

Australian Government

Department of Agriculture, Fisheries and Forestry







Department of Primary Industries and Regional Development

Southern Wheatbelt Regional Drought Resilience Plan

Wheatbelt Development Commission



The Wheatbelt Development Commission thanks their consortia partners in their guidance and support in the development of the Southern Wheatbelt Regional Drought Resilience Plan.



Department of Primary Industries and Regional Development







Disclaimer

This document has been prepared using best available information and expert analyses to provide an evidence base for the Southern Wheatbelt Regional Drought Resilience Plan. We have developed the Plan to the best of our ability and within the limits of our knowledge and resources.

Elements of this inaugural Regional Drought Resilience Plan may require review as updated information and research becomes available.

The interventions identified in this Plan are conceptual and not endorsed by the State. The implementation of these resilience building interventions and the proposed actions is subject to further development, feasibility studies and endorsement with consortia stakeholders and lead delivery agencies.

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An electronic copy of this plan may be obtained at www.wheatbelt.wa.gov.au.

Table of contents

Acknowledgement of Country		
1. Foreword		
2. Executive Summary	7	
3. Introduction	8	
4. Vision, Goals and Outcomes	12	
4.1 Developing Our Vision	13	
4.2 Goals and Outcomes	14	
4.3 Definitions	16	
5. Stakeholder Engagement and Partnerships	18	
6. The Evidence Base	22	
6.1 Range and Quality of Data	23	
6.2 Plan Alignment	25	
7. The Southern Wheatbelt Region - System Description	26	
Geography and population	27	
Landscapes and natural resources	29	
Regional Strategic Priorities	29	
8. An Assessment of the Southern	20	
wheatbeit's resilience	30	
8.1 Drought Indicators	31	
8.2 Impacts of drought on the Southern Wheatbelt	35	
8.3 Building on Existing Resilience	39	

9.	Opportunities Moving Forward	42
1(0. The Plan	46
	10.1 Resilient Water	47
	10.2 Resilient Communities	50
	10.3 Resilient Agriculture Systems	53
	10.4 Resilient Landscapes	56
	10.5 Resilient Regional Economy	58
1: in 	1. Investment framework and nplementation of the Plan	60
1 a	nd Learning	60
1:	3. Project Contact	67
14 Pe	4. Appendix 1: Inland Great Souther olicy, Strategy and Plan Alignment	'n 68
1! 0	5. Appendix 2: Transformative ption review	70
10 Te	6. Appendix 3: Supporting echnical Reports	71

Acknowledgement of Country

We respectfully acknowledge the Traditional Owners of the lands that we live and work on:

The family and clan groups of the Ballardong, Goreng, Gubrun, Kalamaia, Njaki-Njaki, Whadjuk, Wilman, Wudjari, Yued and Yamaji People, their Elders past, present and emerging.

We acknowledge their living culture and their important role in the sustainable economic development and prosperity of the Wheatbelt region.

Sandalwood seed harvesting



Welcome to the Southern Wheatbelt Regional Drought Resilience Plan. This plan is jointly funded through the Australian Government's Future Drought Fund and the Western Australian Government through the Department of Primary Industries and Regional Development (DPIRD).

The Southern Wheatbelt Regional Drought Resilience Plan is a locally led project that champions drought resilience and preparedness in the region. The Shires of Dumbleyung, Kondinin, Kulin, Lake Grace and Wagin have supported the development of the Plan.

Acknowledgements

We would like to thank the 330 people representing 150 different organisations and businesses in the region who contributed to the development of this plan through participation in interviews, meetings and workshops. The in-kind contribution of the Climate Science and Geographic Information Systems teams at DPIRD, and the work of the consultants who undertook literature reviews and data syntheses on our behalf were integral in the development of this document.

We thank the members of the Southern Wheatbelt Program Advisory Group, along with the Steering Committee and Technical Working Group that contributed to the review and refinement of elements of this plan. We also acknowledge the partner agencies, organisations and stakeholders who have supported and contributed to this plan including:

- The Shires of Dumbleyung, Kondinin, Kulin, Lake Grace and Wagin
- The Wheatbelt, Mid-West and Great Southern Development Commissions
- South-West WA Drought Resilience Adoption and Innovation Hub
- Wheatbelt NRM
- Grower Group Alliance
- Local community groups and business networks
- Indigenous groups
- Utility providers and research organisations



1. Foreword

The Wheatbelt region of Western Australia is known for its contribution to agriculture, the region's key economic driver. The \$3 billion industry supports communities across a 150,000 square kilometre expanse, from the West Australian west coast north of Perth to edge of the Goldfields in the east.

The ongoing profitability and sustainability of agriculture is key to the economic prosperity of the Wheatbelt. Since the 1970s, there has been a 10-20% decline in rainfall across the South West land division of WA, challenging the agricultural industry and the communities it supports. With further declines in rainfall and increases in temperatures predicted, the incidence of climate related events likely to increase. This will expose the Wheatbelt to more frequent drought, fire and extreme weather events such as frost and heat waves.

We know that the impact of these events stretches beyond the agricultural industry and can bring uncertainty and strain to local communities and the broader economy.

It is for this reason that the Wheatbelt Development Commission has partnered with the experts and the Southern Wheatbelt consortia of local governments to better understand climate variability and its impacts; and understand how those impacts can be mitigated in this part of the world.

The Southern Wheatbelt Drought Resilience Plan is one of three Pilot Plans for WA, and has emerged from extensive stakeholder engagement and technical analysis.

The Plan will assist in presenting a case to investors in interventions that are more likely to prepare the Southern Wheatbelt region for future climate related events. It will also present future facing opportunities to facilitate the realisation of the benefits that a decarbonised world presents. Climate sensitive water infrastructure, resilient agricultural systems and economic diversification are identified as priorities for the Southern Wheatbelt region.

With strong alignment to local, State and Federal climate and water related planning and policy, the Plan strongly complements the work of the South West WA Drought Resilience Innovation and Adoption Hub.

I'd like to acknowledge and thank everyone who took part in the Regional Drought Resilience Planning process. This input, paired with a strong evidence base, will be invaluable when considering new options for better managing dry seasons and reduced growing season rainfall in the Southern Wheatbelt for years to come.

Proactive planning and forward thinking are vital for our region to keep ahead of the climate challenge.



Susan Hall A/Chief Executive Officer Wheatbelt Development Commission



2. Executive Summary

The Southern Wheatbelt region is one of three regions developing Regional Drought Resilience Plans (RDRPs) in Western Australia. The Wheatbelt Development Commission (WDC) partnered with the Department of Primary Industries and Regional Development (DPIRD) to support the delivery of the plan across the area encompassing the Shires of Dumbleyung, Wagin, Lake Grace, Kulin and Kondinin. Stakeholder consultation facilitated the contribution of more than 330 individuals, representing 150 organisations, to the RDRP and Drought Vulnerability Assessment (DVA). The DVA informs and should be read in conjunction with the RDRP.

The Southern Wheatbelt region's agricultural sector has a history of active engagement in climate adaptation and drought preparedness. It is recognised that more can be done to build on existing drought resilience.

The Southern Wheatbelt RDRP has five key themes, with a range of interventions and suggested actions identified.

These key themes include:



Our proposed interventions align strongly with the Future Drought Fund's strategic priorities and objectives.

Notably, Southern Wheatbelt stakeholders identified improving water system resilience and reliability as the number one priority to build drought resilience in the region. There was also a desire to better articulate agricultural systems research and development needs and build strengthened connections within and across the region.

The themes and interventions within this Plan provide exposure to a broad range of investment opportunities and have an evidence base to support engagement with stakeholders on implementation.

The RDRP is intended to be a living document, guiding State, Federal, Local Government, community, and industry action on drought resilience. Implementation of the RDRP is subject to further collaboration with project partners and local government stakeholders. This will also include identification of high impact and high feasibility interventions that can be further developed into investable projects.

3. Introduction

Australia is a country with a history of drought. In the Southern Wheatbelt Region, there has been a recurring theme of drier growing seasons over the past 30 years, adversely affecting the agricultural sector and agriculturally dependent rural and regional communities. These impacts will become more frequent and severe with climate change. Proactive regional drought resilience planning is imperative to developing locally applicable solutions and responses.

Image courtesy of Wheatbelt NRM



The Australian Government's Future Drought Fund provides secure, continuous funding for drought resilience initiatives, including development of RDRPs across States and Territories. These RDRPs focus on innovative ways to build regional drought resilience across the agricultural sector and supporting industries, through a triple bottom line, collaborative and evidence-based approach.

In the inaugural year of the program in WA, RDRPs have been completed for three regional consortia areas, identified due to their reliance on agriculture, and their experiences of recent exposure to prolonged dry conditions (Figure 1). The consortia include:

- **Southern Wheatbelt** Wheatbelt Development Commission and five LGAs (Dumbleyung, Kulin, Kondinin, Lake Grace and Wagin)
- Inland Great Southern Great Southern
 Development Commission and eight LGAs
 (Jerramungup, Kent, Gnowangerup, Katanning,
 Kojonup, Cranbrook, Woodanilling and
 Broomehill Tambellup)
- Northern Agricultural Mid-West Development Commission, Northern Agricultural Catchments Council and three LGAs (Greater-Geraldton, Northampton and Chapman Valley)



Figure 1: Pilot Consortia Areas of WA for Regional Drought Resilience Planning

To inform the planning process for the Inland Great Southern DRP, input was sought from a range of stakeholders. The following figure (Figure 2, page 12) presents an overview of the Regional Drought Resilience Program, with a description of each of the four stages undertaken as part of our approach.

Regional Drought Resilience Program

The Plans were developed in a four stage process, underpinned by strong governance structure. The program was funded through the Australian Government Future Drought Fund and in-kind contributions from DPIRD, the Wheatbelt, Great Southern and Mid West Development Commissions and the Northern Agricultural Catchment Council, and supported the development of Regional Drought Resilience Plans (RDRP) for three sub-regions across Western Australia.



Figure 2: Regional Drought Resilience Program Overview

Southern Wheatbelt Drought Resilient Vision

To build structural resilience to drought that supports sustainable and thriving communities.

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4. Vision, Goals and Outcomes

Wave Rock, Image courtesy of Phil Davison



4.1 Developing Our Vision

The purpose of the Southern Wheatbelt RDRP is to identify actions to prepare for future droughts and a drying climate, with a sharp focus on the agricultural sector and allied industries, including economic interventions that sustain local economies and communities. By identifying a pipeline of investable drought resilience projects, this plan will inform future investments and assist in securing future funding.

Our drought resilience vision for the Southern Wheatbelt is based on a grass roots assessment of what can realistically be achieved at a community, government and industry level to ensure the region is prepared and capable of withstanding more frequent and severe droughts in the future.

By creating a shared vision and agreed goals and outcomes, we have set a common direction and aspirational view of our region's future from a drought resilience perspective.

Wheatbelt Natural Resource Management Inc (WNRM) has played a key role in providing input into this plan and, in their consultation report¹, they articulated the region's long-term goal for drought resilience as follows:



"The Southern Wheatbelt will build a structural resilience to drought that supports a sustainable and thriving commuity."

This vision has emerged from widespread stakeholder input. There is an aspiration in the community to continue to build capacity to withstand the challenges of drought. It is recognised this requires an integrated approach, and requires a shared responsibility across local communities, State and Federal government and industry.

The vision, priorities and outcomes of the Future Drought Found have provided the background and context for the development of this drought resilience vision for the Southern Wheatbelt.

¹ Wheatbelt Natural Resource Management Inc (2022). WA Regional Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area.

4.2 Goals and Outcomes

Our stakeholder engagement process revealed five key themes, each with a long-term desired outcome. These form the foundation of our overall vison for drought resilience in our communities and are presented in Figure 3.



Figure 3: Southern Wheatbelt's Proposed Outcomes for a Vision of a Drought Resilient Region

We have provided specific priorities and actions associated with each of these themes and outcomes in greater detail in **Section 10** of this plan. The final Wheatbelt Natural Resource Management Stakeholder Engagement Report outlines five to ten year drought resilience outcomes². The interventions detailed in this plan will guide investment to build drought resilience, with actions implemented in partnership between communities, regional organisations, local government and industry.

From a government and funding perspective, the following figure illustrates how our five drought resilience themes align with the outcomes of the Drought Resilience Funding Plan.



Figure 4: Southern Wheatbelt's Proposed Outcomes for a Vision of a Drought Resilient Region

2 Wheatbelt Natural Resource Management Inc (2022). WA Regional Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area.

Kulin slide - Wheatbelt Development Commission



4.3 Definitions

The need for a regionally appropriate definition of drought was raised several times during stakeholder engagement for the RDRP. Community groups defined drought as 'consecutive dry seasons where there is no rainfall over two or more seasons.' Indicators that they are in a drought were the lack of opening rains to commence their seeding operations and / or little winter rainfall to fill dams or finish the crop off³. The Technical Working Group (TWG) defined drought for the RDRP project as follows:

"The term drought refers to a prolonged period of abnormally dry conditions that impact 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 well-being of its residents."

Assessment of meteorological definitions of drought indicated that a definition based on **growing season rainfall** (between April to October) is more appropriate for the Southern Wheatbelt region than a definition based on total annual rainfall. Growing season rainfall better represents agricultural drought in the region, where dryland cropping in autumn and winter is the primary land use⁴. A more in-depth analysis of terms and definitions can be found in the Southern Wheatbelt Drought Vulnerability Assessment in Sections 1 and 4.

A range of terms have been used throughout this document. They are defined below.

Exposure: the extent to which a given system, community or region will be subjected to a particular hazard. For the RDRP, exposure is measured in terms of the extent to which a focus region will be exposed to drought and drought-related climate change processes such as increasing atmospheric temperatures and changes in rainfall patterns and soil moisture.

Sensitivity: the extent to which a given system, community or region will be affected by a particular hazard. For the RDRP, sensitivity is fundamentally about the ways in which regions are impacted by drought. It is measured in terms of the effect of drought on crop and animal production and the influence of regional characteristics such as soil types and farming systems on the effect that a drought has in the region.

Adaptive Capacity: the extent to which a system can exploit opportunities and resist or adjust to change. For the RDRP, adaptive capacity is measured in terms of historical response to droughts in the regions or estimated according to a set of vulnerability proxies such as income, education, community participation rates and drought resilience natural features (ground cover, topography).

Resilience: the capacity of a rural community and landscape as social-ecological system to absorb disturbance, reorganize, maintain or change functions and feedbacks to continue to deliver values. Planning for resilience is about building:

- Absorptive capacity for maintaining the system;
- Adaptive capacity for modifying the systems when needed;
- Transformative capacity for systemic change when maintaining and modifying existing system are untenable; and
- Developing new configuration of networks and institutions to implement these capacities.

³ Wheatbelt Natural Resource Management Inc (2022). WA Regional Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area.

⁴ Mastrantonis, Stanley. (2022). Defining Drought in Western Australia. Centre for Crop and Disease Management, School of Molecular and Life Science, Curtin University, Bentley, WA.

ThreeFarmers oats - Image courtesy of Wheatbelt Development Commission

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5. Stakeholder Engagement and Partnerships

As part of a deliberative regional stakeholder engagement process, project partners worked collaboratively to:

- Demonstrate the WA Government's commitment to supporting farm businesses and communities become more prepared for, and resilient to, the impacts of drought;
- Identify the appropriate targeted audiences in each region, share program benefits and promote the importance of becoming droughtresilient and drought-prepared;
- Engage local stakeholders in each region, undertaking communication activities that promoted the importance of regional-scale planning, building commitment to the process and strengthening partnerships between relevant stakeholders; and
- Maximise participation and engagement in regional planning processes.

Strong partnerships were key in the successful delivery of the program. Figure 5 outlines the governance framework supported the achievement of our engagement goals.





Figure 5: Governance Framework for the WA Regional Drought Resilience Planning Program

To ensure our plan was well informed by local views, values, interests, knowledge and experience, we engaged a diverse range of stakeholders in a fair and non-discriminatory way by creating a collaborative environment where everyone was encouraged to have a voice and contribute their views, without judgement.

Stakeholders were targeted with guidance from the Southern Wheatbelt Project Advisory Group, informed by the FDF's three strategic priorities of environmental, economic and social resilience. Engagement activities occurred between October 2021 and June 2022, involving more than 330 individuals representing 150 organisations.

In addition to the Steering Committee, Project Advisory Group and Technical Working Group, stakeholders engaged included:

- Agricultural and natural resource management
 groups
- Agricultural and non-agricultural businesses
- Elders of the Ballardong Noongar community and Noongar Land Enterprise Group
- Community organisations, leaders, and local champions
- Research organisations
- Tertiary organisations
- CSIRO

- Agricultural industry representatives
- State Government agencies and government trading enterprises
- Financial experts, organisations and institutions
- Farm and agricultural advisers, consultants, agronomists, and stock and station agents.

Engagement sessions focused on reviewing emerging technical analyses, sharing the results of earlier engagement efforts, and identifying drought resilience project ideas for inclusion in the Southern Wheatbelt Regional Drought Resilience Plan. A range of methods were used including in-person interviews, meetings, surveys (online and in person), phone interviews, online engagement and workshops.

The Southern Wheatbelt Project Advisory Group (PAG), consisting of Local Government Executive and Elected Members from across the participating Shires, assisted in targeting stakeholder engagement and guided the RDRP focus areas.

In addition to this consultation work, a global review of drought innovation⁵ was commissioned to identify global resilience projects and assess their potential application to regional WA. Areas of research were developed and workshopped with regional areas to identify key priorities. These are outlined in more detail in "Section 10. The Plan" of this document.

⁵ Middleton, S. 2022. AgDots. Regional Drought Resilience Planning Program Global Literature Review – Key Drivers Report. Prepared for Department of Primary Industries and Regional Development.

Strong stakeholder engagement generated buy-in from the community and stimulated interest in the project, building and strengthening relationships across and within the region that will outlive the RDRP program. As part of our engagement, interventions were identified within each of our five emerging themes.

Outlined in Table 1, these interventions are grouped under their associated theme, and classified according to their identified pathway – maintain, modify, or transform. These pathways identify the type of change needed in the region to achieve our desired outcomes. This allows for decision making around which set of intervention options to start with, given available resources.

Further work is being undertaken to further prioritise these interventions for development into funding ready projects.

	MAINTAIN	MODIFY	TRANSFORM
Resilient Water	Southern Wheatbelt small water infrastructure projects	Future looking and coordinated total water management planning. Better water data to support planning and better regional development outcomes Incentivise the uptake of on farm and household water supply improvement	Alternative non potable water source investigation and development to "climate proof" water supplies in the region
Resilient Communities	Maintain spaces and places to build connection Small town-big events program Reduced red tape to hold impromptu events	Development of local leadership capacity Build cultural connections to integrate traditional owner knowledge Increasing community capacity to understand, plan and manage for drought Community building activities to engage all ages	Refine the Drought Vulnerability Assessment model to better incorporate social indicators and implement longitudinal monitoring in vulnerable cohorts
Resilient Agriculture Systems	Farm Business Resilience and Small Business climate resilience planning workshops in the region	Building drought, climate, and carbon literacy to support risk management planning Articulating research and development needs for the region Build a better understanding of business and climate risk	WA Drought Indicators Platform and longitudinal monitoring program Identify transformative agricultural land uses that could operate in areas of high risk to drought
Resilient Landscapes	Monitor impact of drought on natural resources Community activities that bring people together and support environmental and economic outcomes such as Red Card for the Red Fox Explore diversification options to increase value of marginal land at risk of drought	Natural resource condition report card and natural capital accounting for the regions Best bet land and infrastructure design uses to support improved natural resource functioning	Building regional capacity to manage natural resources Attract projects that support wide scale landscape benefits such as wide scale woody vegetation planting for biofuel production Strategic region wide revegetation program in vulnerable and less productive areas
Resilient Regional Economy	Monitor impact of drought on infrastructure	Addressing constraining enabling infrastructure to support industry growth and regional resilience to climate change Regional collaboration to support tourism product development Quantify and qualify the impact of SMEs and business and industry diversity on climate/ drought resilience	Supporting business development through grass roots business incubation Encouragement and maximisation of community and economic benefit of emerging industry investment in the region

Table 1: Southern Wheatbelt Drought Resilience Themes, Interventions and Pathways



6. The Evidence Base

This RDRP provides a high-level summary of the findings from our Drought Vulnerability Assessment (DVA). The DVA provides the evidence base to support the identification of actions to mitigate drought impacts in the Southern Wheatbelt region. The development of the DVA was a formative step in providing the foundation for the development of the Southern Wheatbelt RDRP and supports the identification of actions to mitigate impacts of droughts and drying seasons in the region. The development of the DVA was a formative step in providing the foundation for the development of our Plan.



6.1 Range and Quality of Data

Effective early engagement and relationship management throughout the project allowed for a diverse range of region-specific knowledge and skills to be harnessed, resulting in a collectively owned region-specific plan for the Southern Wheatbelt.

As the foundational evidence base, the DVA is comprised of a literature review, socio-economic analysis, spatial prioritisation, risk assessment, and additional input and analysis from technical experts, research professionals and industry leaders. Extensive stakeholder and community engagement allowed for the harnessing of perspectives and insights from people's lived experience and provided the opportunity to better understand how the regions have been affected by drought in the past, and what has already been done to mitigate the impacts of future droughts. This in-depth evidence base supports:

- An improved understanding of the impacts of drought in the region;
- Synthesis of program and policy initiatives related to drought at a local, regional, State and Federal level;

- Investigation of alternative definitions of drought, based on growing season rainfall, better-suited to the broadacre cropping areas in the Southern Wheatbelt region;
- In depth analyses of the economic, environmental, social and water impacts of drought, including the impacts of drought on Aboriginal communities;
- Development of a multi-criteria mapping methodology that synthesises many datasets into a single decision-support tool highlighting priority areas for investment in resilience building activities;
- An exploration of how readily measurable biophysical and socio-economic factors, often publicly available data, might serve as indicators of drought and used to understand and / or predict the impacts of drought; and
- A drought vulnerability index using the data collected to create the drought risk priority areas map.

The following figure outlines the key information sources used to develop the DVA in WA, with the broad range of information sources that contribute to the final Drought Resilience Assessment.



Figure 6: Overview of the Drought Vulnerability Assessment Process

To strengthen the evidence base, the following technical reports were commissioned to gain regionally specific insights into drought resilience. These insights informed the DVA and were drawn from:

- Socio-economic and literature review (Anna Dixon Consulting)
- **Drought Indices (CSIRO):** Repeated the recent CSIRO NSW drought indicators exercise by deploying a Random Forest Analysis to Nous data relevant to the three focus regions.
- **Defining Drought in WA (Curtin University):** Assessment of the suitability of the current BoM definition of drought in decile 1 over two or more consecutive years and investigation of other drought definitions or indices appropriate for the regions.
- Drought Risk Assessment (DPIRD): Analysis of historical and future drought risk scenarios for each region.
- Economic and Environmental Impacts of Drought (LA One Economics and Consulting): Review of historical and potential future economic and environmental impacts of drought on farming businesses, communities, agribusiness and supply chain sectors in the region.
- Social Impacts of Drought (UWA): Identification of primary social impacts of drought in the region and assessment of the effectiveness of actions taken in the past.
- **Transformative Review (AgDots):** Research was desktop rapid evaluation of key investment areas that could build resilience. Focus for the research was local, regional, state and global with some occurring via interviews and online.
- Regional Water Issues and Policy Analysis Wheatbelt and Great Southern (Aurora): An investigation into issues and policies relating to provision of non-potable water during drought for agriculture, community and local government authority use.
- Water Supply and Demand Assessment (Murdoch University): A report summarising a high-level water balance for the Wheatbelt and Great Southern Consortia Shires. This report demonstrates state of water supply and demand, identifying gaps and modelling the risk to water supplies under drought and climate change scenarios.

- Valuing Noongar People and Practices in Drought Resilience (Noongar Landcare Enterprises): A review of the impacts of drought on First Nations land management practices, with a focus on Noongar country; and the impacts of drought on the Noongar region. Capturing Noongar knowledge and practices for integration into Drought Resilience Strategies.
- WA Regional Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area: A summary of drought risks, impacts and strategies to increase drought resilience from stakeholders in the Southern Wheatbelt.
- WA Regional Drought Resilience Planning

 Targeted Consultation with Aboriginal
 Communities on Drought in the Lower
 Wheatbelt: A report that collates information
 from stakeholders in First Nations Communities
 of the Southern Wheatbelt and captures risks
 and impacts of drought and strategies to
 increase drought resilience.

This plan has been developed using a partnership and co-design process that has leveraged diverse regionspecific knowledge and skills from the following sources, further adding to the range and quality of data:

- South West Drought Resilience and Innovation
 Hub
- Relevant Council plans
- Economic Development Plans
- Strategic Community Plans
- Australian Drought Plan
- Regional Development Commission Strategic
 Plans
- WA Government's Climate Policy
- State Infrastructure plans

Previous and current strategies such as the North Eastern Agricultural Region Strategy and the Australian Government Drought Response, Resilience and Preparedness Plan, a review of relevant sciencebased initiatives, such as the DPIRD WaterSmart Farms project and the work of the South West Drought Innovation and Adoption Hub, inform the Plans evidence base.

It is recommended to regularly review the DVA to integrate updated or new datasets of relevance. This would inform future planning and investment and enable longitudinal monitoring of drought resilience. The Southern Wheatbelt DVA should be read in conjunction with the Southern Wheatbelt RDRP.

See Appendix 3 for references.

6.2 Plan Alignment

The Southern Wheatbelt RDRP is consistent with the goals and objectives of the National Framework for Drought Policy (National Drought Agreement) and the Australian Government Drought Response, Resilience and Preparedness Plan (fitting under pillar 3). The Drought Resilience Plan has a focus on long term resilience and preparedness. The RDRP also has strong alignment with National, State, Regional and Local plans, strategies and policies, including:

Nationally:

- Infrastructure Australia 2022 Regional
 Infrastructure Strengths and Infrastructure Gaps
- The Australian Government Future Drought Fund;
- South West WA Drought Resilience Innovation and Adoption Hub

At a State level:

- Infrastructure WA State Infrastructure Strategy 2022
- Western Australian Climate Policy
- DPIRD Primary Industries Plan 2020-2024;
- DPIRD Strategic Intent 2018-2021;
- Department of Water (Strategic priority Water for Growth 2016 plan);
- Water Corporation Water Forever (Water Recycling and Water Efficiency)
- Western Australian Agricultural Research Collaboration
- DPIRD State Soil Health Strategy
- Diversity WA (a framework to support the WA Government's economic development priorities)

Regionally:

- The Wheatbelt Development Commission Strategic Plan 2020-2023;
- Wheatbelt South Economic Analysis 2021
- Wheatbelt NRM Inc Strategic Plan
- Wheatbelt South Sub-Regional Economic Strategy 2014;
- Entrepreneurial Innovation in the Wheatbelt 2016 – Regional Development Australia Wheatbelt;
- Wheatbelt Regional Planning and Infrastructure Framework 2015
- Southwest Native Title Settlement Agreement

Locally:

- LGA Community Strategic Community plans;
- Local Government Emergency Rural Water Plans

Appendix 1 presents a detailed outline of how the Southern Wheatbelt Plan aligns with the above strategies, plans and policies.



7. The Southern Wheatbelt Region -System Description

The Southern Wheatbelt Consortia (the Consortia) covers an area of 28,512 km2 in the Wheatbelt region of Western Australia, and includes the local government Shires of Dumbleyung, Kondinin, Kulin, Lake Grace and Wagin, as shown in Figure 7.

Image courtesy of Wheatbelt NRM





Figure 7: Geographic scope of the RDRP in Southern Wheatbelt in foundation year of the Future Drought Fund RDRP Program.

Key characteristics of the Southern Wheatbelt Consortia include:

- 1. The Shire of Wagin has the largest population, followed by Lake Grace.
- 2. All areas have a median age above the WA median, with the largest variance in Wagin.
- 3. Overall, most Shires had net out-migration, with a trend towards neutral in/out migration in 2020.
- 4. The Shires of Wagin, Dumbleyung and Kondinin have more disadvantage than greater regional WA and WA, the Shires of Kulin and Lake Grace have more advantage.
- 5. Agriculture accounts for over 50% of economic output and over 50% direct employment in the Shires of Lake Grace, Dumbleyung and Kulin.

Geography and population

The Consortia is located on land covered by the Ballardong⁶, Wagyl Kaip/Southern Noongar⁷ and Gnaala Karla Booja Indigenous Land Agreement Groups in the South West Native Title Settlement Area. The combined Agreement areas include the Ballardong, Njakinjaki, Kaneang, Koren, Minang and Wudjari people. The region covers the south-eastern portion of the Wheatbelt Development Commission region, bordering the Great Southern Development Commission's northern boundary, and Goldfields-Esperance Development Commission and Great Western Woodland western boundary. It includes the H4 (high rainfall south), M4 (medium rainfall south) and L4 (low rainfall south) agro-economic zones as identified by the Department of Agriculture and Food WA.

The Southern Wheatbelt Consortia is home to 5,323 people, and between 2017 and 2019 most Shires had net out-migration, with a trend towards neutral in / out migration in 2020. All Shires are above the WA median age of 36, being highest in the Shire of Wagin at 49, and in other Shires ranging from 40-44.

The Index of Relative Socio-economic Advantage and Disadvantage (IRSAD SEIFA) score, which measures both advantage and disadvantage, found the Shires of Wagin, Dumbleyung and Kondinin have greater disadvantage than wider regional WA and WA, while the Shires of Kulin and Lake Grace have more advantage.

⁶ Native Title Tribunal. (2022). Ballardong People Indigenous Land Use Agreement. Retrieved 28 January 2022 from: <u>http://www.nntt.gov.au/</u> searchRegApps/NativeTitleRegisters/Pages/ILUA_details.aspx?NNTT_Fileno=WI2017/012

⁷ Native Title Tribunal. (2022). Wagyl Kaip and Southern Noongar Native Title Agreement. Retrieved 28 January 2022 from: <u>http://www.nntt.gov.au/searchRegApps/NativeTitleRegisters/Pages/ILUA_details.aspx?NNTT_Fileno=WI2017/014</u>

The Index of Disadvantage in 2021 Dropping Off the Edge (DOTE) gives a score by Australian Bureau of Statistics Statistical Area 2 (SA2). Across the two SA2 in the Consortia (Wagin SA2 and Kulin SA2) common areas of vulnerability were: psychiatric admissions, family violence, no post-school qualification, particulate matter (air quality), no access to internet at home and no access to recreational parks. In the wider Wheatbelt region the last published figures show an average wait time of 74 weeks for public housing, with 290 people on the waitlist⁸.

Towns in the Consortia are considered car dependent, with walk scores ranging from 0 to 43 and very limited public transport options impact on health service accessibility⁹.

Economy

The Consortia has an annual economic output of \$1.506 billion and 9.52% of all jobs for the Wheatbelt region (2,818 jobs). Overall, the agriculture industry accounts for just over a third of economic output (36.07%) at \$543.16 million and 44.85% of direct employment (1,264 jobs). In the Shires of Lake Grace, Dumbleyung and Kulin over 50% of economic output and over 50% of direct employment is in the agriculture sector.

Wheat production dominates gross value of agricultural production across all Shires except Wagin, with a higher value attributed to livestock production. There are shifts towards more diversity, with value adding and niche market development occurring, particularly in the agribusiness sector, and the increasing concentration and sophistication of health and aged care services centred out of the adjacent Shire of Narrogin. Mining exploration is increasing across the region, with established nickel mining in the Shire of Kondinin and a new kaolin mine due to commence production in nearby Wickepin. Planned renewable energy projects in Kondinin and development of a biodiesel production plant in Narrogin present further economic diversification opportunities based on the region's competitive advantages.

Agricultural businesses make up 636 of the 1098 in the region. Of those businesses, 160 (25%) have a turnover of less than \$200,000; 114 (18%) have a turnover between \$2 million and \$5 million; with three having a turnover of more than \$10 million (all located in Kondinin). Across all regional businesses, 28 have a turnover \$5 million (including 15 over \$10 million) across wholesale trade, manufacturing, retail trade, agriculture and professional, scientific and technical services. They are based in the Shires of Lake Grace, Wagin and Kondinin. Lake Grace has the highest number of total businesses, including 218 agricultural businesses. This is due to its large physical size, larger population and strategic location. Wagin has slightly more diversity than other shires and the second highest number of businesses due to its western Wheatbelt location and proximity to major regional centres of Narrogin and Katanning.

With agriculture a key driver to the economy, there is an established local supply chain network with strong presence of transport, warehousing and mechanical repair services businesses. Agriculture is the primary occupation of employees in the region, though the number employed has decreased over time due to increasing productivity and consolidation of farms, and shift of farming enterprises towards grain growing.

Growth opportunities in the Wheatbelt South subregion include those that build on existing strengths such as agricultural support and population services, and in the development of opportunity industries such as large scale biofuels and renewable energy projects, grain cereal product manufacturing, meat processing, tourism and niche agricultural product.

"The global push to decarbonise economies presents an opportunity for the Southern Wheatbelt region. The region is well placed to benefit from the increasing investment in renewable energy, carbon farming and biofuel development." Wheatbelt Development Commission

⁸ Government of Western Australia. (2018). Rethink Social Housing. Retrieved 11 February 2022 from: http://www.rethinksocialhousing.com/The-

⁹ WAPHA. (2016). Population Health Needs Assessment: Country WA PHN. WA Primary Health Alliance

Key socioeconomic indicators are summarised in the table below.

	Consortia	Shire of Dumbleyung	Shire of Kondinin	Shire of Kulin	Shire of Lake Grace	Shire of Wagin
Area (km²)	28,512	2,541	7,422	4,717	11,886	1,946
Population (ERP 2020)	5,323	681	847	769	1,265	1,761
Median Age (years) - WA 36	-	44	46	44	41	49
SEIFA - greater regional WA 965; WA 1,015	-	996	979	1,021	1,017	929
DOTE Index (Score)	2-3	3	2	3	3	2
Annual economic output (\$)	\$1.506 billion	\$130.74 million	\$543.24 million	\$166.26 million	\$327.14 million	\$338.96 million
Agriculture (% of economic output)	36.07%	63.7%	17.10%	66%	52.60%	25.20%
Agriculture* (% of jobs)	44.85%	62.3%	31.5%	66.8%	53.7%	28.6%

Table 2: Key socioeconomic indicators Southern Wheatbelt

Landscapes and natural resources

The landscape and landforms of the Southern Wheatbelt ranges from medium rainfall and more dissected landscapes in the west, to flatter landscapes, with extensive salt lake chains, dotted with granite exposures towards the east¹⁰.

The region falls into two major catchment areas, the Blackwood and the Lockhart. The Blackwood Catchment drains towards the south west, downstream from Lake Dumbleyung. The Lakes subcatchment of the Lockhart Catchment, in the Avon River Basin, drains to the north west.

The region forms part of the Great Plateau of WA, an ancient landform that has weathered variably to give way to its current gently undulating form with low-relief uplands and flat bottomed valleys. The landscape consists of fragmented remnant vegetation, with medium and open woodland and mallee scrub. Succulent steppe vegetation such as saltbush, bluebush and samphire Saline dominate the valley floor areas.

Soils vary across the region, though are primarily shallow sandy duplexes. The region uses a mix of distantly derived potable and locally derived nonpotable water sources. These resources soils support the dominant use of the land across the region, broadacre cropping and livestock (sheep and cattle).

The region has abundant solar, wind and biomass resources, potentially well suited to in situ bioenergy production.

Regional Strategic Priorities

Local governments in the Consortia combine under various regional organisations to work collaboratively for regional planning and shared projects that benefit the region. Individual local governments have recently completed major reviews of their Strategic Community Plans. The Shire of Dumbleyung has prioritised a Dumbleyung Smart Farming Development Plan and the Dumbleyung Alternative Water Access Study¹¹. The Shire of Kondinin has a strategic priority to support and advocate for the agricultural industry in the Shire¹².

The 4WDL ROC includes the Shire of Dumbleyung, Wagin and Lake Grace and has a strategic focus on increased water security and reduce reliance on current systems, improved internet and mobile connectivity, and identifying opportunities to work across the region to promote tourism.

The Consortia is in the Wheatbelt South sub-region of the Wheatbelt Development Commission area. The WDC 2020-2023 identifies several strategic priorities that are relevant in the context of this report:

- Enabling infrastructure;
- Diversifying the economic base;
- Sustainable landscapes and communities; and
- Entrepreneurship and innovation¹³.

Agriculture, Livestock & Food Supply Chains is one of four key themes in the Wheatbelt Development Commission economic strategy for the Wheatbelt South sub-region¹⁴.

Galloway, P. (2002). 'Agricultural Sub-regions of the Avon River Basin'. Resource Management Technical Report 284, Department of Agriculture WA.
 Shire of Dumbleyung (2022) Shire of Dumbleyung Strategic Community Plan 2022-2032. Retrieved 7 July 2022 from: <u>https://www.dumbleyung.wa.gov.au/_files/ugd/7929f4_b8401cd708cc490e937d15ce32a9f37b.pdf</u>

¹² Shire of Kondinin (2022) Community Strategic Plan 2022-2032. Retrieved 7 July 2022 from: <u>https://www.kondinin.wa.gov.au/Profiles/kondinin/</u> Assets/ClientData/Shire_of_Kondinin_Strategic_Community_Plan_-_March_2022.pdf

¹³ Wheatbelt Development Commission (2021). Strategic Plan 2020-2023. Retrieved 8 February 2022 from https://www.wheatbelt.wa.gov.au/files/5016/1794/3026/Strategic_Plan_Final_050321_COMPRESSED.PDF

¹⁴ Wheatbelt Development Commission. (2014a). Wheatbelt South Sub-Regional Economic Strategy. Retrieved 10 February 2022 from: https://www.wheatbelt.wa.gov.au/files/5714/1041/7002/Wheatbelt_South_SubRegional_Economic_Strategy_FINAL1_for_web

8. An Assessment of the Southern Wheatbelt's Resilience

The Southern Wheatbelt Drought Vulnerability Assessment (DVA) identifies key areas of the region's vulnerability to drought. The Southern Wheatbelt region, defined in this plan as the Shires of Dumbleyung, Wagin, Lake Grace, Kulin and Kondinin, is a region at high risk of the impacts of drought, particularly those Shires on the eastern edge.

Image courtesy of Wheatbelt Development Commission



The characteristics of each vulnerability driver are:

- Exposed areas show long-term increases in temperature and decreases in rainfall, measurable increases in drought frequency and measurable declines in potential wheat yield and root zone soil moisture.
- Sensitive areas have marginal crop and livestock production, low vegetation cover, high levels of economic dependence on agriculture and demographic factors such as relative remoteness, population size and economic diversity.
- Areas with low adaptive capacity relatively poor access to infrastructure and resources, high unemployment and reliance on degraded and/or poor-quality natural resources, including water and soils.

Areas of strength and resilience, which should be maintained and built upon, lie in the region's soil and production capability. Adaptive capacity and resilience to drought may be impacted by inadequate infrastructure and health services, and by social disadvantage¹⁵.

SOUTHERN WHEATBELT	SOUTHERN WHEATBELT
DROUGHT RESILIENCE STRENGTHS	DROUGHT RESILIENCE WEAKNESSES
 Access to critical infrastructure Limited exposure to production risk Soil and production capability 	 Normalised Difference Indication Index (vegetation greenness) trends Expected impacts of climate change on temperature and rainfall patterns Increasing drought frequency Direct dependence of local economies and livelihoods on agriculture

Table 3: Southern Wheatbelt drought resilience strengths and weaknesses

8.1 Drought Indicators

Mapping Drought Vulnerability

Using GIS-based multi-criteria analysis (MCA), DPIRD's Geographical Information System (GIS) team spatially integrated relevant economic, environmental and social data at an appropriate decision-making scale. A set of maps were developed identifying high priority drought risk areas.

Inputs into the MCA follow the RDRP conceptual framework, investigating aspects of exposure, sensitivity, impact and adaptive capacity. The stakeholder engagement process guided how each of these components relate to and inform vulnerability and resilience to drought in the regions.

Maps were developed for drought exposure, drought sensitivity, drought impact, adaptive capacity and vulnerability, and can be found in the Drought Vulnerability Assessment in Section 6. The drought vulnerability map (Figures 8 and 9) is a composite of adaptive capacity and drought impact and showed variability across the region, with higher vulnerability in the north and east. There is a high level of agreement between the three Pilot regions (highlighted in figure 8) and those identified through a participatory mapping process involving regional stakeholders, many of whom have lived experience of drought.

In the Southern Wheatbelt region, stakeholders identified areas most vulnerable to drought as those with lower levels of access to reliable water supplies and water infrastructure, including strategic community water supplies, piped scheme water and on-farm water capture and storage. Specific localities were mentioned as more vulnerable than others due to the lack of reliable water supplies.

Small and Medium Enterprises (SMEs) considered most vulnerable to drought are those with short term planning and narrow focus; less skills in management; fewer resources; limited market share and a conservative approach to risk management.

Those with direct links to rainfall, such as those servicing the agricultural industry are particularly exposed. In depth analysis of the methodology and the full Vulnerability Assessment are in Section 6, 7 and 8 of the Southern Wheatbelt Drought Vulnerability Assessment.

¹⁵ Maru, Yiheyis & Tom Measham. (2021). CSIRO Drought Resilience Mission: Transition planning for building resilient communities in drought affected regions. National Science Agency.



Figure 8 Final drought vulnerability map for south-west Western Australia showing areas most vulnerable to drought are in the north and east of the region.



Figure 9 Final drought vulnerability map at Southern Wheatbelt region scale, showing high to very high vulnerability across the region, with Kondinin more vulnerable than Wagin.

Vulnerability Index Results

A Vulnerability Index was developed for the Southern Wheatbelt region with ten indicators chosen to reflect exposure, sensitivity and adaptive capacity.

It provides a snapshot of vulnerability to drought which can be repeated and tracked over time and aims to assist local decision makers and managers in the rapid evaluation of drought risk in the region. Each indicator was rated on a sliding scale from 1-5, with one being the lowest vulnerability and five the highest.

We acknowledge there are limitations to some of the data, particularly the human capital datasets used that inform adaptive capacity to drought. Technical experts noted that the availability, quality and resolution of human capital datasets was not sufficient to provide confidence in the adaptive capacity assessment.

The assumptions about the direction of effect of these datasets may also not hold in all regions and in all situations. There are opportunities to continue to build and review the model to incorporate further socio-economic information to strengthen understanding and measurement of resilience in regional areas. The average score across indicators gave an overall index of 3.3 for the Southern Wheatbelt, indicating moderate vulnerability to drought. Due to the degree of variation between indicators it is important to consider them individually.

Areas of strength in drought resilience in the Southern Wheatbelt region are access to critical infrastructure (1.5), limited exposure to production risk (2.5) and soil and production capability (3). Weaker areas were identified across each area of exposure, sensitivity and adaptive capacity.

They were NDVI trends (3.5), the expected impacts of climate change on temperature and rainfall patterns (4), increasing drought frequency (4.5), and the level of direct dependence of local economies and livelihoods on agriculture (5).



Figure 10 Vulnerability index

The exposure, sensitivity and adaptive capacity in terms of resilience as identified through the spatial mapping is summarised in the following table.

AREA OF RESILIENCE	RISK RESULT BY	RESULT BY LOCALITY	KEY ISSUES AND RESPONSE
Exposure	 2- projected temperature and rainfall change, moderate increases in temperature and moderate drying 4 - change in timing of the autumn break experienced to date 4.5 - increasing drought frequency 	Moderate in the far west (Wagin) High (parts of Dumbleyung, Kondinin, Kulin and Lake Grace) Very high in Dumbleyung and the eastern edge of Kulin, Lake Grace and across the majority of Kondinin.	Despite high resilience in agricultural production capability, the region is highly exposed to the impacts of climate change and faces several general resilience challenges including economic diversification and access to infrastructure, services and reliable, good quality water. Higher risk was a result of decline in growing season rainfall. The focus of resilience action should be improving understanding of and responses to these challenges.
Sensitivity	 2.5 - production risk 3.5 - lowest 10% of NDVI values recorded between 2002-2021 5 - % of the population that is employed in agriculture 	Less risk in the west (moderate-high in Wagin) Consistently high-very high across remaining parts of the region. Lake Grace and Kondinin have a higher proportion of very high sensitivity compared to other Shires.	May be due to accessibility and remoteness, percentage of Drought Risk by farm profit, higher numbers of livestock in some Shires (Kondinin, Lake Grace), count of declared water deficiencies by Shire and low counts of water assets (bores and dams), and the high percentage of workers reliant on agriculture.
Adaptive Capacity	 2 - levels of existing unemployment in the region 1.5 - access to water services and transport infrastructure 5 - groundwater quality 3 - soil capability 	Lower levels of adaptive capacity linked to ageing population (southwest Wagin, east Kondinin). Higher in north and central areas.	Through community engagement and the outcomes of the social impact study, a strong link was identified between natural and physical capital and economic prosperity, which impacts on individual wellbeing and social and community resilience. Very low unemployment rate relates to better adaptive capacity, though this does not reflect the issues with attracting labour due to lack of housing options for workers. More exploration is needed to ascertain true adaptive capacity to drought.

Table 4: The exposure, sensitivity and adaptive capacity of the Southern Wheatbelt Region

Kerrigan Beef grain

8.2 Impacts of drought on the Southern Wheatbelt

The impacts of drought in the Southern Wheatbelt are cross-cutting. Stakeholder engagement revealed drought impacts can be significant and wide ranging affecting the economic, social and environmental functioning of the Southern Wheatbelt community and industries.

Except for western parts of Wagin, the entire Southern Wheatbelt RDRP study region has high and very high likelihood of being impacted adversely by drought (Figure 10). Areas of most concern are the Shire of Kondinin, Western and Eastern Kulin, most of Dumbleyung, West and North East Lake Grace. The impacts of settlement and the subsequent environmental changes caused by drought and climate change and other issues is consistent across the region and the impacts on culture and Country¹⁶. A summary of the main impacts of drought in the Southern Wheatbelt region, identified through the stakeholder engagement and technical review process, are outlined below. A detailed analysis of drought impacts can be found in Section 5 of the Southern Wheatbelt DVA.



Figure 11: Drought impact in Southern Wheatbelt Consortia.

16 Native Title Tribunal. (2022). Ballardong People Indigenous Land Use Agreement. Retrieved 28 January 2022 from: http://www.nntt.gov.au/ searchRegApps/NativeTitleRegisters/Pages/ILUA_details.aspx?NNTT_Fileno=WI201 7/012

35

Economic Impacts

Agriculture is a key driver of the economy in the region and, as drought has a direct biophysical impact on production of crops and livestock due to reduced available water and higher temperatures, it has a collective adverse impact on the total economic output of the region attributed to agriculture. As the Southern Wheatbelt has a collective value of \$466 million, this impact is significant.

Southern Wheatbelt stakeholders report experiencing financial stress due to of failed production during drought. Farming families sell or euthanise livestock, liquidate assets or increase their debt to survive. It should be noted some farmers do benefit from drought, through increases in farm size and becoming more crop dominant, increasing their wealth over time¹⁷.

Stakeholders noted that the lessons learnt over time from dealing with dry seasons, adoption of new practice and improved business management (including use of the Australian Tax Office Farm Management Deposit Scheme), have mitigated impacts for some, smoothing weather-influenced income variability.

Non-farming families experience reduced income, reduced employment opportunities, inability to retain staff, and reduced cash flows. SMEs considered most vulnerable to drought are those with short term planning and narrow focus, less skills in management, fewer resources, limited market share and a conservative approach to risk management. Those with direct links to rainfall, such as those servicing the agricultural industry, are particularly exposed.

"I realise now what a luxury it is living in town on scheme water. I recently made the decision to move so I no longer have the stress of surviving on tank/bore water. My pumps broke and I have horses, so we were cautious with our water and all our drinking water had to be brought in." Stakeholder Engagement Participant, 2022. Water is an underpinning resource to support industry and business in the region. The Southern Wheatbelt is dependent on piped potable scheme water located in distant geographical areas, and a mix of locally sourced supplies for non-potable use. Groundwater is limited due to geology and requires desalination for productive use.

Drought impacts on-farm and community water supplies, triggering water deficiency declarations, and the carting of water at the expense of the State government. To reduce reliance on scheme supplies, and enhance ability to cope with consecutive dry seasons, continued farm water supply improvement, and local and regional scale water supply planning and investment is required to address supply constraints and future demand under climate change scenarios.

"Small business gets forgotten – like the tyre fitter or mechanic. More support for mum and dad businesses, including the local contractors is needed." Farmer and Agricultural Consultant interviewed April 2022.

¹⁷ Kingwell, R. and Xayavong, V. (2017). How Drought Affects the Financial Characteristics of Australian Farm Businesses. Australian Journal of Agricultural and Resource Economics, Vol. 61, Issue 3, pp. 344-366, 2017, Available at SSRN: https://srn.com/abstract=3004174 or https://srn.com/abstract=3004174 or https://srn.com/abstract=3004174 or https://srn.com/abstract=3004174 or https://srn.com/abstract=3004174 or https://dx.doi.org/10.1111/1467-8489.12195
Environmental

Drought can have serious, long-term consequences for soil health, vegetation cover and biodiversity. Reduced vegetation cover and drier soils increase the risk of erosion and invasion by weeds, pests and diseases. This also impacts on the functioning of the landscape for economic and social purposes.

Droughts exacerbate impacts on already fragile environments. In the context of broader degradation, drought conditions can have a significant impact on natural resources, including irreversible damage to water quality, soil and vegetation, leading in turn to dust storms and a loss of topsoil, soil nutrients, organic matter and soil carbon.

Declining condition and amenity of reserves due to drought impacts detracts visitors from these areas.

Aboriginal community members expressed concern about the impact of drought on vegetation, water and fire regimes in the region, as well as the impact of land transformation and climate change on the region's vulnerability to drought.

"It is distressing to see plants have lived a long time, die due to lack of water." Stakeholder Engagement Participant, 2022.

Social

Southern Wheatbelt stakeholders stated that drought negatively affects mental health, led to business closures, causing people to move away from the region, reducing population sizes and access to skills and services. Drought strained community services and support networks. Stakeholders highlighted the need for stronger support to community groups and networks during drought. Aboriginal communities are likely to be disproportionately affected by drought based on pre-existing health and social disadvantage.

Drought contributes to failed businesses, causing people to move away and, in turn, reducing population sizes, access to skills and services and the availability of community services and support networks in the region.

"Mental health is bad if you have stock. If you are finding a couple dead or abandoned lambs every few days. Trees dying in the landscape also effects mental health." Stakeholder Engagement Participant, 2022.



Future Scenarios

As the climate changes, temperatures will continue to increase, and growing season rainfall will continue to decrease across the region. The time spent in meteorological drought, where conditions are significantly drier than the average over the preceding 30 years, will increase over the course of the century.

Analyses of rainfall and temperature data highlight a potentially concerning trend, with the composite hazard of hot drought beginning to occur in recent years.

Appropriate steps must be taken to anticipate and mitigate the potentially devastating effects of hot droughts.

The potential future environmental impacts of drought are soil degradation, increasing risk of fire, damage from feral animals and weeds and ongoing biodiversity loss. Soils are non-renewable resources that are critically vulnerable to loss and degradation, particularly during drought.

Reduced rainfall and higher temperatures dry out the soil, creating cracks that reduce the moisture and volume of the soil, affect the activity of soil microbes, reduce soil particle cohesion, change soil texture, decrease soil water holding capacity and limit plant growth.

Erosion is one of the greatest risks to soil health during drought, as it strips away the fertile top layers of soil and organic matter. Erosion affects agricultural production and water quality.

Crop and livestock farms in the region will be adversely affected by climate change, with projected increases in extreme events. Broadacre crop and pasture production may also decline. Drought is expected to impact adversely on crop and livestock production in the region, through increases in extreme events, and water supplies potentially not able to meet industry and community demand.

Climate change projections for the Southern Wheatbelt, a high level of direct dependency on agriculture¹⁸ and the demonstrated ability for the agricultural industry, regional businesses and communities to adapt to changing conditions, make the region an excellent candidate for drought resilience action.

The Southern Wheatbelt Drought Vulnerability Assessment describes Future Drought scenarios in Section 4 and details the vulnerability of the region to future climate impacts, along with potentially transformative actions.

Additional future impacts of climate to consider at the regional level include:

- economic pressures
- increased input costs and energy prices
- competing land use pressures
- policy related economic pressures, such as measures to mitigate greenhouse gas emissions.

Exploration of mega-trends and drivers was completed for the program, with the following table identifying these and the impact on the regions¹⁹.

The region is responding to these mega trends through adoption of innovation, particularly in agricultural systems, and through developing locally derived water supply systems to augment geopgraphically distant delivered water supplies.

MEGA TREND	IMPACT/RELEVANCE	DRIVER
Supply + Demand shocks	High input costs – substitution inputs, tight supply commodities, confidence ag industry, land value increases	Supply chain disruptions
Food Trends	Vegetable oil and plant protein demand, aquaculture product demand, onshoring meat production	Demand has other drivers such as geopolitical tensions and consumer confidence.
Climate change	Need for adaptive responses, ecosystem services, natural capital market, carbon market opportunities	Net zero transition/ decarbonising economy
Resource Scarcity	Oil, gas, water, labour underpinning inputs for region's economy	Water, energy, labour key drivers
Digital Transformation	Connectivity is the new highway, and data is currency	Connectivity and digitisation of industries and communities
Neo-ecology	Sustainability becoming major economic driver	Sustainability credentials for trade and markets
Global level	Less safe world, which is very connected, ongoing impact from major events and tensions	Biosecurity
Wellbeing	Wellbeing of communities impacted by drought	Building community cohesion

18 Lester, L., Flatau, P. and Kyron, M. (2022). Understanding the Social Impacts of Drought. Prepared by the Centre for Social Impact, Prepared by the Centre for Social Impact, The University of Western Australia.

19 Sue Middleton. 2022. AgDots. Regional Drought Resilience Planning Program Global Literature Review – Key Drivers Report. Prepared for Department of Primary Industries and Regional Development.

8.3 Building on Existing Resilience

The region faces several resilience challenges including economic diversification, access to infrastructure and services and reliable, good quality water. Improving understanding of and responses to these challenges should be the focus of drought resilience action in the region. Individual resilience factors that influence farmers' ability to cope with drought previously include:

- The pre-existing viability of the business
- Income security
- Managing risk and decision making
- Role diversification
- Opportunities to engage
- Health and wellbeing
- Gender, and age.

Southern Wheatbelt stakeholders identified initiatives that have been successful in supporting communities through the challenges of drought. These are summarised below according to the regional resilience themes identified. Through Wheatbelt NRM discussions with the community, it was clear that a holistic approach is needed to make the Southern Wheatbelt more resilient in the face of future droughts.

People do not want handouts so much as hand ups. They want knowledge to be shared with them so they can continue to change and adapt. They would like to see more support and advice given proactively before disasters like droughts happen. They are looking for innovative technologies to help make their businesses more sustainable.

Goldfields and Agricultural Water Supply



What's working?

Theme 1: Resilient Water

Most people seem to be able to cope if it is a one year drought or extra dry season because they can still gain a yield off their crops on a lower rainfall year. The added pressure of carrying livestock, the impact of carting water, access to water sources, dams drying and seeing the livestock suffer can take a huge mental and economic toll. Experience with drought has seen the region respond strongly to addressing water related challenges in the following ways:

- Investment into water both on farm and for community supplies;
- Additional tanks to support more reliable emergency water supplies initiated by Shires;
- Farm Water Rebate scheme and the ATO Farm Management Deposit scheme helpful in supporting farm businesses through drought, and in preparing for drought;
- Installing, maintaining and cleaning dams and installing and maintaining road catchments;
- More farmers exploring and equipping ground water supplies; and
- Government provision of emergency water supplies.

👫 Theme 2: Resilient Communities

The people that felt supported during tough times by their communities were more equipped to adapt/ cope mentally than people who felt "left out" by the community. The social opportunities such as impromptu catch ups at sporting events are not to be underestimated in helping people "forget" during droughts. Large events that enable volunteer participation support the building of social capital. The following are examples of what has worked for the region:

- Southern Wheatbelt is adept at running large events that bring people together and draw people to the region;
- There is significant existing social capital in the region, with large events in the Southern Wheatbelt include the Wagin Woolarama, Newdegate Machinery Field Days, the Kulin Bush Races, the Wave Rock Weekender;
- An increase in community events was applauded as this gave people a good distraction from the pressures of drought -in non-drought times, these events are important in building social capital and connection;
- Maintaining green spaces and accessible community spaces to support social connection, particularly through sport and cultural events, and networking opportunities;
- Counselling services provided by Regional Men's Health and Rural West to help support mental and financial health;
- The Southern Wheatbelt community identified that social connection is vital in building a sense of community, with people coming together to support each other in times of drought;²⁰ and
- Lessons learned from previous droughts and the community experiences of how they have adapted when going through a drought period.

"We are lucky to have a supportive community here in Kukerin. It is known for its sporting activity and keeping things going – holding things together." Community Member – Wheatbelt NRM Report 2022.

²⁰ Wheatbelt Natural Resource Management Inc (2022). WA Regional Drought Resilience Planning – Grass Roots Commmunity Consultation, Southern Wheatbelt Pilot Area.

🎉 Theme 3: Resilient Agriculture Systems

The Southern Wheatbelt has a good track record in capacity to adapt and respond to risks, with increasing levels of grain production occurring despite reduced growing season rainfall.

All farmers indicated that they have plans and sowing dates were important. Decisions are made based on past experiences, observations, and the plan they were following. They try not to look "over the fence" and have more trust in their own decision-making skills. The following are examples of actions taken to build drought resilience:

- Adoption of research innovation (no-till, new varieties, low input cropping) to support productivity increases despite declining growing season rainfall;
- Increasing sophistication of farm business management, including use of professional farm consultants and advisors, use of ATO farm management deposits;
- Earlier decision making to mitigate and manage risk;
- Adoption of smart farming technology;
- Farmers destocking or agisting livestock in dry times;
- More resilient livestock breeds;
- Exploration of pasture and perennial systems to make use of summer rainfall;
- Niche high value adding opportunities to commodities, new products, tourism; and
- Off farm income.

5 Theme 4: Resilient Landscapes

Consultation with Aboriginal Elders identified that when country is not healthy, the people are not healthy. They articulated that there is no single person, or organisation who can heal country. This requires collaboration with First Nations People and all who are present on Country. Wheatbelt NRM has a long history of engagement with the community to support improved ecosystem services and sustainable farming²¹. The following are examples of what has worked:

- Improving farming practices to build soil health, including on farm demonstrations;
- Active efforts to rehabilitate and regenerate landscapes restoring connection to land, while supporting the economic participation of Aboriginal people through business opportunities including seed collection and seedling raising and revegetation efforts.;
- Noongar people bringing value from cultural knowledge and practices that benefit local ecology;
- Switching to sustainable farming solutions; and
- Government funding to support revegetation of degraded landscapes.

Theme 5: Resilient Regional Economy

Businesses able to diversify their incomes and client bases were able to adapt to a loss of income more easily. Local job opportunities that are not reliant on the fortunes of agriculture were considered important to keep people in the community. While climate change impacts can result in devastating impacts for First Nation communities, there is strong interest and commitment in the region for Noongar engagement and participation to support resilience activities. There is opportunity to develop culture based economies in areas such as biodiversity conservation, land and water management and carbon sequestration²². The following are examples of what has worked:

- Business diversification including multi-industry servicing and expansions of clientele base;
- Improved online presence and e-commerce;
- Reduced spending, good business planning, learning from experience; and
- Accessing professional advice.

21 Noongar land Enterprise Enterprise Group (2022). Valuing Noongar People and Practices in Drought Resilience.

22 Noongar Land Enterprise Group (2022). Valuing Noongar People and Practices in Drought Resilience.

9. Opportunities Moving Forward

Whilst the region already has in place several initiatives and interventions that are working well in terms of drought preparedness and mitigation, efforts should be made to reduce socio-economic vulnerabilities and increase institutional capacities. Recurring themes emerging from each of the Local Government Strategic Community Plans include economic diversification and community sustainability, quality long term water supply, water security, and water holding infrastructure and harvesting.

The Noongar Land Enterprises Group proposed the need for a Framework for Action to facilitate genuine coordinated engagement of Noongar people in initiatives across the regions. This approach may facilitate an approach and commitment from government and industry to genuinely incorporate Noongar knowledge and practices. Climate and drought resilience initiatives would be important to include as part of the economic framework being developed to sit alongside the Indigenous Land Use Agreements that form part of the Southwest Settlement. The following is a summary of the opportunity areas for investment that form the basis of "Section 10. The Plan" in this document.

Image courtesy of Shire of Dumbleyung

🌖 Theme 1: Resilient Water

The number one priority for Southern Wheatbelt communities to build drought resilience is increasing their confidence in available water systems to ride out at least two successive drought years. This would ensure agricultural businesses can continue to function, through direct access to water and to enable critical road maintenance to be undertaken. It would also maintain amenity of community spaces to support social wellbeing and adequate supplies to support emergency situations such as bushfires.

The Southern Wheatbelt's water supply relies on piped potable scheme water located in distant geographical areas, and a mix of locally sourced supplies for non-potable use. Groundwater is limited due to geology and requires desalination for productive use. To reduce reliance on scheme supplies, and enhance ability to cope with consecutive dry seasons, continued on-farm water supply improvement, and local and regional scale water supply planning and investment is required to address supply constraints and future demand under climate change scenarios.

👬 👬 Theme 2: Resilient Communities

There is a need for the whole community to be supported during drought, with many non-farming people and businesses also impacted by the loss of income and regional outmigration associated with drought. Research from UWA into the social impacts of drought identified four elements of a roadmap to social drought resilience. These include infrastructure, good governance, population retention and social capital.

There is opportunity to strengthen connections across the region, based on the experience of those that are involved with the delivery of high quality, large-scale events held in the region. It was recognised that, while these large events are successful, they rely heavily on volunteers and are becoming increasingly stressful to run. A streamlined approach to reduce red tape would be welcomed. Provision of stand up small ad hoc events, and small community projects that involve community members were considered worthy of investigation.

🎉 Theme 3: Resilient Agriculture Systems

The region has a good track record in terms of capacity to adapt and respond to risks, with increasing levels of grain production occurring despite reduced growing season rainfall. There are still areas for further investigation to enable continued productive capacity and profitability in the face of a drying climate. With the plethora of actors working in the agricultural research, it is essential that a joint approach is fostered. The targeting and extension of research and development of climate resilient farming systems is considered essential.

The South West Western Australia Drought Hub is already actively collaborating with Grower Groups and consortia partners to develop and enhance the uptake of farmer-centred drought innovation and adoption practices in the region. There are also opportunities to tap into the recently announced WA Farming Systems project, a partnership between DPIRD and the Grains Research and Development Corporation, that has focus areas in the low and medium rainfall zones, including consortia locations.

Early detection and monitoring of seasonal conditions, and dissemination of relevant and timely information to farming communities about the potential for drought conditions will allow for timely decisions. Using the right measures to understand drought in a timely manner will assist with the management of farm businesses and assist policy decisions. With early information, appropriate services can be provided and accessed by rural and regional communities experiencing drought.



There are opportunities for Aboriginal businesses to participate and benefit from initiatives to support drought resilience. The Noongar Boodja Ranger program has a strong presence in the Wheatbelt region, and is growing its operations, capturing opportunities for decarbonising the economy. This includes collection and nursery raising of native seedlings for carbon and biodiversity plantings. The replication of this model in a culturally appropriate way with local Noongar groups across the Wheatbelt would assist in diversifying employment opportunities for Aboriginal people and supporting landscape restoration. The Djarlma Plan developed for the WA forestry industry has been proposed as a model to work towards.

Healthy ecosystems build resilience to drought, and nature-based solutions can offer cost-effective protections while delivering co-benefits such as carbon capture and storage and improved food and water security. Sustainable natural resource management, including of soil, water, and biodiversity, must be prioritised in the plan for building resilience to drought in the Southern Wheatbelt. Community consultation indicate a need to improve the condition of important environmental, tourism and culturally significant sites through conservation and wetland and vegetation condition monitoring.

Theme 5: Resilient Regional Economy

There is strong potential to capture opportunities for decarbonisation of the economy, with growing interest and investment in renewable energy and biofuels projects, and large-scale carbon farming plantings. Niche value adding on farm, off farm diversification, and multi-industry servicing also present opportunities to build drought resilience and adaptive capacity.

Supporting the diversification of the economy through encouraging business development in the region was also considered important in enhancing economic and community resilience. In the Southern Wheatbelt region, there are opportunities for economic diversification into the population and mining and agricultural service sector, tourism, niche value adding agribusinesses, meat processing and renewable energy sector. There is also opportunity to develop a framework for business incubation using existing infrastructure such as the Community Resource Centre network.

Drought Policy and Support Mechanisms

A range of policy ideas were raised during consultation, including:

- Defining drought for WA to ensure consistent and fair allocation of drought resilience/ drought support funding;
- · Policies and programs to incentivise upgrading of water infrastructure on farms and in communities;
- Tax incentives for landholders/ businesses to invest in water supplies; and
- Extension of ATO Farm Management Deposits to rural businesses that rely on agriculture.

Projections of climate change in the Southern Wheatbelt, high levels of direct dependency on agriculture and a demonstrated ability for the agricultural industry, regional businesses and communities to adapt to changing conditions make the region an excellent candidate for drought resilience action.



The Southern Wheatbelt RDRP presents for consideration a range of interventions and actions to support the preparedness and economic, environmental, and social resilience to future droughts in the Southern Wheatbelt.

10. The Plan

The actions and priorities presented in this plan are grouped under each of our five drought resilience themes, identified through stakeholder engagement, as follows:

- 1. Resilient Water
- 2. Resilient Communities
- 3. Resilient Agriculture
- 4. Resilient Landscapes
- 5. Resilient Regional Economies

Building resilience can involve maintaining, modifying, or transforming parts, sectors or whole systems. Therefore, each proposed set of actions is identified as either maintain, modify, or transform to indicate which pathway is required.

Interventions identified as part of the formal Transformative Reviews have also been included. Appendix 2 provides an overview of the high level transformative themes.

The implementation of these resilience building interventions and the proposed action is subject to further discussion with Consortia stakeholders and potential delivery partners.

Dumbleyung sheep





Theme Outcome

The region has a water system the community has confidence in to sustain industry, agriculture, and the community through consecutive decile one rainfall years

FDF Strategic Priority

Environmental, Economic and Social Resilience

FDF Objective

Grow the self-reliance and performance (productivity and profitability) of the agricultural sector; Strengthen the wellbeing and social capital of rural, regional, and remote communities; Improve the natural capital of agricultural landscapes for better environmental outcomes

Current Situation

Several localities in the region have experienced water deficiencies, with deficiency declarations triggering State Government assistance to cart water for emergency use. It is observed that water infrastructure is unable to keep up with current and expected demand.

The top priorities for a resilient water system identified from community engagement are improving water infrastructure in relation to increased capacity for on farm water capture, treatment, and storage.

Engagement also identified the need for increasing community confidence in available water systems to ride out at least two successive drought years.

Improvement of water supplies have been explored through programs such as the Rural Towns-Liquid Assets Program in the early 2000s. This program was focused on addressing townsite salinity and researched desalination technology. In 2022, the DPIRD and Grower Group Alliance-led WaterSmart Farms initiative is revisiting desalination and on farm water supply improvements opportunities in this region.

Case Study: <u>Water Smart Farms</u> is an initiative of the State Government, focused on researching on-farm desalination and supporting community desalination systems

Lake Grace water tanks - Courtesy of the Countryman

	THEME 1: RESILIENT WATER
INTERVENTION	PROPOSED ACTION
Future looking and coordinated total water management planning.	 Modify - water supply planning Review and update local water supply plans to ensure total water management and climate and industry readiness Develop a regional water strategy for the Wheatbelt, taking into consideration supply and demand requirements of non-potable water, and capacity from scheme, groundwater, and surface water resources/Water Supply and Risk Assessments (Regional Water Security and Investment Plans)* Review policy Water Deficiency Declarations, including a review policy of cost of scheme water for regional communities in drought and cost of scheme water in times of drought Transform - water supply planning Deview capacity of the scheme system to cope during drought events and risks
	 Review capacity of the scheme system to cope during drought events and risks associated in delivery of water for agriculture, businesses, farmland, and regional communities; make this information available to decision makers and planners Conduct water source investigations for all new water sources*
Better water data to support planning and better regional development outcomes	 Modify Understand regional water development constraints to support business investment decisions and consideration of options to address constraints Track capacity of strategic community water supplies (pre and during drought) - develop a monitoring platform for community to access.
	 Maintain/Modify Improve the security of strategic community water supplies through swipe card access.
Improving the uptake of on farm and household water supply improvement	 Modify Support development of on farm planning tools to accelerate water resource planning at local scale (e.g., Farm Cat project acceleration)* Investigate and promote cost effective water quality treatment options to improve water quality on farm Demonstrations of water monitoring technology on farms Support access to hydrogeological expertise to investigate groundwater opportunities Develop proactive regional water improvement incentive scheme (Farm water planning/Farm water rebate scheme/Rainwater tank subsidies)/Incentivise on farm water infrastructure investment.#
Alternative non potable water source investigation and development	 Transform Regional groundwater investigations to identify sites suitable for non-potable water use (including new technologies/desalination) Detailed hydrogeological surveys in areas at risk of drought to identify potential groundwater resources Identify groundwater resources suitable for use for agriculture and community use; consider partnership with DMIRS to access relevant data Review options to extend scheme and increase/buffer capacity to fill gaps in highrisk areas – e.g., installation of buffer tanks Support and expand desalination pilots in communities and on-farm* Modify Implement water re-use schemes for townsites CBH Bin Water Harvesting Program: Developing community water supplies in the region

	THEME 1: RESILIENT WATER
INTERVENTION	PROPOSED ACTION
Optimising use of water in communities	 Maintain Water efficient irrigation and landscaping across greenspaces in communities Government agencies leading the way with water wise practices
Southern Wheatbelt small water infrastructure projects*	 Implement immediate water related projects to address urgent gaps in the water supply system - small infrastructure projects identified below: Kulin double dam East Pingaring community bore Little Italy large scale community dam or bore West Kulin large scale community dam Pingaring community bore Lake Magenta Water Corporation AA Dam catchment upgrade Purnta Rock Varley water tank Lake Grace Town Water Harvesting project South Newdegate water supply - CBH water harvesting Varley dam desilting and rock catchment repair Kondinin town site pipeline to water sporting grounds Bendering dam and catchment improvement Karlgarin water supply improvement works Hyden sporting ground watering system East Hyden water supply improvement North Hyden water supply improvement Wagia Airfield tank installation Puntapin Rock dam and catchment renovation Wedgecarrup bore exploration Wastewater recycling scheme Rifle Range Reserve town dam Dumbleyung Water Supply - CBH water harvesting Dumbleyung community dam/horse dam – stage 2 works roaded catchment sealing and dam expansion Kukerin CBH hardstand and dam desilt Tarin Rock II – catchment works, and dam desilt

*Transformative Actions Identified through AgDots Review

#subject to confirmation with local governments and relevant State agencies

10.2 Resilient Communities

Theme Outcome

Communities that are resourceful, adaptable and supported to mentally and physically bounce back from drought.

FDF Strategic Priority

Social and Economic Resilience

FDF Objective

Strengthen the wellbeing and social capital of rural, regional and remote communities

Current Situation

The uncertainty and financial stress associated with drought negatively affects mental health in regional areas. Drought contributes to failed businesses, causing people to move away and, in turn, reducing population, access to skills and services and the availability of community services and support networks in the region.

The small communities that are a feature of the Southern Wheatbelt are particularly exposed as drought impacts on the normally high levels of volunteerism as people are less able to participate.

The region is home to several large events, including the Wagin Woolarama, the Waverock Weekender and the Kulin Bush Races. In 2022, the <u>Waverock Weekender</u> and <u>Kulin Bush Races</u> sold out tickets in minutes.

Kulin Bush Races



THEME 2: RESILIENT COMMUNITIES		
INTERVENTION	PROPOSED ACTION	
Community Health and Wellbeing	 Transform - wellbeing Development of regionally and locally focused wellbeing programs Ensuring capacity of recreation facilities to support active communities Support wellbeing measures that build resilience including network strengthening activities and programs that increase physical well-being and support positive health outcomes* 	
	 Modify - wellbeing Complete local community wellness plans based on local needs and risks Include an in drought community check-in program and funding schemes that are targeted and relevant to regional communities Establish regular regional visiting mental/financial counselling/physical health specialist program, with delivery of program visible and considerate of local community needs and sensitivities Support communities in the development of custom fit Public Health Plans as a cooperative arrangement between an LGA and local health facility/s that identify 	
Events and green spaces to support community connection	 specific project initiatives Maintain – green spaces Provision for and maintenance of green spaces in regional towns to support well- being during drought events 	
	 Modify – local events support Investigate and facilitate the fast "stand up" of localised community events to support volunteers during drought Innovative and flexible community events funding program with reduced red tape Transform – sharing skills across region Program developed to support sharing (skills, capacity and infrastructure) between large regional community events Maintain/Modify – sharing skills across region 	
	 Build strong links between Shires and volunteer groups to aid communities and reduce burden on "droughted communities" 	
Access to educational opportunities closer to home	 Maintain/Modify/Transform - building local skills Build workforce capability through workforce planning, digital activation, recruit and train young people for high demand industries, active employer engagement and provide childcare* Review option of providing Year 7 in smaller regional communities Improved online learning options for regional people, increase capacity for gaining qualifications online, including the investigation of subsidised online learning options Enhance visibility of the Regional Universities Centre/TAFE opportunities in the regions; Support communities that wish to pursue and establish a strategic relationship with their local education institutions including action planning around key and unique opportunities and projects to differentiate school offerings to potential client parents 	
Resilience in vulnerable cohorts	 Transform - resilient RRR women Conduct research into the true impact of drought and concepts of "resilience" on rural, remote and regional women and investigate appropriate responses from a policy perspective* Transform - resilient RRR women Match financial counsellor and drought support workers to demand by developing rollout triggers linked with in-drought check in programs. 	

THEME 2: RESILIENT COMMUNITIES		
INTERVENTION	PROPOSED ACTION	
Development of local leadership capacity and enhancing social capital	 Maintain/Modify – building leadership capacity Develop local leadership capacity by encouraging participation in leadership programs, identify mentors in and out of the community and support scholarship for leadership opportunities Support for inter-regional tours of growers and community leaders Modify – building regional networks Support an active network of arts, culture and community organisations Measures in place to support Grower Group and Landcare structures and membership numbers to increase and encourage active participation in Grower Group Alliance, SWWA Drought Hub, NRM Group initiatives (includes Red Card for the Red Fox) Transform – enhancing cultural connection 	
	 Cultural connections and learning - increase collaboration between Noongar organisations, farmers and natural resource management or landcare groups in the planning and implementing land restoration projects to increase climate resilience 	
Increasing community capacity to understand, plan and manage for drought	 Transform - addressing housing Build housing supply through innovation - encourage start up activity, support communities to build housing companies* NFP's provide incentives for building or renovating in rural communities (loans, grants or services), and create a seasonal accommodation matching platform* Modify - cultural heritage planning Develop Cultural Heritage Management Plans to include threats from climate change, droughts and dry seasons Conduct vulnerability assessments of Aboriginal sites and potential risk of drought and climate change impacts Transform - tailored drought information Development of a Filtered Drought Platform to enhance visibility of support mechanisms of relevance to the region (e.g., apply a regional filter for regionally relevant tools, referral agencies, technical information). Platform would include case studies about implementation of climate change adaptation; dry season/ drought preparation on farm and profiles of community profiles; and locations and access to relevant research, demonstration sites and trials Modify - drought policy development Government led drought responses require better targeting, guided by drought indicators and identified vulnerabilities relevant to Western Australian agricultural systems 	

*Transformative options identified through the AgDots Review

10.3 Resilient Agriculture Systems

Theme Outcome

An agriculture sector that is highly engaged in innovating farming systems to be resilient to drought

FDF Strategic Priority

Economic Resilience

FDF Objective

Grow the self-reliance and performance (productivity and profitability) of the agricultural sector; Improve the natural capital of agricultural landscapes for better environmental outcomes

Current Situation

Despite high resilience in terms of agricultural production capability, the region is highly exposed to the impacts of climate change (increasing temperatures, decreasing rainfall, changes in the timing of rainfall and increasingly frequent drought) and faces several general resilience challenges.

The agriculture sector across the region has made major changes to farm management practices to limit the impacts of drought on their businesses. There are still areas for further investigation to enable continued productive capacity and profitability in the face of a drying climate.

The targeting and extension of research and development of climate resilient farming systems is considered essential. Historically, improvement of agricultural efficiencies, including adoption new farming systems has been the dominant strategy in this region for mitigating climate and economic risks.

<u>Tolga Farms</u>, located in Kulin, provides a perspective on building resilience through a focus on improving soil health, reducing risk in the business, and lowering inputs.

THEME 3: RESILIENT AGRICULTURE		
INTERVENTION	PROPOSED ACTION	
WA Drought Indicators Platform and longitudinal monitoring program	 Maintain/Modify - Climate indicators Adapt the National Climate/Drought Indicators platform for WA Develop WA specific climate and drought indicators to support early detection, reporting, forecasting for seasonal monitoring, include water module and integrate water supply monitoring (Smart Dams, DWER community supply monitoring) 	
	 Transform - Drought criteria and indices for WA Develop appropriate drought criteria for WA, taking into consideration use of seasonal rainfall versus the meteorological definition using annual rainfall Further investigate the application of drought indices and further research on 'hot droughts' and current and predicted impacts on agricultural production 	
	 Modify - monitoring and measuring drought resilience Undertake longitudinal monitoring of impacts of drought and adaptive capacity Use the RDRP DVA methodology and update as new information comes on board Advocate for improved data quality collected by ABS/ABARES Evaluate impact of drought support programs on farm businesses* 	

PROPOSED ACTION
 Modify – risk management Develop a better understanding of the risk and impact of drought on the agricultural supply chain Investigate improved agricultural weather insurance products and facilitate access to relevant products
 Transform – risk management Build capability for usage of on-farm data for insurance index products* Support grower education/training for financial risk management tools* Advocate for ATO Farm Management Deposit maximum cap to be relative to the size of the business*
 Maintain/Modify - research and development extension Articulate and communicate key research and development priorities for the region through targeted grower group research and development forum and future farming system workshops, including strong engagement with the SWWA Drought Hub, WA Farming Systems Project and key industry stakeholders (MLA, GRDC) Identify and implement opportunities for 'small scale innovation demonstrations' relevant to the region, including digital farm demonstrations and household innovations
 Modify/Transform - agricultural research Advocate for extended field testing of long coleoptile wheat varieties (200mm +) in WA's low-medium rainfall grainbelt and GM drought tolerant wheat and frost* Enhance the visibility of State led farming systems research and development, including long term farming systems trial at Merredin and Katanning pastures and low carbon livestock research and crop and pasture modelling across soil types and rainfall zones Trial the Australian Agricultural Sustainability Framework in WA in target areas for this program* Support R&D and industry development for alternative drought tolerant crops* Support R&D and industry development for livestock feeding options (carbon positive feed supply e.g., asparagopsis)* Support R&D and adoption in low input cropping options (VRT, alternative fuels, electric vehicles, regen farming)* Support R&D and industry development for building soil health (greater depth soil amelioration, holistic soil management, biochar)*

THEME 3: RESILIENT AGRICULTURE		
INTERVENTION	PROPOSED ACTION	
INTERVENTION Building drought, climate and carbon literacy to support risk management planning	 Maintain/Modify – extension and decision making support Extension program to increase knowledge on climate and weather patterns and forecasting Develop regionally specific triggers to support decision making (e.g., Agtactics) Support initiatives to build regional climate monitoring capacity and data sharing Extension programs to support land managers to use industry approved tools to calculate carbon footprint and to support decision making Identify local champions implementing climate change adaption and dry season/drought preparation on farm, document and share Share stories and messages about dealing with difficult seasonal conditions for future learning, with links to Drought Support Platform or SWWA Drought Hub Support delivery of Farm Business Resilience and Small Business Climate Resilience planning workshops in the region 	
	 Support Aboriginal landholders to build drought resilience in their enterprises Modify – on farm water improvement extension Improve the adoption of on farm water management improvements through integration of water planning modules into existing farm business planning decision making tools Extend program to support outcomes of Water Smart farms and incentive programs Modify/Transform – alternative energy options Roll out of standalone power systems in the region to support energy efficiency on farms and improved reliability Identify and implement suitable power supply backup infrastructure arrangements to the region's mobile telecommunications network to maintain communications in times of emergencies (i.e., fire) 	

*Transformative options identified through the AgDots Review



Theme Outcome

Healthy landscapes with natural resources able to sustain industry and environmental services

FDF Strategic Priority

Environmental Resilience

FDF Objective

Improve the natural capital of agricultural landscapes for better environmental outcomes; Strengthen the wellbeing and social capital of rural, regional and remote communities;

Current Situation

First Nations community members talked about environmental repair as their priority . They also spoke of improving farming practices to reduce land clearing and minimise the damaging effects of chemicals on the landscape²⁰.

Wheatbelt Natural Resource Management Inc's threeyear plan for 2021-2024 outlines its priorities as soil acidity issues, prevention of further salinity, and land use planning support, with their 2020/21 Annual Report identifying priorities to increase perennial vegetation cover across the Wheatbelt, optimise the Mixed Farming Fodder Systems Project, and the Living Lakes Project that intends to improve water holding capacity and water quality of lake systems across the region.

The Noongar Boodja Ranger Program, supported by Wheatbelt NRM, is supporting natural resource management outcomes and employing young Noongars to improve the condition of Country.

Noongar Boodja Ranger - courtesy of Wheatbelt Development Commission



	THEME 4: RESILIENT LANDSCAPES
INTERVENTION	PROPOSED ACTION
Natural resource condition report card and natural capital accounting for the regions	 Modify: Develop a program to monitor and record impact of drought on natural resources and longitudinally monitor and incorporate into DVAs Transform: Enlist support of regional landcare groups and Noongar Boodja Rangers to support resource condition monitoring Support national natural capital framework development in WA Agriculture to enable natural capital on balance sheets* Pilot participation in national biodiversity trading platform* Modify:
	 Better articulate the economic and social value of natural resources and ecosystem services
Building regional capacity to manage natural resources Wheatbelt revegetation for carbon plan	 Modify Explore the expansion of Noongar Boodja Ranger program Transform Develop a framework for action to ensure culturally appropriate engagement and participation of Noongar people in land and water management Participation in Biodiversity Stewardship Program through the Drought Hub nodes; Support the establishment of a sub-regional Landcare group to ensure targeting and leveraging of NRM grant opportunities Evaluate and expand biodiversity stewardship program and trials in WA* Support projects to test market to develop smaller more integrated projects (pollination, soil conditions, biodiversity) + create a model to provide co- benefits and support local communities and businesses.* Transform: Develop a strategy for optimised carbon plantings, including mapping of suitable locations that do not compromise agricultural productivity, provide
	 biodiversity benefits and economic opportunities for landholders Maintain/Modify Build carbon farming literacy through delivery of workshops and accessible information Improve carbon and climate literacy and understanding of the carbon market*
Best bet land and infrastructure design uses to support improved natural resource functioning	 Modify Identify productive uses of land not suitable for cropping or livestock and identify appropriate management options Explore how on farm and in town water structures can support environmental functioning (e.g., better dam design to replicate wetland functions and filtering or evaporation controls) Road design that considers impact on surface water flows to mitigate saline groundwater rise.
Quantifying the impacts of regenerative agriculture practices during and post drought	 Modify Investigate opportunities for uptake of regenerative agriculture practices (e.g., increasing groundcover, integration of animals and improving soil health)

 $\ensuremath{^*\mathrm{Transformative}}$ options identified through the AgDots Review

10.5 Resilient Regional Economy

Theme Outcome

A diverse, forward looking, adaptable business sector, not dependent on seasonal conditions

FDF Strategic Priority

Grow the self-reliance and performance of the agricultural sector

FDF Objective

Grow the self-reliance and performance (productivity and profitability) of the agricultural sector; Strengthen the wellbeing and social capital of rural, regional and remote communities

Current Situation

Agriculture is the primary land use in the region and Southern Wheatbelt stakeholders report experiencing financial stress because of failed production during drought. Farming families sell or euthanise livestock, liquidate assets or increase their debt to survive, with non-agricultural businesses and individuals in regional areas impacted through reduced employment opportunities and cash flows. There has been an observation of a decline in permanent worker populations, partly due to changing business practices (farmers and businesses employing seasonal or casual workers). In dry seasons, the "cheque book goes away," with the reduction in spending impacting on cash flow to businesses in the region. Supporting the diversification of the economy through encouraging business development in the region was considered important in enhancing economic and community resilience.

Anecdotal evidence suggests that farm numbers and on-farm based populations are declining, but regional 'town' populations are not - a gap that warrants further investigation.

There is strong potential to capture opportunities for decarbonisation of the economy, with growing interest and investment in renewable energy and biofuels projects, and large-scale carbon farming plantings. Niche value adding on farm, off farm diversification, and multi-industry servicing also present opportunities to build drought resilience and adaptive capacity.

Cambinata Yabbies, located in Kukerin, is a pioneer in diversification. The Nenke's run a gourmet food production business alongside their broadacre farm and tourism venture.

THEME 5: RESILIENT REGIONAL ECONOMY		
INTERVENTION	PROPOSED ACTION	
Addressing constraining enabling infrastructure to support industry growth and regional resilience to climate change	 Modify/Transform - infrastructure planning and improvement Undertake regional infrastructure/market constraint audit, including power, water, transport, telecommunications, land, housing and labour to consolidate understanding and focus investment to building economic and social resilience, enhancing capacity to articulate priority needs to relevant government agencies Improve connectivity through co-investment in digital infrastructure (includes backbaul + wirplaces potworks to farms)* 	
	Transform – regional water and energy strategies	
	• Wheatbelt energy supply strategy developed, or made visible, to support ongoing resilience of regional communities, including enhancing rollout of alternative, grid independent energy sources (e.g., Stand Alone Power Systems) and consideration of requirements to electrify the agricultural industry	
	Wheatbelt water supply plan (refer to water resilience actions)	
	Modify – worker accommodation strategy	
	 Work with relevant organisations to develop and implement a worker accommodation strategy to mitigate accommodation shortages in regional communities, including short stay accommodation needs 	

THEME 5: RESILIENT REGIONAL ECONOMY		
INTERVENTION	PROPOSED ACTION	
Supporting economic diversification and	Modify/Transform – tourism planning and product development Support Tourism planning processes (destination management plans) and 	
business development in the region to capitalise on	invest in regional and local tourism projects*	
growing agriculture and mining sectors and the region's unique features	key experiences the region, including development of pathways to Wave Rock, Wooly Way, links to key events and attractions and the development of Hyden Visitor Centre, Dumbleyung Lake Activation (bike & walk trail); Donald Campbell Artificial Reality/Virtual Reality Experience; Dumbleyung & Kukerin Main Street Tourism Masterplan Destination Attractor implementation	
	Transform – agribusiness diversification	
	 Identify and share case studies of agribusiness diversification, build on the network of businesses who are value adding commodities and developing niche, high value products 	
	 Develop more intensive farming opportunities (eg. horticulture through water security assessments and identification of land/water/workforce / infrastructure packages for investors)* 	
	Transform – business development and tech skills development	
	• Community Resource Centre (CRC) Innovation and Incubation centre strategy to explore leveraging the existing CRC networks to support business incubation in regional communities, including partnerships with networks outside the region (e.g., Pollinators, SpaceCubed, Agri-start) and encourage sharing of learning from other communities	
	 Regional tech support built withing regions (CRC flying squads) and develop long term plan to build tech capacity in regions* 	
	 Build tech skill and support in ag (connectivity literacy, data management capability, farm tech capability of industry)* 	
	Transform – understanding and building economic diversity	
	 Quantify and qualify the impact of small and medium enterprises in the region and true dependency on agriculture, including an audit of all regional businesses indirectly supporting the Agriculture sector (i.e., supermarkets, pubs, roadhouses & hotels) and provide resources to develop business specific and project costed resilience plans to prepare for and sustain business viability during times of drought e.g., innovative & unique 'customer experience' plans 	
	• Leverage existing Aboriginal based local businesses to develop business specific enhancement plans including costed project activities to improve viability, performance and service offerings to customers (e.g., Wuddi Cultural Tours); look to develop planning template for new potential Aboriginal businesses to follow	
	 Create a revolving loan fund to encourage regional entrepreneurship and innovation and support innovation/resilience training for regional businesses (eg. WBN program for regional resilience)* 	
	• Develop socio-economic indicators to assess impact of business and industry diversity and impact on climate/drought resilience and agricultural industry restructuring, and implement findings into the Drought Vulnerability Assessment	
	• Understand extent and plans for mining activity in the region, including using main towns as a FIFO base and explore opportunities for mining projects to support local economy, local workforce development and encourage business expansion or establishment in the region	
	Support higher level of integration and planning for major mining resource projects and develop community structures to capture benefit from investment*	
	 Facilitate engagement of landholders and local governments in the region with Narrogin Biodiesel plant proponents to increase awareness of opportunities to participate; 	
	 Develop in drought support programs and encourage genuine local expenditure and local content outcomes 	

*Transformative options identified through the AgDots Review

11. Investment framework and implementation of the Plan

The Plan's proposed themes and interventions have been developed with the community and technical experts, with delivery and impact targeted at the local and regional level, with some interventions having significance beyond the Consortia region. We acknowledge there are many relevant programs already underway or being planned that will support the delivery of this Plan and, to the best of our knowledge, we have engaged with those programs.

An Implementation Framework supporting the RDRP Plans is under development and will identify priority program areas and resourcing opportunities. This will be subject to further discussion with Consortia local governments and potential delivery partners, including the South-West WA Drought Resilience, Innovation and Adoption Hub and the Foundation for Rural and Regional Renewal Communities Impact Program regional leads.

This work will consider feasibility and practicality of proposed actions and the quantitative and qualitative public-good benefits to the region as described in Component 8 of the Regional Drought Resilience Plans Independent Review Guide. It is vital that the momentum created by developing this initial plan is carried through the implementation of this Plan and the supporting Investment Framework.

12. Monitoring, Evaluation and Learning

12.1 Monitoring, evaluation and learning (MEL) framework

Program objectives and outcomes for the RDRP Program are comprehensively covered in the WA RDRP Monitoring Evaluation and Reporting Plan (MERP). The program's objective included the development and publication of three Regional Drought Resilience (RDR) Plans for priority agricultural areas that have current and predicted future impacts of a drying climate.

The following outlines the Monitoring and Evaluation Framework to measure the regional level impact of the Southern Wheatbelt Regional Drought Resilience Plan.

The **Vision** for the SW RDRP Plan is for the "Southern Wheatbelt to build a structural resilience to drought that supports a sustainable and thriving community".

The Plan **Goals and outcomes** aligned to each theme are:

- Resilient Water a water system that can sustain industry, agriculture and the community for two consecutive low rainfall years.
- 2. Resilient community communities that are resourceful, adaptable and supported to mentally and physically bounce back from drought.
- Resilient agriculture systems an agriculture sector that is highly engaged in innovating farming systems to be resilient to drought.
- 4. Resilient landscapes Healthy landscapes with natural resources able to sustain industry and environmental services.
- Resilient regional economy a diverse, forward looking, adaptable business sector, not wholly dependent on seasonal conditions.

Key Evaluation Questions

The Key Evaluation Questions to support monitoring and evaluation of the impact of the Southern Wheatbelt Regional Drought Resilience Plan (the Plan) are:

KEQ1: To what extent has the Plan been implemented and has impacted on the regional stakeholders' capacity and resources to better plan, manage and recover from climate challenges?

A series of sub-KEQs are posed, aligned to each theme:

KEQ1a: To what extent has the Plan contributed to regional stakeholders planning and developing drought resilience water supplies across the region?

KEQ1ab: To what extent has the plan contributed to improving regional stakeholders confidence in coping with successive dry seasons?

KEQ1c: To what extent has the plan influenced agriculture sector stakeholders in developing farming systems better able to cope with drought or dry periods?

KEQ1d: To what extent has the plan influenced regional stakeholders capacity to manage natural resources?

KEQ1e: To what extent has the plan supported diversification of the business sector and has this reduced reliance on seasonal conditions to ensure viability?

KEQ2: What changes or support might be necessary to ensure that the Plan provides an effective framework for action where stakeholders can effectively work together to implementing those actions?

Assumptions underpinning the implementation of the Plan

The FDF MEL plan identified the following assumptions for the plan to be effectively implemented:

Key assumptions affecting outputs to 1–4 year outcomes

- Regional stakeholders have the capacity and capability to participate in strategic planning;
- Regional stakeholders are willing to cooperate with each other on regional planning;
- Program design is sufficient to give regional stakeholders opportunities to identify and communicate regional drought resilience needs;
- Relevant planning at other scales can be aligned;
- Regional communities are motivated to take ownership of completed plans and actively seek to implement them;
- Communities are willing to share learnings with other regions;
- There are sufficient learnings to inform future program design.

Key assumptions affecting outcomes from 4+ to 10+ years

- Supporting consortia of local governments/ stakeholders representing a region will result in changes in practice through those regions;
- There are sufficient opportunities for regions to implement elements of plans;
- Plans contain implementable activities to build drought resilience across Australia;
- Regions continue to review, update and implement their plans.

These assumptions will need to be monitored during the implementation phase to provide feedback and highlight areas that require further intervention.



Monitoring progress and evaluating outcomes

The following table outlines the KEQs, and approach to monitoring and evaluation. Alignment with the relevant <u>FDF MEL framework</u> high level indicator is provided. Horizons for each outcome are indicated, and include immediate (1-4 years), medium (4+ years) and longer term (10+ years).

FDF MEL high level indicators	Key evaluation question	Outcome
Social resilience for resourceful and adaptable communities – all indicators Economic resilience for an innovative and profitable agricultural sector – all indicators Environmental resilience for sustainable and improved functioning of agricultural landscapes – all indicators	KEQ1: To what extent have the action in the Plans been implemented and how have those actions impacted on the regional stakeholders' capacity and resources to better plan, manage and recover from climate challenges?	The actions identified in the Plan are prioritised, funded and contribute to increasing the ability of industry and communities to plan, manage and recover from climate challenges.
 Economic resilience for an innovative and profitable agricultural sector Farm business drought risk R&D investment and impact Environmental resilience for sustainable and improved functioning of agricultural landscapes Ecosystems services NRM practices and farming practices 	KEQ1a: To what extent has the Plan contributed to regional stakeholders planning and developing drought resilience water supplies across the region?	The Southern Wheatbelt's water system can sustain industry, agriculture and the community for two consecutive low rainfall years.
 Social resilience for resourceful and adaptable communities Socio-economic status Population change, migration Australian natural disaster resilience index Personal wellbeing Social capital Community and human capital and partnerships 	KEQ1ab: To what extent has the plan contributed to improving the confidence of community members in coping with successive dry seasons?	Southern Wheatbelt communities are better equipped, emotionally, mentally, physically and financially, to cope with successive dry seasons.

	Indicator	How monitored and measured	Who and how often	Outcome horizon
	Number of projects or initiatives that have been implemented that are aligned to the actions outlined in the Plan.	Active or passive scan/check of relevant activities and initiatives happening the region against the actions in the Plan	WDC, 6 monthly, or as required	1-4 years
		Regular interaction with other FDF programs and key stakeholders	(when new data becomes available)	
		Running the Drought Vulnerability Assessment MCAS when datasets are updated		
-	Number of actions taken against the water resilience theme	Active or passive scan/check of relevant activities and initiatives happening in the region against the actions in the water theme	WDC, 6 monthly	1-4 years
		Regular engagement with key stakeholders including LGAs, DWER, WC, DPIRD WaterSmart Farms program		
	Increase in non-potable water supply volumes	Information on water supply volumes reported by LGAs and collated in central database	WDC/LGAs, annually	4+ years
		Build on water supply analysis Collection		
	Number of water deficiency declarations (in comparison to similar rainfall experienced in WDD years)	Active monitoring in low rainfall years	LGA/DWER	4+ years
	Number of actions taken against the resilient communities theme	Active or passive scan/check of relevant activities and initiatives happening in the region against the actions in the communities theme	WDC/PAG	1-4 years
-		Regular engagement with key stakeholders including LGAs, Health providers, financial institutions, Rural Financial Counsellors, Non for profit groups and Volunteer organisations in those communities		
	Community perceptions on community capacity to understand, plan and manage for drought	Qualitative survey of community leaders and "drought responders" such as DPIRD and NGOs post dry seasons	WDC/PAG	Post dry seasons
	Communities improve in terms of socio-economic outcomes	ABS Population statistics, volunteerism, SEIFA index, Future Wellbeing index	WDC	10+ years

FDF MEL high level indicators	Key evaluation question	Outcome
 Economic resilience for an innovative and profitable agricultural sector Rural economies Sector performance Farm financial diversification Farm business drought risk Total factor productivity R&D investment and impact 	KEQ1c: To what extent has the plan influenced agriculture sector stakeholders in developing farming systems better able to cope with drought or dry periods?	Southern Wheatbelt agriculture sector stakeholders are highly engaged in innovating farming systems to be resilient to drought.
 Environmental resilience for sustainable and improved functioning of agricultural landscapes Ecosystems services Environmental stewardship uptake Carbon farming uptake Groundcover Soil health NRM practices and farming practices 	KEQ1d: To what extent has the plan influenced regional stakeholders capacity to manage natural resources?	The landscapes of the southern Wheatbelt region are in good condition, with programs in place that support the long term sustainability of natural resources in the region.
 Economic resilience for an innovative and profitable agricultural sector Rural economies Social resilience for resourceful and adaptable communities Socio-econmoic status Financial capital economic diversity index community capital services and infrastructure 	KEQ1e: To what extent has the plan supported diversification of the business sector and has this reduced reliance on seasonal conditions to ensure viability?	The Southern Wheatbelt economy is diverse, its business and community leaders have a forward looking mindset, with an economy that is not wholly dependent on seasonal conditions.
 Social resilience for resourceful and adaptable communities Social capital Community and human capital and partnerships 	KEQ2: What changes/support are/is needed to ensure that the Plan best provides an effective framework for action and stakeholders can effectively work together towards implementing those actions?	Regional stakeholders have capacity to come together and Plan to manage, respond and recover to future climate challenges.

Indicator	How monitored and measured	Who and how often	Outcome horizon
Number of actions taken against the resilient agriculture systems theme	Active or passive scan/check of relevant activities and initiatives happening in the region against the actions in the agriculture systems theme	WDC	1-4 years
	Regular engagement with key stakeholders including Grower Group Alliance, DPIRD Primary Industries Development, Wheatbelt NRM		
Farming systems developed that are appropriate to the region and are deemed to support long term resilience to drought	Engagement with agriculture stakeholders including DPIRD, GGA, and innovative farmers in the region	DPIRD	4+ years
Land continues to be used productively in the region	REMPLAN economic information	WDC/DPIRD	10+ years
Number of actions taken against the resilient landscapes theme	Active or passive scan/check of relevant activities and initiatives happening in the region against the actions in the resilient landscapes theme	WDC	1-4 years
	Regular engagement with key stakeholders including DPIRD Sustainability and Biosecurity, DPIRD Primary Industries Development, Wheatbelt NRM, landcare groups and GGA		
Improvement in the condition of natural resources (soil health, salinity, acidity, water, vegetation) has improved compared to existing benchmarks	State of the environment reporting	DPIRD, WNRM, DWER	10+ years
Number of actions taken against the resilient regional economy theme	Active or passive scan/check of relevant activities and initiatives happening in the region against the actions in the resilient regional economy theme	WDC	
	Regular engagement with key stakeholders including LGAs, Wheatbelt Business Network, CCIs, DPIRD		
Extent of economic diversification in the region	REMPLAN economic statistics (Output, GRP, # businesses by sector)	WDC	10+ years
Regional stakeholders are actively engaged in and	Number of regional consortia engagements related to the Plan.	WDC/PAG	1-4 years
the Plan's governance to ensure effective implementation of actions within the Plan.	Review of the regional consortia group governance and effectiveness.		
Regional stakeholders are aware of the program, with	Survey of regional stakeholders to ascertain awareness of the Plan and actions.		
results shared publicly, through targeted extension and communication programs.	Ongoing reporting that identifies potential for improvements to governance or implementation activities.		

65

MEL Reporting

The primary audience for KEQs includes:

- Wheatbelt Development Commission Board
- Department of Primary Industries and Regional Development
- Department of Agriculture, Forestry and Fisheries Future Drought Fund program
- Southern Wheatbelt Regional Consortia Local Governments.

Other audiences for tailored messaging include:

- Wheatbelt Natural Resource Management Inc
- other Wheatbelt Local Governments
- the WA Ministers for Agriculture and Food and Minister for Regional Development
- Grower Group Alliance
- The South West WA Drought Resilience and Adoption Hub.

Broader communications on RDRP success and learning will be shared publicly, with tailored communications for Wheatbelt based agribusiness and agriculture supply chain businesses.

It is proposed that reporting occurs 6 monthly initially as governance is established and implementation of actions commences. Regularly reporting enables a cycle of adaptive management to allow continuous improvement, align to other reporting and respond to stakeholder interests.

Early reporting on outputs and short to medium term outcomes assists in:

- · identifying intended or unintended changes;
- indicate whether the initiatives outcomes will be achieved;
- and inform adaptive management and corrective actions.

Ongoing reporting could include information on key learning, and actions introduced to improve initiative design and delivery.

Reporting will include written reports and updated Drought Vulnerability maps developed through analysis of economic, social and environmental datasets, with the 2022 Drought Vulnerability Assessment and the Drought Vulnerability Index serving as baselines of Drought Vulnerability.

The frequency of reporting and measuring against this baseline depends on the quality, availability and frequency of collection of the data required for analysis; and the availability of relevant expertise within DPIRD to run the multi criteria analysis tool.

MEL management

Roles and resourcing

The Wheatbelt Development Commission will be the owner of the MEL Framework. Funds allocated to the WDC for the Regional Drought Resilience Planning program will be utilised to support monitoring and evaluation activities. The WDC will oversee the planning, coordinating and conducting of monitoring, evaluation, learning and reporting for the framework.

The WDC will review the MEL Framework annually to ensure its direction and scope remains relevant to the priorities of the Plan.

Risk management

Risks relating to the plan will be managed by the WDC, with oversight held with the WDC CEO. Key risks identified and mitigation are as follows:

Risk	Mitigation
Data to be used in MEL is not available, does not exist or available when required	Indicators selected to be measurable using existing, durable data sources. Where data is not available, adjustments of measured indicators may be required
Expertise not available within DPIRD to support annual multi criteria analysis and development of updated Drought Vulnerability maps.	Engage early with DPIRD to flag request for multi criteria analysis. Failing this, ensure methodology if available, including relevant datasets used to enable outsourcing to relevant external expert
WDC unable to resource MEL	Internal staff allocated time in workmaps to undertake MEL activities. WDC has FDF project funding set aside for external evaluation services if required
False or inappropriate assumptions lead to an incorrect understanding of the Plan's impact	The framework acknowledges changes in drought resilience will not be solely attributable to delivered actions outlined in the Plan. The KEQs are designed to understand the impact of the plan on a range of stakeholders behaviour as it relates to decisions and action that contribute to building drought resilience.

13. Project Contact

To provide feedback or to obtain further information, contact the Wheatbelt Development Commission at info@wheatbelt.wa.gov.au

14. Appendix 1: Inland Great Southern Policy, Strategy and Plan Alignment

POLICY/STRATEGY	ALIGNMENT
Australian Government Future Drought Fund	The program will support the long-term outcomes of the Drought Resilience Funding Plan 2020 to 2024, specifically:
	 Creating stronger connectedness and greater social capital within communities, contributing to wellbeing and security,
	 Empowering communities to implement transformative activities that improve their resilience to drought, and;
	 Supporting more primary producers to adopt whole-of-system approaches to Natural Resource Management to improve the natural resource base, for long term productivity and landscape health.
	This plan is key to delivering on the FDF's three strategic priorities which include:
	• Economic resilience for an innovative and profitable agricultural sector.
	 Environmental resilience for sustainable and improved functioning of agricultural landscapes.
	Social resilience for resourceful and adaptable communities.
WA Government: Diversity WA - A framework to support the WA Government's Our Priorities July 2019	Diversify WA is a blueprint for collaboration between government, industry and the community, to supports the WA Government's focus on creating secure, quality jobs, growing and diversifying the economy and attracting investment. Primary Industries is one of six priority sectors in which Western Australia has a competitive advantage significant growth and diversification opportunity.
Department of Water, Strategic priority - Water for Growth 2016 plan	Moving to water sources for a drier climate - this project delivers new information to support the development of climate-resilient water resource support.
Department of Primary Industries and Regional Development, <i>Strategic</i> Intent 2018-2021	Sustainability - this project ensures future generations of agribusinesses will have continued access to support social and economic growth. Research, Development and Innovation - this project will enable the creation
	of new knowledge and build capacity within WA on alternative resources that incorporate innovative and emerging technology.
	Regional Opportunities - this project will help drive the economic growth, local capability and social amenity of regional communities. Regional growth opportunities will benefit from investment in priority resources to provide drought securities.
DPIRD - Primary Industries Plan 2020–2024	Supports DPIRD vision of a more sophisticated, diverse and globally competitive sector. Growth and expansion into targeted markets remain at the heart of the Plan which complements the State's economic blueprint, Diversify WA.
Water Corporation, Water Forever, Towards Climate Resilience 50 year plan, 2009	Develop new water sources - Water Corporation have acknowledged that reducing water use and increasing water recycling will not be enough to counteract projected reductions in rainfall. As such, it is necessary that new water sources be developed to ensure that there is sufficient supply to meet water demand over the next 50 years. Increasing desalination to support population growth to optimise water use are part of WC strategic vision.
Western Australian Climate Policy - November 2020	The WA Climate Policy outlines the state government's commitment to climate change adaptation and achieving net zero greenhouse gas emissions by 2050. Several climate resilience initiatives are identified as part of this policy, including the Climate Resilience Action Plan 2022-25, Climate Science Initiative, Climate Risk Framework and Pilot Sectoral Adaptation Plans.
	The Climate Science Initiative is aimed at understanding how future global emissions will affect WA's climate. As part of this initiative, climate projections will be provided along with communications material that support agribusinesses and government with interpreting the projections.

POLICY/STRATEGY	ALIGNMENT
Regional Investment Blueprint - 2015	Developed by each of the nine Regional Development Commissions, the Blueprints are plans for investment, outlining transformative strategies, priority actions and investment opportunities. They are plans for growth. Each Blueprint has five key pillars to grow the region.
	The Regional Investment Blueprint 2015 for the Wheatbelt outlines a range of strategies to achieve an ambitious target of doubling its population by 2050, including key economic insights and evidence-based guidance to support regional investment and decision making.
	This blueprint highlights key economic opportunities for the Wheatbelt south economy as agriculture, livestock and food supply chains and describes the region has having 'comparative climate resilience.' The Wheatbelt looks to a Vibrant Economy for investment in innovative end of grid water solutions is a priority action for the and Valued Natural Amenity to contribute to the protection of the economic and social value of the Wheatbelt's natural amenity.
Wheatbelt Development Commission Strategic Plan	The Wheatbelt Development Commission's Strategic Plan 2020-2023, identifies the following strategic priorities that are relevant to drought resilience:
2020-2023	 Enabling infrastructure - Goal 1: Advocate for alternative water and energy solutions suitable for the Wheatbelt; Goal 2: Improve digital connectivity across the region;
	 Diversify the economic base - Goal 1: Support economic diversification opportunities; Goal 2: Support economic diversification opportunities, facilitate regional collaboration, skills building and shared learning;
	 Sustainable landscapes and communities - Goal 1: Facilitate environmental entrepreneurship, build environmental social and economic resilience, facilitate new industry opportunities; and
	• Entrepreneurships and innovation: Goal 1: Facilitate future focused economic opportunities to support local entrepreneurs, business leaders and key industries to collaborate and harness innovation13.
Wheatbelt South Sub- Regional Economic Strategy 2014	The Wheatbelt South Sub-Regional Economic Strategy 2014 provides an overall strategy for the region's economic development, informing sub-regional and regional land use and strategic planning activities. It identifies the Wheatbelt South as being a diverse economic region with potential growth opportunities in Agriculture, Livestock and Supply Chains, Health and Education, Lifestyle Amenity and Retirement, and Tourism.
Entrepreneurial Innovation in the Wheatbelt (2016) – Regional Development Australia Wheatbelt	In its report Entrepreneurial Innovation in the Wheatbelt (2016), Regional Development Australia Wheatbelt (RDAW) explores the barriers preventing innovation and entrepreneurial growth in the Wheatbelt. The report identifies innovation and entrepreneurialism as key community strengths in the Wheatbelt (with Narrogin and Wandering categorised in the second tier of innovation), this report identifies eastern and southern areas of the Wheatbelt are disadvantaged from an innovation perspective.
Wheatbelt Natural Resource Management three year plan 2021-2024	WNRM's three-year plan for 2021-2024 outlines its priorities (relevant to this report) as soil acidity issues, prevention of further salinity, and land use planning support.
Regional Planning and Infrastructure Framework	Identifies each region's vision and provide an important foundation for future decision making, outlining key planning initiatives for each region.
LGA Community Strategic Community plans	Includes economic growth and diversification and community sustainability, quality long term water supply, water security, and water holding infrastructure and harvesting.

15. Appendix 2: Transformative Option review

A high level review of potentially transformative options developed as part of a global review of drought resilience innovation. Completed by AgDots in 2022.

Water Resilience	Digital Resilience	Farm Business Resilience	Farming Systems Resilience
 Water Supply and Risk Assessments (Regional Water Security and Investment Plans) Conduct water source investigations for all new water sources Support and expand desalination pilots in communities and on-farm Support development of on farm planning tools to accelerate water resource planning at local scale (eg. Farm Cat project acceleration) Incentivise on farm water infrastructure investment 	 Improve connectivity through co- investment in digital infrastructure (includes backhaul + wireless networks to farms) Build tech skill and support in ag (connectivity literacy, data management capability, farm tech capability of industry) Regional tech support built withing regions (CRC flying squads) and develop long term plan to build tech capacity in regions 	 Build capability for useage of on-farm data for insurance index products Support grower education and training for risk management tools to support financial risk management Advocate FMD maximum cap to be relative to the size of the business Evaluate impact of drought support programs on farm businesses to inform future strategies 	 Support R&D and industry development for alternative drought tolerant crops (legume, GM + long coleoptile wheat, alternative oil seed crop, bushfoods + cultivate endemic species) Support R&D and industry development for livestock feeding options (carbon positive feed supply eg asparagopis) Support R&D and adoption in low input cropping options (VRT, alternative fuels, electric vehicles, regen farming) Support R&D and industry development for building soil health (greater depth soil amelioration, hostile soil management, biochar) Support R&D and catchment management initiatives and build soil and water systems health (eg landscape ecology and rehydration)

Presented as an overarching framework to suggest no hierarchy in research options, and the areas of transformation are linked and impact each other

Natural Capital Resilience	Community Resilience	Regional Economy Resilience	
 Natural Capital Resilience Community Resilience Regional Economy Resilience Support national natural capital framework development in WA Ag to enable natural capital on balance sheets Evaluate and expand biodiversity stewardship program and trials in WA Pilot participation in national biodiversity trading platform Improve carbon and climate literacy and understanding of the carbon market Support projects to test market to develop smaller more integrated projects (pollination, soil conditions, biodiversity) + create a model to provide co-benefits and support local communities and businesses 	 Build workforce capability through workforce planning, digital activation, recruit and train young people for high demand industries, active employer engagement + provide childcare Build housing supply through innovation – encourage start up activity, support communities to build housing companies NFP's, provide incentives for building or renovating in rural communities (loans, grants or services), and create a seasonal accommodation matching platform Support well being measures that build resilience including network strengthening activities and programs that increase physical well being and support positive health outcomes 	 Support Tourism planning processes (destination management plans) and invest in regional and local tourism projects Support higher level of integration and planning for major mining resource projects and develop community structures to capture benefit from investment Develop more intensive farming opportunities eg. horticulture through water security assessments and identification of land/water/workforce/infrastructure packages for investors Create a revolving loan fund to encourage regional entrepreneurship and innovation and support innovation/resilience training for regional businesses eg. WBN program for regional resilience 	
Presented as an overarching framework to suggest no hierarchy in research options, and the areas of			

Presented as an overarching framework to suggest no hierarchy in research options, and the areas o transformation are linked and impact each other

16. Appendix 3: Supporting Technical Reports

Technical Report	Reference
Socio-economic and literature review (Anna Dixon Consulting)	Anna Dixon Consulting, 2022. <i>Regional Drought Vulnerability</i> <i>Assessment: Background Research and Analysis</i> . Prepared for Department of Primary Industries and Regional Development
Drought Indices (CSIRO)	Gladish, D. and Hochman, Z., 2022, <i>Investigating the Application of Drought Indices to Western Australia</i> , Commonwealth Scientific and Industrial Research Organisation
Defining Drought in WA (Curtin University)	Mastrantonis, S. 2022, <i>Defining drought in Western Australia,</i> <i>Centre for Crop and Disease Management</i> , Curtin University, Bentley, WA.
Drought Risk Assessment (DPIRD)	Bruce, J., Bourne, A., Guthrie, M., Veljanoski, I., Koh, L. and Parker, K., 2022. <i>Drought Priority Areas Map for Southwest Western Australia</i> , Department of Primary Industries and Regional Development
Economic and Environmental Impacts of Drought (LA One Economics and Consulting)	Anderton, L., 2022. <i>Investigating the environmental impacts of drought in regional Western Australia</i> , LA One Consulting, Prepared for Department of Primary Industries and Regional Development Anderton, L., 2022. <i>The Economic Impacts of Drought, Regional Drought Resilience Planning</i> , LA One Consulting, Prepared for Department of Primary Industries and Regional Development
Social Impacts of Drought (UWA)	Lester, L., Flateau, P., and Kyron, M., 2022, <i>Understanding the Social Impacts of Drought, Centre for Social Impact Report</i> , UWA, Perth, WA.
Transformative Review (AgDots)	Agdots, 2022. <i>Regional Drought Resilience Planning Program Global Literature Review, Key Drivers Report</i> , Prepared for Department of Primary Industries and Regional Developmen
Regional Water Issues and Policy Analysis Wheatbelt and Great Southern (Aurora)	Clifton, P. and Price, M., 2022. <i>Regional Drought Resilience Planning</i> – <i>Regional Water Issues and Policy Analysis – not-potable water –</i> <i>Southern Wheatbelt and Great Southern, Western Australia</i> , Aurora Environmental, Albany, WA
Water Supply and Demand Assessment (Murdoch University)	Husbands, B. and Ruprecht, J., 2022. <i>Water Supply Demand</i> and Supply Assessment for 13 Shires for the Regional Drought Resilience Planning Program, Harry Butler Institute, Murdoch University, Murdoch, WA
Valuing Noongar People and Practices in Drought Resilience (Noongar Landcare Enterprises	Noongar Land Enterprise Group, 2022, <i>Valuing Noongar People and</i> <i>Practices in Drought Resilience</i> , Perth, WA
WA Regional Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area	Wheatbelt NRM Inc, 2022, WA Drought Resilience Planning Grass Roots Community Consultation, Southern Wheatbelt Pilot Area
WA Regional Drought Resilience Planning – Targeted Consultation with Aboriginal Communities on Drought in the Lower Wheatbelt	Wheatbelt NRM Inc, 2022, WA Drought Resilience Planning – Targeted Consultation with Aboriginal Communities on Drought in the Lower Wheatbelt


Collgar Wind Farm, Merredin - Tourism Western Australia

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Wheatbelt Development Commission 75 York Road PO Box 250 Northam WA 6401 (08) 9622 7222 info@wheatbelt.wa.gov.au

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wheatbelt.wa.gov.au