Anindilyakwa Indigenous Protected Area Plan of Management 2016

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Anindilyakwa Land Council

Compiled by Stacey Taylor

Anindilyakwa Land Council

Anindilyakwa Land & Sea Rangers

ANINDILYAKWA INDIGENOUS PROTECTED AREA LAND AND SEA MANAGEMENT PLAN

Warnindilyakwa People and Country

Groote Eylandt archipelago is the traditional land and sea country of the **Warnindilyakwa** Traditional Owners, referred to by our language name **Anindilyakwa**.

Ancestral spirits brought us here from the mainland along Songlines that created the land, rivers, animals, plants and sacred sites.

About 1200 Anindilyakwa people live at Angurugu and Umbakumba on Groote Eylandt and Milyakburra on Bickerton Island.

Our Landscape/Seascape Values

- Relationship between people, culture and country
- Kinship with animals and plants on land and sea
- Identity as island and saltwater people
- Songlines that link us to the mainland
- Sacred sites on land and sea
- Traditional food from land and sea
- Traditional knowledge and practices
- Culturally significant species on land and sea
- Habitats that sustain people, animals and plants

Conservation Significance

- Nationally and internationally significant nesting sites for marine turtles and seabird colonies
- Approximately 900 plant species and 330 vertebrate species
- 12 threatened animal species, including Northern Hopping-mouse, Brush-tailed Rabbit-rat and Northern Quoll
- Absence of cane toads, feral pigs, feral horses, feral donkeys, feral buffaloes and most invasive pasture plants
- Pristine marine environment supporting populations of dugong, four species of marine turtle, many fish and shark species, and coral reefs.

Managing Country

Legal Means

- Recreation permits for access to land areas (Land Rights Act)
- Negotiated access arrangements for tidal areas (Land Rights Act)
- Sacred Sites Act
- NT Fisheries Act
- Negotiated compliance training and authorisation

Other Effective Means

- Ranger patrols
- Ghost nets removal
- Fee-for-Service contracts (AQIS and others)
- Weed management
- Feral animal management (including cane toad monitoring)
- Fire management
- Site recording, protection and management
- Research and monitoring

Our Shared History

1600s - 1900s
Maccassan fishermen sailed down from Indonesia with the annual northwest monsoon.

1920s
Church Missionary Society brought Christianity and formal education to our communities

1960s
GEMCO manganese mine established

2007
Dugong Beach Resort opened

Warnindilyakwa Songlines

Boundary of Anindilyakwa IPA

Our Vision for Culture and Country

- Our riches are in the land, the sea and the Songlines.
- Our land and sea country are more important to us than money - once country is destroyed it cannot be replaced.
- We want to keep our land and sea country healthy like it is now for our future generations and for all our countrymen that our Songlines connect us to on the mainland.

Our IPA Journey

2006:
Anindilyakwa IPA over all our islands.

2010/2011:
Consultations with TOs, government and others about expanding our IPA into sea country

2012:
All our land and sea country within the Anindilyakwa Land Council boundary dedicated as an IPA (IUCN Category V Protected Landscape/Seascape)

Threats to Our Country

Seabed mining would:

- Cut through our Songlines
- Destroy our sacred sites
- Destroy dugong and turtle feeding grounds
- Pollute our waters
- Lock us out of hunting areas

Weeds

- Weeds present on the IPA include Buffel Grass, Grader grass, Mission Grass, Coffee Bush, Guinea Grass, Hiptus, Neem and Snake Grass
- Invasive pasture grasses present in Arnhemland threaten the local ecology and fire regimes

Feral Animals

- Many feral animals common to the Top End do not yet occur on the IPA
- Rusa Deer, Asian House Gecko, Eurasian Tree Sparrow, House Mouse, Black Rat, feral cats and wild dogs are found on the IPA.

Research and Monitoring

- Toad monitoring using sniffer dogs and remote sensing
- Animal and plant surveys
- Turtle research and monitoring (nesting surveys and satellite tracking)
- Northern Quoll tracking
- Fisheries research
- Climate change
- Monitoring and reporting on implementation of Management Plan

Supporting Culture

- Traditional knowledge recording and application
- Cultural mapping on land and sea
- Junior Ranger Program
- Culture camps
- Supporting Elders to access country
- Education, communication and community involvement

Using Our Country

Our main **food from the sea** includes:

- Dugong, Green Turtle , Flatback Turtle Trevally, Milkfish, Parrot fish, Stingray,
- Mudcrab, oysters, mud mussels, clams

Our main **food from the land** includes:

- **Mamdakirriyerru** - long yams
- **Yilyakwu-wa** - native honey or "sugarbag"
- **Yiburadu-wa** - agile wallabies
- **Yaraju-wa** - goannas
- **Yimarndakuwabu-wa** - blue-tongued lizards
- **Mangkarrkba** - wild plum
- **Angarrakaka** - jungle currant
- **Marringmur.da** - bush currant
- **Yimurmga** - wild prune

Healthy People – Healthy Country

Healthy Culture

- Maintaining ceremony
- Maintaining language

Economic and Social Development

- Ranger jobs, training and mentoring
- Business opportunities in environmental services and tourism

Health Promotion

- Supporting access to bush foods
- Supporting wellbeing and healthy choices through culture camps

What the IPA Dedication Means

We are committed to protecting, caring for and sustainably using our land and sea country through:

- Traditional law and practices
- Land & sea patrols, management, education and research
- Negotiation & collaboration with government
- Negotiation & collaboration with others
- Aboriginal Land Rights (NT) Act
- Native Title Act

IPA dedication is a non-legal process. It does not impact on any current authorities, licences or access rights. Any changes to current arrangements will only occur through negotiation and agreement.

IPA Governance

- Direction by Warnindilyakwa Traditional Owners
- Implementation through Anindilyakwa Land Council
- Collaboration with government and stakeholders through IPA Consultative Committee

Management Principles:

- Respect for Warnindilyakwa law, Songlines, spiritual and cultural values
- Maintenance of biodiversity values
- Protection of biosecurity integrity
- Sustainable use of natural resources on land and sea by Traditional Owners
- Sustainable recreational fishing
- Economically viable and ecologically sustainable commercial fishing
- No seabed mining
- Land and sea managed together

Anindilyakwa Land and Sea Rangers

Rangers based on Groote and Bickerton Islands:

- Implement IPA Management Plan
- Carry out regular land & sea patrols
- Control weeds and feral animals
- Remove ghost nets from the sea
- Undertake research, monitoring & biosecurity and fire management projects
- Maintain roads to outstations
- Support cultural knowledge and practices
- Engage in training and professional development

Supporting Documents

- IPA Technical Information
- IPA Governance Arrangements and Agreements
- IPA Annual Work Program
- IPA Weed Management Strategy
- IPA Cultural Heritage Management Strategy
- IPA Fisheries Management Arrangements
- IPA Research Agreements

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A message from traditional owners

This plan is about the future of our country. We, the traditional owners of the lands and seas in the Groote Archipelago, are determined to manage our country and to pass it on to our children and grandchildren in good condition so that it supports their lives and their spirits into the future.

We have a great deal of knowledge about our country. We know much about the animals and plants, the rivers and the oceans that others do not. Only our old people know the real meanings of our country. We want to preserve our knowledge and skills. We recognise that we also need new skills to look after some of the new problems that face our country.

We understand that our land must be managed carefully if it is to sustain our future. We are prepared to share our knowledge and skills and to learn new skills for land and sea management. We seek partnerships for the future.

We are determined that the traditional owners will be the first decision makers for managing our country – their word is law and must be respected.

We are happy to make visitor's welcome on our country but we want to make sure they do the right thing and that they respect our country and our communities.

We have met and discussed the idea of an Indigenous Protected Area and we have agreed that an IPA will provide a good structure for looking after our country in a partnership with Government and others.

Purpose and scope of plan

This Plan of Management (PoM) coincides with the extension of the Anindilyakwa Indigenous Protected Area (IPA) to include sea country (see Box 1). It is intended as an update to the 2006 Anindilyakwa IPA PoM (which included prescriptions for land only) and builds on the draft PoM compiled in 2013.

Together with the ALC 15 Year Strategic Plan (ALC, 2012), this PoM outlines how the Anindilyakwa IPA will be managed for the next ten years. This PoM, prepared by the Anindilyakwa Land Council (ALC) Land and Sea Management (LSM) Unit, reflects traditional owner concerns, aspirations and priorities regarding the future management of their country.

The prescriptions contained in this PoM are intended to guide the overarching planning and decision-making across land and sea within the IPA. The IPA Operational Plan (in development) is a more detailed document that guides the work program and priorities of the ALC Rangers and their partners.

Part A

Provides background information on the IPA, its people, uses and significance.

Part B

Describes the IPA's cultural, conservation and recreational values, as recognised by *Anindilyakwa* and *balanda* (non-indigenous) people. The range of issues and opportunities associated with each value is also described. Management objectives and strategies designed to resolve issues or realise opportunities are outlined.

This information is grouped within three overarching management themes:

- Healthy people, healthy country
- Looking after *makarda*
- Looking after *ariba.*

Part C

Outlines the monitoring, evaluation and reporting strategy to measure the performance of the IPA against the broad objectives of the three management themes.

Box 1 - Our IPA journey: recognising connections and responsibility to sea country

The ALC Ranger Program was established in 2002. Since then, the size and scope of activities undertaken by the group has expanded.

In 2006, the Anindilyakwa IPA was declared over Groote, Bickerton and surrounding islands in the archipelago. The IPA encompassed an area of land approximately 3 000km^2. Consistent with *Anindilyakwa* people's cultural connections and obligations to country, the ALC Rangers continued to undertake management activities across the land and the sea.

Following a High Court decision in July 2008 (Northern Territory of Australia V Arnhem Land Aboriginal Land Trust [2008] HCA 29), traditional connections to the waters directly surrounding the IPA were formally recognised. According to the Court's decision, Aboriginal Land Trusts now have the right to control access to waters overlying Aboriginal Land in the intertidal zone.

In 2010 and 2011 ALC representatives engaged traditional owners, government bodies and other relevant stakeholders to discuss the dedication of sea country as part of the existing IPA. Research of the cultural, ecological and recreational values of the IPA was undertaken and a draft PoM was completed. A poster, which outlines the broad themes of the management plan, was also designed to engage community members and other interested parties in the objectives of managing the Groote Archipelago as an IPA (see page 3).

During this time, mining companies were showing an increased interest in exploring and mining the NT seabed. Traditional owners and the ALC led a strong campaign to protect the sea country of the Groote Archipelago and, after a three year moratorium was placed on seabed mining in the coastal waters of the NT, the NT Government vowed to refuse any application for seabed mining in the Groote Archipelago indefinately.

It was not until 2016, after consultations with all interested stakeholders, that traditional owners had adequate support to dedicate and collaboratively manage an additional 7 000km^2 of sea country as part of the Anindilyakwa IPA. The expansion of the IPA to include sea country has no legislative basis and does not give traditional owners the right to restrict access to the sea. Any changes to current licences and access rights will occur only through negotiation and agreement with all relevant parties.

Anindilyakwa people now believe the IPA appropriately represents their traditional connections to country. The expansion to include sea country also recognises the suite of land and sea management activities that have been undertaken by the ALC Rangers since 2002. Traditional owners are keen to take further steps to protect their sea country through Native Title and National Heritage Listing.

Part A - Background

Regional context

The Anindilyakwa IPA is located in the northwest Gulf of Carpentaria in East Arnhem Land (see Box 2). It is approximately 630km east of Darwin and (at its closest point) is 10km east of the mainland. The IPA covers the Groote Archipelago, which includes Groote Eylandt, Bickerton Island and over 40 smaller, low-lying islands (See Figure 1). The IPA covers an area of approximately 10 000km^2; the total land area is approximately 3 000km^2 (Groote Eylandt makes up approximately 2 400km^2).

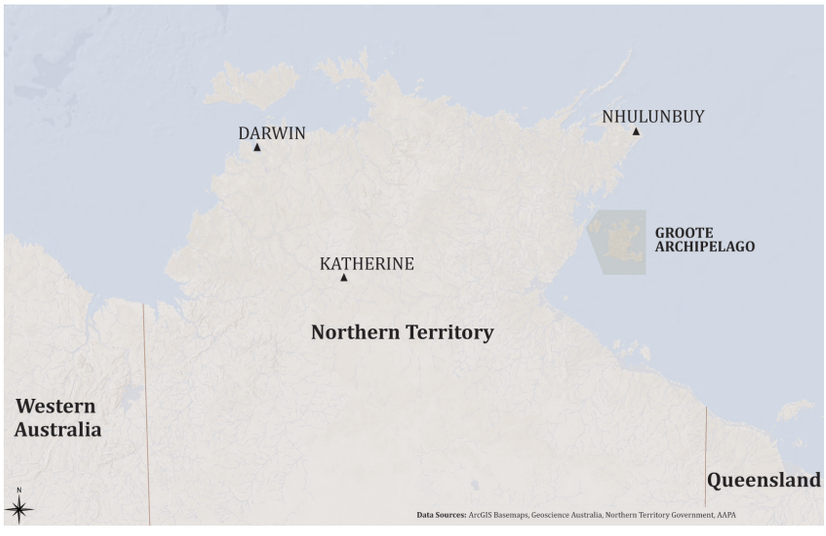


Figure 1 Location of the Anindilyakwa IPA

Box 2 - East Arnhem Land neighbours

Unlike areas of tropical savannah elsewhere in Australia, much of East Arnhem Land is Aboriginal Land that is managed by indigenous ranger groups - on behalf of traditional owners – to conserve cultural and biodiversity values.

The Laynhapuy IPA is northwest of the Anindilyakwa IPA and is actively managed by the Yirralka Rangers (through the Laynhapuy Homelands Aboriginal Corporation). At the completion of 'phase two' of the Laynhapuy IPA (i.e. an expansion to include sea country and additional Aboriginal Land), the Anindilaywka IPA will share its northwest sea border with the Laynhapuy IPA. Further north of the Anindilyaka IPA, the Dhimurru Aboriginal Corporation and Ranger Group manage the Dhimurru IPA. This comprises approximately 5 500km^2 of land and sea.

There are four communities within the Anindilyakwa IPA: Alyangula, Angurugu, Umbakumba and Milyakburra (Figure 2). Each community has its own school, basic grocery store and clinic. Alyangula, located on the northwest coast of Groote Eylandt, is leased by South 32's Groote Eylandt Mining Company (GEMCO) to service the local mining community. Alyangula has approximately 1 100 permanent residents and can have up to 800 temporary residents at any one time. Angurugu is situated on the south bank of the Angurugu River, on the west side of Groote Eylandt. It has approximately 800 residents. Umbakumba, located in the northeast of Groote Eylandt (approximately 50km from Angurugu), has approximately 440 residents. Milyakburra was a former outstation settlement on Bickerton Island and now has approximately 170 residents.

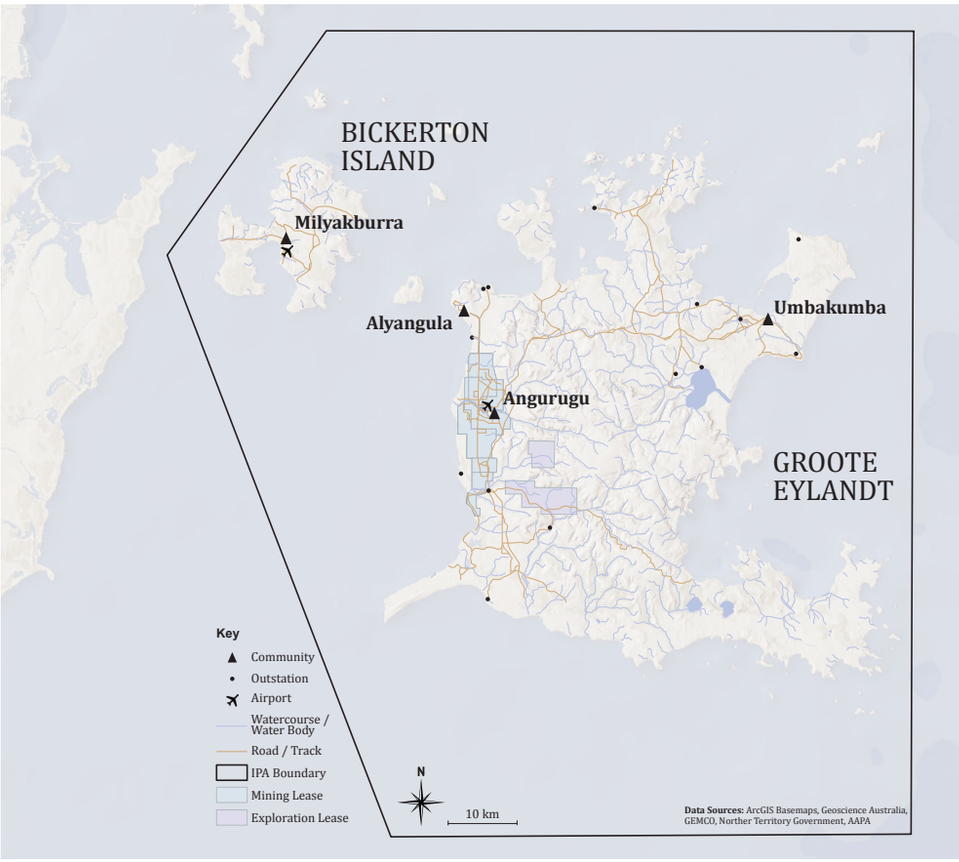


Figure 2 Anindilyakwa IPA

Milyakburra is accessible by light aircraft or boat (approximately 15 and 60 minute travel time from Groote Eylandt to Bickerton Island respectively); there are no sealed roads on Bickerton Island. Various roads and tracks traverse Groote Eylandt. The Rowell Highway runs north - south down the west side of the island. It connects Alyangula with the Groote Eylandt Airport, Angurugu and active manganese mining operations. A sealed road running east - west across Groote Eylandt, links Angurugu with Umbakumba. Numerous bush tracks also connect communities to outstations and other parts of the island. During the wet season, some tracks are inaccessible due to flooding.

Warnumamalya - People

Anindilyakwa is the first language spoken by traditional owners of Groote and Bickerton Islands. *Anindilyakwa* people have resided in the Groote Archipelago for approximately 2 500 years. According to *Anindilyakwa* tradition, the history of people began with the formation of the land and seascape during the Dreaming. During this time, ancestral creatures travelled across the land and sea along 'songlines'. They sang the country's features – including the plants, animals, hills and rivers – into being and brought *Anindilyakwa* people to the region. There are various songlines that traverse the islands and sea within the IPA. These include tracks related to *angwura* (fire), *yukwurrirrindangwa* (sawfish), *dumurrengmurra* (sea snake) and *dinginjabena* (dolphin).

Through songlines and associated totems, *Anindilyakwa* clan groups are linked to each other and other clans on the mainland. Before European settlement, when conditions were good, *Anindilyakwa* people used canoes to reach the mainland. For many years, the *Nungubuyu* people - who reside on the mainland directly west of the IPA - traded goods and food with *Anindilyakwa* people. Today, *Anindilyakwa* people maintain close links with people on the mainland through marriage, migration and shared ceremonies.

Shared history

In 1644, Abel Tasman named Groote Eylandt (i.e. a Dutch name that translates to 'Great Island'). Matthew Flinders formally described the Groote Archipelago and indigenous peoples of the region in the 1800s (Clarke, 1994).

The first regular contact between *Anindilyakwa* people and non-indigenous people began in the 1700s when fisherman from Makassar (the capital of present day Sulawesi, Indonesia) began making the voyage to northern Australia. Makassan fishermen travelled to Groote Eylandt during annual northwest monsoons and returned to Indonesia in April / May, aided by the southeast trade winds. Makassan fisherman came in search of *yungwula* (sea cucumber), which they traded for various goods from Indonesia (e.g. pottery, fish hooks, smoking pipes, tobacco and dugout canoes).

It is believed that Makassan fishers visited the Groote Archipelago regularly for approximately 200 years, until the early 1900s. Over this time, relationships between *Anindilyakwa* people and Makassan visitors were not limited to economic transactions, but involved shared living arrangements and collective ceremonial activities. Ongoing relationships with Makassan fishers are believed to have influenced several aspects of *Anindilyakwa* culture, including: language, art, songs, totems and customs (May *et al*., 2009).

In 1921, not long after Makassan fishers stopped travelling to the Groote Archipelago, the Emerald River Mission was established on Groote Eylandt. In 1943 the mission was relocated to Angurugu and by the 1950s, the majority of *Anindilyakwa* people living on the west side of the island had abandoned their semi-nomadic lifestyle and settled at Angurugu. The Anglican Church Missionary was responsible for the administration of Angurugu

community services until 1979. The 'Missionary Era', when *Anindilyakwa* people were introduced to Christianity and the European lifestyle, influenced the culture and lifestyle of *Anindilyakwa* people dramatically. Today, many *Anindilyakwa* people integrate Christian teachings and traditions with traditional belief systems.

In 1938, Qantas established a refueling base for commercial flying boats in the northeast of Groote Eylandt. During World War II, the Royal Australian Air Force operated a temporary defence airbase from the same location. In 1942, the community of Umbakumba was established nearby; many *Anindilyakwa* people living on the east coast of the island moved to the small community.

The presence of manganese in Groote Eylandt was confirmed in the early 1900s. However, it was not until Broken Hill Pty (BHP) undertook extensive exploration of the island in 1962, that the economic potential of the deposits were confirmed. The Anglican Church Missionary facilitated negotiations between BHP, traditional owners and the Commonwealth Government. In 1964, after being granted a special mining lease (in return for royalty payments), BHP began open-cut mining on the west side of the island.

Country

Following its proclamation in 1931, Groote Eylandt was included as part of the Arnhem Land Aboriginal Reserve. In 1976, with the passing of the *Aboriginal Land Rights (NT) (ALR)* Act, traditional ownership was formalised and unalienable freehold title was delivered to the Groote Eylandt Aboriginal Land Trust.

Climate

The Anindilyakwa IPA is located in the wet-dry tropics region of Australia. Its climate is characterised by a hot summer from October to April (mean maximum and minimum temperature range of 34.6 and 20.9, respectively) and a cool to warm winter from May to September (mean maximum and minimum temperature range of 32.5 and 15, respectively) (BOM, 2016). During the winter months, strong southeast winds bring dry, cool air to the island. Northwest 'monsoon' winds during the summer months bring humid air and rain from the equator (see Figure 3). On average, Groote Eylandt receives approximately 1260mm during the summer months (October to April) and 40mm during the winter months (May to September); most rain falls between December and March (BOM, 2016).

When tropical cyclones approach the coast during the summer months, they bring strong winds and heavy rain. Tropical cyclones occur in the region approximately once every two years (BOM, 2008).

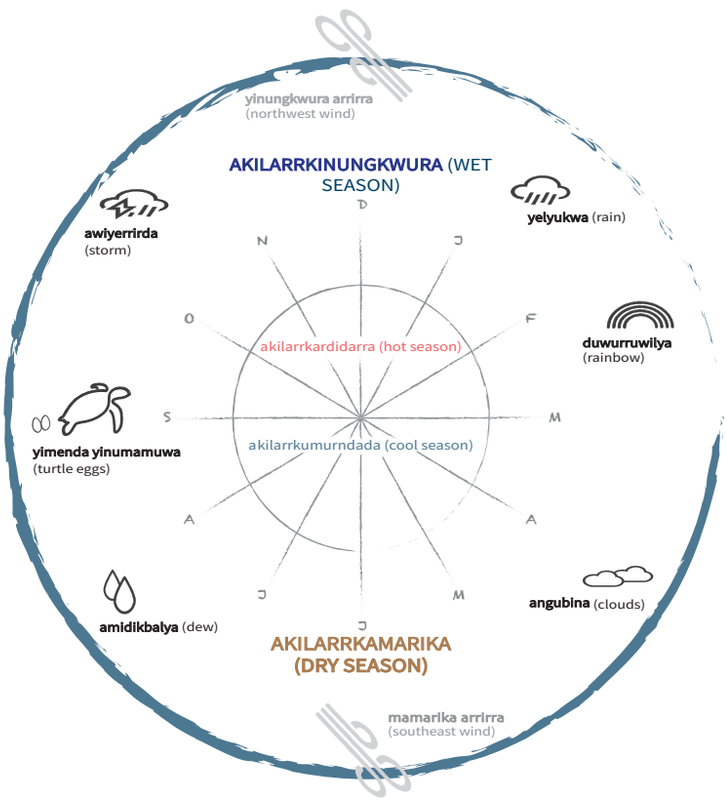


Figure 3 *Anindilyakwa* seasonal calendar

Anindilyakwa people recognise seasons that correspond to changes in temperature, winds and rainfall (Figure 3). The *Anindilyakwa* seasonal calendar also broadly links calendar months and the wet and dry seasons to various ecological indicators and seasonal events. This not only dictates when specific food items are available (e.g. the beginning of the dry season is the time to collect yams), but also when specific ceremonial activities

take place. As such, the traditional seasonal calendar provides an introduction to some of the knowledge *Anindilyakwa* people have regarding the interrelationships between animals, plants, people, climate and cultural practices.

Land types

The IPA is included in the Arnhem Coast Bioregion. This region encompasses a coastal strip that extends from east of Cobourg Peninsula to north of Rose River in southeast Arnhem Land (DLRM, 2016). The Arnhem Coast Bioregion includes some of the most remote and intact natural systems in Australia. These systems include: coastal plains and dunes, mangroves, saline flats, paperbark forests and wetlands, tall open eucalypt forest and woodlands, and patches of monsoon vine forests.

Anindilyakwa people recognise many different landforms and habitats associated with various terrestrial, aquatic and coastal systems within the IPA. These have been grouped into four broad categories (Figure 4 and below) that describe the common landform, soils and vegetation on Groote and Bickerton Islands.

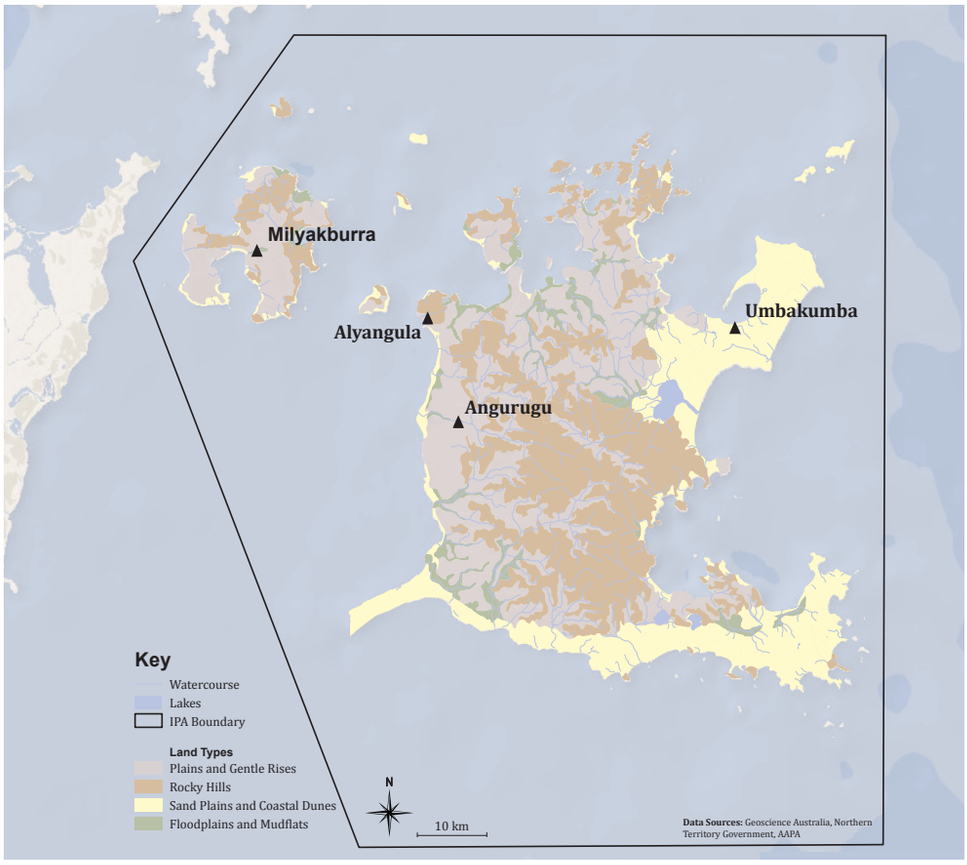


Figure 4 Land types of the Anindilyakwa IPA

Angabilyuwalya - plains and gentle rises

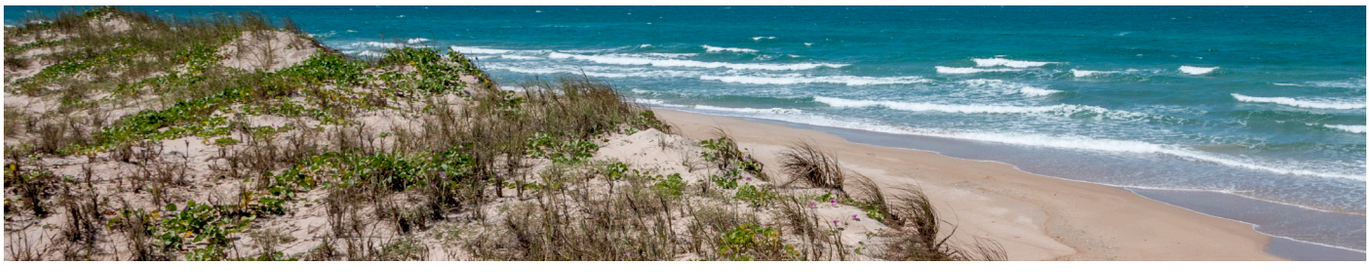
Laterite plains and rises are common throughout the IPA. Expansive plains in the centre of Groote and Bickerton Islands intersect sandstone hills and plateaus. Laterite plains support *erriberriba* (open woodland and forest), which are often dominated by eucalypt species such as *alabura* (Darwin stringybark - *Eucalyptus tetrodonta*) and *mawurdarra* (woollybutt – *E. miniata*). Mixed species woodlands - which include sparse shrub and grass species - are also found in patches across lateritic soils.

Yinijirra - rocky hills

Although Groote Eylandt is relatively low-lying (15m average elevation), a central range of *yinijirra* (rocky plateaus and hills) - composed primarily of sandstone - runs the length of the island from north to south. *Malarra makarda-manja* (rocky platforms) are also common along the north and southeast coast of Groote Eylandt, where they protrude into the water.

Where soil exists to support vegetation on *yinijirra*, *erriberriba* is often the dominant vegetation type. *Eucalyptus* and *Corymbia* species are common and low shrubs and grasses (e.g. spinifex – *Triodia* / *Spinifex spp.*) are patchily distributed. Distinctive cycads (*Cycas arnhemica*) grow in *yinijirra* country and *yimundungwa* (cypress pines - *Callitris intratropica*) are also common where sandstone outcrops are associated with sandy soils.

Mamudangkwa - sand plains and coastal dunes



On Groote Eylandt, sand plains and dune fields are associated with coastal areas and they are particularly extensive along the northeast and south of the island.

Dunes vary in the extent and cover of vegetation they support. *Acacia* shrublands and hummock grasses (e.g. *S. longifolius* and *Triodia spp.*) occur extensively on sandplains and stabilised dune systems. Where dunes meet

coastal fringes, vines (e.g. *maburrawilya - Ipomoea pes-caprae spp.*), grasses (e.g. *Chrysopogon elogatus*) and trees such as *muwarraka* (sheoak - *Casuarina equisetifolia*) and *Pandanus spiralis* are common in patches. Old, elevated patches of dune support more complex vegetation communities and larger trees (e.g. *E. tetrodonata* and *Corymbia kombolgiensis* in association with *Acacia torulosa* and *A. latescens* shrubs).

Ekbulkwurrariya **– floodplains and mud flats**

Small patches of *ekbulkwurrariya* occur on the southwest and northwest coast of Groote Eylandt and on the north coast of Bickerton Island. They are found in association with estuaries and small channels, where mud mixes with coastal sand. *Anuma* (mangrove) habitat is the dominant vegetation in these areas.

Alluvial floodplains are also commonly associated with tidal mudflats in the south and northwest of Groote Eylandt. Alluvial floodplains have sandier soils and commonly support soft grasses and *erriberriba*. On Groote Eylandt, these areas are often swampy and support large *Melaleuca* trees.

Land and sea uses

Traditional management and use

For thousands of years *Anindilyakwa* people relied on marine and terrestrial resources to survive. While *Anindilyakwa* people no longer rely on traditional resources, many people continue to access and connect with country by undertaking traditional activities, including:

- visiting and maintaining spiritual connections with country (especially with *alawudawarra* - sites that are associated with Dreaming stories)
- conducting ceremonies
- hunting, fishing and collecting seafood from coastlines
- collecting materials for art work
- harvesting plant material for food, medicinal and other purposes.

Yuwalkwurra (mud mussel) commonly found in mangrove habitat

Manganese mining

Groote Eylandt has been subject to ongoing manganese mining and exploration drilling for over 50 years. Approximately 5 million tonnes of manganese ore are extracted and sold each year. The GEMCO has current mining leases that cover over 50km^2 on the west coast of Groote Eylandt and 44 km^2 in the area referred to as the Eastern Leases (see Figure 2). There is potential for further exploration (and possible mining) in the south central and southwest of Groote Eylandt.

Recreational use

Traditional owners have designated 22 'Recreation Areas' on Groote and Bickerton Islands that are open to non-indigenous residents and visitors (Figure 5). Recreation Areas provide an opportunity for visitors to enjoy outdoor picnics, fishing and camping within the IPA. Access is conditional and requires residents to purchase an annual or half-year Recreation Permit.

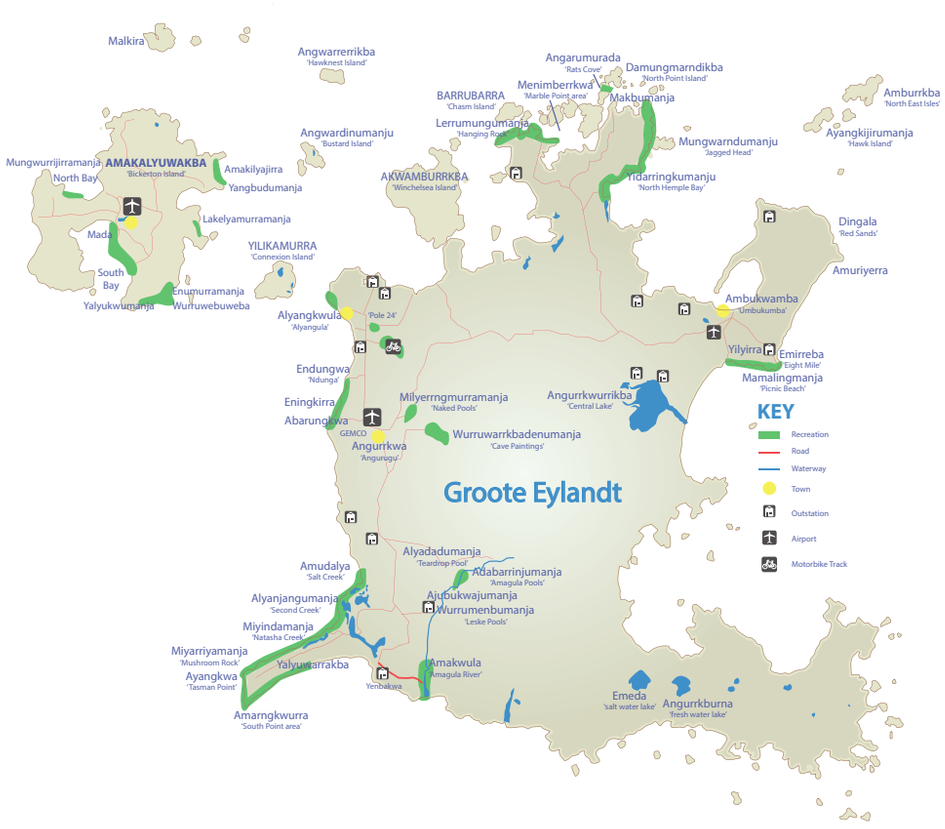


Figure 5 Recreation Areas in the Anindilyakwa IPA

Commercial fishing

Commercial fishing has been undertaken in and around the Groote Archipelago since the arrival of Makassan fishers hundreds of years ago. Today, there are 14 wild harvest fisheries that operate in Northern Territory (NT) waters and all, except the Northern Prawn Fishery (NPF), are overseen by the NT Government (and are represented by the Northern Territory Seafood Council). The Australian Fisheries Management Authority (AFMA) manages the NPF, which operates across the top end of Australia, from western Cape York to Western Australia.

Prawn fishing is the most economically significant commercial fishery in the IPA. There are few other fishing licences operating in the IPA; however, it is possible under current management arrangements, that commercial fishing could expand within the IPA in the future.

Conservation significance

Groote and several small islands in the IPA are classified as sites of international conservation significance (Figure 6).

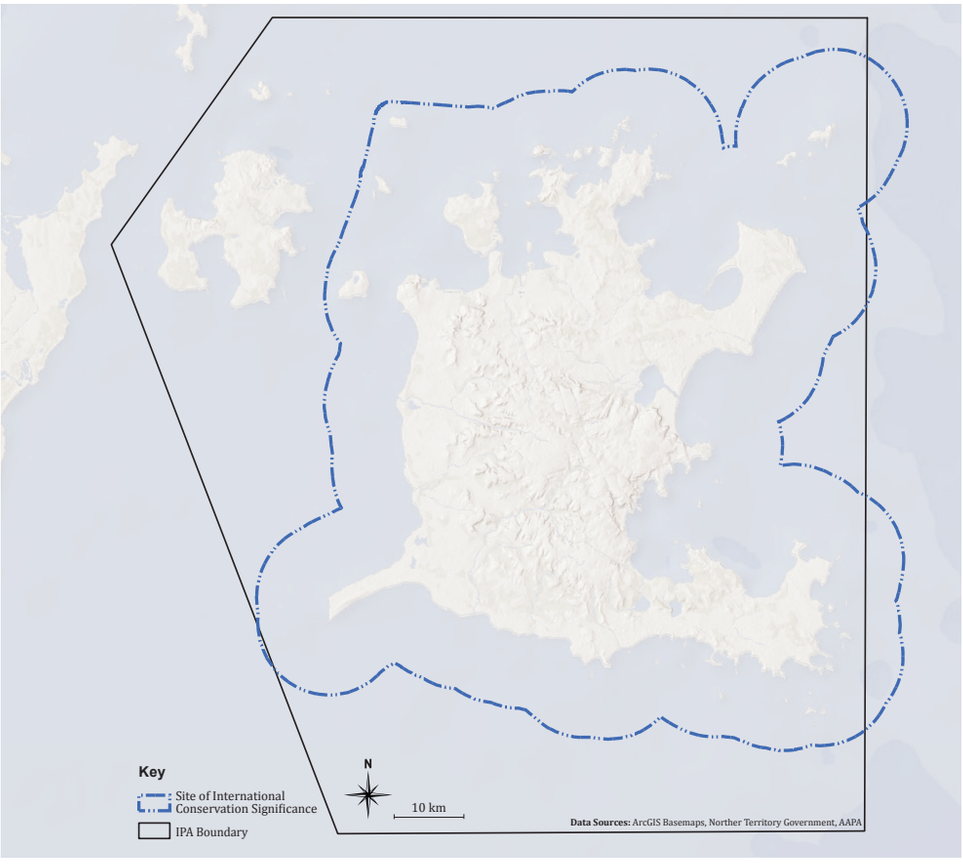


Figure 6 Site of International Conservation Significance

Many threatening processes that are common on the mainland, including: habitat destruction by feral herbivores and pigs, predation by feral predators and inappropriate fire regimes, are absent (or at low levels) within the IPA. Notably, the IPA remains free of cane toads (*Bufo marinus*), which are common across the top end of Queensland, NT and northeast Western Australia. As such, Groote and other islands in the IPA act as important refuges for many species negatively impacted by threatening processes.

The IPA supports over 360 native vertebrate species and over 950 native plants species. Large areas of coastline support internationally and nationally significant numbers of nesting marine turtles and seabirds. Twenty species of fauna, listed as threatened in the NT (under the *Territory Parks and Wildlife Conservation (TPWC)* Act 2000) or Australia (under the *Environment Protection and Biodiversity Conservation (EPBC)* Act 1999), are found in the IPA (see Part B, 2). A further 15 species are listed as near threatened in the NT and fifty-five species are protected under international agreements for migratory species.

Management framework

The Anindilyakwa IPA promotes a collaborative framework for protecting, managing and sustainably using the cultural and natural resources of the Groote Archipelago.

Box 3 - IUCN Category V: Protected Landscape / Seascape

A protected area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value; and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

Primary objective:

To protect and sustain important landscapes / seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices.

(Dudley, 2008)

Consistent with all IPAs across Australia, the Anindilyakwa IPA is a protected area that contributes to Australia's National Reserve System (see Figure 7). Indigenous Protected Areas are classified according to the International Union for the Conservation of Nature (IUCN) protected area categories (see Appendix III). When the Anindilyakwa IPA was declared over land in 2007 it was assigned to the IUCN Protected Area Category 6 (i.e. 'Protected Area With Sustainable Use of Natural Resources'), which emphasises the conservation and sustainable use of natural systems and resources.

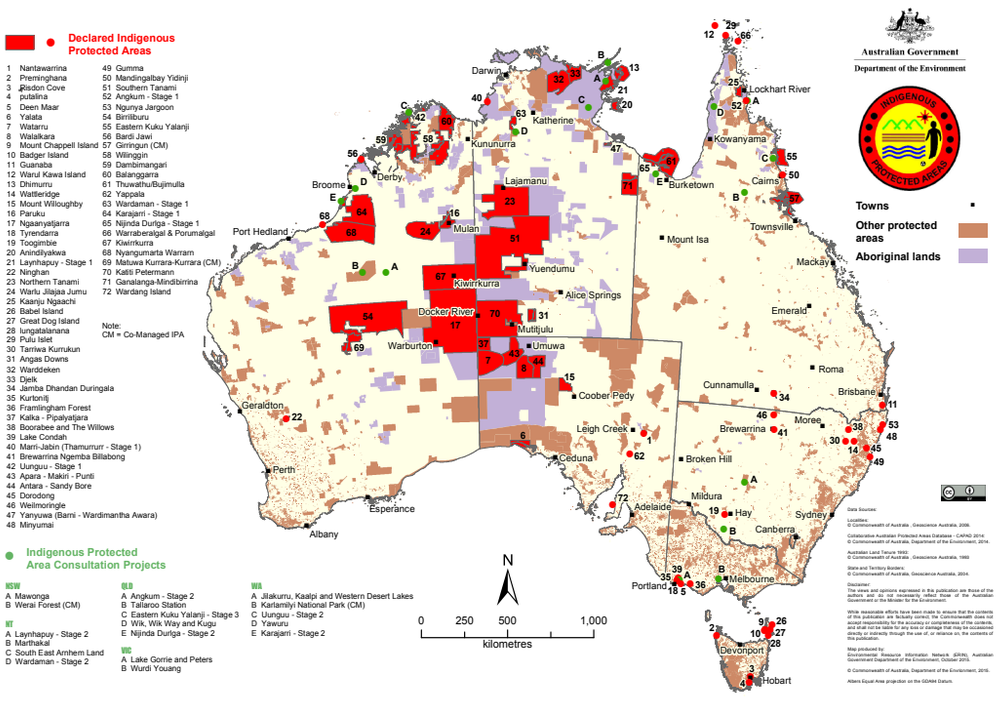


Figure 7 IPA locations across Australia

While the IUCN Protected Areas Category 6 remains compatible with the objectives of the current IPA, which includes both land and sea, the management framework outlined in this document is most consistent with the primary objective of IUCN Protected Areas Category 5 (i.e. 'Protected Landscape / Seascape') (see Box 3). The protection of biodiversity and other important values is prioritised in the management of the IUCN Protected Areas Category 5. The recognition and conservation of values created by interactions between people and the environment is also fundamental. Thus, this designation appropriately respects *Anindilyakwa* people's interactions, cultural connections and responsibilities to country.

Guiding principles

The management of the Anindilyakwa IPA is guided by the following set of principles:

Respect for traditional law, practices and responsibilities

Traditional owners of the Groote Archipelago have traditional responsibilities to manage country. These responsibilities, and the laws and traditions that underpin them, govern how country is owned and managed in the IPA. It is essential that traditional owners are provided with the opportunity to participate in management activities and / or decision-making within the IPA.

Two-way learning and management

Sharing knowledge and developing skills is an essential component of this PoM. Many *Anindilyakwa* people have extensive skills and knowledge relevant to the management and sustainable use of country in the IPA. Senior people must be supported to pass on this knowledge and skills to young people.

New threats to country also require a contemporary understanding and the adoption of modern management techniques. Thus, appropriate and effective management of the IPA requires the integration of both indigenous ecological knowledge (IEK) and contemporary knowledge. The ALC Rangers and management partners implement management activities that are informed by both knowledge systems.

Collaborative decision-making and management

The natural, cultural and economic values of the IPA are significant to *Anindilyakwa* people, local *balanda* people, industry groups and the broader Australian population. Respect is given to the various interests in, and appropriate rights and authorities over, the IPA through a collaborative governance arrangement.

Protect high biodiversity values

The IPA has significant biodiversity conservation value. The integrity of these natural values will be maintained.

When required, appropriate effort will be made to improve knowledge of the biodiversity values and their threats.

Sustainable land use

Both *Anindilyakwa* and *balanda* people will be supported to observe traditional and contemporary laws and knowledge to use the resources of the IPA sustainably.

Management regions

The IPA is divided into two management zones: terrestrial and marine. These zones reflect different responsibilities and governance.

Terrestrial - *Anindilyakwa* traditional owners are solely responsible for the management of land - including intertidal land and the overlying water - that is not leased by a third party. Through the IPA Program, traditional owners seek the advice, knowledge and collaboration of external parties to better understand and appropriately manage environmental threats.

Land within the IPA that is currently leased by a third party remains the property of *Anindilyakwa* people, however it's day-to-day management is the responsibility of the leasee (as detailed in lease agreements). The primary leased areas within the IPA include:

- Western and Eastern mining leases (the GEMCO)
- South Western exploration lease (the GEMCO)
- Alyangula township (the GEMCO)
- Pole 13 (Groote Eylandt and Bickerton Island Enterprises (GEBIE))
- Groote Eylandt Lodge (GEBIE)
- GCC Quarry (GEBIE Civil and Construction)
- Umbakumba, Angurugu and Milyakburra 40 year Township Leases (Commonwealth Government).

Marine - Traditional owners, government agencies and users of marine resources have interests in, and rights and authorities over, the waters from the low tide mark to the sea boundary of the IPA. The Anindilyakwa IPA provides an opportunity for all stakeholders to govern and manage this region collaboratively.

Governance of the IPA

The governance arrangement of the Anindilyakwa IPA aims to achieve stable and effective governance that reflects the rights, interest and obligations of traditional owners and supports collaboration with partner agencies, organisations and stakeholders.

The recent extension to include sea country formalises collaborative management arrangements already in place. This collaborative approach will provide an opportunity for effective communication between traditional owners, government agencies and other parties with an economic or recreational interest in the IPA. The governance structure of the Anindilyakwa IPA is outlined in detail below and in Figure 8.

Figure 8 Governance structure of the Anindilyakwa IPA

Anindilyakwa Land Council

Since 1991 the ALC has been the statutory body, under the *ALR* Act, responsible for representing *Anindilyakwa* people and assisting them in the claiming, management and protection of their country. *Protecting the Land and Sea* is the first of six goals outlined in the ALC's 15 Year Strategic Plan 2012 - 2027 (ALC, 2012). The ALC LSM Unit is a central element of the ALC, representing approximately two thirds of all ALC staff (and the majority

of indigenous staff). The ALC also provides specialist support to assist in the implementation of the IPA PoM, including: legal, anthropological, financial, mining, human resources and information technology.

ALC Land and Sea Management Unit

The ALC LSM Unit is responsible for overseeing the delivery of the IPA PoM and implementing management activities undertaken within the IPA (Table 1).

Traditional owners

Traditional owner clans are represented on the IPA Management Committee and the ALC Board. All traditional owners are responsible for making decisions regarding work undertaken on their respective country.

Table 1 Key responsibilities of the ALC LSM Unit in managing the Anindilyakwa IPA

Responsible staff	Key responsibilities
ALC Rangers, Ranger Group Coordinators, Learning on Country (LoC) Coordinators, Quarantine Officer, Administrative and Training Coordinator	• Plan and implement the actions outlined in the IPA PoM and other (ongoing) priorities identified by the IPA Management and Advisory Committees • Liaise with members of the IPA Management Committee and other traditional owners as necessary
IPA Coordinator (proposed)	• Oversee the implementation of the IPA PoM • Coordinate IPA governance arrangements • Provide project support to the ALC Rangers and other advice to ALC LSM Unit staff
Land and Sea Manager	• Manage the funding, resourcing and all staff required to implement the IPA PoM (including the ALC Rangers and Ranger Coordinators, LoC Coordinators, IPA Coordinator, Quarantine Officer and administrative staff)

IPA Management Committee

With support from the ALC LSM Unit and advice from the IPA Advisory Committee (and other interested parties), it is the sole responsibility of the IPA Management Committee, on behalf of all clan groups, to manage the terrestrial zone of the IPA.

The ALC Board forms the core of the IPA Management Committee, which comprises traditional owners from Umbakumba, Angurugu and Milyakburra. Each of the fourteen clan groups within the IPA are represented. Two indigenous rangers represent the ALC LSM Unit on the Committee. Meetings are held annually to coincide with the release of the IPA Monitoring and Evaluation Report (see Part C) .

The aims of the IPA Management Committee are to:

- represent the broader interests of traditional owners in the management of the IPA
- oversee the functioning of the ALC Ranger Program and review work opportunities
- identify local values, threats and management priorities
- inform annual planning of IPA projects and ALC Ranger work plans
- identify strengths and weaknesses of the management of the IPA, including the effectiveness of the Management Committee
- make decisions regarding the use and management of land.

IPA Advisory Committee

The IPA Advisory Committee is responsible for making decisions and setting priorities for the management of the marine zone of the IPA. The Committee is also responsible for providing advice to the IPA Management Committee regarding the terrestrial zone of the IPA.

The Advisory Committee meets annually following the IPA Management Committee meeting. Membership of the IPA Advisory Committee may change over time in response to emerging issues, priorities and opportunities. The IPA Advisory Committee is currently comprised of the ALC LSM Unit Manager, the ALC Mining and Environment Manager and representatives from the:

- IPA Management Committee
- Department of Prime Minister and Cabinet (Federal government funding body)
- NT Department of Land Resource Management (DLRM)
- NT Seafood Council
- NPF
- AFMA
- NT Department of Primary Industries and Fisheries (DPIF)
- Amateur Fisherman's Association
- Department of Agriculture and Water Resources

The aims of the IPA Advisory Committee are to:

- identify regional values, threats and management priorities (marine and terrestrial zones)
- exchange knowledge, expertise and information and provide advice to traditional owners and the ALC LSM Unit (marine and terrestrial zones)
- review the implementation of management activities undertaken in the IPA (marine and terrestrial zones)
- inform and / or undertake annual planning of IPA projects (marine zone)
- make decisions regarding the use and management of the IPA (marine zone)
- identify strengths and weaknesses of management of the IPA, including the effectiveness of the Advisory Committee
- identify resources and prospective management and research partners to strengthen management outcomes of the IPA
- develop consensus on strategies and actions to address issues of concern (marine zone).

Resourcing the IPA

The Anindilaykwa IPA is financed through funding from government and non-government agencies. These include the:

- **Department of Prime Minister and Cabinet** administers the Working on Country and IPA Programs, which finance the majority of work undertaken by the ALC Rangers within the IPA
- **The GEMCO** provides funding for one LoC Coordinator and one Quarantine Officer position
- **NT Department of Education** provides funding for one LoC Coordinator position
- **Anindilyakwa Land Council funding under s64(1) of the *ALR* Act** funds the LSM Unit Manager position
- **Other grants** for special projects.

The ALC LSM Unit supplements core funding by collecting fees (i.e. cost recovery) for the use of ALC LSM Unit resources (e.g. ranger shed / equipment, lab room / equipment and accommodation) and undertaking a range of fee-for-service works with various partner organisations. The ALC LSM Unit has regular contracts with the:

- **NT DPIF**
- **Federal Department of Agriculture and Water Resources**
- **NT DLRM.**

The ALC LSM Unit's operational hub is located at Pole 13 on the Rowell Highway, approximately 1.5km from Alyangula. A ranger shed and office complex at Umbakumba community provides an alternate base of operations for the Umbakumba Rangers (Figure 9).

Partner organisations

There are a number of government and non-government organisations that operate in the Groote Archipelago. Partnerships with these organisations supports the ALC LSM Unit to meet the objectives of this IPA PoM.

Local partner organisations include the:

- NT Department of Education (schools)
- The GEMCO
- Federal Government's Community Development Program
- East Arnhem Regional Council
- Anindilyakwa Services Aboriginal Corporation (ASAC).

The ALC Rangers partner with research institutions and government agencies to improve knowledge of the natural resources in the IPA. Current partners include the:

- School of Biological Sciences, University of Queensland
- Science and Engineering Faculty, Queensland University of Technology

- School of Marine and Tropical Biology, James Cook University
- NT DLRM
- Australian Institute of Marine Science (AIMS)
- Ghost Nets Australia.

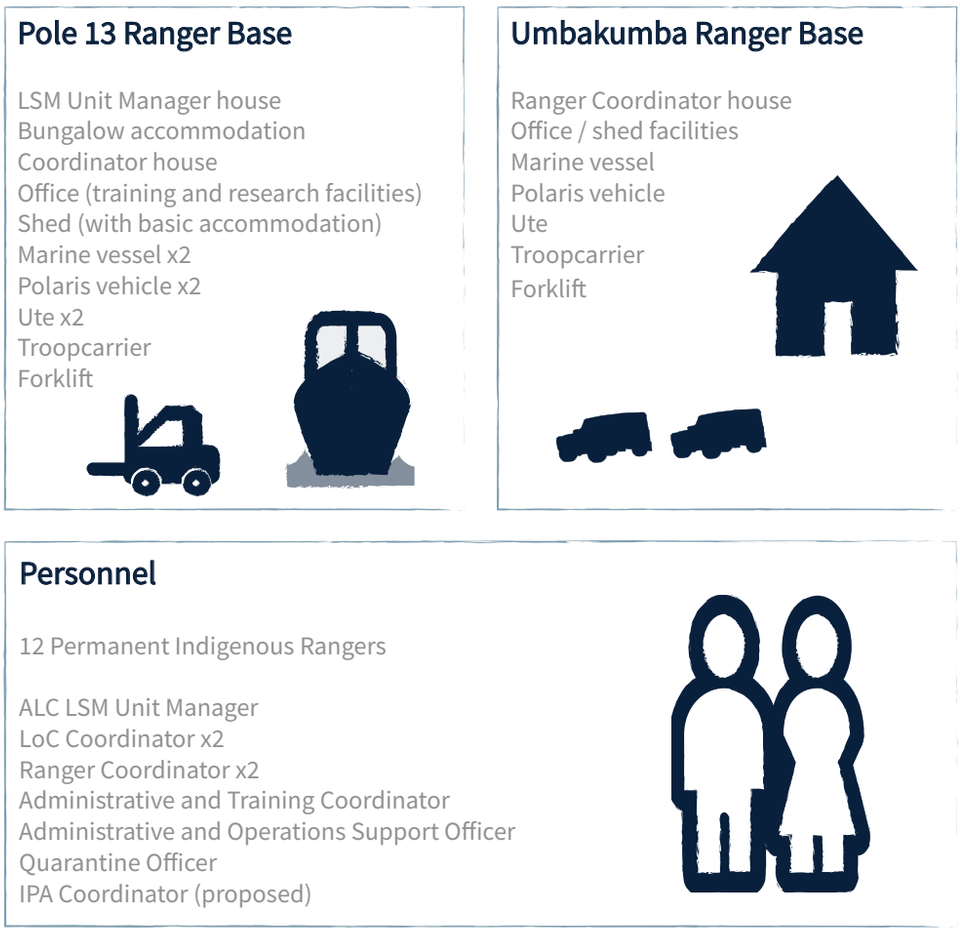


Figure 9 Resources of the Anindilyakwa IPA

Our vision for culture and country

Three management themes have been identified that reflect the aspirations of traditional owners in managing their country (Box 4). These themes are not mutually exclusive and management activities are likely to relate to strategies and objectives from more than one theme.

Box 4 - IPA management themes

Healthy people, healthy country

Passing down cultural and historical knowledge and building the capacity of young people has been identified as the most critical aspect of managing both the natural and cultural values of the IPA and in ensuring the wellbeing of *Anindilyakwa* people.

This management theme includes strategies that aim to strengthen and maintain customary management practices and traditional knowledge. It also includes various objectives to improve the education, employment and training opportunities and achievements of *Anindilyakwa* people.

Looking after *ariba* (land)

Managing the threats to the land is essential to maintain the significant biodiversity and cultural values of country. This requires the integration of both traditional and contemporary knowledge and practices and collaboration with researchers and other stakeholders.

Looking after *makarda* (sea)

Sea country within the IPA has cultural, ecological, recreational and economic significance. Managing threats to these values, including the sustainable use of its resources, requires the integration of traditional and contemporary knowledge and collaborative decision making.

Part B - Management themes

1. Healthy people, healthy country

1.1 Looking after culture

Anindilyakwa people believe that ancestral beings, who laid out the traditional laws and created the land and sea, still reside in the country today. The Dreaming stories and songlines associated with these ancestors provide *Anindilyakwa* people with the moral and social rules for life and dictate how they interact with each other and the environment. The intergenerational transfer of this traditional knowledge is critical to the spiritual and social wellbeing of individuals. Thus, looking after culture is directly linked with managing the health of country.

There are a number of sites in the IPA that are associated with Dreaming stories and many others that have historical and / or archeological significance. Maintaining the value and knowledge associated with these sites is important to both *Anindilyakwa* and *balanda* people.

1.1.1 Description

***Anindilyakwa* relationships with country**

Embedded in traditional teachings, songs and ceremonies are traditional laws and responsibilities that form the basis of *Anindilyakwa* society and culture, including how to look after country. The stories and corresponding rights and responsibilities to manage certain places are complex and are handed down primarily through family lines.

According to customary law, all *Anindilyakwa* people (and local plants and animals) belong to one of two moiety groups. The traditional laws governing moiety (and clan) groups outline appropriate ceremonial responsibilities. They also determine appropriate relationships and behaviour between individuals, including marriage partners (i.e. a person belonging to one moiety must marry somebody from the opposite moiety).

Moieties are further divided into 14 clan groups (Box 5). The stories, songs and responsibilities associated with an individual's clan group determine their connection to specific places and elements of country (i.e. totemic plants, animals and natural features). More than two hundred *amalawudawarra* (totems) are recognised by *Anindilyakwa* people (Waddy, 1988). Some are 'owned' exclusively by one clan and many others are shared between clans (that are linked by songlines). Significant *Anindilyakwa* totems include: the *mungwarra* (hammerhead shark – *Sphyrna lewini*), *barnimbirra* (morning star) and the *yukwurrirrindangwa* (Box 6).

Box 5 - *Anindilyakwa* clan groups

Moiety 1		Moiety 2	
Surname	**Clan name**	**Surname**	**Clan name**
Bara, Wurrabadalamba	*Warnungwadarrbulangwa*	*Mamarika*	*Warnindilyakwa*
Jaragba	*Warnungwijarrakba*	*Amagula*	*Warnungwamakwula*
Wurrawilya	*Warnungawerrikba*	*Wurramara*	*Warnungangkwurrakba*
Maminyamanja	*Wurrumaminyamanja*	*Wurramarrba*	*Wurraliliyanga*
Yantarrnga	*Warnungangwurrkwurrikba*	*Bara Bara*	*Warnungwamulangwa*
Lalara	*Warnungwamadada*	*Wurramarrba*	*Warnungwamakarjirrakba*
Wurragwagwa	*Wurrikilyangba*	*Durila*	*Durila , Wanambi*

Members of each clan have rights and responsibilities to use and look after the resources associated with their respective country. These rights and responsibilities are received from one's father. A person who has patrilineal connections to, and thus ownership of country is known as *Wurabalija* of an area of land or sea. Different responsibilities for country are determined by matrilineal relationships; individuals are *Jungai* for country that belongs to their mother. *Jungai* and *Wurabalija* have different but complimentary rights and responsibilities and must work together to manage country.

Box 6 - Story of the ALC logo: four significant totems

In the beginning the island was dark. *Barnimbirra* brought daylight to the island and ever since then there has been a day and night.

In creation times, *Yumaduwaya* (Stingray), *Mungwarra* and *Yukwurrirrindangwa*, began their journey from the eastern coast of Arnhem Land. On their way to Groote Eylandt they stopped at Bickerton Island where they transformed themselves from human beings into sea creatures. They then continued their journey to Groote Eylandt. On the way, they agreed to go to the centre of the island and decided to enter from the north. *Yukwurrirrindangwa* however, said: "I'll take a short cut". After the *Yumaduwaya* had left him, *Yukwurrirrindangwa* set off with a crowd of many different stingrays following him. *Yukwurrirrindangwa* led the way, probably because he was the biggest.

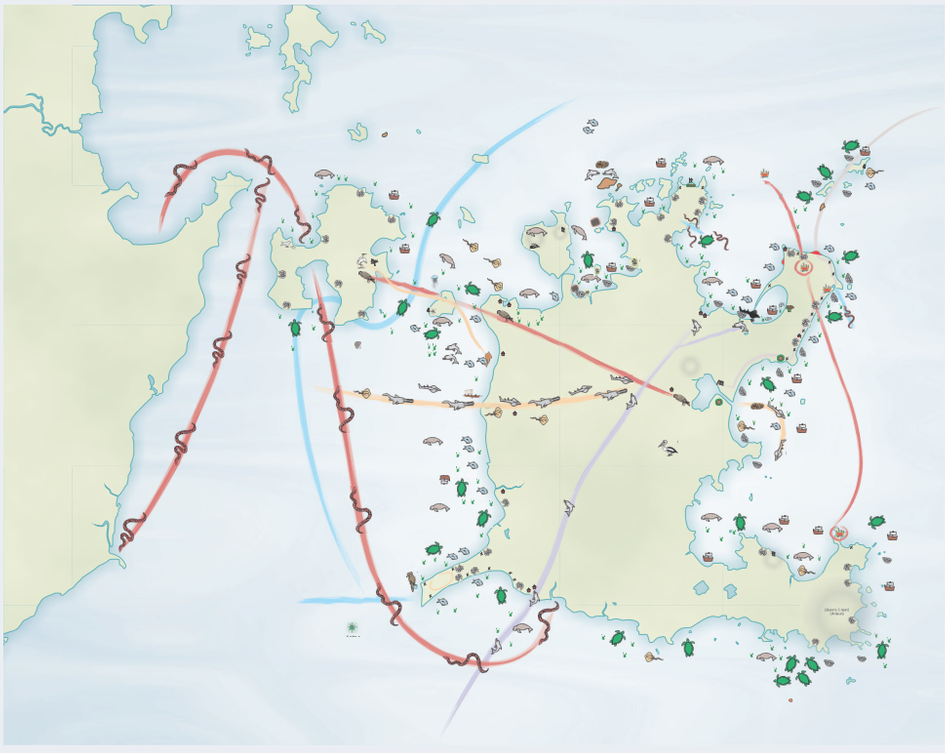
Meanwhile *lirreba* (the tide), was growing big. *Yukwurrirrindangwa* reached Groote Eylandt, came out of the sea, and started to cut his way through the land, using his teeth and nose as he went. As he cut out the land, and threw the earth aside, he created the Angurugu River. He opened a way for himself to travel towards Central Lake. As the water came in, the dirt was stirred up. *Lirreba* grew bigger and bigger and followed close behind *Yukwurrirrindangwa*. The stingrays used *lirreba* to continue following *Yukwurrirrindangwa*. *Yukwurrirrindangwa* then went to the centre of the island where he created Central Hill (*Yandarrnga*).

Cultural knowledge and laws

The stories associated with songlines not only determine ownership of country, they also impart important knowledge related to the environment and its management. This includes teachings about the relationships between all living organisms (including the interactions between humans and the environment), information about seasonal changes, the ecology and use of many organisms and the effect of fire and other disturbances on country.

Although *Anindilyakwa* people no longer rely on IEK to manage the landscape for their survival, being 'on country' and undertaking a range of customary practices remains important in defining and maintaining cultural identity. Visiting country, including places associated with *alawudawarra*, provides an opportunity to maintain connections with the spirits of the land and sea and interact with the country by maintaining and transferring cultural knowledge.

Box 7 - *Anindilyakwa makarda* songline map



This map is a basic representation of traditional knowledge of animals, plants and natural features that are transferred through songlines.

Ceremony and law

Many senior people believe that participating in ceremonies and songs, and upholding other traditional obligations defined in Dreaming stories, are the most important aspects of maintaining culture and keeping country in good condition. Ensuring the right people are taking responsibility and learning about the right country, including gender-specific sites and knowledge, is an important component of this.

Resource use

Harvesting resources from the land and sea was, and continues to be, a key customary activity that links *Anindilyakwa* people to their country. Accessing country to hunt and collect various resources provides an important opportunity for the intergenerational transfer of cultural knowledge and IEK to younger generations.

Marine animals, including fish and turtle, are important components of the diets' of *Anindilyakwa* people; terrestrial animals are less commonly harvested for food today. Many plants continue to be prized for their medicinal value, as food, or their use in producing art work (see Part B, 2.1).

Cycad seeds were used traditionally to make damper

Burning the bush

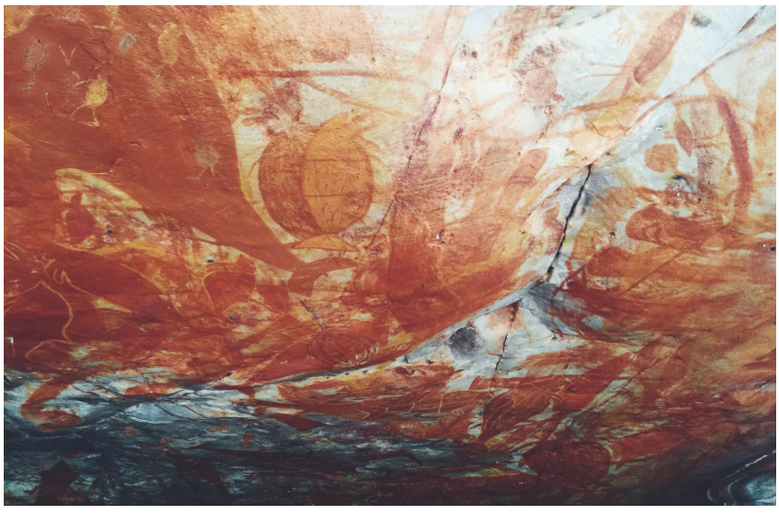
When people still walked the land they used fire to clean up the country and make it easier to traverse. Although fire was not used explicitly for hunting in the IPA, animals fleeing the fire were taken opportunistically (Levitt, 1981). Today, burning continues to alter the distribution and health of vegetation in the IPA. Most fires are lit opportunistically close to roads and tracks.

Cultural and heritage sites

Songlines link ancestral beings with particular areas of land and sea (Box 7). Within the IPA, there are a number of significant places that are associated with songlines and other Dreaming stories. These include notable stands of vegetation and landforms (e.g. *Yandarrnga*), small islands and water places (e.g. Angurugu River and other sections of rivers and creeks). Although the physical and spiritual importance of these locations may not be easily defined, they are commonly referred to as 'sacred sites'. *Anindilyakwa* people have specific responsibilities for, and ceremonies associated with these sites.

Of interest to *Anindilyakwa* and *balanda* people are the numerous archaeological sites that provide evidence of *Anindilyakwa* people occupying and undertaking ceremonial activities in the Groote Archipelago for over 2 000 years. These include caves and rockshelters that were visited regularly for preparing and consuming food (e.g. shell middens), sheltering and ceremony (e.g. rock art sites). Since the 1940s, researchers have investigated sites in the IPA (primarily on Groote, Bickerton and *Barrubarra* (Chasm) Islands (see Clarke, 1994). Traditional owners

continue to locate ‘undiscovered’ archaeological sites today.



Rock paintings at 'Cave Paintings' Recreation Area

Similarly to indigenous people across Australia, *Anindilyakwa* people used rock art to record occurrences, events and ceremonies or to portray people, animals and places. Some images depict animals no longer found in the IPA and others feature imagery – notably praus – that illustrates the long interaction *Anindilyakwa* people had with visiting Makassan fishers.

Physical remnants of Makassan dwellings and trepang processing also exist along the coast of Groote and Bickerton Islands and on islands in the northwest of the IPA. Remains include stone lines, fragments of exotic materials, tamarind trees, sub-surface deposits, freshwater wells and graves (Clarke, 1994). Traces of the Emerald River Mission - including buildings and graves - remain at the Mission’s original location, which is now used as an outstation. On the northeast coast of Groote Eylandt, the site of the Qantas refuelling base (and later the Royal Australian Air Force defence airbase) is marked by remains of a jetty, fresh water well and various buildings.

1.1.2 Issues and opportunities

Loss of indigenous ecological knowledge

Various influences associated with over 90 years of European settlement, have had a significant impact on *Anindilyakwa* culture. Today, senior *Anindilyakwa* people are concerned that some young people are disinterested in learning about their culture and the ‘old ways.’ They are also concerned that young people are not learning to speak, read or write their first language.

There has been significant investment in maintaining indigenous knowledge by the ALC and local corporations. A linguistics centre in Angurugu promotes *Anindilyakwa* language and culture by providing translation and recording services and creating resources for local communities. Cultural centres, which provide young and old people with the facilities to learn, record and engage in traditional (or contemporary) culture, art and language, are currently being established in the three communities within the IPA. The Milyakburra cultural centre, which was opened in 2016, features performance space, interactive technologies and media facilities.

Elders also believe that, while many young adults are disinterested in going out bush, it is essential to provide children with an opportunity to visit traditional lands during their formative years to help them establish a strong sense of identity and an interest in maintaining culture and country later in life. As most *Anindilyakwa* people now live in communities, opportunities to spend time 'on country' and pass on knowledge to younger generations are limited and the areas visited are now more determined by vehicle access. While many families travel out of their communities to fish, local resources are no longer relied upon. Thus, the transfer of knowledge related to marine resources, bush foods and other natural resources, is largely opportunistic.

The transfer of IEK and other knowledge relevant to cultural and historical sites is dependent on a few senior knowledge holders. Many senior people have various obligations and competing demands on their time (e.g. family and ceremonial responsibilities, employment and representation on organisation and community boards and / or committees). Poor health also limits the ability of some elders to go out on country and engage in customary land management activities. As a result, IEK is being lost as elders pass away.

There are a number of sites within the IPA that are yet to be mapped and recorded. It is possible that with the passing of senior people, the location and significance of these sites will remain unknown to future generations.

Physical threats to cultural and heritage sites

A range of land management issues and natural processes threaten the integrity of cultural and heritage sites within the IPA. For example, weeds can result in the decline of native plant species (including bush tucker), provide fuel for fire and reduce access to important places (particularly along watercourses). Significant places and infrastructure are threatened by inappropriate fire regimes (i.e. increasing area burned in hot, late dry season and decreasing inter-fire intervals), vandalism and disturbance caused by nearby development (e.g. blasting that disturbs rocks or smothers a site in dust). Rock art sites are also threatened by natural processes such as intrusion by native vegetation, growth of lichen / moss, the impact of nesting invertebrates such as termites and wasps, and erosion from wind and water runoff.

Outstations

There are fourteen outstations across the IPA that facilitate traditional owners accessing and staying on country (Figure 2). Many traditional owners who regularly visit or live at their outstation feel they maintain a connection to their country and escape some of the negative influences in communities. As such, it is important that the sustainable growth of outstations is managed effectively into the future (see ALC, 2016).

Some outstations have only basic, semi-permanent infrastructure. Others, which are permanently occupied, are self-contained homes, which are well equipped with all basic facilities (e.g. Malkala and Bartalumba Bay). During the dry season all outstations are accessible; many are only a short drive off main tracks and roads. However, during and following a significant wet season, flooding or track damage can impede access to some outstations.

Multimedia and documented knowledge

Since the early 1900s, *Anindilyakwa* people have worked with anthropologists, linguists, historians, archaeologists and other researchers to document cultural knowledge, traditions and language. Songs,

photographs, videos, cultural maps and genealogies are stored in databases held at the ALC, linguistic centre, cultural centres and with other Aboriginal organisations on the island. Additional information is documented in academic and other publications.

Activities undertaken to record the knowledge and stories of traditional owners ensures information is documented for future generations. It is important that this information is easily accessible to community members and relevant information is used to inform management of the IPA.

ALC Rangers

It is essential that all work activities undertaken by the ALC Rangers abide by, and (when appropriate) are informed by, traditional laws and IEK. Projects that support the maintenance and transfer of traditional knowledge include:

- **The LoC Program**. *Anindilyakwa* children (and adults) are provided with an opportunity to visit and share knowledge about cultural and heritage sites and learn two-way knowledge from elders, ALC Rangers, teachers and external experts.
- **Family-based country visits.** An opportunity for traditional owners and young people to access country, undertake customary activities and record and transfer cultural knowledge.
- Locating and undertaking **management and monitoring of fauna** (including turtles, quolls and various other species).
- Traditional knowledge of winds, currents and beaches inform the **timing and location of marine debris** and **ghost net collection**.
- **Resource harvesting trips** (e.g. collection of medicinal plants and wood for art work).
- Working with traditional owners, anthropologists and other ALC staff to **locate and map 'lost' sites**.
- **Producing community resources** (including booklets, posters and videos).
- **Managing Recreation Areas.** Traditional law dictates restrictions and other rules governing access to locations.
- **Supporting research activities**. Many research initiatives adopt, or are informed by, both traditional knowledge and contemporary methods. Traditional laws dictate appropriate activities and locations for research projects.

1.1.3 Management objectives

1.1.3.1 Management objective

Support traditional owners in their efforts to prevent the ongoing loss of IEK

Management strategies

1.1.3.1 (a) Work with the IPA Management Committee, ALC Anthropologists, relevant local organisations and traditional owners to review the IEK recorded for the region and identify and prioritise key knowledge gaps.

1.1.3.1 (b) Provide opportunities for the intergenerational transfer of IEK to young people by:

- undertaking country visits and other activities with traditional owners and school-aged children through the LoC Program
- supporting traditional owners to access country during ALC Ranger activities
- supporting cultural activities (including country visits and cultural mapping exercises) facilitated by ALC Anthropologists and other local organisations.

1.1.3.1 (c) Facilitate the application of IEK in planning and management of the land and sea.

1.1.3.1 (d) Develop links with local indigenous organisations to support the recording, storage and repatriation of IEK.

1.1.3.1 (e) In accordance with protocols governing the appropriate use and management of cultural information, produce maps, booklets and other relevant products to assist traditional owners in maintaining and transferring IEK.

1.1.3.1 (f) Work with traditional owners, ALC Anthropologists and other ALC staff to locate and document knowledge about cultural sites.

1.1.3.2 Management objective

Support traditional owners to access and fulfill obligations to look after country, including sites of cultural and / or historical significance.

Management strategies

1.1.3.2 (a) Undertake country visits as the key means of supporting traditional owners to:

- maintain traditional connections to country
- undertake customary management of culturally important sites
- undertake traditional harvesting activities
- transfer and record IEK.

Country visits may be facilitated by the ALC Rangers, the LoC Program, or in collaboration with ALC Anthropologists (or other partners).

Priorities will be based on discussions with traditional owners and relevant partners and will consider:

- the current priorities of, and resources available for, the LoC Program
- areas of outstanding cultural significance
- a demonstrated interest shown by traditional owners in accessing sites to undertake traditional management activities and transfer of relevant IEK

- the risk of irretrievable knowledge loss due to only a small number of senior knowledge holders remaining alive
- traditional knowledge already recorded for the region / estate
- areas that are difficult for traditional owners to access without logistical support.

1.1.3.2 (b) Provide opportunities for traditional owners to guide, and participate in, on-country work undertaken by the ALC Rangers.

1.1.3.2 (c) Prepare and implement a program for the development, maintenance and protection of infrastructure across the IPA that supports *Anindilyakwa* people in accessing and managing their country. Such infrastructure may include, but is not limited to:

- roads and tracks
- shade shelters
- basic facilitates to access water
- campsites
- fences.

In determining priorities for infrastructure work, consideration will be given to the:

- potential use of infrastructure by *Anindilyakwa* people, the ALC LSM Unit and other ALC staff in implementing land and sea management activities
- number of traditional owners likely to benefit from the proposed works
- potential for co-investment (funding and / or maintenance) from other organisations and / or traditional owners
- potential for infrastructure to support the development of sustainable enterprise
- probability of increased visitation (enabled by infrastructure) resulting in new, or exacerbating existing, risks to environmentally-sensitive areas
- immediate and long-term availability of resources to deliver infrastructure projects.

1.1.3.2 (d) Together with the IPA Management Committee, ALC Anthropologists, senior traditional owners and archaeologists, prepare an inventory of important cultural / historical sites.

Use the cultural / historical sites inventory to develop and implement a site management and monitoring schedule with priorities determined by consideration of the following criteria:

- the risk of irreversible damage occurring at a site if management activities are not undertaken
- sites of outstanding cultural significance
- a demonstrated interest by traditional owners in managing a site
- availability of resources to undertake required activities
- sites that have frequent visitation (e.g. at Recreation Areas)
- location of site.

1.2 Training, education and economic development

Today, many *Anindilyakwa* people believe that communities and people are strong when they understand and respect both traditional and contemporary knowledge systems and responsibilities. It is important that the *Anindilyakwa* IPA Program provides education, training and employment opportunities and builds on existing capacity to care for country.

1.2.1 Description

Education and training

There are four schools within the IPA: Angurugu, Umbakumba, Milyakburra and Alyangula. Approximately 250, 100 and 40 students are enrolled at Angurugu, Umbakumba and Milyakburra, respectively. Alyangula Area School services the local mining community; some *Anindilyakwa* children (mostly from Malkala outstation) also attend the school.

Through the LoC Program, teachers from each school partner with the ALC LSM Unit to provide work experience opportunities for secondary students. The federal government funded Community Development Program (CDP) provides training and work experience to local people to assist them in becoming 'work ready'.

Employment and economic development

Local services and businesses (e.g. schools, the GEMCO, East Arnhem Regional Council, local Aboriginal organisations, shops, health clinics) and other government administration and safety positions provide opportunities for employment in Angurugu, Umbakumba and Milyakburra.

ALC Ranger Program

Employment that provides an opportunity to access and work on country is highly regarded by *Anindilyakwa* people. The ALC Ranger Program (established in 2002), offers a significant opportunity for *Anindilyakwa* people to employ both traditional and contemporary knowledge and skills to manage country.

The ALC LSM Unit employs 12 full time equivalent indigenous rangers funded through the federal government's Working on Country (WOC) Program. The ALC LSM Unit also provides opportunities for senior knowledge holders to gain casual employment through planning, supervising and participating in ranger and LoC work activities.

To date, ALC Ranger work activities within the IPA have focused on:

- keeping shorelines clean and healthy and removing threats to marine fauna (e.g. ghost nets and other marine debris)
- weed mapping and control activities

- track clearing to allow access to outstations and Recreation Areas
- managing visitor access to Recreation Areas (e.g. issuing permits and undertaking patrols)
- facilitating the transfer of contemporary and traditional knowledge through the LoC Program and other on-country activities
- marine patrols and other collaborative projects with the NT DPIF
- supporting terrestrial and marine research projects to inform management activities
- quarantine activities in collaboration with the Federal Government Department of Agriculture and Water Resources.

ALC Ranger Coordinator demonstrates how ghost net data is collected

Work exchanges with other ranger groups responsible for managing Aboriginal Land across the country expose the ALC Rangers to different approaches and skills relevant to land and sea management. Collaborative work activities with other partners - research institutions, the GEMCO, government departments and local organisations - also provide opportunities for the professional development of the ALC Rangers.

Manganese mining

For over 50 years, *Anindilyakwa* people have received significant financial compensation for the exploration and mining of manganese on Groote Eylandt. Traditional owners provide a portion of these finances to support clans to invest in enterprise development. They also fund several local organisations to undertake a range of social (and cultural) services. Under the *ALR* Act, royalties received from the mining of manganese on Groote Eylandt are the single largest contribution to the Aboriginal Benefit Account, which provides benefits to indigenous people across the NT.

Mining operations within the IPA also provide employment opportunities to local people. Approximately 25 *Anindilyakwa* people are currently employed by the GEMCO. Indigenous-specific teams are primarily responsible for undertaking revegetation, weed control and other environmental work on mining and township leases. Indigenous employees of the GEMCO are also offered regular training in English literacy and numeracy and land management and other workplace skills.

Aboriginal corporations

There are a number of community-run Aboriginal corporations that provide employment and training and / or enterprise development opportunities to local *Anindilyakwa* people. These corporations undertake a range of activities on Groote and Bickerton Islands, including:

- investing mining royalties into long-term economic opportunities
- establishing and managing small, profitable businesses
- administering social support programs (e.g. health, education and gender specific services)
- managing civil and construction projects
- administering essential services to communities
- organising community events
- managing art centres and other cultural resources and programs.

1.2.2 Issues and opportunities

Many *Anindilyakwa* people are opposed to passive dependence on welfare and mining royalties and are eager for young people to be educated and employed. However, *Anindilyakwa* people face many barriers to educational achievement and maintaining permanent employment later in life. Many young *Anindilyakwa* people have been raised in families in which few or no relatives have had a formal education or employment opportunities and thus they lack relevant role models. Many school-aged children do not attend school regularly and thus they fail to develop the skills and knowledge required to undertake further training or long-term employment.

Learning on Country Program

The LoC Program is a partnership between the four schools in the IPA and the ALC LSM Unit. The LoC Program aims to improve school attendance and prepare the next generation of children for employment (particularly in natural and cultural resource management).

The LoC Program facilitates 'two-way' learning that values both traditional knowledge and contemporary skills. Some activities support the intergenerational transfer of IEK and other cultural knowledge; others introduce children to contemporary land management issues, skills and work opportunities. All activities seek to make learning both relevant and enjoyable.

Learning on Country activities are delivered in the classroom and / or out on country. Depending on the activity, school children are guided and taught by: teachers, *Anindilyakwa* assistant teachers, trainers, traditional owners, ALC Rangers and / or LoC Coordinators. *Anindilyakwa* students from Umbakumba, Angurugu and Alyangula also undertake regular work experience placements with the ALC Rangers. Other activities include:

- culture camps to support the transfer of IEK and other cultural knowledge
- undertaking formal training (Certificate I in Conservation Land Management (CLM))
- visiting and learning about cultural and / or heritage sites

- collecting and learning about traditional resources (e.g. bush tucker and *eningerriberriba-langwa mirrijina* [traditional medicine])
- learning scientific skills and knowledge from visiting scientists
- learning about, and participating in traditional art forms
- cultural activities specific to men and women
- classroom lessons to improve understanding of environmental values and issues, and land and sea management skills (e.g. threatened species, marine turtles, feral cats, cane toads, weeds and ghost nets).

ALC Rangers

By hosting work experience students regularly and providing critical support to the LoC Program, the ALC Rangers promote education and training pathways to achieve employment in land and sea management. The ALC Ranger Program provides an employment opportunity for *Anindilyakwa* people in which both traditional and contemporary knowledge systems are valued.

ALC Rangers face the same work-related challenges as many residents of Umbakumba, Angurugu and Milyakburra. These include:

- **Low literacy and numeracy** Low literacy can impact a person's ability to work effectively at certain tasks and can result in feelings of inadequacy or frustration.
- **Family and cultural obligations** It can be difficult for ALC Rangers to commit themselves to their job while managing various personal responsibilities.
- **Work away from family** The need to be away from family overnight during work activities can put pressure on relationships.
- **Poor health** Many *Anindilyakwa* people suffer from health issues that require regular monitoring and may impede an individual's ability to undertake physically demanding work.
- **Cultural restrictions** Rangers can feel uncomfortable working on country that they are not culturally connected to, especially if relevant traditional owners are not present. In addition, team dynamics are impacted by 'poison cousin' (i.e. avoidance) relationships and certain traditional and contemporary activities that are regarded as gender specific.

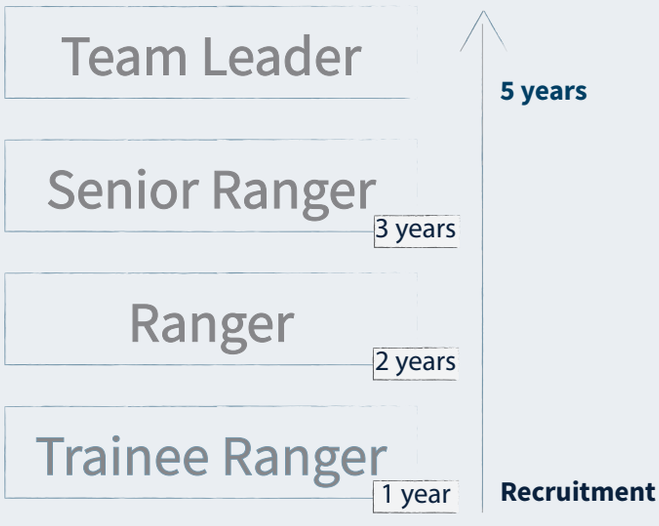
To support ALC Rangers to successfully fulfill the expectations of their employment, they are offered extensive on-the-job mentoring and training. They receive formal training in contemporary land and sea management skills and techniques and general workplace and communication skills. All ALC Rangers (with limited English literacy and numeracy skills) are required to participate in the ALC Ranger Numeracy and Literacy Program. This program is delivered in a way that is tailored to the needs and responsibilities of ALC Rangers in the workplace. It is intended to improve the value and effectiveness of all other formal training.

The ALC Ranger Career Progression Framework provides an incremental pathway for the professional development of ALC Rangers. The Framework outlines a range of training, on-ground experience and demonstrated skills required to advance from Trainee Ranger to Team Leader (see Box 8).

Box 8 - Overview of ALC Ranger Career Progression Framework

The ALC Ranger Career Progression Framework is designed to build the skills and experience of individuals to successfully fulfill all obligations of full time employment. Through formal training, on-the job skill development and mentoring, the Framework provides a pathway for individuals to ultimately gain senior positions in land and sea management.

Four ALC Ranger positions have been identified:



Team Leaders exhibit leadership qualities and are responsible for motivating, mentoring and independently supervising other team members to undertake specific tasks. Team leaders have the opportunity to undertake high-level training related to conservation and land management, compliance activities, team leadership and administration.

Senior Rangers have extensive experience undertaking all activities in the ALC Ranger Group and demonstrate motivational skills. They have access to advanced training related to land and sea management and the development of workplace and communication skills.

Rangers have basic skills and knowledge required to undertake land and sea management activities. Rangers must complete compulsory Conservation CLM (Certificate II) training.

Trainee Rangers require no formal training or experience. After 12 months, if trainee rangers have completed several mandatory training units, have attained adequate workplace experience, and demonstrate the ability to commit to a permanent position, individuals can progress to a Ranger position.

Progressing from Trainee Ranger to Team Leader depends on:

- duration of employment with the ALC LSM Unit
- the completion of formal and informal training
- demonstrated knowledge and skills
- commitment to the job
- ability and interest in increasing workplace responsibilities.

The requirements necessary to advance to a higher position in the ALC Ranger Group are outlined in detail in the ALC Ranger Training and Development Document.

Mining

The financial benefits received by *Anindilyakwa* people from mining activities have declined dramatically in the last three years. Mining royalties are expected to remain at this reduced level for the foreseeable future.

With an agreement for further exploration approved for the 'Southern Leases' area, manganese mining is likely to continue for several decades (if final approval is provided by traditional owners at the conclusion of the exploration phase). Careful investment of royalties is required if funds are to be available to support *Anindilyakwa* people post-mining.

ALC Royalty Development Unit

To facilitate traditional owners to transition from mining dependence to economic self-sufficiency, the ALC recently established a Royalty Development Unit (RDU). The RDU supports traditional owners to develop and manage new and existing Aboriginal corporations by providing professional advice in business development, accounting, governance and human resources. This work is guided by the ALC Mining Rents and Royalties Distribution Framework (ALC, 2015).

The natural environment will continue to be the greatest asset of the IPA post mining. Investment in the ongoing protection, management and use of natural resources will provide sustainable economic opportunities for local communities in the future (for a discussion on this, see Altman *et al*., 2007). In collaboration with the ALC RDU, the ALC Rangers provide support to traditional owners who are interested in developing their own commercial enterprise that will facilitate people working on country. Support may be provided during the planning and development stage and may include environmental expertise, logistical support and / or labour. For example, since 2011, the ALC Rangers have worked collaboratively with the NT DPIF to conduct a growout trial of the fluted giant clam (*Tridacna squamosal*). The information gathered by the ALC Rangers is fundamental in understanding the commercial potential of giant clams in the IPA.

Tourism

With the aim of diversifying economic and employment opportunities, traditional owners, in collaboration with the ALC and GEBIE, developed the Dugong Beach Resort (now known as 'The Lodge') in 2007. The Lodge has the facilities to provide a range of high-end and standard accommodation to visiting government officials, mine staff, contractors and tourists. However, few tourists visit Groote Eylandt and *Anindilyakwa* people have no significant involvement in organised tourism activities or enterprises in the IPA.

Recreation Areas and the marine zone of the IPA offer visitors rewarding 4wd, camping and fishing experiences. The significant cultural and conservation values of both the marine and terrestrial environments of the IPA increase its potential to attract tourists. If appropriately managed, eco-tourism could contribute to the sustainable economic development of local communities.

1.2.3 Management objectives

1.2.3.1 Management objective

Continue to develop the ALC Ranger Group as the primary opportunity for employment of *Anindilyakwa* people with the ALC.

Management strategies

1.2.3.1 (a) Manage and maintain the financial security of the IPA to ensure the ALC LSM Unit can continue to provide stable, local employment opportunities.

1.2.3.1 (b) Ensure the ALC LSM Unit provides a safe workplace that promotes cooperative and supportive workplace relationships.

1.2.3.1 (c) Ensure the ALC Ranger work program provides opportunities that are engaging and suited to the cultural responsibilities and interests of both male and female rangers.

1.2.3.1 (d) Assist the ALC Rangers to maximise the benefits and meet the obligations of their employment through mentoring.

1.2.3.2 Management objective

Continue to build the capacity of the ALC Rangers to undertake cultural and natural resource management within the IPA.

Management strategies

1.2.3.2 (a) Manage and promote the ALC Ranger Career Progression Framework as a means to facilitate the professional development of ALC Rangers.

1.2.3.2 (b) Work with education partners to deliver accredited and non-accredited training to the ALC Rangers.

1.2.3.2 (c) Explore opportunities for exchanges and collaborative work opportunities with other ranger groups and local organisations responsible for land and / or sea management in the IPA.

1.2.3.2 (d) Provide senior *Anindilyakwa* people with opportunities to oversee ALC Rangers and LSM Unit staff during fieldwork in their traditional country.

1.2.3.3 Management objective

Work with community organisations to facilitate training opportunities and promote employment in cultural and natural resource management.

Management strategies

1.2.3.3 (a) Continue to work with the NT Department of Education and local schools to offer regular placements for work experience students.

1.2.3.3 (b) Develop opportunities for participants of the Umbakumba and Angurugu CDP to undertake

collaborative activities with the ALC Rangers.

1.2.3.4 Management objective

Continue to host the LoC Program as a means to improve educational outcomes and employment opportunities.

Management strategies

1.2.3.4 (a) Continue to manage the LoC Program as part of the ALC LSM Unit.

1.2.3.4 (b) Maintain effective partnerships with the Umbakumba, Angurugu, Milyakburra and Alyangula schools to ensure the successful implementation of LoC activities.

1.2.3.4 (c) Ensure LoC activities are considered in annual, monthly and weekly work planning of the ALC Rangers. The ALC Rangers will:

- assist in the delivery of lessons in the classroom
- assist in the development of resources relevant to specific lessons or the LoC Program
- provide planning and logistical support (e.g. vehicle, boat and camping) for lessons and camps on country
- assist in the consultation of appropriate traditional owners as required.

1.2.3.5 Management objective

Support communities to transition the local economy away from a reliance on mining through the development of sustainable enterprises.

Management strategies

1.2.3.5 (a) Support the ALC RDU Unit to assist traditional owners to develop economic enterprises associated with:

- the management and sustainable use of natural resources
- eco-tourism
- cultural and heritage tourism.

In determining appropriate activities to be supported by the ALC LSM Unit, consideration will be given to the:

- potential of the venture to impact (negatively or positively) on the environmental or cultural values of the IPA
- opportunities for ALC Rangers to improve their skills and knowledge in natural and cultural resource

management

- number of traditional owners likely to benefit from the venture
- level of co-investment from other organisations and / or traditional owners
- capacity of a local organisation / business to manage the enterprise past the development stage and into the future
- ability of traditional owners to access relevant areas / resources without support
- potential for ALC Ranger involvement to improve the long-term viability of the enterprise.

1.2.3.5 (b) Preference locally owned and operated businesses for resourcing and supporting the implementation of activities undertaken by the ALC LSM Unit.

Trainer demonstrates how to safely use a chainsaw

2. Looking after *ariba*

2.1 Description

The terrestrial zone of the IPA has significant cultural and conservation value. Traditional knowledge, defined by the laws contained in the Dreaming, has been central to maintaining these values for over two thousand years. Today, a range of contemporary threats - such as weeds, feral animals and increased visitation - threaten these values. To successfully mitigate the impacts of these threats, both traditional and contemporary land management knowledge and techniques are required.

Soils and landforms

Many landforms are significant to *Anindilyakwa* people as they are associated with ancestral beings and their journeys across the landscape. Some landforms, such as hills and rocky outcrops, have significant stories and laws associated with them and may be 'sacred sites'.

Undulating lateritic plains cover much of Groote Eylandt. Plains are separated by sandstone plateaus and other low hills, which run north–south down the east side of the island. At 220m, *Yandarrnga* - a recorded sacred site prominently located near the centre of Groote Eylandt - is the highest point in the IPA. Rocky rises are composed primarily of sandstone rock made up of quartz, which varies from soft material (that can be crumbled into sand-like grains) to very hard rock (Levitt, 1981).

A large sandspit forms the southwest corner ('South Point') of Groote Eylandt and extensive coastal dunes and sand plains occur in the northeast and southeast of the island. The soil found on these plains is poorly developed and highly porous. Laterites and rocks of variable composition (e.g. hydrated oxides of iron, aluminium, titanium and manganese) are scattered throughout the sandy soil (Levitt, 1981). The smaller islands within the IPA are made of white coral sand, often dissected by sandstone outcrops (Noske and Brennan, 2002; NRETAS, 2009).

Freshwater places

There are ephemeral and permanent freshwater sources, such as creeks, swamps, rivers and billabongs, in the IPA. Many water places are significant to *Anindilyakwa* people through representation in Dreaming stories. Aquatic resources such as the seeds, stems and roots of the *wurrayangkwurra* (water lilly - *Nymphaea sp.*) were traditionally harvested from rivers and billabongs. Today, while these resources are rarely harvested, fresh water places remain important for recreation, ceremony and fishing.

Most rivers are shallow and relatively narrow for much of their length. The largest rivers on the island are the Amagula, Emerald and Angurugu Rivers. These rivers are located in the southern half of the island and flow year round. In the north of Groote Eylandt, the most common freshwater systems are creeks that drain from swamps. These ephemeral systems flow during the summer months (i.e. the wet season) and dry up in the winter months, leaving small isolated billabongs. *Angurrkburna*, located in the south of Groote Eylandt, is the largest freshwater lake in the IPA. Two other notable lakes - *Emeda* and *Angurrkwirikwa* - are salt lakes.

Fire

For thousands of years, *Anindilyakwa* people used fire to manage and improve access to country. By burning tall grass and shrubs in open forests, people were able to move more easily across the country on foot.

Information regarding the frequency of historical burning in the Groote Archipelago is limited. Langkamp *et al.* (1981) stated that traditional Aboriginal management resulted in fires in eucalypt forests every two to five years. Today, most fires burn between August and November.

Figure 10 illustrates the number and extent of fires that have burnt within the IPA since 2000. The north and southwest of Groote Eylandt (where plains and low rises support open woodland) and open woodland on Bickerton Island burn most frequently. The rocky plateaus in the central east of Groote Eylandt have longer inter fire intervals. Wet areas that support monsoon rainforest patches (and mangroves) have very long inter fire intervals and many smaller islands in the Groote Archipelago rarely experience fire.

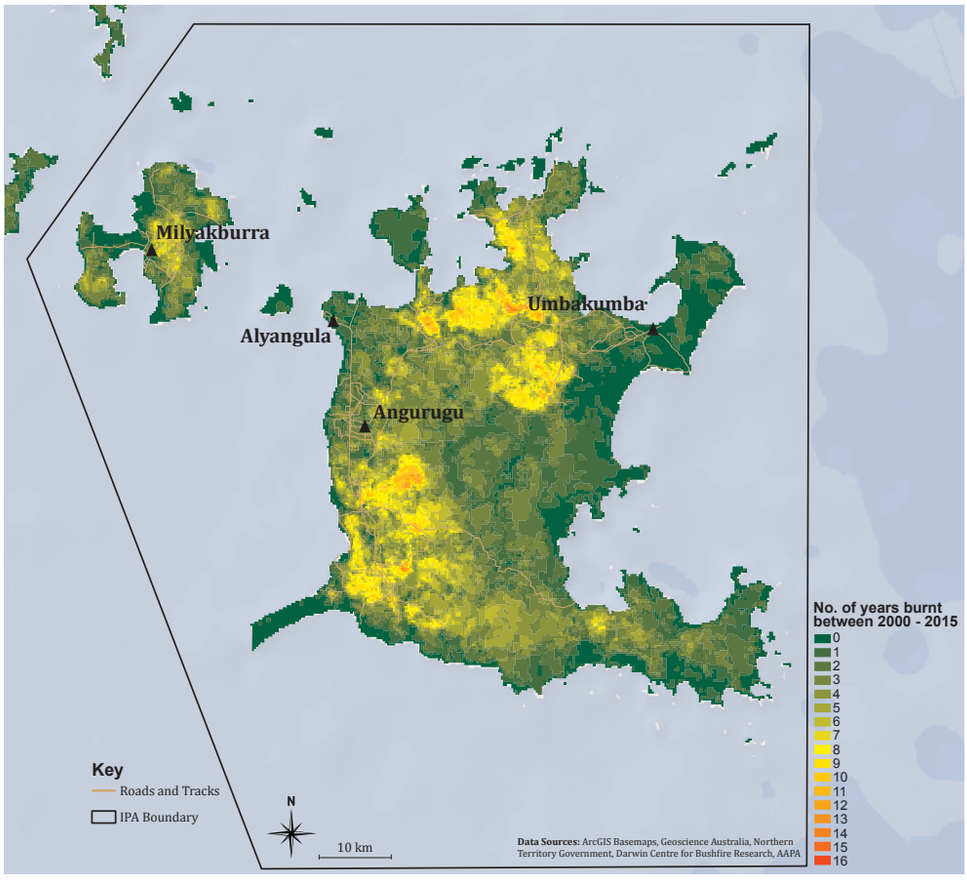


Figure 10 Frequency of fire in the Anindilyakwa IPA between 2000 and 2015

Flora

A total of 964 native plant species have been recorded from sampling undertaken on Groote, Bickerton and small islands within the IPA. The composition of flora is consistent with vegetation communities across East Arnhem Land and the Top End of the NT.

Anindilyakwa people classify plants as either *eka* (woody) or *amarda* (non-woody). They also recognise a number of vegetation types that have been grouped into five broad categories below.

Erriberriba - savannah woodland / open forest

Distribution Open forests and woodlands are characteristic of the Arnhem Coast Bioregion and this is the most common vegetation type in the IPA.

Cultural significance Many trees within *erriberriba* are valued for their wood (for crafting spears and artwork). Many shrubs and trees bear edible fruits, seeds or tubers.

Conservation significance *Erriberriba* provides habitat for threatened species such as the masked owl (*Tyto novaehollandiae*), northern quoll and northern hopping-mouse (*Notomys aquilo*).

The canopy height of *erriberriba* in the IPA ranges between 12 and 22m and is often dominated by one of two eucalypt species: *alabura* and *mawurdarra*. Patches of *erriberriba* dominated by *yimundungwa* are also common on rocky hills, sandstone slopes and in areas that experience relatively low fire frequency and / or cool burns.

The understory of *erriberriba* varies from open to moderately dense according to soil type, proximity to water and other habitat variables. Perennial grasses (e.g. *Sorghum spp.*) are common in patches and where *erriberriba* is associated with sandy dunes and grasslands. *Wurruwarduwarda* (spinifex, e.g. *T. microstachya* or *T. procera*) is also common in patches. Midstory trees and shrubs, include: *P. spiralis*, *miyarrawa* (red kurrajong – *Brachychiton paradoxum*) and various species of *Acacia* and *Grevillia*.

Murungwena - monsoon vine forest 'jungle'

Distribution Small patches occur throughout the larger islands of the IPA. There is over 9 000 hectares of *murungwena* on Groote Eylandt.

Cultural significance *Murungwena* is a totem for the *Wurrawilya* clan. It contains many trees and shrubs that bear edible seeds and fruit. Some vines and palms were used in the construction of bark coolomans and canoes.

Conservation significance Two threatened (and three near threatened) plant species occur in wet or dry monsoon rainforests on Groote Eylandt.

Murungwena refers to both dry and wet monsoon rainforests. Dry monsoon forests are more abundant in the IPA than wet monsoon forests and are commonly found in narrow bands behinds beaches or mangroves (e.g. along the west coast of Groote Eylandt, the coast of Winchelsea Island and around Angurugu). Small patches of

wet monsoon forest occur around perennial springs (e.g. Leske Pools), creeks and rivers (Noske and Brennan, 2002).

Angarrakaba (wild cherry - *Celtis phillippensis*) and *yawurdarra* (*Drypetes deplanchei*) are commonly found in dry coastal monsoon forests. *Mungwunukwamba* (white bridal tree - *Xanthostemon umbrosus*) is also common in patches. Species such as *yilyarra* (cut-leaved palm - *Hydriastele wendlandiana*) and *marrangkwurra* (red bark - *Dillenia alata)* are absent from dry monsoon forests but are common in wet monsoon forests. The height of the tree canopy in *murungwena* ranges from 6 – 18m; wet monsoon forest patches generally have taller canopies than dry monsoon forests (Noske and Brennan, 2002).

Anuma - mangrove

Distribution Patches occur along the north (e.g. Edward River), south (e.g. Yimbagwa and Amagula Rivers) and west (e.g. Emerald and Salt Creek) coasts of Groote Eylandt. There are also small patches on Bickerton, North East and Winchelsea Islands.

Cultural significance Some *anuma* tree species are valued as firewood and as habitat for native bees that produce *yilyakwa* ('sugar bag'). Highly prized crabs and shellfish are found in mangrove vegetation.

Conservation significance One species of mangrove is near threatened in the NT. *Anuma* is critical habitat for many mangrove-dependent bird species.

Anuma is associated with creeks, rivers and estuaries along coastal areas of the IPA. Plants adapted to intertidal conditions are distributed within mangrove habitats and form discernable zones. Stilt mangroves (*Rhizophora stilosa*) often dominate the seaward edge. Spurred mangroves (*Ceriops australis*) are common in the zone abutting this. At higher elevation (i.e. less exposed to inundation from salt water), *yilerrkirra* (white-flowered black mangrove - *Lumnitzera racemosa*) and red mangrove (*Bruguiera gymnorhiza*) are the most common species. These landward species are often associated with either monsoon rainforests or tidal flats.

Ekbulkwurrariya – paperbark swamps

Distribution Small patches of *ekbulkwurrariya* are distributed across Groote Eylandt. A patch also occurs north of the Milyakburra airstrip on Bickerton Island.

Cultural significance The leaves of *Melaleuca* trees are used in treatment of various ailments. Traditional bark clothing for women was created from the bark of *Melaleuca* trees.

Conservation significance *Ekbulkwurrariya* often hold water, which provides a critical resource for some animals.

Ekbulkwurrariya are commonly associated with streamlines, alluvial plains and coastal dunes. *Ekbulkwurrariya* are seasonally inundated with freshwater but typically dry by the middle or late dry season depending on the rainfall received during the wet season. Where *ekbulkwurrariya* is closely associated with creeks and other more permanent water sources, trees are taller and the understory vegetation is thicker.

Ekbulkwurrariya is usually dominated by *alyukwurra* (paperbark - e.g. *Melaleuca viridiflora*, *M. leucodendra* or *M. cajaputi*) and / or *arnduwa* (bloodwood – *E. polycarpa*). Various grass species create a patchy understory in some areas and *P. aquaticus* is often found in the midstory.

Angwa - dune shrublands and grasslands

Distribution *Angwa* is widespread on sandy dune systems in the northeast, southeast and southwest of Groote Eylandt.

Cultural significance The flowering and fruiting of *Acacia* trees commonly found in *angwa* are used to predict the seasonal availability of bush foods. The wood of *Acacia* is commonly used to craft spears.

Conservation significance *Angwa* is critical habitat for the threatened northern hopping-mouse on Groote Eylandt.

Angwa comprises low, shrubby vegetation due to the sandy nature of the soil. Various *Acacia* species, such as club-leaf wattle (*A. hemignosta*), dominate these shrublands. Hummock (e.g. *T. microstachya*) or tussock grasses (e.g. *Eriachne triseta*) are also widespread. *Muwarraka* may also be scattered throughout coastal dune systems.

Cultural significance of vegetation in the IPA

Many plants are culturally significant to *Anindilyakwa* people as they are associated with Dreaming stories and / or are totems for clan groups. *Anindilyakwa* people have considerable ecological knowledge about the plants of the region, particularly those that previously formed an important component of people's diets. While some resources are available throughout the year, many foods, particularly fruits, are only available during the wet season.

Plant material regularly used for food or food preparation included:

- **Fruits** from trees, shrubs, vines and herbs.
- **Seeds,** which were roasted, eaten raw or ground to make 'cakes.'
- **Roots and tubers** from plants that are commonly associated with wet soils.
- **Nectar**, primarily from flowering *enindurrkwa* (swamp banksia - *Banksia dentata*) and species of *Grevillea*.
- **Sap,** from *mebina* (river wattle - *Acacia difficilis*) and *mamaburra* (wild peach - *Terminalia carpentariae*) was eaten by women and children.
- **Stems** of various palms and water lilies were often eaten raw.
- **Leaves** from the *mabalba* (wild peanut - *Sterculia quadrifolia*), red jungle berry (*Drypetes lasiogyna*) and *Melaleuca* trees were used to cover cooking meat and seafood to improve flavor.
- Several eucalypt and mangrove species provide important nectar for native bees and are valued for their association with ***yilyakwa.***

The leaves, sap, fruit, bark and stems of different species were used to treat and manage a range of physical ailments (see Box 9). Several species are still valued today for their medicinal properties. The wood or bark of many local trees and shrubs were traditionally used to create tools for hunting, fishing and collecting other food (e.g. spear, woomera, canoe, rope and digging stick). *Alabura* (Darwin stringybark – *E. tetrodonata*) is a particularly significant species as its wood and bark has a range of uses.

The occurrence of flowering or fruiting of some plants is used to predict the timing of important environmental events (Levitt, 1981). For example, the flowering of *merrika* (broad-leaved wattle – *A. aulacocarpa*) indicates the right time to collect eggs of *yijarra* (terns) from offshore islands. Similarly, when the *mukuwara* (cocky apple - *Planchonia careya*) starts to flower in September / October, it is the right time to catch turtles (Waddy, 1988) (see seasonal calendar, Part A).

Box 9 - Physical ailments and associated *eningerriberriba-langwa mirrijina*

- **Toothache** Inner bark of the *mangkarrkba* (green plum - *Buchanania obovata*)
- **Headache** Leaves of *engbajengbaja* (star boronia - *Boronia lanuginosa*)
- **Ear infection** Young shoots of the *wurruwarduwarda*
- **Bites and stings** Leaves of the *maburrawilya*
- **Boils, burns and sores** Inner bark of the *mukuwara*
- **Wound** Leaves of the *mangkarrkba*
- **General aches and pains** Leaves of *engbajengbaja*
- **Coughs and colds** Leaves of various *Melaleuca* species
- **Diarrhea** Smoke from cones of *enindurrkwa*

Bark of *mangkarrkba*

Yinungungwangba – Terrestrial fauna

A diverse range of habitats within the IPA supports a high number of mammals, birds, reptiles and amphibians. Three hundred and sixty-one fauna species have been recorded in the terrestrial zone of the IPA. These comprise a range of northern or top-end specialists, as well as those found Australia wide.

Thirty-four native terrestrial mammals have been recorded. This includes eight species of *wurrendinda* (rodent), such as the northern hopping-mouse and delicate mouse (*Pseudomys delicatulus*), and fifteen fruit- and micro-bats (e.g. little red flying fox - *Pteropus scapulatus* and ghost bat - *Macroderma gigas*). Nine marsupials have been recorded in the IPA. The *dilanda* (short-eared rock wallaby - *Petrogale wilkinsi*) is locally common across rocky escarpments and the *yiburada* (agile wallaby - *Macropus agilis*) is frequently encountered in various habitats in the IPA. A few sightings of the top-end brushtail possum (*Trichosurus vulpecula arnhemensis*) have been recorded from *murungwena* habitat on Groote Eylandt. Relatively large populations of *yirukwujilangwa* (northern brown bandicoot - *Isoodon macrourus*) and the endangered *yiniyerruwena* (northern quoll - *Dasyurus hallucatus*), both once valued for their meat, also occur on Groote Eylandt. Both *dijinungkwa* (echidna - *Tachyglossus aculeatus*) and *warnungwenimbaluba* (dingo - *canis lupus*) are found in the IPA.

Many mammals have Dreaming stories associated with them and many are totems for several clan groups. For example, *dijinungkwa* is a shared totem for *Bara* and *Jaragba* clans and *warnungwenimbaluba* belongs to both *Mamarika* and *Amagula* clans.

Over one hundred and seventy *wurrajija* (birds) occur in terrestrial habitats in the IPA. Many occur in open forests, while others are largely confined to closed habitats such as monsoon forest patches (e.g. rainbow pitta – *Pitta iris*), mangrove habitat (e.g. mangrove golden whistler - *Pachycephala melanura*) and paperbark swamps (e.g. bar-breasted honeyeater - *Ramsayornis fasciatus*). Rivers, creeks and lakes provide important habitat for a small number of waterbirds (e.g. herons, egrets and waders).

Dilanda on rocky outcrop

Source: David Webb

Anindilyakwa people once ate many birds and their eggs; the feathers from various species were also collected for ceremonial use. Today, birds are not considered an important resource, however several species are totems for clan groups and the Dreaming stories associated with them remain significant.

Seventy-one species of terrestrial reptiles have been recorded in the IPA. Recent surveys indicate several other species, which are not yet formally described, are likely to be endemic to Groote Eylandt. Many species of skink, snake (including: elapids, pythons, colubrids and blind snakes), gecko, flap-footed lizard and dragon occur in the IPA. Others - including several species of monitors, turtles and snakes - are strongly associated with freshwater and mangroves.

Some snake species are significant to *Anindilyakwa* people as they have Dreaming stories associated with them. The venomous *yeyerrindangwa* (pygmy mulga snake - *Pseudechis weigeli*) and *yangkamarnindangwa* (western brown snake - *Pseudonaja nuchalis*) are shared totems for four clan groups. Similarly, three clans have shared ownership of *kwundirra* (olive python - *Liasis olivaceus*) and *duwalja* (water python - *Liasis mackloti*). These snakes were also once hunted for their meat.

Rivers, creeks and waterholes provide important habitat for eighteen native *dilyaburnda* (amphibians). This includes species of arboreal, terrestrial and burrowing frogs, froglets and toadlets. Twenty-one species of fish have also been identified from freshwater systems. Some of these species inhabit estuarine waters of the Angurugu and Emerald Rivers, others are only found in Lake Angurrkburna (e.g. northern saratoga - *Scleropages jardinii*). Freshwater prawns and crayfish (e.g. *Cherax quadricarinatus*) are also found in permanent river systems.

Many invertebrates play critical roles in ecosystem functioning and in maintaining the health of the environment. The majority of invertebrates recorded in the IPA have wide distributions across northern Australia. Conspicuous groups such as butterflies, moths, termites, ants, beetles and mosquitos are commonly encountered. The abundance and diversity of each group varies according to life history, habitat type and season (Webb, 1992). Native bees are significant to *Anindilyakwa* people as their honey (*yilyakwa*) is a prized bush food. Several other invertebrate species feature in Dreaming stories.

Conservation significance of flora and fauna

Yiniyerruwena on Groote Eylandt

Source: University of Queensland

The IPA terrestrial zone has a pristine environment relative to similar vegetation types on the mainland. Many threatening processes present on the mainland are absent from the Groote Archipelago. Thus large islands in the IPA act as refugia for many species that are in decline across their range.

In the IPA terrestrial zone, six species of native flora are listed as near threatened and two species as vulnerable under the *TPWC* Act 2000 (Table 2). Fourty-two other species are classified as data deficient (Appendix IV).

Seven terrestrial fauna species are listed as vulnerable, endangered or critically endangered under the *TPWC* Act and / or the *EPBC* Act 1999 (Table 3). A further twenty two species are listed as either near threatened or data deficient (Appendix V).

Four threatened mammals are found in the IPA: the northern hopping-mouse, brush-tailed rabbit-rat (*Conilurus penicillatus*), northern quoll and the ghost bat. Outside of Groote Eylandt, a few isolated records of the northern hopping-mouse have been recorded in East Arnhem Land and Cape York (Woinarski and Ward, 2012). The population size and range of brush-tailed rabbit rats in the NT has declined by more than 50 percent since European settlement and dramatic declines have been recorded in the last ten years (Woinarski and Hill, 2012). Northern quolls have been severely impacted by cane toads on the mainland; in contrast, northern quolls are relatively abundant on Groote Eylandt, which remains cane-toad free (Box 10).

Ghost bat on Groote Eylandt

Source: Paul Barden

The masked owl and the curlew sandpiper (*Calidris ferruginea*) are both threatened in the NT. The masked owl, found in association with *Eucalyptus*, *Melaleuca* and *Corymbia* forests in the IPA, is also listed as vulnerable under the *EPBC* Act.

It is likely that with further fauna surveys in the IPA (e.g. reptile and amphibian surveys), additional species of conservation significance will be identified, including species endemic to the Groote Archipelago.

Table 2 Threatened flora of the Anindilyakwa IPA terrestrial zone, as listed in the NT under the *TPWC* Act

Scientific name	NT status	Notes
Arenga australasica	Vulnerable	Monsoon rainforest palm
Atalaya salicifolia	Near threatened	Dry rainforest tree
Bruguiera sexangula	Near threatened	Mangrove shrub
Hernandia nymphaeifolia	Vulnerable	Tree / shrub in vine forest
Mallotus dispersus	Near threatened	Rainforest tree
Nephrolepis acutifolia	Near threatened	Rainforest fern
Pleurostylia opposita	Near threatened	Shrub / tree
Vigna marina	Near threatened	Creeping vine

Table 3 Threatened terrestrial fauna of the Anindilyakwa IPA, as listed nationally under the *EPBC* Act and / or in the NT under the *TPWC* Act. VU = vulnerable, CR = critically endangered, EN=endangered, NT=near threatened, *=migratory species under the *EPBCA* Act

	Scientific name	Common name	NT Status	National Status
Reptiles	*Varanus mertensi*	merten's water monitor	VU	
	Varanus panoptes	floodplain monitor	VU	
Birds	*Calidris ferruginea*	curlew sandpiper	VU	CR*
	Tyto novaehollandiae	masked owl	VU	VU
Mammals	*Conilurus penicillatus*	brush-tailed rabbit-rat	EN	VU
	Dasyurus hallucatus	northern quoll	CR	EN
	Macroderma gigas	ghost bat	NT	VU
	Notomys aquilo	northern hopping-mouse	VU	VU

Box 10 - *Yiniyerruwena* - northern quoll

The Anindilyakwa IPA is a key refuge for the threatened northern quoll. They are present on Groote Eylandt and, in lower densities, on small islands in the north of the IPA (e.g. North East, Jagged Head and Winchelsea Islands). In recent years, scientists have worked together with the ALC Rangers to undertake research on northern quolls.

Source: University of Queensland

Research has been undertaken to investigate the potential impact of manganese contamination on their health. Long-term monitoring sites have been established on Groote Eylandt and surveys are undertaken annually to collect population and life history data. Importantly, researchers continue to work with the LoC Program to educate local school children and the broader community about the significance and threats to northern quolls in the IPA.

2.2 Issues and opportunities

Weeds

Weed infestations have the potential to impact the conservation and cultural values of the IPA. Some invasive species outcompete and ultimately displace native flora, others (i.e. invasive grasses) can alter fire regimes by decreasing the inter fire interval and fuelling more destructive, hotter fires. Thus, weed infestations can cause declines in the diversity and distribution of native plants, including traditional food and medicine plants, and other plants that provide critical food and habitat structure for native fauna.

During the missionary era, many non-native plants were intentionally introduced to Groote Eylandt. Others were brought to the island to rehabilitate open-cut mine sites or as ornamental garden plants. The GEMCO have since improved rehabilitation procedures so as to ensure only local native plants are used for revegetation. Today, any request by residents to bring garden plants to the IPA is reviewed by the ALC. There is still a risk of introducing new weeds to the IPA from vehicles and equipment that are transported from the mainland.

Approximately 130 non-native plant species have been recorded in the IPA (Appendix VI). Of these, 19 are declared weeds in the NT (under the *Weeds Management* Act 2001) and two are Weeds of National Significance (WONS) under the *EPBC* Act (Table 4, Figure 11). Species considered a priority for control within the IPA are listed in Table 4 and Appendix VII outlines the considerations in establishing these priorities.

Throughout the IPA, most weeds spread via vehicles, animals and watercourses. Other common weed species, including a variety of grasses, rely on wind dispersal. Disturbance, such as road works, the establishment of tracks, infrastructure and cleared work areas also facilitate the spread and establishment of weeds. The dumping of garden refuse (soil and vegetation) at the Groote Eylandt Open Tip presents an additional risk.

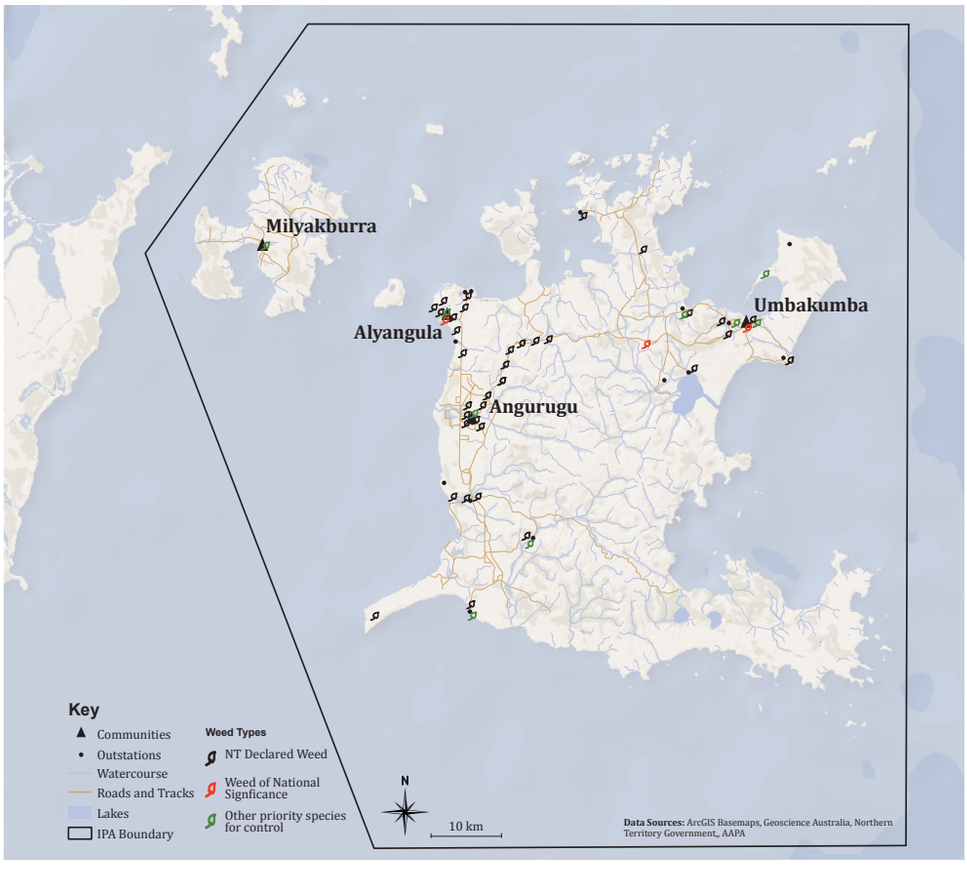


Figure 11 Weed locations across the Anindilyakwa IPA

Table 4 Weeds present in the Anindilyakwa IPA (A: to be eradicated, B: growth and spread to be controlled, C: not to be introduced into the NT, WONS: weed of national significance, Prior: priority for management in the IPA, KTP: key threatening process (i.e. ecosystem degradation, habitat loss and species decline due to invasion of northern Australia by introduced gamba grass, para grass, olive hymenachne, mission grass and annual mission grass [Dep. Environment, 2009])

	Common name	Scientific name	NT status	Notes
Trees	neem	*Azadirachta indica*	B / C	Prior
Shrubs and herbs	khaki weed	*Alternanthera pungens*	B / C	
	hyptis	*Hyptis suaveolens*	B / C	Prior
	bellyache bush	*Jatropha gossypiifolia*	A / B	Prior, WONS
	lantana	*Lantana sp*	B / C	WONS
	coffee senna	*Senna occidentalis*	B / C	Prior
	coffee bush	*Leucaena leucocephala*		Prior
	candlebush	*Senna alata*	B / C	Prior
	flannel weed	*Sida cordifolia*	B / C	
	sida	*Sida acuta*	B / C	
	paddys lucerne	*Sida rhombifolia*	B / C	
	snake weed	*Stachytarpheta jamaicensis*	B / C	Prior
	snake weed	*Stachytarpheta cayennensis*	B / C	
	caltrop	*Tribulus terrestris*	B / C	Prior
	caltrop	*Tribulus cistoides*	B / C	Native to NT
Vines	rubber vine	*Cryptostegia grandiflora*	A / C	Prior, WONS
Grasses	annual mission grass	*Cenchrus pedicellatus*		KTP, Prior
	gamba grass	*Andropogon gayanus*	A / B / C	WONS, Prior
	grader grass	*Themeda quadrivalis*	B / C	Prior
	guinea grass	*Megathyrsus maximus*		Prior
	mexican feather grass	*Nassella tenuissima*	A / C	
	mossman river grass	*Cenchrus echinatus*	B / C	
	para grass	*Urochloa mutica*		KTP, Prior

The ALC LSM Unit undertakes a range of activities to control the introduction and spread of weeds within the IPA. These include:

- mapping and spraying weed infestations on outstation properties, tracks, roads and other locations outside mining leases
- spraying priority weeds within, and on the boundary of communities
- undertaking regular training in identification and best practice control techniques
- hosting and facilitating meetings with all parties responsible for controlling the spread of weeds in the IPA (i.e. the GEMCO, ALC Rangers, East Arnhem Regional Council, GEBIE, Sodexo)
- overseeing the transportation of all plants from the mainland to communities on Groote and Bickerton Islands (includes reviewing the species, source and quantity of plants).

The GEMCO undertakes weed management within mining rehabilitation sites, active mine areas and within Alyangula. Ongoing cooperation between the GEMCO and the ALC LSM Unit - including the exchange of skills and knowledge and cooperative work activities - is critical to limiting the spread of weeds in the IPA.

Feral animals and other exotic pests

Many feral animals that are widespread on the mainland are absent from the IPA. Notably, there is an absence of feral pigs and introduced herbivores that are common across the NT (e.g. cattle, buffalo, donkey and horses). The four species of non-native animals found in the IPA are:

- rusa deer (*Cervus timorensis*)
- house mouse (*Mus musculus*)
- feral cat (*Felis catus*)
- asian house gecko (*Hemidactylus frenatus*).

In the 1950s, rusa deer and goats (*Capra hircus*) were introduced to the North East Isles. Goats were eradicated from the islands in the 1970s, however the population of rusa deer was left. There are approximately 100 – 150 deer on North East Island today. Deer cause substantial damage to vegetation as a result of overgrazing and trampling. Understory vegetation on North East Island is largely absent, with little evidence of the new recruitment of shrubs and trees. Fresh water bodies are also likely to be negatively impacted.

House mice can compete with native animals for food and carry diseases, which can affect other animals and humans. They are seasonally abundant around the community of Angurugu and are noted occasionally in other communities on Groote Eylandt.

Feral cats prey on a broad range of birds, reptiles and mammals and have been implicated in the widespread decline of native fauna across the country (Dickman, 1996). Feral cats are likely to pose a serious threat to threatened small mammal populations in the IPA. However, their distribution, abundance and impact on native fauna in the IPA are not well understood.

Asian house geckos are frequently sighted in and around homes on Groote Eylandt. While the Asian house gecko does not pose a significant threat to biodiversity, there is some evidence to suggest that they may

displace native geckos (*Gehyra spp.*) from settled areas and may spread into native bushland (see Hoskin, 2011).

The ALC Rangers undertake a range of activities to reduce the threat of feral animals and other exotic pests in the IPA. These include:

- improving community education about feral animals, and assisting community members to make informed decisions about their management
- working with researchers to better understand the distribution of feral cats and their impact on threatened species
- a range of biosecurity activities (including surveys, monitoring and community education), in collaboration with the Australian Government, to ensure exotic pests and diseases are detected and managed
- marine patrols (see Part B, 3.1) to detect and report illegal fishing vessels that may carry non-native species to the IPA
- a range of activities to reduce the likelihood of cane toads establishing on Groote Eylandt.

Cane toads

Cane toads are listed as a key threatening process under the *EPBC* Act. They have had a dramatic impact on populations of native fauna on the mainland, including several threatened species. The introduction and establishment of cane toads is a significant threat to the cultural and biodiversity values of the IPA. While several individual toads have been discovered (and disposed of) on Groote Eylandt over the last decade, no population has established.

Cane toads are most likely to enter the IPA via the regular travel of fly-in, fly-out workers and / or via barges that regularly transport goods (predominantly for the GEMCO) from the mainland to the communities of Groote Eylandt and Bickerton Island. The GEMCO have introduced a range of policies and programs to educate and improve the basic quarantine practices of its non-residential workers. The GEMCO are also responsible for inspecting goods that arrive on barges at Alyangula for cane toads. The ALC and the GEMCO recently negotiated the appointment of a Quarantine Officer who will be dedicated to overseeing all barge inspections and undertaking other quarantine activities to ensure the IPA remains free of significant, non-native pests (including cane toads).

Cane toad (*Bufo marinus)*

The ALC Rangers undertake a range of activities to reduce the threat of cane toads entering and establishing in the IPA, including:

- **Regular night spotlighting during the wet season** Survey locations have been identified as high risk for the establishment of cane toads (e.g. slow moving water bodies close to the airport, Alyangula community and ports at Alyangula and Umbakumba).
- Regular **inspection of barges** entering Umbakumba.
- Collaborative work with James Cook University (JCU), Queensland University of Technology (QUT) and the GEMCO to trial and **manage electronic acoustic devices and traps to detect and contain cane toads** on Groote and Bickerton Islands.

Mining

Manganese extraction from open-cut quarries causes major localised disturbance to biodiversity on Groote Eylandt. Mining operations can also have broader impacts on the environmental and cultural values of the island by increasing the:

- risk of introduction and spread of weeds, cane toads, and other non-native pest species
- visitor pressure on Recreation Areas and local fish stock
- pressure on local freshwater supplies (used to service the local mining community and conduct mining operations)
- risk of contamination of natural areas from leaks, discharge, and emissions.

The GEMCO can mitigate many environmental impacts by adhering to appropriate environmental standards and establishing comprehensive, long-term environmental management programs. For instance, following the extraction of manganese ore, the GEMCO 'rehabilitate' sites with the aim to return them to functioning, self-sustaining native ecosystems. As part of this process, sites are backfilled with overburden, topsoil is replaced and native species are planted. Various environmental factors, including fire and weed invasion, influence the success of rehabilitation efforts.

In line with the *EPBC* Act, (part of) the approval process for establishing new mine sites on Groote Eylandt requires an environmental offset strategy to be developed and implemented to counterbalance any significant residual impacts of mining. The ALC LSM Unit and Mining and Environment Unit are currently working with the GEMCO and other parties to establish meaningful projects within the IPA to offset the impacts of new mining leases on Groote Eylandt.

Mining activity on Groote Eylandt

Source: NT DLRM

Fire

Prior to European settlement, traditional burning produced fine-scale, low intensity fires that contributed to a mosaic of different fire ages and sizes across northern Australia. While mitigating the impact of large, hot wildfires, these small patchy fires promoted the regrowth of grasses, food and medicinal plants.

Today, traditional burning practices have been disrupted or are no longer practiced across much of northern Australia. This has resulted in more frequent, hot fires that burn extensive areas late in the dry season. Inappropriate fire regimes have implications for the ecological health of the landscape and the availability of resources for native fauna.

In 2014, late dry-season fires burnt extensive areas in the south and west of Groote Eylandt. Significant patches that remained unburnt from these regions were burnt in 2015 (Figure 10). Nevertheless, fire-scar maps indicate that fires are generally smaller and less intense in the IPA than on the mainland; many areas remain unburnt for four or more years. The fire regime on Groote Eylandt and the surrounding islands is considered to be relatively benign, which, if correct, may contribute to the relatively high diversity of small mammals, reptiles and birds in the IPA relative to equivalent vegetation types on the mainland. Further information is necessary to validate this hypothesis.

To date, research has not been undertaken to investigate the importance of past or current burning regimes in maintaining biodiversity in the IPA. Also, fine-scale fire history and vegetation mapping is not available to inform fire management activities. Nevertheless, *Anindilyakwa* traditional owners continue to value fire as a management tool for 'cleaning up' country, particularly along tracks and around the banks of creeks and rivers. However, *Anindilyakwa* people face many challenges in reinstating a burning regime that resembles traditional practices:

- the GEMCO is responsible for managing fire within their mining and township leases
- uncontrolled fires contribute to social tensions between traditional owners and the mining community as they threaten infrastructure, rehabilitation areas and the safety of communities
- limited intergenerational transfer of traditional burning knowledge (i.e. how to burn the 'right way')
- burning is limited to existing tracks.

Knowledge gaps

Traditional knowledge

Although some native plants - including *alabura* and *mangkarrkba* - are still harvested, *Anindilyakwa* people no longer rely on hunting and collecting natural resources for survival. Consequently, opportunities for the intergenerational transfer of IEK and culturally appropriate ways to look after the land, are limited (see Chapter 1).

Books that describe *Anindilyakwa* knowledge of plants, animals and country (e.g. Groote Eylandt Linguistics, 2011; Levitt, 1981; Waddy, 1988; White, 2005) offer some assurance that future generations will have access to IEK as senior knowledge holders pass away. The ALC Rangers also have a critical role to play in supporting traditional owners to transfer their IEK to younger generations (see Section B, 1.1.1).

Contemporary knowledge

The loss of traditional knowledge is especially regrettable given the incomplete scientific understanding of the fauna and flora within the IPA.

The ALC LSM Unit partners with, or provides support to, government agencies, university researchers and other parties to undertake research on terrestrial biodiversity (see Appendix VIII for a list of projects). Most past research has focused on improving knowledge of threatened terrestrial species such as the northern quoll and northern hopping-mouse. The GEMCO have also commissioned ecological surveys to determine what species of flora and fauna are present on mining leases.

Further research is required to assess the distribution, abundance and diversity of flora and fauna throughout the IPA. Evidence from recent surveys suggest a decline in several small mammal species on Groote Eylandt; further research is required to confirm and quantify these trends. There is very little known about the distribution of the threatened brush-tailed rabbit-rat and masked owl populations. It is possible that Groote Eylandt is a significant refuge for both of these species. Additional information on threatened species in the IPA will inform, and help to prioritise, management activities, which aim to minimize risks to significant species.

Together with environmental research, taking advantage of technological advances (e.g. unmanned aerial vehicles, satellite imagery and remote cameras) may provide opportunities to improve our understanding of the terrestrial environment (e.g. flora and fauna distribution, impacts of natural and unnatural processes and local and landscape scale changes over time) and the efficiency of current management and monitoring activities undertaken within the IPA terrestrial zone (e.g. management of non-native flora and fauna, future fire management and mitigating impacts of unnatural processes).

Visitors to Recreation Areas

All visitors require a valid Permit to visit Recreation Areas (the Recreation Permit System is managed by the ALC LSM Unit, see Appendix IX).

While most visitors appreciate the environmental and cultural significance of Recreation Areas and respect the rules governing access to Aboriginal Land, the ALC Rangers undertake regular patrols of Recreation Areas to monitor the impact visitors have on these sites. During weekend patrols of Recreation Areas, ALC Rangers ensure visitors:

- have a valid permit (or are a temporary visitor of a valid permit holder)
- are complying with the rules governing the possession of alcohol
- are not unlawfully entering sacred sites, areas outside designated Recreational Areas or Recreation Areas that are temporarily closed
- are not unreasonably disturbing or damaging cultural areas, wildlife, vegetation or waterways
- are complying with all other general conditions outlined in the Recreation Permit Guidelines.

ALC Rangers are also responsible for maintaining basic infrastructure to ensure visitors can access Recreation Areas. ALC Rangers maintain signs to (and at) Recreation Areas and regularly clear tracks of encroaching trees and fallen branches.

Community education

Many community members observe the changing condition of their country (and country on the neighbouring mainland) but do not necessarily understand the threatening processes driving these changes. To date, the ALC Rangers have raised community awareness of environmental issues - such as feral animals, weeds and altered fire regimes - through:

- community consultations and meetings (e.g. disseminating information related to feral animals, supporting traditional owners to make informed decisions regarding feral animal management and disseminating knowledge from scientific research projects)
- the production and distribution of cross-cultural resources (e.g. newsletters, flyers, electronic story board recordings and booklets)
- mentoring students on country and in the classroom during LoC activities (including collaborative activities with external experts)
- supporting relevant activities undertaken by local organisations (e.g. the East Arnhem Regional Council Animal Management Program).

2.3 Management objectives

2.3.1 Management objective

Reduce the introduction and spread of weeds within the IPA through strategic management related to:

- **minimising the introduction of new weed species**
- **rapid detection of new weed species**
- **limiting the spread of existing weed populations**
- **eradicating weed populations where feasible.**

Management strategies

2.3.1 (a) Continue to oversee the approval of all ornamental plants transported to Groote and Bickerton Islands.

2.3.1 (b) As new weed infestations are discovered, use Cybertracker software to document and map their location and extent.

2.3.1 (c) To ensure weed control activities are strategic and effective, liaise and collaborate with all stakeholders responsible for weed management in the IPA.

Facilitate periodic meetings with stakeholders to:

- share maps of infestations and control work undertaken
- review weed management activities undertaken
- set seasonal priorities for control activities. Consideration will be given to:
    - those species identified in Table 4
    - mapping data demonstrating the spread or arrival of new species to the IPA
    - the success of previous control activities
- identify opportunities for collaborative training or work activities
- share knowledge regarding control techniques.

2.3.1 (d) Undertake seasonal weed control activities. Priority areas for the ALC Rangers include:

- outstations and Recreation Areas (including access tracks)
- permanent and ephemeral rivers and creeks
- waterholes of cultural and / or recreational value
- boundaries of communities
- sites of cultural and / or heritage significance
- road sides.

2.3.1 (e) Collect data using Cybertracker software during all weed activities. This information should be used to evaluate the effectiveness of seasonal control activities and map changes to the distribution of weed infestations over time

2.3.2 Management objective

Protect key customary and ecological assets from the impacts of feral animals and other non-native pests.

Management strategies

2.3.2 (a) Seek assistance to monitor the population and evaluate the impact of rusa deer on North East Island.

Provide information to traditional owners to allow them to make an informed decision regarding the most appropriate management strategy.

2.3.2 (b) Support the East Arnhem Regional Council vet to manage and reduce the threat posed by domestic and stray cats in Angurugu and Umbakumba.

2.3.2 (c) Continue to enforce the prohibition on all domestic cats entering the IPA.

2.3.2 (d) Work collaboratively with ALC Mining and Environment staff and the GEMCO to ensure all barges entering Groote Eylandt are inspected for cane toads.

2.3.2 (e) Undertake systematic night spotlighting for cane toads at ephemeral and permanent water bodies during the wet season.

Target areas include:

- Alyangula community
- Umbakumba community
- Groote Eylandt airport.

2.3.2 (f) Continue to partner with JCU, QUT and the GEMCO to trial electronic acoustic devices to detect and trap cane toads at target water bodies.

2.3.2 (g) Continue to partner with the Australian Government to undertake quarantine activities to detect the introduction of exotic pests and diseases.

2.3.2 (h) Undertake regular marine patrols (see Part B, 3.1) to minimise the risk of foreign fishing vessels approaching the shoreline of Groote or Bickerton Island.

2.3.2 (i) Provide support to the NT DLRM (and other stakeholders) to establish and implement a threatened species management plan for Groote Eylandt.

2.3.3 Management objective

Protect customary and ecological values of Groote Eylandt from the impacts of mining.

Management strategies

2.3.3 (a) When appropriate, provide support to the ALC Mining and Environment Unit to undertake periodic inspections of the environmental impacts of mining operations (and township services).

2.3.3 (b) Contribute to and / or review relevant Environmental Management Plans (e.g. cane toads, weeds, biodiversity) developed by the GEMCO, as appropriate.

2.3.3 (c) In accordance with the *EPBC* Act, work with the ALC Mining and Environment Unit, the GEMCO and other relevant parties to establish and / or implement appropriate projects to offset significant residual environmental impacts of additional mining operations.

2.3.4 Management objective

Manage fire in order to:

- **reduce the likelihood of large-scale wildfires**
- **protect sites of cultural and heritage significance**
- **maintain or enhance the biodiversity values of the region**
- **maintain or enhance the productivity of key hunting and customary resource use areas.**

Management strategies

2.3.4 (a) Work with external parties to improve knowledge related to the impacts of the current fire regime on biodiversity within the IPA.

2.3.4 (b) Following the outcomes of strategy 1 (above), and in discussion with the IPA Management Committee and senior traditional owners, plan and implement annual fire management activities.

Particular attention will be given to:

- maintaining a fire regime that promotes the persistence of threatened fauna
- supporting traditional owners to engage in appropriate traditional burning practices
- preventing the ongoing loss of traditional knowledge about fire
- conducting localised burns to protect cultural and heritage sites, and fire-sensitive vegetation communities
- maintaining outstation roads, tracks and other infrastructure that facilitates access to country.

2.3.5 Management objective

Support research projects that aim to address knowledge gaps and inform the management of terrestrial biodiversity.

Research projects must:

- **respect *Anindilyakwa* culture and traditional rights to natural and cultural resources**
- **benefit and / or appropriately acknowledge the contributions of traditional owners**
- **recognise the rights of *Anindilyakwa* traditional owners to their cultural and intellectual property**
- **provide information, which can inform management activities undertaken by the ALC Rangers**
- **provide opportunities for ALC Rangers to participate and gain experience and skills.**

Management strategies

2.3.5 (a) Identify key knowledge gaps and priorities for terrestrial research activities. Priorities will be identified in collaboration with traditional owners, and representatives of relevant natural resource management agencies and research institutions, but may include:

- improving baseline biodiversity data (e.g. vegetation mapping)
- improving knowledge about the impact of different fire regimes in the IPA (e.g. fire scar mapping, biodiversity monitoring)
- improving knowledge about declines in small mammal populations
- maintaining the collection of small mammal trapping data from sites established by the University of Queensland
- investigating potential impacts of climate change on terrestrial biodiversity.

2.3.5 (b) Seek collaborations with relevant research institutions and other agencies to address knowledge gaps. When appropriate, ensure environmental researchers complete an IPA research application (see Appendix X).

2.3.5 (c) Improve knowledge regarding the impact of feral cats on the ecological and cultural values of the IPA.

Provide information to traditional owners to allow them to make an informed decision regarding the most appropriate management strategy (i.e. maintain, reduce or eradicate current population of feral cats).

2.3.6 Management objective

Manage visitor access to ensure:

- **visitors are accessing appropriate places within the IPA**
- **residents and visitors have a valid permit or other permissions required to visit Aboriginal Land**
- **visitors respect traditional customs and law when accessing Aboriginal Land**
- **the cultural and environmental values of sites are maintained.**

Management strategies

2.3.6 (a) Manage the administration of Recreation Area Permits for non-indigenous residents and visitors to the IPA.

2.3.6 (b) Inform community members of temporary land closures via a Land Closure emailing list and updates to the IPA Information Sign in Alyangula.

2.3.6 (c) Undertake weekend patrols of Recreation Areas to:

- ensure visitors have valid permits

- ensure visitors are adhering to all rules governing access to country
- detect and monitor visitor impacts on the environment.

2.3.6 (d) Work with the ALC executive staff and board to take appropriate actions, as outlined in the *Recreation Areas: Infringement Protocol Policy*, if a visitor breaches any rules governing entry to Aboriginal Land within the IPA.

2.3.7 Management objective

Undertake basic maintenance activities to facilitate visitors accessing Recreation Areas.

Management strategies

2.3.7 (a) Clear fallen timber, saplings and branches from tracks to ensure Recreation Areas are accessible by 4wd.

2.3.7 (b) Maintain signs (and other basic infrastructure) along tracks and at Recreation Areas. Signs include:

- directional signs to Recreation Areas
- crocodile warning signs at Recreation Areas
- closed land signs.

2.3.8 Management objective

Promote increased community awareness of:

- **the cultural and biodiversity values of the land**
- **contemporary threats to the land (e.g. feral animals and weeds)**
- **ALC Ranger activities that aim to protect the land.**

Management strategies

2.3.8 (a) Develop a range of community education and awareness-raising resources.

Resources may include:

- educational picture books
- multimedia, including film
- community posters, signs and maps
- bilingual field guides / books
- newsletters.

2.3.8 (b) Distribute and / or present educational material to the IPA Management Committee, community members, external partners and local community organisations / businesses as appropriate.

2.3.8 (c) Disseminate the findings of terrestrial scientific research to the IPA Management Committee and traditional owners.

This information may assists traditional owners to make informed decisions regarding the ongoing management of their country.

2.3.8 (d) Update and distribute a community version of this IPA PoM to the IPA Management Committee.

2.3.8 (e) Facilitate contextual learning and two-way knowledge sharing by providing opportunities for traditional owners to access country with the ALC Rangers (and scientific experts).

2.3.8 (f) Provide opportunities for school-aged children to learn about the values and threats to the land in the classroom and 'on country' through the LoC Program.

2.3.8 (g) Develop and implement appropriate strategies to educate non-indigenous residents about *Anindilyakwa* people's traditional connections and obligations to the land.

Ranger clears fallen timber from a track to a Recreation Area

3. Looking after *makarda*

3.1 Description

Dreaming stories carry significant teachings about looking after country and the ancestors associated with *makarda* (salt water). Rock art sites along shorelines in the Anindilyakwa IPA demonstrate the use of *makarda* and the significance of the stories and teachings associated with it.

Today, both *Anindilyakwa* and *balanda* people regularly access *makarda* for recreation or to take advantage of its diverse resources (e.g. fish, turtles, shellfish and dugongs). While *Anindilyakwa* people have strong traditional obligations to look after *makarda*, numerous stakeholders share legal responsibility for its management.

Rocky shoreline near 'Jagged Head' Recreation Area

***Makarda* environment**

The IPA lies in the west of the Gulf of Carpentaria (GoC). The GoC is a large, shallow embayment that connects to the Arafura Sea. The Arafura Sea extends from northern Australia to the south coast of New Guinea.

In the GoC, sea surface salinity varies according to the seasons; salinity is highest between September and November (aproximately. 36.5 psu) and is lowest around April (approximately 32 psu) (Ridgway *et al*., 2001, In: Hoenner, 2012). Sea surface temperatures around Groote Eylandt vary between 23 and 32°C. Temperatures typically drop below 25°C from June to September and remain over 30°C between November and April (NOAA, In: Hoener, 2012).

Currents within the GoC are not strong, however the dominant direction of the current is predicated by seasonal changes in wind direction. During the wet season, when monsoon winds blow from the northwest, waters within the GoC come from the Arafura Sea and circulate clockwise. By the mid-late dry season, southeast trade winds drive counter-clockwise circulation of surface water.

The tidal regime for Groote Eylandt and surrounding islands is mixed (tide height usually ranges from 0 – 2 m) and varies with moon cycles:

- a diurnal period (1 high and 1 low tide every 24 hours) during new and full moons
- a semi-diurnal period (2 high and 2 low tides every 24 hours) during first and last quarter moons (BOM, 2014; Melville and Buchwald, 1976).

Most water within the IPA marine zone ranges between 10 and 30m deep; depth increases at the eastern edge of the IPA boundary. The deepest point recorded in the IPA is located between Bickerton and Connexion Islands (approximately 66 m). Seafloor sediment varies from muddy - gravelly sand to gravelly - sandy mud. Mixed sandy substrate is most common in the southern half of the IPA marine zone and muddy sediment is most common in the northern waters (Passlow *et al.*, 2005).

Primary productivity and *amarda* of *makarda*

In the IPA marine zone, primary productivity is likely to be influenced, at least in part, by the presence of nutrients originating from external (i.e. terrestrial runoff) and internal sources (i.e. nitrogen fixation by cyanobacteria and sediment resuspension) (Burford *et al.*, 1995; Burford *et al.*, 2009). Primary productivity is highest in the shallow waters off the west coast of Groote Eylandt and around small islands north east of Groote Eylandt (NOAA, in: Hoenner, 2012).

Over one hundred taxa of macroalgae ('seaweeds') occur in the GoC and in and around the waters of the IPA marine zone. They are a source of food and / or shelter for many marine animals including fishes, invertebrates and hawksbill turtles. Many species of red, brown and green algae commonly grow on rocky substrates and, although less common, some species of algae are found associated with *mawurrira* (seagrass) (Phillips *et al.*, 1999; Trott, 2012).

Mawurrira are flowering plants that are adapted to near-shore marine environments. They feature in *Anindilyakwa* Dreaming stories and traditionally belong to two clan groups. They are the primary diet of green turtles and dugongs and provide important habitat for many small animals (including commercially important prawn species) (Poiner *et al.*, 1987). *Mawurrira* also helps to keep water clear by stabilising sediment and absorbing and trapping nutrients from coastal runoff (Roelofs *et al.*, 2005). *Mawurrira* beds commonly occur along sheltered bays, but are also found associated with more open coastlines and reef flats (Poiner *et al.*, 1987). In the IPA, they occur along the west and northwest coast of Groote Eylandt and off the northeast and southwest coast of Bickerton Island (Poiner *et al.*, 1987).

Eleven species of *mawurrira* have been recorded in the IPA. The community structure and species composition of *mawurrira* beds vary considerably within the IPA (see Kenyon *et al.*, 1997; Marshall *et al.*, 1998; Poiner *et al.*, 1987).

Akwalya - animals in the sea

The IPA marine zone supports a diverse array of mammals, birds, reptiles, fishes and invertebrates. Many species are migratory, and thus spend only part of their life cycle within the IPA. Several species have significant conservation and / or cultural significance.

Five species of *dinginjabena*, two species of whales and *dinungkwulangwa* (dugong) have been recorded in the

IPA marine zone (Table 5).

Table 5 Mammals recorded in the IPA marine zone

Common name	Scientific name	*Anindilyakwa* name
dugong	*Dugong dugon*	*dinungkwulangwa*
indo-pacific bottlenose dolphin	*Tursiops aduncus*	*dinginjabena*
offshore bottlenose dolphin	*Tursiops truncates*	
Australian humpback dolphin	*Sousa sahulensis*	
dwarf spinner dolphin	*Stenella longirostris roseiventris*	
Australian snubfin dolphin	*Orcaella heinsohni*	
false killer whale	*Pseudorca crassidens*	
killer whale	*Orcinus orca*	

Approximately 60% of the NT's *dinungkwulangwa* inhabit the GoC region (DLRM, 2016 unpublished). Recent estimates from surveys undertaken in 2014 / 2015 suggest that the population density of *dinungkwulangwa* in the IPA and broader GoC region has not changed significantly since 2007 (Groom *et al.*, 2015). *Dinungkwulangwa* have been recorded in the shallow waters off the north and west coasts of Groote Eylandt. This correlates broadly with the distribution of seagrass in the IPA marine zone.

Dinungkwulangwa and *dinginjabena* are significant to *Anindilyakwa* people. Individuals of several clan groups - for which *dinungkwulangwa* and *dinginjabena* are totems - hold and pass on their associated Dreaming stories. *Anindilyakwa* people share a long history of hunting *dinungkwulangwa* and they continue to harvest their meat today. *Dinginjabena* are no longer considered a resource; however, they were once eaten and some parts of the animal were used in similar ways to *dinungkwulangwa* (e.g. see Groote Eylandt Linguistics, 2011).

Over 50 species of birds are associated with the IPA marine zone. A number of distinct species, such as the *yiningakarda* (sea eagle - *Haliaeetus leucogaster*), *duwarrngkirrariya* (osprey - *Pandion haliaetus*) and *dumanda* (reef egret - *Egretta sacra*) are commonly observed fishing and nesting along the coastline of Groote Eylandt. Several seabird breeding colonies exist on small islets within the IPA marine zone. Approximately half of the marine and shore birds found in the IPA marine zone are migratory. Many, including species of *dirrkba* (plover), sandpiper and *yijarra*, visit the IPA marine zone during the wet season to escape harsh winter conditions in the northern hemisphere (Noske and Brennan, 2002).

Yijarra, and other birds associated with *makarda* (e.g. *dengbajamurra* - beach stone curlew) and *dumanda* have cultural significance to some clans as totem animals or as a source of feathers for ceremony. While rarely consumed today, the eggs of *yijarra* once supplemented the diet of *Anindilyakwa* people.

Breeding *yijarra* colony off Groote Eylandt

Local residents often observe *dingarrbiya* (salt water crocodiles - *Crocodylus porosus*) in estuaries and shallow waters off Groote and Bickerton Islands. Sea snakes have also been observed from the air and are commonly noted by prawn fishers in the region.

Four species of *yimenda* (marine turtle) are known to regularly nest on the beaches within the IPA (Table 6).

Table 6 Turtles recorded nesting in the Anindilyakwa IPA

Common name	**Scientific name**	***Anindilyakwa* name**
flatback turtle	*Natator depressus*	*enuwa*
olive ridley turtle	*Lepidochelys olivacea*	*yijirakamurra*
green turtle	*Chelonia mydas*	*yimuwarraka*
hawksbill turtle	*Eretmochelys imbricate*	*dingaluwa*

The majority of marine turtles nest on the east and southeast coast of Groote Eylandt and on the many small islands in the north, east and southeast of the IPA. Several beaches on the southeast coast of Groote Eylandt support high densities of nesting *yimenda* (Chatto and Baker, 2008). Green turtles, which show a general preference for wide, large oceanic beaches, are most commonly found nesting on these beaches. Flatback and hawksbill turtles, which generally prefer to nest on smaller islands across the NT, also nest along this coastline (Chatto and Baker, 2008). The North East Island group (North East, Lane and Hawk Islands) and Bustard Island provides significant nesting habitat for both hawksbill and flatback turtles (Chatto and Baker, 2008). Approximately 600 hawksbill turtles nest in the North East Island Group each year (Hoenner, 2012).

Although they have not been recorded nesting in the IPA, traditional owners note the presence of *Yinubungwaya* (loggerhead turtle – *Caretta caretta*) in the deeper waters of the IPA marine zone. *Yinubungwaya* have also been discovered on the beaches of Groote Eylandt after becoming entangled in discarded fishing nets. Leatherback turtles (*Dermochelys coriacea*) have been recorded northeast of Groote Eylandt and are also likely to forage intermittently in the IPA marine zone.

Given the spiritual and practical value of *yimenda*, *Anindilyakwa* people possess unique knowledge of locally

common species. Green turtles are a shared totem for four clan groups and are the most valued for their meat. Flatback, olive ridley and loggerhead turtles are also eaten on occasion. Eggs of *yimenda* species are traditionally dug from nests and consumed.

Yimenda nesting on the shores of North East Island

Source: Xavier Hoenner

The IPA marine zone supports many species of *akwalya* (bony fishes). Some are associated with reefs, shores and estuaries (e.g. mullet, trevally, milkfish and queenfish); others are found in deeper waters. *Aranjarra* (cartilaginous fish) - including several species of stingray, speartooth sharks (*Glyphis sp.*), whale sharks (*Rhincodon typus*) and manta rays (*Manta birostris*) - also inhabit the IPA marine zone. Frequently hunted species include: *amarbirra* (cowtail stingray - *Pastinachus sephen*), *maja* (blacktip shark - *Carcharhinus spp.*) and *yilyanga* (giant shovelnose ray – *Rhinobatos typus*).

Anindilyakwa people have strong traditional connections with *aranjarra*. The *Yumaduwaya* (stingray), *mungwarra* and *yukwurrirrindangwa* play significant roles in the creation stories of *Anindilyakwa* land and sea country (see Box 6, Chapter 1).

The IPA marine zone provides critical habitat for various marine invertebrates including: corals, molluscs, echinoderms, crustaceans, sponges and sea anenomes.

Small coral reefs are located around islands in the northeast and northwest of the IPA marine zone. As in other parts of the NT, reefs are dominated by *yerrumilya* (hard corals) such as acropara (staghorn) and turbinaria (scroll) corals. Corals provide important habitat for a range of marine life, including culturally important fish species.

A diverse array of molluscs, including gastropods, cephalopods and bivalves, inhabit the IPA marine zone. Many distinctive species, including *yuwurna* (baler shell), *dadikakwakwa* (cone shell) and *mungarniyenda* (trumpet shell), have Dreaming stories associated with them and are totems for several clan groups. Oysters and mussels are common along the rocky coasts of Groote Eylandt and are regularly harvested by local people throughout the year. *Yuwalkwurra* (mud mussel - *Polymesoda sp.*), encountered in the muddy inshore flats of mangroves, are also a significant resource for *Anindilyakwa* people.

Echinoderms such as *miyalkwa* (starfish) and *dingarrkwa* (sea urchins) are common in the IPA marine zone and are totems for several clan groups. The presence of *yungwula* around Groote Eylandt is significant as it

underpins the historic association between *Anindilyakwa* people and Indonesian Macassans (see Part A).

The most conspicuous crustaceans in the IPA marine zone are the various species of crab that inhabit shorelines. *Angwala* (mud crabs – *Scylla spp.*), which are associated with sandy and muddy beaches and mangrove habitat, are a favoured and easily accessible food source for *Anindilyakwa* people. The IPA marine zone also provides important nursery habitat for a number of commercially significant prawn species.

Conservation significance

The IPA is a site of international significance for marine turtles. Some beaches in the IPA support the highest density of marine turtle nesting in the NT (NRETAS, 2009). Small islands in the Groote Archipelago also support significant colonies of nesting seabirds. Several colonies are of national significance; one island supports internationally significant numbers of roseate terns (greater than 1% of the global population) (NRETAS, 2009).

Thirteen *akwalya* are listed as threatened under the *TPWC* Act, *EPBC* Act and / or *NT Fisheries* Act 1988 (Table 7). This includes a range of migratory sea birds, reptiles and fish. An additional nine species are listed as data deficient or near threatened (see Appendix V).

Table 7 Threatened fauna of the IPA marine zone listed nationally under the *EPBC* Act and / or in the NT under the *TPWC* Act (or *NT Fisheries* Act) NT = near threatened, VU = vulnerable, DD = data deficient, EN=endangered, *=Migratory species under the *EPBC* Act, F* = listed as threatened under the *NT Fisheries* Act only

	Scientific name	Common name	National Status	NT Status
Reptiles	*Natator depressus*	flatback turtle	VU*	DD
	Lepidochelys olivacea	olive ridley turtle	EN*	VU
	Chelonia mydas	green turtle	VU*	NT
	Eretmochelys imbricata	hawksbill turtle	VU*	VU
Shore / sea birds	*Calidris canutus*	red knot	EN*	VU
	Limosa lapponica	bar-tailed godwit	*	VU
	Charadrius mongolus	lesser sand plover	EN*	VU
	Charadrius leschenaultii	greater sand plover	VU*	VU
	Calidris tenuirostris	great knot	EN*	VU
	Numenius madagascariensis	eastern curlew	CR*	VU
Cartilaginous fish	*Glyphis glyphis*	speartooth shark	CR	VU (F*)
	Pristis zijsron	green sawfish	VU*	VU (F*)
	Pristis clavata	dwarf sawfish	VU*	VU (F*)

3.2 Issues and opportunities

Marine debris

Marine debris constitutes a significant threat to marine and coastal life. Marine debris includes non-biodegradable floating materials (e.g. fiberglass), waste and garbage (e.g. bags, bottles and containers) and abandoned fishing gear (e.g. 'ghost nets' and fishing lines, hooks and floats) (Australian Government, 2009). Ghost nets entangle marine life indiscriminately, which can lead to various flesh injuries, starvation, smothering or drowning (Australian Government, 2009). Injury and fatality of vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris was listed as a key threatening process in 2003 under the *EPBC* Act.

Marine debris impacts a broad range of species found in the NT (including: whales, dolphins, dugong, seabirds, sharks, fish, crustaceans, corals and sponges). However, turtles are most at risk of death from entanglement in ghost nets (Australian Government, 2009; Ceccarelli, 2009; WWF, 2006). Modelling undertaken by Wilcox *et al.* (2012) illustrates that drifting nets pose a high risk to turtles in and around the IPA marine zone when compared with other areas in the GoC.

In the IPA marine zone, marine debris is deposited on beaches in higher abundance in the dry season, primarily between April and September. A survey in 2004 found that Six Mile Beach on the east coast of Groote Eylandt was the most heavily littered with debris when compared with twelve other sites in Queensland and the NT (6,287 items or 242.1 kg per km) (WWF, 2006). Much of the debris found in the IPA originates from Indonesia, China and Singapore (e.g. rope, plastic bottles, bottle tops and thongs). Derelict fishing gear, including 'ghost nets', originates from vessels of several nations that fish in Indonesian waters (including: Thailand, China, Taiwan and Indonesia) and illegal, unregulated fishing operations. Ghost nets enter the GoC and move along the northeastern shore in a clockwise direction (Wilcox *et al.*, 2012).

Yimenda entangled in a ghost net on Groote Eylandt

Because of the significant threat posed by marine debris, the ALC Rangers have worked collaboratively with various partners to map, identify and remove marine debris from beaches. Today, ghost net removal, stranded turtle recovery and the recording of relevant data are core functions of the ALC Rangers. Clean up activities are focused on the eastern beaches of Groote Eylandt and several small islands in the archipelago. In 2015, the ALC Rangers collected more than 250 ghost nets from beaches and recovered over 35 animals entangled in nets.

Commercial fishing

Prawn fishing is the most significant commercial fishery in the IPA marine zone. The prawn fishery targets tiger prawns (*Penaeus esculentus* and *P. semisulcatus*); banana (*P. merguiensis*) and endeavour prawns (*Metapenaeus endeavouri* and *M. ensis*) are also caught (Laird, 2014). The majority of prawn trawling occurs in the northern and southern waters of the IPA marine zone. To manage breeding stocks and bycatch, there are areas within the IPA marine zone that are subject to seasonal closures. Other areas are permanently closed to prawn fishing (Appendix XI).

Trepang have been collected from the waters around Groote Eylandt since Macassan fishers began travelling to the region. There is a large international market for trepang (namely, east and southeast Asia). Tasmanian Seafoods hold the only licence to harvest wild trepang in Australia and operate intermittently in the IPA marine zone.

Catches of target and non-target species by commercial operations can place pressure on the health of *akwalya*. The magnitude of this impact in the NT remains unknown. Historically, prawn trawl fishing has been responsible for significant bycatch of marine species, including: turtles, sharks, rays, fish and various invertebrates. Changes to the fishery's management practices over the past 30 years have reduced the interaction and impact on marine species (Laird, 2014). Nevertheless, prawn trawl fishing remains one of the least selective of any fishing method and continues to catch large numbers of sea snakes, invertebrates and turtles within the GoC (Guinea *et al.*, 2004; Haywood *et al.*, 2005). In recent years, the number of snakes and turtles caught in prawn fishing nets has been higher in the Groote Archipelago region than any other area of prawn fishery activity.

There have been occurrences in the past when commercial fishers have not adhered to the rules and traditions regarding access to sites within the IPA marine zone. It is important that *Anindilyakwa* traditional owners of the IPA have open communication with commercial fisheries to ensure all operators understand and respect the rules governing access to the IPA marine zone. Management of sea country as part of the Anindilyakwa IPA creates an ideal forum for *Anindilyakwa* people, commercial fishing operators, relevant industry and government representatives to maintain a relationship that respects and upholds the interests, rights and responsibilities of all stakeholders.

Unregulated fishing

Occasionally, foreign fishing vessels are detected operating illegally in NT waters. Unregulated fishing activity by foreign vessels has the potential to deplete local stocks of target species. These vessels also pose a quarantine risks as they can act as vectors for marine or terrestrial pests to enter the IPA.

The NT DPIF fund the ALC Rangers to undertake patrols in the IPA marine zone. The ALC Rangers ensure illegal or suspicious activities – by foreign or local operators – are detected and reported to the appropriate authorities. These patrols also provide an opportunity to detect any unusual animal sightings (e.g. rare or threatened species and dead, sick or injured animals) and report any potential environmental concerns to authorities.

Recreational use

The fish species targeted by recreational fishers include: Spanish mackerel (*Scomberomorus commerson*), golden snapper (*Lutjanus johnii*), red emperor (*Lutjanus sebae*) and various species of bill fish. Many local recreational fishers have an interest in the health of the marine environment. Maintaining open communication with such individuals provides an opportunity for the ALC Rangers and traditional owners to discuss and share information relevant to the current health of, or threats to, fish stock and the local marine environment.

Frequent visitation to beaches and dunes in Recreation Areas may impact various marine animals that rely on shorelines for breeding and / or nesting. The ALC Rangers monitor the impact visitors have on these sites by undertaking regular land and sea patrols at Recreation Areas.

Traditional fishing

Anindilyakwa people have a long history of using traditional knowledge to manage and harvest the resources of the sea. *Anindilyakwa* people once used bark watercrafts and - after introduction from Macassan fisherman - dugout canoes to access *makarda* and the various small islands in the Groote Archipelago.

Today, *Anindilyakwa* people target coastal and marine resources such as: fish, turtle, turtle eggs, rays, shellfish, dugongs and mud crabs. Traditional fishing is an important aspect of *Anindilyakwa* culture and an important opportunity for the intergenerational transfer of IEK relevant to the IPA marine zone.

Seabed mining

Seabed mining refers to the recovery of resources and minerals from the Earth's crust under the ocean. In Australia, seabed mining has focused on sand dredging, however the location of various other resources and minerals have been identified and mapped. Several mining companies have shown interest in mining the prospective manganese deposits in the Groote Archipelago. If these deposits were targeted, mining would likely involve dredging across extensive areas (EPA, 2012).

Exploitation of these deposits is likely to impact the marine environment in a number of important ways. These include the:

- destruction of the top section of the seabed (a mortality rate of 95–100 per cent may be expected for organisms found here)
- mixing of the seabed
- introduction of new materials to the ocean (this includes processing waters, tailings and other discharges that may interfere with light penetration and disrupt natural temperature gradients) (EPA, 2012; Markussen, 1994).

These impacts are likely to cause changes to marine primary productivity, species abundance and distribution, wave and current dynamics and various ecological relationships (EPA, 2012). This has the potential to negatively impact species of both conservation and cultural significance in the IPA marine zone.

In addition to the environmental impacts, *Anindilyakwa* traditional owners believe that seabed mining would destroy sacred sites and songlines that are central to *Anindilyakwa* culture and identity. Traditional owners fought hard to have a permanent ban placed on seabed mining in the Groote Archipelago. There is a current moratorium on seabed mining in the NT, which was recently extended to 2018. In 2013 the NT Government also indicated that any application for seabed mining in the Groote Archipelago would be refused, however no formal agreement has been made.

Manganese mining

Sediments or pollutants arising from land-based mining operations on Groote Eylandt have the potential to impact the IPA marine zone. The port and loading facility at Milner Bay pose the most significant risk.

In the 1990s, a fuel leak was detected from a GEMCO tank at Milner Bay. Ten million litres of fuel was estimated to have leaked into the groundwater table. Approximately half of the fuel was removed and a number of control and monitoring strategies have since been implemented. Entire remediation of the area is not yet complete.

Sewage discharge and storm water runoff at Milner Bay Port could also contaminate the water and / or sediment of the bay with various hydrocarbons, manganese and other metals. Vessels loading manganese at the Milner Bay Port pose a potential risk to the marine environment through accidental leaks or spills of fuel (or other pollutants) or by acting as vectors for marine pest species.

Natural phenomena

The integrity of the marine environment is threatened by natural and human-induced environmental impacts such as storms, floods and climate change. For instance, seagrass meadows can take many years to reestablish following damage incurred by a cyclone (see: Carruthers, 2002; Poiner *et al.*, 1989; Roelofs *et al.*, 2005). Cyclone activity is also believed to have contributed to the reduction in the cover of coral at reefs around the IPA (Trott, 2012).

Climate change is likely to have considerable direct and indirect impacts on the local marine environment. Seagrass meadows, mangroves and coral are all negatively impacted by increasing ocean temperatures. The availability of food and critical habitat within the IPA marine zone will also be affected by changes in sand temperatures, sea level, storm activity and ocean currents.

Knowledge gaps

Traditional knowledge

Many elders who held specific knowledge about *makarda*, its songlines (and associated sacred sites) and customary resources, are no longer able to access country or have passed away. Consequently, many younger people now lack the opportunity to gain a complete understanding of IEK and customary laws relevant to looking after *makarda* (including hunting the right way).

The ALC Anthropologists, together with the ALC Rangers and other partners are currently working with

traditional owners to record cultural information and sites associated with *makarda*. Traditional owners hope this information will be available to future generations and will help guide management of the sea.

Contemporary knowledge

There is limited scientific information about the distribution and significance of marine habitats and biodiversity in the IPA marine zone.

Benthic surveys have been restricted to shallow seagrass pastures and small patches of coral reef (e.g. Harris *et al*., 2004; Poiner *et al*., 1987; Trott, 2012). Information available on marine fauna varies considerably for different species. For instance, the distribution and life cycle of commercially significant prawn stocks is well understood. However, little is known about the life history traits, distribution and population status of many culturally significant species (e.g. shellfish, fish and sharks). Basic biological and ecological information about some of the most significant species occupying the IPA marine zone (e.g. species of turtles, seabirds, sharks and rays) is also unknown. Inter-agency collaborations are required to collect meaningful information about many marine species and to establish ways to manage them effectively.

In recent years, the ALC Rangers have collaborated with external organisations to fill knowledge gaps associated with *makarda* and its biodiversity. Collaborative projects have aimed to increase knowledge related to:

- the traditional harvest of sharks and rays
- turtle nesting distribution, success and ecology
- the biology and impacts to key species of coastal reef fish
- the population density and distribution of dugongs and dolphins in the region

In partnership with AIMS, the ALC and ALC LSM Unit have developed a project, due to commence at the end of 2016, which will advance our current knowledge of sea country within the IPA. The project will aim to map benthic habitat, quantify fish biodiversity and assess sediment properties and contaminants at selected locations. The project will also provide the ALC Rangers with an opportunity to learn new skills in shallow-water mapping and the collection of data from under water recording devices.

In addition to research projects, the use of new and improved technologies (e.g. unmanned aerial vehicles) may provide opportunities to collect novel information about the marine environment and improve the efficiency of current management activities undertaken within the IPA marine zone.

Community education

While many senior traditional owners note changes to *makarda*, including the availability of marine resources, many have a limited understanding of how contemporary issues impact or threaten the marine environment. Community members also lack a complete understanding of how the local marine environment is valued, used and managed by a diverse range of stakeholders.

To date, the ALC Rangers have raised community awareness of marine environmental values, issues and threats through:

- community consultations and meetings (e.g. disseminating knowledge from scientific research projects and discussing turtle monitoring and management options)
- mentoring students on country and in the classroom during LoC activities (including collaborative activities with external experts)
- the production of cross-cultural resources (e.g. newsletters, flyers, electronic story board recordings and booklets).

3.3 Management objectives

3.3.1 Management objective

Protect marine animals and other cultural and ecological values of the IPA marine zone from the impacts of ghost nets and marine debris.

Management strategies

3.3.1 (a) Undertake targeted surveys of beaches (between April and September) to release entangled animals from ghost nets.

3.3.1 (b) Undertake regular beach patrols to retrieve ghost nets and marine debris from beaches (and release entangled animals when required).

Locations will vary according to the season; target locations are identified in IPA Operational Plan.

3.3.1 (c) Dispose of marine debris and ghost nets appropriately. When possible, provide nets to local cultural / art centres for art and craftwork.

3.3.1 (d) Collect systematic and accurate records of stranded animals and ghost nets retrieved within the IPA. This information is:

- maintained in the ALC Ranger database
- used each season to plan strategic and efficient animal and ghost net retrieval activities
- provided to relevant agencies to improve regional knowledge.

3.3.2 Management objective

Monitor commercial, illegal and recreational fishing activity within the IPA marine zone.

Management strategies

3.3.2 (a) Use the IPA Advisory Committee meeting as a forum to:

- share knowledge and develop proposals to enhance management, research and monitoring activities
- develop a consensus on strategies and actions to address issues of concern
- discuss the rights, interests and obligations of traditional owners, recreational fishers and commercial fishing operators.

3.3.2 (b) Undertake a minimum of 40 marine patrols each year and supply associated patrol reports to NT DPIF.

3.3.2 (c) Maintain a relationship with the local recreational fishing club that promotes open communication and information sharing.

3.3.2 (d) Respond promptly to community reports of suspicious activities or equipment in the IPA marine zone (i.e. locate and document and / or report to NT DPIF).

3.3.2 (e) Undertake weekend patrols of Recreation Areas (as outlined in Part B, 2.2) as one way to monitor the fishing activities of local residents.

3.3.3 Management objective

Protect customary, ecological and recreational values of the IPA marine zone from the impacts of mineral and resource mining.

Management strategies

3.3.3 (a) Provide support to traditional owners and the ALC to prevent the mining of resources and minerals in the IPA marine zone.

3.3.3 (b) When appropriate, provide support to the ALC Mining and Environment Unit to inspect the environmental impacts of mining operations on the IPA marine zone (e.g. monitoring the potential threats to Milner Bay).

3.3.3 (c) Provide support to the ALC Mining and Environment Unit to work with the GEMCO to ameliorate current threats to Milner Bay (e.g. remediation of leaked fuel).

3.3.4 Management objective

Support research projects that aim to address knowledge gaps and inform the management of the IPA marine zone.

Research projects must:

- **respect *Anindilyakwa* culture and traditional rights to natural and cultural resources**
- **benefit and appropriately acknowledge the contributions of traditional owners**
- **recognise the rights of *Anindilyakwa* traditional owners to their cultural and intellectual property**

- **provide information that can inform management activities undertaken by the ALC Rangers**
- **provide opportunities for ALC Rangers to participate and gain experience and skills.**

Management strategies

3.3.4 (a) Identify key knowledge gaps and priorities for research activities in the IPA marine zone. Priorities will be identified in collaboration with traditional owners and representatives of relevant government agencies and research institutions and may include:

- the ecology, distribution and threats to marine turtles in the IPA marine zone
- the impact and extent of various threats to habitats and biodiversity in the IPA marine zone (including: commercial and recreational fishing, introduced species and climate change).

3.3.4 (b) Seek collaborations with relevant research institutions and other agencies to address knowledge gaps. When appropriate, ensure environmental researchers complete an IPA research application (see Appendix X).

3.3.5 Management objective

Promote increased community awareness of:

- **the cultural and ecological values of the IPA marine zone**
- **the contemporary threats to the IPA marine zone**
- **ranger activities that aim to protect the IPA marine zone.**

Management strategies

3.3.5 (a) Develop a range of community education and awareness-raising resources.

Resources may include:

- educational picture books
- multimedia, including film
- community posters, signs and maps
- bilingual field guides / books
- newsletters.

3.3.5 (b) Distribute and / or present educational material to the IPA Management Committee, community members, external partners and local community organisations and businesses as appropriate.

3.3.5 (c) Provide opportunities for school-aged children to learn about the values and threats to *makarda* in the classroom and 'on country' through the LoC Program.

3.3.5 (d) Facilitate contextual learning and two-way knowledge sharing by providing opportunities for traditional owners to access *makarda* with the ALC Rangers (and regional experts).

3.3.5 (e) Disseminate the findings of scientific research undertaken in the IPA marine zone to the IPA Management Committee and traditional owners.

This information may assist traditional owners to make informed decisions regarding mining, commercial fishing or other ventures which impact the IPA marine zone.

3.3.5 (f) Develop and implement appropriate strategies to educate non-indigenous residents about *Anindilyakwa* people's traditional connections and obligations to *makarda*.

3.3.5 (g) Update and distribute a community version of this IPA PoM to the IPA Management Committee.

Ranger removing a large ghost net from the beach

Part C - Monitoring and evaluation

Monitoring and evaluation scope

Guidelines provided by the Australian Government Department of Prime Minister and Cabinet specify that monitoring and evaluation plans should select a subset of the most important management objectives of the IPA to establish metrics for evaluation and improvement. The management objectives selected for evaluation of the Anindilyakwa IPA are listed below. Four management objectives were selected from the **healthy people, healthy country** management theme (outlined in Part B, 1) and an additional management objective was added to monitor the effectiveness of the IPA's governance. Four management objectives were created to represent significant management objectives from the **looking after *ariba*** and **looking after *makarda*** management themes (outlined in Part B, 2 - 3).

Healthy people, healthy country

a. Continue to build the capacity of the ALC Rangers to undertake cultural and natural resource management within the IPA.
b. Continue to host the LoC Program as a means to improve educational outcomes and employment opportunities.
c. Support traditional owners in their efforts to prevent the ongoing loss of IEK.
d. Continue to develop the ALC Ranger Group as the primary opportunity for employment of *Anindilyakwa* people with the ALC.
e. Develop and maintain effective management partnerships between the ALC LSM Unit, traditional owners and external stakeholders.

Looking after *ariba* / Looking after *makarda*

a. Protect the cultural and biodiversity values of the land from the impact of pest species.
b. Fill knowledge gaps to improve land and sea management activities.
c. Undertake appropriate visitor management activities.
d. Reduce threats to the cultural and biodiversity values of sea country.

Program Logic

An IPA Program Logic is used as a planning tool to illustrate the rationale behind the implementation of an IPA Program. It outlines short, intermediate and long term outcomes that will ultimately accomplish the vision of the IPA. The Anindilyakwa IPA Program Logic (below) guided the development of the monitoring and evaluation plan.

Vision	Long term (10-20 years)	Intermediate (3-5 years)	Immediate (1-3 years)	Foundation
- Healthy communities with strong culture **- Protecting land and sea country for future generations**	Biodiversity and cultural values of the sea protected using two-way management practices, effective partnerships and collaborative governance	Land and sea management informed by research projects and the ongoing collection of ranger activity data	Comply with all reporting requirements	Strong local governance framework
			Communicate ranger and IPA activities to community members	Established partnerships with government agencies and other relevant stakeholders
			Support country visits and other activities to engage community in IPA activities	Ranger training opportunities
		Strong local governance and community engagement with IPA activities	Implement marine debris collection	LoC Program funding
			Improve transfer of cultural knowledge and traditional land and sea management skills	IPA Plan of Management
			Maintain partnerships with research agencies to improve scientific knowledge of biodiversity	ALC LSM Unit (operational ranger group, coordinator staff and infrastructure)
	Biodiversity and cultural values of the land protected using two-way management practices and effective partnerships	Improved transfer and adoption of traditional land and sea management knowledge and practices	Implement weed control activities	IPA and WoC Program funding
			Identify and protect culturally and historically significant places	Recognition of cultural connection to land and sea country
			Undertake annual IPA Advisory Committee and IPA Management Committee meetings	Continue to develop and meet the requirements of compliance and biosecurity contracts
- Opportunities for sustainable economic development **- Working in effective partnerships that create meaningful outcomes**	Sustainable employment of *Anindilyakwa* people, including employment of indigenous coordinator staff	Rangers have improved land and sea management and workplace skills	Identify research priorities	Collect and manage data systematically
			Rangers build capacity through engagement in Career Progression Framework	Monitor and manage the introduction of feral animals
		Maintaining threatened species and ecological communities	Develop and maintain strong relationships with relevant external stakeholders and local organisations	Scientific knowledge and support
	Established pathways and opportunities for training and meaningful employment	Accountable to funders, partners and community members	Develop strong relationships with schools through the LoC Program	Traditional knowledge and land management skills
		Strong ecological and traditional knowledge base	Engage young people in land and sea management and promote improved education through the LoC Program	Understanding of priority threats to cultural and biodiversity values
	Community members with improved workplace and land and sea management skills	Strong, effective partnerships with external stakeholders and local organisations	Manage visitor access and Recreation Areas	Significant cultural and biodiversity values

Monitoring and evaluation plan

The Anindilyakwa IPA Monitoring and Evaluation Plan (as outlined in Table 8 - 14) is designed to measure progress towards the implementation of the IPA PoM and assess the achievements of the IPA Project by evaluating a subset of management objectives. To assess each management objective, evaluation questions and indicators were developed. Evaluation questions are framed to assess either the effectiveness, impact or efficiency of a management objective.

A mix of quantitative and qualitative indicators, which relate to each evaluation question, have been selected on the basis that they are meaningful to all stakeholders and are practical and achievable given the resources of the IPA Program. Monitoring and evaluating the Anindilyakwa IPA will begin with the measurement of effort (outputs) rather than impact (outcomes) of management actions. Over time, as key knowledge gaps are filled and ALC LSM Unit staff improve their capacity to evaluate the IPA Project, evaluation questions and indicators will be reviewed and adjusted so as to collect information that will provide a more detailed understanding of the IPA's impacts.

The IPA Management Committee and IPA Advisory Committee will be responsible for reviewing the performance and achievements of the IPA Program every 12 months. The success of the IPA Program will be evaluated against the targets outlined in the monitoring and evaluation reporting framework (see Appendix XII). The IPA Management Committee and IPA Advisory Committee meetings will also provide an opportunity to identify and discuss how aspects of the Program could be improved. This Monitoring and Evaluation Plan will be reviewed in 5 - 10 years.

Rangers removing a ghost net from 'Jagged' Recreation Area

Monitoring and evaluation of: Healthy people, healthy country

Table 8 Evaluation of Management Objective (a) Continue to build the capacity of the ALC Rangers to undertake cultural and natural resource management within the IPA

Evaluation Question	Indicator	Method of Evaluation
Are Rangers improving their skills and knowledge in contemporary land and sea management techniques?	Completion of relevant training units	Review no. of Rangers / no. of units completed (annual)
	Participation of Rangers in projects with external land managers / researchers	Review no. of Ranger days (annual)
	Advancement through the ALC Ranger Career Progression Framework	Review records (biennial)
Are Rangers improving their traditional land and sea management skills and knowledge?	Participation of traditional owners in Ranger activities	Review community member participation (annual)
	Traditional land management activities undertaken by the Rangers	Review activity record (annual)
Are Rangers improving their English numeracy and literacy skills?	Advancement of Rangers through levels of the Australian Core Skills Framework	Review no. of Rangers / Core Skills Level (biennial)

Table 9 Evaluation of Management Objectives (b) Continue to host the LoC Program as a means to improve educational outcomes and employment opportunities, (c) Support traditional owners in their efforts to prevent the ongoing loss of IEK and (d) Continue to develop the ALC Ranger Group as the primary opportunity for employment of *Anindilyakwa* people with the ALC

Evaluation Question	Indicator	Method of Evaluation
Are school-aged children being appropriately and effectively engaged in land and sea management activities?	Opportunities for school-aged children to undertake land and sea management activities and / or CLM training with the Rangers	Review no. of student days (annual)
	Response of IPA Management Committee / LoC Steering Committee / traditional owners / Rangers / Assistant Teachers	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)
To what extent have traditional owners been supported to transfer cultural and / or IEK to younger generations?	Relevant LoC activities supported by the Rangers	Review activity record (annual)
	Resources produced by the LoC Program and / or ALC Rangers	Review no. and type (annual)
How many Rangers and other traditional owners are employed?	Employment of indigenous employees	Review no. of paid Ranger days (annual)
	Retention of indigenous employees	Review no. of Rangers employed and length of employment (annual)
	Employment of indigenous community members on a casual basis	Review no. of paid days (annual)

Table 10 Evaluation of Management Objective (e) Develop and maintain effective management partnerships between the ALC LSM Unit, traditional owners and external stakeholders

Evaluation Question	Indicator	Method of Evaluation
Is the current governance framework effective at engaging traditional owners in decision making?	IPA Management Committee meetings	Review no. of meetings and participation of committee members (annual)
	Response of IPA Management Committee members	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)
Is the current governance framework effective at engaging external stakeholders in decision making?	IPA Advisory Committee meetings	Review no. of meetings and no. of stakeholders engaged
	Response of IPA Advisory Committee members	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)

Monitoring and evaluation of: Looking after *ariba* / Looking after *makarda*

Table 11 Evaluation of Management Objective (f) Protect the cultural and biodiversity values of the land from the impact of pest species

Evaluation Question	Indicator	Method of Evaluation
Are appropriate measures being taken to exclude cane toads from the IPA?	Inspection of barges arriving at Umbakumba	Review no. and proportion of barges inspected
	Effort spent undertaking night spotlighting during the wet season	Review activity records (annual)
Are weed infestations being identified and managed?	Number of days spent mapping and treating weeds	Review Cybertracker data (annual)

Table 12 Evaluation of Management Objective (g) Fill knowledge gaps to improve land and sea management activities

Evaluation Question	Indicator	Method of Evaluation
Are research priorities being identified and knowledge gaps addressed?	Current environmental research projects (terrestrial and / or marine) supported by the ALC LSM Unit	Review no. and type of projects (annual)
	New species, populations or ecological communities detected, described and / or mapped	Assessment of no. and type (biennial)
Have biodiversity and cultural values (including customary resources) been maintained?	Changes in the presence and / or absence of significant species	Quantitative analyses (by an external organisation) of data from one long term monitoring project (biennial)

Table 13 Evaluation of Management Objective (h) Undertake appropriate visitor management activities

Evaluation Question	Indicator	Method of Evaluation
Is the current Recreation Area Permit System effective in ensuring visitors respect the rules governing access to Aboriginal Land in the IPA?	Effective administration of Recreation Permits and Land Closures	Review no. of Recreation Permits sold (annual)
	Individuals visiting country hold a valid Recreation Permit and adhere to all rules governing access to country	Review: no. of Recreation Permits checked, proportion of individuals (of those checked) holding a current Recreation Permit and any breaches of rules governing access to country (annual)
	Response of non-indigenous Groote Eylandt residents*	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)
	Response of IPA Management Committee / senior traditional owners / Rangers	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)
Are the impacts on Recreation Areas being effectively monitored and managed?	Ranger patrols of Recreation Areas	Review activity records (annual)

* Individuals purchasing a Recreation Permit will be required to complete a short questionnaire (if they held a Permit the previous year)

Table 14 Evaluation of Management Objective (i) Reduce threats to the cultural and biodiversity values of sea country

Evaluation Question	Indicator	Method of Evaluation
To what extent are beach management activities reducing the impact of marine debris in the sea?	Days spent collecting marine debris / ghost nets	Review activity records (annual)
	Animals released from entanglement	Review no. and type, i.e. species and alive or deceased (annual)
	Weight of ghost net and marine debris collected from beaches	Review Cybertracker data (annual)
Are marine fisheries related threats / issues being appropriately monitored and reported?	Marine patrols undertaken and associated reports provided to NT DPIF	Review activity and reporting records (annual)
	Response of NT DPIF representative	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)

Part D - Appendices

Appendix I - Acronym list

AFMA Australian Fisheries Management Authority
ALC Anindilyakwa Land Council
ALR Aboriginal Land Rights (NT)
BHP Broken Hill Pty
BOM Bureau of Meteorology
CDP Community Development Program
CLM Conservation Land Management
DLRM Department of Land Resource Management
DPIF Department of Primary Industry and Fisheries
EPA Environment Protection Agency
EPBC Environment Protection and Biodiversity Conservation
GEBIE Groote Eylandt and Bickerton Island Enterprises
GEMCO Groote Eylandt Mining Company
GoC Gulf of Carpentaria
IEK Indigenous Ecological Knowledge
IPA Indigenous Protected Area
IUCN International Union for the Conservation of Nature
JCU James Cook University
LoC Learning on Country
LSM Land and Sea Management
NOAA National Oceanic and Atmospheric Administration
NPF Northern Prawn Fishery
NRETAS Natural Resources, Environment, the Arts and Sport
NT Northern Territory
PoM Plan of Management
PSU Practical Salinity Unit
QUT Queensland University of Technology
RDU Royalty Development Unit
TPWC Territory Parks and Wildlife Conservation
WoC Working on Country
WONS Weed Of National Significance
WWF World Wildlife Fund For Nature

Appendix II - *Anindilyakwa* word list

Anindilykwa	English	Anindilykwa	English
Culture		*Dijinungkwa*	echidna
Amalawudawarra	totem	*Dilanda*	rock wallaby
Alawudawarra	dreaming story and associated site	*Dilyaburnda*	amphibian
Balanda	non-indigenous person	*Dingarrbiya*	salt water crocodile
Barnimbirra	morning star	*Dingarrkwa*	sea urchin
Jungai	traditional caretaker	*Dinginjabena*	dolphin
Wurabalija	traditional owner	*Dinungkwulangwa*	dugong
Natural features		*Dirrkba*	plover
Angwa	dune shrublands / grasslands	*Dumanda*	reef egret
Angwura	fire	*Dumurrengmurra*	sea snake
Ariba	land	*Duwalja*	water python
Ekbulkwurrariya	paperbark swamp / mudflat	*Duwarrngkirrariya*	osprey
Merrungwa	the tide	*Kwundirra*	olive python
Makarda	salt water	*Maja*	blacktip shark
Malarra makarda-manja	rocky platforms uncovered at low tide	*Mungwarra*	hammerhead shark
Mamudangkwa	sand plains / coastal dunes	*Miyalkwa*	starfish
Yinijirra	rocky hills	*Mungarniyenda*	trumpet shell
Yandarrnga	Central Hill	*Warnungwenimbaluba*	dingo
Animals		*Wurrajija*	birds
Akwalya	bony fishes / animals in the sea	*Wurrendinda*	rodent
Amarbirra	cowtail stingray	*Yangkamarnindangwa*	western brown snake
Angwala	mud crabs	*Yerrumilya*	hard corals
Aranjarra	cartilaginous fish	*Yeyerrindangwa*	pygmy mulga snake
Dadikakwakwa	cone shell	*Yiburada*	agile wallaby

Anindilykwa	English	Anindilykwa	English
Yijarra	tern	*Eningerriberriba-langwa mirrijina*	traditional bush medicine
Yilyakwa	native bee / sugar bag	*Erriberriba*	open woodland / forest
Yilyanga	giant shovelnose ray	*Mabalba*	wild peanut tree
Yimenda	marine turtle	*Maburrawilya*	*Ipomoea pes-caprae spp.*
Yiningakarda	sea eagle	*Mamaburra*	wild peach
Yiniyerruwena	northern quoll	*Mangkarrkba*	wild plum
Yinubungwaya	loggerhead turtle	*Marrangkwurra*	red bark tree
Yirukwujilangwa	northern brown bandicoot	*Mawurrira*	seagrass
Yukwurrirrindangwa	sawfish	*Mawurdarra*	woollybutt tree
Yumaduwaya	stingray	*Mebina*	river wattle
Yungwula	sea cucumber	*Merrika*	broad-leaved wattle
Yuwalkwurra	mud mussels	*Miyarrawa*	red kurrajong
Plants		*Mukuwara*	cocky apple
Alabura	Darwin stringybark	*Mungwunukwamba*	white bridal tree
Alyukwurra	paperbark	*Murungwena*	monsoon vine forest
Amarda	non woody plant	*Muwarraka*	coastal sheoak
Angarrakaba	wild cherry	*Wurrayangkwurra*	water lilly
Anuma	mangrove	*Wurruwarduwarda*	spinifex grass
Arnduwa	bloodwood tree	*Yawurdarra*	*Drypetes deplanchei*
Eka	woody plant	*Yilerrkirra*	white-flowered black mangrove
Engbajengbaja	star boronia	*Yilyarra*	cut-leaved palm
Enindurrkwa	swamp banksia	*Yimundungwa*	cypress pine

Appendix III - IUCN protected area categories

Category Ia: Strict nature reserve

Set aside to protect biodiversity and also possibly geological / geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.

Primary objective: To conserve regionally, nationally or globally outstanding ecosystems, species (occurrences or aggregations) and / or geodiversity features: these attributes will have been formed mostly or entirely by non-human forces and will be degraded or destroyed when subjected to all but very light human impact.

Category Ib: Wilderness area

Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition.

Primary objective: To protect the long-term ecological integrity of natural areas that are undisturbed by significant human activity, free of modern infrastructure and where natural forces and processes predominate, so that current and future generations have the opportunity to experience such areas.

Category II: National park

Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.

Primary objective: To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation.

Category III: Natural monument or feature

Set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value.

Primary objective: To protect specific outstanding natural features and their associated biodiversity and habitats.

Category IV: Habitat / species management area

Aim to protect particular species or habitats and management reflects this priority. Many category IV protected

areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category.

Primary objective: To maintain, conserve and restore species and habitats.

Category V: Protected landscape / seascape

The interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

Primary objective: To protect and sustain important landscapes / seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices.

Category VI: Protected area with sustainable use of natural resources

Conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.

Primary objective: To protect natural ecosystems and use natural resources sustainably, when conservation and sustainable use can be mutually beneficial.

(Dudley, 2008)

Appendix IV - Flora listed as data deficient under the *TPWC* 2000

Scientific name		
Bonamia linearis	*Fimbristylis spiralis*	*Polymeria pusilla*
Calandrinia arenicola	*Halodule pinifolia*	*Proiphys alba*
Callicarpa brevistyla	*Halodule uninervis*	*Scleria terrestris*
Calochilus holtzei	*Halophila decipiens*	*Sedopsis sp. sandstone*
Cleome tetrandra	*Halophila ovalis*	*Syringodium isoetifolium*
Coelachne pulchella	*Halophila spinulosa*	*Tecticornia indica*
Cymodocea serrulata	*Hibbertia orientalis*	*Tephrosia laxa*
Cymodocea rotundata	*Ipomoea brassii*	*Thalassia hemprichii*
Cyperus scaber	*Ipomoea imperati*	*Thoracostachyum sumatranum*
Cyperus tenuiculmis	*Lindernia tectanthera*	*Trichosanthes morrisii*
Cyperus paniceus	*Mitrasacme inornata*	*Tropidia territorialis*
Drosera fulva	*Mitrasacme squamigera*	*Typha orientalis*
Enhalus acoroides	*Oldenlandia mitrasacmoides*	*Yakirra muelleri*
Eragrostis sp. islands	*Panicum simile*	*Zornia muriculata*

Appendix V - Fauna listed as near threatened or data deficient under the *TPWC* Act 2000

	Scientific name	Common name	NT status
Reptiles	*Cryptoblepharus litoralis*	beach snake-eyed skink	data deficient
	Demansia olivacea	olive whip snake	data deficient
	Dendrelaphis punctulata	green tree snake	data deficient
	Enhydrina schistosa	beaked sea snake	data deficient
	Enhydris polylepis	macleay's water snake	data deficient
	Glaphyromorphus nigricaudis	dark-tailed skink	data deficient
	Tiliqua scincoides	common blue-tongued lizard	data deficient
	Varanus baritji	black-spotted ridge-tailed monitor	data deficient
	Varanus glebopalma	long-tailed rock monitor	data deficient
	Varanus indicus	mangrove monitor	near threatened
	Varanus scalaris	spotted tree monitor	data deficient
Birds	*Arenaria interpres*	ruddy turnstone	near threatened
	Burhinus grallarius	bush stone-curlew	near threatened
	Gallinago megala	swinhoe's snipe	data deficient
	Ixobrychus dubius	Australian little bittern	data deficient
	Limosa limosa	black-tailed godwit	near threatened
	Lophoictinia isura	square-tailed kite	near threatened
	Numenius phaeopus	whimbrel	near threatened
	Pluvialis squatarola	grey plover	near threatened
	Poecilodryas cerviniventris	buff-sided robin	near threatened
	Porzana pusilla	baillon's crake	data deficient
	Tringa brevipes	grey-tailed tattler	near threatened
	Turnix castanotus	chestnut-backed button-quail	data deficient

	Scientific name	Common name	NT status
Mammals	*Dugong dugon*	dugong	near threatened
	Isoodon macrourus	northern brown bandicoot	near threatened
	Orcaella heinsohni	Australian snubfin dolphin	data deficient
	Rattus villosissimus	long-haired rat	near threatened
	Sousa chinensis	indo-pacific humpbacked dolphin	data deficient

Appendix VI - Non-native flora

Scientific name		
Alternanthera brasiliana	*Chloris barbata*	*Gloriosa superba*
Alternanthera pungens	*Citrullus lanatus*	*Gmelina arborea*
Alysicarpus ovalifolius	*Clitoria ternatea*	*Gomphrena celosioides*
Amaranthus viridis	*Corchorus aestuans*	*Hibiscus sabdariffa*
Amaranthus tricolor	*Crotalaria pallida*	*Hyptis suaveolens*
Amaranthus hybridus	*Crotalaria goreensis*	*Indigofera cordifolia*
Anacardium occidentale	*Cryptostegia grandiflora*	*Indigofera hirsuta*
Andropogon gayanus	*Cyanthillium cinereum*	*Ipomoea quamoclit*
Annona squamosa	*Cynodon dactylon*	*Jatropha gossypiifolia*
Antigonon leptopus	*Cyperus rotundus*	*Khaya senegalensis*
Asystasia gangetica	*Cyperus brevifolius*	*Lantana sp.*
Axonopus compressus	*Dactyloctenium aegyptium*	*Leucaena leucocephala*
Azadirachta indica	*Delonix regia*	*Lycopersicon esculentum*
Bauhinia acuminata	*Desmodium tortuosum*	*Macroptilium atropurpureum*
Bothriochloa pertusa	*Desmodium triflorum*	*Macroptilium lathyroides*
Calopogonium mucunoides	*Digitaria ciliaris*	*Malvastrum americanum*
Capsicum annuum	*Digitaria bicornis*	*Mangifera indica*
Caryota mitis	*Echinochloa colona*	*Megathyrsus maximus*
Cascabela thevetia	*Eleusine indica*	*Melinis repens*
Cassia fistula	*Eleutheranthera ruderalis*	*Merremia aegyptia*
Catharanthus roseus	*Emilia sonchifolia*	*Merremia dissecta*
Cenchrus pedicellatus	*Eragrostis amabilis*	*Mitracarpus hirtus*
Cenchrus echinatus	*Eragrostis sp.*	*Momordica charantia*
Cenchrus polystachios	*Euphorbia cyathophora*	*Mucuna pruriens*
Cenchrus ciliaris	*Euphorbia heterophylla*	*Murraya koenigii*
Centrosema pascuorum	*Euphorbia hirta*	*Nassella tenuissima*
Centrosema molle	*Evolvulus nummularis*	*Oldenlandia corymbosa*
Chamaecrista rotundifolia	*Evolvulus nummularia*	*Paspalum plicatulum*

Scientific name		
Passiflora foetida	*Sida cordifolia*	*Syndrella nodiflora*
Pedilanthus tithymaloides	*Sida acuta*	*Synedrella nodiflora*
Peperomia pellucida	*Sida rhombifolia*	*Syngonium podophyllum*
Phyllanthus amarus	*Solanum torvum*	*Tamarindus indica*
Physalis angulata	*Sorghum almum*	*Tecoma stans*
Pilea microphylla	*Spathodea campanulata*	*Themeda quadrivalis*
Pityrogramma calomelanos	*Spermacoce articularis*	*Thunbergia grandiflora*
Polycarpon prostratum	*Spermacoce remota*	*Tithonia diversifolia*
Portulaca pilosa	*Sphagneticola trilobata*	*Tribulus terrestris*
Portulaca oleracea	*Sporobolus*	*Tribulus cistoides*
Quisqualis indica	*Stachytarpheta jamaicensis*	*Tridax procumbens*
Richardia brasiliensis	*Stachytarpheta cayennensis*	*Turnera subulata*
Ruellia tuberosa	*Stylosanthes guianensis*	*Urochloa mosambicensis*
Sansevieria trifasciata	*Stylosanthes hamata*	*Urochloa mutica*
Scoparia dulcis	*Stylosanthes humilis*	
Senna occidentalis	*Stylosanthes scabra*	

Appendix VII - Justification of weed management priorities

A number of species within the IPA have been identified as priority species for control (Table 4). In establishing these priorities, consideration has been given to the:

- current distribution of a species
- likelihood of a species to be spread by human or other means
- capacity of a species to infest undisturbed sites
- threat to the success of mine rehabilitation activities
- threat to the environment or infrastructure through the modification of wildfire
- potential to restrict access to, and / or damage cultural and recreationally important water places
- legislative requirements for control of a species.

Appendix VIII - Research projects

Major research activities that have been, or are currently being undertaken within the IPA include:

- investigating the ecology and impact of manganese on the health of the northern quoll
- monitoring the population of northern quolls on Groote Eylandt
- surveys for northern quoll (and other terrestrial species) on several islands in the IPA
- preliminary surveys for feral cats and threatened mammals on Groote Eylandt
- a review of the bat fauna on Groote Eylandt
- surveys to determine the current distribution and status of threatened mammal species on Groote Eylandt
- testing acoustic and recording devices to detect and capture cane toads at water places
- determining the distribution and estimate the density of feral cats on Groote Eylandt
- mapping benthic habitat and other properties of sea country

Appendix IX - Recreation permit system

All non-indigenous visitors are required to purchase a Recreation Permit before accessing Recreation Areas in the IPA. The ALC LSM Unit administers the Recreation Permit System. This involves:

- assessing and processing permit applications and payments
- maintaining an up-to-date database of valid permit holders
- advising permit holders of temporary land closures through the:
    - update of the IPA Information Sign in Alyangula
    - distribution of Land Closure emails to permit holders and community organisations, corporations and company representatives.

Appendix X - Environmental research applications

All environmental researchers must:

- complete an Anindilyakwa IPA Research Application for appraisal by the traditional owners and the ALC LSM Unit staff
- obtain the free, prior and informed consent of relevant traditional owners
- meet the requirements and obligations outlined in their Research Application
- provide feedback to the ALC LSM Unit (and / or traditional owners) regarding the findings of the research.

Below is the Anindilyakwa IPA Research Application Form:

Anindilyakwa Land Council
Land and Sea Management Unit

Anindilyakwa Indigenous Protected Area Research Application

The Anindilyakwa Land and Sea Management (LSM) Unit supports researchers to undertake environmental projects within the Anindilyakwa IPA that:

- respect Anindilyakwa culture and traditional rights to natural and cultural resources
- benefit and appropriately acknowledge the contributions of traditional owners
- recognise the rights of Anindilyakwa traditional owners to their cultural and intellectual property
- provide information which can inform land and / or sea management activities undertaken by the ALC Rangers
- provide opportunities for ALC Rangers to participate and gain experience and skills.

Researchers must obtain, through the ALC LSM Unit, the free, prior and informed consent of relevant traditional owners and communities before undertaking any project within the Anindilyakwa IPA. Representatives from the LSM Unit will use the information disclosed in the Research Application Form to identify and consult with traditional owners.

Additional requirements should your application be approved:

- attend a full day Groote Eylandt Cultural Induction
- make appropriate arrangements with LSM Unit for ranger/s, traditional owner/s and/ or relevant ALC staff to accompany you during fieldwork
- discuss major changes to the methodology, which arise throughout the duration of the project, with the LSM Unit
- provide traditional owners and the LSM Unit with:
  - a copy of any publication, results or reports arising from the research
  - a plain English report (picture book) outlining the outcomes of the project
  - feedback throughout, and at the completion of, the project.

Anindilyakwa Land Council
Land and Sea Management Unit

Methodology

Please provide details of the methodology of the project. This should include: target species, fauna and flora survey/sampling methodology, firearm or poison use and any plans to undertake bioprospecting activities.
Has the project received approval from an authorized ethics committee?
Will this research affect the physical environment? If so, how do you plan to mitigate these impacts?
Will you visit any communities during the research? If so, please list which communities and how often you anticipate visiting each community.

Logistics

What transportation arrangements will you make for your time on the island?

Do you require any logistical (or other) support from the ALSM unit?

Aboriginal culture and intellectual property rights

Does the project seek to use local indigenous knowledge? If so, how will you ensure indigenous knowledge gathered during the project remains confidential? What provisions in the research proposal ensure Aboriginal cultural and intellectual property rights are protected?
Do you plan to include photography, film, sound recording or other forms of media as part of your project?
Do you intend to use flora or fauna genetic material?

Dissemination of research outcomes

Please provide details of how you plan to present the progress and outcomes of the project to traditional owners and the ALSM unit.

Anindilyakwa Land Council
Land and Sea Management Unit

Aboriginal participation

How do you propose to engage traditional landowners in this project?
Does your project **require** the knowledge and participation of traditional owners? If so, how will individuals be compensated for their services?
What types of monetary or non-monetary benefits will be provided to the communities/traditional owners for the use of their land, waters or knowledge? (e.g. skills and training, awareness and education, capacity development).
Does your research provide opportunities for ranger skill/knowledge development?
How will the research outcomes inform land and/or sea management activities undertaken within the Anindilyakwa IPA?

Please attach any other relevant information about your project that has not been covered above

Appendix XI - Prawn fishing closures

The IPA marine zone is closed to prawn fishing between 31 March and 15 June. A number of sites are closed permanently to prawn fishing (Figure 12). In addition to these closures, the IPA marine zone is subject to other temporary closures that are in place across larger areas of the GoC (AFMA, 2016).

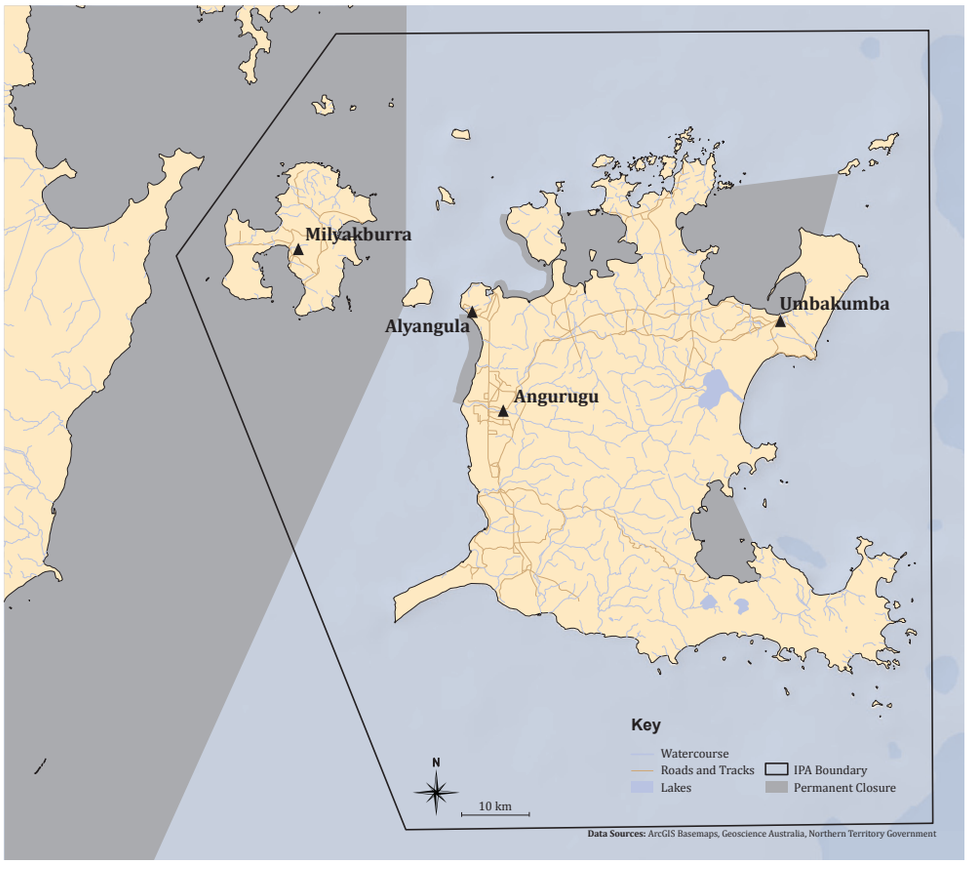


Figure 12 Prawn fishing closures

Appendix XII - Monitoring and evaluation reporting framework

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Completion of relevant training units	Review no. of Rangers / no. of units completed (annual)			60 units (12 Rangers, complete 5 units each)		
Participation of Rangers in projects with external land managers / researchers	Review no. of Ranger days (annual)			30 days		
Advancement through the ALC Ranger Career Progression Framework	Review records (biennial)			3 Rangers advance 1 level each		
Participation of traditional owners in Ranger activities	Review community member participation (annual)			50 days of Traditional Owner participation		
Traditional land management activities undertaken by the Rangers	Review activity record (annual)			20 activities		
Advancement of Rangers through levels of the Australian Core Skills Framework	Review no. of Rangers / Core Skills Level (biennial)			2 Rangers advance 1 level each		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

Table 15 Evaluation Report for Management Objective (a) Continue to build the capacity of the ALC Rangers to undertake cultural and natural resource management within the IPA

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Opportunities for school-aged children to undertake land and sea management activities and / or CLM training with the Rangers	Review no. of student days (annual) (work experience students only)			100 children days**		
Response of IPA Management Committee / LoC Steering Committee / senior traditional owners / Rangers / Assistant Teachers	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		
Relevant LoC activities supported by the Rangers	Review activity record (annual)			40 activities**		
Resources produced by the LoC Program and / or ALC Rangers	Review no. and type (annual)			4 resources (e.g. booklets, videos, posters)		
Employment of indigenous employees	Review no. of paid Ranger days (annual)			2912 Ranger days***		
Retention of indigenous employees	Review no. of Rangers employed and length of employment (annual)			6 Rangers employed for ≥ 2 years		
Employment of indigenous community members on a casual basis	Review no. of paid days (annual)			30 days**		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

** Assuming 2 LoC Coordinators are employed for whole reporting period

*** Based on current WoC funding

Table 16 Evaluation Report for Management Objective (b) Continue to host the LoC Program as a means to improve educational outcomes and employment opportunities, (c) Support traditional owners in their efforts to prevent the ongoing loss of IEK and (d) Continue to develop the ALC Ranger Group as the primary opportunity for employment of *Anindilyakwa* people with the ALC

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
IPA Management Committee meetings	Review no. of meetings and participation of committee members (annual)			1 meeting, 14 committee members		
Response of IPA Management Committee members	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		
IPA Advisory Committee meetings	Review no. of meetings and no. of stakeholders engaged			1 meeting, engaging 6 external stakeholders		
Response of IPA Advisory Committee members	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

Table 17 Evaluation Report for Management Objective (e) Develop and maintain effective management partnerships between the ALC LSM Unit, traditional owners and external stakeholders

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Inspection of barges arriving at Umbakumba	Review no. and proportion of barges inspected			90% of barges inspected*^		
Effort spent undertaking night spotlighting for cane toads during the wet season	Review activity records (annual)			10 night spotlighting activities		
Number of days spent mapping and treating weeds	Review Cybertracker data (annual)			40 days		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

*^Target will change with appointment of Quarantine Officer

Table 18 Evaluation Report for Management Objective (f) Protect the cultural and biodiversity values of the land from the impact of pest species

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Current environmental research projects (terrestrial and / or marine) supported by the ALC LSM Unit	Review no. and type of projects (annual)			2 research projects		
New species, populations or ecological communities detected, described and / or mapped	Assessment of no. and type (biennial)			1 species, population or ecological community detected, described and / or mapped		
Changes in the presence and / or absence of significant species	Quantitative analyses (by an external organisation) of data from one long term monitoring project (biennial)			- Establish sites and undertake annual monitoring of nesting marine turtle; and / or - Continue the annual collection of small mammal data at sites established by University of Queensland		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

Table 19 Evaluation Report for Management Objective (g) Fill knowledge gaps to improve land and sea management activities

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Effective administration of Recreation Permits and Land Closures	Review no. of Recreation Permits sold (annual)			Not applicable		
Individuals visiting country hold a valid Recreation Permit and adhere to all rules governing access to country	Review: no. of Recreation Permits checked, proportion of individuals (of those checked) holding a current Recreation Permit and any breaches of rules governing access to country (annual)			100% of individuals hold current permits, no other breaches of terms and conditions documented		
Response of non-indigenous Groote Eylandt residents	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		
Response of IPA Management Committee / senior traditional owners / Rangers	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		
Ranger patrols of Recreation Areas	Review activity records (annual)			12 weekend patrols		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

Table 20 Evaluation Report for Management Objective (h) Undertake appropriate visitor management activities

Indicator	Method of evaluation	Result	Comments	Target	Target reached?	Comparison with last year
Days spent collecting marine debris / ghost nets	Review activity records (annual)			40 days		
Animals released from entanglement	Review no. and type, i.e. species and alive or deceased (annual)			Not applicable		
Weight of ghost net and marine debris collected from beaches	Review Cybertracker data (annual)			Not applicable		
Marine patrols undertaken and associated reports provided to NT DPIF	Review activity and reporting records (annual)			40 patrols and patrol reports		
Response of NT DPIF representative	Overall rating: *not satisfied, partly satisfied, satisfied* (annual)			Overall rating: *Satisfied*		

Dramatically deteriorating | Deteriorating | Stable | Improving | Dramatically improving

Table 21 Evaluation Report for Management Objective (i) Reduce threats to the cultural and biodiversity values of sea country

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