



NATURAL, CULTURAL & WORLD HERITAGE VALUES OF CURTIS ISLAND, QUEENSLAND

Capricorn Conservation Council Inc.

**A Summary Report of the values and current threats to Curtis Island within
the Great Barrier Reef World Heritage Area**

August 2013

Contents

Introduction	2
Recommendations	3
Background to Curtis Island and Current Threats.....	5
LIST OF KNOWN THREATS TO THE WORLD HERITAGE VALUES OF CURTIS ISLAND	6
Natural Values of Curtis Island.....	8
Geomorphology and vegetation	8
Curtis Island Vegetation	11
The Narrows.....	14
The Contribution of Curtis Island to GBR World Heritage Values and Diversity	15
Marine Plain of North Curtis Island.....	15
Melaleuca forests and woodlands	18
Littoral Rainforest & Coastal Vine Thickets.....	18
Microphyll Rainforest and Semi-Evergreen Vine Thicket (SEVT) on Hills and Ranges.....	21
Eucalyptus forests & woodland of the Wandilla & Shoalwater Formation.	21
Islands, Rocky Reefs & Sea Grass Communities of Port Curtis	21
Additional Fauna Values	23
Threats to Curtis Island retained natural values.....	25
Indigenous cultural values	26
Non-indigenous cultural values	26
Threats to Cultural heritage.....	26
Conclusion.....	27
References	29
Appendix 1 – Curtis Island Map	30
Appendix 2 – Regional Ecosystem list.....	31
Appendix 3 – GPC Port Planning and Development Master Plan	33
Port Alma Balaclava and Sea Hill - Dec 2009	33

Authors: John McCabe and Chantelle James, Capricorn Conservation Council.

Front cover photo: Curtis Island beach. Photo courtesy of John Augusteyn.

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

Introduction

Purpose: This summary of the natural and cultural values of Curtis Island has been prepared by Capricorn Conservation Council (CCC) to assist recognition by the Australian community and Queensland and Federal governments, of the ecological and cultural value of Curtis Island as a significant place within the Great Barrier Reef World Heritage Area.

The intention of this report is to clearly identify the natural and cultural values and World Heritage values of Curtis Island and still natural surrounding areas and highlight key features which may not occur elsewhere within the Great Barrier Reef World Heritage Area.

This summary report notes land tenure and management issues on the island but concentrates specifically on the inadequate degree of protection afforded to the significant, largely natural parts of the island and adjacent features such as the estuarine wetlands of The Narrows.

Achievable actions can be taken to address specific concerns raised by UNESCO in regard to the Great Barrier Reef World Heritage Area. Quarantining further expansion of intensive development on Curtis Island is essential to address a specific concern in the UNESCO report. The Queensland and Australian Governments have joint and separate actions that must be taken to achieve this outcome.

Industrial development and well planned existing port facilities will not be affected by considered environmentally sound action. What must change is the land acquisition mentality from unrestrained government owned corporations and private interest to locate their particular developments inappropriately in coastal and marine environments in or adjacent to the Great Barrier Reef World Heritage Area.

Recommended Commonwealth action to protect of Curtis Island World Heritage Values

Protection of existing World Heritage values of Curtis Island which are highlighted in this report can broadly be addressed by action on the recommendations below.

Curtis Island remains largely in a natural conditions but given the complexity of land tenures a more detailed list of recommendations will have to be addressed by the Queensland Government in respect to land tenures and management by Marine Park staff and other land managers.

1. **Use Commonwealth powers to support improved protection for the terrestrial landscapes and marine areas of Curtis Island as a contribution of diversity to the overall values of the Great Barrier Reef World Heritage Area. This should be achieved through encouraging application of various secure conservation tenures over parts of the island and waters not currently dedicated to industrial use. We understand that some initiatives will potentially be achieved through offset arrangements.**
2. **Targeted landscapes on Curtis Island should include;**
 - The undeveloped freehold lands, leasehold land and State forest, north of Graham Creek which complement the ecological diversity of Curtis Island National a Park and which effectively buffer the inshore Great Barrier Reef marine and estuarine areas.
 - Minimally developed freehold land on North Curtis which includes historic sites and a diversity of littoral ecosystems and important sites for endangered marine mammals (including snub-fin dolphin) and significant shorebird sites. Action by the Commonwealth and State Government on this area would represent a significant step towards addressing UNESCO concerns over poorly planned and controlled port expansion within Great Barrier Reef waters. .
 - Assist the Queensland Government to place secure, permanent conservation tenure over the State Development managed Environmental Management Precinct on Curtis Island which covers freehold and lease areas south of Graham Creek east of the approved LNG operations under construction. This area is in a relatively natural condition and has already been subject to restoration works with support through offset contributions and direct donations from gas company operatives.
3. **Other Areas around Curtis Island/ Gladstone**
 - Assist the protection of seagrass beds in The Narrows and Port Curtis from development impacts and ensure that Commonwealth approvals do not cause further loss of the extent of seagrass beds to development or dredging in the Rodds Bay Dugong Protection Area.
 - Support initiatives which ensure that the relatively undisturbed or minimally disturbed marine areas of Port Curtis waters (such as those between existing shipping channels, the southern end of Curtis Island and Facing Island) are protected and conservation management measures are improved.
 - Ensure adequate management and monitoring which protects fringing reefs from the impacts of decreased water quality associated with dredge spoil dumping.
 - No future land disposal of dredge spoil on Curtis Island.
 - Moratorium on future development until the Strategic Assessment of the Great Barrier Reef World Heritage Area is complete.

Recommended Queensland Government action to protect Curtis Island World Heritage Values

These recommendations suggest measures to protect **Curtis Island**, a significant natural feature with excellent recreational values within the **Great Barrier Reef World Heritage Area**. The community has long expressed the need for accessible natural coastal areas, un-constrained by port and industrial infrastructure. While the LNG facilities have diminished Curtis Island's natural values, appropriate environmental and access management of natural buffer areas can mitigate some of this loss.

Recommendation 1: Implement landscape conservation initiatives on Curtis Island to protect World Heritage Values. This can be achieved through long term secure tenure, rather than current temporary land banking. Key landscapes which need action include;

- Forest and woodland communities along central ridgelines of Curtis Island. These ecosystems, some endangered on the mainland, are not represented elsewhere in the GBR WHA
- The Environmental Management Precinct south of Graham Creek is a natural area with potential for controlled recreational access.
- Areas of dry rainforest/semi-evergreen vine thicket on hills and mountains particularly in the north of Curtis Island.
- Littoral rainforest and melaleuca forest on dunes along the northern shoreline fronting Keppel Bay with no current protected tenure.
- Marine plains and tidal flats are poorly managed and have no conservation tenure.

Recommendation 2: Ensure that monetary and land contributions by LNG companies and other operatives for environmental offsets are directed towards securing key areas and ecological values on Curtis Island (as described in this report).

- Millions of dollars have been contributed by companies to address environmental offset requirements. It will be of critical importance to these companies that their contributions result in actual on-ground landscape and ecological conservation benefits.
- Lengthy government delays facilitating offsets and public concerns that funds will be wasted on endless reports and token offsets with no actual environmental benefits.
- UNESCO concerns would be largely addressed if real and perpetual environmental offsets which protect WHA values on Curtis Island, or on adjacent coastal landscapes, are achieved.
- Offset contributions have provided a rare financial opportunity to reconfigure and improve vehicle tracks, camping areas, and environmental education resources on Curtis Island. This would create highly valued recreational areas for Gladstone residents and visitors

Recommendation 3: Ensure meaningful habitat protection, with secure zoning, in less disturbed inshore estuarine and marine areas surrounding Curtis Island and within Port Curtis. The protection plan should manage viability of marine nursery productivity and protection for marine mega fauna, shorebird feeding and roosting sites. Areas of special interest include;

- The highly productive estuarine channel landscape of The Narrows, a Habitat Protection Zone under Schedule 3 of the *Marine Parks (Great Barrier Reef Coast) Zoning Plan 2004*.
- The relatively undisturbed remaining marine areas of Port Curtis including sea grass lined channels and shallows along the eastern shoreline of the harbour, and undisturbed tidal flats, sub-tidal mud banks and mangroves.
- Sandbanks, tidal lagoons and rocky reef reefs at the entrances to the Fitzroy River, The Narrows and Boyne River, considered as the most significant spawning locations for highly valued commercial and recreational estuarine fish species.

- Secure protection of the remaining undisturbed areas of the Rodds Bay Dugong Protection Area.
- A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area*

Background to Curtis Island and Current Threats

Curtis Island is the second largest island on the east coast of Queensland (after Fraser Island) and the largest island within the boundaries of the Great Barrier Reef World Heritage Area. The island is about 54,200 hectares in terrestrial extent but is bounded by extensive natural marine areas including sand barrier tidal lagoons on the northern shores, the 40 kilometre mangrove-lined passage landscape of The Narrows and, to the south, hilly wooded islands and sea grass tidal flats within the natural embayment of Port Curtis.

While Curtis Island has had a 150 plus years' history of European use, the settlements and activities introduced to the island have been small scale and often short lived. Many of these European contact and settlement sites are now of considerable historic interest (1). Indigenous culturally significant sites are also of considerable historic interest, and more importantly, need to be preserved and protected into the future.

The approval of three Coal Seam Gas (CSG) liquefaction plants (otherwise known as LNG plants) on State Development Area (SDA) land in the south west point of Curtis Island by the Queensland and Federal governments in 2010, has changed the scale of development on Curtis Island and the level and intensity of impacts and threats.

Unfortunately approval processes do not appear to have considered the contribution to World Heritage Values of the Curtis Island landscapes and marine areas outside of the currently approved development sites.

Current Situation

The massive topographic reconfiguration and construction works on the three LNG industrial leases within the Gladstone SDA (refer to Map 1) are currently contained by the natural buffers of a 6 km wide Environmental Management Precinct to the east and the wide estuary of Graham Creek to the north. While these buffers have, to date, little guarantee of long term protection they have, so far, assisted in containing the impact of the Curtis Island gas projects to the actual site of each plant and to the adjacent marine areas of Port Curtis.

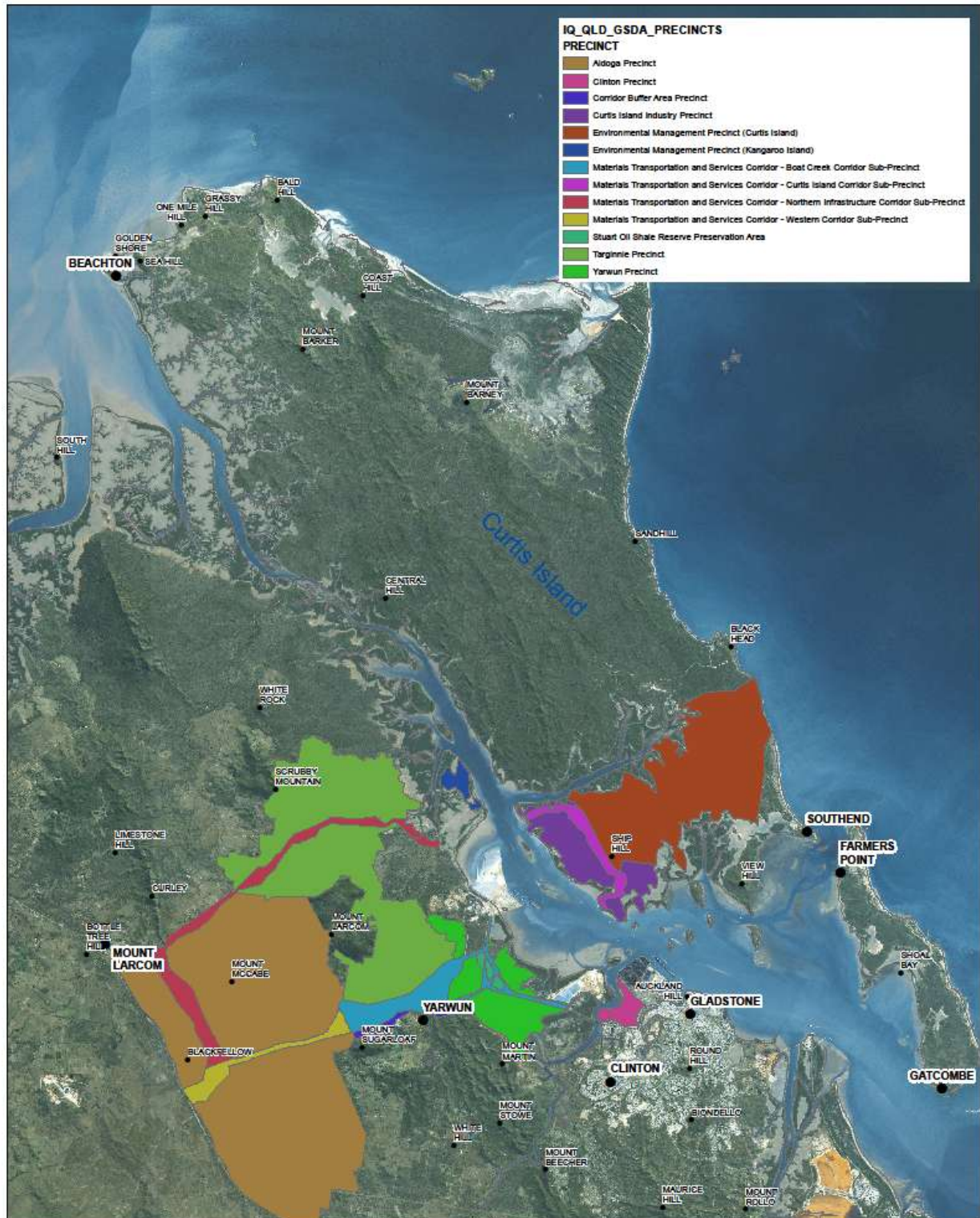
There has been and still is considerable community and scientific concern that the environmental regulations set for these adjacent marine areas are not being met, particularly in regard to the dredging operations and disposal of dredge material in offshore disposal grounds at East banks, and over seagrass beds and estuarine areas within Port Curtis (in the Fisherman's landing reclamation area).

It is not the purpose of this report to consider the above mentioned impacts, or current Federal or State approvals for gas project development (or other development) on Curtis Island. The intention is to **clearly identify the World Heritage values of Curtis Island** and its surrounding, still natural areas and **highlight key features which may not occur elsewhere** within the **Great Barrier Reef World Heritage Area** (GBRWA).

The need for urgent action addressing threats to these values relates to the surreptitious preparation of plans for further major incursions across the length of Curtis Island involving bridges, rail lines, new coal port sites and other, as yet unspecified, heavy industries. Outlined below is a list of known threats, however this list is not exhaustive and there may be some additional threats.

LIST OF KNOWN THREATS TO THE WORLD HERITAGE VALUES OF CURTIS ISLAND

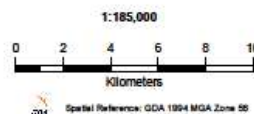
- **Industrial expansion of port facilities and LNG facilities** in the Gladstone State Development Area (GSDA) on Curtis Island and in the Port of Gladstone;
- **Proposed industrial expansion for future Strategic Port Land on the northern end of Curtis Island** (around Sea Hill) and in the south at Hamilton Point;
- **Nearby proposed coal port facilities on Balaclava Island** (BICET project has been withdrawn but there is still the possibility of interest by Gladstone Port Corporation) and transshipping (loading) coal in marine park off the north-eastern coast of Curtis Island;
- **Increased shipping, dredging and vessels in marine areas;**
- **Inappropriate grazing regimes** (cattle affecting sensitive ecosystems) especially reed bed communities on marine plain wetlands in Curtis Island Conservation Park;
- **Shale oil exploration & possible extended mining along the mainland shores of The Narrows.**
- **General threats from development:**
 - Loss of habitat
 - Introduction of pest plants and animals
 - Habitat fragmentation
 - Changes to hydrological regimes and natural flows
 - Light pollution and disturbance
 - Noise pollution
 - Industrial pollution
 - Adverse changes (decreases) in water quality.



Curtis Island Values Gladstone Development Area Precincts

SATELLITE IMAGERY: Ortho-rectified, 2.5m SPOTS Imagery. © CNES 2012 / Spot Image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



MAP 1: Gladstone State Development Area (GSDA)

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

Natural Values of Curtis Island

Geomorphology and vegetation

Although an island, and part of the Great Barrier Reef World Heritage Area, Curtis Island has a sufficient size to contain both a diversity of coastal landscapes and those with inland character in their geomorphology and vegetation. **A comprehensive study of the island by Queensland Parks and Wildlife (2) defined 11 widely differing landscapes (landform patterns).** These included:

- Parabolic dune systems
- Longitudinal dunes
- Stranded beach ridges
- Alluvial plains
- Rocky shores
- Headlands
- Hills of the Shoalwater Formation
- Hills and strike ridges of the Wandilla Formation.

The north east and much of the east coast of Curtis Island are protected under National Park and Conservation Park tenures. The broad centre and western half of the island comprises largely landscapes of the Wandilla Formation and little of this has secure conservation tenure. The area is primarily minimally altered ecosystems within State Forest, lease land and some freehold (refer to Map 2 for tenure of Curtis Island).

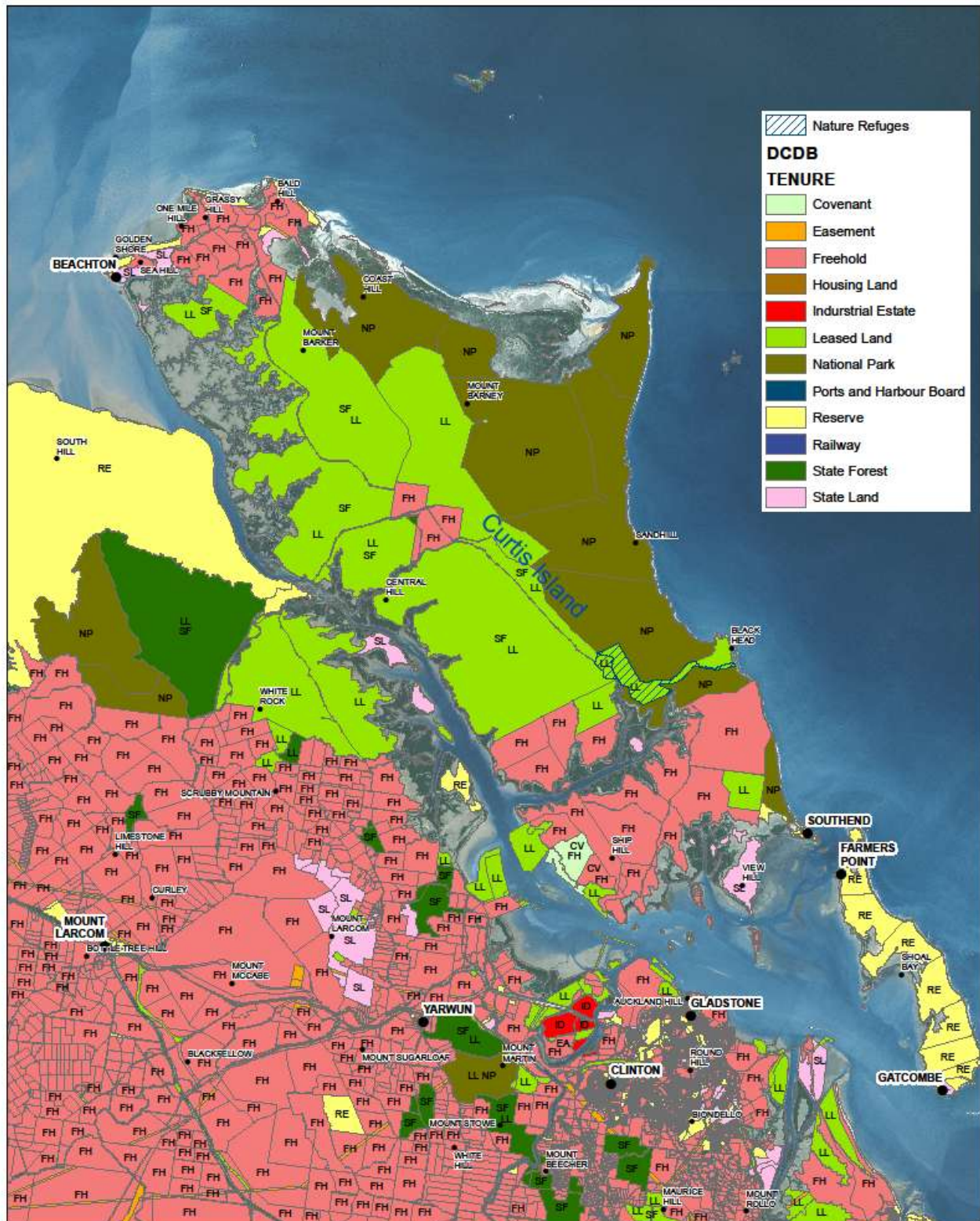
The Wandilla Formation holds landscape and vegetation communities unlikely to be found elsewhere within the Great Barrier Reef World Heritage area. This landscape is also noteworthy for the many short streams flowing westwards from gravel hill slopes and alluvial clay flats. These ephemeral freshwater flows become the tidal side streams entering The Narrows from the east. The remote small pools at the tidal/freshwater interface and associated tidal flats of these creeks entering **The Narrows, are recognised, from studies (3) elsewhere, to have a significant nursery role in the development of early juvenile barramundi (*Lates calcarifer*) and prawn species.**

At the southern entrance to The Narrows, Graham Creek is the most impressive of the streams which incise Curtis Island. Graham Creek and its northern branches (Rawbelle Creek, Hobble Gully) are bounded by hills of the Wandilla Formation with their characteristic forests of Ironbarks, Gum-topped box (*Eucalyptus moluccana*) and Lemon scented gum (*Corymbia citriodora*).



Image 1: Graham Creek, Curtis Island.

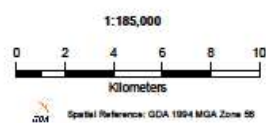
Photo courtesy of Save Curtis Island website www.savecurtisland.com



Curtis Island Values Land Tenure

SATELLITE IMAGERY: Ortho-rectified, 2.5m SPOTS Imagery. © CNES 2012 / Spot Image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



MAP 2: Tenure of Curtis Island

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

Curtis Island Vegetation

The Curtis Island report by Queensland Parks and Wildlife Service (2) defined 120 vegetation community types on Curtis Island. The vegetation report recorded 618 different plant species including one rare species and three undescribed. It also noted that weed species were less abundant than comparative ecosystems on the mainland.

The QPWS report identified the disturbed, cleared grazing land as scattered and small in size in comparison to the islands area. The authors concluded that *“The majority of the vegetation communities on Curtis Island are intact and relatively undisturbed, a fact which is not only beneficial to terrestrial flora and fauna but also freshwater and marine wildlife. Curtis Island provides a rare opportunity to conserve large tracts of land with a contiguous and mostly intact mosaic of diverse vegetation communities”*. This above statement can no longer be applied to the land between Laird Point and Hamilton Point which has experienced extensive vegetation removal and earthworks as the large-scale development of coal seam gas liquefaction plants proceed.

An indication of why Curtis Island has such diversity can be inferred from the geographical position of the island which lies within or close to the boundaries of three bioregions; South East Queensland, Brigalow Belt and Central Queensland Coast – (IBRA) Interim Bioregions of Australia.

Translation of the vegetation/ geological alliances to mapped Regional Ecosystems (4) indicates that Curtis Island has two (2) Endangered Regional Ecosystems and twelve (12) Of Concern Regional Ecosystems (Vegetation Management Act (Qld) 1990). One of these endangered ecosystems (12.2.2) is also listed as critically endangered under the *under the Environment Protection & Biodiversity & Conservation Act 1999 (EPBC)*.

The two Endangered ecosystems are:

12.3.3 Eucalyptus tereticornis woodland to open-forest on alluvial plains.

This ecosystem is listed as Endangered VMA class and Biodiversity status under the Vegetation Management Act. Locations of this ecosystem can be identified on Map 3 (page 10) as dark pink areas labelled with 12.3.3, generally in the gullies. An example of this endangered ecosystem is provided in image 2 below

12.2.2 Microphyll/notophyll vine forest on beach ridges.

This ecosystem has Endangered Biodiversity status and Of Concern VMA class under the Vegetation Management Act.

It is listed as Littoral Rainforest & Coastal Vine Thickets of Eastern Australia, a critically endangered ecosystem under the Environment Protection & Biodiversity & Conservation Act 1999 (EPBC).

A list of the endangered, of concern and not of concern ecosystems that we are interested in protecting are listed in **Appendix 2**. Of importance here are the remnants of endangered, of concern and not of concern ecosystems that are contained within State Forest or on Freehold land which would benefit from extra conservation protection measures, such as the conversion of State Forest and Freehold land to National Park or Conservation Park.

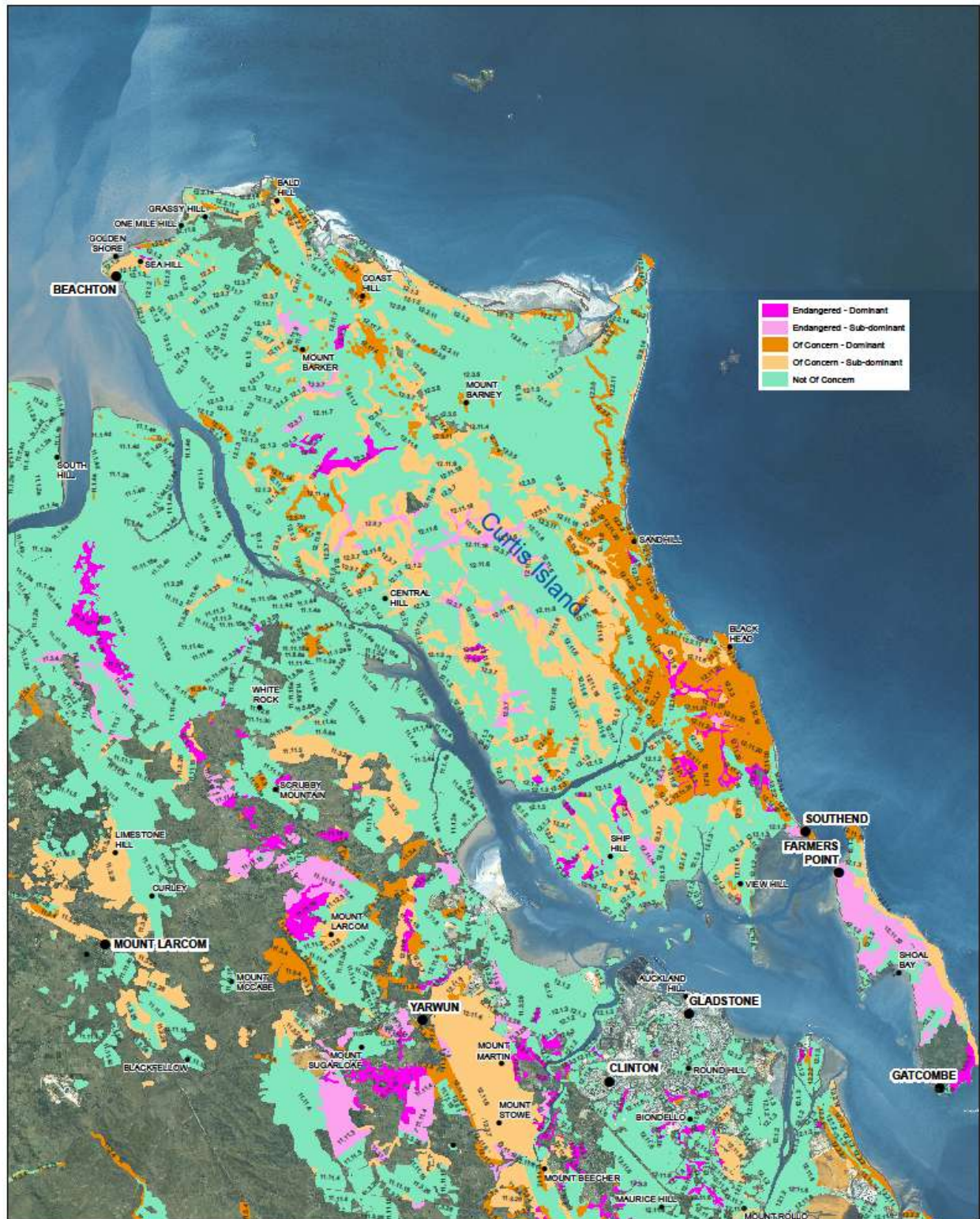
One example is the endangered Blue Gum ecosystem of 12.3.3 located in gullies throughout the state forest, and the endangered Vine Thicket on Beach ridges ecosystem of 12.2.2 that has significantly sized remnants located on freehold land in the north of the island (both of these can be identified if Maps 2 and 3 on tenure and remnant vegetation are compared).

In 1977 a study defining Coastal Key Areas in Queensland (5) ranked Curtis Island, together with the adjacent Rundle Range area on the mainland as the fourth most important Coastal Key Area in Queensland. This process was designed to define areas considered to be irreplaceable assets for the long term preservation of regional diversity (Stanton and Morgan 1977).



Image 2: Endangered Blue Gum on alluvium (RE 12.3.3) Curtis Island.

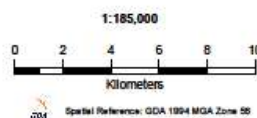
Photo courtesy of John McCabe.



Curtis Island Values Regional Ecosystems (Remnant Veg)

SATELLITE IMAGERY: Orbis-rectified, 2.5m SPOTS imagery. © CNES 2012 / Spot Image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



Map 3: Regional Ecosystems of Curtis Island

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

The Narrows

The World Heritage Values of Curtis Island cannot be fully appraised without consideration of the high conservation values of The Narrows; the tidal estuarine channel which separates the island from mainland Australia.

The Narrows are noteworthy as one of the few tidal passage landscapes in Queensland and is “regarded as one of only five narrow tidal passages separating large continental islands from mainland Australia”.(6)

The passage is a mature feature, in-filled by a long history of natural erosion and sediment retention by mangroves. The Narrows is a winding, shallow, rocky channel system which has trapped many a mariner caught on the wrong side of a dropping tide (7). Just south of Ramsay Crossing within The Narrows is the tidal balancing point between Keppel Bay and Port Curtis. The mangrove forests and channel of The Narrows, approaching their northern extent, join with the 500 metre wide Deception Creek and the southern branches of the Fitzroy River Delta (Connor Creek and Raglan Creek).

The Narrows has been inventoried (8) as “as an estuary of with ‘high fisheries values’ and ‘high conservation values’”. The authors rank such places as having “outstanding regional significance as a fishing ground for commercial and or amateur fishermen or as adult or juvenile necessary for maintaining existing or potential fisheries”.



Image 3: The southern entrance to The Narrows - Curtis Island on right.
Photo courtesy of Save Curtis Island website www.savecurtisland.com

The Contribution of Curtis Island to GBR World Heritage Values and Diversity

Distinctive landform and vegetation elements of Curtis Island are listed below in this section. This is not a comprehensive listing of values for the island but highlights ecological features unlikely to occur or be well represented in any other part of the Great Barrier Reef World Heritage Area.

Marine Plain of North Curtis Island

Listed in the Directory of Important Wetlands in Australia (9) as Northeast Curtis Island, the 4,000 hectare marine plain on the North eastern end of Curtis Island is one of Queensland's least disturbed examples of a tidal/freshwater linked wetland ecosystem. Other significant marine plain areas such as Broadsound and Bowling Green Bay marine plains are adjacent to but not within the Great Barrier Reef World Heritage Area (GBRWhA).

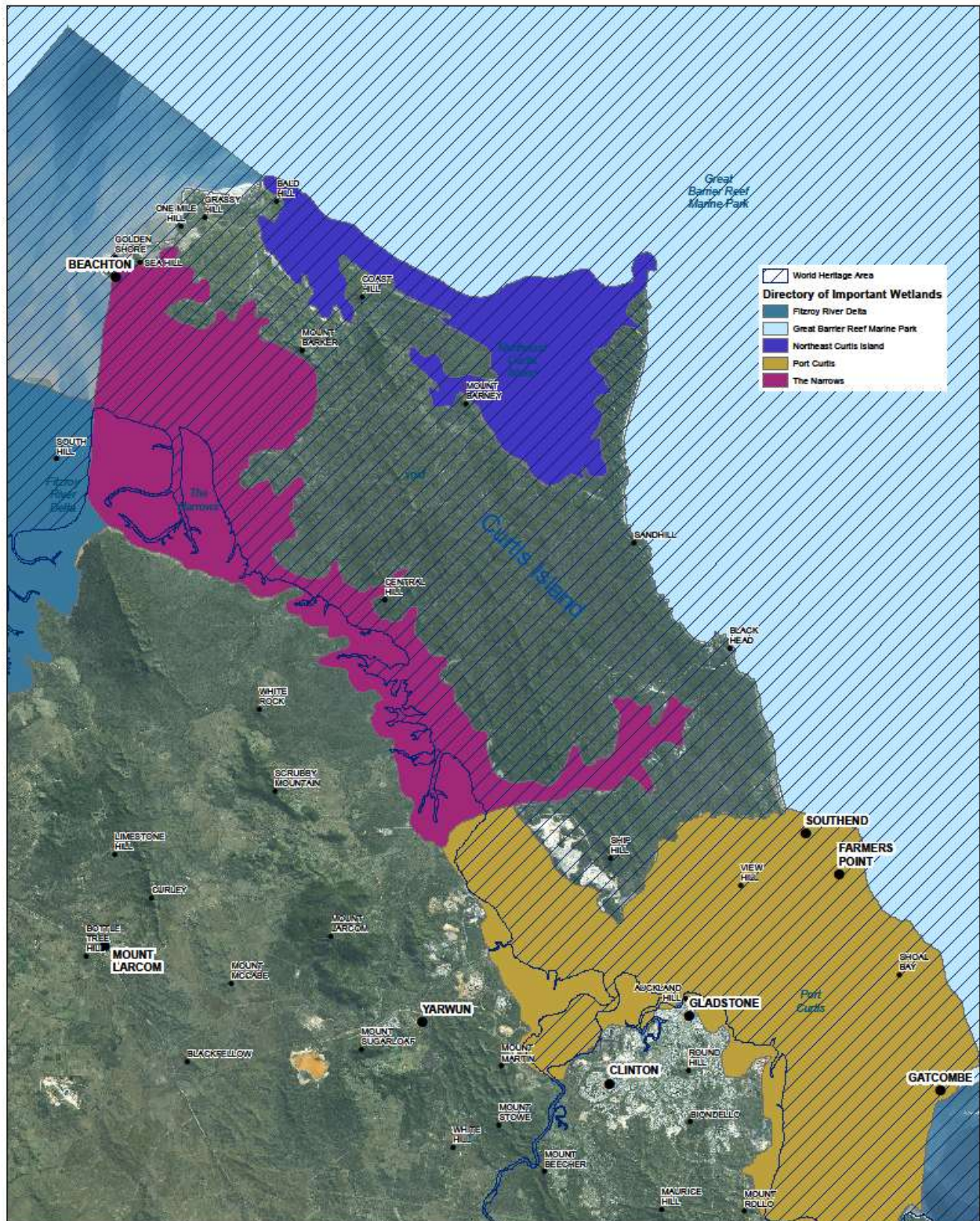
Many of these areas along the coast have been highly degraded through conversion to agriculture usage. The Australian mainland boundary of the GBRWhA is the Low Water Mark and excludes marine plain ecosystems. Curtis Island contains the only representation of this diverse ecosystem within the Great Barrier Reef World Heritage Area.

The Curtis Island Marine Plain is the site of re-discovery for the Critically Endangered Capricorn subspecies of Yellow Chat (*Epthianura crocea macgregori*) (10) which had not been sighted for 90 years along the eastern Queensland coast. The Recovery Plan for the EPBC listed Yellow Chat (11) emphasises the narrow habitat preferences for this species and lists existing and possible threats to the species at the few known habitats along the central coastline.

The marine plain also holds significant populations (6) of migratory shorebirds listed under international conservation conventions and water birds such as brolga (*Grus rubicundus*), Radjah Shelduck (*Tadorna radjah*), and Magpie Goose (*Anseranas semipalmata*)

There is significant breeding of other waterbirds on the marine plain during and following the summer wet season. The major part of the marine plain is Conservation Park but the re-allocation of a 75 year grazing lease by a former Queensland Government is a constraint to the best possible ecological management for this important wetland.

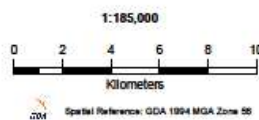
The marine plain sedge communities are also suitable habitat for the Australian Painted Snipe (*Rostratula australis*). This now endangered bird species, as listed in May 2013 (Ref A), has been recorded in similar habitat on the adjacent mainland at the north bank of the Fitzroy River.



Curtis Island Values Directory of Important Wetlands

SATELLITE IMAGERY: Ortho-rectified, 2.5m SPOTS Imagery. © CNES 2012 / Spot Image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



Map 4: Nationally Important Wetlands on and surrounding Curtis Island.

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area



Image 4: Reflections on the Marine Plains, Curtis Island.

Photo courtesy of John Augusteyn.



Image 5: Marine Plain wetlands in winter, Curtis Island.

Photo courtesy of John Augusteyn.

Melaleuca forests and woodlands

Curtis Island hosts a diverse mix of melaleuca forests and woodlands ranging from regularly inundated and ground water fed wetland forests to dwarf woodland on impoverished clay soil hills.

Mid-height to very tall melaleuca forest, predominantly *Melaleuca quinquinervia* and *Melaleuca leucadendra* forest form groves in the toe slopes and swales of the coastal dunes. In the north east the 70 metre high parabolic dune adjacent to the marine plains, have considerable water holding capacity and the consistent seepage enables the fringing melaleuca forest to thrive in close contact with the saline old marine soils. *Melaleuca leucadendra* also occurs on several rocky headland locations along the mid-east coast in exposed seepage zones with Pandanus (*Pandanus tectorius*) and Beach she-oak (*Casuarina equisetifolia* var. *incana*).

Areas of *Melaleuca quinquinervia* woodland also occur in the south-east corner of Curtis Island. While these often lie close to the rear of the southern beach dune system they grow on clay soils and usually have different ground strata vegetation to the forests within sandy dune swales. Low longitudinal dunes lie in the north have near seal level swales which display the distinctive silver grey foliage of *Melaleuca dealbata* interspersed with the darker green of the dune crest vegetation.

Melaleuca nervosa subsp. *nervosa*, a species not confined to watercourses and other wet zones, is very widespread on Curtis Island. Communities with this species range from prostrate plants in windswept headland grasslands and dwarf woodland (< 3 metres height) to mid-height dense or open communities. The cliff hugging melaleuca dwarf woodland above the cliff lines extending along the eastern coastline between Black Head and Connors Bluff is large in extent and forms a particularly distinctive Curtis landscape. Elsewhere, on clay soil hills and flats this species is a prominent mid storey species under taller eucalypts such as on *Eucalyptus moluccana* clay flats and the endangered (Regional Ecosystem 12.3.3) *Eucalyptus tereticornis* dominated alluvial flats.

The considerable diversity and extent of melaleuca species on Curtis Island is significant for the attraction to the island of insectivorous and insectivore bird species. Flowering on the various species occurs from about late December through to late spring. The pulses of autumn/winter/early spring flowering periods coincide with the influx of small passerines from more southerly latitudes and from the east coast highlands of Queensland.

Littoral Rainforest & Coastal Vine Thickets.

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia are a critically endangered ecological community listed under the Federal Government's EPBC Act. They are often referred to as Beach vine scrubs.

This community occurs on Curtis Island on parabolic dunes within the Curtis Island National Park as well as on longitudinal dunes along the northern shoreline of the island fringing Keppel Bay. Littoral Rainforest and Coastal Vine Thickets occur also at Hummock Hill Island to the south of Curtis Island.

A proposed tourist and residential development on Hummock Hill Island was withdrawn when the Federal Minister proposed rejection under the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* because of the threat to World Heritage Values (12).

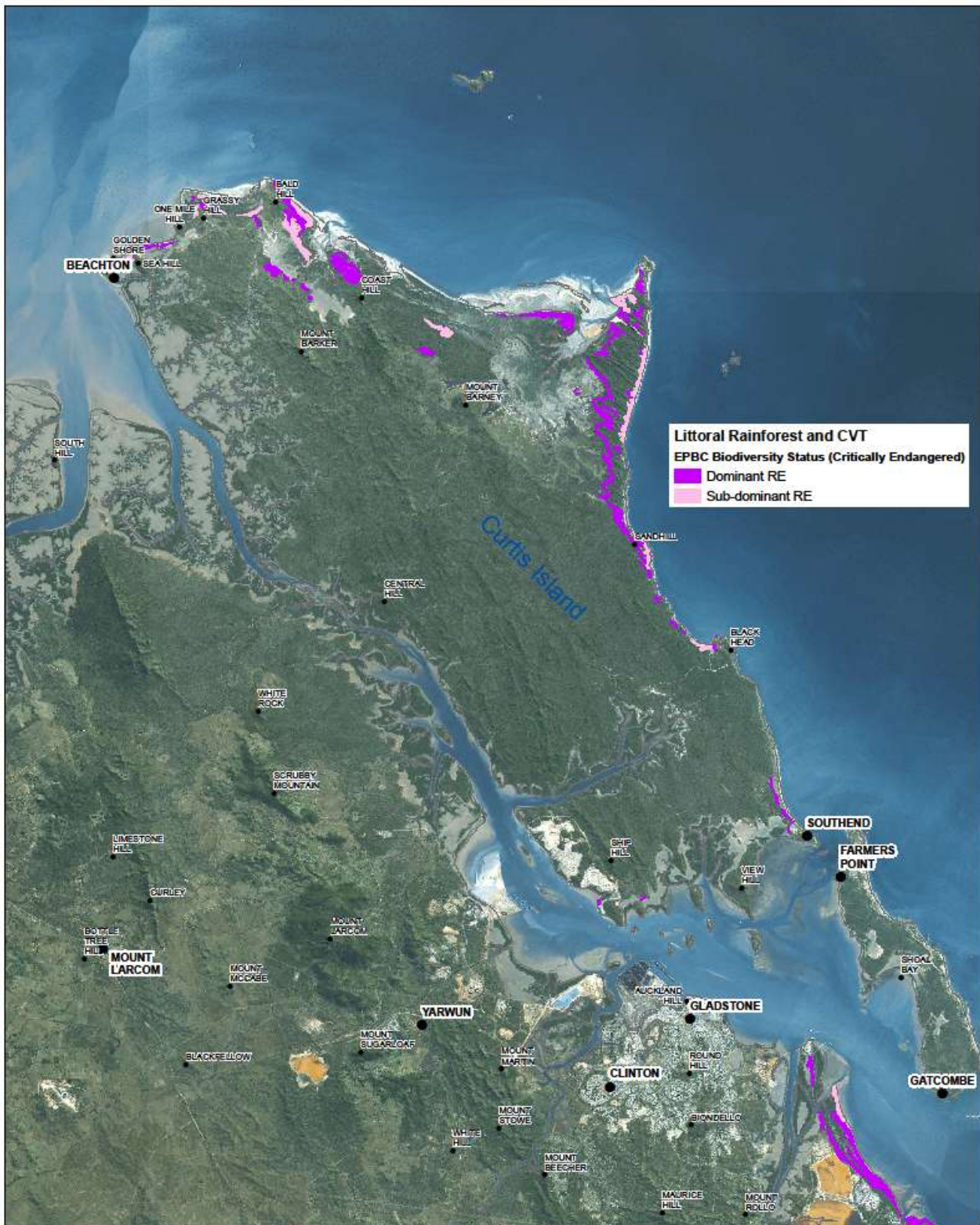
However, this very same development proposal on Hummock Hill Island has raised its head again (*EPBC referral 2012/6643* – with a decision it is a controlled action and an EIS is being produced), branded under a different company, with a replica proposal with the same threats to the EPBC species, ecosystems and Matters of National Environmental Significance.

Areas of littoral vine forest at most risk on Curtis Island are those along the north-west coastline in the Sea Hill to Cape Keppel area where future port development has been suggested. This community and the associated melaleuca dune swale wetlands are groundwater dependent and provide a key ecological function in sustained nutrient and freshwater release to the productive tidal lagoons of Curtis Island. Map 5 on page 18 identifies area of this ecosystem on Curtis Island.



Image 6: Melaleuca wetland, Curtis Island.

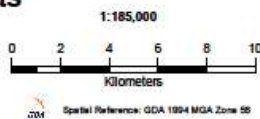
Photo courtesy of John McCabe.



Curtis Island Values Littoral Rainforest & Coastal Vine Thickets

SATELLITE IMAGERY: Ortho-rectified, 2.5m SPOTS imagery. © CNES 2012 / Spot image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



Map 5: Areas where littoral rainforest and coastal vine tickets occur on dunes
A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

Microphyll Rainforest and Semi-Evergreen Vine Thicket (SEVT) on Hills and Ranges

These dry rainforest scrub communities extend for 15 kilometres, in gullies and larger tracts, along the Ramsay Range in the north west of Curtis Island. Additional small areas occur in the south on Chinaman Island which is separated from Curtis Island by an occasionally covered tidal salt flat.

The Curtis Island dry closed scrubs are one of the few occurrences of these vegetation types within the Great Barrier Reef World Heritage Area. Only on Magnetic Island, 700 kilometres to the north do similar communities of this “dry rainforest” type occur within the Great Barrier Reef World Heritage Area.

Littoral Rainforest, Beach Scrubs, SEVT, microphyll rainforest and nearby fringing Acacia woodlands, are all important habitats (17) for the Black -breasted Button-quail (BBBQ), listed as Vulnerable under the EPBC Act. Curtis Island has significant areas and patches of Littoral Rainforest/beach scrubs and Microphyll vine thickets, with nearby communities of *Melaleuca* and *Acacia* species that are likely to provide habitat for the BBBQ. To the best of our knowledge, no specific research on the BBBQ on Curtis Island has occurred to date. We believe some research into the distribution and extent of the BBBQ on Curtis Island and the condition and extent of its preferred habitats would be ideal to assist in recovery and conservation of the species as outlined in the Recovery plan.

Eucalyptus forests & woodland of the Wandilla & Shoalwater Formation.

The open forests/woodlands of Curtis Island (2) comprise the most significant extent of this broad vegetation community within the boundaries of the Great Barrier Reef World Heritage Area.

Mono-specific or mixed forests on hills and alluvial flats including species such as *Eucalyptus tereticornis*, *Eucalyptus moluccana*, *Eucalyptus crebra*, *Eucalyptus fibrosa subsp fibrosa*, *Corymbia citriodora*, and *Lophostemon suaveolens* **occupy over 60 % of Curtis Island's area.**

Mid-storey species such as *Petalostigma pubescens*, *Melaleuca nervosa* form *nervosa* and *Allocasuarina luehmanii* (Bull Oak) add to the structural diversity of these communities, providing excellent habitat diversity for bird species. In places, windswept, dwarfed stands of Bull Oak fringe the tidal salt flats of Port Curtis.

The ground storey vegetation of native grasses, sedges and herbs is generally less disturbed and less weedy than similar vegetation types on the mainland, therefore providing vegetation of higher conservation value and condition.

Islands, Rocky Reefs & Sea Grass Communities of Port Curtis

While strictly not a physical part of Curtis Island the adjacent relatively undisturbed, marine areas and small islands of Port Curtis complement the World Heritage Values of Curtis Island. Features include the rocky reef strewn North Entrance, and the winding North Passage channel, reefs, and extensive sea grass communities at Pelican Banks, Quoin Island, Facing Island and The Narrows.

Marine turtles, dugong, seabirds and Indo-pacific Humpback Dolphins are known to frequent and inhabit the natural channels and tidal flats which have so far avoided the intensive industrial development occurring elsewhere within Port Curtis. Other seagrass beds inside the harbour at

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area

Wiggins Island and Fisherman's landing have suffered greatly from water quality impacts from dredging and recent floods, and approximately 443 hectares of seagrass bed were recently lost to reclamation and dredging associated with industrial projects in the harbour.

A significant population of migratory shorebirds feed across the exposed seagrasses and mud banks and roost at high tide in mangroves and secure vantage points on the salt flats on the south coast of Curtis Island. Recent shorebird counts (March 2012) have recorded numbers at one significant Curtis Island site, roosts of over 700 shorebirds from 21 species (14).

Wider surveys in summer around Curtis Island and associated estuarine areas have recorded 30 species of shorebirds with total numbers over 13,700 (15).

Sea Turtles are known to nest on Curtis Island and there are at least four beaches that are recorded as nesting beaches for the Flatback Turtle (South End beaches, two beaches at Sea Hill and the beach near Turtle Street camping area in the National Park) and the Green Turtle (South End beaches).

A good but out-dated map of shorebirds and turtles on the Curtis Coast can be found at www.ehp.qld.gov.au/coastal/regional-plans/pdf/curtis-coast-rcmp-map15.pdf



Image 7: Rock shelves, Curtis Island

Photo courtesy of John Augusteyn.



Image 8: Sea Grass at Pelican Banks, Curtis Island

Photo courtesy of John McCabe.

Additional Fauna Values

Over 440 species of native fauna are recorded from Curtis Island and surrounding waters.

Many species are protected by international conventions, such as the Convention of Conservation of Migratory Species of Wild Animals (CMS formerly Bonn Convention), China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Queensland legislation lists 19 species of conservation significance and, with Commonwealth legislation there are eight species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC).

The isolated shorelines of Curtis Island are important for resident coastal birds, such as the vulnerable Beach stone-curlews *Esacus magnirostris* and Sooty oyster catchers *Haematopus fuliginosus* as well as the migratory species mentioned above.

Four species of sea turtle are found in surrounding waters with several species recorded as nesting on the islands beaches. Volunteers from the Queensland Turtle Conservation Project monitor significant nesting of Flatback turtle (*Natator depressus*) every summer and other nest beaches are protected by their remoteness.



Image 9: Sea Turtle nesting at South End, Curtis Island

Photo courtesy of Cheryl Watson, Gladstone Conservation Council.

The adjoining sea and estuarine waters host humpback whales *Megaptera novaeangliae* and other near threatened marine mammals such as Snubfin dolphins *Orcaella heinsohni* (in the Fitzroy River Delta) and Indo-Pacific humpback dolphins (*Sousa chinensis*). The dolphins are largely resident within the close inshore and estuarine waters of Curtis Island.

There have been recent research reports in the media (from long term monitoring of the Indo-Pacific Humpback Dolphin) that has shown a reduction in the Gladstone Harbour population from 75 to 40 dolphins (18).

The remoteness from large scale human development, limited disturbance and excellent condition of mangroves and intertidal saltmarshes on the western flanks of Curtis Island and through the Narrows, provides excellent habitat for the vulnerable Native Water Mouse *Xeromys myoides* (EPBC listed).

These mangrove areas in The Narrows and Curtis Island are pristine and are known to have excellent crab and crustacean populations. Crustaceans are one of the major food sources of the Native Water Mouse.

The vital ecological link here is leaf debris on the ground in undisturbed mangrove communities and the pristine undisturbed catchments, salt marshes and clay plans behind the mangrove ecosystems in The Narrows and on Curtis Island. Leaf litter is a food source for the crustaceans and it is known that storm water run-off from urban or industrial areas can 'wash away' essential leaf litter and point source run-off can impact mangrove health.

Threats to Curtis Island retained natural values

Spadely (North Curtis)

Following selective clearing on part of Spadely Pastoral Holding behind Sea Hill on north Curtis Island and establishment of several cabins to serve local recreation needs, the sale of the property to overseas interests was followed by a large scale “ecotourism” resort proposal. This project proved unrealistic due to limited demand and high difficulty.

The former pastoral property, now subdivided into several smaller lots was subject to EPBC referral by Universal Partners North Curtis Island Pty Ltd in an EPBC referral in 2008 over some 2,270 hectares (EPBC referral number 2008/4212).

Gladstone Ports Corporation Development Proposals

There are heavy industry facilities proposed by Gladstone Ports Corporation (GPC) at the northern end of Curtis Island in the Sea Hill area. These proposed port facilities are not included in GPC’s *50 year Strategic Plan*, and to the best of our knowledge, have not been submitted formally as a project to either the Queensland or Federal Government.

However these proposals are public knowledge. Maps have been produced by GPC to show ‘proposed strategic port land’ over freehold land at Sea Hill (refer to Appendix 3) with proposed road or rail access.

Black Head Resort

Queensland Resorts, owners of the Monte Christo pastoral leases on Curtis Island, have had approval to construct a tourist resort facility on leasehold at Black Head on the east coast of Curtis Island for over 12 years. Construction has not proceeded and although the company has failed to comply with development requirements.

The Queensland Government has extended development approval. The company has met some environmental requirements including entering into a Nature Refuge covenant under the Queensland Nature Conservation Act.

Cultural Values

Indigenous cultural values

There is a considerable diversity of indigenous cultural sites (16) on Curtis Island and several references by early European explorers to aboriginal presence on the island or in the seas adjacent to the island. There is some variance in the descriptions of the particular tribal group which occupied Curtis Island. Early references are to a group named Byelle (Baiali) but there is also mention of local groups Goeng (Gurang) and Toolooa.

European contact with this tribal group dates from August 5 1802 when Mathew Flinders, who had anchored the previous day at the southern end of Facing Island, came in contact while navigating The Narrows and on Curtis Island.

The survey of archaeological sites on the Curtis Coast classified eleven sites around Curtis Island as, Extremely High (3 sites), Very High (3 sites), or High (5 sites) significance. While some of these sites are along the east coast of the island, a significant number are within The Narrows; perhaps a confirmation of the high productivity of this tidal wetland in the past that is still recognised today.

Non-indigenous cultural values

Sites of interest to early European contact around Curtis Island include View Hill, first visited by the Matthew Flinders party for observation purposes. In the mid Nineteenth Century the 1858 gold rush to Canoona resulted in the establishment of shipping pilot services at Station Point and later at Sea Hill.

Subsequently lighthouses and a quarantine station were established at Sea Hill and a lighthouse on the higher point of Cape Capricorn. The lighthouse and pilots residence at Sea Hill are listed on the National Heritage Register.

Monte Christo Pastoral Station was established around 1860 and remains today as a pastoral property, seasonally undertaking the difficult task of transferring stock on a carefully selected low tide through the difficult Ramsay Crossing in The Narrows.

The historic and natural values of Sea Hill and a stretch of coastline and hinterland around the North West coast, east to Cape Keppel, are at risk from proposed port developments by the Gladstone Ports Corporation (Refer to PORT PLANNING AND DEVELOPMENT MASTER PLAN – PORT ALMA, BALACLAVA AND SEA HILL - Appendix 3).

Threats to Cultural heritage

- Inappropriate development in the North end of Curtis Island will threaten indigenous and non-indigenous heritage.
- Loss of indigenous cultural sites from current or past development on and around Curtis Island, including marine and intertidal areas.

Conclusion

The objective of protecting the undisturbed parts of Curtis Island and adjacent marine areas is not a constraint to environmentally sound, orderly growth, of the Gladstone Region. Governments must lead in immediately placing secure protection over the natural areas on the island and remaining functional marine habitats. Some of these requirements can be met through the existing conditions for offsets mandated by both State and Federal Governments for existing and proposed port and industry projects.

However there are opportunities for greater protection of the natural and cultural values of Curtis Island and surrounding marine areas within the GBRWHA, from identified and future threats. We have identified some key actions and recommendations to protect the values of Curtis Island with the GBRWHA; these are provided in the Recommendations section of the report below.

As noted in the UNESCO report of the 36th session of the World Heritage Committee, there has been a failure to strategically plan for development in and adjacent to the Great Barrier Reef World Heritage Area. The result has been that initial development planning is too frequently initiated by private industry interests and Government Owned Corporations who operate with minimal oversight.

If the Queensland and Australian Governments commit to meaningful action on the UNESCO report, such actions will be noted at the national and international level. At the local level of Curtis Island, Port Curtis and Gladstone Harbour, they may also assist in addressing the sense of loss of natural values and coastal recreation opportunity expressed by many in the Gladstone and wider Central Queensland community.



Image 10: View from Grassy Hill looking south, Curtis Island.

Photo courtesy of John Augusteyn.

A Summary Report of the values and current threats to Curtis Island within the Great Barrier Reef World Heritage Area



Image 11: Sedge wetland, Curtis Island.

Photo courtesy of John McCabe.

References

1. McDonald, L. (2001) *An overview of the historical cultural resources of the Curtis Coast*. A report to the Queensland Environmental Protection Agency as a fishing ground for commercial and/ or amateur fisherman or as adult or juvenile habitat necessary for maintaining existing or potential fisheries"
2. Melzer R. I. and Brushe J. (1999), Curtis Island Vegetation Assessment. National Estate Grants Program, A report by Queensland Parks and Wildlife Service.
3. Russell, D. J., and Garrett, R., N., (1983) Use by Juvenile Barramundi, *Lates calcarifera*, and other fishes of Temporary Supralittoral Habitats in a Tropical Estuary in Northern Australia. Australian. Journal of Marine and Freshwater Research.
4. Sattler P. S and Williams R.D. (Eds). (1999). The Conservation Status Queensland's Bioregional Ecosystems. Environmental Protection Agency and National Parks Association of Queensland Inc., Brisbane
5. Stanton, J. P and Morgan, M. G. (1977) The Rapid Selection and Appraisal of Key and Endangered Sites: The Queensland Case Study A Report to the Dept. Environment, Housing and Community Development
6. Queensland Environmental Protection Agency (2003). The Curtis Coast Regional Coastal Management Plan (Curtis Coast Plan).
7. Patrick, N., (1986). Curtis Coast – The Complete Cruising Guide Bundaberg to Mackay.
8. Butcher, D., and Saenger, P., (1989b) An Inventory of Australian Estuaries and Enclosed Marine Waters – Volume 1: Queensland. Northern Rivers College of Advanced Education.
9. Australian Nature Conservation Agency, (1996). A Directory of Important Wetlands in Australia, ANCA, Canberra
- 10.. Arnold, D., Bell, L., & Porter, G. 1993. The incidence of the Yellow Chat *Epthianura crocea* (Castelnau and Ramsay) on Curtis Island. Queensland Department of Environment and Heritage
11. Houston, W. and Melzer, A. 2008. Yellow chat (Capricorn subspecies) *Epthianura crocea macgregori* recovery plan. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Queensland Environmental Protection Agency, Brisbane.
12. Department of Sustainability, Environment, Water Population and Communities (2011) Proposed decision to refuse to approve the construction and operation of a tourist, recreational and residential development on Hummock Hill Island located south of Gladstone, Queensland, including associated infrastructure, services and facilities (EPBC 2005/2502), under the Environment Protection and Biodiversity Conservation Act 1999.
13. Rasheed, M.A., R. Thomas, R. A. J. Roelofs, Neil, K.M. and Kerville S. P (2002) Port Curtis and Rodds Bay seagrass and benthic macro-invertebrate community baseline survey. QDPI, Queensland Fisheries Service.
14. Pers com, Birdlife Capricornia (March 2012).
15. GHD (2011) Shorebird Monitoring Report -March 2011. Migratory Shorebird Monitoring Port Curtis to Port Alma
16. Burke, C., (1993). A Survey of Aboriginal Archaeological Sites on the Curtis Coast, Central Queensland. Unpublished Report to the Department of Environment and Heritage
17. Mathieson, M. & Smith, G.C., (2009) National recovery plan for the black-breasted button-quail *Turnix melanogaster*
18. The Australian (February 16, 2013), newspaper article by Graham Lloyd, Environmental Editor. Environmental 'failings' spark Gladstone port probe as dolphins depart. www.theaustralian.com.au
19. Department of Sustainability, Environment, Water, Population and Communities (May 2013) Threatened Species and Ecological Communities, <http://www.environment.gov.au/biodiversity/threatened/index.html>

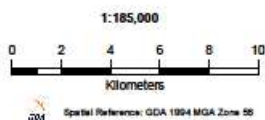
Appendix 1 – Curtis Island Map



Curtis Island Values

SATELLITE IMAGERY: Ortho-rectified, 2.5m SPOTS Imagery. © CNES 2012 / Spot Image, supplied by Spot Imaging Services.

DISCLAIMER: © The State of Queensland (Department of Natural Resources and Mines) 2012. Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2012. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.



Appendix 2 – Regional Ecosystem list

This is not a comprehensive list of all the Regional Ecosystems (under Vegetation Management Act or the Federal EPBC Act) on Curtis Island, rather some of the ecosystems that Capricorn Conservation Council regard as priority ecological communities for conservation protection in the context of this report.

Endangered Regional Ecosystems - Vegetation Management Act (VMA) status

12.2.2 Microphyll/notophyll vine forest. Characteristic species include *Cupaniopsis anacardioides*, *Flindersia schottiana*, *Alectryon coriaceus*, *Elaeocarpus obovatus*, *Polyalthia nitidissima*, *Diospyros* spp., *Pleiogynium timorense* and *Mallotus discolor*. *Melaleuca* spp. and eucalypt emergents may be present, e.g. *Melaleuca dealbata* and *Corymbia tessellaris*. Occurs on Quaternary coastal dunes and beaches.

12.3.3 *Eucalyptus tereticornis* woodland to open-forest on alluvial plains. *Eucalyptus tereticornis* open-forest to woodland. *Eucalyptus crebra* and *E. moluccana* are sometimes present and may be relatively abundant in places, especially on edges of plains and higher level alluvium. Other species that may be present as scattered individuals or clumps include *Angophora subvelutina* or *A. floribunda*, *Corymbia clarksoniana*, *C. intermedia*, *C. tessellaris*, *Lophostemon suaveolens* and *E. melanophloia*. Occurs on broad Quaternary alluvial plains where rainfall is usually less than 1000mm/y. *NOTE: 12.2.2 is the EPBC listing for Littoral Rainforest & Coastal Vine Thickets.*

Of Concern Regional Ecosystems – VMA status

There are 12 Of Concern ecosystems on Curtis Island however we have only listed 7 here for the purpose of this report, however this does not lessen the value of the other 5 not listed here in.

12.3.5a: Palustrine wetland (e.g. vegetated swamp).

Melaleuca quinquenervia, *Casuarina glauca* +/- *Eucalyptus tereticornis* open forest. Occurs on lowest river terraces of Quaternary alluvial plains in coastal areas.

12.3.6 *Melaleuca quinquenervia*, *Eucalyptus tereticornis*, *Lophostemon suaveolens* woodland on coastal alluvial plains.

Melaleuca quinquenervia, *Eucalyptus tereticornis*, *Lophostemon suaveolens* +/- *Corymbia intermedia* open-forest to woodland with a grassy ground layer dominated by species such as *Imperata cylindrica*. Occurs on Quaternary floodplains and fringing drainage lines in coastal areas.

12.3.11 *Eucalyptus siderophloia*, *E. tereticornis*, *Corymbia intermedia* open forest on alluvial plains usually near coast.

Open-forest to woodland of *Eucalyptus tereticornis*, *E. siderophloia* and *Corymbia intermedia*. *Corymbia tessellaris*, *Lophostemon suaveolens* and *Melaleuca quinquenervia* frequently occur and often form a low tree layer. Other species present in scattered patches or low densities include *Angophora leiocarpa*, *E. exserta*, *E. grandis*, *C. trachyphloia*, *C. citriodora*, *E. latisinensis*, *E. tindaliae*, *E. racemosa*, *Melaleuca sieberi* and *M. viridiflora*. *E. seeana* may be present south of Landsborough. Occurs on Quaternary alluvial plains and drainage lines along coastal lowlands. Rainfall usually exceeds 1000mm/y

12.11.14 *Eucalyptus crebra*, *E. tereticornis* grassy woodland. Other species including *Eucalyptus melanophloia*, *Corymbia clarksoniana*, *C. erythrophloia*, *C. tessellaris*, *Angophora* spp. may be present in low densities or in patches. Mid-layer generally sparse but can include low trees such as *Acacia bidwillii*, *Capparis* spp., *Dodonaea triquetra*, *Alphitonia excelsa* and *Xanthorrhoea* spp. Occurs on mid and lower slopes on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

12.12.19 Vegetation complex of rocky headlands on Mesozoic to Proterozoic igneous rocks. Vegetation complex of exposed rocky headlands. Vegetation types include *Themeda triandra* grassland and wind-sheared shrubland and woodland. Occurs on Mesozoic to Proterozoic igneous headlands.

12.11.20 *Corymbia intermedia*, *Lophostemon suaveolens* woodland. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

RE 12.11.21 *Allocasuarina luehmannii*, *Melaleuca nervosa* open-woodland with *Eucalyptus exserta* and emergent *E. crebra*, *E. populnea*. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

Not Of Concern Ecosystems – VMA status

Note: The three vine thicket and closed forest communities listed below are not listed under EPBC and are not shown as endangered. They do however represent the diverse flora and fauna assemblages of these high ecological value ecosystem types in the SEQ and Brigalow Belt and Nandewar Bioregions.

RE 12.11.1 Evergreen notophyll vine forest and/or *Lophostemon confertus* closed forest. *Archontophoenix cunninghamiana* often present in gully floors. The plant families Lauraceae, Myrtaceae and Elaeocarpaceae are characteristic of the type. Occurs in gullies on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

RE 12.11.4 Low microphyll vine forest and semi-evergreen vine thicket. Characteristic species include *Backhousia kingii*, *Pleiogynium timorense*, *Aidia racemosa*, *Archidendropsis thozetiana*, *Atalaya rigida*, *Barklya syringifolia*, *Bridelia leichhardtii*, *Elaeodendron melanocarpum*, *Choricarpia subargentea*, *Flueggea leucopyrus*, *Homalium alnifolium* and *Terminalia porphyrocarpa*. *Melaleuca bracteata* is often present along watercourses. Occurs on Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics.

RE 12.12.13 Microphyll and microphyll/notophyll vine forest +/- *Araucaria cunninghamii*. Characteristic species include *Argyrodendron trifoliolatum*, *Argyrodendron* sp. (Kin Kin W.D.Francis AQ81198), *Dendrocnide photinophylla*, *Diospyros geminata*, *Drypetes deplanchei*, *Ficus virens*, *Cryptocarya bidwillii*, *Planchonella myrsinifolia*, *Vitex lignum-vitae*, *Hernandia bivalvis*, *Croton acronychioides*, *Flindersia* spp. *Olea paniculata*, *Excoecaria dallachyana*, *Gossia bidwillii* and on northern half of bioregion *Vitex acuminata*, *Archidendropsis thozetiana*, *Pleiogynium timorense* and *Cupaniopsis simulata*. Occurs on Mesozoic to Proterozoic igneous rocks.

Appendix 3 – GPC Port Planning and Development Master Plan

Port Alma BalACLava and Sea Hill - Dec 2009

