PROFILE FOR MANAGEMENT OF THE HABITATS AND RELATED ECOLOGICAL AND CULTURAL RESOURCE VALUES OF WARRABER ISLAND

January 2013

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Torres Strait Regional Authority Land & Sea Management Unit

Australian Government

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EXECUTIVE SUMMARY

Warraber Island is located approximately 78 km north-east of Thursday Island. The island is part of the Central Island Group, a geologically diverse group of small islands that also include the inhabited islands of Masig (Yorke), Poruma (Coconut) and Iama (Yam) and numerous uninhabited islands the largest being Sassie, Gebbar, and Naghir (Mt Ernest). The Central Island group includes sand cays on coral platforms, mangrove islands, and islands formed on igneous basement rock. Warraber Island, as for a number of islands in the group, is a sand cay formed by calcareous sand which has accumulated atop a coral platform. Sand cays are relatively dynamic, shaped by prevailing tidal currents and subject to shifting shorelines in response to extreme weather events.

A total of five natural vegetation communities, within two broad vegetation groups and three regional ecosystems are recognised on the island. The known flora is 201 species (77 families and 163 genera). This comprises 137 native species (68 %) and 64 (32 %) which are naturalised. No species listed as threatened at the federal and state level are known to occur. Six species are assigned regional significance and 78 (38%) are culturally significant.

A review of available desktop resources identified 105 fauna species that have been reported for the island. This includes one frog, 10 reptile, 91 bird and three mammal species. This can be compared with the 384 terrestrial fauna species that have been reported for the broader Torres Strait island group. Four species of bird, sooty oystercatcher, beach stone-curlew, eastern curlew and little tern which are known to occur on the island are considered threatened species. Of the animals reported for the island, one reptile, one bird and two mammal species are introduced.

Within the broad vegetation groups (or management units) identified on the island, a number of management issues which are currently impacting biodiversity and ecological health of the island are identified. These are:

- Monitoring for the introduction and spread of a number of exotic species, both fauna and flora, throughout the island landscape.
- A requirement for further survey work to document aspects of the islands faunal assemblage.
- Continued compilation of floristic information, particularly those plants with cultural and biodiversity significance.
- Further survey and documentation of the complex cultural landscape on the island.

It is important that any future surveys on Warraber are undertaken in collaboration with the Warraber people and include study of traditional ecological knowledge and ethno taxonomy. Furthermore all mapping and assessment work must comply with Warraber research protocols (to

be finalised), and be approved by the Warraberalgal (Torres Strait Islanders) Corporation, and involve and be guided by the island rangers.

ACKNOWLEDGEMENTS

The project has been funded through the Land and Sea Management Unit of the Torres Strait Regional Authority (TSRA). Our thanks are extended for the support and guidance of Tony O'Keeffe of TSRA who administered the project and provided valuable input throughout. 3D Environmental also wish to acknowledge all Warraber Elders and thank the Warraberalgal (Torres Strait Islanders) Corporation for access to the land. Appreciation is also given to the Warraberalgal rangers Laura Pearson, Aken Baragud and Mark Pearson for assistance in the field, and to Shaun Skerritt, Karen Evans and George Saveka of the TSRA Land and Sea Management Unit.

Initial fauna information and text was provided by Terry Reis although was adapted for the purpose of this report. It should be noted that Terry was not involved in the compilation of this document other than provision of raw data and preparation of species profiles. Staff of the Queensland Herbarium assisted with identification of plant specimens and provided advice on the ecology and distribution of significant species. Barbara Waterhouse and Stephen McKenna of the Department of Agriculture, Forestry and Fisheries provided valuable information on the occurrence and distribution of weeds.

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1.0 Introduction

Warraber represents one of six islands selected for a second stage of assessment with the specific purpose of developing an island biodiversity management profile. This document aims to identify the biodiversity features, landscape processes, and cultural values (from both a landscape and site specific perspective) that are intrinsic to the island. It also aims to identify management issues, recommends actions to conserve natural values into the future as well as identify those sites and landscape features of specific cultural importance to the Warraber people.

1.1 Cultural Setting

The population of Warraber consists of 247 people (2006 census). Land tenure is DOGIT (Deed of Grant in Trust) and the Registered Native Title Body Corporate[1] (RNTBC or PBC in shortened form) is the Warraberalgal (Torres Strait Islanders) Corporation who administer the title of the land on behalf of the traditional owners. The local dialect is Kalaw Lagaw Ya. Native title was granted to the Warraber people in July 2000.

The native title agreement was made in conjunction with the Poruma People as these two peoples are closely connected by 'ties of kinship and common language' and have traditionally had connections with each other's land. In addition to this determination, the Warraberalgal (Torres Strait Islanders) Corporation also administers two Indigenous Land Use Agreements made between the Warraber people and Ergon Energy and Telstra respectively (Native Title Research Unit, 2012).

1.2 Geographic Setting

Warraber Island is located approximately 78 km north-east of Thursday Island (see **Figure 1**). Warraber is part of the Central Island Group, a geologically diverse group of small island that also include the inhabited islands of Masig (Yorke), Poruma (Coconut), and Iama (Yam), and a number of uninhabited islands including Sassie, Gebbar, and Naghir (Mt Ernest) Islands. The Central Island group includes sand cays on coral platforms, mangrove islands, and islands formed on igneous basement rock.

The island has a total area of 74ha, is approximately 1.2km long, 700m at its widest point and up to 6m above local mean sea level (RPS 2011). The village sits to the north-east of the airstrip which dissects the island in a north-south orientation. Mean annual rainfall of nearby Poruma Island is 1 498mm (BOM 2008a) and it is expected that Warraber is similar. This can be compared to Badu which at 1 983mm is the wettest recording station in the Torres Strait Islands (BOM 2008b), and Dauan at 1 082mm which is the driest.

[1] Registered Native Title Body Corporate – the organisation that is recognised as holding native title in trust for the benefit of the native title holders. It contacts native title holders and administers business between them and outsiders, such as government, industry and developers.

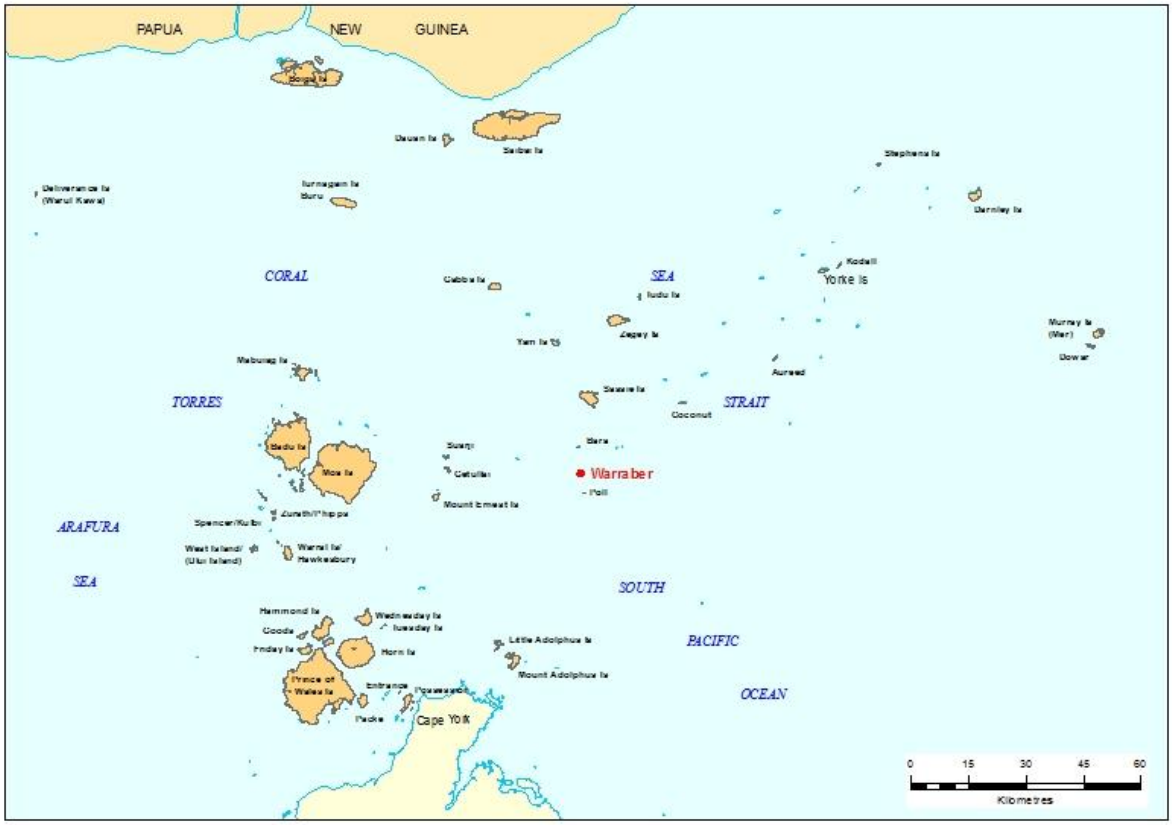

Figure 1. Location of Warraber Island.

1.3 Geological Context

Warraber Island, as for a number of islands in the Central Island Group, is a sand cay formed by calcareous sand accumulated at the northeastern end of a coralline reef platform which is 5.4km long and 2.6km from north to south (Woodroffe *et al.* 2007). Warraber sits at a height of 2 – 8m above sea level (Hart *et al*, 2007).

The island sand cays are in general very low lying and not more than 6m high (Willmott 1972). In contrast to the continental and volcanic islands, the sand cays are relatively dynamic, shaped by prevailing tidal currents and subject to shifting shorelines in response to extreme weather events. Warraber comprises a sequence of low-forested beach ridges of <1 m amplitude (Woodroffe *et al.* 2007). Armour of cemented beach rock is also exposed as a discontinuous apron around the islands fringe in some locations. Being low lying and without the foundation of continental basement rock, Warraber is exposed to erosion caused by storm surges and tides, extreme tidal events and the incipient impacts of long term sea level rise.

2.0 Methods

This document provides a compendium of information that has been compiled from a range of data sources and numerous surveys relevant to flora, fauna and to a lesser extent cultural heritage matters. Desktop resources utilised include but are not limited to:

- Vegetation Communities and Regional Ecosystems of the Torres Strait Islands (Stanton *et al.* 2009).
- Queensland Herbarium's Herbrecs Database (DERM 2011c).
- Queensland Museum fauna record extracts.
- Birds Australia database extract.
- WildNet database extracts (DERM 2010a to 2010g).
- RPS Environmental Report for Warraber Island (RPS 2010).
- Terrestrial fauna report for the Central Islands Indigenous Protected Area (Watson, 2012).
- Various technical papers relating to both flora and fauna (see references section).

The preparation of a preliminary desktop report was completed prior to a field visit that was conducted on a single day in May 2012. With the involvement and support of the TSRA Land and Sea Management Unit and rangers, the field team traversed the island enabling important habitats, plants, animal species and management issues to be identified, and flora lists to be updated. This process facilitated two-way information and learning exchange between the newly appointed ranger team, the TSRA Land and Sea Management Unit, and the research team, and included a formal meeting with the PBC community members and council representatives. Knowledge gained from the visit has been incorporated into the final report.

3.0 Aims and Objectives

The aim of this document is to compile existing information relating to:

1. The extent, values and condition of island habitats and the plants and animals which occur on them.
2. Island-scale ecological processes, that is, the environmental and human factors which are influencing habitats, plants and animals.
3. The cultural interactions with these processes, that is, the ways that Warraber people interact with the natural environment including identification of values.
4. The establishment of a prescribed list of management actions intended to be used by island rangers and managers to assist in updating Land and Sea Ranger Work Plans increasing the effectiveness of island's ecological and cultural value management.

Owing to the long term occupancy of the islands (>4 000yrs) (McNiven & Wright 2008), the apparent stability of the majority of landscapes, and general lack of detailed ecological information pertaining to these landscapes, it is assumed that maintaining the existing landscape condition and process (in all but a few cases) is the safest management option. Habitat maintenance has therefore been a primary consideration during the compilation of this document. The specific actions that are adopted and direction of island-scale ecological management will however be ultimately up to the discretion of the Warraberalgal Rangers and the Warraber people, who are represented by the Warraberalgal (Torres Strait Islanders) Corporation.

4.0 Legislative and Policy Considerations

Biodiversity (plants, animals and their habitats) is regulated at state and national levels by a range of legislative mechanisms which classify animal species, plant species and habitats according to their rarity, population size, distribution and threats. The legislative classification is generally used as a way to assign significance to a particular species or ecological value. If an animal, plant or vegetation type is listed on any Australian or Queensland government legislation, it is subject to rules which protect it from being destroyed or harmed.

For example, if an orchid species is listed on the legislation it would mean that the orchid could not be collected from the bush and sold at a nursery without the necessary authorisation and permits. Similarly, if an animal such as a bat species or bat colony, which was listed as threatened under legislation, lived in a rock shelter where a housing development was proposed, then detailed studies would be required to determine how the bats would be affected by the development. A description of relevant components of the major legislation mechanisms requiring consideration is provided briefly below.

***The Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):** The EPBC Act, an initiative of the Australian Government, provides recognition of four classes of wildlife and habitat being those which are:

- Extinct in the Wild.
- Critically Endangered.
- Endangered.
- Vulnerable.

Plant and animal species and habitats scheduled under these categories are referred to collectively as 'Threatened Wildlife'. The EPBC Act also provides for protection of those species which are considered migratory under international conventions which include:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
- China-Australia Migratory Bird Agreement (CAMBA).
- Japan-Australia Migratory Bird Agreement (JAMBA).

- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Interference or destruction of plants, animals or areas of habitat for species listed as threatened under the EPBC Act requires specific authorisation from the regulatory body (DSEWPC) (which is likely to provide conditions under which the interference can take place. Interference (such as killing of a protected bird species) without authorisation is in breach of the EPBC Act.

Nature Conservation Act 1992: *The Nature Conservation Act* (NC Act) is a legislative mechanism of the Queensland Government that is regulated by Department of Environment and Heritage Protection (EHP). The *Nature Conservation (Wildlife) Regulation* 2006 is subordinate to the NC Act and defines five classes that are:

- Extinct in the Wild.
- Endangered.
- Vulnerable.
- Near-Threatened.
- Least concern.

These classes collectively relate to native species that are protected wildlife (plants and animals).

Vegetation Management Act: The *Vegetation Management Act 1999* (VMA) is a state regulated planning initiative that underpins the regional management of vegetation in Queensland. Under the VMA, conservation significance to particular vegetation groups termed regional ecosystems (REs) is assigned on a consistent state-wide basis. The classification of regional ecosystems is based on a hierarchical system with a three-part code defining bioregion, followed by land zone, and then vegetation. Thirteen bioregions are classified in Queensland with the Torres Strait Islands being a sub-province of the broader Cape York Peninsula bioregion.

Land zones are geological and geomorphic categories that describe the major geologies and landforms of Queensland. The system is based primarily on geology, with geologic age considered an important determinant. The classification of Land Zone generally utilises available geological information (Neldner *et al*. 2005) although field inspection is utilised as a supplementary measure where geological mapping is inadequate.

The status of REs is based on their pre-clearing and remnant extent, and is gazetted under the VMA and listed in the Regional Ecosystem Description Database (REDD) maintained by EHP. The Vegetation Management Status (VMS) of a regional ecosystem is described in line with the following:

Endangered Regional Ecosystem: a regional ecosystem that is prescribed under a regulation and has either:

- less than 10% of its pre-clearing extent remaining, or

- 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10 000 hectares (ha).

Of Concern Regional Ecosystem: means a regional ecosystem that is prescribed under a regulation and has either:

- 10% to 30% of its pre-clearing extent remaining, or
- more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10 000 ha.

Least Concern Regional Ecosystem: means a regional ecosystem that is prescribed under a regulation and has more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10 000 ha.

Hence, the majority of vegetation scheduled under the VMA as 'Of Concern' on Warraber (e.g. evergreen notophyll vine forest habitat RE3.2.28) is classified as such because on a regional level (Cape York Peninsula) more than 30% of the original habitat extent remains although the total area of the habitat is less than 10 000ha.

The regional ecosystem mapping available for Warraber provides accurate information on the legislative significance of vegetation on the island offering an information planning resource for the Warraber community, the TSIRC and the TSRA. For example, if a sewerage plant was proposed in an area which supported a regional ecosystem (vegetation type) that was considered 'Of Concern', then clearing of this vegetation without authorisation is in breach of the VMA. Liaison with regulators must be undertaken to determine the conditions that must be met for clearing to be authorised. EHP also assigns a Biodiversity Status (BS) to REs, a non-statutory indicator of a regional ecosystems susceptibility to elements of degradation.

Land Protection (Pest and Stock Route Management) Act 2002: The *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) provides a framework and powers for improved management of weeds, pest animals and the stock route network. The act provides for designation of threat classes to species of plant and animal considered not native to Queensland (exotic or invasive) and which degrade natural resources, threaten conservation of biodiversity, threaten remnant vegetation, reduce rural production and interfere with human health and recreational activities. Exotic species that pose a threat are declared under one of the following three categories:

- Class 1 Pest: a pest that has potential to become a very serious pest in Queensland in the future.
- Class 2 Pest: a pest that has already spread over substantial areas of Queensland, but its impact is considered sufficiently serious to warrant control.

- Class 3 Pest: a pest that is commonly established in parts of Queensland but its control by landholders is not warranted unless the plant is impacting, or has potential to impact on a nearby environmentally sensitive area.

For example, if a Class 3 weed such as lantana (*Lantana camara*) was found on Warraber, there is a requirement under the act for landowners to take reasonable steps to control and manage the weed. Weeds of National Significance (WONS) identify the top 20 weed in terms of impact to productivity and landscape at a national level on a non-statutory basis.

Weeds of National Significance (WONS): Classification of pest plants as WONS is made at the national level and is not supported by any legislation. The determination of WONS is a system which prioritises weed problems for national action as part of the National Weeds Strategy. In addition to ranking the top 20 weeds in terms of impact to productivity and landscape, it provides indicators on which to base future weed decision-making and a framework for prioritising weeds at the State, regional and local levels (Thorp & Lynch 2000).

The Back on Track Species Prioritisation Framework: The 'Back on Track (BOT) species prioritisation framework' is a non-legislative Queensland Government initiative that prioritises Queensland's native species as a means to guide their conservation, management and recovery. The assessment method utilises multiple criteria allowing identification of those species that are threatened and facing population declines, and those species that have a high potential for recovery. The BOT methodology classifies four priority levels for action to remediate declining Queensland wildlife being 'Critical Priority (CR)', 'High Priority (H)', 'Medium Priority (M)' and 'Low Priority (L)'.

5.0 Vegetation

As described in the following sections, the classification of vegetation includes both nomenclature of individual species and the classification of groups of plants, the latter often forming unique assemblages that can be consistently recognised across islands (e.g. Warraber), island groups (Central Island Group), or bioregions (Cape York Peninsula Bioregion).

5.1 Vegetation Groups and Mapping

The hierarchy of vegetation classification used in the Torres Strait Islands is described below with relationships illustrated in **Figure 2.** At the highest level, the classification of plant assemblages is based on vegetation structure considering the dominant life form (tree or grass), height of the tallest strata, and canopy closure. The structural classification used by the Queensland Government is included within **Appendix A**.

Vegetation structural groupings (i.e. shrubland, woodland etc.) are used to define ***Broad Vegetation Groups*** (BVGs) which provide the broadest level of vegetation classification recognised

in vegetation mapping produced for the Torres Strait Islands (Stanton *et al*. 2009). Broad vegetation groups may be an amalgamation of a number of more specific plant groupings known as ***Vegetation Communities.*** Vegetation communities (VCs) can be described as 'a unit of vegetation that demonstrates similarities in both structure and floristic composition'. They are useful to describe fine scale variation in floristic composition that may occur due to the consistent dominance of a particular plant species or suite of plant species. REs comprise a group of vegetation communities, although unlike BVGs, consider regional distribution and geology within the classification. REs must be considered due to their legislative implications although in this document, for specific habitat management purposes, BVGs provide a more readily usable management grouping and have been used to define habitat management units.

Vegetation Classification on Warraber: For management purposes, the islands vegetation is classified into BVGs, herein referred to as habitats, as derived from Stanton *et al.* (2009). The spatial extent and relative contribution of these groupings is provided in **Table 1,** with descriptions of component vegetation communities and associated REs provided in **Table 2.** Further characterisation of habitat types is provided in the following text.

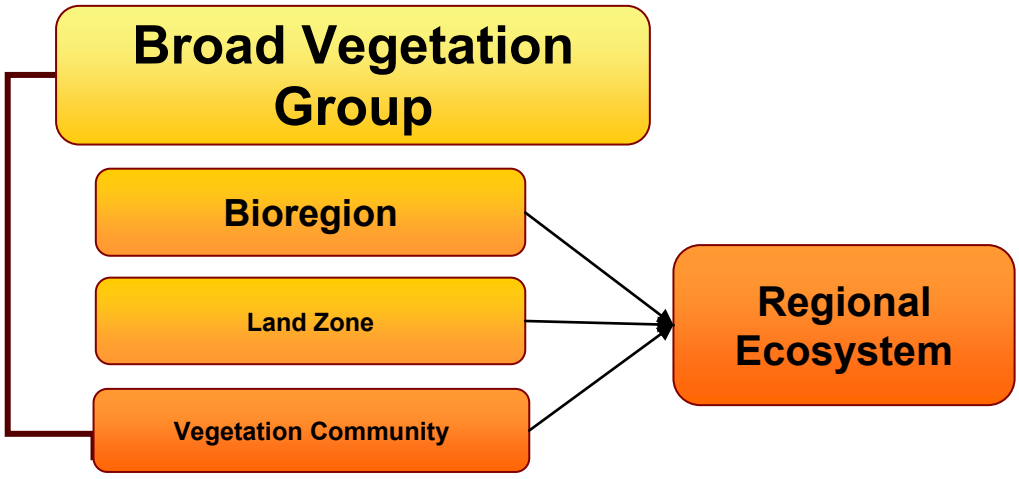

Figure 2. Diagrammatic illustration of the hierarchy and relationship between components of the vegetation classification system used in the Torres Strait Island vegetation mapping study (Stanton *et al*. 2009).

Table 1. Broad vegetation groups and relative contributions to island vegetation.

Broad Vegetation Group/ Habitat**	Component Vegetation Communities**	Area (ha)	Contribution (%)
Deciduous/Semi deciduous vine forest and vine thicket	2m	13.7	18.5
Coastal dune complexes	16a, 17d, 14y, 17j	7.9	10.6
Anthropogenically altered (secondary) vine forest and thicket	22b	4.9	6.6

Broad Vegetation Group/ Habitat**	Component Vegetation Communities**	Area (ha)	Contribution (%)
Cleared land, regrowth and exotic species	Cl, RE, EX	47.7	64.3
Total		**74.2**	**100**

Table 2. Descriptions of component vegetation communities and association with regional ecosystems currently recognised on Warraber Island (from Stanton *et al*. 2009).

Vegetation Community	Description	Geological Association	Regional Ecosystem	VMS	BDS
2m	Semi-deciduous notophyll vine forest + *Milletia pinnata* + *Terminalia* spp. + *Diospyros maritima* + *Manilkara kauki* + *Aglaia elaeagnoidea* + *Planchonella obovata* + *Drypetes deplanchei* +/- *Erythrina* spp.	Calcareous sand	3.2.28	Of Concern	Of Concern
14y	Low *Premna serratifolia* + *Cordia subcordata* +/- *Pemphis acidula* +/- *Drypetes deplanchei* shrubland.	Foredune deposits	3.2.25	Of Concern	Of Concern
17j	Low *Spinifex sericeus* + *Vigna marina* + *Ipomoea pes-caprae* subsp. *brasiliensis* + *Sesuvium portulacastrum* grassland and forbland complex.	Foredune deposits	3.2.24	Of Concern	Of Concern
16a	Coastal foredune grassland, herbland and shrubland complex (17j/14y – 70/30).	Calcareous sand	3.2.24/3.2.25	Of Concern	Of Concern
22b	Semi deciduous vine thicket (secondary) + *Buchanania arborescens* + *Manilkara kauki* + *Scolopia braunii* + *Drypetes deplanchei* + *Terminalia muelleri.*	Calcareous sand	Non-remnant	Non-remnant	Non-remnant
Cl	Cleared areas	Calcareous sand	Non-remnant	Non-remnant	Non-remnant
Re	Regrowth vegetation	Calcareous sand	Non-remnant	Non-remnant	Non-remnant
Ex	Exotic Species	Calcareous sand	Non-remnant	Non-remnant	Non-remnant

5.2 Flora Species

The composition of the island flora has been compiled from analysis of Queensland Herbarium data (Herbrecs 2011), unpublished data from Barbara Waterhouse and Stephen McKenna of the Department of Agriculture, Forestry and Fisheries (DAFF 2012), and field surveys carried out by 3D Environmental in May 2012 (refer **Appendix B**).

The known flora is 201 species which are represented within 77 families and 163 genera. This comprises 137 native species (68 %) and 64 (32 %) which are naturalised. No species listed as threatened at the federal or state level are known to occur on the island. Six species are assigned

regional significance and 78 (38%) are locally/culturally significant (62 native, 16 naturalised). The dominant families (number of native species) are: Fabaceae (10), Poaceae (7), Phyllanthaceae (5), Rubiaceae (5), Moraceae (5), Acanthaceae (4), Celastraceae (4), Convolvulaceae (4), Cyperaceae (4), Euphorbiaceae (4), and Menispermaceae (4).

5.2.1 Flora Species with Biodiversity Significance

An assessment of significant flora species draws on the data sources identified above. Species have been broadly categorised into significance categories (i.e. national, state, regional and cultural) based on criteria, which include legislative status, keystone/focal, threatened or sensitive, restricted, and otherwise noteworthy, or of cultural interest value. Culturally significant species are assessed separately (refer **Sect. 5.2.2** and **Appendix C**).

National Significance

No species listed on the EPBC Act are known to occur.

State Significance

No species listed on the amended regulations of the NC Act are known to occur.

Regional Significance

The classification of regional significance takes into account factors such as disjunct occurrence, endemism (at the bioregional, bioprovince, and island scales), limits of geographic distribution, and local rarity in the landscape. The six species identified as having regional significance are summarised in **Table 3** below.

Table 3. Summary of flora with conservation significance on Warraber

Species	National EPBC	State NC Act	Regionally Significant	BVG	VC	RE
Aristolochia chalmersii	-	-	Disjunct	Vine forest & thicket	2m	3.2.28
Flacourtia sp. (Shiptons Flat L.W. Jessup + GJD3200)	-	-	Disjunct	Vine forest & thicket	2m	3.2.28
Scolopia braunii	-	-	Disjunct, limit of distribution.	Vine forest & thicket	2m	3.2.28
Spermacoce sp. (Lorim Point A.Morton AM1237)	-	-	Disjunct	Herblands	17j	3.2.24
Streblus brunonianus	-	-	Disjunct	Vine forest & thicket	2m	3.2.28
Pittosporum ferrugineum subsp. *linifolium*	-	-	Disjunct, limit of distribution.	Vine forest & thicket	2m	3.2.28

Chalmers Aristolochia *(Aristolochia chalmersii)*

Chalmers aristolochia is a slender vine inhabiting coastal vine forest/thicket and dune shrubland. The leaf blades are soft in texture, about 3.5-11 x 5-15 cm, with slender petioles about 3-8 cm long. Petioles are distinctly thickened and twisted near the base forming a type of tendril (Hyland *et al.* 2010). It is a bioregional endemic known from south-eastern Cape York (Laura Basin including Cape Melville, Silver Plains, Coen), Lizard Island and Torres Strait (DERM 2011c). It is not common in Torres Strait being known from Masig, Mer, Pulu, and Poruma. The occurrence on Warraber is disjunct and represents part of its northern limits of distribution. The vine is a food plant for the larvae of the big greasy and Cairns birdwing butterflies (Hyland *et al.* 2010).

Photograph 1. Chalmers aristolochia (*Aristolochia chalmersii*) in vine forest on Poruma.

***Flacourtia* sp. (Shiptons Flat L.W.Jessup + GJD 3200)**

This currently undescribed shrub to small tree is a Cape York Peninsula bioregional endemic, known from vine thickets in Cape York Peninsula and in Torres Strait from a few disjunct occurrences. Warraber populations form part of its northern limit of distribution.

Flintwood *(Scolopia braunii)*

Flintwood is a small rainforest tree that is endemic to northern eastern New South Wales and eastern Queensland. Its occurrence on Warraber is disjunct and reaching its northern limit of geographical range. It has a fleshy fruit which is bird dispersed. It occurs in vine forest & thicket.

Pittosporum ferrugineum* subsp*. Linifolium

A rainforest shrub endemic to north eastern New South Wales and eastern Queensland. Its occurrence on Warraber is disjunct and reaching its northern limit of geographical range. It

has fragrant flowers and a fleshy fruit with sticky seeds which are bird dispersed. Occurs in vine forest & thicket.

***Spermacoce* sp. (Lorim Point A.Morton AM1237)**

This currently undescribed perennial herb is known from northern Cape York Peninsula (near Somerset), Torres Strait (Badu, Mua, Dauan, Masig, and Poruma), and Papua New Guinea (Mabadauan), (DERM 2011c). Warraber populations form part of its disjunct northern limit of distribution. It occurs on sandy soils supporting savanna woodlands and coastal grasslands and shrublands (DERM 2011c). On Warraber it has been recorded from regenerating dune shrublands. The population size is unknown.

Whalebone tree (*Streblus brunonianus)*

This shrub to small tree is known from vine forests and thickets from Torres Strait through Cape York Peninsula, coastal Queensland, and eastern New South Wales. Its habitat is restricted in Torres Strait and Warraber populations form part of its disjunct northern limit of distribution.

5.2.2 Flora with Cultural Significance

Information on useful plants of Warraber is currently being documented by the Land and Sea Ranger team. More detailed ethnobotanical studies to derive baseline information of useful plants and the local language names should include information on uses, seasonality, habitat, distribution, abundance, phenology, and most importantly the relationships to story and culture. Useful plant species recorded by Senior Ranger Laura Pearson (Pearson 2012) are supplemented by specimen label data of the botanical collections of Lawrie (DERM 2011c), and field survey by the authors during May 2012. The available information indicates 78 plant species (38% of the island flora) are culturally significant. Of these, 62 are native and 16 are naturalised. Broad habitat use types and data sources have been annotated in the species lists provided in **Appendix B** & **C**.

5.2.3 Introduced Plants

A number of plants which are not native to Warraber are present on the island. These introduced plants are also referred to as ‘environmental weeds’ or ‘naturalised plants’. Most have been brought to the island as garden plants, and others may have been imported by natural means such as birds, wind and tides. Others may have been brought in by boats and barges within freight items, and in soil, gravel and machinery. While many of them pose no real problem to the natural environment, others have the ability to spread into bush areas and have serious impacts if not controlled. A number of naturalised plants are however valued by Warraber people on the basis of their various uses and have been part of the island environment for generations. Such plants include Manilla rope (*Agave sisalana*), tridax daisy (*Tridax procumbens*), and wild passionfruit (*Passiflora foetida*).

As for the majority of the inhabited islands in the Torres Straits, the developed and disturbed areas are a major dispersal point for weeds.

Information on weeds has been sourced from Qld Herbarium voucher data (DERM 2011c), the land use planning report of Conics (2009), field data of Barbara Waterhouse and Stephen McKenna from DAFF, and field surveys by 3D Environmental in May 2012.

With reference to the flora list (**Appendix B**), there are 64 naturalised species currently known to occur on the island (32% of the total island flora). Those species considered a current threat to biodiversity on the island and requiring management action are summarized below. Further surveys are required to determine the extent of impact and threats of individual weeds to the islands ecology.

Declared Weeds

Two species declared on the LP Act are currently known to occur on Warraber.

Lantana - *Lantana camara* (Class 3)

Lantana is a Class 3 Declared Weed and listed as Weed of National Significance (WONS). It is currently widespread on Mer, Erub and Ugar with localised infestations on Masig and Poruma where it is limited to plantings in gardens within the community area. Ongoing monitoring and prompt control of any infestations is recommended. On Warraber, lantana infestations are restricted to disturbed areas near the township and airstrip.

Photograph 2. Lantana on Masig (May 2012).

Yellow Bells – *Tecoma stans* var. *stans* (Class 3)

Yellow bells is a medium to tall shrub with attractive yellow flowers with a papery wind-blown seed which readily germinates in disturbed areas and native bushland. The shrub is likely an

escaped ornamental tree from local domestic gardens. It is currently occurring throughout the village in house gardens and community areas where it is valued as an attractive ornamental. Populations occur in disturbed vegetation fringing village areas and on the margins of vine forest/thicket and foredunes. It poses a potential threat to Warraber vegetation. Ongoing monitoring and prompt control of any infestations is recommended.

Photograph 3. Yellow bells (yellow flowers lower left) on the margins of foreshore coastal shrubland, Poruma.

Environmental Weeds

The existing level of disturbance on the island is evident by a large number of introduced plants (over one-quarter of the islands flora). The limited extent of remnant vegetation is therefore increasingly susceptible to impacts from a number of weeds. Whilst weeds are primarily distributed throughout disturbed areas, a number pose more significant threats to native vegetation. Weeds which are not currently declared under state legislation are categorised in **Table 4** according to their invasiveness, dispersibility and potential threat under the following criteria:

High

These plants are considered to be the highest threat to the islands cultural and biodiversity values because they have a high potential to expand beyond existing infestations and could occupy a much larger area if not controlled. These plants have a high likelihood to spread and establish in new areas and are able to invade reasonably intact ecosystems areas.

Moderate

These plants are considered to be of secondary importance at present, although some could become a problem in the future. They are not considered as invaders yet, but are known to be invasive elsewhere in the region and/or are showing signs of extension (species which are in an early stage of invasion), or may be present on the island in disturbed areas. These plants have a moderate potential to spread and establish in new areas, both within native bush and disturbed areas.

Low

These are naturalised plants which are not considered as invaders given their low dispersal potential. They have a low potential to expand beyond existing areas of infestations and may already occupy as much area as likely to infest.

Table 4. Environmental weeds

Species	Life Form	Comments
HIGH		
Leucaena (*Leucaena leucocephala*)	Shrub	Leucaena is the most pressing weed threat to island with the potential to severely impact and transform the remaining natural ecosystems. It is a small tree up to about six metres tall with fine bipinnate leaflets, spherical creamy yellow flower heads, dense clusters of flattened pods up to 15 cm long with 20 glossy brown, and flat seeds that scatter when ripe (Biosecurity Queensland 2007). Its origins on Warraber are not known although it is likely to have been brought in from other islands as an ornamental possibly for its seeds which can be used for necklaces. The current distribution of Warraber has been subject to initial targeted control by the Land and Sea Management Unit.
Bundled pigeon flower *(Desmanthus pernambucanus)*	Low shrub	A decumbent low shrub to 1m with fine bipinnate leaves and round white mimosa like flowers and straight narrow pods. Native to Caribbean and South America. Naturalised throughout the Pacific and Indian oceanic islands, eastern Australia, southern Africa, south east Asia and southern USA. Considered a weed in Pacific Islands. Can resemble Leucaena in appearance. Known also from Iama Island (Waterhouse pers. comm.).
Glory lily (*Gloriosa superbens*)	Climber	A tuberous climbing plant with brilliant wavy-edged yellow and red flowers. It is a serious weed on sandy coastal soils in south-eastern Queensland and along the north coast of New South Wales, and is known to be fatally toxic to humans. The rootstock is the most toxic part of the plant. The plant has underground tubers and is difficult to control. It has been observed in gardens on a number of islands in the Torres Strait including Masig, Mer, Ugar, Erub and Poruma. It is likely that it has been introduced as an ornamental for house gardens. There is a potential for it to escape into bushland.
Scarlet flower *(Ipomoea hederifolia*)	Vine	A slender vine originally from tropical America, now Naturalised in Cape York Peninsula (CYP), north eastern Queensland and southwards to north eastern New South Wales. Recorded on disturbed margins of the community invading shrublands and vine thicket margins. There is a high potential for its further proliferation.
Sisal, Manilla rope (*Agave sisilana*)	Succulent shrub	A robust succulent plant that is widely cultivated as a garden ornamental. The species has had traditional usage on the Torres Strait Islands providing a natural source of fibre. It generally occurs in coastal areas where it may form dense impenetrable thickets covering dune swales and riparian areas. It is also listed as one of the 35 most troublesome weed species in the state, occurring on sandy

Species	Life Form	Comments
		beaches and dunes along Queensland (Queensland Government 2012). Its occurrence on the margins vine thicket habitats were confirmed during the May 2012 field survey.
Butterfly pea (*Clittoria ternatea*)	Vine	A vigorous, herbaceous perennial leguminous vine. Leaves are pinnate with 5-7 leaflets. Flowers are axillary, single or paired ranging in colour from white, mauve through to light and dark blue. Occurs in and around disturbed community areas on a number of Torres Strait Islands.
Castor oil bush (*Ricinus communis*)	Shrub	A robust perennial spreading shrub to about 6m native to Africa and Eurasia. Leaves are large, palmately divided when mature, with 7–9 lobes, and with a strong odour when crushed. Seeds ejected explosively. It was introduced to Australia in the early 1800's. Now widespread in mainland states where it occurs in disturbed areas and along rivers and creeks. It was cultivated for castor oil which was extracted from seeds which also contain the toxin ricin. Humans are sensitive to the toxin and a few seeds ingested may kill (Parsons & Cuthbertson 1992). Limited to a few scattered individuals.
MODERATE		
Coffee senna (*Senna occidentalis*)	Shrub	Annual to short-lived perennial shrub to 2m with 3–7 pairs of leaflets that are 2–10 cm long, 0.6–4 cm wide, and mounded gland at base of leaf stalk. Seedpod hairless, straight or sickle-shaped, opening at maturity, with seeds transverse in seedpods. Seeds ovate to oblong, flattened, olive to dark brown, 0.4–0.5 cm long. Widespread in Queensland and northern Australia. Seeds have been used as a coffee substitute. Small infestations occur on Warraber.
Beggar weed (*Desmodium tortusoum*)	Herb	An herbaceous annual 1-2m in height with a deep taproot. It is naturalised throughout temperate and tropical regions of the world. It is common on Warraber occurring on disturbed areas around the village and roadsides. The sticky seed pods are easily dispersed by dogs, humans and machinery.
Bluebell, minnieroot (*Ruellia tuberosa)*	Herb	A perennial herb with tuberous roots, widely branched erect stems to 50 cm. Leaves ovate to oblong, 4-6 x 1.5-2.5 cm, with undulate margins and petioles to 1.5 cm long. Flowers are purple. Fruit is a cigar-shaped capsule, 1.5 cm long, with a persistent calyx, and produces 20 or more seeds per locule which explode at maturity (Howard 1989; pp. 380-381). Reproduces by seeds and tubers. It occurs throughout the West Indies, northern South America, and central America (Long 1976, Wilson *et al*, 2004). It is used medicinally in West Indies, Suriname (Lans n.d). In Torres Strait it is present on a number of islands. Its abundance around disturbed parts of Warraber indicates a potential for proliferation.
Indian couch *(Bothriochloa pertusa)*	Grass	A stoloniferous and/or tufted perennial, commonly with pink to red stolons. Widespread throughout the tropics and in urban lawns, parks and roadsides. Occurs in disturbed areas and along tracks and roads. Has potential to invade native dune grassland and herbland ecosystems in the long term.
Painted spurge *(Euphorbia cyathophora)*	Herb	An introduced weed originally from tropical America naturalised in Queensland and New South Wales. Widespread throughout Torres Strait in particular on sand dunes and coral cays. Invades native grassland and herblands.
Mossman River grass *(Cenchrus echinatus)*	Grass	Mossman River grass is a prostrate spreading grass with a spiny seed head that adheres to clothing and can penetrate the skin. The species has potential to become a troublesome dominant cover on grassy dune systems.
Siratro (*Macroptileum atropurpureum*)	Vine	Siratro is widespread throughout Torres Strait occurring in community areas and on the margins of tracks and roads. It is a vigorous sprawling leguminous climber that establishes rapidly and is considered capable of invading the groundcover of shrublands.

Species	Life Form	Comments
Snake weed (*Stachytarpheta jamaicensis)*	Herb	This low erect perennial herb is common on Masig. Its leaves are opposite with toothed margins and blue flowers borne on stiff spikes. They are also naturalised throughout Queensland where they invade roadsides, creek lines and vine forests where soil has been disturbed.
Townsville stylo / secca *(Stylosanthes humilis)*	Erect herb	A perennial herb to 1 m high which was introduced as a pasture species in northern Australia and now widely naturalised. Leaves have three small leaflets which are narrow elliptic. Seedpods are 3–11 mm long and 1.5–2 mm wide, with 1–2 red-brown seeds. Common on Warraber throughout disturbed areas.
True indigo *(Indigofera tinctoria)*	Low shrub	A low compact perennial shrub 1-2 metres in height naturalised in tropical and temperate regions. Common on numerous Torres Strait Islands inclusive of coral cays. Tends to inhabit disturbed areas and is able to tolerate coastal exposure. The plant is one of the original sources of indigo dye which is extracted from the leaves.
LOW		
Asthma plant (*Euphorbia hirta)*	Herb	Prostrate herb to 10cm with milky sap from stems and leaves. Widespread in the tropics and throughout Torres Strait in particular on sand dunes and coral cays. Invades native grassland and herblands.
Button grass *(Dactyloctenium aegyptium*)	Grass	A low perennial grass widespread throughout Qld and Torres Strait. Common on coral cay islands.
Cinderella weed *(Synedrella nodiflora)*	Herb	An annual herb which occurs on Warraber and other Torres Strait Islands. Occurs in disturbed areas and on margins of native vegetation.
Couch *(Cynodon dactylon* var. *dactylon*)	Grass	A low-growing perennial grass with grey-green leaves which spreads rapidly by seed and runners. It is widely planted as a lawn grass. It occurs in all states and territories. It invades wetlands and river edges in tropical parts of Qld.
Crowsfoot *(Eleusine indica*)	Grass	Tufted erect perennial grass found throughout village area and along tracks and roads.
Pink periwinkle *(Catharanthus roseus)*	Herb	An upright herbaceous perennial with dark green, lance-shaped leaves and abundant pale pink flowers. Seeds are dispersed by ants, wind and water. It was first recorded as naturalised in south eastern Queensland in 1909 and is widely spread from North Queensland south to the New South Wales border. Common throughout Torres Strait.
Poinciana *(Delonix regia)*	Tree	A large spreading deciduous tree with fine deciduous leaves and attractive red flowers. Known to be invasive throughout the Pacific Islands and on basalt islands of Mer and Erub.
Red Natal grass *(Melinus repens*)	Grass	A widespread perennial grassy weed common in the northern and eastern parts of Australia including Torres Strait. Occurs along disturbed areas with ability to invade margins of native vegetation and disturbed areas. On Warraber it is found primarily on disturbed sites with ability to spread into natural habitats.
Stinking passionflower *(Passiflora foetida)*	Vine	A climbing or scrambling vine with leaves that are mostly 3-lobed and glandular hairy 4–12 cm long. Fruit are 2–4 cm wide, hairy, yellow-orange when ripe. Flowers are solitary, 3–5 cm wide, white to pale purple with a foetid smell. Small black seeds are spread by birds and mammals. Occurs throughout northern and subtropical Australia often in good condition vegetation. Ripe fruits have a pleasant flavour but green fruits and leafy material are toxic.
Tridax daisy (*Tridax procumbens*)	Herb	An annual herb which is widespread on Warraber and other Torres Strait Islands. Occurs in disturbed areas and as a groundcover on foredune grassland and herbland communities.
Ogiera *(Eleutheranthera ruderalis)*	Herb	A weed of disturbed areas and gardens.
Summer grass (*Digitaria ciliaris*)	Grass	This grass is commonly found in lawns, gardens and disturbed areas.
Sweet broom	Herb	This herb is commonly found in lawns, gardens and disturbed

Species	Life Form	Comments
(*Scoparia dulcis*)		areas.
Mint weed (*Hyptis suaveolens*)	Herb	A robust annual herb forming a multi stemmed shrub to 2m. Native of tropical America but now widespread throughout the tropics and subtropics. Naturalised in Western Australia, Northern Territory, CYP, north-eastern Queensland and southwards as far as south-eastern Queensland. It is widespread in and around a number of island communities with seeds dispersed by wind, water and birds.
Streaked rattlepod (*Crotalaria pallida* var. *obovata*)	Low shrub	Originally from tropical America, and now widespread in northern Queensland and north-eastern New South Wales. Occurs as scattered individuals in disturbed areas.

Weed Threats

The following weeds not currently recorded on the island are considered to have serious potential to degrade natural habitats on Warraber.

Table 5. Weed threats

Species	Comments
Praxelis (*Praxelis clematidea)*	Praxelis is a highly invasive erect, branched, unpleasant-smelling herb known on Erub, Badu, Mua, Mabuiag and Masig. It is a native of South America, and known to spread rapidly by wind-blown seeds along roadsides. It can spread into native bushland forming dense monospecific stands that exclude other vegetation. Praxelis is known to invade grasslands, woodlands and rock pavements. It is considered a potential threat to habitats on Warraber.
Barleria *(Barleria prionitis)*	This plant is considered an emerging environmental weed, which has the potential to seriously degrade habitats on coral cay islands, particularly in vine thickets/shrublands on sand dunes where there are canopy openings or disturbance. It is recognized as one of 28 weeds on the *Alert List for Environmental Weeds* (NHT 2003). The plant is currently known from Boigu Island.
Cupids flower (*Ipomoea quamoclit*)	A slender vine originally from India and now naturalised across northern Australia and on the east coast south to northern New South Wales. Existing infestations on other islands such as Mabuiag have the potential to disperse.
Indian calapo (*Calopogonium mucunioides*)	A vigorous short-lived viney creeper which is native to South America and introduced to northern Australia as a pasture legume. It establishes from seed, and rapidly forms dense mats of foliage 30-50 cm high often climbing and smothering adjoining vegetation. It is less common than siratro and butterfly pea however existing infestations on other islands such as Mabuiag indicate its potential to disperse.
Annual mission grass *(Cenchrus pedicellatsus* subsp. *pedicellatus*)	A robust annual grass known from northern Australia including northern CYP and Mua. The invasion of annual mission grass is listed as a Key Threatening Processes under the EPBC Act. It threatens biodiversity in northern savannas by competing with native annual grass species and rapidly occupying disturbed areas with the ability to remain green until the late dry season providing fuel for fires which occur later and are hotter than normal seasonal fires (DEWHA 2011).
Grader grass (*Themeda quadrivalvis*)	A robust erect perennial grass to 1.5m in height which is a major weed in northern and coastal central Queensland which is capable of invading grassy woodlands and shrublands. Infestations are typically prominent along roadsides. The seeds are easily dispersed by machinery, vehicles and slashing, with colonisation typically following ground disturbance. Recorded from Masig.

6.0 Fauna (Animals)

For the purposes of this report, terrestrial fauna includes amphibious species such as crocodiles and amphibians and aerial species such as swifts. It does not include marine species and hence marine turtles, sea snakes and sea birds are excluded. Sea birds include all members of the Order Procellariformes such as shearwaters and petrels, as well as frigatebirds (family Fregatidae), boobies (family Sulidae) and tropicbirds (family Phaethontidae). Some species of tern (family Laridae) are largely marine but are usually considered as shorebirds rather than sea birds (*e.g.* Pringle 1987).

For the majority of Torres Strait Islands there is a lack of systematic survey of fauna habitats. Warraber has been the focus of a number of studies including RPS (2010) and Watson (2012), and is therefore one of the best-surveyed islands in the broader Torres Strait Island group per unit area. A desktop review of the DERM WildNet (Wildlife Online) database, Online Zoological Collections of Australian Museums (OZCAM 2011), the EPBC Online Protected Matters Search Tool maintained by the DSEWPC (2011g), was supported by analysis of the survey results of RPS (2010) and Watson (2012). Other records are incidental, or part of broader regional surveys targeted towards particular life forms (e.g. Draffan *et al.* 1983; Clarke 2004; Garnet *et al.* 2000; Hall 2008, Helgen 2004) of which studies of avifauna (birds) have been most comprehensive.

The desktop review identified 105 fauna species that have been reported for Warraber (**Appendix E**). This includes one frog, 10 reptile, 91 bird and three mammal species. This can be compared with the 384 terrestrial fauna species that have been reported for the broader Torres Strait Island group. Of the animals reported for the island, one reptile, one bird and two mammal species are introduced. An additional two species have been identified by the Protected Matters Search Tool as possibly occurring on the island.

6.1 Culturally Important Fauna Species

Over 100 years ago, English anthropologist Alfred Cort Haddon (1912:230) noted Torres Strait Islanders' familiarity with the natural world:

> *'[they] are good field naturalists and have names for a large number of plants and animals. A considerable number of plants are utilised in one way or another, more so than we have mentioned in these Reports. Although the land fauna is deficient in forms of economic importance, the natives have names for animals which are not of value to them, and are acquainted with their habits; their knowledge of the natural history of marine animals being very extensive. The uses and properties of most of the plants are known to them'.*

The region's birds, mammals and reptiles also have cultural significance for Torres Strait Islanders. Many feature in local myths and legends, and some are also clan totems (*augadh*). On Warraber

Island, clan totems include crocodile, shark, frigate bird, dog and gau (possibly banded landrail) (Shukal 2004).

The calls of some birds are recognized as omens, foretelling events such as weather, the arrival of a ship or the death of a relative (e.g. Haddon 1908: 260-261), others are 'calendar species' which alert people to the fact that a particular food resource is now available. Feathers from birds such as herons (*Egretta sacra* and *Ardea* spp.) and the cassowary (*Casuarius casuarius* – obtained from Papua New Guinea traders) continue to be used for traditional head-dresses.

6.2 Fauna Habitat Values

Warraber, at 74 ha is a relatively small island with limited habitat diversity. Approximately 29% of the island is covered in natural or near natural vegetation, dominated by vine forest and, beach dune complexes. A considerable amount of secondary regrowth also occurs on the island. As Warraber is a coral cay, the sandy substrate forms a uniform surface across the island and does not present to diversity of soil and landform types that are demonstrated on the larger continental islands. Hence the fauna diversity, as it is with all coral cays in the Torres Strait when compared to the larger continental islands, is relatively depauperate.

The major value of the island habitats is as a foraging resource, roosting and nesting site for birds. Of the 105 fauna species recorded on the island 91 (86 %) are birds, many of which are transient or migratory species. The vine forest habitats on Warraber provide an important roosting site for a number of avian species plus a seasonal foraging resource for frugiverous birds. Littoral margins of the island, particularly in those less disturbed portions of the coastal fringe, provide a temporary stop-over for migratory species as well as serving an important habitat for a number of waders and terns including the little tern, eastern curlew and beach stone-curlew. These species are further discussed further in **Section 6.3.**

6.3 Fauna Species with Conservation Significance

In this report fauna of conservation significance include:

- Species listed as Critically Endangered, Endangered or Vulnerable under the EPBC Act including those listed as Migratory.
- Species listed under Endangered, Vulnerable or Near-Threatened under Queensland's NC Act.
- Species considered of 'Critical' or 'High' priority under the Back on Track framework (DERM 2011a).

Other species may be assessed as being significant at the regional scale (i.e. Torres Strait) by the study team based on criteria such as local rarity, state and bioregional endemism, limits of distribution and disjunct occurrences.

6.2.1 *Endangered, Vulnerable and Near-Threatened Species*

A total of four species of conservation significance (threatened species) at either state or federal level have been reported on the island, with an additional two species predicted to occur (see **Table 6)**. There are also an additional 32 migratory species considered to have significance at federal level that are reported to occur on the island (**Appendix E**).

Table 6. Endangered, Vulnerable and Near-Threatened fauna species[1] reported or predicted[2] to occur on Warraber Island.

Scientific Name[3]	Common Name	Status[4]			Source[6]
		EPBC Act	NC Act	BoT[5]	
SPECIES REPORTED					
Esacus magnirostris	Beach stone-curlew	-	V	-	Reported in RPS 2010.
Sternula albifrons	Little tern	M	E	High	Wildnet, Reported in RPS 2010.
Haematopus fuliginosus	Sooty oystercatcher	-	NT	-	Watson 2012, RPS 2010
Numenius madagascariensis	Eastern curlew	-	NT	-	Reported across 18 islands in the Torres Strait
SPECIES PREDICTED[2]					
Pteropus conspicillatus	Spectacled flying fox	V	-	-	Predicted by the EPBC Protected Matters database
Crocodylus porosus	Saltwater Crocodile	-	V	-	Predicted by the EPBC Protected Matters database

1. Listed as Endangered, Vulnerable, Near-Threatened or Migratory under the EPBC Act 1999 and/or the NC Act 1992 or of critical or high priority under the Back on Track prioritisation framework (DERM 2011a).
2. Predicted by the EPBC Protected Matters Search Tool maintained by DSEWPC (2011g). Only noted if not recorded from another source.
3. Nomenclature follows the Australian Faunal Directory (DSEWPC 2011d).
4. Status: E = Endangered, V = Vulnerable, NT = Near-Threatened, M = Migratory, LC = Least Concern (Common).
5. BoT = Back on Track priority species.
6. Known from Museum records, published literature (*eg* Draffan *et al*. 1983; Clarke 2004a, b), WildNet database and/or reports and other grey literature (*eg* Schaffer 2010). These sources are not necessarily mutually exclusive.

Little tern (*Sternula albifrons*)

EPBC Act: Migratory

NC Act: Endangered

Listed under the EPBC Act as *Sterna albifrons* (Bonn Convention, CAMBA, JAMBA, ROKAMBA).

The little tern is also considered of 'High' priority under the Back on Track species prioritisation framework (DERM 2011a).

The little tern is found along a variety of coastal areas, including open beaches, lagoons, estuaries, river mouths, lakes, bays, harbours and inlets, especially those with exposed sandbanks. They feed primarily on small fish, crustaceans and other invertebrates and nest on open sandy beaches.

Nesting occurs mainly from September to January but in northern Australia nesting also occurs from April to July. Little terns breed in small colonies (Pringle 1987; Higgins & Davies 1996).

The species occurs in Europe, Asia and Australasia and within Australia occurs along the coastal regions of eastern Australia, south to Tasmania, and across northern Australia, west to northern parts of Western Australia (Higgins & Davies 1996). The little tern is mainly a summer visitor to northern Australia, including Torres Strait, though there is a winter-breeding population in the Gulf of Carpentaria (Blakers *et al*. 1984). In the Torres Strait Draffan *et al*. (1983) reports the species from 13 islands, including Badu, Mer and Erub. It is also known from Boigu (Clarke 2004b; DERM 2010a), Mua (Ingram 2008) and Iama (Natural Solutions 200b). A single WildNet record is reported from Dauan. Draffan *et al*. (1983) described it as an uncommon summer visitor throughout the Torres Strait. In summer of 2002, Clarke (2004b) recorded 151 individuals on Boigu Island, approximately one third of which were in, or near, full breeding plumage, suggesting that the northern Torres Strait Islands may be more important for the species than previously thought.

The little tern in Australia is both increasing in abundance and expanding its distribution. The species has a naturally high rate of breeding failure, with ground-nesting making it vulnerable to natural events that contribute to low success, such as loss of eggs and chicks through native predators, flooding of nesting sites (including high tides), and adverse weather conditions (Garnett & Crowley 2000). Little terns are also threatened by human disturbance at nesting colonies, encroachment of vegetation in colonies (Blakers *et al.* 1984), nest predation by rats, gulls and feral pigs, and by degradation of estuaries, pesticide residues in fish, and oil-fouling of both birds and beaches (Garnett & Crowley 2000). Little tern is unlikely to breed on Warraber Island and therefore threats are likely to be minimal.

Beach Stone-curlew *(Esacus magnirostris)*

NC Act: Vulnerable

Beach stone-curlew is considered of 'Critical' priority under the Back on Track species prioritisation framework (DERM 2011a). The species was formerly known as beach thick-knee and as *Burhinus neglectus*.

The beach stone-curlew generally occurs singularly or in pairs, and occasionally in small groups of up to six birds. The species is exclusively coastal, occurring on all types of beaches, especially near river mouths, on mudflats, near mangroves, and occasionally on coastal lagoons. It is typically more common on islands than the mainland (Lane 1987; Marchant & Higgins 1993). The species is mainly nocturnal or crepuscular and adult birds appear to be sedentary. The species feeds predominately on crabs and other marine invertebrates in the intertidal zone and a single egg is laid in a scrape in the sand, often in the same area year after year (Clancy 1986; Marchant & Higgins 1993).

Beach stone-curlews are found around eastern and northern Australia from Nambucca Heads in New South Wales (and occasionally south to Victoria) to Port Cloates in Western Australia and extend into New Guinea, the Solomon Islands and Indonesia (Marchant & Higgins 1993). Draffan *et al.* (1983) report the species from 33 Torres Strait Islands in total, in every area except the north-west.

This species is still found in locations where human activity is high but the lack of young birds in such areas indicates that reproduction is being affected by human disturbance (Freeman 2003). Breeding success may also be significantly reduced from predation by cats, dogs and feral pigs. Much of the species' habitat in Australia, particularly on islands, is secure. However, because beach stone-curlews occur at low densities and occupy linear habitats, the potential for local extinctions to become regional ones is increased (Garnett & Crowley 2000).

The species utilises vine forest habitats for roosting and may be threatened by feral species and disturbance by humans, particularly when nesting.

Eastern Curlew (*Numenius madagascariensis*)

EPBC Act: Migratory (Bonn Convention, CAMBA, JAMBA, ROKAMBA);

NC Act: Near-Threatened

The eastern curlew is mostly confined to coastal habitats, particularly estuaries, harbours and coastal lagoons. They mainly forage on open intertidal mudflats, sandflats and saltmarsh, often near mangroves, and occasionally on ocean beaches. Roosting occurs on sandy spits and islets, in mangroves and saltmarsh, and along high water mark on beaches (Pringle 1987; Higgins & Davies 1996). The species usually feeds individually or in small groups (Pringle 1987), though large numbers may congregate at high tide roosts (Lane 1987).

Eastern curlews breed in eastern Siberia during the northern hemisphere summer and arrive in north-eastern Australia as early as late July, but most individuals arrive in eastern Australia by late August and September (Ueta *et al*. 2002). Birds begin to depart to return to breeding grounds around March and April (Lane 1987). However, a significant percentage of the Australian population remains through the Australian winter, particularly in northern Australia (Pringle 1987; Driscoll & Ueta 2002). In Australia eastern curlews occur in suitable habitat on all coasts (Higgins & Davies 1996). In the Torres Strait Draffan *et al*. (1983) reported them from 18 islands, including Mua, Badu, Mer, Erub and Boigu, and there is a single WildNet record from Mabuiag (DERM 2010e) and an unpublished record from Iama (Natural Solutions 2008). The species is likely, at least on passage, on any island that has suitable foraging habitat. Only one individual was observed among many hundreds of waders at St Pauls on Mua Island in March 2011 (Terry Reis *pers. obs*.).

The Australian eastern curlew population is estimated at 19,000 and numbers have fallen significantly in some southern areas. In Tasmania populations have declined by 65% (Reid & Park 2003). It is unknown as to whether these declines are a result of overall population decline or a change in non-breeding range. Eastern curlews are easily disturbed by people at foraging and roosting sites (Higgins & Davies 1996; Taylor & Bester 1999) and are often the first species in a high-tide roost to take to flight if disturbed, relocating to alternative roosts often some considerable distance away (Lane 1987). Eastern curlews will take off when humans approach to within 30-100m (Taylor & Bester 1999) and sometimes are disturbed within 250m of approach (Higgins & Davies 1996). Pollution may have also reduced food availability (Higgins & Davies 1996).

Draffan *et al*. (1983) provide no detail on local numbers and the two WildNet records (DERM 2010f) are more likely to be a reflection of a lack of formal survey work rather than an accurate indication of their numbers on Mua Island. The species is most likely to be threatened by disturbance when foraging and such a threat would only be significant during passage to northern hemisphere breeding grounds.

Sooty Oystercatcher (*Haematopus fuliginosus)*

NC Act: Near-Threatened

The sooty oystercatcher prefers rocky shorelines and headlands, exposed reef although it does occasionally frequent sandy beaches. The species typically feeds on limpets and other shellfish. Breeding generally occurs on offshore islands during summer months where eggs are typically laid in shell-lined hollows. The species is threatened by disturbance to nesting sites, predation of eggs and chicks by rodents and raptors as well as destruction of nesting sites during periods of high swell or storms. Entanglement in fishing nets and discarded tackle is also considered a threat.

Sooty oystercatcher is an uncommon species in the Torres Strait and no specific information on bird numbers is provided in either RPS (2010) or Watson (2012). The sooty oystercatcher can be inconspicuous on rocky shores and if its presence is only sporadica, may be under-recorded due to a lack of consistent survey effort. Breeding occurs mainly October to January and may begin as early as June in the tropics (Pringle 1987; Marchant & Higgins 1993). They often roost and breed on offshore islands, nesting in shallow depressions on a range of substrates including sand, gravel, coral rubble and rocks in quiet, isolated spots above the high-tide mark (Marchant & Higgins 1993). On light coloured beaches sooty oystercatchers place eggs in low visibility nest sites next to and under vegetation (Lauro & Nol 1995). The species is threatened by human disturbance and damage to feeding, nesting and roosting areas and from predation by feral animals such as dogs (*Canis lupus*), cats (*Felis catus*) (NSW NPWS 2002) and rats (*Rattus rattus*). These threats would be relevant to the species on Warraber.

6.2.2 *Migratory Species*

Fifty-seven bird species listed as Migratory under the EPBC Act are known to occur in Torres Strait (**Appendix E**). The Vulnerable (NC Act) salt-water crocodile is also listed as Migratory under the EPBC Act and is predicted by the EPBC Matters of National Environmental Significance (MNES) search engine to occur on Warraber. A number of other species also migrate into or through the Torres Strait but are not listed under the EPBC Act. Unless otherwise stated it should be assumed that reference to Migratory species in this report refers only to those species listed as such under the EPBC Act. **Table 7** lists the 31 Migratory species reported to occur on Warraber, with an additional 24 birds that are likely to occur based on records on adjacent islands and habitat suitability. All species are listed as Least Concern under the NC Act unless otherwise noted.

Table 7. Migratory[1] species reported or predicted to occur on Warraber

Scientific Name[2]	Common name	Comments[3]
SPECIES REPORTED		
Pandion cristatus[5]	Eastern osprey	WildNet & published records.
Haliaeetus leucogaster	White-bellied sea-eagle	WildNet & published records.
Pluvialis fulva	Pacific golden plover	WildNet & published records.
Pluvialis squatarola	Grey plover	WildNet & published records.
Chardrius bicinctus	Double banded plover	WildNet & published records.
Charadrius mongolus	Lesser sand plover	WildNet & published records.
Numenius madagascariensis[6]	Eastern curlew	WildNet & published records.
Tringa brevipes	Grey tailed tatter	WildNet & published records.
Calidris alba	Sanderling	WildNet & published records.
Vanellus miles	Masked lapwing	WildNet & published records.
Xenus cinereus	Terek sandpiper	WildNet & published records.
Actitis hypoleucos[7]	Common sandpiper	WildNet & published records.
Tringa brevipes[8]	Grey-tailed tattler	WildNet & published records.
Calidris ruficollis	Red-necked stint	WildNet & published records.
Calidris acuminate	Sharp-tailed sandpiper	WildNet & published records.
Anous stolidus	Common noddy	WildNet & published records.
Onychoprion anaethetus[10]	Bridled tern	WildNet & published records.
Sternula albifrons[11]	Little tern	WildNet & published records.
Sterna dougallii	Roseate tern	WildNet & published records.
Sterna Hirundo	Common tern	WildNet & published records.
Chlidonias leucopterus	White-winged black tern	WildNet & published records.
Myiagra cyanoleuca	Satin flycatcher	WildNet & published records.
Calidris canutus	Red knot	WildNet & published records.
Thalasseus bengalensis[12]	Lesser crested tern	WildNet & published records.
Merops ornatus	Rainbow bee-eater	WildNet & published records.
Symposiarchus trivirgatus	Spectacled monarch	WildNet & published records.
Monarcha melanopsis	Black-faced monarch	WildNet & published records.
Sterna sumatrana	Black-naped tern	WildNet & published records.
Limosa lapponica	Bar-tailed godwit	WildNet & published records.
Calidris tenuirostris	Great knot	WildNet & published records.
Egretta sacra	Eastern reef egret	WildNet & published records.
Arenaria interpres	Ruddy turnstone	WildNet & published records.
Additional possible migratory species		
Crocodylus porosus	Salt water crocodile	Predicted to Occur – MNES database

Scientific Name[2]	Common name	Comments[3]
		search
Charadrius leschenaultii	Greater sand plover	No Records
Numenius phaeopus	Whimbrel	No Records
Cuculus optatus	Oriental cuckoo	No Records
Xenus cinereus	Terek sandpiper	No Records
Tringa nebularia	Common greenshank	No Records
Rhipidura rufifrons	Rufous fantail	No Records
Ardea modesta[4]	Eastern great egret	No Records
Ardea ibis	Cattle egret	No Records
Plegadis falcinellus	Glossy ibis	No Records
Tringa incana[9]	Wandering tattler	No Records
Apus pacificus	Fork-tailed swift	No Records
Gallinago megala	Swinhoe's snipe	No Records
Limosa limosa	Black-tailed godwit	No Records
Numenius madagascariensis	Eastern curlew	No Records
Numenius minutus	Little curlew	No Records
Tringa stagnatilis	Marsh sandpiper	No Records
Tringa glareola	Wood sandpiper	No Records
Calidris melanotos	Pectoral sandpiper	No Records
Hydroprogne caspia	Caspian tern	No Records
Symposiarchus trivirgatus[14]	Spectacled monarch	No Records
Hirundo rustica	Barn swallow	No Records
Coracina tenuirostris melvillensis	(Melville) cicadabird	No Records
Calidris ferruginea	Curlew sandpiper	No Records

1. Listed as Migratory under the EPBC Act 1999.
2. Nomenclature follows the Australian Faunal Directory (DSEWPC 2011d).
3. Known from Museum records, published literature (*eg* Storr 1973; Draffan *et al*. 1983; Wilson 2005), WildNet database and/or reports and other grey literature (Natural Solutions 2008a). These sources are not necessarily mutually exclusive. No additional species was predicted by the EPBC Protected Matters Search Tool maintained by DSEWPC (2011g).
4. Listed under the EPBC Act (CAMBA, JAMBA) as Great Egret *Ardea alba*. Australian birds elevated to full species level as *A. modesta* (Kushlan & Hancock 2005; Christidis & Boles 2008).
5. Listed under the Bonn Convention as Osprey *Pandion haliaetus*. Australian birds have been elevated to species level as *P. cristatus* (Wink *et al*. 2004; Christidis & Boles 2008).
6. Listed as Near-Threatened under the NC Act.
7. Also listed under CAMBA and ROKAMBA as *Tringa hypoleucos*.
8. Also listed under the Bonn Convention and JAMBA as *Heteroscelus brevipes*.
9. Also listed under the Bonn Convention and JAMBA as *Heteroscelus incanus*.
10. Listed under the EPBC Act as *Sterna anaethetus* (CAMBA, JAMBA).
11. Listed under the EPBC Act (Bonn Convention, CAMBA, JAMBA, ROKAMBA) as *Sterna albifrons*. Listed under the NC Act as Endangered.
12. Listed under the EPBC Act (CAMBA) as *Sterna bengalensis*.
13. Listed under the EPBC Act (CAMBA, JAMBA, ROKAMBA) as *Cuculus saturatus*. Australian birds elevated to full species level as *A. optatus* (Christidis & Boles 2008).
14. Listed under the EPBC Act (Bonn Convention) as *Monarcha trivirgatus*.

6.2.3 Species of Regional Significance

The *Action Plan for Australian Birds 2000* provides a list of bird species or subspecies that occur on Warraber Islands and meet the criteria for listing as Vulnerable under the EPBC Act. These species should be considered regionally significant although none of these species has been recorded on Warraber.

6.3 Pest Fauna Species

Exotic (introduced) fauna species reported for Warraber Island are house gecko, house sparrow (*Passer domesticus)*, house mouse, dog and cat.

House gecko is considered a threat to native species through competition in both natural habitats and on buildings (Case *et al*. 1994; Hoskin 2010). There are records of native geckoes on Warraber, including the dubious dtella (*Gehrya dubia*). Mourning gecko is superficially similar in appearance to Asian house gecko and also inhabits buildings. Local information on geckoes is therefore unlikely to be reliable in regards to species and an assessment of the level of threat posed by house gecko requires survey effort. This could be combined with other, higher priority, reptile surveys.

House sparrow is unlikely to pose any threat to native species on Warraber and no action is required for the species.

Dogs are present on the island and are a threat to ground nesting birds, particularly the beach stone-curlew, sooty oystercatcher as well as a disturbance factor for waders and terns. Cats have been observed in the village area by the authors in June 2012. Although house cats in Australian suburbs have been shown to kill mainly introduced rats and mice, native wildlife are also killed, including mammals, birds, reptiles and frogs. With access to undisturbed habitat, it is likely that they would have a substantial impact on native fauna (Barratt 1997).

In northern Australia the house mouse lives mostly in houses and other buildings storing food. However, the species does move into areas of natural vegetation, especially after fire when native rodent numbers may be low. In dry and temperate Australia, house mouse numbers typically fall as numbers of native species increase with increasing time since fire (Singleton 2008). With no record of native rodents on Warraber, house mouse may potentially spread into areas of native vegetation although the impacts of this are uncertain.

6.4 Threats

The major threats to fauna in any location are loss, degradation and fragmentation of habitat. These processes may be due to deliberate clearing, damage by feral and domestic herbivores, storm and tidal damage, erosion and weed invasion. The extent of exotic weeds on the island requires further investigation, particularly leucaena and yellow bells, as these species have potential to significantly alter habitat function. Exotic predators, such as dogs and cats, pose a threat to native fauna, either directly through predation or by disturbance.

The black rat poses concern to culturally significant flora, and native fauna/bird species particularly during nesting where eggs may be vulnerable to foraging. Diete (2010) recorded high densities in and around houses and in all the vegetated habitats on Poruma, with reports of occasional

outbreaks causing potentially serious health problems to the local islander community, damage to household goods and infrastructure. Whilst rats have not been reported on Warraber, they remain a potential threat requiring ongoing monitoring efforts.

6.5 Future Work

Being a small island with a limited number of habitats, Warraber is one of the most intensively surveyed islands in the Torres Strait. It is important however that continued information be collected on the islands fauna assemblage, particularly for avian species. In addition to general opportunistic survey methods, the following actions are recommended:

High Priority

Targeted surveys to identify important areas of habitat and roosting sites for the beach stone-curlew.

The location of any breeding sites for the beach stone-curlew should be recorded so that these sites can be monitored and afforded protection from threatening processes. Vigilant recording of any other species sighted on the island, particularly the conservation significant species including eastern curlew, sooty oystercatcher and little tern should be an ongoing action.

Determining presence and populations of feral cats, wild dogs and exotic rodents.

Domestic cats occur on the island and it is likely that feral populations occur. In regard to the latter, the first priority is to carry out spotlighting surveys in and around the tip on a regular basis. If cats or dogs are evident, sand padding of tracks on the remoter parts of the island will provide additional data on population size and movement. This information is critical to allow development of a targeted control plan. The process may require involvement of training in feral animal survey and control techniques.

7.0 Profiles for Warraber Island Habitats

This section presents a summary of current knowledge, management issues and recommended management actions for the habitats that occur on Warraber. The information presented has been derived from prior and recent field survey efforts, review of previous reports, input from experts at technical workshops, and consultation with island rangers and indigenous community members. As context it is noted that the vegetation on the island has been affected by human occupation and settlement.

*"Pre-contact Kulkalgal had acted both deliberately and inadvertently upon their surroundings. For their gardens they cleared land, marked permanent boundaries, planted, harvested, placed increase statues, brought new plant species from elsewhere, collected seeds for replanting. For their settlements they built huts, kooda and skullhouses, cleared open spaces for meeting places, criss-crossed their islands with well-trodden paths, constructed burial mounds, put up temporary shelters and windbreaks, cut wood and bamboo to build fires, house supports, shelters and drying racks, took the hard wood of the mangrove to make digging sticks and the softer wongai wood to carve totemic figures and harpoon heads" (*Shnukal 2004).

7.1 Deciduous/Semi -Deciduous Vine Forest and Vine Thicket

7.1.1 Status of Ecological Knowledge

Deciduous and semi-deciduous vine forest and thicket, as represented by vegetation community 2m, is mapped exclusively on coral cays of the central group of islands. The limited areas remaining on Warraber, represent the true wongai forest type which is characteristic of the vegetated coral cays in the Central Island Group.

The canopy forms heights of 12m to 18m and is dominated by wongai-ubar (*Manilkara kauki*) with coral tree – nawai (*Erythrina variegata).* Associated species include *Diospyros maritima, Aglaia elaeagnoidea, Planchonella obovata,* and aka (*Drypetes deplanchei).* This vegetation community is reported to have been heavily impacted by firewood harvesting in the late 1800's to service the trepang and bech de mer industry (see Shnukal 2004).

7.1.2 Ecological / Cultural Considerations

Habitat Condition: The remaining areas of the forest type on Warraber are in good condition. The interior of the intact forest is free of weeds with closed canopy cover and a consistently dense leaf litter. Evidence of past disturbance from gardening or along old access tracks is indicated by the presence of scattered emergent coconut palms, areas of pionciana – christmas tree (*Delonix regia*) and small groves of Manilla rope (*Agave sisalana*). The interface between the forest and adjoining disturbed areas are the focus for introduced species and may include vines such as *Ipomoea hederifolia*, yellow bells, and leucaena.

Photograph 4. Nawai *(Erythrina variegate)* structure of VC2m on Warraber.

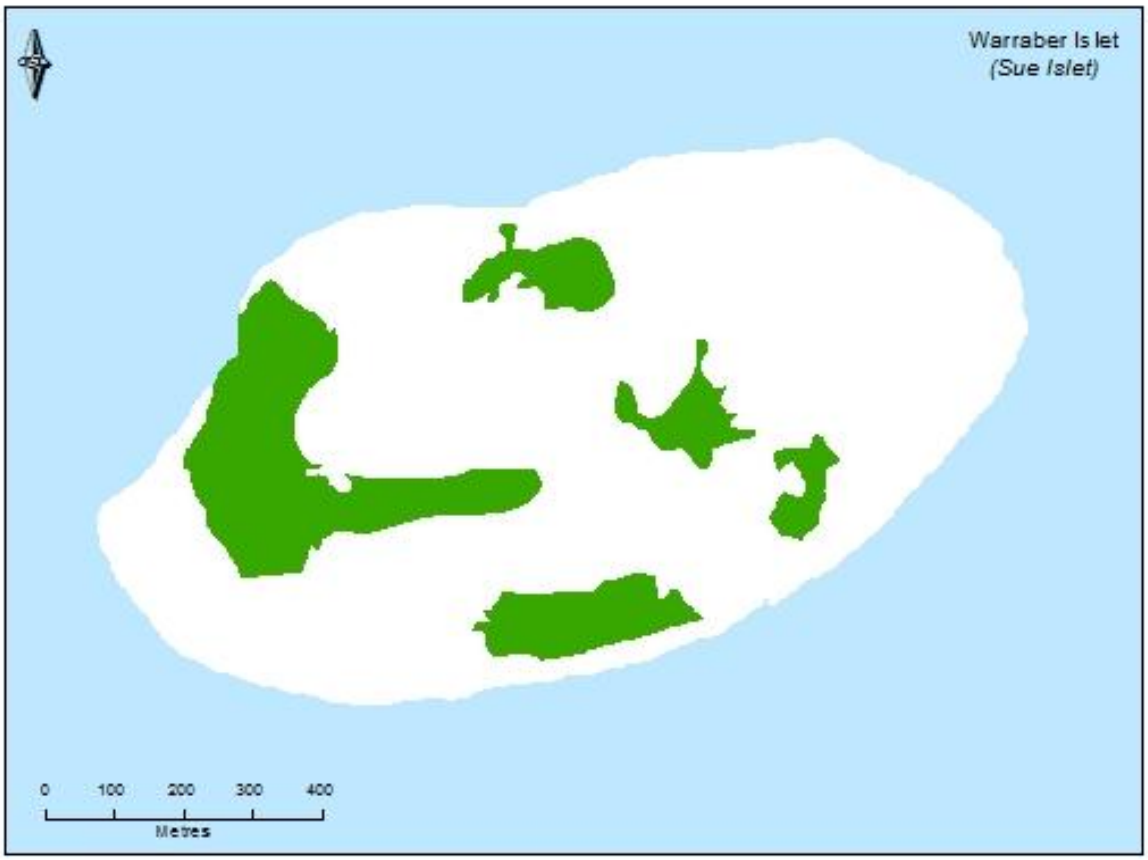

Figure 3. Distribution of evergreen vine forest and thicket Warraber.

Fauna: The fauna assemblage associated with this habitat is simple, comprising a limited number of reptiles such as spotted tree monitor. It is however an important habitat for frugiverous birds and may provide roosting sites for beach stone-curlew. Further survey across a range of season will aid characterisation of the habitats full faunal assemblage.

Flora: The habitat supports the regionally significant species *Aristolochia chalmersii, Flacourtia* sp. Shiptons Flat (L.W. Jessup + GJD3200)**,** *Scolopia braunii, Streblus brunonianus* and *Pittosporum ferrugineum* subsp. *linifolium*. Warraber populations form part of the northern limits of distribution for these species. Other species such as *Elaeodendron melanocarpum, Mimusops elengi, Sterculia quadrifida, and Claoxylon hillii,* are considered uncommon and locally rare on the island.

Cultural Perspectives: Vine forests on Warraber provide an abundance of cultural resources. Food resources include: ubar (*Manilkara kauki*), mipa (*Terminalia muelleri*), kurath (*Eugenia reinwardtiana*), gasi (*Tacca leontopetaloides*), merkai ubar (*Mimusops elengii*), and spitting cucumber (*Muelleragia timorensis*).

Other traditional resources include: aka (*Drypetes deplanchei*), kubil gim (*Diospyros maritima*), nawai (*Erythrina variegata*), usarkan (*Aglaia eleagnoidea*), sarzar (*Ficus opposita*), githgith (*Micromelum minutum*), nhokazue pui (*Pittosporum ferrugineum* subsp. *linifolium*), thimikapu (*Abrus precatorius*), obui (*Morinda citrifolia*) and naziarsr (*Pipturus argentea*).

7.1.3 Management Considerations

The habitat has a restricted regional distribution and has been heavily fragmented and modified across much of its original extent. This is manifest in the 'of concern' status under the Qld VMA (1999). Semi-deciduous vine forest associated with coral cays is a restricted and fragile habitat requiring highly specific edaphic conditions, in particular a threshold depth of well-drained calcareous soil and availability of fresh groundwater. In the short term, the habitat is threatened with clearing for development and weed invasion although long-term threats are largely associated with coastal erosion associated with sea level rise and changing climatic regimes. Salinisation of the fresh groundwater lense through overdrawing of the resource may also be a threat. Canopy openings and other forms of disturbance to this habitat provide a niche for invasion of exotic species, particularly leucaena.

At present, minimal active management is required although the passive management situation may change rapidly with the introduction of invasive exotic species. Regular patrols, focusing initially on disturbed vine forest areas should continuously monitor for introduction of exotic species such as leucaena. The impacts of changing shorelines and coastal erosion should also be monitored through observation on a regular basis. Management actions can be considered if damage to this habitat is noted.

7.1.4 Summary of Recommended Management Actions

The information provided in **Table 8** below aims to summarise the key issues, actions and priorities so as to aid the transfer of information into the Warraber Island Working on Country Plan. Priority categories are adapted from the Draft Plan of Management for Pulu Indigenous Protected Area (Hitchcock *et al.* 2009) as follows:

Immediate Priority Actions – Actions required for management issues which have potential to significantly alter or damage the islands natural or cultural values in the short term (0-5 years).

High Priority Actions – Actions required for management issues which have potential to result in significant damage of the islands natural or cultural values within the medium term (5-15 years) or where lack of knowledge significantly hampers the ability to manage a habitat effectively.

Moderate Priority Actions – Actions required for management issues which have potential to result in significant damage of the islands natural or cultural values within the long term (>15 years) or where there is a knowledge gap that does not detract significantly from the ability to manage a habitat effectively.

Table 8. Summary of management actions for evergreen and semi-evergreen vine forests

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Fauna composition within this habitat requires further definition.	Opportunistic collections of fauna and observations relating to fauna usage within this habitat should be undertaken as part of rangers general duties. Maintain focus on ethno taxonomy to feed into Traditional Ecological Knowledge (TEK).	Moderate
Plant Surveys	Flora composition is documented although limited to rapid surveys. Potential for new records for the island of significant species particularly during the wet season.	Carry out additional flora field surveys with focus on collection of new records for the island and important cultural resource species. Collect leaf specimens and photograph plants with known uses/values and that may have been used in the past, and catalogue. Update island species list as new information becomes available.	Moderate
Traditional Ecological Knowledge	Composition of TEK within this habitat is becoming better known by rangers. Plant and animal lists provided in the appendices provide a good foundation for increasing TEK and ethno taxonomy.	Collect and collate TEK knowledge within this habitat gained through fauna and flora survey actions on an ongoing basis.	High
Fire Management	No fire management required.	No management actions required.	Not required
Threatened Species Management	Flora: The habitat hosts six species considered significant at the regional level with another five locally rare. The ecology of this habitat is poorly documented. The habitat is potentially threatened by rising sea levels. Fauna: No threatened fauna species currently known from the habitat although it may provide roosting sites for the beach stone-curlew.	Flora: No management actions required. Carry out ongoing surveys as identified above. Fauna: Adopt a structured fauna assessment program as per recommendation set out in **Section 6.5.**	Moderate Moderate

Management Category	Context/Issue	Actions	Priority
Invasive Species Management	Flora: A number of species known from disturbed areas pose a threat in the long term. Fauna: The impacts that introduced mice, cats and dogs are having on this habitat are unknown and needs to be ascertained. Dogs are known to be impacting on goannas although the extent of impact is unknown.	Flora: Monitoring for new weed infestations, particularly for weeds including leucaena, yellow bells, and Manilla rope, is required on a regular basis. Control of weeds needs to be identified within a weed management plan which identifies priorities for control. This should include precise mapping of all populations using GPS. Development of yearly weed maps indicating control areas would be valuable. Monitoring of control efforts should include regular photo monitoring points. Fauna: Populations of dogs and cats should be monitored and an eradication/control program considered if populations expand considerably	Immediate Immediate
Monitoring	Observations relating to any changes to habitat condition, particularly those arising from weeds and utilisation by feral animals, or coastal erosion are required on a regular basis.	Carry out informal observation of habitat condition including health of canopy (monitoring for dieback) and presence of invasive weed species, on a regular annual to bi-annual basis. .	Moderate

7.2 Coastal Dune Complexes

7.2.1 Status of Ecological Knowledge

This habitat is essentially a mosaic of grassland, forbland, shrubland and vine thicket copses located on coastal foredune locations. The habitat represents the primary seral stage in the succession of bare beach sand to stabile dune woodland / forest vegetation. Coastal dune complexes on Warraber comprise a fine mosaic of three dominant vegetation communities including:

- An open to closed forbland complex composed of species including *Spinifex longifolius, Vigna marina, Ipomoea pes-capre* subsp*. brasiliensis, Cassytha filiformis, Thurea involuta, Lepturus repens, Cyperus pedunculatus, Canavalia roseus, Josephinia impetricans,* and a range of succulent forbs such as *Sesuvium portulacastrum, Euphorbia pallens, E. tannensis* subsp*. tannensis,* and *Salsola kali* (VC17j).
- Grasslands dominated by species including *Cenchrus brevisetosus* (VC17d).
- Low shrublands formed by *Premna serratifolia, Casuarina equisetifolia, Cordia subcordata, Scaevola taccada, Pemphis acidula, Colubrina asiatica* and *Drypetes deplanchei* (VC14y).

Of these, VC 17j is the most prominent forming broad flats on areas of foredune accretion. The complex forms an almost universal cover on the majority of coastal foredune habitats throughout the Torres Strait Islands although its best development is often associated with sand cay islands of the central and eastern group, particularly on foredune communities where sand actively accumulates. The habitat, where better formed, has an uneven appearance accentuated by the groved nature of the community which has scattered clumps of trees and shrubs relatively well-spaced and separated by bare sand or sparse tussock grasses and herbs.

These are colonising communities forming on recent (Holocene) dunes and foredunes with a primary ecological function of stabilising mobile dune sand. They are highly sensitive to disturbance and destruction of colonising vegetation by fire, recreation or exotic animals, may have a destabilising effect on dune morphology, leading to beach erosion. For this reason, they should be considered highly sensitive habitats and protected from elements of human disturbance as far as is practical.

7.2.2 Ecological / Cultural Considerations

Habitat Condition: Away from settlement areas, these habitats are generally in excellent condition. Closer to settlements, there is usually degradation associated with trampling and a number of forms of traffic. These areas lack significant infestations of exotic species although they are at risk of infestation by gloriosa lily which has been noted in garden areas within the village. Leucaena has also been observed to invade disturbed areas within this habitat. This habitat will be the initial point of impact for beachside erosion related to sea level rise and storm surges and is constantly adjusting its profile in response to changing seasonal conditions and sedimentation rates.

Photograph 5. Typical structure of RE3.2.24 (VC17j) on Warraber.

Photograph 6. Dune grassland (VC17d) on low amplitude beach ridges on Warraber.

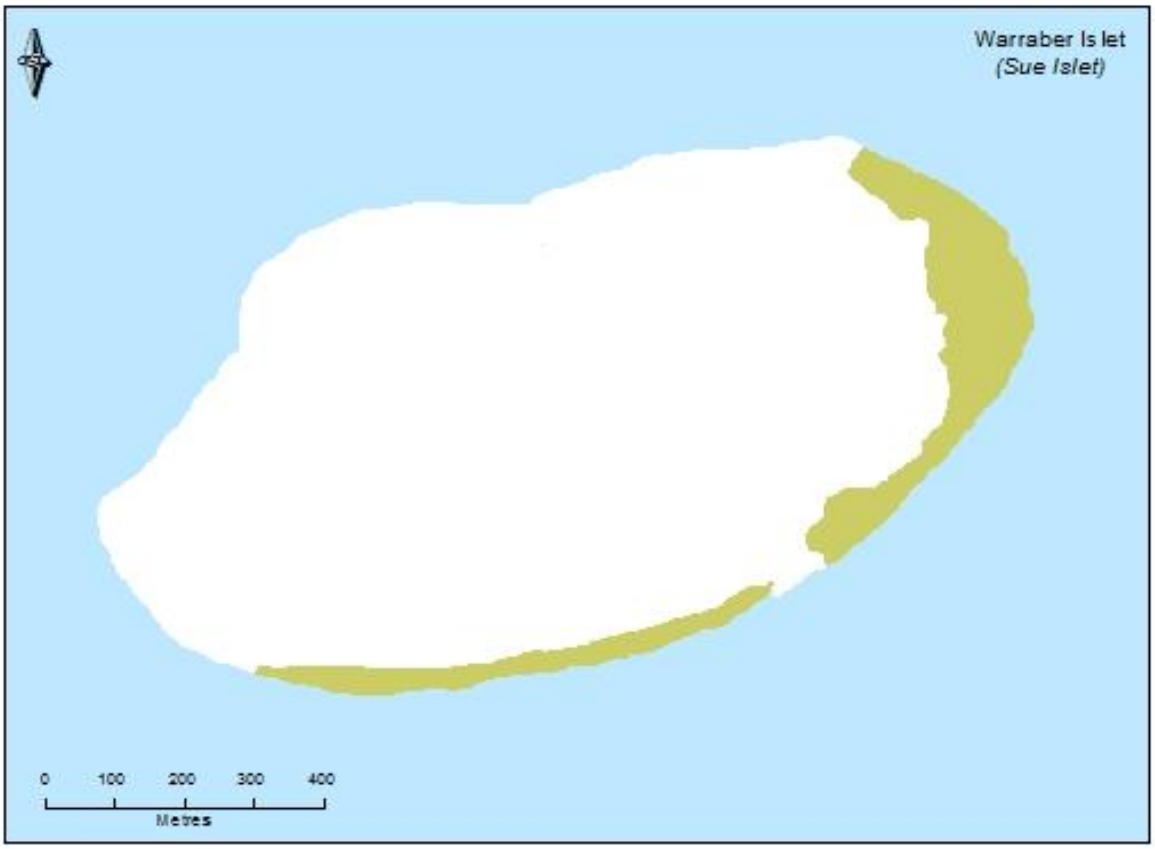

Figure 4. Distribution of coastal dune complex habitats

Fauna: The habitat provides an important nesting ground for marine turtles and a number of bird species including beach stone-curlew (*Esacus magnirostris*), listed as 'Vulnerable' under state legislation and little tern (*Sternula albifrons*) which is listed as 'Endangered' under state legislation.

Flora: No individually significant flora species are known to occupy this habitat.

Cultural Perspectives: Groved thickets dispersed throughout community provide an extensive repository of cultural resources including a number of important food trees such as wongai (*Manilkara kauki)* and kurath (*Eugenia reinwardtiana),* and mipa *(Terminalia subacroptera).* The habitat also provides an important repository for food resources such as turtle eggs.

7.2.3 Management Implications

The inherent sensitivity of these habitats presses the importance of appropriate management regimes. Recommendations relate largely to ensuring vehicular access is restricted in sensitive areas. Recreational access also has significant potential to degrade the habitat through dune destabilisation and potential vector for introduction of pest species. Continued monitoring for the invasion of exotic species is also required. Due to their sensitive and often transitional nature, fire should be excluded from the habitat due to its destabilising effect on landform and tendency to simplify habitat diversity.

7.2.4 Summary of Recommended Management Actions

Table 9. Summary management recommendations for coastal beach complexes.

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Limited previous survey.	Design and implement a structured survey program targeting the identification of sensitive bird rookeries for management focus. Include training rangers in survey methods.	High
Plant Surveys	Information on flora composition is incomplete and limited to rapid surveys in early dry season.	Carry out additional flora field surveys across seasons with focus on wet season herbs and grasses. Collect specimens and photograph plants with known uses/values and that may have been used in the past, and catalogue.	Moderate
Threatened Species Management	Flora: No significant species known. Fauna: Dune complexes provide habitat for a range of significant fauna species including beach stone-curlew, little tern as well as nesting grounds for marine turtles.	Flora: No actions. Fauna: Surveys should identify the extent to which exotic predators (dogs and cats) are utilising these sites for hunting purposes. The location of nesting, and foraging sites for the beach stone-curlew should be identified by GPS for incorporation within the GIS database. The community should be made aware of critical habitat areas and recreational activities within these areas should be monitored or controlled.	Moderate High

Management Category	Context/Issue	Actions	Priority
Traditional Ecological Knowledge	Composition of TEK within this habitat is poorly known. Plant and animal lists provided in the Appendices provide a good foundation for increasing TEK and ethno taxonomy.	Collect and collate TEK knowledge through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	Over burning leading to the loss of species diversity and habitat structure and destruction of cultural sites.	Fire should be excluded from these habitats.	Immediate
Invasive Species Management	Flora: The habitat supports scattered infestations of weeds. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna particularly nesting birds, by feral cats and dogs.	Flora: All beachfront habitats should be monitored for infestation of exotic species, particularly gloriosa lily, during routine patrols. Any observed infestation should be documented and eradication/control measures implemented immediately. Fauna: Invasive fauna to be determined from fauna survey results. Assess cat activity levels through nocturnal spotlighting, and consultation with community members. Implement control where appropriate.	High Moderate
Monitoring	Observations relating to any changes to habitat condition should be documented so that the risk these changes pose to long-term habitat stability can be assessed and appropriate management responses formulated.	All generally accessible beachfront habitats should be informally monitored for infestation of exotic species, and other aspects of land degradation on a minimum 6 monthly interval during routine patrols. Less accessible habitats can be accessed by boat on an annual basis. It is important that location and track logs of informal monitoring exercises be recorded to ensure at risk habitats are not overlooked. Areas of beach erosion should be monitored on a regular basis through establishment of permanent photographic monitoring points.	High
Cultural Heritage	Known cultural heritage values occur within the habitat.	Implement systematic surveys of the cultural heritage values of this habitat zone with consideration given to protecting/managing any significant sites.	Immediate
Other Management Issues	Vehicular recreational access to dune complex habitats has considerable potential to destabilise dune landforms and lead to habitat degradation. Beach access also greatly increases the risk of exotic weed species introduction and spread. Dumping of garden refuse and waste materials on the margins of foreshore areas is a potential source of weed pathogens.	Designate a single recreational access point for vehicles and close all alternative access points to usage. Educate community regarding weed problems arising from dumping of garden refuse. Ensure the reasons for these actions are communicated to the broader Island community.	Immediate

7.3 Anthropogenically Altered (Secondary) Vine Forest and Thicket

7.3.1 Status of Ecological Knowledge

This habitat, represented solely by the vegetation community 22b, has been included for its unique cultural values. It manifests as a low vine thicket 3-6m in height dominated by species which include *Premna serratifolia, Diospyros maritima, Glochidion apodogynum, Diospyros compacta, Guettarda speciosa, Salacia chinensis, Pittosporum ferrugineum* and *Terminalia muelleri*. The vegetation cover occurs in district groves or clumps with large open areas occurring in between. Groundcover is dominated by *Tephrosia laxa*, with *Eragrostis* sp*., Cassytha filiformis, Cyperus* sp., and *Wahlenbergia caryophylloides*. This vegetation community is reported by local people to represent former traditional garden areas that have long since regenerated to a relatively stable vine thicket dominated by native species. Whilst a number of similar communities, controlled and maintained by natural process, are present in other island locations, the communities on Warraber lacks sufficient cover of the original canopy for classification as remnant vegetation. These areas however retain significant cultural values with land ownership boundaries well defined within the local community.

7.3.2 Ecological / Cultural Considerations

Habitat Condition: This habitat is a product of anthropogenic alteration and hence habitat condition cannot readily be discussed in terms of naturalness or similarity to natural habitats. It is however rapidly developing the structure of an intact vine thicket/forest habitat and in the long term, will present habitat values similar to intact semi-deciduous vine forest stands.

Fauna: The assemblage of fauna within this habitat will most likely mimic that of intact semi-deciduous vine forest and include ground dwelling reptiles as well as frugivorous birds. This habitat provides possible shelter and roosting sites for the beach stone-curlew.

Photograph 7. Anthropogenically altered vine thicket (light green flush) VC22b on Warraber.

Figure 5. The location of anthropogenically altered vine forest communities on Warraber.

Flora: The habitat is not known to support any regionally significant plant species.

Cultural Perspectives: The role Torres Strait Islander people have had in shaping the vegetation communities of the Torres Strait (see Parr and Carter 2003, Rowe 2007, Barham 1999) is evident through the length of continuous occupation +2 500 years before present which relied on land and marine resource exploitation inclusive of extensive garden cultivations.

This habitat is essentially a long term established permaculture with traditional food trees including mipa (*Terminalia muelleri*), kurath (*Eugenia reinwardtiana*), aka (*Drypetes deplanchei*) and kubil gim (*Diospyros maritima*). In this regard, it holds particular cultural significance, providing a record of traditional agricultural practice in the eastern Torres Strait Islands. The actual age of these garden areas is not known although discussions with knowledgeable members of the Warraber community suggest that their last record of traditional usage was during the war years.

7.3.3 Management Considerations

This habitat is currently self-maintaining although it may be at long-term risk of degradation through infestation of leucaena, lantana, yellow bells and gloriosa lily. Whilst the habitat is classified as non-

remnant under the VMA (1999), this by no means degrades its value as a significant habitat worthy of preservation.

7.3.4 Summary of Recommended Management Actions

The information provided in **Table 10** below summarises recommendations pertaining to the management of this habitat.

Table 10. Summary of management actions for anthropogenically altered vine forest and thicket.

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Fauna composition within this habitat is poorly documented.	Incidental observations and documentation of the fauna that utilise this habitat should be a component of the rangers general duties. Maintain focus on ethno taxonomy to feed into TEK.	Moderate
Plant Surveys	Flora composition is poorly documented and limited to rapid surveys.	Carry out additional flora field surveys with focus on collection of important cultural resource species. Collect leaf specimens and/or photograph plants with known uses/values and that may have been used in the past, and catalogue.	Moderate
Traditional Ecological Knowledge	TEK within this habitat is poorly known. Plant and animal lists provided in the Appendices provide a good foundation for increasing TEK and ethno taxonomy.	Collect and collate TEK knowledge within this habitat gained through fauna and flora survey actions on an ongoing basis. The significance of this habitat as a cultural resource as well as traditional farming practice which shaped the landscape should be documented for future reference.	High
Fire Management	This habitat is not threatened by fire incursion.	No actions required.	Not Required
Threatened Species Management	Flora: No threatened species are known to occupy this habitat. Fauna: Composition of fauna within this habitat is poorly documented.	Flora: No action required. Fauna: Further baseline survey information is required in regard to habitat usage.	Not required Moderate
Invasive Species Management	Flora: Yellow bells, lantana, leucaena, and gloriosa lily may impact this habitat if infestations are unchecked. Fauna: The composition of invasive fauna within this habitat requires further study. There is considerable potential for impacts on fauna by feral cats and dogs.	Flora: No direct action required at present as there are a number of habitats suffering degradation that are in greater need of attention. Continued assessment of this habitat should be undertaken as a component of general ranger duties to identify any problematic weed outbreaks that require attention. Fauna: Further survey into the usage of this habitat by feral (and domestic) cats is required.	High High

Management Category	Context/Issue	Actions	Priority
Monitoring	The success of any weed control efforts in promoting natural species recruitment and regeneration requires documentation.	Continued informal monitoring of this habitat should be undertaken as a regular component of ranger management duties to identify any potentially problematic weed outbreaks.	High

7.4 Cleared Areas, Exotic Vegetation and Regrowth Forests.

With a relatively large population and small land area, there is considerable pressure on Warraber Islanders to modify the natural environment for a range of community needs. The trend of landscape modification has been ongoing on Warraber since human arrival. At current levels, heavily modified environments (excluding anthropogenic vine thickets) account for 47 ha or 65% of the islands total area. Degraded areas have the potential to host a considerable number of exotic weed species which have potential to spread to less disturbed habitats on Warraber and adjacent islets. The majority of the 64 introduced species on the island occur in degraded areas. The more problematic of these have been previously discussed previously however include:

- Leucaena *(Leucaena leucocephala).*
- Yellow bells *(Tecoma stans).*
- Gloriosa lily *(Gloriosa superba).*
- Lantana *(Lantana camara).*

A structured program of weed planning, awareness, and control within the community areas is required to prevent the spread of these species throughout the island landscape. In particular the dumping of garden waste onto foreshore areas or adjoining vine forests is a threatening process which increases the potential for weed establishment and invasion.

7.4.1 Management Implications

A comprehensive program of weed assessment, followed by strategic control and eradication around the community is required to minimise the risk of spread of invasive species into natural habitats. Weed surveys are routinely carried out by DAFF. A close partnership between the DAFF field botanists and the rangers program is an important foundation to protecting the island from highly invasive weeds. A focus on building the rangers knowledge on identifying, mapping and assessing weeds particularly those capable of inducing major environmental damage is required.

7.4.2 Summary of Recommended Management Actions

Table 11. Summary of management actions for cleared and disturbed areas.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Cultural heritage values may occur throughout cleared and degraded areas.	Implement systematic surveys of the cultural heritage values of this habitat. In consultation with the community, give consideration to	Immediate

Management Category	Context/Issue	Actions	Priority
		protecting/managing these values through fencing and signage.	
Fauna Surveys	NA	No actions.	-
Plant Surveys	NA	No actions.	-
Threatened Species Management	Flora: NA Fauna: NA	Flora: No actions. Fauna: No actions.	- -
Traditional Ecological Knowledge	The recording of TEK may include places, stories, and cultural resources which occur in cleared and degraded areas.	Collect and collate TEK and from interviews with elders on an ongoing basis.	High
Invasive Species Management	Flora: Many weeds are known from within and on the disturbed margins the community. Fauna: Populations of cats, dogs and rodents originate from the community area.	Flora: Undertake a comprehensive program of weed assessment around the community followed by strategic control and eradication. Monitor success of past and recent control measures on known populations of highly invasive weeds. Foster a close partnership between the DAFF field botanists and the rangers program as an important foundation to protecting the island from highly invasive weeds. Train rangers in weed identification. Fauna: Train rangers in feral animal monitoring methods. Assess cat and dog activity levels by installation and monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members. Implement control where appropriate.	Immediate Immediate Immediate Immediate Immediate
Monitoring	NA	See invasive plant species.	-

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9.0 Glossary

Aeolian: Pertaining to transport by wind, particularly wind-blown sand.

Beach Rock: A hardpan layer formed by cemented coral or shells.

Bioregion: The bioregion forms the primary level of classification for terrestrial biodiversity values on a state and nationwide basis. Thirteen bioregions are classified in Queensland with the Torres Strait Islands being a sub-province of the broader Cape York Peninsula bioregion.

Broad Vegetation Group: The highest level of classification used to describe plant assemblages in the Torres Strait Islands, typically referring to plant habit and structure.

Deciduous: A tree species that undergoes a seasonal shedding of leaves, typically being leafless in the drier seasonal periods (e.g. *Bombax ceiba*).

Edaphic: Pertaining to characteristics of the soil including moisture, drainage and fertility.

Evergreen: A tree or vegetation community that retains foliage on an annual basis i.e. always has leaves.

Holocene: The period of time less than 11 thousand years to present. Less than 5 thousand years old is considered to be 'Late Holocene'.

Igneous Rock: A rock formed by cooling and solidification of molten magma or lava.

Notophyll: A category of leaf size with a leaf blade for 7.5 to 12.5 cm long.

Obligate Seeder: A plant that can only regenerate after fire from a seed or stored seed bank.

Pleistocene: The period of time between 11 thousand and 1.8 million years old.

Quaternary: The period of time between present and 1.8 million years old, which is sub-divided into Pleistocene and Holocene ages.

Regional Ecosystem: The primary unit against which Queensland's Vegetation Management Act (1999) is regulated and as such, the classification has specific legislative significance. The classification of regional ecosystems is based on a hierarchical system with a three part code defining bioregion, followed by land zone, and then vegetation.

Savanna: A habitat typified by grasses where trees do not form a closed canopy.

Semi-evergreen: A tree or forest type whose pattern of leaf loss can be related to specific periods of environmental stress. In semi-evergreen vine forest, only portions of the canopy will be subject to leaf loss at a particular time.

Semi-deciduous: A rainforest or vine thicket type in which a component of the forest canopy trees and canopy emergents are seasonally (obligate) deciduous.

Vine Thicket: A vegetation community that is formed by predominantly soft leaf (rainforest) trees and shrubs, typically with dense layers of wiry lianes (vines) growing from ground level and reaching canopy height. Thicket is in reference to canopy height with the predominant canopy forming at < 9m.

Vine Forest: A vegetation community commonly referred to as rainforest, that is formed by predominantly soft leaf (rainforest) trees and shrubs. Dense cover of lianes (vines) and epiphytes are common at all structural levels. Vine forest is differentiated from vine thicket by height, with predominant vine forest canopy being > 9m.

10.0 Appendices

Appendix A. Queensland Govt. Vegetation Structural Classification

Structural formation classes qualified by height for Non-Rainforest Vegetation: Neldner *et al.* (2005) modified from Specht (1970).

Projective Foliage Cover	**70-100%**	**30-70%**	**10-30%**	**<10%**
Approximate Crown Cover %	**80 - 100%**	**50 - 80%**	**20 - 50%**	**< 20%**
Crown separation	**closed or dense**	**mid-dense**	**sparse**	**very sparse**
Growth Form[2]	**Structural Formation Classes (qualified by height)**			
Trees > 30m	tall closed-forest (TCF)	tall open-forest (TCF)	tall woodland (TW)	tall open-woodland (TOW)
Trees 10 – 30m	closed-forest (CF)	open-forest (OF)	woodland (W)	open-woodland (OW)
Trees < 10m	low closed-forest (LCF)	low open-forest (LOF)	low woodland (LW)	low open-woodland (LOW)
Shrubs 2 - 8m	closed-scrub (CSC)	open-scrub (OSC)	tall shrubland (TS)	tall open-shrubland (TOS)
Shrubs 1 - 2m	closed-heath (CHT)	open-heath (OHT)	shrubland (S)	open-shrubland (OS)
Shrubs <1m	-	dwarf open-heath (DOHT)	dwarf shrubland (DS)	dwarf open-shrubland (DOS)
Succulent shrub	-	-	succulent shrubland (SS)	dwarf succulent shrubland (DSS)
Hummock grasses	-	-	hummock grassland (HG)	open hummock grassland (OHG)
Tussock grasses	closed-tussock grassland (CTG)	tussock grassland (TG)	open tussock grassland (OTG)	sparse-tussock grassland (STG)
Herbs	closed-herbland (CH)	Herbland (H)	open-herbland (OH)	sparse-herbland (SH)
Forbs	closed-forbland (CFB)	Forbland (FB)	open-forbland (OFB)	sparse-forbland (SFB)
Sedges	closed-sedgeland (CV)	Sedgeland (V)	open-sedgeland (OV I)	-

[2] Growth form of the predominant layer (the ecologically dominant layer).

Appendix B. Flora Species List – Warraber Island, Torres Strait, Queensland.

- Nomenclature follows Bostock & Holland (2010) 'Census of the Queensland Flora'.
- Habitats refer to broad vegetation groups of Stanton *et al.* (2009).
- *Denotes naturalised or doubtfully naturalised taxa according to Bostock & Holland (2010).
- ^ denotes local - cultural significance.
- # denotes regional significance.
- Unnamed species followed by a collection number (i.e. DGF10153) are pending formal identification at Qld Herbarium.
- Common names of rainforest taxa follow Hyland *et al.* (2010).
- Weed lists compiled by Department of Agriculture Fisheries and Forestry Northern Australia Quarantine Strategy plant health surveillance activities have been incorporated (DAFF 2012).
- Includes selected native non-indigenous plants and naturalised plants found in village areas.

SUMMARY

- 201 species (1 fern, 200 angiosperms)
- 137 native (68%)
- 64 naturalised (32%)
- 77 families (11 wholly naturalised)
- 163 genera (46 wholly naturalised)
- Dominant families (native species): Fabaceae 10, Poaceae 7, Phyllanthaceae 5, Rubiaceae 5, Moraceae 5, Acanthaceae 4, Celastraceae 4, Convolvulaceae 4, Cyperaceae 4, Euphorbiaceae 4, Menispermaceae 4
- Local/cultural significance 78 (38%) (62 native, 16 naturalised)

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
Pteridiophytes (Ferns & fern allies)																
Nephrolepidaceae	*Nephrolepis cordifolia*	*	fishbone fern					X				X				
Angiosperms (Flowering plants)																
Acanthaceae	*Achyranthes aspera*				X	X	X							X		
	Asystasia australasica		chaff burr		X	X								X	X	
	Dicliptera ciliata				X					X						
	Hemigraphis alternata	*	red ivy					X		X	X					
	Pseuderanthemum variable		love flower		X									X		flw
	Ruellia tuberosa	*	spearpod					X		X		X		X		
Agavaceae	*Agave sisalana**	*^	Manilla rope				X	X				X		X		
	Pleomele angustifolia	^	native draceana	Buz	X	X				X	X			X	X	flw
Aizoaceae	*Sesuvium portulacastrum*	^	sea purslane	Garawad			X							X		
Amaryllidaceae	*Priophys amboinensis*		Christmas lily, Cardwell lily		X									X	X	
Anacardiaceae	*Buchanania arborescens*	^	little gooseberry tree	Sizarnai (1)	X	X				X	X		X	X		
	Mangifera indica	*^	mango					X						X		
	Semecarpus australiensis	^	tar tree		X					X	X			X		
Apocynaceae	*Calotropis procera*	*^	poison flower	Susuil (1)				X					X	X	X	flw
	Carissa laxiflora	^		Pataipui (1)		X								X	X	
	Catharanthus roseus	*	pink periwinkle	Patal pui (1)		X	X	X				X	X	X		flw
	Nerium oleander	*	oleander					X					X			
Araliaceae	*Polyscias macgillivrayi*	^	whistle tree		X					X				X		
Arecaceae	*Cocos nucifera*	*^	coconut (varieties recognised locally)	Samo[4]				X					X	X	X	
Aristolochiaceae	*Aristolochia chalmersii*	#	Chalmers aristolochia		X	X								X		
Asteraceae	*Blainvillea dubia*					X	X			X						
	Cyanthileum cinereum							X				X				
	Eleutheranthera ruderalis	*	ogiera					X						X		

[3] Language names sourced from Pearson (2012)
[4] Refers to a variety of coconut

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
	Synedrella nodiflora	*	cinderella weed					X				X		X		
	*Tridax procumbens**	*^	tridax daisy, grass medicine			X	X	X		X		X		X		
	Vernonia junghuhniana	*						X		X						
Bignoniaceae	*Tecoma stans var. stans**	*Class 3	yellow bells				X	X				X		X		Flw
Bombacaceae	*Bombax ceiba var. leiocarpum*	^Cult.	canoe tree					X						X		
Boraginaceae	*Argusea argentea*	^	octopus bush				X							X		
	Cordia subcordata	^	golden trumpet tree	Mukamai		X	X				X			X		Ft
Campanulaceae	*Wahlenbergia gracilis*		blue bells			X	X			X				X		
Caesalpiniaceae	*Caesalpinea bonduc*	^	nicker nut				X							X		
	Delonix regia	*^	poinciana, christmas tree					X			X	X		X		
	Senna occidentalis	*	coffee senna					X				X		X	X	Ft
Capparaceae	*Capparis lucida*		coast caper		X	X				X				X	X	
	Capparis nummularia				X									X		
	Capparis quiniflora				X	X				X	X			X		
	Capparis sepiaria		wild orange		X	X	X			X				X		
Caricaceae	*Carica papaya*	*^Cult.	papaya, paw paw					X				X		X		
Casuarinaceae	*Casuarina equisitifolia var. incana*	^	horsetail oak	Gaibui (1)			X						X	X		
Celastraceae	*Elaeodendon melanocarpum*		black olive pulm		X									X		
	Hippocreata barbarta				X									X		
	Pleurostylia opposita		pleurostylia		X	X				X				Xv	X	
	Salacia chinensis	^	lolly berry, jaffa bush		X	X				X	X			X		
Chenopodiaceae	*Salsola kali*		prickly saltwart				X							X		
Cleomaceae	*Cleome viscosa*	^	tick weed			X	X	X		X				X		Flw
Clusiaceae	*Calophyllum inophyllum*		beach touriga					X								
Cochilaceae	*Gloriosa suberosa*	*Cult.	glory lily					X						X		Flw
Combretaceae	*Quisqualis indica*	*Cult.	Rangoon creeper					X				X				
	Terminalia cattapa	^	beach almond	Meka (1)			X	X					X	X		
	Terminalia meulleri	^	Australian almond	Mepa (1)	X	X	X						X	X		
	Terminalia subacroptera	^		Mepa (1)	X	X					X		X	X		

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
Commeliniaceae	*Commelina ensifolia*		scurvy weed			X	X							X		
Convolvulaceae	*Evolvulus alsinoides var. decumbens*					X	X	X		X				X	X	
	Ipomoea hederifolia	*	scarlet creepr					X						X		Flw
	Ipomoea nil	*	native morning glory		X			X				X				
	Ipomoea pes-capre subsp. brasiliensis	^	goats foot convolvulus	Pulla (1)			X						X	X	X	
	Jacquemontia paniculata		jacquemontia			X	X			X				X		
	Xenostegia tridentata					X	X			X	X			X		
Cucurbitaceae	*Cucumis maderaspatanus*		Madras sea pumpkin			X				X						
	Diplocylos palmatus		striped cucumber		X	X	X							X	X	Ft
	Muellerargia timorensis	^	spitting cucumber	Wild cucumber (1)	X					X			X	X	X	
Cyperaceae	*Bulbostylis barbarta*		water grass			X	X	X						X		
	Cyperus pedunculatus		pineapple grass				X							X	X	
	Cyperus sp.						X							X		
	Queenslandiella hyalina						X				X					
Ebenaceae	*Diospyros compacta*	^	An Australian ebony		X	X				X				X		
	Diospyros maritima	^	broad leaved ebony	Kubilgim (1)	X	X				X	X		X	X		
Euphorbiaceae	*Claoxylon hillii*				X					X	X			X	X	
	Euphorbia cyathophora	*	painted spurge	Poison flower (1)			X	X				X	X	X		
	Euphorbia hirta	*	asthma plant					X			X			X		
	Euphorbia pallens		beach euphorbia				X			X				Xv	X	
	Euphorbia prostrata	*	red caustic weed					X				X		X		
	Euphorbia tannensis var. tannensis		euphorbia				X							Xv	X	
	Manilhot esculenta	*^	cassava					X						X		
	Ricinus communis	*^	castor oil bush	Lam lam (1)				X				X	X			
Fabaceae	*Abrus precatorius*	^	crabs eyes, gidee gidee	Thimikapu (1)	X	X					X		X	X		
	Alysicarpus vaginalis	*	alyce clover					X				X				
	Canavalia rosea		beach bean				X			X				X		

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
	Clitoria ternatea	*	butterfly pea					X				X				
	Crotalaria goreensis	*	gambia pea					X				X				
	Crotalaria pallida var. obovata		streaked rattlepod					X				X				
	Desmodium scorpiurus	*						X		X						
	Desmodium tortuosum	*	beggar weed					X				X		X		Ft
	Erythrina insularis	^	coral tree	Nawai (1)	X		X			X			X	X	X	Ft
	Erythrina variegata	^	coral tree	Nawai (1)	X					X			X	X	X	
	Erythrina vespertilio	^	bats wing coral tree			X					X					
	Indigofera tinctoria	*^	indigo				X	X				X		X	X	
	Indigofera sp. (tiny pinnate DGF)					X		X						X	X	
	Macroptileum atropurpureum	*	siratro					X				X		X	X	Ft
	Rhynchosia minima var. australis		rynchnosia			X	X			X				X	X	Ft
	Stylosanthes hamata	*	Townsville stylo, secca					X				X		X		
	Stylosanthes humilis	*	Townsville stylo, secca					X				X		X		
	Tephrosia laxa					X	X			X				Xv	X	
	Vigna marina		dune bean				X							X		
Flacourtiaceae	*Flacourtia sp. (Shiptons Flat, L.W.Jessup + GJ.D3200)*		flintwood		X						X			X		
	Scolopia braunii		flintwood		X					X				X		
Flagellariaceae	*Flagellaria indica*	^	whip vine		X					X				X		
Goodeniaceae	*Scaevola taccada*	^	sea lettuce				X			X				X	X	Flw
Lamiaceae	*Anisomeles malabarica*	^	chodhava			X				X			X	X		
	Clerodendrum inerme		scrambling clerodendrum	Komark (1)			X						X	X		
	Hyptis suaveolens	*	cockatoo weed					X				X				
	Premna serratifolia	^	coastal premna		X	X	X	X			X			X	X	Ft
Lauraceae	*Cassytha filiformis*	^	dodder	Mujuru (1)	X	X	X	X		X			X	X		
Lythraceae	*Pemphis acidula*	^	digging stick tree				X	X		X	X			X	X	Flw
Malvaceae	*Hibiscus tiliaceus*	^	cotton wood	Warkar (1)			X	X					X	X		

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
	Sida acuta	*	sida					X				X		X		
	Sida pusilla		a sida				X	X		X		X		X		
	Thespesia populneoides	^	Pacific rosewood		X		X							X	X	flw
Meliaceae	*Aglaia elaeagnoidea*	^	coastal boodyara		X	X					X			X		
	Azadirachta indica	*Cult.	neem tree					X					X	X		
	Vavaea amicorum		vavaea		X									X		
Menispermaceae	*Pachygone ovata*				X	X				X	X			X	X	
	PLeogyne australis				X									X	X	
	Stephania japonica var. timoriensis		snake vine		X	X				X				X	X	
	Tinospora smilacina		snake vine		X									X	X	
Mimosaceae	*Acacia oraria*[5]	^Cult.	coastal wattle	Tarpal (1)				X					X	X		
	Desmanthus pernambucanus	*	bundled pigeon flower					X			X	X				
	Leucaena leucocephala subsp. glabrata	*	leucaena					X		X		X	X	X		Flw, ft
	Tamarindus indicus	*	tamarind	Tambarine (1)				X					X	X		
Moraceae	*Ficus microcarpa*		small fruited fig		X									X		
	Ficus opposita	^	sandpaper fig	Sarzar	X	X							X	X		
	Ficus virens var. sublanceolata	^	white fig		X				X					X		
	Streblus brunonianus	#	whalebone tree		X									X	X	
	Trophis scandens subsp. scandens		burny vine		X									X		
Moringaceae	*Moringa oleifera*	*	miracle tree					X				X				
Musaceae	*Musa sp.*	*^Cult.	banana					X						X		
Myrtaceae	*Eugenia reinwardtiana*	^	Cedar bay cherry	Kurath, kurad		X					X			X	X	
	Eugenia uniflora	*^Cult.	Brazilian cherry					X					X	X		
	Syzygium aquem	^Cult.	bell fruit					X						X		
	Syzygium branderhorstii	^Cult.	Lockerbie satin ash	Uzu				X					X	X		
Nyctaginaceae	*Boerhavia albiflora var. albiflora*		tar vine				X			X				X		
	Bouganvillea spectabilis	*^	bouganvillea					X						X		

[5] Observed May 2012 as germinating seedlings in garden pot. Seed sourced from Poruma.

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
Oleaceae	*Jasminum elongatum*		native jasmine		X									X		
Opiliaceae	*Cansjera leptostachya*				X	X					X			X		
Pandanaceae	*Pandanus spirilis*	^	pandanus	Kosarr (1)			X						X	X	X	Ft
Passifloraceae	*Passiflora foetida*	*^	stinking passionflower			X		X				X				
Pedaliaceae	*Josephinia imperatricis*	^	a sand burr	Puttee (1)			X			X			X	X		Flw
Phyllanthaceae	*Breynia cernua*		imer		X	X								X		
	Breynia oblongifolia		coffee bush			X				X				X		
	Flueggea virosa subsp. melanthesoides	^	white current, white fruit	Kupi (1)		X							X	X		
	Glochidion apodogynum		button wood		X	X								X		
	Phyllanthus amarus	*	bahupatra					X		X		X		X		
	Phyllanthus novae-hollandaei		phyllanthus		X	X								X		
Phytolaccaceae	*Pilea microphylla*	*	artillery plant					X				X				
Pittosporaceae	*Pittosporum ferrugineum subsp. linifolium*	^	rusty pittosporum	Nhokazue pui (1)	X	X				X	X		X			Flw
	Pittosporum ferrugineum subsp. ferrugineum	^	rusty pittosporum	Nhokazue pui (1)	X	X				X				X		
Plumbaginaceae	*Plumbago zeylanica*									X				X		
Poaceae	*Bothriochloa bladhii var. bladhii*		forest blue grass					X						X		Flw
	Bothriochloa pertusa	*	Indian couch					X						X		
	Cenchrus brevisetosus	^	dune grass				X							X		
	Chloris inflata	*	purple top rhodes					X				X		X		
	Cenchrus echinatus	*	Mossman river grass				X	X				X		X		
	Cynodon dactylon	*	common couch									X				
	Dactyloctenium aegyptium	*	button grass				X	X		X		X		X		
	Digitaria ciliaris	*	summer grass					X		X		X		X		
	Digitaria setigera		summer grass					X				X				
	Eleusine indica	*	crows foot grass					X				X		X		
	Eragrostis amabilis		a love grass									X				
	Eragrostis tenuella	*	a love grass			X	X	X						X		
	Eragrostis sp. (DGF)		a love grass			X	X							X		
	Letpurus repens		lepturus											X	X	
	Megathrysus maximus var.	*	giant green panic,					X						X		

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
	maximus		guinea grass													
	Panicum trichoides		pygmy panic, dwarf pannic			X		X		X				X		
	Spinifex longifolius	^	beach spinifex				X			X				X		
	Thuraea involuta		running grass				X							X		
	Urochloa subquadripara	*						X		X						
	Pennisetum sp.	*Cult.	barner grass					X						X		
Putrangivaceae	*Drypetes deplanchei*	^	yellow boxwood	Aka	X	X							X	X		
Rhamnaceae	*Colubrina asiatica*	^	colubrina, beach berry bush			X	X			X				X		
Rhizophoraceae	*Rhyzophora apiculata*	^	tall stilted mangrove						X					Xv	X	
Rubiaceae	*Cyclophyllum maritimum*		coastal canthium		X	X								X		
	Guettarda speciosa	^	sea randa, beach gardenia		X	X	X			X	X			X	X	Flw, ft
	Ixora timorensis		northern ixora		X	X				X	X			X	X	Flw
	*Oldenlandia corymbosa**	*				X		X				X		X		
	Morinda citrifolia	^	noni	Obui (1)	X	X		X			X		X	X		
	Spermacoce sp. (Lorim Point A.Morton AM1237)	#				X	X			X				X		
Rutaceae	*Citrus limon*	*^	lemon					X					X			
	Micromelum minutum	^	lime berry	Githgith (1)	X	X				X	X		X	X		
Santalaceae	*Exocarpos latifolius*	^	broad leaf ballart			X								Xv	X	
Sapindaceae	*Dodonaea viscosa subsp. viscosa*	^	hop bush			X					X			X		
Sapotaceae	*Manilkara kauki*	^	wongai	Whbarr (1)	X		X	X		X	X		X	X		
	Mimusops elengii	^	mimusops	Markai whbarr (1)	X			X					X	X		
	Planchonella obovata	^	northern yellow boxwood		X	X				X	X			X	X	
Simaroubiaceae	*Harrisonia brownii*		thorn bush		X									X		
Solanaceae	*Physalis angulata*	*^	cape gooseberry	Scorekine (1)				X				X	X	X		
Stackhousiaceae	*Stackhousia intermedia*						X			X				X		
Sterculiaceae	*Sterculia quadrifida*	^	peanut tree	Yellow kuku (1)	X											
Surianaceae	*Suriana maritima*	^		Mur (1)			X	X					X	X		Flw
Taccaceae	*Tacca leontopetaloides*	^	native arrowroot	Gasi	X	X	X						X	X		

Family	*Botanical Name*	Status	Common name	Central Is. Language Name[3]	Habitat					Source					DGF photo	Phenology (June 12)
					Vine forest & thicket	Altered dune forest thicket	Coastal dune complexes	Disturbed-cleared	Intertidal	Herbrecs (2011)	AVH (2012)	DAFF (2012)	L. Pearson (2012)	DGF June 2012 (v-voucher)		
Thymeliaceae	*Wickstoemia indica*		tie bush			X								X		
Turneraceae	*Turnera ulmifolia*	*	yellow alder					X				X		X		Flw
Ulmaceae	*Celtis paniculata*		celtis		X								X	X		
Urticaceae	*Pipturus argenteus*		white nettle, white mulberry	Naziarsr (1)	X					X	X		X	X		
	Pouzolzia zeylanica				X					X				X		
Verbenaceae	*Lantana camara*	*Class 3	lantana					X		X				X		Flw
	Stachytarpheta jamaicensis	*	snake weed					X				X		X	X	
Vitaceae	*Cayratia cardiophylla*		large leaf water vine		X					X				X		
	Cayratia trifolia		slender water vine		X	X								X		
Zygophyllaceae	*Tribulus cistoides*		caltrope	Puttee (1)			X	X					X	X		

Appendix C. Preliminary List of Culturally Significant Plants for Warraber

Scientific Name	Language Name	Common Name	Life Form	Broad Use	Part Used	Broad Habitat	Source
Abrus precatorius	thinikapu	Gidee gidee, crabs eye	Vine	Material	Black and red seeds used for decorative purposes i.e. necklaces and bracelets. Seeds shot through paw paw stems for kids play.	Vine forest & thickets, & shrublands.	L. Pearson (May 2012).
Agave sisalana*	TBD	Manilla rope	Succulent shrub	Material	Leaves cut and soaked in water to extract fibre for traditional grass skirts. Spike used for holding leaves in a fence or wind barrier.	Disturbed areas.	L. Pearson (May 2012).
Aglaia eleagnoidea	usarkun	Coastal boodyara	Tree	Material	Strong timber known to be once used for building purposes on other islands.	Vine forests and thickets.	D. Mosby pers. com. (2007)
Anisomeles malabarica	kibur	Chodhava	Herb	TBD	TBD	Dune shrublands.	M. Lawrie (plant specimen label)
Argusia argentea	TBD	Octopus bush	Shrub	TBD	Known as a wind breaker	Dune foreshores.	D. Mosby pers. com. (2007)
Boerhavia sp.	ipee, ipi, apai	Tar vine	Herb	Material	Once used as a succulent green feed for pigs.	Dune foreshores.	O. Pearson pers. comm. (May 2012).
Breynia oblongifolia	bik or iusi	Coffee bush	Shrub	TBD	TBD	Vine forests and thickets, dune shrublands.	TBD
Buchanania arborescens	sizenai	Little gooseberry tree	Tree	Food	Small black fruits eaten as a snack when ripe on other islands.	Vine forests & thickets.	L. Pearson (May 2012).
Caesalpinia bonduc	TBD	Nicker nut	Shrub, vine	Material	Seeds known to be used on other islands for playing marbles.	Margins of vine forests near coast.	N. Gibuma pers. com. (Nov. 2011).
Cassytha filiformis	muzurru	Dodder laurel	Vine	Material	Stems used for mats on racks for drying wongai.	Vine forests and thickets, dune shrublands and grasslands.	Shnukal (2004)
Casuarina equisitifolia var. incana	gaibui	Horsetail oak	Tree	Material	Good timber. Valued as beachfront tree.	Foredunes	L. Pearson (May 2012).
Catharanthus roseus*	patal pui	Pink periwinkle	Herb	Material, aesthetic	Flowers used as a decoration.	Disturbed foreshores.	L. Pearson (May 2012).
Cocos nucifera*	urub	Coconut	Palm	Food, Material	Kernel	Planted locations.	D. Mosby pers. com. (2007)

Scientific Name	Language Name	Common Name	Life Form	Broad Use	Part Used	Broad Habitat	Source
Colubrina asiatica	Gurigal, guraigur	Colubrina or beach berry bush	Shrub	Material	Leaves in water to wash hands. Ladies used to dig roots to expose inner skin (bark) and extract put in rag and used as a shampoo to clean hair and make shiny.	Margins of vine forests near coast.	O. Pearson pers. comm. (May 2012).
Cordia subcordata	mukamai	Golden trumpet tree	Tree	Material	Young fruits eaten (coconut taste). Timber used for drums on other islands.	Vine forests and thickets.	L. Pearson (May 2012).
Cylcophyllum maritimum	TBD	coastal canthium	Shrub	Material	Timber burns green.	Vine forests and thickets.	F. Nai (May 2012).
Delonix regia*	TBD	Christmas tree, poinciana	Tree	Aesthetic	Red flowers are valued aesthetically and an indicator of Christmas time.	Disturbed areas	D. Mosby (Oct 2007).
Diospyros compacta	kubi	An Australian ebony	Tree	TBD	TBD	Vine forests and thickets.	TBD
Diospyros maritima	kubil gim	Broad leaved ebony	Tree	Indicator	Fruit ripening yellow is a sign for turtle abundance. Sap of leaves and stem and fruit is toxic.	Vine forests and thickets.	L. Pearson (May 2012).
Dodonaea polyandra, Dodonaea viscosa subsp. Viscosa	TBD	Hop bush	Shrub	TBD	TBD	Dune shrublands	TBD
Drypetes deplanchei	aka	Yellow box wood	Tree	Material	Dried leaves traditionally used for storing wongai plums on Masig and Warraber.	Vine forests and thickets.	L. Pearson (May 2012).
Erythrina variegata	nawai	Coral tree	Tree	Material	Glossy seeds used for decorative purposes i.e. necklaces and bracelets. Soft timber easily worked.	Vine forests and thickets.	L. Pearson (May 2012).
Eugenia reinwardtiana	kurath, kurad	Cedar bay cherry	Shrub	Food	Ripe fruits eaten as a snack.	Vine forests and thickets.	L. Pearson (May 2012).
Euphorbia cyathophora	TBD	Painted spurge	Herb	TBD	TBD	Dune shrublands and disturbed areas.	TBD
Euphorbia pallens	itmarr	Beach euphorbia	Herb	TBD	TBD	Foreshores.	TBD
Exocarpos latifolius	TBD	Broad leaved ballart	Shrub	Food	Small fruit eaten when ripe.	Vine forest & thickets, & shrublands.	E. Nai (May 2012).
Ficus opposita	sarzar	Sandpaper fig	Herb	Material, medicinal	Leaves	Vine forests and thickets, dune shrublands.	E. Nai (May 2012).
Ficus virens var. sublanceolata	darni tree	White fig	Tree	TBD	TBD	Community area	E. Nai (May 2012).
Flagellaria indica	TBD	Whip vine	Vine	Material	Stems for binding.	Vine forests and thickets, dune shrublands.	D. Mosby (Oct 2007).
Flueggea virosa subsp. melanthesoides	kupi	White current, white fruit	Shrub	Food	Small white fruit for eating as a snack.	Vine forests and thickets, dune shrublands.	E. Nai (May 2012).

Scientific Name	Language Name	Common Name	Life Form	Broad Use	Part Used	Broad Habitat	Source
Glochidion apodogynum	peleith	Button wood	Shrub	Material	TBD	Vine forests and thickets, dune shrublands.	TBD
Guettarda speciosa	budu, bodo	Sea randa, beach gardenia	Tree	Material	Leaves for Kup Muri	Vine forests and thickets, dune shrublands.	D. Mosby (Oct 2007).
Gymnosporia inermis	pitader	Gymnosporia	Shrub	TBD	TBD	Coastal shrublands and vine thickets.	D. Mosby (Oct 2007).
Hibiscus tiliaceus	warkar	Cottonwood hibiscus	Tree	Material	Light wood for making small racing canoes. Fibrous bark possibly used for fibre.	Dune shrublands.	L. Pearson (May 2012).
Imperata cylindica	TBD	Blady grass, house grass	Grass	Material	Used traditionally for thatching roofs of huts and houses.	Dune shrublands.	D. Mosby (Oct 2007), Snukal (2004).
Indigofera tinctoria*	TBD	Indigo	Low shrub	TBD	Known from other parts of the tropics as a source of true Indigo dye.	Dune shrublands and disturbed areas.	-
Ipomoea pes capre var. brasiliensis	pulla	Goats foot convolvulus	Herb/Vine	Material	Stems for tying.	Foreshores.	L. Pearson (May 2012).
Ixora timorensis	TBD	Native ixora	Shrub	TBD	TBD	Vine forests and thickets, dune shrublands.	TBD
Josephinia imperatricis	puttee	A sand burr	Herb	TBD	TBD	Foreshores.	L. Pearson (May 2012).
Mangifera indica	TBD	Mango	Tree	Food	Fruit are eaten.	Disturbed areas and gardens.	-
Manilkara kauki	ubar, (dried wongai 'kaiga')	Wongai	Tree	Food, Material	Fruit are eaten. Strong timber favoured for dugong spears and carving.	Vine forests & thickets.	D. Mosby (Oct 2007), F. Nai (May 2012), L. Pearson (May 2012).
Micromelum minutum	githgith	Lime berry	Shrub	TBD	TBD	Vine forests and thickets.	L. Pearson (May 2012).
Morinda citrifolia	auboi	Noni plum	Shrub	Medicinal	Fruit. Fruit ripens white. Eaten raw or fruit boiled up and juice drunk for illness. Leaves cut and heated/boiled. Juice mixed with coconut oil and put on sores.	Vine forests and thickets. Disturbed areas and gardens.	D. Mosby (Oct 2007), E. Nai (2012), L. Pearson (May 2012).
Pandanus spirilis	kowsar	Pandanus	Pandanus Palm	Food, Material	Kernel of individual fruit segments hammered out when dry and eaten. Leaves used for fibre making baskets, mats. Used for making paint brushes.	Vine thicket, dune shrublands.	L. Pearson (May 2012), D. Mosby (Oct 2007).

Scientific Name	Language Name	Common Name	Life Form	Broad Use	Part Used	Broad Habitat	Source
Papaya carica	TBD	Paw paw	Shrub	Food	Fruit. Cultivated past and present.	Gardens	-
Passiflora foetida*	TBD	Stinking or wild passionfruit	Vine	Food	Small fruit eaten as a snack when ripe.	Vine forest & thickets, & shrublands, disturbed areas.	L. Pearson (May 2012), D. Mosby (Oct 2007).
Pemphis acidula	mur	Pemphis, Digging stick tree	Shrub	Material	Strong timber used for firewood.	Coastal margins.	D. Mosby (Oct 2007).
Physalis angulata*	scorekine	Cape gooseberry	Herb	Food	Fruit are eaten.	Disturbed areas and gardens.	L. Pearson (May 2012).
Pipturus argenteus	naziarsr	White nettle, white mulberry	Shrub	TBD	TBD	Vine forests and thickets.	L. Pearson (May 2012).
Pittosporum ferrugineum	nhokazue	Rusty pittosporum	Shrub	TBD	Flowers	Vine forests and thickets.	L. Pearson (May 2012).
Planchonella obovata	TBD	Northern yellow boxwood	Tree	TBD	TBD	Vine forests and thickets.	TBD
Pleomele angustifolia	buz	Native draceana	Shrub	TBD	TBD	Vine forest and thickets.	L. Pearson (May 2012).
Polyscias macgillivraei	buman, sahra buman	Whistle tree	Shrub	Material	Leaves cut and used for kup muri. Leaf stems broken at base and used for toy whistle.	Vine forest and thickets.	L. Naawi (May 2012).
Premna serratifolia	komak	Premna	Shrub	Food	Fruit edible when pink before turning black.	Vine thicket, dune shrublands.	L. Pearson (May 2012).
Rhizophora apiculata	TBD	Tall stilted mangrove	Tree	Material	Timber	A few plants occur on intertidal areas around Masig.	-
Ricinus communis*	lam	Castor oil bush	Shrub	Medicinal	Leaves crushed and juice mixed with coconut oil to heal sores. Leaf put on woman's stomach to straighten baby. In WW2 seeds reportedly crushed up and put in food to kill Japanese.	Disturbed areas.	Use from Poruma (O. Pearson May 2012).
Salacia chinensis	uru	Jaffa fruit	Shrub	Food	Fruit ripening red is edible. Stems twisted in a bundle and fire wood stored inside.	Vine thicket, dune shrublands.	L. Naawi (May 2012).
Scaevola taccada	dell	Sea lettuce	Shrub	Ritual	If leaves or branches are broken tradition has it that the strong wind will blow.	Dune foreshores.	L. Naawi (May 2012).
Scolopia braunii	liwar?	Flintwood	Tree	TBD	TBD	Vine forest and thicket	TBD
Semecarpus australiensis	duha	Tar tree	Tree	Material, food	Leaves used for toy sailing boats. Seeds extracted and roasted in	Vine forest	Use from Poruma (O.

Scientific Name	Language Name	Common Name	Life Form	Broad Use	Part Used	Broad Habitat	Source
					coals. Sap toxic.		Pearson May 2012).
Sesuvium portulacastrum	gurawad	Sea purslane	Herb	Material	Succulent leaves and stems once fed to pigs to make fat.	Dune foreshores.	L. Pearson (May 2012), L. Naawi (May 2012).
Syzygium aqeum	errow	Bell fruit	Tree	Food	Fruit eaten. It is unlikely that this plant grows in the wild in Torres Strait however is now domesticated and planted in home gardens.	House gardens.	L. Pearson (May 2012).
Syzygium branderhorstii	uzu	Lockerbie satinash	Shrub/Tree	Food	Fruit eaten. This plant grows in the wild on Mua, Erub, and Dauan. It is now domesticated and planted in home gardens.	House gardens.	L. Pearson (May 2012).
Tacca leontopetaloides	gasi, argussi	Native arrowroot	Tuber	Food	Tuber dug, prepared and eaten.	Vine forests and thickets, dune shrublands, grasslands.	L. Pearson (May 2012), E. Nai, L. Naawi (May 2012).
Tecoma stans var. stans	TBD	Yellow bells	Shrub	Aesthetic	Valued as a garden plant for attractive yellow flowers.	House gardens, disturbed areas	L. Pearson (May 2012).
Terminalia catappa	merkai	Sea almond	Tree	Food	Outer skin of fruit eaten when ripe. Inner nut eaten when dry. Leaves cut and used for kup muri.	Community areas.	L. Pearson (May 2012), E. Nai, L. Naawi (May 2012).
Terminalia muelleri	mipa	Australian almond	Shrub or small tree	Food	Fleshy skin of small purplish-black fruit eaten when ripe.	Vine forest & thickets, & shrublands.	L. Pearson (May 2012), E. Nai, L. Naawi (May 2012).
Thespesia populneoides	wana	Pacific rosewood	Shrub/Tree	Material	Round fruit used for toys.	Mangrove margins.	D. Mosby (Oct. 2007).
Tribulus cistoides	puti	Caltrope	Herb	TBD	TBD	Disturbed areas, coastal dunes complex.	D. Mosby (Oct. 2007).
Tridax procumbens*	grass medicine	Tridax daisy, grass medicine	Annual herb	Medicinal, Material	Decoction of leaves used for treating cuts and sores. Flowers weaved into daisy chain for decoration.	Disturbed areas, coastal dunes complex.	L. Pearson (May 2012), E. Nai, L. Naawi (May 2012).

Appendix D. Terrestrial vertebrates known[1] or predicted[2] to occur on the islands of Torres Strait and their occurrence on Warraber Island.

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
AMPHIBIANS						
Myobatrachidae	*Limnodynastes ornatus*	Ornate Burrowing Frog		LC		
Myobatrachidae	*Uperoleia lithomoda*	Stonemason Toadlet		LC		
Myobatrachidae	*Uperoleia mimula*	Mimic Toadlet		LC		
Hylidae	*Litoria bicolor*	Northern Dwarf Tree Frog		LC		
Hylidae	*Litoria caerulea*	Green Tree Frog		LC		Watson 2012, RPS 2010
Hylidae	*Litoria gracilenta*	Dainty Green Tree Frog		LC		
Hylidae	*Litoria infrafrenata*	White-lipped Tree Frog		LC		
Hylidae	*Litoria nasuta*	Rocket Frog		LC		
Hylidae	*Litoria nigrofrenata*	Bridle Frog		LC		
Hylidae	*Litoria rubella*	Red Tree Frog		LC		
Microhylidae	*Austrochaperina gracilipes*	Slender Frog		LC		
Microhylidae	*Cophixalus* sp.	No common name				
Ranidae	*Rana daemeli*	Wood Frog		LC		
Bufonidae	*Rhinella marina*	Cane Toad		I		
REPTILES						
Crocodylidae	*Crocodylus porosus*	Salt-water Crocodile	M	V		Predicted by EPBC protected matters search
Gekkonidae	*Cyrtodactylus louisiadensis*	Ring-tailed Gecko		LC		
Gekkonidae	*Gehyra baliola*	Short-tailed Dtella		LC		
Gekkonidae	*Gehyra dubia*	Dubious Dtella		LC		Watson 2012, RPS 2010
Gekkonidae	*Gehyra variegata*	Tree Dtella		LC		
Gekkonidae	*Hemidactylus frenatus*	House Gecko		I		Watson 2012, RPS 2010
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko		LC		
Gekkonidae	*Lepidodactylus lugubris*	Mourning Gecko		LC		
Gekkonidae	*Lepidodactylus pumilus*	Slender Chained Gecko		NT		
Gekkonidae	*Nactus eboracensis*	no common name		LC		
Gekkonidae	*Nactus 'pelagicus'*	Pelagic Gecko		LC		
Gekkonidae	*Oedura rhombifer*	Zigzag Velvet Gecko		LC		

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
Gekkonidae	*Pseudothecadactylus australis*	Giant Tree Gecko		LC		
Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard		LC		
Scincidae	*Bellatorias frerei*	Major Skink		LC		
Scincidae	*Carlia coensis*	Coen Rainbow-skink		LC		
Scincidae	*Carlia longipes*	Closed-litter Rainbow-skink		LC		RPS 2010
Scincidae	*Carlia Macfarlani*	Closed-litter Rainbow-skink		LC		
Scincidae	*Carlia quinquecarinata*	no common name		LC		
Scincidae	*Carlia sexdentata*	no common name		LC		Watson 2012
Scincidae	*Carlia storri*	Brown Bicarinate Rainbow-skink		LC		
Scincidae	*Cryptoblepharus litoralis litoralis*	Supralittoral Shinning-skink		LC		Watson 2012
Scincidae	*Cryptoblepharus virgatus*	Cream-striped Shinning-skink		LC		Watson 2012
Scincidae	*Ctenotus inornatus*	Bar-shouldered Ctenotus		LC		
Scincidae	*Ctenotus robustus*	Robust Ctenotus		LC		
Scincidae	*Ctenotus spaldingi*	Straight-browed Ctenotus		LC		
Scincidae	*Emoia atrocostata*	Littoral Whiptail-skink		NT		
Scincidae	*Emoia longicauda*	Shrub Whiptail-skink		LC		
Scincidae	*Eremiascincus pardalis*	Lowlands Bar-lipped Skink		LC		
Scincidae	*Eugongylus rufescens*	Bar-lipped Sheen-skink		LC		Watson 2012
Scincidae	*Glaphyromorphus crassicaudus*	Cape York Mulch-skink		LC		
Scincidae	*Glaphyromorphus nigricaudis*	Black-tailed Bar-lipped Skink		LC		
Scincidae	*Glaphyromorphus pumilus*	Dwarf Mulch-skink		LC		
Scincidae	*Lygisaurus macfarlani*	Translucent Litter-skink		LC		
Agamidae	*Chlamydosaurus kingii*	Frilled Lizard		LC		
Agamidae	*Diporiphora bilineata*	Two-lined Dragon		LC		
Agamidae	*Lophognathus temporalis*	Swamplands Lashtail		LC		
Varanidae	*Varanus gouldii*	Gould's Goanna		LC		
Varanidae	*Varanus indicus*	Mangrove Monitor		LC		
Varanidae	*Varanus mertensi*	Mertens' Water Monitor		LC		
Varanidae	*Varanus panoptes*	Yellow-spotted Monitor		LC		

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
Varanidae	*Varanus prasinus*	Emerald Monitor		NT		
Varanidae	*Varanus scalaris*	Spotted Tree Monitor		LC		Watson 2012, RPS 2010
Varanidae	*Varanus tristis*	Black-tailed Monitor		LC		
Typhlopidae	*Ramphotyphlops braminus*	Flowerpot Blind Snake		I		
Typhlopidae	*Ramphotyphlops leucoproctus*	Cape York Blind Snake		LC		
Typhlopidae	*Ramphotyphlops polygrammicus*	North-eastern Blind Snake		LC		
Boidae	*Antaresia cf childreni*	Children's Python		LC		
Boidae	*Antaresia maculosa*	Spotted Python		LC		
Boidae	*Liasis fuscus*	Water Python		LC		
Boidae	*Morelia amethistina*	Amethyst Python		LC		
Boidae	*Morelia kinghorni*	Scrub Python		LC		Watson 2012
Colubridae	*Boiga irregularis*	Brown Tree Snake		LC		
Colubridae	*Cerberus australis*	Bockadam		LC		
Colubridae	*Dendrelaphis calligastra*	Northern Tree Snake		LC		
Colubridae	*Dendrelaphis punctulatus*	Common Tree Snake		LC		Watson 2012
Colubridae	*Stegonotus cucullatus*	Slaty-grey Snake		LC		
Colubridae	*Stegonotus parvus*	Slate-brown Snake		LC		
Elapidae	*Acanthophis praelongus*	Northern Death Adder		LC		
Elapidae	*Demansia papuensis*	Papuan Whipsnake		LC		
Elapidae	*Demansia vestigiata*	Black Whipsnake		LC		
Elapidae	*Furina tristis*	Brown-headed Snake		LC		
Elapidae	*Pseudechis papuanus*	Papuan Black Snake		LC		.
Elapidae	*Oxyuranus scutellatus*	Papuan Taipan		LC		
BIRDS						
Megapodiidae	*Alectura lathami*	Australian Brush-turkey		LC		
Megapodiidae	*Megapodius reinwardt duperryii*	Orange-Footed Scrubfowl		LC		Watson 2012, RPS 2010
Phasianidae	*Coturnix ypsilophora*	Brown Quail		LC		
Anseranatidae	*Anseranas semipalmata*	Magpie Goose		LC		
Anatidae	*Dendrocygna guttata*	Spotted Whistling-Duck		LC		
Anatidae	*Dendrocygna eytoni*	Plumed Whistling-Duck		LC		

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
Anatidae	*Dendrocygna arcuata*	Wandering Whistling-Duck		LC		
Anatidae	*Tadorna radjah*	Radjah Shelduck		NT		
Anatidae	*Chenonetta jubata*	Australian Wood Duck		LC		
Anatidae	*Nettapus pulchellus*	Green Pygmy-goose		LC		
Anatidae	*Anas gracilis*	Grey Teal		LC		
Anatidae	*Anas superciliosa*	Pacific Black Duck		LC		
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe		LC		
Columbidae	*Columba livia*	Rock Dove		I		
Columbidae	*Geopelia striata papua*	Emerald Dove		LC		
Columbidae	*Geopelia striata*	Peaceful Dove		LC		
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove		LC		Watson 2012, RPS 2010
Columbidae	*Ptilinopus magnificus*	Wompoo Fruit-Dove		LC		
Columbidae	*Ptilinopus superbus*	Superb Fruit-Dove		LC		
Columbidae	*Ptilinopus regina*	Rose-crowned Fruit-Dove		LC		Watson 2012, RPS 2010
Columbidae	*Ptilinopus iozonus*	Orange-Bellied Fruit-Dove		LC		
Columbidae	*Ducula mullerii*	Collared Imperial-Pigeon		LC		.
Columbidae	*Ducula bicolor*	Pied Imperial-Pigeon		LC		Watson 2012, RPS 2010
Columbidae	*Lopholaimus antarcticus*	Topknot Pigeon		LC		
	Colonectris leucomelus	Streaked Shearwater	M	LC		
Podargidae	*Podargus strigoides*	Tawny Frogmouth		LC		
Podargidae	*Podargus papuensis*	Papuan Frogmouth		LC		
Eurostopodidae	*Eurostopodus mystacalis*	White-throated Nightjar		LC		Watson 2012, RPS 2010
Eurostopodidae	*Eurostopodus argus*	Spotted Nightjar		LC		
Caprimulgidae	*Caprimulgus macrurus*	Large-tailed Nightjar		LC		
Apodidae	*Collocalia esculenta*	Glossy Swiftlet		LC		
Apodidae	*Aerodramus terraereginae*	Australian Swiftlet		NT		
Apodidae	*Aerodramus vanikorensis*	Uniform Swiftlet		LC		Watson 2012, Wildnet
Apodidae	*Hirundapus caudacutus*[5]	White-throated Needletail	M	LC		
Apodidae	*Mearnsia novaeguineae*	Papuan Spine-tailed Swift		LC		
Apodidae	*Apus pacificus*	Fork-tailed Swift	M	LC		
Apodidae	*Apus affinis*	House Swift		LC		

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		LC		Watson 2012, Wildnet
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant		LC		
Phalacrocoracidae	*Phalacrocorax carbo*	Great Cormorant		LC		
Phalacrocoracidae	*Phalacrocorax sulcirostris*	Little Black Cormorant		LC		
Phalacrocoracidae	*Phalacrocorax varius*	Pied Cormorant		LC		
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		LC		Watson 2012, RPS 2010, Wildnet
Ciconiidae	*Ephippiorhynchus asiaticus*	Black-necked Stork		NT		
Ardeidae	*Ixobrychus dubius*	Australian Little Bittern		LC		
Ardeidae	*Ixobrychus flavicollis*	Black Bittern		LC		
Ardeidae	*Ardea pacifica*	White-necked Heron		LC		Watson 2012, RPS 2010
Ardeidae	*Ardea modesta*[6]	Eastern Great Egret	M	LC		
Ardeidae	*Ardea intermedia*	Intermediate Egret		LC		Watson 2012, RPS 2010
Ardeidae	*Ardea sumatrana*	Great-billed Heron		LC		
Ardeidae	*Ardea ibis*[7]	Cattle Egret	M	LC		
Ardeidae	*Butorides striata*	Striated Heron		LC		Watson 2012, RPS 2010
Ardeidae	*Egretta picata*	Pied Heron		LC		Watson 2012, RPS 2010
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		LC		.
Ardeidae	*Egretta garzetta*	Little Egret		LC		
Ardeidae	*Egretta sacra*	Eastern Reef Egret	M	LC		Watson 2012
Ardeidae	*Nycticorax caledonicus*	Nankeen Night-Heron		LC		Watson 2012
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	M	LC		
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		LC		Watson 2012, Wildnet
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		LC		Watson 2012, Wildnet
Threskiornithidae	*Platalea regia*	Royal Spoonbill		LC		
Accipitridae	*Pandion cristatus*[8]	Eastern Osprey	M	LC		Watson 2012
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		LC		
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard		LC		
Accipitridae	*Aviceda subcristata*	Pacific Baza		LC		
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	M	LC		Watson 2012
Accipitridae	*Haliastur sphenurus*	Whistling Kite		LC		
Accipitridae	*Haliastur indus*	Brahminy Kite		LC		Watson 2012, RPS 2010
Accipitridae	*Milvus migrans*	Black Kite		LC		

Family	Scientific Name[3]	Common Name	Status[4]			Warraber
			EPBC Act	NC Act	BoT	
Accipitridae	*Accipiter fasciatus*	Brown Goshawk		LC		
Accipitridae	*Accipiter cirrhocephalus*	Collared Sparrowhawk		LC		
Accipitridae	*Accipiter novaehollandiae*	Grey Goshawk		NT		
Accipitridae	*Circus assimilis*	Spotted Harrier		LC		
Accipitridae	*Circus approximans*	Swamp Harrier		LC		
Accipitridae	*Erythrotriorchis radiatus*	Red Goshawk	V	E	high	
Accipitridae	*Aquila gurneyi*	Gurney's Eagle		LC		.
Falconidae	*Falco cenchroides*	Nankeen Kestrel		LC		Watson 2012, Wildnet
Falconidae	*Falco berigora*	Brown Falcon		LC		
Falconidae	*Falco longipennis*	Australian Hobby		LC		
Falconidae	*Falco peregrinus*	Peregrine Falcon		LC		
Fregatidae	*Fregata ariel*	Lesser Frigatebird		LC		Watson 2012, RPS 2010
Fregatidae	*Fregata minor*	Greater Frigatebird		LC		Watson 2012
Gruidae	*Grus rubicunda*	Brolga		LC		
Rallidae	*Porphyrio porphyrio*	Purple Swamphen		LC		
Rallidae	*Eulabeornis castaneoventris*	Chestnut Rail		LC		
Rallidae	*Rallina tricolor*	Red-necked Crake		LC		
Rallidae	*Gallirallus philippensis*	Buff-banded Rail		LC		Watson 2012, RPS 2010
Rallidae	*Porzana pusilla*	Baillon's Crake		LC		
Rallidae	*Porzana fluminea*	Australian Spotted Crake		LC		
Rallidae	*Porzana tabuensis*	Spotless Crake		LC		
Rallidae	*Amaurornis cinerea*	White-browed Crake		LC		Watson 2012, RPS 2010
Rallidae	*Amaurornis moluccana*	Pale-vented Bush-hen		LC		
Sulidae	*Sula leucogaster*	Brown Booby		LC		Watson 2012
Otididae	*Ardeotis australis*	Australian Bustard		LC		
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew		LC		
Burhinidae	*Esacus magnirostris*	Beach Stone-curlew		V	high	Watson 2012, RPS 2010
Haematopodidae	*Haematopus longirostris*	Australian Pied Oystercatcher		LC		Watson 2012, RPS 2010
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher		NT		Watson 2012, RPS 2010
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt		LC		
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	M	LC		Watson 2012, RPS 2010
Charadriidae	*Pluvialis squatarola*	Grey Plover	M	LC		Watson 2012

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Charadriidae	*Charadrius ruficapillus*	Red-capped Plover		LC		Watson 2012
Charadriidae	*Charadrius bicinctus*	Double-banded Plover	M	LC		Watson 2012
Charadriidae	*Charadrius mongolus*	Lesser Sand Plover	M	LC		Watson 2012, RPS 2010
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover	M	LC		
Charadriidae	*Erythrogonys cinctus*	Red-kneed Dotterel		LC		
Charadriidae	*Vanellus miles*	Masked Lapwing		LC		Watson 2012, RPS 2010
Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	M	LC		
Scolopacidae	*Gallinago megala*	Swinhoe's Snipe	M	LC		
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	M	LC		
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	M	LC		Watson 2012
Scolopacidae	*Numenius minutus*	Little Curlew	M	LC		
Scolopacidae	*Numenius phaeopus*	Whimbrel	M	LC		
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	M	NT		Watson 2012, RPS 2010
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	M	LC		Watson 2012
Scolopacidae	*Actitis hypoleucos*[9]	Common Sandpiper	M	LC		Watson 2012
Scolopacidae	*Tringa brevipes*[10]	Grey-tailed Tattler	M	LC		Watson 2012
Scolopacidae	*Tringa incana*[11]	Wandering Tattler	M	LC		
Scolopacidae	*Tringa nebularia*	Common Greenshank	M	LC		Watson 2012, RPS 2010
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	M	LC		
Scolopacidae	*Tringa glareola*	Wood Sandpiper	M	LC		
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	M	LC		Watson 2012
Scolopacidae	*Calidris tenuirostris*	Great Knot	M	LC		Watson 2012, RPS 2010
Scolopacidae	*Calidris canutus*	Red Knot	M	LC		Watson 2012
Scolopacidae	*Calidris alba*[12]	Sanderling	M	LC		Watson 2012
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	M	LC		Watson 2012, RPS 2010
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	M	LC		
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	M	LC		Watson 2012, RPS 2010, Wildnet
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	M	LC		
Sturnidae	*Acridotheres tristis*	Common Mynah		I		Draffan, 1983
Turnicidae	*Turnix maculosus*	Red-backed Button-quail		LC		Watson 2012, RPS 2010
Turnicidae	*Turnix pyrrhothorax*	Red-chested Button-quail		LC		Watson 2012,
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	M	LC		

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Glareolidae	*Stiltia isabella*	Australian Pratincole		LC		Watson 2012, RPS 2010, Wildnet
Laridae	*Anous stolidus*	Common Noddy	M	LC		Watson 2012, Wildnet
Laridae	*Anous minutus*	Black Noddy		LC		
Laridae	*Onychoprion anaethetus*[13]	Bridled Tern	M	LC		Watson 2012, Wildnet
Laridae	*Onychoprion fuscata*	Sooty Tern		LC		
Laridae	*Sternula albifrons*[14]	Little Tern	M	E	high	Watson 2012, RPS 2010, Wildnet
Laridae	*Gelochelidon nilotica*	Gull-billed Tern		LC		Watson 2012, RPS 2010, Wildnet
Laridae	*Hydroprogne caspia*	Caspian Tern	M	LC		
Laridae	*Chlidonias hybrida*	Whiskered Tern		LC		
Laridae	*Chlidonias leucopterus*	White-winged Black Tern	M	LC		Watson 2012, Wildnet
Laridae	*Sterna dougallii*	Roseate Tern	M	LC		Watson 2012, Wildnet
Laridae	*Sterna striata*	White-fronted Tern		LC		
Laridae	*Sterna sumatrana*	Black-naped Tern	M	LC		Watson 2012, Wildnet
Laridae	*Sterna hirundo*	Common Tern	M	LC		Watson 2012, Wildnet
Laridae	*Thalasseus bengalensis*[15]	Lesser Crested Tern	M	LC		Watson 2012, Wildnet
Laridae	*Thalasseus bergii*	Crested Tern		LC		
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		LC		Watson 2012, RPS 2010, Wildnet
Cacatuidae	*Probosciger aterrimus*	Palm Cockatoo		NT		.
Cacatuidae	*Eolophus roseicapilla*	Galah		LC		
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo		LC		
Psittacidae	*Trichoglossus haematodus caeruliceps*	Rainbow Lorikeet		LC		
Psittacidae	*Cyclopsitta* species	fig-parrot species				
Psittacidae	*Eclectus roratus polychloros*	Eclectus Parrot		LC		
Psittacidae	*Geoffroyus geoffroyi aruenesis*	Red-cheeked Parrot		LC		
Cuculidae	*Centropus phasianinus*	Pheasant Coucal		LC		
Cuculidae	*Eudynamys orientalis*	Eastern Koel		LC		Watson 2012, Wildnet
Cuculidae	*Eudynamus scolopacea*	Common Koel		LC		
Cuculidae	*Urodynamys taitensis*	Long-tailed Cuckoo		LC		
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo		LC		Watson 2012,
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo		LC		

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Cuculidae	*Chalcites osculans*	Black-eared Cuckoo		LC		
Cuculidae	*Chalcites lucidus*	Shining Bronze-Cuckoo		LC		Watson 2012, Wildnet
Cuculidae	*Chalcites minutillus*	Little Bronze-Cuckoo		LC		
Cuculidae	*Cacomantis pallidus*	Pallid Cuckoo		LC		
Cuculidae	*Cacomantis castaneiventris*	Chestnut-breasted Cuckoo		LC		
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo		LC		
Cuculidae	*Cacomantis variolosus*	Brush Cuckoo		LC		
Cuculidae	*Cuculus optatus*[16]	Oriental Cuckoo	M	LC		
Strigidae	*Ninox connivens*	Barking Owl		LC		
Strigidae	*Ninox novaeseelandiae*	Southern Boobook		LC		
Tytonidae	*Tyto longimembris*	Eastern Grass Owl		LC		
Alcedinidae	*Ceyx azureus*	Azure Kingfisher		LC		
Alcedinidae	*Ceyx pusilla pusilla*	Little Kingfisher		LC		
Halcyonidae	*Tanysiptera sylvia*	Buff-breasted Paradise-Kingfisher		LC		Watson 2012
Halcyonidae	*Tanysiptera galatea*	Common Paradise-Kingfisher		LC		
Halcyonidae	*Tanysiptera hydrocharis*	Little Paradise-Kingfisher				
Halcyonidae	*Dacelo leachii*	Blue-winged Kookaburra		LC		
Halcyonidae	*Syma torotoro*	Yellow-billed Kingfisher		LC		
Halcyonidae	*Todiramphus macleayii*	Forest Kingfisher		LC		Watson 2012, Wildnet
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher		LC		Watson 2012, RPS 2010, Wildnet
Halcyonidae	*Todiramphus chloris*	Collared Kingfisher		LC		
Meropidae	*Merops ornatus*	Rainbow Bee-eater	M	LC		Watson 2012, Wildnet
Coraciidae	*Eurystomus orientalis*	Dollarbird		LC		Watson 2012, Wildnet
Oceanitidae	*Oceanites oceananicus*	Wilson's Storm Petrel		LC		Watson 2012
Pittidae	*Pitta erythrogaster*	Red-bellied Pitta		LC		
Pittidae	*Pitta versicolor*	Noisy Pitta		LC		Watson 2012, Wildnet
Ptilonorhynchidae	*Ptilonorhynchus nuchalis*	Great Bowerbird		LC		
Acanthizidae	*Sericornis beccarii*	Tropical Scrubwren		LC		
Acanthizidae	*Gerygone levigaster*	Mangrove Gerygone		LC		
Acanthizidae	*Gerygone magnirostris brunneipectus*	Large-billed Gerygone		LC		

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Acanthizidae	*Gerygone palpebrosa*	Fairy Gerygone		LC		
Meliphagidae	*Meliphaga notata*	Yellow-spotted Honeyeater		LC		
Meliphagidae	*Meliphaga gracilis*	Graceful Honeyeater		LC		
Meliphagidae	*Lichenostomus versicolor*	Varied Honeyeater		LC		Watson 2012, RPS 2010, Wildnet
Meliphagidae	*Manorina melanocephala*	Noisy Miner		LC		
Meliphagidae	*Ramsayornis modestus*	Brown-backed Honeyeater		LC		Watson 2012, Wildnet
Meliphagidae	*Conopophila albogularis*	Rufous-banded Honeyeater		LC		
Meliphagidae	*Myzomela obscura fumata*	Dusky Honeyeater		LC		
Meliphagidae	*Myzomela erythrocephala infuscata*	Red-headed Honeyeater		LC		Watson 2012, RPS 2010, Wildnet
Meliphagidae	*Cissomela pectoralis*	Banded Honeyeater		LC		
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		LC		
Meliphagidae	*Philemon buceroides*	Helmeted Friarbird		LC		
Meliphagidae	*Philemon argenticeps*	Silver-crowned Friarbird		LC		
Meliphagidae	*Philemon corniculatus*	Noisy Friarbird		LC		
Meliphagidae	*Philemon citreogularis*	Little Friarbird		LC		
Meliphagidae	*Xanthotis flaviventer saturatior*	Tawny-breasted Honeyeater		LC		
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler		LC		
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		LC		Watson 2012, RPS 2010, Wildnet
Campephagidae	*Coracina papuensis*	White-bellied Cuckoo-shrike		LC		Watson 2012, RPS 2010, Wildnet
Campephagidae	*Coracina lineata*	Barred Cuckoo-shrike		LC		
Campephagidae	*Coracina tenuirostris melvillensis*	(Melville) Cicadabird	M	LC		
Campephagidae	*Lalage tricolor*	White-winged Triller		LC		
Campephagidae	*Lalage leucomela*	Varied Triller		LC		
Pachycephalidae	*Pachycephala melanura*	Mangrove Golden Whistler		LC		Watson 2012, RPS 2010, Wildnet
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler		LC		
Pachycephalidae	*Colluricincla megarhyncha*	Little Shrike-thrush		LC		
Oriolidae	*Sphecotheres vieilloti*	Australasian Figbird		LC		
Oriolidae	*Oriolus flavocinctus*	Yellow Oriole		LC		
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole		LC		Watson 2012, RPS 2010, Wildnet
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow		LC		Watson 2012, RPS 2010, Wildnet.

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Artamidae	*Artamus cinereus*	Black-faced Woodswallow		LC		
Artamidae	*Artamus minor*	Little Woodswallow		LC		
Artamidae	*Cracticus quoyi alecto*	Black Butcherbird		LC		
Dicruridae	*Dicrurus bracteatus carbonarius*	Spangled Drongo		LC		Watson 2012, Wildnet
Rhipiduridae	*Rhipidura rufifrons*	Rufous Fantail	M	LC		Watson 2012, Wildnet
Rhipiduridae	*Rhipidura phasiana*	Mangrove Grey Fantail		LC		
Rhipiduridae	*Rhipidura rufiventris gularis*	Northern Fantail		LC		
Rhipiduridae	*Rhipidura leucophrys melaleuca*	Willie Wagtail		LC		
Corvidae	*Corvus orru orru*	Torresian Crow		LC		
Monarchidae	*Myiagra ruficollis*	Broad-billed Flycatcher		LC		Watson 2012
Monarchidae	*Myiagra rubecula*	Leaden Flycatcher		LC		Watson 2012, Wildnet
Monarchidae	*Myiagra cyanoleuca*	Satin Flycatcher	M	LC		Watson 2012, Wildnet
Monarchidae	*Myiagra alecto*	Shining Flycatcher		LC		
Monarchidae	*Myiagra inquieta*	Restless Flycatcher		LC		
Monarchidae	*Monarcha melanopsis*	Black-faced Monarch	M	LC		Watson 2012, Wildnet
Monarchidae	*Monarcha frater*	Black-winged Monarch	M	LC		
Monarchidae	*Symposiarchus trivirgatus*[17]	Spectacled Monarch	M	LC		Watson 2012, Wildnet
Monarchidae	*Grallina cyanoleuca*	Magpie-lark		LC		
Monarchidae	*Arses telescopthalmus*	Frilled Monarch		LC		
Paradisaeidae	*Phonygammus keraudrenii*	Trumpet Manucode		LC		
Paradisaeidae	*Ptiloris magnificus*	Magnificent Riflebird		LC		
Petroicidae	*Microeca flavigaster*	Lemon-bellied Flycatcher		LC		
Petroicidae	*Peneoenanthe pulverulenta*	Mangrove Robin		LC		
Petroicidae	*Drymodes superciliaris*	Northern Scrub-robin		LC		
Cisticolidae	*Cisticola exilis*	Golden-headed Cisticola		LC		
Acrocephalidae	*Acrocephalus australis*[18]	Australian Reed-Warbler	M	LC		
Megaluridae	*Megalurus timoriensis*	Tawny Grassbird		LC		
Megaluridae	*Megalurus gramineus*	Little Grassbird		LC		
Timaliidae	*Zosterops citrinella*	Pale White-eye		LC		Watson 2012, RPS 2010, Wildnet
Timaliidae	*Zosterops lateralis*	Silvereye		LC		

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Hirundinidae	*Hirundo rustica*	Barn Swallow	M	LC		
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		LC		Watson 2012
Hirundinidae	*Petrochelidon ariel*	Fairy Martin		LC		
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		LC		Watson 2012
Hirundinidae	*Cecropis daurica*[19]	Red-rumped Swallow	M	LC		
Turdidae	*Zoothera* sp.	thrush species		LC		
Sturnidae	*Aplornis cantoroides*	Singing Starling		LC		
Sturnidae	*Aplornis metallica*	Metallic Starling		LC		
Sturnidae	*Sturnus tristis*	Common Myna		I		
Nectariniidae	*Dicaeum geelvinkianum*	Red-capped Flowerpecker		LC		
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird		LC		
Nectariniidae	*Nectarinia jugularis*	Olive-backed Sunbird		LC		Watson 2012, RPS 2010, Wildnet
Estrildidae	*Poephila personata*	Masked Finch		LC		
Estrildidae	*Lonchura punctulata*	Nutmeg Mannikin		I		
Estrildidae	*Lonchura castaneothorax*	Chestnut-breasted Mannikin		LC		Watson 2012, RPS 2010, Wildnet
Passeridae	*Passer domesticus*	House Sparrow		I		Watson 2012, RPS 2010, Wildnet
Motacillidae	*Motacilla* sp.	Yellow Wagtail species	M	LC		
MAMMALS						
Tachyglossidae	*Tachyglossus aculeatus*	Short-beaked Echidna		LC		
Peramelidae	*Isoodon macrourus*	Northern Brown Bandicoot		LC		
Peramelidae	*Isoodon obesulus*	Southern Brown Bandicoot		LC		
Macropodidae	*Macropus agilis*	Agile Wallaby		LC		
Pteropodidae	*Dobsonia magna*	Bare-backed Fruit-bat		NT		
Pteropodidae	*Macroglossus minimus*	Northern Blossom-bat		LC		
Pteropodidae	*Syconycteris australis*	Common Blossom-bat		LC		
Pteropodidae	*Nyctimene cephalotes*	Torresian Tube-nosed Bat		NT		
Pteropodidae	*Nyctimene robinsoni*	Eastern Tube-nosed Bat		LC		
Pteropodidae	*Pteropus alecto*	Black Flying-fox		LC		Watson 2012, RPS 2010
Pteropodidae	*Pteropus conspicillatus*	Spectacled Flying-fox	V	LC	high	Predicted by the EPBC Protected Matters Search Tool
Pteropodidae	*Pteropus macrotis*	Large-eared Flying-fox		LC		
Pteropodidae	*Pteropus scapulatus*	Little Red Flying-fox		LC		
Pteropodidae	*Pteropus banakrisi*	Torresian Flying-fox		LC		

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Rhinolophidae	*Rhinolophus philippinensis* (large form)	Greater Large-eared Horseshoe Bat	E	E	high	
Hipposideridae	*Hipposideros ater aruensis*	(eastern) Dusky Leaf-nosed Bat		LC		
Hipposideridae	*Hipposideros cervinus*	Fawn Leaf-nosed Bat		V	high	
Hipposideridae	*Hipposideros diadema*	Diadem Leaf-nosed Bat		LC		
Emballonuridae	*Saccolaimus saccolaimus nudicluniatus*	Bare-rumped Sheathtail-bat	CE	E	high	
Emballonuridae	*Sacolaimus mixtus*	Papuan Sheathtail Bat		NT		
Emballonuridae	*Taphozous australis*	Coastal Sheathtail Bat		V	high	
Molossidae	*Chaerephon jobensis*	Northern Freetail-bat		LC		
Molossidae	*Mormopterus beccarii*	Beccari's Freetail-bat		LC		
Vespertilionidae	*Chalinolobus nigrogriseus*	Hoary Wattled Bat		LC		
Vespertilionidae	*Miniopterus australis*	Little Bent-wing Bat		LC		
Vespertilionidae	*Miniopterus schreibersii*	Eastern Bent-wing Bat		LC		
Vespertilionidae	*Myotis macropus*	Large-footed Myotis		LC		
Vespertilionidae	*Nyctophilus bifax*	Eastern Long-eared Bat		LC		
Vespertilionidae	*Pipistrellus* sp.	Pipistrelle species		LC		
Vespertilionidae	*Pipestrellus adamsii*	Forest Pipestrelle bat		LC		
Vespertilionidae	*Pipestrellus weastralis*	Northern Pipestrelle bat		LC		
Muridae	*Conilurus penicillatus*	Brush-tailed Tree-rat	V	LC		
Muridae	*Hydromys chrysogaster*	Water-rat		LC		
Muridae	*Melomys burtoni*	Grassland Melomys		LC		
Muridae	*Melomys capensis*	Cape York Melomys		LC		
Muridae	*Melomys rubicola*	Bramble Cay Melomys	E	E	high	
Muridae	*Mus musculus*	House Mouse		I		Watson 2012, RPS 2010
Muridae	*Pseudomys delicatulus*	Delicate Mouse		LC		
Muridae	*Rattus exulans*	Pacific Rat		I		
Muridae	*Rattus norvegicus*	Brown Rat		I		
Muridae	*Rattus rattus*	Black Rat		I		
Muridae	*Xeromys myoides*	Water Mouse	V	V	high	

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Canidae	*Canis familiaris*	Domestic Dog		I		Watson 2012, RPS 2010
Felidae	*Felis catus*	Cat		I		
Equidae	*Equus caballus*	Horse, Brumby		I		
Suidae	*Sus scrofa*	Pig		I		
Bovidae	*Capra hircus*	Goat		I		
Cervidae	*Cervus timorensis*	Rusa Deer		I		

8 Known from Museum records, published literature (*eg* Tyler 1972; Draffan *et al.* 1983; Whittier & Moeller 1993; Clarke 2004a, b; 2005, 2006; Wilson 2005; Ingram 2008), WildNet database and/or reports and other grey literature (*eg* Smith & Smith 2006; Borsboom 2007; RPS 2010a, Schaffer 2010). These sources are not necessarily mutually exclusive and many records are un-confirmed. Some appear unreliable. WildNet database searches were conducted for Boigu, Saibai, Bramble Cay, Erub (Darnley), Mer, Mabuiag, Iama (Yam), Mua, Badu, Possession, Thursday, Wednesday, Horn, Hammond and Prince of Wales Islands.

9 Predicted by the EPBC Protected Matters Search Tool maintained by the Department of Sustainability, Environment, Water, Population and Communities, Canberra (DSEWPC) http://www.environment.gov.au/erin/ert/epbc/index.html. Only noted if not recorded from another source.

10 Nomenclature follows the Australian Faunal Directory maintained by DSEWPC. http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/index.html

11 Status: CE = Critically Endangered, E = Endangered, V = Vulnerable, NT = Near-Threatened, M = Migratory, LC = Least Concern (Common), I = Introduced (Exotic) under the *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act) and/or *Nature Conservation Act* 1992 (NC Act). BoT = species listed as critical or high priority under the Back on Track species prioritisation framework. Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/back_on_track_species_prioritisation_framework/index.html.

12 Also listed under the EPBC Act as *Chaetura caudacuta* (ROKAMBA).

13 Listed under the EPBC Act as Great Egret *Ardea alba* (CAMBA, JAMBA). Australian birds elevated to full species level as *A. modesta* (Kushlan & Hancock 2005; Christidis & Boles 2008).

14 Listed under CAMBA as *Ardeola ibis*, listed under JAMBA as *Bubulcus ibis*.

15 Listed under the Bonn Convention as Osprey *Pandion haliaetus*. Australian birds have been elevated to species level as *P. cristatus* (Wink *et al.* 2004; Christidis & Boles 2008).

16 Also listed under CAMBA and ROKAMBA as *Tringa hypoleucos*.

17 Also listed under the Bonn Convention and JAMBA as *Heteroscelus brevipes*.

18 Also listed under the Bonn Convention and JAMBA as *Heteroscelus incanus*.

19 Also listed under ROKAMBA as *Crocethia alba*.

20 Listed under the EPBC Act as *Sterna anaethetus* (CAMBA, JAMBA).

21 Listed under the EPBC Act as *Sterna albifrons* (Bonn Convention, CAMBA, JAMBA, ROKAMBA).

22 Listed under the EPBC Act as *Sterna bengalensis* (CAMBA).

23 Listed under the EPBC Act as *Cuculus saturatus* (CAMBA, JAMBA, ROKAMBA). Australian birds elevated to full species level as *A. optatus* (Christidis & Boles 2008).

24 Listed under the EPBC Act as *Monarcha trivirgatus* (Bonn Convention).

25 Listed under the EPBC Act as Clamorous Reed-warbler *Acrocephalus stentoreus* (Bonn Convention). Australian birds elevated to full species level as *A. australis* (Higgins *et al.* 2006b).

26 Listed under the EPBC Act as *Hirundo daurica* (ROKAMBA).

Appendix E. Profiles of Migratory Fauna Species Potentially occurring on Warraber and Surrounding Islets

Waders

Life history: Waders listed as Migratory under the EPBC Act that have been recorded in the Torres Strait include plovers, sandpipers and Oriental pratincole. Sandpipers are known by a number of common names including snipe, godwit, curlew, tattler, knot and stint. The majority of the waders recorded occur in coastal areas, particularly in the intertidal zone, on mudflats, sandflats, beaches, saltmarsh, coastal lagoons and mangroves. Some also forage and/or roost on rocky shores. Many of these species are also found on freshwater and artificial waterbodies such as rivers, streams, swamps, dams and sewage ponds. Two species are unlikely to be found in the intertidal zone, Oriental pratincole and wood sandpiper. Oriental pratincole is largely restricted to grasslands and other open areas and wood sandpiper occurs on freshwater waterbodies (Pringle 1987). None of these wader species breed in Australia but individuals of some species, especially large sandpipers such as Eastern curlew and bar-tailed godwit, may be present year-round.

Flat tidal shores with extensive muddy intertidal areas support the most species and individuals, though some waders feed in mangroves forests at low tide (Lane 1987). The coastal species have a life cycle driven largely by the tidal cycle, roosting in mixed species flocks above the high water mark at high tide and moving to feeding areas as the tide recedes. Most of these species are gregarious, wary and fly strongly and swiftly (Pringle 1987; Geering *et al*. 2007). Smaller species, such as red-necked stint and curlew sandpiper, feed for longer each tide cycle than do larger species and may continue to feed in non-tidal areas during high tide (Lane 1987).

Other than double-banded plover (*Charadrius bicinctus)*, which breeds in New Zealand, all the Migratory waders breed in the northern hemisphere during the Australian winter. Migration to Australia after breeding starts in mid-July and finishes by December. Birds begin returning to breeding grounds as early as mid-February, though most birds leave in mid-March (Lane 1987).

Threats: Although none of the species breed in Australia they are susceptible to loss of foraging and roosting habitat and to disturbance when foraging or roosting by human activities and feral and domestic animals. Such disturbance may limit their ability to undertake long migration flights through depletion of their energy reserves. Pollution may also affect the intertidal invertebrate species on which so many Migratory waders depend (Lane 1987). Warraber Island provides some habitat for waders but threats appear limited to disturbance on mudflats, beaches and around mangroves. This will be most relevant prior to return passage in autumn.

Terns

Life history: Six Migratory tern species have been recorded from Warraber, though other species are also expected to occur. Many tern species are cosmopolitan, with very large distributions. Most species are coastal, found in a variety of habitats, including open beaches, lagoons, estuaries, river mouths, lakes, bays, harbours and inlets. Some species do also occur on inland freshwater habitats

and others are largely restricted to pelagic waters. Fish is the major food item but crustaceans and insects are also taken by some and those species that feed in freshwater may also eat reptiles, frogs and small mammals. Most terns are gregarious when feeding and are colonial nesters, with most of the species that breed in Australia simply laying their eggs in shallow depressions, though noddies will nest in trees (Pringle 1987; Higgins & Davies 1996).

Threats: Ground-nesting makes many species susceptible to loss of eggs and chicks through native and feral predators and adverse weather conditions. Colonies can be threatened by human disturbance and birds are affected by degradation of feeding areas, pesticide residues in fish, and oil-fouling, both of birds and beaches. Birds occasionally are tangled in fishing nets (Blakers *et al*. 1984; Higgins & Davies 1996; Garnett & Crowley 2000). There is likely to be little, if any, breeding by terns on Warraber Island. Threats appear to be minimal.

Herons and egrets

Life history: The family Ardeidae includes herons, egrets and bitterns and all species are characterised by long necks and legs and long sharp bills. Although there is variation, most species forage in shallow water and eat fish, crustaceans, frogs, insects and other small animals (McKilligan 2005). Three species listed as Migratory occur in the Torres Strait; Eastern great egret, cattle egret and eastern reef egret.

Eastern egrets are generally associated with shallow water, both freshwater and saline, but also occur in dry habitats. The species occurs on coastal and inland habitats, including rivers, estuaries, tidal mudflats, swamps, man-made dams and ponds, sewage farms and wet pasture. Eastern Great Egrets eat mainly fish but also small vertebrates such as frogs and aquatic insects (Pringle 1985; Marchant & Higgins 1990; McKilligan 2005). The cattle egret inhabits grasslands, wetlands and wooded lands, often foraging away from water in grassland, pasture and crops. The species is strongly associated with grazing animals in Australia, but also forages at garbage tips, follows machinery, and feeds independently. Cattle egrets feed on invertebrates, especially grasshoppers, and small vertebrates such as frogs, reptiles and mammals (Pringle 1985; Marchant & Higgins 1990). Eastern reef egret is found on coastlines, foraging on rocky and muddy shores. The species eats mostly fish, but also crustaceans, molluscs, bird chicks and turtle hatchlings (McKilligan 2005).

Eastern great egret is common and widespread in Australia even in some arid areas. The cattle egret occurs in all Australian states and mainland territories. Eastern reef egret occurs along most of the Australian coastline. All three species extend through the Torres Strait into south-east Asia. The cattle egret has a limited distribution in the Torres Strait but has been undergoing a global expansion of range (Pringle 1985; Marchant &Higgins 1990; McKilligan 2005). It may become more widespread and common in the Torres Strait if there are changes to land use which favour the species.

Threats: The eastern great egret is threatened by destruction and modification of freshwater habitats by drainage and groundwater extraction, clearing, livestock, burning, increased salinity and weed invasions (Marchant & Higgins 1990). The most important issue is the allocation of water from

regulated rivers in sufficient quantity and with appropriate timing to maintain suitable wetland conditions (Maddock 2000). The cattle egret is also threatened by loss of breeding habitat through drainage of wetlands and river regulation and water harvesting that prevent or limit flooding of temporary wetlands. Nestlings may be susceptible to predation by cats (DSEWPC 2011b). Eastern reef egrets can be disturbed by human activity near nest sites and are threatened by reclamation of tidal areas and deepening of channels. However, the species often tolerates human presence and roosts, and sometimes breeds, on artificial structures (Marchant & Higgins 1990).

Neither Eastern great nor cattle egret is likely to breed on Warraber Island and threats appear minimal. Eastern reef egret may breed and would be susceptible to disturbance at its nest. The level of threat is likely to be minor.

Swifts

Life history: In Australia the white-throated needletail and fork-tailed swift are almost completely aerial species, possibly even sleeping on the wing. These species are sometimes found roosting in trees and may on rare occasions rest in trees and on the ground during the day. They are found over a wide variety of habitat, including forest, open areas, modified land and the ocean. Foraging for aerial invertebrates occurs at heights from less than one metre up to more than 1000 metres (Higgins 1999).

Both species breed in Asia and arrive in Australia in September/October and leave by April. Some birds may over-winter. White-throated needletail is widespread in eastern and south-eastern Australia and fork-tailed swift is widespread throughout Australia (Higgins 1999). The total population of White-throated needletail is unknown but it is described as abundant in some regions of Australia (Chantler 1999). A comparison of Birds Australia atlas data between 1977–81 and 1998–2002 indicates that the species has undergone a decline in both its area of occupancy and extent of occurrence in Australia (Blakers *et al.* 1984; Barrett *et al*. 2003). Worldwide the Fork-tailed Swift is thought to have a stable population with no evidence for any declines or substantial threats (BirdLife International 2011).

Threats: Both species are occasionally killed by collision with man-made structures, and fork-tailed swifts are occasionally killed by cats (Higgins 1999), but there is no apparent major threat to either species overall, either in Australia or elsewhere (DSEWPC 2011a, f). A potential threat is a reduction in prey due to loss of habitat (Low 1995; DSEWPC 2011a). Neither species would be subject to any significant level of threat on Warraber.

Raptors

Life history: The family Accipitridae includes a very large number of species with an enormous variety of body sizes, prey species and habitat use. The two Migratory raptors, Eastern osprey and white-bellied sea-eagle, are, however, very similar in much of their life history. Both species occur along the entire Australian coastline and extend far inland, typically along major rivers or on large lakes and reservoirs. Eastern osprey feeds on fish but the white-bellied sea-eagle also eats

mammals, birds, reptiles and carrion. Both species will nest on cliffs and in large trees but Eastern osprey also nest on artificial structures such as power poles and towers (Debus 1998; NSW NPWS 2002). Established breeding pairs are mostly sedentary although there is evidence that territorial adults move long distances. Inland territorial birds are probably more dispersive than those on the coast and may move as waters disappear (Debus 1998).

Threats: The Eastern osprey population in Australia has decreased since European settlement but has been recovering in recent years (Olsen 1998). They are threatened by loss of existing and suitable replacement breeding trees, disturbance at the nest site, reduction in quality and quantity of fish stocks, collision with or electrocution by power lines, and the use of pesticides (NSW NPWS 2002). The white-bellied sea-eagle is threatened by clearing of forests and the consequent loss of optimal breeding sites (Marchant & Higgins 1993) and disturbance at nest sites (Debus 1998). Neither species is likely to be threatened by current land use practices on Warraber.

Oriental Cuckoo (*Cuculus optatus*)

Listed under the EPBC Act (CAMBA, JAMBA, ROKAMBA) as *Cuculus saturatus*. Australian birds elevated to full species level as *A. optatus* (Christidis & Boles 2008).

The Oriental cuckoo breeds in northern Asia with birds spending the non-breeding season in south-east Asia, New Guinea, the Solomons and Australia. The species mostly occurs on the northern and eastern coasts of Australia, between September and April. Most birds do not arrive in Australia until December. Oriental cuckoos occur in rainforest, vine thicket and open forest and woodland. The species is sometimes found in mangroves and is often recorded in gardens and plantations. It feeds on invertebrates, particularly caterpillars (Blakers *et al*. 1984; Higgins 1999).

Threats: The species is sometimes killed by cats and by collisions with windows and lighthouses (Higgins 1999). Clarke (2004b) recorded Oriental cuckoo over the township and around the refuse dump. Draffan *et al.* (1983) state that it occurs in wooded areas, including mangroves. Oriental cuckoo is likely to be a regular visitor to Warraber, occurring in almost any habitat other than grasslands. Threats would be minimal.

Rainbow Bee-eater (*Merops ornatus*)

The rainbow bee-eater occurs in almost any habitat. The species eats insects, preferring bees and wasps, which are mostly caught in the air, and will also take food from the ground or vegetation and occasionally water. It is widespread in Australia, New Guinea, Indonesia and Micronesia. In northern Australia populations are present in coastal or sub-coastal areas where they breed in the riparian areas and move into more open habitat after the breeding season. Breeding may take place individually or in colonies, nesting in burrows in soft sand or soil (Higgins 1999; Boland 2004a).

Threats: The species appears little threatened, although cane toads have been found to prey on the eggs and nestlings (Boland 2004b). Draffan *et al.* (1983) describe rainbow bee-eater as an abundant

passage migrant in Torres Strait and the species could occur in, or over, all habitats on Warraber. Cane toads are not reported for the island and threats to rainbow bee-eater would be minimal.

Passerines

Ten species of Migratory passerine are known from the Torres Strait. These species may be split into two broad groups, species that occur mostly in wooded habitats and those that occur mostly in open habitats. Members of these pairings may not be particularly closely related.

Wooded habitat species

Life history: Six of the Migratory passerine species that occur in Torres Strait occur mostly in wooded habitats. All of these birds, (Melville) cicadabird (subspecies *melvillensis*), rufous fantail, satin flycatcher, black-faced, black-winged and spectacled monarchs, occur in rainforest, melaleuca woodlands, mangroves and occasionally open forests, except for satin flycatcher, which typically avoids closed forest. All the species are insectivorous, though the Cicadabird may also eat some fruit and seeds. All breed in Australia and, except for black-winged monarch; all are at least partly resident in Australia. Some individuals of black-winged monarch may also be present year-round (Higgins *et al*. 2006a).

Threats: Threats include the loss and fragmentation of habitat, especially along the migratory routes, and predation of eggs and young by the black rat (*Rattus rattus*) (Higgins *et al*. 2006a). All six species do or could occur on Warraber and would use any wooded areas.

Open habitat species

Life history: Four of the Migratory passerine species that occur in Torres Strait occur mostly in open habitats.

Reed-warblers in Australia were previously thought to be a subspecies of the migratory clamorous reed-warbler (*Acrocephalus stentoreus*). They are now considered a full species, Australian reed-warbler (*A. australis*), and all movements are thought to occur within Australia. Australian reed-warblers typically occur in reeds and other dense vegetation in and adjacent to a variety of wetland types. They feed on insects and spiders. The species is not known to breed in the Torres Strait (Higgins *et al*. 2006b).

Barn and red-rumped swallows are both widespread species, particularly in the northern hemisphere, and neither breeds in Australia. Barn swallow is an annual visitor to northern Australia in small numbers but red-rumped swallow may not be present every year. Both species feed in open areas, particularly over wetlands, cane fields and sporting fields and often perch on overhead wires.

Yellow wagtail is listed under the EPBC Act as *Motacilla flava* (sens. Lat.). The birds that occur in Australia are now treated as full species, Eastern yellow wagtail (*M. tschutschensis*) and green-headed yellow wagtail (*M. taivana*) (Christidis & Boles 2008). They were previously regarded as

subspecies of *M. flava*, which is no longer considered to occur in Australia. The occurrence of yellow wagtails in the Torres Strait appears unconfirmed but yellow wagtails have been reported for Boigu, Thursday and Horn Islands (Baxter 2010) and are likely to occur as irregular visitors on many of the Torres Strait Islands.

Yellow wagtails occur in open areas with low vegetation, especially in cultivation and on lawns, sporting fields and air fields. They are often recorded near water. Yellow wagtails are probably regular wet season non-breeding visitors to north Queensland. Diet consists mainly of invertebrates, taken mostly from the ground and occasionally from the air (Higgins *et* al. 2006b).

Threats: The major threat to Australian reed-warbler is loss of habitat due to coastal development in natural habitat areas (Higgins *et al*. 2006b). Barn and red-rumped swallows appear to be increasing in numbers in Australia, though this may be due to an increase in observers. Neither species appears subject to any particular threat in Australia. Threats to yellow wagtails in Australia are unknown.

Australian reed-warbler is not known from Warraber and is not expected to occur. Draffan *et al*. (1983) report the species only from south-western islands in Torres Strait. Barn and red-rumped swallows are known from Warraber Island but their status there, as for yellow wagtails, is unknown. Increased clearing of wooded areas would actually benefit these species and threats appear minimal.