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Regional Development

Inland Great Southern Drought Resilience Plan

Great Southern
Development Commission



2023

 **GREAT SOUTHERN**
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TABLE OF CONTENTS

Acknowledgement of Country	4	08 Opportunities Moving Forward	50
Acknowledgements	5	Theme 1: Resilient Water	51
Disclaimer	5	Theme 2: Resilient Communities	52
Foreword	6	Theme 3: Resilient Agriculture	52
Executive Summary	7	Theme 4: Resilient Landscapes	53
		Theme 5: Resilient Regional Economy	53
01 Introduction	8	09 The Plan	54
02 Vision, Goals and Outcomes	12	9.1 Resilient Water	55
2.1 Developing Our Vision	13	9.2 Resilient Communities	57
2.2 Goals and Outcomes	14	9.3 Resilient Agriculture	59
2.3 Definitions	15	9.4 Resilient Landscapes	61
		9.5 Resilient Regional Economy	63
03 Stakeholder Engagement and Partnerships	16	10 Plan Implementation and Enduring Governance	64
04 The Evidence Base	20	11 Investment Framework	65
4.1 Drought Vulnerability Assessment	21	12 Monitoring and Evaluation	66
4.2 Technical Expertise	24	12.1 Context	66
4.3 Plan Alignment	25	12.2 Inland Great Southern Regional Drought Resilience Plan Monitoring and Evaluation Framework	67
		12.3 Reporting and Responsibility	67
05 The Inland Great Southern Region - System Description	26	13 Appendix 1: Inland Great Southern Policy, Strategy and Plan Alignment	70
06 An Assessment of the Inland Great Southern's Resilience	30		
6.1 Mapping Drought Vulnerability	31		
6.2 Drought Vulnerability Index	37		
6.3 Impacts of Drought on the inland Great Southern	40		
07 Building on Existing Resilience	44		
Theme 1: Resilient Water	46		
Theme 2: Resilient Communities	47		
Theme 3: Resilient Agriculture	47		
Theme 4: Resilient Landscapes	48		
Theme 5: Resilient Regional Economy	48		

Acknowledgement of Country

We acknowledge the Noongar people, the traditional custodians in the Great Southern, and their continuing connection to the region's land, waters and community.

We pay our respects to all members of Noongar communities, and to elders past, present and emerging.



Indigenous filmmaker Karla Hart (centre) and elders Averil Dean and Annette Eades lead Noongar dancers during the CinefestOZ Albany event Kinjarling Koort.

Welcome to the Inland Great Southern Drought Resilience Plan (DRP). 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 Inland Great Southern DRP is a locally led project that champions drought resilience and preparedness for dry seasons in the region. It has been developed in collaboration with the Shires of Jerramungup, Kent, Gnowangerup, Katanning, Kojonup, Cranbrook, Woodanilling and Broomehill-Tambellup.

Acknowledgements

We would like to thank the nearly 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 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 Wheatbelt, Mid-West and Great Southern Development Commissions
- South-West WA Drought Resilience Adoption and Innovation Hub
- Shires of Kojonup, Jerramungup, Gnowangerup, Katanning, Kent, Cranbrook, Woodanilling and Broomehill-Tambellup
- Southcoast Natural Resource Management
- State Agencies
- Grower Groups
- Local community groups and business networks
- Indigenous groups
- Research organisations
- Consultants/technical experts

Disclaimer

This document has been prepared using best available information and expert analyses to provide an evidence base for the Inland Great Southern DRP. All information is provided to the best of our ability, and within the limits of our knowledge and resources. It is anticipated that elements of this inaugural Drought Resilience Plan will require review and updating, as new information and research become 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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Photos: Great Southern Development Commission, Marion Leonhardt, Shire of Gnowangerup.



Foreword

The Great Southern region of Western Australia is well known for its unique environment, strong communities, and farmland. Agriculture is a significant segment of our economy, with both livestock and a diverse variety of cropping featuring across the region.

The impacts of extended dry seasons and drought stretch far beyond the agricultural sector, bringing uncertainty and strain to our local communities and the broader economy. However, there are opportunities for diversification of our regional economy to reduce the dependence upon agriculture, and increase value-adding options and new industries across the Great Southern region.

For this reason that the Great Southern is heavily invested in better understanding climate variability and dry seasons in our local region, and how we can support our regional economy. This will allow us to strengthen our preparedness for future dry season events to better withstand the risks of drought and an increasingly changing climate.

The Great Southern is fortunate to participate in the pilot of the Regional Drought Resilience Planning process which draws on understanding local impacts and opportunities, while also creating pathways to share and learn from other regions.

This three-stage process brings together a Drought Vulnerability Assessment, Regional Drought Resilience Plan and Investment Framework specific for our region. The combination of both technical and scientific evaluation, along with extensive local insights, provide a comprehensive picture of the impacts of climate variability and practical future actions to encourage investment in long term risk mitigation and resilience activities.

This community-led plan will ultimately place the Great Southern in a position to adapt, recognise opportunities, and implement mitigation activities with the benefit of both local knowledge and learnings from further afield.

I would 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 inland Great Southern.

We are fortunate to live and work in such a beautiful part of the world, with a strong sense of community. Our Drought Resilience Plan is yet another tool that will help to support our communities to thrive.



Natasha Monks
Chief Executive Officer



Executive Summary

The inland Great Southern is one of three regions developing Regional Drought Resilience Plans (RDRPs) in Western Australia. The Great Southern Development Commission (GSDC) partnered with the Department of Primary Industries and Regional Development (DPIRD) to support the delivery of the plan across the Shires of Jerramungup, Kent, Gnowangerup, Katanning, Kojonup, Cranbrook, Woodanilling and Broomehill-Tambellup.

Collaborative stakeholder consultation facilitated the contribution of over 330 people, from 150 organisations. The Drought Vulnerability Assessment (DVA) informs the Inland Great Southern DRP and should be read in conjunction with the plan.

The intensity and duration of hot spells is projected to increase across WA, with wet years likely to become less frequent, and dry years likely to become more common. Analyses of rainfall and temperature data highlight a potentially concerning trend, with the composite hazard of hot drought beginning to occur in recent years.¹ Appropriate steps must be taken to anticipate and mitigate the potentially devastating effects of hot droughts and a changing climate.

The region has demonstrated good capacity to adapt to drying seasons and is in a strong position of resilience due to consistent rainfall and increased technology. However, there is a continual need to adapt, innovate and potentially transform to enable this success to be maintained or built upon.

The Inland Great Southern DRP identified five key drought resilience themes, with a number of interventions and specific actions identified.

These key themes include:



Inland Great Southern stakeholders identified gaps in past dry season responses that could be addressed through future resilience building activities. Opportunities to enhance resilience include:

- well-informed farm business planning
- earlier identification of dry season impacts
- interventions to support community groups and local government
- continued investment for research and development into farming practices to maximise preparedness for reduced rainfall in the growing season

The Inland Great Southern DRP has strong alignment with the Great Southern Development Commission's strategic priorities of a Strong and Diverse Economy, Regional Livability and Strong Communities. The Plan also aligns with the Strategic Community Plans of the Shires of Broomehill-Tambellup, Cranbrook, Gnowangerup, Jerramungup, Katanning, Kent, Kojonup and Woodanilling.

This Plan is intended to be a living document, guiding state, federal and local government, community, and industry action on drought resilience. Implementation of the plan is subject to further discussion 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.

¹ Mastrantonis, S. (2022). Defining Drought in Western Australia. Centre for Crop and Disease management, School of Molecular and Life Science, Curtin University, Bentley, WA.

01 Introduction

Inland Great Southern Drought Resilience Vision

To build a resilient region that can withstand the impacts of dry seasons and climate variability by creating a sustainable environment, self-reliant communities, and a diverse regional economy.



Lake Ewlyamartup

Australia is a country with a history of drought. In the Great Southern region, there has been a recurring theme of drier seasons over the last decade, 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.

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 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 project allocated funds to DPIRD and the Wheatbelt, Great Southern, and Mid West Development Commissions to support the development of Regional Drought Resilience Plans for three sub-regions across Western Australia

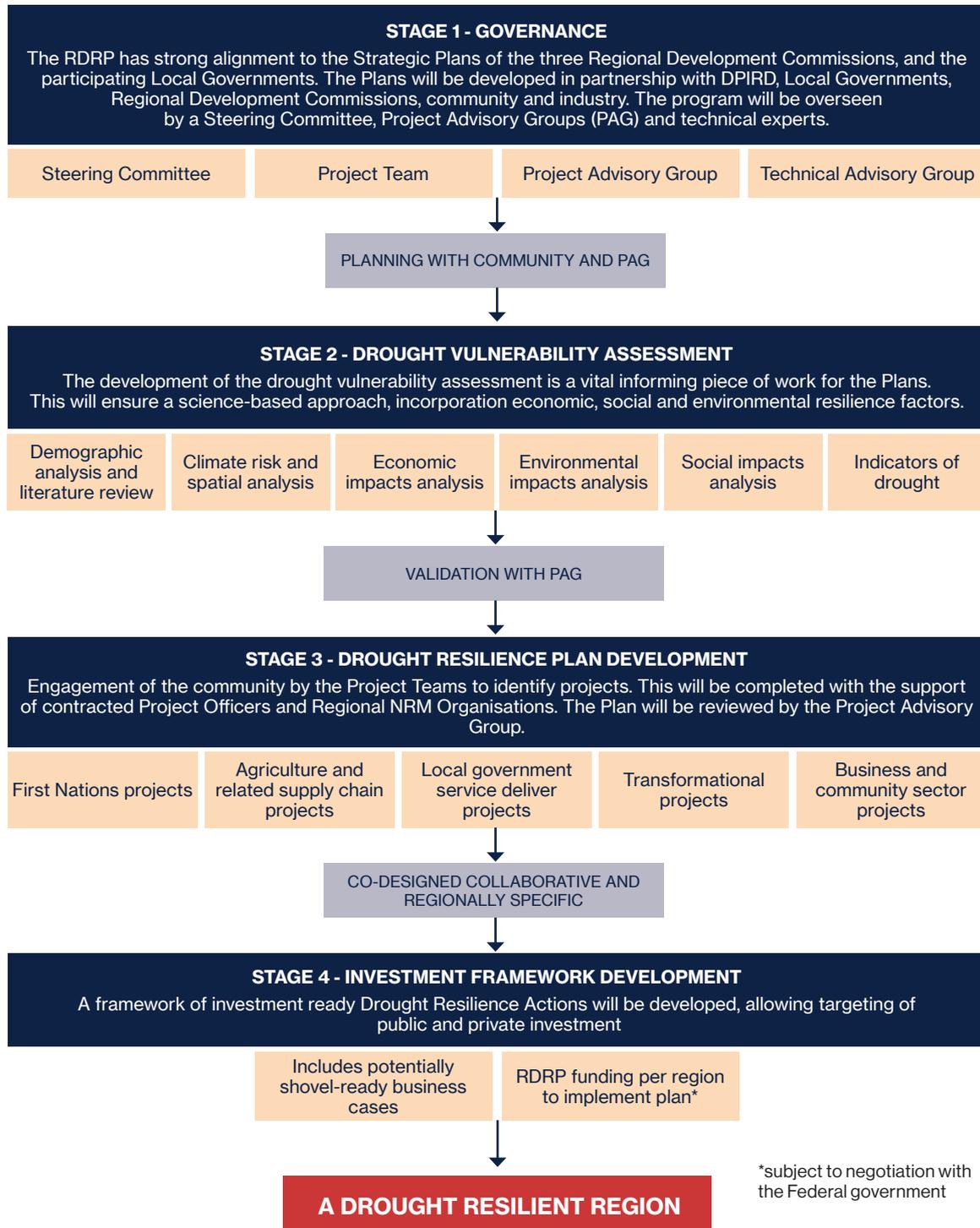


Figure 2: Regional Drought Resilience Program Framework



Jake Wilton Photo

02 Vision, Goals and Outcomes



2.1 Developing Our Vision

The purpose of the Inland Great Southern DRP is to identify actions to prepare for increased climate variability, reduced growing season rainfall, and an increased number of drought events. This plan will inform future investments and assist in securing future funding for communities, the agricultural sector and regional businesses to help increase drought resilience in our region.

Our drought resilience vision for the inland Great Southern 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 for 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.

Our vision has been guided and informed by widespread stakeholder input which points to a self-reliant agricultural community, capable of withstanding the challenges of dry seasons through shared responsibility and an integrated approach to drought management and preparedness. As such, our resilience vision for the region is *'to build a resilient region that can withstand the impacts of dry seasons and climate variability, by creating a sustainable environment, self-reliant communities, and a diverse regional economy.'*



“ Our Noongar youth artistically represented Country with trees and landscapes, highlighted the importance of trees to address global challenges.

(Report on Aboriginal Community Consultations, 2022)

”

Notably, the vision, priorities and outcomes of the Future Drought Fund have provided the background and context for the development of the inland Great Southern drought resilience vision.

2.2 Goals and Outcomes

Through discussions with regional stakeholders, five key themes emerged, each with its own long-term desired outcome. These provide the roadmap needed to achieve our overall drought resilience vision and are outlined in the following figure.

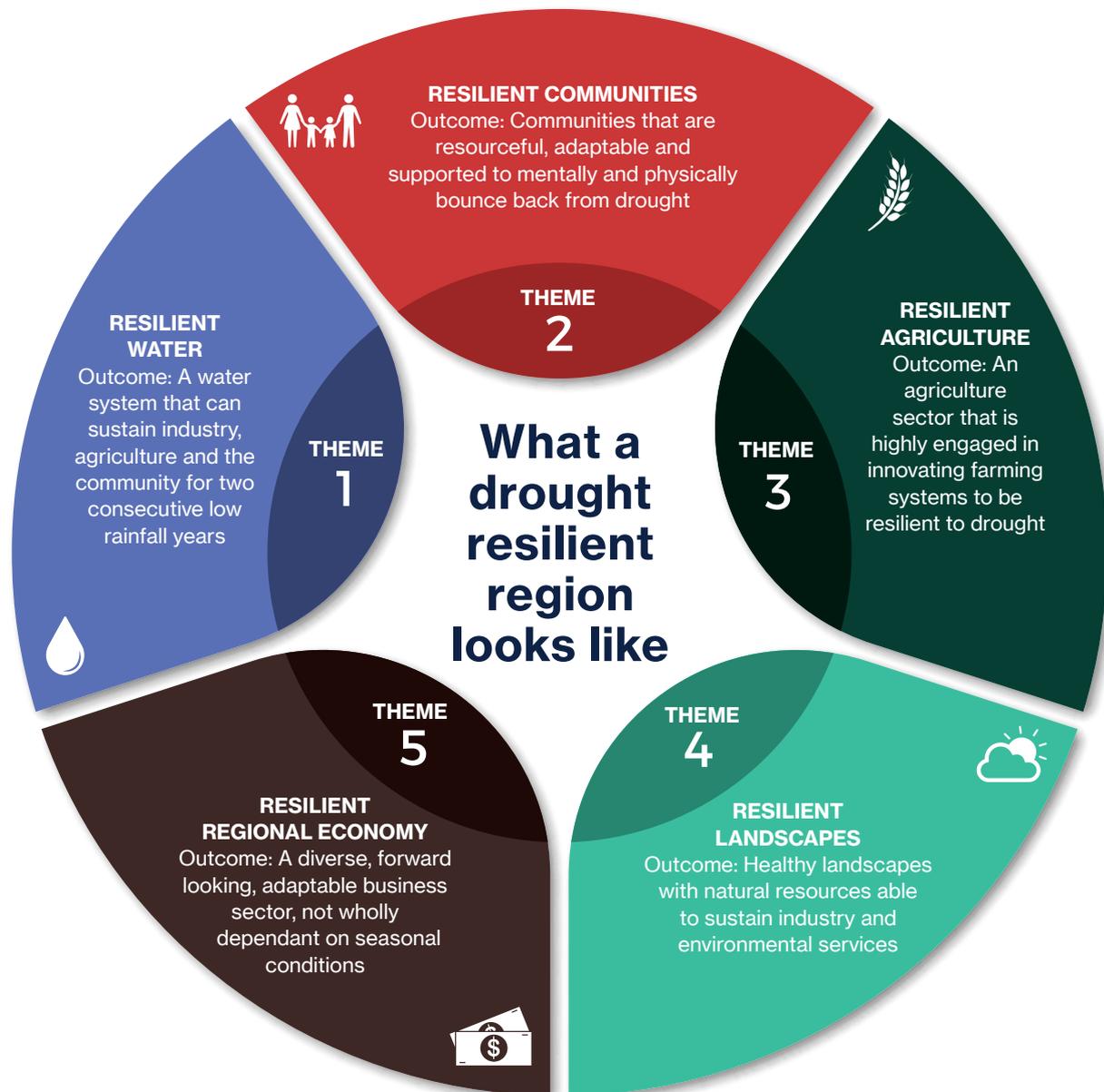


Figure 3: Inland Great Southern's drought resilient themes and desired outcomes

The specific priorities and actions associated with each of these themes and outcomes are provided in greater detail in The Plan section of this document. The interventions detailed 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 resonate with the objectives of the Drought Resilience Funding Plan.

Stakeholder themes and future drought fund alignment



Figure 4: Inland Great Southern drought resilient themes

2.3 Definitions

The need for a regionally appropriate definition of “drought” was raised several times during stakeholder engagement for this Plan. Community groups defined drought as ‘consecutive dry seasons where there is inadequate growing season rainfall over two or more seasons.’ Indicators that they are in a drought were the lack of opening rains to commence their seeding operations, reduced growing season rainfall, less rainfall events that result in reduced run-off, and reduced spring rainfall. The Drought Vulnerability Assessment highlights the need for a more appropriate set of drought criteria for Western Australia.

The Technical Working Group further expanded the need for drought definitions to include social, environmental and economic impacts. The Technical Working Group (TWG) defined drought for the RDRP project as follows:²

“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”.

An assessment of meteorological definitions of drought indicated that a definition based on **growing season rainfall** (between April to October) is considered more appropriate for the inland Great Southern 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 use.³ Livestock also require water for runoff into dams, generally events greater than 25mm. In some years there is sufficient rainfall for cropping but not enough on-farm water for livestock. A more in-depth analysis of terms and definitions can be found in the Inland Great Southern Drought Vulnerability Assessment and supporting analysis undertaken by Curtin University.

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

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

03 Stakeholder Engagement and Partnerships



Pingrup silos - Shire of Kent

Through the regional stakeholder engagement process, project partners worked collaboratively to:

- demonstrate the State’s commitment to supporting farm businesses and communities to become more prepared for, and resilient to, the impacts of drought
- identify the appropriate target audiences in each region, share program benefits and promote the importance of becoming drought-resilient and drought-prepared
- engage local stakeholders in each region, undertaking communication activities that promote the importance of regional-scale planning, building commitment to the process and strengthening partnerships between relevant stakeholders
- maximise participation and engagement in regional planning processes

Strong partnerships were key in the successful delivery of the program. The following figure outlines the governance framework that supported the achievement of our engagement goals.

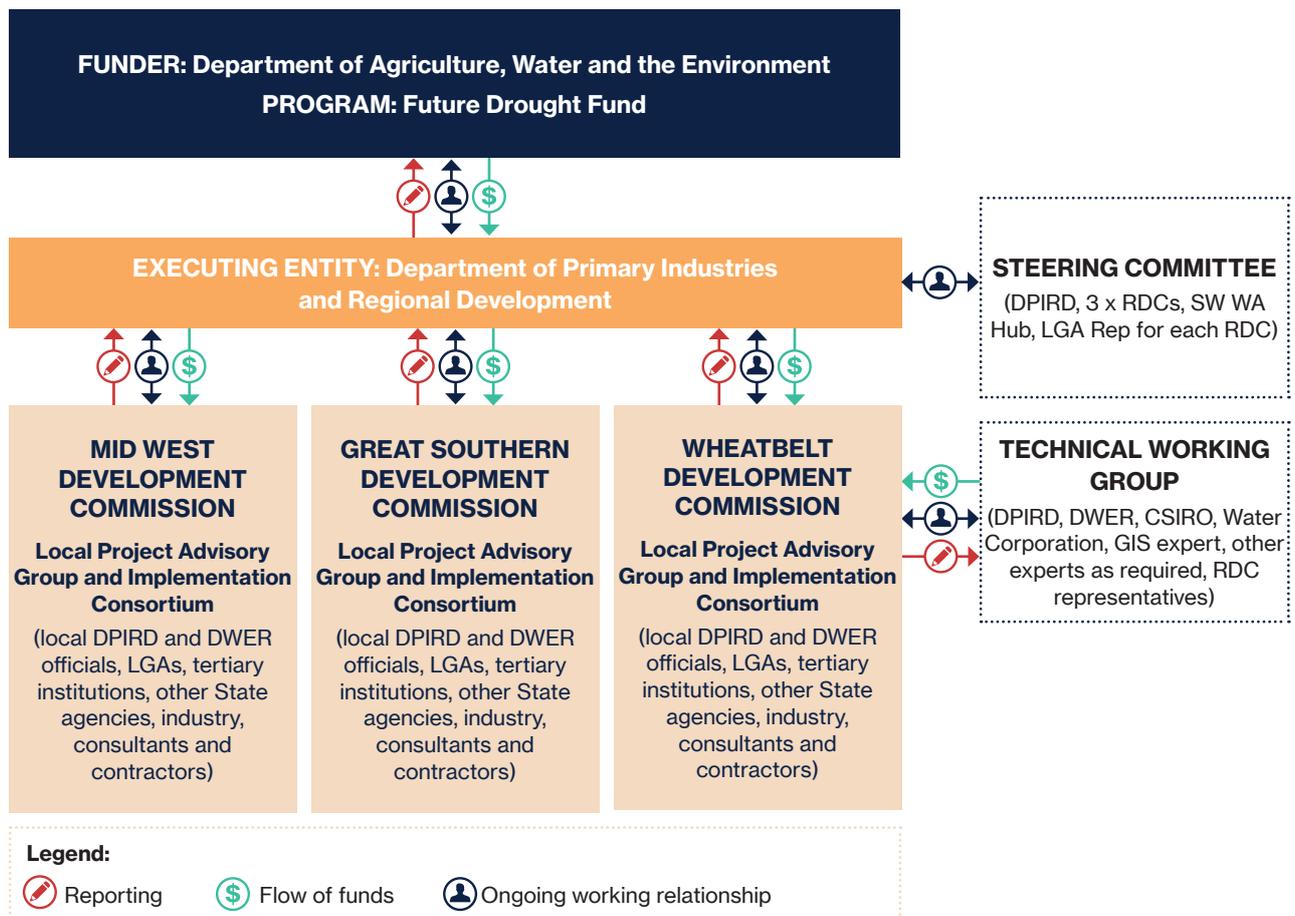


Figure 5: Governance framework for the WA Regional Drought Resilience Planning Program

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.

Engagement activities occurred between October 2021 and Dec 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 non-agricultural businesses
- Representatives of the Indigenous community
- Noongar Land Enterprise Group
- Growers groups
- Community organisations, leaders, and local champions
- Research organisations
- South Coast Natural Resource Management
- Local Government Areas (LGA)
- 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 and identifying drought resilience project ideas for inclusion in the Inland Great Southern DRP. A range of methods were used including in-person interviews, meetings, surveys (online and in person), phone interviews, online engagement and workshops.

In addition to this consultation work, a global review of drought innovation⁴ 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 “The Plan” section of this document.

Strong stakeholder engagement generated buy-in from the community and stimulated interest in the project, building and strengthening relationships across and within the region.

As part of our engagement, interventions were identified within each of our five emerging themes. Outlined in Table 1, interventions are grouped under each 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.

⁴ Middleton, S. (2022). AgDots. Regional Drought Resilience Planning Program Global Literature Review – Key Drivers Report. Prepared for Department of Primary Industries and Regional Development.

	MAINTAIN	MODIFY	TRANSFORM
Resilient Water	<p>Increase capacity of on-farm water supplies to meet increasing demands and a drying climate.</p> <p>Bolster scheme capacity in agricultural areas and regional towns at risk of a drying climate and increased demand (buffer tanks).</p> <p>Review risks of drought on regional intensive livestock, horticulture and viticulture industries, and support implementation of drought proof measures.</p>	<p>Prioritisation framework to guide investment in water infrastructure for agriculture and regional communities, based on increased demand and a drying climate.</p> <p>Install climate-independent water infrastructure using innovative technology in areas with no access to scheme water.</p>	<p>Extend scheme pipes further into regions of the Great Southern at risk of climate change.</p> <p>Water for industry growth: Identification of future business opportunities in regional areas with access to suitable water resources (i.e. Beaufort Paleo-channel).</p>
Resilient Communities	<p>“Green spaces” and community infrastructure to support community connection during drought events.</p> <p>Mental health first aid training for farm consultants and community leaders to support farmers and regional businesses pre, post and during drought events.</p> <p>Development of local leadership capacity to share drought resilient strategies.</p>	<p>Drought Plan for WA (interagency approach using framework of Emergency Management).</p> <p>Provision of drought officers to support LGAs, regional communities, businesses and the agriculture sector during and post drought events.</p>	<p>Drought Vulnerability Assessment – refined to monitor, track and predict impact of drought (benchmarking social, environment and economic criteria).</p>
Resilient Farms	<p>Farm Business Resilience and Small Business climate resilience planning workshops in the region.</p> <p>Collaborate to identify, prioritise, and implement research and development needs to increase drought resilience.</p> <p>Identify and integrate economic indicators into the DVA framework.</p>	<p>WA Drought Platform (including climate information, drought indicators, support services, drought resilience information).</p> <p>Increase uptake of innovative research to address drought resilience.</p> <p>Implement farm drought risk planning and implement into business planning to ensure preparedness.</p>	<p>Strengthen and expand WA Climate Policy programs to develop carbon farming and sequestration markets.</p> <p>Identify transformative agricultural enterprises that could operate in areas at high risk of drought.</p> <p>Continued research and trials of drought resilient crops and pastures.</p>
Resilient Landscapes	<p>Quantify the impacts of regenerative agriculture practices during and post drought.</p> <p>Diversification options explored and analysed to increase value for marginal agricultural land at risk of drought.</p> <p>Farm dams built with ecosystem services to improve water quality and reduce evaporation.</p>	<p>Natural resource condition report card and natural capital accounting for the regions.</p> <p>Increase capacity of Aboriginal businesses to be more resilient to dry seasons.</p> <p>Landscape rehydration project – to increase water holding capacity across the agricultural land.</p>	<p>Documented ecosystem services for inland Great Southern.</p>
Resilient Regional Economy	<p>Undertake regional infrastructure audit of regional towns and identify actions to address limitations to growth.</p> <p>Review risks and viability of supply chain sector based on increasing drought events.</p>	<p>Support industry diversification to buffer regional communities from the impact of droughts.</p>	<p>Address constraining enabling infrastructure to support industry growth and regional resilience to climate change.</p>

Table 1: Inland Great Southern themes, interventions and pathways

04 The Evidence Base



4.1 Drought Vulnerability Assessment

4.1.1 Overview

This Inland Great Southern DRP 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 inland Great Southern. It provides a summary of the likely economic, environmental and social impacts of future drought, based on the latest available climate change scenarios.

The DVA is comprised of a literature review, socio-economic analysis, spatial prioritisation, risk assessment. It includes 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 inland Great Southern
- 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 be used to understand and / or predict the impacts of drought
- A drought vulnerability index using the data collected to create the drought risk priority areas map

Regional drought vulnerability assessments require consideration of both the potential impacts of drought and the adaptive capacities of the people and systems in each region. Drought impact includes the degree of exposure to drought in the regions and each region's inherent sensitivity to drought conditions. Adaptive capacity describes the internal features and characteristics of the regions that influence their ability to respond effectively to and withstand past and future droughts.

Exposure is 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 is 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 is the extent to which a system is able to 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 resilient natural features (ground cover, topography).

Resilience refers to the region's ability to absorb disturbance and to effectively maintain, reorganise or make changes to sustain lives and livelihoods⁵. The RDRP drought vulnerability assessment conceptual framework draws on past studies in Australia and around the world to ensure that sufficient attention is paid to all important aspects of drought vulnerability and resilience in the affected regions. 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 systems
- developing new configuration of networks and institutions to implement these capacities

⁵ Maru, Yiheyis & Tom Measham. 2021. CSIRO Drought Resilience Mission: Transition planning for building resilient communities in drought affected regions. National Science Agency.

The following figure outlines the framework for the development of the DVA, with the broad range of information sources that contributed to it.

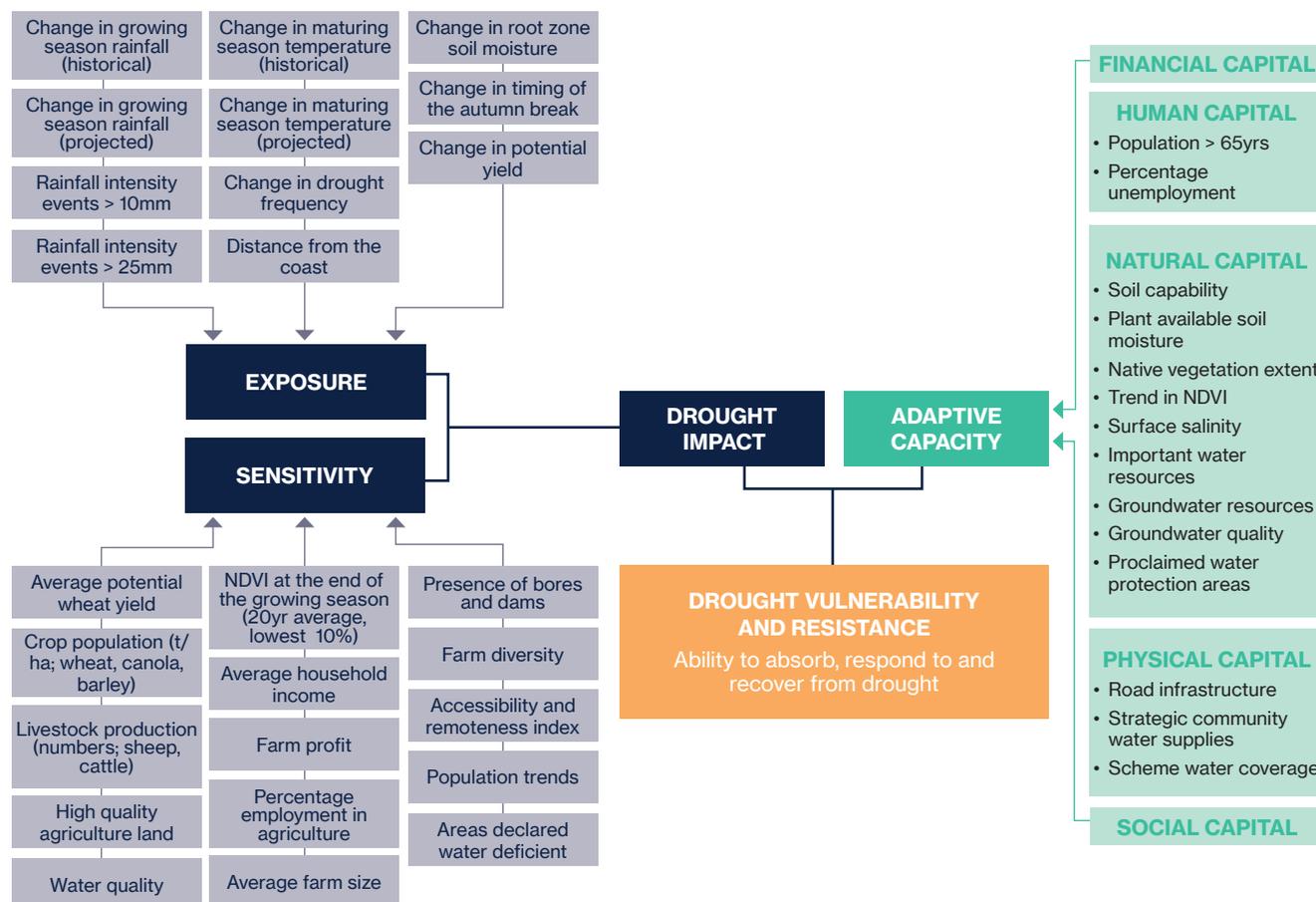


Figure 6: Conceptual framework for the DVA

4.1.2 DVA Methodology Components

Stakeholder Engagement

Consultation with stakeholders is critical in understanding how those living and working in the regions have experienced and responded to drought in the past, what they have undertaken to mitigate drought risk, how they perceive future drought risk and understanding priority actions they consider important in building resilience to drought in the future.

A Technical Working Group (TWG) was established and provided opportunity for input and review of the key elements of the DVA model, including identification of important datasets to inform the assessment process. Membership of the TWG included DPIRD climate scientists, CSIRO, University of Western Australia's Centre for Social Impact, Curtin University's Centre for Crop Disease Management, Murdoch University's Harry Butler Institute, Planfarm and Noongar Land Enterprises

A Steering Committee provided high level support and direction to the project team and was chaired by the CEO of the Wheatbelt Development Commission, with representation from the participating Regional Development Commissions and local governments, and the Director of the South-West of WA Drought Resilience and Adoption Hub.

South Coast Natural Resource Management (South Coast NRM) was contracted to assist with consultation with Grower Groups, farm advisors, farming champions and South Coast NRM Reference Groups. They also worked in cooperation with Gillamii Centre and Keogh Bay to consult with First Nation representatives across the region. They used a range of methods including participatory workshops, interviews and regional surveys.

This consultation focused on identifying ways in which the local community understands and defines drought, how they have been impacted by drought in the past, and how they responded in the most recent droughts. Consultation then focused on identifying key actions and priorities to include in the final drought resilience plan.

In the Great Southern region, engagement occurred with 24 farming businesses, six Grower groups, community members, two agronomists, eight LGAs, South Coast NRM and over 25 Aboriginal community members and industry representatives.

As the project includes the Wheatbelt and Midwest regions, collaboratively the program consulted with more than 330 people representing at least 150 separate organisations and businesses. with 19 state agencies, six peak bodies (agricultural), 34 agribusiness, three universities and CSIRO and over 300 stakeholder engagement meetings.

Locally, the project was overseen by the Great Southern Development Commission (GSDC). The GSDC's role is to coordinate and support endeavours that build the economy and promote growth in the Great Southern region of Western Australia. Project updates were regularly provided to GSDC's Board of Management, with the opportunity to provide input and feedback into the DVA and final Inland Great Southern DRP.

Desktop review

Desktop review is a critical component of any vulnerability assessment process. It involves identifying, summarising and interpreting what is already known about the impacts of the hazard on drought. The desktop review followed the development of the RDRP conceptual framework, and investigated aspects of exposure, sensitivity, impact and adaptive capacity and the ways in which each of these relate to and inform vulnerability and resilience to drought in the regions.

The desktop review included an overview of existing data, research, tools and resources that informed our stakeholders' understanding of drought impacts and drought preparedness across the focus regions. It included a socio-economic and land-use profile of each region, describing the population, major land uses and economic activities, the threatening processes they face and what that means in terms of drought resilience.

The review identified those actively working to support drought resilience in the region with regards to drought, including their respective roles and relationships between them, and summarised existing and past drought resilience policies and plans across a range of levels, from local to international, and the suite of drought resilience programs currently operating in Western Australia and Australia as a whole.

Spatial Prioritisation

The spatial component of the drought vulnerability assessments used mapping software to map drought resilience priority areas. All spatial data was prepared and presented at the scale of local administrative boundaries, to best support local level decision-making and investment.

Inputs into the multi-criteria analysis (MCA) were determined following the development of the RDRP conceptual framework, and include exposure, sensitivity, impact and adaptive capacity and the ways in which each of these relate to and inform vulnerability and resilience to drought in the regions. Spatial data layers include:

- climate data (historical and projected change in rainfall, temperature, soil moisture and drought frequency and severity)
- environmental data (soil type, topography, ground and surface water resources, native vegetation extent, ground cover, Normalised Difference Vegetation Index)
- production data (crop yields, animal production, type of farming system)
- financial data (household income, farm profitability, use of farm management deposit schemes)
- social data (population trends, access to services, community participation rates)
- infrastructure data (roads, water supplies).

Composite maps showing how different features of drought risk and resilience are overlaid using a standard multi-criterion GIS analysis (MCA). Priority areas for investment are highlighted at the overlap between spatial datasets where drought is likely to occur, where there are features are likely to provide resilience to the impacts of drought (e.g. high ground cover, availability of water resources, drought resilient farming systems) and/or where vulnerable communities are likely to be impacted (e.g. remote communities with limited access to services).

Risk Assessment

A drought risk assessment collates all the data collected and analysed from the stakeholder engagement, desktop review and spatial prioritisation components, and provides local decision-makers with a summary of vulnerability to drought in their region. Synthesis of the data into a risk assessment followed the development of the RDRP conceptual framework and investigated aspects of exposure, sensitivity, impact and adaptive capacity and the ways in which each of these relate to and inform vulnerability and resilience to drought in the regions.

The aim of a risk assessment summary is to assist local decision makers and managers in the rapid evaluation of drought vulnerability for the region and enable tracking of change over time. Data in each drought impact category (i.e., social, financial, production, environmental) can be scored along a sliding scale and assessed over medium and long-term timeframes in terms of drought risk and resilience^{6,7}

4.2 Technical Expertise

To strengthen this 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.
- **Drought Priority Areas Map for Southwest of Western Australia (DPIRD):** A GIS-based multi-criteria analysis integrating relevant economic, environmental and social data at a scale to identify high priority drought risk areas.
- **Economic 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.
- **Investigating the Environmental Impacts of Drought in Regional WA (LA One Economics and Consulting):** Review of the impacts of drought on natural resources that support and surround farming, rural and regional communities. Identification of responses and initiatives to mitigate the environmental impacts of drought.
- **Transformative Review (AgDots):** Global review of transformative research areas to build resilience.
- **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 (e.g. stock drinking and crop spraying), community (e.g. firefighting, watering ovals and landscaped areas) and local government authorities (LGAs, road works and water for community uses).
- **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 includes understanding the current state of water supply and demand, identifying gaps and modelling the risk to water supplies under drought and climate change scenarios (the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 4.5 and 8.5).
- **Valuing Noongar People and Practices in Drought Resilience (Noongar Landcare Enterprises):** A review of the impacts of drought and 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 Resilient Strategies.
- **Great Southern (Inland) Regional Drought Resilience Plan:** Report on Aboriginal Community Consultations (South Coast NRM in cooperation with Keogh Bay and the Gillamii Centre): A report that collates information from stakeholders in the Noongar Community of the Great Southern and captures risks and impacts of drought and strategies to increase drought resilience.
- **Regional Drought Resilience Community Consultation Report for the Inland Great Southern (South Coast NRM):** A summary of drought risks, impacts and strategies to increase drought resilience from stakeholders in the Great Southern.

6 Bourne, Amanda R.; Petra de Abreu; Camilla Donatti; Sarshen Scorgie; Stephen Holness. 2015. A Climate Change Vulnerability Assessment for the Namakwa District, South Africa: The 2015 revision. Conservation South Africa, Cape Town. Available [here](#).

24 7 Hughes, Neil; Kevin Burns; Wei Ying Soh; Kenton Lawson. 2020. Measuring drought risk: the exposure and sensitivity of Australian farms to drought. ABARES Research Report 20.17

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

- South-West WA Drought Resilience Adoption and Innovation Hub
- relevant local government plans
- economic development plans
- strategic community plans
- Australian Government Drought Response, Resilience and Preparedness Plan
- regional blueprints
- WA Government's Climate Policy
- State Infrastructure plans

The evidence base for this plan was also informed by previous and current strategies such as the Australian Government Drought Response, Resilience and Preparedness Plan and a review of relevant science-based initiatives, such as the DPIRD WaterSmart Farms project and the work of the South-West WA Drought Resilience Adoption and Innovation Hub.

4.3 Plan Alignment

The Inland Great Southern DRP was developed to be consistent with 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 Inland Great Southern DRP also has strong alignment with National, State, Regional and Local plans, strategies and policies, including:

Nationally:

- Australian Government Future Drought Fund
- South-West WA Drought Resilience Adoption and Innovation Hub

At a State level:

- State Infrastructure Strategy: Foundations for a Stronger Tomorrow)
- Diversity WA (a Framework to Support the WA Government's Economic Development Priorities)
- Department of Water (Strategic priority - Water for Growth 2016 plan)
- DPIRD Strategic Intent 2018-2021
- DPIRD Primary Industries Plan 2020–2024
- Water Corporation - Water Forever (Water Recycling and Water Efficiency)
- Towards Climate Resilience 50 Year Plan 2009
- Western Australian Climate Policy November 2020
- Western Australian Agricultural Research Collaboration
- DPIRD State Soil Health Strategy
- WA Natural Resource Management Framework

Regionally:

- The Great Southern Development Commission Strategic Plan 2022-25
- Regional Investment Blueprint – 2015
- Regional Planning and Infrastructure Framework
- South Coast NRM Strategic Plan
- Southern Link Voluntary Regional Organisation of Councils (VROC) Strategic Plan
- South-West Native Title Settlement Agreement

Locally:

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

Appendix 1 of this document presents a detailed description of how the Inland Great Southern DRP aligns with the above strategies, plans and policies.

05 The Inland Great Southern Region - System Description



Tourism WA

The inland Great Southern Consortia covers an area of 27,871 km² in the Great Southern region of Western Australia and includes the local government Shires of Broomehill-Tambellup, Cranbrook, Gnowangerup, Jerramungup, Katanning, Kent, Kojonup and Woodanilling, as shown in the following figure.

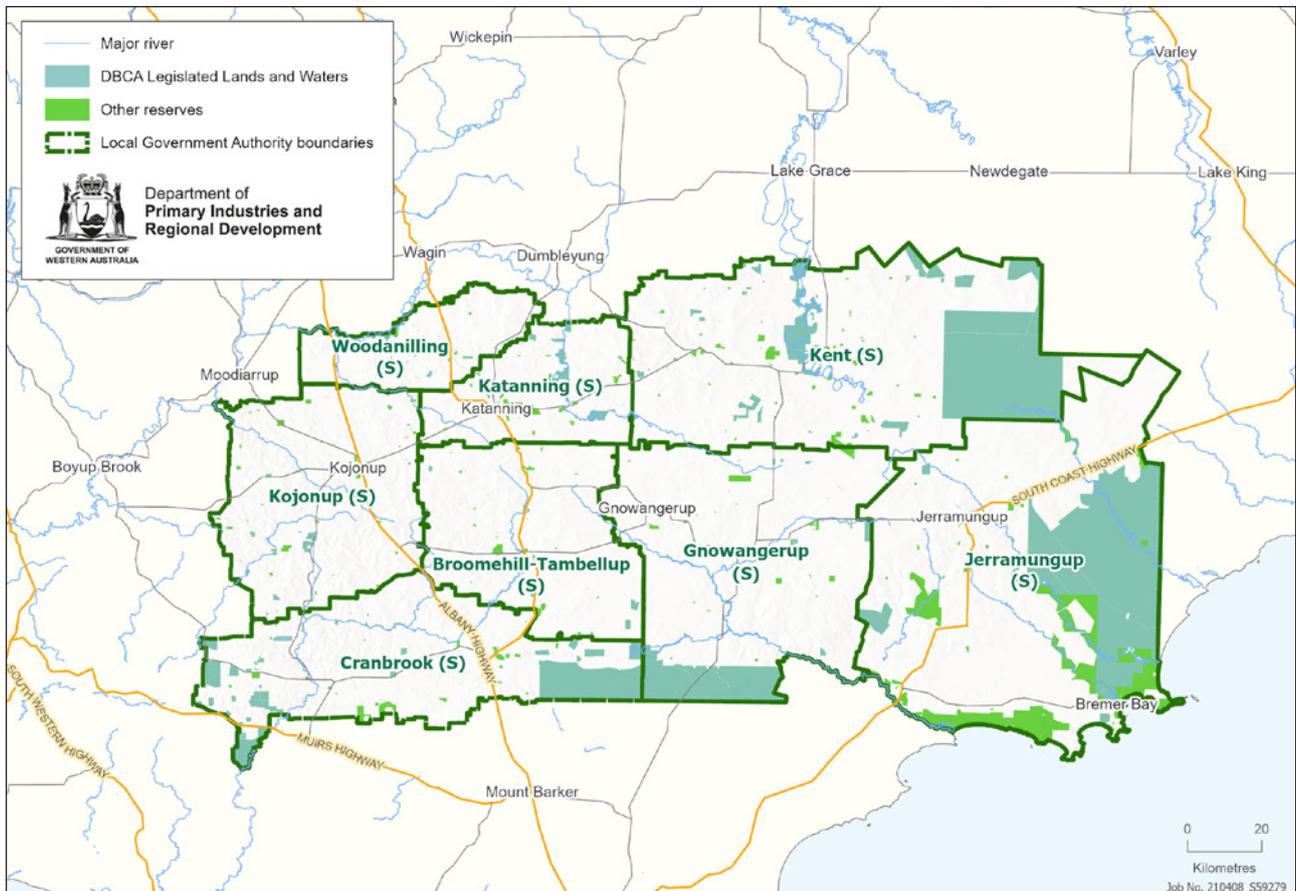


Figure 7: Map showing the geographic scope of the regional drought resilience plan in inland Great Southern.

The Consortia is within the Wagyl Kaip / Southern Noongar (Ganeang, Goreng and Menang) Agreement for Native Title and the northern section is Ballardong Noongar, both in the South West Native Title Settlement. It is home to 11,324 people. Between 2017 and 2019, there was population decline within all local government areas in the Consortia. The median age is highest in the Shire of Cranbrook at 46 and all Shires are above the WA median of 36. The percentage of older people (over 65 years) is projected to increase from 18.8% to 22.3% between 2015 and 2025 in the region.

The Index of Relative Socio-economic Advantage and Disadvantage Socio-Economic Indexes for Areas (IRSAD SEIFA) score found the Shires of Broomehill-Tambellup and Katanning have more disadvantage than greater regional WA, while the Shires of Jerramungup and Kent have more advantage than both greater regional WA and greater WA. Within the Consortia region, Katanning and Tambellup are considered locations of priority health need in the Great Southern, based on analysis of social determinants, health indicators, service gaps and stakeholder feedback.

The Index of Disadvantage Dropping off the Edge (DOTE) gives a score by SA2 area, with the Consortia covering three SA2 areas. Katanning had an overall score of 1 (highest level of disadvantage); Kojonup SA2 had an overall score of 2 and Gnowangerup had an overall score of 3. Common areas of vulnerability across all three SA2 areas were: no post-school qualification, family violence, psychiatric admissions and no access to recreation parks. Some key characteristics of the inland Great Southern region are highlighted below:

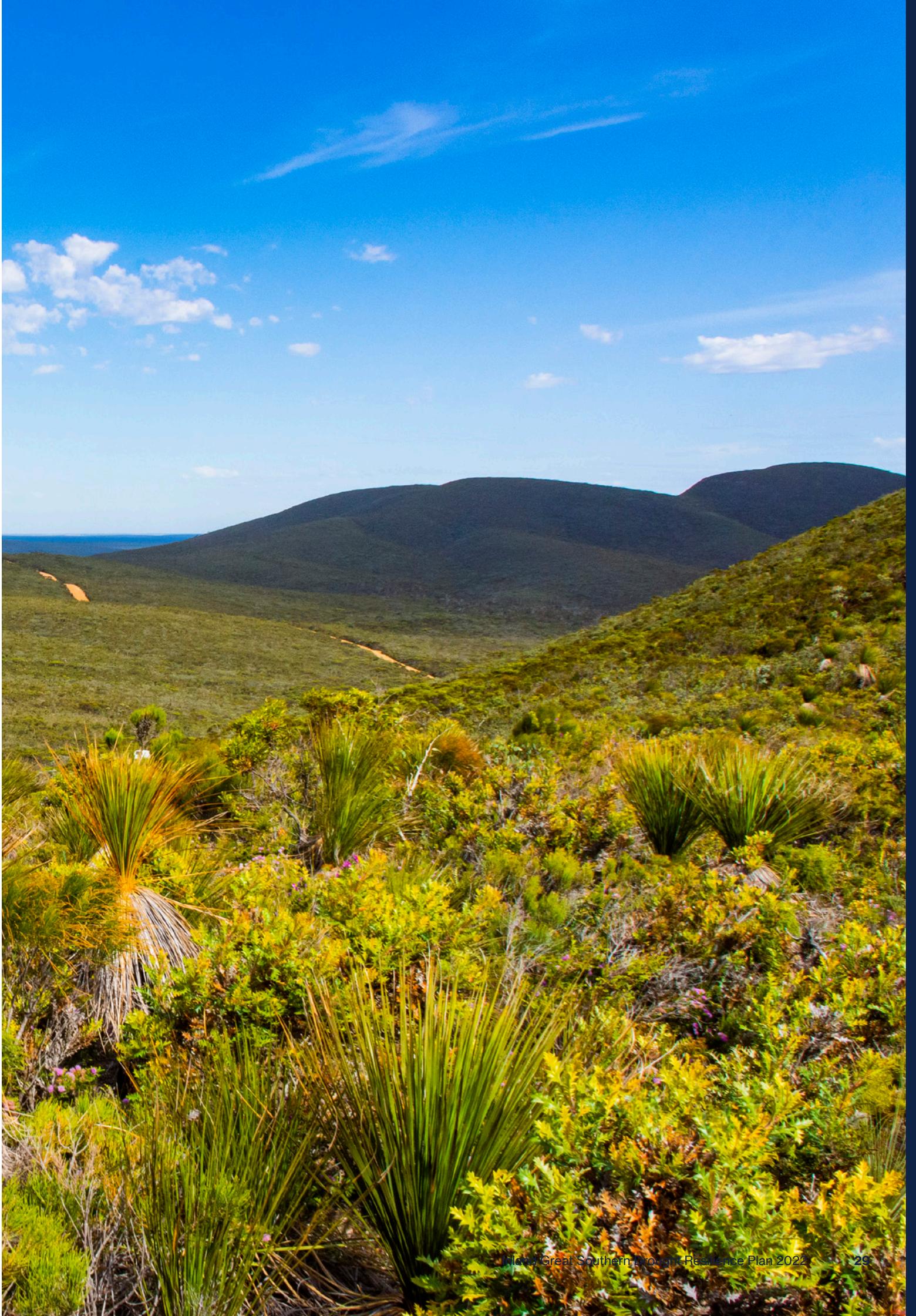
- Largest population is in the Shire of Katanning, which is the key centre for the inland Great Southern
- All areas have a median age above the WA median, with the largest variance in Cranbrook
- All areas had negative in-migration between 2017-2020
- the Shires of Broomehill-Tambellup and Katanning have more disadvantage than greater regional WA
- the Shires of Jerramungup and Kent have more advantage than both greater regional WA and greater WA
- the Shires of Broomehill-Tambellup, Cranbrook, Jerramungup, Kent and Kojonup agriculture accounts for 50% or more of economic output.

Climate

The Consortia includes projections for average temperatures to continue to increase in all seasons, more hot days and warm spells, a continuing reduction in growing season rainfall (April – October) increased extreme rainfall events and a harsher fire-weather climate.

Economy

The Consortia has an annual economic output of \$2.1 billion and accounts for 9.5% of employment in the broader Great Southern region. Agriculture accounts for 40.1% of economic output and 40.9% of total jobs in the selected areas. The Shire of Kojonup had the largest output from Agriculture at \$178.5 million, and the Shire of Kent had the largest percentage of total economic output from agriculture at 75.6%, followed by the Shire of Broomehill-Tambellup at 65.2%.



06 An Assessment of the Inland Great Southern's Resilience



Katanning saleyards

The Inland Great Southern DVA identified key areas of the region's vulnerability to drought. The characteristics of each vulnerability driver are:

- **Exposed areas** – show low incidence of rainfall events over 10mm and 25mm, percentage change in autumn break from 1975-1999 and 2000-2020, and decline in average yield potential over the same time frame, number of hot days, and decline in growing season rainfall.
- **Sensitive areas** – factors such as accessibility, relative remoteness, drought risk by farm profit, high numbers of livestock in some Shires, areas declared water deficient (Jerramungup and Kent), low water assets such as bores and dams and high levels of employment dependence on agriculture.
- **Areas with low adaptive capacity** – could be related to an ageing population.

6.1 Mapping Drought Vulnerability

6.1.1 The Mapping Process

Using GIS-based multi-criteria analysis (MCA), DPIRD's GIS team spatially integrated relevant economic, environmental and social data to produce a set of maps identifying high priority drought risk areas. These maps take into consideration farm water supply, agricultural production, soil health and erosion potential along with a range of socio-economic and landscape features that contribute to drought resilience or exacerbate drought risk in the Great Southern region. These features include water-related ecological infrastructure, high value agricultural land and areas of higher socio-economic vulnerability.

The approach consolidates complex information into user-friendly spatial products designed to enable fine-scale, local-level decision making on drought resilience. The maps form part of the evidence base for the RDR Plans.

Drought resilience priority areas maps are made up of a set of composite maps for i) exposure, ii) sensitivity, iii) impact (combining exposure and sensitivity) and iv) adaptive capacity. Forty-four variables and ten composite maps were weighted according to their likely influence on drought resilience, based on literature review, expert opinion and feedback from regional stakeholders, and combined to create the final drought priority map. The analysis was performed using the Multi-Criteria Analysis Shell for Spatial Decision Support (MCAS-S) tool developed by ABARES⁸. Drought resilience priority areas lie at the intersection of all categories, where exposure, sensitivity and adaptive capacity overlap.

The overlapping areas highlight where droughts are likely to occur most frequently and have the largest impact on water resources and agricultural production. They also identify locations where regional communities may be more vulnerable to the impacts of drought due to socio-economic factors including relative remoteness, access to infrastructure and income.

The maps were ground-truthed with the community and the technical working group and feedback was incorporated into the final products.

The composite drought vulnerability map has the potential to be a powerful decision-support tool for the South West of WA. There is a high level of confidence in the analysis as many of the included datasets are robust, regularly collected and available at high spatial and temporal resolution including the participating Shires in the inland Great Southern.

⁸ MCAS-S Development Partnership. 2018. Multi-Criteria Analysis Shell for Spatial Decision Support MCAS-S version 3.2 user guide. In ABARES BY-ND 4.0.

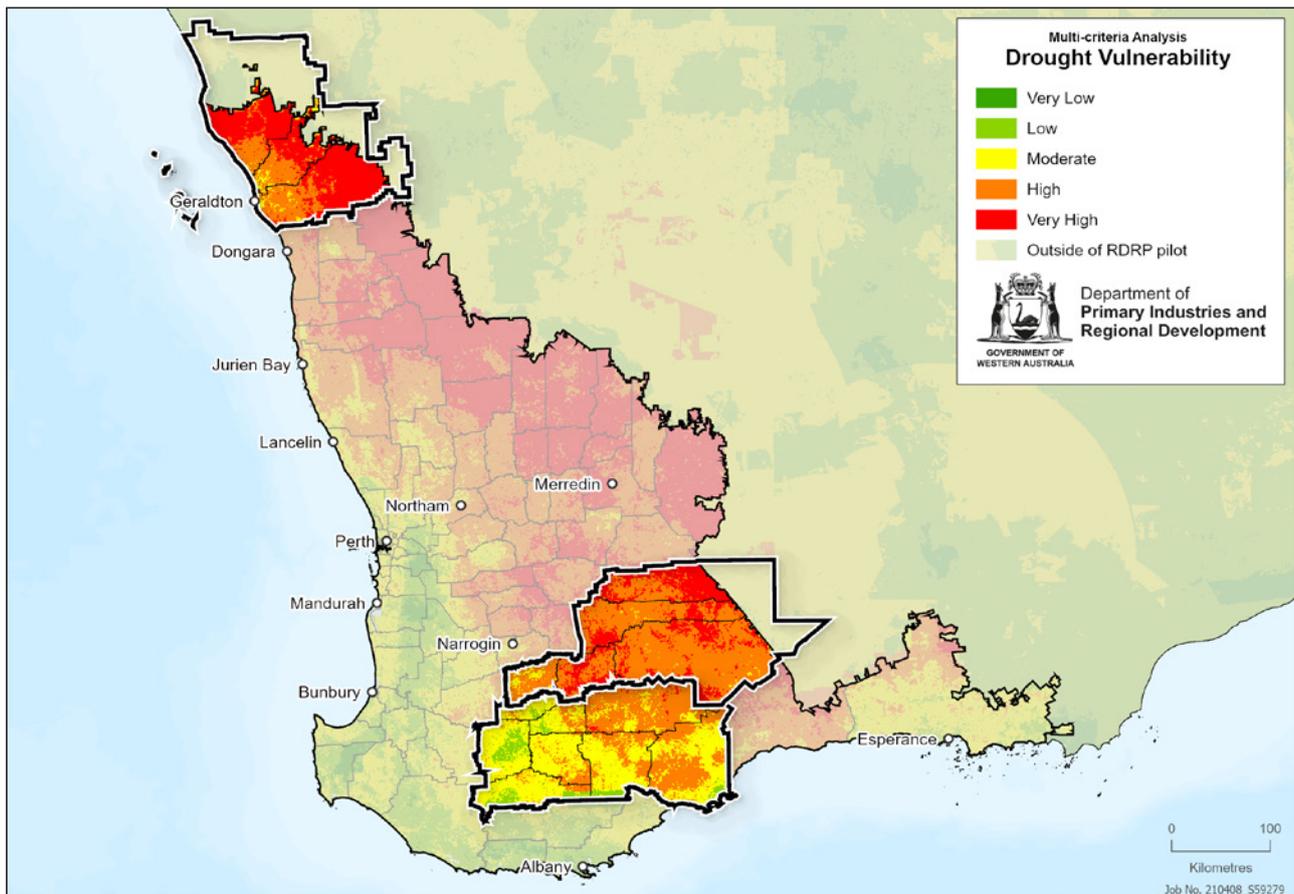


Figure 8: Final drought vulnerability map showing that the areas in WA most vulnerable to drought are in the north and east of the region

The links between the component datasets and impacts of drought are well understood. Low rainfall exacerbates drought risk, as does a shorter or warmer growing season; drought is associated with reduced production and farm income; problems with water quality or infrastructure can leave regional communities more vulnerable to the effects of drought. Spatial products such as the drought risk and resilience priority areas maps can provide significant support to decision-makers by collating complex climate, ecological, and socio-economic information into a single powerful image. These maps, developed together with regional stakeholders, are widely replicable.

6.1.2 Drought Exposure Map

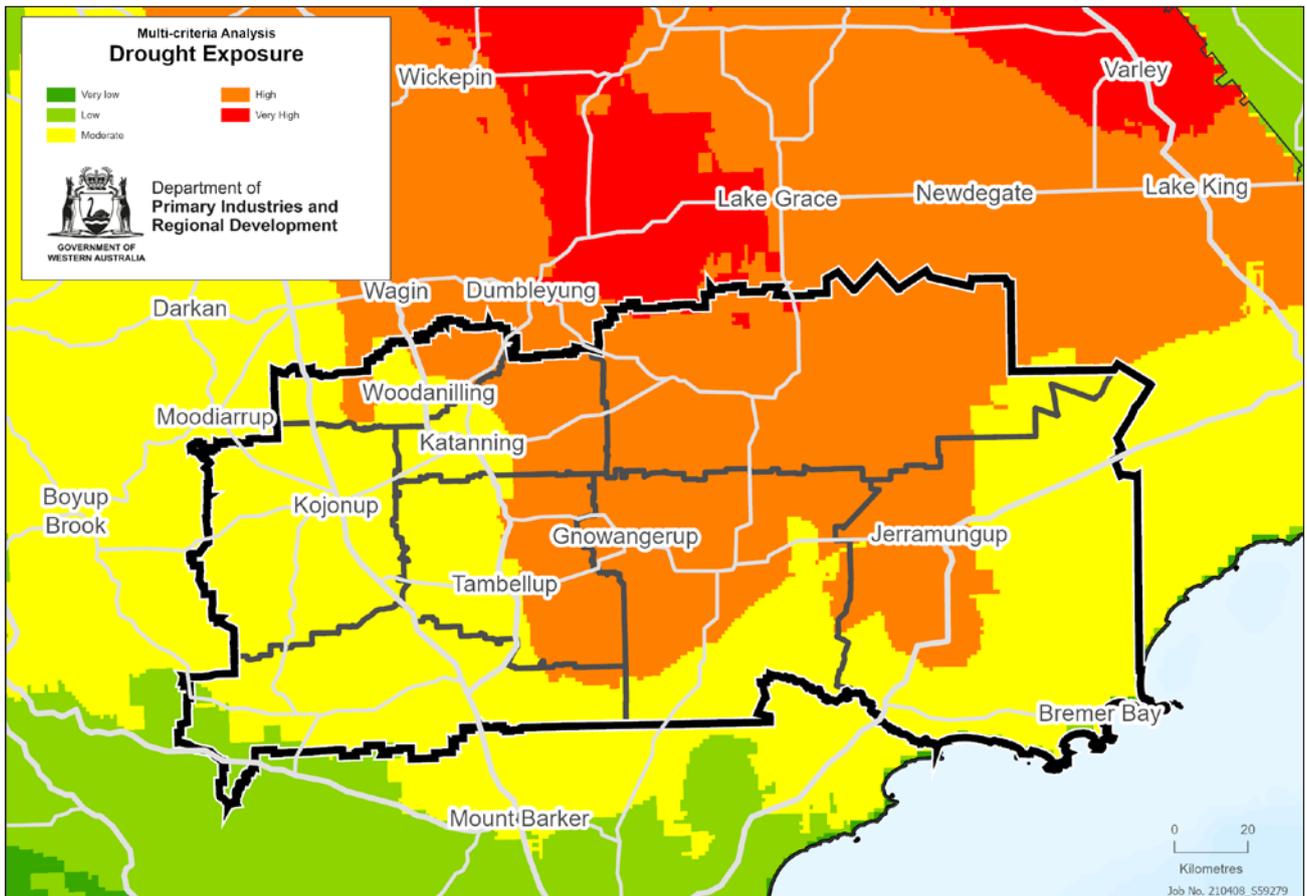


Figure 9: Inland Great Southern Exposure Map

In the inland Great Southern, exposure to drought ranges from moderate in the far west of the region to high in the north/east region.

This result was influenced by the low incidence of rainfall events over 10mm and 25mm, the percentage change in the autumn break from 1975-1999 to 2000-2020 and decline in average yield potential from 1975-1999 to 2000-2020, number of hot days and decline in growing season rainfall.

6.1.3 Drought Sensitivity Map

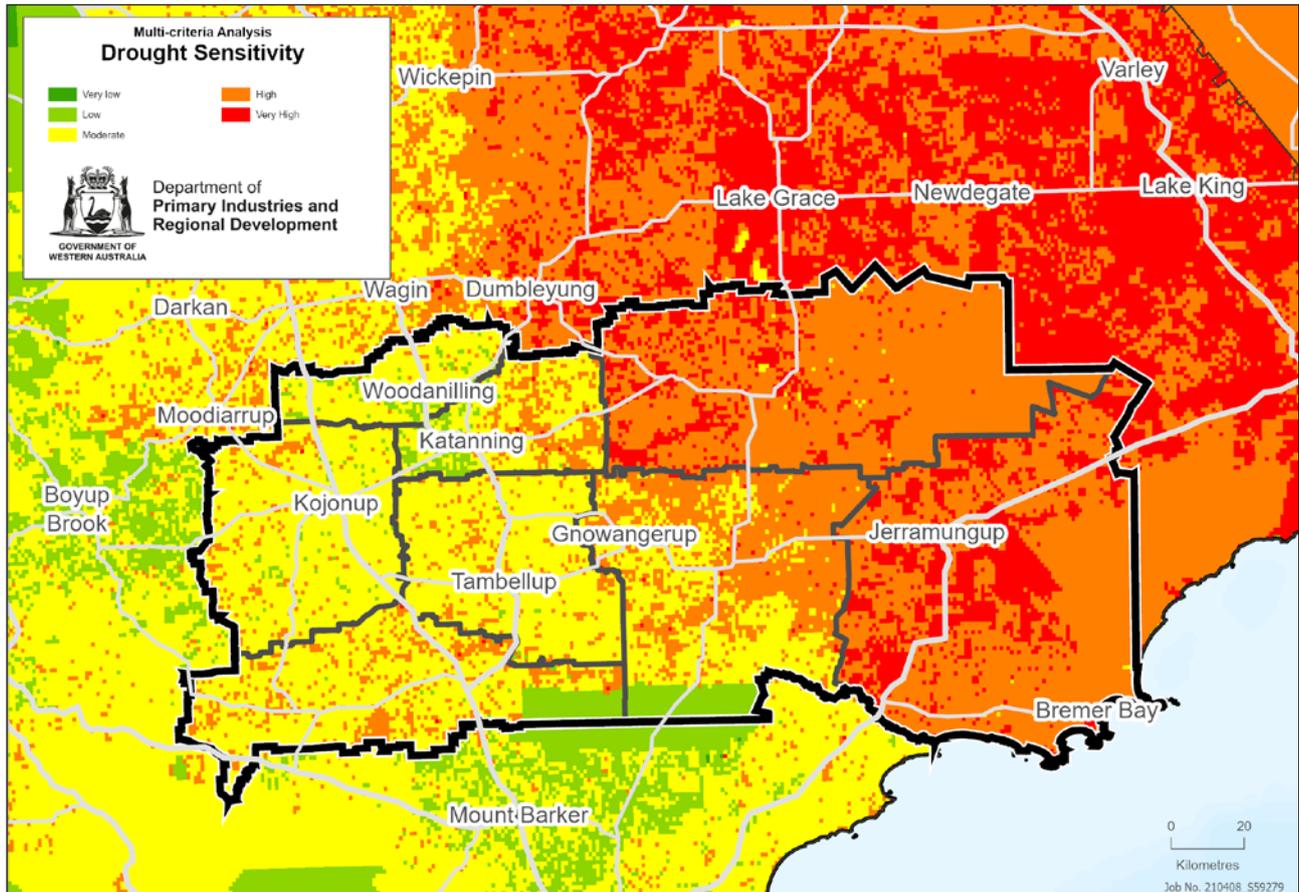


Figure 10: Inland Great Southern Drought Sensitivity Map

In the Great Southern, sensitivity to drought ranges from moderate in the far west of the region and high to very high across the Shires of Jerramungup and Kent.

Investigation of the datasets identify accessibility and remoteness, percentage of drought risk by farm profit, higher numbers of livestock in some Shires, areas declared water deficient (Jerramungup and Kent) and low counts of water assets (bores and dams), and the high percentage of workers reliant on agriculture, may have contributed to the result.

6.1.4 Drought Impact Map

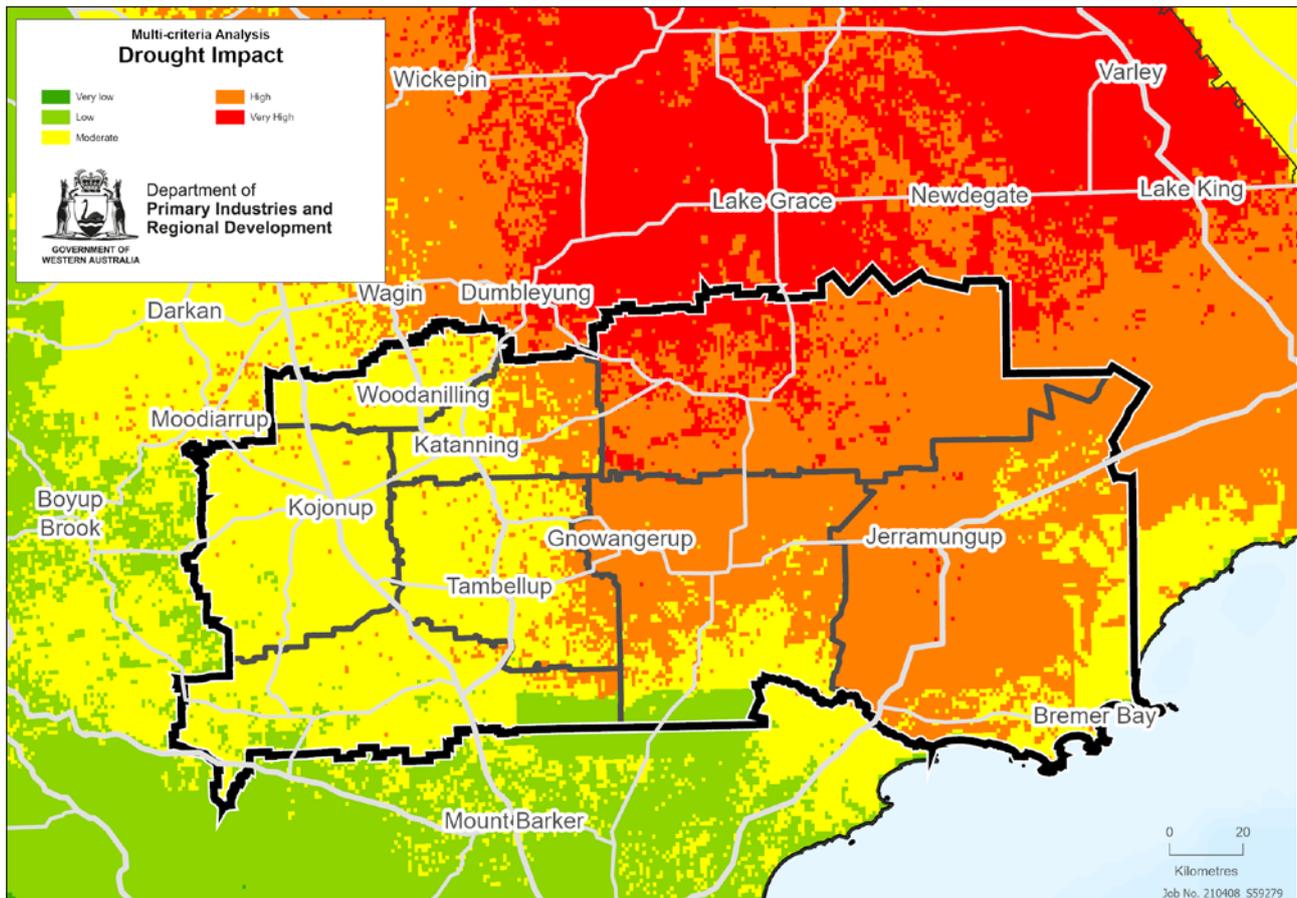


Figure 11: Inland Great Southern Drought Impact Map

The drought impact map is a composite of the Drought Exposure and Drought Sensitivity maps. The Western Shires including Kojonup, Katanning, Tambellup, Woodanilling Cranbrook and Broomehill-Tambellup have moderate risk of being impacted adversely by drought. The eastern half of the Great Southern region has high to very high likelihood of being impacted adversely by drought. Areas of most concern are the northern areas in the Shire of Kent.

Actions that are targeted at improving the reliable harvesting and storage of water, support drought resilient farming systems, and diversification of economic activity across the region will support the ability of the region to lessen adverse impacts of drought.

6.1.5 Drought Adaptive Capacity Map

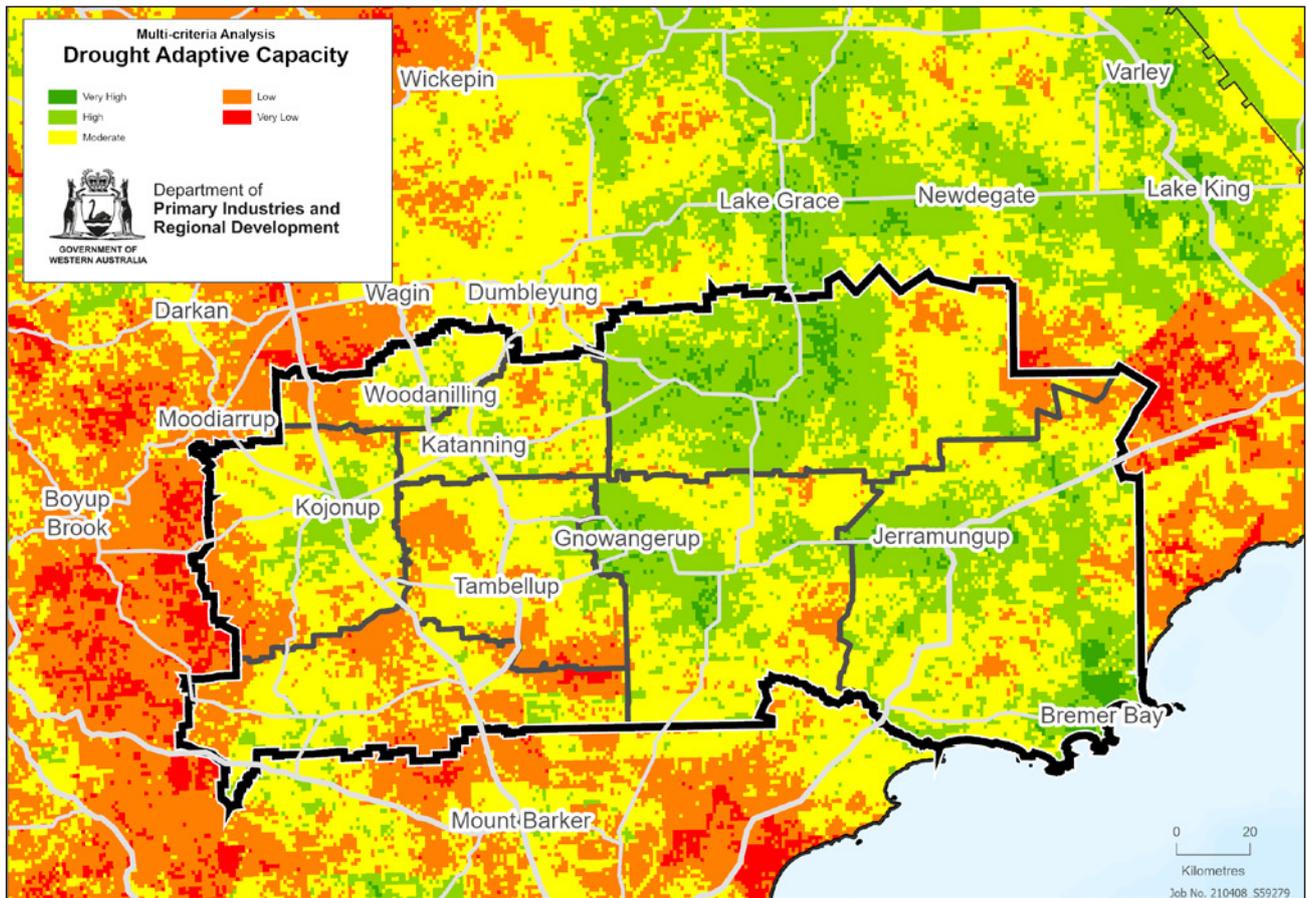


Figure 12: Inland Great Southern Adaptive Capacity Map

The adaptive capacity map is made up of three composite maps for human capital, natural capital and physical capital. This map is based primarily on the natural and physical capital of the region and limited in its depiction of human and social capital. Though community consultation, 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 ultimately social and community resilience.

In the Great Southern, the areas that had the highest impact of drought, showed the highest capacity to adapt. The lower levels of capacity around Kojonup and Katanning would require further investigating.

The very low unemployment rate across the region 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 of these factors to ascertain true adaptive capacity to drought.

6.1.6 Drought Vulnerability Map

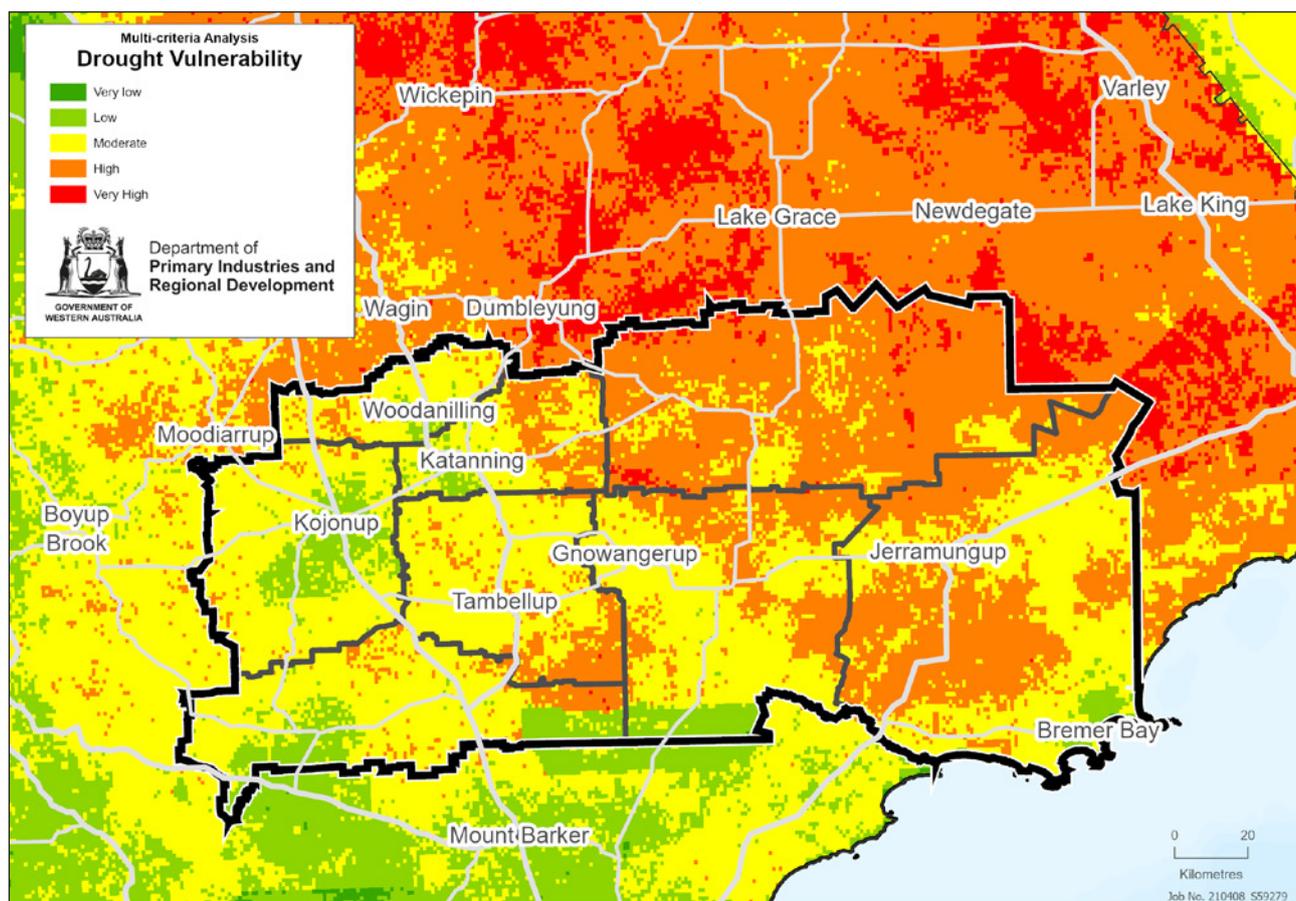


Figure 13: Great Southern Drought Vulnerability Map

The drought vulnerability map is a composite map of Adaptive Capacity and Drought Impact. There is variability in drought vulnerability across the inland Great Southern.

Further work is needed to consolidate the different approaches and agree on a final vulnerability assessment framework for drought resilience planning. While the current drought vulnerability assessment for the inland Great Southern is best represented by the regional drought priority areas maps, the spatial analysis is limited in its ability to include social and economic data.

The DVA summarises several different possible approaches to assessing drought vulnerability focusing primarily on measurable biophysical and economic indicators (indicators of drought) or primarily on socio-economic factors. These contributions were considered and incorporated into the overarching conceptual framework for the vulnerability assessment.

6.2 Drought Vulnerability Index

A Drought Vulnerability Index calculated for the inland Great Southern region, enables local decision makers and managers in the rapid evaluation of drought risk in the region. The index has been specifically designed to track change over time for the study, although it could be adapted for any region across Western Australia. The index can be seen as a repeatable exercise providing a snapshot of vulnerability to drought that can be tracked over time.

The analysis utilizes the overarching DVA conceptual framework and an understanding overall vulnerability as the outcome of interacting exposure, sensitivity and adaptive capacity parameters. A number of indicators were then selected within each category to serve as proxies for exposure, sensitivity and adaptive capacity.

Each sub-indicator was scored using a 1-5 sliding scale where 1 represents the most desirable condition (low vulnerability) and 5 represents the least desirable state (high vulnerability) in terms of drought risk. The data used for determining scores for each indicator were drawn from the same (largely) publicly available datasets used to create the drought risk priority areas map. Scores represent the average for the region.

AREA OF RESILIENCE	RISK RESULT BY INDICATOR	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 (Kojonup, Cranbrook and western parts of Woodanilling, Katanning and Tambellup), the far east (parts of Jerramungup) and far south (parts of Gnowangerup). High (Kent and parts of Woodanilling, Katanning, Gnowangerup, Jerramungup). Very high in minimal parts of Kent.	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.	Ranges from moderate in the far west of the region and high to very high across Shires of Jerramungup and Kent.	Accessibility and remoteness, percentage of Drought Risk by farm profit, higher numbers of livestock in some Shires, areas declared water deficient (Jerramungup and Kent) and low counts of water assets (bores and dams), and the high percentage of workers reliant on agriculture, may have contributed to the result.
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 potentially linked to ageing population (Kojonup and Katanning). Very high in north (Kent), central (Gnowangerup) and western areas (Jerramungup).	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 ultimately 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 2: The exposure, sensitivity and adaptive capacity of the inland Great Southern

Averaging the scores from each individual indicator returns an overall vulnerability index of 3.3, indicating moderate vulnerability to drought. A radar chart is useful for seeing which components of vulnerability need to be addressed most urgently as risk is not evenly spread across the selected indicators and therefore poorly represented by the average score. Given that each indicator has been scored on a 1-5 sliding scale where 1 represents the most desirable state and 5 the least desirable, it is most desirable for the indicators to cluster towards the centre of the radar chart.

Areas of strength in terms of drought resilience in the inland Great Southern region lie in soil and production capability, access to critical infrastructure and limited exposure to production risk. These are areas to maintain and build on for a successful response to future drought in the region. These are shown on the radar chart as points closer to the centre of the chart.

Weaker areas in terms of drought resilience are shown on the radar chart as those points further from the centre of the chart. These are the expected impacts of climate change on temperature and rainfall patterns, increasing drought frequency, NDVI trends and the level of direct dependence of local economies and livelihoods on agriculture. These are the aspects of vulnerability to drought in the region that need to be prioritised to improve resilience. If these can be improved, or better understood, planned for and dealt with, the region will be in a better position to respond effectively to drought. Improving levels of economic diversity are a desired outcome for the region to build drought resilience.

Improving understanding of the impact of changing weather patterns on agricultural production is required. Measures to improve access to water and road infrastructure, as well as other services, increase and diversify employment opportunities and adapt agricultural practices in the region to accommodate shorter or later growing seasons will improve resilience to drought. Current climate projections suggest that the situation is likely to worsen over time and steps should be taken now to ensure proactive adaptation to expected impacts.

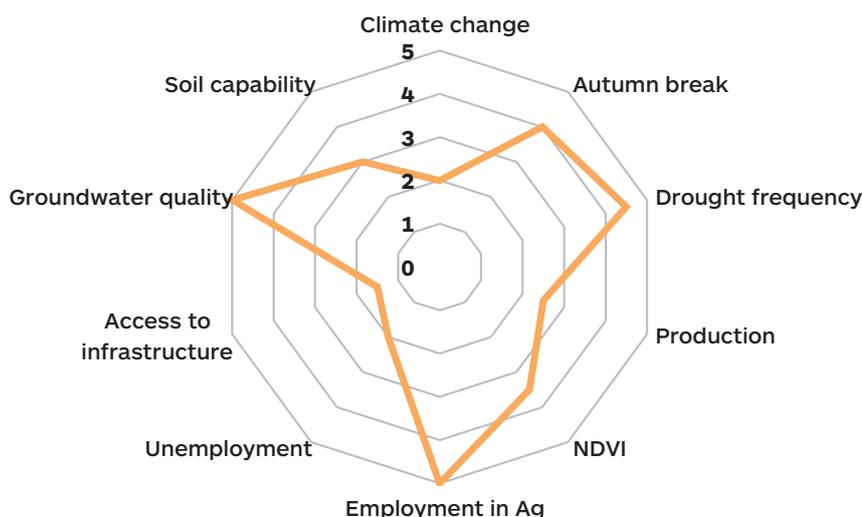


Figure 14: Radar chart of vulnerability index scores

INLAND GREAT SOUTHERN DROUGHT RESILIENCE STRENGTHS	INLAND GREAT SOUTHERN DROUGHT RESILIENCE WEAKNESSES
<ul style="list-style-type: none"> • Access to critical infrastructure • Percentage unemployment • Limited exposure to production risk • Projected change in growing season rainfall and maturing season temperature 	<ul style="list-style-type: none"> • Change in drought frequency to date • Percentage employment in agriculture • Groundwater quality

Table 3: Inland Great Southern drought resilience strengths and weaknesses

6.3 Impacts of Drought on the inland Great Southern

Drought impacts can be significant and wide ranging. It can impact a region's economic, social and environmental functioning. Several studies rank drought first amongst natural hazards in terms of the seriousness of impacts, including loss of life and livelihoods, economic losses and adverse social, economic and ecological effects⁹.

Reduction in household income, financial hardship and a drop in financial position are three major economic impacts experienced by those in drought across Australia. Broader economic impacts on regional communities include job losses, worker relocation and a reduction in income for small local businesses, particularly in small towns with economies highly dependent on-farm expenditure.

Environmental impacts of drought include irreversible damage to soil and vegetation, leading to dust storms and a loss of top soil, soil nutrients, organic matter and soil carbon. Social impacts of drought can be devastating and include permanent loss of services in regional areas, loss of employment opportunities, negative physical and mental health impacts and financial hardship.

Drought amplifies existing personal and professional burdens of regional communities such as poor health, isolation and limited access to services and infrastructure. Drought resilience is strongly influenced by regional characteristics including wealth, infrastructure, policies and plans, the level of community cohesion and the extent to which regional economies depend directly on agriculture and/or water^{10,11,12}.

6.3.1 Regional Level Impacts

It is evident from the literature that climate change is having significant and ongoing impacts on the agricultural regions of Western Australia. Australian average temperatures have increased by about 1° Celsius since 1950 and the south west and south east of Australia are seeing a trend towards lower average winter rainfall. This includes a forecast increase in hotter weather patterns across Western Australia and a reduction in wet years, with drought becoming a more common occurrence¹³.

Many areas of the State are experiencing the early impacts of drought and ongoing drying conditions including the Northern Agricultural Region, inland areas of the Great Southern, parts of the Wheatbelt and Southern Rangelands¹⁴.

Decreased water availability is one of the biggest identified concerns across all regions. Forage production may be reduced by up to 10% over the agricultural areas, and by 10–20% over the rest of the state. Broadacre crops are the most vulnerable to rainfall variations with an expected decline in yields in the drier eastern and northern areas of the Great Southern.

9 Bruntrup M. & Tsegai D. 2017. Drought Adaptation and Resilience in Developing Countries. German Development Institute in partnership with United Nations Convention to Combat Desertification. Retrieved 22 January 2022. Available [here](#).

10 Adams P., Horridge M., Madden J., Wittwer G. 2002. Drought, regions and the Australian economy between 2001-02 and 2004-05. Centre of Policy Studies, Monash University

11 Wanders N. 2016. Human impacts on droughts: how these hazards stopped being purely natural phenomena. Princeton University. Retrieved 3 February 2022. Available [here](#).

12 Department of Agriculture, Water and the Environment. 2021. National Climate Resilience and Adaptation Strategy. Retrieved 10 January 2022. Available [here](#).

13 CSIRO. (2018). Australia's Changing Climate. Retrieved 15 January 2022. Available [here](#).

14 Sudmeyer, R, Edward, A, Fazakerley, V, Simpkin, L & Foster. (2016). Climate change: impacts and adaptation for agriculture in Western Australia. Bulletin 4870, Department of Agriculture and Food, Western Australia, Perth. Retrieved 16 January 2022. Available [here](#).

Additional potential impacts of climate to consider at a 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 emission.

The results of stakeholder engagement were centred around the broad ranging impacts of drought at an economic, environmental and social level. It is important to recognise that impacts span a spectrum and may be cumulative. For example, a drought may not be seen as severe, but impacts might be greater due to a lack of recovery between stress events. The dry seasons of 2018 and 2019 were compounded by events happening over two consecutive years. The late break in 2020 amplified concerns of another dry season however, extensive spring rainfall events provided relief and enabled farmers to finish their crops and replenish on-farm water storage.

Economic Impacts

Agriculture is the primary land use in the region. Inland Great Southern stakeholders reported experiencing financial stress because of reduced production during drought. Farming families sell livestock, change livestock structure, liquidate assets or increase their debt to survive. Non-farming families in the region suffer from reduced employment opportunities and cash flows.

A decline in rainfall over the winter months in the south-west regions of Western Australia, including in parts of the Great Southern, over the past 20 years has contributed to a reduced inflow into many surface dams. In some towns not connected to the Lower Great Southern Towns Water Supply Scheme, supplies are becoming critically low. Below-average rainfall has also impacted on-farm storage sources, local government dams and Department of Water and Environmental Regulation strategic community water supplies, which are held for emergency use when low rainfall causes on-farm supplies to fail. To address water deficiencies in the Great Southern, resilient water infrastructure is essential.

Several localities in the region including Jerramungup, Gairdner and Kent experience water deficiencies, with deficiency declarations triggering State Government assistance to cart water for emergency use. Non-potable strategic water supplies and on-farm supplies are often unable to cope with more than two dry seasons.

Regional businesses in LGAs with more diverse economies, not dependent upon agriculture, showed a reduced effect of drought events¹⁵. In the Great Southern region, some businesses, including dam building businesses, water drilling companies, and hay production businesses, significantly benefited from drought events. However, there is a significant risk to our value-adding industries such as abattoirs, where a significant loss of livestock to the region impacts viability of our key regional industries.



“ ***The additional labour demands, with the need to carry out activities such as confinement feeding and water carting for some businesses, was identified. Recovery times from drought are not immediate, especially for stock related enterprises. It can take considerable time to restock to pre-drought levels.*** ”

(South Coast NRM stakeholder engagement 2022)

¹⁵ Anderton, L. (2022). Economic Review on the Impacts of Drought. Prepared for the Department of Primary Industries and Regional Development.

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. Plant mortality becomes more pronounced in drought years, impacting on biodiversity and ecosystem services, and reduces the ability to sequester carbon. This also impacts on the functioning of the landscape for economic and social purposes. Aboriginal community members expressed concern about the impact of drought on vegetation, water and fire regimes in the region.



“ Land clearing really affects the environment and its ability to retain water. Water runs off the land very fast and poisons creeks with fertilizer or chemicals and silt, and it brings up the salt. All the land clearing creates heat. These days, I see a lot of trees dying because it is too dry.

(Noongar stakeholder engagement participant, 2022).

”

Social

During the consultation process, Great Southern stakeholders stated that drought and drying seasons negatively affect mental health, and led to business closures. This causes people to move away from the region, reducing population sizes and access to essential skills and services. Mental health pressures are observed particularly in successive dry or damaging event seasons, with people withdrawing from social interaction, impacting on volunteering and philanthropy.

Notably, Aboriginal communities are likely to be disproportionately affected by drought, based on pre-existing health and social disadvantage. Dry seasons and climate change impacts were highlighted as two of several linked factors that have damaged the foundation of Noongar identity and well-being. The effects of dry seasons are felt most strongly in First Nations communities as people feel Country hurting. This is also felt by the youth who feel a disconnection from country, leading to struggles retaining identity and culture¹⁶. There are however opportunities to increase the resilience of our First Nation communities through on-country restoration programs, to help Noongar people connect with landscape and share cultural knowledge.

Further work is required to unpack and further understand the links between social and economic impacts and environmental and economic predictors in the context of drought. However, inland Great Southern consultation identified that drought and a drying climate presents an existential threat to ongoing cultural connection to the land.



“ Country is pretty important to us. I see the overload of community when it becomes part of someone - it takes their wellbeing. I see young fellas who don't get out into the bush enough. It takes away their identity and they start to lose it.

(Noongar stakeholder engagement participant, 2022).

”

¹⁶ Noongar Land Enterprise Group (2022). Valuing Noongar People and Practices in Drought Resilience.

Future Scenarios

The intensity and duration of hot spells is projected to increase across WA, with wet years likely to become less frequent, and dry years (and drought) likely to become more frequent. Analyses of rainfall and temperature data highlight a potentially concerning trend, with the composite hazard of hot drought beginning to occur in recent years¹⁷. Appropriate steps must be taken to anticipate and mitigate the potentially devastating effects of hot droughts. Analysis of climate data over recent decades has demonstrated six key messages relevant to the sustainable and profitable management of our agricultural land¹⁸:

- mean temperatures are rising
- annual rainfall is declining
- autumn and winter rainfall is declining
- spring and summer rainfall is increasing
- predictions indicate that these trends will continue
- in the short term, year-to-year climate variability may be more important than the longer-term trends

Additional future impacts of climate to consider at a 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 emission

Crop and livestock farms in the region are likely to be adversely affected by a changing climate, with projected increases in extreme events. Through increases in extreme events, water supplies may not be able to meet industry and community demand. The potential future environmental impacts of drought are soil degradation, in particular soil erosion, increasing risk of fire, and ongoing biodiversity loss.

The Inland Great Southern Drought Vulnerability Assessment describes future drought scenarios and details the vulnerability of the region to future climate impacts, along with potentially transformative actions. Research commissioned by DPIRD¹⁹ highlights transformative solutions to build drought resilience of the community, regional businesses, and agriculture. The project pipeline underpins the Regional Drought Resilience Plans and pending investment framework. The overarching objective when implemented, will ensure the transformative projects will build the resilience of the communities and regional businesses.

Research areas were identified by mega trends and short-range trends, their impact on the regions and what type of change they would drive. Seven categories were then identified: water, digital, farm business, farming systems, natural capital, community resilience and regional economy resilience (table below).

The level of innovation is high within the Great Southern region and this information was captured where possible to provide the opportunity to leverage existing projects to support increasing resilience.

MEGA TREND	IMPACT/RELEVANCE
Supply and demand shocks	High input costs – substitution inputs, tight supply commodities, confidence agriculture industry, land value increases
Food trends	Vegetable oil and plant protein demand, aquaculture product demand, onshoring meat production
Climate crisis	Need for adaptive responses, ecosystem services, natural capital market, carbon market opportunities
Resource scarcity	Oil, gas, water, labour underpinning inputs for the region's economy
Digital transformation	Connectivity is the new highway, and data is currency
Neo-ecology	Sustainability becoming major economic driver
Globalisation and pandemics	Less safe world, which is very connected, ongoing impact from major events and tensions
Wellbeing	Wellbeing of communities impacted by drought

Table 4: Mega trends and short-range trends and potential impacts on regions

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

18 Anderton, L. (2022). Economic Review on the Impacts of Drought. Regional Drought Resilience Planning 2022. LA. One Economics and Consulting.

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

07 Building on Existing Resilience



The agricultural regions of South-West of Western Australia are a success story in terms of climate adaptation to date. While regions like the inland Great Southern are exposed to the impacts of climate change, farmers have demonstrated a very high level of innovation to climate variability and reduced growing season rainfall. This includes strong advancements in farming technology such as spray innovations to reduce water consumption and tramline farming. It must be recognised that there is substantial collective experience in dealing with adverse conditions and innovation and increased technological advancements. Much can be learned from what is already happening within our communities and farming businesses.

The sector has a good track record with increasing levels of grain production occurring despite reduced growing season rainfall. The dryer seasons in the Great Southern have seen a shift towards more cropping, particularly canola, which is very profitable and reduces the risk of water logging in areas such as Cranbrook.

All farmers indicated that they have plans and seeding 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 region has a number of highly valued grower groups who are actively involved in activities that support the production, profitability and sustainability of their members through farmer-led collaboration, participatory research and peer to peer learning. The South-West Western Australia Drought Resilience and Innovation Hub is actively working with grower groups to develop and enhance the uptake of farmer-centred drought innovation and adoption practices in the region.²⁰

South Coast NRM is an organisation involved in initiatives and programs that support the regeneration and sustainability of local landscapes. The Gondwana Link program, supported by a number of local, national and global organisations, is highly active in reconnecting natural habitats across the South West.

Regional stakeholders identified a number of initiatives worth noting that have been successful in supporting communities through the challenges of drought. These are summarised below, according to each of our five regional resilience themes. Through South Coast NRM discussions²¹ with the community, it was clear that a “holistic” approach is needed to make our region more resilient in the face of future droughts.

Drought or dry seasons have encouraged better farming practices and planning, bringing farmers’ attention to improvements required. Some farmers have worked harder to increase drought resilience, although there is room for some enterprises to improve their cost structuring and farm planning.



“ Building recognition of the impacts of drought and what’s needed for resilience should be an ongoing conversation - set the groundwork in the good times to prepare for the bad times. ”

South Coast NRM Community Consultation Report 2022 for the Inland Great Southern).

”

Farmer interviews conducted by South Coast NRM²² indicated a strong level of existing resilience amongst agricultural businesses in the inland Great Southern region. The responses revealed that farmers:

- recognise adverse seasonal conditions and fully understand the impacts of dry seasons on their business
- see business planning as a way to limit the stress, with the need to be adaptable and flexible
- noted the need to read the season and make early decisions
- were aware of changing climate trends

²⁰ Grower Group Alliance 2022. South West WA Drought Resilience Adoption and Innovation Hub. Available [here](#).

²¹ South Coast Natural Resource Management Inc (2022). Regional Drought Resilience. Community Consultation Report for the Inland Great Southern. Prepared for the Department of Primary Industries and Regional Development

²² South Coast Natural Resource Management Inc (2022). Regional Drought Resilience. Community Consultation Report for the Inland Great Southern. Prepared for the Department of Primary Industries and Regional Development

Theme 1: Resilient Water

Snapshot of what's working:

- Water harvesting projects
- Community Water Supply Program providing grants for community water supply improvements provided by Department of Water Environment and Regulation (DWER)
- Water Smart Farms – a program demonstration innovative options to increase water harvesting, storage and desalination options
- Farm Water Rebate scheme and Farm Management Deposit scheme to support farm businesses through drought, and in preparing for drought
- Technology to improve water harvesting and storage
- Interconnected dam strategies to maximise water storage efficiencies i.e. Gnowangerup
- More farmers exploring and equipping ground water supplies
- Government provision of emergency water supplies
- Waterwise towns program. In the Great Southern region, the program is being adopted in Gnowangerup, Katanning, Kojonup, Tambellup and Pingrup
- Stormwater recycling schemes for irrigating public open space and/or providing emergency agriculture supplies
- Policies that encourage water re-use policies including decentralised water supplies such as plumbed-in rainwater tanks, greywater recycling and water efficient appliances for new residential developments.²³



“ Gnowangerup Airport Dam funded through DWER’s Community Water Supply Program, in partnership with the Shire of Gnowangerup. Completed in 2021.

”

²³ Clifton, P. and Price, M. (2022) Regional Water Issues and Policy Analysis – Non-potable water: Southern Wheatbelt and Inland Great Southern, Western Australia.

Theme 2: Resilient Communities

Snapshot of what's working:

- Community events and projects supporting ongoing connection and opportunities to volunteer
- Participation in on-country land restoration projects
- Sharing cultural knowledge
- Maintaining green spaces and accessible community spaces to support social connection, particularly through sport and cultural events, and networking opportunities
- Counselling services to support those farmers dealing with dry seasons, and extending this support to regional businesses
- Sharing lessons learned from previous droughts and the community experiences of how they have adapted when going through a drought period



“ Participation in restoration projects gets Noongar people out on Country. Spending time on Country helps Noongar people connect with the landscape and share cultural knowledge. These projects, in addition to their restorative benefits and mental health effects, are also mechanisms for the maintenance and transmission of Noongar culture.

(Indigenous stakeholder participant 2022).

”

Theme 3: Resilient Agriculture

Snapshot of what's working:

- Drought mitigation and planning through shared experiences and farmer networking
- Encouraging farmers to adopt practices to become more profitable and sustainable, with a focus on carbon sequestration
- Adoption of research innovation (no-till, new varieties, low input cropping) has been instrumental in ensuring productivity increases despite declining growing season rainfall
- Increasing sophistication of farm business management, including use of professional farm consultants and advisors
- Drought planning
- Exploration of pasture and perennial systems to make use of summer rainfall
- Niche, high value-adding opportunities
- Off-farm income
- Soil health monitoring site and projects aiming to remediate soil acidity and wind erosion
- General sound management such as weed control, appropriate varieties and stock husbandry
- Non-wetting management, such as clay spreading, mouldboard ploughing or application of wetting agents
- Seeking methods for improving soil biology to improve efficiency of inputs such as fertiliser
- Application of lime to improve soil pH and deep ripping for improvement in subsoil pH
- Precision agriculture tools such as GPS monitoring of operations allow for better targeted application of inputs
- Alternative crops and pastures, chickpeas, long coleoptile wheat varieties
- Lick feeders and increased storage facilities for grain and fodder
- Labour-saving technology for stock
- Re-greening farms to benefit biodiversity in a changing climate

Theme 4: Resilient Landscapes

Snapshot of what's working:

- Analysis of climate change impacts and adaptation approaches
- Soil health monitoring site and projects aiming to remediate soil acidity and wind erosion
- Supporting farmers with knowledge and tools across the Southern WA agricultural regions to regenerate saline and marginal production lands (Gillamii)
- Improving farming practices to build soil health
- 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, seedling raising and revegetation efforts
- Noongar people bringing value from cultural knowledge and practices
- Switching to sustainable farming solutions



“ But there are good things going on - there is “a lot of seed collection and replanting and revegetation, especially at the Stirlings. You are starting to see where there are more trees planted. You start to see more rainfall, so it is not all doom and gloom”.

(Noongar stakeholder, 2022).

”

Theme 5: Resilient Regional Economy

Snapshot of what's working:

- Business diversification
- Value-adding to existing agricultural enterprises
- Improved online presence and e-commerce
- Good business planning
- Learning from experience
- Accessing professional advice
- Strong interest and commitment in the region for Noongar engagement and participation to support resilience activities ²⁴
- Katanning has a high level of business diversity (less reliance on agriculture)

²⁴ Wrigley, M. and Bartlett, K. (2022). Great Southern Inland Regional Drought Resilient Plan – Report on Aboriginal Community Consultations. Prepared in collaboration by Keogh Bay; South Coast NRM and Gillamii Centre for the Department of Primary Industries and Regional Development.



08 Opportunities Moving Forward



Shire of Gnowangerup - Street Art

Whilst the region already has several initiatives and interventions that are working well in terms of dry season preparedness and mitigation, efforts should be made to reduce socio-economic vulnerabilities and increase institutional capacities. Through the stakeholder engagement process, a number of opportunities for drought resilience were identified.

Inland Great Southern communities are very dependent on the agriculture sector for their economic well-being. This means climate variability and dry seasons could impact on the economic and social wellbeing of these communities. The region also faces several resilience challenges, including economic diversification and access to infrastructure and services. **The number one issue of concern for inland Great Southern communities is having confidence in existing available water systems to ride out at least two successive drought years.**

South Coast NRM stakeholder²⁵ engagement revealed key whole of landscape, whole of business, and whole of community resilience challenges. These include:

- the need for extension of drought preparedness information
- communications consistency in the delivery of planning and mitigation actions
- support for existing networks that work at the ground level (eg. grower groups and community landcare groups)
- a more holistic approach to drought response (impacts don't stop at the farm boundary)
- the need for mental health and wellbeing need to be supported individually and at a community level
- the need to build and restore natural resources

The following is a summary of the key areas of opportunity for improving drought resilience. These are structured around each of our five resilience themes. More details on this can be found in the Inland Great Southern DVA.

Theme 1: Resilient Water

Targeted research, development and extension to build on water efficient farming systems and practices, and investment in water infrastructure, would further support ongoing agricultural resilience. Improved planning and coordination of future water needs was identified as a key opportunity for industry, agriculture and community use, supporting ongoing growth and development of the region.

Investigation of alternative water sources is an opportunity that should be pursued, along with reducing distances between off-farm water sources and increasing the capacity of community water sources. Also important is the bolstering of scheme capacity to support regional communities' non-potable and potable water supplies. Considerable work has been undertaken in the Great Southern to address rising saline groundwater beneath farming land and rural towns. This water could supplement farm and emergency community water supplies and alleviate the pressure on schemes that supply potable water.

²⁵ South Coast Natural Resource Management Inc (2022). Regional Drought Resilience. Community Consultation Report for the Inland Great Southern. Prepared for the Department of Primary Industries and Regional Development.

Theme 2: Resilient Communities

Mental health pressures are amplified in rural communities in successive dry or damaging event seasons. This manifests through people withdrawing from social interaction, impacting on volunteering and philanthropy which often form the fabric of many communities. The challenges to maintain green spaces in towns and the decline in natural resource condition (soil erosion, water erosion, vegetation decline) adds to the mental health burden associated with drought and directly impacts social cohesion. The delivery of high-quality, large-scale events held in the region provides significant regional economic benefits to the region.

Through regional stakeholder engagement, it became clear that opportunities for strengthening Indigenous knowledge through creating and maintaining access to land and sea Country is very important for social and community resilience. Fostering strong partnerships that enable the building of respect and appreciation for Indigenous knowledge and the harnessing of intergenerational knowledge, peer-to-peer learning opportunities and leveraging networks are highly valued and important opportunities to be pursued²⁶.

Theme 3: Resilient Agriculture

There are 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 information to farming communities about the potential for drought conditions would allow for timely decisions. There is an opportunity to establish a network of 'typical' farms in WA to monitor farm performance and volatility of climate impacts which would be a cost-effective and more informative strategy to understand the impacts of seasonal conditions.

Transitioning to regenerative agriculture practices has also been identified as fundamentally important to meet climate change targets, food security needs, protect farmland and build healthier food systems in addition to carbon farming opportunities.

²⁶ Noongar Land Enterprise Group (2022). Valuing Noongar People and Practices in Drought Resilience.



“ The Inland Great Southern Drought Resilience Plan presents for consideration a range of interventions and actions to support the preparedness and economic, environmental, and social resilience to future droughts in the region. ”

Theme 4: Resilient Landscapes

Stakeholder consultation in the region revealed a number of opportunities for Aboriginal businesses to participate and benefit from initiatives to support drought resilience. In particular, participation in landscape conservation and restoration activities such as seed collection to support revegetation and carbon farming projects offer potential economic opportunities for Aboriginal people.

Environmental stewardship programs, informed participation in carbon farming, and extension and adoption programs were identified as opportunities to improve environmental resilience. Developing and sharing Noongar “science” to support the improved condition and potential restoration of significant gathering places such as the water pools, was an expressed desire of Noongar Elders.

Noongar people hold valuable and in-depth knowledge about the nature of the Great Southern. As a result, opportunities should be sought to engage the Noongar community in leading and being involved in any restoration-related projects. It was suggested that an innovative project to support Noongar cultural maintenance and relationships in the inland Great Southern might be to establish a “Noongar-friendly landowner network” willing to allow Noongar people to do some, or all, of the following on their land²⁷:

- Access remnant bushland
- Gather bush foods and medicines
- Run revegetation projects on parts of their land
- Take kangaroos and emus and other game
- Control feral animals
- Visit important sites and locations that may have previously been inaccessible
- Camp
- Conduct traditional burning in remnant native vegetation

A Noongar led framework of action to support improved engagement in land management was suggested as a way forward.

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. Improved understanding and advocacy for regional enabling infrastructure to support economic growth is considered essential for building dry season and climate resilience.

Additionally, there is the opportunity to develop ‘culture based’ economies in areas such as biodiversity conservation, land and water management and carbon sequestration. A project identified during stakeholder engagement, included the option to integrate carbon farming to low-value agricultural land – across a number of properties. This is an example of a project that would have significant benefits to the environment, in addition to a potential economic benefit to landholders in the region.

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
- extension of farm management deposits to rural businesses that rely on agriculture

A demonstrated ability for the agricultural industry, regional businesses and communities to adapt to changing conditions make the region an excellent candidate for future drought resilience action.

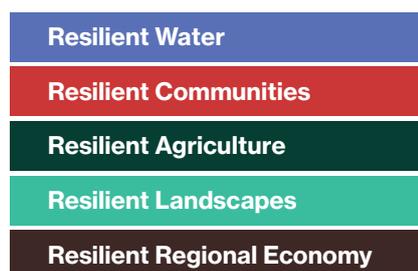
²⁷ Wrigley, M. and Bartlett, K. (2022). Great Southern Inland Regional Drought Resilient Plan – Report on Aboriginal Community Consultations. Prepared in collaboration by Keogh Bay; South Coast NRM and Gillamii Centre.

09 The Plan



Stirlings - Tourism WA

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



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. 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.

Interventions identified as part of the formal Transformative Review undertaken by AgDots have also been included. The implementation of these resilience building actions is subject to further discussion with Consortia stakeholders.

9.1 Resilient Water

Theme Outcome

The region has a water system the community has confidence in to sustain industry, agriculture, and the community through consecutive decile 1 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

The inland Great Southern's potable water source is provided by externally sourced piped scheme water via Great Southern Town Water Supply scheme. During dry periods, scheme water resources are strained. Non-potable strategic water supplies and on-farm supplies are often unable to cope with more than two dry seasons. Dry seasons and reduced growing season rainfall result in increased draw on scheme water and strategic community water supplies, triggering water deficiency declarations. Water supply development occurs sporadically and is undertaken by multiple organisations. Improved planning and coordination of future water needs was identified as a key opportunity for industry and community use, supporting ongoing growth and development of the inland Great Southern.

THEME 1: RESILIENT WATER

INTERVENTION	PROPOSED ACTION
Future looking and coordinated total water management planning.	<ul style="list-style-type: none"> • Review and update LGA emergency water supply plans • Review water requirement for regional road works and firefighting capabilities, and identify risks in supply during times of drought • Update regional water strategy for the Great Southern, taking into consideration supply and demand requirements of non-potable water, and capacity from scheme, groundwater and surface water resources • Review Water Deficiency Declarations Policy, including a review of cost of scheme water for regional communities in drought • 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 • Develop a platform to make this information available to decision makers and planners on current demand and availability of water across the region (include Standpipe access, strategic community water supplies) • Farm water budgeting - assist farmers to integrate climate information, increased demand for water into on-farm water supply plans to ensure farms are not at risk for two dry seasons
Better water data to support planning and better regional development outcomes	<ul style="list-style-type: none"> • Understand regional water development constraints to support business investment decisions and consideration of options to address constraints • Review capacity of regional bores that provide drought relief • Review risks of water demands for key industries in the Great Southern • Improve the security of strategic community water supplies through swipe card access • Undertake detailed hydrogeological surveys in areas at risk of drought to identify potential groundwater resources for non-potable water use (including new technologies/desalination)
Improving the uptake of on-farm and household water supply	<ul style="list-style-type: none"> • Investigate and promote cost effective water quality treatment options to improve water quality on-farm • Demonstrations of water monitoring technology on-farm • Support access to hydrogeological expertise to investigate groundwater opportunities to support regional communities access water for agriculture and industry development
Regional small water infrastructure projects	<ul style="list-style-type: none"> • Review options to extend scheme and increase/buffer capacity to fill gaps in high-risk areas • Implement a program of water-related project upgrades to address urgent gaps in the water supply system (based on DWER/LGA/Water Corporation planning)
Optimising use of water in communities	<ul style="list-style-type: none"> • Develop proactive regional water improvement incentive scheme (farm water planning/farm water rebate scheme/rainwater tank subsidies)
Transformative Actions Identified through AgDots Review	<p>Transform</p> <ul style="list-style-type: none"> • 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 (e.g., DamCat project acceleration) • Incentivise on-farm water infrastructure investment

9.2 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 small communities in the inland Great Southern are particularly exposed to dry season impacts, given the high dependence on agriculture and the high levels of volunteerism that support social connection. The uncertainty and financial stress associated with future droughts has the potential to negatively affect mental health in regional areas.

Drought also contributes to failed businesses, causing people to move away from regional communities. Smaller communities lack access to community services and support networks in the region. Noongar community members see drought in the context of wider changes to the natural environment including land clearing, damage to rivers and creeks, changing climate and ecological responses. Drought was noted as one of the several linked factors that have damaged the foundation of Noongar identity and well-being.²⁸

THEME 2: RESILIENT COMMUNITIES	
INTERVENTION	PROPOSED ACTION
Community Health and Wellbeing	<ul style="list-style-type: none">• Development of drought responsive wellbeing programs to support key areas including mental health, women, businesses, community groups and farmers• Complete local community wellness plans based on local needs and drought resilience risks• Establish regular regional visiting mental/financial counselling/physical health specialist program that is visible and delivery is considerate of local needs and sensitivities, matched to drought status
Events and green spaces to support community connection	<ul style="list-style-type: none">• Provision and maintenance of green spaces for regional towns during drought events• Innovative flexible community events funding program with a defined trigger for access during drought events• Support LGA's, communities and Grower Groups with Drought Officers, providing support and knowledge/access to funding assistance
Access to educational opportunities closer to home	<ul style="list-style-type: none">• Education - review option of providing year 7 for smaller regional communities impacted by drought• Improved online learning options for regional people - qualifications on-line (subsidised options)• Enhance visibility of the regional University Centres/TAFE opportunities

²⁸ Wrigley, M. and Bartlett, K. (2022). Great Southern Inland Regional Drought Resilient Plan – Report on Aboriginal Community Consultations. Prepared in collaboration by Keogh Bay; South Coast NRM and Gillamii Centre.

THEME 2: RESILIENT COMMUNITIES

INTERVENTION	PROPOSED ACTION
Development of local leadership capacity and enhancing social capital	<ul style="list-style-type: none"> • Statewide drought plan to include appropriate indicators and response mechanisms to support regional communities in drought (including a reviewed communication and reporting mechanism from regional communities to State and Commonwealth Government) • Enhance local leadership capacity through encouraging participation in leadership programs • Identify mentors in and out of the community (drought champions) • Support for inter-regional tours of growers and community leaders to share drought experiences and practices • Support an active network of arts/culture/community organisations during times of drought • Cultural connections and learning - increase collaboration between Noongar organisations, farmers and natural resource management / landcare groups in planning and implementing land restoration projects to increase climate resilience
Increasing community capacity to understand, plan and manage for drought	<ul style="list-style-type: none"> • 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/climate change impacts • Drought Platform - one stop shop for support mechanism - enhance visibility of support mechanisms of relevance to the region - (regionally relevant tools, referral agencies, technical information); case studies of local champions that are implementing climate change adaption and dry season/drought preparation on-farm; locations of relevant research, demonstration sites and trials • Drought responses further validated based on appropriate drought indicators and identified vulnerabilities contextualised to Western Australian agricultural systems
Support evidence-based policy and program response to address drought resilience in vulnerable cohorts	<ul style="list-style-type: none"> • Conduct research into the true impact of drought and concepts of 'resilience' on rural, remote and regional women - what is the most appropriate response from a policy perspective • Match financial Counsellor and drought support workers to demand - develop triggers, linked with drought check in programs
Natural resource condition report card and natural capital accounting for the regions	<ul style="list-style-type: none"> • Develop a program to monitor and record impact of drought on natural resources (report card instigated during times of drought) • Include appropriate measures into DVAs (water quality and availability, soil health (biology, carbon), pests and weed incursion, vegetation condition, salinity, and erosion) • Enlist support of regional landcare groups and Aboriginal rangers to support resource condition monitoring and restoration during and post drought events • Better articulate the economic and social value of natural resources and ecosystem services - natural capital accounting for the regions; and impact on capital during times of drought
Building regional capacity to manage natural resources	<ul style="list-style-type: none"> • Support the regional NRM organisations to target and leverage grant opportunities to assist landcare groups and grower groups become more drought resilient • Support expansion of Aboriginal ranger program to embed traditional knowledge into natural resource management
Best bet land and infrastructure design uses to support improved natural resource functioning	<ul style="list-style-type: none"> • Identify diversified options for land not suitable for cropping or livestock such as native bush food collection • Explore how on-farm and town water structures can support environmental functioning (e.g. better dam design to replicate wetland functioning/filtering; evaporation control; drainage planning)
Quantifying the impacts of regenerative agriculture practices during and post drought	<ul style="list-style-type: none"> • Investigate and champion opportunities for uptake of regenerative agriculture practices that support drought resilience in the region (increasing groundcover; integration of animals; improving soil health)

9.3 Resilient Agriculture

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 still 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 including economic diversification and access to infrastructure, services and reliable, good quality water.

However, the agriculture sector across the region has made major changes to farm management practices to limit the impacts of reduced growing season rainfall and dry seasons on businesses. These include managing their debt, accessing farm management and business support, de-stocking early and / or permanently, improving soil acidity and water retention capability, increasing on-farm water storage and optimising pesticide and fertiliser use. The sector 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. The region has a large number of highly valued grower groups who are actively involved in activities that support the production, profitability and sustainability of their members through farmer-led collaboration, participatory research and peer to peer learning.

THEME 3: RESILIENT AGRICULTURE	
INTERVENTION	PROPOSED ACTION
WA Drought Indicators Platform and longitudinal monitoring program	<ul style="list-style-type: none"> Adapt the National Climate Drought Indicators platform for WA - develop WA specific climate/drought indicators and platform to support early forecasting, detection and reporting, of drought Develop an appropriate drought criterion for Western Australia (seasonal rainfall, researching use of rainfall percentiles, or other more appropriate criteria as triggers for drought support programs) Further investigate the application of drought indices relevant for the Great Southern Further research on 'hot droughts' - current and predicted impacts on agricultural production Further define the RDRP DVA methodology, updating as new information comes on board; advocate for improved data quality collected by ABS/ABARES and appropriate criteria. Develop a State-wide Drought Plan, documenting roles and responsibilities of all agencies with appropriate response and support mechanisms

THEME 3: RESILIENT AGRICULTURE

INTERVENTION	PROPOSED ACTION
Building drought, climate and carbon literacy to support risk management and planning	<ul style="list-style-type: none"> • Improve regional access to extension program to increase knowledge on climate and weather patterns and forecasting, including use of existing tools such as DR-SAT, CliMate, DPIRD Statistical Seasonal Forecasting • Support initiatives to build regional climate monitoring capacity • Extension programs to support land managers to use available industry approved tools to calculate carbon footprint and to support decision making to mitigate the impact of climate change, drought and dry seasons on land and economic assets • Identify local champions that are implementing climate change adaption and dry season/drought preparation on-farm to document and share their experiences • Improve the adoption of on-farm water management improvements through integration of water planning modules into existing farm business planning decision making tools • Cost benefit analysis of innovative wate resolutions and maintenance of existing infrastructure • Support delivery of Farm Business Resilience and Small Business climate resilience planning workshops in the region; including focus on financial strategies to mitigate drought impacts • Support Aboriginal landholders to build drought resilience in their enterprises
Connection and collaboration for identifying, prioritising and implementing research and development needs for the region	<ul style="list-style-type: none"> • Articulate and communicate key drought R&D priorities for the region through targeted grower group • R&D forum and future farming system workshop, including strong engagement with the SWWA Drought Hub and key industry stakeholders (MLA, GRDC) • Identify and implement opportunities for 'in my backyard' innovation demonstrations relevant to the region, including digital farm demonstrations to increase uptake of drought innovation and research • Advocate for extended field testing of long coleoptile wheat varieties (200mm +) in WA's low-medium rainfall grain belt 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 AASF in WA in target areas for this program
Better understanding risk	<ul style="list-style-type: none"> • Assess the risk and impact of drought on the agricultural supply chain • Investigate improved agricultural weather insurance products and access to products
Collaboration and extension support for drought resilience	<ul style="list-style-type: none"> • Support local Grower Groups and local community groups who provide a valuable role to implement drought adaption initiatives • Support farmers to develop drought plans for their farms
Transformative Actions Identified through AgDots Review	<p>Transform</p> <ul style="list-style-type: none"> • Build capability for usage of on-farm data for insurance index products • Support grower education/training for financial risk management tools • Advocate Farm Management Deposit maximum cap to be relative to the size of the business • Evaluate impact of drought support programs on-farm businesses • Support research and development and industry development for alternative drought tolerant crops • Support research and industry development for livestock feeding options (carbon positive feed supply e.g., asparagopis) • Support research and increased adoption of low input cropping options (VRT, alternative fuels, electric vehicles, regen farming) • Support research and development for building soil health (greater depth soil amelioration, hostile soil management, biochar) • Support research and development in catchment management initiatives and build soil and water systems health (e.g., landscape ecology and rehydration)

9.4 Resilient Landscapes

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

Consultation with Aboriginal Elders identified that, when country is not healthy, the people are not healthy. A number of initiatives are already being undertaken by local natural resource management and Indigenous groups to mitigate the effects of drought on the natural landscape.

During stakeholder consultation, Aboriginal community members expressed concern over the degradation of the natural environment, through land clearing, and salinisation, worsened by global warming, higher temperatures and dry seasons. Cultural values are steeped in connection to land, and this degradation is of concern in the Noongar community.

Natural resource management support was noted as one of the first things to be cut in a dry season, with no extra time or money for activities like revegetation. At the sub-regional level, management of landscapes to reduce impact of erosion events (e.g. increased levels of vegetation, permanent plantings) and improve biodiversity are areas that need further investigation and support.

THEME 4: RESILIENT LANDSCAPES	
INTERVENTION	PROPOSED ACTION
Natural resource condition report card and natural capital accounting for the regions	<ul style="list-style-type: none">• Develop a program to monitor and record impact of drought on natural resources, longitudinally monitor and incorporate into DVAs; includes water quality and availability, soil health (biology, carbon), pests and weed incursion, vegetation condition, salinity, erosion• Re-establish regional wetland monitoring program to establish environmental values, cultural values and condition of wetlands and the impact of drying seasons (include groundwater dependent ecosystems)• Enlist support of regional Landcare groups and Noongar Boodja Rangers to support resource condition monitoring• Identify and monitor indicator species for changes in the climate (such as the Australasian bittern or noisy scrub bird)• Collect more information on threatened species biology and ecology, particularly climate tolerances• Better articulate the economic and social value of natural resources and ecosystem services - natural capital accounting for the regions; and impact on capital during times of drought

THEME 4: RESILIENT LANDSCAPES

INTERVENTION	PROPOSED ACTION
Building regional capacity to manage natural resources	<ul style="list-style-type: none"> • Support sub-regional groups to ensure targeting and leveraging of NRM grant opportunities • Promote actions to improve soil health (e.g. increased soil cover, organic matter) and ensure that actions are implemented to retain a vegetative cover/structure to protect topsoil • Support expansion of Noongar Boodja Ranger program; encourage expansion of traditional knowledge into natural resource management • Promote the principles of land rehydration and support the process through education and funding for on-ground actions/trials/demonstrations • Provide opportunities for on-country projects, recognising that on-country activities enable intergenerational transfer of knowledge and build connection to country and offer viable business opportunities
Inland Great Southern Revegetation	<ul style="list-style-type: none"> • Develop a strategy for optimised carbon plantings to ensure triple bottom line benefits; includes mapping of suitable locations that do not compromise agricultural productivity, provide biodiversity benefits (create habitat corridors) and economic opportunities for landholders • Build carbon farming literacy through delivery of workshops and accessible information/support on carbon farming opportunity to support uptake of appropriate opportunities • Build resilience by large scale re-vegetation, build connectivity and improve mosaic landscapes (using priority areas as identified in the South Coast Macro-Corridor Project and the NRM Planning for Climate Change MCAS modelling, Gondwana Link) • Monitor increased fire risk with vegetation management and fire research
Best bet land and infrastructure design uses to support improved natural resource functioning	<ul style="list-style-type: none"> • 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 functioning/filtering; evaporation control • Investigate opportunities for uptake of regenerative agriculture practices that support drought resilience in the region - increasing groundcover; integration of animals; improving soil health
Quantifying the impacts of regenerative agriculture practices during and post drought	<ul style="list-style-type: none"> • Investigate opportunities for uptake of regenerative agriculture practices that support drought resilience in the region - increasing groundcover; integration of livestock and improving soil health
Ecosystem services	<ul style="list-style-type: none"> • Marketing of good land stewardship (e.g. case studies) • Environmental services • Catchment plans to support holistic landscape scale actions • Continue updating and implementing the Regional NRM Plan (Southern Prospects) – a regional context and framework for catchment management.
Transformative Actions Identified through AgDots Review	<p>Transform</p> <ul style="list-style-type: none"> • Support natural capital framework development in WA Agriculture • 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) and create a model to provide co-benefits and support local communities and businesses

9.5 Resilient Regional Economy

Theme Outcome

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

FDF Strategic Priority

Economic 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.

Current Situation

Despite a declining or stagnant population growth, the Great Southern region's gross regional product is growing as the agricultural and mining sector grows, and small and medium enterprises establish to service those underpinning sectors. 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.

THEME 5: RESILIENT REGIONAL ECONOMY	
INTERVENTION	PROPOSED ACTION
<p>Addressing constraining enabling infrastructure to support industry growth and regional resilience to climate change</p>	<ul style="list-style-type: none"> 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; Great Southern water supply plan (refer to water resilience actions) Great Southern 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 Work with relevant organisations to develop and implement a worker accommodation strategy
<p>Supporting economic diversification and business development in the region to capitalise on growing agriculture and mining sectors and the region's unique features</p>	<ul style="list-style-type: none"> Regional collaboration to support tourism product development related to regional CRC Innovation and Incubation Centre strategy - explore leveraging the existing CRC networks to support business incubation in regional communities, including partnerships with networks outside the region Identify and share case studies of agribusiness diversification, build on the network of businesses who are value-adding to commodities and developing niche, high value products; Quantify and qualify the impact of small and medium enterprises in the region and true dependency on agriculture Understand extent and plans for mining activity in the region; explore opportunity for mining projects to support local content and local workforce development and encourage business expansion or establishment In-drought support programs developed and encourage genuine local expenditure/local content outcomes Expand Stand Alone Power System program to support energy efficiency on farms and improved reliability

THEME 5: RESILIENT REGIONAL ECONOMY

<p>Transformative Actions Identified through AgDots Review</p>	<p>Transform</p> <ul style="list-style-type: none"> • Improve connectivity through co-investment in digital infrastructure (includes backhaul + wireless networks to farms) • Build tech skill and support in agriculture (connectivity literacy, data management capability, farm tech capability of industry) • Regional tech support built within regions (CRC flying squads) and develop long term plan to build tech capacity in regions • 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 (e.g., 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
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10 Plan Implementation and Enduring Governance

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.

The implementation of the Plan, including identification of priority program areas and the Plan's enduring governance and ongoing resourcing, will be subject to further discussion in coming months with Consortia local governments and potential program delivery partners. While locally-led delivery of the Plan is preferred to ensure maximum community buy-in and impact, resourcing to implement the Plan requires resolution.

Successful plan implementation should consider projects for investment as drought preparedness measures against those that could be delivered during an actual drought event. Drought mitigation actions are best implemented well in advance of any drought event to mitigate drought induced impacts on local farming communities.

11 Investment Framework

An Investment Framework supporting the RDRP Plans is being developed to identify priority program areas and potential resourcing opportunities. This will be subject to further discussion in coming months with Consortia local governments and potential program delivery partners, including the South-West WA Drought Resilience Adoption and Innovation Hub.

This work will include the principles of the 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.

What is drought resilience and preparedness?

BACKGROUND

The WA Government is committed to ensuring our regions are equipped to manage the impacts of drought by being more prepared and resilient.

The WA Government, through the Department of Primary Industries and Regional Development (DPIRD), is working with the Australian Government's Future Drought Fund to support partnerships of regional

organisations, local government, communities and industry to develop Regional Drought Resilience Plans (DRPs).

This pamphlet outlines the core elements of an Investment Framework which will enable the Western Australian State Government to assess, rank and prioritise its investment in this critical area of drought resilience and preparedness.

Investment Framework Criteria

			WEIGHTING	RANKING	RESULT
IMPACT	Social	Benefits	33%	6	4.33
	Environmental	Benefits	33%	3	
	Economic	Return on Investment	33%	4	
			100%		
FEASIBILITY	Capability	Capacity, skills and expertise	20%	8	4.8
	Approvals	Planning and Approvals	20%	4	
	Risks	Project risk	20%	6	
	Strategic Fit	Aligns with Existing Programs	20%	4	
	Timeframe	Project delivery timeframe	20%	2	
			100%		

“ Given the needs of communities preparing, responding and recovering from drought and maintaining a resilience to do so, there needs to be a mechanism to prioritise the allocation of Government funding. This tool provides a framework to assist with this goal.

IMPACT



FEASIBILITY



COST

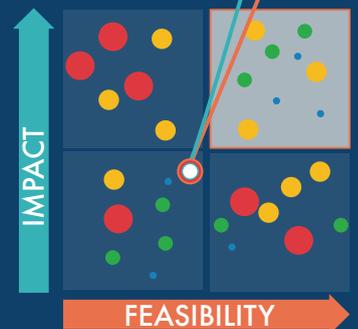


Figure 16: Investment Framework for RDRP Program

12 Monitoring and Evaluation

12.1 Context

Monitoring and evaluation is a critical component of effective planning. It provides the framework to assess progress of implementation, adapt strategies and ensure that the plan ultimately achieves its intended outcomes. The Inland Great Southern Regional Drought Resilience Plan Monitoring and Evaluation Framework sits within the broader context of the Future Drought Fund (FDF) Monitoring, Evaluation and Learning Plan (MELP) and the WA RDRP Monitoring Evaluation and Reporting Plan (MERP).

The Great Southern Development Commission has the role of initiating actions in line with the Plan, reviewing progress against the Plan objectives and making changes to the Plan as needed to maintain its relevance and usefulness.

During the program period, reporting against the MELP and MERP is coordinated by the Department of Primary Industries and Regional Development (DPIRD) in WA, including monthly dashboard reporting, and annual reporting including acquittal report at program completion. The MERP also includes a client survey at the completion of the program to collect qualitative data on engagement, capacity and understanding of drought resilience.

A FDF Steering Committee formed within DPIRD will provide high-level monitoring and evaluation of the program at a State level. **FDF indicators of success** include:

Short term:

- Regional representatives have considered and planned incremental, transitional and transformational opportunities to strengthen resilience.
- Identified actions, pathways and opportunities (including innovative and transformative) to improve regional drought resilience, mitigate risks and adapt to change.
- Communities use relevant data and information to better understand their resilience to plan for drought.
- Plans have buy-in from key stakeholders in the region.
- The number of, and participation in, local networks and programs to enhance drought resilience increases.
- Communities share knowledge, collaborate and partner with government more often to build drought resilience.
- Regional leaders are in a stronger position to implement strategic actions, adapt to change and take advantage of opportunities to build economic resilience as they arise.
- Partnerships, networks and engagement are built between stakeholders managing natural resources.
- Increased community understanding of the region's current and future drought resilience, considering the region's unique economic, environmental and social characteristics.
- Natural resource management capability is improved across region.

Long term:

- Agricultural landscapes are functional and sustainable, with healthy natural capital (environmental resilience).
- Agricultural businesses are self-reliant, productive, and profitable (economic resilience).
- Agricultural communities are resourceful, adaptable, and thriving (social resilience).
- Stronger connectedness and greater social capital within communities, contributing to wellbeing and security.
- Communities implement transformative activities that improve their resilience to drought.
- More primary producers preserve natural capital while also improving productivity and profitability.

12.2 Inland Great Southern Regional Drought Resilience Plan Monitoring and Evaluation Framework

The Monitoring and Evaluation Framework (Table 5) outlines how the regional level impact of the Inland Great Southern Regional Drought Resilience Plan will be measured.

The Vision for the IGS RDRP Plan is *'to build a resilient region that can withstand the impacts of dry seasons and climate variability, by creating a sustainable environment, self-reliant communities, and a diverse regional economy.'*

The **Outcomes** driving the IGS RDRP across the five themes are:

1. **Resilient Water:** The region has a water system the community has confidence in to sustain industry, agriculture, and the community through consecutive decile 1 rainfall years.
2. **Resilient Economy:** A diverse, forward-looking, adaptable business sector, not wholly dependent on seasonal conditions.
3. **Resilient Landscapes:** Healthy landscapes with natural resources able to sustain industry and environmental services.
4. **Resilient Agriculture:** An agriculture sector that is highly engaged in innovating farming systems to be resilient to drought.
5. **Resilient Communities:** Communities that are resourceful, adaptable and supported to mentally and physically bounce back from drought.

The Monitoring and Evaluation Framework align with these five theme areas of the IGS RDR, together with the foundational requirement for communities to have access to relevant and up to date information to support planning and implementation. A range of assessment tools will be used to assess progress, including but not limited to surveys, environmental scans, data analysis, direct industry engagements and project counts.

In addition to the qualitative measures in Table 5, the Drought Vulnerability Assessment (DVA) is a key component of the Regional Drought Resilience Planning program. In addition to identifying key areas of vulnerability to inform interventions and actions, the information captured could be used as a baseline for comparison with future assessments to measure the success of the program at building drought resilience.

12.3 Reporting and Responsibility

Though the implementation of the plan will be undertaken by a range of agencies and organisations, the GSDC, with DPIRD, is responsible for monitoring and evaluation through this framework.

Reporting will include progress towards achieving the desired outcomes of the IGS RDRP through the identified interventions and activities. In addition to monitoring, reporting will be used to capture emerging opportunities, record learnings and considerations for future interventions. Short-term evaluation will be captured through DPIRD MERP reporting during the program phase.

FDF Indicators	RDRP Theme	RDRP Summary interventions*	
	Foundational Decision makers and planners have access to relevant and up to date information to underpin planning and activities	Platform for decision makers and planners to access information. WA Drought Indicators Platform and longitudinal monitoring.	
Communities implement transformative activities that improve their resilience to drought.	Resilient Water The region has a water system the community has confidence in to sustain industry, agriculture, and the community through consecutive decile 1 rainfall years.	Optimise use of water and explore alternative water sources for industry and community. Future looking and coordinated total water management planning to support regional development outcomes.	
Agricultural businesses are self-reliant, productive, and profitable.	Resilient Economy A diverse, forward-looking, adaptable business sector, not wholly dependent on seasonal conditions.	Addressing constraining enabling infrastructure to support industry growth and regional resilience to climate change. Supporting economic diversification and business development in the region. Maximising economic development opportunities for communities associated with major projects.	
Agricultural landscapes are functional and sustainable, with healthy natural capital.	Resilient Landscapes Healthy landscapes with natural resources able to sustain industry and environmental services.	Incorporate environmental services and values in agricultural and community landscape planning. Research and adoption of practises that support natural resource functioning. Building regional capacity to manage natural resources.	
More primary producers preserve natural capital while also improving productivity and profitability.	Resilient Agriculture An agriculture sector that is highly engaged in innovating farming systems to be resilient to drought.	Connection and collaboration for identifying, prioritising and implementing research, development and extension needs for the region. Building capacity of regional farmers and supporting services to plan and adapt to a changing climate.	
Agricultural communities are resourceful, adaptable, and thriving. Stronger connectedness and greater social capital within communities, contributing to wellbeing and security.	Resilient Communities Communities that are resourceful, adaptable and supported to mentally and physically bounce back from drought.	Build community capacity to understand, plan and respond to drought. Support initiatives that connect community and engage vulnerable cohorts.	

Table 5. IGS RDRP Monitoring and Evaluation Framework

* Refer to section 9 for the full list of interventions and actions

Indicator	Timeframe
Availability of information to support rapid evaluation of drought risk in the region.	1-4 years
Regional plans reference the IGS RDRP and associated technical reports.	1-4 years 4+ years
Number of projects or initiatives that have been implemented that are aligned to the actions outlined in the Plan or directly support by the Plan.	1-4 years 4+ years
Activities underway to progress identified priority interventions.	1-4 years 4+ years
Increased uptake of alternative/ innovative water infrastructure for farms, industry and community.	4+ years
Investment framework for water infrastructure, underpinned by integrated water planning, is delivered for consortia LGAs.	4+ years
Activities underway to progress identified priority interventions.	1-4 years 4+ years
Investment framework for enabling infrastructure, underpinned by an infrastructure audit, is delivered for consortia LGAs.	4+ years
Activities underway to progress identified priority interventions.	1-4 years 4+ years
Uptake of environmental value assessments such as natural capital accounting and ecosystem services.	4+ years
Activities underway to progress identified priority interventions.	1-4 years 4+ years
Increased R&D focus on drought resilience for Farms and agricultural industry.	4+ years
Activities underway to progress identified priority interventions.	1-4 years 4+ years
Number of community infrastructure projects and events remains steady pre, during and post drought periods.	4+ years

Project Contact

To provide feedback or to obtain further information, contact the Great Southern Development Commission at gfdc@gfdc.wa.gov.au or (08) 9842 4888

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

POLICY/STRATEGY	ALIGNMENT
<p>Australian Government Future Drought Fund</p>	<p>The program will support the long-term outcomes of the Drought Resilience Funding Plan 2020 to 2024, specifically:</p> <ul style="list-style-type: none"> • 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 • 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 <p>This plan is key to delivering on the FDF's three strategic priorities which include:</p> <ul style="list-style-type: none"> • 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
<p>WA Government: Diversity WA - A framework to support the WA Government's Our Priorities July 2019</p>	<p>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.</p>
<p>Department of Water, Strategic priority - Water for Growth 2016 plan</p>	<p>Moving to water sources for a drier climate - this project delivers new information to support the development of climate-resilient water resource support.</p>
<p>Department of Primary Industries and Regional Development, Strategic Intent 2018-2021</p>	<p>Sustainability - this project ensures future generations of agribusinesses will have continued access to support social and economic growth.</p> <p>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.</p> <p>Regional Opportunities - this project will help drive the economic growth, local capability and social amenity of regional communities.</p> <p>Regional growth opportunities will benefit from investment in priority resources to provide drought securities.</p>
<p>DPIRD - Primary Industries Plan 2020-2024</p>	<p>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.</p>
<p>Water Corporation, Water Forever, Towards Climate Resilience 50 year plan, 2009</p>	<p>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.</p>

POLICY/STRATEGY	ALIGNMENT
Western Australian Climate Policy - November 2020	<p>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.</p> <p>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</p>
Regional Investment Blueprint - 2015	<p>Developed by each of the nine Regional Development Commissions, the Blueprints are plans for investment, outlining transformative strategies, priority actions and investment opportunities. This plan identifies four regional imperatives that are fundamental to the region's economic and social development, growth and prosperity to 2040:</p> <ol style="list-style-type: none"> 1. Economic growth and diversification 2. Essential infrastructure and services 3. Knowledge and innovation 4. Community and environment <p>It also specifies 7 transformation projects:</p> <ol style="list-style-type: none"> 1. Growing value (premium food production and value adding) 2. Energy security 3. Water for growth 4. Avenues to opportunity (transport and industry hubs) 5. Connected Great Southern (thriving in the digital age) 6. Destination of natural choice (iconic and creative tourism) 7. Strong communities
Great Southern Development Commission Strategic Plan 2020-2022	<p>By working in partnership with local governments, businesses and communities, the GSDC aims to coordinate and support endeavours that build an integrated regional economy, foster regional growth, and transform our communities into vibrant places to work, play and learn. The GSDC's strategic goals include:</p> <ul style="list-style-type: none"> • Strong and diverse economy • Regional liveability • Strong communities • Organisational excellence
South Coast Natural Resource Management – Southern Prospects 2019-2024	<p>A strategy to guide investment in natural resource management on the South Coast of WA. Provides a common focus for the communities of the SCNRM region to work collectively towards the vision of looking after where we live – communities caring their environment.</p>
Regional Planning and Infrastructure Framework	<p>Identifies each region's vision and provide an important foundation for future decision making, outlining key planning initiatives for each region.</p>
LGA Community Strategic Community plans	<p>Includes economic and community sustainability, quality long term water supply, water security, and water holding infrastructure and harvesting.</p>

Inland Great Southern Drought Resilience Plan

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