



Regional Delivery Partner (RDP) Biodiversity and Agricultural Natural Capital Emergency Preparedness and Response Plan

Prepared by Rangelands NRM

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Emergency Preparedness and Response Plan for Biodiversity and Agricultural Natural Capital Assets in the Rangelands NRM.

This Plan seeks to improve preparedness for, response to, and recovery from emergency events related to Australian Government biodiversity and agricultural natural-capital assets. This will be achieved through improved integration of assets in emergency planning, response and recovery.

The Plan will enhance the resilience of biodiversity and agricultural natural capital assets by recognising the risks and threats posed by disasters and natural hazards and planning to improve outcomes through actions and management before, during (to the extent possible), and post-event to support recovery.

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We acknowledge the Traditional Owners and other Aboriginal and Torres Strait Islander Peoples across the region and pay respect to Elders past, present and emerging.

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Acronyms used in this Plan

AUSVETPLAN	Australian Veterinary Emergency Plan
DAFF	Department of Agriculture, Fisheries and Forestry
DBCA	Department of Biodiversity Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DFES	Department of Fire and Emergency Services (WA)
DEMC	District Emergency Management Committee
DEWR	Department of Water and Environmental Regulation (WA)
DPIRD	Department of Primary Industries and Regional Development (WA)
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPRP	Emergency Preparedness and Response Plan
HMA	Hazard Management Agency
LEMA	Local Emergency Management Arrangements
LEMC	Local Emergency Management Committee
MNES	Matters of National Environmental Significance
MU	Management Unit
NAFI	North Australian Fire Information
NHT	Natural Heritage Trust
NDRRF	National Disaster Risk Reduction Framework (NDRRF)
NLP	National Landcare Program
NRM	Natural Resource Management
OASG	Operational Area Support Group
RDP	Regional Delivery Partner
SEMC	State Emergency Management Committee (WA)
TEC	Threatened Ecological Community
TCHA	Tropical Cyclone Risk Model
WAIP	Western Australia Implementation Plan
WHS	Work Health and Safety
WHSMS	Work, Health and Safety Management System

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1. Background

There is a growing need to enhance our preparedness for disasters resulting from natural hazards and their impact on biodiversity and agricultural natural capital assets. Ensuring the survival of species and places helps preserve critical ecosystem services such as clean air, water, and climate regulation, all of which profoundly affect human well-being. Disaster preparedness bolsters ecosystem resilience, enabling them to recover and flourish following catastrophic events.

Better preparation and response also contribute to stronger regional economies through sectors such as tourism and agriculture. For example, by preparing for disasters, long-term costs for recovery and restoration post-disaster are reduced.

In preparing this Emergency Preparedness and Response Plan (EPRP) 'the Plan', consideration has been given to disaster risk reduction and emergency management frameworks and objectives from the Commonwealth to the local level to ensure a consistent and current approach is achieved within the current resources available to Rangelands Natural Resource Management (NRM).

The National Disaster Risk Reduction Framework (NDRRF), implemented in 2018 by the Commonwealth Government, clearly aims to *"guide national, whole-of-society efforts to proactively reduce disaster risk to minimise the loss and suffering caused by disasters"* associated with natural hazards.

The framework identified four key environments: built, social, natural, and economic.

Aligned with the Sendai Framework, developed in 2015 (the international disaster risk management policy), the NDRRF has established 2030 visions, goals, and priorities.

The Plan contributes, in part, to actions under Target 17 of the Threatened Species Action Plan 2022- 2023 and outcomes 1, 2 and 3 of the Natural Heritage Trust (NHT) by addressing vulnerability from extreme weather events relevant to biodiversity and agricultural natural capital assets identified in the Rangelands Management Unit and improving emergency response and planning within jurisdictions.

The Plan also contributes to Outcomes 1 and 3 of the Climate—Smart Agriculture program by supporting the agriculture sector's efforts to build resilience to climate change and conserve natural capital and farm biodiversity.

The State Emergency Management Framework administers emergency management in Western Australia. It is underpinned by legislation, policy, procedures, and guidelines and outlines organisations' roles and responsibilities for emergency management. The State Emergency Management Committee (SEMC), as defined in the Emergency Management Act 2005, is the peak emergency management body in Western Australia.

The primary responsibilities of the SEMC are:

- Advising the Minister for Emergency Services on emergency management and Western Australia's preparedness to combat emergencies.
- Guiding and supporting public authorities, industry, businesses, and the community in planning and preparing for efficient emergency management.
- Providing a forum for community coordination to minimise the effects of emergencies.
- Developing and coordinating risk management strategies to assess community vulnerability to emergencies.
- Providing a forum to develop information systems to improve communications during emergencies.
- Arranging the preparation of emergency management policies and plans for Western Australia.

At the state level, the SEMC establishes subcommittees that report directly to the SEMC. There are 11 Emergency Management Districts in Western Australia, and the following function with the Rangelands NRM region:

- Kimberley
- Pilbara
- Midwest – Gascoyne
- Goldfields – Esperance

The 2023 Emergency Preparedness Report details that the state's emergency management systemic approach aligns with the NDRRF framework.

The systemic approach to emergency risk management has an increased focus on capabilities to promote 'general resilience'.

As part of the stakeholder engagement process, Rangelands NRM has communicated the plan's development with the State Emergency Management Committee (SEMC) and five District Emergency Management Committees (DEMC), which will, in turn, communicate the plan with the 27 Local Emergency Management Committees (LEMC). Local governments are key players in Western Australia's emergency management arrangements and provide expert knowledge about their communities and environments.

Under the Emergency Management Act 2005 (Western Australia, 2005), a local government must ensure that Local Emergency Management Arrangements (LEMA) are in place. LEMAs are developed to provide a community-focused, coordinated approach to managing potential emergencies in a local government area.

Each local government must establish one or more LEMCs for its district. Local governments may also collaborate to form a combined Local Emergency Management Committee (LEMC) for their districts. The LEMC, which is managed and chaired by the local government, includes representatives from organisations involved in emergency management in the district.

A LEMC's primary functions include:

- Advising and assisting the local government in ensuring that LEMAs are established.
- Liaising with public authorities and other key organisations to develop, review, and test the LEMA.
- Progressing emergency management across their local government area. This includes all aspects of Prevention, Preparedness, Response and Recover (PPRR).

The LEMA aims to incorporate all sub-plans relevant to the local government, and this Plan will provide key information for inclusion.

During the response to an incident, hazard, emergency or disaster, an Incident Support Group (ISG) or an Operational Area Support Group (OASG) will be formed based on size, impact and complexity. These groups consist of government and non-government stakeholders to ensure a coordinated response to the event is enacted.

In addition, the HMA may also establish an Incident Support Group (ISG) to coordinate response activities at the local level. The ISG membership is predominantly made up of LEMC memberships.

Rangelands NRM is one of seven NRM organisations operating in Western Australia. The Emergency Management Act (2005) does not define it as a Hazard Management Agency (HMA), Combat Agency, or Support Agency.

Rangelands NRM comprises 14 staff, with its role being:

- Delivering Environmental and Agricultural projects with more than 20 years of experience.
- Complex projects and multi-stakeholder collaboration.
- Building the community's and Traditional Owners' land management capacity over the long term.

Rangelands NRM cannot provide dedicated resources to monitor and respond to regional emergency and disaster events. Contingent on further funding, the plan details Rangelands NRM's contribution to the systemic approach to promoting general resilience to emergency risk management.

2. Objectives of this Plan

This Plan's objective is to improve preparedness for and response to emergency events where they occur through better integration of biodiversity and agricultural natural capital assets in emergency planning and response. This includes efforts to enhance the resilience of biodiversity and agricultural assets by recognising the risks and threats posed by natural hazards and planning to improve outcomes through actions and management before, during (to the extent possible) and after to support recovery.

The following actions will achieve these objectives:

- Develop the documented plan and share it with stakeholders to raise awareness of critical assets, the level of vulnerability, and current and future preparedness activities (if applicable).
- Enhance stakeholder collaboration by documenting and communicating the roles and responsibilities of Rangelands NRM and stakeholders.

The plan does not focus on disasters or emergencies below the 'high' to 'very high' risk rating threshold (Appendix Asset Risk Assessment 23.1).

3. Scope

The Commonwealth Government has commissioned this EPRP, and asset selection was limited to criteria provided in the Guidance Document (DCCEEW, 2023) as outlined in 9.1. The following details the scope of this project and the plan.

In

- Development of the Plan.
- Assessment, identification and mapping of the biodiversity and agricultural assets.
- Identification of preparedness activities/actions relevant to the identified assets.
- Communicate gaps in preparedness activities with the relevant stakeholder/s.
- Engage and collaborate with internal and external stakeholders throughout the plan's development phases.

Out

- Broader biodiversity and agricultural assets beyond current Matters of National Environmental Significance (MNES) and others as excluded by the Commonwealth criteria.
- Implementation of the Plan.
- Implementation of preparedness activities as part of the assessment and development of the Plan.
- Providing an operational emergency response and recovery from hazards, events and disasters.

This Plan is specific to the Commonwealth requirements outlined in the Guidance documents and designed to meet the Commonwealth's outcomes. It has been developed to expand it to incorporate Western Australia State Priority Action Areas (WAIM, 2023) if additional resources become available.

4. Defining Emergencies

The understanding of emergency risks has drastically changed in the past ten years. According to the 2023 SEMC Emergency Preparedness Report, the risk is the impact of unpredictability on our plans and goals. When it comes to emergency management, an emergency is defined by considering the risk as a mix of danger, exposure, and vulnerability. For example, a risk could be a bushfire (the danger) affecting people or places (the exposure) that can be harmed (vulnerability). When a risk's impact is too much for people to handle, and there is a high chance of damage to what people care about, it becomes an emergency (Government of Western Australia, 2024).

To complete this plan, the following definitions have been considered and applied in the assessment and analysis process.

The Emergency Management Act 2005 (WA) defines an emergency as *“the occurrence or imminent occurrence of a hazard which is of such a nature or magnitude that it requires a significant and coordinated response”*.

The Emergency Management Regulations 2006 (WA) define 28 hazards. The regulations prescribe the HMA for each hazard.

State legislation does not define drought as a hazard. However, Rangelands NRM considers it a significant “natural environmental” event and has been subject to the same likelihood/consequence risk rating assessment.

The United Nations Disaster Risk Reduction, Global Assessment Report on Disaster Risk Reduction, Special Report on Drought 2021 asserts:

- The damage and costs resulting from drought are usually seriously underestimated due to widespread and cascading impacts that are often not explicitly attributed to drought.
- The drought hazard and human activities (e.g. land and water management) are strongly intertwined, so these activities can exacerbate the hazard and increase the risk of severe socioeconomic and ecological impacts.

5. Emergency Scenarios

The following table details the 28 hazards the WA Emergency Management Regulations 2006 identified.

Each hazard has been assessed using the Asset Risk tool (Appendix 23.1). Hazards with a high or very high-risk rating are considered most likely to impact the Rangelands NRM biodiversity and agricultural assets. As a result, they are included within the EPRP.

* Drought is not defined as a hazard in WA Emergency Management Regulations.

Hazard	Likelihood Rating	Consequence Rating	Risk rating
Air crash	Possible	Minor	Low
Animal or plant pests or diseases	Likely	Extreme	High
Biological substance	Possible	Moderate	Medium
Collapse	Possible	Minor	Low
Cyclone	Almost certain	Moderate	High
Drought *	Almost certain	Moderate	Very High
Earthquake	Possible	Moderate	Medium
Electricity supply disruption	Possible	Minor	Low
Fire	Almost certain	Moderate	High

Hazard	Likelihood Rating	Consequence Rating	Risk rating
Flood	Almost certain	Moderate	High
Gas supply disruption	Possible	Minor	Low
HAZMAT - chemical/radiological/other hazardous material.	Possible	Minor	Medium
Heatwave	Almost certain	Moderate	High
Hostile act	Rare	Insignificant	Low
Human epidemic	Rare	Minor	Low
Land search	Possible	Minor	Low
Liquid fuel supply disruption	Possible	Minor	Low
Marine oil pollution	Possible	Moderate	Medium
Marine search	Possible	Minor	Low
Marine transport emergency	Possible	Minor	Low
Radiation escapes from a nuclear – powered warship	Rare	Critical	Low
Rail crash	Possible	Minor	Low
Road crash	Possible	Minor	Low
Space re-entry debris	Rare	Minor	Low
Storm	Almost certain	Moderate	High
Terrorist act	Rare	Minor	Low
Tsunami	Rare	Extreme	Medium

5.1 Hazard Event Frequency

The recent Emergency Preparedness Report by the Government of Western Australia (2023) acknowledged that emergencies will likely increase in scale, frequency, and severity. Additionally, cascading, compounding and aggregate impacts are projected to grow due to a concurrent increase in heatwaves, droughts, fires, storms, and floods (CSIRO, 2020; Lawrence et al., 2020).

Contextualising information for Western Australia, are the SEMC State Risk Profile Fact Sheets (Government of Western Australia 2023) and State Risk Profile Fact Sheets (DFES, 2023b) developed after the State Risk Project were reviewed during the plan's development.

The following information about each hazard included within this plan has been noted.

In addition, the Australian Government Bureau of Meteorology report on 6 March 2024 regarding drought was also reviewed.

Bushfire

Between 2012 and 2022, approximately 975 bushfires, over 1 hectare, were responded to each year in Western Australia (DFES 2023b).

Threatened species face pressures from habitat loss, predation by introduced species, and climate change. Bushfires exacerbate these threats, potentially leading to further population declines. Protecting the habitat of threatened species requires effective fire management strategies that balance the ecological role of fire in Australian landscapes with the need to safeguard critical habitats. Implementing prescribed burns to reduce fuel loads, managing key areas by Traditional Custodians with mosaic burning, and restoring damaged habitats are part

of comprehensive conservation efforts needed to ensure the survival of the threatened species in Western Australia.

Addressing bushfires in the Western Australian rangelands is critical to protecting and sustaining the grazing system, preserving biodiversity, and ensuring the livelihoods of rural communities. Strategies for mitigation and adaptation include implementing prescribed burns to reduce fuel loads, managing vegetation to prevent the spread of fires, and developing comprehensive fire management plans. Additionally, building the fire management capacity of landowners and graziers in fire preparedness and response can significantly reduce the impact of bushfires on grazing systems, supporting both the economic and ecological health of the Western Australian rangelands.

Cyclone

Cyclones are low-pressure systems that form over warm tropical waters. In the southern hemisphere, the systems rotate clockwise and can increase intensity over the ocean. They can generate extreme winds, heavy rainfall with flooding, and damaging storm surges in exposed locations.

A cyclone will dissipate once it moves over land or cooler oceans; however, strong winds and heavy rain can persist as the remnants of a system move inland, sometimes causing widespread damage a long way from where the cyclone made landfall.

On average, five cyclones occur during each cyclone season (November – April) in the waters off the northern coast of WA. While each season is different, generally, two systems make landfall, one of which tends to be severe.

The changing climate is predicted to result in more cyclones impacting southern parts of the state (DFES 2023b).

Drought

A drought is a prolonged, unusually dry period resulting in water shortage, not just low rainfall.

Drought can mean different things to different industries. Meteorologists monitor the scope and severity of drought in terms of rainfall deficiencies. Agriculturalists focus on the impact on primary industries, hydrologists compare stream flow and groundwater levels, ecologists are concerned with ecosystem function and collapse, and sociologists examine the impact on welfare and well-being. People's different uses and needs of water make it difficult to find a universal definition of drought ([The evolution of drought policy in Western Australia | Agriculture and Food](#), (DPIRD 2018).

Drought is a complex phenomenon with mixed environmental, social and economic implications (Bastin, 2014; Mastrantonis, 2022). Major droughts, such as 1982–83 and the Millennium drought of 1997–2010, can significantly impact agriculture and communities. Apart from crop failure and stock losses, droughts set the scene for bushfires, dust storms, and land degradation. The Western Australian rainfall deciles for the combined three-year 2017, 2018, and 2019 April–September periods were below average. Across Australia, spring 2019 saw the greatest fire weather danger as measured by the Forest Fire Danger Index (FFDI, a standard measure of fire weather conditions), with record-high values observed in areas of all States and Territories (BoM, 2024).

Northern Rangelands - Rainfall data for the past 30 years (1989–2018) shows that wet-season rainfall has been moderately reliable in the northeast region around Broome and Halls Creek. It has been less reliable through the region's centre around Marble Bar and Port Hedland. Rainfall is unreliable year-round in the western and southern parts of the northern Rangelands. Although the Northern Rangelands have experienced more hot days in the past 30 years, at

Halls Creek and Marble Bar over the past 30 years (1989-2018), evaporation rates decreased slightly across the year compared to the previous 30 years (1959-1988) (BoM, 2023a).

Drought can be expected to continue to be an occasional feature of the Kimberley climate, but projections of how the frequency or duration may change are low confidence (Sudmeyer et al., 2016).

Southern Rangelands - Rainfall data for the past 30 years (1989–2018) show that most of the Southern Rangelands' rainfall is unreliable across all seasons. The only exception is winter rainfall along the southern coastal region, which is moderately reliable. Annual rainfall has increased by around 40 mm (19%) from about 230 mm to about 270 mm over the past 30 years (1989–2018) when compared to the previous 30 years (1959–1988). During the 30 years (1959–1988), dry years occurred 11 times; in the recent 30 years (1989-2018), only five dry years occurred. Changes in evaporation rates are not consistent across the region. In the past 30 years (1989-2018) at Wiluna, evaporation rates increased across all months of the year. A similar pattern was also observed at Carnarvon. Over the same period, evaporation rates at Kalgoorlie decreased across all months of the year, a pattern also observed at Meekatharra. However, the Southern Rangelands have experienced more hot days in the past 30 years (BoM, 2023b), and periods of drought frequently occur across the Southern Rangelands (GGA 2022b).

As of April 2024, parts of the southern rangelands have experienced dry conditions for up to five successive years, reducing carryover feed and pasture's ability to recover when it rains (DPIRD, 2024).

Flood

The most common form of flooding in Western Australia is flooding rivers, creeks, lakes, and basins following heavy rain. Historically, floods have tended to be seasonal, occurring in summer in the north and winter in the south of the State. However, in recent years, southern Western Australia has experienced almost as many flood emergencies in summer as in winter (DFES 2023b).

Floods are often linked to land degradation (including from droughts), exacerbated by factors like reduced groundcover, rainfall infiltration and plant water use. This can lead to higher rates of water runoff, soil erosion and increased stream flow and volume.

The Rangelands area within Western Australia has been significantly impacted by flooding in the last 20 years, for example:

2010 Gascoyne River Flood - Record-breaking rainfall caused the river to flood. The impacts of the flood were throughout the Gascoyne region, with Carnarvon being most significantly affected, including homes being washed away.

2023 Kimberley Floods—Rainfall caused record-breaking floods after Tropical Cyclone Ellie. Impacts included the destruction of the Fitzroy Crossing Bridge and widespread flood damage to homes across the east of the region.

Storm

There are two distinct types of storms in Western Australia: warm-season storms and cool-season storms. Warm-season storms are typically severe thunderstorms across the state between October and April. Cool-season storms mainly occur between May and September when cold fronts pass over the Southwest Land Division, particularly in coastal areas.

Storms can produce weather phenomena, including strong winds with gusts over 90km/hr, heavy or intense rainfall, large hail, tornadoes and storm surges.

Heavy rains and storm surges can result in flooding, and lightning from warm-season storms is a common cause of bushfires.

Climate change will likely result in more frequent and intense storms and longer warm-season storm seasons (DFES 2023b).

Heatwave

On average, Western Australia experiences two to three extreme terrestrial heatwaves annually, most of which occur in the inland Mid-West region. Climate change is likely to increase the number of extreme temperature days and daily temperatures throughout WA.

Livestock body temperatures are regulated to approximately 0.5C daily. Increased heat stress reduces grazing time, feed intake, and weight, increases body temperature and respiration rate, and discourages breeding. In addition, livestock are unlikely to travel as far to reach water when heat stressed. Rising temperatures and extreme heat impact livestock health (DR SAT, 2024) and severe to extreme heat stress days for livestock are increasing across the Southern Rangelands (GGA 202b).

Five thermal marine events have occurred over the past 22 years, resulting in significant coral mortality in the Ningaloo system (Richards et al., 2024). The 2011 Ningaloo Niño event significantly impacted 2,000km of marine ecosystems off the West Coast, bleaching coral reefs, killing fish, and affecting the West Australian fisheries industry (Caputi, Kangas et al., 2019). Climate projections show that this warming trend is set to continue in the coming decades (BOM, 2021).

6. Role of Rangelands NRM In Emergency Management

The Prevention, Preparedness, Response and Recovery (PPRR) is commonly used in emergency management. The model originated in the USA in 1978 (Cronstedt 2002, p.10, Rogers 2011, p.55) Australian Institute for Disaster Resilience, *Australian Journal of Emergency Management* July 2022.

The model is widely used to describe the ‘stages of emergency management’. The figure below displays the four interconnected phases of the PPRR model.

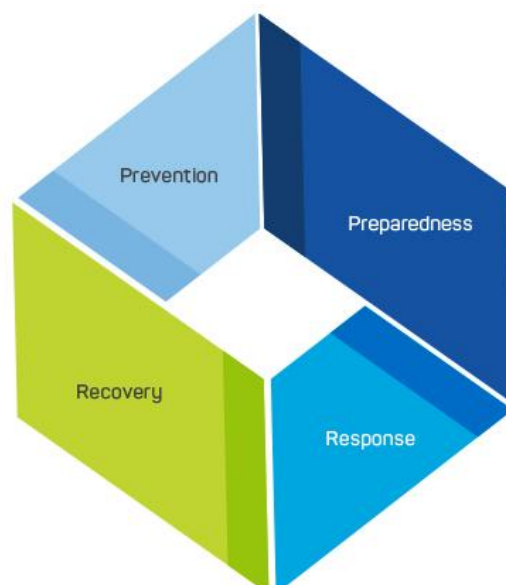


Figure 1. Prevention, Preparedness, Response and Recovery (PPRR) Model

6.1 Prevention and Preparedness Phases

With further funding, Rangelands NRM has the capacity and capability to support prevention and preparedness activities within the region. It can build and maintain relationships with agency stakeholders and increase the internal understanding of emergency management processes and systems at a district/state and federal level, contributing to the systemic goal of emergency risk management and general resilience.

6.2 Response and Recovery Phases

Key contact points have been identified and recorded (Appendix 21.2 Stakeholder Communication Register). This ensures the appropriate community stakeholders have a conduit to seek support and report the asset's potential (or actual) impact to the Hazard Management Agency (HMA) or Controlling Agency during the response and recovery phases.

In addition, community stakeholders have a conduit to seek support (including financial for recovery activities) via Disaster Recovery Funding Arrangements administered by the Department of Fire and Emergency Services (DFES) at a state level).

Future and ongoing funding will impact the response and recovery phases, and level of service.

7. The Rangelands Region

The Rangelands NRM region covers about 28% of Australia and 87% of Western Australia (WA) and is the largest NRM region in Australia.



Figure 2. Rangelands NRM Area and Sub-Regions

The Rangelands is unmatched in its geographic scale and the vulnerability and challenges its land managers, communities, and industries face. Still, it is also a region of extraordinary potential for production and long-term stewardship of its unique assets.

The Rangelands region has unsurpassed natural beauty, encompassing some of the most spectacular natural landscapes. It is known globally for its uniqueness, immense diversity, and cultural values.

The region is comprised of:

- 227 million hectares across six subregions
- 15,000km of coastline
- 98 million hectares of pastoral leasehold
- 70 million hectares of determined Native Title areas
- 18 Dedicated Indigenous Protect Areas
- 50+ Traditional Owner Groups
- 27 Ranger Groups
- 430+ Pastoral Station Leases
- 100+ Resource Interests
- 400+ Natural Resource Management Assets
- 3 World Heritage Areas
- 5 Ramsar wetlands
- 3 Climatic zones

8. Rangelands Assets

Rangelands NRM uses a hierarchical three-classification system to sort over 400 agricultural and biodiversity assets in a way that recognises their different scales and levels of importance. The three levels are.

8.1 Umbrella Assets

- Generally, at a very large scale (e.g., the Fitzroy River) or aggregations of entities (e.g., species of plants and animals with similar ecological requirements or threats).
- While assets at this level are exceptional or at least very significant, they are too large and complex to manage effectively at a project level. However, they form an umbrella for component significant or notable assets.

8.2 Significant Assets

- They are usually highly significant, with the potential for major investment or protection measures to maintain or enhance their values.
- Assets at this scale have potential for consideration, but only a limited subset is likely to be the focus of significant investment at any time.

8.3 Notable Assets

- Many assets identified are of local significance.
- Generally modest in scale, they are certainly noteworthy and will be the focus of smaller-scale projects often initiated by local community environmental and Landcare groups.
- Most notable assets are nested within assets at higher levels.

Registering an asset on the Rangelands NRM Register allows for its protection, improvement, or management through a proposed project. The project can be large or small and may involve degraded or pristine assets, which could be in a specific area or spread out over various locations.

The Asset Register records the systematic appraisal of sites, locations, flora and faunal assemblages, and places of cultural value aggregated across the landscape by the people who live, work and are passionate about the rangelands.

9. Identification and Prioritisation of Assets and Susceptibility

9.1 Asset Identification and Prioritisation

The list of Rangelands NRM biodiversity and agricultural assets (Table 1) is sourced from the Rangelands NRM Register, which contains over 400 such assets. These assets are recognised and listed under Western Australian State laws and Matters of National Environmental Significance (MNES) under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Many are also nominated in other environmental databases such as the Western Australian Threatened Flora Database, Department of Biodiversity, Conservation and Attractions (DBCA) Databases, Commonwealth Department of Agriculture, Water, and the Environment Databases, Australian Collaborative Rangeland Information System (ACRIS), and TERN Australia's Global Vegetation Database.

The assets are filtered against the intent of the Commonwealth EPRP, which is not to create an exhaustive list of all assets and their risks but to list assets to consider for developing emergency preparedness and response actions.

Every asset listed aims to develop emergency preparedness and response actions. This plan focuses on the Commonwealth's priorities, particularly where the Australian Government has historically invested over a long period. The Matrix list represents those assets on the Rangelands NRM Register that have had some or extensive Commonwealth investment.

Five key criteria were used to select biodiversity and agricultural assets when developing the Rangeland NRM region's Emergency Preparedness Response Plan (EPRP). The higher-order points must be met, while the remaining are important but less critical.

1. Historical investment by the Australian Government: Assets that have received long-term government investment for biodiversity/agricultural natural capital outcomes were prioritised. The rationale is to protect prior investments and continue the efforts to maintain these beneficial ecosystems. These assets usually have well-documented data, making planning and implementing emergency responses easier.
2. High-risk areas: Assets located in areas where the likelihood, frequency, and severity of emergency events are significantly high were also prioritised. These areas require more immediate attention as they are at a higher risk of damage or loss. This criterion ensures that resources are directed where they are needed most.
3. Significant Australian Government assets: These include Matters of National Environmental Significance (MNES) and the protection of ecosystem services to productive agriculture or other significant government assets, focusing on hot spots, breeding areas, or other seasonal factors. The rationale is to protect nationally significant environmental and cultural values from emergencies.
4. Practical on-ground impact by Rangelands NRM: Assets were also selected where Rangelands NRM can make a significant on-ground difference before or during an emergency. This ensures that the EPRP is not just theoretical but has practical applicability. It also allows for direct intervention and effective response during emergencies.
5. Cultural significance to First Nations peoples: Assets of significant value to First Nations peoples and areas where First Nations knowledge can be built into the plan were considered. This acknowledges the value of traditional knowledge in managing land and responding to emergencies. It also respects and protects sites of cultural importance.

The idea is to respond directly to significant assets at risk or where intervention can have the greatest impact.

9.2 Asset Mapping

The assets that have been identified during the assessment process are displayed in the following maps:

- Map 1 World Heritage Areas and Ramsar Sites (pg38)
- Map 2 High-Priority Biodiversity Sites (pg39)
- Map 3 Agricultural Sites (pg41)

These maps are located within section 21 of the Plan.

9.3 Maps and Hazard Overlay

In developing EPRP for the rangelands of Western Australia, a comprehensive approach is adopted to address the impacts of severe weather events, including cyclones, storms, and floods. Recognising that these events often occur in succession, exacerbating their effects on environmental assets, the plan integrates the impacts of these weather phenomena rather than treating them as separate incidents. This integration facilitates a more holistic understanding and preparation for these events compounded challenges.

Further work is required to effectively visualise and predict the increased frequency and intensity of severe weather events because of climate change, using Geographic Information Systems (GIS) technology. A key component for cyclones uses a GIS layer titled "Climate Change - increased frequency and intensity of severe weather events." The Standardised Pressure Sum (SPS) is central to this layer, a sophisticated metric for climate studies and GIS applications. The SPS operates on standardising atmospheric pressure readings across a defined area and timeframe, summing these standardised values to identify significant trends and anomalies. These trends serve as indicators of shifts in weather patterns, potentially linked to the overarching influences of climate change.

By applying the SPS within this GIS layer, we can assess and quantify how climate change may alter the landscape of severe weather events in Western Australia's rangelands. This analysis supports our EPRP by providing a detailed, data-driven foundation for anticipating weather-related emergencies. It enables us to forecast with greater accuracy the likelihood of successive weather events — such as cyclones following floods — and their cumulative impact on the region's environmental assets.

Incorporating SPS within our GIS-based visualisation tools is instrumental in enhancing the EPRP. It augments our capacity to predict and prepare for the evolving nature of severe weather events in the context of climate change. It strengthens our overall strategy for safeguarding the rangelands' environmental assets against these increasing threats. Through this integrated and technologically informed approach, we are better positioned to respond effectively to the challenges posed by severe weather events, thereby minimising their impact on the region's ecological integrity and resilience.

9.4 Asset Risk Assessment

There are no well-defined state or national legislative parameters or activation criteria for disasters/hazards/emergencies to assist in determining the priority of 'rangelands' assets. A tailored risk assessment tool evaluates each asset against potential hazards (refer to Appendix 23.1 for details). The tool is based on the likelihood rating + consequence rating = risk rating formulae aligned with ISO 3100.

To complete the following tables, the hazards of cyclones, floods and storms are grouped.

Table 1: Biodiversity and Agricultural Assets

Asset	Emergency scenario	How it poses a threat	Susceptibility	Why
BIODIVERSITY				
RAMSAR – Eighty Mile Beach	Cyclone/Flood/Storm	Cyclones can significantly damage coastal areas, leading to flooding, erosion, and habitat destruction. Floods can also disrupt ecosystems and endanger wildlife within the coastal region.	Medium	Eighty Mile Beach and dune systems are naturally resilient to severe weather events, allowing the ecosystem to withstand storms and cyclones without suffering extensive damage.
	Animal Disease Outbreak	Highly pathogenic avian influenza can lead to high mortality rates among bird populations and some domestic and wild mammal species. Potentially zoonotic, it infects animals but also has the capacity to infect humans.	High	Critical habitats for diverse bird species make them vulnerable to disruptions caused by the virus. As stopover points for migratory birds, they pose a global risk to both wild and domestic bird populations.
RAMSAR – Roebuck Bay	Cyclone/Flood/Storm	Extreme climate events (Changed rainfall patterns and intensity) can impact Ramsar Wetland values.	Medium	Extreme events reduce the system's ability to retain sediment and nutrient loads in the catchment, lead to toxic algal blooms and affecting habitat function.
	Animal Disease Outbreak	Highly pathogenic avian influenza can lead to high mortality rates among bird populations and some domestic and wild mammal species. Potentially zoonotic, it infects animals but also can infect humans.	High	Critical habitats for diverse bird species make them vulnerable to disruptions caused by the virus. As stopover points for migratory birds, they pose a global risk to wild and domestic bird populations.
World Heritage Area – Shark Bay	Cyclone/Flood/Storm	Extreme climate events can impact the Shark Bay WHA values.	Medium	Extreme events cause erosion, increased sediment, and nutrient inflows into the Bay, affecting habitat conditions and function.
	Heatwave	Marine heatwaves have devastating effects on Shark Bay coral and seagrass ecosystems.	High	Excessive marine heatwaves lead to coral mortality and extensive declines in seagrass coverage.
	Animal Disease Outbreak	Highly pathogenic avian influenza can lead to high mortality rates among bird populations and some domestic and wild mammal species. Potentially zoonotic, it infects animals but can also infect humans.	Medium	Critical habitats for diverse bird species make them vulnerable to disruptions caused by the virus. Shark Bay is part of a broader migratory route for birds, posing a global risk to wild and domestic bird populations.
World Heritage Area –	Cyclone/Flood/Storm	Extreme climate events can impact the Ningaloo WHA values.	Medium	Extreme events cause erosion and increased sediment and nutrient

Asset	Emergency scenario	How it poses a threat	Susceptibility	Why
Ningaloo Coast				inflows, affecting habitat conditions and function.
	Heatwave	Marine heatwaves have devastating effects on coral and seagrass ecosystems.	High	Excessive marine heatwaves lead to coral mortality and extensive declines in seagrass coverage.
	Animal Disease Outbreak	Highly pathogenic avian influenza can lead to high mortality rates among bird populations and some domestic and wild mammal species. Potentially zoonotic, it infects animals but can also infect humans.	Medium	Critical habitats for diverse bird species make them vulnerable to disruptions caused by the virus. Ningaloo is part of a broader migratory route for birds, posing a global risk to wild and domestic bird populations.
Monsoon Vine Thickets TEC	Bushfire	Monsoon vine thickets' vulnerability to intense late dry-season fires threatens their existence. Post-event, there would be an increased threat of weeds and invasive species, increased erosion, and overall biodiversity loss.	Medium	Fires can destroy vegetation, alter ecosystem composition, and hinder the regeneration of plant species. Frequent and intense bushfires can overwhelm natural systems, leading to long-term ecological damage.
Malleefowl	Bushfire	Bushfires can impact habitat and habitat linkages.	Medium	The Malleefowl is facing pressures from habitat loss, predation by introduced species, and climate change. Bushfires exacerbate these threats, potentially leading to further population declines.
Greater Bilby	Bushfire	Bushfires can impact habitat and habitat linkages.	Medium	Bilbies are facing pressures from predation by introduced species and climate change. Bushfires exacerbate these threats, potentially leading to further population declines.
Night Parrot	Bushfire	Bushfires can impact habitat.	Medium	Inappropriate fires can destroy habitat, particularly the dense spinifex it relies on for cover and nesting. Recovery from such fires can take many years, during which the habitat may not be suitable for the species.
Northern Quoll	Bushfire	Bushfires can impact habitat.	Medium	Altered fire regimes that result in more frequent and intense fires can destroy the Northern Quoll's critical habitat and food sources. Changes in fire patterns can also lead

Asset	Emergency scenario	How it poses a threat	Susceptibility	Why
				to habitat fragmentation, further exacerbating quolls' difficulty in finding food and shelter.
AGRICULTURE				
Carnarvon horticulture precinct	Cyclone/Flood/Storm	Cyclones, extreme floods and storms impact the horticulture precinct.	High	The impact of cyclones/Floods/Storms can erode and remove fertile topsoil and destroy crops.
	Plant pest or Disease Outbreak	Diseases and pests, such as Potato spindle tuber viroid (PSTVd), fusarium wilt, and Medfly, can severely impact horticultural properties.	Medium	Plant pest or disease outbreaks can cause economic losses, trade restrictions and health and welfare concerns.
Rangelands Grazing Lands and Pastoral Properties	Animal Disease Outbreak	Animal disease outbreaks like lumpy skin, foot, and mouth would impact graziers and landowners.	High	Disease outbreaks can cause economic losses, trade restrictions and health and welfare concerns.
	Cyclone/Flood/Storm	Cyclones, flooding and storms can severely impact grazing lands.	High	Cyclones, storms, and floods can result in the loss of harvest or livestock, increased susceptibility of livestock to disease, contamination of water bodies, land degradation through wind and water erosion, and destruction of agricultural infrastructure such as roads and fences.
	Drought	Drought significantly impacts the Western Australian rangeland grazing system, affecting the region's ecological balance and economic sustainability.	High	Drought can lead to erosion, loss of soil fertility, reduced forage and water availability, loss of livestock, and agricultural productivity and economic losses.
	Bushfire	Bushfires can immediately lose vegetation cover, which is essential for grazing livestock. They expose soil to wind and water erosion, leading to dust storms and a loss of topsoil, soil nutrients, organic matter, and soil carbon, which creates water supply and quality issues.	High	The economic repercussions of bushfires on the grazing system can be profound. Loss of forage cover, rehabilitation costs, additional feed for livestock, and infrastructure repairs Direct loss of livestock, either directly due to fires or indirectly through reduced feed availability and quality.

10 Biodiversity Asset Preparedness

In line with the National Climate Resilience and Adaptation Strategy 2021 to 2025 objectives, Rangelands NRM drives action through collaboration and groundwork with key stakeholders such as:

- Dampier Peninsula Fire Working Group (DPFWG) workshops and reports outlining the evaluation of fire management on Dampier Peninsula, spatial mapping, survey and data analysis.
- Bilby - Threatened species actions and threat treatment of critical threats identified by the National Recovery Plan, notably fire, weeds, and pest animals in northern rangelands.
- Night Parrot – Surveys and management in the desert regions of the rangelands.
- Malleefowl - Implementation of an appropriate fire management strategy to support the species, protect habitat, and restore habitat linkages. Feral animal control and management of grazing by feral, native, and domestic herbivores to maintain suitable habitat in southern rangelands.
- Ramsar, Eighty Mile, and Roebuck Bay—Work with key stakeholders, including First Nations and pastoralists, to implement activities to protect, repair, and stabilise this area and facilitate research on migratory birds and microscopic (benthic) organisms vital to the area's ecology.

10.1 Preparedness actions for protecting Biodiversity assets.

Table 2 outlines the preparedness actions that could be taken for each biodiversity asset to reduce the threat of relevant emergency scenarios (such as bushfires, drought, floods, cyclones, diseases, and pests). It includes where the action must be taken and who could (or is undertaking) it.

Table 2: Biodiversity Asset Preparedness

Asset	Emergency scenario	Actions	Where	Who	Is action by Rangelands NRM currently underway?
RAMSAR – Eighty Mile Beach	Cyclone/Flood/Storm	Erosion management	Coastal dune system	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Yes
		Controlling pest animals	Walyarta Conservation Park and dune stems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Yes
		Improving land Management practices	Grazing land impacting the site.	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Yes
	Animal Disease Outbreak	Undertake training, monitor developments	EAD Foundational Course AUSTVETPLAN	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Partially
RAMSAR – Roebuck Bay	Cyclone/Flood/Storm	Improving land Management practices	Grazing land impacting the site.	Rangelands NRM, DBCA, DWER, Traditional Custodians, Land Managers	Yes
		Remediating riparian and aquatic areas	Key drainage-control structures	Rangelands NRM, DBCA, DWER, Traditional Custodians, Land Managers	Yes
		Controlling access	Key wetland sites	Rangelands NRM, DBCA, DWER, Traditional Custodians, Land Managers	Yes
	Animal Disease Outbreak	Undertake training, monitor developments	EAD Foundational Course AUSTVETPLAN	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Partially
World Heritage Area – Shark Bay	Cyclone/Flood/Storm	Erosion management	Wooramel River banks and catchment areas.	Rangelands NRM, DBCA, Bush Heritage, Traditional Custodians, Land Managers	Yes, RNRM is delivering a small Australian Heritage grant.
	Heatwave	Monitoring	Western Gulf, Wooramel Bank, and Faure Sill seagrass areas	DBCA, Traditional Custodians, Universities	No
	Animal Disease Outbreak	Undertake training, monitor developments	EAD Foundational Course AUSTVETPLAN	Rangelands NRM, DBCA, Traditional	Partially

Asset	Emergency scenario	Actions	Where	Who	Is action by Rangelands NRM currently underway?
				Custodians, Land Managers	
World Heritage Area – Ningaloo Coast	Cyclone/ Storm	Erosion management	Ningaloo coast system	DBCA, Traditional Custodians, Universities	No
	Heatwave	Monitoring	Ningaloo Coast and Reef systems	DBCA, Traditional Custodians, Universities	No
	Animal Disease Outbreak	Undertake training, monitor developments	EAD Foundational Course AUSTVETPLAN	Rangelands NRM, DBCA, Traditional Custodians, Land Managers	Partially
Monsoon Vine Thickets TEC	Bushfire	Prescribed or planned burns	Dampier Peninsula West Kimberley	Dampier Peninsular Fire Working Group (DPFWG), DFES, DBCA, Environs Kimberley, Traditional Custodians	Rangelands NRM is involved with the DPFWG, Environs Kimberley and Traditional Custodians.
		Vegetation Management	Dampier Peninsula West Kimberley	DBCA, Environs Kimberley, Traditional Custodians	No
Malleefowl	Bushfire	Fire management strategies and prescribed planned burns	Areas identified with Malleefowl populations	DBCA, Landowners, Traditional Custodians	Work Order with Australian Government un process.
Greater Bilby	Bushfire	Fire management strategies and traditional Custodian mosaic burning	Areas identified with Bilby populations	DBCA, Landowners, Traditional Custodians	No
Night Parrot	Bushfire	Fire management strategies and traditional Custodian mosaic burning	Old dense spinifex areas, identified as Night Parrot habitat	DBCA, Landowners, Traditional Custodians	No
Northern Quoll	Bushfire	Fire management strategies and traditional Custodian mosaic burning	Northern Quoll habitat areas	DBCA, Landowners, Traditional Custodians	No

11. Biodiversity Asset Response

11.1 Response actions for protecting Biodiversity assets.

Table 3 outlines response actions that could be undertaken for each biodiversity asset to respond to the relevant emergency scenarios (such as bushfires, drought, floods, cyclones, and heatwaves), including where/when the action would need to be undertaken and who could undertake it.

Table 3: Biodiversity Emergency Scenario – Cyclone / Flood / Storms Heatwaves / Bushfire

Asset	Emergency scenario	Actions	Where	Who
While the event is occurring				
RAMSAR – Eighty Mile Beach	Cyclone/Flood/Storm	Monitoring and Assessment	Coastal dune and beach systems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Animal Disease Outbreak	Communication, education, public awareness, monitoring	Media	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
RAMSAR – Roebuck Bay	Cyclone/Flood/Storm	Monitoring and Assessment	Wetlands and beach/mudflat systems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Animal Disease Outbreak	Communication, education, public awareness, monitoring	Media	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
World Heritage Area – Shark Bay	Cyclone/Flood/Storm	Monitoring and Assessment	Wooramel River discharge areas, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Heatwave	Monitoring and Assessment	Western Gulf, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Animal Disease Outbreak	Communication, education, public awareness, monitoring	Media	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
World Heritage Area – Ningaloo Coast	Cyclone/Storm	Monitoring and Assessment	Ningaloo beach system	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Heatwave	Monitoring and Assessment	Western Gulf, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Animal Disease Outbreak	Communication, education, public awareness, monitoring	Media	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
Monsoon Vine Thickets TEC	Bushfire	Monitoring and Assessment	Dampier Peninsula and Central North Kimberley	Rangelands NRM, DFES, DBCA, Traditional Custodians

Asset	Emergency scenario	Actions	Where	Who
Malleefowl	Bushfire	Monitoring and Assessment	Identified Malleefowl habitat areas	DBCA, Emergency Services, Land Managers, Traditional Custodians
Greater Bilby	Bushfire	Monitoring and Assessment	Identified Bilby habitat areas	DBCA, Emergency Services, Land Managers, Traditional Custodians
Night Parrot	Bushfire	Monitoring and Assessment	Identified Night Parrot habitat areas	DBCA, Emergency Services, Land Managers, Traditional Custodians
Northern Quoll	Bushfire	Monitoring and Assessment	Identified Northern Quoll habitat areas	DBCA, Emergency Services, Land Managers, Traditional Custodians
After the event has occurred				
RAMSAR – Eighty Mile Beach	Cyclone/Flood/Storm	Immediate Response Plans	Coastal dune and beach systems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers, Emergency services
		Stakeholder Engagement	DBCA, Traditional Custodians, Land Managers and interested parties	Rangelands NRM, DBCA, Emergency Services
		Data Collection and Analysis	Coastal dune and beach systems, grazing land, Walyarta Conservation Park	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
		Debris removal and clean-up	Beach systems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
	Animal Disease Outbreak	Surveillance and monitoring	Migratory zones	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
RAMSAR – Roebuck Bay	Cyclone/Flood/Storm	Immediate Response Plans	Intertidal, beach and wetland systems	Rangelands NRM, DBCA, Traditional Custodians, Land Managers, Emergency services
		Stakeholder Engagement	DBCA, Traditional Custodians, Land Managers and interested parties	Rangelands NRM, DBCA, Emergency Services
		Data Collection and Analysis	Intertidal, beach and wetland systems	Rangelands NRM, DBCA, Traditional Custodians, Other Stakeholders

Asset	Emergency scenario	Actions	Where	Who
		Debris removal and clean-up	Intertidal, beach and wetland systems	Rangelands NRM, DBCA, Traditional Custodians, Other Stakeholders
	Animal Disease Outbreak	Surveillance and monitoring	Migratory zones	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
World Heritage Area – Shark Bay	Cyclone/Flood/Storm	Immediate Response Plans	Wooramel River discharge areas, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, Land Managers, Emergency Services
		Stakeholder Engagement	DBCA, Traditional Custodians, Land Managers and interested parties	Rangelands NRM, DBCA, Emergency Services
		Data Collection and Analysis	Wooramel River discharge areas, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, other stakeholders
		Debris removal and clean-up	Wooramel River discharge areas, Wooramel Bank, Hamelin Pool, and Faure Sill	Rangelands NRM, DBCA, Traditional Custodians, Other stakeholders
	Heatwave	Stakeholder Engagement	Western Gulf, Wooramel Bank, Hamelin Pool, and Faure Sill	DBCA, Traditional Custodians, Universities
	Animal Disease Outbreak	Surveillance and monitoring	Migratory zones	Rangelands NRM, DBCA, Traditional Custodians, Land Managers
World Heritage Area – Ningaloo Coast	Cyclone/Storm	Immediate Response Plans	Ningaloo beach system	Rangelands NRM, DBCA, Traditional Custodians, Land Managers, Emergency Services
		Stakeholder Engagement	DBCA, Traditional Custodians, Land Managers and interested parties	Rangelands NRM, DBCA, Emergency Services
		Data Collection and Analysis	Ningaloo beach system	Rangelands NRM, DBCA, Traditional Custodians, other stakeholders
		Debris removal and clean-up	Ningaloo beach system	Rangelands NRM, DBCA, Traditional Custodians, Other stakeholders
	Heatwave	Stakeholder Engagement	Ningaloo reef system	DBCA, Traditional Custodians, Universities
	Animal Disease Outbreak	Surveillance and monitoring	Migratory zones	Rangelands NRM, DBCA, Traditional Custodians, Land Managers

Asset	Emergency scenario	Actions	Where	Who
Monsoon Vine Thickets TEC	Bushfire	Stakeholder Engagement	Dampier Peninsula West Kimberley	DBCA, DPFWG, Environs Kimberley, Traditional Custodians
Malleefowl	Bushfire	Monitoring, fire management strategies	Identified Malleefowl habitat areas	DBCA, Traditional Custodians, Land Managers
Greater Bilby	Bushfire	Monitoring, fire management strategies	Identified Bilby habitat areas	DBCA, Traditional Custodians, Land Managers
Night Parrot	Bushfire	Monitoring, fire management strategies	Identified Night Parrot habitat areas	DBCA, Traditional Custodians, Land Managers
Northern Quoll	Bushfire	Monitoring, fire management strategies	Identified Northern Quoll habitat areas	DBCA, Traditional Custodians, Land Managers

12. Agricultural Asset Preparedness

The Rangelands pastoral industry is frequently on the receiving end of disasters, often with multiple cumulative effects.

From De Grey Station, in the Pilbara, Mark Bettini recounts such a series of events. “Cyclone Veronica” was forecast to head straight for the Pilbara coast. My planning changed from drought mitigation to cyclone preparation within hours. TC Veronica was not what our cattle needed, considering they were already in poor condition due to the poor season thus far. The following day, I awoke to a flood! In all, we counted 1500 cattle that had succumbed to the wind and rain of cyclone Veronica. Since then, we have revised that to 2000. Looking back over the last six months, we have gone from managing drought to flood conditions quickly (DPIRD, Nov 2019).

Agriculture resilience-building practices are developed with land managers (pastoralists, First Nations people or groups) through engagement, facilitation, research, on-station practice demonstrations, and extension and adoption activities. Key practices include rehydration, grazing, and sustainable fire management practices.

These align with national or state agriculture and resilience-building programs/strategies and include:

- Natural Heritage Trust, Regional Delivery Partners (small, funded program in the rangelands region with significant outreach to individual land managers, including pastoralists, all producer groups, biosecurity groups, Landcare groups)
 - Sustainable Agriculture Facilitator (1FTE)
 - Climate-Smart Sustainable Agriculture
- Future Drought Fund program (small program in the rangelands region)
 - Drought Resilience Planning
 - Drought Resilience, Innovation and Adoption Hubs
- Northern Australia Climate Program (small program in the rangelands region)
 - Climate Mate
- Department of Primary Industries and Regional Development (small-moderate projects in the region)
 - Northern Beef Development
 - Southern Rangelands Revitalisation

12.1 Preparedness actions for protecting Agricultural assets

Table 4 outlines the preparedness actions that could be taken for each agricultural asset to reduce the threat of relevant emergency scenarios (such as bushfires, drought, floods, cyclones, and animal disease outbreaks). It includes where the action must be taken and who could (or is) undertaking it.

Table 4: Agricultural Asset Preparedness

Asset	Emergency scenario	Actions	Where	Who	Is action by Rangelands NRM currently underway?
Carnarvon Horticulture Precinct	Cyclone/Flood/Storm	Levies, upstream rehydration and remediation works	Carnarvon Horticulture Precinct	State and local government and growers	No
	Plant disease or pest outbreak	Pest monitoring and biosecurity controls	Carnarvon Horticulture Precinct	State and local government and growers	No
Rangelands Grazing Lands and Pastoral Properties	Animal Disease Outbreak	Biosecurity monitoring. Dissemination of AUSVETPLANS	Grazing properties in the rangelands	Rangelands NRM, State and local government	No
	Drought	Rehydration plans and works, total grazing management, planning and forage budgeting	Drought-affected areas or regions	Rangelands NRM, State, local government, land managers	Partially
	Cyclones, Storms and Flood	Rehydration plans and works, grazing management	Flood-declared areas or regions	Rangelands NRM, State, local government, land managers	Partially
	Bushfire	Prescribed burning plans and works, Evacuation plans	High bushfire-prone areas	Rangelands NRM, State, local government, land managers	Partially

13. Agriculture Asset Response

13.1 Response actions for Protecting Agricultural assets

Table 5 outlines response actions that could be undertaken for each agricultural asset to respond to the relevant emergency scenarios (such as bushfires, drought, floods, cyclones and animal disease outbreaks), including where/when the action would need to be undertaken and who could undertake it.

Table 5: Agricultural Emergency Scenario – Cyclone / Flood / Storms / Animal Disease / Drought

Asset	Emergency scenario	Actions	Where	Who
While the event is occurring				
Carnarvon Horticulture Precinct	Cyclone/Flood/Storm	Monitoring and Assessment	Carnarvon Horticulture Precinct	State and local government, growers, emergency services
	Plant disease or pest outbreak	Monitoring, assessment and controls	Carnarvon Horticulture Precinct	State and local government and growers.
Rangelands Grazing Lands and Pastoral Properties	Animal Disease Outbreak	Biosecurity monitoring. Dissemination of AUSVETPLANS	Grazing properties in the rangelands	Rangelands NRM, State and local government, pastoralists, peak bodies, emergency services
	Drought	Monitoring, Assessment, Stakeholder Engagement	Grazing properties in the rangelands	Rangelands NRM, State and local government, pastoralists, peak bodies, emergency services
	Cyclones, Storms and Flood	Monitoring, Assessment, Stakeholder Engagement	Grazing properties in the rangelands	Rangelands NRM, State and local government, pastoralists, peak bodies, emergency services
	Bushfire	Monitoring, assessment and controls. Stakeholder Engagement	Grazing properties in the rangelands	Rangelands NRM, State and local government, pastoralists, peak bodies, emergency services
After the event has occurred				
Carnarvon Horticulture Precinct	Cyclones, Storms and Flood	Immediate Response Plans	Horticulture Precinct	State and local government, growers, emergency groups
		Stakeholder Engagement	Horticulture Precinct	Rangelands NRM, State and local government, growers, emergency groups

Asset	Emergency scenario	Actions	Where	Who
		Data Collection and Analysis	Horticulture Precinct	State and local government, growers, emergency groups
		Debris removal and clean-up	Horticulture Precinct	State and local government, growers, emergency groups
	Plant disease or pest outbreak	Stakeholder Engagement	Horticulture Precinct	DPIRD growers and grower groups
Rangelands Grazing Lands and Pastoral Properties	Animal Disease Outbreak	Stakeholder Engagement	Grazing properties in the rangelands	State (DPIRD) and local government, pastoralists
	Drought	Stakeholder Engagement	Pastoralists in the rangelands	State and local government, pastoralists
	Cyclones, Storms and Flood	Stakeholder Engagement	Pastoralists in the rangelands	State and local government, pastoralists
	Bushfire	Stakeholder Engagement	Pastoralists in the rangelands	State and local government, pastoralists

14. Community/Stakeholder Engagement

Based on the listed biodiversity and natural capital assets incorporated into the plan, individual stakeholders and communities were identified, communicated with, and engaged in the process.

The approach for community stakeholder engagement activities comprises two phases:

Phase 1 – February 2024 to 7 June 2024 Project actions

Purpose

- Identify key stakeholders and communities relevant and impacted by the plan.
- Engagement, input and feedback on the draft plan before finalising.
- Sharing of the final plan with the relevant stakeholders and communities.

Phase 2 – from 7 June 2024, proposed actions subject to additional funding

Purpose

- To build capability within Rangelands NRM specific to emergency management preparedness, prevention, response, and recovery.
- This will be achieved through public awareness strategies and professional learning, including education and training for the relevant key stakeholders.

14.1 Engagement, Collaboration and Coordination Activities

Rangelands NRM identified and engaged with stakeholders from the following:

- State Government agencies.
- Shires and Councils (through District Emergency Management Advisors)
- Traditional Custodian Groups
- Ranger Groups
- Pastoralists representatives
- Universities and other industry subject matter experts

- Other Western Australian NRMs to ensure relevant information is shared and consistent coordination when liaising with relevant state government agencies.

The stakeholder engagement has resulted in the involvement with the development and feedback on the plan to ensure its accuracy and relevance.

Communication and engagement methods have varied depending on the requirements and needs of each stakeholder.

Methods have included phone calls, emails, meetings, and workshops conducted via an online application (such as Microsoft Teams).

The following documents have been developed and utilised as part of the stakeholder engagement and communication process:

- Stakeholder register.
- A documented Communications and Engagement Strategy, including a stakeholder engagement and communication action plan.

Rangelands NRM will support government efforts to incorporate biodiversity and agricultural natural capital assets into emergency response management and planning systems, guiding future responses to extreme events.

This has been done by working with the relevant state government stakeholders and committees to develop and understand the plan.

These committees include the following District Emergency Management Committees:

- Kimberley
- Pilbara
- Midwest - Gascoyne
- Goldfields - Esperance

The following stakeholder engagement activities have been completed:

- Over 160 Emails
- Five online presentations to key stakeholders.
- six workshops (a total of 24 attendees).
- Numerous phone calls.

Twelve stakeholders provided feedback on the draft plan, which has been considered and updated where relevant and appropriate.

14.2 Raising Public Awareness

Phase 1 Project actions

Engagement and collaboration with stakeholders and communities will increase public awareness of the plan, preparedness activities, and future actions.

During the plan's development, Rangelands NRM presented and provided information to the State Emergency Management Committee Executive Manager and four District Emergency Management Committees as part of the project and stakeholder engagement activities.

These presentations have raised significant awareness among the state and district emergency management stakeholder groups, who are now aware of the project and Rangelands NRM's roles and responsibilities.

The final Plan will be provided to the 4 District Emergency Management Committees.

Phase 2 Future proposed actions subject to additional funding

The Rangelands NRM website may be updated to include relevant information to the plan and links to the West Australian State Emergency Management arrangements, framework, and resources.

In addition, the Rangelands NRM social media profile could be utilised to increase public awareness.

14.3 Education and Training

Phase 1 Project actions

Engagement and stakeholder collaboration are used as an education strategy to inform the plan's purpose and clarify roles and responsibilities. This is an opportunity to communicate the West Australian rangelands and the state's emergency management arrangements and share relevant online information and available resources.

As part of the stakeholder engagement activities, Rangelands NRM have conducted six workshops with 24 attendees.

Key information relevant to the development of the Plan was presented during the workshops, and stakeholders provided feedback and input.

Phase 2 Future proposed actions subject to additional funding

In line with the Government of Western Australia Disaster Resilience Strategy, Rangelands NRM will engage with the Community Resilience and Recovery Subcommittee to identify opportunities for stakeholder involvement in planned multiagency activities/learning events.

In addition, the following subcommittees are operating and relevant to consider future engagement and collaboration.

- Climate Change
- Risk and Capability

Rangelands NRM can design and develop professional learning for key stakeholders, including:

- Local Governments and Councils
- Traditional Custodian Groups
- Pastoralists
- Ranger Groups

Professional learning, education and training activities include desktop exercises and on-country face-to-face training designed to test the Plan while building stakeholder capability.

In addition, online and hardcopy resources such as checklists and guides relevant to biodiversity and agricultural natural capital assets specific to emergency management could be developed.

14.4 Key gaps

As part of assessing and analysing preparedness actions to safeguard biodiversity assets, any identified gaps have been documented in the "Asset Preparedness" register and shared with the relevant stakeholders. While some assets do not align with the Commonwealth criteria and plan scope, stakeholders have raised the need to consider additional assets beyond the five key Commonwealth priorities.

14.5 Feedback

Feedback from meetings and stakeholder engagement shows inconsistencies in the level of capability and capacity in Emergency Management preparedness. There is a lack of resources at a local level to undertake this work, and without these resources, this work will not occur—either now or in the future.

Initial feedback from stakeholders is that this project has reinvigorated the focus on preparedness in local government and has provided the district-level advisors with additional leverage for action.

15. Legal Framework

The key legal and regulatory considerations Rangelands NRM will manage in delivering this plan are:

- Work Health and Safety (WHS) Regulations: Rangelands NRM must adhere to WHS regulations to ensure the health and safety of its workforce while implementing the emergency preparedness plan.
- Emergency Management Act 2005 (WA): The Emergency Management Act 2005 (WA) governs emergency management activities in Western Australia and outlines the legal framework for emergency responses and preparations.
- Emergency Management Regulations 2006 (WA): These regulations define 28 specific hazards and designate the Hazard Management Agency (HMA) responsible for each hazard. Rangelands NRM must understand and comply with these regulations to address identified hazards effectively.
- National Disaster Risk Reduction Framework (NDRRF): The plan aims to align with the National Disaster Risk Reduction Framework (NDRRF) established by the Commonwealth Government in 2018. Rangelands NRM can enhance its emergency risk management practices by adhering to this framework.
- Threatened Species Action Plan 2022-2032: The plan contributes to actions under Target 17 of the Plan, demonstrating Rangelands NRM's commitment to protecting threatened species in emergencies.
- Natural Heritage Trust (NHT): The plan aligns with outcomes 1, 2, and 3 of the Natural Heritage Trust (NHT), indicating Rangelands NRM's dedication to preserving and enhancing Australia's natural heritage during emergencies.
- Climate-Smart Agriculture Program: Rangelands NRM's actions within the plan also contribute to Outcomes 1 and 3 of the Climate-Smart Agriculture program, showcasing a focus on sustainable agricultural practices in emergency response and preparedness.
- Local Emergency Management Arrangements (LEMA): Local governments have a vital role in emergency management and are responsible for ensuring the existence of Local Emergency Management Arrangements (LEMA). Rangelands NRM must coordinate with local authorities to integrate their efforts effectively.
- Resilience Building: The plan outlines Rangelands NRM's contributions to promoting general resilience within the community and systematically managing emergency risks. This proactive approach enhances preparedness and response capabilities.

By considering and addressing these critical legal and regulatory aspects, Rangelands NRM can effectively deliver its emergency preparedness plan while aligning with relevant frameworks and regulations to enhance emergency management practices.

16. Risk Management, Including Mitigation Strategies

The key risks associated with implementing the EPRP, with mitigation strategies, are summarised below.

16.1 Key Risks:

- **Safety Risks:** Implementing asset preparedness and response actions could pose safety risks to the individuals involved.
- **Human Health Risks:** Exposure to pollutants could adversely affect human health.
- **Ecosystem Destruction:** Response actions might lead to further destruction of ecosystems, negatively impacting biodiversity and the environment.
- **Resource Availability:** A lack of sufficient resources, including personnel, equipment, and supplies, could hamper emergency response and recovery efforts.
- **Communication Challenges:** Effectively communicating with the public during emergencies can be challenging, particularly in providing timely and accurate information.
- **Communication with Emergency Services:** Maintaining effective communication channels with emergency services is crucial for coordinated response efforts but can be challenging.
- **Preserving Corporate Knowledge:** There is a risk of losing valuable organisational knowledge and expertise in emergency preparedness and response.
- **Reliance on Technology:** Over-reliance on technology can pose risks, especially in the event of technological failures.

16.2 Mitigation Strategies:

- **Safety Risks:** Implement proper safety protocols and procedures, train staff, and conduct regular safety inspections.
- **Human Health Risks:** Minimize exposure to pollutants, provide staff with protective equipment, and monitor health.
- **Ecosystem Destruction:** Develop response actions that minimise damage, prioritise ecosystem restoration, and consider long-term impacts on biodiversity.
- **Resource Availability:** Ensure the availability of necessary resources for effective emergency response and recovery.
- **Public Communication:** Develop a comprehensive communication plan, utilise various channels, and address public concerns effectively.
- **Communication with Emergency Services:** Establish and maintain strong communication channels with emergency services for better coordination.
- **Preserving Corporate Knowledge:** Capture and document organisational knowledge through training programs, knowledge-sharing platforms, and succession planning.
- **Technological Reliance:** Develop backup systems, regularly update technology infrastructure, and train staff on technology use during emergencies.

Implementing these mitigation strategies can effectively manage and minimise the risks associated with asset preparedness and response actions, ensuring a more robust and resilient emergency response framework.

17. Monitoring and Data

The nature of data collected as part of the emergency preparedness plan includes information on biodiversity and agricultural assets, hazard event frequency, asset risk assessment, stakeholder communication register, communications and engagement strategy, and monitoring and assessment data for specific assets. This diverse data set is crucial for assessing vulnerability and risks associated with the assets and developing appropriate preparedness and response actions.

Proper data management practices are essential to maintaining data integrity and confidentiality. The level of data handling sophistication will be determined by future funding/investment availability.

The data will be accessed and shared with relevant stakeholders, including state government agencies, shires and councils, traditional custodian groups, ranger groups, pastoralists, universities, and industry subject matter experts. It will be analysed to assess the assets' vulnerabilities and risks. The data will be stored in the Rangelands NRM management unit, although the specific data storage and sharing mechanisms have yet to be specified.

The data collected will be provided to the Australian Government as part of the plan's reporting and monitoring requirements. The process of providing this data to the government is not outlined in the current context. However, ensuring compliance with data protection regulations and secure transmission methods will be critical when sharing information with governmental bodies.

18. Key Contacts

Includes the key contacts in RNRM for delivery on this plan, including the organisation, key individual/s, contact details, and their role.

Organisation	Contact	Position/Role	Email	Phone
Rangelands NRM	Paul Buckman	Operations Manager	PaulB@rangelandswa.com.au	0411 496 838
Rangelands NRM	Steve Ewings	Special Projects	stevee@rangelandswa.com.au	0437 381 842
Kimberley District Emergency Management Committee (DFES)	Matt Reimer	District Emergency Management Advisor	Matthew.reimer@dfes.wa.gov.au	0409 415 256
Pilbara District Emergency Management Committee (DFES)	Matt Reimer	District Emergency Management Advisor	Matthew.reimer@dfes.wa.gov.au	0409 415 256
Midwest Gascoyne District Emergency Management Committee (DFES)	Ranelle Clarke	District Emergency Management Advisor	Ranelle.clarke@dfes.wa.gov.au	0428 152 215
Goldfields-Esperance District Emergency Management Committee (DFES)	Shelby Robinson	District Emergency Management Advisor	Shelby.robinson@dfes.wa.gov.au	0488 907 187

19. Recommendations

Throughout the development of the Rangelands NRM EPRP, research undertaken by the RDP and feedback received during stakeholder engagement activities has identified future opportunities or considerations outside the scope of this current project.

The following recommendations are detailed based on stakeholder feedback:

1. Publicly available data, such as Ramsar asset locations, have been included within the plan; however, other locations, such as critical habitat locations, have not due to the confidential nature of the information.
 - A solution to this issue is to develop and agree upon a mechanism, such as a documented process, to enable data sharing under certain circumstances (such as an emergency).
2. Continue to collaborate with the State Emergency Management Committee and be aware of future projects, particularly sharing spatial data via a Geographic Information System.
3. Combine all seven Western Australia Natural Resource Management Plans to form one standalone plan with an operational focus.
4. Build capability and capacity with Rangelands NRM stakeholders by testing and exercising the plan.
 - This could be done by conducting simulated and desktop exercises.
5. Further develop the plan to allow for consideration of additional assets that are currently outside of the five key Commonwealth priorities.
Stakeholders provided the following examples:
 - Mornington Sanctuary
 - Dirk Hartog Island
 - Pastoralist areas such as the Nullarbor
 - Aboriginal heritage sites
 - Lake Argyle, Lake Kununurra and lower Ord River
 - Broome Horticulture area
 - Proposed sites such as Lake MacLeod
6. Build on the information relevant to the asset to include details relating to its current condition; this could consist of assessing the condition of the land under the current pastoral/agricultural management.
7. Expand on the scale and severity section of the hazards to include the social, environmental and economic impacts.
8. Further development of these recommendations presents an opportunity for Rangelands NRM to advocate for increased, appropriate, and long-term funding for NRM asset management and emergency response capacity.

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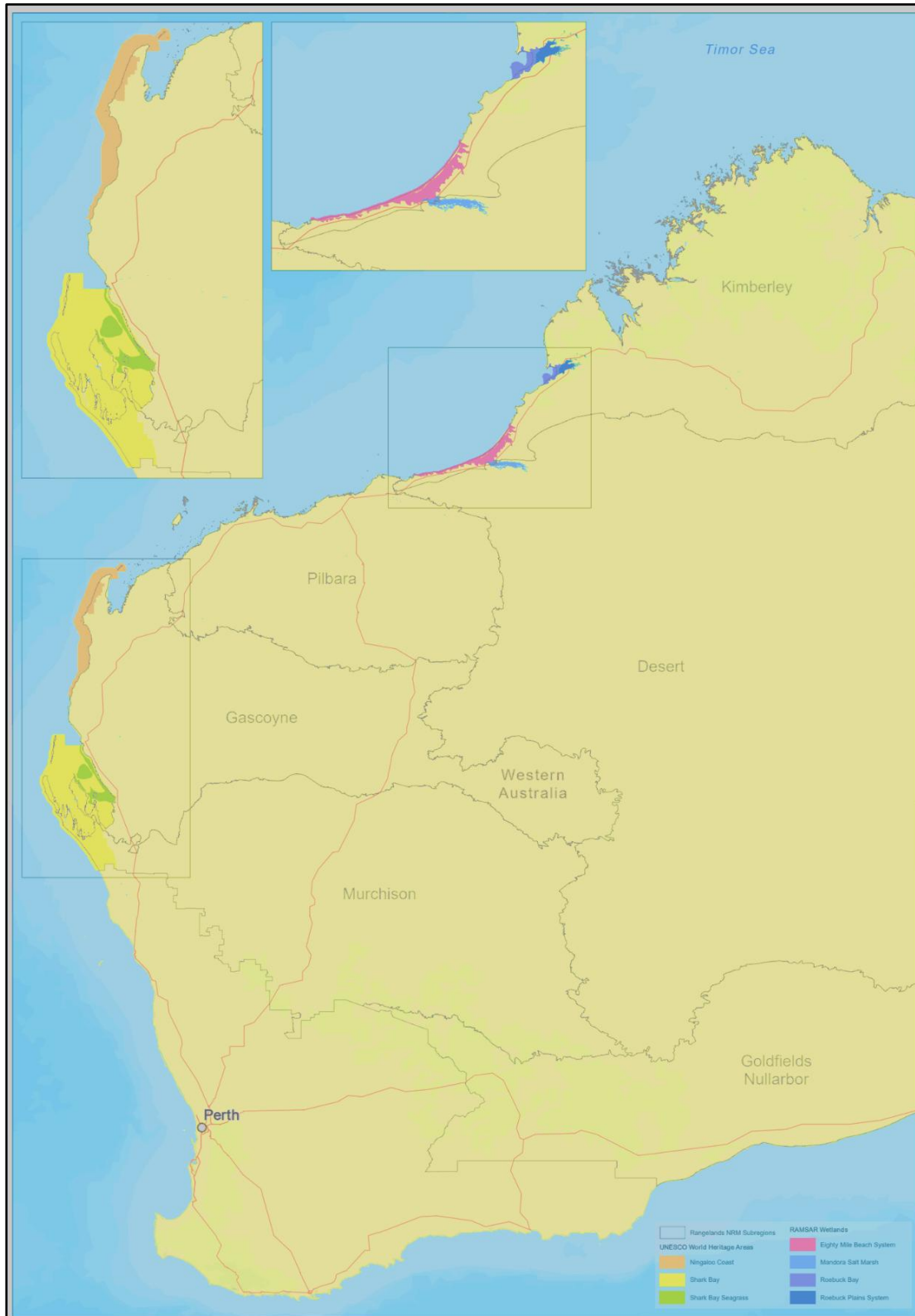
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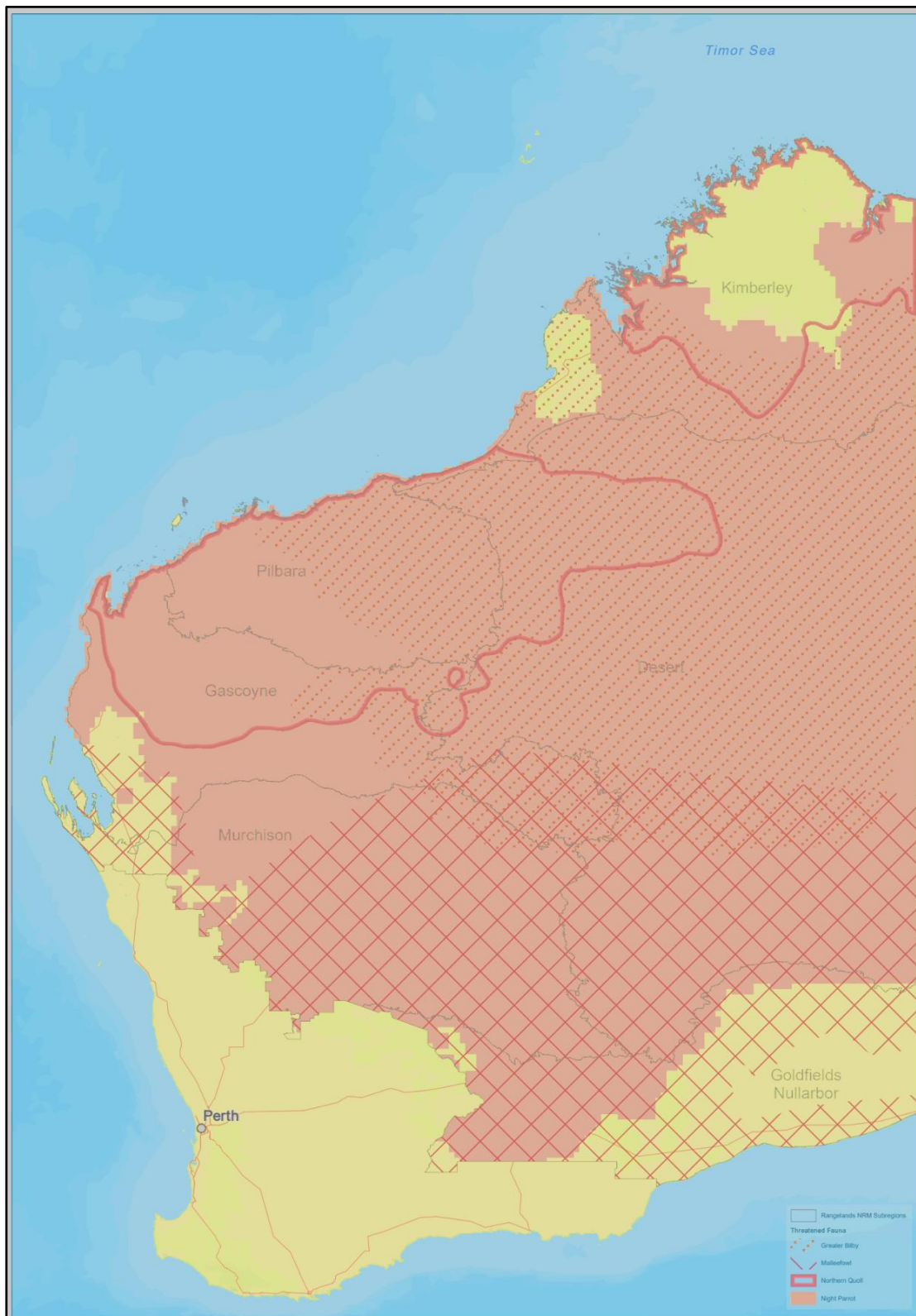
21. Rangelands EPRP Asset Maps

Map 1 World Heritage Areas and Ramsar Sites



Map 2 High-Priority Biodiversity Sites

Map 2a Threatened Fauna

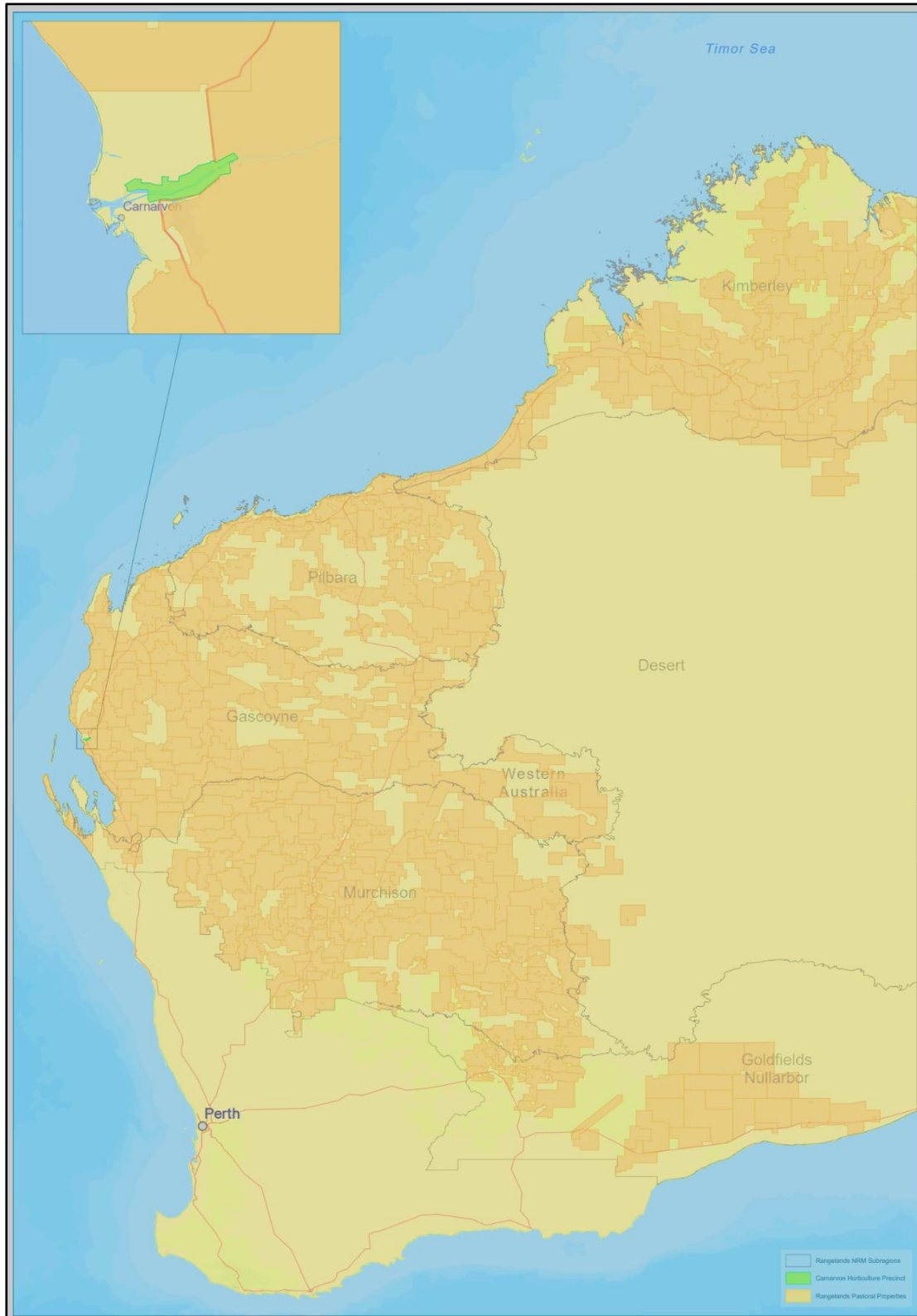


Map 2b TEC Monsoon Vine Thickets



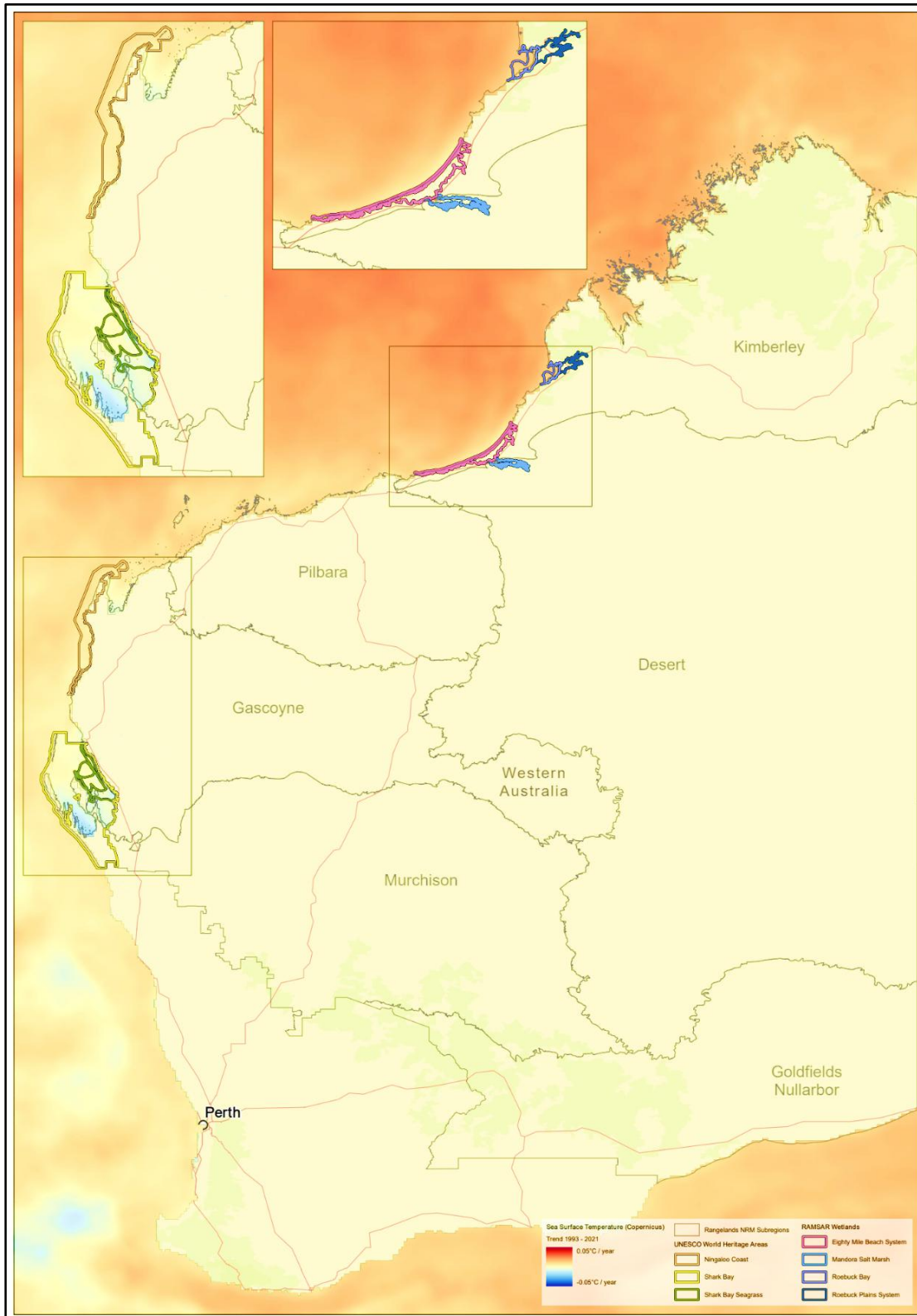
Indicative TEC Monsoon Vine Thickets, source DBCA 2108.

Map 3 Agricultural Sites - Pastoral Leases and Horticultural Precinct



22. EPRP Hazard Maps

22.1 World Heritage Areas and Ramsar Sites - Marine Heatwaves

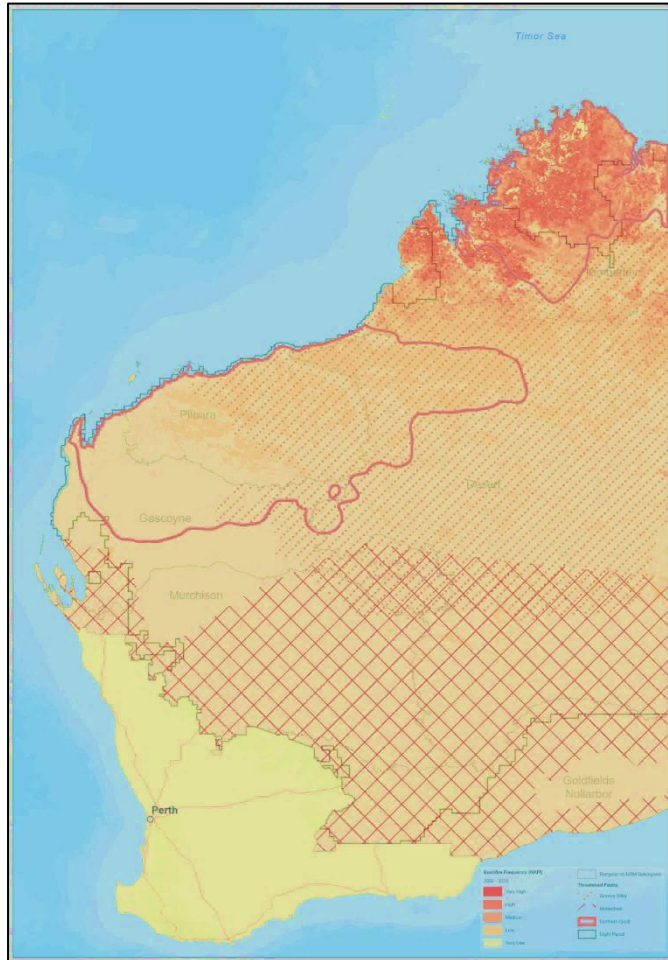


22.1 World Heritage Areas and Ramsar Sites - Cyclones

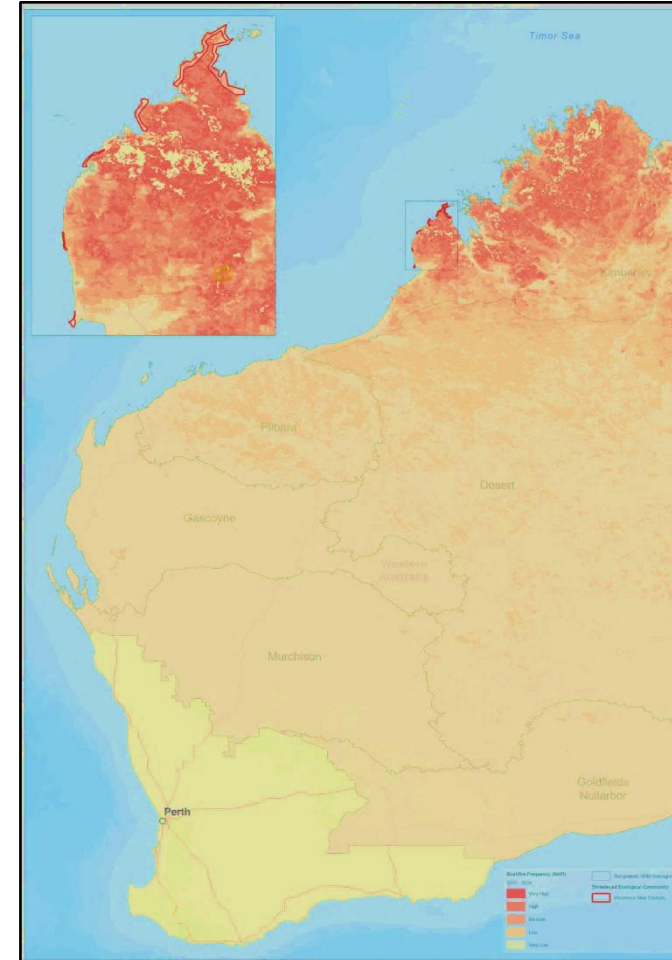


22.3 High-Priority Biodiversity Sites - Bushfire

Long-Term Fire Frequency in the 24 years 2000 - 2023, NAFI 2024



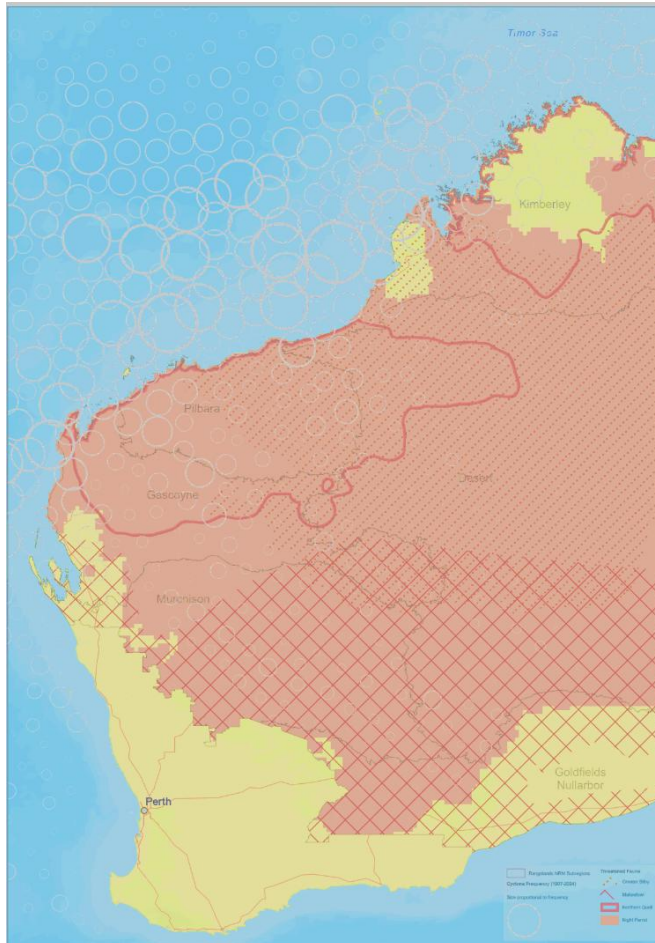
Threatened Fauna



TEC Monsoon Vine Thickets

22.4 High-Priority Biodiversity Sites - Cyclones (storms and floods)

Tropical cyclone tracks 1907 - 2023, BOM 2023.



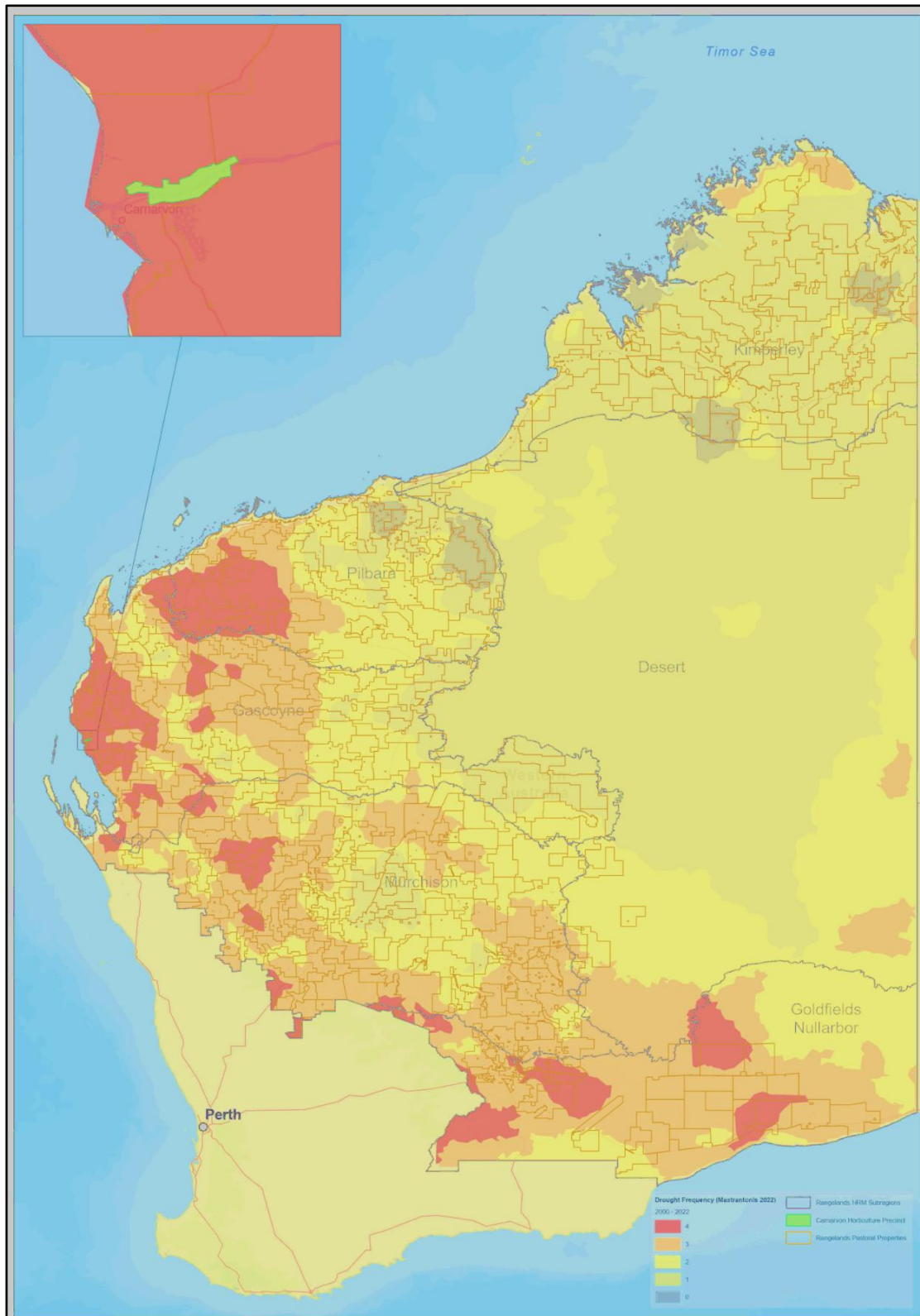
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22.5 Agricultural Sites – Drought

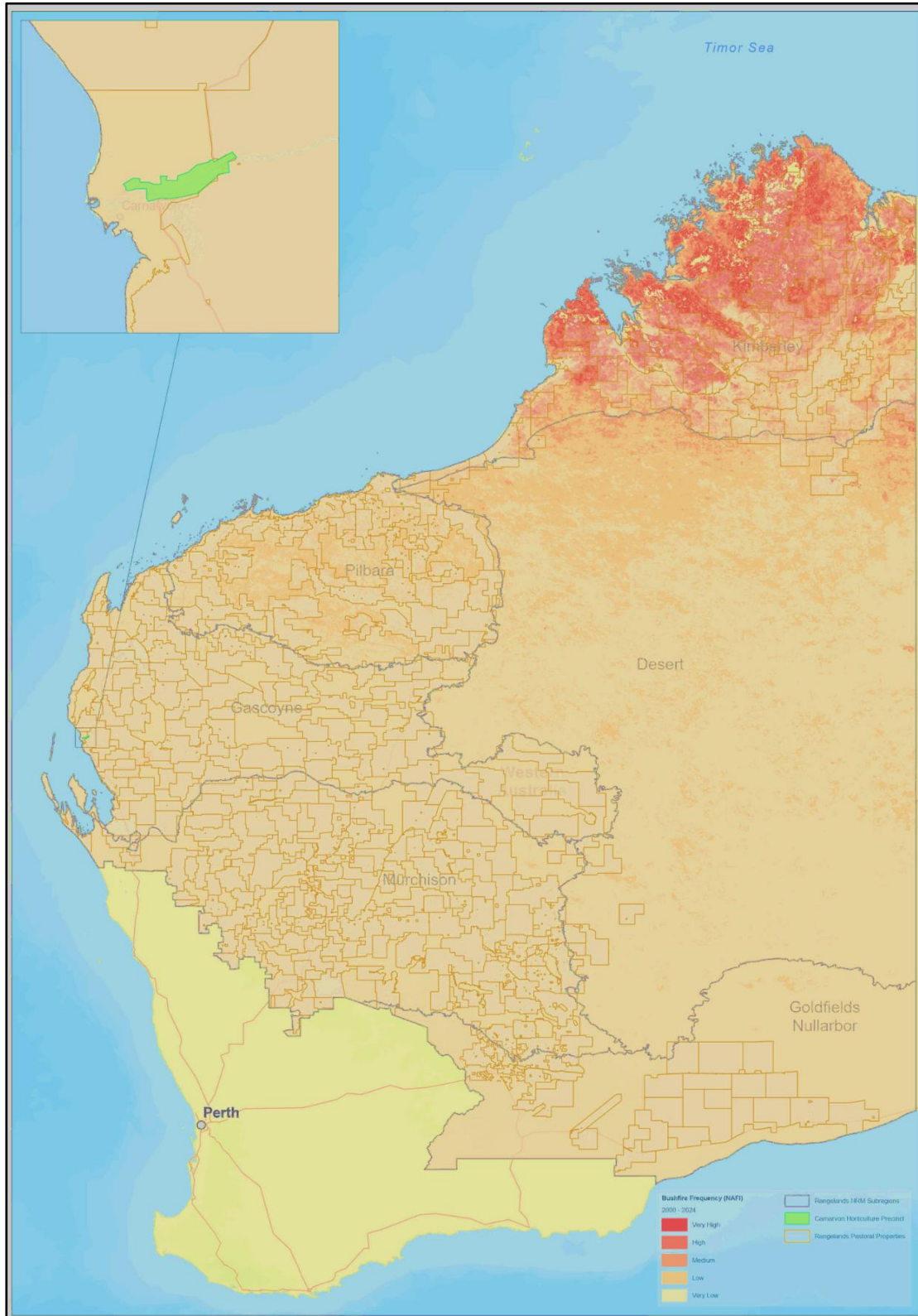
Annual Drought Frequency 2000 - 2020, derived from Mastrantonis, 2022.



Rangelands Pastoral Properties

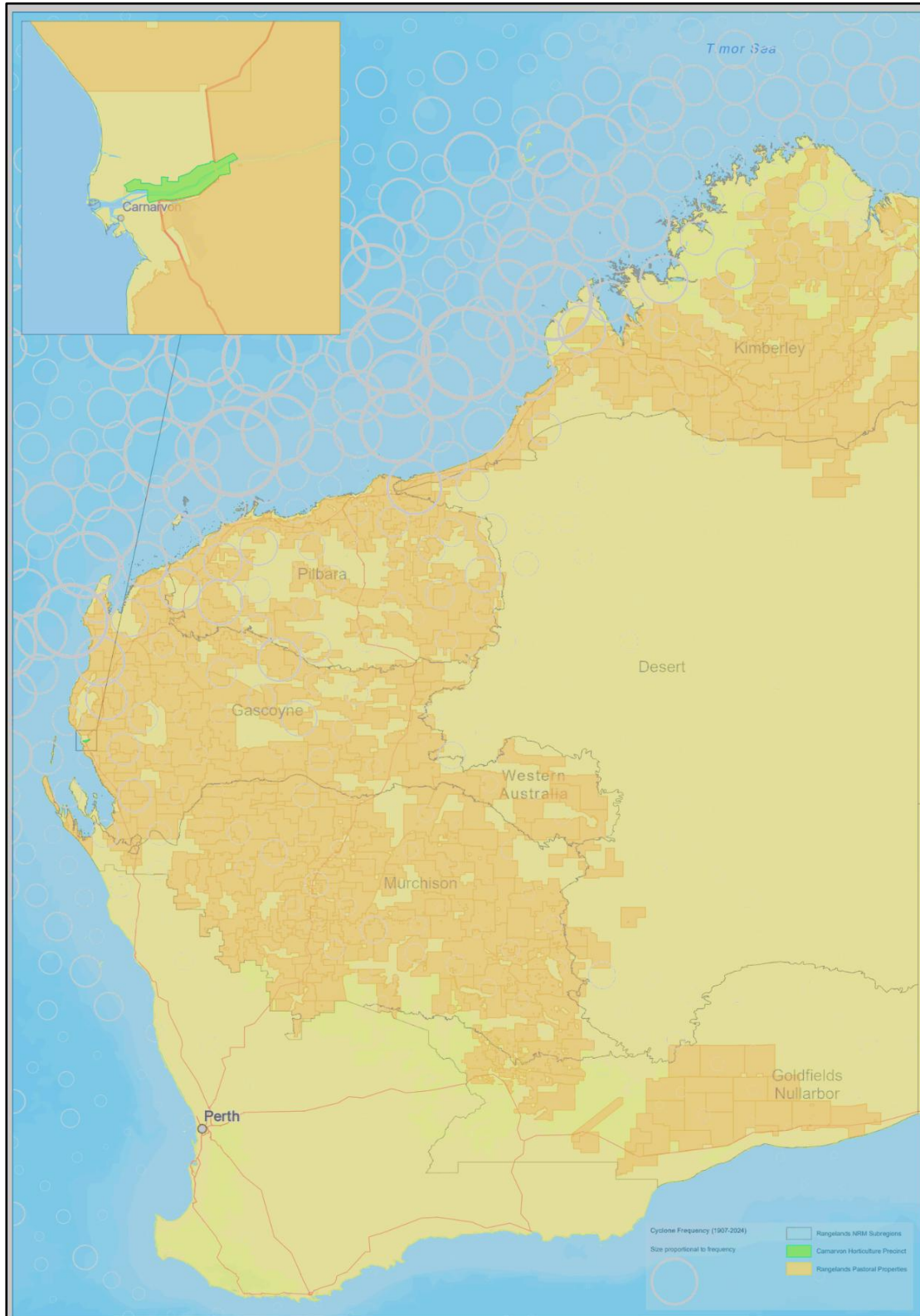
22.6 Agricultural Sites – Bushfire

Long-Term Fire Frequency 2000 - 2024, NAFI 2024

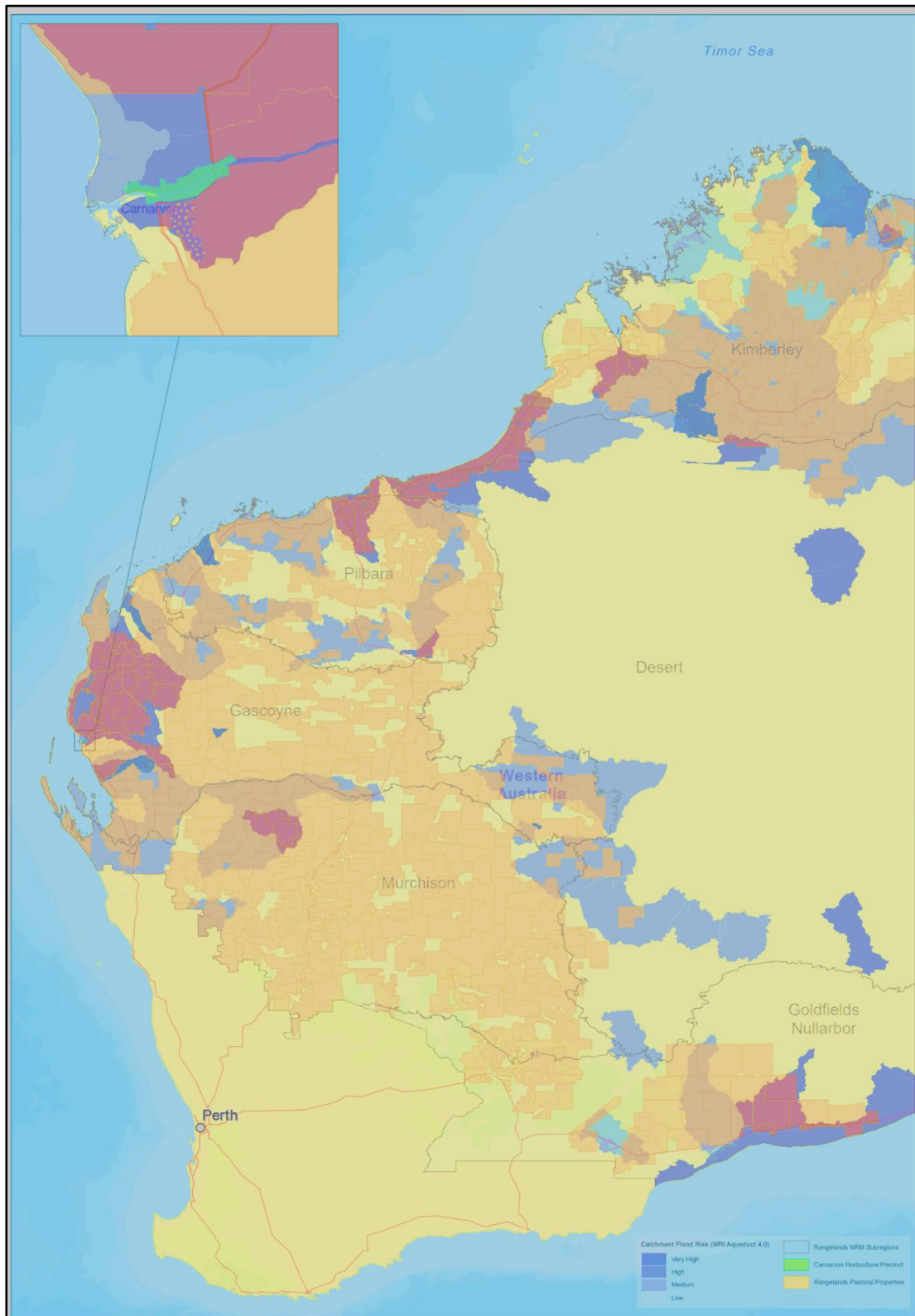


22.7 Agricultural Sites – Cyclones

Tropical cyclone tracks 1907 - 2023, BOM 2023.



22.8 Agricultural Sites – Flood and storms



23. Appendices

23.1 Appendix Asset Risk Assessment

Level	Consequence Rating	Physical Impact	Cultural/Environmental/ Production Impact	Response
1	Insignificant	No short- or long-term impact.	Nil impact	The impact is managed through standard Business practices.
2	Minor	Minor short-term impact.	Minor impact – such as short-term access to asset area controlled/minimised.	Impact requires additional local management effort or response or redirection of resources to respond.
3	Moderate	Low to medium-level impact on asset	Community impact and concerns are publicly expressed.	Impact requires short-term management and coordination of resources to respond and recover.
4	Extreme	Part destruction of an asset or impact requires significant resources to rectify/regenerate	Assets significantly impacted. Considerable and prolonged community and environmental impact For example, a UNESCO World Heritage site was affected/impacted.	Major response and long-term recovery Impact requires long-term, significant management and organisational resources to respond – both state and federal.
5	Critical	Destruction/ significant long-term impact, including asset extinction	Consistent long-term ongoing community and environmental impact High widespread media Significant financial loss	Major response and long-term recovery Impact requires significant long-term management and organisational resources to respond – both state and federal.

Likelihood rating		Consequence rating					Risk rating
		1	2	3	4	5	
		Insignificant	Minor	Moderate	Extreme	Critical	
5	Almost certain	Medium	High	Very high	Very high	Very high	Very high
4	Likely	Medium	Medium	High	Very high	Very high	High
3	Possible	Low	Medium	Medium	High	Very high	Medium
2	Unlikely	Low	Low	Medium	Medium	High	Low
1	Rare	Low	Low	Low	Medium	Medium	