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Limmen Bight: Marine and coastal biodiversity values

Review of information and knowledge

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Summary

Limmen Bight Marine Park lies within the “Limmen Bight and associated coastal floodplains” Site of Conservation Significance. This is one of 67 such sites in the Northern Territory identified by NRETAS as being particularly important for biodiversity (Ward and Harrison 2009, Harrison *et al* 2009).

The Limmen Bight Site of Conservation Significance (Harrison *et al* 2009) includes Maria Island as well as Low Rock and Sandy Island to the north, and the coastal floodplains of the Roper, Towns and Limmen Bight Rivers and the extensive tidal flats and other coastal habitats between the Roper and Limmen River mouths. The marine and coastal areas of Limmen Bight are rated as of international significance.

The Marine Park and associated coastal area in Limmen Bight help protect the following biodiversity values:

- Extensive seagrass beds (notably east of the Limmen Bight River), which are important foraging areas for dugong and marine turtles;
- Part of the largest (and internationally significant) dugong population in the Northern Territory (NT), associated with the shallow marine system between the Pellew Islands and Limmen Bight;
- Other important marine species associated with the extensive inshore seagrass beds, including at least three species of the nationally listed family of seahorses and pipefishes;
- A preliminary survey in the estuarine and marine areas has recorded more than one hundred fish species including the threatened freshwater sawfish;
- Very extensive intertidal salt flats and mud flats, which are one of the most important areas for migratory shorebirds in the NT, supporting internationally significant numbers of at least five species;
- The large freshwater wetlands support large numbers of waterbirds. One mixed waterbird breeding colony in mangroves near the mouth of the Roper River had at least 10,000 birds;
- Significant nesting numbers of threatened flatback turtles on Maria Island, and turtle feeding grounds in adjacent Limmen Bight waters;
- Foraging areas for one of the Territory’s largest breeding colonies of silver gulls on Maria Island; and
- Generally high productivity, in part driven by seasonal outflow from the large rivers, and relatively diverse and abundant biota within the Gulf of Carpentaria coastal waters.

In addition the adjacent coastal environments have many scattered patches of coastal rainforest.

The biodiversity significance of Limmen Bight and the associated coastal area have been recognised in a number of other documents and reviews, including:

- as an internationally important site for migratory shorebirds on the East Asian-Australasian Flyway (Bamford *et al* 2008);
- as an internationally Important Bird Area (Birds Australia); and

- listed in the Directory of Important Wetlands in Australia.

Limmen Bight Marine Park is also adjacent to the Limmen Marine Reserve as currently proposed by the Australian Government

(<http://www.environment.gov.au/coasts/mbp/north/publications/pubs/north-fs-limmen.pdf>).

Maria Island itself has a very high density of northern brown bandicoot, a species which has declined on the adjacent mainland.

The combination of the Marine Park, Limmen National Park (including Maria Island) and any coastal Indigenous Protected Area within the Limmen Bight Regional Biodiversity Area would ensure a fully integrated catchment-to-coast-to-sea protection of the key values in this area. There is also potentially continuity with the Commonwealth's proposed Limmen Marine Reserve.



Inter-tidal area near Wuriliwuntya Creek (Photo: Ray Chatto).

Introduction

Location and description

Limmen Bight Marine Park (approximately 884 km²) is located on the Gulf of Carpentaria about 360 kilometres east of Katherine and comprises inshore waters from the mean low water mark and extending three nautical miles to the limit of Territorial waters. The area is bounded to the north and west by the mouth of the Roper River and the Marra Land Trust, and to the south by Limmen National Park and Wuraliwuntya Creek, and also includes waters off Maria Island (277 km²) (Map 1). Whilst Beatrice Island is close to shore, Maria Island is further offshore and hence is separated from other Territorial possessions by a small intervening area of sea administered by the Australian Government.

The Gulf of Carpentaria is a large, shallow, muddy marine embayment in northern Australia. There is marked seasonality in temperature, rainfall, salinity and wind regimes. The summer monsoon with its northerly winds and rain and the very dry winter period with south-east trade winds dominate the climate features. Temperatures range from 10°C in the dry season to the high 30's in the summer wet season.

There are two islands in this area, Maria and Beatrice (Ymunguni) Islands. Maria Island (3,893 hectares) is a low, vegetated island about 20 kilometres from the mainland and due north of the mouth of the Limmen Bight River. It is the largest island between Groote Eylandt in the north and the Sir Edward Pellew Islands in the south. The island is roughly oval-shaped with a large sand spit on the south-western side and is approximately 10 kilometres long by 7 kilometres wide. Beatrice Island is a very small mangrove and rocky island, very close to the mouth of the Limmen Bight River.

A major feature of Limmen Bight is the large coastal wetlands to the south of the Roper River (including those associated with the Towns River), and to the north of the Limmen Bight River. These wetlands are mostly open, saline wetlands that dry up quickly after the wet season or inter-tidal mudflats. The salt flats and mudflats are some of the most extensive in the Northern Territory. There are large areas of mangrove forests associated with the large coastal delta system at the mouths of the Limmen Bight and Roper Rivers and fringing the coast.

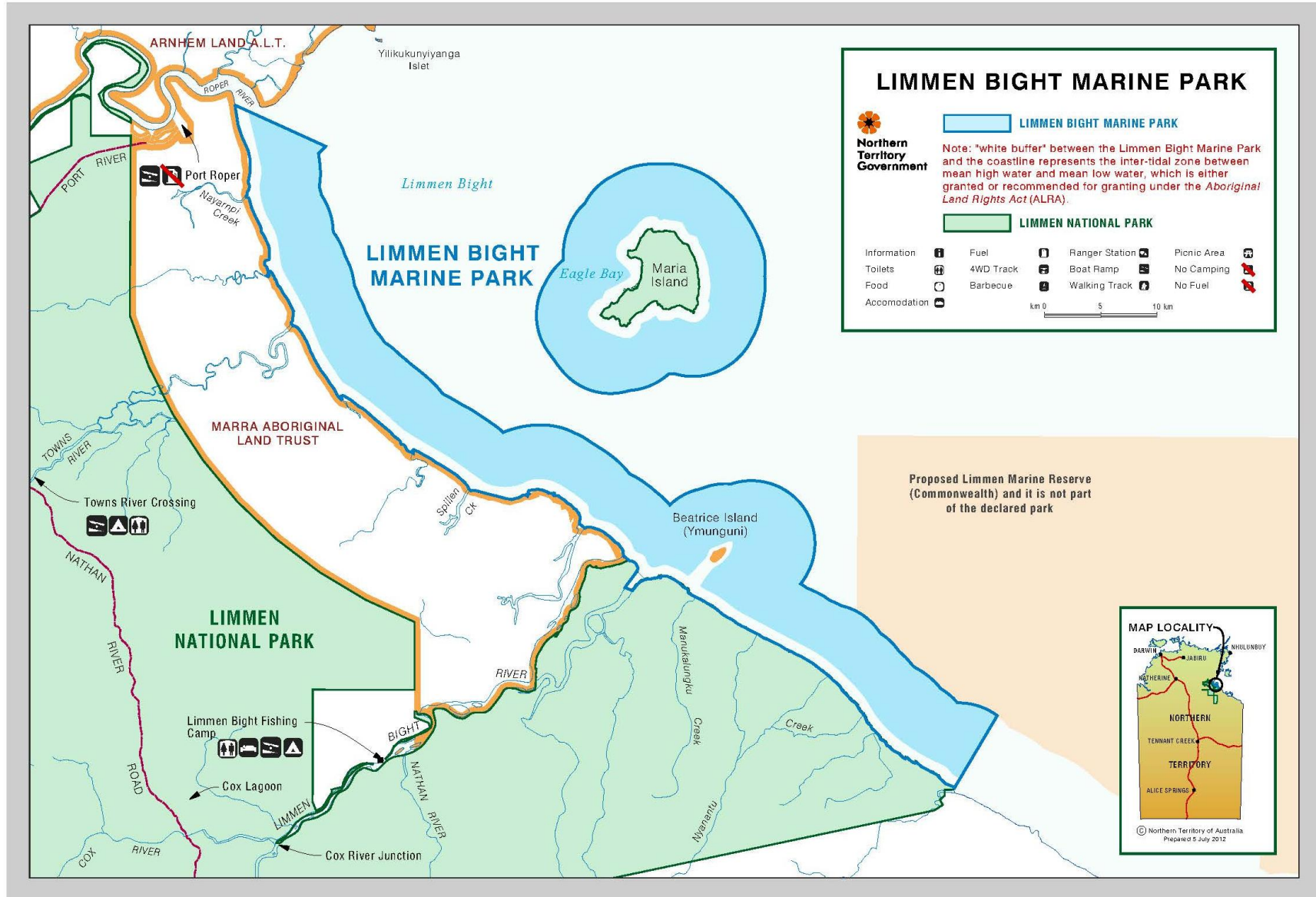
Limmen Bight Regional Biodiversity Area

This report reflects the integral environmental and bio-cultural connections between the land and sea by discussing a broader area that includes the adjacent coast and Maria Island, inter-tidal areas and inshore coastal waters.

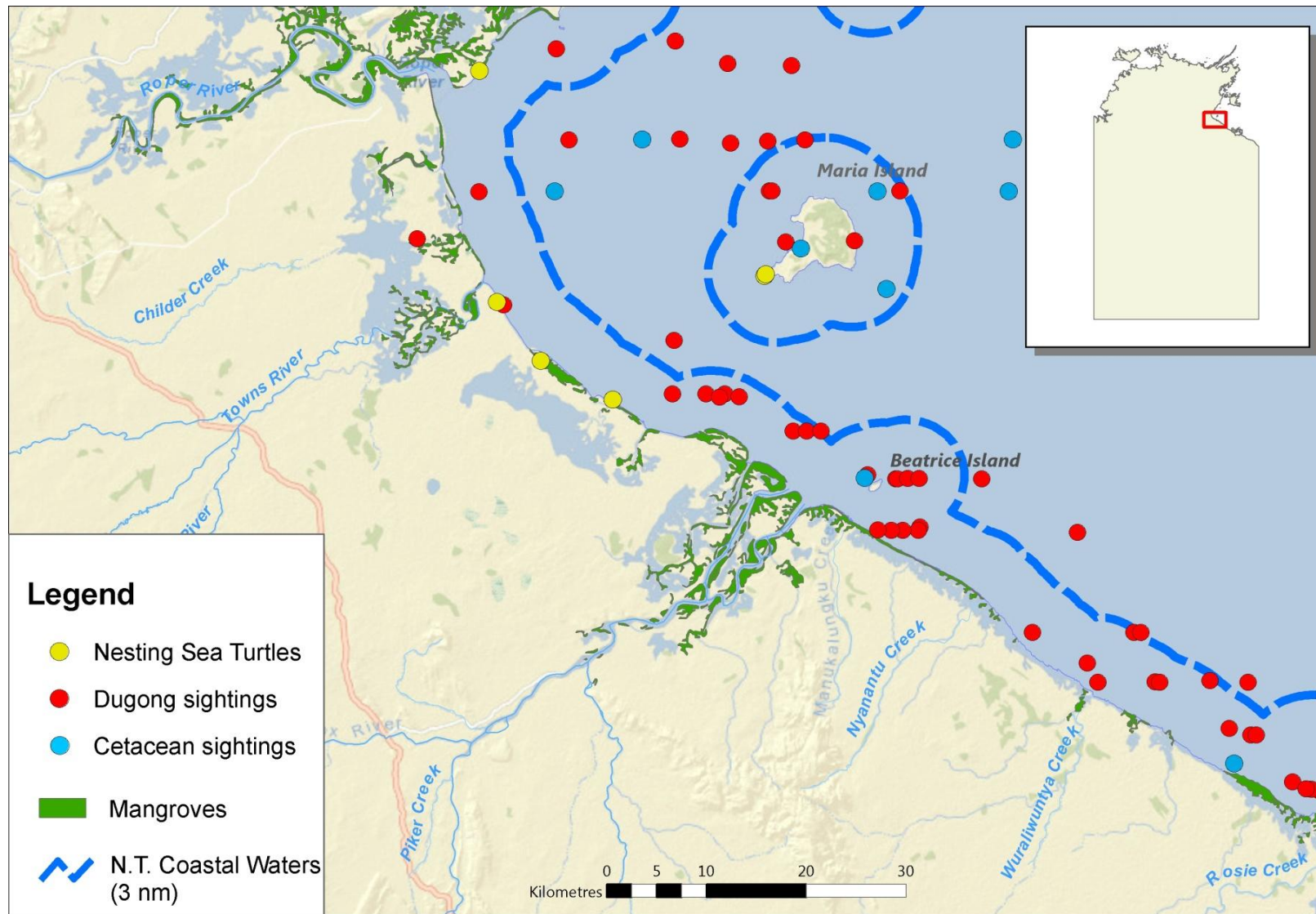
The combination of Limmen Bight Marine Park with Limmen National Park helps integrate catchment-to-coast-to-sea protection of key biodiversity values into a proposed Limmen Bight Regional Biodiversity Area (Map 1). There is also potential continuity with the Commonwealth's proposed Limmen Marine Reserve and an opportunity to expand these land and sea connections should a coastal Indigenous Protected Area be formed on adjacent Aboriginal Land Trust.

The proposed Limmen Bight Regional Biodiversity Area seeks to integrate conservation efforts in the region, with support from government for community-driven proposals (such as covenanting or Indigenous Protected Areas), and the concept will be developed further through extensive consultation.

Map 1. The proposed Limmen Bight Regional Biodiversity Area, including the Marine Park.



Map 2. Records of some of the key biodiversity values of the Limmen Bight area.



Tenure and land use

The coastal area is predominantly Aboriginal Freehold land and within the Marra Aboriginal Land Trust (NT Portion 2099). A slightly smaller portion (forms part of Limmen National Park (NT Portion 1334). Maria Island (NT Portion 2373) is included in Limmen National Park (Map 1).

There are no towns or communities along this coast. The nearest town of Ngukurr is well inland along the Roper River. However, boats regularly travel along the river to the coast, and boats travel here from Numbulwar to the north. There are also a few, small outstations along this section of coast and commercial fishing camps in the Roper and Limmen Bight Rivers. Borroloola is located further south about 40 km inland along the McArthur River adjacent to the Sir Edward Pellew Islands.

Coastal geomorphology

A monsoonal climate influences Limmen Bight Marine Park. Rainfall varies from 1,000 to 1,200 mm. Unlike most of the Territory coast, the tides are quite small in the Gulf, varying from 2 to 3 metres only. Tropical cyclone activity is moderate to high. Tropical cyclones can generate locally strong shelf currents that can significantly alter local geomorphology.

The sediments in Limmen Bight are typically fine to very fine sand grains, although the texture of the near shore sediments varies greatly depending in the influence of local catchments. Territorial waters in this area are all less than 20 metres deep, with a high deposition rate of sediment from the nearby rivers and local tides and currents. The shallow water and tides combine to re-suspend these fine particles and lessen water clarity. This in turn affects the distribution of species such as seagrasses, which need light to grow.

The coastline is mainly alluvial plains, composed of clays and muds in varying proportions. The major river systems of the Roper, Towns and Limmen Bight Rivers discharge enormous amounts of freshwater into the estuaries and the coastal gulf waters during the monsoon season, churning the waters and significantly adding to its biological productivity.

This high productivity is important for biota in adjacent areas. For example, the coastal boundary abuts very extensive intertidal salt flats and mud flats in the Limmen National Park and in the Marra Aboriginal Land Trust. These wetlands are one of the most important areas for migratory shorebirds in the NT, supporting internationally significant numbers of at least five species, and also supporting large numbers of waterbirds, with one mixed breeding colony of at least 10,000 birds.

On these shores mangroves are essentially continuous, extending up to 1 km inshore in parts. Coral reefs are sparse. Significant seagrass beds are found along the coast and inshore waters between the Roper and McArthur Rivers.

Marine biodiversity values

Mangroves and inter-tidal habitats

One of the dominant features of the coast is the extensive intertidal mud or mud/sand flats (Maps 2, 3). Some of this intertidal zone has a defined mangrove or low dune coast that separates it from the extensive areas of saline wetland in behind the coast. In other areas the intertidal zone merges into the open saline mudflats, which sometimes extend many kilometres inland. Mangroves also dominate the banks of the rivers and many small creeks that run into the coast. Further inland, particularly to the north are some quite extensive freshwater wetlands, but most of the wetlands are saline.

At least 19 plant species are found in the mangrove communities in this area (Wightman 2006). Most are relatively widespread. Mangrove diversity and abundance is concentrated around the major rivers and tidal creeks. The intertidal zone between the Towns and Limmen Bight Rivers and south of the Limmen Bight River, where the flow of water from either tides or freshwater runoff is minimal, has significantly less mangroves.

Seagrass meadows

Seagrasses are specialised marine flowering plants. They are one of the most important habitats world-wide, having been ranked the third most valuable ecosystem globally on a per hectare basis for ecosystem services, behind only estuaries and swamp/floodplains (Constanza 1997 in Roelofs *et al.* 2005).

Seagrasses have a well documented role in providing food and shelter, as well as nursery grounds for many animals and in stabilising the substrate. Seagrasses are commonly found in shallow waters around estuaries and tidal flats, on shallow, sandy areas close to the coast, in coral reef lagoons and around sand cays. They can be found at much greater depths in clearer waters.

Seagrass meadows are often damaged at least temporarily by cyclones, storms and excessive freshwater input from large runoff events. In contrast, the sediments and waters brought to the meadows by these events also replenish local nutrients and enhance growth.

Seagrass meadows in the Gulf of Carpentaria are patchily distributed and the structure of individual meadow varies greatly. *Halophila* meadows are the most common inter-tidal meadow recorded in the Gulf and they form the main diet for dugongs and green turtles as well as habitat for many smaller species, some of which are commercially important (eg prawns and some fish). Almost all seagrass meadows surveyed here by Roelofs *et al* (2005) showed evidence of dugong and turtle feeding.

Intertidal seagrass meadows in the area have been most recently mapped in 2004 (Roelofs *et al* 2005), which showed a concentration from Limmen Bight River east to the Sir Edward Pellew Island Group. The more recent (2007) aerial survey of dugongs provides a better overall distribution of near shore seagrass meadows as the distribution of dugongs is closely linked to their seagrass food

source (see dugong distribution in Map 2). This indicates broad areas of seagrass in all the inshore areas from the Roper River south-east to the Pellews, and broader, probably more patchy, near shore seagrass beds extending east to Maria Island and beyond.

Fish

The fish diversity of Limmen Bight Marine Park is not well known. MAGNT briefly surveyed the coastal and estuarine fish of the Roper River and neighbouring waterways (including Nayarnpi Creek and the Towns River) in 1994, as part of a comparison with the fish fauna of Bing Bong Creek, west of the McArthur River (Larson 1996). Any other knowledge of the fish fauna in the areas is based largely on prawn bycatch, demersal fish trawl catch and very limited *ad hoc* collecting.

Despite this limited sampling, over 100 species of fish are known from the area (Larson 1996; Michael Hammer MAGNT, pers. comm., February 2012), including:

- Three species of pipefish (*Hippichthys cyanospilus*, *H. parvicarinatus* and *H. penicillus*) that are restricted to seagrass beds (see dugong distribution in Map 2). These pipefish are in the Family Syngnathidae (seahorses and pipefish), which are listed marine species under the Commonwealth *EPBC Act*.
- Threatened sharks (Freshwater Sawfish) have been recorded in inshore waters and the adjacent estuaries; and
- Species of recreational/commercial importance such as Barramundi, Golden Snapper, Blue Salmon and Northern Whiting.

The gobies had the most species in the Larson survey, partly due to the number of mangrove-associated species and partly to the sampling techniques used. The fish fauna of the Roper River is similar to that of the East Alligator River, the southern Gulf of Carpentaria and the Gulf of Papua. This is not surprising as these are all highly turbid areas with largely muddy substrates and fluctuating salinity (Larson 1996).

Further detailed sampling at different locations and using different gear types, especially beam trawling over seagrass, would add considerably to the species list and our understanding of ecological assets in the area. The total number of seagrass-dependent pipefish and seahorses (Syngnathids) as well as threatened sharks (eg. Speartoothed shark) will probably increase markedly, as will other species that are important for amateur fishers such as Black Jewfish, Mangrove Jack, Mackerel species, Giant Trevally etc.

Sea turtles

Maria Island has been surveyed a number of times for nesting marine turtles by Chatto, who rated it as of high significance for flatback turtles (Chatto and Baker 2008). Over 100 tracks were recorded around the island in two separate September surveys, with most around the southern and eastern beaches and the large sand spit (Chatto and Baker 2008) (Map 3). Eggs are laid during the dry season months and nests here are not affected by the introduced animals such as feral dogs and pigs found on the mainland.

The prevalence of inter-tidal mudflats and saline wetlands on mainland coast

make it mostly unsuitable for nesting. However low numbers of flatback turtles are known to nest at the few small beaches found north of the Limmen Bight River (Map 2).

The area may be an important feeding and resting for some marine turtles that nest nearby (SEWPaC 2011). To the north the high numbers of four species of marine turtles nesting on Sandy Island include flatbacks, greens, hawksbills and olive ridleys, and flatback turtles nest on Low Rock (Map 3). The Sir Edward Pellew Islands to the south have significant numbers of nesting green and flatback turtles. Flatback and green turtles feed on seagrass and the seagrass meadows in Limmen Bight and the area is likely to support a feeding population, as well as those resting in between egg laying periods in the breeding season.

Anecdotal records of turtles nesting on Beatrice Island have not been confirmed (Chatto and Baker 2008).

Birds

Waterbirds

The Roper River - Limmen Bight area is one of the three most important waterbirds areas (along with Blue Mud Bay and the Port McArthur areas), along the east coast of the Top End. The extensive wetlands and mangroves along the coast support these large numbers of waterbirds and there are many important waterbird records (Map 3). Chatto (2006) defined two important waterbird areas, namely the wetlands and coast south of the Roper River including those of the Towns River, and the saline wetlands and coast north of the Limmen Bight River. The highest reported single count is of 33,500 birds (Chatto 2006).

There is a large mixed breeding colony of great, intermediate and little egrets, pied heron, nankeen night heron, Australian white ibis, little pied cormorant and darter near the mouth of Nayarnni Creek, south of the Roper River. This site is nationally important as almost 10,000 birds have been recorded nesting here (Chatto 2000). Nearby on the same creek is a smaller, regionally significant colony of Australian white ibis and nankeen night heron.

Pied cormorants roost and possibly nest in mangroves on Nyanantu Creek, south of the Limmen River. Large numbers of cormorants also roost on Beatrice Island.

A number of waterbird breeding colonies were recorded historically, but are no longer thought to be active (Chatto 2000), including:

- a significant colony (now extinct) of great, intermediate and little egrets at the mouth of the Roper River (White 1917 in Chatto 2000);
- on Maria Island - Australian pelicans by Steve Johnson, a traditional owner from Vanderlin Island, and pied cormorants nesting in the mangroves; and
- cormorants and egrets nesting on Beatrice Island.

Shorebirds

The wetlands, mudflats, estuaries and intertidal areas of Limmen Bight are internationally important for both migrating and over-wintering shorebirds as a critical part of the East Asian - Australasian Flyway (Bamford 2008) (Map 3).

Nineteen migratory shorebird species have been recorded in these wetlands, with the largest single count of around 29,000 birds.

Notable shorebird records (Chatto 2006) include:

- the second highest concentration of Black-winged Stilts in the NT, including a record of 5000 birds; and
- one of the highest concentrations of Red-necked Avocets in the NT.

Birdlife International (2009) has designated this as an Important Bird Area as the intertidal mudflats of Limmen Bight support more than 1% of the world's Grey-tailed Tattlers and Great Knots, and the coastal saline flats support more than 1% of the world's Black-winged Stilt.

Seabirds

In comparison to elsewhere in the Territory there are few nesting and roosting colonies of seabirds in the Limmen Bight region (Map 3).

Maria Island has one of the largest silver gull colonies in the Territory, with a maximum of 270 nests recorded in 1994 (Chatto 2001). Chatto noted suitable nesting habitat for Little and Black-naped / Roseate Terns but no evidence of these species nesting was found during the NRETAS survey in October 2007.

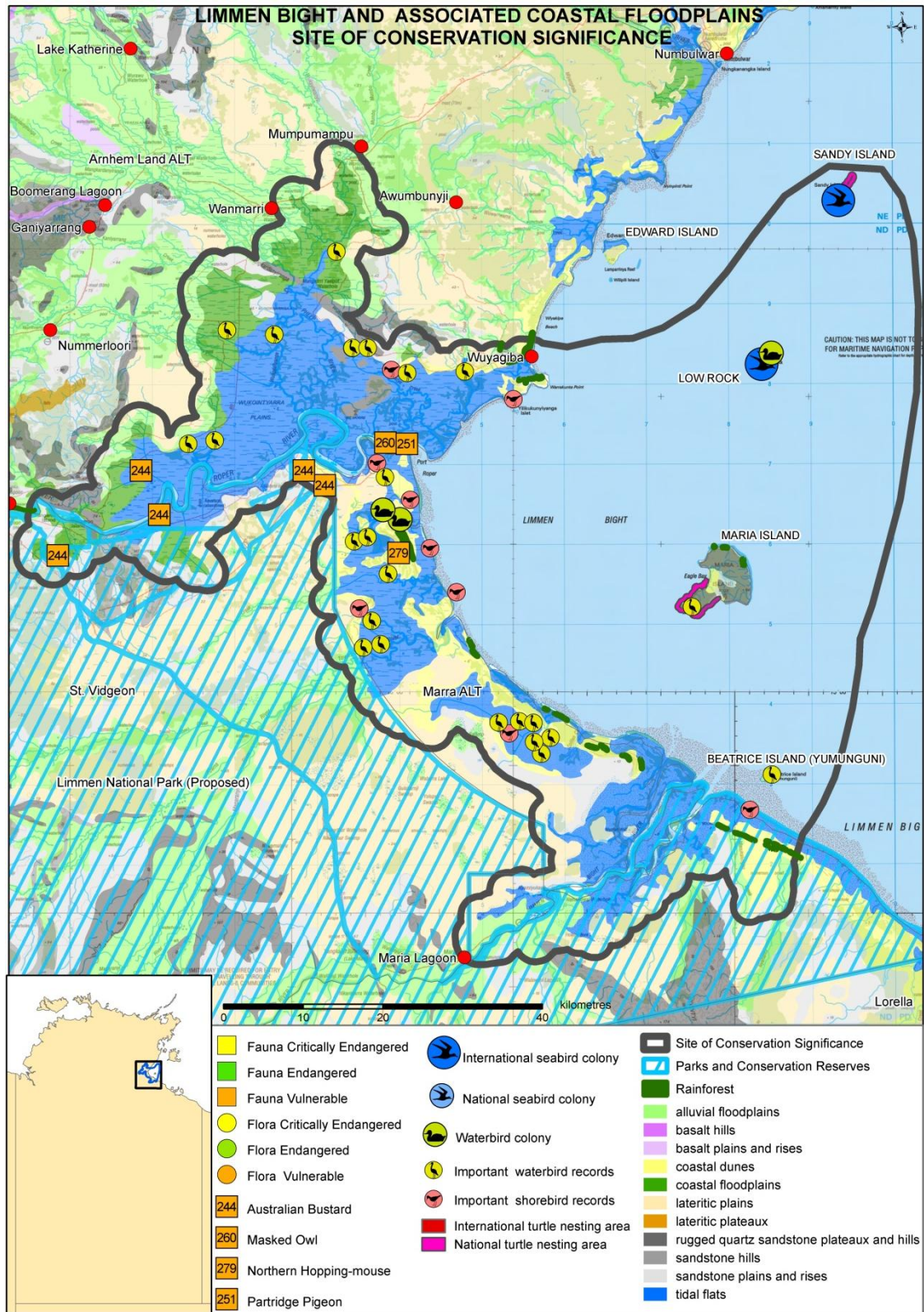
Large groups of Caspian Terns were observed by Chatto (2001) in the saline wetlands and mudflats along the coast from the Roper River south to the Queensland border.

Anecdotal records suggest seabirds previously nested on Beatrice Island by B. Walsh (in Chatto 2001) but this has not been confirmed.



Coastal area between Roper and Limmen Bight Rivers

Map 3. Limmen Bight and associated coastal floodplains Site of Conservation Significance (Harrison *et al.* 2009).



Marine mammals

Dugongs

The dugong is a long-lived, slowly reproducing mammal, that is closely associated with seagrass beds such as are found in Limmen Bight. It is also an important animal for saltwater people wherever it occurs. The distribution and abundance of dugongs was surveyed across the Gulf of Carpentaria in 1997 and again in 2007. The Gulf of Carpentaria is one of the most important regions in the world for this species with an estimated 12,500 animals; of these some 5,000 animals are found off the Territory coast (Marsh 2008).

Limmen Bight is part of the area of highest known density of dugongs in the NT and one of the highest known in the world. This area extends east from around the mouth of the Limmen Bight River to the Sir Edward Pellew Islands (Marsh 2008), and is closely linked to the distribution of seagrass beds.

The major pressures on local dugong populations are from incidental deaths in nets (both ghost nets and commercial fishing nets) and localised over-harvesting.

Cetaceans (whales and dolphins)

There have been no dedicated surveys for dolphins and other cetaceans in Limmen Bight. The few records that exist are anecdotal or part of the dugong surveys in 1997 and 2007. Suitable habitat exists for inshore dolphins such as Australian snub-fin and Indo-Pacific humpback, and they are expected to be reasonably common in the area. It is unlikely that there are significant numbers of any other cetacean species.

Cultural and Historical Values

The Limmen Bight area encompasses a rich Aboriginal culture. The Marra, Yanyuwa, Alawa and Wandarang have cultural affiliation with this saltwater country, which is clearly evidenced by the numerous rock art, occupation and identified and registered sacred sites in the vicinity.

An Aboriginal person's perception of 'country' does not distinguish between land and sea, and there is significant cultural as well as biological connection from the coast across the waters, and including Maria Island.

The Aboriginal traditional owners continue to maintain strong links to the land and water and associated dreamings of the Limmen Bight area, and live in many locations close to the Park, including the growth towns of Borroloola and Ngukurr, a number of smaller freehold blocks, and in communities and outstations located on the former pastoral leases of Hodgson, Nutwood and Bauhinia, which have been subject to successful Aboriginal Land Rights claims and granted to Aboriginal Land Trusts.

Much of the coastal area is part of the Marra Aboriginal Land Trust and there are several Aboriginal communities and outstations in the vicinity that still practice traditional use of the area.

The Gulf of Carpentaria has been both a dry plain and a marine gulf. The present sea level stabilised about 6,000 years ago, with an outlying hill in the flat plain becoming Maria Island. As the sea level rose it covered or destroyed most of the older archaeological sites. The Aboriginal traditional owners have strong cultural associations with Maria Island and strong storylines are expected to exist between the mainland and Maria Island.

Limmen Bight was named by Abel Tasman after one of the three small ships he used to

survey the Northern Territory coast in 1644

(http://libweb5.princeton.edu/visual_materials/maps/websites/pacific/tasman/tasman.html).

Since the mid-17th century Macassan fishermen have been working for trepang in the Gulf as far south as the Sir Edward Pellew Islands. Traces of Macassan activity have been found on Maria Island.

Resource and recreational use

Commercial fishing

The Northern Prawn Fishery in the Gulf of Carpentaria is the most lucrative fishery in Australia and is managed by the Australian Government, including in Territorial waters. The large numbers of commercially harvested tiger, banana and endeavour prawns (*Penaeus spp.*) are dependent on seagrass meadows such as are found in Limmen Bight.

The importance of the Limmen Bight area and its seagrass nurseries is recognised by the permanent closure on prawning up to two nautical miles offshore along the length of this coast. However, the remaining nautical mile of Territorial waters and the area of the Park surrounding Maria Island are available for prawn trawling.

The inshore waters of Limmen Bight also support Barramundi, Mud Crab, Spanish Mackerel and Offshore Net and Line Fisheries activities; all of which are strictly managed to conservative catch levels and guided by environmental management strategies to address ecosystem, bycatch and protected species interactions. Commercial fishers have base camps in the Roper and Limmen Bight Rivers.

The mouth of the Roper River is closed to commercial barramundi fishing.

Tourism and other recreational values

The recreation and tourism values of the Park are related to its 'remote' geographic location and unspoiled beauty. Most tourists coming into this remote area are camping and travelling between the Top End and Queensland and/or are visiting to go fishing. The Limmen Bight River and Towns Rivers in particular can be fished en route to or from Queensland. The tidal areas around the Limmen Bight River area are reached from the Barrett fishing camps (26 and 32 kilometres upstream).

Local visitation and tourism to the area is increasing with approximately 15 000 people visiting the neighbouring Limmen National Park annually. A significant proportion of these will also spend sometime along the rivers although most do not venture out along the coasts or over to Maria Island.

The Regional Conservation Area lies in coastal waters between the Territory Growth Towns of Ngukurr and Borroloola, and has the potential to contribute to the employment and economic development of both towns.

Potential also exists for Aboriginal operated businesses including cultural tours.

Recreational fishing

The Roper and Limmen Bight Rivers are considered paradise for the fishing enthusiast who enjoys remote areas. There are several commercial and semi-permanent fishing camps on the Roper and Limmen Bight Rivers. This helps concentrate recreational fishing in the major estuaries of the Roper and Limmen Bight Rivers with lower levels of fishing likely throughout the other waterways, coastal areas and around Maria Island.

Exploration and mining

There are seabed mining applications in parts of the Limmen Bight area, but seabed mining is currently subject to a moratorium in NT waters.

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