OVERVIEW OF THE
NORTHERN GULF REGION
NATURAL RESOURCE
MANAGEMENT PLAN

2017-2022

NORTHERN GULF
RESOURCE MANAGEMENT GROUP

MESSAGE FROM THE CHAIR

This Natural Resource Management (NRM) Plan is a collection of your insights, recommendations, and life-long wisdoms. Layered and woven amongst your perspectives are the science and the policy that connect this NRM Plan to other ways of knowing and living on country.

The Northern Gulf regional NRM Plan is an integrated, forward-looking, and optimistic expression of our collective regional intent. It gives us a regional road-map to help navigate the unpredictable future. The NRM Plan helps us deliver practical and positive NRM outcomes to the Northern Gulf region, such as:

- guiding regional NRM priorities for all stakeholders and sectors to collectively work towards, including industry, community and all levels of government;
- brokering collaborative partnerships, research and investment into priority areas and programs;
- directing regional NRM operations and activities; and
- responding to new and emerging opportunities and challenges.

This NRM Plan aims to be ambitious and realistic. The NRM Plan sets high goals for regional NRM outcomes in the Northern Gulf. These goals and activities are essential to our region's landscape health, and they are achievable.

The process of people coming together to make a plan is as important as the plan itself. This plan arises from a robust community-driven process. We intend to grow that process over the years ahead, revisiting our assumptions, updating the data, and adapting to our changing world.

The NRM Plan is freely available to inspire and align our individual actions toward a healthier country and healthier, more prosperous communities. It is a great privilege to commend this vital asset back into your hands.

John Brisbin, Chair

ACKNOWLEDGEMENT

The Northern Gulf region is home to many languages and tribal groups, including the Bar Barrum, Djungan and Muluridji people of the Upper Mitchell Catchment, the Ewamian, Tagalaka and Western Yalanji people of the Grazing Lands, and the Gkuuthaarn, Kukatj, Kurtijar, Koko Berrin, Yir Yoront and Kunjen people of the Gulf Coast and Gulf Plains.

We acknowledge these People, the Traditional Owners of the land within the Northern Gulf NRM Region, and pay our respects to their Elders both past and present.

CONTENTS

THE NORTHERN GULF REGION

The Northern Gulf region is located in the north-west corner of Queensland, just below Cape York Peninsula. The region is defined as a combination of the Mitchell, Staaten and Gilbert River Catchments (Figure 1). It is dominated by dry tropical savanna rangelands, however it contains a stretch of Gulf of Carpentaria coastline to the west and wet tropical rainforests to the east. The region contains four broad bio-regions: Cape York, the Wet Tropics, the Einasleigh Uplands and the Gulf Plains.

The Northern Gulf region's settlement pattern is dispersed, and clustered in the Upper Mitchell catchment and along the Gulf Coast, with a network of very small communities scattered throughout the Gulf Plains and Einasleigh Uplands.

OUR CLIMATE IS CHANGING

The Northern Gulf community is resilient and hard working. This has enabled them to endure many hard times in the last decade which included many catastrophic events:

- The 2009 floods which resulted in an area the size of Germany and France combined being inundated for eight weeks
- Cyclone Yasi devastated many properties and towns in the area
- A ban on the live export trade;
- Uncontrolled bushfires over 750,000 ha of the Etheridge Shire in 2012
- Three failed wet seasons creating water supply shortages across the region.

However, if the climate predictions are correct, Northern Australia should prepare for more of the same. Current trends and future projections indicate our region may experience:

- Increased incidence of destructive wild fires
- Increased intensity of high rainfall events (floods and cyclones)
- Increased storm surge and rising sea levels
- Longer dry seasons
- Continued warming of temperature, including more hot days.

In this context, we plan for the future. To be prepared for upheaval and increasing uncertainty, all stakeholders in the region will rely and build on existing community capital and manage natural capital sustainably to ensure the Northern Gulf region will continue to adapt, grow and prosper.
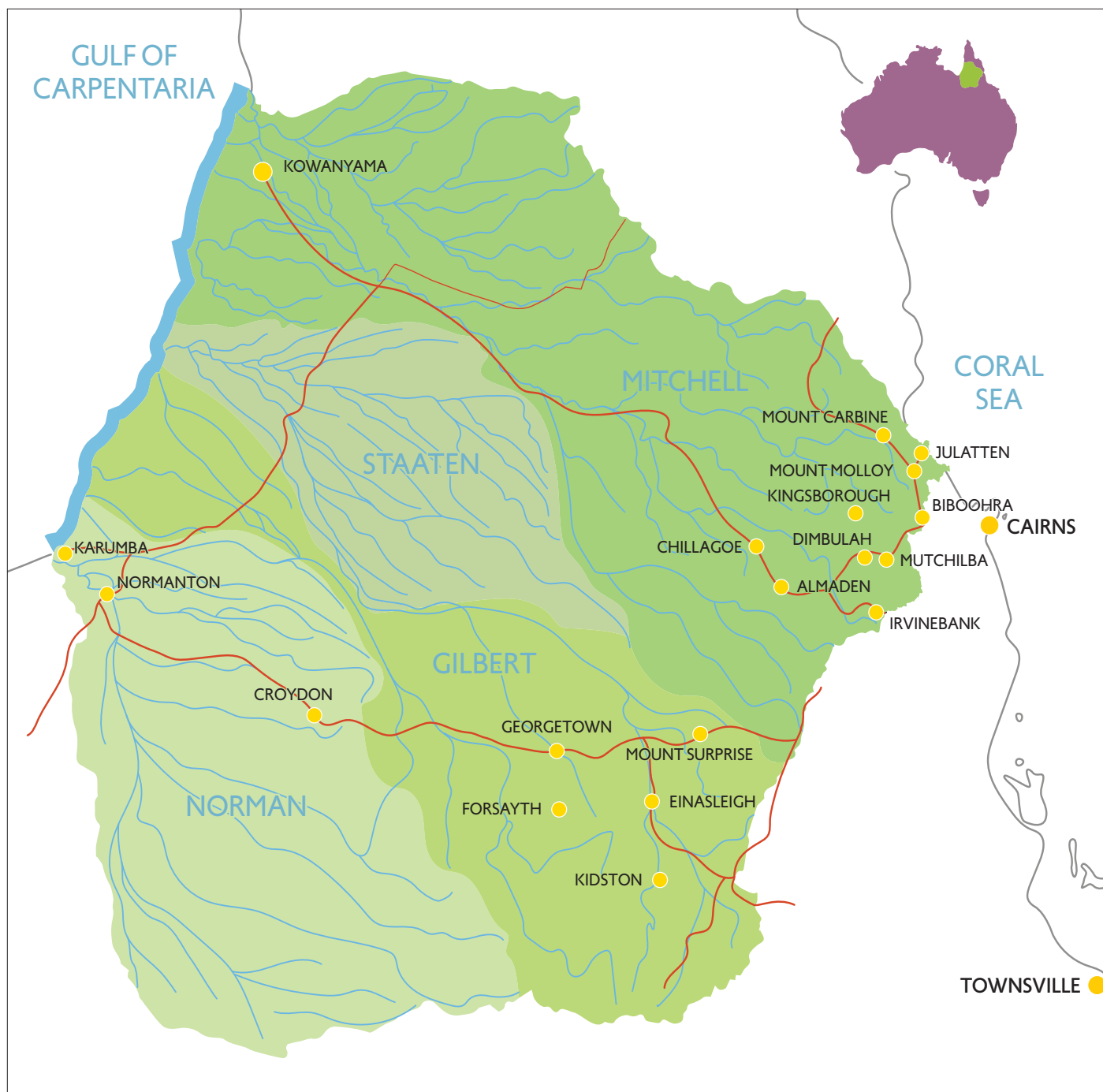
GULF OF
CARPENTARIA

KOWANYAMA

CORAL
SEA

MITCHELL

MOUNT CARBINE
JULATTEN

STAATEN

MOUNT MOLLOY
KINGSBOROUGH

BIBOOHRA

DIMBULAH

CAIRNS

KARUMBA

CHILLAGOE

MUTCHILBA

NORMANTON

ALMADEN

IRVINEBANK

GILBERT

CROYDON

GEORGETOWN

MOUNT SURPRISE

NORMAN

FORSAYTH

EINASLEIGH

KIDSTON

TOWNSVILLE

FIGURE I: The Northern Gulf Region is dominated by dry tropical svanna rangelands, with four river catchments as shown.
The region is very sparsely populated, with most small townships clustered to the east.

WHAT IS AN NRM PLAN?

The NRM Plan identifies threats and aspirations for the natural resources of a defined region. The NRM Plan combines science, on-ground intelligence, traditional knowledge, and community aspiration. It describes the strategies and priorities for meeting our goals.

Why

A plan is the best way to stay on track in an uncertain, changing world. In order to develop proper solutions to real problems, we plan. To create a healthier environment and more sustainable economy, we plan. To help our communities increase their resilience and capacity to handle drought, floods, and wildfires, we plan.

Who For

This NRM Plan is provided for the benefit of the regional community and the many participants who contributed to it. Northern Gulf is the custodian for the NRM Plan: we record, caretake, and synthesise a vast amount of relevant documentation so that everyone who wishes to benefit from the Plan can do so.

How

Our work to produce this NRM Plan involves preparing and developing the content, reviewing and consulting with the community, and then publishing the Plan in print and online.

What Next

For the NRM Plan to do its job, regional communities and stakeholders will increasingly refer to the NRM Plan as they go about their own work agendas. Councils, land managers, researchers, and special interest groups can all gain value by mapping their activities to the Northern Gulf NRM Plan. We will produce periodic progress reports that document the combined efforts in the region toward our shared goals.

When

This is a 5 year plan that is set for review in 2022.

The contents of this overview (top segment of Figure 2) provide a summary of the Northern Gulf Regional NRM Plan, however everything contained within this document is underpinned by a great deal more detail, activities, assessments and citations. If you would like to access this information, it is all housed in our NRM Plan website at www.plan.northerngulf.com.au.
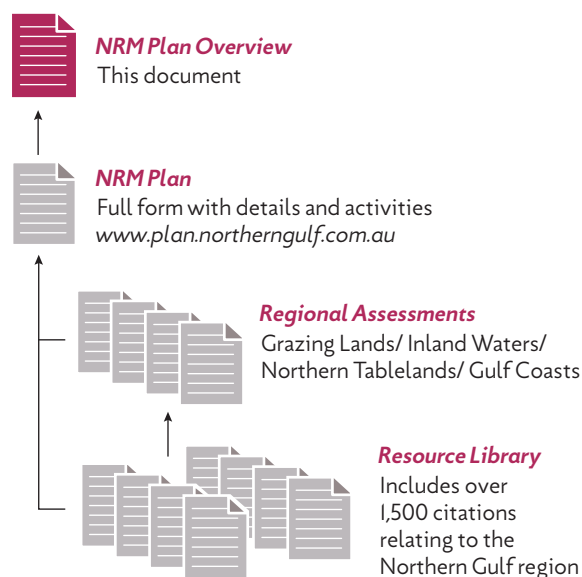
NRM Plan Overview
This document

NRM Plan
Full form with details and activities
www.plan.northerngulf.com.au

Regional Assessments
Grazing Lands/ Inland Waters/ Northern Tablelands/ Gulf Coasts

Resource Library
Includes over 1,500 citations relating to the Northern Gulf region

FIGURE 2: This overview document is a summary of several levels of documentation, consultation and planning.

THE PLANNING PROCESS

The NRM Planning (2017-2022) for the Northern Gulf region followed the process of collecting evidence, engaging the community, and prioritising actions through a robust and thorough assessment process towards developing the NRM Plan.

1. Gathering Evidence

To develop a strong evidence base for the NRM Plan, the planning team reviewed and collated over 1500 citations, including scientific papers, reports, strategies and other plans. This information was then collated into a series of Regional Assessments, which were reviewed by a network of 40 scientists with first-hand knowledge of the region.

2. Community Engagement

To gain local knowledge and establish community priorities, the planning team:

- Conducted a community survey involving 123 people
- Consulted with 54 Traditional Owners, and 7 Aboriginal organisations
- Ran stakeholders' workshops in Karumba, Georgetown and Dimbulah to engage regional industry groups and sectors, with attendance of 65 people
- Visited 14 small regional centres
- Attended 16 local community events to engage local people living, working and visiting the region
- Engaged 64 delegates representing a wide range of stakeholder groups at the Gulf Futures Day on 31 March 2015.

In total, from October 2014 - August 2015, they directly engaged approximately 920 people, across the breadth of the region. This represents approximately 10% of the total Northern Gulf residential population.

The values, concerns and recommendations which resulted from this consultation underpin the strategies, actions and targets contained within the Northern Gulf NRM Plan. For a full report on all the outcomes and messages received and collected from these engagement activities, please go to: www.plan.northerngulf.com.au/wp-content/uploads/2016/05/engagementreport.pdf

3. Assessment Criteria

Each NRM activity and project recommended was then filtered through a set of assessment criteria (Figure 3) to prioritise those which met the wider strategic goal of the NRM Plan, via a clear line of sight to the higher level goal and strategies, and remove those that do not.

4. Developing The Plan

The NRM Planning team finally grouped all information into two major sections, **Subregions** (Figure 3) and **Whole Region Assets**. Each have further categories.

The **Subregions** are known as "social-ecological systems" that facilitate a finer level of strategic planning based on their common demographics, economies, landscapes, and stakeholder networks. These have been tiered into a vision, goals, strategies and activities.
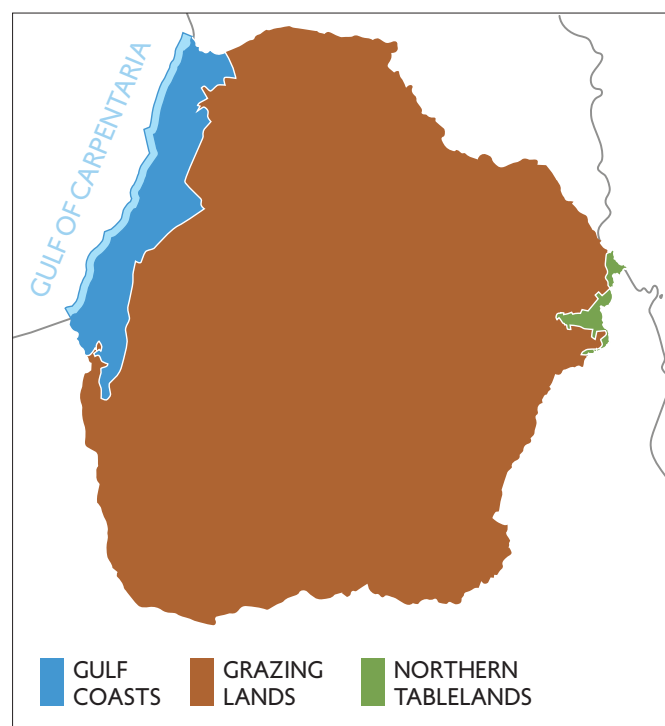

FIGURE 3: The Northern Gulf Subregions

Each of the **Whole Region Assets** (Community, Land, Water, Biodiversity, and Biosecurity) has been assigned a resource condition target (i.e. the best condition it can be in), monitoring frameworks so that we know we are on track, and strategies and actions to get us there.

The Visions, Goals and Resource Condition Targets are crafted to respond to engagement outcomes, whereas the Monitoring Frameworks, Strategies and Activities are underpinned by science and evidence.

ASSESSMENT CRITERIA USED TO FILTER RECOMMENDATIONS

STEP 1

Each recommendation or management action must answer yes to all of the criteria below:

1. Does it meet the Goal of the NRM Plan?
2. Does it align with one or more of the Regional Strategies?
3. Does the activity ultimately deliver an NRM outcome?

STEP 2

Each recommendation or management action was separated into one of four categories and then rated (1–5) with lower ranked actions eliminated.

Education and Capacity Building

1. Equitable access to NRM resources across the region, including very remote communities, and spread across the demographic profile of region
2. Uses creative and varied pathways to engage the community
3. Builds institutional and individual capacity to undertake sustainable NRM
4. Assists resource managers to make more informed management decisions
5. Builds community resilience to drought and natural disaster

Research and Knowledge

1. Critical information to direct NRM investment
2. Addresses a critical environmental issue/risk
3. Takes an integrated, multi-disciplinary approach, including the social sciences
4. Acknowledges/respects and integrates Traditional knowledge and local knowledge
5. Addresses a critical knowledge gap

On Ground Works

1. Stabilises a critical risk
2. Ultimately focused on long term, successful outcomes (as opposed to outputs, e.g. fencing)
3. Prioritises areas with threatened and vulnerable species
4. Conserves and protects multiple species and ecosystems
5. Considers and responds to interactions between threatening processes

Strategies

1. Collaborative, deliberative process engaging all affected stakeholders
2. Has a direct and practical application
3. Builds and aims for consensus towards NRM objectives
4. Delivers combined community/NRM outcomes
5. Addresses a critical risk

STEP 3

Remaining recommendations and management actions were then rated (ranked 1–5) against the following criteria:

1. *Effectiveness* – Which pathway has greater influence/success?
2. *Efficiency* – What is the relative cost of different pathways to achieve the same outcome, incorporating costs/benefit, delays and expected levels of ongoing investment, support and costs?
3. *Impact* – What other attributes of the system are changing (positive and negative) due to the chosen pathway?
4. *Appropriateness* – Does the pathway have general community support and stakeholder buy-in? Does the activity duplicate the work and role of another agency? Are the works endorsed by the Traditional owners of the site?
5. *Legacy* – What happens if the resourcing stops? Is there a point where the NRM can exit and the activity/intervention will sustain itself?

GULF COAST

POPULATION: 2,827

Indigenous: 59%

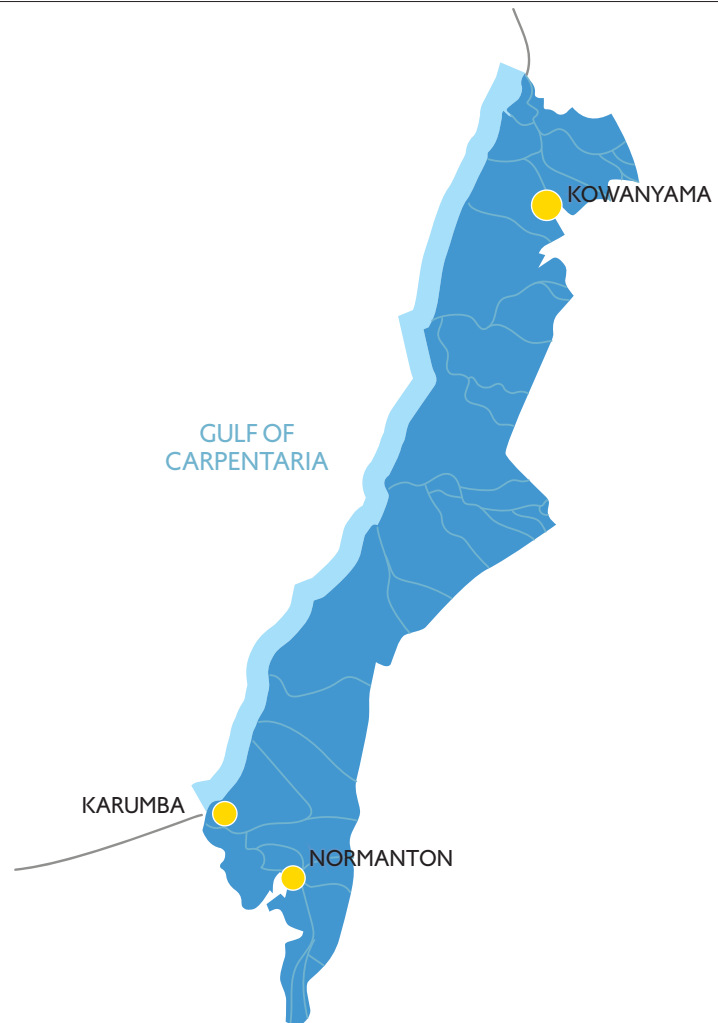**LAND AREA: 13,043KM²**
(21 people per 100km²)

100

TOP INDUSTRY:
FISHING

= 40 People
Please note that the Indigenous population
may be under represented in census data.

GULF OF
CARPENTARIA

KOWANYAMA

KARUMBA

NORMANTON

GULF COASTS INCLUDING THE COASTAL STRIP AND
GULF PLAINS, 15M ABOVE THE SEA LEVEL CONTOUR
FROM THE CARPENTARIA COASTLINE, INCLUDING
THE TOWNS OF KOWANYAMA, KARUMBA AND
NORMANTON, AS WELL AS THE SOUTH-EAST
GULF OF CARPENTARIA MARINE ENVIRONMENT,
EXTENDING IN AN ARC OF 150 NAUTICAL MILES
FROM THE TOWN OF KARUMBA.

VISION The health and resilience of the Carpentaria
coastline and the south east Gulf of Carpentaria marine
environment is maintained, and biodiversity is teeming
and flourishing. Fish stocks are abundant and diverse and
support Indigenous, recreational and commercial fishing
sectors into the future, managed through collaborative
arrangements which accommodate all users of the
natural resource while maintaining the ecological and
cultural integrity of the environment.

The Gulf of Carpentaria is a shallow-water tropical sea containing varied and dynamic marine and estuarine habitats, such as mangrove communities and patches of coral reef and seagrass beds which are nursery habitats for commercial fisheries species and internationally significant marine biodiversity. The adjoining coastal area contains high conservation value coastal wetlands which support abundant birdlife, and extensive salt pans which are now being recognised for their unique ecological significance.

The Gulf Coast has a very high Indigenous population, including three tribes which converge on Normanton, and six tribes which converge on Kowanyama. There are two well established and highly respected Land and Sea Ranger groups, which are the primary delivery mechanism for on ground NRM along the coast. The town of Karumba is the focal point of a thriving tourist economy based on recreational fishing and a port which supports Gulf fisheries and the live export trade.

A CHANGING CLIMATE

Under high confidence climate change scenarios, the Gulf coastal environment will be affected by high rainfall events, increased gully erosion and subsequent mobilisation and pluming of sediment exported from further up in the catchment through river mouths and flowing into the Gulf waters. The abundance of sea grass beds may be much reduced in extent, with serious consequences for the marine biodiversity that they support.

Gulf fisherman often say "A drought on the land means a drought in the sea", as fisheries and marine biodiversity in the Gulf rely on monsoonal flows off Gulf catchments. Therefore, projected increased drought will have a direct impact of Gulf fisheries and marine ecosystems.

Projected increased storm surge and rising sea levels will leave vulnerable dune foreshores and adjoining dune systems exposed to retreat and disturbance. Coastal wetlands are very exposed to breaching of inter swale swamps from saline water, which may result in the loss of wetland habitats and associated biodiversity in the freshwater/brackish/marine interface zone. Longer dry seasons could also put increased pressure on fragile coastal wetlands and coastal frontage country.

The risk of increasing atmospheric CO_2 concentration and ocean acidification will have significant potential impacts on corals, coralline algae and benthic molluscs due to calcification.

Whilst mangrove forests could actually grow in extent due to the inundation of coastal areas and stimulation from increased CO_2 levels, periods of prolonged droughts will dry out mangroves to the point of collapse, like a recent occurrence from October–December 2015 which saw the dieback of 7,000ha of mangroves along 1,000km of the Gulf coast.

Fauna modelling of climate change refugia demonstrates that despite these vulnerabilities, the coastal strip contains a continuous strip of high quality, intact habitat including the top 2-3% of areas in the Northern Gulf Region currently prioritised conservation areas for all species, but particularly birds. Climate change predictions however indicate that this high quality biodiversity habitat will be much reduced in extent over the coming decades.

- Annually monitor beds, banks and floodplains of major river systems for new and emerging weed pests washed down from the east.

4. Investigate the possibility of a ghost crab pot removal program from waters adjoining Karumba, with the involvement of fisheries enforcement officers and Land and Sea Rangers.

GOAL 1: INDIGENOUS RANGER PROGRAMS

Indigenous Land and Sea Ranger programs that are based out of Kowanyama and Normanton are supported; for their on ground works programs controlling weeds and pests along the coast, conserving and monitoring biodiversity, and maintaining cultural and ecological assets.

Strategies and Actions

1. Support the continuation and expansion of the Indigenous Land and Sea Ranger marine debris collection and monitoring program on shorelines and beaches, strategically targeting areas of higher modelled risk such as Karumba north.

2. Support Land and Sea Ranger programs to develop ranger-delivered environmental and cultural education/ interpretation modules for tourists and residents to facilitate greater dissemination of cultural/environmental awareness to visitors and residents.

3. Support Land and Sea Ranger programs, Carpentaria Shire Council and coastal landholders, through providing mapping support, including GIS remote sensing and field based infestation mapping of weeds, prioritising:

   - Rubber Vine (Cryptostegia grandiflora) in the south east Gulf coastal zone to support strategic control and monitoring of existing management effectiveness;
   - Olive Hymenachne (Hymenachne amplexicaulis) in the key locations, especially around Normanton, to reduce the risk of spread further into the Gulf plains;
   - Water Hyacinth (Eichhornia crassipes), particularly in the Smithburne River and Kowanyama as a matter of urgency;

GOAL 2: FISHERIES MANAGEMENT

The three sectors competing for the same fisheries resource (recreational, commercial, Indigenous) within the south-east Gulf of Carpentaria marine environment and estuaries collaborate towards a sustainable management framework which accommodate the needs of all, while developing an evidence base to verify the condition of the fishery and understand the drivers of change in dynamic coastal and marine environments.

Strategies and Actions

1. Initiate and seek co-funding for the coordination of a community based, deliberative review of fisheries in the south east Gulf of Carpentaria that represents the Indigenous, recreational and commercial fishing sectors.

2. Review the condition of the fisheries through:

   - Collation of datasets on key species of the inshore fishery, javelin grunter, barramundi and mud crabs, from previous surveys, species specific studies and log book data;
   - Traditional fisher survey programs to quantify the annual and seasonal take by Gulf Coastal Indigenous communities;
   - A cost-benefit analysis of economic and community costs and benefits of both recreation and commercial fishing to both Karumba and the greater Northern Gulf Region.

3. Create a benchmark for a sustainable fishery which utilises all information to create a model that will give a foundation for real discussions and agreement on what constitutes good management. On the basis of this consensus between sectors, move towards policy and legislative changes, conservation and sanctuary zones or commercial license buy-backs (subject to full compensation) in targeted areas in the Norman River delta and near-coastal marine environment.

GOAL 3: ANGLER EDUCATION

Recreational anglers in Karumba and Normanton are educated by the promotion of sustainable fishing practices and regulations while working alongside tourism operators.

Strategies and Actions

1. Collaborate with local coastal communities and visiting anglers to provide accessible information in the form of boat ramp signage, brochures and tailored communications to visiting anglers concerning fishing regulations, appropriate angler behaviour and the vulnerabilities of certain species.

2. Engage the local community and fishery agencies to establish a 'Fishcare' volunteer group or to adopt initiatives such as those developed by OZfish (community based fish habitat restoration), including the long-term resident population of Karumba caravan parks during the tourist season.

3. Develop a 'Coastal Savanna Knowledge' hub to present interpretive information to educate visitors and residents about the key ecological characteristics, values and climate vulnerabilities of the Gulf coastal and marine environment as a basis for imparting greater commitment to ecologically sustainability in local businesses and visitor behaviour.

4. Adopt the Large Tooth (freshwater) Sawfish (Pristis pristis) as an ambassadorial threatened aquatic species to:
   • Promote recreational fisher awareness of potential bycatch impacts;
   • Develop interpretive signage regarding the risks of recreational bycatch on sawfish species at popular recreational fishing areas within sawfish habitat.

GOAL 4: COASTAL WETLANDS

Collaboration occurs between key stakeholders to maintain and enhance the environmental values of internationally significant coastal wetlands, by supporting monitoring of impacts and on ground works to build their resilience to climate change.
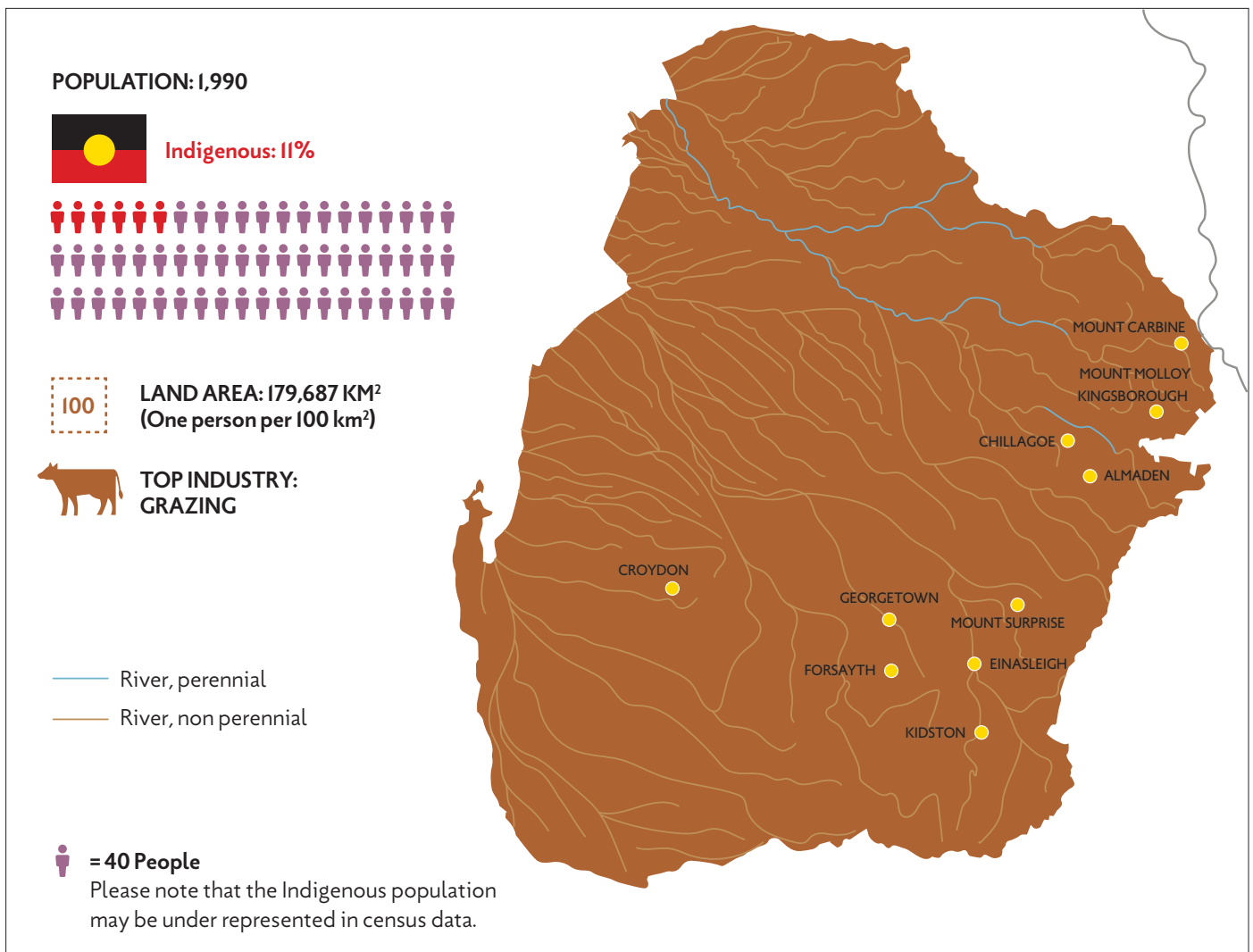
Strategies and Actions

1. Collect information towards the preservation of the habitat of the coastal zone's shore birds and migratory sea birds through the following:
   • Lobby government and relevant agencies to include coastal wetlands of the south east Gulf coast on the Wetlands of International significance register, thus elevating their conservation status;
   • Encourage bird watchers, Indigenous ranger groups and local people to monitor and record bird sightings and numbers;
   • Collaborate with researchers and students to collect new data and monitor on internationally significant migratory wader bird habitat and numbers.

2. Collaborate with Carpentaria Shire Council and Land and Sea Rangers to improve the habitat values and cultural, nature based tourism opportunities of the Mutton Hole Wetlands Reserve.

3. Contribute to the integrity of coastal wetlands by:
   • Supporting Land and Sea Ranger Programs engagement in delivery of appropriate fire regime outcomes for WARE (Wetland Associated Regional Ecosystems) in Protected Areas, Local Government Reserves and on selected private lands;
   • Engaging coastal pastoral land managers and Land and Sea Rangers in a 'participatory learning' based implementation of the Simple Wetland Assessment Monitoring Proforma (SWAMP) photo point based monitoring system for coastal wetland condition (Tait 2005) targeting DIWA wetlands stratified across properties in the Gulf coastal zone.

GRAZING LANDS

GRAZING LANDS IS THE VAST EXPANSE OF REMOTE DRY TROPICAL SAVANNAH, STRETCHING FROM PALMER RIVER CATCHMENT IN THE NORTH-EAST TO THE CLARAVILLE PLAINS IN THE SOUTH-WEST, AND IS DOMINATED BY BROAD HECTARE PASTORAL LEASES.

VISION The Grazing Lands are healthy and prosperous, simultaneously supporting productivity and ecosystem services. Land condition is improved through sustainable grazing practices, which in turn reduces debt and builds resilience to drought and natural disasters, contributing to a profitable and enduring grazing industry, abundant and diverse wildlife populations and happy, well and vibrant communities. New and emerging industries contribute to a diversified and stable regional economy, while maintaining and enhancing healthy landscapes.

POPULATION: 1,990

Indigenous: 11%

LAND AREA: 179,687 KM²
(One person per 100 km²)

TOP INDUSTRY:
GRAZING

MOUNT CARBINE

MOUNT MOLLOY
KINGSBOROUGH

CHILLAGOE

ALMADEN

CROYDON

GEORGETOWN

MOUNT SURPRISE

FORSAYTH

EINASLEIGH

KIDSTON

— River, perennial

— River, non perennial

= 40 People
Please note that the Indigenous population may be under represented in census data.

Over 90% of our region's land area is covered by grazing lands. These extend over the Gulf Plains, up into the Einasleigh Uplands, along the Gulf Coast and up into the Palmer River catchment at the bottom of Cape York. There are approximately 160 grazing properties, covering an area of roughly 17m ha. These enterprises rely principally on native pastures to turn off about 200,000 cattle per year.

Grazing lands are mostly open woodland dominated by Eucalyptus and Corymbia species with a grassy understory, but paperbark woodlands, lancewood open woodlands and bluegrass communities can also be found on open grasslands. This reflects the region's diversity of landforms, geology, soil types, climatic variation and fire history. The grazing lands generally support native vegetation from pre-European times; however, these have been altered by weeds and feral animals, altered fire regimes and grazing pressure. Consequently, the understory and grass layer cannot support the wildlife it once did, with small mammals and birds which rely on grass seeds being the most effected.

A CHANGING CLIMATE

The climate of the dry tropical savannas of the Grazing lands is projected to get hotter, drier with more extreme events (fire, floods, droughts and cyclones). This may affect the carrying capacity and health of many grazing enterprises, resulting in reduced pasture, productivity and subsequently reduced profit margins.

A decrease in surface ground cover may occur, resulting in a reduction in livestock carrying capacity as a result of these climate induced stresses. Changed climatic conditions may also favour weed species and will accelerate woody thickening meaning longer lived perennial pasture and tree species may have reduced survival during long drought periods.

Altered fire regimes also have the potential to radically alter vegetation communities, especially the grass understory that many wildlife and cattle depend on. This will further impact on already vulnerable species including small to medium sized marsupials and rodents that have small home ranges or favour unburnt habitat (e.g. common brush tail possums and black footed tree rat) as well as reptiles like the spotted tree monitor. It may also facilitate predation and prey switching by feral pigs and wild dogs to target mammal communities and also possibly calves.

We know riparian corridors are very important, however increased intense high rainfall events will accelerate bank erosion, gullying of drainage line and frontage country and the destruction of riverine corridor vegetation. Reduced water supply will also lead to more livestock pressure on river and creek frontages.

GOAL 1: DROUGHT RESILIENCE

Community and enterprise resilience to drought and other natural disasters is improved, by building the capacity of the grazing industry to achieve viable business models and sustainable resource use within the context of a highly variable climate.

Strategies and Actions

1. Provide targeted extension (group and one-on-one) and tailored communications, to encourage and inform producers about the use of management practices that build the resilience of the grazing industry to drought and climate variability. These management practices include:

   • The use of flexible stocking rates in response to seasonal variability;

   • Matching cattle numbers to feed supplies;

   • Rotational wet season spelling of pastures;

   • Timely fire management to control woody weeds and native woodland thickening;

   • Improving herd production efficiencies e.g. live weight gain, death rates and weaning rates;

   • Regular monitoring of pasture (end of wet season and late dry season) to inform stocking rate decisions and to track the condition-productivity of native pasture systems;

   • The development of sustainable and appropriate scaled irrigated pasture on grazing properties;

   • The development of Grazing Land Management Plans including elements like fencing configurations, water distribution, seasonal spelling, integrated weed and fire management, feral animal control and total grazing pressure across the property;

   • Holistic Management of grasslands.

2. Provide GIS mapping services to land managers across the grazing lands. In repeat visits, evaluate the effectiveness of the outcomes of the mapping projects undertaken to date to determine if the service has been effective in improving land condition through better stock management.

3. Provide one-on-one business analysis support to beef enterprises, to improve productivity, profitability and sustainability.

4. Investigate opportunities for remote mentoring, training and skills development programs for grazing communities, to:

   • Build capacity of grazier's as environmental stewards;

   • Develop succession pathways for younger generations;

   • Diversify skills in remote areas;

   • Educate and train local landowners and the wider pastoral community about specific rehabilitation techniques and the benefits of erosion control;

   • Promote regional best management practices (Grazing BMP).

GOAL 2: SUSTAINABLE LAND MANAGEMENT

Land managers are provided with the knowledge and tools to implement practices which result in improved land condition and ground cover.

Strategies and Actions

1. Establish learning (demonstration) sites and case studies that promote novel or innovative grazing land management practices which achieve integration of good land management and biodiversity conservation principles with sound economic management of a grazing property.

2. Investigate and promote large-scale, longer-term, controlled-access fencing of erosion scarp front(s), by establishing a small number of large-scale sites within the Mitchell River and Gilbert River basins, with the aim of fencing along entire erosion scarp fronts at a sub-catchment scale, to prevent further gully retreat in predicted extreme rainfall events, as well as monitor the responses of weeds, biodiversity and erosion to the controlled access that fencing provides.

3. Support the establishment of a water quality monitoring and mine rehabilitation program in areas affected by historical mining legacies, such as Palmer River, Croydon and Chillagoe. In collaboration with Traditional Owners and pastoral land managers, provide training for water quality monitoring techniques, with the aim of engaging Traditional Owners/Indigenous rangers to conduct future water quality monitoring work.

GOAL 3: FIRE MANAGEMENT

Recommended fire management practices that mitigate wildfires while maintaining biodiversity values, healthy pastures and carbon storage in the landscape, are promoted and embraced.

Strategies and Actions

Promote the development of information resources for grazier's and Indigenous land managers about the impact of fires, and promote fire management regimes that aim to achieve the following:

- Manage carbon stocks;
- Maintain open woodland and good pasture composition;
- Woody weed control and thickening;
- Spread grazing pressure;
- Protect fire-sensitive species;
- Maintain some large, infrequently burnt refuge areas;
- Benefit localised populations of threatened species;
- Improve or maintain suitable habitat quality in localised areas which still support an abundance of small to medium sized mammals;
- Manage the alkalinity and nitrogen fertility of soils;
- Assist with controlling feral animal species.

Improve community coordination of fire programs, especially early season aerial ignition programs and provide education to local fire brigades and community networks on the management of pasture, biodiversity and carbon, while managing the destructive impacts of wildfires and mitigating the hazard to people and property.

GOAL 4: EMERGING ECONOMIES

The Grazing Lands' economy is diversified through emerging environmental economies such as stewardship and ecosystem services payments, carbon sequestration and trading, ecotourism and biodiversity surveillance.

Strategies and Actions

1. Encourage regional reductions in carbon emissions and participation in the carbon economy through:
   - Supporting the participation of land managers and Traditional Owners in the carbon trading market by disseminating information to industry on emerging opportunities associated with the Emissions Reduction Fund.
   - Disseminating information about early wet season burns to manage fire on grazing properties and position land holders to take advantage of emerging carbon markets, including the savanna burning (areas with under 600ml average rainfall per annum) emissions; and
   - Disseminating information about sequestering carbon in soils in grazing systems methodology.

2. Support the development of a conservation economy on privately and publicly managed land through the following steps:
   - Investigate the effectiveness of the stewardship payment program including allocation of funds based on merit, i.e. whether to place a higher value on areas that have been grazed poorly for a number of years or well managed areas.
   - Conduct a GIS and field based assessment to identify specific pastoral properties with high value biodiversity assets to target with a proposed 'conservative grazing management incentives program'.

3. Support the development of a regional beef brand from sustainable grazing enterprises based on a robust, accreditation scheme, based on completion of NRM based field studies, and ongoing assessment of grazing management by landholders, including monitoring of the results of grazing practices. This brand will enable Gulf beef from qualifying beef businesses to be marketed as an environmentally friendly product on both local and export markets.

4. Explore opportunities to leverage new development for environmental offsets, and direct funds to restoring priority areas with high value biodiversity assets and climate change refugial areas.

5. Support the development of real economic opportunities for Indigenous and non-Indigenous cultural tourism and enterprises, such as ecotourism (bush camping/ fishing, bird watching), breeding programs and plant nurseries.

6. Explore local employment strategies by developing a monitoring framework and protocols that are easily used by citizens across regional centres, including volunteers and casual employees, to collect data across the region, to surveil biosecurity threats, monitor water quality and collect biodiversity data.

GOAL 5: WATER RESOURCE DEVELOPMENT

Viable, sustainable and equitable practices and models for emerging irrigated agricultural industries are promoted and facilitated, which support healthy environmental flows into the Gulf catchments, and out to the Gulf of Carpentaria.

Strategies and Actions

1. Provide communication channels, available to all community and industry stakeholders, to deliberate and ensure long term sustainability concerns are represented in future water resource development planning, including catchment scale and downstream impacts.

2. Coordinate an "Agricultural Industry Sustainable NRM Working Group", with representation from relevant industry bodies, landholders and Government agencies via the proposal to develop:

   • A targeted water quality monitoring program in agricultural catchments;

   • Best management practice trials;

   • Monitoring of land condition;

   • Climate change impacts and trends;

   • Establish a dedicated agricultural catchments program in the Gilbert Catchment, which incorporates;

     – Best management practices for minimising contaminant loads and hydrological impacts associated with intensive agricultural catchment runoff and irrigation tail water;

     – Early detection program on the basis of a range of environmental indicators, including salinity profiles, water quality and soil condition;

   • Monitor the impacts of climate change on water impoundments and environmental flows, such as evaporation.
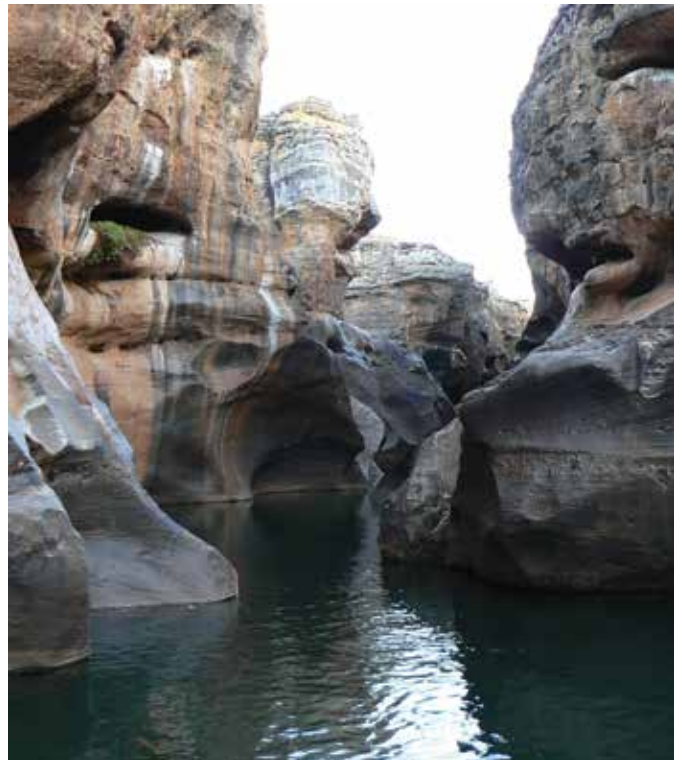
NORTHERN TABLELANDS IS THE MORE DENSELY POPULATED PART OF THE REGION, STRADDLING THE WESTERN SHED OF THE GREAT DIVIDING RANGE, AND INCLUDES THE TOWNS OF DIMBULAH, MUTCHILBA, JULATTEN, MT MOLLOY, IRVINEBANK AND WATSONVILLE. THIS IS A MIXED USE RURAL AREA WITH MANY SMALL ACREAGE AND LIFESTYLE BLOCKS, BUT ALSO INCLUDES THE MAREEBA DIMBULAH IRRIGATION AREA (MDIA) WHICH SUPPORTS A RANGE OF HORTICULTURAL INDUSTRIES INCLUDING SUGAR CANE, BANANAS AND TROPICAL FRUITS.

VISION The Northern Tablelands of the Upper Mitchell catchment will have prosperous, efficient and diverse agricultural industries supported by healthy, fertile soils. The water quality and riparian health of the Walsh River catchment is protected from degradation caused by erosion, topsoil loss and elevated nutrient loads. Engaged communities in rural towns, commercial farms and on small acreages, maintain strong collaborative networks that contribute to healthy ecosystems and support abundant biodiversity.

POPULATION: 3,716

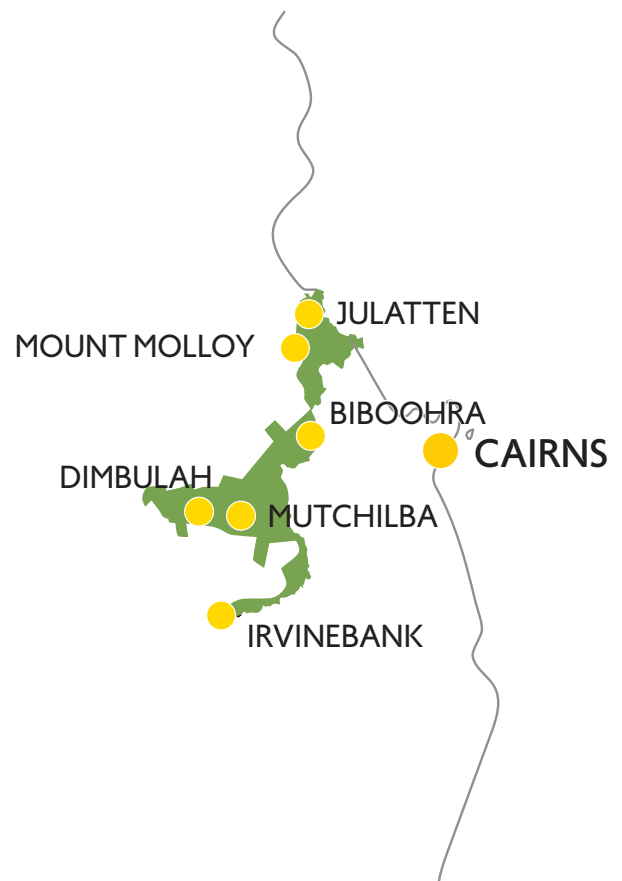**Indigenous: 5%**

LAND AREA: 1,330 KM²
(279 people per 100km²)
100

TOP INDUSTRY:
FARMING

= 40 People
Please note that the Indigenous population may be under represented in census data.

JULATTEN

MOUNT MOLLOY

BIBOOHRA

CAIRNS

DIMBULAH

MUTCHILBA

IRVINEBANK

The Northern Tablelands is a mixed use rural area, with large parts under agricultural cultivation, interspersed with small acreage lifestyle properties and country towns, located in the Upper Mitchell River catchment, which straddles western shed of the Great Dividing Range. This area supports around 30 tropical agricultural crops, including bananas, sugar cane, mangoes, avocados and citrus industries.

The region also includes a large population of "peri-urban" residents on small acreage lots in the Cairns Hinterland, particularly in the Julatten/Mt Molloy area and the bush communities in Irvinebank and Watsonville. The Northern Tablelands supports a great diversity of regional ecosystems and biodiversity, as it straddles the three bioregions of the Wet Tropics, the Einasleigh Uplands and Cape York, and contains important landscape scale linkages for biodiversity, spanning a mosaic of wet tropical rainforests, open eucalypt woodlands, dry savannah country, and includes a network of important riparian corridors and waterways.

A CHANGING CLIMATE

The climate of the Northern Tablelands is cooler than the grazing land further west into the Northern Gulf Region, and the agricultural industries of the MDIA are arguably more resilient to drought that grazing operations because of their access to irrigation water- however variability of stream flow could still threaten agricultural production by making irrigation supply unreliable and more costly. However, the rainforest, wet sclerophyll and open eucalypt woodlands of the Upper Mitchell are still exposed to hotter climates, longer dry periods and more extreme events like cyclones and wildfires, all of which have the potential to radically disturb and alter the composition of these native vegetation communities.

The biggest horticultural industries of the Northern Tablelands which are bananas, sugar cane, mangoes and avocados, are all exposed to big losses from damage caused by cyclonic events. Increased intense high rainfall events can also increase the pressure of weeds, pests and disease on agricultural production, and water logging can impact agriculture by limiting machinery operations and leach soils of their nutrient content, thus lowering soil fertility. High rainfall events will also exacerbate erosion in extreme rainfall events, and continue to rise saline ground water tables.

Climate change modelling of biodiversity highlights the importance of the Northern Tablelands to facilitate the movement of wildlife between bioregions and fragments of habitat, particularly in the Julatten and Mt Molloy area. This further illuminates the importance of maintaining and improving these connections into the future to facilitate refuges for wildlife populations migrating under altered climatic conditions projected in the future.

GOAL 1: TROPICAL AGRICULTURE

Intensive agricultural industries are supported to regenerate their natural resource base and improve their efficiency and sustainability in the Mareeba-Dimbulah Irrigation Area (MDIA).

Strategies and Actions

1. Assist the farming community to build skills and knowledge in sustainable agriculture, climate change resilience and NRM, by providing:

   • Property mapping, spatial information, precision agriculture and surveying and spatial technology and monitoring extension services;

   • One-on-one extension to growers, identifying opportunities for more sustainable land management practices together with improved farm system efficiencies;

   • Information, mentoring and training services to farmers and agribusinesses through workshops and tailored communications.

2. Provide material and technical support to agricultural producers along the upper Mitchell/Walsh catchment for the establishment of learning/ demonstration sites of the following:

   • Riparian vegetation on tail water drains as a means of mitigating water quality impacts (elevated nutrients, turbidity, low dissolved oxygen) on downstream receiving wetlands and to provide riparian habitat values within mono-cultural landscapes;

   • Artificial wetland retention basins in irrigated agricultural areas;

   • Stream or wetland remnant riparian habitat rehabilitation and management;

   • Capture and reuse of water in tail water drains;

   • On farm water capture and recycling systems;

   • Onsite renewable energy generation for conveying water on farms;

   • Management practices which increase and promote soil biology.

3. Address rising salinity groundwater profiles in the Arriga plain by:

   • Strategically plant native trees in saline affected areas (targeting Cattle Creek and Two Mile Creek catchments), to address rising salinity and to improve riparian health and water quality;

   • Promoting alternatives to flood irrigation.

4. Monitor and document trends and condition of surface and ground water, through establishing a long term water quality monitoring program at key sites throughout Northern Tablelands targeting:

   • Arriga flats (Cattle and Dingo Creek) for salinity;

   • Two-Mile Creek and Mareeba sewerage treatment plant for sewerage contaminants and salinity;

   • Bullaburrah Creek (Dimbulah) – high metal concentrations;

   • Collins Weir, Walsh River, Watsonville (site of the proposed Nullinga dam).

GOAL 2: MINING LEGACIES

Communities are supported to improve their environs and waterways by managing the localised impacts of abandoned mines.

Strategies and Actions

1. Support and encourage more detailed studies of sediment and water quality downstream of the mine sites that are considered greater risk to water users to assess the wider spatial distribution and year to year fluctuations of heavy metals and in response to high rainfall events.
Priority areas include:

· The highly contaminated sediment water in close proximity to the township of Watsonville and the Walsh River;

· The rehabilitation of Jamie Creek downstream of the Baal Gammon mine;

· Poison Creek (old mine site above the creek);

· Creek siltation from Governor Norman mine (Irvinebank);

· Creek siltation from Peterson mine (Irvinebank).

2. Support the Irvinebank communities and Traditional Owners to restore watershed functions by containing the impacts of abandoned mines in the Irvinebank and Watsonville area, focusing on the stretch of McDonald Creek through the Irvinebank town centre.

GOAL 3: WILDLIFE HABITAT

Local communities are supported to restore ecological values by enhancing intact habitat within protected conservation areas while working across tenure to identify and build strategic landscape-scale linkages to facilitate the movement of wildlife and maintain their population viability.

Strategies and Actions

1. Identify sites for strategic tree plantings and ecological restoration throughout the Northern Tablelands to reconnect fragmented habitat across regional ecosystem types, with a particular focus on the Mt Molloy/Julatten area.

2. Provide material and technical support to restore ecological values and nature based recreation (bird watching) to Abattoir Swamp in Julatten.

GOAL 4: COMMUNITY NETWORKS

Environmental education is provided to peri-urban and rural communities, through schools and community initiatives.

Strategies and Actions

1. Engage horse owners on small acreages (5-100 acres) by developing educational resources and events which promote sustainable horse keeping in peri-urban areas. Collaborate with existing horse clubs, societies and events to disseminate these messages.

2. Support the development and expansion of local food networks and cottage and niche food industries by working with existing community networks.

COMMUNITY

COMMUNITY RESOURCE CONDITION TARGET
The communities of the Northern Gulf Region will improve their capacity for climate change resilience through developing and maintaining a strong and sustainable resource-based economy, growing skills and awareness, and supporting Traditional Owners in their custodial roles as the region's land and sea managers.

The settlement pattern of the region is sparse. There are population clusters in the Upper Mitchell Catchment and along the Gulf of Carpentaria coastline, with a dispersed network of small, remote townships in the Gulf Plains and the Einasleigh Uplands. About 50% of the region's population falls within the Mareeba Shire, a further 22% in the Carpentaria, Kowanyama, Etheridge and Croydon Shires accounting for 12% combined, and the remaining 4% in Cook Shire.

The Northern Gulf community is made up of individuals and groups who live, work in or have a spiritual or custodial attachment to the Northern Gulf region. The regional community can broadly be characterized by the following demographic themes.

Disadvantaged

All local government areas (LGAs) within the region fall below the Queensland average for the index of relative socio-economic disadvantage and Carpentaria, Cook and Croydon Shires are all within the 10% cohort of the most disadvantaged LGAs in Queensland.

Indigenous

Census data (2006) identifies 25% of the regional population as being of Aboriginal and Torres Strait heritage (compared with 3% average for Queensland), with the combined Indigenous populations of Kowanyama and Carpentaria Shire accounting for 70% of the entire region's Aboriginal populations. It is noted however that Indigenous people are typically underrepresented in census counts and the real proportion of Indigenous people could be much higher. Croydon and Dimbulah also have very high Indigenous populations. Traditional Owners have native title interests over most of the region, whether they reside in it or not.

Itinerant

A report on angler tourism published 10 years ago, reported that 14,000 tourists visit Carpentaria Shire each year (this number could have increased since this report was published) resulting in a total of 280,000 tourist days per annum – the majority of whom are in Karumba. Stays are commonly up to 10 weeks and around 50% return visitors. Therefore, this itinerant group of tourists can legitimately be considered as a component of the community.

Peri-urban

Rural landscape demographics are changing which leads to a greater complexity of rural occupancy, including higher rates of small, lifestyle acreages, especially closer to urban centres. This applies to the rural districts of the Cairns Hinterland such as Julatten, Mt Molloy, Dimbulah, Mutchilba, and to a lesser extent Watsonville and Irvinebank. These areas can be defined as "Peri-urban" which is a term which broadly captures people living on small acreages from 5-100 acres, and deriving most or all of their incomes from off farm sources.

Rural

The regional economy is based on four main activities – agriculture (including grazing and horticulture), fishing, mining and tourism. Local government employs approximately 20% of the regional population, followed by primary production which accounts for a further 17%. Therefore, the regional economy can be classed as a rural based economy.

Very remote

The region's total population is approximately 10,000 people over an area which spans more than 165,000 sq.km. 88% of this land is held within very large leasehold properties. With the exception of small peri-urban clusters in the Upper Mitchell Catchment, the whole region is classed as "very remote" in the Accessibility and Remoteness Index Assessment (ARIA).

GOAL 1: CUSTODIAL CONNECTIONS

The aspirations of Indigenous people in returning to their traditional lands as natural resource managers are supported through a range of enterprises and initiatives.

Strategies and Actions

1. Support Traditional Owners to better regulate tourism to reduce impacts on country and sacred sites, by:

   • Preventing the stealing of artefacts through no-go zones;

   • Regulating access;

   • Developing education material and signage;

   • Encouraging Traditional Owner presence on country;

   • Developing cultural tourism opportunities, where rangers and Traditional Owners take tourists out on country.

2. Support Traditional Owners to regain, maintain, share and hand down cultural knowledge to succeeding generations, through the continued mapping of story/sacred places and initiatives to preserve traditional languages.

3. Support existing Indigenous ranger programs, and encourage and support new and emerging Indigenous ranger groups to undertake on ground works towards improving environmental health in collaboration with land managers of pastoral and mining leases, and government agencies.

4. Continue to strengthen country based plans, strategic planning and governance of Aboriginal organisations, as vehicles to provide increased access to country, undertake recreational activities, implement conservation and land management measures, and record the cultural and natural values of country.

5. Continue to assist in the sustainable development of Aboriginal-managed lands.

6. Support Traditional Owners in:

   • Recording knowledge on culturally significant places, plants and animals;

   • Conducting surveys and map results detailing number and distribution of species;

   • Ground truthing and documenting threats to endangered and of concern regional ecosystems, map known threats, and register findings on the database;

   • Support initiatives and programs which encourage young Traditional Owners to connect with their country and gain skills to be next generation land managers and Traditional custodians.

GOAL 2: COMMUNITY EDUCATION

A multi-generational, cross sectoral approach to building NRM capacity and promoting environmental awareness is embraced by the communities of the Northern Gulf region.

Strategies and Activities

1. Promote ecological literacy and a stewardship ethos in the younger generation by developing classroom resources, curriculum material, and hosting excursions and events which relate to the unique environments of the Northern Gulf, through the following:

   • Develop wildlife awareness communication tools including posters and wall charts, species identification guides, and classroom resources;

   • Disseminate news and relevant educational resources to teachers, parents and students;

   • Continue to engage school children in environmental education activities and events;

   • Provide training and mentoring opportunities to Gulf youth.

2. Develop opportunities for citizen science, via volunteers, tourists, local residents, students and amateur field naturalists in the Northern Gulf Region to participate in the collection of field data across the region.

3. Develop a hub of 'Savanna Knowledge' to:

   • Distill scientific knowledge through key messages that can be used for interpretive purposes.

   • Present information in a range of accessible media forms (including websites and apps) to inform both visitors and residents of the unique environmental qualities of the Gulf savanna;

   • Contribute display material to existing information centres and tourist facilities.

4. Support the strengthening and expansion of rural women's networks through events and communications.

5. Collaborate with existing networks to engage new sectors (e.g. rural banks, rural agents) on NRM issues and forge linkages with these industries to disseminate key NRM messages.

6. Recognise the tourism sector as key NRM educators and disseminators of knowledge, and collaborate with them in efforts to provide environmental interpretation and realise new eco-tourism ventures.

MONITORING FRAMEWORK

Resilience Rating Scale through the Social Resilience Benchmarking in the Northern Gulf Region[1], which calibrates the most current and best available data and evidence, providing a current assessment of the social resilience of Gulf Communities against a set of prescribed indicators, with reference to climate change drivers.

[1] *See: http://plan.northerngulf.com.au/wp-content/uploads/2015/11/2014-Social-Resilience-Benchmarking-in-the-Northern-Gulf-region.pdf*

LAND

LAND RESOURCE CONDITION TARGET

An improvement in overall land condition of the Northern Gulf will be achieved by:

- Maintaining ground cover at current levels as a minimum standard and incrementally improving the condition of cover
- Arresting dryland salinity and loss of topsoil through the implementation of regenerative land management strategies
- Supporting policy, regulation and incentive programs aimed at delivering improved production and environmental outcomes.

Our ecosystems and resource based economies, such as grazing and horticultural industries, all rely on the land condition and soil health. A fundamental priority for Natural Resource Management is the maintenance of land and soils, largely by maintaining land condition, and promoting soil biology in areas of intensive agriculture.

However, climate change drivers are impacting on land condition, particularly through prolonged periods of drought, which result in a decrease in surface cover and a greater percent of undesirable, annual species. This may be further compounded by more very hot days which result in higher ground surface temperatures, both of which will lead to land degradation and loss of top soil, leading to a decline in pasture production, land carrying capacity and soil fertility.

Determining land condition is notoriously difficult over extensive areas such as the Northern Gulf Region, which constrains research and monitoring efforts. However, the Regional EcoAccounts[2] provides us with our most recent "whole of region" account, based on a combination of photo monitoring points, an assessment of vegetation cover, composition and soil surface condition. The use of remote sensing techniques is also becoming an important tool in land condition assessments.

Salinity is an issue which is already affecting parts of the Northern Gulf, with key risks including rising water tables as a result of intensive irrigation such as in the Northern Tablelands, increasing seawater intrusion resulting in excessive groundwater extraction along the Gulf Coast, deteriorating groundwater quality associated with water extraction from sub-artesian aquifers and the impact of soil sodicity in future agricultural development such as the Gilbert Catchment.

For more information about land resources and conditions in the Northern Gulf, see our regional NRM assessments at: http://plan.northerngulf.com.au/wp-content/uploads/2016/05/Grazing-Lands-NRM-Assessment.pdf and http://plan.northerngulf.com.au/wp-content/uploads/2016/05/Northern-Tablelands-NRM-Assessment.pdf

GOALS

Further goals and activities which support this Resource Condition Target are included in the **Grazing Lands** (page 12) and **Northern Tablelands** (page 18) sections.

MONITORING FRAMEWORK

Continue the Regional EcoAccounts to assess trends in land condition, with repeat on ground monitoring every 5 years, next due in 2016, and again in 2021, which includes the following assessments:

- Use of rapid land condition assessment techniques to determine change in land health throughout the region. Indicators include pasture composition, broad vegetation groups, soil surface conditions, ground cover, weeds, fire, thickening etc. to establish the cause and extent of existing and potential land degradation problems;
- Promoting safe land type carrying capacity and detail the impact of water distribution and land condition;
- Regular monitoring of key indicators to assess any changes in land condition.

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[2] The Regional EcoAccounts (Gobius: 2012) classed the Northern Gulf Land Health (using 14 health indicators) as being "good", while Land Condition (as described above) was classified as in "moderate health" overall, with Karumba Plains, Claraville Plains and Donors Plateau identified as being in the poorest health, due in part to above average wet conditions in the previous 9 years which more seriously affected these lower-reach parts of the region.

WATER

WATER RESOURCE CONDITION TARGETS

Impacts on surface water and groundwater assets of Northern Gulf Catchments will be managed to ensure the long term environmental, recreational and economic viability of the region's water resources.

New and existing irrigators will embrace practices which maintain healthy water quality and environmental flows.

The Northern Gulf region comprises of the Norman Catchment (including the Clara, Yappar, Norman and Carron Rivers), the Gilbert Catchment (including the Smithburne, Etheridge, Einasleigh and Gilbert Rivers) the Staaten Catchment (including Clark, Vanrook Creeks, Red and Staaten Rivers) and Mitchell Catchment (including the Lynd, Tata, Walsh, Palmer, Alice and Mitchell Rivers).

Due to the variety of habitat types and the remoteness of the Northern Gulf, the rivers found within the region are probably some of the most diverse but poorly known systems in Australia (Burrows, 2000). The length of the waterways in the region is enormous. The Mitchell Catchment alone contains 15,425km of major stream length, and this catchment only accounts for 36% of the total area of the Northern Gulf.

Monsoonal rainfall events typically occur between December and March, and then become scarcer into the remainder of the year. Most rivers and creeks stop flowing and dwindle to a series of permanent and semi-permanent waterholes. The marine environment of the south-east Gulf Carpentaria is highly reliant on the monsoonal flows from these rivers, which flush nutrients into the Gulf. Monsoonal flow also enables spawning runs from the Gulf out across floodplains and far upstream into fresh water breeding grounds.

Riparian corridors are important habitats, and if degraded can be avenues for weed spread through the region. The Great Artesian Basin underlies most of the Northern Gulf Region, and several major springs are fed from this source.

Wetland habitats provide wintering, feeding and breeding grounds for biodiversity, especially migratory and wetland birds. Eight of Northern Gulf's wetland areas have been listed as nationally significant. Most of these listed wetlands are in the extensive coastal flood plains area.

These rainfall patterns, water cycles and water bodies are very vulnerable to climate change, and predictions of prolonged droughts combined with more isolated but extreme rainfall events will impact on all aspects of these hydrological systems and all the life which depends upon it.

For more information about water resources and conditions in the Northern Gulf, see our regional NRM assessments at: http://plan.northerngulf.com.au/wp-content/uploads/2015/11/Inland-Waters-Assessment-FINAL-.pdf

GOALS

Further goals and activities which support this Resource Condition Target are included in the **Grazing Lands**, **Gulf Coasts** and **Northern Tablelands** sections.

MONITORING FRAMEWORK

Water quality monitoring programs need to be established and operated on a rigorous basis at a minimum of 16 sites. Monitoring needs to be undertaken at least every month and samples analysed for a minimum of seven key water quality parameters. Quantitative assessment of the composition of waste materials in high risk sites needs to be undertaken to identify the chemical nature and quantity of acid-generating material.

BIODIVERSITY

BIODIVERSITY RESOURCE CONDITION TARGET
The biodiversity of the Northern Gulf Region will be preserved and improved through strategic habitat restoration; targeting areas identified as key refugia; applying regenerative land management practices in marginally productive country to lower the impacts of threatening and degrading processes.

Northern Gulf remains one of the least studied areas for biodiversity in Australia. However, a combination of local knowledge and sporadic data collection has identified a rich and diverse array of vertebrate fauna. This includes at least 118 mammals, 196 reptiles, 63 amphibian and 455 bird species, including a number of endangered species such as the Golden Shouldered Parrot; Gouldian Finch; Star Finch; Red Goshawk; Northern Quoll and the Yakka Skink.

The region generally supports pre-European vegetation. Over 90% of the landscape is either intact or has been subject to minimal disturbance. Despite the low levels of direct clearing, vegetation communities have been extensively modified by a combination of cattle grazing; exotic pastures; woody weeds; changed fire regimes; pest species, and the more localized impacts of mining and infrastructure development. While landscape connectivity remains high over most of the region, human-induced pressures are significantly impacting the health and composition of regional ecosystems.

Vegetation in the Northern Gulf region is largely comprised of open woodland dominated by Eucalyptus and Corymbia with a grass understory, however other common vegetation communities include Paperbark Woodlands, Lancewood on gravelly ridges, bluegrass communities, salt marshes, mudflats, mangroves and sand dunes, small areas of vine thicket, riparian woodlands and the wet tropical rainforests at the headwaters of the Mitchell catchment.

The alarming decline in native mammals that is occurring across the breadth of Northern Australia is also evident in the Northern Gulf region. Although the precise rate of decline is difficult to establish due to the lack of long term data, recent surveys have verified the absence or very low abundance of small to medium mammals.

The major drivers of biodiversity decline in the region are most likely altered fire regimes, grazing pressure and pests like feral cats and pigs. Whilst some of these pressures have modified the landscape irreversibly, it is still important to enhance areas for their habitat values, particularly in light of climate change impacts, which could stress many wildlife communities to the point of collapse if these habitats become critically degraded.

Areas of high biodiversity value are found in the Einasleigh Uplands, Brooklyn Sanctuary near Mt Carbine, and Blackbraes National Park. Important wildlife refuges also occur within the wetland aggregations along the Gulf Coast, and along riparian corridors throughout the region.

The biodiversity of Gulf Plains bioregion is the least studied and scientifically understood of the region. There are currently 22 Nature Refuges on private properties throughout the Northern Gulf and a further 23 protected areas, in the form of National Parks and resource reserves, the largest being the Staaten River National Park. The secure tenure of these areas make them ideal candidates for investment toward enhancing habitat values.

For more information about the region's biodiversity in the Northern Gulf, see our regional NRM assessments at:

http://plan.northerngulf.com.au/wp-content/uploads/2015/11/Gulf-Coast-Assessment-FINAL.pdf

http://plan.northerngulf.com.au/wp-content/uploads/2016/05/Grazing-Lands-NRM-Assessment.pdf

http://plan.northerngulf.com.au/wp-content/uploads/2016/05/Northern-Tablelands-NRM-Assessment.pdf

GOAL

Biodiversity values are preserved through improved management regimes and dedicated conservation works across tenure, while the understanding of wildlife responses to land management practices and climate change is improved through monitoring and research.

Strategies and Actions

1. Continue to develop and implement conservation strategies on Nature Refuges, protected areas and targeted areas identified as "key refugia" through the following works in these areas:

   - Provide material and technical support to pastoral landholders for targeted feral animal management (particularly to mitigate the impacts of feral cats and pigs on high risk areas) and noxious weeds (e.g. fencing, baiting and chemical costs);

   - Encourage land managers to reduce grazing pressure on ecosystem assets in targeted areas;

   - Encourage fire regimes designed to promote recruitment of native flora and maintain essential habitat for native fauna;

   - Demonstrate merits of integrated management approaches for maintaining and improving condition of different habitats via learning sites and communications;

   - Ongoing monitoring of trends and conditions, and responses to change in climate and management interventions.

2. Further develop material and financial incentives to encourage the establishment of conservation agreements and other protected area arrangements for high value biodiversity assets on privately and publicly managed land, by:

- Consulting with land owners hosting these sites to identify what form and level of incentives would engage them to support formal inclusion of sites in protected area management arrangements across the spectrum of tenure, from nature refuges to conservation parks;

- Using consultation feedback to develop an effective incentives program in conjunction with state government conservation agencies;

- Initiate a dedicated program to secure high value biodiversity assets in such arrangements on private land where appropriate and practical;

- Encourage land managers of prioritised sites to consider including these areas in a protected area, through the application of an incentives program developed on the basis of aforementioned consultation.

3. Provide material and technical support to reduce erosion, weed and pest impacts and protect ecological values of freshwater habitat by:
   - Controlling access of cattle along or around priority riparian areas, wetlands, springs and swamps throughout the Northern Gulf Region through fencing these sites;
   - Integrated fire and weed control for fenced/managed areas;
   - Providing alternative watering points to reduce cattle damage to these areas;
   - Encouraging landowners to exclude stock from riparian areas during environmentally sensitive times, such as after floods or fire;
   - Follow up visits to monitor the impacts and effectiveness of these works.

4. Assist in maintaining the natural passage of fish through the following:
   - Develop a GIS based inventory of fish passage barriers within Gulf River basins;
   - Conduct barrier independent assessments of passage effectiveness;
   - Where relevant, collaborate with fishery managers to conduct assessments of effectiveness of fish and Catadromous Crustacean (e.g. Cherabin) passage provision at existing and rectified barrier sites;
   - Use results to confirm adequacy of existing passage provision and/or to highlight structures requiring removal;
   - Work with local government to remove fish passage barriers where practical and affordable;
   - Seek proponent commitments to effective fish barrier mitigation in new water resource infrastructure development proposed for Northern Gulf Rivers.

MONITORING FRAMEWORK

1. Compilation of all available biodiversity data into thematic GIS spatial layers with linked databases. On this basis, recommendation of prioritised sites for new and ongoing monitoring activities.

2. Resurveying some locations where baseline data already exists.

3. Cross reference field data with Climas[3] spatial modelling to verify predicted climate change impacts of species distribution.

4. Implement adaptive fauna monitoring around threat abatement actions to determine the benefits for biodiversity in our regional investments, to determine the best 'bang for your buck' for strategic future investments.

[3] Climas modelling is climate change projections developed by James Cook University: http://climas.hpc.jcu.edu.au/

BIOSECURITY

BIOSECURITY RESOURCE CONDITION TARGET
The abundance and spread of invasive plants and pest animals will be effectively managed to progressively reduce their negative impacts. Production areas and biodiverse ecosystems will be protected through enhanced capacity for resilience. Improved monitoring and biosecurity protocols will reduce the risks of new stresses on ecosystem health and production values.

Invasive plants and animals have the potential to impact on production systems through reducing the productivity of grazing lands, yield losses and contamination of agricultural products or through material and labour costs for their control. They also threaten and compete with terrestrial and aquatic biodiversity.

The Queensland Herbarium has recorded more than 300 introduced plant species in the region. Weeds data from the Northern Gulf has identified 56 weeds of importance in the Northern Gulf region of which 13 were classed as high priority, including bellyache bush, gamba grass, giants rats tail grass, grader grass, hymenachne, parthenium, physic nut, prickly acacia, rubber vine, siam weed, sickle pod, water hyacinth and asbestos grass.

Climate change may effect weed spread by creating new opportunities for invasive species to recruit, spread and increase in abundance. Changes in habitat will give opportunities for weeds and exotics to replace natives as the conditions become less than ideal. Increases in the growth and recruitment of invasive weeds are likely to follow severe cyclones. More niches for weeds and ferals will be created with large scale climatic disturbance like strong winds and flooding. Invasive grasses may spread to dominate savanna ecosystems as climatic conditions change.

The pest animals that have the greatest abundance and pose greatest threat to the Northern Gulf ecosystems include feral pigs, cats and dogs. These impact production and ecosystems across the Northern Gulf region by preying upon and competing with native fauna, competing with livestock for native pasture, and degrading habitat by assisting in the spread of invasive weeds. Seasonally inundated waterholes and creek beds in the dry tropics are likely to be increasingly impacted by invasive animals, particularly pigs.

GOAL

Education and practical support is provided to communities, land managers and local government to combat priority weed and pest species.

Strategies and Actions

1. Develop an education package to raise awareness of feral animal issues. Some specific topics include:
   - Preventing new, emerging species and the potential expansion of existing ranges under climate change;
   - Increasing community understanding of feral animal issues;
   - Individual landholder responsibilities;
   - Increasing landholder participation in pest containment;
   - Acknowledging there have been 'wins' and promoting success stories;
   - Increasing awareness and adoption of best practice methods and emerging technologies in controlling feral animals.

2. Collaborate with local government and Biosecurity QLD, through a regional consortium that seeks to deliver coordinated feral animal control across properties and land tenures in prioritised and strategically targeted sites, including pig, wild dog, cat, rabbit, horse and agile wallaby management through the following mechanisms:
   - Prioritise sites for pig control activities by preparing impact risk and management capacity assessment matrix;
   - Provide subsidized baiting and culling services as incentives for landholders to control feral animal numbers on identified, priority sites;
   - Contribute to practitioner and land manager training in advances in effective feral animal control;
   - Support local government in the achievement of strategies and priorities as identified in their own pest management plans;
   - On the basis of all of the above, continually develop a longer term, regional scale feral animal management strategies in collaboration with all key stakeholders.
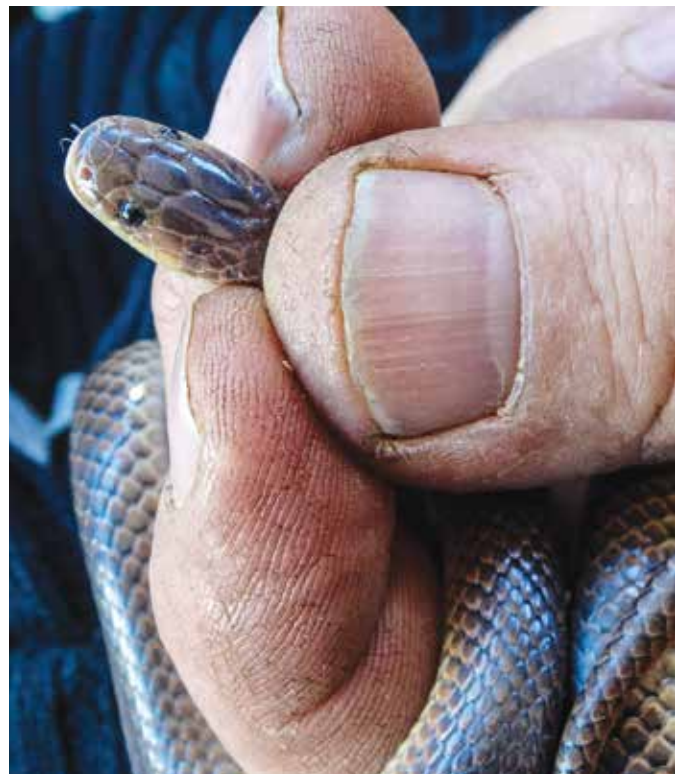
3. Collaborate with local government and Biosecurity QLD, through a regional consortium that seeks to deliver coordinated weed control across properties and land tenures in prioritised and strategically targeted sites to:

- have a strategic view of key emerging weed issues;
- provide extension services to liaise with land holders and agencies to help land holders implement and refine weed and pest management practices;
- help attract and distribute funding to on-ground weed managers, based on the most significant priority weeds and projects determined by the various local agencies;
- Support local government in the achievement of strategies and priorities as identified in their own Weed and Pest management plans.

4. Promote early detection and management of emerging weeds by educating the general public, land holders and key stakeholders about key pest plant species through the following:

- Encourage participation in the "Weeds Spotters Network";
- Establish a public service to provide correct identification of plant species found within Northern Gulf Region, including training in the correct procedures for sending plant samples and photographs to the QLD Herbarium;
- Collaborate with local government, Biosecurity QLD and neighbouring NRM bodies to conduct a roadside survey to determine the distribution of priority weed species such as thatch grass (Hyparrhenia rufa), navua sedge (Cyperus aromaticus), and gamba grass (Andropogon gayanus) which will be transported from the tractor slashers from Mareeba and could be a major emerging problem weed for the Northern Gulf bio-regions.
- Support the QLD Biosecurity campaign against the spread of Siam Weed (Chromolaena odorata), Koster's Curse (Clidemia hirta), Limnocharis (Limnocharis flava), Makania Vine (Mikania micrantha), and Miconia (Miconia calvescens).

5. Support new infestation monitoring and response capacity for exotic fish species, especially Tilapia (Tilapia, Oreochromis and Sarotherodon spp), including the following:

- Consult QLD Fisheries to identify high risk areas for new pest fish infestations on the basis of proximity to established populations, past controlled infestations and likely conduits for new infestations;
- Seek co-funding support from corporate water supplier Sunwater and Government fisheries agencies for an independent review of the adequacy of existing inter-basin water transfer screen barriers and nominated options for improvement;
- Encourage and support government agency led seasonally stratified fish surveys and baseline aquatic biota surveys in areas vulnerable to new Tilapia Infestations;
- Expand the current Government Agency–backed education and extension strategy for Tilapia of the Upper Mitchell catchment into other catchments of the Northern Gulf Region.

6. Collaborate with Department of Main Roads and the Etheridge Shire Council to investigate the effectiveness of wash down stations in removing weed reproductive material from vehicles in the Northern Gulf Region, with the aim of:

- Encouraging and supporting the Etheridge Shire Council to reactivate the existing Mt Surprise wash down station;
- Determining the number of vehicles using the Mt Surprise wash down service relative to the traffic load;
- Determining if more wash down stations are required in the region, including investigating The Lynd Junction as a potential new, wash-down site;
- Developing education material for locals and visitors about the importance of using the wash down station and controlling weeds entering the Gulf Region.

MONITORING FRAMEWORK

Continue weeds mapping which has the capacity to be scaled at property, catchment and region level through:

1. Landholder surveys of priority weeds on the basis of a 1 square kilometre grid;

2. Regional and catchment scale analysis of weed presence, absence, and migration patterns;

3. Calibrate and cross reference with remote sensing, local government and biosecurity data and climate change projections of future weed spread scenarios;

4. Trial new technologies to expand and maximize weeds mapping effort;

5. Analysis of feral animal numbers recorded at biodiversity monitoring sites;

6. Cross referencing of feral animals sited through monitoring activities with QLD government feral animal abundance and distribution mapping.

CONTRIBUTORS