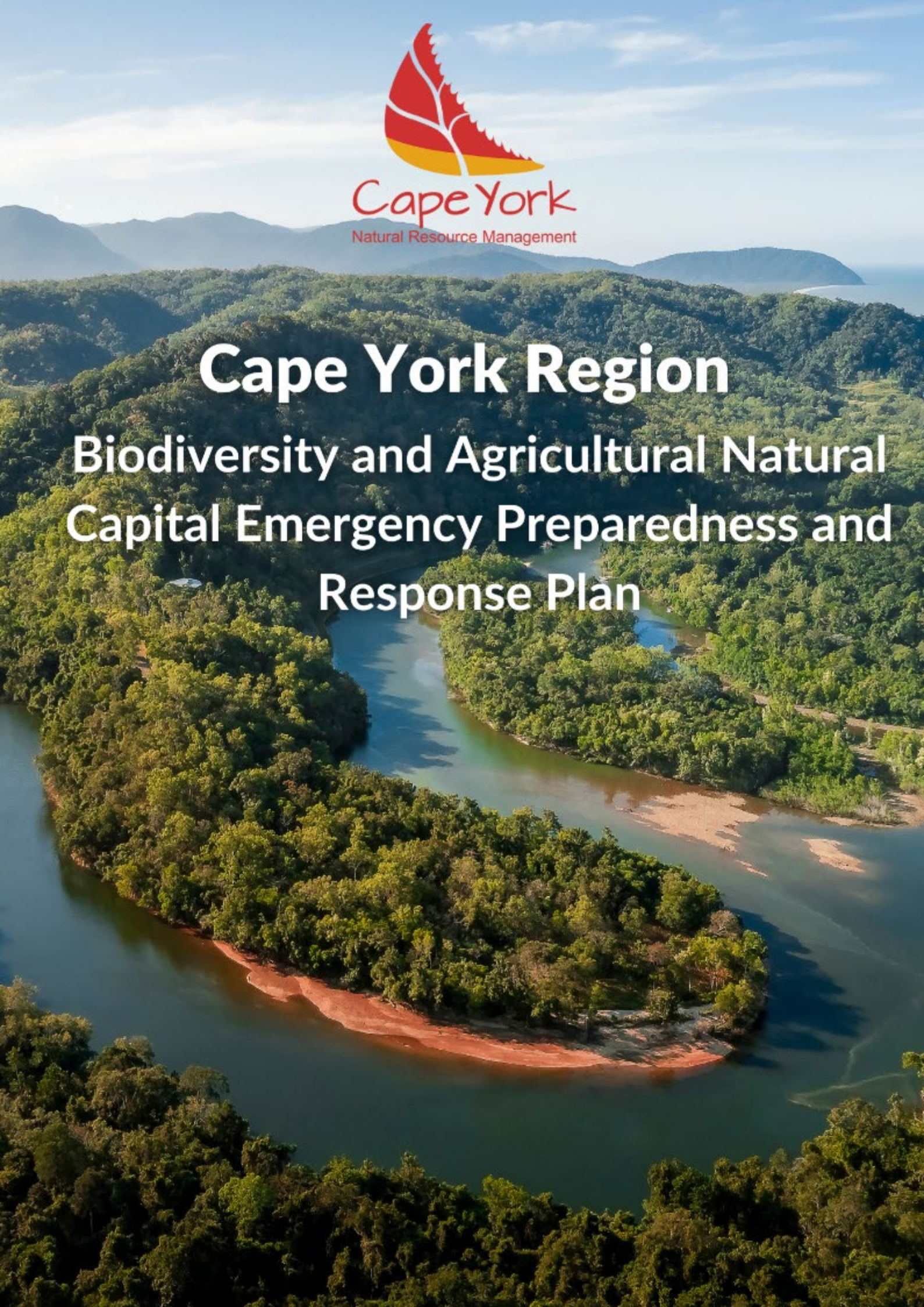
Cape York
Natural Resource Management

Cape York Region

Biodiversity and Agricultural Natural Capital Emergency Preparedness and Response Plan



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FOREWORD

Queensland is a global biodiversity hotspot – home to more than half of Australia's native species. Some of these species are found nowhere else in the world. Yet, some of these precious plants and animals are at risk of extinction and natural events such as cyclones, floods, drought and fire contribute to their decline. We know now that these threats are being exacerbated by climate change.

At the same time, Queensland's agricultural output is expanding and intensifying. More than 88% of Queensland's land is used for primary production and this means how we manage agriculture is intertwined with how we manage our environment.

Across mainland Queensland there are 11 regional Natural Resource Management (NRM) organisations working with partners, on the ground through its 334 highly qualified staff operating out of 27 rural and regional offices, to help communities become more resilient to the effects of climate change and to farm more sustainably.

Using the best possible science, regional NRM organisations are ensuring our species and ecosystems – which provide essential environmental services for all of society – can withstand the threats which would otherwise impact their survival. By supporting communities to be prepared for disasters we will reduce the impact of these catastrophic events on species, ecosystems, agricultural natural capital assets and local economies.

Strategically the Queensland regional NRM sector works collegiately with each other and across all levels of Government and regional stakeholders to align efforts, planning and resources to maximise the efficiency and effectiveness of emergency preparedness, response and recovery.

Cape York Natural Resource Management (Cape York NRM) works to enhance disaster resilience in the Cape York Peninsula region, an area defined by its remarkable landscapes, including vast tropical savannas, coastal wetlands, and dynamic river systems. The region is renowned for its rich biodiversity, hosting a variety of endemic flora and fauna.

Cape York Peninsula is largely a First Nations estate with Aboriginal people maintaining their culture and connection to Country. There are approximately 45 distinct Aboriginal languages with several hundred dialects. Economically, the region is sustained by agriculture, particularly cattle grazing across its expansive rangelands. Additionally, there is small-scale mining, including bauxite and zinc extraction. The agricultural industry, particularly in areas like the Lakeland region, is marked by intensive farming practices focused on high-value crops such as mangoes, bananas, and watermelons, supported by advanced irrigation systems and favourable agri-climatic conditions.

Tourism is also growing, with unique attractions such as the Cape York Peninsula's pristine wilderness, recreational fishing, and stunning coastal landscapes drawing increasing numbers of visitors. These natural resources and environmental features underscore the region's ecological importance and diverse economic activities.

Cape York Peninsula's unique assets face significant threats from natural disasters, posing substantial risks to its ecological integrity and economic stability. The region is vulnerable to a range of environmental disasters, including cyclones, floods, droughts, and late-season wildfires, all of which can cause extensive damage to infrastructure, disrupt agricultural activities, and lead to severe erosion and habitat destruction.

Droughts are a recurring challenge, stressing water resources, diminishing agricultural productivity, and increasing the risk of bushfires. These natural disasters not only endanger the region's agricultural industries but also threaten its rich biodiversity. Effective natural resource management and disaster preparedness strategies are essential to mitigate these risks and safeguard Cape York Peninsula's unique landscape and economic vitality.

Pip Schroor
Chief Executive Officer

Australian Government

This project is funded by the Australian Government Natural Heritage Trust and delivered by Cape York NRM, a member of the Commonwealth Regional Delivery Partners panel

ACRONYMS

AIMS	Australian Institute of Marine Science
AWC	Australian Wildlife Conservancy
BMP	Best Management Practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CYNRM	Cape York NRM
DAF	Department of Agriculture and Fisheries'
DAFF	Department of Agriculture Fisheries and Forestry
DETSI	Department of Environment, Tourism, Science and Innovation
EPA	Environmental Protection Authority
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GRASS	Grazing Resilience and Sustainable Solutions Program
GSPRT	Golden-shouldered Parrot Recovery Team
HLW	Healthy Land and Water
NAFI	North Australian Fire Information
NAILSMA	North Australian Indigenous Land and Sea Management Alliance Ltd
NEMA	National Emergency Management Agency
QPWS	Queensland Parks and Wildlife Service
QFD	Queensland Fire Department
QWSG	Queensland Wader Study Group
RFSQ	Rural Fire Service Queensland
SARA	Sharks and Rays Australia
SCYC	Southern Cape York Catchments
SFFRT	Spectacled Flying Fox Recovery Team
TSRA	Torres Strait Regional Authority
WCTTAA	Western Cape Turtle Threat Abatement Alliance
WTMA	Wet Tropics Management Authority
WWF	World Wildlife Fund

BACKGROUND

There is a growing need to enhance our preparedness for natural disasters and their impact on biodiversity and agricultural natural capital assets. Ensuring the survival of species and places helps to preserve key ecosystem services such as clean air, water, and climate regulation, all of which profoundly affect human well-being.

Disaster preparedness bolsters the resilience of ecosystems, 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 investing in disaster preparedness, long-term costs for recovery and restoration post-disaster are reduced.

Preparedness for natural disasters and effective responses for biodiversity and agricultural natural capital assets are paramount in the Cape York Region. Given the region's vulnerability to various natural disasters, proactive measures are essential to safeguard both the environment and agricultural productivity and the long-term environmental sustainability of the region.

In Cape York Peninsula, strengthening ecosystem resilience is crucial for mitigating the impacts of disasters on our native flora and fauna. This involves prioritising the conservation of critical habitats and employing effective land management strategies to reduce risks. Understanding how disasters affect species in this region is vital; this knowledge allows us to implement targeted actions to protect these species both during and after such events, ensuring the preservation of our valuable biodiversity.

In addition, adopting sustainable land management practices can significantly bolster agricultural resilience. Techniques such as regenerative agriculture, rotational grazing to maintain ground cover, destocking, water conservation, maintaining cool burning regimes, and monitoring animal health help reduce soil erosion and enhance resilience during extreme weather events.

Community engagement is also key. By equipping land managers with access to early warning systems, emergency resources, and financial support, we can enable prompt and effective responses to minimise the impacts of disasters on both biodiversity and agricultural assets. Tailoring preparedness and response strategies to the unique landscapes and challenges of Cape York will strengthen resilience and support the long-term sustainability of our natural and agricultural resources.

The Cape York Region Biodiversity and Agricultural Natural Capital Emergency Preparedness and Response Plan (The Plan) considers the most likely disaster scenarios for the Cape York Management Unit (CYMU) including risk assessments for natural disaster scenarios including, cyclones, floods, droughts, late-season wildfires, pests and disease, extreme heat waves and oil spill / pollution events.

The plan is built on information gathered from:

a) previous natural disasters in the Cape York Region including:
   - late dry season wildfires in 2016 and 2019 that burned over 4 million ha of land, including national parks, Indigenous lands and pastoral properties;
   - Devastating impacts from Cyclone Ita, Trevor, and Jasper in 2014, 2019, and 2023 respectively, and the associated increased wildfire risk due to fallen timber and debris across the region.
   - 2014 and 2022 floods which resulted in extensive areas of flooding and long periods of inundation; and
   - Drought declarations in 2015-2017 and 2020;

b) science reviews including peer-reviewed publications, conservation advice, recovery plans, government reports, regional disaster management plans, and the Cape York NRM regional planning documents (e.g., NRM Plans developed for the Regional Land Partnerships Program (RLP);
c) comprehensive spatial mapping of assets and known and predicted environmental extremes to determine risks and priority locations; and

The plan also contributes, in part, to actions under Target 17 of the *Threatened Species Action Plan 2022-32*[1] and Outcomes 1, 2 and 3 of the Natural Heritage Trust (NHT), by addressing vulnerability from extreme weather events relevant to biodiversity[2] and agricultural natural capital assets[3] identified in the 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 to build resilience to climate change and conserve natural capital and biodiversity on-farm.

Given the looming threat of severe weather seasons in the future, along with the critical role of Regional Delivery Partners in supporting NRM preparedness and response, Cape York NRM was invited to deliver a 'Biodiversity and Agricultural Natural Capital Emergency Preparedness & Response Plan' to safeguard biodiversity and agricultural natural assets. This plan will be utilised to direct preparedness actions and respond in the event of natural disasters in the future and will be reviewed annually.

The Queensland Strategy for Disaster Resilience 2022-2027 (QSDR) promotes a systems approach to resilience that connects with a range of agencies and sectors to deliver improved outcomes for Queensland. A systems approach is built into this plan where stakeholders across the Cape York region work collaboratively to deliver a locally led, strategic, proactive, and planned approach to disaster resilience.

This approach also extends through the alignment of this plan with the Cape York Regional Plan, Cook Shire Disaster Management Plan, Great Barrier Reef Climate Change Adaption Strategy, and the Aboriginal and Torres Strait Islander Disaster Resilience Plan.

[1] https://www.dcceew.gov.au/sites/default/files/documents/threatened-species-action-plan-2022-2032.pdf
[2] Biodiversity assets refer to assets identified by jurisdictions, environment management agencies or environmental law as important to preserve during emergencies or natural disasters e.g., species, ecological communities, habitat features.
[3] Agricultural natural capital assets relate to the on-farm natural resources that we rely on for food and fibre production, including soil, air, water, riparian areas, remnant native vegetation, agroforestry and environmental plantings and animals.

OBJECTIVES OF THIS PLAN

The Cape York Biodiversity and Agricultural Natural Capital Emergency Preparedness and Response Plan aims to improve preparedness for and response to emergency events by effectively integrating biodiversity and agricultural natural capital assets into all phases of emergency planning, response, and recovery. This involves identifying the biodiversity and agricultural assets most at risk from natural disasters and undertaking proactive planning to mitigate these threats.

The plan enhances the resilience of these assets through targeted actions before, during (to the extent possible), and after emergencies to support recovery. These measures include conservation efforts to preserve critical habitats, sustainable land management practices such as regenerative agriculture, seasonal forecasting to guide grazing management, and hazard reduction fire management.

By incorporating tailored preparedness and response strategies, this plan seeks to safeguard Cape York's biodiversity and agricultural assets, ensuring their long-term sustainability in the face of increasing climate variability.

SCOPE

The Cape York NRM Emergency Preparedness and Response Plan aims to mitigate the impact of catastrophic events on biodiversity and agricultural natural capital assets across Cape York, addressing likely disaster scenarios such as wildfires, tropical cyclones, flooding, biosecurity incursions, drought, and heatwaves. The Plan outlines mitigation measures to be taken before emergencies, response activities during events, and recovery efforts afterwards, with a focus on assets identified as having high to medium susceptibility to specific emergencies. While implementing these actions is beyond the scope of the Plan, it identifies ongoing activities that are already funded or underway.

The capacity of Cape York NRM to deliver these preparedness and response actions is influenced by several factors, including financial resources, organisational capacity, stakeholder engagement, and access to critical data and technology. The Plan acknowledges that financial resources will play a significant role in determining the scope of actions that can be implemented, and while some actions are outlined, additional funding will be sought as needed. The organisation's capacity, including staff expertise and technical capabilities, will also impact its ability to plan and respond to emergencies effectively. Building internal capacity through training and partnerships is essential for enhancing the organisation's effectiveness.

Resource availability, such as access to reliable information, hazard mapping, and environmental monitoring data, and knowledge about species distribution is crucial for informed decision-making and risk assessment.

The plan recognises the challenges posed by the region's vast size, remoteness, and limited environmental and spatial data. Despite these challenges, Cape York NRM is committed to delivering disaster preparedness and response actions that align with its organisational goals, strategic priorities, and available resources. Collaborative partnerships and strategic alliances will be pursued to leverage additional resources and expertise, ensuring the Plan's successful implementation and the long-term resilience of Cape York's natural assets.

REGIONAL PROFILE

The Cape York NRM region spans approximately 137,000 km² and encompasses several local government areas, including Cook, Torres, Lockhart River, Northern Peninsula Area, and Kowanyama (Figure 1). The region is predominantly characterised by Indigenous land management, conservation areas, and extensive cattle grazing, which together cover the majority of the landscape.

Conservation and natural environments account for a significant portion of the region, with pastoral activities, including beef cattle production, occupying large areas. The regional economy is supported by key industries such as agriculture (primarily grazing), mining, tourism, and fishing. From 2017 to 2021, total agricultural production in the Cape York NRM region varied, with contributions from livestock and cropping sectors.

The region is rich in Indigenous heritage, with Native Title Determinations, Applications, or Indigenous Land Use Agreements covering much of the area. Traditional Custodians hold Native Title interests across the region, reflecting the deep cultural connections to the land, whether they reside on Country or elsewhere (Figure 2).

Cape York encompasses diverse bioregions, including the Cape York Peninsula itself, the Wet Tropics, and the Gulf Plains. These bioregions form a mosaic of habitats that support a wide array of plant and animal species, contributing to the ecological significance of the region.

The landscape is predominantly tropical savannah, with the eastern coastline featuring extensive mangrove systems and the western coastline along the Gulf of Carpentaria characterised by low-lying floodplains and regionally significant coastal wetlands.

The region also contains several major river catchments, including the Jardine, Wenlock, and Normanby Rivers. These rivers play a crucial role in the ecological health of the region, with their waters draining into the Gulf of Carpentaria and the Coral Sea, where upstream activities can have significant downstream impacts.

Map 1 – Cape York NRM Region

Map 2 - Cape York Traditional Owners Representative Bodies

High biodiversity is a fundamental component of ecosystem stability, contributing to resilience, productivity, and the maintenance of ecological processes. Cape York Peninsula is recognised as a region of extraordinary biodiversity, with over ten thousand documented plant species and several thousand animal species. This region supports more than 15% of Australia's total species, a result of its diverse and relatively undisturbed landscapes.

Cape York is particularly notable for harbouring 60% of Australia's butterfly species, over one-third of its avian species, and more than a quarter of its amphibian, mammalian, and reptilian species. Additionally, the region boasts the richest freshwater fauna in Australia, encompassing over 40% of the nation's fish species.

Endemism is a significant feature of Cape York's biodiversity, with approximately 240 plant species found nowhere else in the world. Moreover, at least 350 species within the region are listed as threatened under state, national, and international conservation frameworks, underscoring the global importance of Cape York's biodiversity.

The species identified in the biodiversity component of this plan have been selected based on rigorous criteria, including their environmental roles and cultural significance within the Cape York region. These selections are critical for informing conservation strategies and ensuring the protection of both ecological and cultural assets across this biodiverse landscape.

Agriculture plays a major role in the economy of the Cape, Torres and Gulf region with more than half of the Cape York Peninsula's land mass occupied by cattle grazing. Horticulture, aquaculture, commercial and recreational fishing are also key enterprises within the region, however, there is very limited fresh food production. Food and essentials are largely transported in from outside the region, and is therefore costly, particularly fresh food.

Ecosystem services provided by land, soils, native habitats and animals, and waterways, include water infiltration and storage, soil stability, nutrient cycling and availability for plant growth, pollination, habitat, flood control and carbon storage. Due to the geographical scale of most of these commodities, the impacts of disaster events can vary significantly and therefore have been separated within this plan. Due to the logistics of freight and workforce movements within Cape York, agriculture can be affected by a disaster event even when the event is not within the area of impact due to limited road and port access and the loss of connectivity when these routes are impeded.

Natural Disaster and Emergency Events

Cape York Peninsula, located in the northernmost part of Queensland, Australia, is prone to various natural disaster events due to its geographic and climatic conditions. The most common natural disasters in Cape York include cyclones, severe storms, floods, late-season wildfires, heatwaves and droughts.

The region is characterised by distinct dry and wet seasons with an annual average rainfall of 1305 millimetres.

Based on the future climate projects, the region is expected to experience the following changes to climate conditions in the future:

- higher temperatures
- hotter and more frequent hot days
- more intense downpours
- increased exposure to coastal hazards including storm surge and sea level rise
- warmer and more acidic seas
- less frequent but more intense tropical cyclones
- longer periods spent in extreme drought

These changes will likely impact the region through a strengthening in cyclone intensity when cyclones occur, increasing severe storms, increasing flooding over large areas of the catchments and adding disruptions to transport networks, and weed invasion across the region.

Cyclone Trevor, which struck Cape York in March 2019 as a category 3 system, had significant impacts on biodiversity in the region. Cyclone Trevor's intense winds, reaching speeds of up to 250 km/h, caused widespread deforestation and canopy damage.

Recently, in November 2024, over 1,000,000 hectares burned in the region due to late-season wildfires, arson, and lightning strikes. In the Lakeland area, these large-scale fires caused significant crop damage, livestock mortality, and the destruction of extensive grazing lands.

Additionally, there was substantial infrastructure damage to fences and irrigation systems. Landholders battled the fires until the rains from Tropical Cyclone Jasper, which made landfall as a Category 2 system on December 13th, extinguished the flames.

This plan will build on recent lessons learned by TC Jasper and the subsequent major flooding event that occurred post-cyclone. The impacts and effects of this event will be felt for many years to come as the communities rebuild and fully recover and the natural environment reacts to the significant changes that occurred.

ROLE OF REGIONAL DELIVERY PARTNER (RDP) IN EMERGENCY PREPAREDNESS AND RESPONSE

This plan outlines Cape York NRM's approach to disaster preparedness, response, and recovery across the Cape York region. The plan was developed to guide the organisation's effective support in disaster efforts to minimise the impacts of natural disasters on the environment. The plan also aims to enhance awareness among key stakeholders regarding the region's critical biodiversity and agricultural assets, as well as the threats they face from natural disasters in a changing climate.

Cape York NRM serves as a key liaison between government and non-government agencies, providing high-level technical expertise on at-risk assets and offering guidance on mitigation strategies to reduce disaster impacts. During disaster events, Cape York NRM will collaborate with Local Disaster Management Groups (LDMGs), providing expert knowledge and coordinating necessary resources. Following disasters, the organisation will facilitate environmental restoration efforts, including ecosystem rehabilitation and the utilisation of sustainable land management practices, while supporting communities in accessing recovery funding.

Cape York NRM's CEO is an active member of the Cook Shire Environmental Recovery Subgroup, part of the Cook Shire Disaster Recovery Group, and participates in the Queensland Government's Ex-TC Jasper Environmental Functional Recovery and Resilience Group. These affiliations provide the organisation with direct access to high-level recovery efforts and foster increased collaboration among the diverse stakeholders involved in disaster response and environmental recovery.

Through these coordinated initiatives, the plan aims to build regional resilience and support sustainable recovery from natural disasters.

EMERGENCY MANAGEMENT FRAMEWORK

Cape York NRM aligns with the Australian Government's Crisis Management Framework by playing a crucial role in each phase of the disaster management continuum, focusing on enhancing regional resilience and supporting effective response and recovery efforts. Within the broader emergency management framework this plan effectively provides regional (coordination) and local (delivery) within the resilience policy line of sight (figure 1).

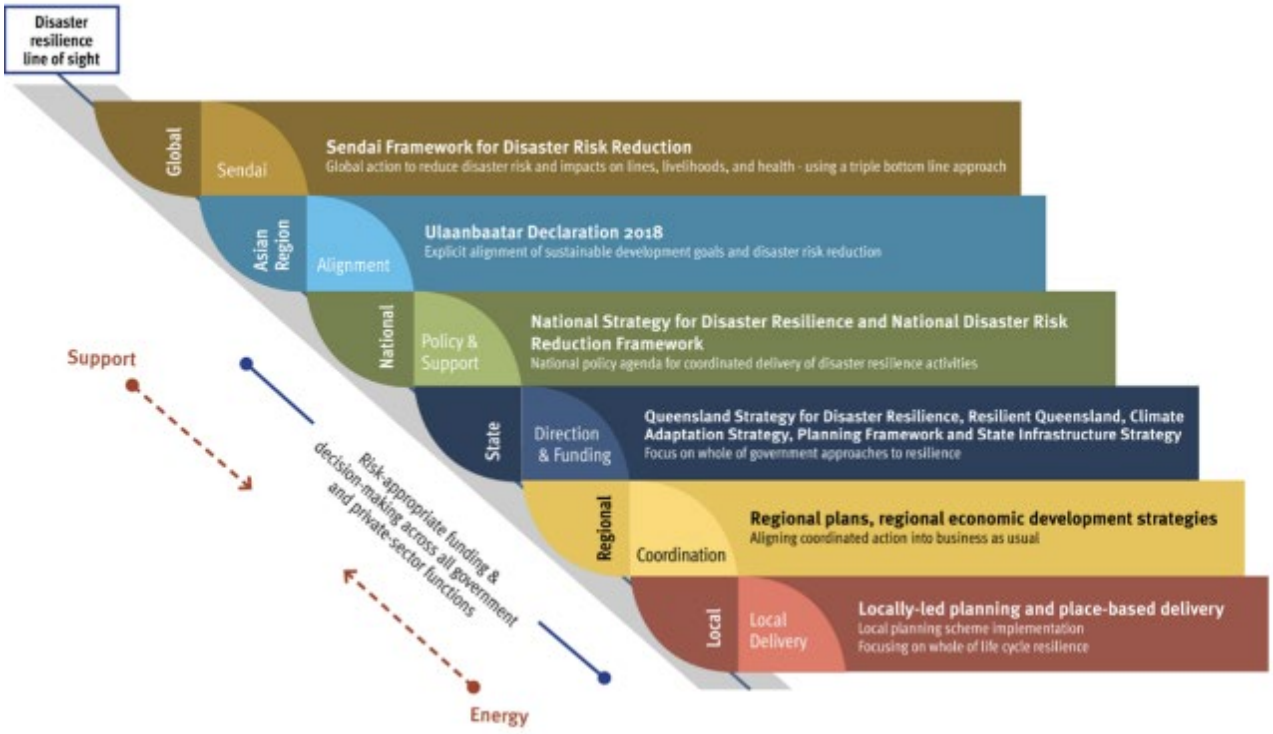

Figure 1. Resilience policy line of sight

Cape York NRM serves as a key player in the regional community, assisting both government and corporate investors in natural capital emergency preparedness.

The organisation achieves this by providing essential data analysis to assess environmental and agricultural vulnerabilities, facilitating communication and collaboration among local communities, government agencies, and other stakeholders to ensure a unified and effective response, and developing and implementing strategies for disaster preparedness, response, and recovery, including sustainable land and water management practices.

A brief overview of Cape York NRM's role in a comprehensive approach to disaster management is outlined in figure 2 below.

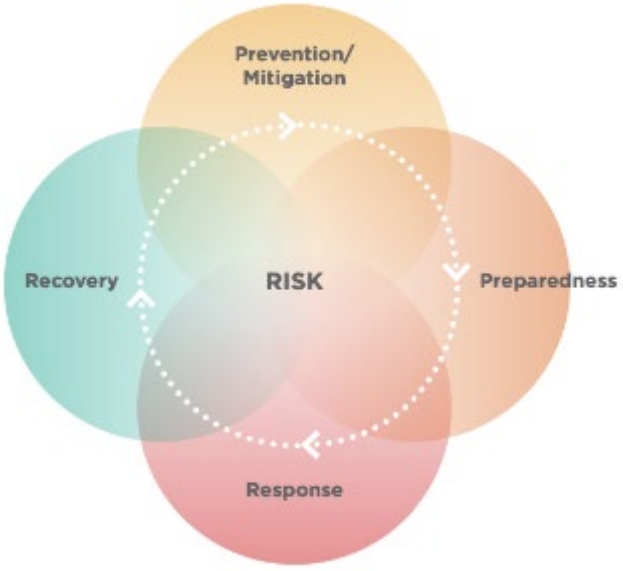

Figure 2. The comprehensive approach to disaster management

Mitigation and Preparedness

Cape York NRM adopts a comprehensive strategy to tackle the risks associated with natural disasters. This strategy includes the current project focused on identifying and prioritising the biodiversity and agricultural capital assets most vulnerable to such events. Cape York NRM actively devises and implements strategies to mitigate these risks and strengthen community resilience.

These strategies involve monitoring and supporting the condition of natural assets, promoting sustainable land and freshwater management practices, and fostering collaboration with local communities, government agencies, Indigenous groups, and other stakeholders. By enhancing awareness and building collective knowledge and capacity for environmental management, Cape York NRM aims to improve the resilience of ecosystems to natural disasters.

Additionally, Cape York NRM collaborates with the Local Disaster Management Groups (LDMGs), leveraging their expertise in natural resource management and sustainability to develop and refine disaster management plans. The organisation also plays a key role in conducting training sessions and workshops focused on drought-proofing properties, fire and land management for biodiversity protection and agricultural sustainability. Through these efforts, Cape York NRM is dedicated to boosting the region's preparedness for natural disasters and minimising their impact on communities and ecosystems.

Response

Cape York NRM is dedicated to mitigating the impact of natural disasters and promoting the long-term sustainability and well-being of the Cape York region. Cape York NRM will actively respond in disaster scenario in the following actions:

- **Supporting Local Disaster Management Groups (LDMGs):** Providing expertise and resources to address the immediate impacts of disasters.
- **Facilitating Communication and Collaboration:** Ensuring coordinated and efficient responses by connecting relevant agencies and stakeholders.
- **Coordinating Assistance:** Helping impacted communities access essential resources, information, and technical support needed for recovery.
- **Engaging Local Volunteers and Securing Funding:** Mobilising volunteers and acquiring financial support to assist in emergency response and evaluation.
- **Utilising Traditional and Local knowledge:** Embedding traditional and local knowledge into land management and conservation programs to ensure the most suitable methods are utilised for the location to ensure the best outcomes.
- **Monitoring Environmental Impacts:** Assessing the environmental effects of disasters where funding permits, to gather critical data for post-disaster recovery and restoration efforts.

Through these actions, Cape York NRM aims to enhance the region's resilience and ensure effective disaster response and recovery.

Recovery

When funding is available, Cape York NRM will collaborate intensively with landowners, local governments, community organisations Traditional Owners, conservation groups, and Local Disaster Management Groups (LDMGs) to develop and execute post-disaster monitoring and recovery strategies. This approach ensures a unified and effective response to assess recovery, restore damaged ecosystems, and rehabilitate natural resources.

Cape York NRM supports key initiatives including erosion control, fire management, grazing land management, and habitat restoration to address and mitigate the environmental impacts of disasters. The organisation also assists communities in securing financial support and grants for recovery and rebuilding, providing vital resources to aid the restoration process.

Additionally, Cape York NRM fosters community-driven projects focused on long-term resilience, promoting sustainable land management and climate adaptation strategies to strengthen the region's capacity to handle future disasters.

Through these collaborative efforts, Cape York NRM plays a crucial role in enhancing the restoration and resilience of Cape York's biodiversity and natural agricultural assets, thereby ensuring the region's ongoing sustainability.

Community Approach

In response to natural disasters, Cape York NRM will actively incorporate traditional and local knowledge to enhance response strategies and recovery efforts. This involves engaging with Indigenous communities and local experts who possess deep understanding of the region's ecosystems, historical patterns of natural events, and traditional land management practices.

By integrating this invaluable knowledge, Cape York NRM aims to develop culturally informed and environmentally effective response actions. A community approach will greatly benefit with the inclusion / integration of rural landholders, graziers and farmers (rural communities) to promote sustainable land use practices.

Collaboration with traditional custodians will help identify critical areas for immediate attention, such as culturally significant sites and traditional resource management practices that can be applied to mitigate disaster impacts. Local knowledge will also guide the implementation of recovery strategies that respect and preserve cultural values while promoting sustainable land use practices.

This approach ensures a holistic response that not only addresses the immediate needs of the community but also strengthens long-term resilience by incorporating time-tested methods and perspectives into disaster management plans. Through this integration of traditional and local knowledge, Cape York NRM enhances the effectiveness of its response efforts and supports the region's recovery and sustainability in a culturally respectful manner.

IDENTIFICATION OF MANAGEMENT UNIT ASSETS AND SUSCEPTIBILITY

The identification of biodiversity assets initially involved a comprehensive assessment of Matters of National Environmental Significance (MNES) governed by *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as well as an internal Cape York NRM prioritisation of species and ecological communities considered regionally and culturally significant.

Species distribution maps were then juxtaposed with spatial threat layers, utilising both historical and predictive data. Species and ecological communities that were not identified to be threatened by disaster scenarios or had limited distribution in the Cape York region were omitted from the asset list to ensure a targeted approach to disaster preparedness and response.

Determining the susceptibility of threats to each species and ecological community involved a review of spatial layers alongside a thorough examination of relevant literature for each asset. Peer-reviewed publications, conservation advice, government reports, recovery plans, and other regional strategies were reviewed to identify potential emergency scenarios posing threats to each species and actions that could be used to build the resilience of each asset.

Biodiversity assets included in this plan alongside their conservation listings with Federal and State Legislations and Internationally are provided in table 1 below.

Table 1 - Priority species and ecological communities and their conservation listing under the Environment Protection and Biodiversity Conservation (EPBC) Act 1999, Nature Conservation Act (NCA) 1992, and the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species.

SPECIES	EPBC	NCA	IUCN
Buff-breasted button-quail (*Turnix olivii)*	CE	V	CE
Dugong (*Dugong dugon)*	V	V	V
Eastern curlew (*Numenius madagascariensis)*	E	CE	E
Flatback turtle (*Natator depressus)*	V	V	DD
Freshwater sawfish (*Pristis pristis)*	V	E	CE
Golden-shouldered parrot (*Psephotellus chrysopterygius)*	E	E	E
Green turtle (*Chelonia mydas)*	V	V	E
Hawksbill turtle (*Eretmochelys imbricata)*	CE	CE	CE
Northern quoll (*Dasyurus hallucatus)*	E	LC	E
Olive Ridley turtle (*Lepidochelys olivacea)*	E	E	V
Palm cockatoo (*Probosciger aterrimus macgillivrayi)*	V	E	NT
Red goshawk (*Erythrotriorchis radiatus)*	E	E	E
Spectacled flying fox (*Pteropus conspicillatus)*	E	N	E
Southern Cassowary (*Casuarius casuarius johnsonii* northern population)	E	E	LC

ECOLOGICAL COMMUNITIES			
Littoral Rainforest and coastal vine thickets of Eastern Australia	E		

** NT = Near Threatened, V = Vulnerable, E = Endangered, CE = Critically Endangered, LC = Least Concern, DD = Data Deficient*

Agricultural Natural Capital Assets in the Cape York region were identified through an assessment of the region's key agricultural industries and the natural resources essential to their sustainability. Pastoral production dominates the region, with cattle grazing occurring across the majority of Cape York's landscapes, while smaller areas are used for dryland cropping.

Intensive agriculture is primarily concentrated around Lakeland and the Northern Peninsula Area, focusing on crops like bananas, tropical fruits, and some vegetable production. Livestock assets, including cattle, are integral to the region's economy, along with natural resources such as high-value soils, freshwater systems, and native vegetation used for grazing. These assets form the backbone of Cape York's agricultural industry and are critical to maintaining the region's economic and environmental resilience.

Each asset was assigned a risk rating based on an internal review by Cape York NRM, using a risk matrix that assessed the potential impacts of environmental disasters on these assets (Appendix 1). In some cases, the cumulative effects of multiple threats—such as droughts leading to overgrazing—were considered alongside other factors influencing the resilience of these assets.

Data gaps for certain species and assets meant that assumptions were necessary, which may have affected the accuracy of the risk ratings. Additional threats, such as habitat degradation, water use, and invasive species, further complicated the assessment, making it difficult to isolate the impact of individual disaster events.

As a result, the risk matrix incorporates these uncertainties, underscoring the need for ongoing research and monitoring to improve risk assessments and resilience strategies.

The severity of disasters will also influence risk ratings. For instance, the intensity of cyclones significantly affects the level of ecological damage, with stronger cyclones posing greater risks. Similarly, the intensity of wildfires, which varies depending on fuel loads and environmental conditions, will affect the extent of damage in different locations.

This highlights the need for a flexible, dynamic approach to risk assessment that adjusts ratings based on real-time data and predictive models to enhance preparedness and mitigate the impacts of disasters on Cape York's biodiversity and agricultural natural capital assets.

BIODIVERSITY ASSETS PREPAREDNESS AND RESPONSE TABLES

Natural Disaster Risk Register for Biodiversity Assets - Drought														
			Susceptibility				Preparedness			Response				
Asset	Emergency scenario	Risk description / reason susceptible	Likelihood	Consequence	Rating	Priority locations	Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Freshwater sawfish (*Pristis pristis*)	Drought	Drought poses a significant threat to sawfish populations, leading to decreased body condition and lower growth rates, particularly during long dry seasons, which reduce their resilience (Lear et al., 2020). Juvenile sawfish are especially vulnerable, often becoming trapped and dying in evaporating waterholes as water levels recede. Prolonged droughts further constrain habitat use, limiting resource availability (Kearney and Porter, 2009). Along the Cape York coastline, climate predictions under an RCP 8.5 scenario, indicate that the frequency and duration of extreme droughts will increase between 2020 and 2039. Consequently, sawfish susceptibility to drought will intensify during years of extreme drought.	Possible	Moderate	High	All known species locations.	Surveys and mapping of waterholes where juvenile sawfish may be stranded.	Sawfish and Rays Australia (SARA), Traditional Owner groups (Normanton Rangers), CYNRM	Limited surveys of waterholes have occurred to specifically identify the presence of sawfish at the end of the dry season or during drought.	Survey of waterholes identified to provide habitat for sawfish and removal of juvenile sawfish. Tag and release sawfish removed from waterholes.	SARA, Traditional Owner groups	Ad hoc post-drought monitoring of sawfish to track the survival of sawfish removed from drought-affected waterholes.	SARA, Traditional Owner groups
							Undertake habitat restoration projects in mangrove and seagrass habitats.	Traditional Owners, GBRMPA, Research Institutions, Earthwatch Australia	Currently the Great Barrier Reef Marine Park Authority (GBRMPA) oversees various seagrass restoration initiatives.				
Marine turtles (Chelonioidea)	Drought	Drought can influence the success of marine turtle nesting by affecting the temperature and moisture levels of nesting beaches. Higher temperatures and reduced moisture content in the sand can increase the risk of egg desiccation and mortality. Drought can alter the availability and distribution of seagrass, algae, and other marine vegetation. Reduced freshwater inflows from rivers and estuaries during drought periods can lead to increased salinity levels in coastal waters, affecting the health and productivity of seagrass beds and other marine habitats. In western Cape York, nesting occurs during dryer winter months while the nesting period on the East Coast occurs during the wet season in summer, when droughts are less likely to occur.	Possible	Moderate	High	Across the species' ranges	Implementing monitoring programs to assess the health of turtle populations	Traditional Owners, QPWS, GBRMPA, Research Institutions, WCTTAA	WCTTAA, QPWS, and Traditional Owners monitor turtle populations across the Cape York region.	Monitor the health of seagrass in areas where drought conditions have persisted.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	Continue to monitor seagrass meadows to assess the recovery of seagrass following the drought event.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government
										Collect sand moisture data.	WCTTAA, Traditional Owners QPWS	Monitor nest sand temperatures following the heat wave event to understand the impact on marine turtle nesting success and hatchling survival.	WCTTAA, Traditional Owners QPWS

Natural Disaster Risk Register for Biodiversity Assets - Drought

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		Along the Cape York coastline, climate predictions under an RCP 8.5 scenario indicate that the frequency and duration of extreme droughts will increase between 2020 and 2039. Consequently, marine turtle susceptibility to drought will intensify during years of extreme drought.					Conduct monitoring program to assess habitat conditions and implement habitat restoration projects in areas where habitats are identified as requiring rehabilitation.	Traditional Owners, GBRMPA, Research Institutions, Earthwatch Australia	QPWS are undertaking habitat restoration projects on Raine Island.	Where possible, relocate eggs from nests at risk of overheating and drying out to cooler, shaded areas / under shade structures.		Monitor the emergence and survival rates of hatchlings from nests to provide crucial data for assessing nesting site health and the effectiveness of egg relocation efforts.	
Dugong (*Dugong dugon*)	Drought	Drought can lead to changes in seagrass beds, the dugong's primary food source. The lack of freshwater runoff into coastal areas can lead to increased salinity in the water, which can stress and even kill seagrass. This reduction in seagrass can have serious consequences for dugong populations, leading to malnutrition and sometimes death. Reduced seagrass mean less food available for dugongs, leading to malnutrition and starvation or they may be forced to migrate longer distances in search of suitable feeding grounds. Female dugongs may experience nutritional stress, leading to decreased fertility, delayed breeding cycles or less milk production. Along the Cape York coastline, climate predictions under an RCP 8.5 scenario indicate that the frequency and duration of extreme droughts will increase between 2020 and 2039. Consequently, dugong susceptibility to drought will intensify during years of extreme drought.	Possible	Moderate	High	Across the species range	Establish long-term monitoring programs to assess the success of seagrass restoration efforts, track seagrass recovery, and monitor dugong presence and habitat use	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	The Great Barrier Reef Marine Park Authority (GBRMPA) oversees various seagrass restoration initiatives and conducts ongoing monitoring of dugong populations within the Great Barrier Reef Marine Park. The Torres Strait Regional Authority (TSRA) have been involved in seagrass monitoring and restoration projects between Australia and Papua New Guinea and conduct dugong monitoring programs to assess dugong abundance, distribution, and habitat use in the region	Monitor drought event and monitor seagrass meadows during drought to determine areas for continued monitoring.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	Conduct long-term monitoring of Dugong populations to determine long-term impacts from the drought event. Continue long-term monitoring program to assess the impact of the drought event on the availability of seagrass important to dugongs, track seagrass recovery, and monitor dugong presence and habitat use.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government TSRA
Golden-shouldered parrot (*Psephotellus chrysopterygius*)	Drought	Reduction in quality and availability of water in the late dry season (OAC, 2022). Complete failure of a wet season is considered a factor that could cause Golden-shouldered parrots to decline. Duration and frequency of extreme droughts under an RCP 8.5 emissions scenario between 2020-2039 show an increase in the frequency and duration of droughts across the species range in Cape York.	Likely	Significant	Very High	Artemis Station and Olkola Traditional Lands	Establishment of automated weather station on Artemis Station and Olkola Traditional Lands and monitoring of temperature, rainfall and flood patterns. Assess the quality and availability of water in the late dry season.	QPWS, Traditional Owners	A remote weather station is not currently monitored to respond to conservation actions for the Golden-shouldered parrot in Staaten River National Park.	If the quality and availability of water in the late dry season is low provide alternative watering points where required and monitor the use of watering points.	QPWS, Traditional Owners, Landholders	Post-drought population survey to determine resilience and plan conservations efforts accordingly.	QPWS, Traditional Owners, CYNRM

Natural Disaster Risk Register for Biodiversity Assets - Drought

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Northern quoll (*Dasyurus hallucatus*)	Drought	Drought conditions can lead to reduced vegetation cover, affecting the availability of shelter and nesting sites for quolls. Sparse vegetation makes quolls more vulnerable to predators. Drought can also significantly reduce the abundance of prey species such as insects, small mammals, and birds due to lower primary productivity and water availability. Reduced water sources during droughts pose a risk of dehydration. Quolls might disperse to new areas or increase their range and movement to find water sources, which can lead to higher mortality risks due to increased exposure to predators and road traffic. Quolls may adjust their diet to include more drought-resilient prey. The duration and frequency of extreme droughts under an RCP 8.5 emissions scenario between 2020-2039 show an increase in the frequency and duration of droughts across the species range.	Likely	Minor	Moderate	Areas where drought conditions occur and where Northern quoll populations are highest.	Management of feral predators.	Landholders QPWS	There are currently no coordinated feral animal control activities occurring specifically for the protection of the northern quoll. Some sporadic feral animal control occurs.	Provide artificial water stations in areas where high-density populations exist.	Traditional Owners, South Endeavour Trust, CYNRM	Strategically undertake population monitoring to determine impacts of drought on quoll populations.	Research Institutions, South Endeavour Trust, DETSI
Spectacled flying fox (Pteropus conspicillatus)	Drought	Drought conditions pose significant threats to this species by reducing the availability of their primary food sources, such as nectar and fruit. Prolonged drought can lead to malnutrition, weakened immune systems, and increased mortality rates among spectacled flying foxes. Additionally, drought-stressed habitats may force these bats to travel further in search of food, increasing their vulnerability to predation and human-wildlife conflicts. The duration and frequency of extreme droughts under an RCP 8.5 emissions scenario between 2020-2039 show an increase in the frequency and duration of droughts across the species range in Cape York.	Likely	Significant	Very High	Sites near historically known habitats.	Protect and restore critical habitats, including rainforest areas that provide essential food resources like fruit and nectar. Foster partnerships between local landholders, Indigenous groups, and conservation organisations to establish protected areas and undertake reforestation projects with native plant species that offer year-round food supplies.	Traditional owner /Ranger groups and landholders, State Government	No actions are currently being undertaken specifically to manage critical habitats that provide food resources for spectacled flying fox conservation.	Develop supplementary feeding programs during extreme drought conditions to support spectacled flying fox populations. Set up DETSIgnated feeding stations with appropriate food sources in consultation with wildlife experts to avoid dependency and manage health risks.	Traditional Owner Groups, State Government, Tolga Bat Hospital, SFFRT	Continue to monitor the health of the Spectacled flying fox population.	Traditional Owner Groups, State Government, Tolga Bat Hospital, SFFRT
										Monitor the health of the spectacled flying fox population impacted by drought to detect signs of malnutrition, dehydration, or disease outbreaks	DETSI, Veterinarians, Conservation Organisations		
										Provide emergency water sources near roosting sites to reduce the stress on flying foxes during severe drought.	Traditional Owners, Tolga Bat Hospital, SFFRT		

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Freshwater sawfish (*Pristis pristis*)	Late-season wildfire	The frequency and size of wildfire could exacerbate floods and debris flows, increase erosion, and imperil water resources and change the hydraulic dynamics for sawfish habitat (Fowler et al. 2022). Reduced water quality can cause a shift in sawfish habitat use away from the shallow areas with unDETSIred water quality. This can lead to lower prey availability and energy intake. It can also increase predator pressure by restricting access to refuge habitats and increasing likelihood of predator interactions (Lear et al. 2020). Late-season fire frequency has been greatest along the Western Cape between Kowanyama and Weipa, where some locations burn yearly.	Unlikely	Minor	Moderate	Locations adjacent to sawfish habitat, particularly on the Western Cape between Kowanyama and Weipa.	Controlled burns and change in current burning practices in the National Bushfire Mitigation program, with the aims to reduce wildfire causing loss of vegetation which leads erosion and sediment washing into freshwater sawfish habitat.	QFD, Traditional Owners, Landowners, State Government, QPWS	Cape York NRM currently has fire management projects underway in some areas. Fire and erosion management is also being undertaken through the Eastern Cape York Water Quality Program whereby project partners are tackling significant sources of erosion and sediment into coastal habitats.	Protect valuable riparian vegetation by back burning, creating fire breaks, and direct control of the fire to reduce the loss of vegetation that stabilises river banks.	Traditional Owners, CYNRM, QFD, QPWS, SCYC	Conduct thorough assessments of freshwater sawfish habitats to identify areas damaged by fire and subsequent runoff. Remove cattle where required to reduce further impact to damaged riparian vegetation.	Traditional Owners, CYNRM, DETSI, SARA
										Monitor water quality in Freshwater sawfish habitats, particularly in rivers and wetlands at risk from ash runoff, increased sedimentation, and nutrient loading due to the fire.	CYNRM, Traditional Owners, QPWS, SARA	Implement long-tern monitoring of Freshwater sawfish populations and their habitats to assess recovery. Research the impacts of fire on water quality, food availability, and habitat use to inform future management strategies.	SARA, Research Institutions
Red goshawk (*Erythrotriorchis radiatus*)	Late-season wildfire	Extensive, hot fires late in the dry season have been known to cause nesting failures and destroy nest trees (QG, 2021). Fire management is especially important for managing the density of sapling regrowth under canopy trees and converting forest to woodland or grassland therefore reducing prey availability. Fire management for this species is complex and varied fire history occurs throughout the species distribution. According to the NAFI data, late-season wildfires do not occur extensively across Cape York, however, do occur across some of the western Cape. Threats of late season wildfire would be largely dependent on known nesting and feeding areas.	Possible	Minor	Moderate	Within modelled species distribution. Landholder engagement informed by nest site data.	Identify and map important red goshawk habitat in the Northern Gulf region. Collate a list of known nest locations for red goshawks.	Birdlife Australia, CSIRO	Historical surveys occurred specifically for this species in north Queensland in 1999 (Czechura et al.. 2010).	Protect any known nesting trees in the possible line of fire by creating fire breaks or back burning.	Landowners, QFD	Undertake assessment of damage to nesting sites following the wildfire.	Birdlife Australia, CSIRO
							Incorporate best practice guidelines for fire management for the conservation of red goshawk habitat into community and property fire management plans as part of the Qld Fire and Biodiversity Program.	HLW, CYNRM, Landowners, QFD, QPWS, Local Councils	Healthy Land and Water is currently delivering the Qld Fire and Biodiversity Program. Future collaborations are required to build conservation priorities for the red goshawk into fire management plans.				
							Conduct fire management planning workshops that enhance awareness and capacity of private landholders and public land managers regarding the role of fire in enhancing red goshawk habitat.	CYNRM, Firesticks Alliance	No targeted fire management workshop or information sessions are delivered specifically for integration of red goshawks into fire management planning.				

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
							Encourage landholders to enter land management agreements, particularly in-perpetuity covenants, that reduce the effects of habitat fragmentation and degradation and promote the protection and maintenance of private lands with high-value habitat for the red goshawk.	Qld Govt Private Protected Area Program partnered with Pastoralists, Support provided by CYNRM	Prioritisation of properties for land management agreements requires updated survey data.				
Golden-shouldered parrot (*Psephotellus chrysopterygius*)	Late-season wildfire	Fire has the potential to alter and reduce the suitable habitat of the Golden-shouldered parrot by reducing forage availability, vegetation thickening and nesting sights. Post event, there would be a decrease in forage species and an increased threat of weeds and invasive species establishment. Control burning regimes have been altered to suit grazing practices and to align with the Savannah Burning methodology. This has increased the risk to the parrot due to the thickening of vegetation, reduced germination of Cockatoo Grass at early wet season and in some cases destruction of nesting sites. Altered fire regimes also open the opportunity for the establishment of weed species such as invasive grasses. According to NAFI data, late-season wildfires have occurred infrequently in Golden-shouldered parrot habitat in Cape York. Some fires have occurred in Alwal National Park	Possible	Significant	Very High	Artemis Station, Olkola Traditional Lands (Alwal National Park)	Integrate fire management practices aimed at conserving Golden-shouldered parrot habitat into community and property fire management planning to ensure a coordinated approach to planning and implementing fire management to restore and manage the open savanna habitats that Golden-shouldered Parrots depend on, focusing on maintaining a mosaic of grassy areas with scattered trees.	Traditional Owners, Landowners, QPWS, QFD	There are currently a number of stakeholders in Cape York specifically using fire management to protect habitat for Golden-shouldered parrots including Indigenous Ranger Groups, QPWs, AWC, Bush Heritage and local land owners.	Protect valuable golden-shouldered parrot habitat from wildfire by back burning, creating fire breaks, and direct control of the fire.	QFD, Landowners, Traditional Owners, State Government	Promote the regeneration of essential vegetation, including specific grasses that the parrots rely on for food.	Landowners, QPWS, Traditional Owners
							Establish and maintain strategic firebreaks around critical nesting and feeding areas to protect them from encroaching wildfires.	Traditional Owners, Landowners, QPWS, QFD					
							Extension activities to build property manager awareness, skills and adoption of fire management aimed to protect Golden-shouldered parrot habitat.	CYNRM, QFD, Fire Sticks, FireScape, HLW	CYNRM have undertaken an extensive amount of extension across Cape York to build the skills and awareness of land managers to undertake fire management for conservation.			Undertaken post-fire feral animal management (Cats, dogs and pigs).	Landowners, QPWS, Traditional Owners
							Increased participation of regional stakeholders (particularly property managers) in regional fire management meetings. Provision of community and property fire management plans to the Rural Fire Service.	QFD	Greater participation is required at regional fire management meetings.			Conduct regular surveys to assess the impact of the wildfire on the parrot population and track recovery efforts.	Traditional Owners, QPWS
Southern cassowary (*Casuarius casuarius johnsonii)* (northern population)	Late-season wildfire	Severe fires that progressively destroy rainforest on steep slopes, availability, vegetation thickening and nesting sights. Post event, there would be a decrease in forage species and an increased threat of weeds and invasive species establishment. However the maintenance of sclerophyll communities utilised by cassowaries is dependent on the presence of fire.	Likely	Moderate	High		Controlled burns and change of current burning practices as mentioned in the Cassowary Recovery Plan	QFD, QPWS Landholders, Traditional Owners	Some adoption of changed practices have occurred across the known habitat for this species.	Use aerial water bombing, ground crews, and firebreaks to prevent the fire from spreading into cassowary habitats. Prioritise areas with known cassowary	QPWS, QFD, Landowners, Traditional Owners	Assess the extent of habitat damage and plan for restoration efforts to support cassowary populations.	QPWS, Traditional Owners, CYNRM

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		The structure of Cassowary habitat has been degraded over time due to the intrusion of invasive weeds, which have altered controlled burning practices. This has led to increased degradation of shelter, breeding sites and food resources. Altered fire regimes also open the opportunity for the establishment of weed species such as invasive grasses. According to NAFI data, late-season fire frequency is low across the species distribution in Cape York.					Protect and restore the dense, tropical rainforest habitats by ensuring fire-sensitive rainforest edges are protected by creating buffer zones of less flammable vegetation and creating fire breaks.	QFD, QPWS Landholders, Traditional Owners	Several stakeholders in Cape York undertake fire management with the aims to protect fire-sensitive rainforest.	populations and nesting sites.		Undertake revegetation of native fruit-bearing trees that cassowaries rely on, especially in degraded areas.	QPWS, Traditional Owners, CYNRM
Palm Cockatoo (*Probosciger aterrimus macgillivrayi*)	Late-season wildfire	Frequent, high-intensity fires are directly destroying nest trees and indirectly reducing the number of breeding hollows available to palm cockatoos by negatively impacting termite populations, which are crucial for hollow creation. These fires also affect the stability of the rainforest/woodland ecotone, which is essential for maintaining the recruitment of large trees. At Iron Range, nest hollows are already a limiting resource, with changes in fire patterns being the main cause (TSSC, 2015). According to NAFI late-season fire frequency data, late-season fires are most frequent within and around Weipa, other areas within the species distribution appear to burn less frequently.	Very Likely	Significant	Severe	Areas across the species range frequent fires have occurred, primarily in locations near Weipa, potentially around Iron Range where fires have already destroyed nest hollows.	Implement active and appropriate fire management regimes to optimise the creation and longevity of large tree hollows (TSSC, 2015).	QFD, Landowners, Traditional Owners	Some properties in Cape York undertake appropriate fire management, however, greater adoption of strategic fire management with the aims to protect Palm Cockatoo hollows is required.	Protect valuable Palm cockatoo habitat from wildfire by back burning, creating fire breaks, and direct control of the fire.	QFD, Landowners, Traditional Owners, State Government	Undertake long-term post-fire population monitoring and hollow availability to determine the direct and ongoing impact of the fire on the population and critical resources.	DETSI, Research institutions, Traditional Owners
							Conduct research to identify fire management regimes best suited to improving and protecting Palm cockatoo habitat, focusing on critical resources such as nesting hollows.	CSIRO, Research Institutions	More research is requited to investigate fire regimes most suited.			Review and update policies and recovery plans to incorporate lessons learned from the wildfire event. Ensure that future fire management strategies include specific provisions for protecting palm cockatoo habitat, particularly critical hollow bearing trees.	State and Federal Government, DETSI
Buff-breasted button-quail (*Turnix olivii*)	Late-season wildfire	The alteration of fire regimes encouraging extensive burning has brought about woody thickening, a reduced abundance of perennial grasses, weed invasion and general habitat change and degradation. This has led to a reduction of suitable habitat for the buff-breasted button-quail and an elevated predation pressure. In addition to this, during the species' breeding season it may be susceptible to fire. Burning regimes that encourage extensive burning and consequently the possible promotion of woody weed invasion, have a very high potential of creating further habitat loss of the buff-breasted button-quail as their specific habitat is prone to degradation. Extensive dry season fires may eliminate large areas of habitat.	Likely	Significant	Very High	Confirmation of the species occurrence and distribution on Cape York is required.	Establish and maintain strategic firebreaks around known Buff-breasted button-quail habitats to prevent wildfires from spreading into sensitive areas.	QPWS, QFD, Landowners, Traditional Owners	No specific actions for protecting Buff-breasted button-quail habitats are occurring, however other initiatives involving habitat protection for other species is occurring in the region which could potentially include similar practices if a Buff-breasted button-quail population is found.	Protect valuable Buff-breasted button-quail habitat from wildfire by back burning, creating fire breaks, and direct control of the fire.	QFD, Landowners, Traditional Owners, State Government	Conduct population surveys and track population recovery if possible.	Traditional Owners, QPWS, State Government
							Protect and restore the grassland and woodland habitats critical to the Buff-breasted button-quail. This includes maintaining a mosaic of vegetation with varying heights and densities, which provides cover and foraging opportunities. Conduct controlled burns during the early dry season to reduce fuel loads in a way that mimics natural fire regimes while preserving critical habitat features.					Conduct surveys to identify impacted areas and implement habitat restoration activities such as replanting native vegetation and weed management.	

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Spectacled flying fox (*Pteropus conspicillatus*)	Late-season wildfire	Fire can destroy food resources for the spectacled flying-fox and cause the species to vacate roost sites. Smoke is a known deterrent to flying foxes and is used as a dispersal mechanism. Fire during birthing time of year could result in increased mortality of dependent juveniles (TSSC, 2017). According to NAFI late-season fire frequency data, late-season wildfires have occurred infrequently throughout the distribution of the species in Cape York.	Possible	Moderate	High	Sites near historically known habitat.	Controlled burns and change of current burning practices as mentioned in SFF EPBC advice. Create fire breaks to protect critical roosting and foraging habitat for this species. Undertake management of key vegetation (cool fire regimes and weed management) where flying foxes are known to utilise as roosting areas and known foraging areas.	Traditional owner /Ranger groups and landholders, State Government	None of these actions are occurring specifically for protection of habitat for this species. An RDP monitoring and evaluation project underway to provide is currently being undertake to collect location data. Following completion of this project, threats to habitat will be reviewed and targeted management will be undertaken to strategically protect habitat for this species.	Protect valuable spectacled flying fox habitat from wildfire by back burning, creating fire breaks, and direct control of the fire.	QFD, Landowners, Traditional Owners, State Government	Protect remaining habitat that could serve as critical roosting and feeding areas. Undertake weed management to aid in the recovery of native vegetation. Undertake post-fire population surveys to assess the impact on spectacled flying foxes and landscape use post-fire focusing on roosting and feeding patterns to inform future conservation efforts.	Traditional Owners, CYNRM Traditional Owners, Landowners SFRT, Research Institutions, Traditional Owners
Northern quoll (*Dasyurus hallucatus*)	Late-season wildfire	Late-season wildfires can cause direct mortality of individuals. Indirect changes in habitat structure and floristics, and reduction in prey availability post-fire can facilitate post-fire population declines through increased predation risk and reduced reproductive output (Hill & Ward, 2010). Some of the Northern quoll's range is impacted by frequent late-season fires according to the NAFI late-season fire frequency data. Although fires are identified in these areas, the fire would be required to occur during critical breeding times to have a large impact on a quoll population. Several scientific studies have documented population declines following a fire due to lowered recruitment.	Possible	Significant	Very High	Across the species extent in the CY region.	Integrate fire management practices aimed at conserving northern quoll habitat into community and property fire management planning to ensure a coordinated approach to planning and implementing early season fire management. Integrate traditional burning practices aimed to reduce fuel loads whilst keeping unburnt patches in identified high-value *D. hallucatus* habitat (e.g., woodlands adjoining rocky escarpments) (Andersen et al., 2005; Einoder et al., 2023; Thomas et al., 2021).	Landholders with support from QFD, Traditional Owners, QPWS, HLW	In some locations, best practice fire management is being undertaken (e.g., South Endeavour Trust properties and Indigenous organisations). Greater adoption of best practice fire management is required across the region. CYNRM are currently undertaking a fire monitoring and evaluation project.	Protect valuable northern quoll habitat from wildfire by back burning, creating fire breaks, and direct control of the fire.	Landholders with support from QFD, Traditional Owners, QPWS	Undertake post-fire population monitoring of Northern quoll populations in affected areas.	Research Institutions, Conservation organisation (AWC, Bush Heritage)
							Extension activities to build property manager awareness, skills and adoption of fire management aimed to reduce fuel loads and maintain long unburnt patches.	CYNRM, QFD, Fire Sticks, FireScape, HLW	CYNRM have undertaken an extensive amount of extension across Cape York to build the skills and awareness of land managers to undertake fire management for conservation.				

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
							Increased participation of regional stakeholders (particularly property managers) in regional fire management meetings. Provision of community and property fire management plans to the Rural Fire Service.	QFD	Landholders attend regional fire management meetings however, increased participation would improve coordinated burning regimes.			Implement long-term monitoring and research programs to assess the resilience of Northern quolls to wildfires and understand their ecological requirements post-fire.	Research Institutions, Conservation organisation (AWC, Bush Heritage)
						Prioritise control activities in open, topographically simple landscapes where quolls are more reliant on vegetation and woody debris (rather than rocks) for cover which will be reduced post-fire.	Management of feral predators.	Landholders, QPWS	There are currently no coordinated feral animal control activities occurring specifically for the protection of the northern quoll. Some sporadic feral animal control occurs.			Undertake post-fire feral animal management (Cats and wild dogs) (Cremona et al., 2017).	Landholders QPWS
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community	Late-season wildfire	Late-season wildfires can severely impact Cape York's littoral rainforests by destroying and altering habitats for native wildlife. These fires make the forest more susceptible to invasive weeds like *Andropogon gayanus* (Gamba grass) and *Melinis minutiflora* (Molasses grass), creating a feedback loop that heightens future fire risks. The fragmented nature of these rainforests increases their vulnerability, as high-intensity fires threaten both mature trees and seedlings, often causing irreversible damage and loss of biodiversity. Late-season fires burn hotter and spread faster, leaving little time for ecosystems to recover. However, some plant species can resprout after low-intensity fires. Additionally,	Likely	Moderate	High	Along the edges of rainforest	Establish fire breaks and buffer zones of less flammable vegetation around rainforest edges to slow the spread of fires and protect sensitive areas.	CYNRM, Traditional Owners, QPWS	Efforts to protect littoral rainforests in Cape York, including establishing fire breaks and buffer zones, are actively underway. CYNRM, alongside Traditional Owners and local ranger groups, has been conducting surveys and implementing management strategies to mitigate fire and other threats to these sensitive ecosystems.	Protect valuable riparian vegetation by back burning, creating fire breaks, and direct control of the fire to reduce the possibility of the fire impacting rainforest.	QPWS, QFD, Traditional Owners, Landholders	Undertake post-fire assessments to determine the extent of damage to vegetation.	CYNRM, QPWS, Traditional Owners

Natural Disaster Risk Register for Biodiversity Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		coastal factors such as high humidity, salt haze, surface water, mangroves, and salt marshes provide partial protection against fire, helping to mitigate some of the damage. According to NAFI late-season fire frequency data, late season wildfires do not occur frequently within the distribution of this threatened ecological community.					Control and remove invasive, highly flammable species like *Andropogon gayanas* (Gamba grass) and *Melinis minutiflora* (Molasses grass) that increase fire risk.	CYNRM, Landowners, QPWS, Traditional Owners, Biosecurity Qld	CYNRM is actively involved in controlling these invasive species through projects aiming to stop the spread of Gamba grass, particularly through mapping, spraying, and community awareness campaigns. A multi-agency task force, including local councils, Queensland Parks and Wildlife Service, Biosecurity Queensland, and Traditional Owners, has been collaborating on efforts to manage this threat.			Where feasible undertake revegetation of areas affected by the wildfire.	Traditional Owners, CYNRM
							Implement controlled burns to reduce fuel loads and minimise the risk of high intensity fires.	QFD, QPWS Landholders, Traditional Owners	Controlled burns are used in Cape York to minimise the risk of high intensity fires.				

Natural Disaster Risk Register for Biodiversity Assets - Flood

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Marine turtles (Chelonioidea)	Flooding	Flooding can lead to significant habitat degradation in coastal areas, including seagrass beds and coral reefs. This can cause displacement from usual habitats and foraging grounds, disrupting normal behaviour patterns, migration routes, and nesting activities, which in turn can impact population dynamics and distribution. On land, flooding can inundate nests and lead to the loss of nesting habitats through coastal erosion. Flooding also causes large movements of sediment downriver catchments, which can blanket seagrass feeding grounds, resulting in considerable habitat loss due to light limitation. This reduction in food availability for marine turtles can lead to decreased health, starvation, increased stranding, and long-term impacts on turtle populations (AG, 2017). More than 90 percent of coral bleaching has already occurred in shallow-water coral communities within the northern Great Barrier Reef. While marine turtles exhibit resilience to seagrass degradation and coral bleaching through adaptable foraging behaviour, wide distribution, and reproductive adaptations, their long-term survival ultimately depends on the health of seagrass and coral ecosystems.	Likely	Minor	Moderate	All areas where seagrass and coral reef occurs. Specific locations as impacted by storm surges.	Assess the condition of critical seagrass meadows and coral reefs.	Research Institutions, CYNRM, Traditional Owners, Cape York Water Partnerships, GBRMPA, AIMS	Significant surveys and long-term monitoring is established to assess the distribution and health of seagrass and coral reefs habitats across Cape York.	Use satellite imagery and/or aerial photography to document flood plumes and storm surges during the flood event.	Research Institutions, CYNRM, GBRMPA, AIMS	Undertake targeted post-flood seagrass and coral reef surveys to assess the impact of the flood/storm surge events on seagrass communities.	Research Institutions, AIMS
												Undertake monitoring of turtle health post-flood.	Traditional Owners, Research Institutions
							Undertake beach nourishment efforts to replenish lost sediment and restore suitable nesting habitat	Traditional Owners, State Government, DETSI	Beach/sand restoration has been occurring on Raine Island			Assess the impacts of storm surges or flooding on nesting beaches and where possible conduct beach nourishment to restore nesting habitat.	Traditional Owners, State Government , GBRMPA
Freshwater sawfish (*Pristis pristis*)	Flooding	Cyclone storm surges create landscape discharging of sediments into sawfish habitat and modify it to a less DETSIred environment to hold and sustain the species (Fowler et al. 2022). Little is known about the ecology of the species. However, any aggravation to the sawfish habitat will affect the species negatively. Significant floodplains occur in Cape York across the range of the species.	Possible	Minor	Moderate	Across the species range.	Conduct surveys of suitable habitat for Freshwater sawfish to determine priority areas for management and monitoring during a flooding/storm surge event.	SARA, Traditional Owners, Research Institutions, CSIRO, DETSI, WWF	Significant surveys have been undertaken for the species in Cape York on the Wenlock, Ducis, Archer and Jardine Rivers.	Conduct rapid assessments of Freshwater sawfish habitats to determine the extent of flood-related damage, including changes in water quality and habitat structure.	SARA, Traditional Owners, Research Institutions, CSIRO, DETSI, WWF	Continue monitoring of Freshwater sawfish habitats to determine the recovery of flood-damaged habitat.	SARA, Traditional Owners, Research Institutions, CSIRO, DETSI, WWF
										Monitor sawfish populations using tagging data, surveys and direct observations to assess any displacement, injury or mortality caused by the flood. Compare post-flood data with pre-flood baselines.		Continue to monitor sawfish populations using tagging data, surveys and direct observations to assess Freshwater sawfish movement following the flood event.	

Natural Disaster Risk Register for Biodiversity Assets - Flood

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Dugong (*Dugong dugon*)	Flooding	Flooding events can lead to the long-term degradation or loss of seagrass meadows, resulting in reduced habitat and food availability for dugongs. Dugongs are herbivores, and seagrass constitutes the bulk of their diet. Without access to healthy seagrass beds, dugongs would struggle to find adequate food. In addition, if seagrass beds are damaged, it can impact the reproductive success and survival of dugong calves. Seagrass meadows offer shelter and protection for dugongs, especially for calves..	Unlikely	Minor	Moderate	Across the Dugongs Range	Establish long-term monitoring programs to assess the success of seagrass restoration efforts, track seagrass recovery, and monitor dugong presence and habitat use	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	The Great Barrier Reef Marine Park Authority (GBRMPA) oversees various seagrass restoration initiatives and conducts ongoing monitoring of dugong populations within the Great Barrier Reef Marine Park. The Torres Strait Regional Authority (TSRA) have been involved in seagrass monitoring and restoration projects between Australia and Papua New Guinea and conduct dugong monitoring programs to assess dugong abundance, distribution, and habitat use in the region	Use satellite imagery and/or aerial photography to document flood plumes and storm surges during the flood event. Establish areas for post-flood monitoring	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	Conduct long-term monitoring of Dugong populations to determine long-term impacts from the flood event. Continue long-term monitoring program to assess the impact of the flood event on the availability of seagrass important to dugongs, track seagrass recovery, and monitor dugong presence and habitat use.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government , TSRA
Buff-breasted button-quail (*Turnix olivii*)	Flooding	Cyclones and flooding events have the potential to severely impact the vegetation across Cape York Peninsula. Torrential rainfall can cause inundation of habitat, possibly destroying nesting and foraging vegetation. The ecology of the buff-breasted button-quail is still poorly understood and therefore their response to catastrophic events such as cyclones and flooding is largely unknown (Mathieson & Smith, 2009).	Unlikely	Minor	Moderate	Confirmation of the species occurrence and distribution on Cape York is required.	Conduct surveys to determine the presence and distribution of the Buff-breasted button-quail on Cape York Peninsula. .	Traditional Owners, CSIRO, CYNRM, State Government, Birdlife Australia, Research Institutions	A joint project is currently being undertaken by Conservation Partners, Cape York NRM, Traditional Owners, Birdlife Australia and Research and Recovery of Endangered Species (University of Queensland) to search Cape York Peninsula for the species.	No actions possible.	N/A	If population found in the region, undertaken population assessments following the flooding event.	Traditional Owners, State Government , Birdlife Australia
							Develop and implement a program of habitat assessment, tracking and field observations which will improve knowledge of the response to catastrophic flooding events.	Research Institutions, CSIRO, Traditional Owners	This project could only be undertaken following confirmation of the species on Cape York.				
Eastern curlew (*Numenius madagascariensis*)	Flooding	Changes to flows due to flooding can lead to inundation and increased sedimentation in mudflats and estuaries, reducing the availability of invertebrates that curlews rely on for food. Inundation in coastal areas and intertidal zones where Eastern curlews roost, can force them to relocate to less suitable areas. Flooding can cause temporary or long-term shift in the availability of prey species such as crabs and molluscs in the intertidal zones which can severely impact the food availability of the species. Significant floodplains intersect with coastal wetlands and important Migratory Shorebird Habitat from the National Directory of Important Migratory Shorebird Habitat.	Unlikely	Minor	Moderate	Western coastline between Kowanyama and Pormpuraaw	Promote conservation of migratory shorebirds through strategic programmes and educational products.	CYNRM, Birdlife Australia, QWSG	BirdlCife Australia is currently promoting the conservation of migratory shorebirds and several other organisations and documentaries have highlighted the importance of conserving critical habitat for these species along the East-Asian Australasian Flyway.	No actions required during event.	N/A	Conduct post-flood assessment of foraging ground and food resources to determine impact of flood on the species.	Birdlife Australia, CSIRO, Research Institutions Traditional Owners,
							Monitoring and population assessments completed at important sites in Cape York to establish areas for protection.	Birdlife Australia, CSIRO, Traditional Owners, CYNRM	Several areas for protection have been identified				

Natural Disaster Risk Register for Biodiversity Assets - Cyclone

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Marine turtles (Chelonioidea)	Cyclone	Cyclones can cause severe damage to coastal habitats, including nesting beaches (wash away nesting sites, destroy nests, and alter beach topography). Cyclones can contribute to habitat degradation in coastal and nearshore environments, including physical damage to seagrass beds, mangrove forests, and coral reefs. In addition, cyclones can cause water temperature fluctuations and mixing, which may exacerbate coral bleaching events. Cyclones can have population-level impacts on marine turtle populations, especially if nesting and foraging sites are heavily impacted and reproductive output is significantly reduced. Coral reefs have evolved mechanisms to recover from cyclone impacts, including coral recruitment, growth, and regeneration, as well as the recruitment of new coral colonies from nearby healthy reef, however in severe cases recovery is slow. Cyclonic winds are predicted to occur at 120-140 km/hr along all coastlines in the region.	Likely	Moderate	High	All areas where seagrass and coral reef occurs. Specific locations as impacted by cyclonic storm surges.	Assess the condition of critical seagrass meadows and coral reefs.	Research Institutions, CYNRM, Traditional Owners, Cape York Water Partnerships, GBRMPA, AIMS	Significant surveys and long-term monitoring is established to assess the distribution and health of seagrass and coral reefs habitats across Cape York.	No activity possible.	N/A	Undertake targeted post-cyclone seagrass and coral reef surveys to assess the impact of the cyclone event on seagrass communities.	Research Institutions, AIMS
							Undertake beach nourishment efforts to replenish lost sediment and restore suitable nesting habitat	Traditional Owners, State Government, DETSI	Beach/sand restoration has been occurring on Raine Island			Assess the impacts of the cyclone on nesting beaches and nests (if during nesting season) and where possible conduct beach nourishment to restore nesting habitat.	Traditional Owners, State Government, GBRMPA
Freshwater sawfish (*Pristis pristis*)	Cyclone	Cyclone storm surges create landscape discharging of sediments into sawfish habitat and modify it to a less DETSIred environment to hold and sustain the species (Fowler et al. 2022). Little is known about the ecology of the species. However, any aggravation to the sawfish habitat will affect the species negatively. Cyclonic winds are predicted to occur at 120-140 km/hr along all coastlines in the region.	Likely	Minor	Moderate	Across the species Range where cyclones and associated heavy rains / storm surges have impacted habitat.	Conduct research to determine Freshwater sawfish response to altered environmental conditions and develop tools to predict the species response to changes in environmental conditions.	SARA, CYNRM, Research Institutions	Some research has been undertaken to evaluate the recruitment, biology and impacts of changes in flow regimes to the freshwater sawfish. No specific project has been undertaken to assess the impacts of high river flows due to cyclonic activity. There are currently no tools to predict sawfish response as there is still little known about the biology of this species.	No activity possible.	N/A	Conduct post cyclone population monitoring if possible.	SARA, CYNRM, Research Institutions
Dugong (*Dugong dugon*)	Cyclone	Cyclones can cause extensive physical damage to seagrass meadows and lead to coastal erosion, altering the physical landscape of coastal and nearshore habitats where dugongs reside. Seagrass meadows and coastal ecosystems can take a long time to recover. Post-cyclone habitat changes may force dugongs to inhabit less suitable areas if their primary seagrass meadows are damaged or destroyed. Damaging cyclonic winds are predicted to occur at 120-140 km/hr along all coastlines in the region.	Likely	Minor	Moderate	Across the Dugongs Range	Establish long-term monitoring programs to assess the success of seagrass restoration efforts, track seagrass recovery, and monitor dugong presence and habitat use	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	The Great Barrier Reef Marine Park Authority (GBRMPA) oversees various seagrass restoration initiatives and conducts ongoing monitoring of dugong populations within the Great Barrier Reef Marine Park. The Torres Strait Regional Authority (TSRA) have been involved in seagrass monitoring and restoration projects between Australia and Papua New Guinea and conduct dugong monitoring programs to assess dugong abundance, distribution, and habitat use in the region.	Use satellite imagery and/or aerial photography to document potential cyclone damage to coastal areas and seagrass meadows. Establish areas for post-cyclone monitoring	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	Continue long-term monitoring program to assess the impact of the cyclone event on the availability of seagrass important to dugongs, track seagrass recovery, and monitor dugong presence and habitat use. Conduct long-term monitoring of Dugong populations to determine long-term impacts from the cyclone event.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government, TSRA

Natural Disaster Risk Register for Biodiversity Assets - Cyclone

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Golden-shouldered parrot (*Psephotellus chrysopterygius*)	Cyclone	Reduction in food resources in response to high rainfall events associated with cyclones as rainfall buries and germinates seed and can destroy nesting sites (OAC, 2022). Cyclone impact has the potential to severely impact the vegetation of the landscape across Cape York Peninsula. This impact could destroy nesting sites and with associated rain events destroy valuable food resources for this species. Cyclones are predicted to cause damaging winds of up to 90-120 km/hr across parts of the Golden-shouldered parrots' range in Cape York Peninsula.	Unlikely	Moderate	Moderate	Artemis Station and Olkola Traditional Lands	Establishment of automated weather station on Artemis Station and Olkola Traditional Lands to monitor temperature, rainfall and flood patterns.	State Government, Traditional Owners, Landowners	A remote weather station is currently being utilised to respond to conservation actions for the Golden-shouldered parrot.	Coordinate a post-cyclone field team to undertake a rapid assessment of food resources following the cyclone.	State Government „ GSPRT CYNRM, Traditional Owners	Undertake a rapid survey of food resources. If food shortage is identified in accessible areas, implement a supplementary feeding regime.	State Government „ GSPRT CYNRM, Traditional Owners
Red goshawk (*Erythrotriorchis radiatus*)	Cyclone	Cyclones can damage nesting trees. Cyclone predictions indicate maximum wind speeds of 90-120 km/hr within red goshawk habitat, which could impact the availability of nesting trees or damage nesting sites by breaking tree branches and stripping leaves causing nests to collapse. Nesting occurs from May to October in North Queensland, so it is unlikely to directly impact nesting birds. There is some historical evidence of collapsed nests in northern Australia causing breeding failures at the egg stage. Cyclones are predicted to cause damaging winds of up to 90-140 km/hr across parts of the Red goshawks range in Cape York Peninsula.	Unlikely	Negligible	Minor	More Information is required on the species distribution.	Identify and map important red goshawk habitats in the Cape York region. Collate a list of known nest locations and pairs of red goshawks.	Birdlife Australia, CSIRO	Historical surveys occurred specifically for this species in north Queensland in 1999 (Czechura et al.. 2010)..	No actions required.	N/A	Undertake post-cyclone survey of nesting habitat to determine any damage to nesting trees.	Birdlife Australia, CSIRO
							Encourage landholders to enter land management agreements, particularly in-perpetuity covenants, that reduce the effects of habitat fragmentation and degradation and promote the protection and maintenance of private lands with high-value habitat for the red goshawk.	Qld Govt Private Protected Area Program partnered with Pastoralists, Support provided by CYNRM	Prioritisation of properties for land management agreements requires updated survey data.				
Southern cassowary (*Casuarius casuarius johnsonii* (northern population)	Cyclone	Cyclone impact has the potential to severely impact the vegetation of the landscape across Cape York Peninsula. This impact could destroy breeding sites and food sources and with associated rain events destroy forage species. Cyclone damage will only occur in the impact area of the event. This may encourage cassowary to relocate and populate unaffected sights. The impacts of this movement appear unknown Cyclonic winds are predicted to occur at 120-140 kilometres per hour along all coastlines in the region.	Likely	Moderate	High	Across the species extent in CY, cyclones can impact all areas along the coastline.	Develop a post-cyclone cassowary response strategy incorporating recommendations in the Cassowary recovery plan (Latch, 2007).	EPA. WTMA, CYNRM, Local Councils, State Government	Some information regarding post-cyclone response for cassowaries has been drafted (Goodall, n.d.). A specific post-cyclone cassowary response strategy has not been drafted.				
Eastern curlew (Numenius madagascariensis)	Cyclone	The effects following a cyclone are compounded by flooding rains, storm surges that cause debris accumulation in shallow tidal coastal areas. Cyclone damage will only occur in the impact area of the event. This may encourage the eastern curlew to relocate. The impacts of this movement remain unknown, however could cause additional stress and loss in body condition when the birds are ready to leave Australia on their migration. Tropical cyclone hazard assessments show that Cyclonic winds are predicted to occur at 120-140 km/hr along all coastlines in the region.	Likely	Minor	Moderate	Across the region	Promote conservation of migratory shorebirds through strategic programmes and educational products.	CYNRM, Birdlife Australia, QWSG	Birdlife Australia is currently promoting the conservation of migratory shorebirds and several other organisations and documentaries have highlighted the importance of conserving critical habitat for these species along the East-Asian Australasian Flyway.	No actions required during event.	N/A	Conduct post-cyclone assessment of foraging grounds.	Birdlife Australia, CSIRO, Research Institutions Traditional Owners,
							Monitoring and population assessments completed at important sites in Cape York to establish areas for protection.	Birdlife Australia, CSIRO, Traditional Owners, CYNRM	Several areas for protection have been identified				

Natural Disaster Risk Register for Biodiversity Assets - Cyclone

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Palm Cockatoo (*Probosciger aterrimus macgillivrayi*)	Cyclone	Cyclone impact has the potential to severely impact the vegetation of the landscape across Cape York Peninsula. Cyclones can impact Palm cockatoo habitat by destroying hollows, and can create hollows through tree breakages (Murphy & Legge, 2007; Heinsohn et al., 2009, Woolley et al., 2018). With associated rain events, critical food resources may be impacted. Strong and gusting winds have the potential to break tree branches and strip leaves and which activity is known to have collapsed nests in northern Australia causing breeding failures at the egg stage, which severely impacts the population that already has a low breeding success rate. Tropical cyclone hazard assessments predict gusts of between 90-120 km/hr to occur across the species range in the region.	Very Likely	Moderate	Very High	Areas across the species Range. Response actions dependent on track of the Cyclone.	Protect hollows from other impacts such as fire and land clearing.	QFD, Landowners, Traditional Owners, State Government	Some actions are undertaken to protect nesting trees, however, land clearing from mining and inappropriate fire regimes are reducing hollows across the Cape.	Investigate the impacts of cyclonic events to Palm cockatoo habitat (e.g., destruction of critical limiting resources such as nesting hollows) and monitor population response (TSSC, 2015)	CSIRO, Research Institutions, Traditional Owners, CYNRM	Continue long -term population monitoring where cyclone has impacted the populations.	CSIRO, Research Institutions, Traditional Owners, CYNRM
Spectacled flying fox (*Pteropus conspicillatus*)	Cyclone	Cyclones can cause widespread damage to tree canopies resulting in the long-term loss of flower and fruit resources (TSSC, 2017). Tropical cyclones are projected to become less frequent in Cape York, but they will be more intense. Both severe and moderate cyclones can have a significant effect when they result in widespread damage to tree canopies. This can result in long-term loss of flower and fruit resources seeing the SFF disperse and find new and possibly less favourable sites. Tropical cyclone hazard assessments predict gusts of between 90-140 km/hr in habitat within the Spectacled flying fox estimated spatial distribution.	Possible	Moderate	High	Across the species range	Undertake telemetry studies to determine key foraging habitat in the Cape York region across an annual cycle.	CSIRO, Research Institutions	Insufficient information known about this action.	Monitor the path of the cyclone and determine if the cyclone passes over important foraging grounds (if known) for the Spectacled flying fox.	Govt Agencies	If logistical, undertake a post-cyclone assessment of damage to foraging grounds.	Research Institutions, DETSI
						Across the species range in the Cape York region	Identify opportunities to protect important foraging resources in native vegetation communities that are poorly represented within current reserves.	CSIRO, Research Institutions	Insufficient information known about this action.			Assess the health of Spectacled flying fox camps to determine if supplementary feeding is required. If identified as a requirement, provide supplementary feeding.	Research Institutions, Tolga Bat Hospital, SFFRT
						Across the species range in the Cape York region	Conduct a scientific research program to determine response to catastrophic events such as cyclones, as mentioned in the recovery plan.	Traditional Owners, landholders, State Government , Research Institutions	This activity is currently not being undertaken. A RDP monitoring and evaluation project is currently underway to provide current location data.			Undertake habitat restoration activities, such as revegetation, of important foraging grounds if required	Rainforest regeneration and recovery groups.
						Informed by telemetry studies	Investigate formal conservation arrangements or protected areas (nature refuge status) on properties containing important foraging resources and educate landowners about the benefits of entering into a nature refuge agreement	Qld Govt Private Protected Area Program partnered with Pastoralists, Support provided by CYNRM	A number of nature refuges are gazetted within the spectacled flying fox distribution.				

Natural Disaster Risk Register for Biodiversity Assets - Cyclone

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Northern quoll (*Dasyurus hallucatus*)	Cyclone	Cyclones can significantly impact quoll populations by reducing the availability of nest sites (hollows) in lower-elevation habitats and causing extensive vegetation damage that affects foraging habitat and food resources (Thomas, 2020). Cyclones and flooding can uproot trees, break branches, and flatten vegetation, further reducing shelter and nesting sites and potentially displacing quolls from their usual territories. This displacement can force quolls to seek refuge in protected areas such as rocky crevices, hollow logs, and burrows, increasing competition with other quolls and predators, and causing stress that can negatively impact their health and reproduction. Cyclones also pose a direct threat to den sites, making quolls more susceptible to exposure and predation, especially during the young-in-den phase of the breeding period (November to December) (Thomas, 2020). Cyclone predictions indicate maximum wind speeds of 100-120 km/hr within quoll habitat, which could severely impact lower elevation areas. However, quolls have a moderate susceptibility rating on a population scale, as they are relatively protected in higher-elevation rocky areas. Despite this, the destruction caused by cyclones and floods can still lead to the loss of nests and dens, forcing quolls to relocate, which can further stress their populations. Tropical cyclone hazard assessments predict gusts of between 90-140 km/hr in habitat within the Northern quoll spatial distributrion.	Possible	Minor	Moderate	Lower elevation areas where quoll populations would be susceptible to impacts from cyclones	Management of feral predators.	Landowners	Feral predators are not routinely managed across the Northern quoll's range.	Coordinate the development of a post-cyclone Northern quoll response team.	CYNRM	Undertake a post-cyclone assessment of habitat condition of areas impacted by the cyclone to determine if any management actions are required.	AWC, QPWS, CYNRM
												Undertake feral animal management to reduce the impacts of predation on displaced quolls.	Landowners, AWC, QPWS
							A coordinated approach to planning and implementing early season fire management (incorporating traditional burning practices) aimed to reduce fuel loads whilst keeping unburnt patches in identified high-value D. hallucatus habitat (e.g., woodlands adjoining rocky escarpments) (Andersen et al., 2005; Einoder et al., 2023; Thomas et al., 2021).	Landholders with support from QFD, Traditional Owners, QPWS	In some locations, this is already underway. Greater adoption of best practice fire management is required across the region.			Provide artificial hollows if habitat assessments indicate denning resources have been significantly impacted.	AWC, CYNRM
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community	Cyclone	Hydrological changes from heavy cyclone-induced flooding can significantly impact Cape York's littoral rainforests by intensifying coastal processes and altering inundation regimes. These changes lead to coastal erosion, damage the forest canopy, and increase the risk of invasive species like *Mimosa pigra* and *Chromolaena odorata* establishing themselves, further degrading biodiversity. Cyclones cause varying levels of damage to different tree species: early-successional species, such as Acacia and Melaleuca, suffer immediate damage but recover quickly, while late-successional species like *Syzygium* and *Terminalia* are more resilient but take longer to recover, potentially leading to long-term	Likely	Moderate	High	All areas where the ecological community occurs.	Undertake rehabilitation and restoration activities to restore vegetation structure and control invasive plant species (DEE, 2019).	CYNRM, Traditional Owners, QPWS	Efforts to rehabilitate and restore littoral rainforests in Cape York are currently happening. CYNRM are working with Traditional Owners and land managers to manage invasive species and restore vegetation structure in these fragile ecosystems. These activities are part of broader conservation efforts to protect endangered ecosystems such as littoral rainforests and coastal vine thickets.	No activities can be undertaken during the event.	N/A	Conduct post-cyclone assessment of damage to rainforest including tree falls, erosion, and flooding.	CYNRM, DETSI, Traditional Owners
												Conduct erosion control measures, such as planting ground cover or installation erosion control mats to stabilise soil and prevent further erosion in areas where this is logistical.	CYNRM, DETSI, Traditional Owners

Natural Disaster Risk Register for Biodiversity Assets - Cyclone													
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		imbalances in forest structure. With the increased frequency of cyclones, these rainforests face cumulative stress, risking permanent shifts in composition and structure. Tropical cyclone hazard assessments predict gusts of between 120-140 km/hr along the coastline..					Conduct fine-scale mapping of littoral rainforest across the extent of the ecological community on Cape York to establish distribution at a regional management scale which can then be used to inform management and response actions (DEE, 2019).	CYNRM, CSIRO, DETSI	Fine-scale mapping of littoral rainforest has occurred through the Wet Tropics as part of a research project delivered by CSIRO and JCU, funded through the NESP program.			Monitor the recovery of the vegetation and manage weeds as required.	CYNRM, DETSI, Traditional Owners

Natural Disaster Risk Register for Biodiversity Assets – Pests & Disease

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Marine turtles (Chelonioidea)	Disease	The recovery plan for marine turtles in Australia outlines diseases and pathogens as a risk to the health of turtles. Several diseases and infections have been found in marine turtles, considered to be caused by poor water quality including spirochiid parasites and bacterial infections. Fibropapillomatosis, a common disease presents as internal and external tumours (AG, 2017). The current risk of disease and pathogens to the Gulf of Carpentaria green turtle populations is unknown (AG, 2017).	Unlikely	Minor	Moderate	Across the species' range in the region.	Describe disease and pathogen prevalence and assess the implications for stock viability. Where necessary, identify causal factors and appropriate management responses (AG, 2017).	CYNRM, Research Institutions, DETSI, CSIRO	There are currently no activities being undertaken to investigate disease prevalence of marine turtles in Cape York.	Collect and report disease prevalence data.	CYNRM, Traditional Owners, DETSI, Veterinarians	Undertake monitoring and health checks post-outbreak.	CYNRM, Research Institutions, DETSI, CSIRO
							Undertake baseline water quality monitoring	CYNRM, State Government, Traditional Owners	The health status of turtles in Cape York is currently poorly known.	Undertake repeat water quality monitoring.	CYNRM, State Government, Traditional Owners		
							Describe disease and pathogen prevalence and assess the implications for stock viability. Where necessary, identify causal factors and appropriate management responses (AG, 2017).	Research institutions, DETSI				Capture and rehabilitate sick turtles.	DETSI
Golden-shouldered parrot (*Psephotellus chrysopterygius*)	Disease	Psittacine Circoviral (beak and feather) Disease (PCD) is a disease that affects parrots and is often fatal to birds that contract it, and most species do not respond to treatment. The virus remains in the environment for many years and can result in long-term contamination of nesting sites (AG, 2005). PCD has been recorded in Golden-shouldered parrots and the species is considered vulnerable to catastrophic epidemics of the disease (AG, 2021).	Possible	Severe	Very High	Artemis Station and Olkola Traditional Lands	Implement appropriate protocols needed to prevent disease occurrence. e.g., if research is being conducted on Artemis Station and Olkola Traditional Lands populations, implement hygiene protocols.	Traditional Owners,	No specific hygiene protocols are currently undertaken to prevent disease transmission.	Conduct thorough disease surveillance to assess the extent of the outbreak. Undertake field surveys, population monitoring and diagnostic testing to confirm cases of beak and feather disease in both populations. Report the occurrence of disease to the GSPRT.	Traditional Owners, DETSI, CSIRO, Veterinarians	Undertake monitoring and health checks post-outbreak to determine if the disease risk has lessened and to monitor the recovery of the population.	Traditional Owners, Landholders
							Assess the prevalence of beak and feather disease, and other diseases and genetic abnormalities that could affect survival and reproductive success.	Traditional Owners, CSIRO, Landholders, DETSI, Research Institutions	This is currently not occurring for either of the populations.	Implement appropriate protocols to avert disease spread		Implement appropriate protocols needed to prevent disease reoccurrence. e.g., if research is being conducted either population, implement hygiene protocols.	Traditional Owners, Landholders

Natural Disaster Risk Register for Biodiversity Assets – Pests & Disease

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Southern cassowary (*Casuarius casuarius johnsonii* (northern population)	Disease	Avian TB is a ubiquitous disease with the organism found in the environment including soil and water. Known diseases include internal parasites (particularly ascarids), aspergillosis, Aspergillus fumigatus, and avian tuberculosis (TB), Mycobacterium avium. Immature birds (8–12 months) could be most affected. Aspergillosis is an opportunistic infection, stress and malnutrition may contribute to immunosuppression and increased susceptibility to the disease.	Unlikely	Significant	High	All known species locations.	Complete investigations into disease and its possible impact on cassowaries.	Research Institutions, DETSI	There are currently no activities being undertaken to investigate the prevalence of disease in cassowaries and factors affecting the epidemiology.	Conduct intensive monitoring to identify and track the spread of the disease.	CYNRM, QPWS, DETSI, Research Institutions, Traditional Owners	Continue to monitor for disease following the outbreak	Research Institutions, QPWS, DETSI
										Educate the local community about the disease outbreak and encourage reporting of sick or dead cassowaries to relevant authorities.	CYNRM, DETSI		
										Conduct intensive monitoring to identify and track the spread of the disease.	QPWS, DETSI, Research Institutions, Traditional Owners		
Red goshawk (*Erythrotriorchis radiatus*)	Disease	Psittacine Beak and Feather Disease (PBFD) is a widespread, lethal disease, typically transferring between adults and nestlings. Recent analysis of a dead red goshawk chick found under a nest in Cape York by C MacColl (pers. comm. 2022) tested positive for PBFD, however it is not known how PBFD impacts red goshawk survival at a population level.	Likely	Significant	Very High	Priority locations to be informed by updated population survey data.	Protected habitat areas are managed appropriately to enhance habitat quality and support Red Goshawk recovery efforts (QG, 2021).	Landowners, QPWS, Local councils	This activity is dependent on population survey data.	Collect samples from sick of deceased individuals if possible for analysis.	CYNRM, DETSI, Veterinarians	Conduct ongoing health monitoring of red goshawk populations if possible.	CYNRM, DETSI, Veterinarians
							Conduct research on the impact of the disease on the species.	CSIRO, Research Institutions.	There is currently no research being undertaken on the prevalence / impact of the disease on the species.	Communicate to local communities, landholders, and the public about the disease outbreak and reporting sick or deceased birds.	CYNRM, DETSI, Local Councils	Review and update existing conservation and management plans for the species to incorporate lessons learned from the outbreak.	CYNRM, DETSI, Red goshawk recovery team
Spectacled flying fox (Pteropus conspicillatus)	Parasites	The spectacled flying fox has little resistance to the toxin of the paralysis tick. Animals can become paralysed and fall to the ground and may die from the effects of the venom. There appears to be a correlation between high rainfall events and tick numbers and there is an association between ticks paralysis and the flying foxes feeding on wild tobacco (*Solanum mauritanium*).	Very Likely	Significant	Severe	Atherton Tableland roosts	Manage Tobacco weed around roost sites.	Landowners, QPWS, Local councils	Tobacco weed is listed as a priority weed in the Tablelands regional council biosecurity as an environmental weed.	Undertake ground searches to rescue and rehabilitate spectacled flying foxes during tick season (October to December).	Tolga Bat Hospital, Volunteers	Strategically manage Tobacco weed around roost sites to reduce the incidence of tick incursion.	Local Council, Traditional Owners.

Natural Disaster Risk Register for Biodiversity Assets - Heatwave

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Marine turtles (Chelonioidea)	Heatwave	High sand temperatures can cause egg mortality, alter sex ratios (warmer temperatures produce more females), and increase the likelihood of developmental abnormalities in turtle hatchlings. During the hatching period, heatwaves can increase the vulnerability of hatchlings to dehydration, overheating, and predation. Improving knowledge of nest temperatures and nesting sites, combined with targeted intervention projects (e.g., shading and cooling of nests), can help mitigate the impacts of climate change on marine turtle populations. However, given the limited resources and the ability to target only a small percentage of nests, the susceptibility remains. Heatwaves are predicted to marginally increase across the marine turtle species' distributions under an RCP 8.5 emissions scenario. Heatwave events are predicted to increase by 3 events annually.	Very Likely	Significant	Severe	Known nesting locations	Establish structures to shade valuable nesting areas. Undertake nest relocation and nest monitoring at key nesting beaches.	WCTTAA, Traditional Owners, QPWS	WCTTAA protects and monitors nests in western Cape York Region through shading and nest temperature monitoring. QPWS are undertaking shading and nest temperature monitoring on Raine Island. Multiple other project are conducted at various locations across Australia (e.g., Mon Repos provides shading, cooling and relocation)	Set up temperature loggers to monitor sand temperature at key nesting sites to track conditions in real-time.	WCTTAA, Traditional Owners QPWS	Monitor nest sand temperatures following the heat wave event to understand the impact on marine turtle nesting success and hatchling survival.	WCTTAA, Traditional Owners QPWS
							Undertake nesting habitat protection from predators through strategic pest management and fencing.		Pest species are strategically managed to protect some nesting beaches along the Western Cape York Peninsula, Pormpuraaw, Mapoon, Eastern Cape York Peninsula and Archer Point.	Where possible, relocate eggs from nests at risk of overheating to cooler, shaded areas / under shade structures.		Monitor the emergence and survival rates of hatchlings from nests to provide crucial data for assessing nesting site health and the effectiveness of egg relocation efforts.	
Dugong (*Dugong dugon*)	Heatwave	Heatwaves can have profound and detrimental effects on dugong habitats, primarily through their impact on seagrass meadows, water quality, and overall ecosystem health. Extreme heat can lead to mass die-offs of seagrass, especially if the heatwave is prolonged or combined with other stressors such as low light levels due to increased turbidity. Protecting and restoring seagrass meadows, improving monitoring and predictive capabilities, engaging local communities, and mitigating climate change are crucial to enhance the resilience of both seagrass ecosystems and dugong population. Heatwaves are predicted to marginally increase across the marine turtle species' distributions under an RCP 8.5 emissions scenario. Heatwave events are predicted to increase by 3 events annually	Possible	Minor	Moderate	Across the Dugongs Range	Establish long-term monitoring programs to assess the success of seagrass restoration efforts, track seagrass recovery, and monitor dugong presence and habitat use.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government, TSRA	The Great Barrier Reef Marine Park Authority (GBRMPA) oversees various seagrass restoration initiatives and conducts ongoing monitoring of dugong populations within the Great Barrier Reef Marine Park. The Torres Strait Regional Authority (TSRA) have been involved in seagrass monitoring and restoration projects between Australia and Papua New Guinea and conduct dugong monitoring programs to assess dugong abundance, distribution, and habitat use in the region.	Monitor heat wave events and accordingly plan survey efforts following heatwave event	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government	Conduct long-term monitoring of Dugong populations to determine long-term impacts from the heatwave event. Continue long-term monitoring program to assess the impact of the heatwave event on seagrass meadows important to dugongs, track seagrass recovery, and monitor dugong presence and habitat use.	Research Institutions, CSIRO, Traditional Owners, GBRMPA, State Government, TSRA

Natural Disaster Risk Register for Biodiversity Assets - Heatwave

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Golden-shouldered parrot (*Psephotellus chrysopterygius*)	Heatwave	Currently unknown if heatwaves pose a threat, however, the draft recovery plan stipulates that determining if temperature stress during the breeding season is likely to become an issue should be a priority for managing the resilience of populations (OAC, 2022). Potential for heat stress to cause mortality of nesting parrots, (March to June). The annual number of heatwave events is predicted to increase up to 4 events annually between 2020 and 2039 in some areas of the Golden-shouldered parrot's distribution on Cape York Peninsula under an RCP 8.5 emissions scenario.	Unlikely	Minor	Moderate	Artemis Station and Olkola Traditional Lands	Establishment of automated weather station on Artemis Station and Olkola Traditional Lands and monitoring of temperature, rainfall and flood patterns.	QPWS, Traditional Owners	A remote weather station is currently monitored to respond to conservation actions for the Golden-shouldered parrot.	Monitor nesting site temperature and the health of parrots and their young to determine impacts of the heat wave on nesting animals.	Landholders, Research Institutions, Traditional Owners	Establish monitoring and assess the recovery of the golden-shouldered parrot populations and nesting habitats following the heatwave event. Monitor nesting activity, breeding success, and population dynamics using standardised survey methods.	Research Institutions, QPWS, Traditional Owners
										Provide water stations near to nesting sites if practical.	Landholders, Traditional Owners	Conduct research to better understand the long-term effects of heatwaves on golden-shouldered parrots and their nesting ecology, and use this information to inform management decisions.	Research Institutions, DETSI
Spectacled flying fox (*Pteropus conspicillatus*)	Heatwave	Heat waves cause direct mortality to individuals when temperatures exceed 42 degrees Celsius and remain elevated for several consecutive days. Flying fox mortality is higher during heat wave events in camps that provide less shade. Short-term climate estimates project annually averaged warming to be between 0.5 and 1.2°C above long-term averages, which will result in summer averages reaching 29°C by 2030 and over 31°C by 2070. Further, the annual number of heatwave events is predicted to increase up to 2 events annually between 2020 and 2039 within the spectacled flying fox's distribution on Cape York Peninsula under an RCP 8.5 emissions scenario.	Possible	Severe	Very High	Known Spectacled flying fox camps	Undertake a complete census of Spectacled flying fox roosts across Cape York Peninsula to determine roosts that may be susceptible to heatwave events.	WTMA, SFFRT	A complete census has been undertaken by the SFFRT and is currently under consultation.	Rescue and rehabilitate heat-stressed or injured spectacled flying foxes.	Trained wildlife carers, volunteers, veterinarians, DETSI	Conduct habitat improvement at flying fox camps impacted by heatwave events to improve canopy cover and shade.	DETSI, Local Councils
							Ensure adequate tree canopy and understory is maintained in areas of known spectacled flying fox roosts and foraging areas, to minimise heat stress.	SFFRT, Traditional owner /Ranger groups and landholders, State Government	No actions are currently being undertaken.	Where logistical, cool the flying fox camp down using sprinklers, misting systems, or shallow water stations.	DETSI	If logistical, install sprinklers and misting systems to provide cooling mechanisms during heatwave events.	DETSI, Local Councils
							Use roost site records with mapping of past, current and future high temperature models, to plan roost vegetation recovery actions.	WTMA, SFFRT	This is currently being completed by the SFFRT.	Conduct regular monitoring and surveillance of spectacled flying fox colonies during heat wave events to assess the health and behaviour of the flying foxes and identify any individuals that may be in distress.	Tolga Bat Hospital, Local Council, DETSI		

Natural Disaster Risk Register for Biodiversity Assets - Heatwave

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Northern quoll (*Dasyurus hallucatus*)	Heatwave	High temperatures can lead to hyperthermia if they cannot find adequate shade or cool areas. Heatwaves increase the risk of dehydration due to higher water loss through panting and evaporation. Heatwaves can reduce the abundance of prey species. Quolls may need to rely more heavily on specific microhabitats that provide cooler conditions, such as rocky crevices, burrows, or dense vegetation and adjust their diet. The number of annual number of heatwave events is predicted to increase up to 3 events annually between 2020 and 2039 within Northern quoll distribution on Cape York Peninsula under an RCP 8.5 emissions scenario.	Likely	Minor	Moderate	Across the species range in Cape York.	Management of feral predators.	Landholders, QPWS	There are currently no coordinated feral animal control activities occurring specifically for the protection of the northern quoll. Some sporadic feral animal control occurs.	Provide artificial water stations in areas where high-density populations exist.	Traditional Owners, South Endeavour Trust, CYNRM	Strategically undertake population monitoring to determine impacts of the heatwave on quoll populations.	Research Institutions, South Endeavour Trust, DETSI

Natural Disaster Risk Register for Biodiversity Assets – Oil/Chemical Spill

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Marine turtles (Chelonioidea)	Oil / Chemical Spill	Oil spills and pollutants can cause significant impacts to turtles through external contact, ingestion or inhalation resulting in breathing, sight or gastrointestinal injuries (AG, 2017). Oil can remain in the environment for many years and is highly toxic to eggs. Terrestrial runoff of nutrients and sediments from can impact water quality, causing changes in light and salinity over coral reefs and seagrass meadows. The long-term effects of turtle exposure to chemical pollutants are not well understood (AG, 2017). The Recovery plan for marine turtles (2017) sates that Northern Queensland stocks for marine turtles are at a medium to low risk for chemical and terrestrial discharge.	Possible	Severe	Very High	Across the species range in the Cape York region	Educate local communities, fishermen, and industries about the importance of marine turtles and the impact of oil /chemical spills. Conduct awareness campaigns on how to prevent, and report oil /chemical spills and the importance of quick response.	CYNRM, Local councils, DAF	Currently there are no campaigns to deliver this information to industry, fishermen and the local community.	Deploy booms, skimmers, and other containment equipment to limit the spread of the contaminant.	Maritime Safety Queensland, DAF, Local Council	Undertake water quality monitoring to assess the long-term impacts of the oil / chemical spill.	Local Council, DAF, CYNRM
							Develop a response plan oil / chemical spill.	Local councils, DAF	There are currently no specific response plans for this in Cape York	Begin clean-up operations to remove oil / chemicals from the water and shorelines.	Maritime Safety Queensland DAF, Local Council, CYNRM		
										Conduct monitoring of the extent and movement of the oil spill using aerial surveys, or on-site observations.	Maritime Safety Queensland, Local Council, DAF, CYNRM	Release rehabilitated turtles back into the habitat where they were captured.	DETSI, CYNRM
										Catch and rehabilitate any turtles or other wildlife impacted by the spill.	Maritime `Safety Queensland, DETSI, CYNRM		
Eastern curlew (*Numenius madagascariensis*)	Biosecurity-Chronic and Acute Pollution	Exposed to chronic and acute pollution during their time in Australia and along their migration routes, although the extent and implications of this exposure remains largely unknown. The high vulnerability of marine ecosystems to environmental pollution can have significant impacts on the life cycle, foraging behaviour, and migratory ecology of shorebirds such as the Eastern curlew. Pollution in coastal habitats can degrade stopover sites and overwintering areas used by Eastern Curlews during their migration and non-breeding periods in north Australia regime.	Unlikely	Significant	High	Areas where migratory shorebird roosting and feeding habitat is present including river mouths and mangrove-lined bays and estuaries, e.g. around Cape Keerweer, and in Albatross, Archer, Newcastle, Temple, Lloyd and Princess Charlotte Bays, as well as the Jardine River area.	Develop specific guidelines for shore, estuarine and wetland rehabilitation to support populations of migratory shorebirds.	QWSG, Birdlife Australia.	Coastal high-tide shorebird habitat management guidelines have been developed by Australian Wader Study Group (Jackson & Straw, 2021), however these do not specifically address issues with pollution.	Develop targeted education material that builds public knowledge of migratory shorebirds and threats along their migration path.	CYNRM, Birdlife Australia, QWSG	Follow duty of notification obligation from DES.	Landowners / Managers with NGO, Local and State Government
							Increase on-ground capacity for local enforcement and response personnel.	State Government		Increase on-ground capacity for local personnel that can respond to pollution events.	State Government	Follow biosecurity code of practice when responding to the event.	Biosecurity Queensland, Landowners
							Undertake baseline water quality monitoring.	Traditional Owners, Birdlife Australia, QWSG		Establish exclusion zones to prevent further contamination of key feeding and roosting sites and implement temporary restrictions on human activities in affected areas.	State Government , Biosecurity Queensland	Continue to monitor water quality to assess levels of environmental pollutants.	Traditional Owners, Birdlife Australia, QWSG

AGRICULTURAL NATURAL CAPITAL ASSETS, PREPAREDNESS AND RESPONSE TABLES

Natural Disaster Risk Register for Natural Agricultural Capital Assets - Drought														
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
High value grazing soils	Drought	Drought conditions in Cape York significantly impact soil health by reducing the production of soil organic matter and decreasing soil particle cohesion. As a result, drought exacerbates soil erosion, especially when plants are overgrazed or die due to water scarcity. More frequent and extended droughts, as projected under future climate scenarios, will increase pressure on riparian and alluvial areas from grazing animals. Current grazing practices, such as allowing cattle to graze down grass cover to minimal levels near waterways during the late dry season, create dense cattle pads that cut into steep banks. Additionally, early wet season fires that burn remnant vegetation further expose and disturb erodible soils just as the tropical monsoon rains begin (Shellberg & Brooks, 2012). These exposed soils are highly vulnerable to erosion during the monsoon, resulting in large amounts of sediment being washed into nearby waterways. This sediment ultimately flows into the Great Barrier Reef, contributing to water quality degradation, which negatively affects the reef's ecosystems. The influx of sediment can smother coral and seagrass beds, reduce light availability for photosynthesis, and increase nutrient loads that fuel algal blooms. The degradation of riparian and alluvial areas in Cape York due to drought, overgrazing, and fire exacerbates the problem, highlighting the need for improved land management practices to protect both terrestrial and marine ecosystems. The duration and frequency of droughts under an RCP 8.5 scenario are predicted to increase marginally in some areas of the region, with the highest increases in the south-eastern areas of Cape York.	Very Likely	Significant	Severe	Across the region with prioritisation of the Mitchell, Normanby, Endeavour and Bloomfield River Catchments, Archer River and Laura Basin	Management of riparian vegetation (particularly native deep-rooted perennial grasses which are best for protecting and binding surface soils) to promote bank stability and prevent alluvial gully erosion into dispersible sodic soils (Shellberg & Brooks, 2012).	Landowners	Some landowners have adopted wet season spelling of riparian areas and hundreds of kilometres of riparian fencing has been installed to remove cattle from riparian areas.. Graziers at a Grazing industry round table in 2015 expressed willingness to adopt these practices.	Remove stock from paddocks along riparian areas and floodplains that are prone to erosion to reduce grazing impacts, and promote the growth of ground cover to stabilise soil.	Landowners	Fencing to exclude cattle from riparian zones, steep bank, and local catchment floodplain catchment areas around alluvial gullies to reduce chronic soil disturbance and cattle pad density and increase vegetative cover to protect soils from rainfall and reduce excess water runoff (Shellberg & Brooks, 2012).	Landowners
							Fencing of riparian areas to remove grazing impacts and reduce reduction in ground cover that can lead to erosion during flooding events (Shellberg & Brooks, 2012). Locate fences/infrastructure outside flood zones if possible.		Fencing of riparian areas is not particularly common practice due to the cost of fencing and its maintenance. Some areas have been destocked completely as grazing properties are protected as conservation reserves (e.g., Springvale, Kings Plains, Caloola, South Endeavour and Alkoomie stations.				
							Long-term safe stocking rates that maintain pasture resources in a DETSIrable and productive condition (Tothill & Gillies, 1992) and therefore build the resilience of soil from the impacts of flooding and drought. Stocking rates to match pasture growth and spelling of pastures during the wet season (Bowen et al., 2019).	Landowners with facilitation from DAF	Some graziers drought-proof their properties, however, there is some resistance to best management practices.	Monitor soil health and major gully scarps to determine retreat during the drought event.	CSIRO, CYNRM, DAF in partnership with Landowners		
							Monitoring of major gully scarps to determine the rate of retreat and use the data to prioritise gully scarps for remediation.	CSIRO, Research institutions e.g., Griffith University	Lidar mapping has been undertaken in the Normanby Basin to prioritise areas for management (Shellberg et al., 2018) and a field guide has been developed to guide the identification of gully erosion and guidelines and procedures for site monitoring (Shellberg & Thwaites, 2022).	Continue to undertake gully front stabilisation of priority gully scarps.	Landowners	Manage weeds round alluvial gullies to promote native vegetation regrowth.	Landowners
							Undertake gully front stabilisation of gully scarps which have been identified as having major retreat.	Landowners	This has occurred in some locations, but more action required across the region.				

Natural Disaster Risk Register for Natural Agricultural Capital Assets - Drought

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
							Development of gully erosion management guidelines for the Cape York Region providing locally relevant examples and management techniques options suitable for effective intervention.	CYNRM	A field guide for identifying and managing gully erosion in Cape York has been developed (Shellberg & Thwaites, 2022).			Continue to monitor gully scarps to determine future management actions required.	
Agricultural soils	Drought	Drought poses severe implications for soil and agricultural yield. Drought conditions affect the ability of soil organic matter and decrease soil particle cohesion. Drought also limits sufficient crop growth to produce effective residue cover and could lead to failure of intensive agricultural development due to the unreliability of rainfall. Variability in stream flows due to drought could threaten irrigated agricultural production due to the unreliability of irrigation water. Further, drought conditions can lead to the loss of soil through erosion. Under an RCP 8.5 scenario the frequency and duration of droughts is expected to increase marginally in agricultural areas.	Very Likely	Moderate	Very High	Normanby, Annan, Endeavour River Catchments.	Increase soil organic matter through practices such as cover cropping, crop rotation, and adding organic amendments like compost or manure. Higher organic matter content improves soil structure, water-holding capacity, and nutrient availability, making soils more resilient to drought.	Farmers	Increasing numbers of farmers are utilising cover cropping, crop rotation and compost/manure however, this practice is not widely adopted.	Monitor soil moisture levels using sensors or probes to inform irrigation scheduling and optimise water management practices.	Landowners, extension can be provided by CYNRM	Support the adoption of biodegradable mulch to assist drought resilient crops.	Farmers, FNQ Growers
							Apply mulches to the soil surface to reduce evaporation, suppress weed growth, and moderate soil temperatures. Mulching helps conserve soil moisture during dry periods and can improve soil health over time.	Farmers	Mulching is a common practice utilised by farmers in the region.				
							Capture and store rainwater through techniques such as building swales, contour trenches, or constructing dams and reservoirs. Stored water can be used to supplement irrigation during dry periods.	Landowners, extension provided by CYNRM	Several dams for irrigated cropping established at Lakeland	Participate drought workshops, training programs, or support groups to access valuable resources and expertise.	CYNRM, Farmers, FNQ Growers	Conduct soil tests to assess nutrient levels, pH, and organic matter content to provide a basis for developing an appropriate soil management plan.	Farmers
							Implement water-saving irrigation techniques such as drip irrigation or precision irrigation systems to optimise water use efficiency and minimise losses to evaporation and runoff.	Farmers, extension provided by CYNRM	Cape York Weeds and Feral Animal's Incorporated delivered a project in 2021 aimed to improve Producer Technology Uptake to build drought resilience in the Annan, Endeavour and Normanby Catchment's	Use mulches or cover crops to conserve soil moisture and reduce evaporation from the soil surface	Farmers		
							Disseminate information about erosion management and utilising the field guide for identifying and managing gully erosion in Cape York has been developed to manage erosion (Shellberg & Thwaites, 2022).	CYNRM	CYNRM actively promote gully erosion management.	Explore options for financial assistance, subsidies, or insurance programs available for drought-affected farmers.	Farmers, CYNRM, FNQ Growers	Replant native vegetation or suitable cover crops to restore soil health and biodiversity.	Farmers

Natural Disaster Risk Register for Natural Agricultural Capital Assets - Drought

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										Seek advice from agricultural extension services, farm advisors, or financial consultants to develop effective drought management strategies.	Farmers, CYNRM, DAF, FNQ Growers	Upgrade irrigation systems to incorporate newest water saving technologies.	Farmers, extension provided by CYNRM
Freshwater	Drought	Droughts in Cape York have significant impacts on freshwater sources, reducing water availability for both human and ecological systems. During prolonged dry periods, rivers, creeks, and wetlands experience reduced flow or may dry up entirely, placing stress on aquatic ecosystems and reducing habitat for species like fish, turtles, and amphibians. Lower water levels concentrate pollutants, degrade water quality, and increase the risk of algal blooms. Additionally, changes in river and stream flow regimes lead to longer periods of low or no flow, with reduced baseflow inputs and shallower waterholes, which further degrade water quality, resulting in higher temperatures, lower dissolved oxygen, increased salinity, and eutrophication. These effects make it harder for aquatic species to survive the dry season, especially in systems without groundwater supplementation or disconnected refugial waterholes (Waltham et al., 2014). For local communities and agricultural activities, diminished freshwater availability affects drinking water supplies, irrigation, and livestock watering. Drought exacerbates gully erosion and sedimentation, which further degrades waterways when rains return. Less ground cover on drought-affected catchments increases soil erosion and elevates sediment loads, leading to reduced infiltration and aquifer recharge. Although future climate projections suggest increased precipitation levels for Cape York River basins, these changes will likely be accompanied by greater seasonal variability, including extended dry seasons and more frequent failed wet seasons (Moise, 2014). This	Very Likely	Significant	Severe	Across the grazing lands.	Reduce impacts of livestock on riparian areas by lowering stocking rates, fencing to remove cattle, and installing additional watering points away from watercourses and wet season paddock spelling to reduce erosion, sediment and nutrient input into waterways.	Landowners	Some landowners have adopted wet season spelling of riparian areas and hundreds of kilometres of riparian fencing has been installed to remove cattle from riparian areas. Graziers at a Grazing industry round table in 2015 expressed willingness to adopt these practices.	Destock riparian areas and alluvial plains where damage from livestock could cause greater impacts to erosion and water quality.	Landowners	Conduct assessment of soil condition, ground cover and pasture regrowth to ensure restocking of paddocks occurs after adequate growth of ground cover.	Landowners
						Agricultural areas in Lakeland, McIvor and Endeavour Valleys	Manage nutrient inputs into agricultural soils to reduce the pollution of water and resulting eutrophication. (e.g., applying fertilisers during suitable weather conditions and at the correct stage during crop growth in addition to using crop rotation, planting cover crops and ploughing in crop residues (Pau Vall & Vidal, 2015).	Farmers	This practice is more widely adopted due to the cost benefits to farmers and overall soil health.			Conduct water quality monitoring post drought to determine impacts of the drought on water quality, particularly close to areas close to intensive agricultural enterprises.	Landowners
										Manage feral animals, such (e.g., pigs), and cattle that may cause additional damage to water bodies.	Landowners, Traditional Owners	Improve the uptake of Best Management Practices in regard to on farm water, nutrient and pesticide use.	CYNRM, DAF, CSIRO

Natural Disaster Risk Register for Natural Agricultural Capital Assets - Drought

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
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		variability, along with additional water entitlements, increases the susceptibility of freshwater systems to drought risks. As drought places greater demands on water resources for human and agricultural uses, there is less residual water available for environmental allocations, underscoring the need for sustainable water management strategies, including conservation, water storage, and restoration efforts to protect these critical resources.				Across the region	Maintain native vegetation including deep-rooted perennial grasses along riparian zones and floodplains to promote bank and soil stability.	Landowners	This practice is more widely adopted due to the cost benefits to farmers and overall soil health.			Educate Farmers and the regional community regarding the continued need for BMP adoption.	CYNRM, DAF, CSIRO
Native perennial pasture grasses	Drought	Extended dry periods in Cape York will place increasing pressure on pastures, particularly perennial grasses, which are vital for both cattle grazing and ecosystem stability. Overgrazing during drought conditions can significantly reduce grass cover and limit the amount of organic carbon entering the soil, which is essential for maintaining soil health. Droughts, followed by brief but intense wet periods, may further diminish the resilience of perennial grasses and promote the spread of annual species, which are less effective at stabilizing soil and retaining nutrients. Perennial grasses play a crucial role in protecting soil by trapping and retaining litter, sediment, and nutrients, while also providing forage for cattle and habitat for native fauna. Under drought conditions, the growth of these grasses is severely limited, leading to overgrazing, which reduces seed production, diversity, and the abundance of perennial grass species. The cumulative effects of repeated defoliation weaken the ecosystem's ability to recover from future droughts, resulting in long-term degradation of pasture quality. While future climate projections suggest overall increases in precipitation for Cape York, this will likely be accompanied by increased variability. More extended dry seasons and failed wet seasons are expected to become more common, creating challenging conditions for pasture management. The duration and frequency of droughts under an RCP 8.5 scenario are predicted to increase marginally in some areas of the region, with the	Very Likely	Severe	Severe	Across the region	Increase the adoption of seasonal climate forecasts to facilitate pastoralists decisions to vary stocking rates (e.g., destocking in response to drought predictions) (Howden et al., 2008; Rolfe et al., 2014; Rolfe et al., 2021).	DAF to facilitate adoption by pastoralists, CYNRM promote action.	Seasonal climate forecasting is utilised by some Pastoralists.	Apply a logical decision-making framework to reassess drought planning and response strategy for each grazing enterprise and modify as required for the individual drought circumstance.	Landowners in collaboration with extension through CYNRM	Conduct monitoring of pasture resources to inform the restocking process.	Landowners in collaboration with DAF, extension supported by CYNRM
							Long-term safe stocking rates that maintain pasture resources in a DETSIrable and productive condition (Tothill & Gillies, 1992). Stocking rates to match pasture growth and spelling of pastures during the wet season.	Landowners	Some pastoralists manage their enterprises using safe stocking rates that are responsive to land condition.				
							Wet season spelling of paddocks for the first 6-8 weeks of the wet season and utilisation of 50% of the pasture thereafter (Ash et al., n.d.).		Wet season spelling is used by some pastoralists (e.g., GRASS program), greater adoption across the region is required.				
							Provision of Grazing Land Management (GLM) extension and to continue to promote practice change, development of planning frameworks to respond to drought and managing livestock for seasonal variability.	CYNRM	CYNRM have been delivering a GRASS program where extension officers work with graziers to deliver long-term solutions for grazing and reef water quality outcomes which also benefits native perennial grasses.	Further destocking of country in response to drought length and severity.	Landowners	Delay restocking as long as possible, and when re-stocking utilise conservative stocking rates and wet season spelling to aid in the recovery of perennial pasture species.	Landowners

Natural Disaster Risk Register for Natural Agricultural Capital Assets - Drought														
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		highest increases in the south-eastern areas of Cape York.											
Beef cattle	Drought	Cape York Peninsula experiences distinct wet and dry seasons, with drought being a frequent and significant challenge for the livestock industry. Droughts impact cattle production by limiting access to suitable feed, forcing graziers to rely on costly supplementary fodder to maintain livestock health. Beef production is highly dependent on seasonal conditions, and if graziers do not adjust stocking rates during droughts, the loss of forage can lead to cattle deaths. Given the vulnerability of the landscape and its reliance on high rainfall, drought conditions severely affect the availability of suitable grazing species, making sustainable pasture management crucial in these periods. The duration and frequency of droughts under an RCP 8.5 scenario are predicted to increase marginally in some areas of the region, with the highest increases in the south-eastern areas of Cape York.	Very Likely	Significant	Severe	Across the region	Increase the adoption of seasonal climate forecasts to facilitate pastoralists decisions to vary stocking rates (e.g., destocking in response to drought predictions) (Howden et al., 2008; Rolfe et al., 2014; Rolfe et al., 2021)	DAF to facilitate adoption by Landowners, CYNRM	Seasonal climate forecasting is not widely used however, pastoralists adjust stocking rates to match land condition in some areas.	Destock in response to drought conditions.	Landowners	Conduct monitoring of pasture resources to inform the restocking process.	Landowners in collaboration with DAF, extension supported by CYNRM
							Increase adoption of proven technologies, GLM that improve decision making capacity for drought preparedness of livestock production systems. Particularly farm-management economics approaches to assess the relative value of alternative destocking and restocking decisions during drought response and recovery (Bowen & Chudleigh, 2021).	DAF to facilitate adoption by Landowners, MLA, CYNRM	Some landowners are using farm management economics approaches to enhance decision making and increase the viability of their businesses.			Delay restocking as long as possible, and when re-stocking utilise conservative stocking rates.	

Natural Disaster Risk Register for Agricultural National Capital Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
High value grazing soils	Late-season wildfire	Uncontrolled wildfires pose an annual risk to grazing enterprises across Cape York, with the potential to remove ground cover, exposing soils to erosion by wind and rainfall runoff. Erosion leads to the loss of productive topsoil, nutrients, and carbon, directly impacting soil fertility and pasture productivity. The loss of productive pasture grasses further complicates landholders' ability to manage livestock effectively. The remoteness of Cape York, combined with the dry season landscape conditions, makes wildfire management especially challenging. Due to isolation, limited access, and the vast scale of the region, active wildfire control is often limited to mechanical measures like fire breaks and the use of controlled burns as preventive tools. However, these methods can sometimes be counterproductive. Late-season wildfires can cause significant topsoil degradation, which may be worsened if followed by heavy rainfall and grazing, further exacerbating erosion and reducing the land's capacity to recover. Late-season fires have occurred most frequently on western Cape York, in areas that are generally utilised for conservation or grazed as the natural environment. Late-season wildfires are predicted to increase in the Cape York region	Likely	Severe	Severe	Across the region, however focusing on pastoral properties along Western Cape York.	Conduct prescribed mosaic burning during cooler, wetter months to reduce the build-up of dry vegetation and minimise the risk of late-season wildfire. Conduct storm burning to manage weeds.	Landowners, Traditional Owner, QFD, QPWS	Fire management is actively used across the region to manage fuel loads and weeds, particularly by Traditional Owners.	Coordinate the development of fire management teams to upgrade or install fire breaks and conduct backburns overnight or when conditions cool, winds drop and humidity increases to prevent wildfire damaging riparian vegetation.	QFD, Local Councils, Landowners, Traditional Owners	Monitor ground cover and pasture condition to ensure restocking of paddocks occurs after adequate growth of ground cover.	Landowners, DAF, Traditional Owners, CYNRM
							Undertake wet season spelling.		Wet season spelling is used by some pastoralists, greater adoption across the region is required.				
							Manage weeds in sensitive riparian areas to reduce wildfire risk and increase bank stability by promoting the growth of native vegetation and grasses.		Farmers have a legal obligation to undertake weed management on their properties.				
Agricultural soils	Late-season wildfire	High frequency or intensity of wildfires may reduce soil organic matter in intensive agricultural systems. According to the NAFI late-season fire data, the majority of the areas used for intensive agriculture in the Cape York region have a history of relatively low late-season fire frequency.	Possible	Moderate	High	Agricultural areas in Lakeland, McIvor and Endeavour Valleys	Implement controlled burns during cooler, wetter periods to reduce fuel loads.	Farmers, QFD	Some farmers undertake cool season burns, however, this is not widely adopted using a strategic approach between landholders.	Coordinate the development of fire management teams to upgrade or install fire breaks and conduct backburns overnight or when conditions cool, winds drop and humidity increase.	QFD, Farmers	Perform soil tests to assess nutrient levels, pH, and organic matter content, and adapt post-fire soil management strategies based on the results.	Farmers.
							Ensure firefighting equipment, including pumps, hoses, and water tanks are readily accessible and in good working order. Implement and maintain fire breaks around the property.	Farmers	Management of fire breaks are a relatively common practice in the region.			Implement erosion control measures such as mulching, revegetation, and soil stabilisation to prevent soil erosion and promote recovery.	Farmers.
							Promote collaboration and open communication among stakeholders to create comprehensive fire management plans, share resources, and coordinate response efforts. Landowners, QPWS, and other key parties are encouraged to participate in fire management group meetings to strengthen collective preparedness.	Farmers, QFD, QPWS	Ongoing promotion and education around improved fire management planning across the region	Collaborate with local fire agencies, emergency services, and neighbouring landowners to enhance the efficiency of firefighting efforts and resource allocation.	QFD, SES, Farmers		

Natural Disaster Risk Register for Agricultural National Capital Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Freshwater	Late-season wildfire	In Cape York, freshwater ecosystems, including wetland-associated regional ecosystems, are increasingly threatened by late-season wildfires. These fires expose catchment areas to soil erosion just as the wet season begins, destabilising stream banks and opening overstorey canopies, which promotes weed invasion and raises in-stream temperatures. Burnt areas often face additional pressure from increased grazing. The intensified runoff from these fire-affected catchments further reduces the recharge of groundwater aquifers, exacerbating the long-term impacts on water quality and ecosystem health. Late-season wildfires are predicted to increase in the Cape York region and combined with predicted heavy rainfall, flooding and droughts, the impacts from this combination could be high	Likely	Moderate	High	Across the region of Cape York	Implement prescribed mosaic burning during the cooler, wetter months to reduce the accumulation of dry vegetation and lower the risk of late-season wildfires, while preserving some pasture for livestock. Rotate the areas burned each year to maintain a sustainable balance between fire management and grazing needs.	Landowners, QFD, QPWS	Fire management is actively used across the region to manage fuel loads and weeds, particularly by Traditional Owners.	Organise fire management teams to enhance or establish fire breaks and carry out backburns during cooler conditions, such as overnight or when winds are calm and humidity is higher. .	QFD, Landowners	Conduct assessment of soil condition, ground cover and pasture regrowth to ensure restocking of paddocks occurs after adequate growth of ground cover.	Landowners
												Conduct post fire water quality monitoring to determine impacts of the fire on water quality.	Landowners, Traditional Owners
							Manage weeds in riparian zones, particularly introduced grasses and weeds that create high fuel loads.	Farmers	Farmers have a legal obligation to undertake weed management on their properties.	Destock paddocks near riparian areas to minimize grazing pressure and reduce sediment runoff into freshwater systems following a late-season wildfire.	Landowners	Enhance the adoption of Best Management Practices (BMPs) for on-farm water, nutrient, and pesticide use. Involve primary producers in BMP trials and ecosystem monitoring	CYNRM, DAF, CSIRO
Native perennial grasses	Late-season wildfire	The response of pastures to repeated wildfires is influenced by conditions both during and after the fires. High-intensity fires, particularly when followed by dry weather, can encourage the growth of certain woody species, such as wattles. However, intense burns can also reduce wattle populations. These woody species can then compete with perennial pasture grasses for resources. NAFI data shows that some areas in Cape York have experienced frequent late-season wildfires and wildfires have impacted large areas of the region historically (e.g., wildfires in 2016 and 2019 that burned over 4 million ha of land, including national parks, Indigenous lands and pastoral properties. High-intensity wildfires are predicted to occur more frequently in Cape York as a result of climate change.	Likely	Significant	Very High	Across the region, however focusing on pastoral properties along Western Cape York.	Implement prescribed mosaic burning during the cooler, wetter months to reduce the accumulation of dry vegetation and lower the risk of late-season wildfires, while preserving some pasture for livestock. Rotate the areas burned each year to maintain a sustainable balance between fire management and grazing needs.	Landowners, QFD, Traditional Owners	Fire management is actively used across the region to manage fuel loads and weeds, particularly by Traditional Owners.	Organise fire management teams to enhance or establish fire breaks and carry out backburns during cooler conditions, such as overnight or when winds are calm, and humidity is higher. .	QFD, Local Councils, Landowners, Traditional Owners	Assess the impact of wildfire on vegetation, soil erosion, seed bank depletion and plant mortality.	Landowners, DAF, CYNRM
							Strategically create and manage fire breaks to prevent wildfire entering the property.	Landowners, QFD, QPWS	Management of fire breaks are a relatively common practice in the region.	Destock paddocks in response to wildfire.	Landowners	Conduct weed management in burnt areas to prevent establishment of weeds.	Landowners
							Manage weeds to reduce wildfire risk, with priority for weeds that create high fuel loads.	Landowners, Traditional Owners	Farmers have a legal obligation to undertake weed management on their properties.	Pastoralists and response teams to stay informed of the latest information about wildfire using the NAFI website.	Landowners and response teams	Monitor regrowth of perennial grasses to inform when it is safe to restock paddocks.	Landowners

Natural Disaster Risk Register for Agricultural National Capital Assets - Late-season wildfire

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Beef cattle	Late-season wildfire	Extensive late-season wildfires can have large impacts on cattle management in the region. Wildfires can destroy pasture resources and cause direct mortality to cattle. NAFI data shows that some areas in Cape York have experienced frequent late-season wildfires and wildfires have impacted large areas of the region historically (e.g., wildfires in 2016 and 2019 that burned over 4 million ha of land, including national parks, Indigenous lands and pastoral properties. High-intensity wildfires are predicted to occur more frequently in Cape York as a result of climate change.	Likely	Severe	Severe	Across the region	Disseminate fire information to landholders to help prepare for the upcoming fire season(s), to raise awareness about adopting best practice fire management.	QFD, CYNRM	CYNRM currently run fire management workshops and forums in collaboration with fire practitioners. They also	Muster cattle out of fire-prone paddocks or areas within the predicted path of the fire if possible.	Landowners	Facilitate agistment arrangements with neighbouring parks to relocate cattle to areas unaffected by wildfire.	Local councils, DAF ,CYNRM
							Conduct prescribed burning aligning with Traditional cultural burning during cooler, wetter months to reduce the build-up of dry vegetation and minimise the risk of late-season wildfire.	Landowners, QFD, Traditional Owners	Fire management is actively used across the region to manage fuel loads and weeds, particularly by Traditional Owners.	Organise fire management teams to enhance or establish fire breaks and carry out backburns during cooler conditions, such as overnight or when winds are calm, and humidity is higher. .	QFD, Local Councils, Landowners	Map the extent of fire damage and establish risk to animal welfare to prioritise properties for assistance.	
							Strategically create and manage fire breaks to prevent wildfire entering the property.	Landowners, QFD	Management of fire breaks are a relatively common practice in the region.				
							Develop property level fire management and response plans.	Landowners, with assistance from CYNRM, QFES and Traditional Owners	Very few properties have a written fire management plan, most properties have considered response actions.				
Horticultural crops and tropical fruit	Late-season wildfire	Fires can potentially cause crop damage. According to the NAFI late-season fire data, the majority of the areas used for intensive agriculture in the Cape York region have a history of relatively low late-season fire frequency. Wildfies under RCP 8.5 drought scenario identifies highest increases in the south-eastern areas of CYP, where highest and most valuable cropping occurs	Possible	Significant	High	Agricultural areas in Lakeland, McIvor and Endeavour Valleys	On property fire-fighting equipment and fire management plan in place.	Farmers	Insufficient knowledge regarding this activity.	Activate firefighting protocols. Seek assistance with fighting the fire if required.	Farmers, QFD	Assess damage, replant / replace crops.	Farmers.

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Flood and Cyclone														
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
High value grazing soils	Flood and cyclone	Major flooding can lead to erosion of riparian soils, a risk that is heightened when intense rainfall occurs alongside declining average rainfall or following drought conditions (Howden et al., 2008). This erosion risk is further exacerbated in overgrazed, cleared areas or regions impacted by invasive species like rubber vine. Flooding can also damage fence lines that protect riparian areas from grazing. In Cape York, flooding is a regular occurrence, with multiple events happening at varying intervals. In 2014 and 2022 flooding impacted large areas of the Cape York region resulting in long periods of inundation.	Very Likely	Significant	Severe	Across the region.	Reduce impacts of livestock on riparian areas by lowering stocking rates, fencing to remove cattle, and installing additional watering points away from watercourses and wet season paddock spelling to reduce erosion, sediment and nutrient input into waterways.	Landowners	Some landowners have adopted wet season spelling of riparian areas and hundreds of kilometres of riparian fencing has been installed to remove cattle from riparian areas. Graziers at a Grazing industry round table in 2015 expressed willingness to adopt these practices.	Remove stock from paddocks containing riparian zones and flood plains.	Landowners	Assess the extent of soil erosion and damage caused by the flood, including sediment deposition and loss of soil fertility. Consider aerial surveys to assess large scale impacts.	Landowners Traditional Owners, CYNRM
												Assess ground cover and pasture condition to ensure restocking of paddocks occurs after adequate growth of ground cover.	Landowners
							Long-term safe stocking rates that maintain pasture resources in a DETSIrable and productive condition (Tothill & Gillies, 1992). Stocking rates to match pasture growth and spelling of pastures during the wet season.	Landowners	Some pastoralists manage their enterprises using safe stocking rates that are responsive to land condition.			Undertake immediate monitoring of major gully scarps to assess retreat from the flood and prioritise scarps for remediation.	Landowners, Traditional Owners CYNRM
							Disseminate information about erosion management and utilising the field guide for identifying and managing gully erosion in Cape York has been developed to manage erosion (Shellberg & Thwaites, 2022).	CYNRM	CYNRM actively promote gully erosion management.			Manage weed regrowth immediately following the flood and promote the growth of native ground cover.	Landowners, Traditional Owners
							Monitoring of major gully scarps to determine the rate of retreat and use the data to prioritise gully scarps for remediation.	CSIRO, DAF in partnership with Landowners	This has occurred in some locations through projects aiming to reduce sediment loads into the GBR.				
							Undertake gully front stabilisation of gully scarps which have been identified as having major retreat.	Landowners	Gully front stabilisation has occurred in many areas along the eastern boundary of the region to reduce sediment flow onto the reef.				

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Flood and Cyclone														
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Agricultural soils	Flood and cyclone	In intensive agriculture, major flooding and heavy rainfall from cyclonic activity can lead to significant topsoil erosion, especially if soils are exposed. Waterlogging in certain soils can further reduce agricultural productivity by causing nutrient leaching or increasing saline groundwater levels. This leaching depletes essential nutrients, leading to lower soil fertility and reduced crop yields which is critical for the region's agriculture. Flood mapping indicates most intensive agricultural areas lie outside major flood areas.	Likely	Significant	Very High	Laura basin, Lakeland and Normanby and Endeavour River catchments	Identify flood-prone areas on the farm and plant crops and plantations above the flood zone.	Farmers	Most plantations and croplands are located above the flood zones.	Implement temporary drainage measures such as adjusting irrigation infrastructure to manage excess soil and prevent waterlogging.	Farmers	Evaluate the effects of flooding on soils to identify areas of erosion, sediment deposition, and nutrient loss.	Farmers
							Preserve and restore vegetation along waterways to reduce soil erosion and stabilise riparian areas, which helps in mitigating flood impacts and protecting agricultural land.	Farmers	Riparian vegetation is largely intact in the region.			Adapt cropping schedules and select crops based on flood damage and current soil conditions. Consider using cover crops to reduce erosion and restore soil health.	Farmers
												Implement soil stabilisation measures such as revegetation, mulching and erosion control.	Farmers
Freshwater	Flood and cyclone	Flooding in Cape York can have significant impacts on freshwater ecosystems, disrupting the balance of aquatic habitats. Heavy rainfall and flooding events lead to increased runoff, carrying sediment, nutrients, and pollutants into rivers, wetlands, and other freshwater systems. This influx can reduce water quality, harm aquatic species, and alter natural flow patterns. A major problem is the transport of sediment from these floodwaters onto the Great Barrier Reef (JCU, 2024). Excessive sedimentation can smother coral reefs, block sunlight needed for photosynthesis, and promote algal blooms, which further degrade reef health, as seen in 2024 due to flooding from cyclone Jasper (JCU, 2024). The combination of freshwater ecosystem disruption and reef sedimentation poses a serious threat to the biodiversity and ecological integrity of Cape York's natural environments.	Very Likely	Moderate	Very High	Eastern Cape York river catchments.	To reduce the impact of livestock on riparian areas, lower stocking rates, fence off watercourses to exclude cattle, install alternative watering points away from sensitive areas, and implement wet season paddock spelling. These practices help minimize erosion, sedimentation, and nutrient runoff into waterways.	Landowners	Some landowners have adopted wet season spelling of riparian areas and hundreds of kilometres of riparian fencing has been installed to remove cattle from riparian areas. Graziers at a Grazing industry round table in 2015 expressed willingness to adopt these practices.	Destock riparian areas where damage from livestock could cause greater impacts to erosion and water quality.	Landowners	Undertake post-flood water quality monitoring to assess the level of contamination and pollution level and continue monitoring to detect changes in nutrient levels, sedimentations, and pollutants, and take corrective actions as needed to protect ecosystem health.	Landowners, Farmers, CYNRM
							Manage nutrient inputs into agricultural soils to reduce the pollution of water and resulting eutrophication. (e.g., applying fertilisers during suitable weather conditions and at the correct stage during crop growth in addition to using crop rotation, planting cover crops and ploughing in crop residues (Pau Vall & Vidal, 2015).	Farmers	This practice is more widely adopted due to the cost benefits to farmers and overall soil health.	Engage with landowners, industry, agricultural	CYNRM, DAF, Landowners,	Monitor the regrowth of pasture grasses and other vegetation to inform a suitable time	Landowners

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Flood and Cyclone													
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
							Preserve and restore vegetation along waterways to reduce soil erosion and stabilise riparian areas, which helps in mitigating flood impacts and protecting agricultural land.	Landowners	Riparian vegetation is largely intact in the region.	stakeholders, and local communities to coordinate flood response and recovery efforts.	FNQ Growers	to restock riparian areas.	
Native perennial pasture grasses	Flood and cyclone	Sustained inundation of floodplains in Cape York can lead to significant reductions in ground cover during the recovery period, affecting the resilience and carrying capacity of the associated vegetation communities. The severity of these impacts depends on several factors, including the extent of flooding, the specific pasture species present, and the depth and duration of the flood (Peck & Jones, 2022). Following flood events, weed establishment can be a major concern, as invasive species may outcompete recovering pastures, further hindering their regrowth. Flooding can severely affect pasture condition, with impacts varying based on the level of inundation and the tolerance of different pasture grasses. For example, complete inundation lasting two days or more can lead to the death of some pasture plants, impacting overall pasture health and productivity. Under future climate scenarios, significant increases in precipitation levels are projected for Cape York river basins, and flood mapping indicates significant areas used for pastoralism occur within floodplain areas.	Very Likely	Moderate	Very High	Normanby, Mitchell, Wenlock and Daintree River Floodplains	To reduce the impact of livestock on the resilience of perennial pasture grasses lower stocking rates, fence off watercourses to exclude cattle, install alternative watering points away from sensitive areas, and implement wet season paddock spelling.	Landowners	Some landowners have adopted wet season spelling of riparian areas and hundreds of kilometres of riparian fencing has been installed to remove cattle from riparian areas. Graziers at a Grazing industry round table in 2015 expressed willingness to adopt these practices.	Constantly assess flood levels and move all stock to higher ground where required.	Landowners	Monitor the recovery of pastures closely for 2-3 weeks following flooding and then monthly thereafter to determine recovery actions required and inform when safe to restock paddocks. Manage weeds in bare areas after flooding. Take photographs post-flooding to assess the pasture damage and recovery (using Normalised Difference Vegetation Index (NDVI)	Landowners, DAF, CYNRM Landowners Landowners, DAF, CYNRM
Beef cattle	Flood and cyclone	Flooding events and cyclones in Cape York have significant impacts on beef cattle and the broader pastoral industry. Flooding can inundate grazing lands, making pastures inaccessible and reducing the availability of feed. This not only disrupts the cattle's diet but also increases the risk of nutritional deficiencies and health issues. Prolonged waterlogging can damage pasturelands, leading to soil erosion and degradation, which affects the long-term productivity of grazing areas. Cyclones add another layer of risk by causing physical damage to infrastructure such as fencing, cattle yards, and water supplies. Strong winds can result in the destruction of shade structures and feed storage facilities, further complicating the management of cattle. Additionally, the intense rainfall associated with cyclones can exacerbate flooding, leading to	Very Likely	Significant	Severe	All grazing areas located within flood zones.	Maintain safe stocking rates and destock at the end of the dry season if cattle lose condition. Cull preg-tested empty cows. As a last resort, ensure that cattle are in reasonable condition entering the wet season by providing appropriate nutritional support, such as grass hay. Ensure fencing provides cattle with access to high ground in paddocks affected by flooding.	Landowners	This is undertaken by some pastoralists in the region. There is minimal uptake of this activity across the region.	When possible, muster livestock to safer areas outside the flood impact zone.	Landowners	Where possible arrange relocation / transportation of stock to a safer location. Assess the damage to infrastructure and repair as required.	Landowners

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Flood and Cyclone													
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
		further pasture loss and muddy conditions that may increase the risk of diseases. Under future climate scenarios, significant increases in precipitation levels are projected for Cape York river basins, and flood mapping indicates significant areas used for pastoralism occur within floodplain areas.								Monitor the movement of low-pressure systems in Cape York to provide early indications cyclone and flood events.	Landowners	Monitor cattle for disease.	
Horticultural crops and tropical fruit	Flood and cyclone	Flooding can lead to significant fruit and crop losses by uprooting trees and causing plant rollover. It also heightens the risk of plant disease and pest outbreaks, which can further contribute to crop loss. For tropical vegetable crops and sugarcane, flooding can result in substantial damage or even death, particularly if the inundation is prolonged. This increased risk necessitates effective management and recovery strategies to mitigate the impacts on these vital crops. Flood mapping indicates most intensive agricultural areas lie outside major flood areas.	Possible	Moderate	High	All agricultural areas.	Maintain on farm disease / pest management and quarantine protocols.	Farmer	Farmers have a legal obligation to follow disease and pest management protocols.	Follow disease/pest management best practice and report any incidences of plant disease to Biosecurity Queensland. Undertake a damage assessment of crop loss and clean up paddocks.	Farmers, BQ Farmers	Monitor for disease and pest outbreaks. Respond and report to DAF and BQ as required.	Farmers
Aquaculture	Flood and cyclone	Flooding can lead to breaches in bunded walls at aquaculture facilities, potentially releasing fish into natural waterways. This can result in the transfer of diseases from farmed fish to wild populations. Additionally, extended power outages caused by flooding may lead to significant stock losses due to disruptions in critical systems such as aeration and water filtration. Flood mapping indicates that two aquaculture facilities are located within flood hazard areas.	Likely	Significant	Very High	Aquaculture facilities located within the vicinity of Cooktown (Annan River) and the Daintree River	Facilities built to a Q100 event and to industry standards	Farmer	Facilities would be built to industry standards at the time of build.	Repair infrastructure.	Farmers	Rebuild infrastructure to current industry standards.	Farmers

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Pests & Disease

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Beef cattle	Pests & Disease	Pests and diseases such as Foot and Mouth Disease, Lumpy Skin Disease, and other invasive species pose a risk to the Cape York Peninsula beef cattle herd, given their presence in nearby countries and potential to establish in northern Australia. Climate change can influence the host environment, vectors, and the pests or diseases themselves, affecting their epidemiology. Increased rainfall and flooding events are likely to expand the range of some pests and diseases while reducing the distribution of others (Black et al., 2008; McKeon et al., 2009; Henry et al., 2012). In the event of a significant outbreak of animal diseases or invasive weed incursions, the impacts on the grazing industry could be substantial, necessitating the implementation of robust biosecurity measures.	Possible	Severe	Very High	Across the region	Ensure animals are vaccinated (Black et al., 2008).	Landowners	Insufficient knowledge regarding this activity.	Report any signs of unusual disease or pest outbreaks in livestock to Biosecurity Queensland, including both suspected and confirmed cases	Landowners	Continue monitoring for any signs of recurrence and immediately reporting any new cases to Biosecurity Queensland.	Landowners
							Select disease and climate-adapted beef cattle breeds to build the resilience of the herd to diseases and parasites (Black et al., 2008).		The selection of climate-adapted beef cattle breeds is widely used in the region.	Follow directives from Biosecurity Queensland regarding movement restrictions, animal treatment and control measures, including vaccination, culling of affected animals, applying pest control measures and record keeping.		Ensure decontamination protocols are followed for personnel, vehicles, and any items that may have come into contact with infected animals or areas.	
							Establish conditions for managing a disease outbreak and financial compensation for stock losses to provide incentives to report disease outbreaks (Black et al., 2008).	Govt Agencies, BQ, DAFF, CYNRM	BQ and DAFF have well established procedures for managing disease outbreaks.			Adhere to required follow-up measures or monitoring programs set by Biosecurity Queensland to ensure the long-term eradication of the disease or pest.	
							Develop an on-farm biosecurity management plan and maintain biosecurity practices (e.g., quarantine new animals and constantly monitor animals for disease).	Landowners	This activity is relatively well adopted, however, monitoring animals on larger pastoral holdings is more challenging due to animals dispersed over wider areas.				
							Provide educational resources and materials on optimal livestock health and biosecurity practices. Host workshops and training sessions to enhance knowledge on preventing, identifying, and managing diseases and implementing robust biosecurity protocols.	CYNRM, BQ, DAFF	This information is relatively well disseminated by DAFF and BQ.	Enhance biosecurity practices on the property to reduce the risk of spread, including disinfecting equipment, and controlling the movement of people and vehicles.	Landowners	Revise and enhance biosecurity plans to address any weaknesses identified during the outbreak.	Landowners, support provided by CYNRM
										Alert and provide information about the emerging disease to the community to build knowledge about the disease symptoms and protocols for reporting notifiable diseases.		Facilitate access to financial aid, grants, and compensation schemes for affected pastoral holdings.	

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Pests & Disease

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Horticultural crops and tropical fruit	Pests & Disease	Environmental conditions significantly influence disease severity in agricultural settings. Increased temperatures can create favourable conditions for plant pathogens, such as black sigatoka in bananas and fungal infections in sugarcane (QG, n.d.). Altered rainfall patterns can weaken plants, making them more susceptible to diseases. Warmer temperatures and extreme weather events can expand the range of pest and disease vectors, spreading spores and infectious agents over larger areas. Pests and diseases, such as Panama Disease, Varroa Mite, and other invasive species, pose risks as they are either already present in Australia or nearby countries, with the potential to establish in northern Australia, particularly Cape York Peninsula. The impact of these diseases on the horticulture industry is significant and widespread. In Cape York, the remoteness and low population density present challenges for early detection and ongoing surveillance.	Possible	Moderate	High	All agricultural areas	Diversify crops and use crop rotation to break potential disease cycles.	Farmers	This activity is widely adopted	Report any signs of notifiable disease or pest outbreaks in their crops (both suspected and confirmed cases) to Biosecurity Queensland.	Farmers	Thoroughly clean and disinfect affected areas, equipment, and facilities to ensure the disease or pest is eradicated.	Landowners
										Isolate infected plants or areas to prevent the spread of pathogen and apply recommended treatments.		Continue monitoring for any signs of recurrence and immediately reporting any new cases to Biosecurity Queensland and Adhere to required follow-up measures or monitoring programs set by Biosecurity Queensland to ensure the long-term eradication of the disease or pest.	
							Plant disease and pest resistant or tolerant crop varieties.	Farmers	This activity is widely adopted.	Enhance biosecurity practices on the property to reduce the risk of spread, including disinfecting equipment, controlling the movement of people and vehicles, and implementing biosecurity zones.			
							Education and extension services to provide farmers with the latest information on diseases management strategies and climate adaption techniques.	DAF, CSIRO, CYNRM	DAF currently disseminate information and deliver extension to farmers on disease management strategies and climate adaption techniques.	Maintain detailed records of the outbreak, including dates of occurrence, number of affected plants, treatment measures undertaken, and outcomes.		Revise and enhance biosecurity plans to address any weaknesses identified during the outbreak.	Landowners, with support provided by BQ, CYNRM
							Regularly monitor crops for signs of disease or pest infestations and utilise disease forecasting models to detect and manage issues early.	Farmers	The monitoring of crops for signs of diseases and pest infestations is currently occurring widely in the region.	Notify the community about the emerging to build knowledge about the disease symptoms and protocols for reporting notifiable diseases.	DAF, BQ, CYNRM	Facilitate access to financial aid, grants, and compensation schemes for affected pastoral holdings.	

Natural Disaster Risk Register for Agricultural Natural Capital Assets – Pests & Disease														
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Aquaculture	Pests & Disease	Rising temperatures, heat waves, cyclones, and heavy rainfall can create favourable conditions for pathogens and parasites. This increases the risk of significant aquatic animal diseases emerging and spreading within aquaculture systems (DAWR, 2016).	Unlikely	Minor	Moderate	Aquaculture facilities located within the vicinity of Cooktown (Annan River) and the Daintree River	Develop on farm biosecurity plan to prevent the introduction and spread of disease and allow for early disease detection so that impacts can be reduced (DAWR, 2016).	Farmers	Farm biosecurity plans are widely adopted.	Isolate infected stock and implement quarantine and treatment measures to treat and prevent the spread of disease.	Farmers	Continue monitoring for any signs of recurrence and immediately reporting any new cases to Biosecurity Queensland.	Farmers
									Insufficient knowledge regarding this activity.			Ensure decontamination protocols are followed for personnel, vehicles, and any items that may have come into contact with infected animals or areas.	
							Undertake regular health monitoring of stock, control the movement of animals and equipment, and use disease-free broodstock (FAOUN, 2024).		Regular health monitoring of stock is used by aquaculture facilities.	Immediately report disease outbreaks to Biosecurity Queensland.			
							Research to develop diseases-resistant strains and improve vaccines and treatments for common aquaculture diseases.	Research institutions, CSIRO, DAF	Insufficient knowledge regarding this activity.	Alert other aquaculture facilities regarding the outbreak and provide information regarding disease signs and reporting obligations	CYNRM, DAFF,	Adhere to required follow-up measures or monitoring programs set by Biosecurity Queensland to ensure the long-term eradication of the disease or pest.	
										Thoroughly clean and disinfect affected areas, equipment, and facilities to ensure the disease or pest is eradicated.	Farmers	Revise and enhance biosecurity plans to address any weaknesses identified during the outbreak.	Farmers with support from BQ

Natural Disaster Risk Register for Agricultural Natural Capital Assets - Heatwave

Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
Beef cattle	Heatwave	As temperature and humidity levels rise, animal thermal stress is expected to increase (Howden et al., 2008). This can lead to reduced production and reproductive performance, as well as higher mortality rates. Temperature increases of 1.5°C or more may surpass normal thermoregulation limits for cattle, potentially causing persistent heat stress (Thornton et al., 2021). Additionally, as temperatures rise, livestock water demand is expected to increase significantly (Howden et al., 2008). Heatwave conditions under an RCP 8.5 scenario are predicted to increase across the region between 1 and 4 events annually.	Very Likely	Moderate	Very High	All pastoral holdings across the region.	Selecting livestock breeds with effective thermoregulatory capabilities may enhance herd resilience to heat stress.	Landowners	Pastoralists currently utilise climate-resilient beef breeds, however, there is large variation within breeds.	Monitor cattle behaviour and signs of heat stress, such as excessive panting and drooling.	Landowners	Conduct a post-event review of impacts and response measures to identify areas for improvement.	Landowners
							Increase the number of watering points to reduce the distance livestock have to travel to access water.	Landowners	Insufficient knowledge available regarding the utilisation of watering points.	Monitor water sources.			
Aquaculture	Heatwave	Temperature plays a crucial role in regulating fish development and physiology. Extreme temperatures can hinder fish growth and negatively affect their hemato-physiology, metabolism, immune responses, and stress tolerance. Prolonged periods of elevated water temperatures can impair aquaculture performance by reducing fish development, reproduction, growth, and survival, while simultaneously increasing susceptibility to diseases (Islam et al., 2022). Heatwave events under a RCP 8.5 scenario are not predicted to change where aquaculture facilities are located within the region.	Very Likely	Minor	High	Aquaculture facilities located within the vicinity of Cooktown (Annan River) and the Daintree River	Increase aquaculture pond depth (Islam et al., 2022).	Farmers	Insufficient knowledge available regarding this activity.	Adjust feeding rates and schedules to minimise metabolic heat production and reduce stress.	Farmers	Assess the impact of the heatwave on the aquaculture operation, including water quality, fish health, and reproductive performance, and implement corrective measures such as water quality treatments, pond or tank flushing, and stock management adjustments to aid recovery and minimize losses.	Farmers
							Apply pond coverings such as shade cloth to reduce water temperature, direct sunlight exposure and prevent heating (Islam et al., 2022).		Insufficient knowledge available regarding this activity.	Regularly monitor and manage water quality parameters, including temperature, dissolved oxygen, pH, and nutrient levels.			
							Cultivate heat-tolerant aquatic species adapted to the local climate conditions and temperature extremes.		Insufficient knowledge available regarding this activity.	Use aerators, water circulation pumps, or evaporative cooling systems to lower water temperatures and enhance oxygenation during heatwaves, while			

Natural Disaster Risk Register for Agricultural Natural Capital Assets - Heatwave													
Asset	Emergency scenario	Risk description / reason susceptible	Susceptibility			Priority locations	Preparedness			Response			
			Likelihood	Consequence	Rating		Activities to build resilience	Action	Currently undertaken?	Activities during event	Action	Longer-term recovery actions	Action
							Explore the options of food additives, essential oils, and endocrine therapy to build the resilience of aquaculture fish to heat waves (Islam et al., 2022).	CSIRO, DAF	Insufficient knowledge available regarding this activity.	also increasing water exchange rates or replenishment frequency to flush out heat-affected water and maintain cooler conditions.			

COMMUNITY AND STAKEHOLDER ENGAGEMENT

Cape York NRM is dedicated to enhancing disaster preparedness and resilience in the Cape York region through robust community and stakeholder engagement. We work in close collaboration with Local Disaster Management Groups (LDMG's) to provide input and feedback on draft disaster management plans. These plans are then integrated as sub-plans within the LDMGs' broader Local Disaster Management Plans to ensure cohesive and effective regional responses.

Cape York NRM actively engages with Indigenous Groups across the region to incorporate traditional knowledge and species-specific actions into the disaster management strategies. This collaboration respects and utilises Indigenous expertise in managing and protecting local ecosystems and resources. Additionally, Cape York NRM participates in District Disaster Management Group meetings, where it presents plans to all stakeholders, ensuring that diverse perspectives are considered and integrated.

Cape York NRM also works with local and regional National Emergency Management Agency (NEMA) staff to raise awareness and garner support for the plans at the federal level. Cape York NRM acknowledges the importance of effective communication in this process and employs various platforms, including newsletters, workshops, and community forums, to share detailed information about the plan's objectives and strategies. Through targeted outreach, such as one-on-one meetings and presentations, we ensure active stakeholder involvement and continuously gathers feedback to refine and improve the plans.

Furthermore, Cape York NRM is committed to aligning its disaster preparedness and resilience plans with government efforts at the Commonwealth, state, and territory levels. This involves close collaboration with government agencies, participating in working groups, and advocating for the inclusion of critical preparedness actions in broader government policies.

By engaging with communities and stakeholders throughout the Cape York region, Cape York NRM leverages local knowledge and strengthens social cohesion. The organisation promotes sustainable land management practices and conservation efforts, contributing to the long-term environmental sustainability and resilience of the region's biodiversity and agricultural assets.

Cape York NRM is committed to engaging with all relevant stakeholders by thoroughly consulting them on the disaster preparedness and resilience plan and addressing the issues identified. The organisation will actively promote the plan through its communications networks and present it at events and field days attended by Cape York NRM staff.

Additionally, face-to-face meetings with key regional stakeholders will be conducted to discuss the draft plan and its implementation. Cape York NRM will seek invitations to Local Disaster Management Group meetings to build rapport and strengthen relationships within the Cape York disaster management network. To ensure ongoing input and refinement, a feedback platform will be established for local and regional stakeholders to provide their insights both now and in the future.

LEGAL FRAMEWORK

Cape York NRM is committed to adhering to relevant legislative frameworks to ensure that disaster preparedness, response, and recovery activities are conducted in a legal, responsible, and sustainable manner. Compliance with these laws is essential for safeguarding natural resources, mitigating biosecurity risks, and ensuring the safety and well-being of local communities. By aligning with these regulations, Cape York NRM fosters coordinated efforts among various levels of government and local stakeholders, promoting a cohesive approach to disaster management. This not only supports immediate response actions but also contributes to long-term environmental and community resilience.

Integral to this approach is the Queensland State Disaster Management Plan, developed in accordance with section 49 of the *Disaster Management Act 2003*. This plan outlines disaster management arrangements for effective disaster management in Queensland and is consistent with the Standard for Disaster Management in Queensland and the Queensland Prevention, Preparedness, Response, and Recovery (PPRR) Disaster Management Guidelines.

It is crucial to keep landowners and stakeholders informed about their legal obligations to maintain compliance and protect the environment during disaster operations. Understanding and adhering to these laws helps prevent actions that could worsen disaster impacts, such as inappropriate land clearing or the spread of invasive species. By promoting awareness and adherence to these regulations, Cape York NRM enhances the effectiveness of disaster management efforts and supports sustainable development practices.

The key legislations relevant to this plan include:

- **Disaster Management Act 2003**: Establishes the framework for managing disasters in Queensland.
- **Biosecurity Act 2014:** Prevents the spread of pests and diseases during recovery operations.
- **Local Government Act 1989:** Defines the roles of local councils in disaster management.
- **Environment Protection and Biodiversity Conservation (EPBC) Act 1999:** Protects significant biodiversity and habitats.
- **Nature Conservation Act 1992:** Safeguards native flora and fauna.
- **Vegetation Management Act 2006:** Regulates land clearing to prevent soil erosion and protect vegetation.
- **Coastal Protection and Management Act 1995:** Addresses coastal erosion and habitat conservation.
- **Water Act 2000 (Qld):** Manages water resources in Queensland, ensuring sustainable water use and protection of water ecosystems.
- **Waste Reduction and Recycling Act 2011 (Qld):** Promotes waste management and recycling, critical during disaster debris clearance and waste management.
- **Environment Protection Act 1994:** Controls pollution and protects the environment.
- **Cape York Peninsula Heritage Act 2007:** Provide for cooperative management, protection and ecologically sustainable use of land, including pastoral land
- **Forestry Act 1959:** provide the management and protection of State forests.
- **Wet Tropics World Heritage Protection and Management Act 1993:** Ensures conservation within the Wet Tropics World Heritage Area.
- **Fisheries Act 1994 (Qld):** Manages and protects fish habitats and fisheries resources.
- **Aboriginal Cultural Heritage Act 2003 (Qld):** Protects Indigenous cultural heritage, requiring consideration of cultural sites during disaster response and recovery.

RISK MANAGEMENT INCLUDING MITIGATION STRATEGIES

Risk management involves systematically identifying and understanding risks and the controls in place to manage them. A risk is defined as the "effect of uncertainty on objectives." The goal of risk management is not to eliminate risks entirely but to manage them effectively to maximise opportunities and minimise adverse impacts.

The initial risks of this Emergency Disaster Response Plan (EDRP) were determined through a systematic evaluation of potential threats that could impact the effectiveness of the plan (table 2).

Table 2. Risks identified for the initial delivery of the EDRP

Risk	Likelihood	Consequence	Risk Rating	Risk Mitigation Action	Residual Risk
The health, safety and wellbeing of employees or contractors is impacted by their role in responding to an emergency event.	Possible	Extreme	High	The philosophy of protecting life and property will take precedence. Emergency services training and accreditation pathways are implemented. Onset risk assessment conducted for each unique situation.	Moderate
Unintended ecosystem destruction or the spread of biosecurity risks occurs because of emergency response actions.	Unlikely	Moderate	Moderate	The EDRP is provided to emergency Services agencies for use in incident control centres. Delivery of the plan adheres to the Far North Queensland Regional Organisation of Councils Disaster Management Natural Assets Code of Practice.	Low

Resources are not available to implement this Plan.	Unlikely	Moderate	Moderate	The Disaster Management Framework is implemented through NEMA onto QRA to activate DRFA type funding will ensure actions are met.	Low
Emergency services organisations are not aware of this Plan.	Unlikely	Moderate	Moderate	QFES and QPS are engaged through LDMG and DDMG's to ensure awareness within the emergency management frameworks.	Low
The plan is not implemented by emergency services organisations and/or the RDP.	Unlikely	Moderate	Moderate	Funding secured to implement this plan. Assessment of resources required to deliver this plan.	Low

In the delivery of this plan, identified risks need to be analysed and treated individually, with assessments made regarding their consequences and likelihood, resulting in specific risk ratings. During an emergency, the level of risk may vary based on the event's scale and size. The risk management process follows a comprehensive approach consisting of several key steps.

Firstly, a thorough risk analysis will be conducted at the onset of each natural disaster. This includes establishing the context by defining the scope and objectives of the risk management activities. Risks will then be identified, followed by a detailed assessment to understand their potential impact and likelihood. In the risk evaluation step, risks will be prioritised based on their analysis, allowing CYNRM to focus on the most significant threats.

Once risks are evaluated, the risk treatment step involves selecting and implementing measures to mitigate, transfer, accept, or avoid risks. Continuous monitoring and review ensure that the risk management process remains dynamic and responsive to new threats and changing circumstances. Communication and consultation are integral throughout the process, ensuring that all stakeholders are informed and involved in managing risks.

By adhering to these standards, Cape York NRM can develop a robust risk management plan for each unique disaster event, addressing immediate disaster-related risks and enhancing overall resilience and preparedness for future emergencies.

Safety and Human Health Risks

For each unique natural disaster encountered in Cape York Peninsula, a risk assessment will be conducted to ensure safety and protect human health, with a focus on protecting life and property as a top priority. This process involves identifying potential hazards that could affect individuals and

communities, including risks such as hazardous material exposure, infrastructure collapse, disease outbreaks, and restricted access to medical services.

By evaluating the likelihood and severity of these risks, Cape York NRM can prioritise them to develop targeted mitigation strategies and allocate resources effectively. Emergency services training and accreditation pathways will be implemented to ensure preparedness.

Continuous monitoring throughout the disaster will help ensure that response activities remain effective, aiming to safeguard lives and minimise health impacts during the emergency.

Ecosystem/Asset Damage

For each emergency situation an assessment of risks related to ecosystem and asset damage will be conducted. This involves identifying threats to natural habitats, biodiversity, and agricultural assets, analysing the likelihood and severity of impacts such as habitat destruction, species displacement, spread of weeds and pathogens, water contamination, and soil erosion.

By evaluating potential damage to agricultural lands, water resources, and conservation areas, Cape York NRM can prioritise protective measures and recovery strategies for each disaster event. Preparedness plans are provided to emergency services agencies for use in incident control centres, ensuring that response activities are well-coordinated and effective.

This integrated approach helps to preserve biodiversity, maintain ecosystem services, and protect natural assets, contributing to long-term resilience and sustainability in the Cape York region.

Resource Availability

For each natural disaster, a thorough evaluation of current resource availability will be undertaken to ensure that Cape York NRM has the necessary resources to effectively mitigate and respond to identified risks. This process involves a comprehensive inventory and analysis of essential resources, such as personnel, equipment, funding, and technical expertise.

By assessing these resources, Cape York NRM can identify any gaps and plan for the allocation or procurement of additional support as needed. This evaluation helps ensure that protective measures can be implemented, monitoring and rehabilitation actions can be carried out, and ecosystems can be restored after damage. The integration of resource availability into the risk assessment process allows Cape York NRM to develop realistic and actionable plans that address both ecological and asset damage efficiently.

Additionally, the Disaster Management Framework, implemented through the National Emergency Management Agency (NEMA) and Queensland Reconstruction Authority (QRA) for activating Disaster Recovery Funding Arrangements (DRFA), ensures that the necessary actions are met. This comprehensive approach enhances overall resilience, supporting the recovery and long-term sustainability of both human and natural systems in Cape York.

Engaging Emergency Services

Cape York NRM will actively engage Queensland Fire and Emergency Services (QFES) and Queensland Police Service (QPS) through Local Disaster Management Groups (LDMGs) and District Disaster Management Groups (DDMGs) to ensure they are well informed and aware of the EDRP.

At the onset of a natural disaster, a comprehensive list of stakeholders and their contact details, as outlined in ‘14. Key Contacts,’ will be reviewed to develop a strategic communication plan tailored to

the specific situation. Establishing effective communication channels will be crucial for facilitating swift exchanges of critical information among disaster responders during and after an event. This will enable proactive measures to mitigate risks and deploy resources to vulnerable areas, protecting ecosystems and agricultural resources from potential harm. By providing timely updates and deploying resources efficiently, Cape York NRM aims to minimise the likelihood and severity of damage, thereby preserving essential natural capital assets necessary for ecological balance and sustainable agriculture.

Disaster Management Code of Practice

Cape York NRM will strive to adhere to the Far North Queensland Regional Organisation of Councils Disaster Management Natural Assets Code of Practice (Dryden & Doak, 2021) by incorporating its guidelines into activity planning and risk management processes. This Code offers a decision-making framework designed to prevent the spread of priority biosecurity risks and mitigate impacts on natural assets and significant environmental areas during disaster response and recovery efforts.

Collaboration with local governments and regional partners, including Cape York NRM, is crucial in identifying and safeguarding priority biosecurity risks, natural assets, and significant environmental areas that may be affected by disasters. This clear identification allows for targeted safeguarding and recovery actions.

Although natural areas may not always be the immediate focus during disaster situations, it is important for Councils and Disaster Management Teams to follow established processes to mitigate negative impacts.

Cape York NRM's role in Local Disaster Management Group (LDMG) Environmental Sub-committees will enhance the application of the Code of Practice by integrating environmental considerations into disaster response plans and effectively addressing biosecurity risks and the protection of natural resources.

MONITORING AND DATA

Many of the fourteen priority species identified in this plan already have established recovery plans and ongoing projects, which will provide a foundation for monitoring the success of this plan and other related conservation efforts.

Data on response actions or incidents will be gathered from Queensland Fire and Emergency Services (QFES) and other relevant Emergency Management Agencies regarding the sites outlined in this plan. Cape York NRM will compile all relevant post-event data from stakeholders to build a comprehensive regional recovery picture and guide future learning.

Additionally, the continued use of VegCAT monitoring across Cape York will support the monitoring of specific sites as per project deliverables and enable the assessment of impacts from post-disaster events in the future.

REFERENCES

Andersen, A. N., Cook, G. D., Corbett, L. K., Douglas, M. M., Eager, R. W., Russell-Smith, J., . . . Woinarski, J. C. Z. (2005). Fire frequency and biodiversity conservation in Australian tropical savannas: implications from the Kapalga fire experiment. *Austral Ecology*, *30*(2), 155-167. https://doi.org/10.1111/j.1442-9993.2005.01441.x

Australian Government (AG). (2006). Threat Abatement Plan for Psittacine Beak and Feather Disease Affecting Endangered Psittacine Species.

Australian Government (AG). (2017). *Recovery plan for marine turtles in Australia (2017-2027)*. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/recovery-plan-marine-turtles-2017.pdf

Australian Government (AG). (2021). *Psittacine Circoviral (beak and feather) Disease*. Department of Climate Change, Energy, the Environment and Water. https://www.dcceew.gov.au/environment/biodiversity/threatened/key-threatening-processes/psittacine-circoviral-beak-and-feather-disease

Australian Government (AG). (2021). *Psittacine Circoviral (beak and feather) Disease*. Department of Climate Change, Energy, the Environment and Water. https://www.dcceew.gov.au/environment/biodiversity/threatened/key-threatening-processes/psittacine-circoviral-beak-and-feather-disease

Black, P. F., Murray, J. G., & Nunn, M. J. (2008). Managing animal disease risk in Australia: the impact of climate change. *Rev Sci Tech*, *27*(2), 563-580.

Bowen, M. K., & Chudleigh, F. (2022). Can a return to small ruminants increase profitability and drought resilience in the semiarid rangelands of northern Australia? Animal Production Science, 62(10), 975–982. https://doi.org/10.1071/AN21143

Brooks, A., Curwen, G., & Spencer, J. (2018). A framework for prioritising gully management in the Normanby Basin Cape York. Australian Rivers Institute Griffith University. https://capeyorknrm.com.au/sites/default/files/2018-08/Appendix_2_Gully_Prioritisation_0.pdf

Brooks, A., & Thwaites, R. (2022). Field Guide: Identifying and managing gully erosion in Cape York. capeyorknrm.com.au/sites/default/files/2024-03/220729 Gully Guide FINAL.pdf

Cremona, T., Crowther, M., & Webb, J. K. (2017). High mortality and small population size prevent population recovery of a reintroduced mesopredator. *Animal Conservation*, *20*(6), 555-563.

Czechura, G.V., Hobson, R.G., & Stewart, D.A. (2010). Distribution, status and habitat of the Red Goshawk Erythrotriorchis radiatus in Queensland, *Corella*, 35(1), 3-10.

Department of Agriculture and Water Resources (DAWR). (2016). Aquaculture Farm Biosecurity Plan: Generic guidelines and template, Canberra, https://www.agriculture.gov.au/sites/default/files/sitecollectiondocuments/fisheries/aquaculture/aquaculture-farm-biosecurity-plan.pdf

Department of the Environment, Water, Heritage and the Arts (DEWHA). (2009). Littoral rainforest and coastal vine thickets of eastern Australia: A nationally threatened ecological community. EPBC Act 1999.

Department of the Environment and Energy (DEE). (2019). National recovery plan for the littoral rainforest and coastal vine thickets of eastern Australia ecological community. EPBC Act 1999.

Department of the Environment (DE). (2014). Draft issues paper for sawfish and river sharks: Largetooth sawfish (Pristis pristis), green sawfish (Pristis zijsron), dwarf sawfish (Pristis clavata), speartooth shark (Glyphis glyphis), northern river shark (Glyphis garricki).

Department of the Environment (DE). (2015). Sawfish and river sharks multispecies recovery plan.

Department of Environment and Energy (DEE). (2017). Threat abatement plan for the impacts of marine debris on vertebrate marine life.

Dryden, K. & Doak, K. (2021). Disaster Management Natural Assets Code of Practice, Draft Revision, July 2021, Far North Queensland Regional Organisation of Councils.

Dulvy, N. K., Davidson, L. N. K., Kyne, P. M., Simpfendorfer, C. A., Harrison, L. R., Carlson, J. K., & Fordham, S. V. (2016). Ghosts of the coast: Global extinction risk and conservation of sawfishes. Aquatic Conservation: Marine and Freshwater Ecosystems, 26, 134–153. https://doi.org/10.1002/aqc.2525

Einoder, L. D., Fisher, A., Hill, B. M., Buckley, K., de Laive, A. H., Woinarski, J. C. Z., & Gillespie, G. R. (2023). Long term monitoring reveals the importance of large, long unburnt areas and smaller fires in moderating mammal declines in fire-prone Savanna of northern Australia. *Journal of Applied Ecology*, *60*(10), 2251-2266. https://doi.org/https://doi.org/10.1111/1365-2664.14482.

Food and Agriculture Organisation of the United Nations (FAOUN). (2024). Climate Smart Agriculture Sourcebook: Climate-Smart fisheries and aquaculture. https://www.fao.org/climate-smart-agriculture-sourcebook/production-resources/module-b4-fisheries/chapter-b4-4/en/

Fowler, K., Peel, M., Saft, M., Peterson, T. J., Western, A., Band, L., Petheram, C., Dharmadi, S., Tan, K. S., Zhang, L., Lane, P., Kiem, A., Marshall, L., Griebel, A., Medlyn, B. E., Ryu, D., Bonotto, G., Wasko, C., Ukkola, A., Stephens, C., Frost, A., Gardiya Weligamage, H., Saco, P., Zheng, H., Chiew, F., Daly, E., Walker, G., Vervoort, R. W., Hughes, J., Trotter, L., Neal, B., Cartwright, I., & Nathan, R. (2022). Explaining changes in rainfall-runoff relationships during and after Australia's Millennium Drought: A community perspective. Hydrology and Earth System Sciences, 26, 6073–6120. https://doi.org/10.5194/hess-26-6073-2022

Goodall, K. (n.d.). Caring for cassowaries in post-cyclone times. Queensland Parks and Wildlife Service. https://www.awrc.org.au/uploads/5/8/6/6/5866843/goodall_cassowaries_2012.pdf

Heinsohn, R., Zeriga, T., Murphy, S., Igag, P., Legge, S., & Mack, A. L. (2009). Do palm cockatoos (Probosciger aterrimus) have long enough lifespans to support their low reproductive success? Emu - Austral Ornithology, 109(3), 183–191. https://doi.org/10.1071/MU08053

Henry B, Charmley E, Eckard R, Gaughan J., Hegarty, R (2012) Livestock production in a changing climate: adaptation and mitigation research in Australia. Crop and Pasture Science 63, 191-202.

Hill, B., & Ward, S. (2010). *National recovery plan for the northern quoll - Dasyurus hallucatus*.

Howden, S., Crimp, S., & Stokes, C. (2008). Climate change and Australian livestock systems: impacts, research and policy issues. *Australian journal of experimental agriculture*, *48*(7), 780-788.

HSI. (n.d.). Disastrous decline: Spectacled flying fox nominated as critically endangered. Retrieved from https://hsi.org.au/blog/disastrous-decline-spectacled-flying-fox-nominated-as-critically-endangered/

Islam, M. J., Kunzmann, A., & Slater, M. J. (2022). Responses of aquaculture fish to climate change-induced extreme temperatures: A review. Journal of the World Aquaculture Society, 53(2), 314-366. https://doi.org/https://doi.org/10.1111/jwas.12853

Jackson, M. V., & Straw, P. (Eds.). (2021). Coastal high-tide shorebird habitat management guidelines. figshare. https://doi.org/10.6084/m9.figshare.16628560.v1

James Cook University (JCU). (2024). Back-toback cyclones and flood plume impacts on the Great Barrier Reef. https://www.jcu.edu.au/news/releases/2024/january/back-to-back-cyclones-and-flood-plume-impacts-on-the-great-barrier-reef

Kearney, M., & Porter, W. (2009). Mechanistic niche modelling: Combining physiological and spatial data to predict species' ranges. Ecology Letters, 12, 334–350. https://doi.org/10.1111/j.1461-0248.2008.01277.x

Latch, P. (2007). Recovery plan for the southern cassowary (Casuarius casuarius johnsonii). Queensland Government, City East.

Lear, K. O., Morgan, D. L., Whitty, J. M., Beatty, S. J., & Gleiss, A. C. (2021). Wet season flood magnitude drives resilience to dry season drought of a euryhaline elasmobranch in a dry-land river. Science of the Total Environment, 750, 142234. https://doi.org/10.1016/j.scitotenv.2020.142234

Marchant, S., & Higgins, P. J. (Eds.). (1993). Handbook of Australian, New Zealand and Antarctic birds: Vol. 2. Raptors to lapwings. Oxford University Press.

Mathieson, M. T., & Smith, G. C. (2009). National recovery plan for the buff-breasted button-quail (Turnix olivii). Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Department of Environment and Resource Management, Brisbane.

McKeon, GM, Stone, GS, Syktus, JI, Carter, JO, Flood, NR, Ahrens, DG, Bruget, DN, Chilcott, CR, Cobon, DH, Cowley, RA and Crimp, SJ 2009. Climate change impacts on northern Australian rangeland livestock carrying capacity: a review of issues. The Rangeland Journal 31, 1–29.

Moise, A. (2014). *Regional projections report: Monsoonal North - Draft for consultation 14 April 2014*.

Olkola Aboriginal Corporation. (OAC) (2022). *Draft Golden-shouldered Parrot Recovery Plan*. Cairns: Olkola Aboriginal Corporation

Peck, G., & Jones, G. (2022). *Pasture recovery from flooding*. Retrieved from https://www.publications.qld.gov.au/ckan-publications-attachments-

prod/resources/694a0b72-28e4-4723-9abe-38ecda57f13c/pasture-recovery-flooding.pdf?ETag=83814f694e71c8029888a08f1f458135

Pillans, R. D. (2012). Freshwater sawfish. In K. McDonald, A. Dennis, P. Kyne, & S. Debus (Eds.), Queensland's threatened animals (pp. 472). CSIRO Publishing.

Queensland Government (QG). (n.d.). Climate change in the Far North Queensland region. https://www.qld.gov.au/__data/assets/pdf_file/0025/68371/far-north-qld-climate-change-impact-summary.pdf

Queensland Government (QG). (2021). National recovery plan for the red goshawk (Erythrotriorchis radiatus). Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/erythrotriorchis-radiatus.pdf

Reside, A. E., VanDerWal, J., Garnett, S. T., & Kutt, A. S. (2015). Vulnerability of Australian tropical savanna birds to climate change. Austral Ecology, 41(1), 106–116.

Rolfe, J., English, B., McGrath, T., Larard, A., Archer, R., Taylor, A., . . . Gunther, R. (2014). *$avannahPlan - Beef$ense Progress Report June to December 2014*. Mareeba.

Rolfe, J., Perry, L., Long, P., Frazer, C., Beutel, T., Tincknell, J., & Phelps, D. (2021). GrazingFutures: learnings from a contemporary collaborative extension program in rangeland communities of western Queensland, Australia. *The Rangeland Journal*, *43*(3), 173-183. https://doi.org/https://doi.org/10.1071/RJ20078

Shellberg, J., & Brooks, A. (2012). *Alluvial Gully Erosion: A dominant erosion process across tropical northern Australia*.

Thomas, H., Cameron, S. F., Campbell, H. A., Micheli-Campbell, M. A., Kirke, E. C., Wheatley, R., & Wilson, R. S. (2021). Rocky escarpment versus savanna woodlands: comparing diet and body condition as indicators of habitat quality for the endangered northern quoll (*Dasyurus hallucatus*). *Wildlife Research*, *48*(5), 434-443. https://doi.org/https://doi.org/10.1071/WR20032

Thomas, J. (2020). *The Ecology of an Insular Population of Northern Quoll Dasyurus Hallucatus* Murdoch University].

Thorburn, D., Morgan, D., Gill, H., Johnson, M., Wallace-Smith, H., Vigilante, T., Gorring, A., Croft, I., & Fenton, J. (2004). Biology and cultural significance of the freshwater sawfish (Pristis microdon) in the Fitzroy River Kimberley, Western Australia. Report to Threatened Species Network.

Thornton, P., Nelson, G., Mayberry, D., & Herrero, M. (2021). Increases in extreme heat stress in domesticated livestock species during the twenty-first century. *Global Change Biology*, *27*(22), 5762-5772.

Threatened Species Scientific Committee (TSSC). (2015). Conservation advice for palm cockatoo (Australian) (*Probosciger aterrimus macgillivrayi).*

Threatened Species Scientific Committee (TSSC). (2017). *Conservation Advice: Pteropus conspicillatus (spectacled flying-fox)*. Retrieved from https://environment.gov.au/biodiversity/threatened/species/pubs/185-conservation-advice-22022019.pdf

Tothill, J. C., & Gillies, C. (1992). *The pasture lands of northern Australia: their condition, productivity and sustainability*.

Waltham, N. J., Burrows, D., Butler, B., & Wallace, J. (2014). Water quality and fish refugia in riverine waterholes in northern Queensland potentially subject to irrigation development. Proceedings of the 7th Australian Stream Management Conference, Townsville.

Webster, P., Leseberg, N., Murphy, S., Joseph, L., & Watson, J. (2022). A review of specimens of buff-breasted button-quail (Turnix olivii) suggests serious concern for its conservation outlook. Emu - Austral Ornithology.

Webster, P., Watson, J., Murphy, S., Leseberg, N., & Seaton, R. (2021). Essential research to secure the buff-breasted button-quail (Turnix olivii). NESP Threatened Species Recovery Hub Project 2.6 report. Brisbane.

Whitty, J. M., Morgan, D. L., Peverell, S. C., Thorburn, D. C., & Beatty, S. J. (2009). Ontogenetic depth partitioning by juvenile freshwater sawfish (Pristis microdon: Pristidae) in a riverine environment. Marine and Freshwater Research, 60, 306–316. https://doi.org/10.1071/MF08169

Wood, R., & Storch, K. (1988; 1996). Threatened Species Scientific Committee, Conservation advice for Probosciger aterrimus macgillivrayi.

APPENDIX 1: RISK MATRIX

Likelihood	Consequences				
	Negligible	**Minor**	**Moderate**	**Significant**	**Severe**
Very likely	Moderate	High	Very high	Severe	Severe
Likely	Minor	Moderate	High	Very high	Severe
Possible	Minor	Moderate	High	Very high	Very high
Unlikely	Minor	Moderate	Moderate	High	Very high
Unknown	Minor	Minor	Moderate	High	High

Risk matrix legend / Risk rating

Minor	Moderate	High	Very high	Severe

APPENDIX 2: BIODIVERSITY PROFILES

Buff-breasted button-quail (*Turnix olivii*)

Description
The buff-breasted button-quail is a plump, large, pale-eyed bird with a grey bill and pale yellow legs. The females are slightly larger than the males, measuring 19-22 cm and about 18 cm long respectively. The plumage of the males is grey on the forehead and between the eye and lower part of the bill, with a whitish face and throat. They have fine black freckling against an off-white plumage on the neck and sides of the head.

The fore neck and breast are olive-buff transitioning to off-white at the flanks and undertail coverts. The upper to mid-back has black and rufous-barred panels whereas the lower back, rump and tail are light rufous-brown. The wings are light rufous-brown with white spots and barring. In flight the outer wing tips are grey.

Compared to the males, female buff-breasted button-quails have a darker grey forehead contrasting with paler gray crown and nape of neck. They also have brighter rufous-brown upperparts with fewer dark markings. The sides of the head and neck are not freckled but uniformly dark grey and they have chestnut head stripes. In all other respects the females are similar to the males (Mathieson & Smith 2009).

Location in Cape York Peninsula
The buff-breasted button-quail is endemic to north-eastern Queensland however, there is no known population of this species. Only scattered records exist from the eastern side of the Cape York Peninsula bioregion, the Wet Tropics biogeographic region to the eastern fringe of the Einasleigh Uplands biogeographic region (Mathieson & Smith 2009). Another credible record exists from the Chillagoe area (pers comm R. Hobson).

Habitat
The buff-breasted button-quail occurs in habitats such as open savanna, dominated by *Eucalyptus tertradonta* and *Eucalyptus cullenii* with a high diversity of perennial and annual grasses in an open understory (Webster et al. 2021), stoney and/or grassy woodlands and forests on plains and slopes where Melaleuca species (*M. viridiflora* and *M. minutifolia*) often dominate the mid storey (Mathieson & Smith 2009). These sparsely wooded, well-drained, slight-sloping bases of hills appear critical during the breeding season as nests are made at the base of perennial grass tussocks (Mathieson & Smith 2009, Webster et al., 2021).

Dugong (*Dugong dugon*)

Description
The dugong is a large marine mammal belonging to the order Sirenia, which also includes manatees. They have a robust, torpedo-shaped body with a rounded head and a downturned mouth. Their bodies are covered in smooth, grayish-brown skin, which is sparsely covered with short, bristly hairs.

Dugongs lack hind limbs and have paddle-like flippers at the front of their bodies, which they use for swimming and maneuvering in the water. Adults typically range in length from about 2.5 to 3 meters and can weigh anywhere from 200 to 600 kilograms, with females generally being larger than males.

Dugongs are herbivores, primarily feeding on seagrasses, which make up the bulk of their diet. They use their flexible upper lips to graze on seagrass beds, uprooting the seagrass from the ocean floor and consuming it.

Location in Cape York Peninsula
Dugongs occur in various coastal and nearshore areas around all of the Cape York Peninsula. They may frequent estuarine environments, including river mouths, tidal channels, and mangrove-lined creeks within the Cape York Peninsula.

These habitats provide access to both freshwater and marine environments and support diverse seagrass communities that attract dugongs. Dugongs undertake seasonal migrations along the coastline of the Cape York Peninsula, moving between different feeding areas, breeding grounds, and sheltered habitats.

Habitat
Dugongs are found in warm coastal waters and shallow marine environments throughout the Indo-Pacific region, including the Red Sea, Indian Ocean, and western Pacific Ocean. They prefer areas with shallow, sheltered bays, estuaries, and coastal lagoons that provide access to seagrass habitats, which serve as their primary feeding grounds.

Dugongs are often found close to shore, within a few kilometers of the coastline. These nearshore areas provide access to abundant seagrass beds and also offer potential refuge from predators and human activities.

Eastern Curlew (*Numenius madagascariensis*)

Description
The Eastern Curlew is the largest shorebird that visits Australia, with a very long down-curved bill. The female's bill is usually longer than the male's and averages 185 mm in length. It is a bulky, dark-streaked brown wader, with a long neck and legs.

Location on Cape York Peninsula
The Eastern Curlew is widespread in coastal regions in the northeast and south of Australia

Habitat
The Far Eastern Curlew is found on intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.

Freshwater Sawfish (*Pristis pristis*)

Description
The freshwater sawfish, also known as the large tooth sawfish, has a slender shark-like body, with a flattened head and elongated saw-like rostrum containing evenly spaced teeth along both sides (DE, 2015). The teeth have a groove along its posterior margin and start near the rostral base.

Depending on region and sex, the number of teeth can range between 14 to 24 with males possessing more teeth than females. It has five pairs of gill slits on its ventral surface. The distinct pectoral fins are triangular and the dorsal fins tall and pointed. Usually they have a yellowish to greyish colour dorsally and white colour ventrally. The posterior margin of the fins is a richer yellowish brown (DE, 2014). Based on the region, age and distance inland there can be some variation in colour (Thorburn et al., 2004).

In Australian freshwater environments, individuals of up to 2.80 metres have been recorded and in estuarine environments up to 5.82 metres. Elsewhere the species is reputed to grow to a maximum length of 7 metres (DE, 2014).

Location in Cape York Peninsula
In Cape York Peninsula, their distribution and abundance is patchy and low and is confirmed in rivers draining into Princess Charlotte Bay (Pillans, 2012). They have also been recorded in the fresh and saline water of the Gilbert, Wenlock, Mission, Embley, and Leichhardt Rivers (DE, 2015).

Regular expeditions to the Mitchell River conducted by Sharks And Rays Australia (SARA) has shown that also this river appears to be one of their strongholds on the Cape (Pers. comm. Wueringer, B).

Habitat
The species occurs in the sandy or muddy bottoms of shallow coastal waters, rivers, river mouths and estuarine environments as well as up to 100 kilometres offshore (DE, 2014). They inhabit the upper and central reaches of freshwater rivers and isolated water holes and have been found up to 400 kilometres inland (DE, 2014).

In Australian waters it is generally accepted that the young are born in estuarine environments and at the mouth of rivers from where they migrate to spend the first several years of their life up the river. Individuals reaching maturity, move back out of the rivers and into the marine environment (Thorburn et al. 2004).

Golden-shouldered parrot (*Psephotellus chrysopterygius*)

Description
The male golden-shouldered parrot is a multi-coloured bird. Most of its body is turquoise, but its back is grey-brown and it has a scarlet belly with white scalloping. Its wings are grey-brown with a bright yellow shoulder patch. It has a yellow flush to its turquoise face, and a black crown. Its long tail is greenish-blue.

Females and immature birds are mostly yellowish-green, with a turquoise rump and red markings around the legs.

Location in Cape York Peninsula
Golden-shouldered parrots are found only on Cape York Peninsula, north Queensland Their distribution once covered most of the peninsula. Breeding is currently known from only small areas, in the headwaters of the Morehead and Staaten Rivers and nearby catchments, which are separated by about 140 km. The distribution fragmented following the introduction of the grazing industry to the peninsula.

Habitat
Golden Shouldered Parrot habitat characteristics Ideally are well drained and gravely to retard the germination of fallen seeds, or have been storm-burnt, exposing patches of roasted seeds that cannot germinate.

For nesting, the parrots require ant beds, particularly conical ant beds with an open structure, to enable the parrots to be vigilant of butcherbirds, has a black-faced wood swallow nest, as wood swallows' alarm calls at the approach of predators also assists the parrots. In the dry season, habitat choice appears to be based on the availability of annual grass seed.

Northern Quoll (*Dasyurus hallucatus*)

Description

The northern quoll is a small, carnivorous marsupial found in northern Australia and the smallest of all four of Australia's quoll species. Males typically weigh between 600 to 1,200 grams, while females are smaller, weighing between 300 to 600 grams. They have a compact body with short legs. Their fur is typically reddish-brown to grey with prominent white spots on their back and sides. Their underbelly is lighter, often white or cream-coloured. They have a pointed snout and large, rounded ears. Their eyes are adapted for nocturnal vision. The tail is bushy and tapers towards the end.

Northern quolls are omnivorous and opportunistic feeders. Their diet includes insects, small mammals, birds, reptiles, and fruit. They are known to scavenge, and their diet can vary seasonally based on availability. Breeding season occurs from May to July, but depends on the location. After a short gestation period of around 21 days, females give birth to up to 8 young. The young initially stay in the mother's pouch and later in a den until they are mature enough to fend for themselves.

Females typically have a lifespan of 2-3 years, whereas males usually die after their first breeding season, so called “male die-off”. This phenomenon is due to the intense and exhaustive mating activities males engage in. During mating, male quolls extensively roam to find mates and compete with other males. They sacrifice sleep and foraging to maximize their mating opportunities.

Location in Cape York Peninsula

On the Cape York Peninsula, Northern quolls were formerly widespread and common, offering diverse landscapes and ecosystems that are critical to their survival. However, following cane toad invasion in 1980s, the quoll was thought to have become extinct in the region until recently, when Northern quolls were found in key locations such as the Iron Range National Park (Kutini-Payamu National Park), McIlwraith Range, around Weipa and the Cooktown area.

Habitat

Northern quolls inhabit a variety of environments such as rocky outcrops, eucalyptus woodlands, and open forests. They are often found in areas with dense ground cover and rocky shelters which provide protection and nesting sites. Riparian zones offer both water and prey, making them attractive habitats for quolls.

Palm Cockatoo (*Probosciger aterrimus macgillivrayi*)

Description

The palm cockatoo (Australian) is a large cockatoo with a massive, curved dark grey bill and a long erectile crest (Pizzey & Knight, 1997; Higgins, 1999). Adults are entirely slate-black in colour except for a bright-red facial patch which flushes a deep scarlet when alarmed or excited (Pizzey & Knight, 1997; Higgins, 1999).

Juveniles are similar to adults in colouration; however, they have pale yellow scallop-like markings on the under-body and underwing coverts, a paler grey bill and paler pink facial patch (Pizzey & Knight, 1997; Higgins, 1999).

Location in Cape York Peninsula
Palm cockatoos (Australian) are conventionally accepted as a distinct subspecies distributed across the north of Cape York Peninsula, Queensland, from north of Pormpuraaw on the west coast to Saltwater Creek, Princess Charlotte Bay on the east coast (Storch, 1996; Higgins, 1999). The palm cockatoo (Australian) is the only subspecies of the palm cockatoo found on mainland Australia (Garnett et al., 2011).

Habitat
The palm cockatoo (Australian) inhabits closed forest and riparian systems, and open woodlands adjacent to these habitats. The subspecies attains the highest densities in open woodlands adjacent to Corymbia and Eucalytpus dominated forest and has significantly lower densities in the closed forests themselves (Murphy, 2006).

Individuals and small flocks feed in closed forests and littoral systems during the middle of the day, mostly on the hard seeds of fibrous and woody fruits of woodland, littoral and closed forest species, taken from the canopy and the ground (Wood, 1988; Storch, 1996).

Marine Turtles: Green Turtle (*Chelonia mydas*), Olive Ridley Turtle (*Lepidochelys olivacea*), Hawksbill Turtle (*Eretmochelys imbricata*) and Flatback Turtle (*Natator depressus*)

Description
Marine turtles are reptiles that have a streamlined, hard shell that acts as a protective covering for their body. The shell consists of two main parts: the carapace (upper shell) and the plastron (lower shell). They have paddle-like limbs called flippers, which they use for propulsion while swimming. Marine turtles have a sharp, pointed beak, which is adapted for grasping and tearing food.

The size of marine turtles varies depending on the species and they feed on a variety of marine plants, algae, jellyfish, and invertebrates. They have a long life cycle, with individuals reaching sexual maturity after several years. Female marine turtles come ashore to nest, digging nests in the sand where they lay their eggs. Eggs incubate in the nest for several weeks before hatchlings emerge and make their way to the ocean. Marine turtles exhibit a remarkable behavior known as natal homing, where they return to the same beach where they were born to lay their eggs.

Location in Cape York Peninsula
The Cape York region is an important habitat for several species of marine turtles. Key locations where these turtles are found include various coastal areas, beaches, and islands, which provide critical nesting and foraging grounds. The east coast of the Cape York Peninsula and the adjacent off-shore island beaches are known to support some of the highest-density nesting populations of the green and hawksbill turtles worldwide.
Raine Island for example, located in the northern Great Barrier Reef World Heritage region, is home to the largest rookery of green turtles globally and Milman Island hosts a significantly large rookery of hawksbill turtles. While the east coast of Cape York Peninsula is the primary nesting populations of hawksbill and green turtles, both species are occasionally found nesting on the west coast.

In addition, the west coast of Cape York Peninsula is home to Queensland's largest nesting population of flatback turtles. These turtles are endemic to Australia and nest primarily on Australian beaches. In addition, the west coast of Cape York provides important nesting habitat for Queensland's only nesting population of the olive ridley turtle.

Habitat
Marine turtles are highly migratory, utilising widely dispersed (terrestrial and marine) habitats throughout their life cycle. They are commonly found in coastal waters, including bays, estuaries, and lagoons, where they forage for food such as seagrass, algae and invertebrates. Coral reefs are vital habitats for marine turtles, providing food resources and shelter.

Turtles, particularly hawksbill turtles, feed on sponges, algae, and other invertebrates found on coral reefs while seagrass beds are essential feeding grounds for green turtles. In addition, seagrass beds provide shelter, foraging opportunities, and nursery grounds for juvenile turtles.

Marine turtles are also highly adapted to life in the open ocean and can travel long distances across oceanic expanses during migrations between feeding and nesting grounds. Some species, like loggerhead and leatherback turtles, spend much of their time in the open ocean, foraging on jellyfish and other pelagic prey.

During nesting, marine turtles return to specific nesting beaches to lay their eggs. These beaches are typically sandy and located in tropical or subtropical regions.

Red Goshawk (*Erythtotriorchis radiatus*)

Description
The red goshawk is a large, swift and powerful rufous-brown hawk. It is one of the most sexually dimorphic raptors in the world (Baker-Gabb 1984), with females (1100 g) nearly twice as heavy as males (630 g). Adult male and juvenile red goshawks have rich rufous underparts, whereas adult females are much paler and heavily streaked below. Adults with their grey, darkly-streaked heads can be distinguished in the field from juveniles which have rufous heads.

Location in Cape York Peninsula
Distribution is patchy and its population is small, it has been recorded in various locations across the Cape York Peninsula. Sightings and surveys have identified the presence of Red Goshawks in both coastal and inland areas of the peninsula.

Habitat
Nesting habitat is a subset of foraging habitat, mature trees for both the substantial nests the birds construct and foraging advantages where prey is concentrated. In flat to rolling country where there may be few breaks in the tree canopy, nest trees are sometimes selected alongside roadways or other clearings, but still within 1 km of permanent water.

Southern Cassowary (*Casuarius casuaruis johnsonii*) northern population

Description
Cassowaries belong to the ratite group of large flightless land birds. Of the three species, only the southern cassowary, *Casuarius casuarius johnsonii*, is found in Australia. It is the largest native vertebrate in Australian rainforests. Adults grow to two metres tall with males up to 55 kg and females, usually larger, up to 76 kg (Westcott and Reid 2002, QPWS unpub. data).

Newly hatched chicks are striped dark brown and creamy white. After three to six months the stripes fade and the plumage changes to brown. As the young mature the plumage darkens, the wattles and casque develop and the skin colour on the neck and wattles brighten.

Location in Cape York Peninsula
Cassowaries on Cape York Peninsula historically extended from just west of the tip of the Cape (at the mouth of the Jardine River) and down the east coast to at least as far south as Massey River (Thomson 1935) and probably further south into the Princess Charlotte Bay area (QPWS 2003).

Cassowaries are known today from all historical sites with the exception of those in the far north. Cassowaries are suspected to have disappeared from the Lockerbie Scrub near Bamaga, as there have been no sightings since 1986 (QPWS 2003).

Cassowaries on Cape York occur as two disjunct populations: a southern population centered on the vine forests of the MacIlwraith and Iron Ranges and a northern population centred on the much less extensive vine forests north of Shelburne Bay.

Habitat
In Cape York, 98 per cent of all cassowary records that could be confidently associated with a habitat type were from seven vine forest types (after Neldner and Clarkson 1995). The majority of records are from mesophyll forest types (43 per cent) and notophyll vine-forest (24 per cent).

The extent of vine forest on Cape York in which cassowaries have been recorded is 488,547ha (QPWS 2003).

Spectacled Flying Fox (*Pteropus conspicillatus*)

Environmental Protection and Biodiversity Conservation Act (1999) status - Listed as Endangered (Date effective 22-Feb-2019)
International Union for Conservation of Nature (IUCN) status- (Global Status: IUCN Red List of Threatened Species: 2023.1 list
Nature Conservation Act 1992 status - Not listed
International Obligations - The spectacled flying fox is listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Populations of the spectacled flying fox are recognised as values of the Wet Tropics of Queensland World Heritage Area, a World Heritage property under the Convention.

Description
At a distance in dull conditions, the Spectacled Flying Fox can be confused with sympatric species, such as the little red flying fox *Pteropus scapulatus*. However, at close range, the spectacled flying fox can readily be identified by the rings of pale yellow fur ('spectacles') around the eyes (Churchill 1998; Hall and Richards 2000).

In individuals that have indistinct markings around the eyes, the species can be identified by the diagnostic pale yellow patch of fur on the upper back, shoulders and hind-neck. Their head and body length ranges between 220 to 240 mm and weight is from 580-860 g for males and 500-650 g for females.

According to data from the Atherton Tablelands, peak births occur between October and December when individuals have formed into large maternity camps, and lactation occurs through to approximately February or March (J. Maclean, Tolga Bat Hospital, pers. comm.). Females generally give birth to one pup per year with 89% of three to seven year old females reproducing in each year (Fox et al. 2008).

Location in Cape York Peninsula
The location of camps on Cape York Peninsula is poorly known and it is likely that a number of camps have been overlooked in past research(G. Richards, consultant, pers. comm.). There are few confirmed records of this species from the islands of the Torres Strait and no camps have been located (G. Richards, consultant, pers comm.; L. Hall, retired UQ, pers comm).

Cape York NRM is currently undertaking a survey and monitoring program to confirm the location of camps in Cape York, our coalition of prior research suggests camps could be present in Iron Ranges, Mcilwraith Ranges, Cape Melville, Noah and Wujul Wujul areas.

Habitat
The spectacled flying fox requires a continuous temporal sequence of productive foraging habitats and suitable roosting habitat (Westcott et al. 2001). Additionally, the species may require migration corridors/stopover habitats if individuals regularly move between New Guinea and Australia or between Cape York Peninsula and the Wet Tropics.

Littoral Rainforest & Coastal Vine Thickets of Eastern Australia

Littoral Rainforest provides habitat for a number of flora and fauna species listed as threatened under the IUCN Red List of Threatened Species.

Description and Habitat
The Littoral Rainforest & Coastal Vine Thickets of Eastern Australia is an ecological community of which its appearance and plant species composition can vary greatly depending on the location. The vegetation generally has a closed, though sometimes patchy, canopy of 1-25m high and is structurally diverse with shrubs, native trees, sparse ground layers and vines all potentially being present.
The community can occur on sand, coral rubble, basalt soils and on rocky headlands within two kilometres of the coast, a large body of salt water or an estuary and it shows evidence of maritime processes. This is often most visible in the leading edge section closest to the sea, where the community is exposed to salt-laden winds and different vegetation layers demonstrate a height continuum.

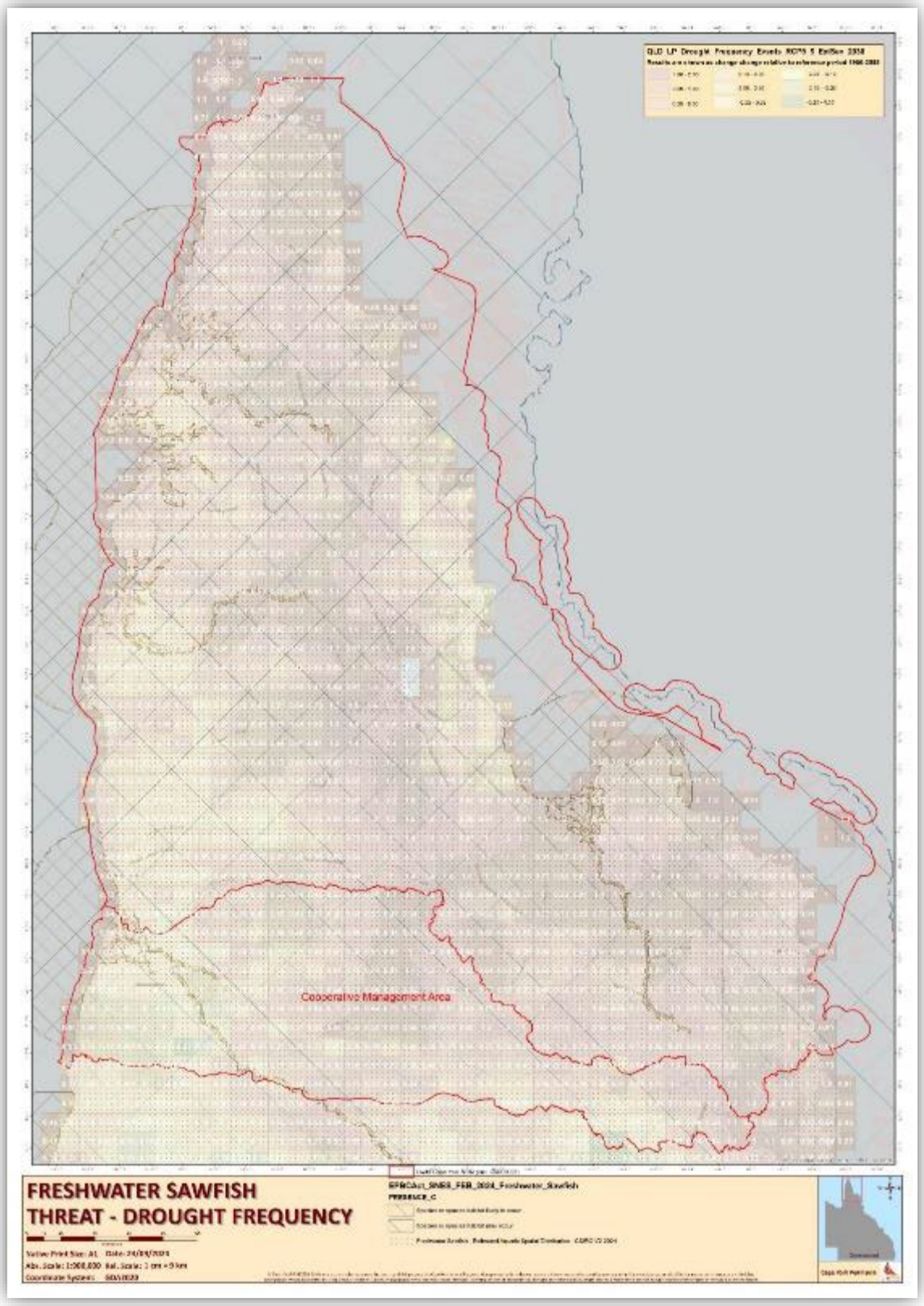
Compared to more inland rainforest types, the littoral rainforest hosts plants with drought tolerant and succulent features and the canopy stem sizes tend to be smaller (DEWHA, 2009; DEE, 2019).

Location in Cape York Peninsula
On Cape York, the Littoral Rainforest & Coastal Vine Thickets of Eastern Australia occur from Princess Charlotte Bay southwards to the Wet Tropics. It typically occurs within two kilometres of the east coast or on offshore Islands.

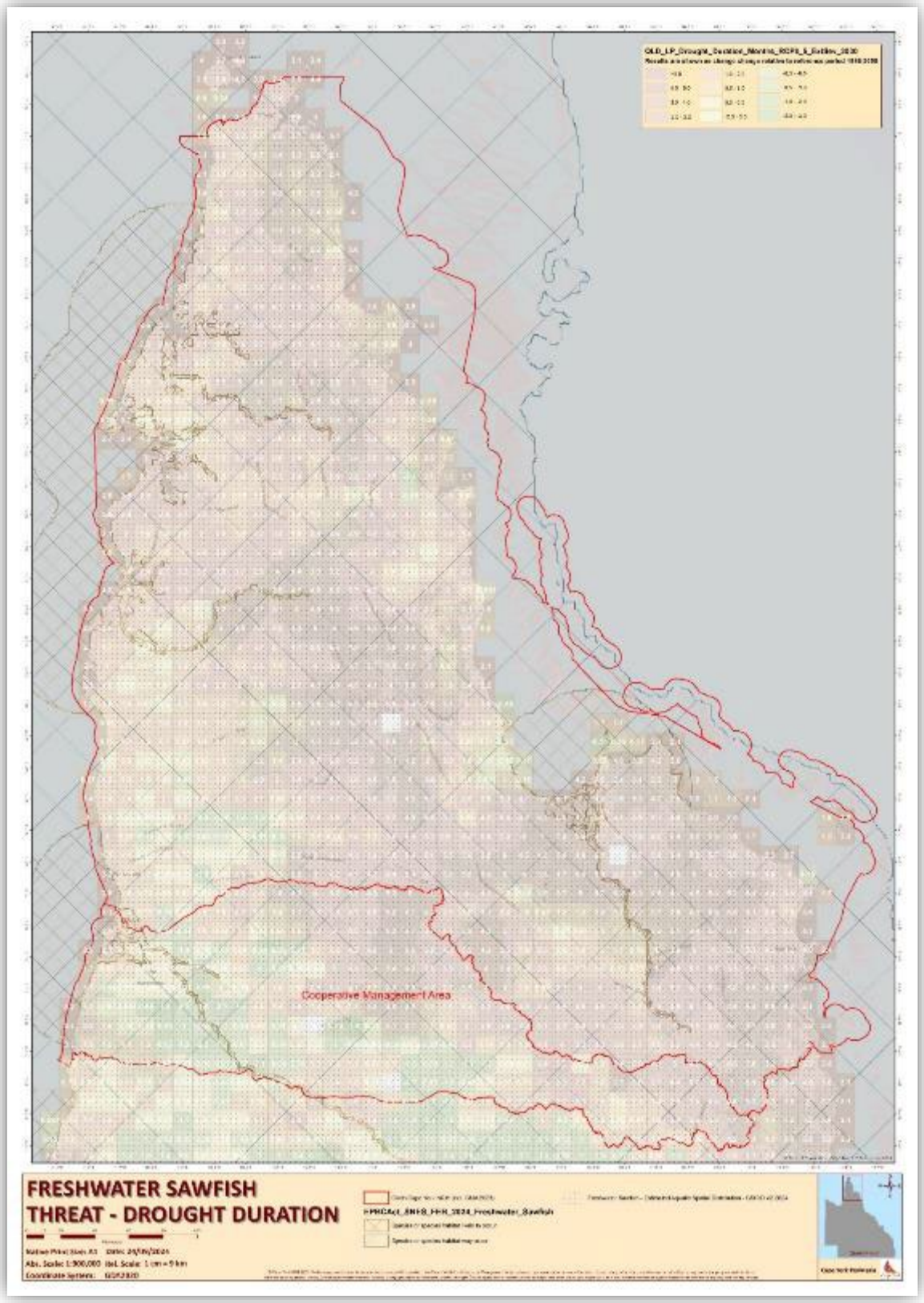
This ecological community can be present in warm temperate, sub-tropical and tropical climate zones (DEWHA, 2009).

APPENDIX 3: BIODIVERSITY ASSET AND THREAT SPATIAL MAPPING

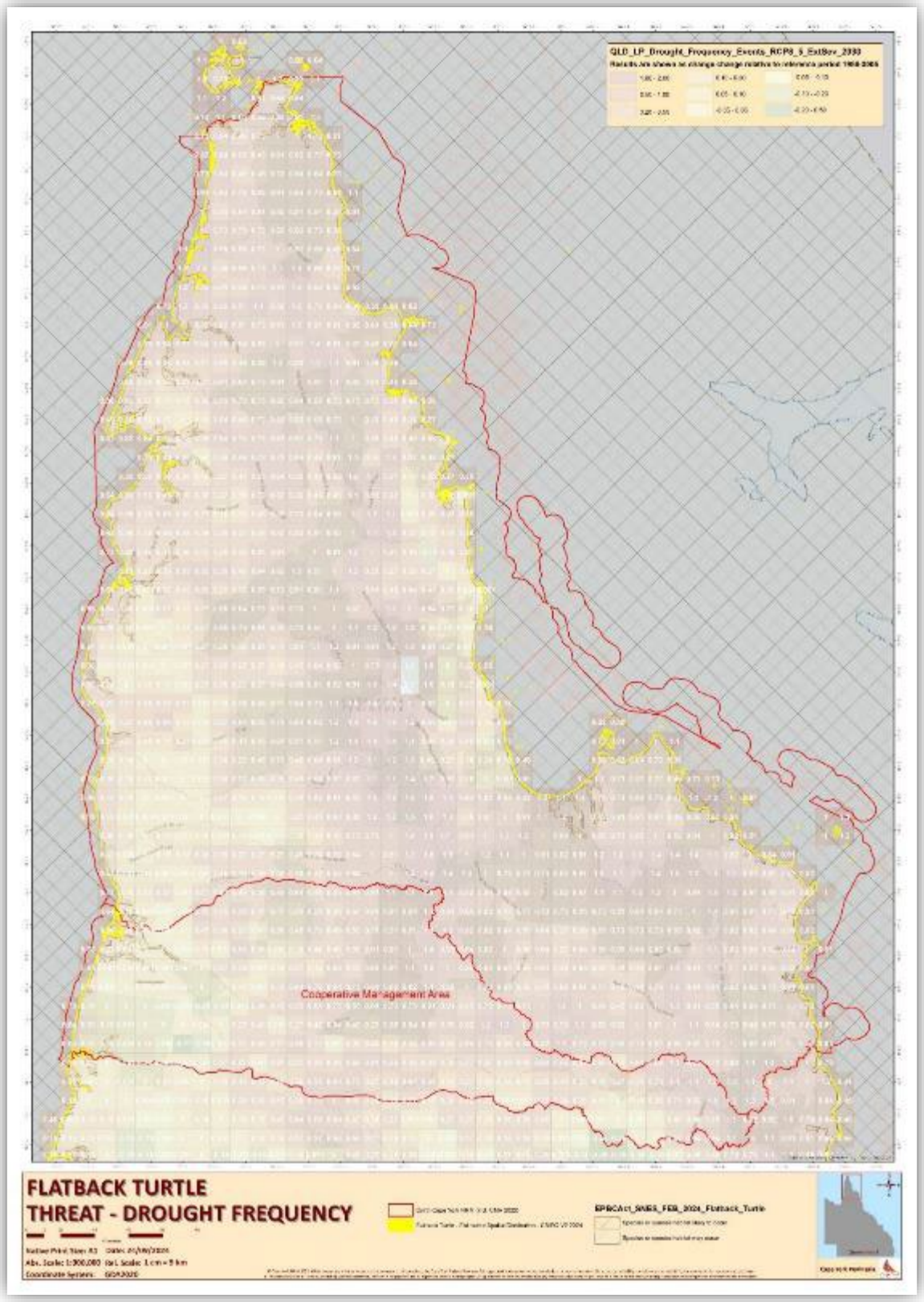
Map 3 - Freshwater sawfish: Drought Duration



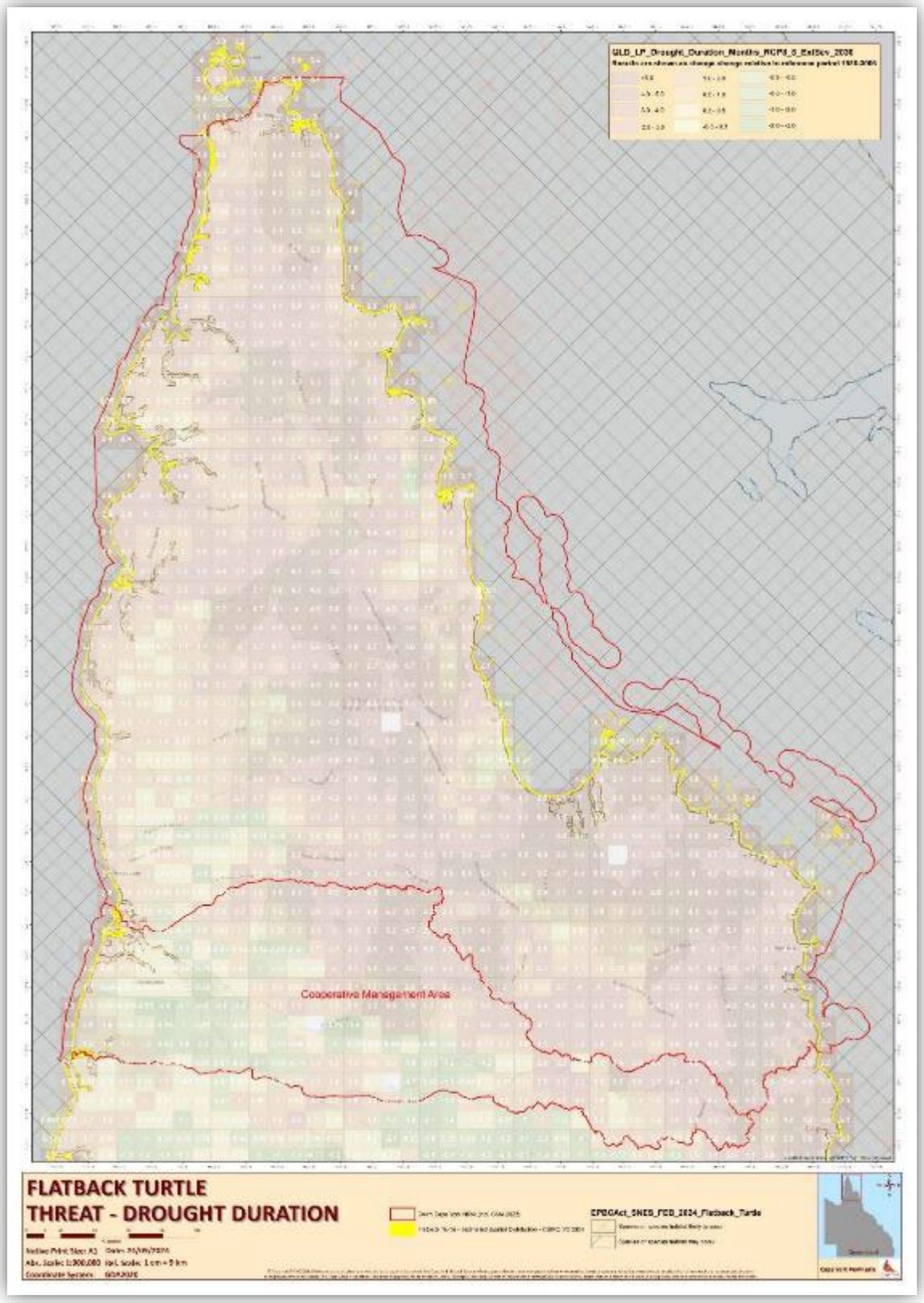
Map 4 - Freshwater sawfish: Drought Duration



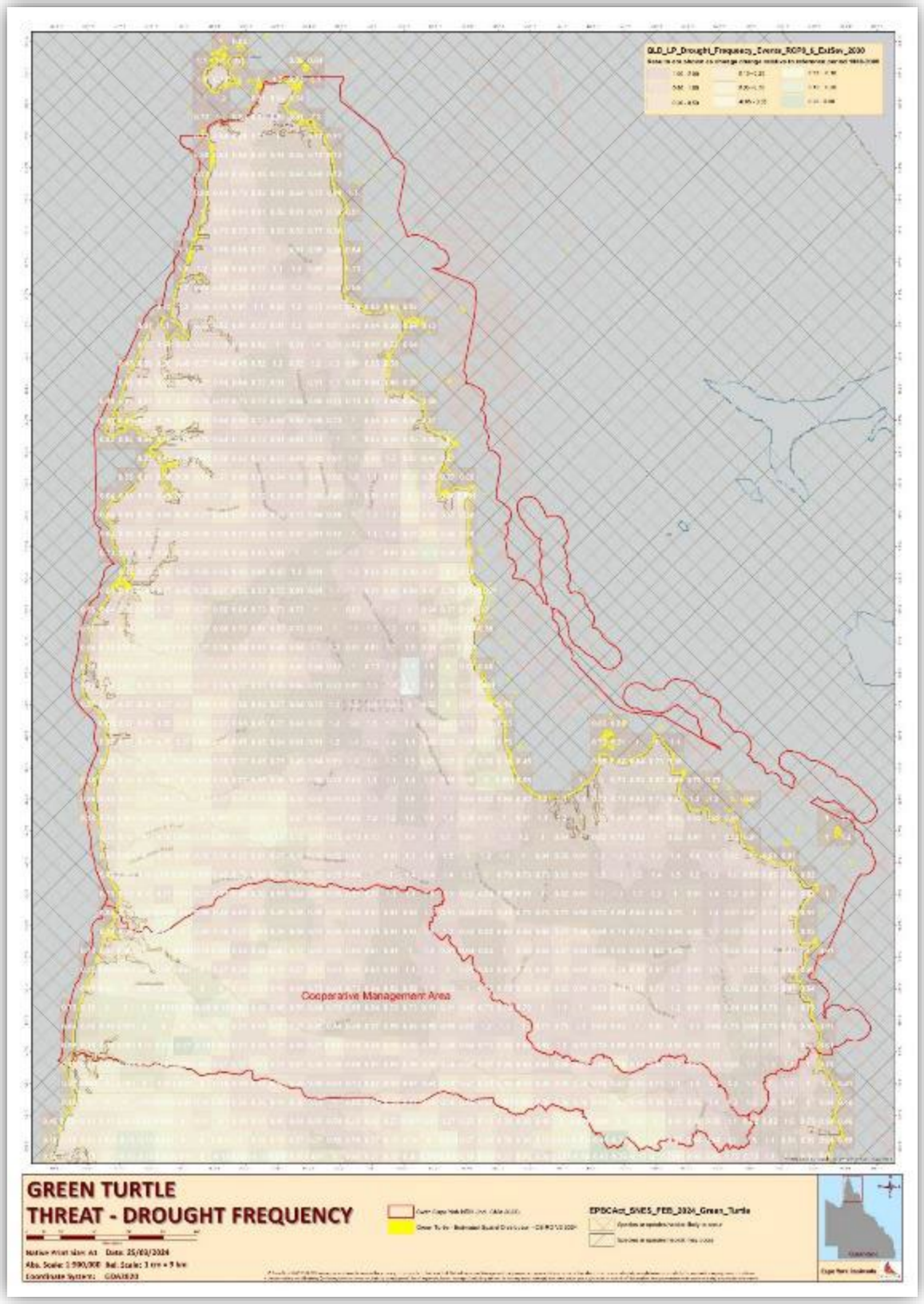
Map 5 - Flatback Turtle: Drought Frequency



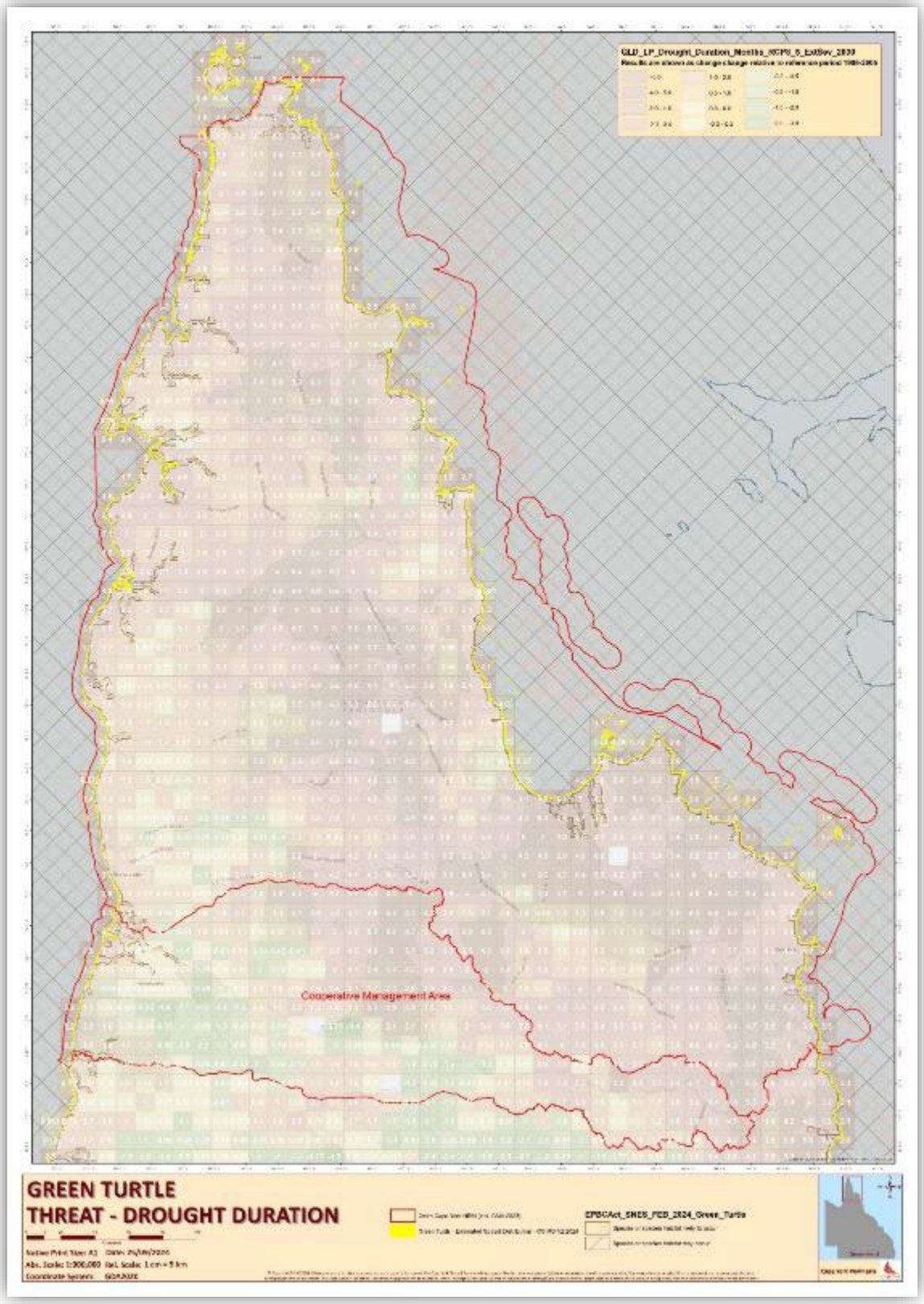
Map 6 - Flatback Turtle: Drought Duration



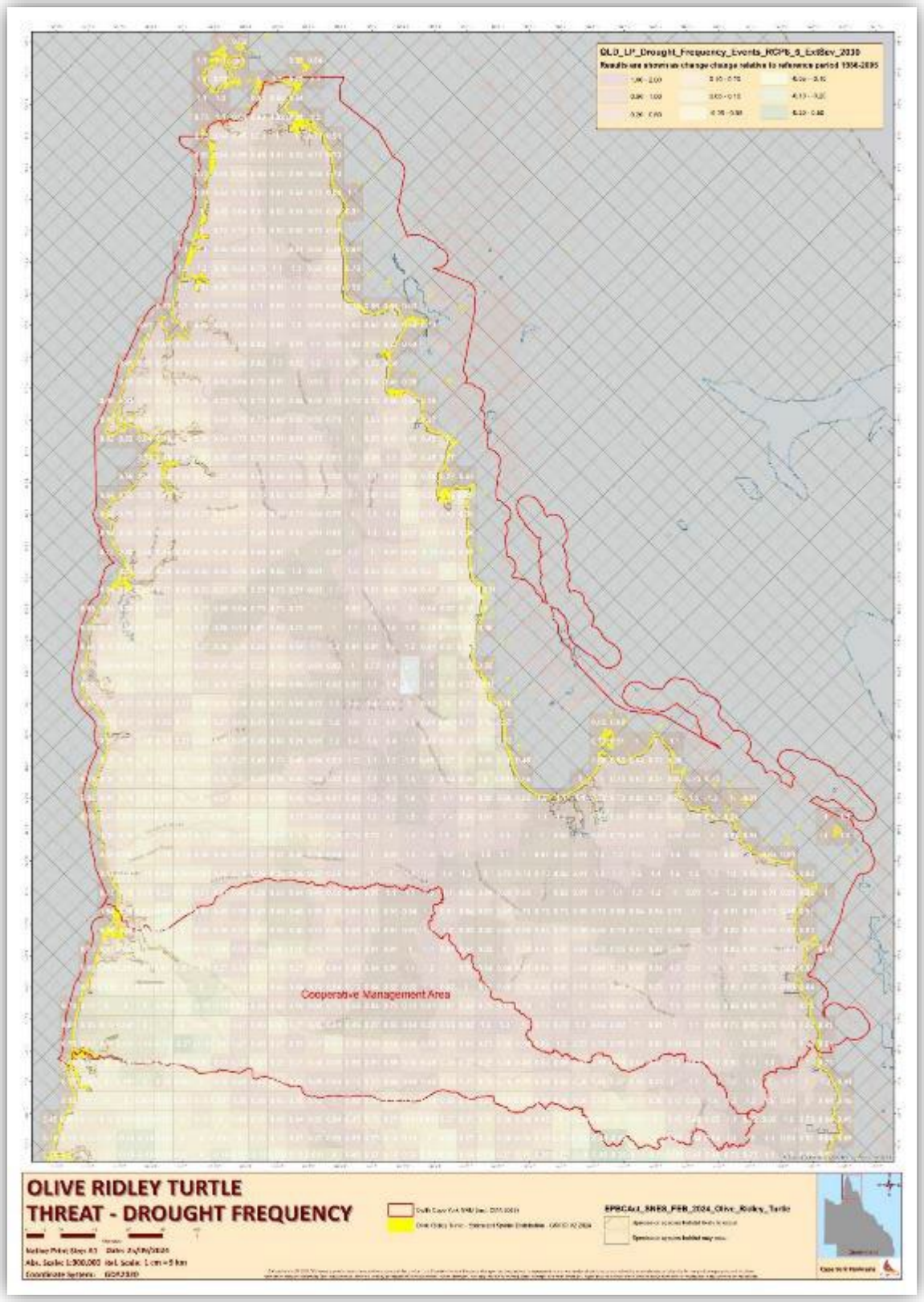
Map 7 - Green Turtle: Drought Frequency



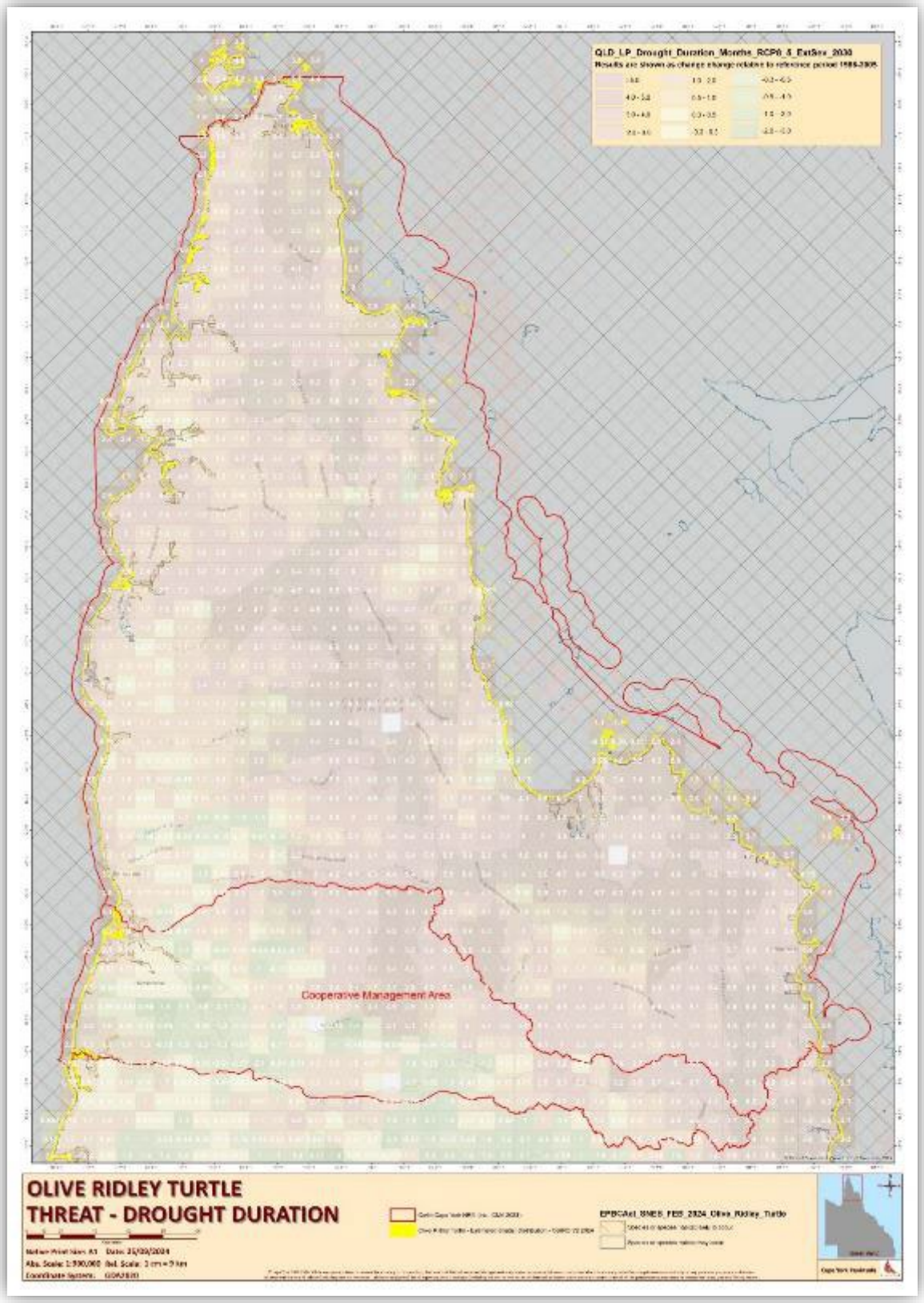
Map 8 - Green Turtle: Drought Duration



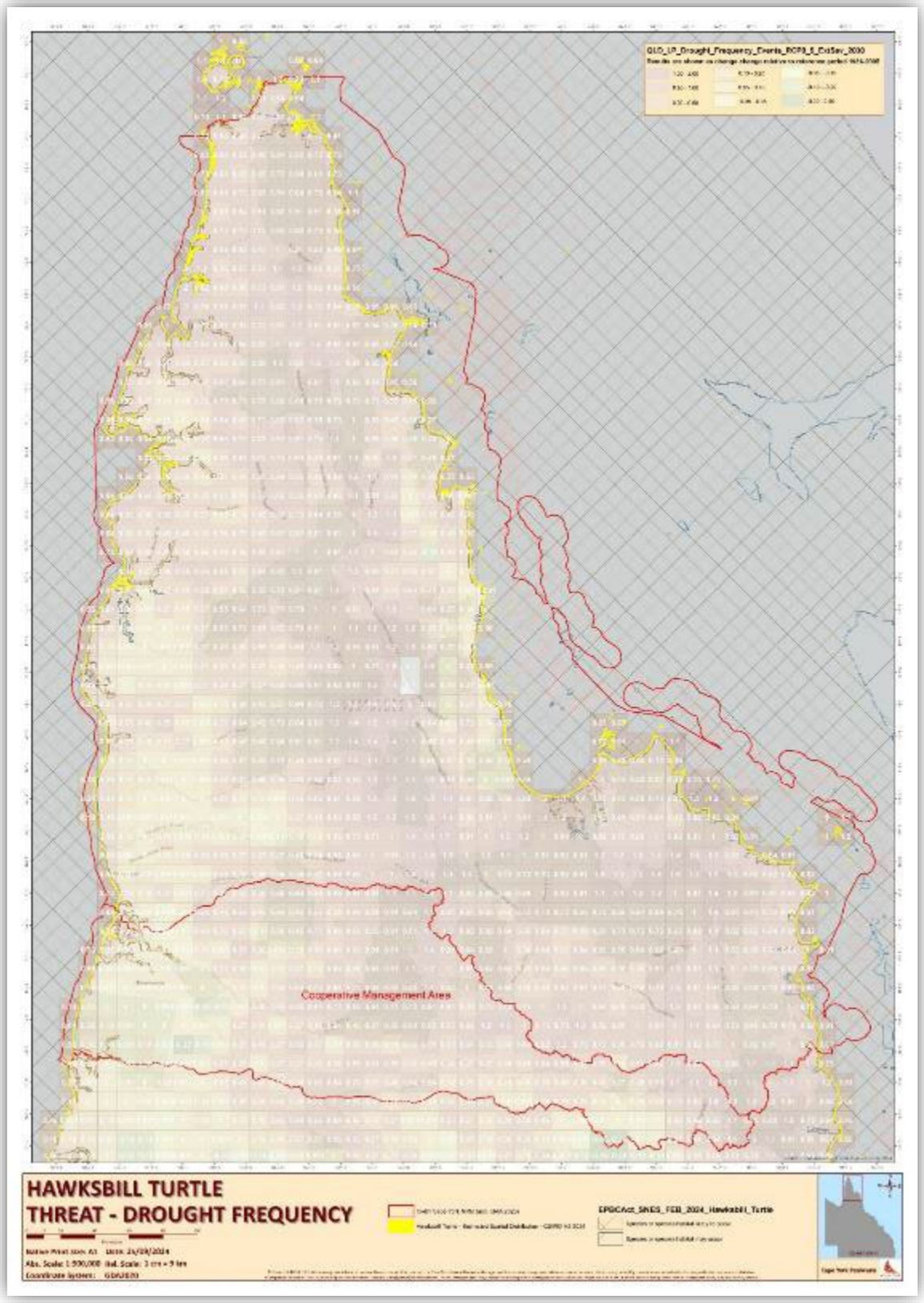
Map 9 - Olive Ridley Turtle: Drought Frequency



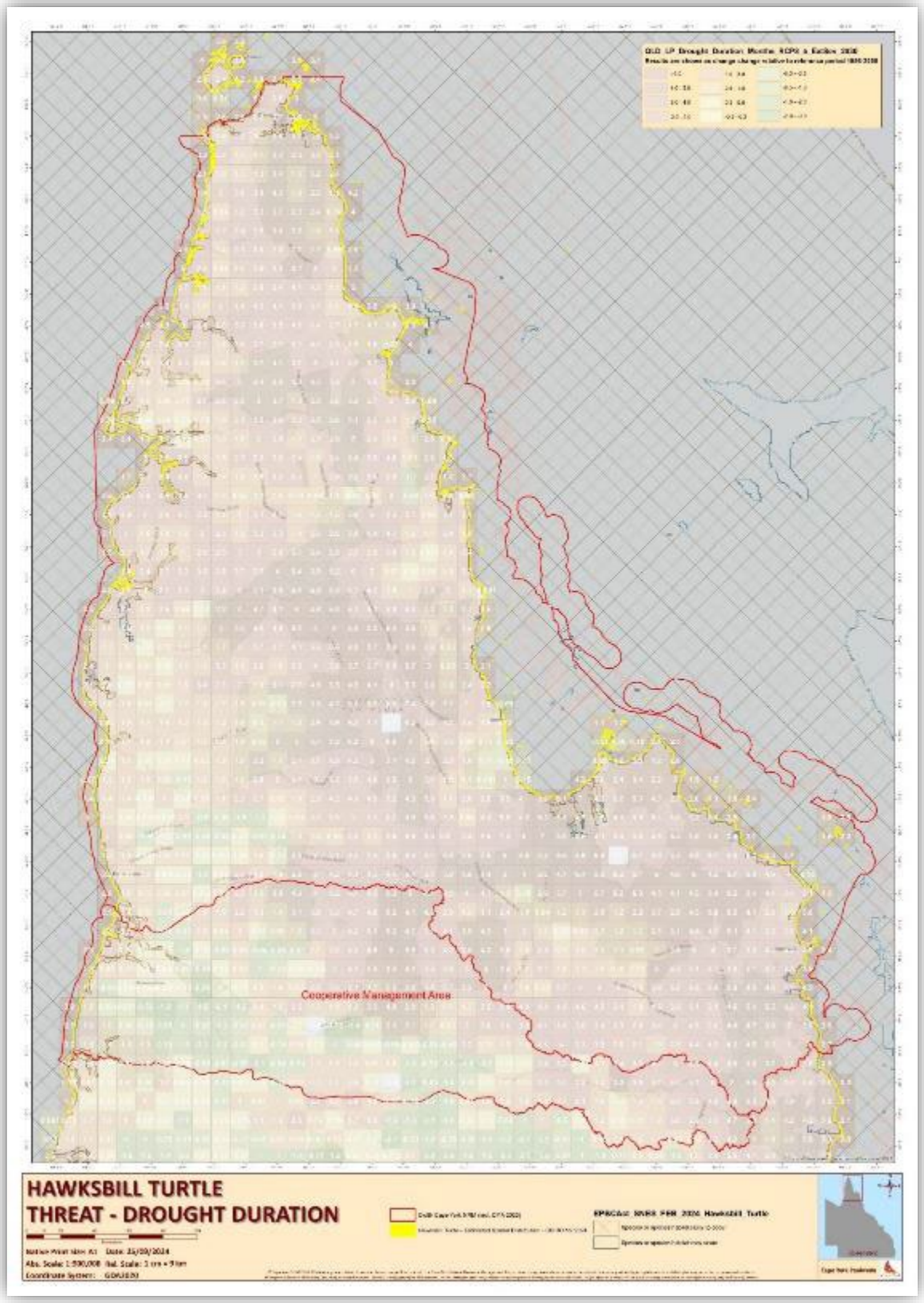
Map 10 - Olive Ridley Turtle: Drought Duration



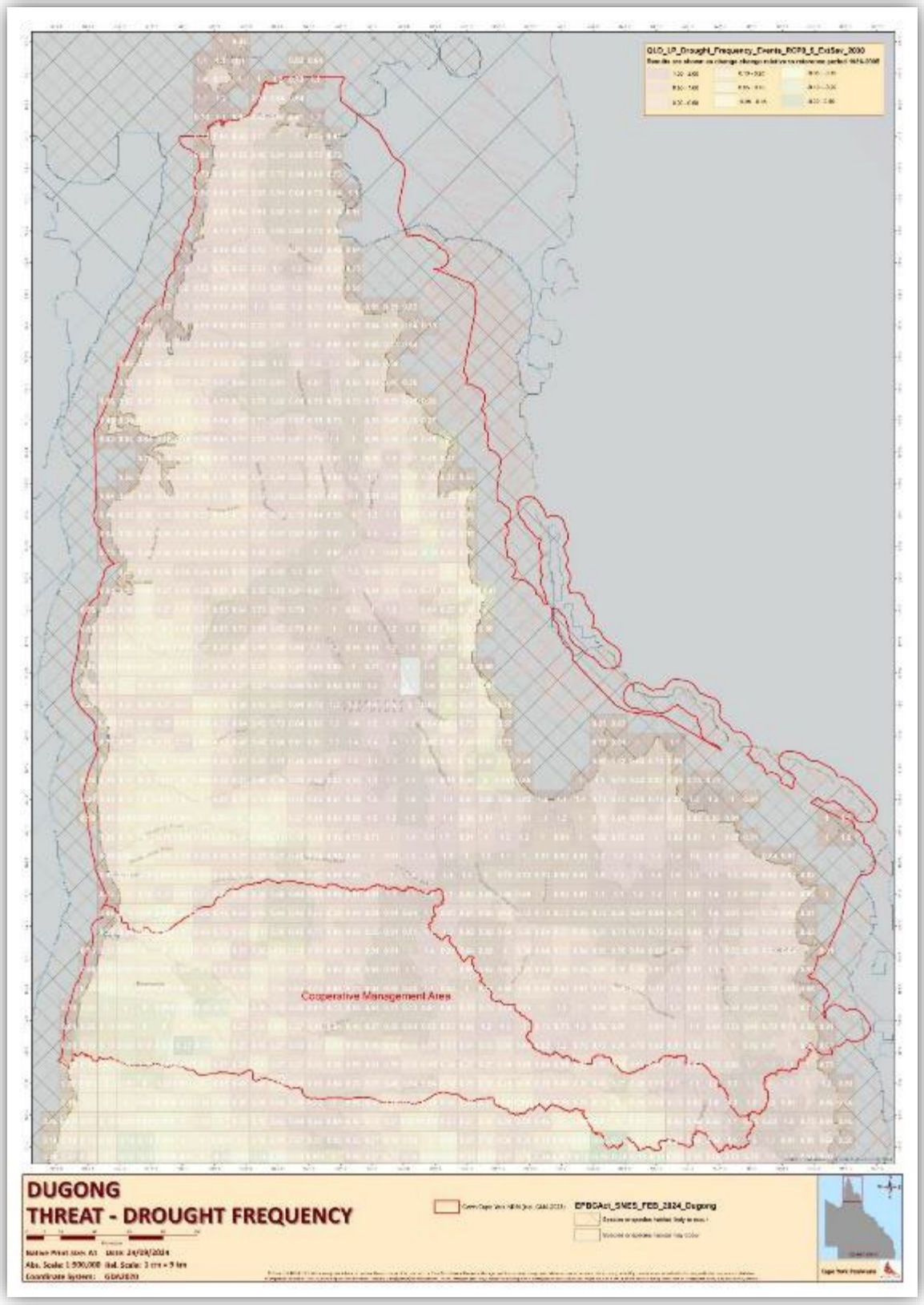
Map 11 - Hawksbill Turtle: Drought Frequency



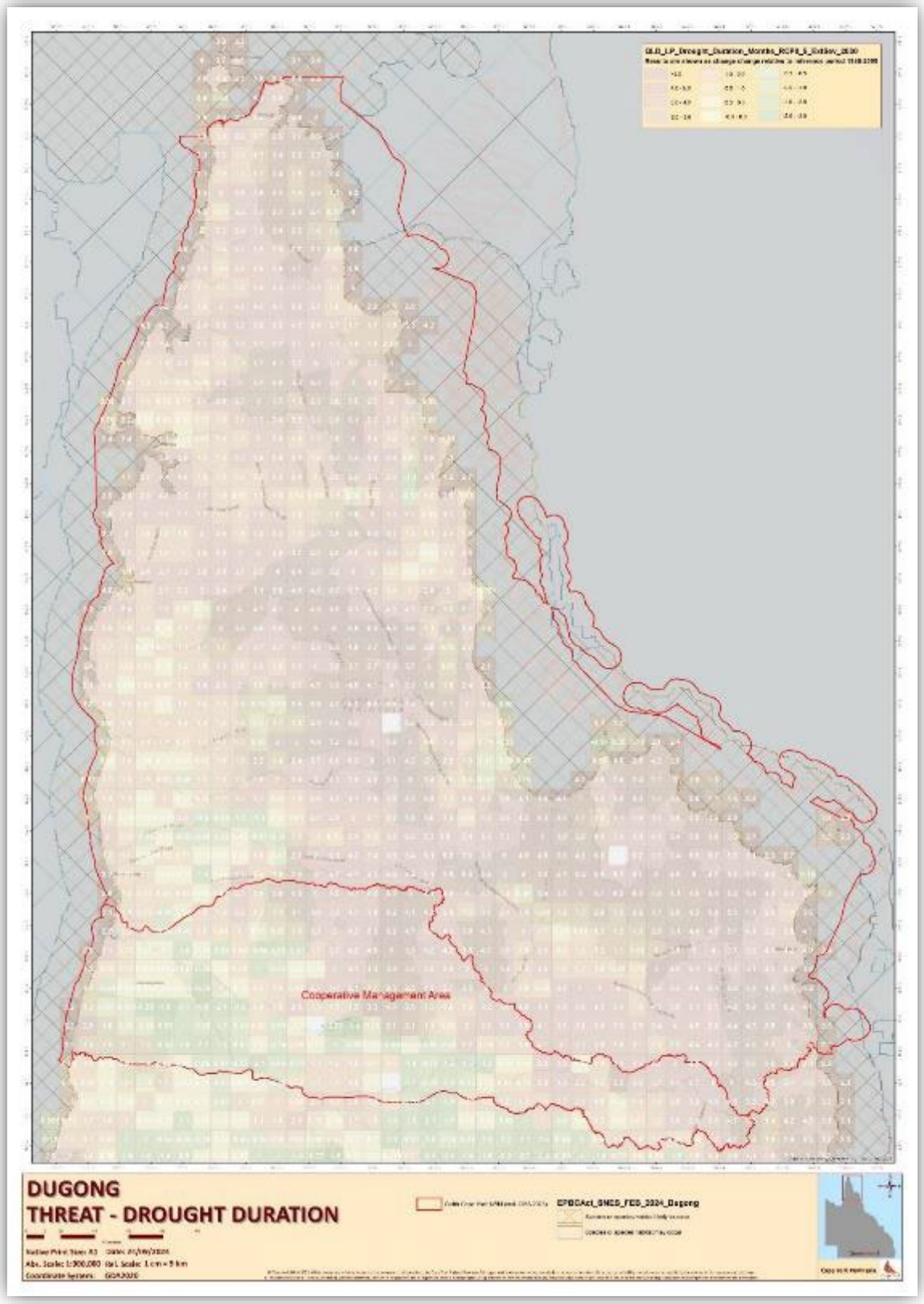
Map 12 - Hawksbill Turtle: Drought Duration



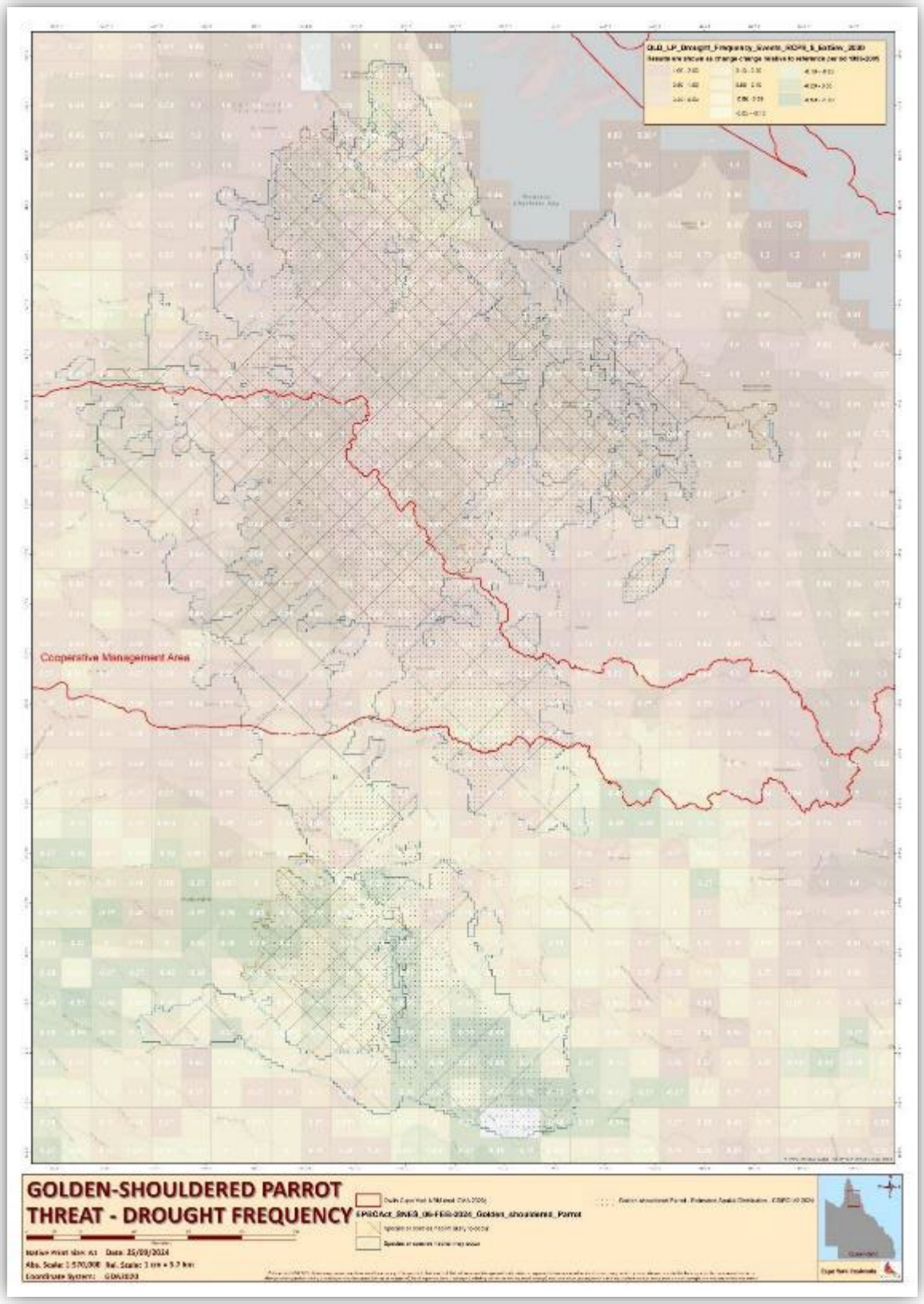
Map 13 - Dugong: Drought Frequency



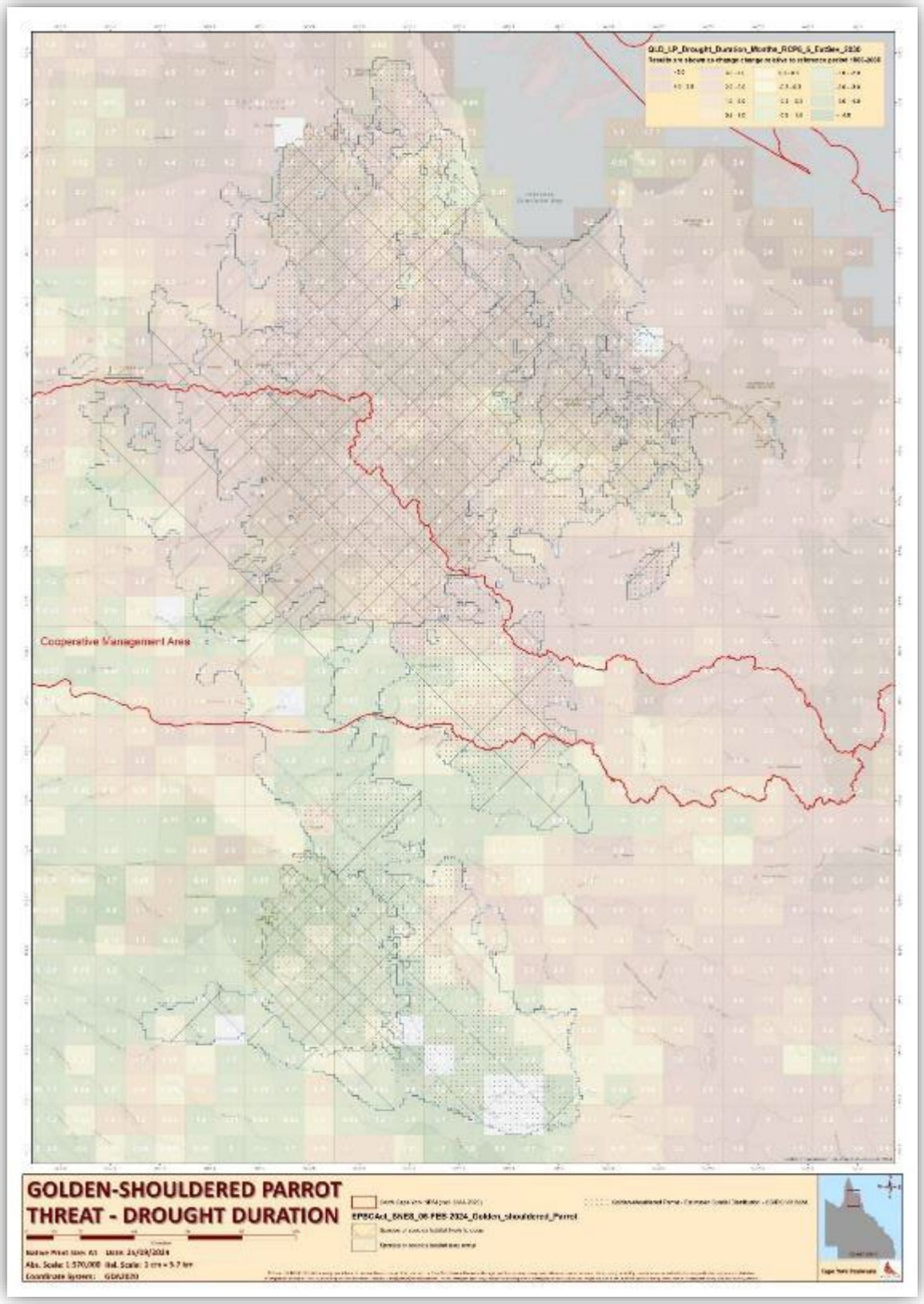
Map 14 - Dugong: Drought Duration



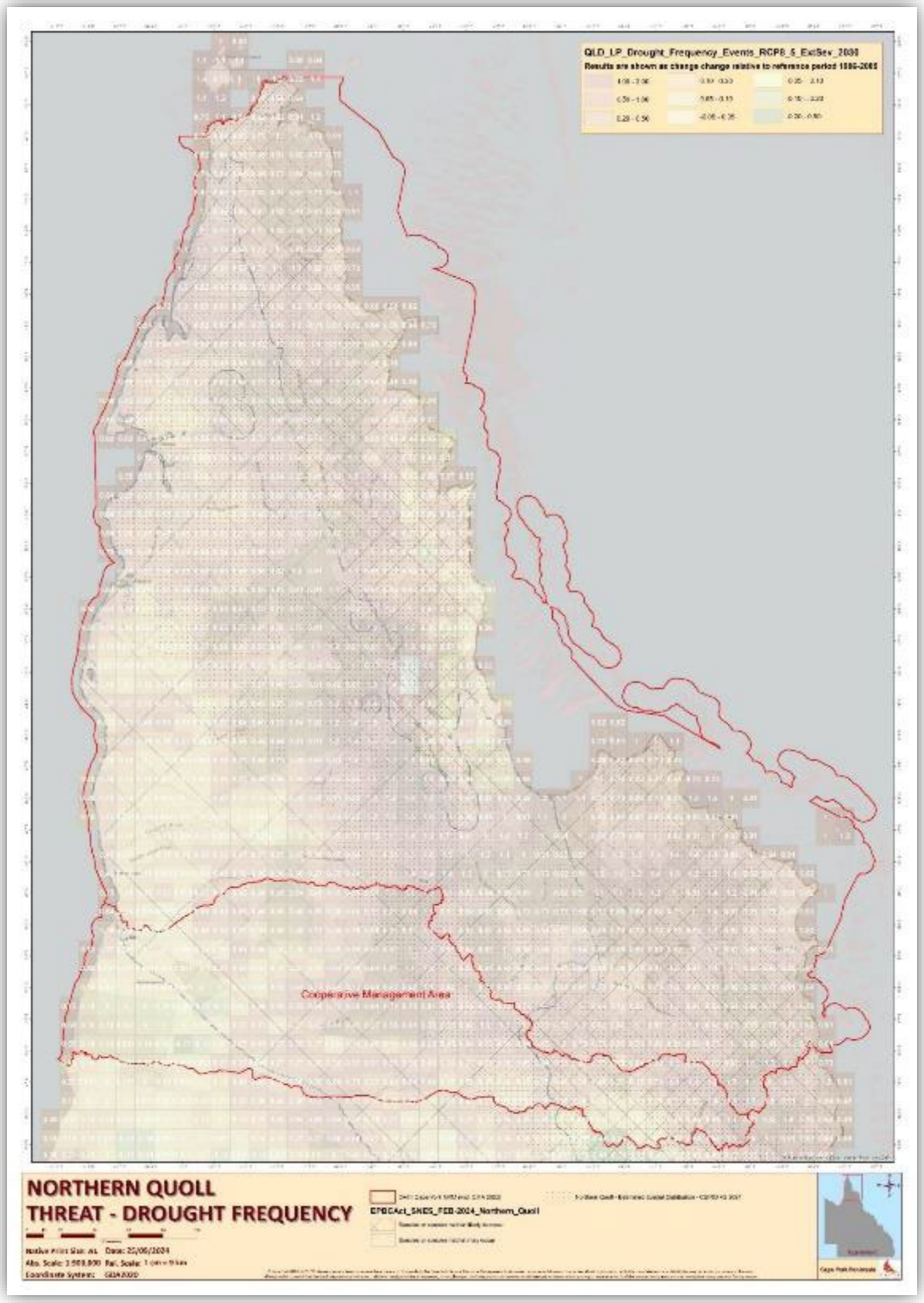
Map 15 - Golden-shouldered parrot: Drought Frequency



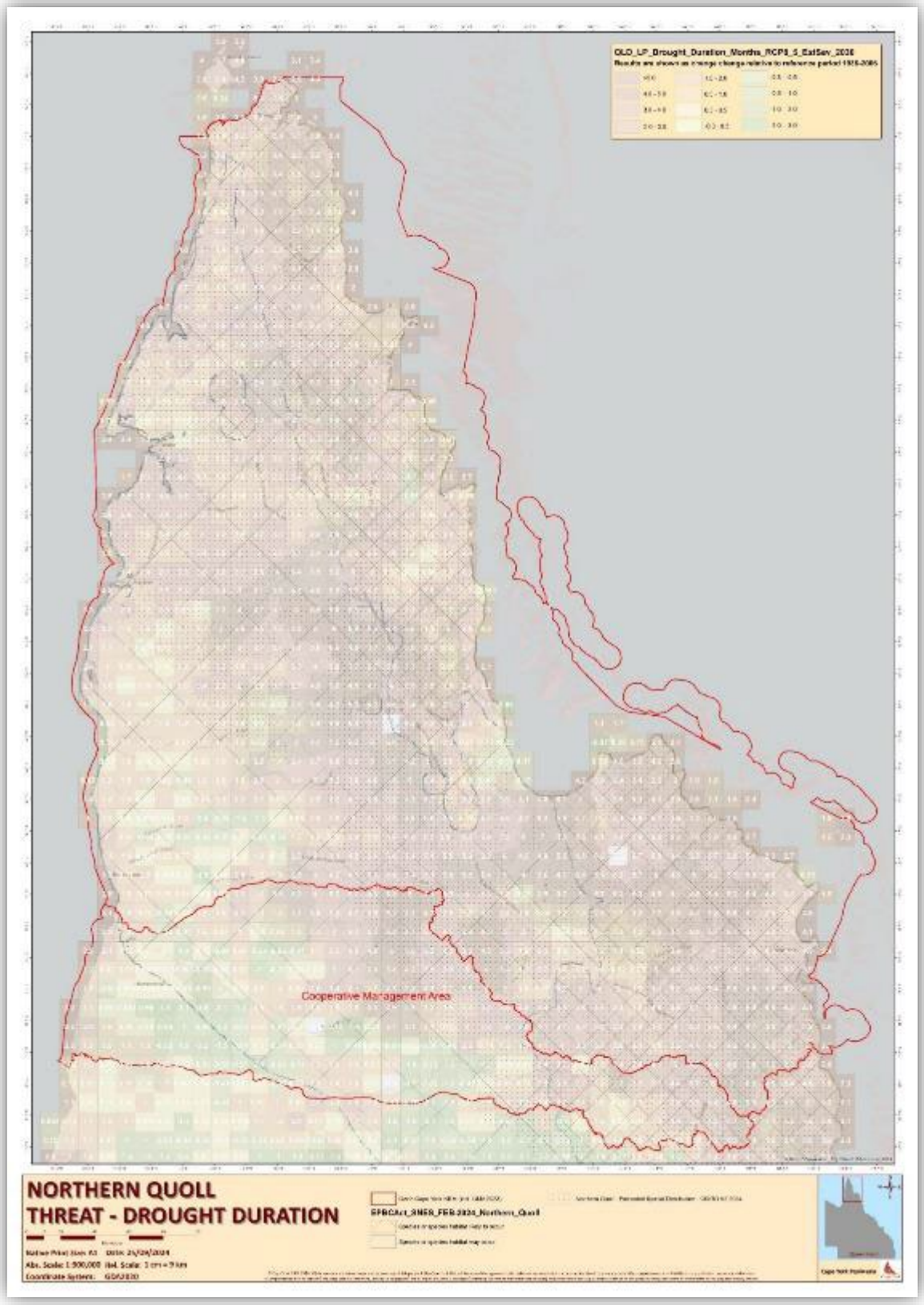
Map 16 - Golden-shouldered parrot: Drought Duration



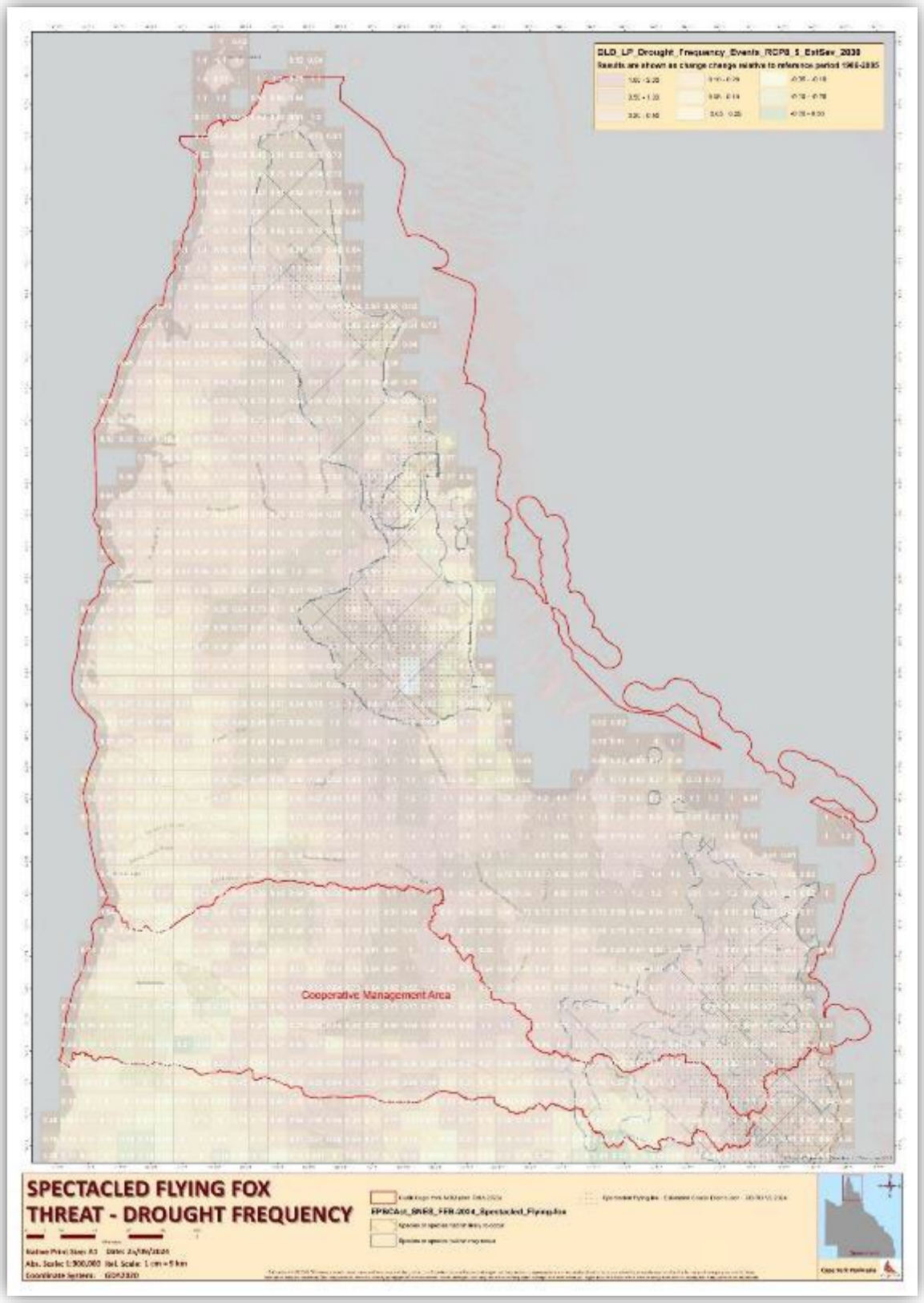
Map 17 - Northern quoll: Drought Frequency



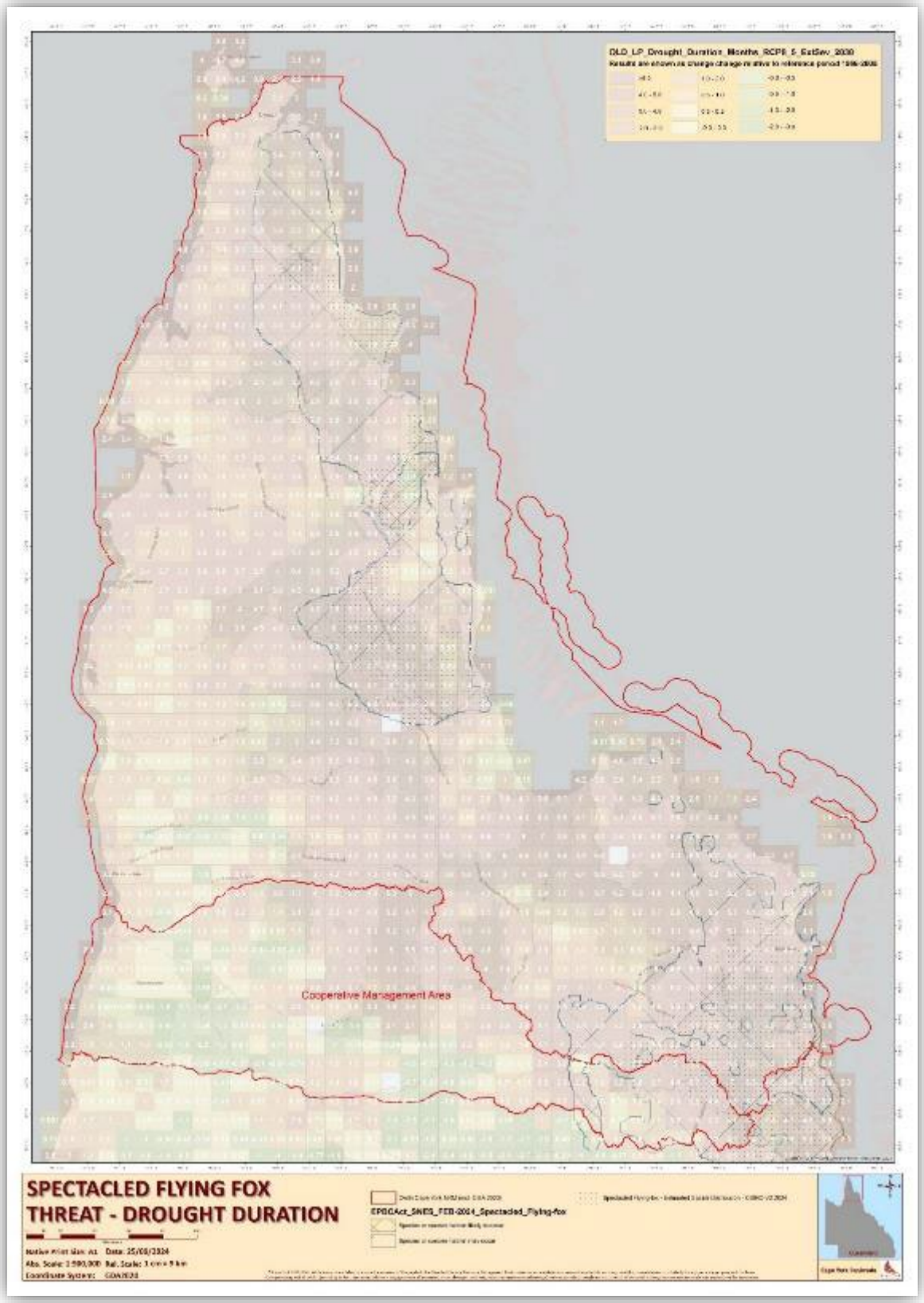
Map 18 - Northern quoll: Drought Duration



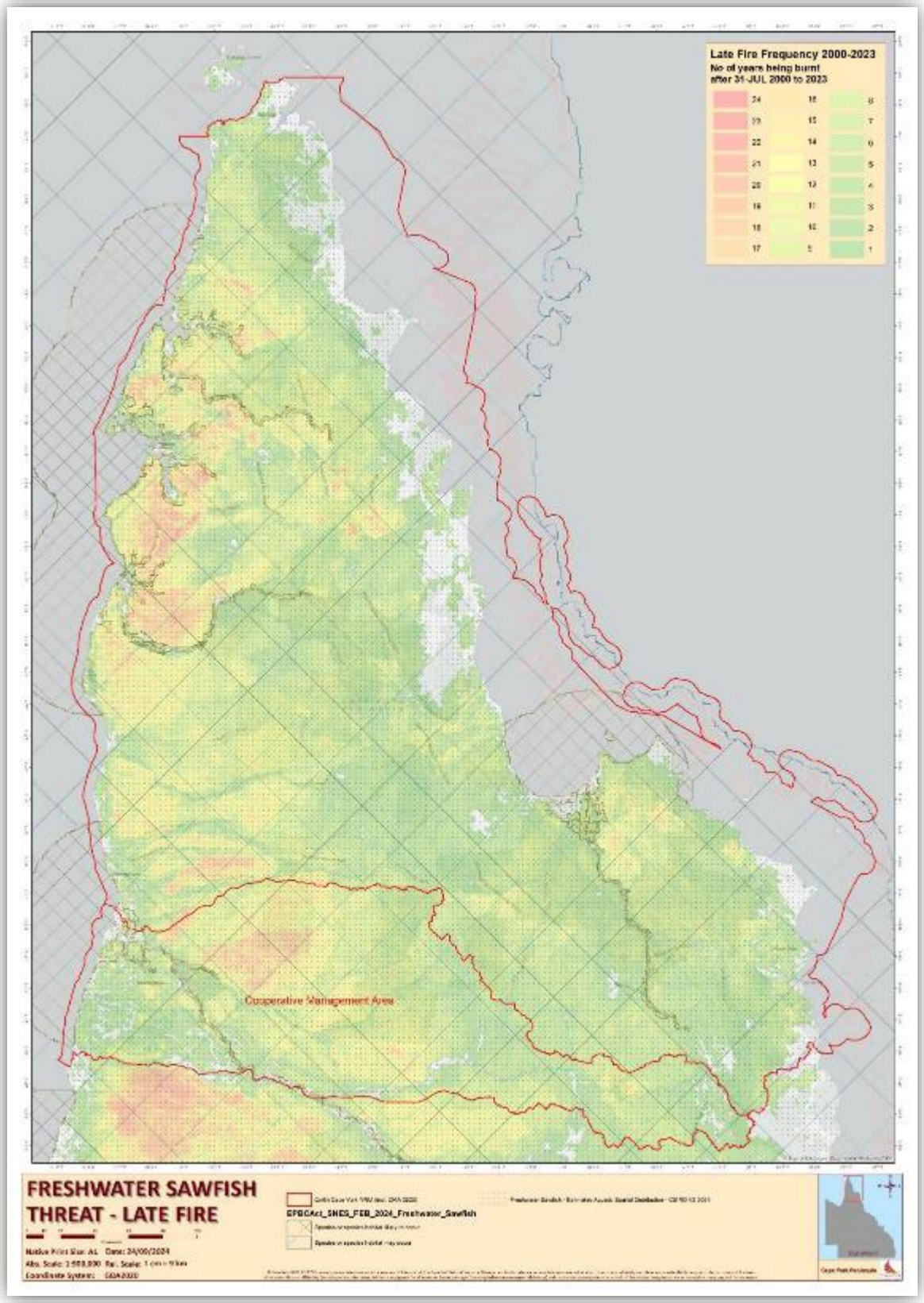
Map 19 - Spectacled flying fox: Drought Frequency



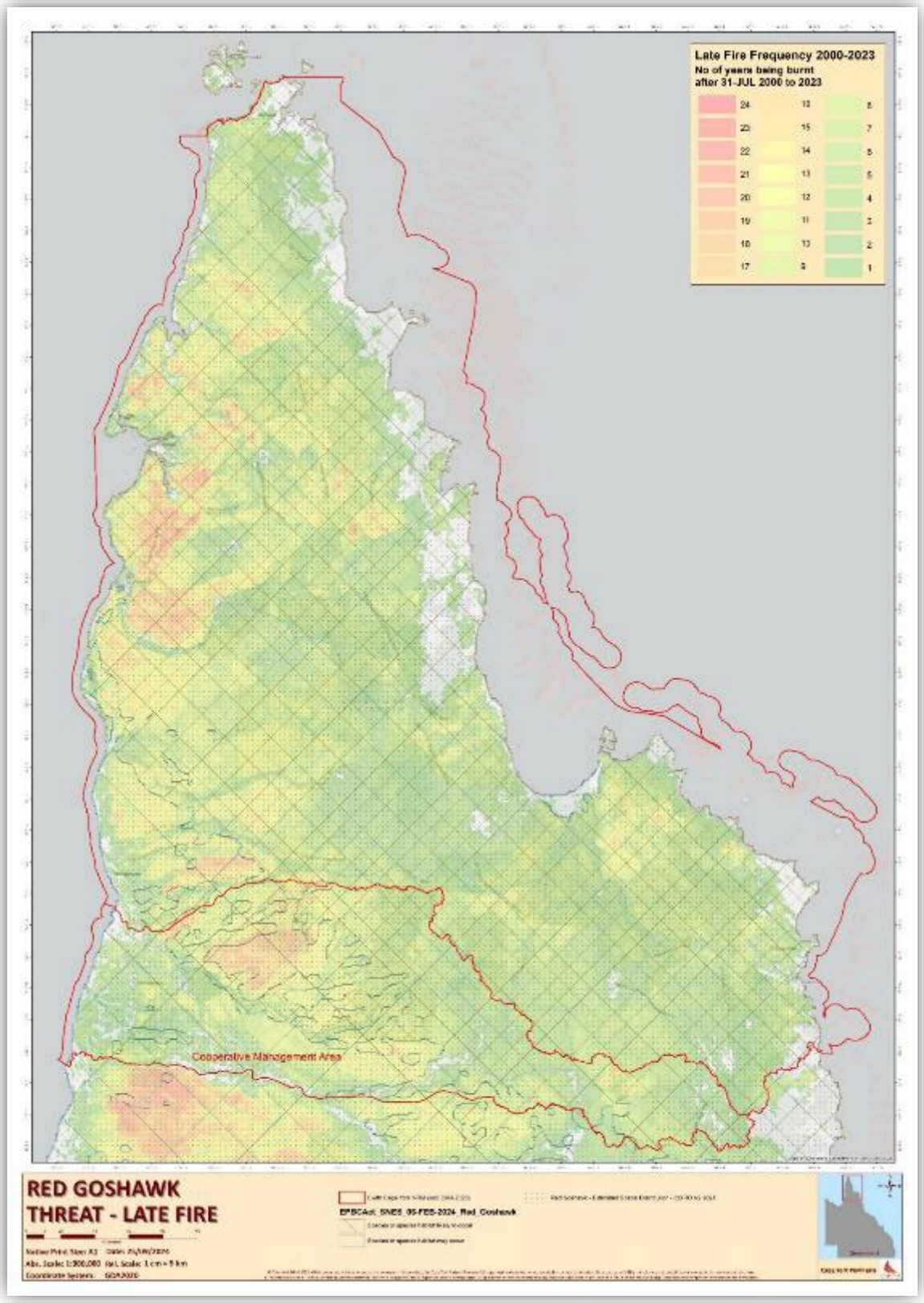
Map 20 - Spectacled flying fox: Drought Duration



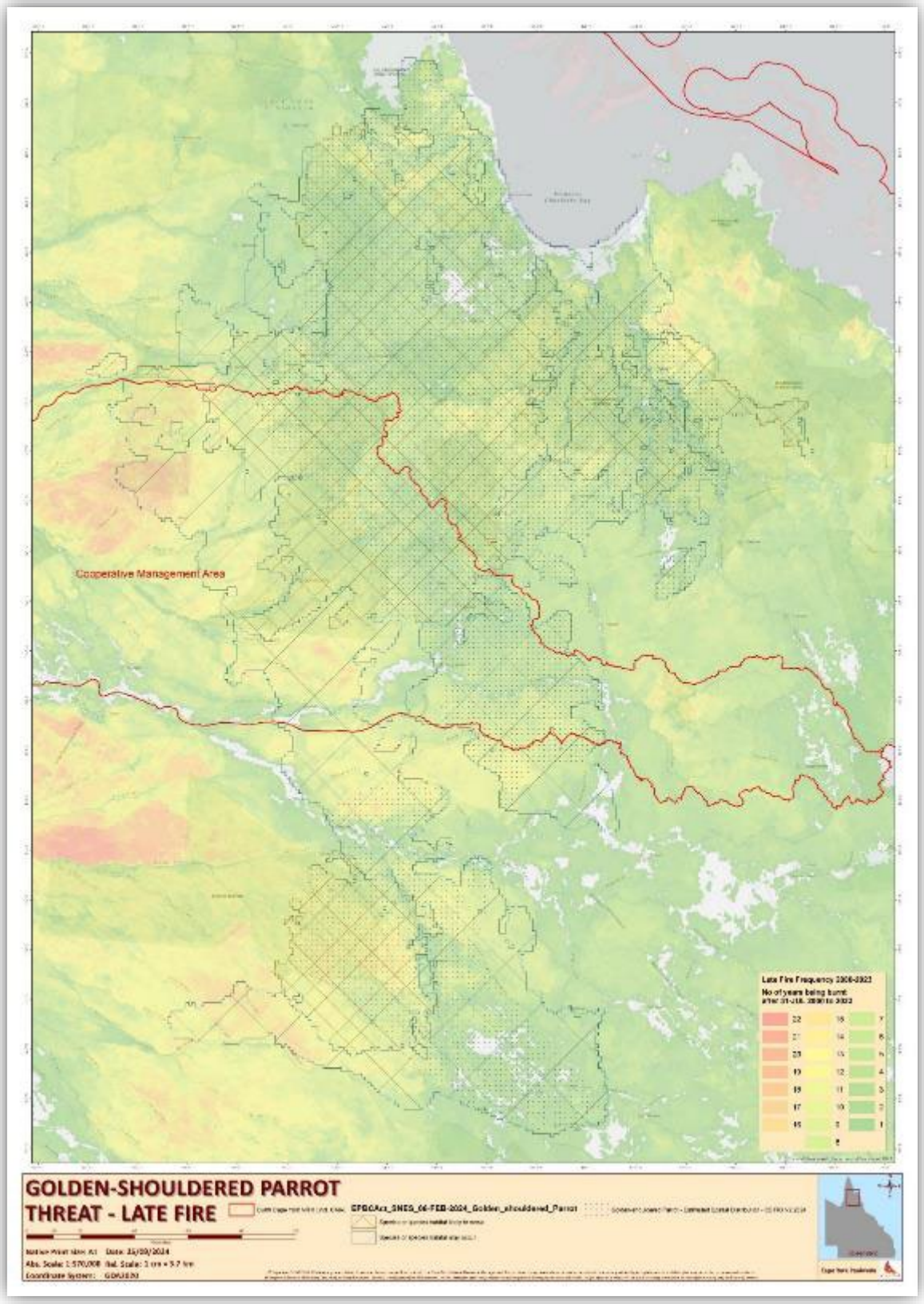
Map 21 - Freshwater sawfish: Late Season Fire Frequency



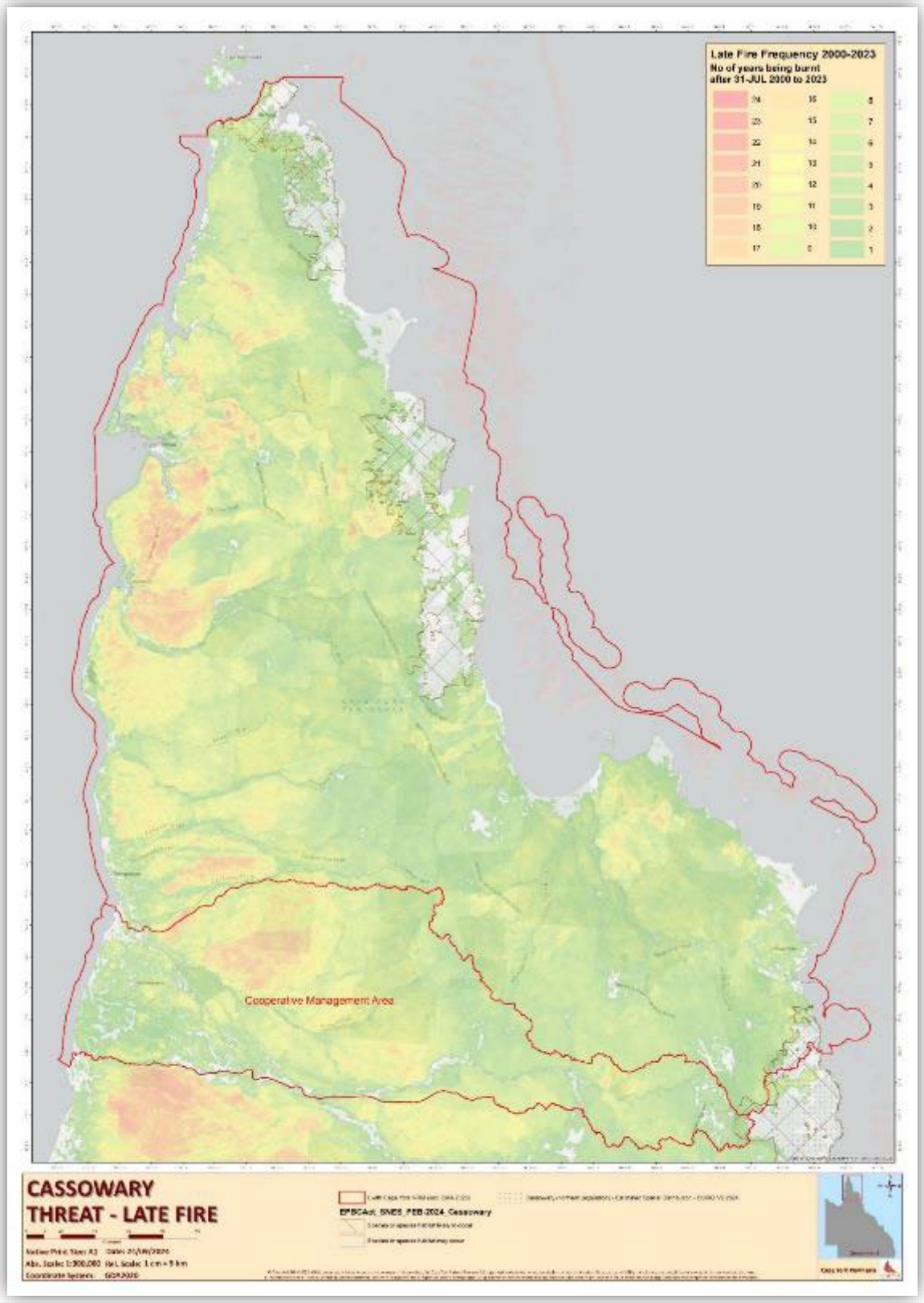
Map 22 - Red goshawk: Late Season Fire Frequency



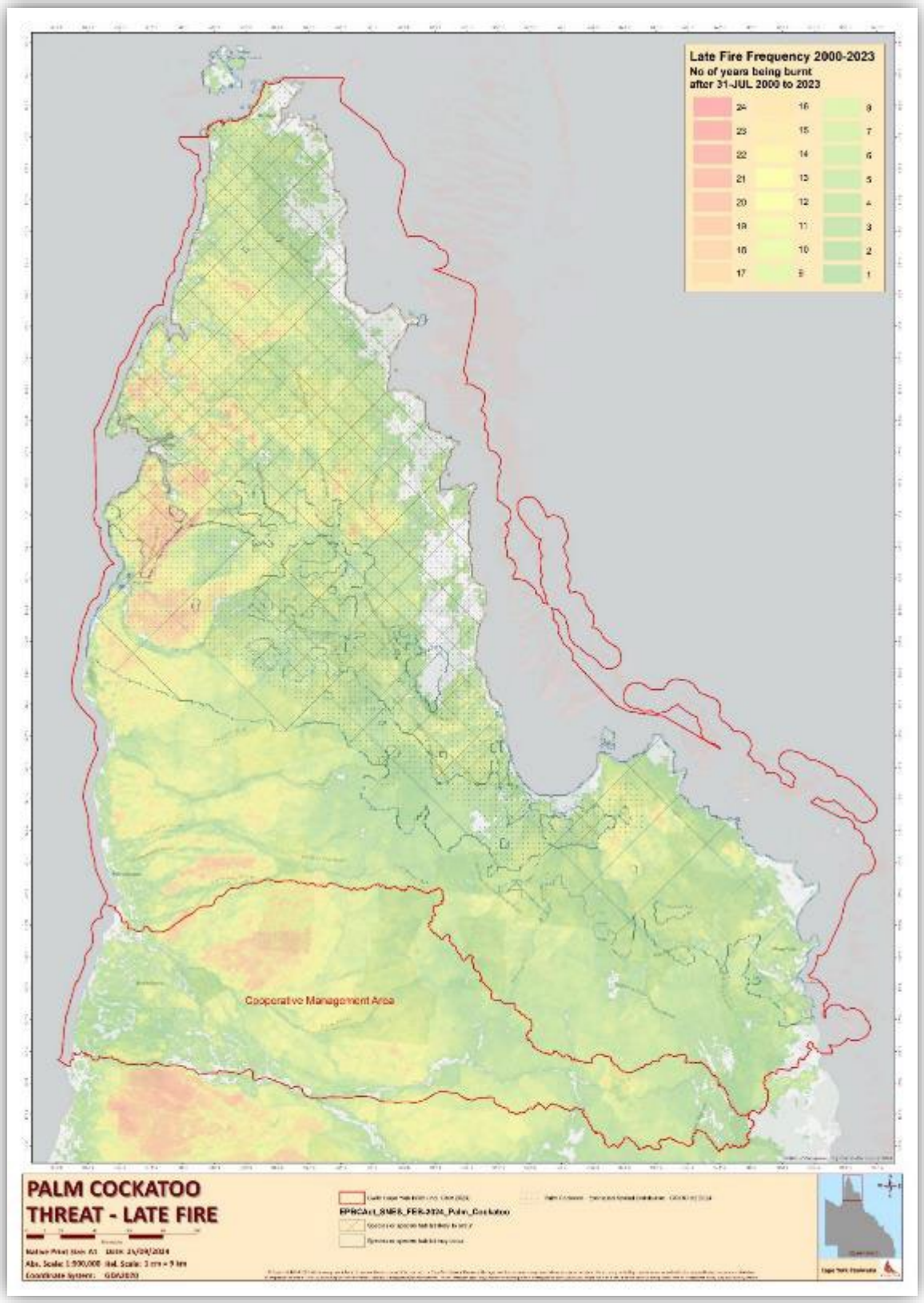
Map 23 - Golden-shouldered parrot: Late Season Fire Frequency



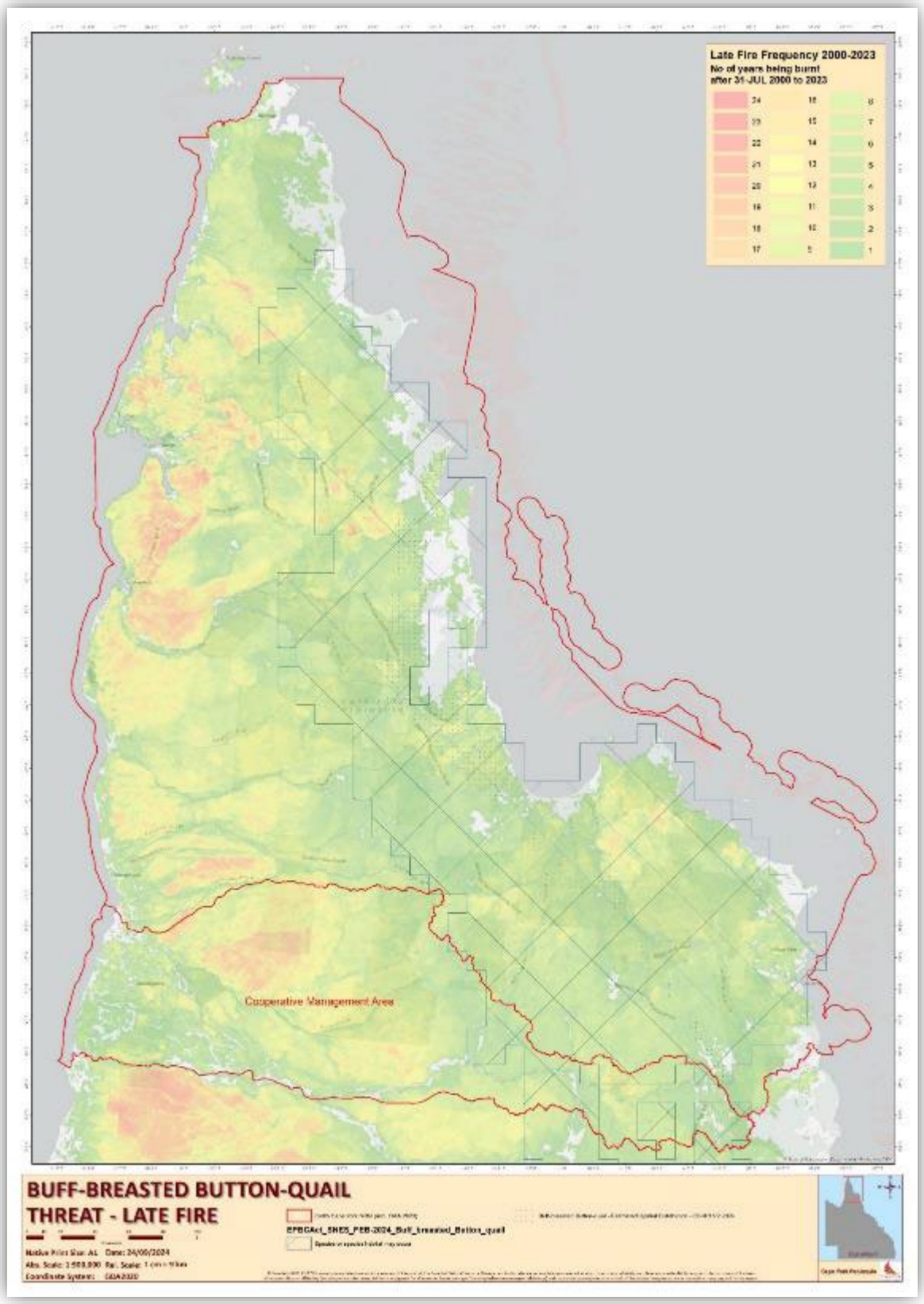
Map 24 - Southern cassowary: Late Season Fire Frequency



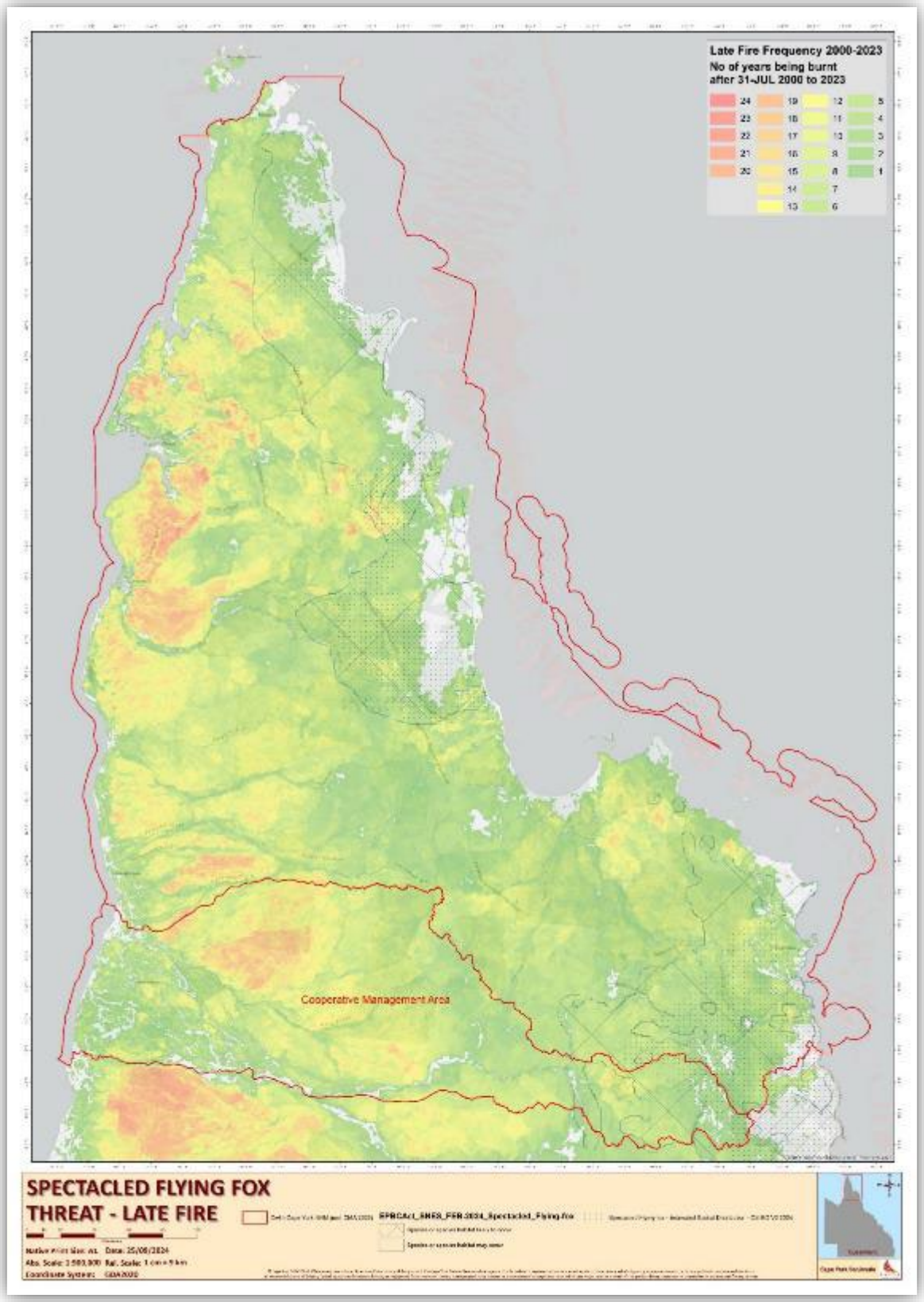
Map 25 - Palm cockatoo: Late Season Fire Frequency



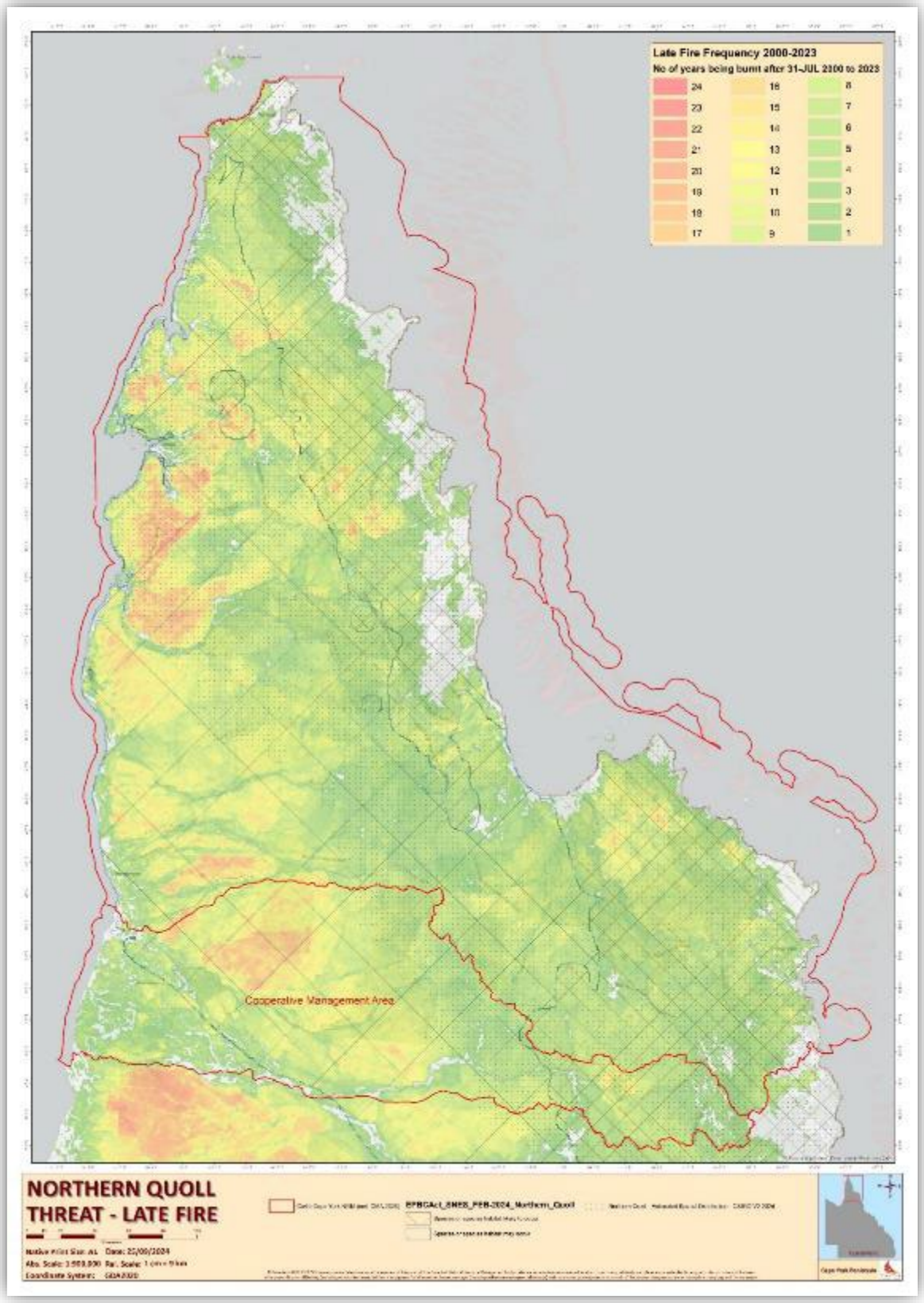
Map 26 - Buff-breasted button-quail: Late Season Fire Frequency



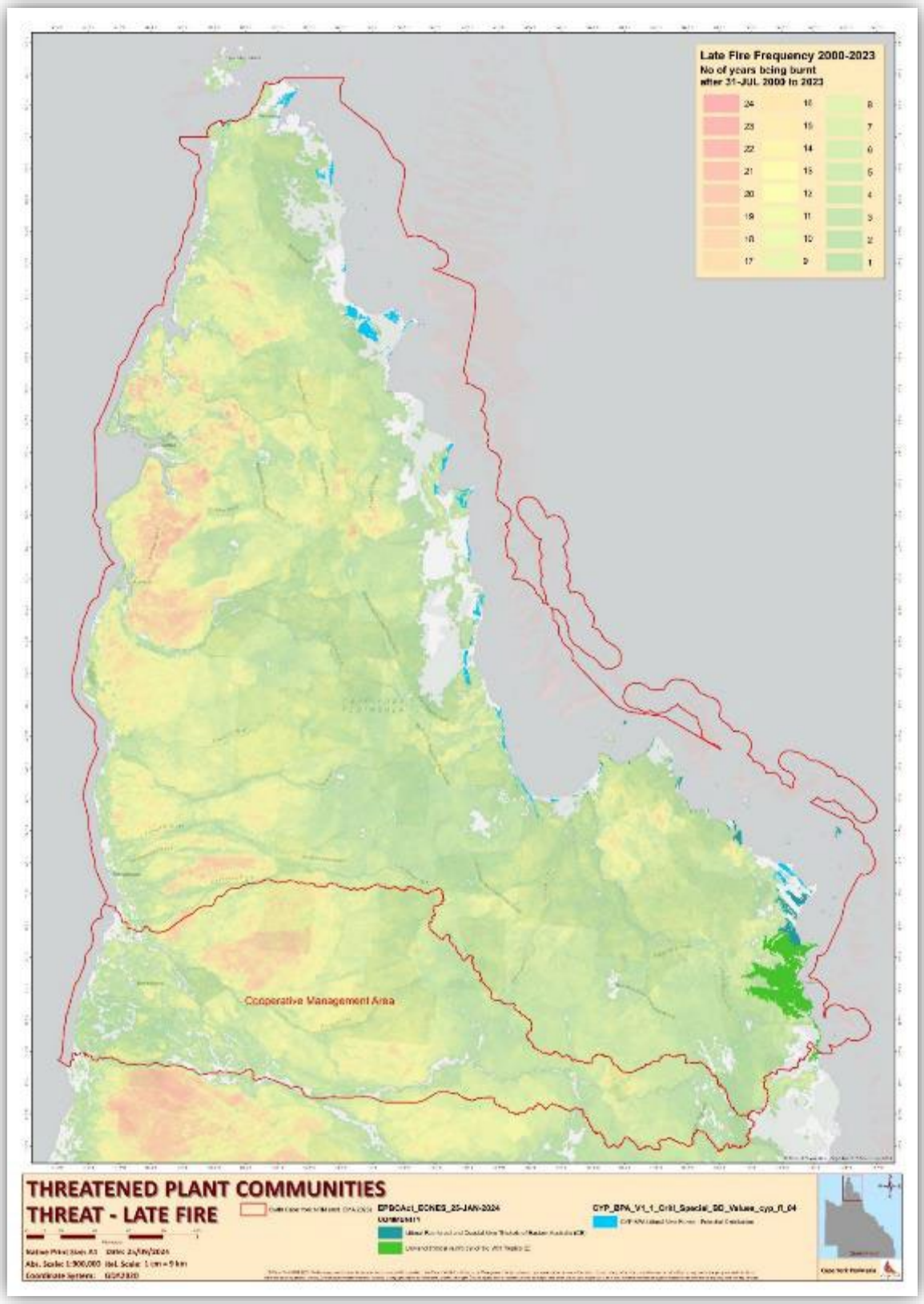
Map 27 - Spectacled flying fox: Late Season Fire Frequency



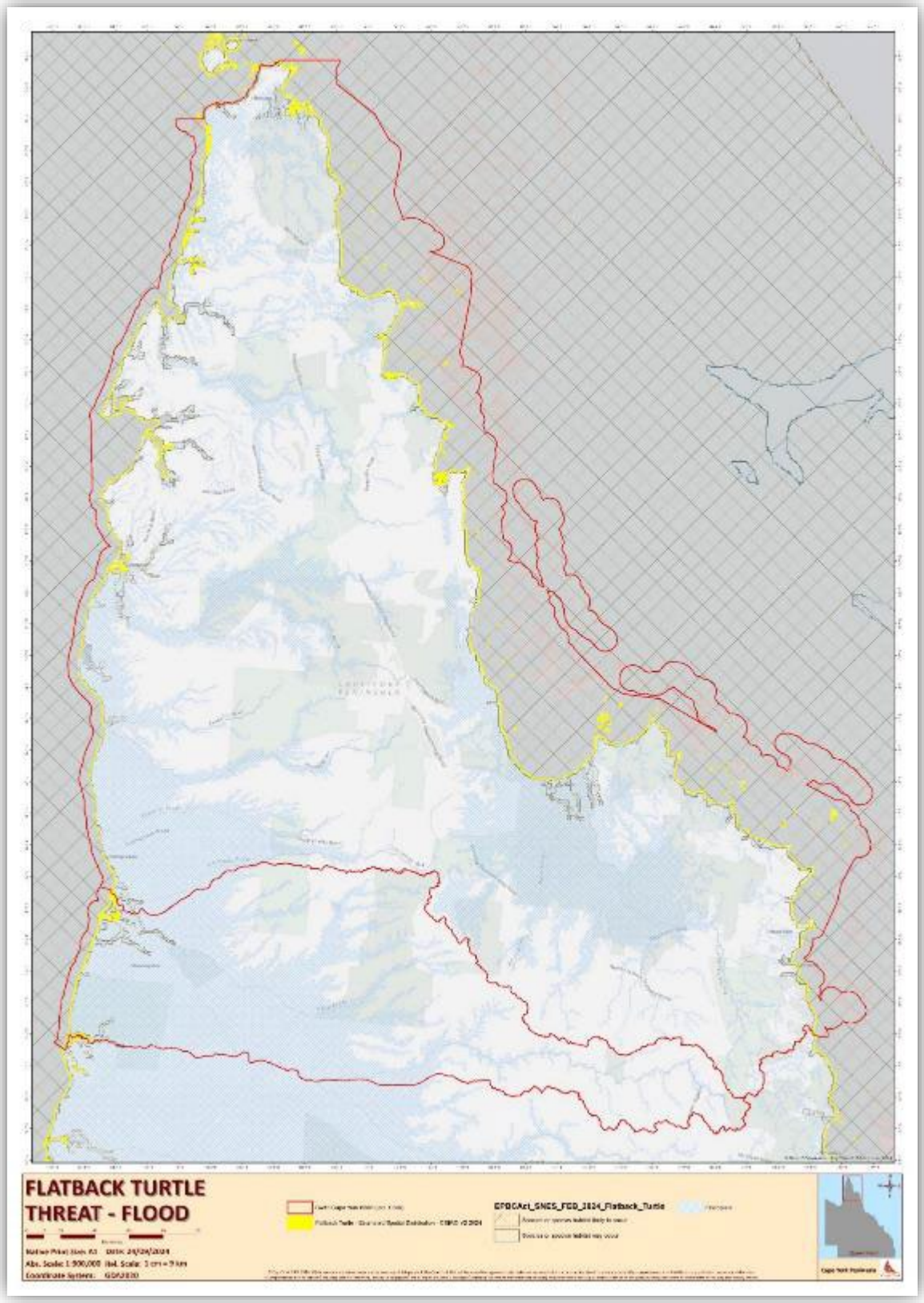
Map 28 - Northern quoll: Late Season Fire Frequency



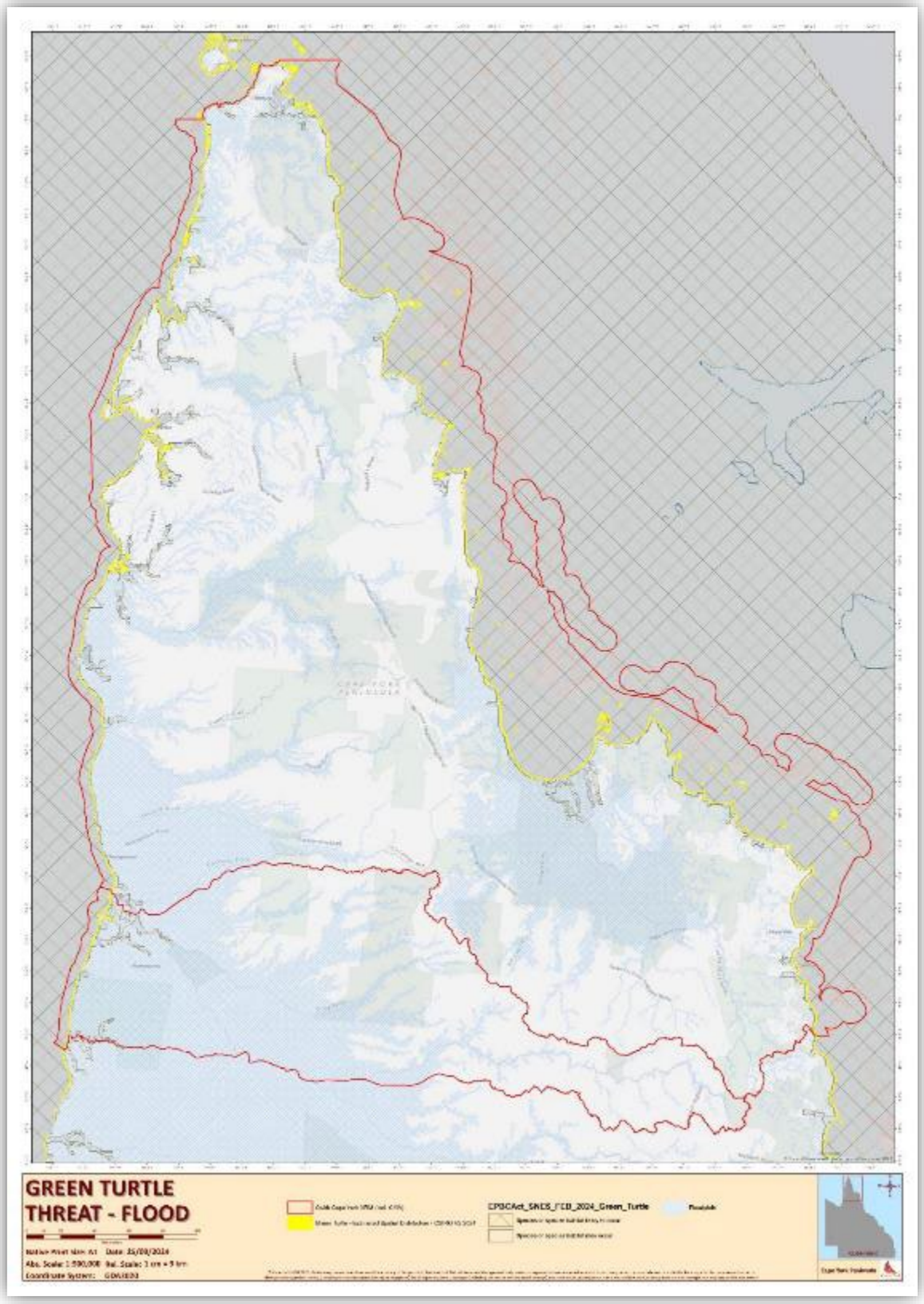
Map 29 - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community: Late Season Fire Frequency



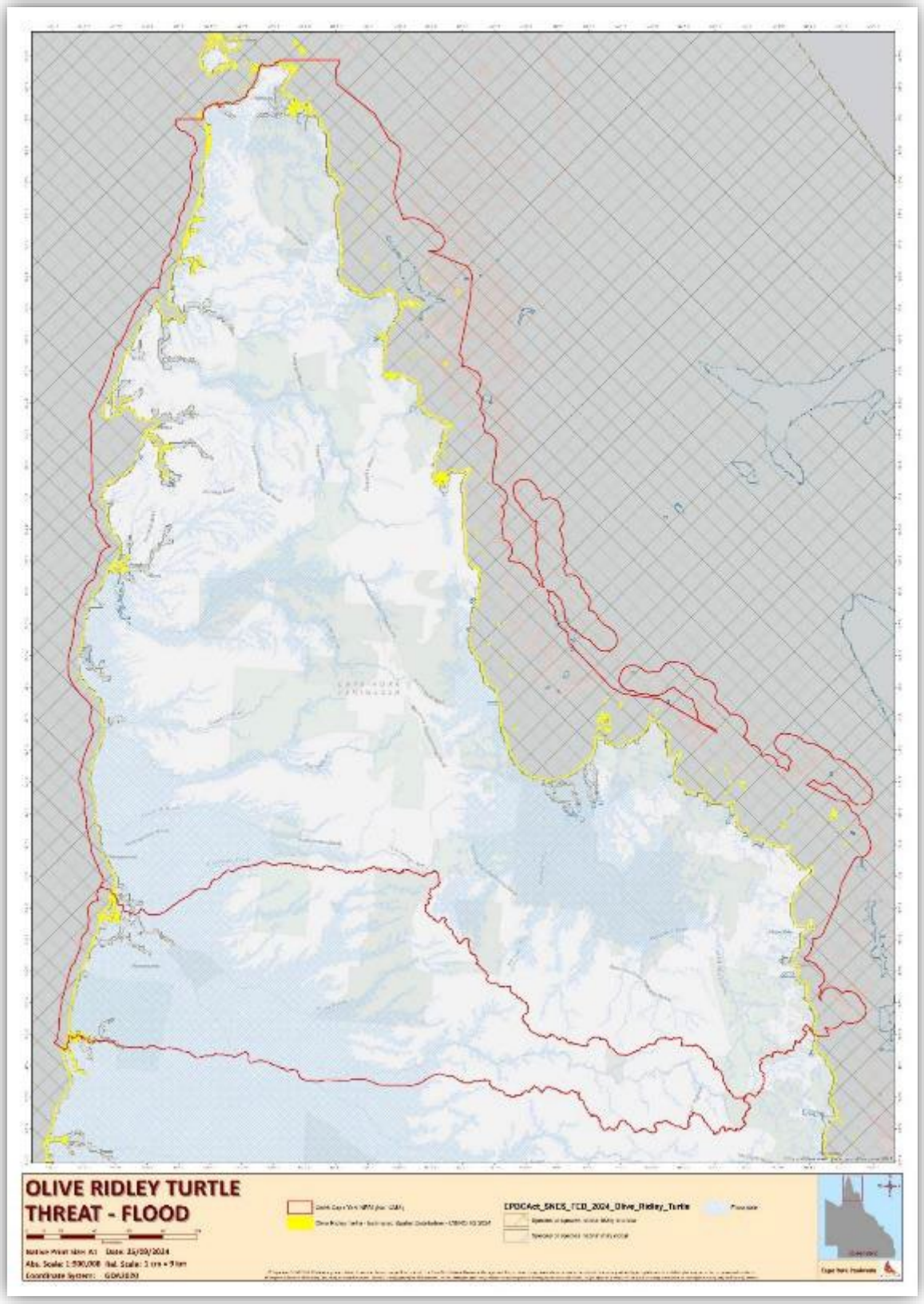
Map 30 - Flatback turtle: Flood



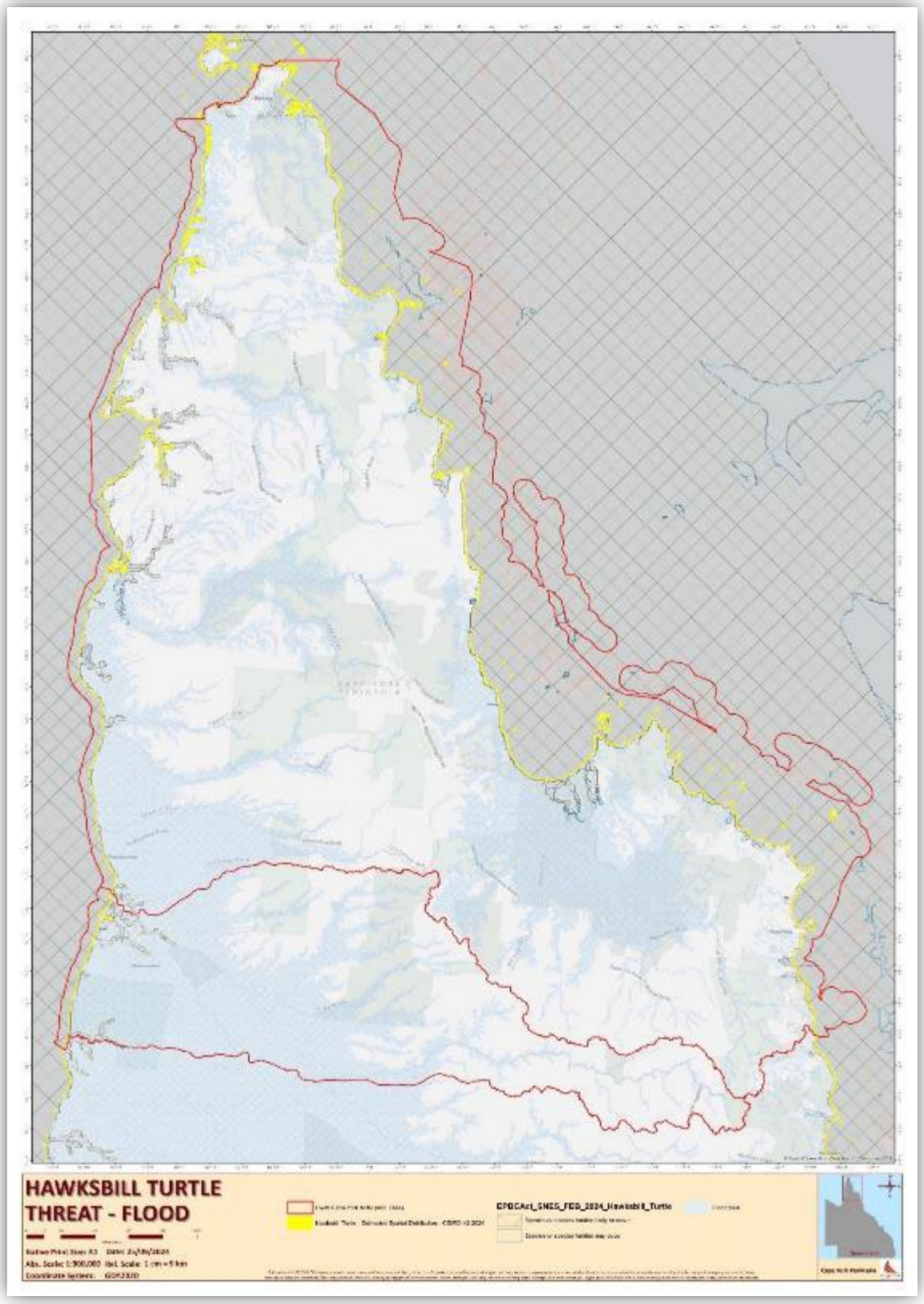
Map 31 - Green turtle: Flood



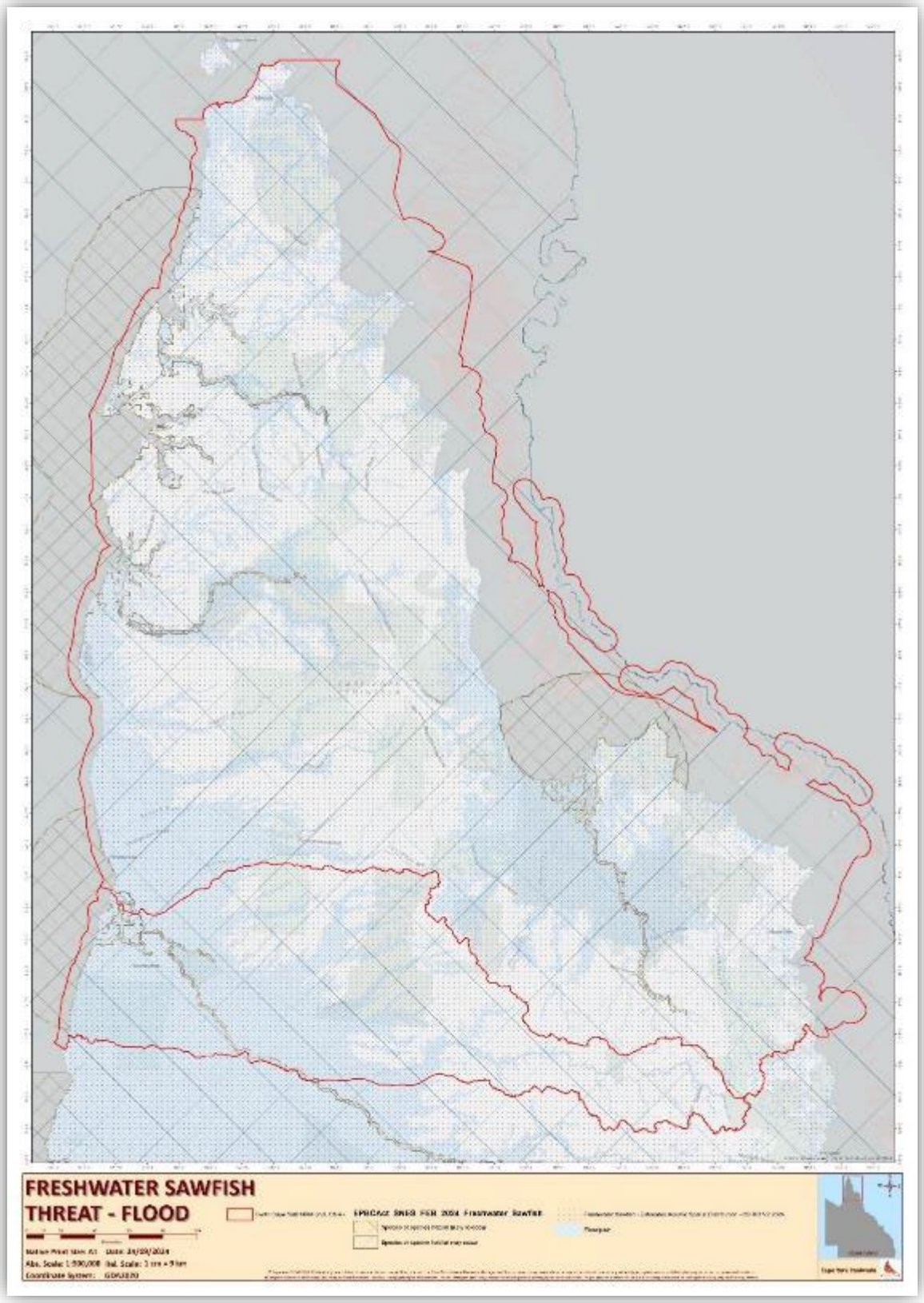
Map 32 - Olive Ridley turtle: Flood



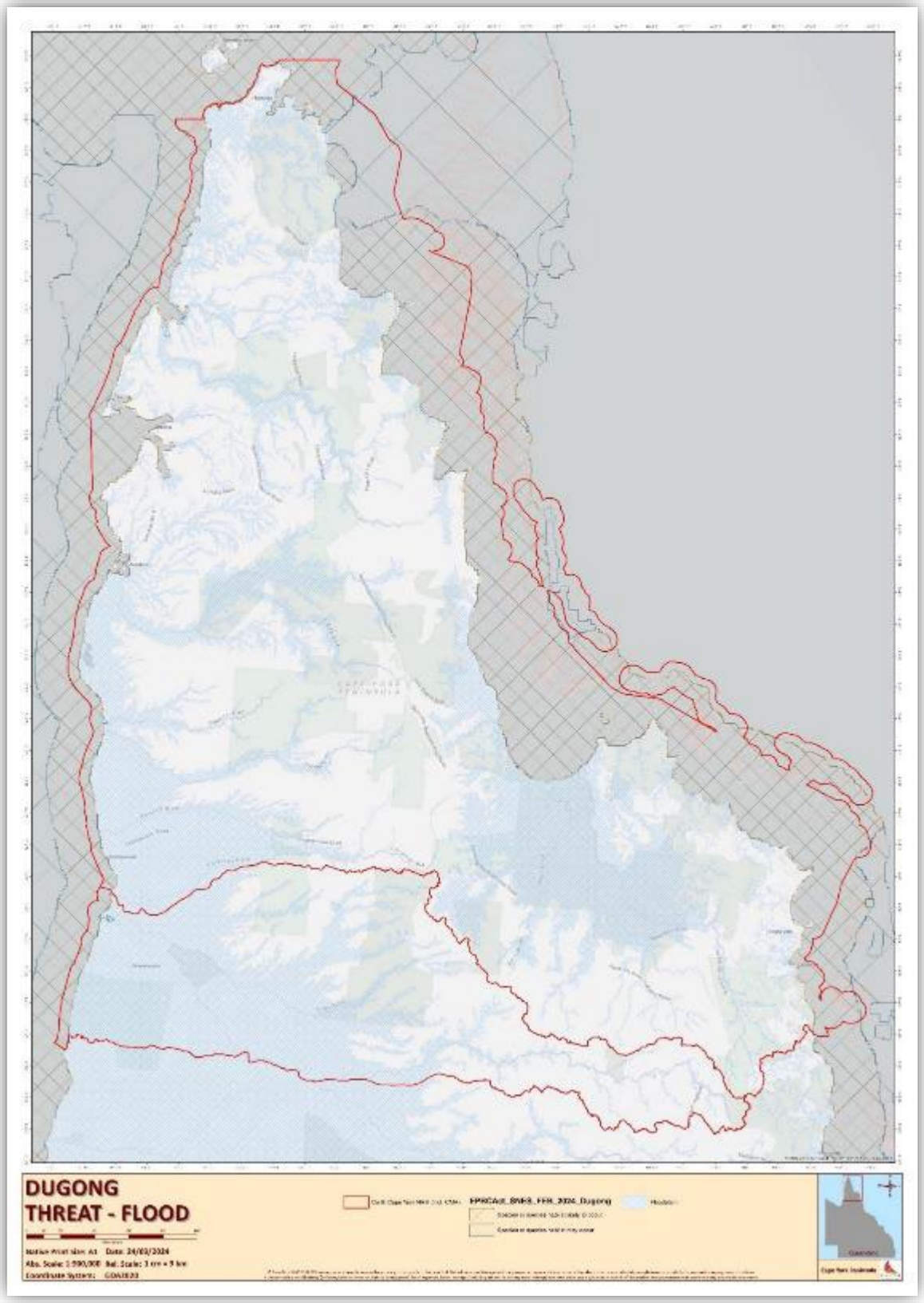
Map 33 - Hawksbill turtle: Flood



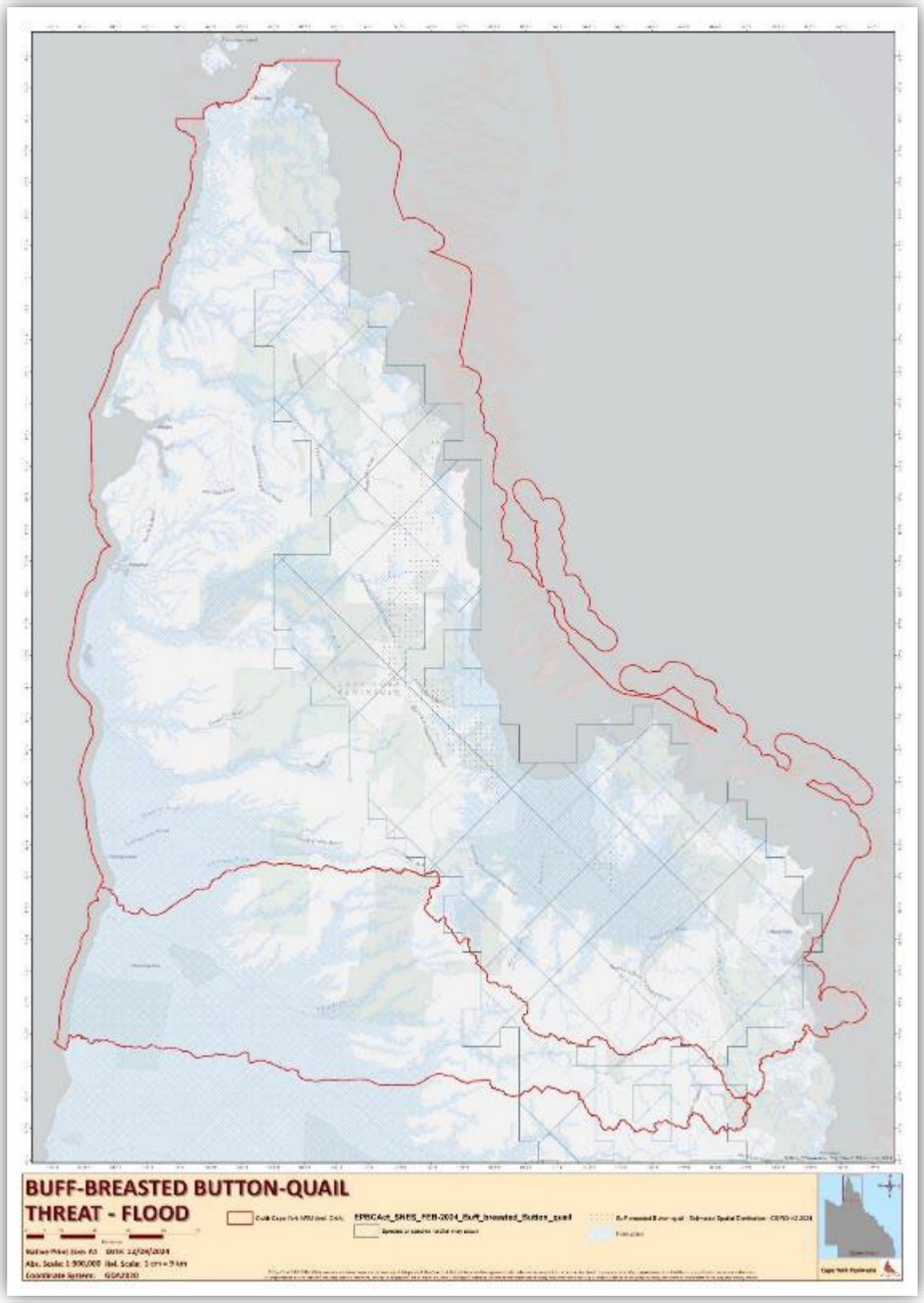
Map 34 - Freshwater sawfish: Flood



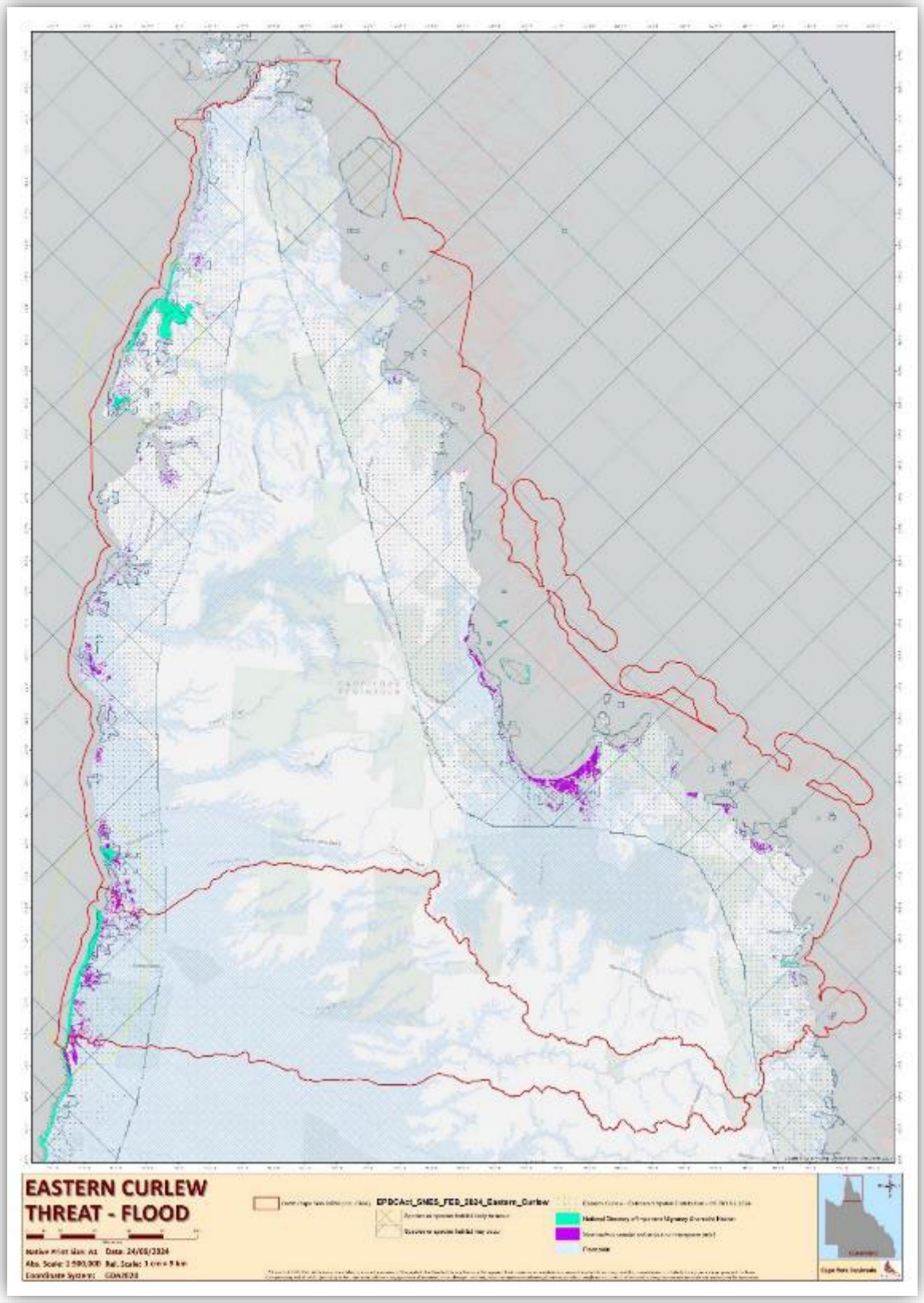
Map 35 - Dugong: Flood



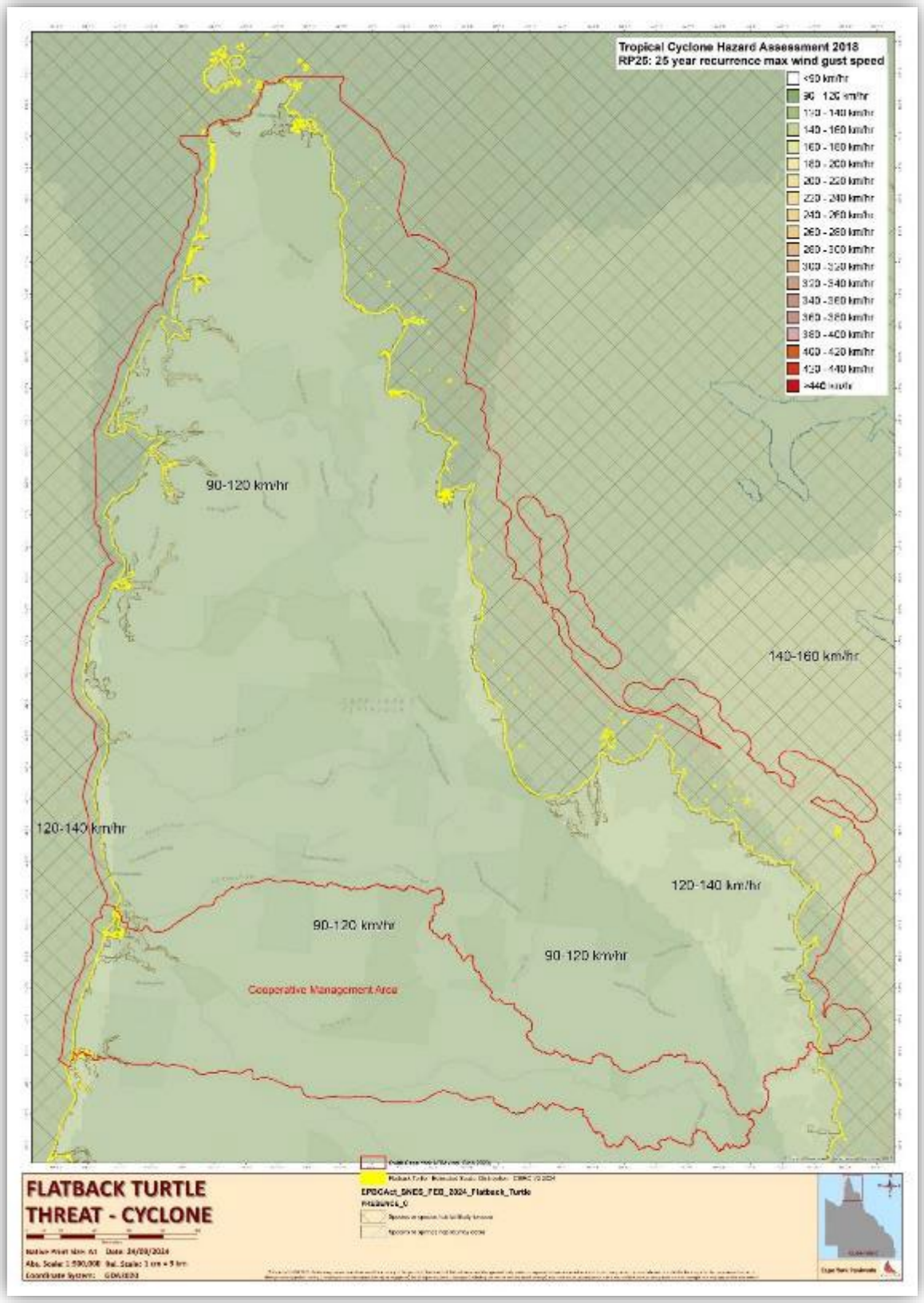
Map 36 - Buff-breasted button-quail: Flood



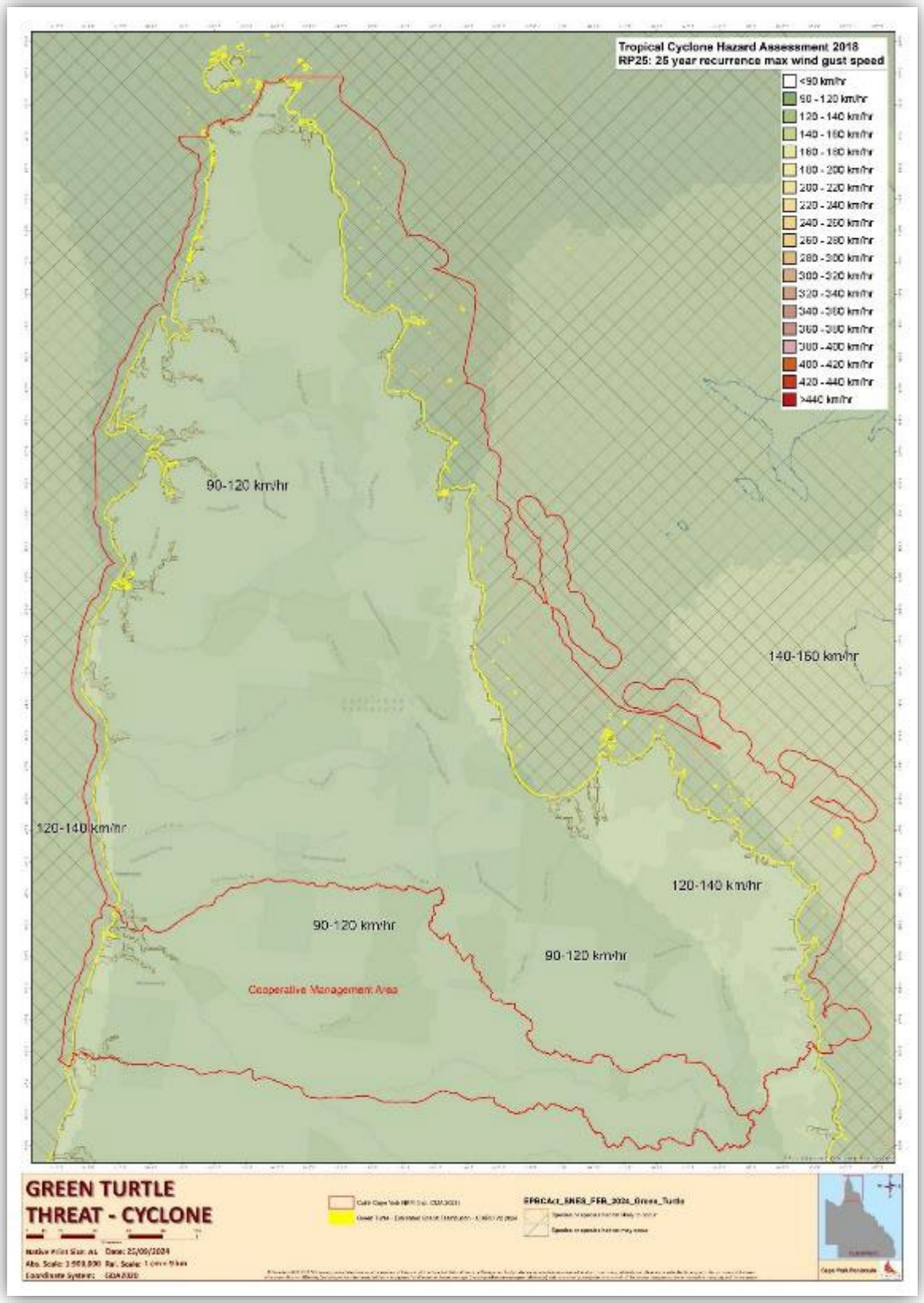
Map 37 - Eastern Curlew: Flood



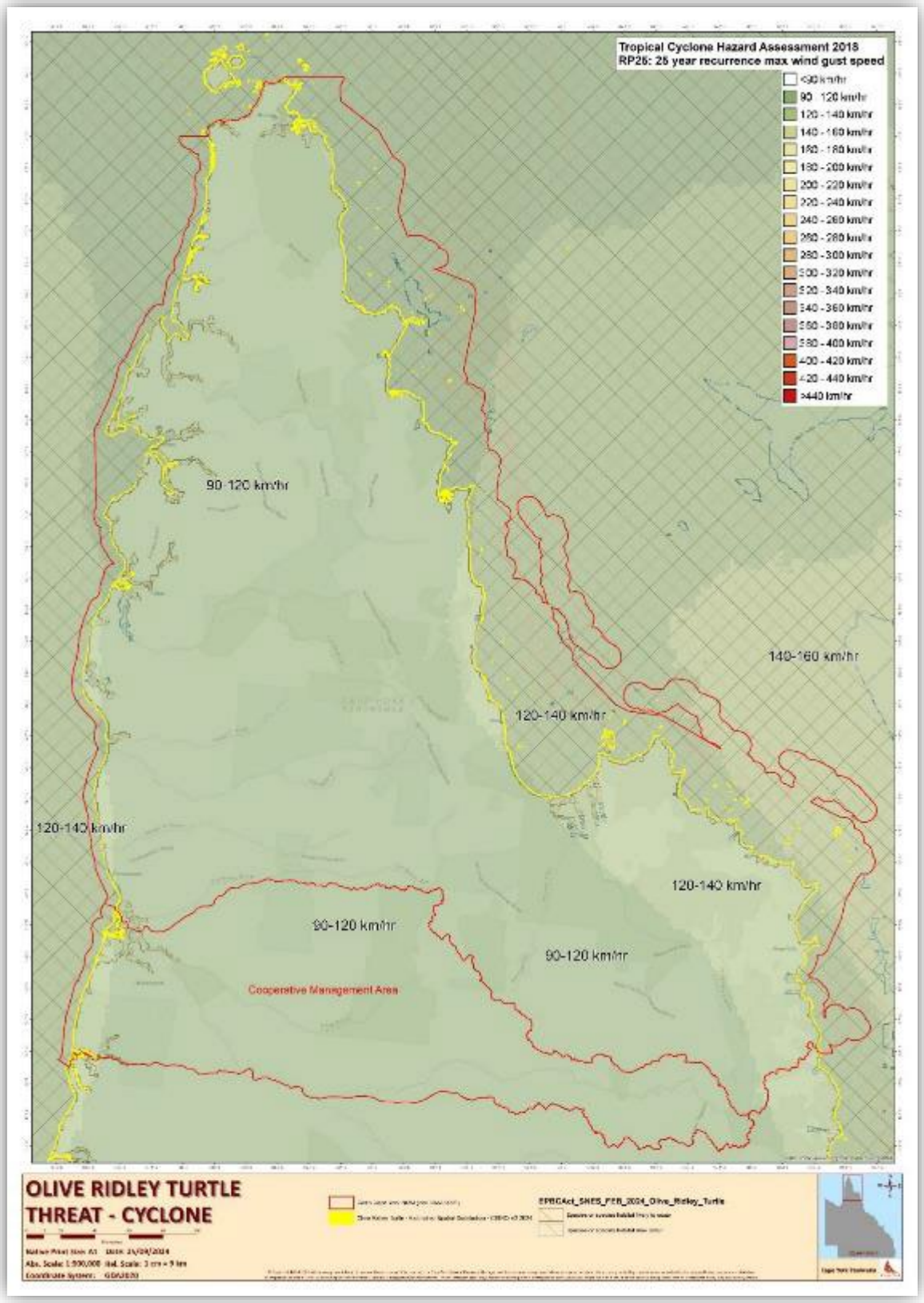
Map 38 - Flatback turtle: Cyclone



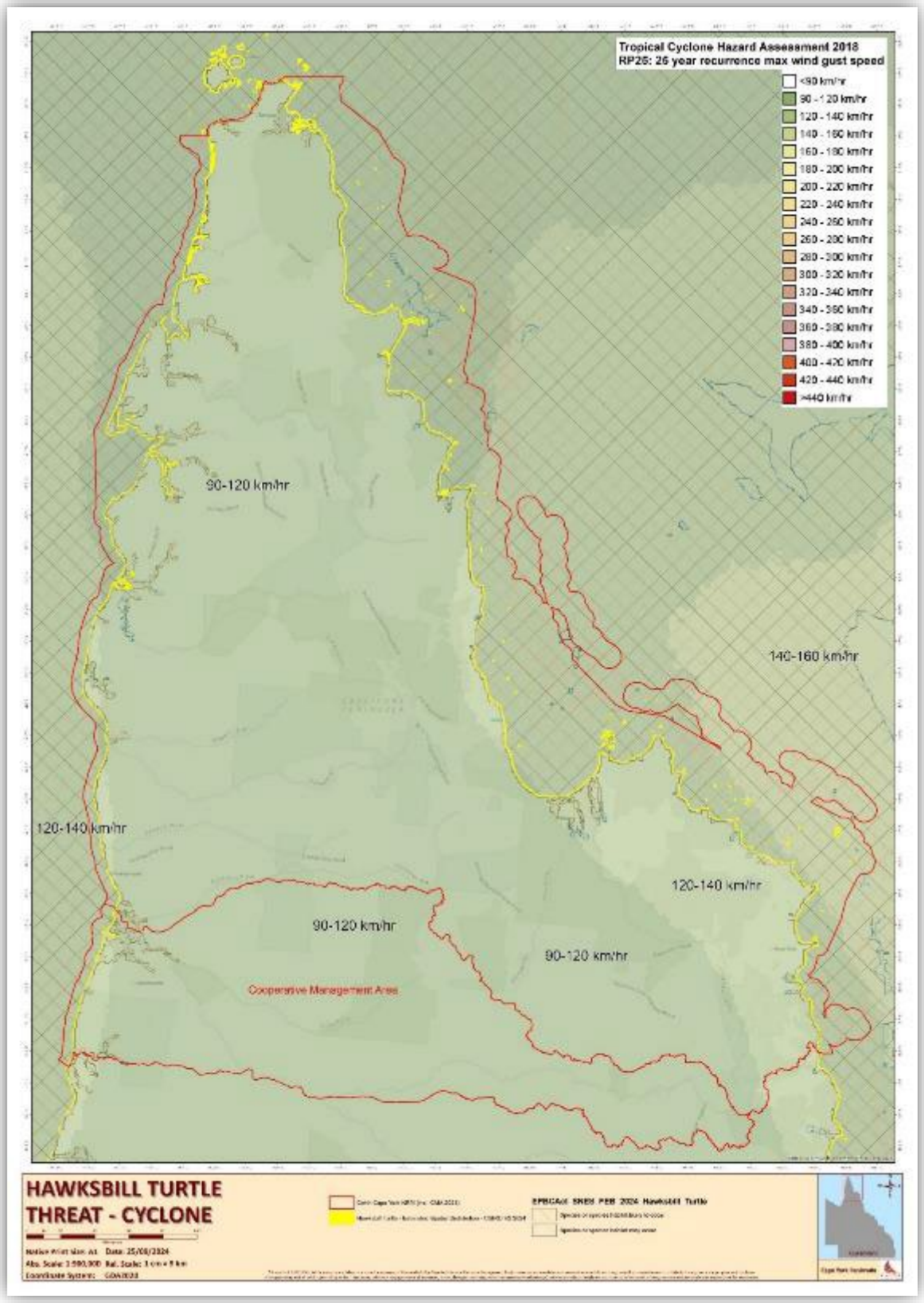
Map 39 - Green turtle: Cyclone



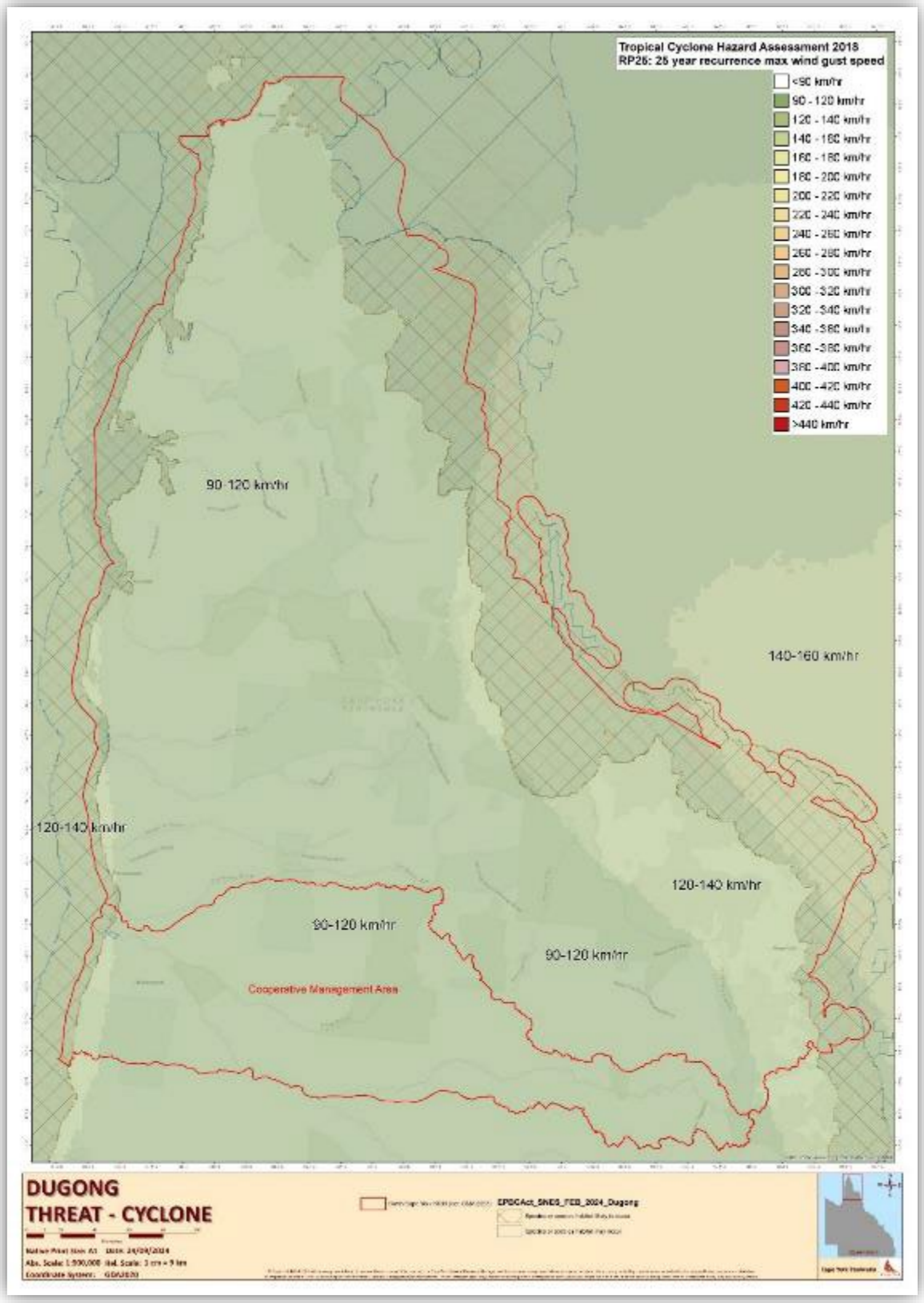
Map 40 - Olive Ridley turtle: Cyclone



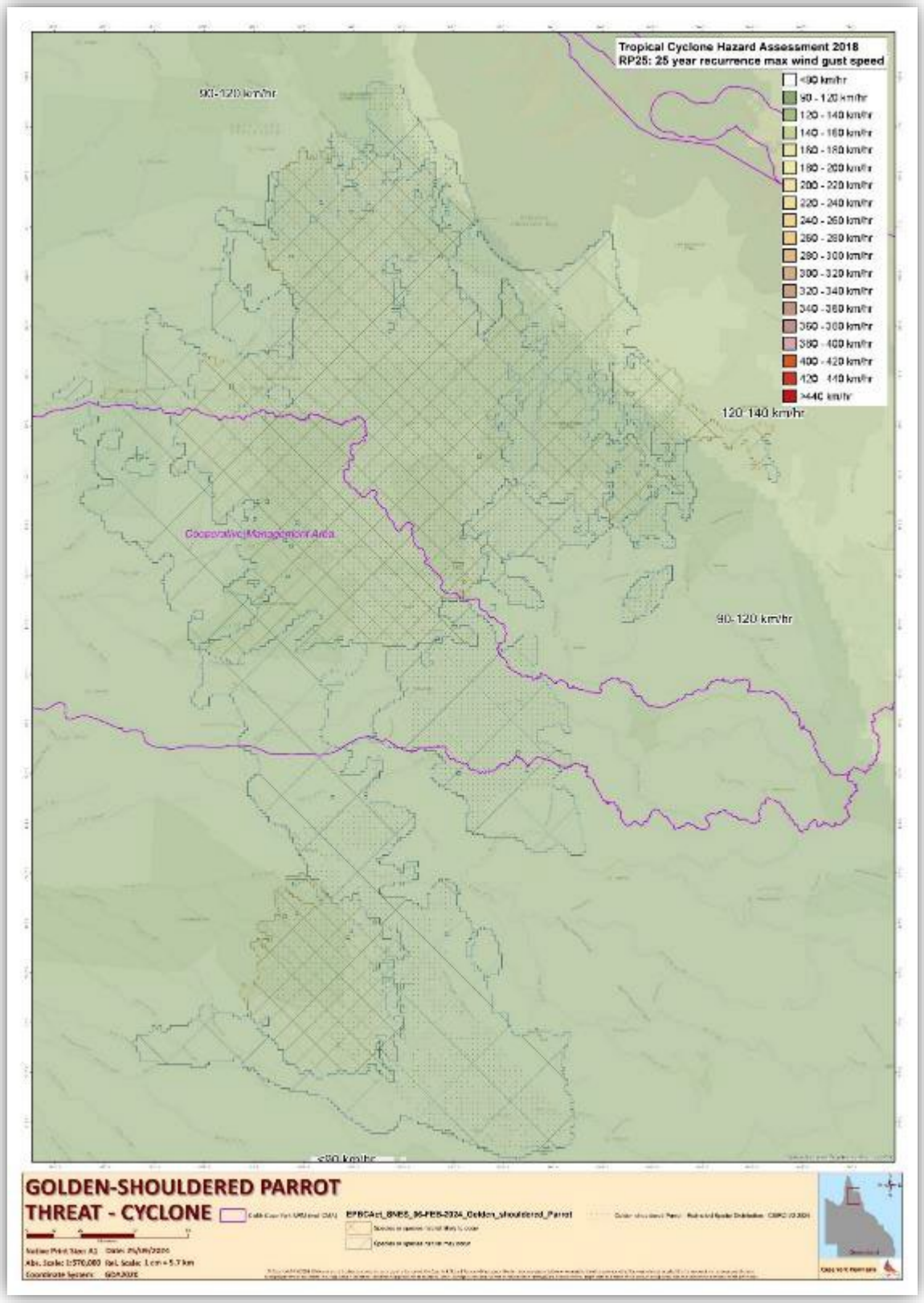
Map 41 - Hawksbill turtle: Cyclone



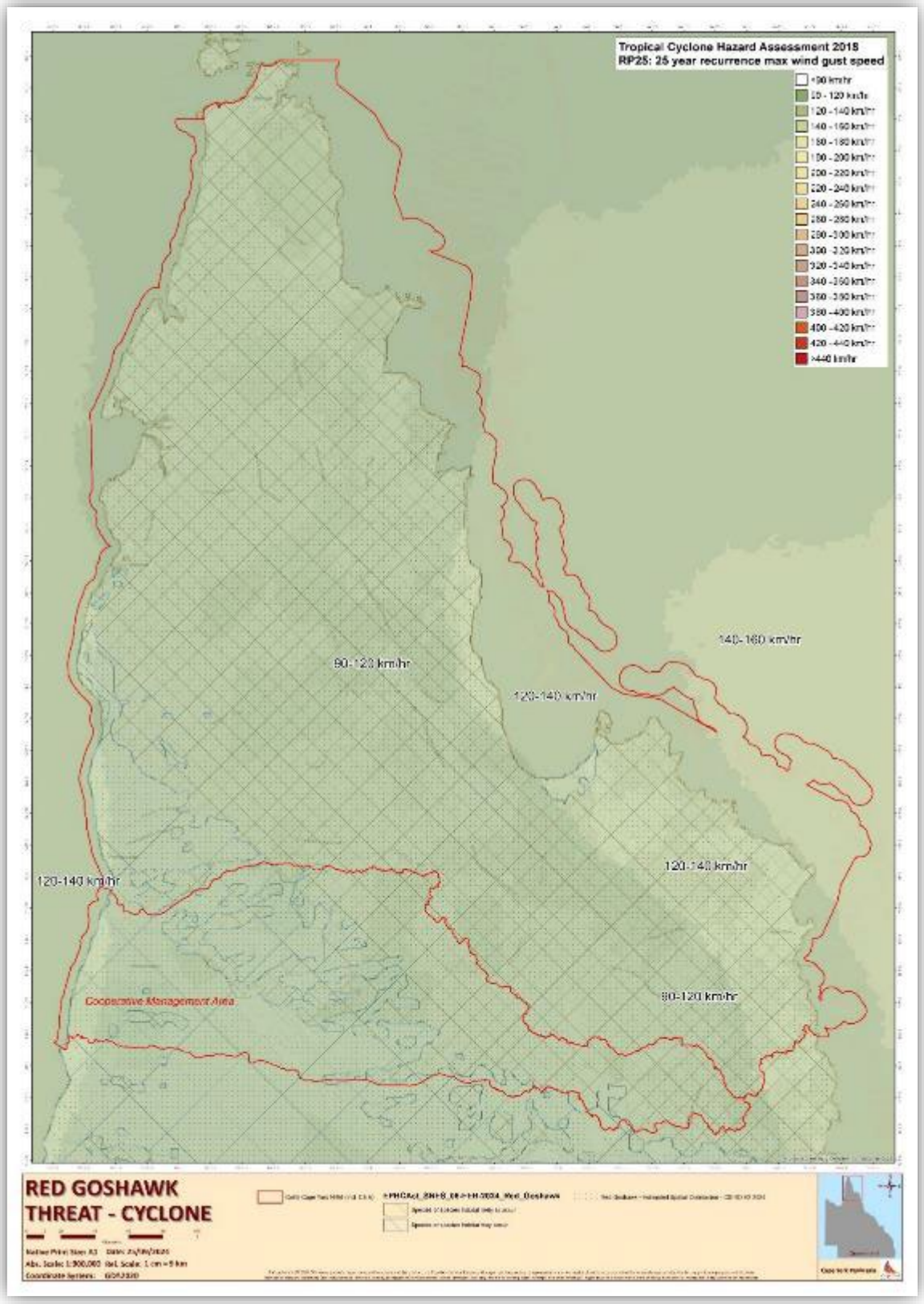
Map 42 - Dugong: Cyclone



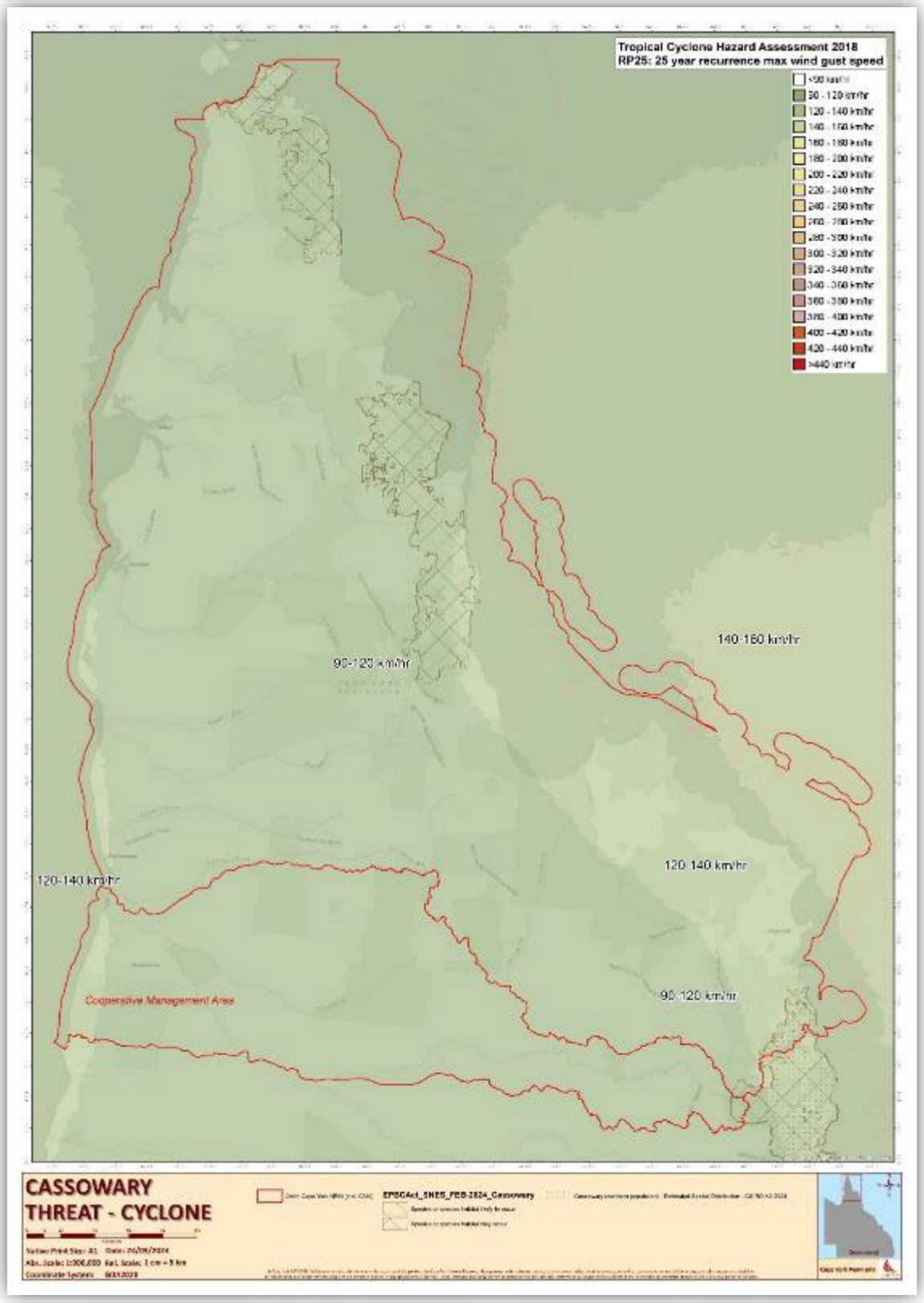
Map 43 - Golden-shouldered parrot: Cyclone



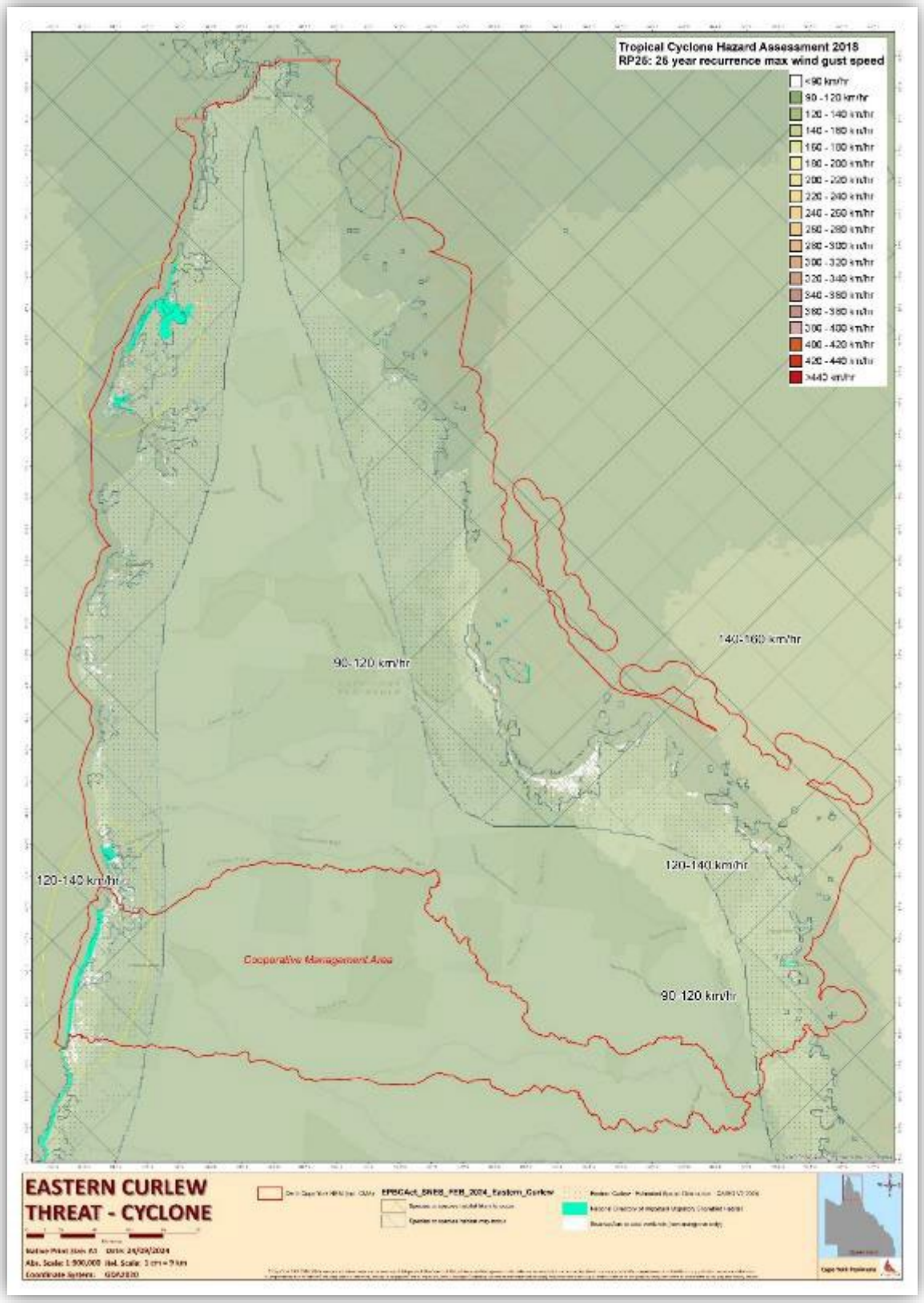
Map 44 - Red goshawk: Cyclone



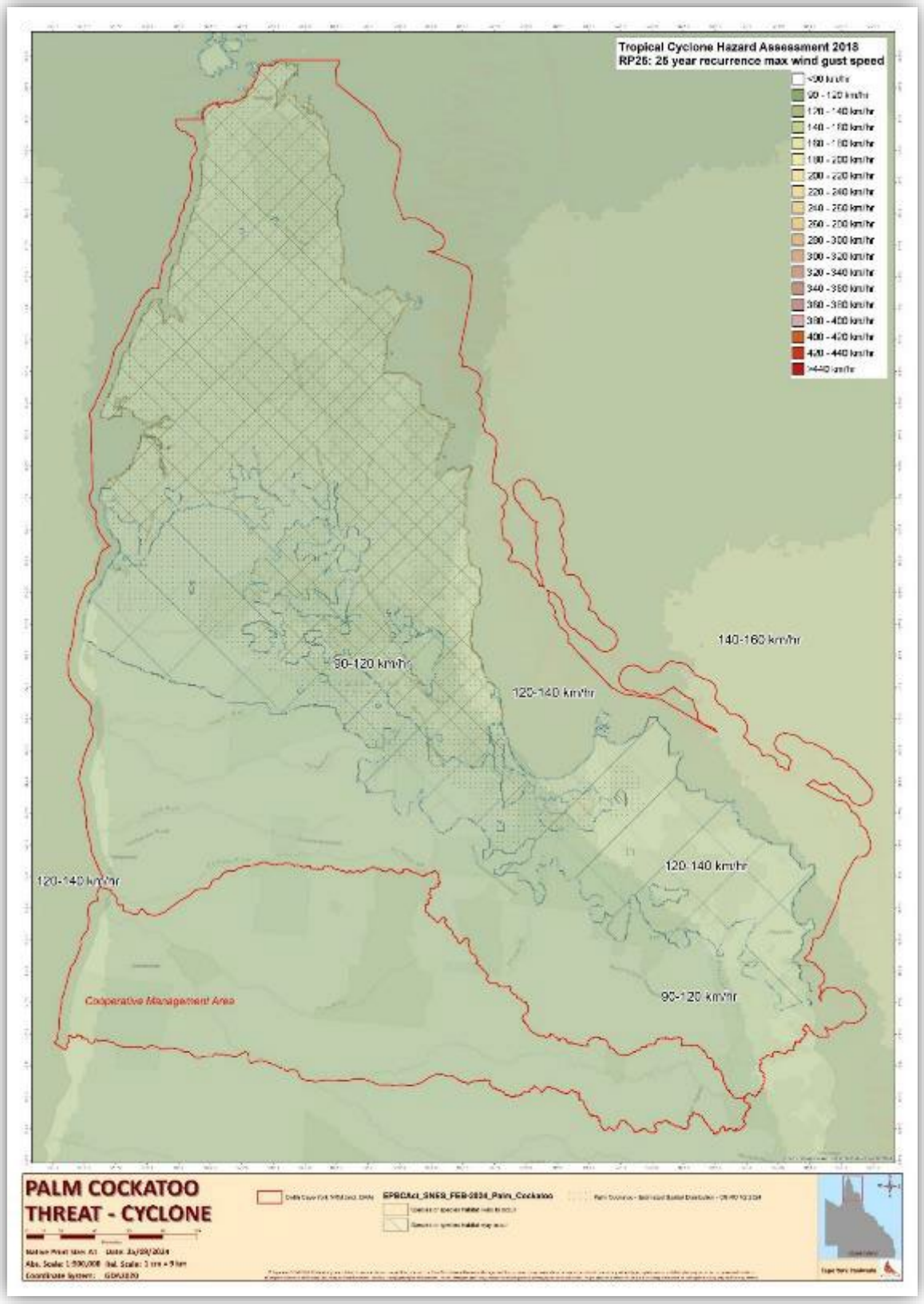
Map 45 - Southern cassowary: Cyclone



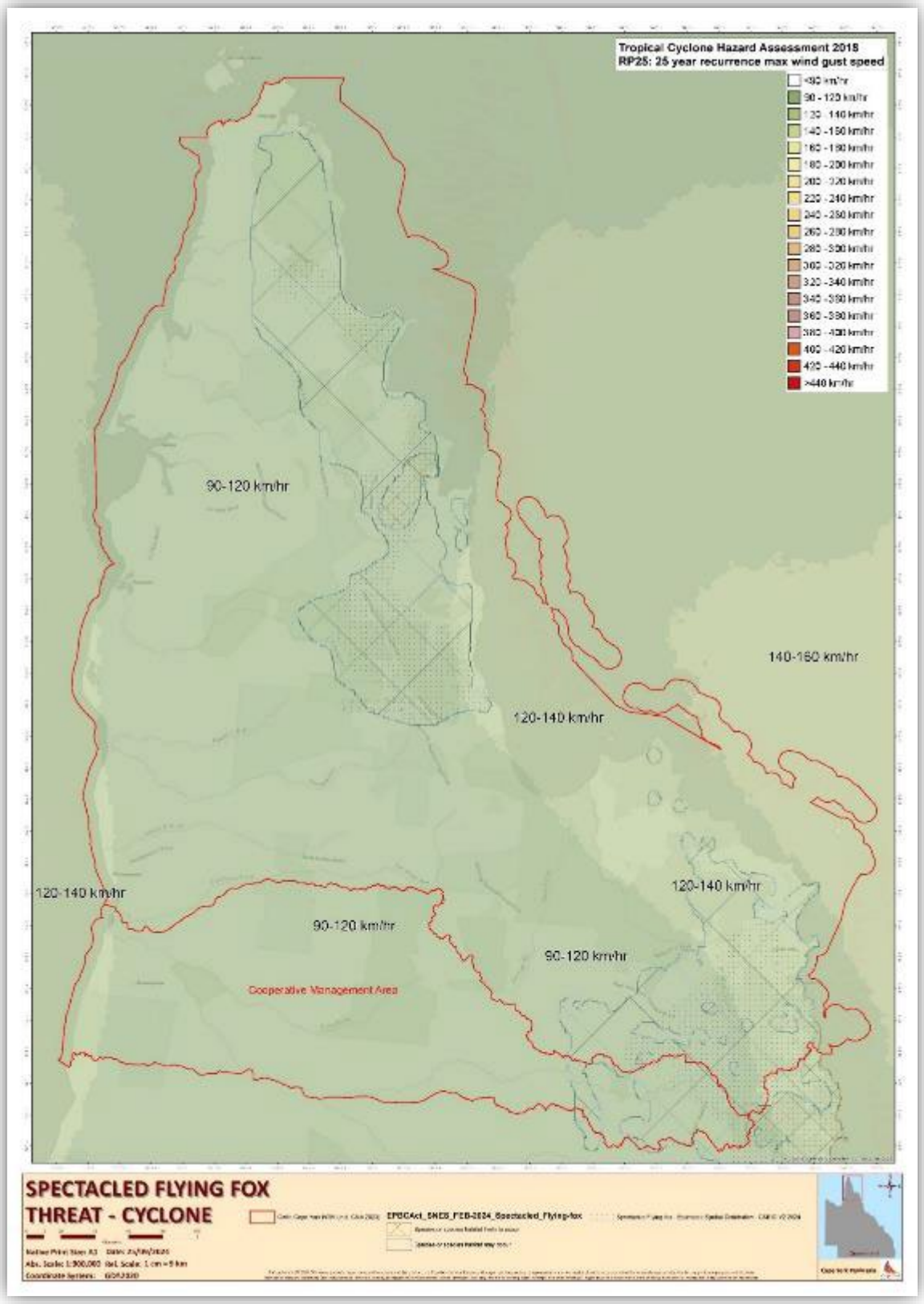
Map 46 - Eastern curlew: Cyclone



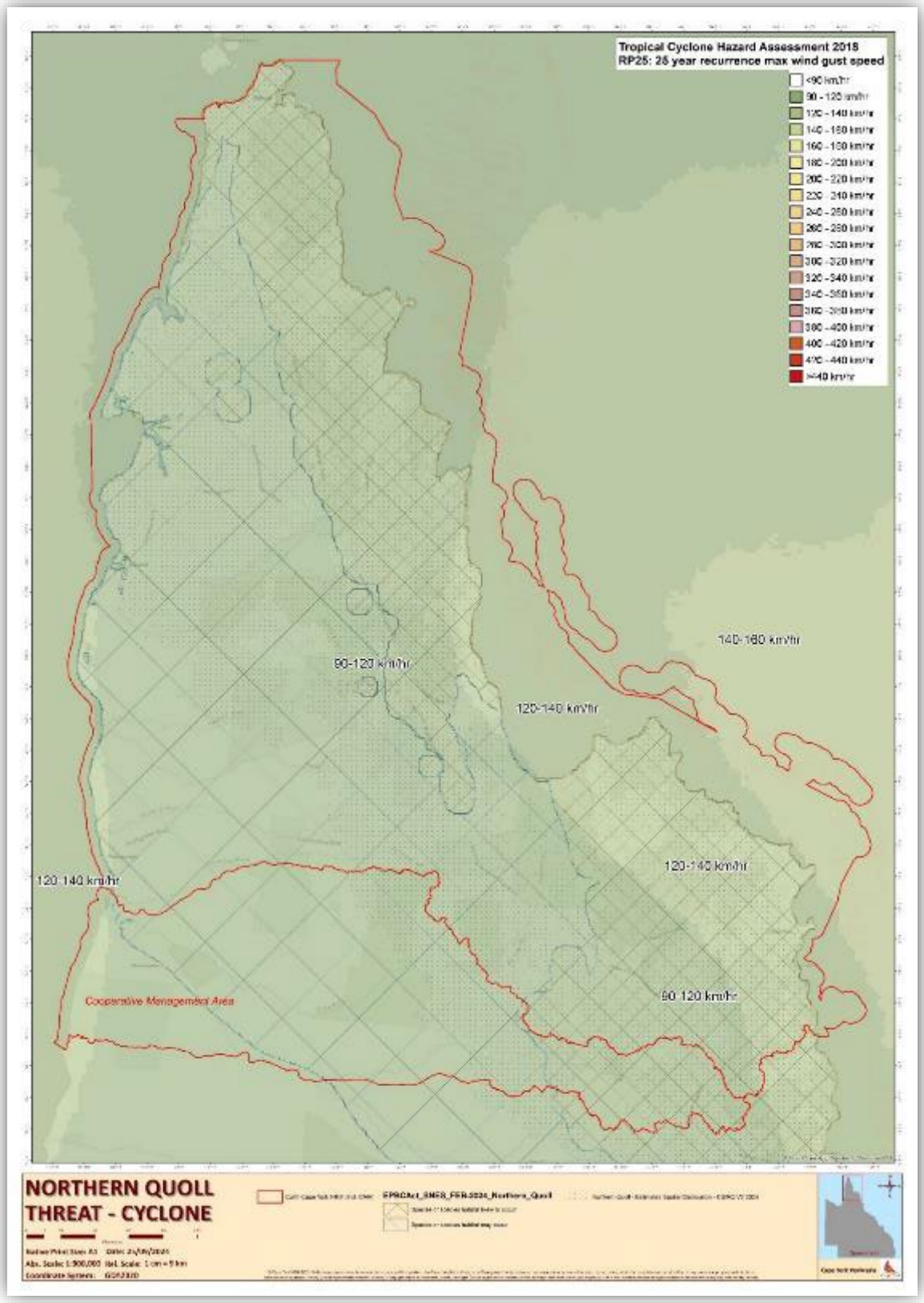
Map 47 - Palm cockatoo: Cyclone



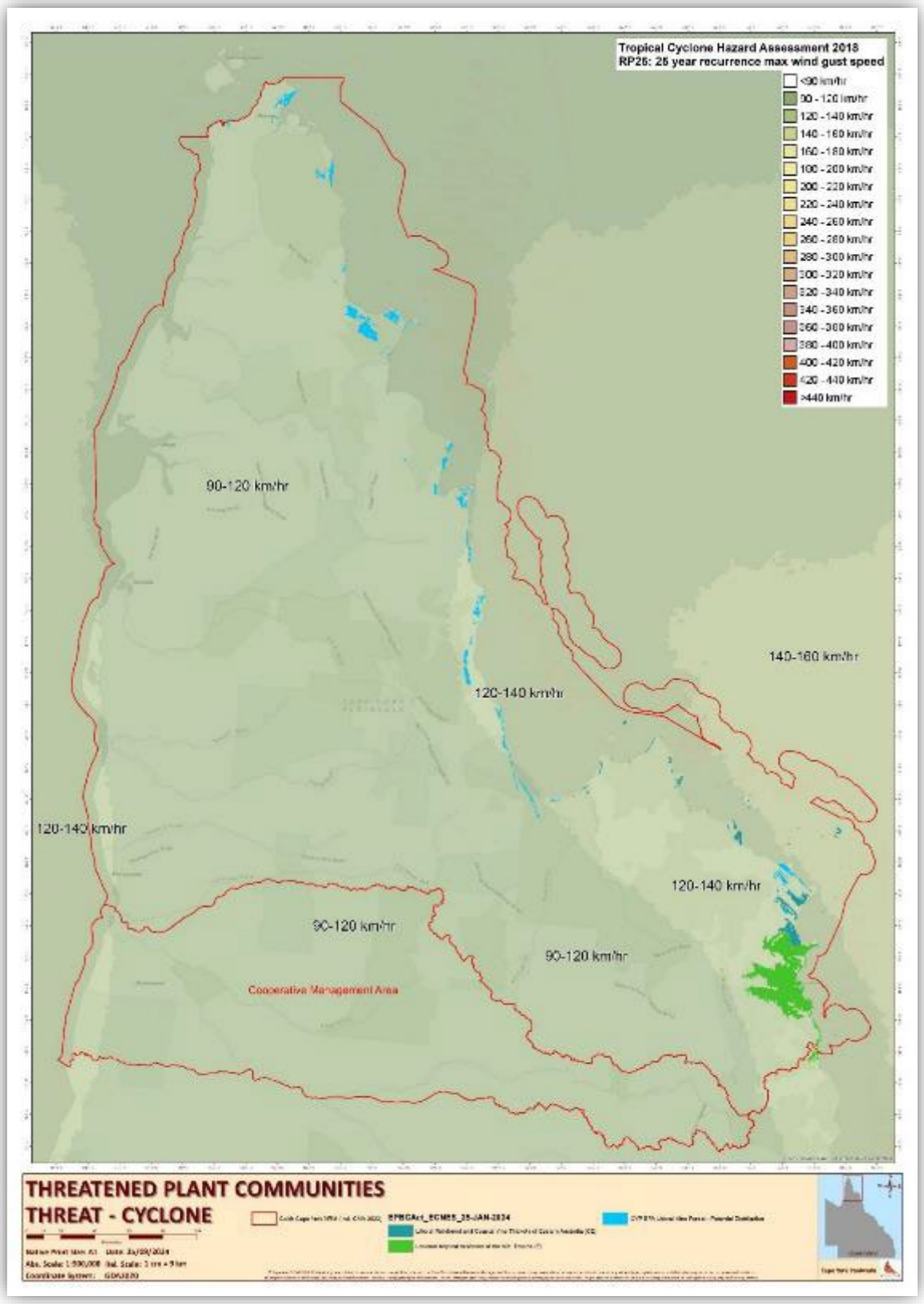
Map 48 - Spectacled flying fox: Cyclone



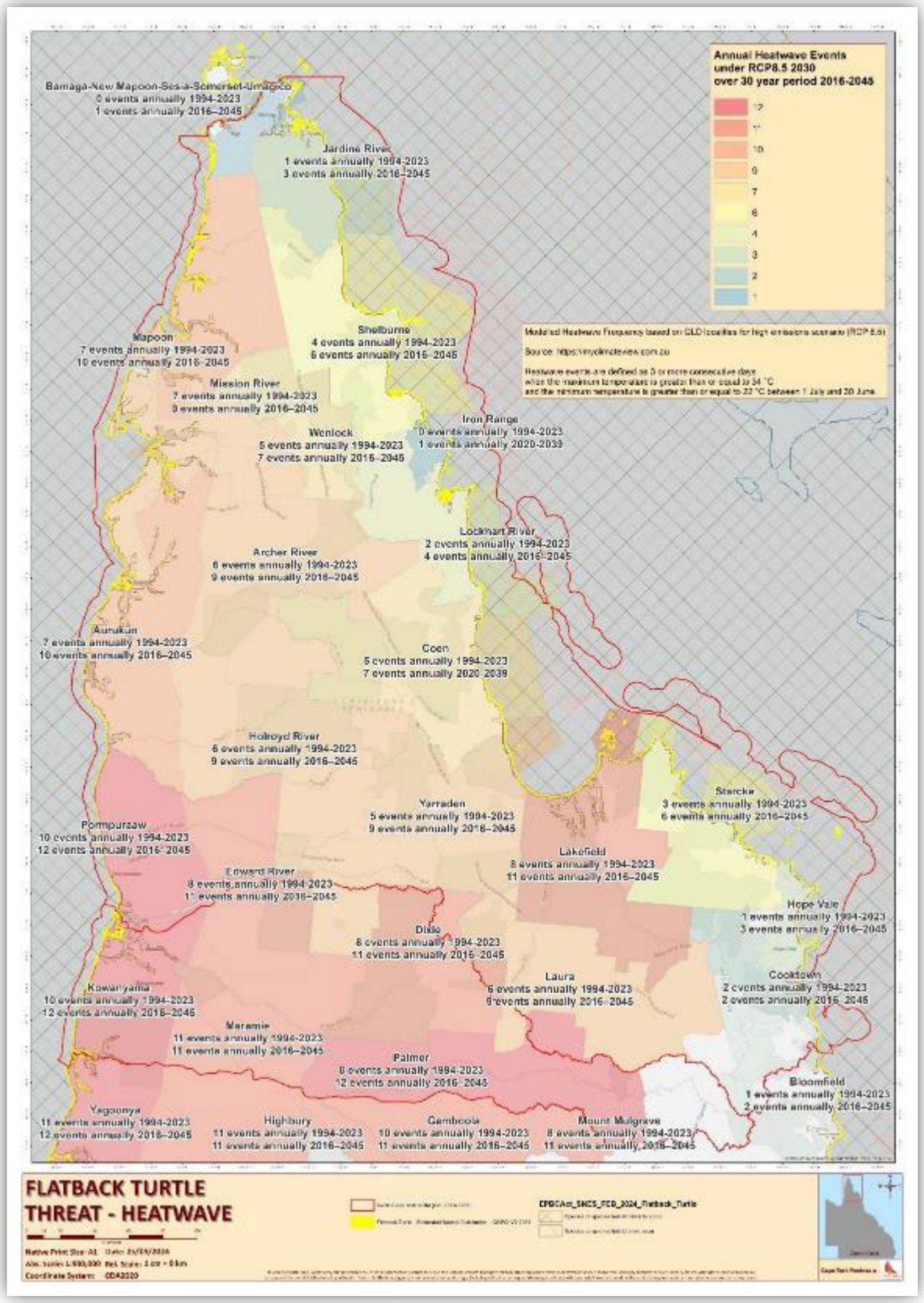
Map 49 - Northern quoll: Cyclone



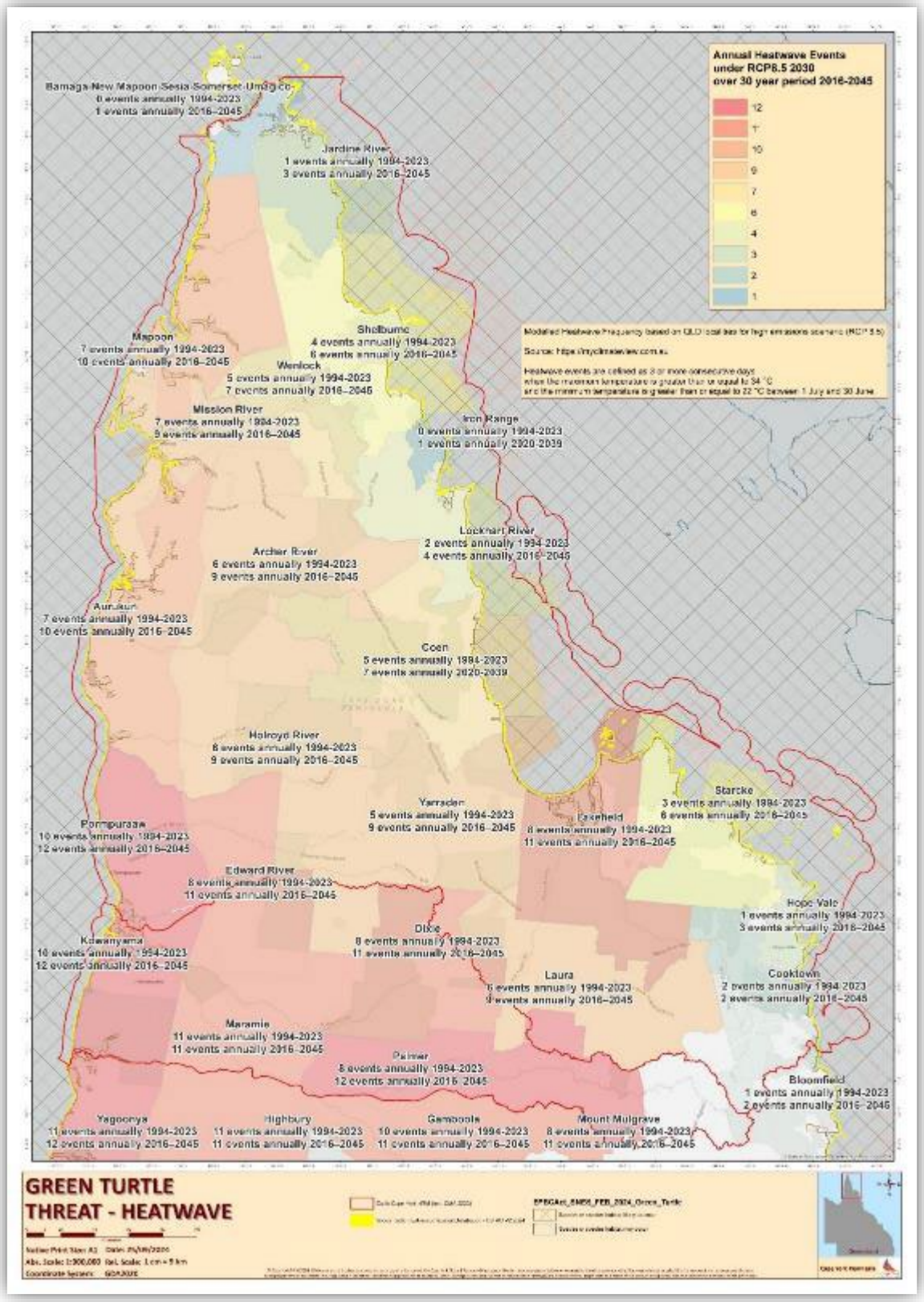
Map 50 - Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community: Cyclone



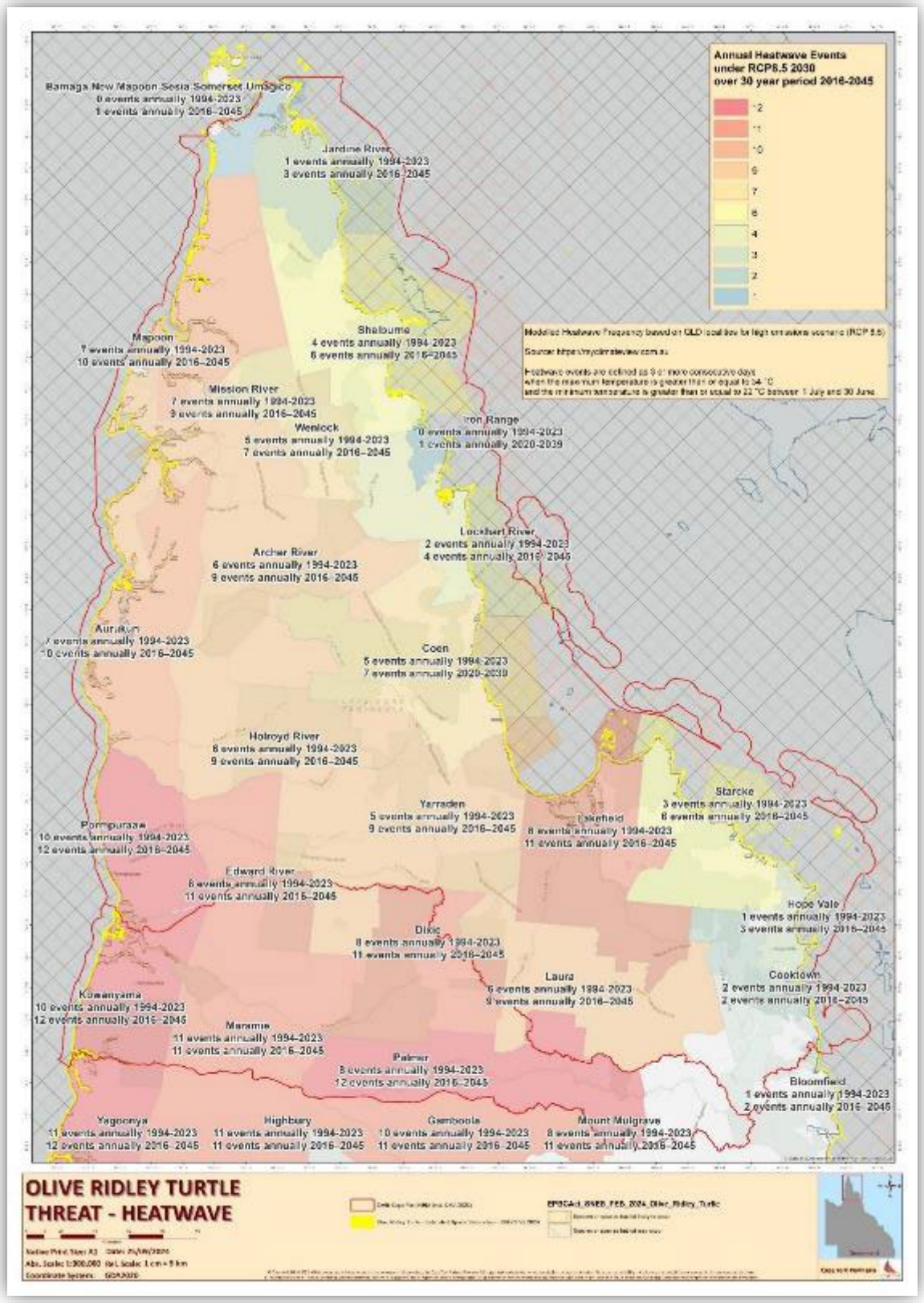
Map 51 - Flatback turtle: Heatwave



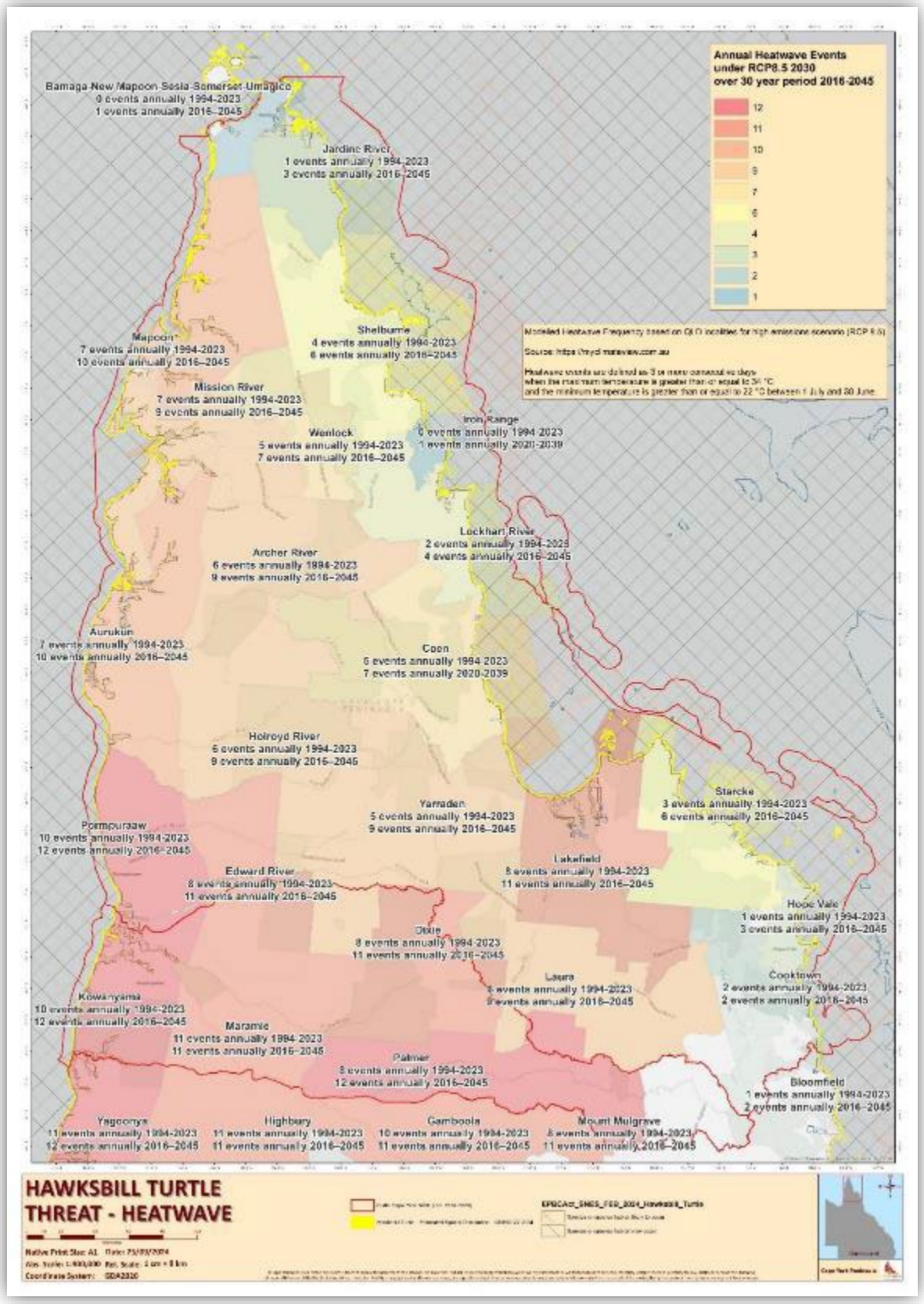
Map 52 - Green turtle: Heatwave



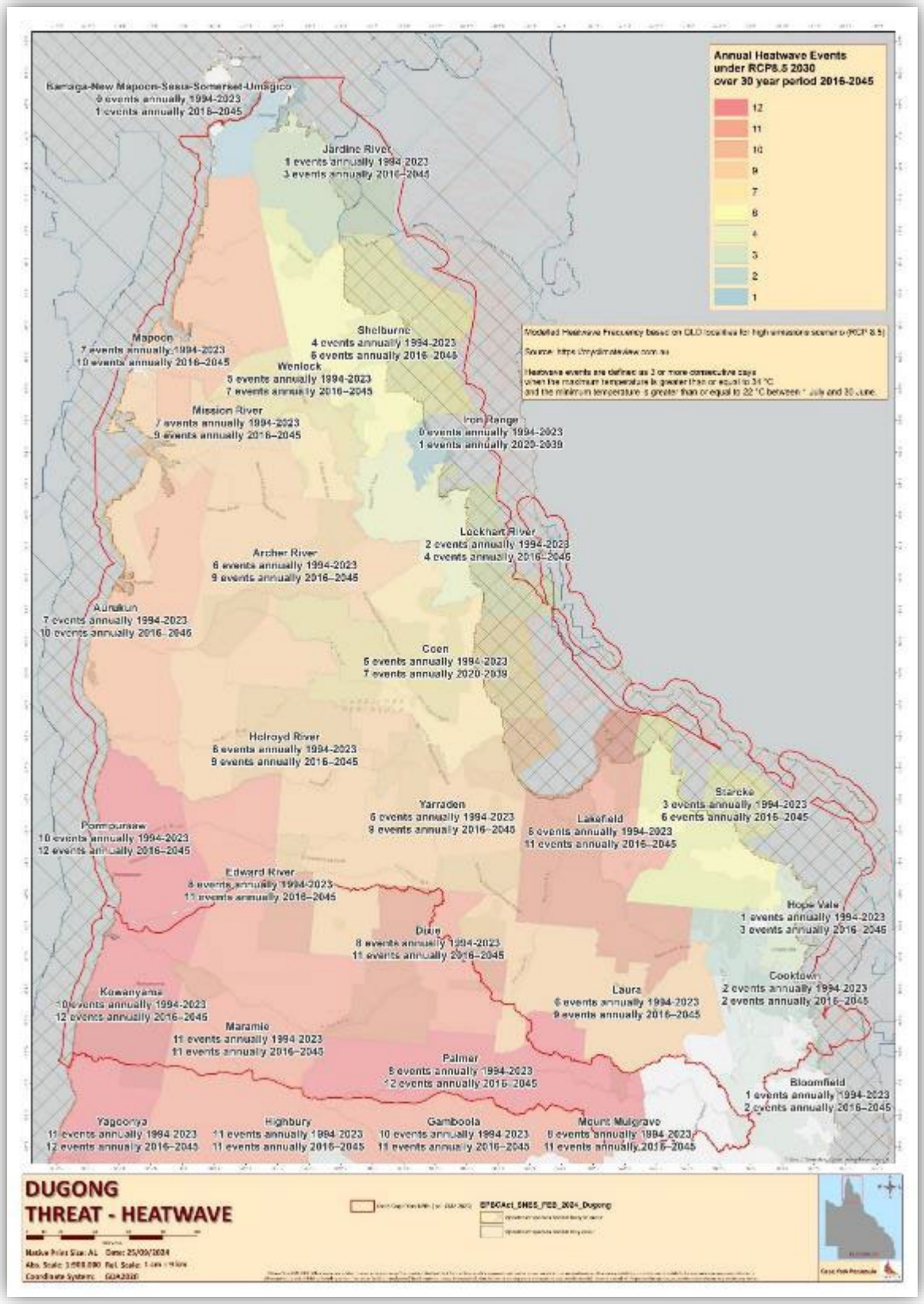
Map 53 - Olive Ridley turtle: Heatwave



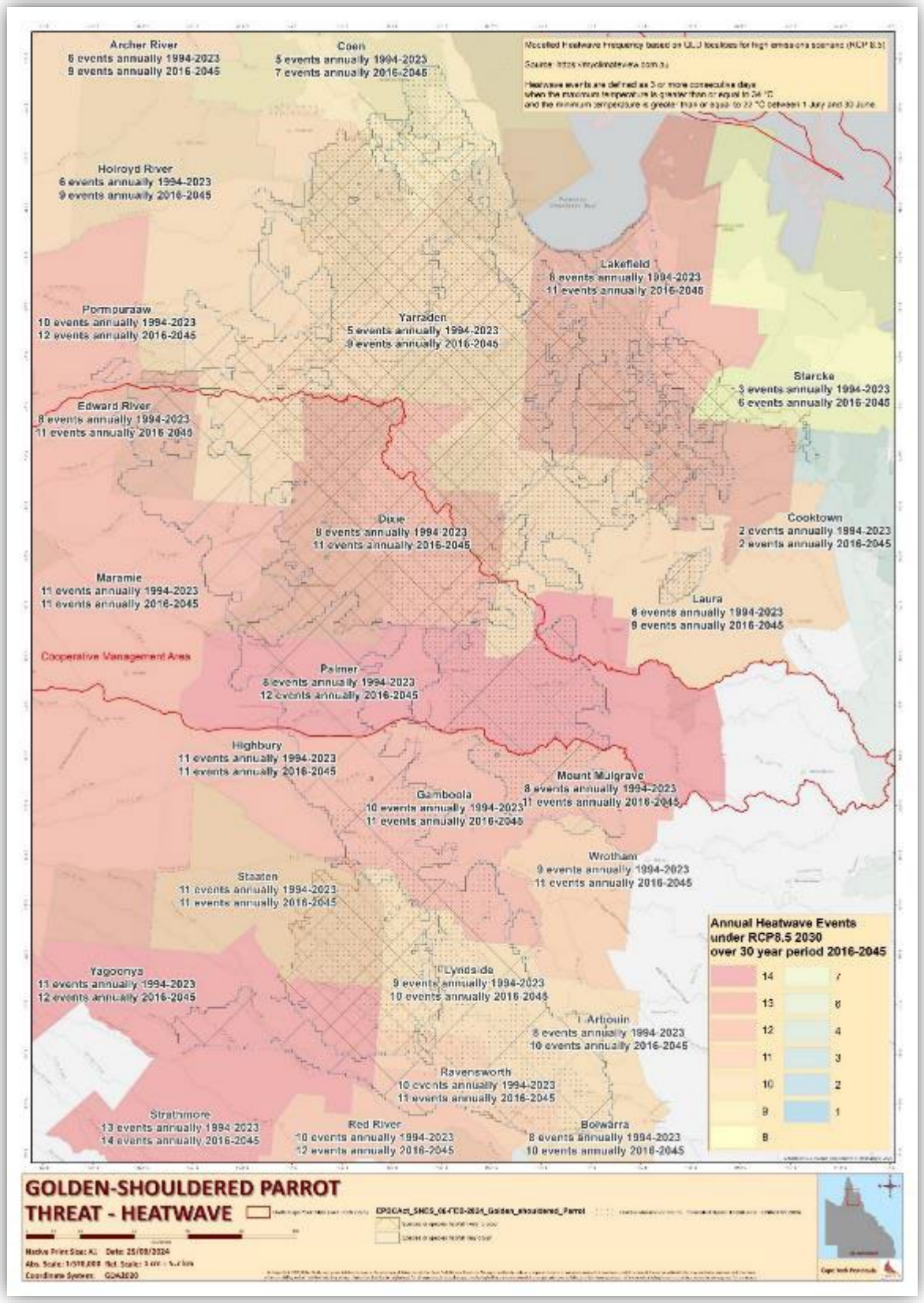
Map 54 - Hawksbill turtle: Heatwave



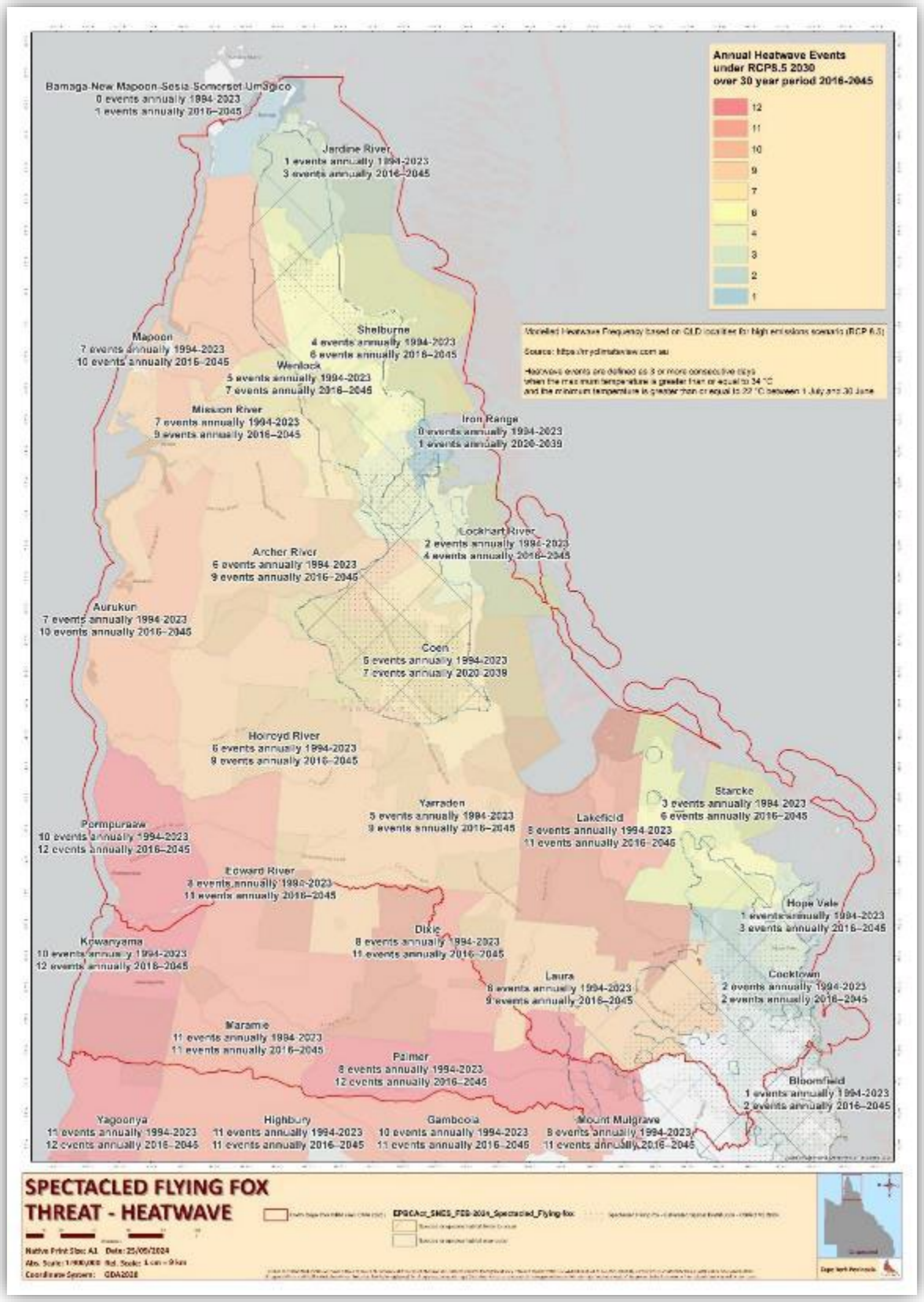
Map 55 - Dugong: Heatwave



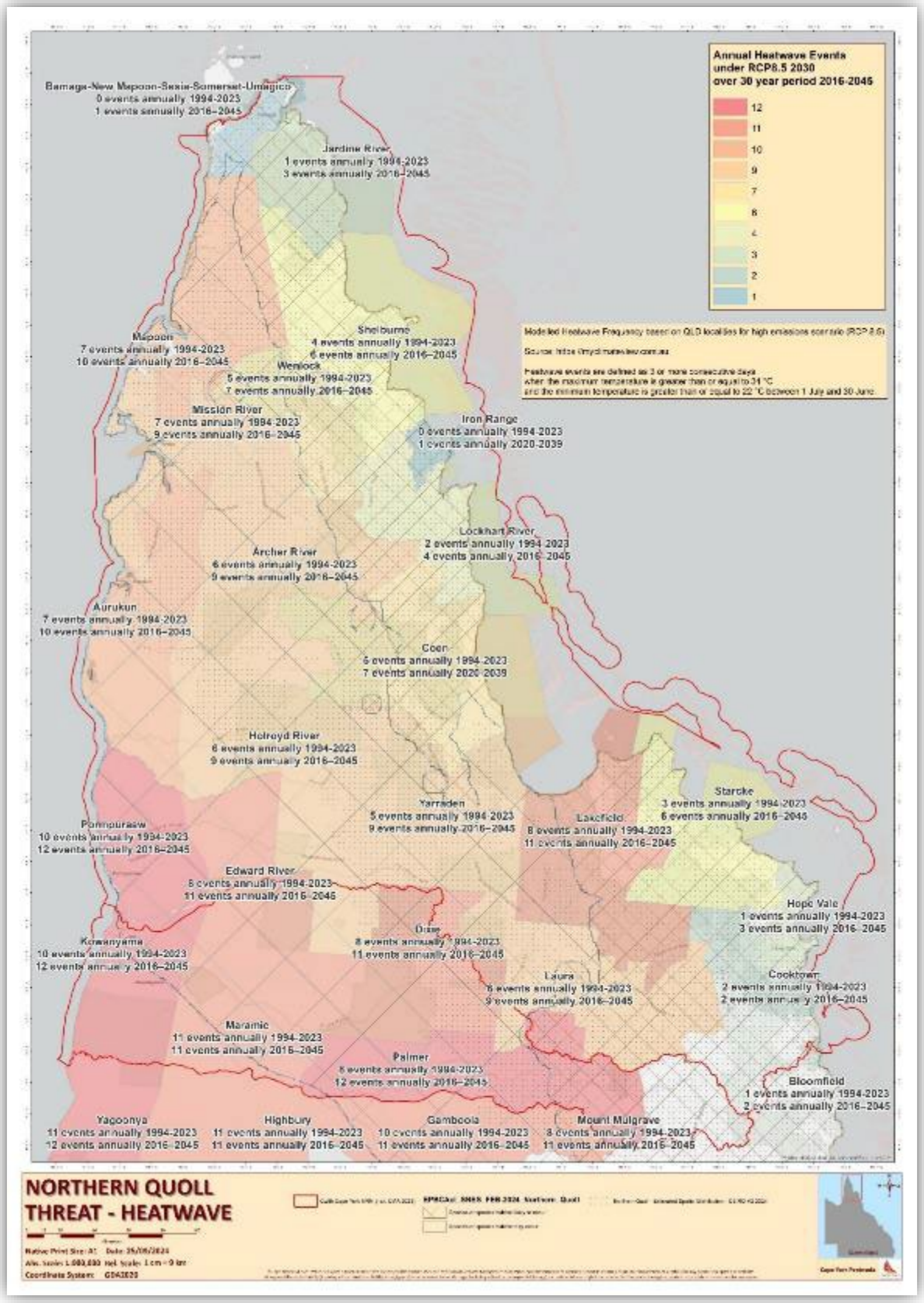
Map 56 - Golden-shouldered parrot: Heatwave



Map 57 - Spectacled flying fox: Heatwave

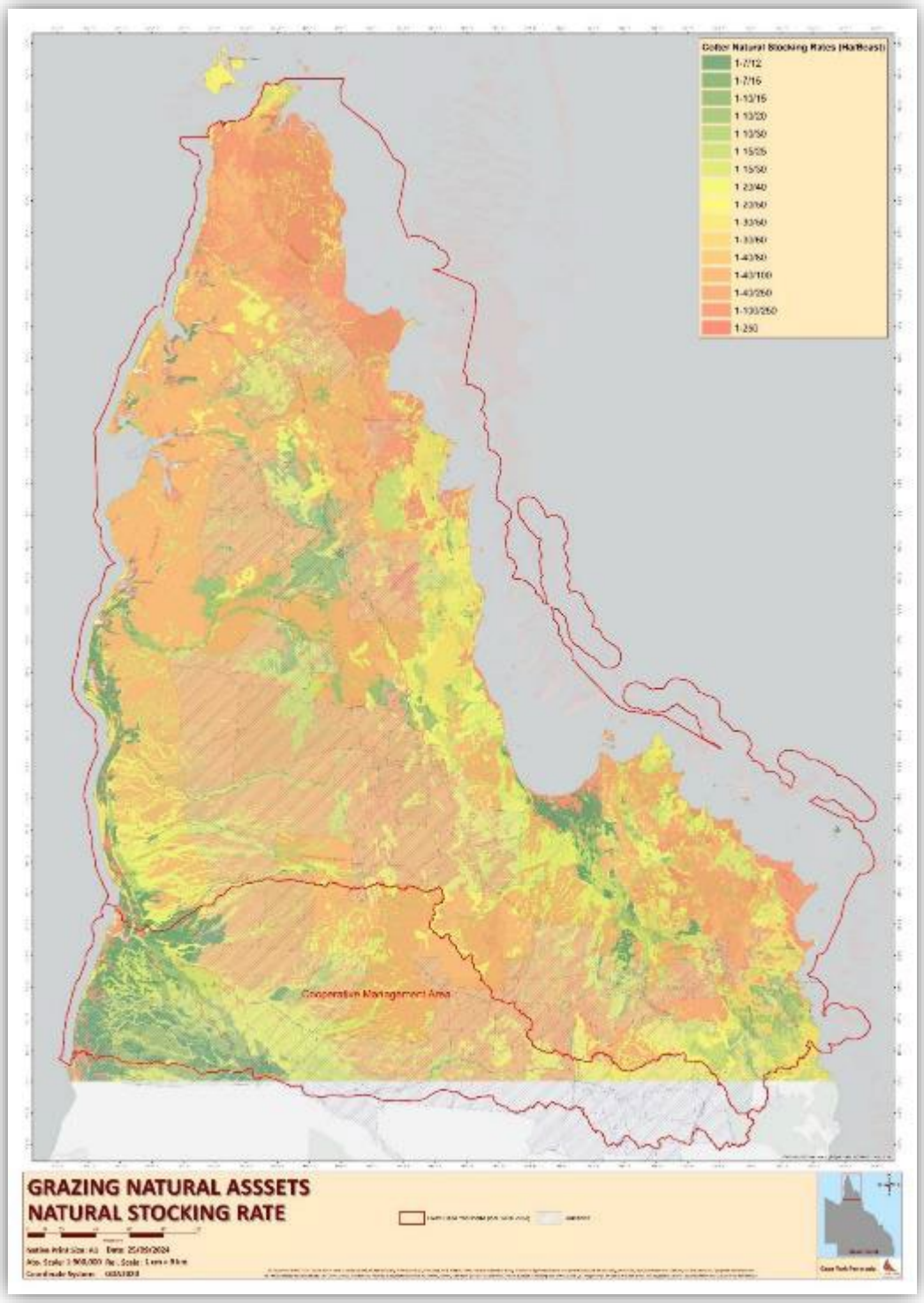


Map 58 - Northern quoll: Heatwave

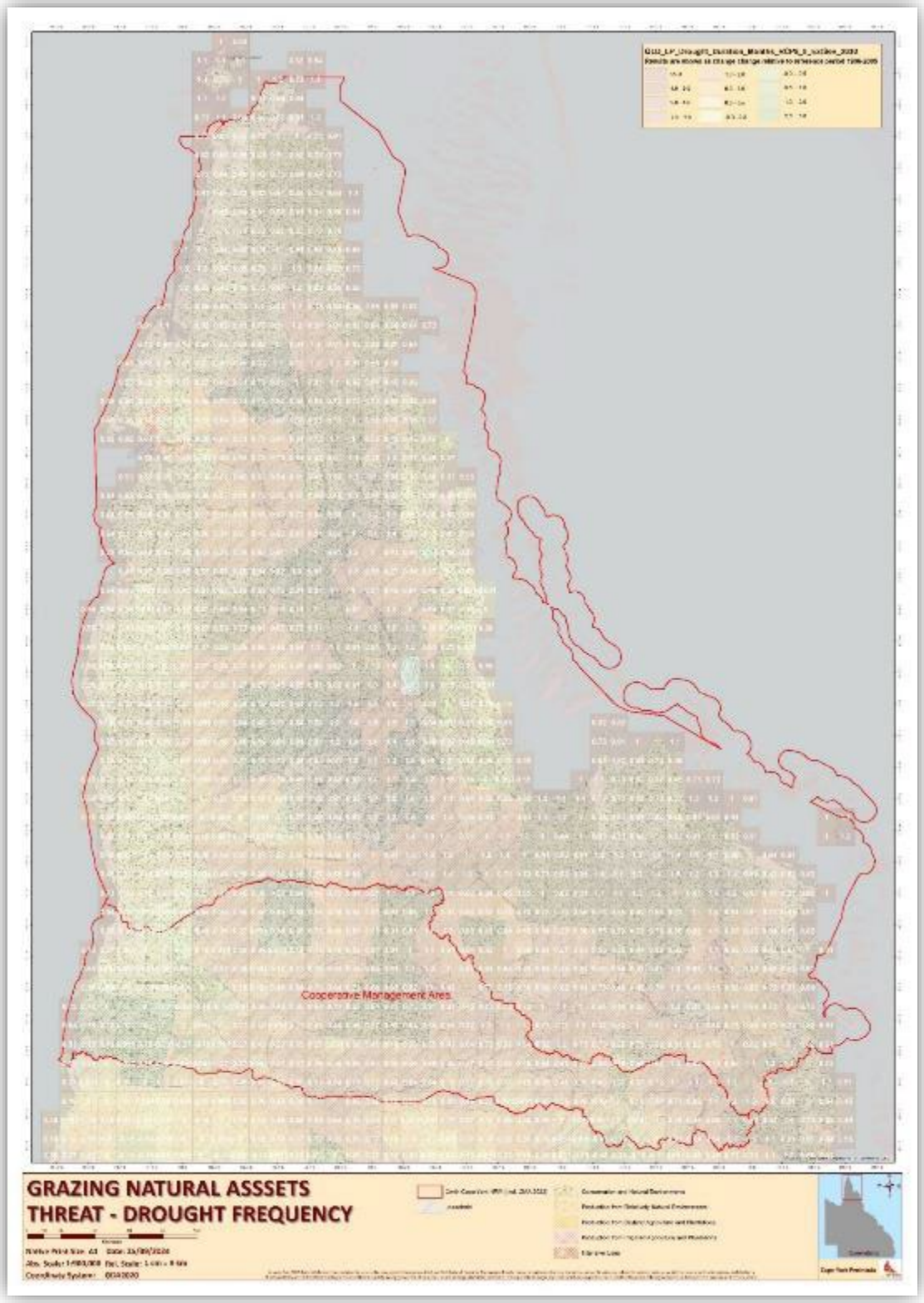


APPENDIX 4: AGRICULTURAL NATURAL CAPITAL ASSET AND THREAT SPATIAL MAPPING

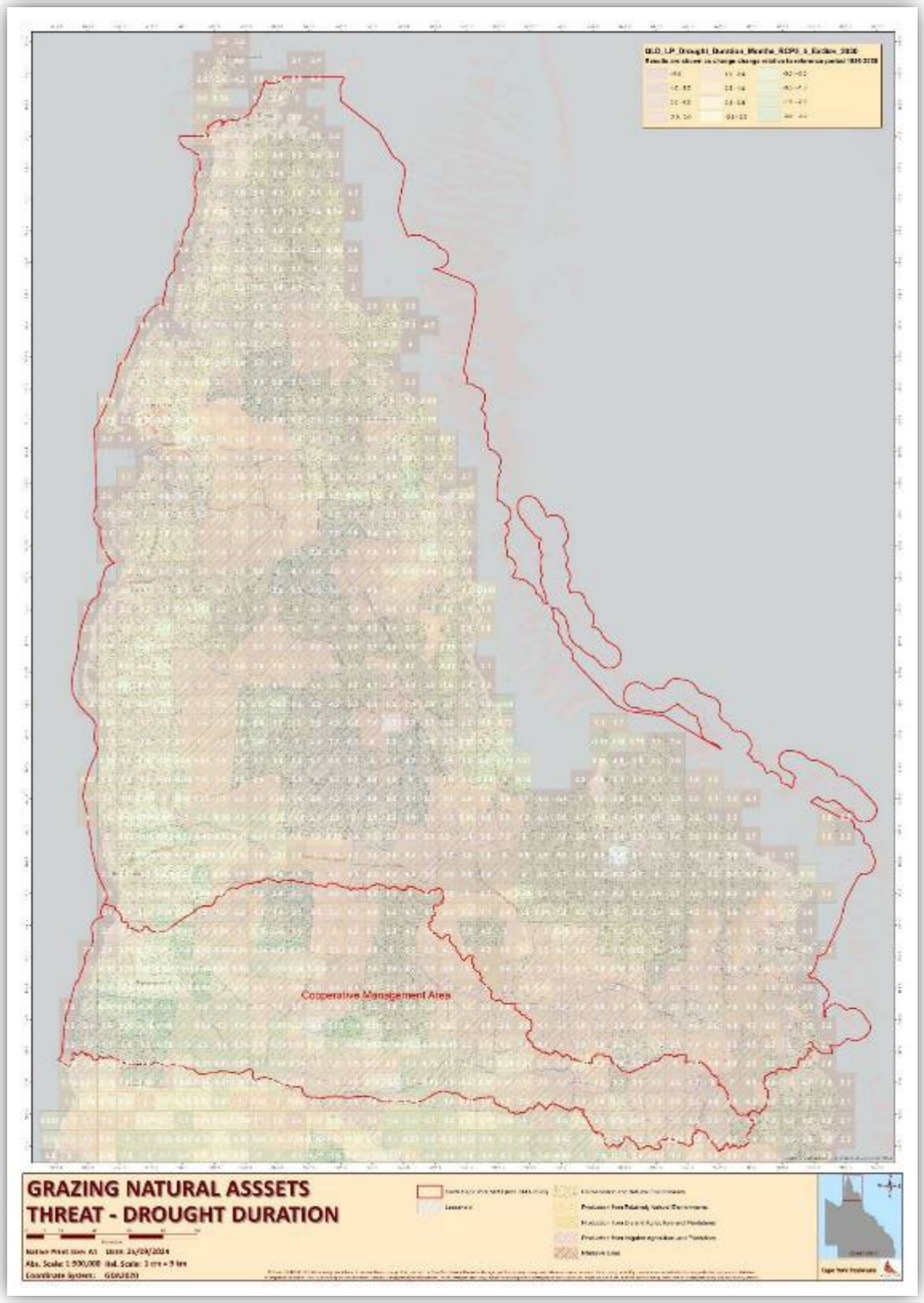
Map 59 - Grazing assets: Natural stocking rates



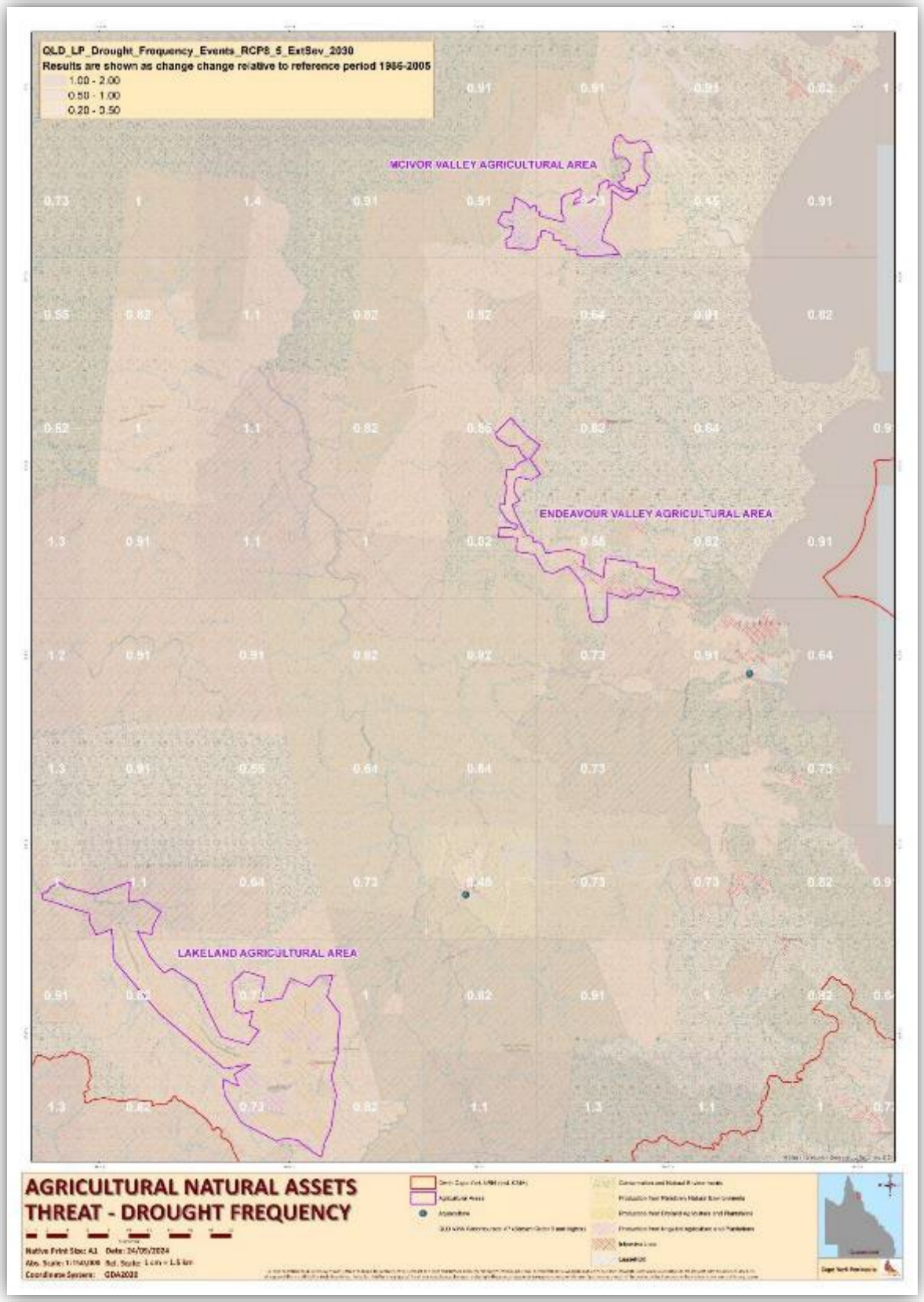
Map 60 - Grazing assets: Drought frequency



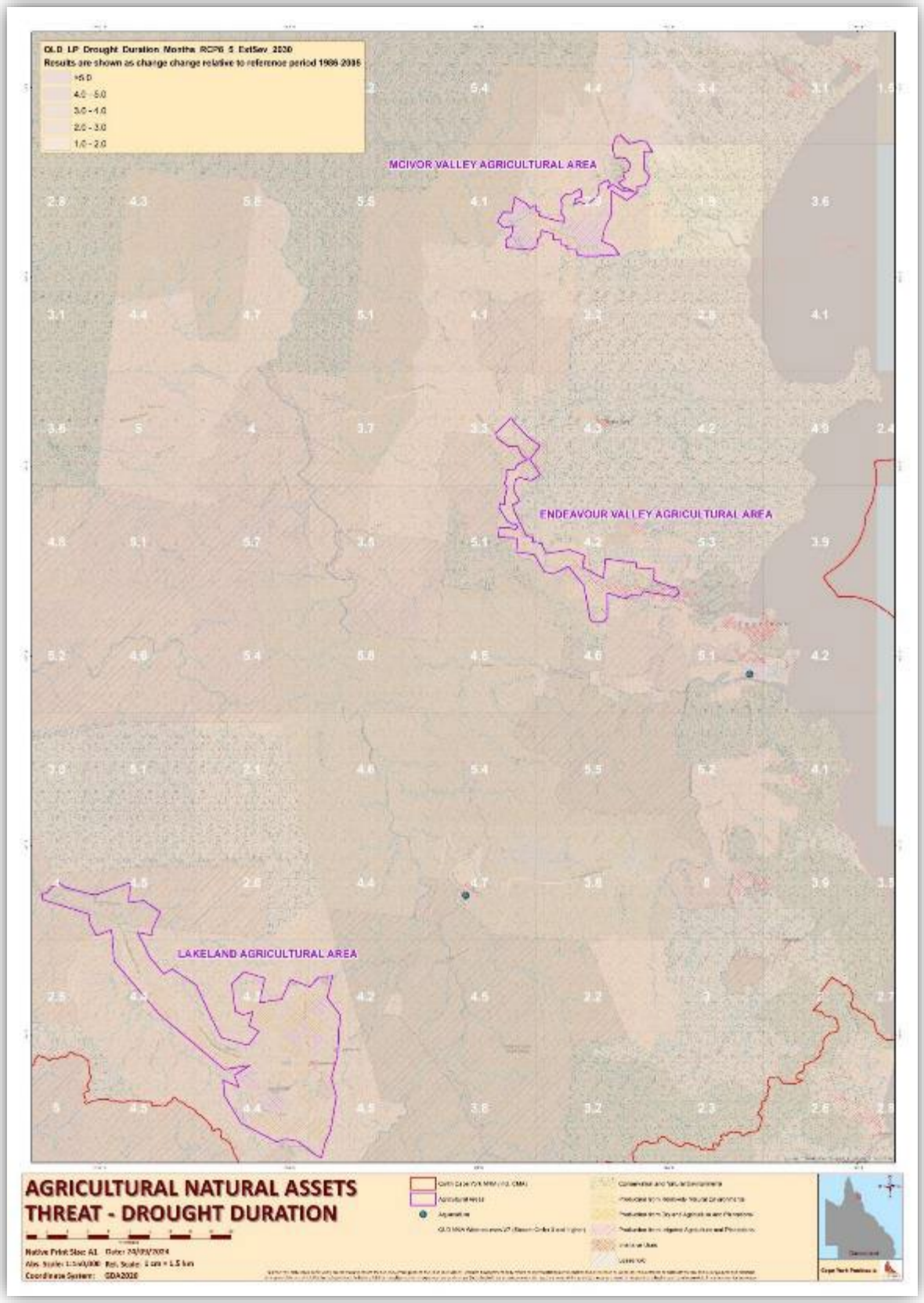
Map 61 - Grazing assets: Drought duration



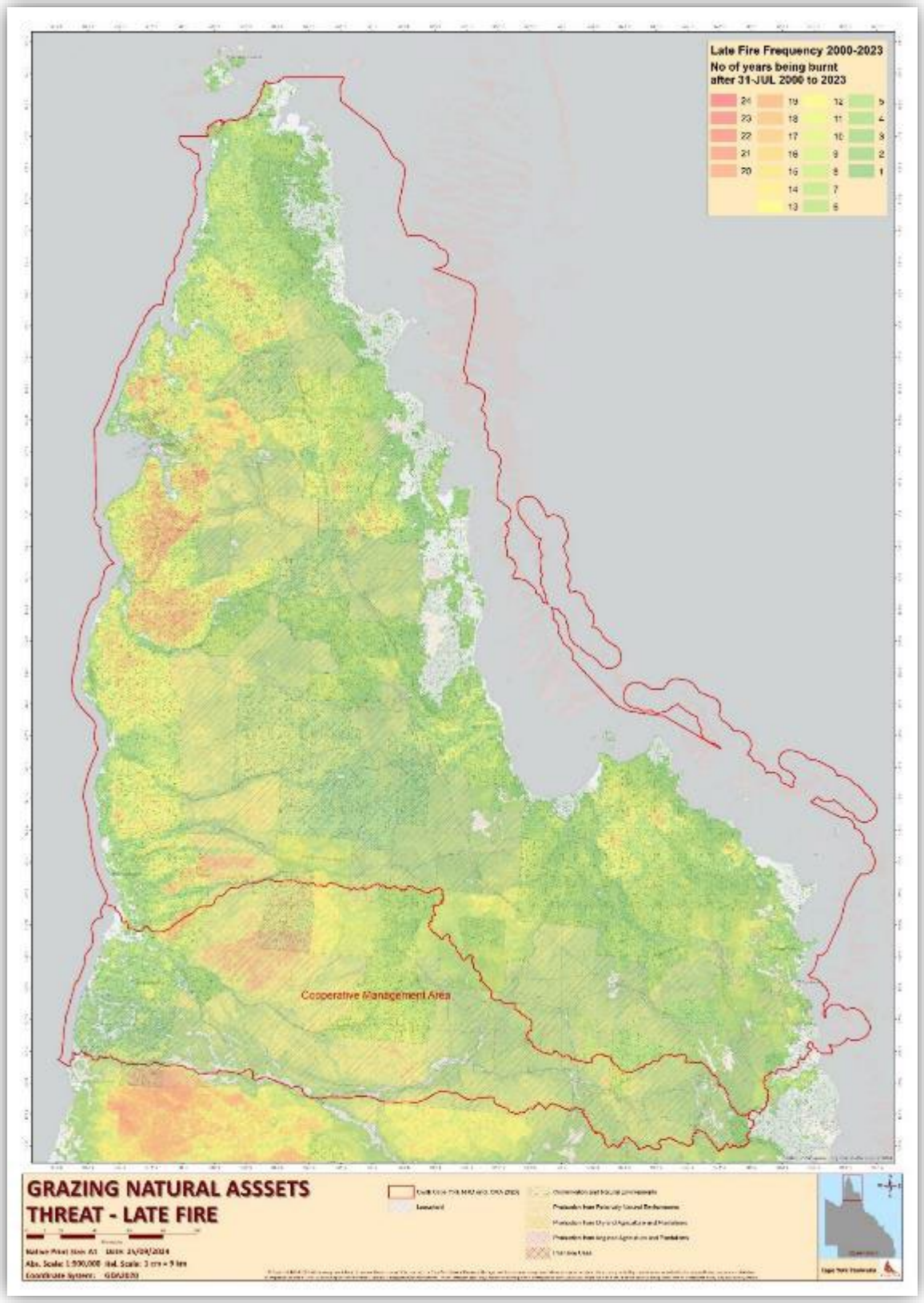
Map 62 - Agricultural assets: Drought frequency



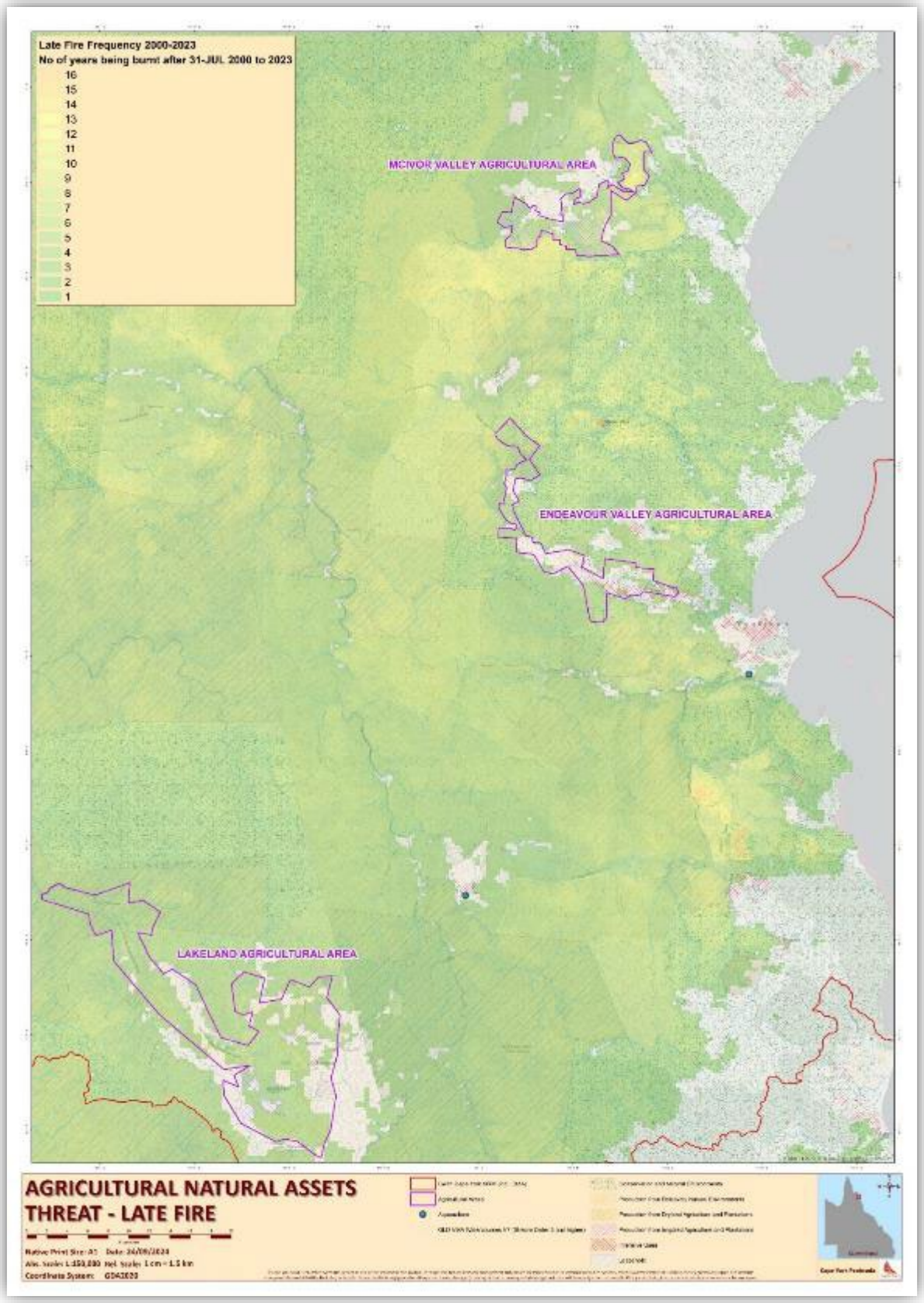
Map 63 - Agricultural assets: Drought duration



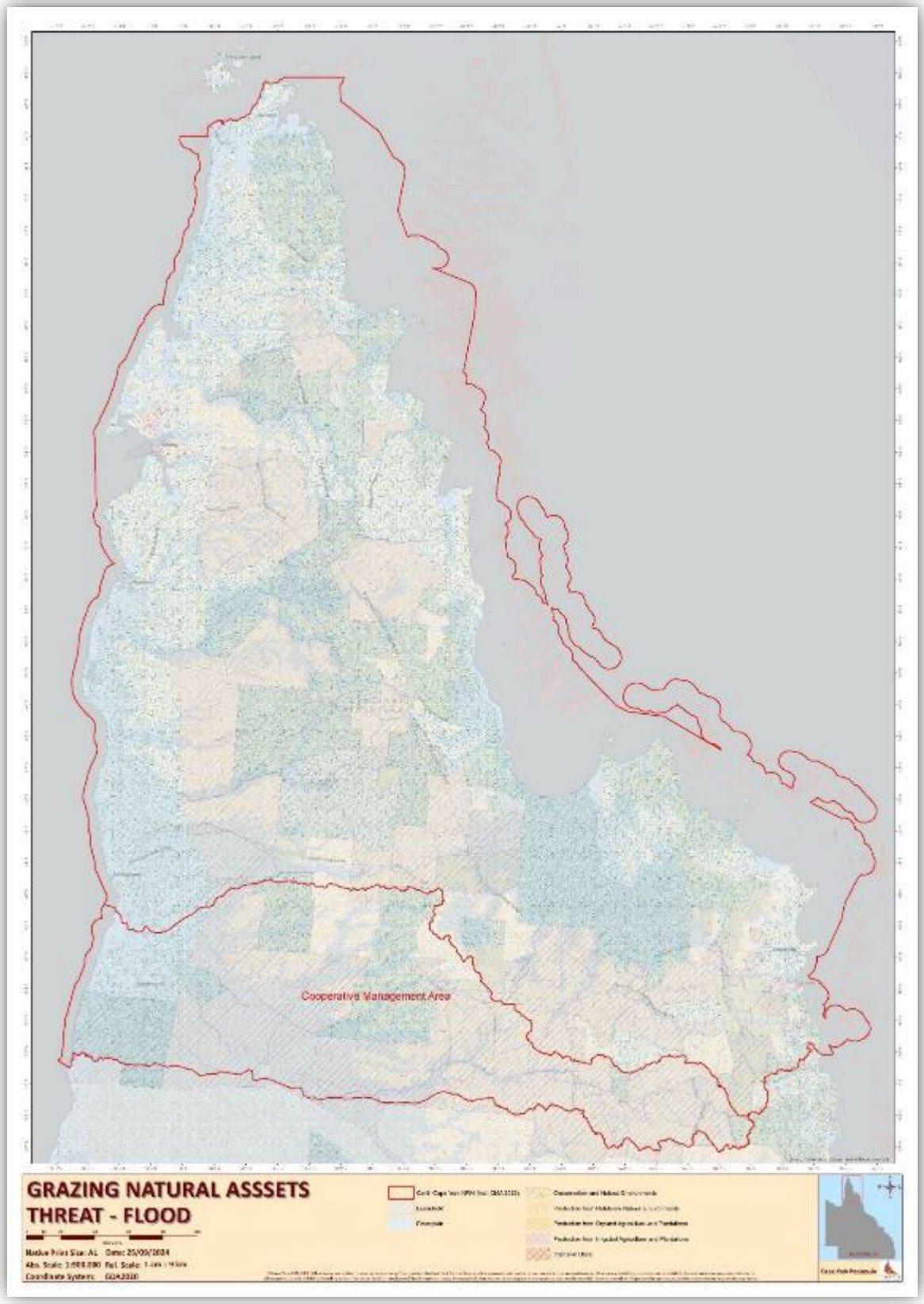
Map 64 - Grazing assets: Late-season fire frequency



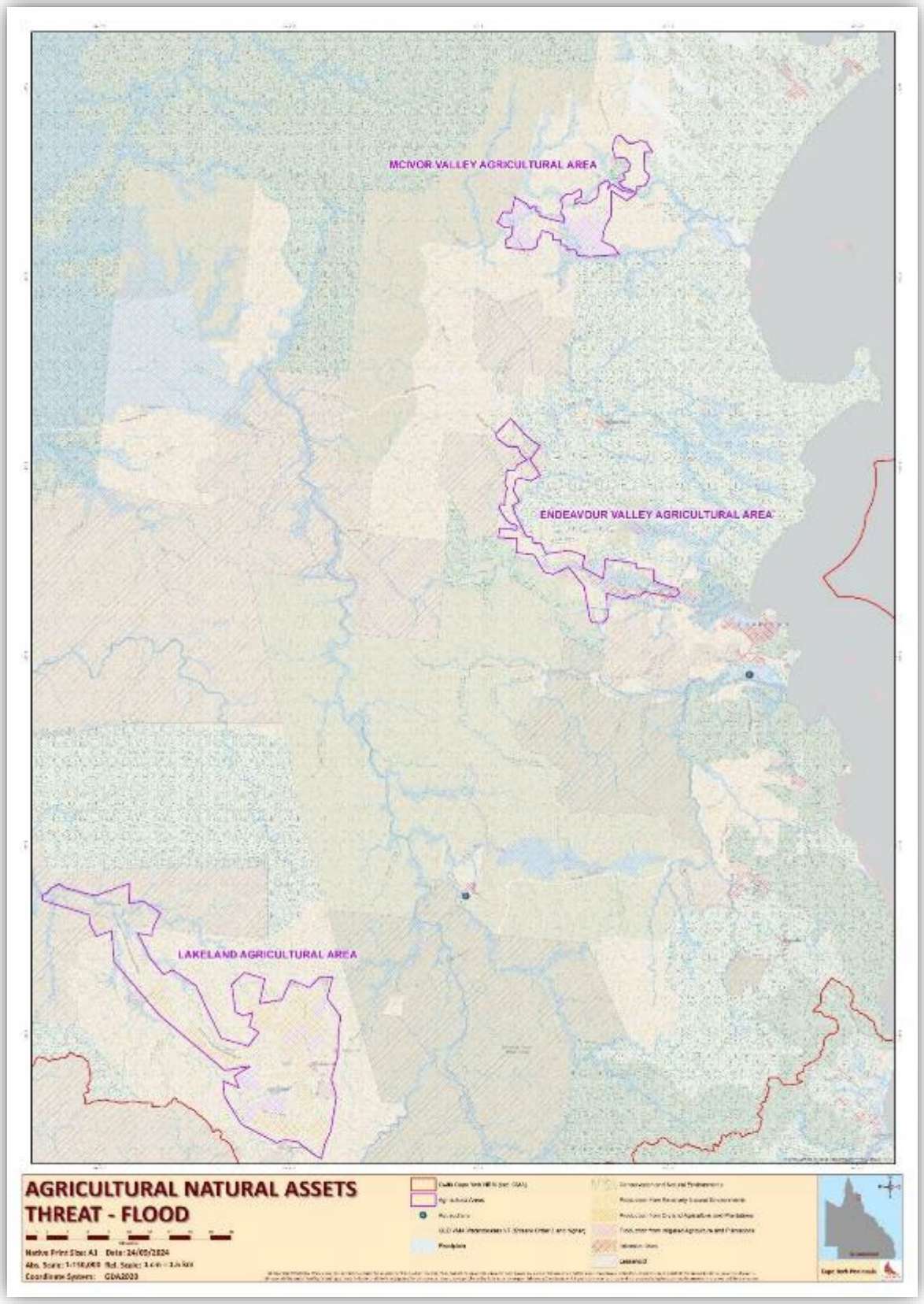
Map 65 - Agricultural assets: Late-season fire frequency



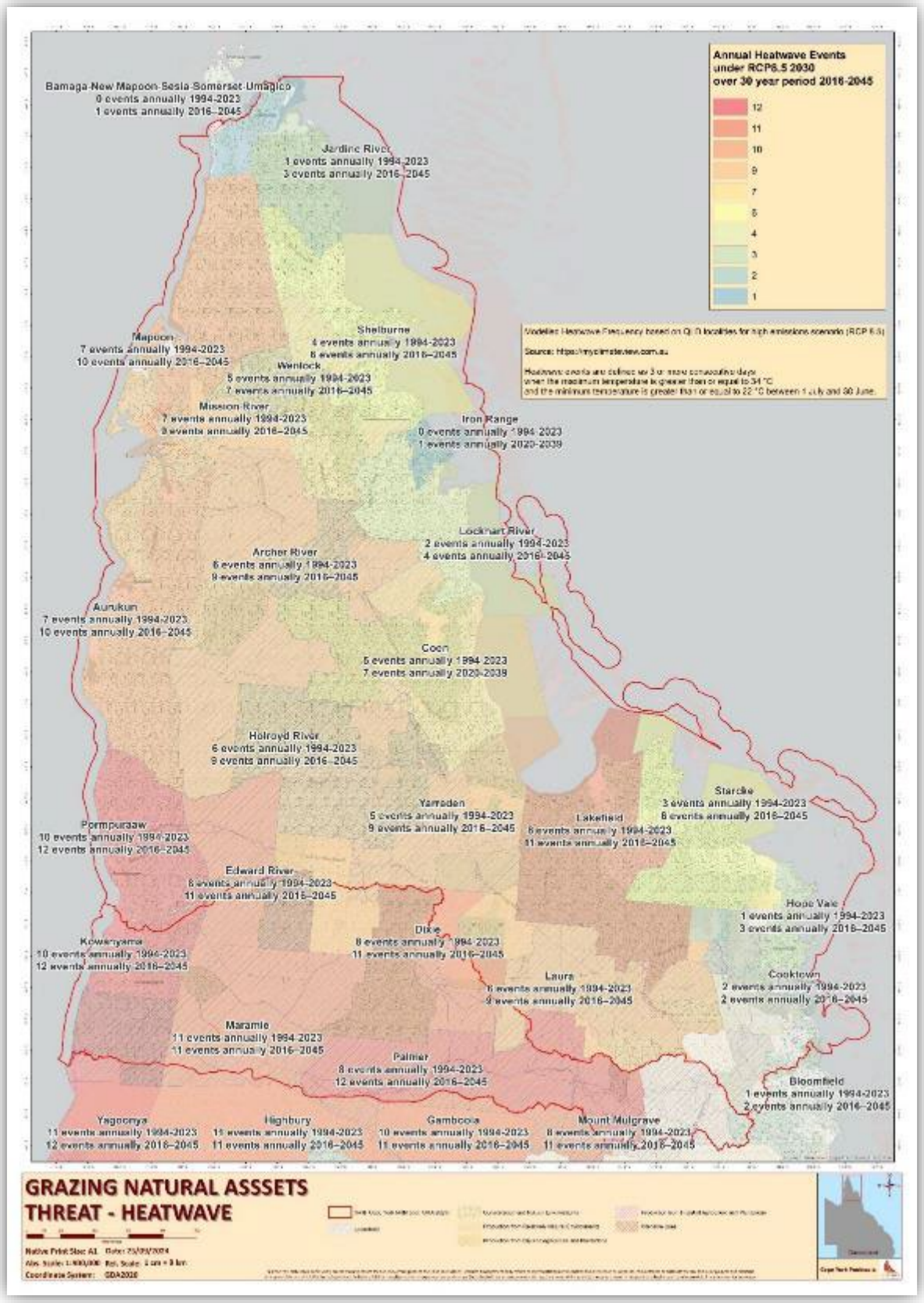
Map 66 - Grazing assets: Flood



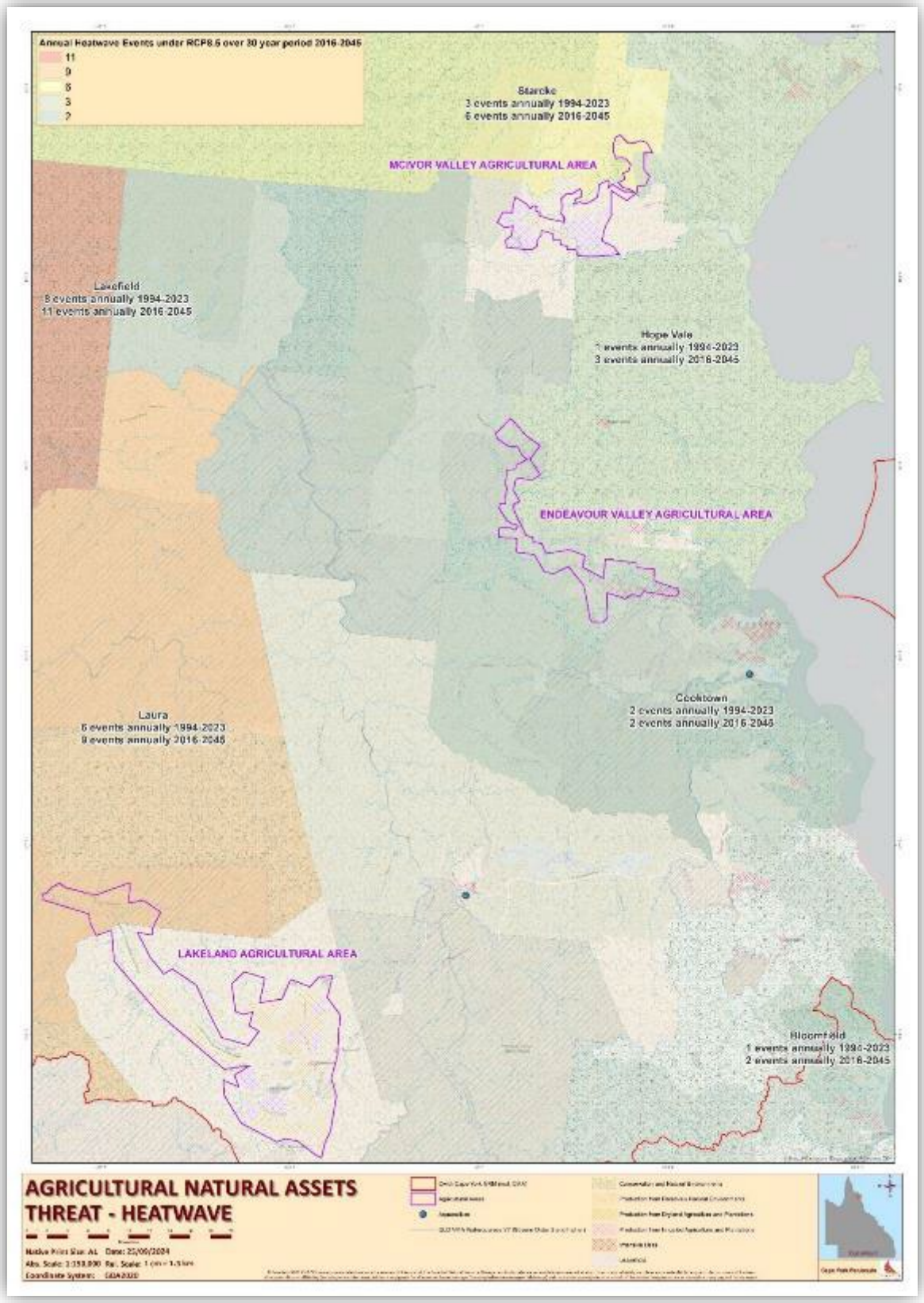
Map 67 - Agricultural assets: Flood



Map 68 - Grazing assets: Heatwave



Map 69 - Agricultural assets: Heatwave



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