	- Explore and support carbon reduction activities, including uptake of carbon farming. - Ensure water resource planning is climate-ready - Support primary producers to understand regional climate impacts and adaptation options. - Support the community to prepare landscapes for, and recover from, fire and extreme weather events. - Build systems and consumer demand that support local provenance foods and regenerative, climate-ready land management practices. - Encourage primary producers and consumers to adopt circular economy practices
	First Nations	- Strengthen collaboration with First Nations to embed their knowledge and approaches in looking after Yatra/Ruwe Country. - Protect and raise awareness of First Nations cultural and heritage assets. - Support the interests of Aboriginal people in accessing and caring for Country.

Plan	Plan theme / project	Opportunity
		- Involve Aboriginal businesses and organisations in landscape restoration.
Kangaroo Island Landscape Plan 2021-2026 (Kangaroo Island Landscape Board 2021)	Economy - Sustainable primary production and the island's economy	- Improving the health of the soil, water and biodiversity that supports our economy - Strengthening the viability of primary production through sustainable practices - Working in partnership with industry to ensure the island's economy continues to prosper
	Pests	- Controlling and, where possible, eradicating weeds, pests and diseases
Resilient Hills & Coasts – Regional Action Plan 2020-2025 (Resilient Hills & Coast 2022)	Agriculture – Adelaide Hills and Fleurieu	- Continue to improve seasonal forecasting relating to rainfall and temperature which will provide growers with the ability to make better decisions on farms, such as when to trade stock or determining how to manage projected water demand over a coming irrigation season. - Undertake research to determine suitable crops, varieties, and management techniques - Research into and manage potential changes in future water quality - Assess a broad variety of products to determine suitability for production under a changing climate. - Provide information to primary producers regarding adaptive land management techniques. - Develop a policy that requires cost-benefit analysis for agricultural water infrastructure to consider future climate and water quality implications. - Diversification of agricultural activities
	Agriculture – Kangaroo Island	- Adapting agriculture to climate change will require diversifying agricultural production systems; improved seasonal forecasting; incorporating carbon sequestration into food based agriculture primarily through increasing soil carbon; and building the resilience of supporting ecosystems. - Adaptation options for emergency management that will assist in protecting vulnerable members of the community and aid with biodiversity conservation involve whole-of-island vegetation management planning to reduce fire risk, community messaging around risk; and insurance developed in partnership with the Insurance Council of Australia; and improved early warning systems leading into fire events
Livestock SA:	Beef	- Consistent supply of highly credentialed premium product to high-value markets

Plan	Plan theme / project	Opportunity
The South Australian Beef Industry Blueprint – 2018 to 2028 (Livestock SA 2018)		- Product differentiation based on product quality and integrity attributes - Equipping producers with the knowledge and skills to cost effectively increase productivity and return on farm assets managed - Capitalise on new data recording and technology platforms both on-farm and through the value chain for enhanced decision making and management - Unlocking the increased production potential in key regions - Expansion of finishing opportunities for stock bred in the pastoral zone
The South Australian Sheep Industry Blueprint 2030 (Livestock SA 2020)	Sheep	- Supporting productivity with sustainable practices - Promoting a responsive and resilient supply chain - Fostering a growing, skilled workforce - Optimising market outcomes
SA Grain Industry Blueprint (Grain Producers SA 2020)	Cropping	- Grain production sector to have increased business resilience and sustainability – through training and providing tools/support to farmers - Sustain industry capacity by supporting the health and wellbeing of regional communities – provide access to range of programs in response to drought or other hardships - Secure the science base to support growth in SA's grain industry by driving innovation in agriculture - focus investment in traits to combat the greatest environmental risks to grain production, such as heat, drought, frost and salinity tolerance. - Increase the production base of SA's grain industry through sustainable intensification of agriculture - invest in research which targets plant breeding, agronomic management and better use of weather forecasts to develop solutions to frost, heat stress and drought.
SA Dairyfarmers Association (SADA) (SADA 2024)	Dairy	- Our Farm Our Plan' Project (funded by future drought fund) is to provide subsidised training for a minimum of 30 farmers to develop their strategic management skills and support them to develop or to update an existing farm business plan.

7.3 Opportunities identified through regional engagement

Through the regional engagement, stakeholders identified strategies and opportunities that will be further explored and considered as the AHFKI Regional Drought Resilience Plan is prepared. These are presented in the following themes:

- Agriculture, horticulture and viticulture
- Community health and wellbeing
- Financial and economic management
- Environmental management
- Governance and advocacy
- Infrastructure.

Opportunities are ordered by whether they are to be implemented before, during or after drought.

7.3.1 Agriculture, horticulture and viticulture

Table 22 Opportunities to strengthen regional drought resilience through agriculture, horticulture and viticulture

Phase	Opportunities for action
Before	Develop and implement bushfire preparedness plans
	Encourage farmers to plan ahead and take action to prepare for the season ahead (e.g. consider diversification options to spread risk)
	Establish a central fodder hub for producers to stockpile resources and consider storage of fodder rebate
	Plan for drought by enhancing on-farm efficiencies and management practices, such as reducing fodder wastage, managing fodder reserves, improving irrigation efficiency, breeding for genetic resilience, selecting drought-resistant rootstocks, and improving water catchments and storage
	Develop and implement individual farm/business drought plans, including specific trigger points for action based on rainfall and other indicators
	Provide education on innovative farming and drought practices through local discussion groups with expert speakers (e.g., ways to manage farming calendar by seeding according to variability rather than set calendar)
	Create property management plans to guide land use and resource allocation during drought
	Increase financial management skills among farmers, focusing on debt reduction and better tax management
	Encourage vineyards and fruit growers to analyse and prioritise their most profitable production areas
	Develop a comprehensive drought learning book that compiles best practices and lessons learned

Phase	Opportunities for action
	Promote forward planning for grain warehousing and conservative risk management
	Work with the Kangaroo Island Pasture Group (KIPG) to improve feed availability on Kangaroo Island
	Implement benchmarking for production and finance to identify best practices
	Encourage the planting of low water-use and more drought resilient gardens, pastures, and crops (e.g. rye grass)
	Encourage and support clay spreading which will help hold soil together, retain moisture, help with germination etc.
	Improve water holding capacity and biological health of soils through the use of soil ameliorants, soil amendments and soil management practices, agronomic practices and strategic crop selection
	Build relationships with fodder suppliers within and outside the region
	Invest in soil moisture probes and provide training for farmers to use them effectively across all drought phases
	Improve on-farm data measurement and monitoring to make informed decisions
	Ensure efficient water security and storage and delivery infrastructure, minimise water usage
	Adopt biodynamic farming methods and other innovative farm management systems
During	Develop and implement a stock management strategy and confinement feeding practices in accordance with established farm drought plan
	Continuously evaluate performance for improvement (e.g. identify good performing crops)
	Collaborate with Kangaroo Island Pure Grain (KIPG) to increase grain availability
	Managing total grazing pressure by increasing shooting permits
	Have good accessibility of feed/fodder and money to afford
	Make prompt, prioritised decisions, deferring non-critical tasks
	Work proactively to address immediate stock-related issues with feed and water
	Identify effective strategies during the drought and share this knowledge with others
	Tailor fertilisation strategies based on soil testing to optimise resource use
	Utilise alternative resources and bring in additional fodder to support livestock
After	Provide tailored advice specific to individual properties rather than generic solutions
	Manage and restock farming systems according to appropriate stocking rates
	Utilise technology to connect neighbouring properties with experts, providing timely and specific support
	Review land use to identify opportunities for diversification, such as converting farms to housing or engaging in different primary production activities, like solar farming or other agribusinesses

Phase	Opportunities for action
	Learn from and implement effective water infrastructure strategies used during drought
	Improve soil health to enhance resilience against future droughts

7.3.2 Community health and wellbeing

Table 223 Opportunities to strengthen regional drought resilience through community health and wellbeing

Phase	Opportunities
Before	Establish strong social structures and networks to foster community collaboration through accessible and free social activities (e.g., sports, church groups, clubs)
	Facilitate knowledge sharing on adapting to changing conditions (e.g. connecting older and younger farmers)
	Build relationships with key stakeholders such as carriers, bank agents, and neighbours
	Offer mentoring, business advice, and tailored support to farmers
	Support mental health and wellbeing initiatives in the region
	Empower community leaders to take proactive roles
	Encourage farmers to develop individual drought and farm plans
	Bring together experience, knowledge, and innovation to strengthen community resilience
During	Foster community collaboration and maintain social connections through activities and regular interactions (e.g. pub/clubs)
	Provide education and training opportunities, including mentoring and peer-to-peer advice for effective decision-making and business planning
	Emphasise the importance of self-care, including health, exercise, sleep, and hobbies
	Support those who support others (e.g. volunteers) to prevent burnout
	Encourage sharing of successful strategies and tools from businesses and individuals who have managed drought well
	Encourage seeking help and advocacy when needed
	Organise workshops tailored to specific areas, discussing past experiences, confinement pastures, mental health, benchmarking, budgeting, etc.
	Launch a campaign to support local community (e.g. 'buy from the bush' and do 'normal business')
	Promote the provision of counselling services to support mental health during drought
After	Foster community collaboration to review drought experiences and identify improvements

Phase	Opportunities
	Understand and address the financial positions and support needs of individuals affected by drought
	Document and celebrate successful strategies and resilience to learn from experience and plan for the future
	Support personal recovery and well-being through counselling services and encouraging help-seeking behaviours
	Maintain a forward-looking perspective to stay positive and proactive in drought recovery efforts
	Encourage individuals to take breaks and holidays to recover from the stress of drought
	Promote better feed sources and nutritional value to support livestock recovery
	Implement stock management practices to allow pastures to recover effectively
	Ensure effective collaboration between community and government agencies
	Ensure transparent communication about the impacts of drought and the measures needed to recover

7.3.3 Financial and economic management

Table 24 Opportunities to strengthen regional drought resilience though financial and economic management

Phase	Opportunities
Before	Promote solid business planning, including budgeting, setting aside funds, and risk management, particularly concerning water allocation
	Optimise profitability during good years to build financial buffer/reserves
	Fund projects that attempt to reverse the likelihood of drought (e.g. reduce carbon emissions, soil carbon)
	Provide access to local bank managers and financial solutions tailored to regional needs
	Promote education and capacity building for agronomists to improve sector-wide expertise
During	Maintain close oversight of finances and liaise with bankers to navigate drought-related challenges
	Secure funding to support drought resilience measures such as contained feeding and advisory services
	Support to find additional workers when needed
	Encourage continued spending within the region by locals and visitors
After	Simplify access to Farm Household Allowance
	Simplify and expedite recovery grant processes to provide quick and flexible financial support
	Conduct individual financial reviews

7.3.4 Environmental management

Table 25 Opportunities to strengthen regional drought resilience through environmental management

Phase	Opportunities
Before	Implement a regional approach to pest management for both plants and animals, (e.g. focusing on those that extract moisture from crops)
	Ensure access to local weather data and improve forecasting capabilities
	Clearly define what constitutes a 'drought' to ensure consistent understanding and responses
	Establish shelterbelts and native corridors to support biodiversity and environmental resilience
	Shelterbelts and native corridors and patches
	Encourage practices that reduce emissions
	Encourage species diversity in pastures to enhance drought tolerance
During	Provide information and education on pasture management and drought resilience
	Promote understanding and acceptance of the uncontrollable factors causing drought, focusing on adaptable measures
	Implement pest plant management strategies
After	Continue efforts to reduce emissions to mitigate climate impacts

7.3.5 Infrastructure

Table 26 Opportunities to strengthen regional drought resilience though infrastructure

Phase	Opportunities
Before	Promote the adoption, education and use of technologies that support better farm management
	Provide financial support for infrastructure improvements, such as environmental covers and netting
	Ensure resource flexibility to respond to various events, not just drought
	Upgrade and improve farm infrastructure, including dams, silos, confinement lots, water monitoring systems, grain and fodder storage, water pumps, and fencing (e.g. vermin proof fencing)
	Ensure reliable sea freight services, including strategies to increase capacity and freight subsidies for Sealink during critical periods
	Rebuild roads that were previously affected by drought and implement better/active road maintenance
	Improve communication and coordination between transport operators
	Develop a long-term Kangaroo Island Water Security Infrastructure Plan (2025 -2050) for planned expansion of the desalination water network across the Island in the future

Phase	Opportunities
	Address capacity issues at abattoirs to prevent kill constraints
	Regional water infrastructure planning for improved water security
During	Provide freight subsidies for offloading stock, transporting food, fertilisers, grain, hay, etc. and enable heavy vehicle access to reduce freight costs
	Increase the capacity for Sealink services to Kangaroo Island, especially during adverse conditions
	Broaden access to quality fodder resources and ensure accessible information about fodder availability
After	Rebuild and repair infrastructure and assets damaged by drought

7.3.6 Governance and advocacy

Table 27 Opportunities to strengthen regional drought resilience through governance and advocacy

Phase	Opportunities
Before	Establish a coordinating structure to inform decision-making during droughts, similar to Agriculture Exceptional Circumstances
	Form a task force with representatives from various agricultural groups (e.g. ASART, Yan, Ag Ado group, VH Ag Whg group + others)
	Create pathways for new and young farmers to enter and remain in the industry
	Improve the dissemination of water information to farmers
	Advocate for longer funding and policy timeframes with more consistency
	Implement policy changes before droughts, such as increasing water harvesting capabilities, to prepare for future droughts
	Secure long-term funding for drought and land management staff who can lead and facilitate workshops
	Ensure drought plans include supported planning with built-in accountability
During	Ensure flexibility in water infrastructure policies (both on-farm and across region) and consider water infrastructure rebate
	Provide support to modify farming strategies and fill knowledge gaps through research
	Increase biosecurity measures (e.g. commodity vendor declaration)
	Provide transport subsidies
	Maintain open communication with the community about drought impacts and response actions
	Develop a plan for how the maximum number of businesses can access the help – irrelevant of the available funds of the business at the time

Phase	Opportunities
	Ensure local decision-making remains community-centric
	Activate a structured response to coordinate drought relief efforts
	Identify and implement ways to alleviate financial stress, such as adjusting rates and bank repayments
After	Regularly review and update the Drought Plan
	Change policies to enhance resilience, better prepare for future droughts, and remove policy and legislative barriers to diversification and adaptation
	Develop and review case studies on lessons learned, including what worked well, for different drought intensities and durations
	Review organisational structure and processes to assess what was learned and what can be improved
	Rebuild and repair infrastructure and assets damaged by drought
	Provide funding to rebuild essential resources such as water supplies and livestock.
	Advocate for more local presence of government departments
	Implement new systems for accessing farming leases and hobby farmer lands at reasonable costs

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Appendix A Regional Engagement Summary Report

Regional Development Australia Adelaide Hills, Fleurieu & Kangaroo Island
24ADL-0489
December 2024

DROUGHT RESILIENT
ADELAIDE HILLS
FLEURIEU PENINSULA
KANGAROO ISLAND

Adelaide Hills, Fleurieu and Kangaroo Island Regional Drought Resilience Plan - Engagement Summary Report

Engagement Summary Report

December 2024

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Prepared for	Regional Development Australia Adelaide Hills, Fleurieu & Kangaroo Island
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URPS Ref	24ADL-0489

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V1	12/07/24	R. Liew, A Pannell	A. Pannell	Draft report for Steering Committee review
V2	10/12/2024	R. Liew, A Pannell	E. Mansfield, A. Pannell	Updated report following Steering Committee and CSIRO review

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DROUGHT RESILIENT
ADELAIDE HILLS
FLEURIEU PENINSULA
KANGAROO ISLAND

Contents

Acknowledgement of Country

The Adelaide Hills, Fleurieu and Kangaroo Island Drought Resilience Steering Committee acknowledge Aboriginal people as the First Peoples and Nations of the lands and waters we live and work upon. We pay our respects to Elders past, present and emerging. We acknowledge and respect the deep spiritual connection and the relationship that Aboriginal and Torres Strait Islander people have to country and commit to working with the First Nations People of the region as we deliver the Drought Resilience Plan.

1. Introduction

The Adelaide Hills, Fleurieu and Kangaroo Island (AHFKI) region Drought Steering Committee has initiated the preparation of a Drought Resilience Plan as part of the Regional Drought Resilience Planning Program.

The Plan will identify strategies and actions to enhance the Adelaide Hills, Fleurieu and Kangaroo Island region's ability to respond to and recover from drought, that will also help prepare for and respond to other stresses or pressures.

The Plan will document how the region's agricultural and associated industries might be impacted by drought, describe a desired future or vision that acknowledges more frequent or severe drought and greater rainfall variability and identify strategies and actions to build resilience to ensure regional values are maintained and economic and social development opportunities are optimised.

Stakeholder and community engagement is an integral part of the Plan's preparation.

Engaging with stakeholders and community members has:

- Enabled people and organisations to contribute their own knowledge, expertise and experience to the plan.
- Built capacity of people to think about how drought might change what they do and how they could plan and act proactively to build resilience to drought.
- Provided the foundation for an ongoing and enduring process that empowers people to activate the Plan developed by this project and drive the implementation of actions.

The first phase of engagement aimed to understand:

- How has the AHFKI region impacted by drought?
- What makes people, communities and regions resilient to drought?
- In what ways is the AHFKI region already resilient?
- How can the resilience of the AHFKI region to drought be maintained and enhanced?

1.1 How we engaged

Four face-to-face workshops were undertaken with stakeholders and communities across the region in late June 2024. Stakeholders were identified by the Steering Committee and invitations sent by the AHFKI project manager.

Table 1 Workshop participation

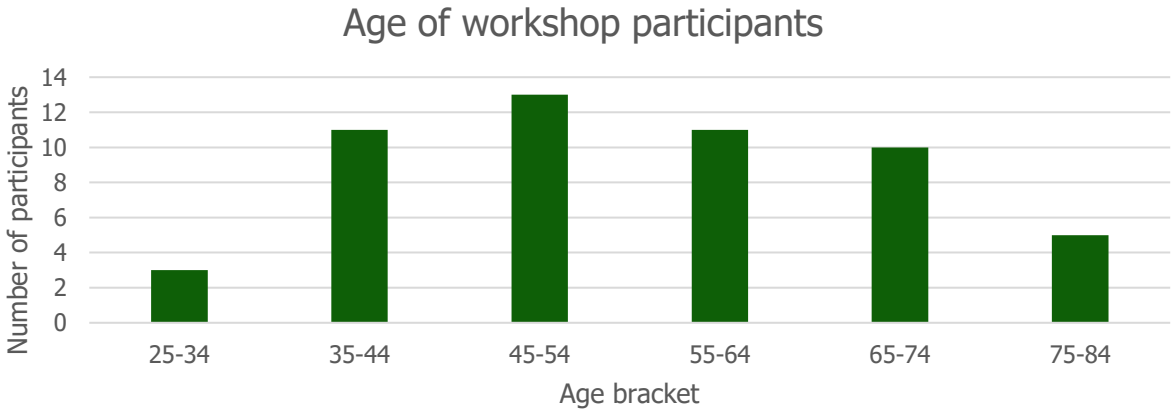
Location	Date	Number of participants
Charleston	24 June 2024	10
Parndana	25 June 2024	24
Strathalbyn	27 June 2024	9
Mount Compass	28 June 2024	12

1.2 Who we engaged with

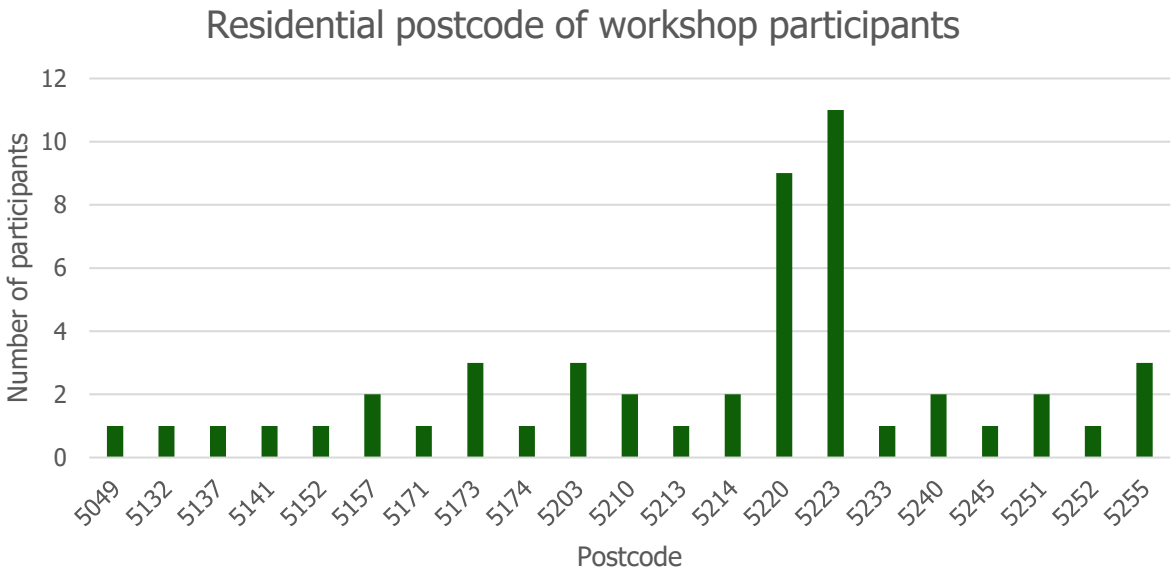
1.2.1 Workshops

Participants at the workshops included primary producers, local, state and federal government, land and/or catchment management authorities, extension and training providers, researchers and academics, agribusiness specialists, not-for profit organisations, other private businesses, grower groups, wellbeing providers, funding bodies and retirees.

Participants represented every age bracket between 25-34 years old and 75-84 years old, with most participants aged in the middle.



Participants lived across every part of the AHFKI region, with the most represented postcodes being 5223 (American River, Baudin Beach, Brownlow Ki, Emu Bay, Island Beach, Nepean Bay, Penneshaw) and 5220 (Kingscote) on Kangaroo Island.



A summary of the discussions and key points from the workshops is provided in Section 2.

1.2.2 Key informant interviews

In addition, key stakeholders that were unable to attend the workshops were invited to participate through a "key informant" interview. 12 interviews were undertaken with representatives from the following organisations:

- ifarmwell (University of SA)
- SA Water
- Hills and Fleurieu Local Food Futures project
- South Australian Dairyfarmers Association (SADA)
- Rural Bank / Bendigo Bank
- Kangaroo Island Leaders
- Food and Beverage Australia Limited (FABAL)
- Kangaroo Island Landscapes Board
- Goyder Institute for Water Research Coorong, Lower Lakes and Murray Mouth Research Centre (CCLLM)
- Mundoo Island Station
- Susie Green Consulting
- Adelaide Hills Wine Region

A summary of key points raised in each interview is provided in Section 3.

77 individuals participated in the engagement.

2. Summary of workshops

At each workshop, participants were presented with information about the drought resilience planning process and then facilitated discussions and activities were used to understand participants' ideas about the following:

- What makes individuals, communities and regions resilient to drought?
- How has/does drought impact the region?
- What can be done to build resilience before, during and after drought?

The following sections collate the responses. In each table, the points raised have been collated by theme and the workshop/s where the idea or point was raised is identified.

2.1 What contributes to resilience?

Workshop participants were asked what makes individuals, communities and regions resilient to drought?

Table 2 Characteristics of individual resilience

Characteristics	What makes individuals resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Social	Having strong social connections, networks and relationships with friends, family, and the wider community, having multiple touch points such as sport clubs, the Country Women's Association, Fleurieu Beef group, Fleurieu Food group, or participating in shed talks, workshops, or other peer to peer groups	X	X	X	X
	Sharing struggles with others, being open and willing to ask for help, having adequate access to mental health support, and the opportunity to take breaks or go on holiday/respite	X	X	X	X
	The ability to learn and reflect from past experiences of droughts, and possessing adequate knowledge and education about what to do before, during, and after a drought event	X	X	X	X
	Awareness of available resources and knowledge for primary producers and local communities	X		X	
Environment	Being open-minded and understanding the need to adapt to changing climate conditions is crucial for resilience	X	X	X	X
Agriculture	Embracing innovation and implementing new techniques, approaches, and technology in agricultural practices	X	X	X	X
	Utilising methods like containment feedlots for livestock feed during drought conditions.		X		
Economic	Having diverse sources of household and off-farm income	X	X	X	X
	Good long-term business and financial planning, focusing on long-term sustainability rather than short-term profit, avoiding stagnant debt, and adopting good risk management plans	X			

Characteristics	What makes individuals resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Assets and infrastructure	Strategic investment in infrastructure on farm, such as reliable water infrastructure and effective water management practices, is crucial for resilience.	X	X		X

Table 3 Characteristics of community resilience

Characteristics	What makes communities resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Social	Strong relationships and connections within the community and between community groups and organisations	X	X	X	X
	Sharing information, experience, and knowledge within the community and celebrating success stories of sustainable practices, and early adopters being proactive in learning from others	X	X	X	
	Showcasing and supporting community leaders who act as a conduit to other members in the community		X	X	
	Supporting volunteers and promoting opportunities for people to positively contribute within the region which provide a sense of purpose			X	
Environment	Providing support for protection against pests (e.g. birds, bats, deer, kangaroos, etc.) especially during dry times (e.g. installing environmental covers in farms)	X			
Agriculture	Implementing flexible water supply options and temporary changes in water licensing during dry times	X	X		X

Characteristics	What makes communities resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Promoting industry diversification			X	
	Implementing soil water efficiency practices, increasing soil carbon			X	X
	Understanding of seasonality – important for primary production (autumn, spring, water runoff) – holistic approach bringing it all together				X
Economic	Providing access to education and training to take up off-farm opportunities	X			
Assets and infrastructure	Access to efficient and accessible community services (e.g. childcare, social groups, education, health, GPS, psych services, mental health support) and affordable commodities (food, housing, etc.)	X	X	X	X
	Access to good education, supporting career pathways into the agricultural sector, improving community knowledge by bringing in knowledge experts to the region			X	X
	Ensuring efficient transportation capacity and special need services during crises		X		
Governance	Ensure initiatives are community-led and that engagement occurs across all levels	X			

Table 4 Characteristics of regional resilience

Characteristics	What makes regions resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Infrastructure	Enhance the availability and management of infrastructure (e.g. dams, tanks, bores, pipeline, transport, roads, power, water, technology, telecommunication) and provide adequate infrastructure support (e.g. state government, Sealink)		X	X	X
	Implementing efficient water storage/infrastructure, and flexible water policies (e.g. reserve on excess water)		X	X	X
	Providing an accessible platform for information and updates	X			
	Strategic investment in infrastructure across the region		X		
	Ensuring reliable transport/freight and movement to and from mainland (e.g. inputs, stock, fodder, people)		X		
	Efficient local and regional weather forecasting			X	X
Economy	Providing access to financial institutions, interest rate support, grants/incentives, emergency funds, pre-drought financial buffers, and financial education		X	X	X
	Attracting and retaining workers in the region		X		
	Promoting local products and supporting local businesses			X	
	Protecting economic use of land			X	
Governance	Developing and implementing policies that reflect the unique characteristics and needs of each region (e.g. Water Affecting Activities policy, sustainable limits review, live export of animals)		X	X	X
	Establishing clear protocols for drought declarations that trigger funding, strategies, and policy implementations (e.g., farm drought plans with triggers for different actions)		X	X	X
	Ensuring that government agencies engage in meaningful dialogue with locals in the region to understand their needs and challenges	X		X	

Characteristics	What makes regions resilient to drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Ensure the government has a good understanding of drought, promoting a comprehensive understanding of what drought means for various stakeholders across the region			X	X
	Utilising a strong scientific lens and/or observational lens	X			
	Implementing a bipartisan approach where government investment is made in collaboration with regional communities to run resilience programs and initiatives	X			
	Ensuring that organisations, agencies, and government bodies possess the behaviours and values necessary to learn from communities and develop informed policies and strategies that allow community-driven solutions	X			
	Implementing policies and practices that promote better management of the biophysical environment, such as sustainable land and water use practice				X

2.2 How has/does drought impact the region?

Workshop participants were asked how drought has previously impacted the region, and what might happen in the future.

Table 5 Drought impacts on the AHFKI region

Characteristic	How has/does drought impact the region?	Charleston	Parndana	Strathalbyn	Mount Compass
Social	Drought erodes confidence, increases anxiety and mental stress, leading to physical health issues, increased divorce, and higher suicide rates	X	X	X	X
	Relationships get strained as people focus on immediate situations and cannot think about the future	X	X	X	X
	Withdrawal from community settings which leads to reduced social interaction and division within the community	X	X	X	X
	Children are affected by the loss of family income and increased stress, leading to reduced family time	X	X	X	
	Reduced feelings of positivity and optimism (e.g. caused by having to get rid of stock or wastages or financial stress), leaving people feeling out of control	X		X	
	Declines in community visual amenities and lifestyle, leading to a reduction in services and infrastructure		X		X
	Decrease in holidays and time off, with people working 7 days a week, leading to increased workload and burnout		X		X
	Everyone is impacted by drought	X			
Agriculture	Farms incur greater debt, impacting their financial stability, long-term viability, and reducing cash flow, making it difficult to manage regular expenses and invest in future operations	X	X		X
	Farmers often engage in 'fire sales' to get rid of stock and then have to buy back at a premium or have lost herd genetic diversity	X			
	Increased fruit/crop damage from extreme heat	X			

Characteristic	How has/does drought impact the region?	Charleston	Parndana	Strathalbyn	Mount Compass
	Depletion of water supplies (for stock consumption, irrigation of pastures, milking shed hygiene)	X		X	
	Increased need for grants for crop protection	X			
	Increased spending on buying feed, trucking water, and other essential resources	X	X	X	
	Decreased water availability which leads to poorer water quality and increased salinity		X	X	
	Livestock health deteriorates due to inadequate feed and water		X		X
	Consolidation of smaller farms, reducing the number of individual farm operations.			X	
	Reduction of ability to grow feed	X	X		X
	Reduced income and profitability will impact ability to adapt/respond				X
	Immediate demands of drought conditions make it difficult for farmers to plan for the long term		X		X
Environment	Highlights the importance to recognise the impacts of compound events such as drought, bushfire, hail, pandemic, etc.	X			
	Different timing of pests during drought and increased grazing pressure	X	X		
	Increase in bushfire risk due to lack of water resource access	X	X		
	Adverse impacts on wildlife health		X		
	Native fish reduced water flows		X		
	Increased erosion risk, decrease in topsoil, decline in soil health		X	X	
	Decrease in water quality and availability of water		X	X	
	Increase in wildlife and human interaction, increase in biosecurity risk		X	X	

Characteristic	How has/does drought impact the region?	Charleston	Parndana	Strathalbyn	Mount Compass
	Impact on native vegetation		X		
Economy	Decrease in farm income	X	X	X	X
	Increased economic strain due to insufficient government funding and assistance (Charleston: no funding because area is not considered a drought area but could increase government spending)	X	X	X	
	Larger companies can afford to pay higher wages, making it difficult for smaller businesses to compete	X			
	Decrease in local economy (in towns and also individual farms/agribusiness) – an increase in debt and decrease in equity	X	X	X	X
	Lower farm incomes lead to decreased spending in local shops and businesses	X	X	X	X
	Businesses that provide services and supplies to farms, such as machinery suppliers and resellers, experience reduced demand and financial stress	X			
	Labour demands – increase workloads but decrease in motivation and productivity		X		
	Increase in off farm income jobs		X		
	Job losses, with people leaving the area to seek employment elsewhere	X	X	X	X
	Serious strain on Kangaroo Island's logistics, affecting the transport of goods and resources		X		
	Decrease in tourists, impacting the local tourism industry. Strathalbyn: Improved messaging by tourism bodies is needed to encourage visitors to support the region during drought periods.			X	X
	Increase in prices for essential goods and services			X	
	Fall in market prices for agricultural products				X
Infrastructure	Deterioration of infrastructure due to compounded effects of drought		X		

Characteristic	How has/does drought impact the region?	Charleston	Parndana	Strathalbyn	Mount Compass
	Damage to farm infrastructure and equipment from poor roads worsened by drought conditions		X		
	Decrease in on-farm capital and repairs		X		
Governance	Highlights the need for local decision-making to be managed locally to effectively address the unique challenges posed by drought			X	

2.3 What can be done to build resilience before, during and after drought?

Workshop participants were asked what can be done to build resilience before, during and after drought.

Table 6 Opportunities to strengthen resilience before drought

Characteristic	What can be done before drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Social/ Community	Establish strong social structures and networks to foster community collaboration through accessible and free social activities (e.g., sports, church groups, clubs)	X	X	X	X
	Facilitate knowledge sharing on adapting to changing conditions (e.g. connecting older and younger farmers)		X	X	X
	Build relationships with key stakeholders such as carriers, bank agents, and neighbours		X		
	Offer mentoring, business advice, and tailored support to farmers			X	
	Support mental health and wellbeing initiatives in the region				X
	Empower community leaders to take proactive roles				X
	Encourage farmers to develop individual drought and farm plans				X
	Bring together experience, knowledge, and innovation to strengthen community resilience				X
Agriculture	Develop and implement bushfire preparedness plans	X	X		
	Encourage farmers to plan ahead and take action to prepare for the season ahead (e.g. consider diversification options to spread risk)		X	X	
	Establish a central fodder hub for producers to stockpile resources and consider storage of fodder rebate		X	X	
	Plan for drought by enhancing on-farm efficiencies and management practices, such as reducing fodder wastage, managing fodder reserves, improving irrigation efficiency, breeding for genetic resilience, selecting drought-resistant rootstocks, and improving water catchments and storage		X		X

Characteristic	What can be done before drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Develop and implement individual farm/business drought plans, including specific trigger points for action based on rainfall and other indicators			X	X
	Provide education on innovative farming and drought practices through local discussion groups with expert speakers (e.g., ways to manage farming calendar by seeding according to variability rather than set calendar)			X	X
	Create property management plans to guide land use and resource allocation during drought	X			
	Increase financial management skills among farmers, focusing on debt reduction and better tax management	X			
	Encourage vineyards and fruit growers to analyse and prioritise their most profitable production areas	X			
	Develop a comprehensive drought learning book that compiles best practices and lessons learned		X		
	Promote forward planning for grain warehousing and conservative risk management		X		
	Work with local farmers and other groups to improve feed availability on Kangaroo Island		X		
	Implement benchmarking for production and finance to identify best practices		X		
	Encourage the planting of low water-use and more drought resilient gardens, pastures, and crops (e.g. rye grass)		X		
	Encourage and support clay spreading which will help hold soil together, retain moisture, help with germination etc.		X		
	Promote understanding of the role of biochar in drought resilience and training landowners to make biochar as part of their land management plans to reduce fire risk and improve soil water holding capacity			X	
	Build relationships with fodder suppliers within and outside the region				X
	Invest in soil moisture probes and provide training for farmers to use them effectively across all drought phases				X

Characteristic	What can be done before drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Improve on-farm data measurement and monitoring to make informed decisions				X
Environment	Implement a regional approach to pest management for both plants and animals, (e.g. focusing on those that extract moisture from crops)	X		X	
	Ensure access to local weather data and improve forecasting capabilities		X		X
	Clearly define what constitutes a 'drought' to ensure consistent understanding and responses	X			
	Establish shelterbelts and native corridors to support biodiversity and environmental resilience		X		
	Encourage practices that reduce emissions			X	
Assets and infrastructure	Promote the adoption and use of technologies that support better farm management	X	X		
	Provide financial support for infrastructure improvements, such as environmental covers and netting	X			
	Ensure resource flexibility to respond to various events, not just drought	X			
	Upgrade and improve farm infrastructure, including dams, silos, confinement lots, water monitoring systems, grain storage, water pumps, and fencing (e.g. vermin proof fencing).		X		
	Ensure reliable sea freight services, including strategies to increase capacity and subsidies for Sealink during critical periods		X		
	Rebuild roads that were previously affected by drought and implement better/active road maintenance		X		
	Improve communication and coordination between transport operators		X		
	Address capacity issues at abattoirs to prevent kill constraints				X
Economic	Promote solid business planning, including budgeting, setting aside funds, and risk management, particularly concerning water allocation	X	X		

Characteristic	What can be done before drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Optimise profitability during good years to build financial buffer/reserves		X		
	Fund projects that attempt to reverse the likelihood of drought (e.g. reduce carbon emissions, soil carbon)		X		
	Provide access to local bank managers and financial solutions tailored to regional needs			X	
	Promote education and capacity building for agronomists to improve sector-wide expertise			X	
Governance	Establish a coordinating structure to inform decision-making during droughts, similar to Agriculture Exceptional Circumstances.				X
	Form a task force with representatives from various agricultural groups (e.g. ASART, Yan, Ag Ado group, VH Ag Whg group + others)				X
	Create pathways for new farmers to enter the industry				X
	Improve the dissemination of water information to farmers				X
	Advocate for longer funding and policy timeframes with more consistency	X			
	Implement policy changes before droughts, such as increasing water harvesting capabilities, to prepare for future droughts		X		
	Secure long-term funding for drought and land management staff who can lead and facilitate workshops		X		
	Ensure drought plans include supported planning with built-in accountability			X	

Table 7 Opportunities to strengthen resilience during drought

Characteristic	What can be done during drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Social/ Community	Foster community collaboration and maintain social connections through activities and regular interactions (e.g. pub/clubs)	X	X	X	X
	Provide education and training opportunities, including mentoring and peer-to-peer advice for effective decision-making and business planning		X	X	X
	Emphasise the importance of self-care, including health, exercise, sleep, and hobbies		X	X	
	Support those who support others (e.g. volunteers) to prevent burnout	X			
	Encourage sharing of successful strategies and tools from businesses and individuals who have managed drought well	X			
	Encourage seeking help and advocacy when needed		X		
	Organise workshops tailored to specific areas, discussing past experiences, confinement pastures, mental health, benchmarking, budgeting, etc.		X		
	Launch a campaign to support local community (e.g. 'buy from the bush' and do 'normal business')			X	
	Promote the provision of counselling services to support mental health during drought			X	
Agriculture	Ensure efficient water security and storage and delivery infrastructure, minimise water usage		X	X	
	Develop and implement a stock management strategy and confinement feeding practices		X		X
	Continuously evaluate performance for improvement (e.g. identify good performing crops)	X			
	Collaborate with Kangaroo Island Pure Grain (KIPG) to increase grain availability		X		
	Managing total grazing pressure by increasing shooting permits		X		

Characteristic	What can be done during drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Have good accessibility of feed/fodder and money to afford		X		
	Make prompt, prioritised decisions, deferring non-critical tasks		X		
	Work proactively to address immediate stock-related issues with feed and water		X		
	Identify effective strategies during the drought and share this knowledge with others		X		
	Tailor fertilisation strategies based on soil testing to optimise resource use.			X	
	Adopt biodynamic farming methods and other innovative farm management systems				X
	Utilise alternative resources and bring in additional fodder to support livestock				X
Environment	Provide information and education on pasture management and drought resilience		X		
	Promote understanding and acceptance of the uncontrollable factors causing drought, focusing on adaptable measures			X	
	Implement pest plant management strategies			X	
Assets and Infrastructure	Provide freight subsidies for offloading stock, transporting food, fertilisers, grain, hay, etc. and enable heavy vehicle access to reduce freight costs		X		X
	Increase the capacity for Sealink services to Kangaroo Island, especially during adverse conditions		X		
	Broaden access to quality fodder resources and ensure accessible information about fodder availability				X
Economic	Maintain close oversight of finances and liaise with bankers to navigate drought-related challenges		X		
	Secure funding to support drought resilience measures such as contained feeding and advisory services			X	
	Support for finding additional workers			X	

Characteristic	What can be done during drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Encourage continued spending within the region by locals and visitors			X	
Governance	Ensure flexibility in water infrastructure policies (both on-farm and across region) and consider water infrastructure rebate		X	X	X
	Provide support to modify farming strategies and fill knowledge gaps through research	X			
	Increase biosecurity measures (e.g. commodity vendor declaration)		X		
	Provide transport subsidies		X		
	Maintain open communication with the community about drought impacts and response actions		X		
	Develop a plan for how the maximum number of businesses can access the help – irrelevant of the available funds of the business at the time		X		
	Ensure local decision-making remains community-centric			X	
	Activate a structured response to coordinate drought relief efforts				X
	Identify and implement ways to alleviate financial stress, such as adjusting rates and bank repayments				X

Table 8 Opportunities to support drought recovery

Characteristic	What can be done after drought?	Charleston	Parndana	Strathalbyn	Mount Compass
Social/ Community	Foster community collaboration to review drought experiences and identify improvements		X	X	X
	Understand and address the financial positions and support needs of individuals affected by drought		X		X
	Document and celebrate successful strategies and resilience to learn from experience and plan for the future		X		X
	Support personal recovery and well-being through counselling services and encouraging help-seeking behaviours	X			
	Maintain a forward-looking perspective to stay positive and proactive in drought recovery efforts		X		
	Encourage individuals to take breaks and holidays to recover from the stress of drought		X		
	Promote better feed sources and nutritional value to support livestock recovery		X		
	Implement stock management practices to allow pastures to recover effectively		X		
	Ensure effective collaboration between community and government agencies			X	
	Ensure transparent communication about the impacts of drought and the measures needed to recover			X	
Governance	Regularly review and update the Drought Plan		X	X	X
	Change policies to enhance resilience, better prepare for future droughts, and remove policy and legislative barriers to diversification and adaptation		X	X	
	Develop and review case studies on lessons learned, including what worked well, for different drought intensities and durations		X		X
	Review organisational structure and processes to assess what was learned and what can be improved			X	X
	Provide funding to rebuild essential resources such as water supplies and livestock.			X	

Characteristic	What can be done after drought?	Charleston	Parndana	Strathalbyn	Mount Compass
	Advocate for presence of government departments in regional areas			X	
	Implement new systems for accessing farming leases and hobby farmer lands at reasonable costs				X
Economic	Simplify access to Farm Household Allowance	X			
	Simplify and expedite recovery grant processes to provide quick and flexible financial support	X			
	Conduct individual financial reviews		X		
Agriculture	Provide tailored advice specific to individual properties rather than generic solutions	X		X	
	Manage and restock farming systems according to appropriate stocking rates		X		X
	Utilise technology to connect neighbouring properties with experts, providing timely and specific support.	X			
	Review land use to identify opportunities for diversification, such as converting farms to housing or engaging in different primary production activities, like solar farming or other agribusinesses			X	
	Learn from and implement effective water infrastructure strategies used during drought				X
	Improve soil health to enhance resilience against future droughts				X
Environment	Continue efforts to reduce emissions to mitigate climate impacts			X	
Assets and Infrastructure	Rebuild and repair infrastructure and assets damaged by drought		X		

3. Key informant interviews

Interviews were undertaken with the following regional stakeholders:

- ifarmwell (University of SA) – Natasha Caufield
- SA Water – Simon Sheriff
- Hills and Fleurieu Local Food Futures project – Liz Sanders, Local Food Activator
- South Australian Dairyfarmers Association (SADA) – Andrew Curtis, CEO
- Rural Bank / Bendigo Bank – Nick Brook, Agribusiness Relationship Manager
- Kangaroo Island Leaders
- Food and Beverage Australia Limited (FABAL) – Ashley Keegan, CEO
- Kangaroo Island Landscapes Board – Jo Sullivan, Sustainable Landscapes Manager
- Goyder Institute for Water Research Coorong, Lower Lakes and Murray Mouth Research Centre (CCLLM) – Nick Whiterod, Science Program Manager
- Mundoo Island Station – Sally Grundy
- Susie Green Consulting – Susie Green
- Adelaide Hills Wine Region – Sarah Carlson

Key points from each interview are summarised below with more information provided in Appendix A.

ifarmwell, University of SA, Natasha Caulfield

- Drought has significant impacts on farmer health and wellbeing, with increased stress leading to relationship and family breakdowns and in some cases suicide.
- Decision making during drought is poorer as clouded by high stress and fatigue combined with an increased workload as farms may have let staff go.
- Drought can lead to some farmers leaving the land. Less primary production can deplete regional communities.
- Farmers may need to recognise that they may not be able to control what is going on as a result of drought but that there is support for them.
- Maintaining social networks and connections during drought is really important.
- It is important to communicate what is available to provide support for health and wellbeing of farmers. This requires multiple avenues to promote what available, and continually remind them.
- Ifarmwell modules can be used before, during and after to learn /trigger thinking about what can do to feel better, how manage in drought.

- Fat Farmers groups (rural health initiative) focussed on exercise and social interaction could be established in Adelaide Hills and Fleurieu (currently on Kangaroo Island)

Hills and Fleurieu Local Food Futures project, Liz Sanders, Local Food Activator

- Drought significantly reduces farmers' wellbeing, contributing to high suicide rates and increased stress over managing livestock and uncertain rainfall patterns.
- Drought leads to severe economic impacts on local communities, resulting in reduced spending, business closures, and a decline in local investments in infrastructure and labour.
- Farmers face reduced access to essential supplies such as fertiliser and feed due to global shipping and distribution challenges. This further stresses the financial stability of agricultural operations within the region.
- There is a perception that the region is consistently lush and productive and is not susceptible to drought. It is crucial to address this misconception and highlight the impacts of drought within the region.
- Building strong relationships, fostering trust within the community, and learning from First Nations practices (e.g., cool burns) are crucial for managing land sustainably and enhancing resilience against drought.
- Encouraging diversity in agricultural activities and avoiding monocultures on individual farms and across the region can strengthen resilience.
- Effective governance is critical for implementing resilience strategies. This involves rigorous processes, clear Terms of Reference, and the inclusion of the right people, including First Nations perspectives and farmers with lived drought experience.

SA Water, Simon Sheriff

- Townships and service centres across the region depend on climate-sensitive water supplies, such as reservoirs. SA Water and the Department for Environment and Water have implemented measures such as construction a desalination plant that connects to Middle River water supply system in Kangaroo Island and preparing a water security statement for Fleurieu.
- Fires in catchment areas severely affect water quality, leading to increased reliance on alternative water sources like groundwater and additional strain on the mains system.
- Livestock relocation near pipelines adds further pressure, while low water levels cause algal growth and water quality challenges, worsened by intensified stock contamination near unfenced watercourses.
- It is important to how to share the impacts of drought and reduced water availability across social, economic, and environmental sectors.
- Opportunities in Kangaroo Island: Implement water efficiency measures and fit-for-purpose water use, such as avoiding mains water for activities like boom spraying and livestock, exploring on-farm opportunities for matching water use with its purpose.

- Opportunities in Adelaide Hills/Fleurieu: Utilise wastewater from Mount Barker, implement low flow dam programs, improve efficiency, adopt integrated water management approaches, prevent urban encroachment on preservation districts, reduce land use intensification to protect water quality and quantity, and maintain soil moisture in vineyards over winter.
- General opportunities: Enhance data and monitoring systems to understand water use and impacts better. Revive PIRSA's program matching land use with land capability to adapt to client changes. Administer environmental flows and import River Murray water during dry periods.

South Australian Dairyfarmers Association (SADA), Andrew Curtis, CEO

- Drought leads to cost increases, forcing dairy farms to downsize and reduce employment. Smaller dairy operations often do not recover post-drought.
- Dairy cows need to be milked twice daily. During drought, reduced pasture feed lowers milk production, or expensive feed needs to be brought in, impacting farm viability.
- Each drought cycle results in a loss of dairy farms, as the inability to agist cows leads many to be sold for meat, effectively ending their dairy production.
- The dairy industry relies heavily on irrigation; drought-induced water shortages severely impact farm operations.
- Communities like Myponga and Mt Compass that are less reliant on agriculture, still face economic downturns during droughts as farmers cut back on local spending.
- Enhancing resilience through infrastructure (e.g., housed animals, varied diet, technology) and support for intensification, while addressing challenges such as proximity to communities and mobile connectivity gaps is important.
- The dairy sector generates significant data through advanced technology (e.g., cow collars, sensors). However, there are gaps in training, maintenance, and support for these technologies, leading to potential inefficiencies. Efforts should focus on providing good tech resilience plans, including repair, replacement, and redundancy measures.
- Numerous agricultural and regional plans exist from various bodies, requiring coordinated efforts to prevent overlap, conflict, and resource wastage. The RDA could play a central role in aligning these initiatives.

Rural Bank / Bendigo Bank, Nick Brook, Agribusiness Relationship Manager

- During droughts, unprepared livestock farmers often resort to buying poor-quality, overpriced feed out of desperation, leading to negative impacts on stock health.
- Well-prepared farmers can achieve 85% lambing targets, while poorly prepared ones drop to around 45%, leading to a five-year decline in farm viability.
- Banks are obligated lend responsibly during drought; well-prepared operators can justify the risks, while poorly prepared one's struggle to secure loans, worsening their financial issues.

- Drought significantly increases stress among farmers, local businesses, and advisors, putting pressure on mental wellbeing and leading to feelings of abandonment.
- Prepared farmers reduce spending early in anticipation of drought, negatively affecting local businesses well before the drought's peak.
- Debt levels rise during drought as farmers who paid it down in good times tend to draw it back out again, either to invest or fund sustaining operations.
- Effective drought resilience relies on comprehensive preparation, including detailed plans and cashflows, made during non-stress periods. Trusted advisors and regular strategic meetings are also crucial.
- While diversification can be beneficial, it should not distract from the main operation. Investments in machinery during good times can enhance productivity and provide valuable assets that can be sold if necessary.

Kangaroo Island Leaders Meeting

- There is interest in building additional desalination plants and capturing overland water to address water security concerns. There are constraints to building dams in existing dry areas due to salinity, water table issues, and current water allocation policies.
- Impact of drought on mental health needs to be addressed, with calls for rural financial counsellors and ongoing community support.
- Ensuring that the community receives financial and legal advice (e.g., through workshops) before drought is important.
- Effective community engagement involves the government reaching out to the community, not the other way around, and immersing in daily community life and events like footy to foster good collaboration.
- This plan presents an opportunity to go beyond political cycles by embedding robust business planning skills, including cash flow management, risk mitigation, and succession planning, within the community's resilience framework.
- The issues of freight were highlighted, with calls for a designated freight port/service for agriculture purposes (e.g., transporting hay and livestock). It is also important to provide subsidies or cost discounts for water transport during drought.
- During the Millennium drought, there was significant delay in decision-making and implementation, often attributed to bureaucratic processes and delays from Canberra. Similar challenges were observed during recent bushfires, where promises were slow to materialise into action.
- Famers should consider agricultural diversification (e.g., crops, livestock, or different business such as agri-tourism and grape and bee farming) to mitigate economic impacts of drought.
- The plan must prioritise Kangaroo Island's unique needs, ensuring it is not overshadowed by the Adelaide Hills and Fleurieu Peninsula regions. It's crucial for the Kangaroo Island community to identify with and take ownership of the plan.

Food and Beverage Australia Limited (FABAL), Ashley Keegan, CEO

- Drought impacts are varied across the region; areas with diverse water sources (e.g., McLaren Vale) were more resilient than areas that are heavily dependent on surface water (Langhorne Creek).
- Many were unprepared for the Millennium Drought, as people assumed that 'it would rain next season'. Education on the importance of being prepared is needed (e.g., having plans and backup plans).
- Drought events are not always prolonged; it can also occur in shorter periods, such as within a single growing season.
- Communities faced heightened stress if they had limited coping options during drought periods.
- A positive impact of drought was the effective collaboration between government and industry, which accelerated engineering solutions to protect production. This cooperation also reduced regulatory barriers and strengthened community bonds. For instance, FABAL secured Ngarrindjeri support for a 3.8 km dredging project to access lake water.
- Diversifying water sources is crucial for building drought resilience. FABAL's approach during the Millennium Drought involved significant investments in diverse water access and storage infrastructure including dredging for lake water access, aquifer recovery schemes, a desalination plant, surface storage capacity, and the Marathon pipeline to secure River Murray water.
- Good community and stakeholder engagement is crucial for enhancing farm and farmer resilience against drought. Despite the challenges of acquiring access across 32 km of private land for the Marathon pipeline, the project succeeded due to strong community support.
- Effective government support in minimising regulatory barriers for infrastructure projects is crucial to building regional resilience.
- Resilience of a primary producer ultimately comes down to effective capital utilisation and ability to raise capital and use it a cost-effective way that delivers a return (like the Creeks Pipeline Company and Marathon pipelines).

Kangaroo Island Landscapes Board - Jo Sullivan, Sustainable Landscapes Manager

- Kangaroo Island experiences highly variable rainfall (400 to 900mm), with lower rainfall areas more susceptible to dry periods.
- Agriculture predominantly focuses on grazing (meat and wool) with limited irrigation, relying heavily on off-stream surface water storage due to limited groundwater availability.
- Previous droughts have resulted in pasture shortages and feed depletion for sheep, leading to potential over-grazing and increased soil erosion risks.
- Economic activity declines during drought, and there are challenges in securing adequate water for critical human needs, intensified by low storage capacity in the Middle River dam.
- Strategies to strengthen drought resilience include promoting the use of perennial pastures with deep roots to improve soil moisture retention capabilities.

- There should be further exploration of the use of biochar, potentially sourced from local blue gum plantations, to enhance soil moisture management on Kangaroo Island.
- The reliance on Sealink ferry for feed imports highlights vulnerabilities in transport logistics during drought periods.
- The Kangaroo Island Landscape Board has completed valuable drought-related projects in the area, including climate change impact assessments, water supply security mapping, and property management planning.

Goyder Institute for Water Research Coorong, Lower Lakes and Murray Mouth Research Centre (CCLLM), Nick Whiterod, Science Program Manager

- The CCLLM are undertaking research to better understand the environmental, social, cultural, and agricultural importance of water and recognise how water availability impacts community well-being and adaptation planning.
- Increasing environmental flows to maintain lake levels and salinity is a key part of drought resilience in the lower lakes.
- The prediction of more frequent droughts suggests a cumulative impact that may drive long-term adjustments to farming systems.

Mundoo Island Station - Sally Grundy

- Drought in the lower lakes isn't just about lack of water. During the Millennium drought, stock water in the lower lakes became very salty due to leaking barrages, leading to cattle deaths. Mundoo Station had to self-fund a pipeline for stock water to protect their breeding herd.
- Mental health issues are significant for landholders especially during dry periods, with increased anxiety due to inadequate support from SA Water and other authorities.
- Better government support and a trigger-based management approach linked to lake water levels and salinity would have helped.
- Resilience in the lower lakes is tied to maintaining environmental flows, as local rainfall was adequate, but flows were too low during the Millennium drought.
- There were unacceptable delays with emergency declarations to allow the extension of channels.

Susie Green

- Apple, pear, and cherry trees are irrigated using a mix of groundwater and surface water.
- Most dams were constructed between 30 and 80 years ago with variable maintenance. Currently, there are limited potential for new dams or bores

- Producers with less water availability have seen reduced fruit size, affecting yield and marketability. There is a need to better manage and diversify water sources; there has been an increase in the usage of recycled water (e.g. Bird in Hand and Mount Barker treatment plants)
- Extreme heat and fires have had a more significant impact on horticultural crops than drought
- New variety breeding is mostly done overseas, with Australian growers sourcing new stock internationally. Trialling new varieties is highly controlled and licenced
- Within the region, there has been a shift away from potato farming. When orchards are removed, they are replaced with wine grapes.
- Strawberries are a high-value crop in the region, nearly matching the value of apples and pears at around $85 million.
- Fresh fruit is not significantly affected by smoke taint; research discovered that there is some impact on cider production post-Cudlee Creek fire. Spring frosts can affect cherries and apples.
- Agri-tourism presents an income diversification option for smaller producers.

Adelaide Hills Wine Region, Sarah Carlson

- During 2021-2023, PIRSA and the Hills and Fleurieu Landscape Board supported landholders impacted by the Cudlee Creek bushfire to recover by establishing a recovery program and local economic recovery fund. The recovery program also offered funding support for training initiatives aimed at rebuilding and improving skills in the affected communities.
- By identifying and organising training, the Adelaide Hills Wine Region strengthened its reputation as a regional association and created opportunities to build connections among businesses and with the association, all contributing to resilience.
- PIRSA also had a similar program on Kangaroo Island, but this was only limited to fire impacted properties.
- The Adelaide Hills Wine Region uses a regional weather station network for crop watch reports, with soil moisture data accessible on their website.
- There is an opportunity to expand the soil moisture monitoring network to support vineyard irrigation decisions, helping avoid over and under-watering.
- The South Australian Vine Improvement Association (SAVIA) has an Adelaide Hills group that supports the supply of drought-resilient vine cuttings.
- Early planning and investment are needed to transition vineyards to drought-resilient varieties or invest in other efforts for vine improvement.
- There is also an opportunity to fund and support better vineyard management that improves soil health, water management and vine health through vine pruning.