

Wongaling - South Mission Beach Habitat Linkages

July 2009

Report No: ter9.2.01

Prepared for: Terrain NRM

Prepared by: © BIOTROPICA Australia Pty



DOCUMENT CONTROL SUMMARY

REPORT AND CLIENT DETAILS

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1 Executive Summary

This report identifies the location and quality of habitat linkages between Wongaling and South Mission Beaches, north Queensland. The report focuses on potential linkages for the Southern Cassowary (*Casuarius casuarius johnsonii*). It replicates a previous report by Biotropica Australia (2008) for the Wongaling Creek area to the north. Further background information is detailed in the 2008 report regarding linkages and their role in reducing the effects of habitat fragmentation.

Mapping for this report includes the identification of “Potential Cassowary Habitat” based on GIS data supplied by the Queensland Department of Natural Resources and Water (DNRW) and the Queensland Environmental Protection Agency (EPA). Due to the limited scope of the field assessments, and as private properties were not surveyed, this recommendation is of potential habitat only at the time of the aerial photography (2006). Further clearing or regeneration may have occurred since that time.

Five linkages were identified and these are described in Sections 6 to 11 (see Maps 1, 2 and 8 for overviews and Maps 9 to 13 for detailed depictions). The five linkages described are: -

- Habitat Linkage 1: Tam O'Shanter National Park to Wongaling Beach and the Hull River National Park
- Habitat Linkage 2: Hull River National Park to Wongaling Beach
- Habitat Linkage 3: Wongaling Beach Internal Linkages
- Habitat Linkage 4: Hull River National Park to South Mission Beach
- Habitat Linkage 5: Hull River National Park at South Mission Beach

Habitat Linkage 1: Tam O'Shanter National Park to Wongaling Beach and the Hull River National Park across the Tully Mission Beach Road. There are two routes; one east and one west of the South Mission Beach Road turn-off. The main barrier to movement is the Tully Mission Beach Road.

Habitat Linkage 2: Hull River National Park to Wongaling Beach is a linkage across the South Mission Beach Road joining the National Park with large rural lots behind Wongaling Beach. The main barrier to movement is the South Mission Beach Road.

Habitat Linkage 3: Wongaling Beach Internal Linkages joins Linkages 1, 2 and 4. This linkage is reliant on Lot 7 SP197640 which is a large rural freehold property.

Habitat Linkage 4: Hull River National Park to South Mission Beach joining the Hull River National Park on either side of the South Mission Beach Road. The main barrier to movement is the South Mission Beach Road.

Habitat Linkage 5: Hull River National Park at South Mission Beach joining the Hull River National Park south of the study area with Habitat Linkage 4. The linkage is constrained between the residential lots of South Mission Beach and the mangroves and watercourses of the North Hull River.

The study area is generally distinguished by relatively large blocks of habitat in good ecological condition and in state ownership. It supports one of the main habitat linkages from the coast to the highlands, in the Wet Tropics bioregion. The network of habitat linkages in the study area enables cassowaries to access a diversity of habitat types and resources, including coastal and hinterland resources, thereby enhancing the ecological viability of the important Mission Beach cassowary population.

Conservation of these linkages would have significant benefits for cassowaries and other wildlife. Linkage conservation would protect significant lowland rainforests, including littoral rainforests, and link coastal forests to the Wet Tropics World Heritage Area and highland forests. The restoration of riparian vegetation would also be expected to contribute to an improvement in water quality entering the adjacent Great Barrier Reef Marine Park.

Subject to Native Title Claim outcomes and provisions, State Land supporting habitat linkages should be protected for conservation. Moreover, the valuable contribution of private landholders who have maintained habitat on their property should be acknowledged. Owners of freehold land supporting habitat linkages should be offered voluntary incentives (e.g. funding) to encourage ongoing conservation of the habitat linkages. The ecological functions of habitat linkages would generally be enhanced by protecting existing native vegetation, revegetating strategic cleared or degraded areas, excluding domestic animals, managing pest species, in addition to providing a low traffic speed environment. Cassowary roadkill in the study area is significant.

[Figure 1: MAP1 A3 EXECUTIVE OVERVIEW MAP (Page 3 fold-out)]

2 Report Focus

This report follows the Biotropica (2008) study examining habitat linkages in the area between Mission Beach and Wongaling Beach, and uses an identical methodology combining desktop and on-ground survey. The focus of this report is the Southern Cassowary (*Casuarius casuarius johnsonii*) and the maintenance of ecological connectivity for this species. No formal survey of local Cassowary populations has been undertaken, and it is reasonably assumed that birds are using all habitats within the study area that can be considered to meet their ecological needs, including sources of fresh water. It should not be assumed that birds are necessarily following indicative routes shown on the accompanying maps. Nor should it be assumed that all areas are used at all times, clearly seasonality and social structures will dictate differential utilisation. However, it is reasonably assumed that where resources are available and accessible they will be utilised, at some time. The focus of this report is therefore to identify where suitable habitats exist, their tenure, and their spatial relationship to significant adjacent habitats. It should be noted that cassowaries may utilise open/cleared areas as well as habitat linkages to travel between habitat areas.

Whilst Cassowaries are the focus of this report it is emphasized that habitat linkages supporting Cassowary movement are very likely to support all other wildlife species commonly associated with that habitat. Of note, much of the identified potential Cassowary habitat is also mapped as Mahogany Glider (*Petaurus gracilis*) habitat. The species is listed as *Endangered* under both the Queensland *Nature Conservation Act 1992* (NCA) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) and has a very limited distribution.

Similarly, habitat linkages may benefit littoral rainforest by ensuring it remains ecologically connected to other native forests including other sections of the Wet Tropics World Heritage Area. Littoral Rainforest and Coastal Vine Thickets of Eastern Australia are listed as “*Critically Endangered*” under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

3 Methodology

The study area for this report includes Wongaling and South Mission Beaches and areas to the west (see [Map 2](#)). The northern boundary of the study area, directly borders the southern boundary of a previous Biotropica report (2008) detailing habitat linkages in the Wongaling Creek area.

The Hull River and Tam O'Shanter National Parks make up a substantial portion of the western side of the study area. Other tenures within the study area include: freehold, state lands, leasehold, unallocated state lands (USL), reserve, covenants, and road reserves. This report identifies potential habitat on each lot regardless of tenure.

Potential habitat was identified using ArcView 9.3 GIS software, aerial imagery and field verification.

Produced by EPA/QPWS in April 2007 are maps detailing locations of cassowary deaths. Deaths are known to be due to vehicle collisions and were reported to QPWS between 1992

and early 2007. Records of three additional cassowary roadkills in late 2008 were provided by Community for Coastal and Cassowary Conservation (C4), and all sites of recorded cassowary deaths are shown on the accompanying habitat linkage detail maps. Representatives from Cassowary Coast Regional Council, James Cook University and C4 provided anecdotal observations of cassowary movements in the study area. For interpretive purposes, information on cassowary roadkill and crossings is referred to in this document as “EPA 2007”.

Mapping for this report includes the identification of “Potential Cassowary Habitat outside National Park tenure”. This was developed by Biotropica based on the following GIS datasets: Regional Ecosystems of Queensland (EPA 2005), Essential Cassowary Habitat (EPA 2006), aerial photography taken post-Cyclone Larry (DNRW 2006, supplied by Terrain NRM Ltd), and some field assessment. Due to the limited scope of the field assessments and as private properties were not able to be surveyed, this recommendation is of potential habitat only at the time of the aerial photography (2006). Further clearing or regeneration may have occurred since that time. Field assessments for Mahogany Gliders or other threatened species or communities were not undertaken.

In the context of this report linkages were considered to be continuous native vegetation, providing existing habitat between the more intact (core) habitats represented by Tam O'Shanter National Park and the Hull River National Park and other areas of suitable Cassowary habitat. While most of the linkages are mapped by the Environmental Protection Agency (EPA) as a remnant Regional Ecosystem (RE), some are mapped as “*Disturbed*”. This does not preclude use by Cassowaries as a habitat linkage. Some vegetation previously mapped as an RE by the EPA in 2005, has been subsequently cleared. There are also areas where revegetation projects are underway, and some have reached a level where they provide suitable linkage habitat. These factors result in anomalies between the REs as mapped by the EPA and the linkages identified in this report.

Linkage surveys included an examination of the level of connectivity within each linkage to determine:

- Spatial extent / configuration (wider, continuous vegetation vs. fragmented patches)
- Degree of legislative protection (habitat protected vs. unprotected)
- Number and location of connectivity gaps (few points vs. many)
- Resource diversity (heterogeneous vs. homogeneous habitats)
- Quality of linkage habitat (intact vegetation vs. disturbed)
- Proximity to high density settlement (distant vs. directly adjacent)

Five potential linkages were identified. These may or may not be utilised by Cassowaries and therefore are suitable habitat linkages rather than confirmed Cassowary linkages. Additional research may determine the degree to which each may or may not be utilised.

Connectivity gaps have been identified, and each of these is discussed separately in Sections 6 to 11. A connectivity gap is defined as any location where habitat is fragmented and birds would need to cross structures (such as roads) or cleared lands. The South Mission Beach and Tully Mission Beach Roads are considered to be continuous linear barriers to wildlife movement for their entire length. Their effect is outlined further in Biotropica 2008.

4 Site Context

The study area covered by this report includes the area between Wongaling Beach and South Mission Beach, and encompasses sections of the Hull River National Park (NP) and the Tam O'Shanter NP (see [Map 2](#)). This is a complex habitat mosaic comprising sclerophyll and mesophyll/notophyll vegetation in large blocks of intact habitat, occurring in conjunction with smaller fragments. Much of the area has been intensively developed for agriculture and settlement, although the diversity of resources available within this matrix continues to attract and sustain a subset of the original wildlife that is still present. This includes Cassowaries which are the principal focus of this report.

The study area is surrounded by two World Heritage properties, the Wet Tropics World Heritage Area and the Great Barrier Reef World Heritage Area (see [Map2](#)). The Tam O'Shanter NP is within the Wet Tropics World Heritage Area, though the Hull River National Park is not included within this tenure. Other properties on the northern side of the Tully South Mission Beach Road border the Wet Tropics World Heritage Area, however none of the other properties in this report are included within its boundaries. The Great Barrier Reef World Heritage Area borders the eastern study area boundary.

The southern part of the study area also falls within the boundaries of the *Hull River Fish Habitat Area (FHA-046) – Management Area A*. All of this part of the Fish Habitat Area is within the Hull River National Park (see [Map 2](#)).

The North Hull River is the major catchment for the study area. The river is fed by a number of streams that rise in the ranges of the Tam O'Shanter NP (including the North Hull River), coalescing into a large mangrove system at the southern end of the study area. With the exception of Wongaling Creek in the north, all watercourses in the study area flow into the Hull River and in this way the system provides a hierarchical network of interconnected habitats with most riparian zones retaining some native vegetation. The Hull River terminates in Rockingham Bay and the forests of the north-eastern section of Rockingham Bay contain high quality cassowary habitat. Forests flanking the Hull River NP are therefore significant regional linkages, given that they are an integral part of the Mount Myrtle massif to the west of the study area.

The Mount Myrtle massif is a portion of relatively intact forest which forms part of a major area of east-west connectivity remaining between Cairns and Townsville. Through the area colloquially known as Smiths Gap adjacent to Mt. Myrtle, broad ecological connectivity remains between the littoral zone and the highlands east of Ravenshoe (Biotropica 2005). There are parts of the study area in this report which contribute directly to this landscape scale connectivity. Their long term protection is the chief means by which this landscape scale connection will remain in place.

Infrastructure, settlement and agriculture are embedded within this matrix of forests and interconnected catchments. Whilst agriculture remains relatively static, the development of new residential areas continues with a number of housing subdivisions either approved or under construction in this area. Associated clearing for powerlines and roads further contributes to the fragmentation of habitat. However, the Far North Queensland Regional Plan 2009-2031 now limits urban development to the Urban Footprint (see [Maps 1 & 6](#)).

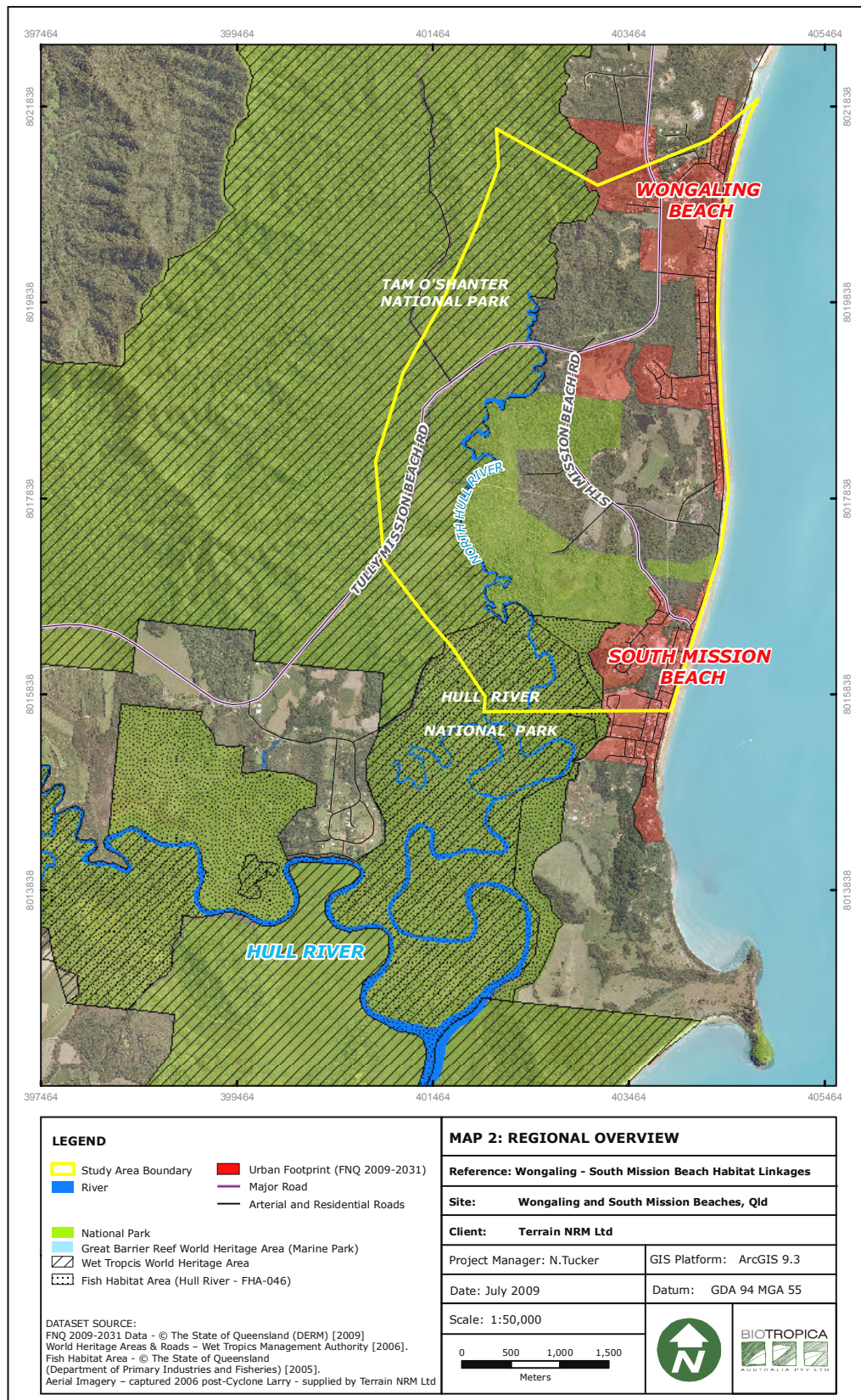
Habitat blocks are larger through this area when compared to the more fragmented areas to the north between Wongaling and Mission Beach, and most settlement is confined to the township of South Mission Beach. The diversity of resources available in the matrix, and their relatively high level of connectedness suggest conservation outcomes in this area are eminently achievable.

Vegetation of the study area

The area contains significant heterogeneity of vegetation types, including notophyll/mesophyll vine forests, mangroves, open woodlands, palustrine wetlands and vine forest shrublands. Mesophyll vine forests dominate much of the study area, occurring as complexes, with Feather Palm (*Archontophoenix alexandrae*) and Fan Palm (*Licuala ramsayi*) conspicuous in areas of impeded drainage. Mangroves are similarly extensive particularly adjacent to the North Hull River. Sclerophyllous emergents of *Corymbia*, *Melaleuca* and *Eucalyptus* are common, more so on ridges, poorly drained areas and the littoral zone. There are also significant areas of wetland in areas of lower relief and these are important seasonal water sources for a number of species, including cassowaries. [Appendix 1](#) contains a full description of all Regional Ecosystems occurring within the study area. All Regional Ecosystems are represented in the extensive protected areas occurring within the study area. Littoral Rainforest and Coastal Vine Thickets of Eastern Australia in the study area are discussed in [Section 5.1](#).

Edge effects are prominent in most notophyll/mesophyll vine forests, particularly on *Acacia* dominated edges. Acacias were particularly affected by Cyclone Larry and their loss of limbs has resulted in surrounding disturbance and proliferation of a number of disturbance-adapted vines including Blackfellow Wire (*Lygodium reticulatum*) and Captain Cook Vine (*Merremia peltata*). Generally, weeds are restricted to edges only and are not a conspicuous issue, although exotic palms such as Royal Palm (*Syagrus romanzoffianum*) and non-local natives such as Foxtail (*Wodyetia bifurcata*) can be seen germinating in fragments within the study area. These have almost certainly been dispersed by Cassowaries.

Figure 2: **MAP 2 - Regional Overview**



5 Planning Framework

Land use and conservation on public and private tenures in the project area are regulated by various national, state and local government legislations and plans.

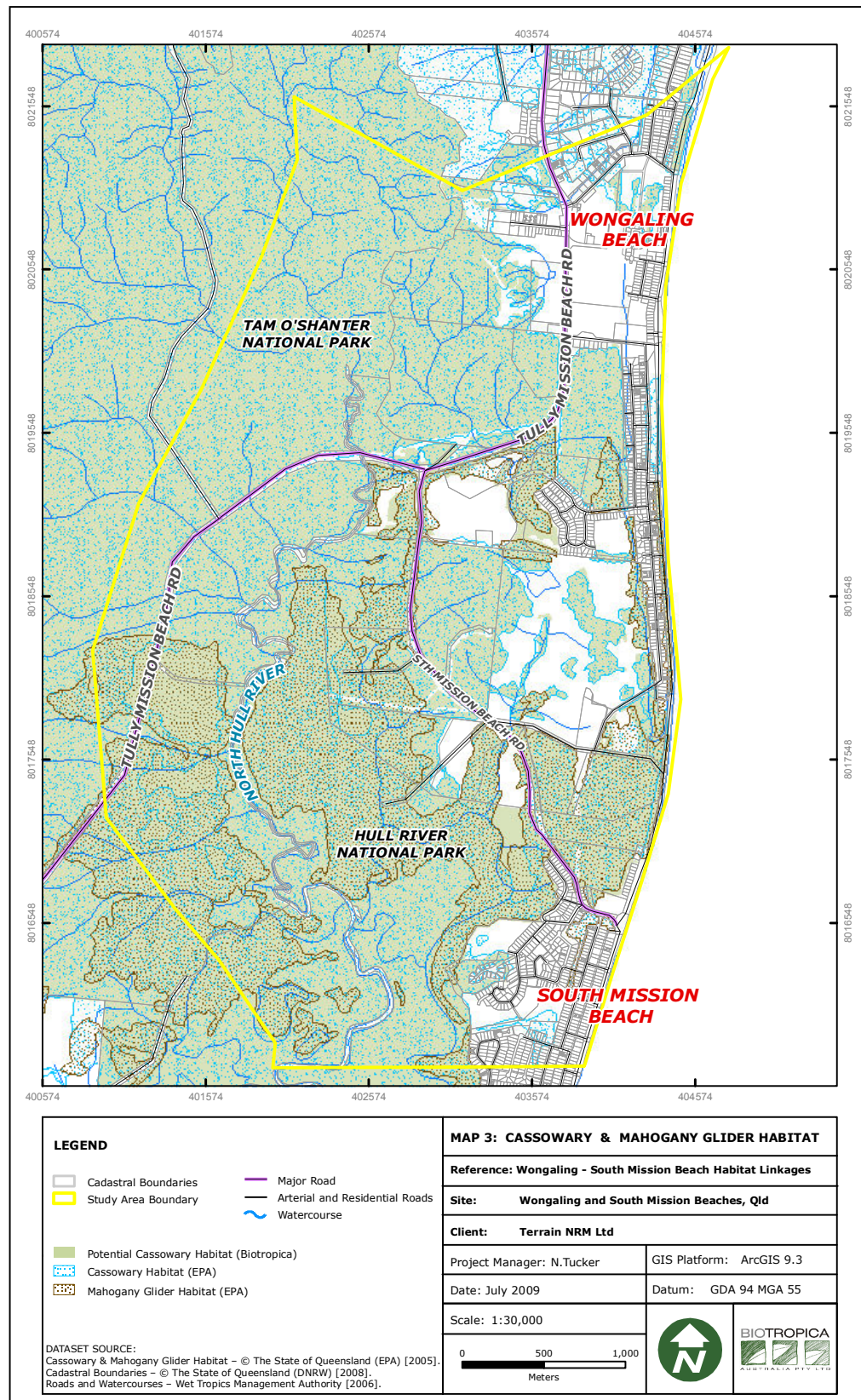
5.1 Environment Protection and Biodiversity Conservation Act 1999

Matters of National Environmental Significance (NES) are triggers under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). A number of NES triggers are present in the study area, including Wet Tropics World Heritage Area, Great Barrier Reef World Heritage Area (see [Map 2](#)) and a range of endangered and vulnerable plants and animals. “*Critically endangered*” Littoral Rainforest and Coastal Vine Thickets of Eastern Australia (LR&CVToEA) are likely to occur in the study area due to the presence of two REs (7.2.1 and 7.2.5a) that “equate wholly” to the listed community (see [Maps 9 & 9A](#)). Rainforest vegetation within two kilometres of the coast (Listing Advice - Section 3) is potentially LR&CVToEA, subject to fieldwork.

5.2 Nature Conservation Act 1992

The large majority of remnant vegetation in the study area is mapped by the Environmental Protection Agency as *Essential Cassowary Habitat* (EPA 2006; see [Map 3](#)). Some of the vegetation is also identified as *Essential Mahogany Glider Habitat* (EPA 2006; see [Map 3](#)). Both these species are listed as “*Endangered*” under Commonwealth and State legislation.

Figure 3: **MAP 3 – Cassowary and Mahogany Glider Habitat Map**



5.3 Regional Ecosystems

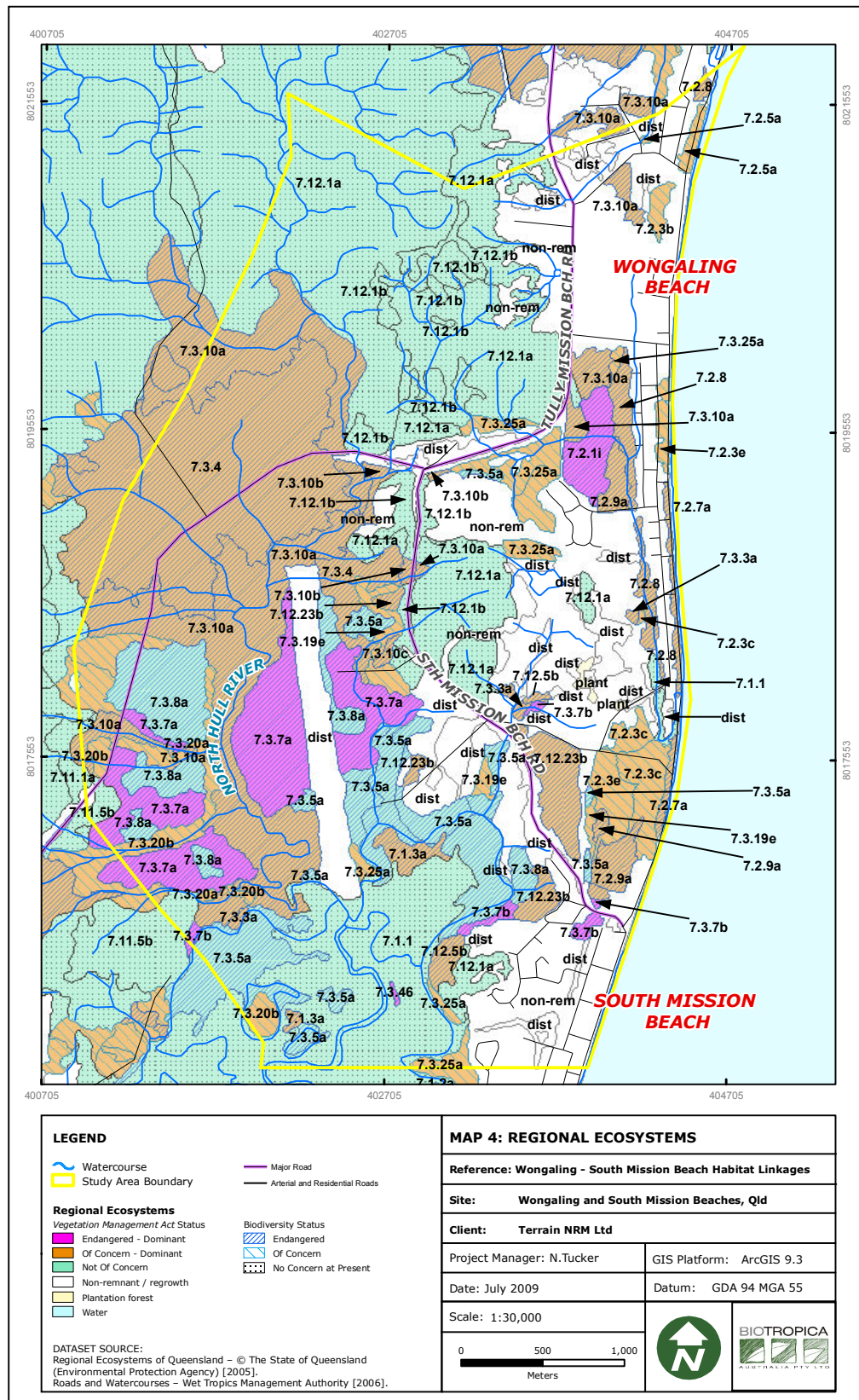
Twenty-one Regional Ecosystems (REs) were identified within the study area (refer to [Map 4](#)). Of these, a number were found only in the National Parks to the west and north of the area. Fifteen Regional Ecosystems occur within the boundaries of the other lots detailed in [Section 6 to 11](#) and are listed under the *Vegetation Management Act 1999* as *Endangered*, *Of Concern*, or *Not of Concern* (see [Table 1](#) and [Map 4](#)). In addition, they are further listed for biodiversity planning purposes by the Environmental Protection Agency as *Endangered*, *Of Concern*, or of *No concern at Present*, depending on the condition of the remaining ecosystems.

[Table 1](#) below, summarises the status of REs within the linkages identified. A detailed description of each RE is given in [Appendix 1](#). Detailed locations by lot number are provided in the [tables in Section 6 to 10](#).

Table 1: Regional Ecosystem Status - Summary

Regional Ecosystem	EPBC Status	VMA Status	Biodiversity Status
7.1.1	-	Not of Concern	No Concern at Present
7.2.1	Critically Endangered	Endangered	Endangered
7.2.3	-	Of Concern	Of Concern
7.2.7	-	Of Concern	Endangered
7.2.8	-	Of Concern	Endangered
7.2.9	-	Of Concern	Endangered
7.3.3	-	Of Concern	Endangered
7.3.5	-	Not of Concern	Endangered
7.3.7	-	Endangered	Endangered
7.3.8	-	Not of Concern	Endangered
7.3.10	-	Of Concern	Endangered
7.3.19	-	Of Concern	Of Concern
7.3.25	-	Of Concern	Of Concern
7.12.1	-	Not of Concern	No Concern at Present
7.12.23	-	Of Concern	Endangered

Figure 4: **MAP 4 - Regional Ecosystems**



5.4 Cardwell-Hinchinbrook Regional Coastal Management Plan

The *Cardwell-Hinchinbrook Regional Coastal Management Plan* (CHRCMP) is a statutory instrument under the *Coastal Protection and Management Act 1995* and describes how the region's coastal zone is to be managed. The study area is wholly within "*Key Coastal Site 1: Hull*" in the CHRCMP. Desired coastal outcomes for the Hull Key Coastal Site include the following:

- High quality interconnected habitats are conserved to support viable populations of southern cassowary, mahogany glider, ant plant, Apollo jewel butterfly and estuarine crocodile.
- The Walter Hill Range wildlife corridor is managed as the major ecological link between the coast and the Walter Hill Range.
- Development in Wongaling Beach and South Mission Beach is managed to conserve endangered regional ecosystems and coastal wetlands, and retain the mosaic of lowland rainforest and associated forests.

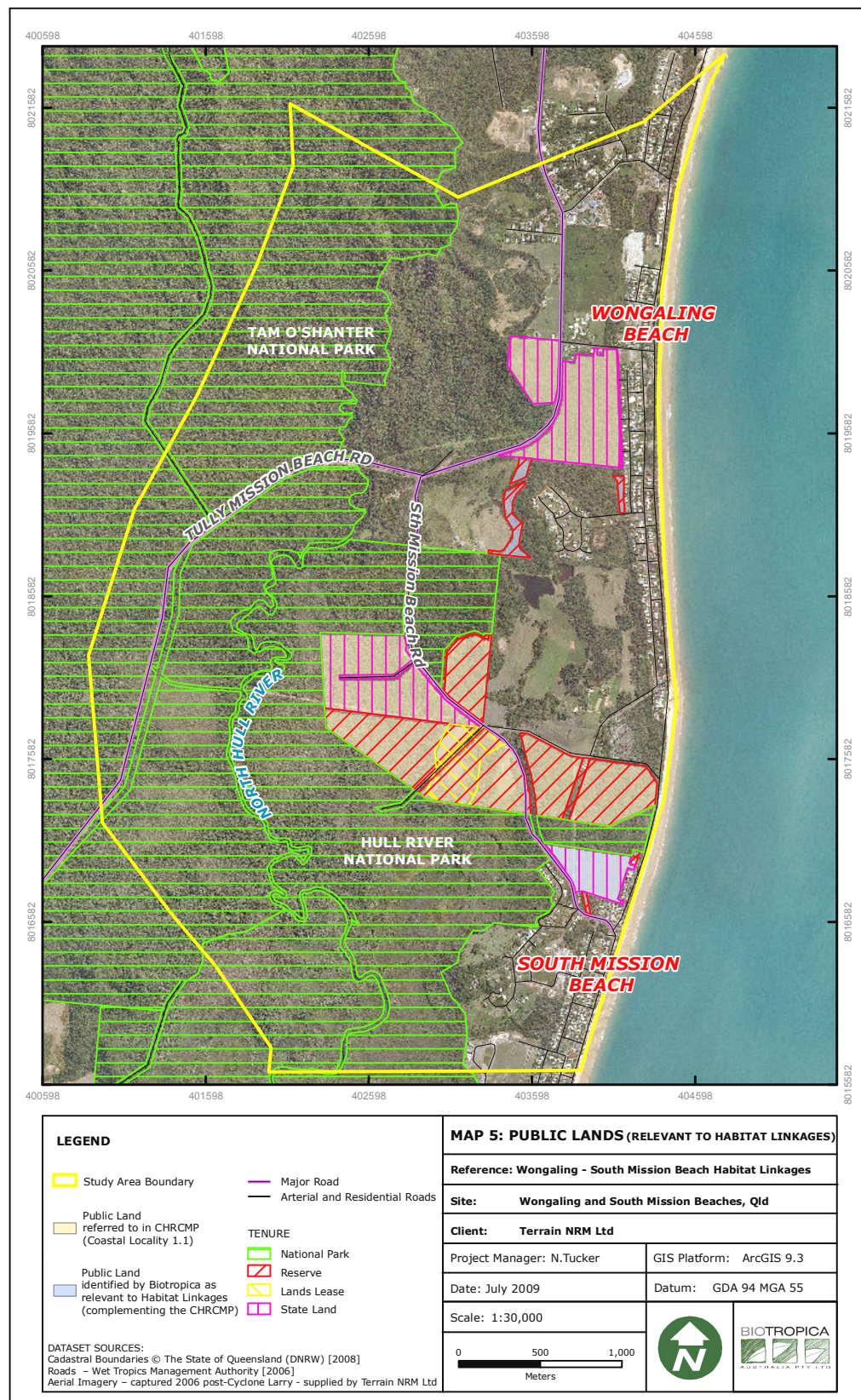
Additionally, part of the study area is within "*Key Coastal Site 1.1: Wongaling Beach to South Mission Beach*". Desired coastal outcomes for this locality are [for lot locations see [Map 5](#)]:

- Future use of the following State land on the coast conserves the high environmental values and features, including remnant lowland native vegetation and critical habitat for the Southern Cassowary, and avoids significant impacts on coastal processes, through the implementation of an appropriate management regime:
 - USL Lots 1 and 2 on Plan SP125434;
 - USL Lot 2 on Plan SP125433;
 - USL Lots 3, 38 and 39 on Plan USL42219; and
 - Land Lease Lot 634 on Plan CWL3519.
- Future use of the listed reserves is consistent with their dedicated purpose and includes the community purposes of 'beach protection and coastal management' and 'environmental purposes'. The reserves are properly and effectively managed in accordance with an approved management plan:
 - Reserve Lots 3, 4, 5 and 7 on Plan SP125434; and
 - Reserve Lot 109 on Plan CWL3519.
- The wildlife corridor for the Southern Cassowary is retained and managed as a major link between the coast at Wongaling Beach and the Walter Hill Range.

(The State of Queensland 2003, p 100)

Under the CHRCMP, sections of the study area are also identified as Fish Habitat Areas, Areas of State Significance for Significant Coastal Wetlands, Significant Coastal Dune Systems, Endangered Regional Ecosystems, and Coastal Management District, triggering certain CHRCMP policies.

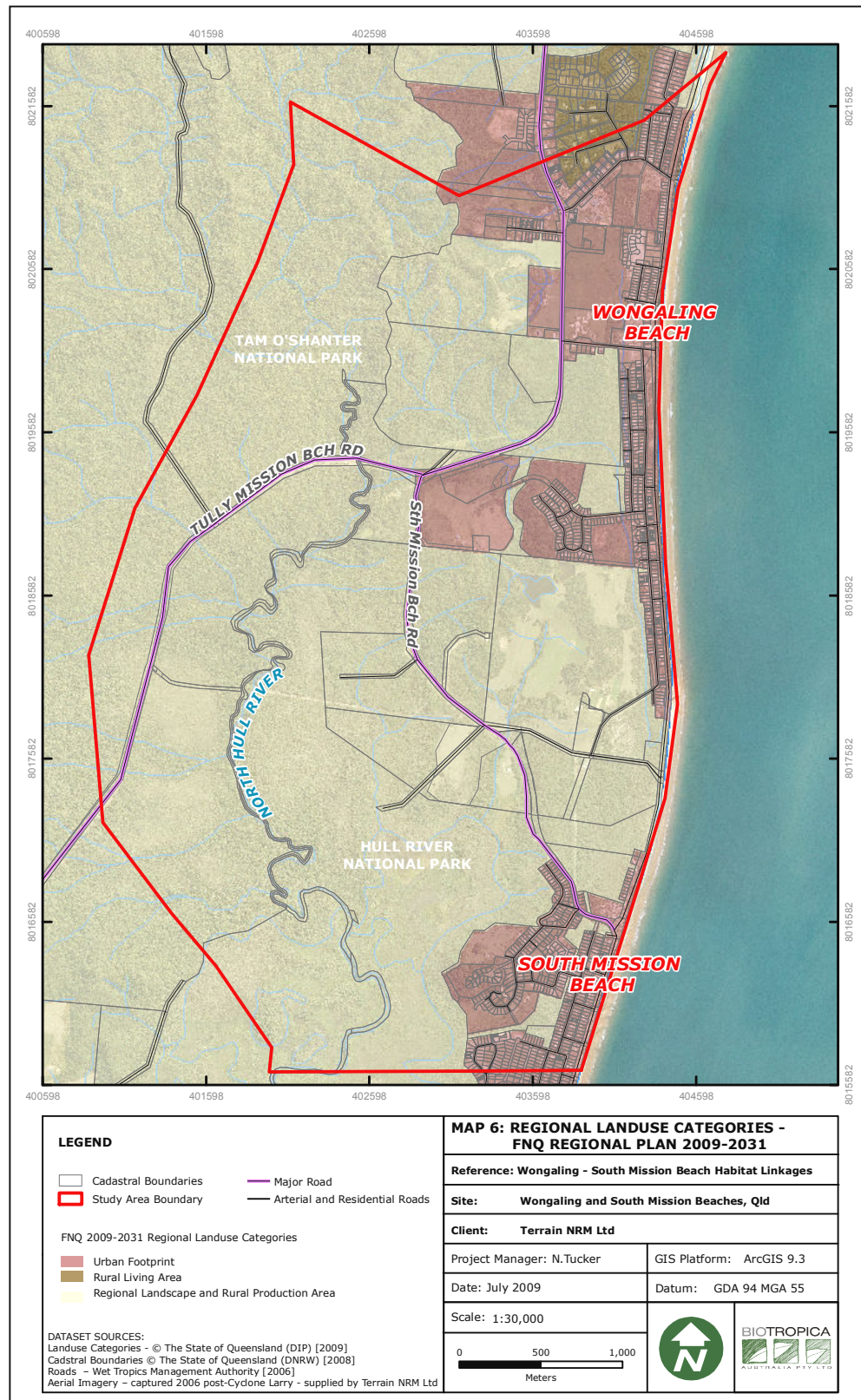
Figure 5: **Map 5 - State Lands Relevant to Habitat Linkages**



5.5 Far North Queensland Regional Plan 2009-2031

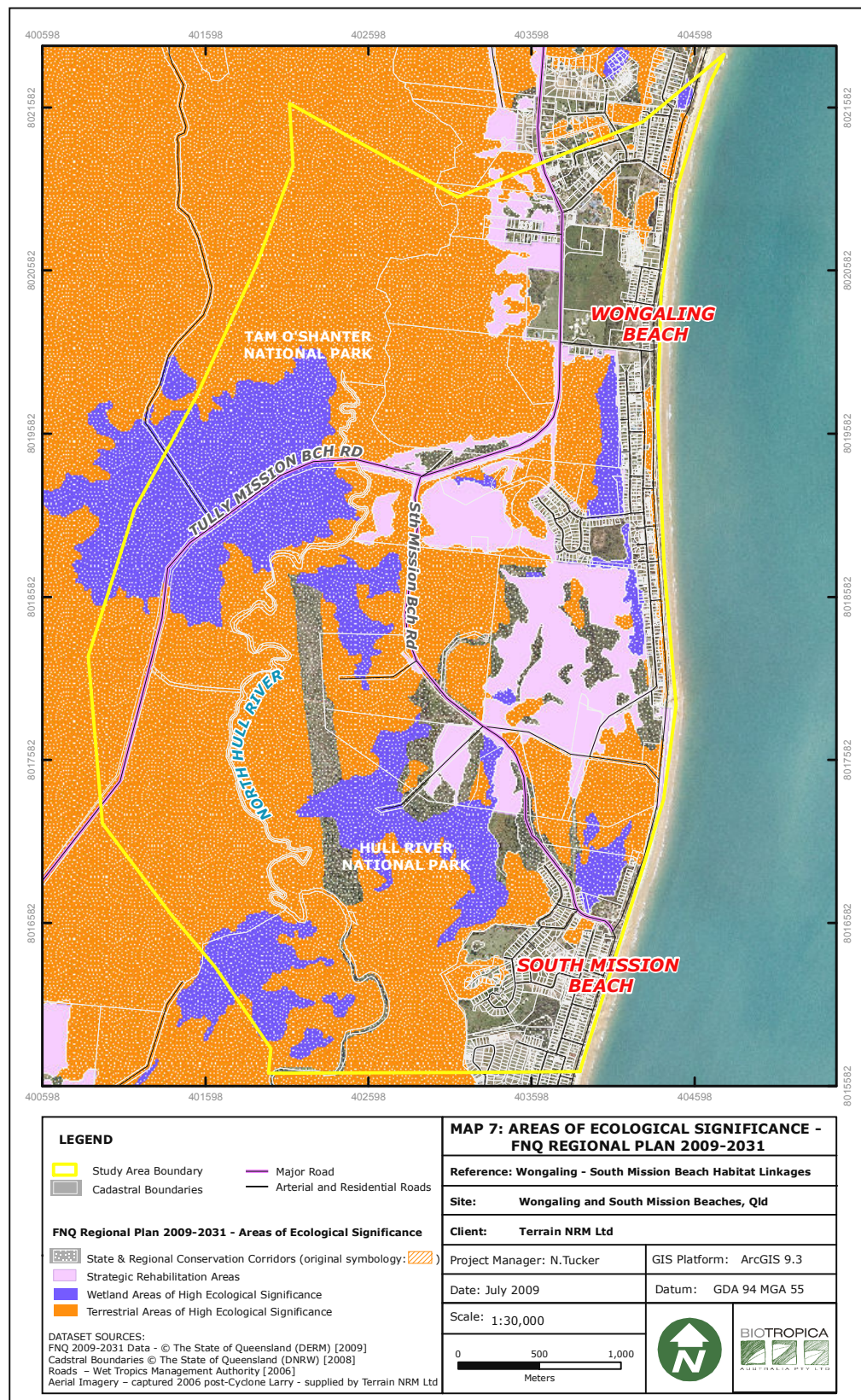
The FNQ Regional Plan is the pre-eminent plan for the FNQ region and takes precedence over all other planning instruments made under state legislation. Local governments must amend their planning schemes to reflect the FNQ Regional Plan. The FNQ Regulatory Provisions allocate all land into regional land use categories. [Map 6](#) shows the extent of the Urban Footprint, Rural Living and Regional Landscape and Rural Production Area in the study area. Regional Landscape and Rural Production Areas are protected from future urban or rural residential development. The Urban Footprint is intended to provide for urban development. FNQ Regional Plan Biodiversity Conservation Policies (S1.1) regulate development within Areas of Ecological Significance, including in the Urban Footprint. [Map 7](#) shows Areas of Ecological Significance in the study area. It should be noted that for interpretive reasons, the “areas of general ecological significance”-layers of the source-dataset have been omitted in [Map 7](#) (terrestrial and wetland areas of general ecological significance are virtually identical with remnant vegetation extents in this area, whilst there are no local conservation corridors depicted in this area). Other relevant sections of the FNQ Regional Plan include S7.1 (Protection of waterways, wetlands and water quality). The large majority of remnant vegetation in the study area is outside the Urban Footprint and/or within Areas of Ecological Significance.

Figure 6: **MAP 6 – Regional Landuse Categories (FNQ 2009-2031 Regional Plan)**



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Figure 7: MAP 7 - Areas of Ecological Significance (FNQ 2009-2031 Regional Plan)

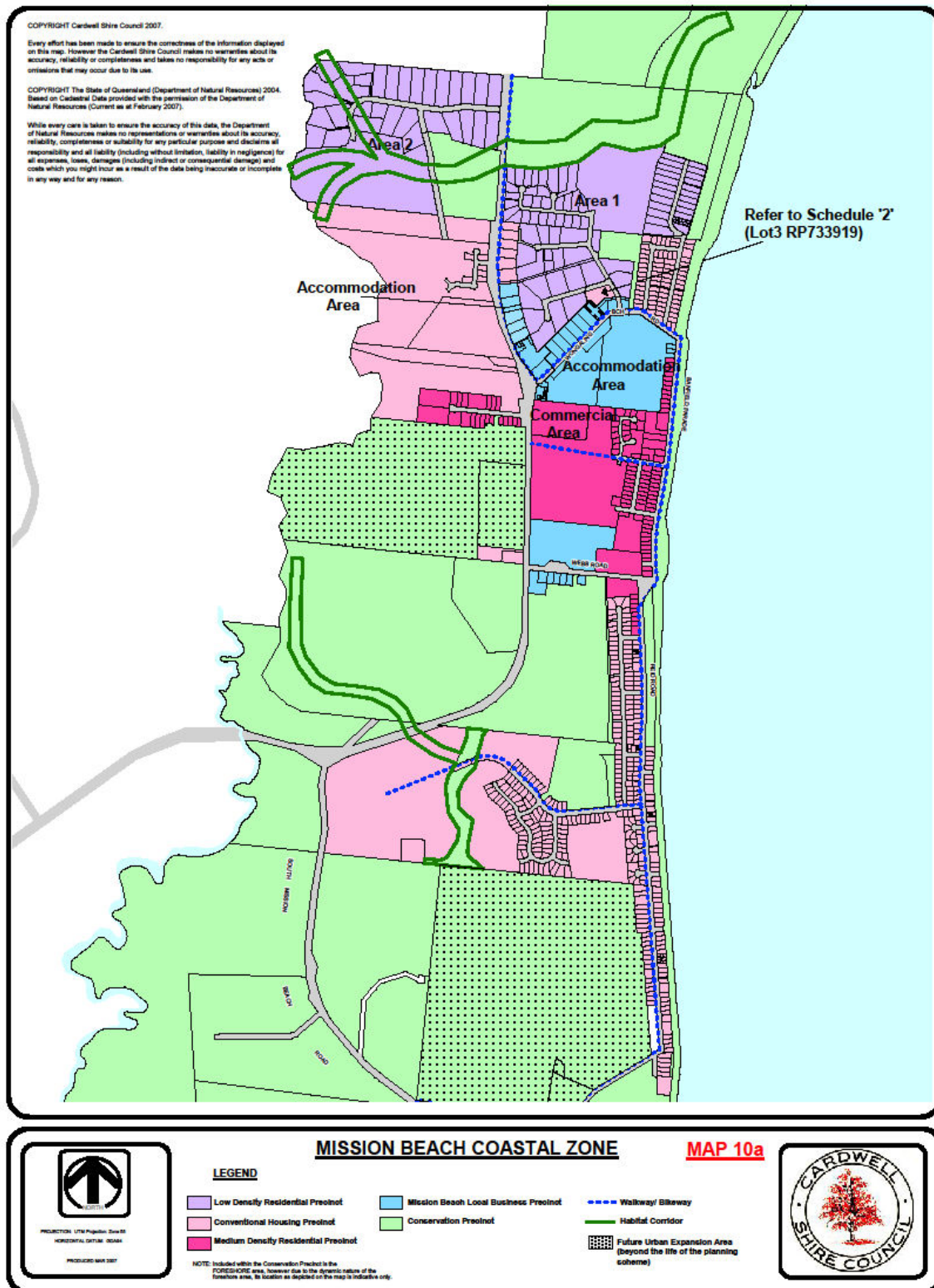


5.6 Local Government Planning Scheme

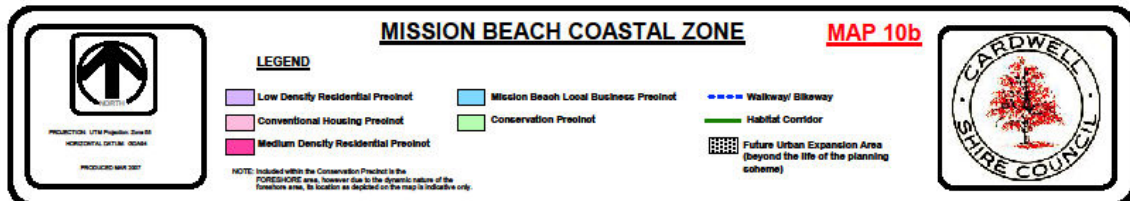
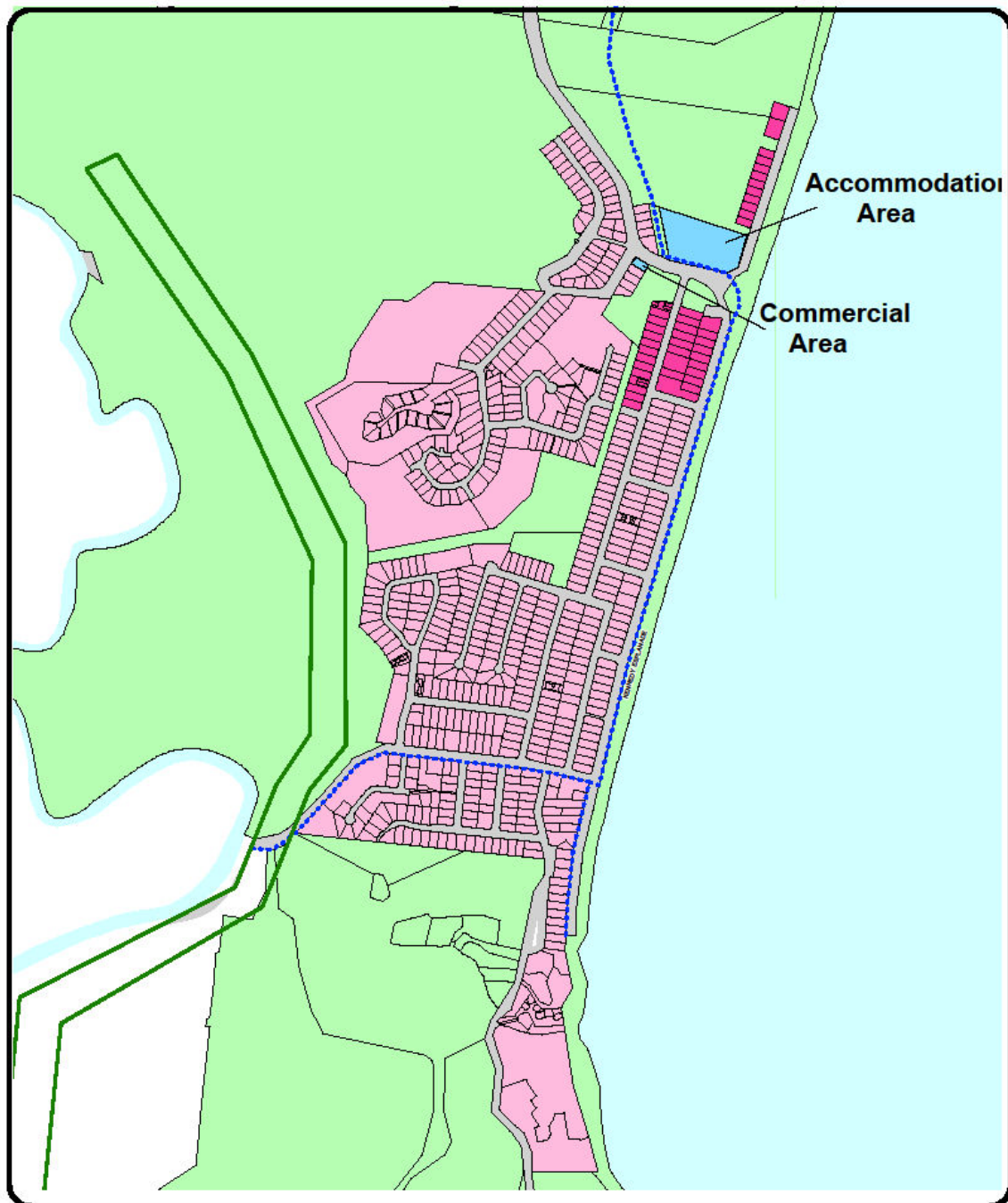
The study area is within the Cassowary Coast Regional Council area under the recent amalgamation of local councils, being previously part of the Cardwell Shire Local Government Area. The *Cardwell Shire Council Planning Scheme* (2007) continues to have effect in the area. It identifies zones within the study area for conservation and habitat linkages (see [Figure 8](#)). Habitat Linkages 1 and 5 (see [Section 6, 7 & 11](#)) are identified in the planning scheme.

Previously, the *Mission Beach Coastal Area Development Control Plan* was developed jointly by the Johnstone and Cardwell Shires in 1997 to coordinate planning for the Mission Beach Area, which was at the time split between the two shires. Within the study area, it identifies Habitat Linkages 1, 4 and 5 (see [Section 6, 7, 10 & 11](#)) as *Habitat Linkage* areas, demonstrating a long-held statutory intent for habitat linkage conservation in the study area.

Figure 8: Cardwell Shire Planning Scheme



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5.7 Recovery Plan for the Southern Cassowary

The State-approved and Australian Government-funded "National recovery plan for the Southern Cassowary *Casuarius casuarius johnsonii*" (Latch 2007) recognises that major threats to Cassowaries in the Wet Tropics include habitat loss from clearing (more than 80 per cent of coastal lowland habitat has been cleared) and habitat fragmentation, which isolates populations and disrupts movement. The overall objective of the recovery plan is to protect Cassowaries, habitats and corridors from threats through better planning, monitoring and community involvement. The recovery plan requires actions including the following:

- complete the mapping of essential Cassowary habitat and identify areas and corridors to protect, restore and manage;
- develop and implement Cassowary Conservation Local Area Plans as part of local planning;
- study the Cassowary population at Mission Beach.

State Land Planning Studies and Native Title Claims

The Dept of Environment and Resource Management (DERM) undertakes planning studies to consider the most appropriate use for unallocated state land. Two planning studies have considered various land parcels in the study area; *Wongaling-South Mission Beach State Land Strategy* and *Djiru People #3 Native Title Claimant Application QC03/06 (QUD6006/03) Planning Study*.

Djiru Traditional Owners are currently negotiating native title claims with the Queensland government for certain Lots of state land in the study area, including Lot 3 SP171843, Lot 38 USL 42219, Lot 2 SP125434 and Lot 2 SP125433. The outcomes of these studies and claims are not yet finalised. Djiru aspirations for some of the Lots include Aboriginal freehold (with some development) and reserves including traditional owner purposes and conservation. Planning regulations will apply to freeholded Lots.

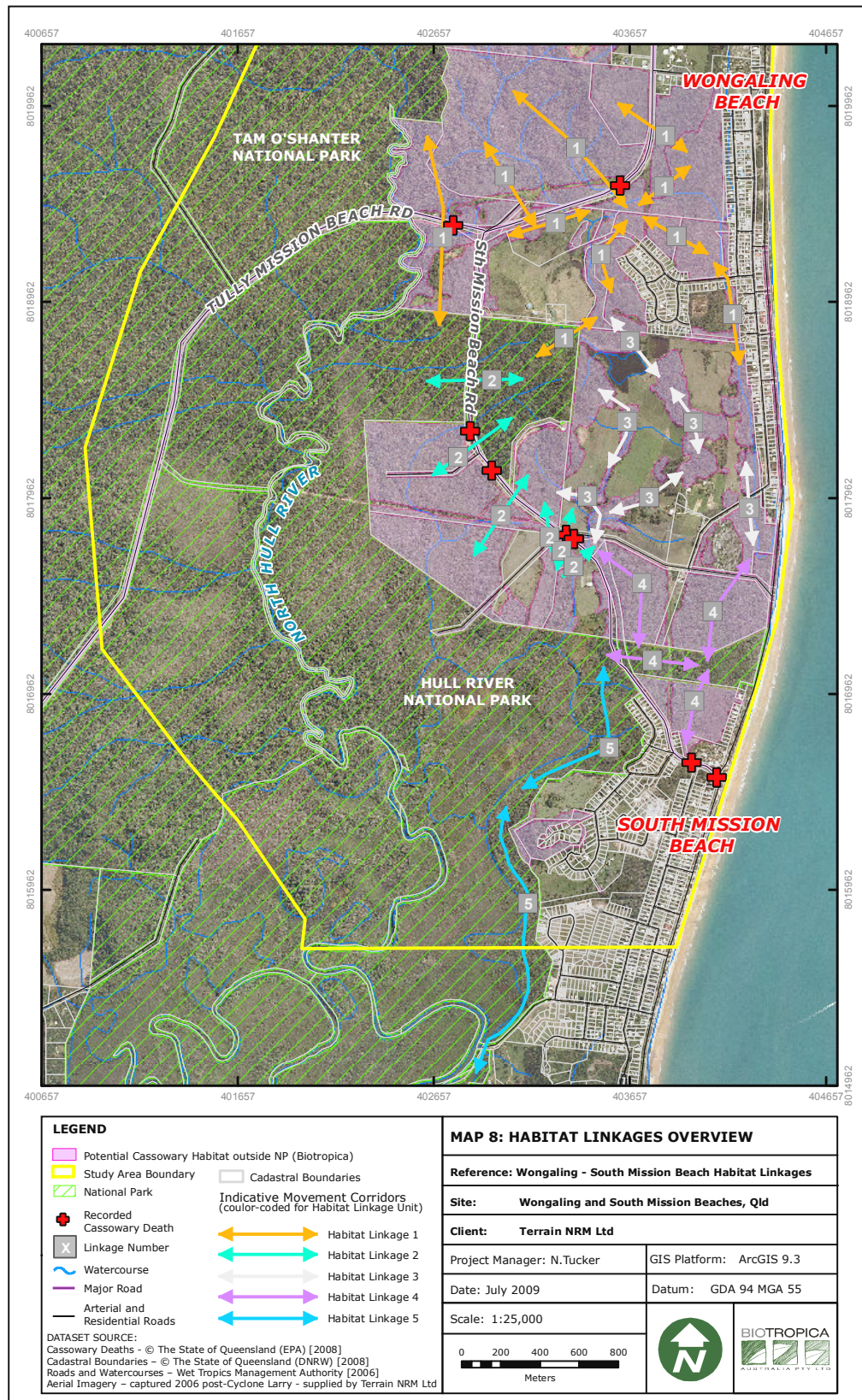
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6 Detailed Descriptions of Habitat Linkages - Overview

The five linkages described are (see [Map 8](#) for an overview): -

- Habitat Linkage 1: Tam O'Shanter National Park to Wongaling Beach and the Hull River National Park
- Habitat Linkage 2: Hull River National Park to Wongaling Beach
- Habitat Linkage 3: Wongaling Beach Internal Linkages
- Habitat Linkage 4: Hull River National Park to South Mission Beach
- Habitat Linkage 5: Hull River National Park at South Mission Beach

Figure 9: **MAP 8 - Habitat Linkages - Overview Map**



7 Habitat Linkage 1: Tam O'Shanter NP to Wongaling Beach and the Hull River NP

This linkage traverses from the Tam O'Shanter National Park through freehold lots across the Tully Mission Beach Road to the Wongaling Beach urban area, and south into the Hull River National Park. There are two main routes: the South-Eastern Route projects south-east across the Tully Mission Beach Road to the east of the South Mission Beach turn-off; and the Western Route projects south across the Tully Mission Beach Rd to the west of the South Mission Beach turn-off (see [Map 9 for an overview and Maps 9A & 9B for detailed presentation](#)). Cassowaries have been observed crossing at a number of points along this stretch of road and Cassowary deaths have been recorded in this area (EPA 2007). Freehold Lot 113 CWL3232 is critical to both routes and vital to ongoing utilisation by Cassowaries. The property also has significant wildlife habitat values.

Regional Ecosystems (REs) 7.3.10a & b, 7.12.1a & b and 7.3.25a constitute most of the native vegetation in this section. There are also areas of 7.2.1i, 7.2.8 and 7.2.9a towards the beach in the eastern portion of the area. This habitat linkage is dissected by the Tully Mission Beach Road.

Several properties within this linkage are privately owned lands. Lot 3 SP171843 and Lots 38 & 39 USL42219 (State Land) and Lot 998 & 999 RP893464 (Reserve) are public land. Adjacent land uses are unlikely to place Cassowaries at risk, with the exception of dogs wandering from adjacent residences.

7.1 Linkage 1 - Connectivity Gaps

The crossing of the Tully Mission Beach Road is the main 'connectivity gap' to be considered for Habitat Linkage 1, although given its length, it is more appropriate to consider it a linear barrier along this section. Internal gaps in vegetation cover are present at a number of points, however the low level of human presence counters this effect. C4 and others have undertaken tree planting works along the roadside, adding to its scenic amenity. Cassowary Coast Regional Council has undertaken amenity plantings at the South Mission Beach/Tully-Mission Beach Road intersection as per DMR guidelines for visibility. Plantings that reduce driver visibility may increase roadkill.

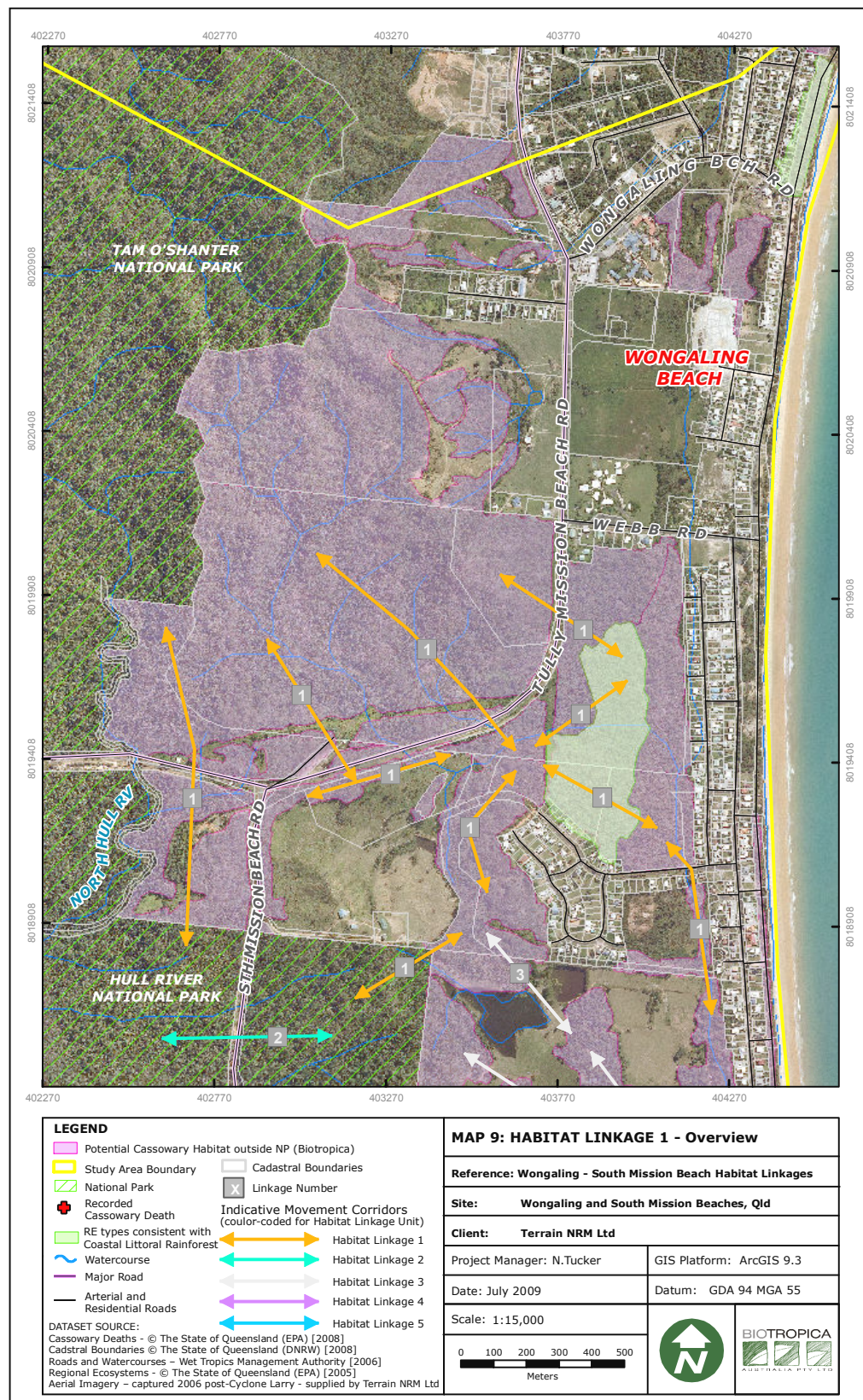
7.2 Linkage 1 - Recommendations

Remnant vegetation cover within this section is relatively high, however it may be threatened by development of larger freehold lots. Protection of existing high quality habitat should be a higher management priority than restoration of cleared lots. Lot 113 CWL3232 is critical to the linkage and as habitat in its own right. Voluntary acquisition for National Park or incentives for secure voluntary conservation agreements should be investigated as a matter of priority. State Lands and Reserves including Lot 3 SP171843, Lots 38 & 39 USL 42219 and Lots 998 & 999 RP893464 should also be included in secure conservation tenure, subject to Native Title Claim outcomes.

Internal movements between Linkage 1 and 2 are dependent on Lots 998 & 999 RP893464 and Lot 996 SP111626 / Lot 362 SP131225, and these lots should also be included in secure conservation tenures or agreements.

To the west, Lots 3 & 4 RP747499 are critical for linking National Park tenures and should be a high priority for voluntary conservation incentives.

Figure 10: **MAP 9 - Habitat Linkage1 - Overview**



7.3 Linkage 1 Detail: South-Eastern Route

[Table 2](#) and [Map 9A](#) detail properties within the south-eastern section of this linkage. This section is characterised by high quality habitat in larger lots with good connectivity. The Tully Mission Beach Road is the major barrier to movements in this section. Increasing subdivision of freehold lots forms a major threat to smaller linkages.

Of these properties, Freehold Lot 113 CWL3232 is of key importance. It has generally high quality habitat, mainly comprised of Complex Mesophyll Vine Forest, with patches of Feather Palm and Fan Palm reinforcing the low-lying nature of the property. The mesophyll vine forest sections include emergent *Ficus* sp to 35m whilst poorly drained areas closer to the Hull River are dominated by Narrow-leaf Paperbark (*Melaleuca leucadendra*). It is however, dissected by powerlines in the southern part of the property and a number of common weed species were observed within this cleared corridor. Rehabilitation of this corridor with low growing species would benefit the ecological values of the area.

Small areas of Lot 113 CWL3232 are more heavily disturbed with Brown Salwood (*Acacia mangium*), Blue Quandong (*Elaeocarpus grandis*) and Butterfly Tree (*Melicope elleryana*) indicative of past clearing. The native Captain Cook Vine (*Merremia peltata*) is also common and indicative of both natural and anthropogenic disturbance. Acquisition for inclusion in the adjacent Tam O'Shanter National Park, or a secure conservation covenant would ensure continued habitat linkage in this area.

The adjacent Lot 603 RP881736 is directly adjacent to the Tully Mission Beach Road and vegetation is generally well developed, although edge effects are prominent on three boundaries. The wedge-shaped Lot 603 RP881736 is important for cassowary movement patterns across the Tully Mission Beach Road.

A habitat linkage also exists between the State Lands of Lot 3 SP171843 and Lot 38 USL42219. These lots also contribute significantly to connectivity at a local scale, and both retain significant biodiversity values (see [Map 9A](#))

Birds are known to move south-east from Lot 113 CWL3232 across the Tully Mission Beach Road and into USL Lot 38 (EPA 2007). One crossing point appears to be through Complex Mesophyll Vine forest vegetation around a bend in the Tully Mission Beach Road. Cassowary deaths have previously been recorded at this location (EPA 2007, see [Map 9A](#)). The road reserve also includes important habitat along both the southern side of the Tully Mission Beach Road and the eastern side of the South Mission Beach Road.

Birds are also known to cross the Tully Mission Beach Road from Lot 603 RP881736 into Lot 2 SP196190 (EPA 2007, see [Map 9A](#)). This Freehold Lot has three areas of conservation covenant over the remnant vegetation (A, B & C). A revegetation project is also planned to connect roadside patches (A & B) through to the existing covenanted vegetation (C) to the east and south of the property (Biotropica 2007), using the existing drainage line through Lot 2 SP196190. The covenanted section of road-side vegetation makes an important contribution to habitat in this area, although remnant vegetation is both linear and disturbed. This patch does however contain a number of high value Cassowary food plants and the restoration of Cassowary habitat along the waterway through Lot 2 SP196190 should improve permeability through this area. Vegetation on Lot 2 SP196190 also includes a small patch of vine forest with Feather Palm (*Archontophoenix alexandre*) which has been little impacted by stock or weed invasion. As noted, this patch and the roadside remnant are protected under covenant.

Lot 2 SP196190 also contains stands of *Melaleuca leucadendra* in poorly drained areas following the existing drainage line.

The protection of Lot 113 CWL3232 (Freehold) should be encouraged through conservation incentives. Protection of Lots 3, 38, 39, (all State Land) and Lots 998 & 999 RP893464 (Reserve) is suggested and it is appropriate that all be included in a secure conservation covenant or similar tenure, subject to negotiations with Native Title claimants. Freehold Lots 996 SP111626 & 362 SP131225 and Reserve Lots 998 & 999 RP893464 form a crucial linkage corridor and are habitat in their own right. They contain high quality habitat (littoral rainforest in eastern part of Lot 362 SP131225) and a total corridor width of around 160m at the narrowest point. Lots 998 & 999 RP893464 are around 50-70m wide and the Freehold Lots 996 SP111626 & 362 SP131225 make an important contribution to habitat in this linkage. This linkage is significant, being the only remaining linkage in this area which retains ecological integrity. It joins northern areas of Linkage 1 to the Hull River National Park and Linkage 2, allowing birds several movement options in and out of the Wongaling Beach area. It contains areas of "Of Concern" RE 7.3.25a and is also one of the last remaining patches of Mahogany Glider Habitat in the area.

Habitat connectivity between Lots 994 SP111626 and Lot 1 SP106832 is tenuous. Habitat quality and vegetation cover in Lot 1 SP106832 is poor and provides a barrier to movement from the south, pushing movement to the west.

The following blocks can be considered the highest value areas, combining fresh water with higher quality habitat: Lot 113 CWL3232, Lot 3 SP171843, Lot 603 RP881736, Lot 362 SP131225, Lot 996 SP111626, Lot 998 & 999 RP893464, Lots 38 & 39 USL42219, Lot 994 SP111626 and Lot 999 RP862629. All of these properties should be considered for a higher level of protection incentive.

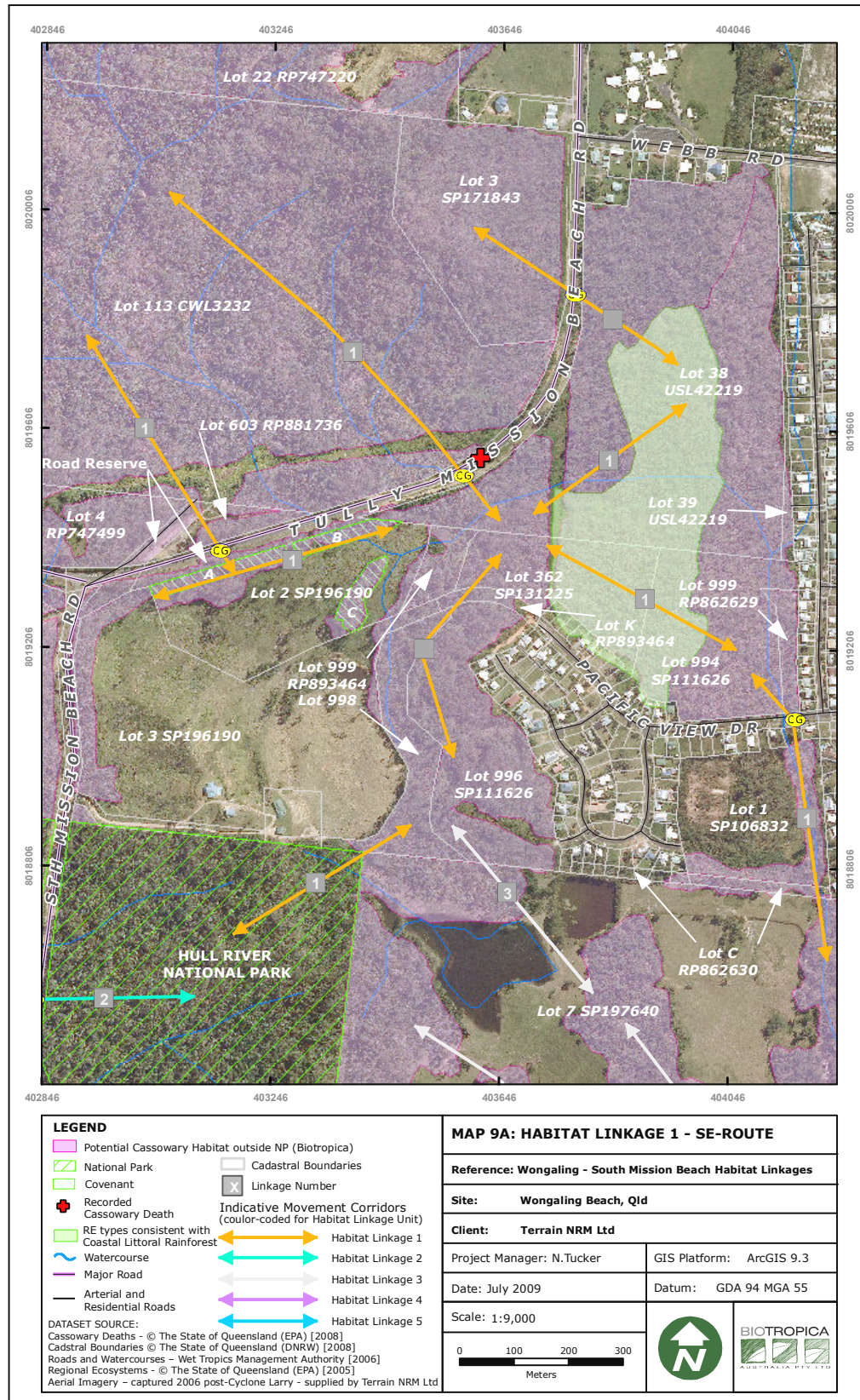
Table 2: Properties forming Linkage 1 –South-Eastern Route

Lot & Plan	Tenure*	Area	Comment
Lot 22 RP747220	FH	47.9Ha	Mapped Cassowary Habitat (EPBC). REs 7.12.1a and 7.12.1b. Contains high quality habitat. Borders the Tam O'Shanter NP. Approx. 80% remnant vegetation cover remains, cleared area towards eastern part of block.
Lot 113 CWL3232	FH	62.6Ha	Mapped Cassowary Habitat (EPBC). REs 7.12.1a, 7.12.1b and 7.3.25a. Crucial linkage property for known movements to east and south. Southern part of block dissected by powerlines, otherwise vegetation cover intact.
Lot 3 SP171843	SL	10.4Ha	Mapped Cassowary Habitat (EPBC). REs 7.12.1a. High quality habitat. Subject to Native Title Claim.
Road Reserve	Road	0.5Ha	Minor disturbance evident. Small road reserve between Lots 603 and 4. Mapped as a "Disturbed" RE.
Lot 603 RP881736	FH	1.1Ha	Mapped Cassowary Habitat (EPBC). RE 7.3.25 however mapped as "Disturbed". Habitat quality high. Small unformed road dissects property. Crucial linkage property. Southern border is Tully Mission Beach Rd. Small riparian area.

Lot & Plan	Tenure*	Area	Comment
Road Reserve	Road	approx. total 3Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.10b, 7.12.1b, 7.3.25a. Small linear fragment along road. Important linkage along the southern side of the Tully Mission Bch Rd and along the eastern side of the Sth Mission Bch Rd (up to NP boundary). High quality habitat.
Lot 2 SP196190 (incl. Lots A, B,C)	FH (CV)	8.5Ha (1.6Ha)	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.5a, 7.3.10b and 7.3.25a. Conservation covenant over vegetated portions of the property. Habitat restoration underway between remnant vegetation patches. Lot mostly cleared with approx. 28% vegetation cover remaining (mostly under covenant).
Lot 3 SP196190	FH	18.8Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.12.1a and b, 7.3.10b, 7.3.25a. Lot mostly cleared. Borders Hull River National Park to south. Small fragments of habitat along property boundary adjacent to Sth Mission Beach Rd form linkage from north to south along the road.
Lots 38 & 39 USL42219	USL	27.9 & 0.7Ha	Mapped Cassowary and Mahogany Glider Habitat, Coastal Littoral Rainforest (EPBC). REs 7.3.10a, 7.12.1a, 7.3.25a, 7.2.1i, 7.2.8 and 7.2.9a. Crucial linkage - known movements. High habitat quality. Small linear clearing in western part of lot 38. Subject to Native Title Claim.
Lot 362 SP131225 (& Lot K RP893464)	FH (EA)	5.3Ha (0.5ha)	Mapped Cassowary and Mahogany Glider Habitat, Coastal Littoral Rainforest (EPBC). REs 7.3.25a (west), 7.2.1i east). High quality habitat. Crucial linkage block. Small linear clearing through middle of block. Easement along southern boundary of western section.
Lot 998 RP893464	RE	3.3Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE 7.3.25a. Small drainage reserve. High quality habitat. Crucial linkage property.
Lot 999 RP893464	RE	1ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE 7.3.25a. Small drainage reserve. High quality habitat. Crucial linkage property.
Lot 999 RP862629	RE	0.8Ha	Mapped Cassowary Habitat (EPBC). RE 7.2.8. Drainage Reserve. Connectivity Gap across Pacific View Drive between this lot and Lot 1 to the south.
Lot 996 SP11626	FH	8.1Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE 7.3.25a. High quality habitat. Crucial linkage property.
Lot 994 SP11626	FH	7.1Ha	Mapped Cassowary and Mahogany Glider Habitat, Coastal Littoral Rainforest (EPBC). RE 7.2.1i, 7.2.9a, 7.2.8. High quality habitat.
Lot 1 SP106832 (& Lot C RP862630)	FH (EA)	3.7Ha (0.9Ha)	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE 7.2.8. Property mostly cleared. Remnant vegetation along drainage lines (along boundary). Habitat degraded. Drainage easement on southern boundary of property. Possibly no longer used by Cassowaries.

* FH = Freehold; SL = State Land; USL = Unallocated State Land; RE = Reserve; EA = Easement; CV = Covenant

Figure 11: **MAP 9A - Habitat Linkage1 – South-eastern Route**



7.4 Linkage 1: Western Route

Table 3 and Map 9B details properties within the western section of this linkage. The Hull River National Park is not included in this table because of its existing protected status.

Both Lot 3 RP747499 and Lot 4 RP747499 are critical to the linkage and join the Tam O'Shanter National Park to the north and west with the Hull River National Park to the south of Lot 3. Importantly this linkage is on the eastern side of the North Hull River. This forms a continuous linkage of habitat north to south, framed on either side by the South Mission Beach Rd in the east and the North Hull River in the west. The Tully Mission Beach Road is the major linear barrier and Cassowary deaths have been recorded along this stretch of road (EPA 2007). However, the North Hull River crossing allows birds better access beneath the road / bridge in relative safety and continued restoration of areas adjacent to the North Hull River bridge is recommended. Sand tracking has demonstrated common usage of the North Hull River bridge underpass by cassowaries (pers. comm. Dr Miriam Goosem, JCU, 2009).

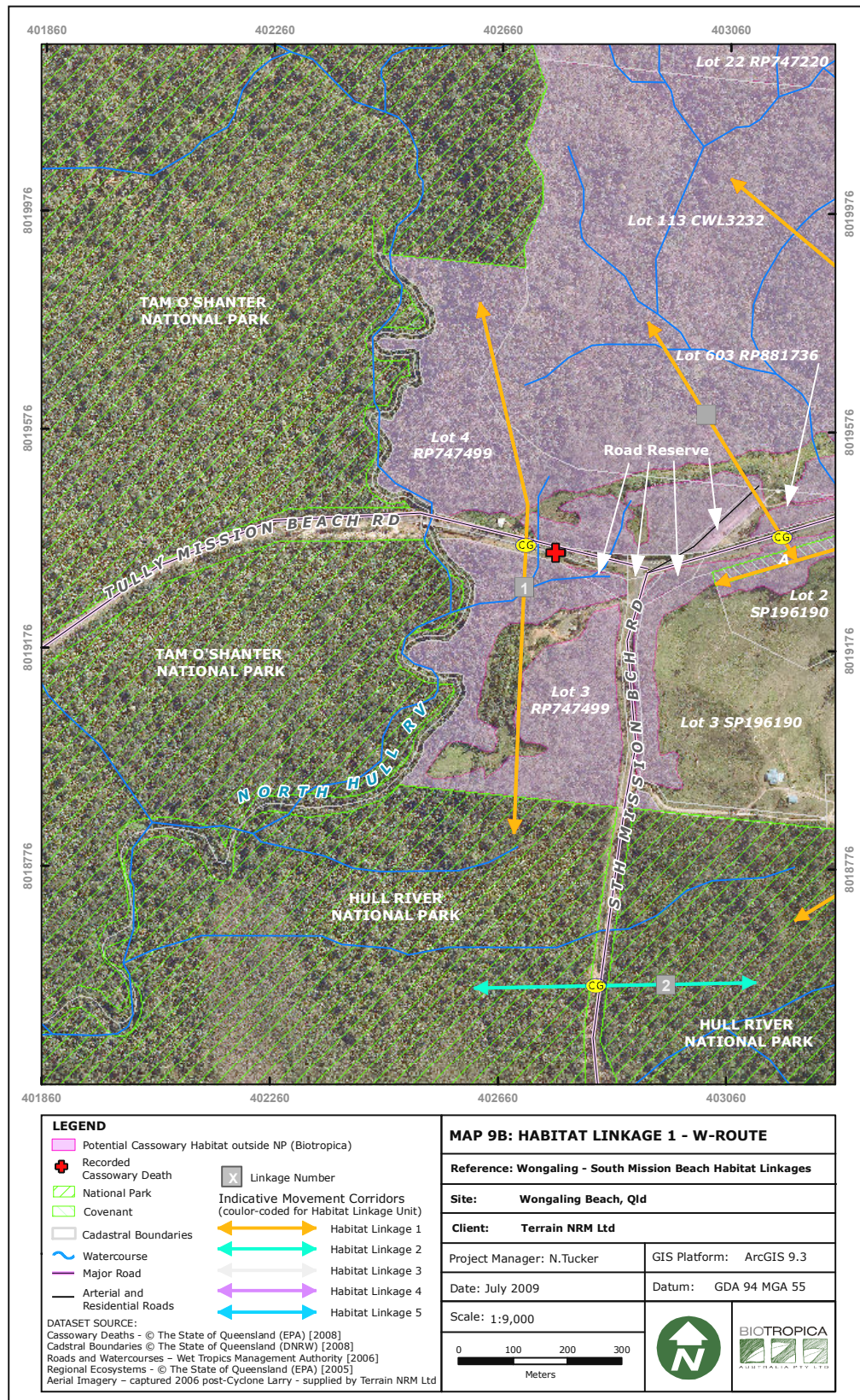
Habitat quality in both lots is high, although the *Acacia*-dominated canopy and the prevalence of secondary species is indicative of past disturbance. Due to the critical nature of this linkage, and in particular its proximity to the Hull River, both Lot 3 RP747499 and Lot 4 RP747499 should be considered for a higher level of protection incentive.

Table 3: Properties forming Linkage 1 – Western Route

Lot & Plan	Tenure*	Area	Comment
Lot 4 RP747499	FH	13.9Ha	Mapped Cassowary Habitat (EPBC). REs 7.12.1a, 7.12.1b, 7.3.10a. Crucial linkage property for known movements. Borders Tam O'Shanter NP to west and north. Includes the North Hull River which has continuous riparian vegetation to Rockingham Bay exit. Fragmented towards south-eastern part of property. Southern border is Tully Mission Beach Rd.
Lot 3 RP747499	FH	13.6Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.10a, 7.3.10b and 7.12.1b. Crucial linkage property for known movements. Partially cleared, approx. 76% remnant vegetation remains. High quality habitat. Includes the North Hull River which has continuous riparian vegetation to Rockingham Bay exit. Borders the North Hull River and the Tam O'Shanter NP to the west and the Hull River NP to the south.

* FH = Freehold

Figure 12: **Map 9B - Habitat Linkage 1 – Western Route**



8 Habitat Linkage 2: Hull River National Park to Wongaling Beach

This linkage joins the Hull River National Park and a Reserve Lot on the eastern side of the South Mission Beach Road, with State Lands and Reserves (partly under Lands Lease) on the western side (see [Table 4](#) and [Map 10](#)) of the road. The northern part of the linkage is directly through the Hull River National Park. While crossing points are marked on [Map 10](#), birds are likely to move across the road at any number of points, and several Cassowary deaths have been recorded along this section of road (EPA 2007). Habitat quality is high in most parts of the linkage and all of the relevant properties are State lands. [Table 4](#) below details lots within this linkage, except the National Park areas.

While the Hull River National Park to the west of the linkage provides protected vegetation cover, the area to the south-west is dissected by the North Hull River and is predominantly mangrove and associated environments. This restricts Cassowary movement to the habitat closer to the South Mission Beach Road within Linkage 2. South of this area, Cassowary movement becomes increasingly constrained between the North Hull River and urban subdivisions.

The Hull River NP contains a number of vegetation communities principally reflecting drainage conditions. Mangroves are present over large areas and these forests are flanked by sclerophyll and mesophyll vegetation. Vegetation is continuous along the margins of the river and this is an important connection at a landscape scale, traversing the area between Rockingham Bay to the south and Clump Mountain NP to the north.

Remnant vegetation cover is high in most of the linkage representing Regional Ecosystems 7.12.1a & b, 7.3.4, 7.3.5a, 7.3.7a, 7.3.8a, 7.3.10c, 7.3.19e and 7.3.23b. This vegetation is a combination of swamp/wetland communities, mesophyll to notophyll vine forest and open forest with a vine forest understorey. Approximately half of the remaining vegetation is listed as either *Of Concern* or *Endangered* under the Vegetation Management Act 1999. Vegetation adjacent to roadsides is edge-affected and was significantly disturbed by Cyclone Larry, the impacts of which are especially obvious on the eastern side of the South Mission Beach Road.

Lot 3 SP125434 (Reserve) is an important property for linkage purposes. This lot is adjacent to Hull River NP and also provides an intimate connection to forests on the south-western side of the South Mission Beach Road. Roadkills have been recorded adjacent to the block, a feature of this entire section of the South Mission Beach Road.

Lot 2 SP125434 and Lot 4 SP125434 increase the corridor width of suitable habitat on the west – south-western side of the South Mission Beach Road and allow birds to move north-south between the mangroves and the road. An impediment to Cassowary movement within this linkage is the area around the intersection of the South Mission Beach Road and the Wongaling Beach turn-off (towards Wheatley Rd). Cassowary deaths have been recorded along the road in this area. Linear barriers occur due to clearing on both sides of the road, and the road itself.

It should be noted that the south-eastern portion of Lot 4 SP125434 (south-east of the Community Centre) was largely devoid of vegetation in 1990. A vegetation survey at the time recorded 38 native species in an area of approximately 2ha (N. Tucker pers. Obs. January 1990). At that time native vegetation occurred singly or in clumps to 3m high, interspersed with Guinea Grass and other exotic shrubs and grasses. C4 and QPWS undertook restoration works on the property in 1993/94 in recognition of its habitat connectivity value and the area has regenerated well with a now closed canopy. A survey in March 2009 reached 38 species

in a 10m x 10m area, emphasizing the diversity of species which now occupy the site. The canopy exceeds 20m in places, dominated by Blue Quandong, Sarsaparilla (*Alphitonia incana*) and Brown Salwood. The sub-canopy to 15m is comprised of a diverse range of Cassowary food plants including White Apple (*Syzygium forte*), Native Olive (*Chionanthus ramiflorus*), Brown Beech (*Litsea leefeana*) and various other *Lauraceae* including *Cryptocarya vulgaris* and *C. grandis*. In 20 years restoration has converted a grazing block into habitat of increasing quality, an indication of what is possible using restoration to achieve conservation objectives.

8.1 Linkage 2 - Connectivity gap

The connectivity gap in this linkage is the area around the intersection of the Wongaling Beach turn-off (towards Wheatley Rd) and the South Mission Beach Road. Birds are constrained in their north-south movements on the eastern side of the road due to the clearing of Lot 7 SP197640 (see [Map 10](#)). Birds are further constrained on the western side of the road by clearing in the eastern half of Lot 4 SP125434 (Reserve) and the saline environments further to the west.

Revegetation around the eastern part of Lot 4 SP125434 and along the road would encourage bird movement through this area. Some tree-planting has been undertaken around the South Mission Beach Recreational/Sporting grounds. Some vegetation there is conflicting with clearance zones under powerlines. Liaison with Ergon Energy is required to manage vegetation beneath this powerline to allow suitable smaller species to be retained.

In the longer term, a review of the grazing lease (Lot1,A & B AP5929 (LL: PO215205) over Lot 4 SP125434 is required. In the shorter-term, it is suggested that some liaison take place with the lessee to undertake rehabilitation measures over part of the cleared grazing lands, and amend the fencing configuration to widen the habitat available at this point.

Additionally, the South Mission Beach Road is a major linear barrier, with birds likely to cross along this section of the road. There is potential at the turn-off to Wongaling Beach to either retro-fit an underpass or install traffic calming and a signed crossing point. An “over-road” crossing in this area would be combined with wildlife exclusion fencing to guide birds to the crossing.

8.2 Linkage 2 - Recommendations

All of the lands in this linkage are State lands. Lot 2 SP125434 is subject to Native Title Claim. A long-term phase-out of the grazing lease over parts of Lot 4 SP125434 and rehabilitation of cleared areas should be investigated. Explicit protection for conservation purposes is recommended for all lands in this linkage.

Road crossing points are required across the South Mission Beach Road. As a priority a crossing point in the area of the turn-off to Wongaling Beach is required. Any rehabilitation should however be done as part of a more thorough review of the intersection. Roadkills at this intersection, and its proximity to larger habitat blocks, suggest it will remain problematic until a much more sensitive design is constructed.

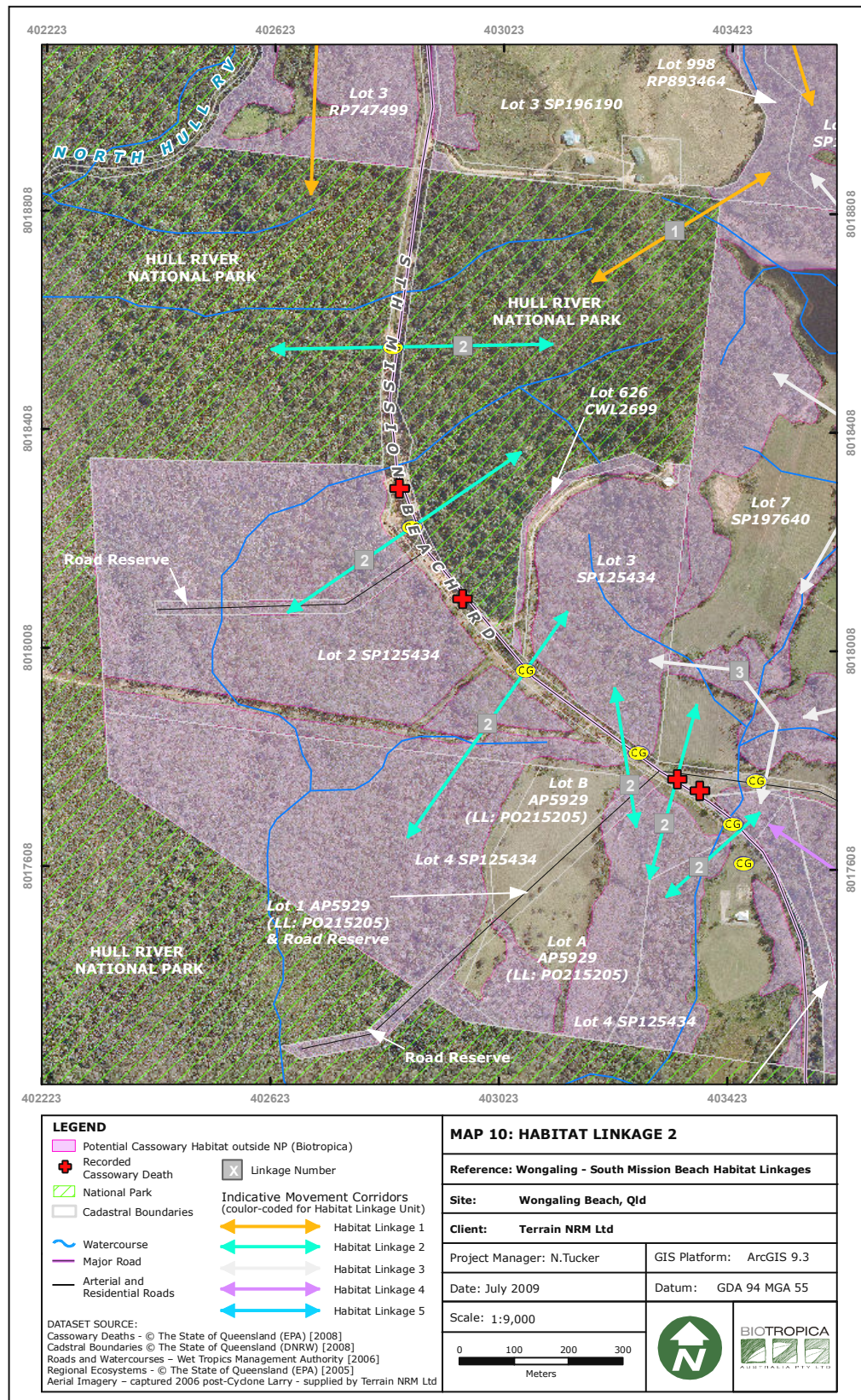
Rehabilitation of a movement corridor through cleared areas in Lot 4 SP125434 should be a priority. Liaison with Ergon Energy is required to manage vegetation under powerlines to allow suitable smaller species to be retained.

Table 4: Properties forming Linkage 2 – Hull River National Park to Wongaling Beach

Lot & Plan	Tenure*	Area	Comment
Lot 2 SP125434	SL	31.9Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.4, 7.3.5a, 7.3.19e, 7.3.8a, 7.3.10c, 7.3.7a, 7.12.1a, 7.12.1b. Good quality habitat. Important linkage property. Borders Hull River NP to the north and west. Subject to Native Title Claim.
Road Reserve (dissecting Lot 2 SP 125434)	Road	1.2Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.12.1a, 7.3.19e, 7.3.7a. Fully intact habitat, except for a small cleared area adjacent to South Mission Beach Road.
Lot 3 SP125434	RE	11Ha	Mapped Cassowary Habitat (EPBC). RE 7.12.1a. High quality habitat. Crucial linkage area. Borders the Hull River NP to the north and west.
Lot 626 CWL2699	RE	1.1Ha	Mapped Cassowary Habitat (EPBC). REs mainly "Disturbed" and some 7.12.1a. Cleared for infrastructure access.
Lot 4 SP125434 (additionally: Lands Lease: PO215205 on Lot B AP5929)	RE (LL)	23.3Ha (3Ha)	Lot divided by road reserve. Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.8a, 7.3.7a, 7.3.5a, 7.12.23b. Constitutes linkage property associated with known movements. Borders Hull River NP to the south-west. Habitat quality high in north-western part of lot. Eastern corner (mainly Lot B) cleared for grazing.
Lot 4 SP125434 (additionally: Lands Lease: PO215205 on Lot A AP5929)	RE (LL)	21.5Ha (9.9Ha)	Lot divided by road reserve. Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.3.5a, 7.3.19e. Important linkage property near known movements. Borders Hull River NP to the south, but this section of the lot is fragmented. Cleared for grazing towards north-western border. Cleared area in the eastern section supports community recreation/sporting facilities towards South Mission Beach Road boundary. Some rehabilitation planting underway along road near community facilities. Powerline clearance zone conflicts with this revegetation.
Lot1 AP5929 (Lands Lease: PO215205) (Also Road Reserve)	LL	1.25Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE "Disturbed". Partially cleared. Fragmented habitat.
Road Reserve (dissecting Lot 4 SP 125434; includes Lot 1 AP5929)	Road	2.5Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE "Disturbed". Road reserve partially cleared; only far SW section RE 7.3.5a. Fragmented habitat.

* SL = State Land; LL Lands Lease; RE = Reserve

Figure 13: **MAP 10 - Habitat Linkage 2**



9 Habitat Linkage 3: Wongaling Beach Internal Linkages

This 'internal' linkage habitat joins to main Habitat Linkages 1, 2 and 4. It allows Cassowary movement on the eastern side of the South Mission Beach Road, and between the Wongaling Beach and South Mission Beach areas.

Lot 7 SP197640 is an important property for movements in the area. This large Freehold Lot is more than 50% cleared with fragmented linear patches of remnant vegetation along the creek and ridge lines. Movement patterns through this lot are presumed to predominantly follow remnant vegetation (EPA 2007). The property contains a major north-south connection on the eastern side of the South Mission Beach Road and in this way provides habitat continuity into Lot 113 CWL3232 via Lots 998 & 999 RP893464 (see [Habitat Linkage 1](#)). Lot 7 SP197640 also contains a good supply of fresh water. "Recent Cassowary Crossing" signage (April 2009) at the south-eastern corner of the Wheatley Road frontage indicates that birds are also moving between Lots 3 RP723365 and Lot 7 SP197640. Historical clearing, access to water and habitat towards the western and southern side of Lot 7, appears to funnel birds to the intersection of the South Mission Beach Road and the turn-off to Wongaling Beach. Rehabilitation of the south-western corner of this lot would significantly enhance the width of habitat through this point, but would bring birds towards the South Mission Beach Road.

Lot 3 RP723365 forms an important connection across Wheatley Road. This property contains Regional Ecosystem 7.2.7a and 7.2.3c, both of which are classed as *Of Concern* under the *Vegetation Management Act 1999*. Within RE 7.2.7a two clumps of the locally significant plant *Lomandra banksii* occur at its southern distributional limit (Biotropica 2006). Correspondence with the Queensland Herbarium confirmed that Cowley Beach south of Innisfail was the previous most southern limit for this species, and this record extends its known range by 50kms to the south. Lot 11 RP722604 strengthens the habitat linkage function of Lot 3 RP 723365 and provides connectivity with the foreshore.

Adjacent to Lot 7 SP197640 is Lot 8 SP197640, which abuts covenanted Lot B SP197640 adjacent to Wheatley Creek. The vegetation along the creek includes remnants of the original mesophyll vine forest vegetation including emergent *M. leucadendra*, permanent water and a wider strip of vegetation to the west where land use is less intense. To the south the vegetation is more dominated by mangroves limiting its utility for terrestrial wildlife. No maintenance is required apart from ensuring that vegetation is not compromised by incursions from either side, and adjacent land-holders are discouraged from dumping weeds into Lot B at the rear of properties. It would be desirable to seek protection through an incentive program for the adjacent riparian vegetation on the far eastern side of Lot 7 SP197640.

Remnant vegetation cover in the western and southern parts of the linkage is predominantly mesophyll to notophyll vine forest as RE 7.12.1a in Lot 3 SP125434 and open-forest as RE 7.12.23b in Lot 5 SP125434. Towards the beach, wetlands, mangroves, and beach dune assemblages dominate as REs 7.1.1, 7.2.3c & e, 7.2.7a, 7.2.9a and 7.3.5a. Approximately half of the remnant vegetation within this linkage is listed as *Of Concern* under the *Vegetation Management Act 1999*.

9.1 Linkage 3 - Connectivity gap

Gaps occur throughout Lot 7 SP197640 and along Wheatley Road. The major gap is represented by Wheatley Road, which tends to align movement toward the South Mission Beach – Wongaling Beach intersection, placing wildlife at elevated risk. However, the complex array of habitat amongst roads and powerlines means that Cassowary encounters may be frequent and from multiple source points.

It will be important to ensure that roads do not create another barrier if Lot 3 RP723365 is developed along the gazetted road reserve on the property's southern boundary.

Securing internal and external habitat connectivity may be improved by securing the future of habitats on Lot 7 SP197640. The value of this internal habitat network would be significantly improved through restoration works.

9.2 Linkage 3 - Recommendations

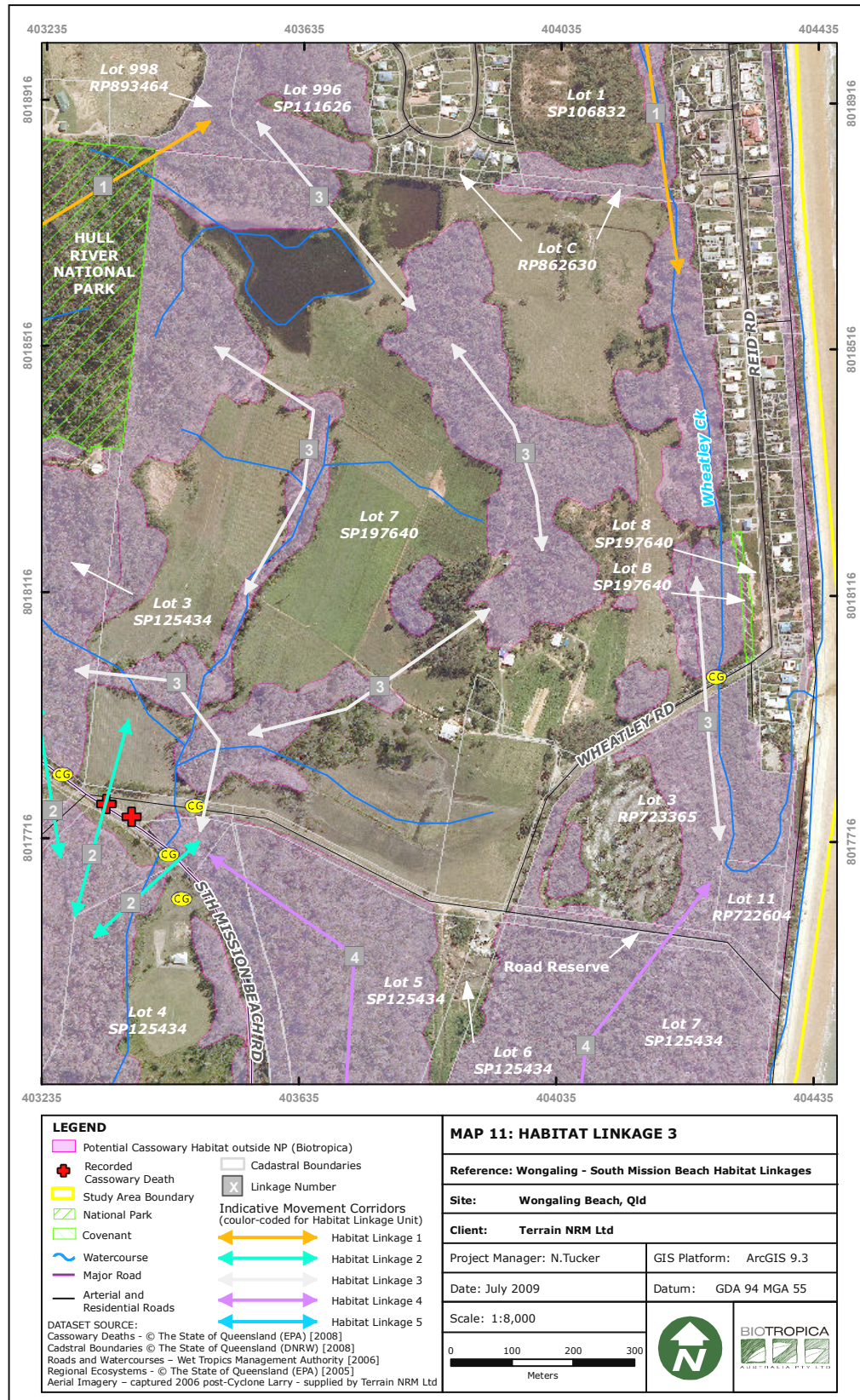
Lot 7 SP197640 and Lot 3 RP723365 are important properties for linkage function and as habitat in their own right. Voluntary protection through conservation incentives should be sought for existing habitats and linkages. On Lot 7 SP197640, the largest remnant in the centre, as well as riparian vegetation and habitats adjacent to Lot B SP197640 (on the eastern boundary) and to Lot 998 RP893464 (at the north-western boundary corner) are particularly important.

Table 5: Properties forming Linkage 3 – Wongaling Beach Internal Linkages

Lot & Plan	Tenure*	Area	Comment
Lot 3 SP125434	RE	11Ha	Mapped Cassowary Habitat (EPBC). RE 7.12.1a. High quality habitat. Important property for linkage purposes. Borders the Hull River NP to the north and west.
Lot 7 SP197640	FH	91.8Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). Crucial linkage property. Fragmented, 38% vegetation cover remaining, with lower quality habitat. Permanent water sources on the property.
Lot 8 SP197640 (and Lot B SP197640)	FH (CV)	0.7Ha (0.3Ha)	Mapped Cassowary and Mahogany Glider Habitat (EPBC). Lot 8 has virtually no vegetation cover. Lot B is covenanted.
Lot 3 RP723365	FH	10.4Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.2.3c and 7.1.1. Fragmented, 63% cover remains. Important north-south linkage. Connectivity point at NE corner across Wheatley Rd. "Recent Cassowary Crossing" signage at this point.
Road Reserve (between Wheatley Rd and Wongaling Beach)	Road	1.4Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.2.3c, 7.1.1 and 7.2.7a. Public access to beach and Lot 11 RP 722604. Sand track only, through good quality habitat.
Lot 11 RP722604	FH	1.4Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.2.3c, 7.2.7a, 7.1.1. Good quality habitat.

* FH = Freehold; RE = Reserve; CV = Covenant

Figure 14: **MAP 11 - Habitat Linkage 3**



10 Habitat Linkage 4: Hull River National Park to South Mission Beach

This linkage joins the Hull River National Park from west to east across the South Mission Beach Road (see [Map 12](#)). The road forms a north-south linear barrier and Cassowary deaths have been recorded in this area (EPA 2007). To the south the linkage is broken by residential development in the South Mission Beach urban area. This constrains birds to move west through Habitat Linkage 5 to travel further south. The linkage is comprised mainly of State lands of high quality habitat. It is one of the best east-west habitat linkages in the broader Mission Beach area, and in north Queensland, with good habitat from the Wet Tropics World Heritage Area in the west to the beachfront in the east. [Table 6](#) below details properties within this linkage.

Lots 5, 6 & 7 SP125434 (Reserve) form a large block of approximately 32 Ha of good quality habitat on the northern border of the Hull River National Park. This block of habitat is dissected by a cleared powerline corridor of between 20 and 50m wide. These lots are critical to the north-south linkage on the eastern side of the South Mission Beach Road.

On the southern border of that Hull River National Park section, Lot 2 SP125433 (State Land) also forms a large block of high quality habitat. The lot is also dissected by the cleared power line corridor and weeds are evident through this cleared area. This lot is subject to Native Title Claim.

A narrow linear strip of high quality habitat intersects the above-mentioned blocks of remnant vegetation and forms part of the Hull River National Park. The National Park is narrow in this area (about 160m wide) and the adjacent lots to the north and south are therefore critical to continuing habitat integrity and ecological function in this area. Lots 5, 6 & 7 add approximately 400m to the corridor width to the north, and Lot 2 adds around 200m to the south. Together, the National Park and the bordering lots to the north and south form a continuous block of high quality habitat of between 600 and 850 m wide (north-south) and between 300 and 700m long (west to east); an area of about 53Ha.

This block of remnant vegetation is of significant habitat importance both within the study area, and also within the wider Mission Beach area. It arguably forms the best remaining stand of more-or-less intact remnant vegetation from the Wet Tropics World Heritage Area and National Parks in the west, to the foreshore and Great Barrier Reef World Heritage Area in the east. Elsewhere in the region coastal lowland linkages are usually broken by residential development along the foreshore, or have fragmented connectivity due to clearing. These lands form a linkage which is effectively continuous from the beach through to the foothills and highlands west of Mission Beach. The value of this connection is elevated by the domination of mesophyll vine forest through the linkage. Further south, the Hull River NP also provides an almost continuous linkage, although large sections of mangroves limit its utility for terrestrial wildlife, in addition to the linear barrier posed by the wide and meandering Hull River. Elsewhere habitat quality is high and vegetation cover is close to 100%.

Increased protection of habitat of Lots 5, 6 & 7 SP125434 through a secure conservation covenant or conversion to National Park should be a priority. Subject to Native Title Claim outcomes, increased protection of Lot 2 SP125433 is also recommended. Rehabilitation of the cleared powerline corridor with suitable low-growing species, while ensuring compatibility with pedestrian and bicycle use is also desirable. Together with actions to improve vegetation cover in Lot 4 SP125434 and road crossing points, these actions have the potential to provide a significant block of high quality habitat cover with continuous west-east connectivity.

A small 'wetland' in Lots 2591 CWL2688 (Freehold) and Lot 3 SP125433 (Reserve) runs to the west of the cleared area of the South Mission Beach Caravan Park and joins with the habitat corridor above. There are anecdotal reports of Cassowaries using this crossing point and Cassowary deaths have been recorded in that area (EPA 2007). The wetland on either side of the road represents *Endangered* RE 7.3.7b.

Forests within this linkage are a combination of open forests on beach ridges and coastal foothills with a vine forest understorey (REs 7.2.3, 7.2.7, 7.12.23, 7.3.19) and wetlands (REs 7.2.9, 7.3.5, 7.3.7). The majority of the remnant vegetation is listed as *Of Concern* under the *Vegetation Management Act 1999*.

10.1 Linkage 4 - Connectivity gap

Habitat Linkage 4 is broken by the South Mission Beach Road, compromising the east-west connectivity of this linkage, and by powerline infrastructure across the entire north-south extent of the linkage

While birds move into the high quality habitat on the eastern side of the South Mission Beach Road, connectivity to the south is broken by residential development pushing birds onto urban streets. There have been Cassowary deaths along the stretch of road adjacent to the South Mission Beach Caravan Park. Action may be required along this stretch of road to coax birds back to the north and west to more suitable linkages.

10.2 Linkage 4 - Recommendations

Increased protection of habitat in Lots 5, 6 & 7 SP125434 and Lot 2 SP125433 (all State land) through a secure conservation covenant or conversion to National Park is recommended.

Liaison with Ergon Energy is required to manage vegetation under the Lot 6 / NP / Lot 2 powerline to allow revegetation with suitable species.

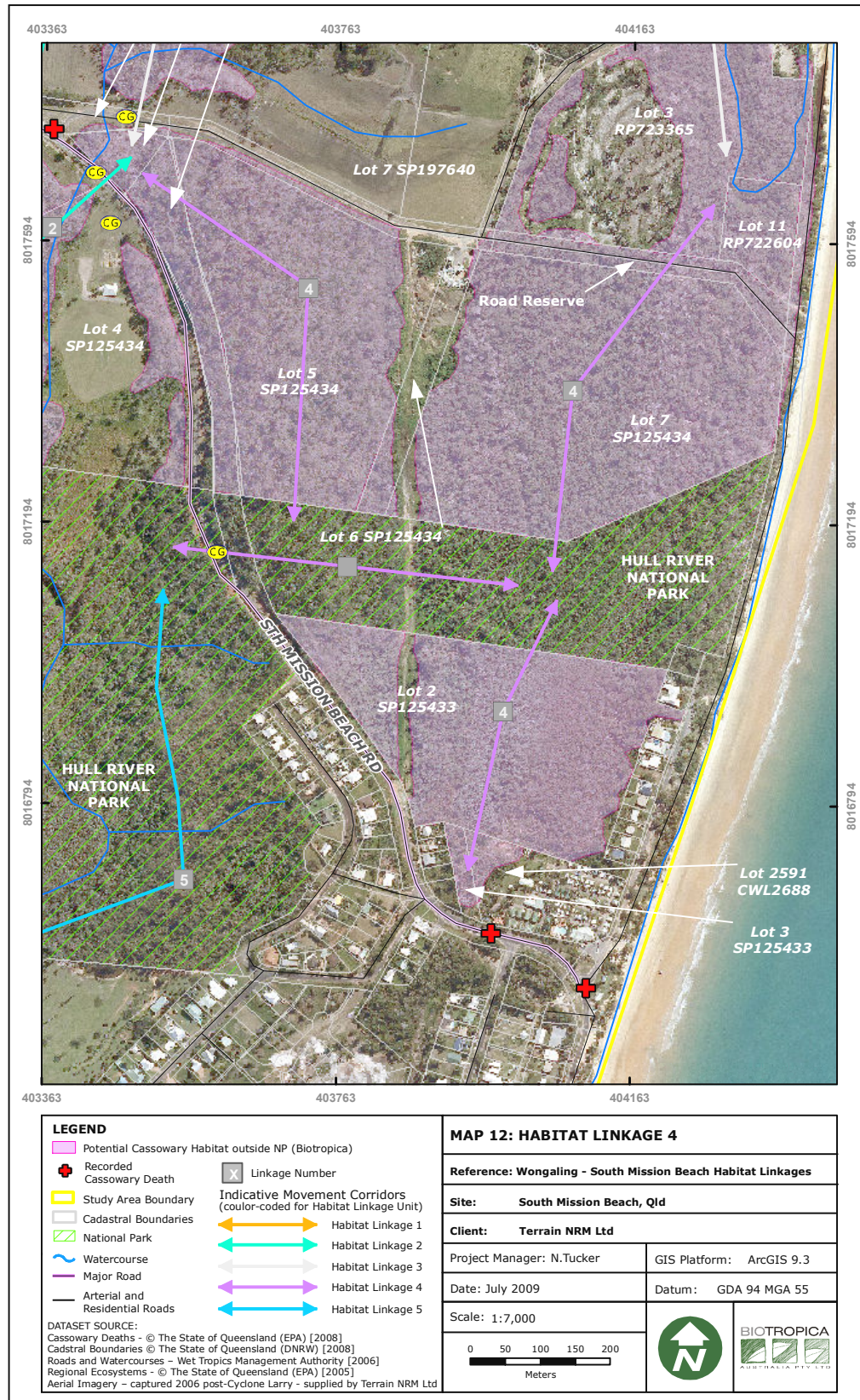
Cassowary movements around the South Mission Beach Caravan Park should be reviewed. Management may be required to direct Cassowaries to more suitable habitat to the north.

Table 6: Properties forming Linkage 4 – Hull River National Park to South Mission Beach

Lot & Plan	Tenure	Area	Comment
Lot 7 SP125434	RE	19Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs, 7.2.3c, 7.2.3e, 7.2.9a, 7.2.7a, 7.3.5, 7.3.19e,. Connects to Habitat Linkage 2. Good quality habitat. Borders Hull River NP to south.
Lot 6 SP125434	RE	1.6 Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.12.23b. Cleared powerline corridor (used by cyclists and pedestrians) and refuse transfer station. Small fragments of vegetation along margins. Powerline corridor forms a minor linear barrier. Borders Hull River NP to south.
Lot 5 SP125434	RE	11.6 Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). RE 7.12.23b. Connects to Habitat Linkage 2. Good quality habitat, 92% cover remains. NE corner cleared for powerlines. Borders Hull River NP to south.
Lot 2 SP125433	SL	10.9 Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.2.3c & 7.2.3e, 7.2.9a, 7.3.5a, 7.3.19e, 7.12.23b. Good quality habitat. Lot dissected by powerlines. Borders Hull River NP to the north. Subject to Native Title Claim.
Lot 2591 CWL2688	FH	2.3 Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). Sth Mission Beach Caravan Park. REs 7.2.9a and 7.3.7b. Small patch of remnant vegetation of high quality. Rest of lot cleared (approx. 98.5%). Forms part of larger remnant vegetation cover in neighbouring undisturbed lots.
Lot 3 SP125433	RE	0.3 Ha	Mapped Cassowary and Mahogany Glider Habitat (EPBC). REs 7.2.9a and 7.3.7b. Small patch of remnant vegetation of high quality.

* FH = Freehold; SL = State Land; RE = Reserve

Figure 15: **MAP 12 - Habitat Linkage 4**



11 Habitat Linkage 5: Hull River National Park, South Mission Beach

This linkage joins areas of the Hull River National Park to the south of the study area, with other linkages to the north. At present, Cassowaries move through a narrow habitat linkage (approximately 100m wide) to the east of the mangroves around the North Hull River. This linkage narrows to the south around the public boat ramp (outside the study area). To the east, vegetation has been largely cleared for residential lots. However, there are no private properties contained within this linkage area. The forested areas more distant from the Hull River (immediately to the south of the South Mission Beach residential area) are all freehold.

The forests of the Hull River NP to the west of South Mission Beach are part of a larger linkage extending from Rockingham Bay to Tam O'Shanter NP and Clump Mountain NP. The linkage varies in width, but is generally restricted to the riparian strip beside the river. All these forests are protected within the National Park and their retention represents the only continuous habitat from the forests of Rockingham Bay on the eastern side of the Hull River to the coastal foothills. Ongoing development pressure adjacent to the National Park should be managed to ensure permeability of the local area for cassowaries. This will rely largely on local landholders and the South Mission Beach human population.

Forests within this linkage are predominantly within the Hull River NP. Adjacent lands are largely cleared and have fragments of vegetation remaining of generally poor quality. Within these lands, vegetation is predominantly wetlands (REs 7.12.1a and 7.12.5b). The majority of the remnant vegetation is listed as "*Disturbed*" under the Vegetation Management Act 1999. There is also small fragment of Endangered RE 7.3.7b.

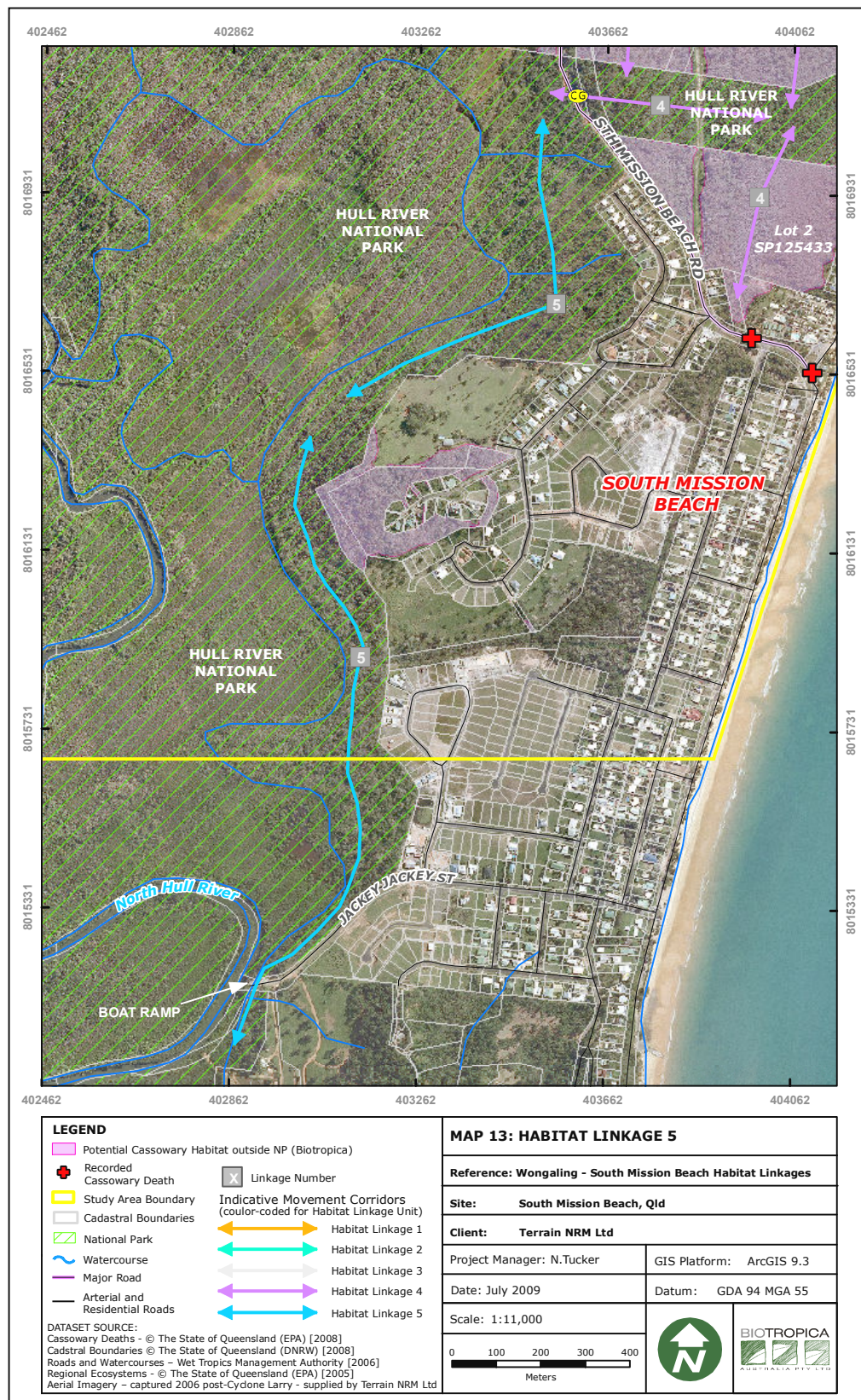
11.1 Linkage 5 - Connectivity gap

The mangroves within the Hull River NP pose a barrier to movement in a westerly direction. The boat ramp and associated traffic at the Hull River is an additional pressure on birds at what is a bottleneck point.

11.2 Linkage 5 - Recommendations

The linkage is conserved within the Hull River NP. It is constrained by the mangroves to the west and residential lots to the east, effectively limiting the linkage to around 100m wide. All existing and future residential or commercial expansion in this area must ensure that the linkage is retained and enhanced to the greatest possible extent.

Figure 16: **MAP 13 - Habitat Linkage 5**



12 References

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13 Appendix 1 – Regional Ecosystems

Source - The State of Queensland (Environmental Protection Agency) 2009

Regional Ecosystem:	7.1.1
Vegetation Management Act status (December 2005):	Not of concern
Biodiversity Status:	No concern at present
Subregion:	2, 1, 3, 9, (6)
Estimated Extent:	In September 2003, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained.
Extent in Reserves:	High
Wetland:	Estuarine wetlands (e.g. mangroves).

Short Description:

Mangrove closed forest to open shrubland of areas subject to regular tidal inundation

Structure Category:

Dense

Description:

Mangrove closed-scrub to open-forest. Sheltered coastlines, estuaries, and deep swales between dunes, on fine anaerobic silts, inundated with saline water at high tide.

Supplementary Description:

Stanton and Stanton (2005), E22a; Kemp and Morgan (1999), 1; Kemp et al. (1999), 1; Neldner and Clarkson (1995), 34, 132; Tracey and Webb (1975), 22a

Protected Areas:

Bloomfield River CP, Carello Palm Swamp CP, Cedar Bay NP, Edmund Kennedy NP, Ella Bay NP, Family Islands NP, Girringun NP, Goold Island NP, Halifax Bay Wetlands NP, Hinchinbrook Island National Park, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach NP, Malbon Thompson FR, Maria Creek NP, Moresby Range NP, Moresby Range RR, Orpheus Island NP, Paluma Range NP, Russell River NP

Comments:

The main river systems with extensive mangrove communities include the Annan, Bloomfield, Daintree, Barron, Mulgrave, Russell, Johnstone, Hull, Tully, Murray, Seymour and Herbert Rivers and Mourilyan Harbour and Trinity Inlet. Structure and composition varies greatly, depending upon distance from the sea and differential freshwater influence.

Regional Ecosystem:	7.2.1
Vegetation Management Act status (December 2005):	Endangered
Biodiversity Status:	Endangered
Subregion:	3, 9, (2)
Estimated Extent:	In September 2003, remnant extent was < 10,000 ha and 10-30% of the pre-clearing area remained.
Extent in Reserves:	Medium
Wetland:	Contains palustrine wetland (e.g. in swales).

Short Description:

Mesophyll vine forest on beach ridges and sand plains of beach origin

Structure Category:

Dense

Description:

Mesophyll vine forest. Beach ridges and sand plains of beach origin, mainly in small patches in the lee of coastal beach ridges in very high rainfall areas. Major vegetation communities include: 7.2.1a: Complex mesophyll or mesophyll vine forest. Lowlands on beach sands, of the very wet and wet rainfall zone. 7.2.1b: Mesophyll vine forest with *Intsia bijuga*, *Beilschmiedia obtusifolia*, and *Palaquium galactoxylon*. Calcareous coastal sands, of the very wet rainfall zone. 7.2.1c: Closed-forest with *Calophyllum inophyllum*, *Terminalia arenicola*, *Dillenia alata*, *Myristica insipida*, *Pouteria obovoidea*, *Milletia pinnata*, and *Hibiscus tiliaceus*. Beach ridge deposits adjacent to the foredune, in the very wet rainfall zone. 7.2.1d: Palustrine wetland (e.g. vegetated swamp). Swampy mesophyll vine forest with *Archontophoenix alexandrae* (feather palm) in the sub-canopy. Seasonally inundated lowland areas on dune sands. 7.2.1e: Floodplain (other than floodplain wetlands). Simple Notophyll vine forest with *Syzygium angophoroides*, on sands of beach origin. Dune sands. 7.2.1f: Simple notophyll vine forest with *Blepharocarya involucrigera*, *Acacia celsa*, *Flindersia bourjotiana*, *Syzygium angophoroides*, *Dillenia alata*, *Grevillea baileyana*, *Syzygium kuranda*, *Calophyllum sil*, *Backhousia hughesii*, *Achronychia acronychioides*. Shallow sand deposits in lowland swamps. 7.2.1g: Palustrine wetland (e.g. vegetated swamp). Mesophyll vine forest with *Archontophoenix alexandrae* (feather palm). Seasonally impeded drainage on dune sands. 7.2.1h: Palustrine wetland (e.g. vegetated swamp). Mesophyll vine forest with *Licuala ramsayi* (fan palm). Seasonally impeded drainage on dune sands. 7.2.1i: Mesophyll vine forest. Lowlands on dune sands, of the very wet and wet rainfall zone.

Supplementary Description:

Stanton and Stanton (2005), D2a, D2b, D3a, D3b, D72, D228, A228, D225, D52, D81, D1a; Kemp and Morgan (1999), 5; Kemp et al. (1999), 5; Tracey and Webb (1975), 2b

Protected Areas:

Edmund Kennedy NP, Ella Bay NP, Etty Bay Road CP, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach CP, Kurrimine Beach NP, Maria Creek NP, Orpheus Island NP, Russell River NP

Comments:

Coastal margin, mainly central and northern parts of the bioregion. A regional ecosystem of very limited extent on very nutrient depauperate sands. Threatened by housing and industrial development, and recreational disturbance. Information on condition and values of this ecosystem can be found in Lavarack (1991) and Hopkins et al. (1999). 7.2.1g: Feather palm forests also occur on alluvium as 7.3.3. 7.2.1h: Fan palm forests also occur on alluvium as 7.3.4.

Regional Ecosystem: Vegetation Management Act status (December 2005):

Biodiversity Status:

Subregion:

Estimated Extent:

Extent in Reserves:

7.2.3

Of concern

Of concern

3, 2, 1, 9, (6), (7)

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

High

Short Description:

Corymbia tessellaris and/or *Acacia crassicaarpa* and/or *C. intermedia* and/or *C. clarksoniana* closed forest to woodland, of beach ridges, predominantly of Holocene age

Structure Category:

Mid-dense

Description:

Corymbia tessellaris (Moreton Bay ash) and/or *Acacia crassicaarpa* (beach wattle) and/or *C. intermedia* (pink bloodwood) and/or *C. clarksoniana* (Clarkson's bloodwood) woodland to closed-forest. Beach ridges, predominantly of Holocene age. Major vegetation communities include: 7.2.3a: *Corymbia tessellaris*, *C. clarksoniana* (and/or *C. intermedia*), *Melaleuca dealbata* ± *Lophostemon suaveolens* woodland to closed-forest, with *Acacia mangium*, *A. crassicaarpa*, *Canarium australianum* and *Deplanchea tetraphylla*. Unweathered low prograding beach dunes, predominantly of Holocene age. 7.2.3b: *Corymbia tessellaris* and *Corymbia clarksoniana* (or *C. intermedia*), woodland to open-forest. Beach ridges, predominantly of Holocene age. 7.2.3c: *Corymbia tessellaris* and *Corymbia clarksoniana* (or *C. intermedia*), woodland to open-forest, with a very well developed vine forest understorey (due to infrequent burning). Beach ridges, predominantly of Holocene age. 7.2.3d: *Corymbia intermedia* open-forest. Beach ridges, predominantly of Holocene age. 7.2.3e: *Corymbia intermedia* open-forest, with a very well developed vine forest understorey (due to infrequent burning). Beach ridges, predominantly of Holocene age. 7.2.3f: *Acacia crassicaarpa* open to closed-forest. Beach ridges, predominantly of Holocene age. 7.2.3g: *Corymbia clarksoniana* woodland to open forest. Beach ridges, predominantly of Holocene age. 7.2.3h: *Corymbia tessellaris*, *Acacia crassicaarpa*, *Melaleuca leucadendra* and *M. viridiflora* woodland. Prograding dunes, often mixed with alluvium. 7.2.3i: *Acacia crassicaarpa* low closed forest (wind sheared). Fore dunes. 7.2.3j: *Corymbia clarksoniana*, *C. tessellaris* and *Acacia crassicaarpa* woodland. Transported coastal cobble and boulder ridges.

Supplementary Description:

Stanton and Stanton (2005), D117, D73, D73v, D74, D74v, D151, G43, D43, D88, D98, D104; Kemp and Morgan (1999), 6; Kemp et al. (1999), 6; Neldner and Clarkson (1995), 20, 53C, 55, 93, 193, 198; Tracey and Webb (1975), 17 (in part)

Protected Areas:

Clump Mountain NP, Edmund Kennedy NP, Ella Bay NP, Family Islands NP, Girringun NP, Gool Island NP, Halifax Bay Wetlands NP, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach NP, Moresby Range NP, Orpheus Island NP, Paluma Range NP, Russell River NP

Comments:

Distributed along most sections of coastline in the bioregion. Many areas in poor condition due to weed invasion and vehicular disturbance. Subject to encroachment by housing developments. 7.2.3c: This vegetation community may be considered a condition state - a low burning frequency has enabled encroachment by vine forest species. 7.2.3e: This vegetation community may be considered a condition state - a low burning frequency has enabled encroachment by vine forest species.

Regional Ecosystem:
Vegetation Management Act
status (December 2005):
Biodiversity Status:

7.2.7
Of concern

Subregion:
Estimated Extent:

Endangered. A rare ecosystem subject to weed invasion and damage caused by recreation.

1, 3, 2, 9, (7)

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

Extent in Reserves:

High

Short Description:

Casuarina equisetifolia ± *Corymbia tessellaris* open forest ± groved vine forest shrublands of the beach strand and fore dune

Structure Category:
Mid-dense

Description:

Casuarina equisetifolia (coast sheoak) ± *Corymbia tessellaris* (Moreton Bay ash) open-forest ± groved vine forest shrublands. Beach strand and foredune. Major vegetation communities include: 7.2.7a: Complex of open-shrubland to closed-shrubland, grassland, low woodland and open-forest. Includes pure stands of *Casuarina equisetifolia*, and *Acacia crassicaarpa*, *Syzygium forte* subsp. *forte*, *Calophyllum inophyllum* and *Pandanus* spp. woodland to open-forest. Beach strand and foredune. 7.2.7b: Groved shrubland with *Corymbia tessellaris*, *Casuarina equisetifolia* and vine forest species including *Canarium australianum*, *Terminalia arenicola*, *Pouteria sericea*. Alluvial terrace behind coastal boulder ridge, only on the Palm Islands. 7.2.7c: Areas of open sand. Coastal dunes (excluding the beach).

Supplementary Description:

Stanton and Stanton (2005), D44, D236, A236, D260j; Kemp and Morgan (1999), 4; Kemp et al. (1999), 4; Tracey and Webb (1975), 17 (in part)

Protected Areas:

Brook Islands NP, Cedar Bay NP, Clump Mountain NP, Edmund Kennedy NP, Ella Bay NP, Fitzroy Island NP, Halifax Bay Wetlands NP, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach NP, Orpheus Island NP, Paluma Range NP, Russell River NP

Comments:

Occurs on the majority of foredunes in the Wet Tropics. Most examples are invaded by weeds, many quite severely. Common weed species include *Sphagneticola trilobata* (Singapore Daisy), *Cenchrus echinatus*, *Melinis repens*, *Tridax procumbens*, *Megathyrsus maximus* (Guinea grass), and *Hyptis suaveolens*. Extremely vulnerable to weed invasion, and subject to recreational disturbance and encroachment by housing developments.

Regional Ecosystem:
Vegetation Management Act status (December 2005):
Biodiversity Status:

7.2.8

Of concern

Endangered. Less than 30% remains unaffected by severe degradation (weed invasion and fragmentation) and less than 10 000 Ha remain.

Subregion:

1, 3, 9, 2, (6), (7), (8)

Estimated Extent:

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

Extent in Reserves:

High

Wetland:

Palustrine wetland (e.g. vegetated swamp).

Short Description:

Melaleuca leucadendra open forest to woodland on sands of beach origin

Structure Category:

Mid-dense

Description:

Melaleuca leucadendra (weeping tea tree) open-forest to woodland. Sands of beach origin.

Supplementary Description:

Stanton and Stanton (2005), D38; Tracey and Webb (1975), 17 (in part)

Protected Areas:

Cedar Bay NP, Edmund Kennedy NP, Ella Bay NP, Halifax Bay Wetlands NP, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach NP, Moresby Range NP, Paluma Range NP, Russell River NP

Comments:

Distributed patchily along the entire coastline of the Wet Tropics, particularly common in northern areas. Threatened by housing developments, and changes to hydrology.

Regional Ecosystem:
Vegetation Management Act
status (December 2005):
Biodiversity Status:

7.2.9
 Of concern

Subregion:
Estimated Extent:

Endangered. Less than 30% remains unaffected by severe degradation (changes to hydrology, pig damage and weed invasion) and less than 10 000 Ha remain. 3, 2, (1), (9)

Extent in Reserves:
Wetland:

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained. High
 Palustrine wetland (e.g. vegetated swamp).

Short Description:

Melaleuca quinquenervia shrubland to closed forest, or Lepironia articulata open to closed sedgeland on dune swales and swampy sand plains of beach origin

Structure Category:
 Dense

Description:

Melaleuca quinquenervia (swamp paperbark) shrubland to closed-forest, or Lepironia articulata (grey sedge) open to closed sedgeland. Dune swales and swampy sandplains of beach origin. Major vegetation communities include: 7.2.9a: Palustrine wetland (e.g. vegetated swamp). Melaleuca quinquenervia open forest to woodland and shrubland. Dune swales and swampy sandplains of beach origin. 7.2.9b: Palustrine wetland (e.g. vegetated swamp). Mixed sedgeland-shrubland complex with Melaleuca quinquenervia. Perennially inundated peat soils. 7.2.9c: Palustrine wetland (e.g. vegetated swamp). Lepironia articulata sedgeland. Permanent swamp with deep deposits of fibrous peat. 7.2.9d: Palustrine wetland (e.g. vegetated swamp). Melaleuca quinquenervia and Acacia crassiparva open-forest to woodland. Sandy soils with organic hardpan layer at depth.

Supplementary Description:

Stanton and Stanton (2005), D33, D92, D76, D84, D96; Kemp and Morgan (1999) 7; Tracey and Webb (1975), 17 (in part)

Protected Areas:

Edmund Kennedy NP, Ella Bay NP, Etty Bay Road CP, Hinchinbrook Island NP, Hull River NP, Kurrimine Beach NP, Russell River NP

Comments:

Distributed in most near-coastal parts of the Wet Tropics, and particularly well developed in the Tully and Innisfail subregions. Inappropriate burning may threaten the persistence of the peat layer in this ecosystem.

Regional Ecosystem:
Vegetation Management Act
status (December 2005):
Biodiversity Status:

7.3.3
 Of concern

Subregion:
Estimated Extent:

Endangered. Under review
 3, 2, 9, 1, 7

Extent in Reserves:
Wetland:

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained. High
 Palustrine wetland (e.g. vegetated swamp).

Short Description:

Mesophyll vine forest with *Archontophoenix alexandrae* on poorly drained alluvial plains

Structure Category:

Dense

Description:

Mesophyll vine forest with *Archontophoenix alexandrae* (feather palm). Occurs in lowland swamps on gleyed podzolic alluvial soils derived from basaltic and granitic parent material, in the very wet rainfall zone. Major vegetation communities include: 7.3.3a: Palustrine wetland (e.g. vegetated swamp). Mesophyll vine forest with *Archontophoenix alexandrae* (feather leaf palm). Occurs in lowland swamps on gleyed podzolic alluvial soils derived from basaltic and granitic parent material, in the very wet rainfall zone. 7.3.3b: Palustrine wetland (e.g. vegetated swamp). Mesophyll vine forest with *Archontophoenix alexandrae* (feather leaf palm) recovering from disturbance, with *Acacia celsa* canopy or emergents. Occurs in lowland swamps on gleyed podzolic alluvial soils derived from basaltic and granitic parent material, in the very wet rainfall zone. 7.3.3c: Palustrine wetland (e.g. vegetated swamp). Mesophyll vine forest with dominant *Syzygium tierneyanum* and/or *Barringtonia racemosa* and sub-canopy dominated by feather palms (*Archontophoenix alexandrae*). Seasonally flooded alluvium.

Supplementary Description:

Stanton and Stanton (2005), A3a, A3a(a), A79; Kemp and Morgan (1999), 17; Kemp et al. (1999), 16; Tracey and Webb (1975), 3a

Protected Areas:

Djilgarin CP, Edmund Kennedy NP, Ella Bay NP, Eubenangee Swamp NP, Hinchinbrook Island NP, Hull River NP, Malbon Thompson FR, Moresby Range NP, Mount Mackay NP, Russell River NP, Tam O'Shanter NP, Tully Gorge NP

Comments:

Scattered across the coastal lowlands (once much more common), now predominantly the Innisfail and Tully subregions. In many areas drainage works on adjoining lands have altered vital hydrological and water table relationships within this ecosystem. Increased wind exposure associated with agricultural clearing is now also a threat. A favoured habitat of, and often heavily dug up by, feral pigs.

Regional Ecosystem: Vegetation Management Act status (December 2005):

Biodiversity Status:

Subregion:

Estimated Extent:

Extent in Reserves:

Wetland:

7.3.5

Not of concern

Endangered. Under review

2, 3, 1, (9)

In September 2003, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained.

High

Palustrine wetland (e.g. vegetated swamp).

Short Description:

Melaleuca quinquenervia and/or *Melaleuca cajuputi* closed forest to shrubland on poorly drained alluvial plains

Structure Category:

Dense

Description:

Melaleuca quinquenervia (swamp paperbark) and/or *Melaleuca cajuputi* (cajuput) closed-forest to shrubland on poorly drained alluvial plains. Lowlands of the very wet and wet rainfall zone, on poorly drained peaty humic gley soils where the water table is near or above the ground for

most of the year. Major vegetation communities include: 7.3.5a: Palustrine wetland (e.g. vegetated swamp). *Melaleuca quinquenervia* open-forest, woodland and shrubland. Lowlands of the very wet and wet rainfall zone, on poorly drained peaty humic gley soils where the water table is near or above the ground for most of the year. 7.3.5b: Palustrine wetland (e.g. vegetated swamp). Mixed shrubland-sedgeland complex with *Melaleuca quinquenervia*. Perennially inundated areas on peat soils. 7.3.5c: Palustrine wetland (e.g. vegetated swamp). *Melaleuca cajuputi* open-forest to woodland. Perennially inundated areas on peat soils. 7.3.5d: Palustrine wetland (e.g. vegetated swamp). *Melaleuca quinquenervia* and *M. viridiflora* open-woodland with a dense grassy ground layer, usually dominated by *Ischaemum australe* and *Isachne globosa*. Semi-permanent swamps of coastal lowlands with fibrous peat soils. 7.3.5e: Palustrine wetland (e.g. vegetated swamp). *Melaleuca quinquenervia* and *Lophostemon suaveolens* open-shrubland with a ground layer of by *Ischaemum australe* var. *arundinaceum*. Lowland swamp. 7.3.5f: Palustrine wetland (e.g. vegetated swamp). *Melaleuca viridiflora*, *M. quinquenervia*, *Banksia robur* and *B. spinulosa* low open-woodland with a ground layer of sedges including *Baumea rubiginosa*, *Fimbristylis nutans* and the grass *Ischaemum australe*. Groundwater seepage zones on swamp fringes. 7.3.5g: Palustrine wetland (e.g. vegetated swamp). *Melaleuca quinquenervia* open-forest, woodland and shrubland. Swamps within basalt landscapes.

Supplementary Description:

Stanton and Stanton (2005), A125, A33, A83, A87, A92, A190, B33; Kemp and Morgan (1999), 19; Kemp et al. (1999), 17; Tracey and Webb (1975), 15a

Protected Areas:

Carello Palm Swamp CP, Djilgarin CP, Edmund Kennedy NP, Ella Bay NP, Eubenangee Swamp NP, Girringun NP, Hinchinbrook Island NP, Hull River NP, Jalum CP, Koombooloomba FR, Kuranda NP, Malbon Thompson FR, Maria Creek NP, Moresby Range NP, Moresby Range RR, Mount Mackay NP, Paluma Range NP, Russell River NP, Tam OShanter NP, Tully Falls NP, Tully Gorge NP, Warrina CP

Comments:

Scattered across the coastal lowlands, predominantly the Innisfail and Tully subregions. External and upstream hydrological changes have affected this ecosystem, leading to more concentrated flood flows in streams with consequent bank erosion and channel siltation. Portions of remnant patches of this regional ecosystem continue to be illegally cleared, particularly within agricultural areas. Disturbance often results in invasion by the introduced *Urochloa mutica* (para grass), *Annona glabra* (pond apple), and *Eichhornia crassipes* (water hyacinth). Small dense stands of *Melaleuca cajuputi* (a species which is more common in Cape York) occur in the coastal north of the bioregion (as far south as Trinity Inlet). Pre-clearing mapping has revealed that *M. cajuputi* stands in the Wet Tropics have always been rare.

Regional Ecosystem: Vegetation Management Act status (December 2005):

7.3.7
Endangered

Biodiversity Status:

Endangered
3, 2, 9

Subregion:

Estimated Extent:

In September 2003, remnant extent was < 10,000 ha and 10-30% of the pre-clearing area remained.

Extent in Reserves:

Medium

Wetland:

Contains palustrine wetland (e.g. in swales)

Short Description:

Eucalyptus pellita and *Corymbia intermedia* open forest to woodland (or vine forest with emergent *E. pellita* and *C. intermedia*), on poorly drained alluvial plains

Structure Category:

Mid-dense

Description:

Eucalyptus pellita (red stringybark) and *Corymbia intermedia* (pink bloodwood) open-forest to woodland (or vine forest with emergent *E. pellita* and *C. intermedia*). Poorly drained alluvial plains. Major vegetation communities include: 7.3.7a: Contains palustrine wetland (e.g. in swales). *Eucalyptus pellita* and *Corymbia intermedia* open forest and woodland. Poorly drained alluvium, including seasonal swamps. 7.3.7b: Contains palustrine wetland (e.g. in swales). *Eucalyptus pellita* and *Corymbia intermedia* open forest and woodland, with a very well developed vine forest understorey. Poorly drained alluvium, including seasonal swamps. 7.3.7c: Contains palustrine wetland (e.g. in swales). *Corymbia intermedia*, *Eucalyptus pellita*, *Lophostemon suaveolens* and *Melaleuca dealbata* open forest and woodland. Poorly drained alluvium.

Supplementary Description:

Stanton and Stanton (2005), A80, A80v, A119; Kemp and Morgan (1999), 25; Tracey and Webb (1975), 19

Protected Areas:

Edmund Kennedy NP, Hull River NP, Kuranda NP, Maria Creek NP, Mount Mackay NP, Tam OShanter NP

Comments:

Coastal areas from Cardwell to Cape Tribulation. This ecosystem has been narrowed in definition to represent the *E. pellita*-dominated component of the formerly described ecosystem. Very little remains of this ecosystem, with only approximately half of the remaining in protected tenures. 7.3.7b: Well-developed vine forest understorey is probably a condition state caused by infrequent burning.

Regional Ecosystem: Vegetation Management Act status (December 2005):

Biodiversity Status:

Subregion:

Estimated Extent:

Extent in Reserves:

Wetland:

7.3.8

Not of concern

Endangered. under review

1, 2, (3), (8)

In September 2003, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained.

Medium

Floodplain (other than floodplain wetlands).

Short Description:

Melaleuca viridiflora ± *Eucalyptus* spp. ± *Lophostemon suaveolens* open forest to open woodland on alluvial plains

Structure Category:

Sparse

Description:

Melaleuca viridiflora (broad leaf tea tree) ± *Eucalyptus* spp. ± *Lophostemon suaveolens* (swamp mahogany) open-forest to open-woodland. Humic gleyed texture contrast soils with impeded drainage, on alluvial plains. Major vegetation communities include: 7.3.8a: Floodplain (other than floodplain wetlands). *Melaleuca viridiflora* open-forest to open-woodland. Includes areas of natural invasion onto former grasslands. Alluvial plains. 7.3.8b: Floodplain (other than floodplain wetlands). *Melaleuca viridiflora* open-forest to open-woodland with eucalypt emergents (or sparse eucalypt overstorey) of species such as *Corymbia clarksoniana*, *Eucalyptus platyphylla*, *Lophostemon suaveolens* and *E. drepanophylla*. Poorly drained alluvium, mostly on the coastal plains. 7.3.8c: Floodplain (other than floodplain wetlands). *Melaleuca viridiflora*, and *Lophostemon suaveolens* open forest to woodland. Poorly drained soils of coastal lowlands. 7.3.8d: Floodplain (other than floodplain wetlands). *Melaleuca*

viridiflora, *Lophostemon suaveolens* and *Allocasuarina littoralis* open-shrubland. Poorly drained soils of coastal lowlands.

Supplementary Description:

Stanton and Stanton (2005), A118, A41, A78, A93; Kemp and Morgan (1999), 30, 31, 32; Kemp et al. (1999), 23, 24, 31, 32; Tracey and Webb (1975), 20

Protected Areas:

Abergowrie FR, Cedar Bay NP, Edmund Kennedy NP, Girringun NP, Halifax Bay Wetlands NP, Hinchinbrook Island NP, Hull River NP, Kuranda NP, Kuranda NP (R), Maria Creek NP, Meunga FR, Mount Mackay NP, Mowbray NP, Murray Upper NP, Paluma Range NP, Russell River NP, Tam OShanter FR, Tam OShanter NP

Comments:

Widespread throughout the bioregion where most common on the coastal floodplains, but also found in upland areas. The greatest threat to this ecosystem now lies in gradual fragmentation (and resulting weed invasion) via clearing of fence, road and housing infrastructure, and the introduction of cattle grazing, on hobby farms, particularly in southern areas. In some areas many weeds occur in the ground layer after disturbance. These include *Cassia occidentalis* (coffee senna), *Cassia obtusifolia* (sickle pod), *Clitoria laurifolia*, *Chrysopogon aciculatus* (Mackie's pest), *Mimosa pudica* (common sensitive plant), *Sida cordifolia* (flannel weed), *Stachytarpheta jamaicensis* (snakeweed) and *Hyparrhenia rufa*. Inappropriate fire regimes result in the conversion of the diverse ground layer to a simple grass layer, and the loss of life forms such as ground orchids. The exotic ant *Pheidole megacephala* is displacing the native ant *Philidris cordatus* from the ant plant *Myrmecodia beccarii*. This introduced ant does not tend the larvae of *Hypochrysops apollo* (the apollo jewel butterfly) or pollinate the ant plant. The enormous variation displayed by this regional ecosystem across the bioregion suggests that it could be further divided into several regional ecosystems given further examination of soil, drainage and groundstratum species differences.

Regional Ecosystem:
Vegetation Management Act
status (December 2005):
Biodiversity Status:

7.3.10
Of concern

Subregion:
Estimated Extent:

Endangered. Less than 10% remains unaffected by severe degradation (logging, fragmentation, feral animal disturbance and weed invasion).

3, 2, 9, 7, 8

Extent in Reserves:
Wetland:

In September 2003, remnant extent was > 10,000 ha and 10-30% of the pre-clearing area remained.

Medium

Contains palustrine wetland (e.g. in swales).

Short Description:

Simple to complex mesophyll to notophyll vine forest on moderate to poorly drained alluvial plains of moderate fertility

Structure Category:

Dense

Description:

Simple-complex mesophyll to notophyll vine forest. Moderately to poorly-drained alluvial plains of moderate fertility. Major vegetation communities include: 7.3.10a: Mesophyll vine forest. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. 7.3.10b: Mesophyll vine forest recovering from disturbance, with *Acacia* spp. canopy or emergents. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. 7.3.10c: Floodplain (other than floodplain wetlands). Mesophyll vine forest with scattered *Archontophoenix alexandrae* (feather palm) in the sub-canopy. Seasonally inundated lowland alluvial plains. 7.3.10d: Open areas in vine forests dominated by

spawning vines, with emergent vine-draped trees or clumps of trees. Vines commonly include *Merremia peltata*. Alluvial plains. 7.3.10e: Simple notophyll vine forest with *Blepharocarya involucrigera*, *Acacia celsa*, *Flindersia bourjotiana*, *Syzygium angophoroides*, *Dillenia alata*, *Grevillea baileyana*, *Syzygium kuranda*, *Calophyllum sil*, *Backhousia hughesii* and *Achronychia acronychioides*. Swampy alluvial plains. 7.3.10f: Floodplain (other than floodplain wetlands). Simple Notophyll vine forest with *Syzygium angophoroides*. Swampy alluvial plains. 7.3.10g: Simple notophyll vine forest dominated by *Blepharocarya involucrigera*. Alluvial plains.

Supplementary Description:

Stanton and Stanton (2005), A2a, A2a(a), A2a(b), A2a(c), A72, A66, A109, A81, A52; Kemp et al. (1999), 48 (part); Kemp and Morgan (1999), 49 (part); Tracey and Webb (1975), 2a (in part)

Protected Areas:

Brook Islands NP, Cardwell FR, Carello Palm Swamp CP, Cedar Bay NP, Danbulla NP, Djilgarin CP, Edmund Kennedy NP, Ella Bay NP, Eubenangee Swamp NP, Gadgarra FR, Giringun NP, Grey Peaks NP, Hinchinbrook Island NP, Hull River NP, Japoon NP, Kamerunga CP, Kirrama NP, Kuranda NP, Kuranda NP (R), Kurrimine Beach NP, Little Mulgrave FR, Malbon Thompson FR, Maria Creek NP, Moresby Range NP, Moresby Range RR, Mount Mackay NP, Mowbray NP, Murray Upper NP, Orpheus Island NP, Paluma Range NP, Russell River NP, Tam OShanter FR, Tam OShanter NP, Tully Gorge NP, Tully Gorge NP (R), Walter Hill Range CP, Warrina CP, Wooroonooran NP, Wooroonooran NP (R)

Comments:

Widespread across coastal parts of the bioregion. This regional ecosystem has been extensively and selectively cleared for agricultural purposes and remaining areas are highly fragmented and altered in structure and species composition. This is the dominant rainforest type on alluvial plains - it occurs on shallower, less fertile soils than 7.3.17 (Stanton and Stanton (2005) A1a), and it is widespread. It generally receives higher rainfall (or more seasonally-even rainfall) than 7.3.23 (Stanton and Stanton (2005) A1c). Includes levees, plains and colluvials (high rainfall means there is little difference in floristics across these soils). It varies from being very species-diverse to quite simple. 7.3.10d: Presumed to originate either from cyclone damaged rainforests, or areas of rainforest that have been previously cleared prior to the aerial photograph and land survey records (i.e. possibly of indigenous origin). 7.3.10g: Sites subject to episodic disturbance such as a seral stage of recovery from a single event or period of disturbance.

Regional Ecosystem: Vegetation Management Act status (December 2005):

7.3.19
Of concern

Biodiversity Status:

Of concern

Subregion:

1, 6, 3, 2, 9, 5, (4), (7)

Estimated Extent:

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

Extent in Reserves:

High

Short Description:

Corymbia intermedia or *C. tessellaris* ± *Eucalyptus tereticornis* open forest (or vine forest with these species as emergents), on well drained alluvium

Structure Category:

Mid-dense

Description:

Corymbia intermedia (pink bloodwood) or *C. tessellaris* (Moreton Bay ash) ± *Eucalyptus tereticornis* (forest red gum) open-forest (or vine forest with these species as emergents). Well-drained alluvium. Major vegetation communities include: 7.3.19a: *Corymbia intermedia*, *Eucalyptus tereticornis*, *E. drepanophylla*, *Allocasuarina torulosa*, *A. littoralis*, *Lophostemon*

suaveolens, woodland with *Acacia cincinnata*, *A. flavescens*, *Banksia aquilonia* and *Xanthorrhoea johnsonii*. Well-drained alluvium. 7.3.19b: *Corymbia tessellaris* and *C. intermedia* woodland and open forest. Well-drained alluvium. 7.3.19c: *Corymbia tessellaris* and *C. intermedia* woodland and open forest with a very well developed vine forest understorey. Well-drained alluvium. 7.3.19d: *Corymbia intermedia* open forest. Well-drained alluvium. 7.3.19e: *Corymbia intermedia* open forest with a very well developed vine forest understorey. Well-drained alluvium. 7.3.19f: *Eucalyptus moluccana* woodland and open forest. Alluvium. 7.3.19g: *Eucalyptus tereticornis*, *E. drepanophylla*, *E. portuensis*, *Corymbia intermedia*, *C. tessellaris*, woodland and open-forest with *Allocasuarina torulosa* and *Angophora floribunda*. Uplands and highlands on alluvium, of the dry rainfall zone. 7.3.19h: *Corymbia tessellaris* ± *Eucalyptus tereticornis*, *C. intermedia*, *E. drepanophylla*, *E. platyphylla* and *Lophostemon suaveolens* layered grassy woodland with *Acacia celsa* and *Cycas media*. Lowlands on alluvium, of the wet and moist rainfall zones. 7.3.19i: *Corymbia intermedia*, *Allocasuarina torulosa* and *Lophostemon suaveolens* woodland and open forest. Uplands on alluvium, of the moist rainfall zone. 7.3.19j: *Themeda triandra* and *Imperata cylindrica* grassland. Alluvium, Palm Islands.

Supplementary Description:

Stanton and Stanton (2005), A16e in part (Qld Herbarium and WTMA (2005) A250a), A73, A73v, A74, A74v, A16o, A14d, A239, A16a, A134; Kemp and Morgan (1999), 37; Kemp et al. (1999), 39; Tracey and Webb (1975), 19

Protected Areas:

Abergowrie FR, Cardwell FR, Cedar Bay NP, Dinden NP, Girringun NP, Hinchinbrook Island NP, Hull River NP, Japoon NP, Moresby Range NP, Murray Upper NP, Orpheus Island NP, Paluma Range NP, Russell River NP, Tam O'Shanter NP, Tully Gorge NP, Woornoonoran NP

Comments:

Widespread across the bioregion. Introduced weed species, notably *Hyptis suaveolens* and *Passiflora suberosa*, are common and may result from heavy grazing pressure. 7.3.19c: Well-developed vine forest understorey is probably a condition state caused by infrequent burning. 7.3.19e: Well-developed vine forest understorey is probably a condition state caused by infrequent burning.

Regional Ecosystem:
Vegetation Management Act
status (December 2005):
Biodiversity Status:
Subregion:
Estimated Extent:

7.3.25

Of concern

Of concern

1, 9, 2, 3, (6), (7), (8)

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

Medium

Extent in Reserves:

Wetland:

Riverine wetland or fringing riverine wetland.

Short Description:

Melaleuca leucadendra ± vine forest species, open to closed forest, on alluvium fringing streams

Structure Category:

Mid-dense

Description:

Melaleuca leucadendra (weeping tea tree) ± vine forest species, open-forest to closed-forest. Stream levees and prior streams on well-drained sandy clay loam alluvial soils. Major vegetation communities include: 7.3.25a: Riverine wetland or fringing riverine wetland. *Melaleuca leucadendra* open forest and woodland. Stream levees and prior streams on well-drained sandy clay loam alluvial soils. 7.3.25b: Riverine wetland or fringing riverine wetland. *Melaleuca leucadendra* and *Eucalyptus tereticornis*, layered open forest, and closed forest with a vine forest understorey. Stream levees and prior streams on well-drained sandy clay loam

alluvial soils. 7.3.25c: Riverine wetland or fringing riverine wetland. Closed forest of *Tristaniopsis exiliflora* and *Xanthostemon chrysanthus*. Stream banks, on well drained alluvium adjacent to Pleistocene sand dunes.

Supplementary Description:

Stanton and Stanton (2005), A38, A50, M38, G38, D50; Kemp et al. (1999), 47; Kemp and Morgan (1999), 47; Tracey and Webb (1975), 18

Protected Areas:

Abergowrie FR, Dinden NP, Dinden NP (R), Edmund Kennedy NP, Eubenangee Swamp NP, Girringun NP, Goold Island NP, Halifax Bay Wetlands NP, Hinchinbrook Island NP, Hull River NP, Japoon NP, Kuranda NP, Little Mulgrave FR, Maria Creek NP, Moorsby Range NP, Mount Mackay NP, Mount Whitfield CP, Mount Windsor NP, Mowbray NP, Murray Upper NP, Paluma Range NP, Russell River NP, Tully Gorge NP, Wooroonooran NP

Comments:

Distributed across the entire bioregion. Subject to widespread weed invasion and clearing for agriculture.

**Regional Ecosystem:
Vegetation Management Act
status (December 2005):**

7.12.1

Not of concern

Biodiversity Status:

No concern at present

Subregion:

7, 6, 9, 2, 3, (5), (8)

Estimated Extent:

In September 2003, remnant extent was > 10,000 ha and >30% of the pre-clearing area remained.

Extent in Reserves:

High

Wetland:

Contains palustrine wetland (e.g. in swales).

Short Description:

Simple to complex mesophyll to notophyll vine forest on moderately to poorly drained granites and rhyolites of moderate fertility of the moist and wet lowlands, foothills and uplands

Structure Category:

Dense

Description:

Simple-complex mesophyll to notophyll vine forest. Moderately to poorly-drained granites and rhyolites of moderate fertility of the moist and wet lowlands, foothills and uplands. Major vegetation communities include: 7.12.1a: Mesophyll to notophyll vine forest. Lowlands and foothills of the very wet and wet rainfall zones. Granite and rhyolite. 7.12.1b: Mesophyll to notophyll vine forest recovering from disturbance, with *Acacia* spp. canopy or emergents. Lowlands and foothills of the very wet and wet rainfall zones. Granite and rhyolite. 7.12.1c: Low to medium complex notophyll vine forest with *Flindersia bourjotiana*, *Alstonia muelleriana*, *Grevillea baileyana*, *Cerbera floribunda*, *Franciscodendron laurifolium*, *Austromuellera trinervia*, *Carnarvon araliifolia*, *Stenocarpus reticulatus*, *Musgravea heterophylla*, *Buckinghamia ferruginiflora*, *Elaeocarpus bancroftii*, and *Beilschmiedia castrisensis*. Colluvial boulder fields of lowlands and foothills. 7.12.1d: Floodplain (other than floodplain wetlands). Mesophyll vine forest with scattered feather palms (*Archontophoenix alexandrae*). Seasonally inundated areas, on granite. 7.12.1e: Complex mesophyll vine forest. Lowlands on granitic colluvium, of the moist and dry rainfall zones.

Supplementary Description:

Stanton and Stanton (2005), G2a, G2a(a), CG2a(a), G2a(c), CG2a, R2a, R2a(a), CR2a, G72, CG72, G166, CG1c; Tracey and Webb (1975), 2a

Protected Areas:

Alcock FR, Bare Hill CP, Brook Islands NP, Cardwell FR, Cedar Bay NP, Clump Mountain NP, Dinden NP, Dinden NP (R), Family Islands NP, Fitzroy Island NP, Gadgarra FR, Girringun NP, Goolooloolo NP, Grey Peaks NP, Hinchinbrook Island NP, Hull River NP, Japoon NP, Koombooloomba FR, Kuranda NP, Kuranda NP (R), Little Mulgrave FR, Malbon Thompson FR, Mount Lewis FR, Mount Mackay NP, Mowbray NP, Mowbray NP (R), Murray Upper NP, Paluma Range NP, Riflemead FR 2, Russell River NP, Smithfield CP, Tam OShanter FR, Tam OShanter NP, Tully Falls NP, Tully Falls NP (R), Tully Gorge NP, Tully Gorge NP (R), Wooroonooran NP, Wooroonooran NP (R)

Comments:

Widespread throughout the bioregion. Destructive cyclonic winds and previous logging activities have resulted in much canopy disturbance, usually resulting in a significant *Calamus* cover. This is the dominant rainforest regional ecosystem below 400 m on granitic hills and mountains. It occurs on more poorly-drained and lower fertility soils than 7.12.2.

Regional Ecosystem: Vegetation Management Act status (December 2005): Biodiversity Status:

7.12.23

Of concern

Endangered. Less than 30% remains unaffected by severe degradation (rainforest invasion, timber harvesting and weed invasion.) and less than 10 000 Ha remain.

Subregion:

6, 2, 1, 3, 7

Estimated Extent:

In September 2003, remnant extent was < 10,000 ha and >30% of the pre-clearing area remained.

Extent in Reserves:

High

Short Description:

Corymbia intermedia and/or *C. tessellaris* ± *Eucalyptus tereticornis* medium to tall open forest to woodland (or vine forest with these species as emergents), on coastal granite and rhyolite headlands and near-coastal foothills

Structure Category:

Mid-dense

Description:

Corymbia intermedia (pink bloodwood) and/or *C. tessellaris* (Moreton Bay ash) ± *Eucalyptus tereticornis* (forest red gum), open-forest to tall open-forest to woodland (or vine forest with these species as emergents). Coastal granite and rhyolite headlands and near-coastal foothills. Major vegetation communities include: 7.12.23a: *Corymbia intermedia* open-forest to tall open-forest. Coastal granite and rhyolite headlands and near-coastal foothills. 7.12.23b: *Corymbia intermedia* open forest to tall open-forest with a very well developed vine forest understorey. Coastal granite and rhyolite headlands and near-coastal foothills. 7.12.23c: *Corymbia tessellaris* and *C. intermedia* open-forest to tall woodland. Coastal granite and rhyolite headlands and near-coastal foothills. 7.12.23d: *Corymbia tessellaris* and *C. intermedia* open-forest to tall woodland with a very well developed vine forest understorey. Coastal granite and rhyolite headlands and near-coastal foothills. 7.12.23e: *Eucalyptus tereticornis*, *Corymbia tessellaris*, *E. pellita*, *C. intermedia*, *Melaleuca dealbata*, *Lophostemon suaveolens*, *Acacia mangium* and *A. crassicarpa* woodland to low woodland. Coastal granite and rhyolite headlands and near-coastal foothills. 7.12.23f: *Eucalyptus tereticornis*, *Corymbia tessellaris*, *C. intermedia*, *E. drepanophylla*, *E. platyphylla*, *Lophostemon suaveolens* and *Acacia aulacocarpa* woodland to low woodland and low layered grassy woodland, with *Cycas media*. Foothills and coastal headlands, of the wet and moist rainfall zones.

Supplementary Description:

Stanton and Stanton (2005), G73, G73v, CG73, CG73v, G74, G74v, R73, R73v, R74, R74v, G16a, G16g, CG16g, R16g; Tracey and Webb (1975), 14d, 16g

Protected Areas:

Cardwell FR, Family Islands NP, Fitzroy Island NP, Girringun NP, Goold Island NP, Grey Peaks NP, Hinchinbrook Island NP, Hull River NP, Meunga FR, Murray Upper NP, Paluma Range NP, Russell River NP, Tam OShanter NP, Tully Gorge NP

Comments:

Near-coastal foothills south of Port Douglas. Distinguished from 7.12.53 by the dominance of *Corymbia intermedia* instead of *C. clarksoniana* (wetter zones than 7.12.53). Distinguished from 7.12.29 by its occurrence on headlands and near-coastal foothills as opposed to sub-coastal zones. Distinguished from 7.12.54 by its medium to tall stature (7.12.54 consists of mosaics of grasslands and shrublands with low wind-sheared eucalypt stands.) 7.12.23b: Well-developed vine forest understorey is probably a condition state caused by infrequent burning. 7.12.23d: Well-developed vine forest understorey is probably a condition state caused by infrequent burning.