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

January 2013

Prepared by 3D Environmental for
Torres Strait Regional Authority Land & Sea Management Unit

Australian Government

TSRA
www.tsra.gov.au

3D Environmental
vegetation analysis and mapping specialists

Cover image: 3D Environmental (2013)

EXECUTIVE SUMMARY

Mabuiag Island, which occupies a total area of 744 ha, is the smallest permanently occupied island in the Near Western Island Group. The island is formed on acid volcanic basement rocks and the landscape is rugged with low, shrubby windswept vegetation occupying numerous hillocks and knolls.

A total of 21 vegetation communities, within 11 broad vegetation groups and 31 regional ecosystems are recognised across the island, representing approximately 17% of regional ecosystems recorded across the broader Torres Strait Island landscape. There are currently 433 flora species recorded on the island which comprises 363 (94%) native species, with 70 (16%) introduced species. This represents approximately 32% of the known flora for the Torres Strait Island group. A total of three plant species are considered threatened at either federal or state level and a further 15 species are considered to have significance at a regional level.

As for the majority of Torres Strait Islands there is a considerable lack of systematic survey of fauna habitats on the island. A desktop review of reports and databases identified 123 fauna species that have been reported on Mabuiag Island including three frogs, 26 reptile, 87 bird and seven mammal species. This can be compared with the 384 terrestrial fauna species that have been reported for the broader Torres Strait Island group. A total of five species of conservation significance (threatened species) at either state or federal level have been recorded on the island, with an additional species predicted to occur. There are also an additional 33 migratory species considered to have significance at federal level that are reported to occur on the island.

Within the 11 broad vegetation groups (or management units) identified on the island, a number of issues for future management are regularly identified as necessary for the future biodiversity maintenance and ecological health of the island. These are but not limited to:

- Further survey and documentation of the complex and diverse cultural landscape on the island.
- Maintenance of traditional burning regimes or specific requirements for protection from fire.
- Monitoring of landscapes threatened by changing burning regimes.
- Monitoring for the introduction of the continued spread of a number of exotic species, both fauna and flora, throughout the landscape.
- A requirement for further survey work to document the poorly known faunal assemblage on the island.

- Continued collection of baseline information for plants which are culturally significant and significant to biodiversity values.

Hitchcock *et al*. (2009) underline the importance for any future surveys on Mabuiag to be undertaken as collaborative research with the Goemulgal and to include study of Goemulgaw traditional ecological knowledge and ethnotaxonomy. Furthermore all mapping and assessment work must comply with Goemulgaw research protocols and be approved by the Goemulgaw PBC and the Pulu IPA Committee, and involve and be guided by the Mabuygiw Rangers.

ACKNOWLEDGEMENTS

The project has been funded by through the Land and Sea Management Unit of the Torres Strait Regional Authority. Our thanks are extended for the support and guidance of Tony O'Keeffe and Michael Bradby of TSRA who administered the project and provided valuable input throughout. 3D Environmental also wish to acknowledge all Geomulgal Elders and thank the Goemulgaw PBC and Goemulgal for their access to the land. Appreciation is also given to the Mabuygiw Rangers Terrence Whap, David Amber and Charlie Hankin and to TSRA Ranger Supervisor Matt Anderson for assistance in the field.

Permission to use the unpublished data of Dr Garrick Hitchcock and Dr Justin Watson is greatly appreciated, as is the detailed editing, input of cultural background and assistance in the field provided by Dr Hitchcock. Fauna information and review was provided by Terry Reis with peer review carried out by Dr Garrick Hitchcock and Peter Stanton who also provided the text for fire in the ecological landscape. Dr Paul Forster and staff of the Queensland Herbarium assisted with identification of plant specimens and provided advice on the ecology and distribution of significant flora species. Barbara Waterhouse of the Australian Quarantine Inspection Service provided valuable information on the occurrence and distribution of weeds. All members of the expert technical panel provided essential input into the process and their contribution is most appreciated.

All photographs used within this document were captured by 3D Environmental during their numerous excursions to the island.

Table of Contents

List of Tables

List of Figures

1.0 Introduction

Mabuiag (Mabuyag Island) represents one of seven islands within the Torres Strait region selected for the development of an island-specific biodiversity management profile. The profile aims to document the biodiversity features (vegetation, plants and animals), landscape processes, and cultural values (from both a landscape and site specific perspective) that are intrinsic to the island and develop management actions to ensure preservation or enhancement of those features. In the process of developing this plan, those sites and landscape features of specific cultural importance to the Goemulgal (Mabuiag people) are recognised and recommendations pertinent to the management of values of importance from both a traditional cultural and western scientific perspective are identified. Specific management recommendations detailed within this document will be directly incorporated into the 'Mabuiag Working on Country Plan' for action by Mabuygiw Rangers.

1.1 Cultural Setting

The population of Mabuiag consists of 241 Indigenous and seven non-Indigenous people (2006 census). Land tenure is DOGIT (Deed of Grant in Trust) with Native Title determined on 06/07/2000. The Registered Native Title Body Corporate[1] (RNTBC or PBC in shortened form) is the Goemulgaw (Torres Strait Islanders) Corporation who hold the title of the land on behalf of the traditional owners.

The Goemulgal, the people of Mabuiag, speak Mabuyaagi, one of four dialects of Kala Lagaw Ya, the Western-Central Torres Strait language. Several orthographies have been developed for the language. The development of renewed interest in their language has led to the development of their own preferred orthography. A number of language names identify island landscapes and are used in this document[2].

- *bau* - beach.
- *dhoey* - clearing (e.g. open grassland).
- *kula* - rock / boulder on land .
- *pad* - hill.
- *thag* – mangrove.

Goemulgaw conservation philosophy is founded on *mina pawa* (good ways, or culturally appropriate behaviours), in particular, respect of traditional values and the collective knowledge and wisdom of Elders. This respect extends to the responsibility of on-going active management of culturally significant areas, to honour the ancestors and spirits of these places. This management also helps ensure the spiritual and material nourishment and collective well-being of current and future generations of Goemulgal. As Islanders and a sea people, Goemulgaw society is one of building alliances based upon mutual respect and trust. In this sense, the Goemulgal embrace the opportunity to work in partnership with various outside agencies, including the Torres Strait Regional Authority, to manage and protect their ancestral domain (Hitchcock *et al*. 2009).

[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.
[2] Source. Hitchcock *et al*. (2009)

1.2 Geographic Setting

Mabuiag Island, along with the larger islands of Mua and Badu, is part of the Near Western Group of islands which are formed on continental igneous rocks (see **Figure 1**). The island which is located 69 km north of Thursday Island at approximately 142° 10' E, 9° 57' S, has an area of 744 ha. It is mostly rocky and undulating with a topographic high point of 146 m. The mean annual rainfall of 1 753 mm (BOM 2008a) can be compared with 1 983 mm on Badu Island (BOM 2008b), the wettest recording station in the Torres Strait Islands, (BOM 2008b) and Dauan, the driest at 1 082mm (BOM 2008c). There are no permanently flowing streams on the island although a number of groundwater springs are reportedly present which discharge on a seasonal basis.

1.3 Geological Context

The Mabuiag landscape is formed by the acid welded tuff and rhyolite of the Torres Strait Volcanic group. Soil development over much of the island is skeletal and surface exposures form hard rock pavements, rock piles, boulders, and associated boulder slopes. The formation of deeper soil profiles is largely restricted to the northern part of the island, where weathering of diorite has allowed development of uncharacteristically red and relatively fertile soils. Coarse-grained alluvial soils are restricted to confined pockets associated with seasonal streams and gully lines. Sand dunes, which occur sporadically on the coastal fringe, often form a single parallel ridge of coral rubble and grit, pushed into place by tidal action. These are young features of late Holocene age (< 5 000 yrs BP) that are formed in response to present day sea levels. No remnants of older Pleistocene age dune systems, a product of the last Glacial Maximum (15 000 – 22 000 yr BP) are preserved on the island. A well-developed system of beach sand ridges occurs in the vicinity of the settlement, although this dune feature has been largely cleared for development.

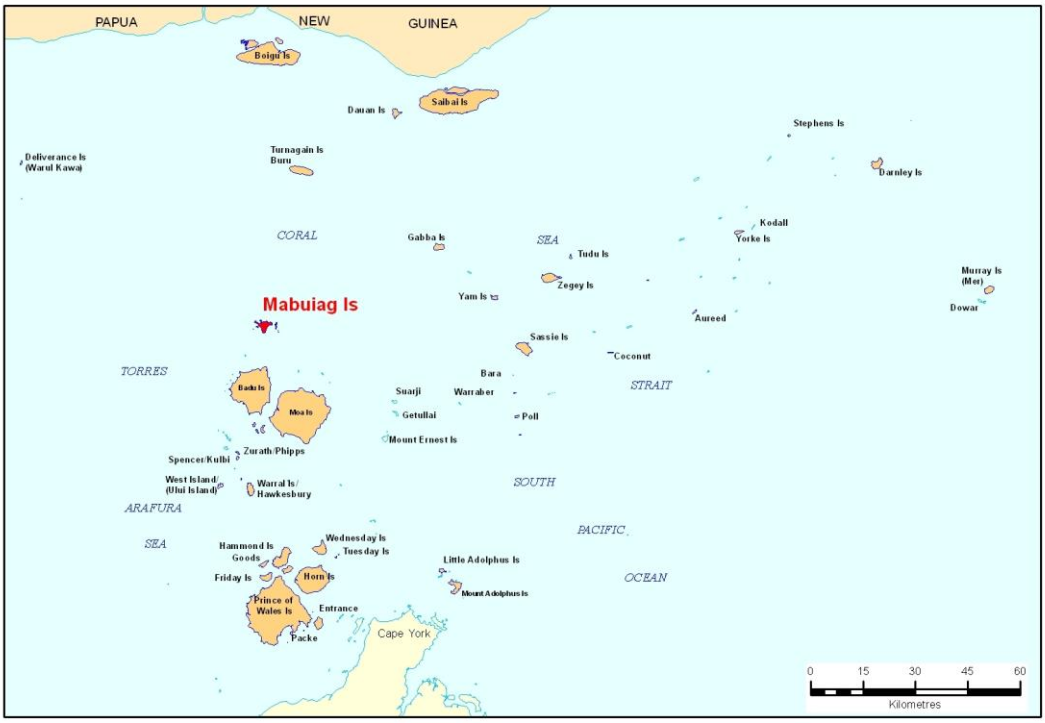


Figure 1. Location of Mabuiag Island

2.0 Methods

This document provides a compendium of information that has been compiled from a range of sources, and supplemented with information gathered from consultation with both technical experts and the Goemulgal people of Mabuiag. Numerous surveys relevant to flora, fauna and cultural heritage matters have contributed to this document and these are referenced throughout the body of the report. In summary, the steps taken during preparation of this document are:

1. Compilation of desktop resources which includes but is not limited to Stanton *et al.* (2009), Queensland Herbarium's Herbrecs Database, Queensland Museum fauna record extracts, Birds Australia database extract, WildNet database extracts, Conics Land Use Management Plan for Mabuiag Island (Conics 2009) and various technical papers relating to both flora and fauna (see references section).
2. Presentation of information at a workshop in Cairns, where biodiversity information was presented to a range of technical experts for discussion and further input. A list of workshop attendees is provided in **Appendix A.**
3. An island-based consultation with Mabuygiw Rangers on Mabuiag Island (8-10th November, 2010) including a consultation session with the broader island community.

3.0 Aims and Objectives

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

1. The extent, values and condition of island habitats and the plants and animals which occur in 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 Mabuiag people interact with the natural environment including identification of values.
4. The establishment of management actions. Management actions are intended for use by island rangers and managers to assist in updating Land and Sea Ranger Work Plans toward effectively managing the island's ecological and cultural values.

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 Mabuygiw Rangers and the Goemulgal, who are represented by their Registered Native Title Body Corporate, the Goemulgaw (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 of the Australian or Queensland government legislation, it is subject to rules which protect it from being destroyed or harmed. For example, if a certain 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 on the 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 that require consideration for Mabuiag is provided briefly below.

Nature Conservation Act 1992: *The Nature Conservation Act* (NC Act) is a legislative mechanism of the Queensland Government that is regulated by the Department of Environment and Heritage Protection Management (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 and 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 is assigned to particular vegetation groups termed regional ecosystems (REs) 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 intend to 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 the 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 Mabuiag (e.g. welchiodendron dominant RE3.12.4) 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 Mabuiag provides accurate information on the legislative significance of vegetation on the island offering an information planning resource for the Mabuiag community, the TSIRC and the TSRA. For example, if a radio tower was proposed for a mountain top which supported a regional ecosystem (vegetation type) that was 'endangered' or '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 (ESA).

For example, if a Class 2 weed such as Gamba grass (*Andropogon gayanus*) was found on Mabuiag, there is a requirement under the Act for landowners to take reasonable steps to control and manage the weed.

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)'. Information on the flora and fauna of Mabuiag prepared in this document will assist in future BOT assessments of the Torres Strait Region.

***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), and
- 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 regulatory agencies who are likely to provide

conditions under which the interference can take place. Interference (such as removal of protected orchid species) without authorisation is in breach of the EPBC Act.

5.0 Vegetation and Flora

As described in the following sections, the classification of vegetation includes both nomenclature of individual species and the classification of groups of plants. Plant groups often form unique assemblages that can be consistently recognised across islands (e.g. Mabuiag), island groups (Near Western Torres Strait Islands) 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 which considers 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 B**. Vegetation structural groupings (*i.e*. shrubland 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). BVGs 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'. VCs 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 as described in **Section 4** comprise a group of vegetation communities, although unlike BVGs, consider regional distribution and geology within their classification. REs must be considered due to their legislative implications although in this document, BVGs have been used as a principle unit to define habitat management groupings.

Vegetation Classification on Mabuiag Island: For management purposes, the island's 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 regional ecosystems provided in **Table 2.** Further characterisation of habitat types is provided in the following text.

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

Broad Vegetation Group/ Habitat**	Component Vegetation Communities**	Area (ha)	Contribution (%)
Evergreen/Semi-evergreen vine forest and vine thicket	1d, 1h	8	1
Deciduous/Semi deciduous vine forest and vine thicket	2f, 2u, 2x	8	1
Welchiodendron dominant closed to open forests and woodlands	4a, 4b, 4c	238	32.1
Melaleuca dominant open forests	7b	2	0.3
Pandanus dominant woodland and shrubland	11b	4	0.5
Melaleuca dominant shrublands and woodlands	13a	11	1.5
Shrublands and shrubland complexes	14a, 14c, 14d, 14j	123	17
Coastal Dune Complexes	16k	<0.01	<0.05

Broad Vegetation Group/ Habitat**	Component Vegetation Communities**	Area (ha)	Contribution (%)
Grasslands and grassland complexes	17c, 17d	97	13
Rock pavement and pavement complexes	18a, 18b	123	17
Mangrove forest, woodland and shrubland complexes	24a	61	8.2
Regrowth	RE	3	0.3
Exotics	Ex, Bamboo	1.8	0.2
Cleared Areas	Cl	65	8.7
Total (ha)		**744**	**100**

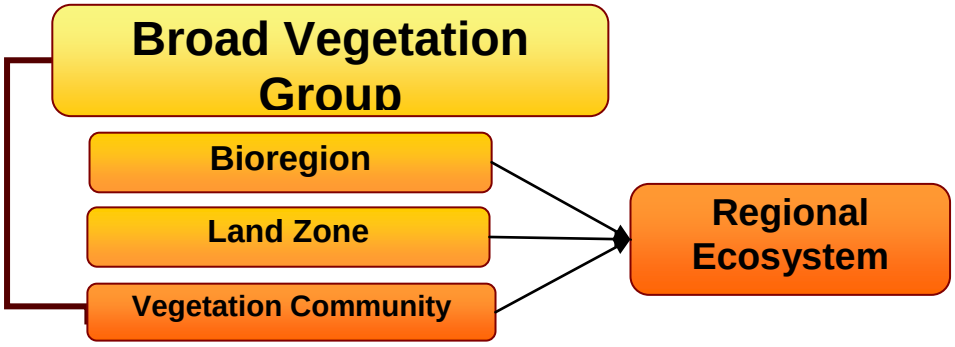


Figure 2. Diagrammatic illustration of the hierarchy and relationship between components of the vegetation classification system used in the Torres Strait Island vegetation mapping study (Stanton *et al.* 2009).

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

Vegetation Community	Description	Geological Association	Regional Ecosystem	VMS*	BDS**
1d	Mesophyll/notophyll vine forest + *Endiandra glauca* + *Acacia polystachya* + *Syzygium bungadinnia* + *Canarium australianum* + *Dysoxylum oppositifolium.*	Steep hillslopes on rhyolite	3.12.4d	OC	OC
1h	Evergreen notophyll vine thicket with *Buchanania arborescens* + *Drypetes deplanchei* + *Elaeodendron melanocarpum* + *Endiandra glauca* + *Elaeocarpus arnhemicus* + *Chionanthus ramiflora.*	Upper slopes on rhyolite talus	3.12.36b	OC	OC
2f	Semi-deciduous vine thicket + *Canarium australianum* + *Manilkara kauki* + *Dalbergia densa* var. *australis* + *Buchanania arborescens* + *Sterculia* sp. (Annan River L.J. Brass 20319) + *Cochlospermum gillivraei.*	Exposed coastal headlands on rhyolite	3.12.21a	LC	NCAP
2u	Semi-deciduous vine forest + *Manilkara kauki* + *Terminalia* spp. + *Sterculia quadrifida* + *Premna serratifolia* + *Acacia crassicarpa* + *Drypetes deplanchei* + *Millettia pinnata.*	Beach ridge	3.2.2b	LC	OC
2x	Deciduous vine thicket + *Cochlospermum gillivraei* + *Bombax ceiba* var. *leiocarpum* + *Terminalia subacroptera* +*Sterculia*	Pavement on rhyolite	3.12.21a	LC	NCAP

Vegetation Community	Description	Geological Association	Regional Ecosystem	VMS*	BDS**
	quadrifida + Psydrax reticulata + Drypetes deplanchei.				
4a	*Welchiodendron longivalve + Acacia polystachya +/- Terminalia subacroptera +/- Canarium australianum +/- Bombax ceiba* var. *leiocarpum* open to closed forest.	Rocky hillslopes on acid volcanic rocks	3.12.4a	OC	OC
4b	*Welchiodendron longivalve* low woodland, low open woodland and tall open shrubland.	Rocky hillslopes on acid volcanic rocks	3.12.4a	OC	OC
4c	Low *Welchiodendron longivalve + Melaleuca dealbata* open forest.	Rocky hillslopes on diorite	3.12.4a	OC	OC
7b	*Melaleuca saligna* open forest.	Coastal dune swales	3.2.4d	OC	OC
11b	*Pandanus* sp. *+/- Melaleuca viridiflora* open forest, woodland and shrubland.	Alluvial Plains	3.3.42a / 3.2.15	LC	NCAP
14a	Dwarf *Welchiodendron longivalve + Alyxia spicata +/- Melaleuca viridiflora +/- Acacia* spp. *+/- Asteromyrtus brassii* shrubland.	Exposed hillslopes on acid volcanic rocks	3.12.31x1a	OC	OC
14c	*Welchiodendron longivalve* shrubland.	Rocky granite hillslopes and knolls	3.12.20	OC	OC
14d	*Cochlospermum gillivraei +/- Canarium australianum +/- Welchiodendron longivalve* deciduous shrubland.	Rhyolite and granidiorite hillslopes	3.12.20	OC	OC
14j	*Acacia brassii +/- Welchiodendron longivalve* closed shrubland.	Rhyolite pavements	3.12.23	OC	OC
16k	Coastal foredune grassland, herbland, woodland and vine thicket complex (17j/17d/10b/2aa – 50/20/20/10).	Coastal foredunes	3.2.24/3.2.6a/3.2.2a	OC	OC
17c	Open to closed tussock grassland with emergent shrubs.	Rocky headlands	3.12.29	OC	OC
17d	Medium to tall *Mnesithea rottboellioides + Heteropogon triticeus + Cymbopogon* spp. *+/- Imperata cylindrica +/- Themeda triandra* grassland.	Coastal dunes and foredunes	3.2.24	OC	OC
18a	Deciduous shrubland / Rock pavement complex.	Rocky granite slopes and knolls	3.12.34c	OC	OC
18b	Low *Acacia brassii +/- Welchiodendron longivalve +/- Cochlospermum gillivraei* shrubland/ rock pavement complex (18a/14j -50/50).	Rhyolite and granidiorite hillslopes	3.12.34c	OC	OC
24a	Mangrove closed and open forest, woodland and shrubland complexes (24d/24c – 80/20).	Estuarine muds (periodically inundated)	3.1.1/ 3.1.2	LC	OC sub-dom.

** VMS =Vegetation Management Status. ** BDS = Biodiversity Status: OC = Of Concern Regional Ecosystem, LC = Least Concern Regional Ecosystem, NCAP = regional ecosystem with a biodiversity status that is considered to be 'No Concern at Present'.*

5.2 Plants (Flora)

An assessment of the Mabuiag flora has been compiled from analysis of Queensland Herbarium data (Herbrecs 2010), 3D Environmental survey data (Stanton *et al*. 2009), and field survey data of Fell (2009, 2010). The total known flora of 433 species is a preliminary figure and likely to be revised with additional systematic surveys and after finalisation of identifications. Based on the currently available data the flora comprises 363 (94%) native taxa, with 70 (16%) naturalised. This represents approximately 32% of the known flora for the Torres Strait Islands.

The 16% of introduced species listed excludes plants of town gardens, however it incorporates many species which occur within the disturbed community area and which may occur on the disturbed margins of native vegetation. This figure compares to 5.8% for Badu, 6.7% Iama, 30% Boigu, 15% for Torres Strait Islands (Stanton *et al.* 2009), 7.4% for Cape York Peninsula (Neldner and Clarkson 2005) and 15.6% for Queensland (Bostock and Holland 2007).

On Mabuiag, one hundred and three families are represented by 257 genera with major native plant families being Fabaceae (29 species), Apocynaceae (21 species), Rubiaceae (19 species), and Myrtaceae (16 species). A comparison of the island flora in relation to other Torres Strait Islands and regional floras is provided in **Table 3**.

Table 3. Summary of the native vascular flora of Mabuiag Island

Islands/Regions	Families Species	Ferns	Pines Cycads	Flowering Plants	Total
Mabuiag Is.	Families Species	2 4	1 1	101 428	104 433
Boigu Is	Families Species	3 4	0 0	62 226	65 230
Badu is.	Families Species	11 17	2 2	117 586	130 605
Iama Is.	Families Species	2 2	0 0	78 266	80 268
Torres Strait Islands (Combined)	Families Species	5 39	1 2	158 1,289	174 1,331
Cape York Peninsula	Families[3] Species	30 157	5 6	183 3,173	218 3,338
Great Barrier Reef Continental Islands[4]	Families Species	25 97	5 7	165 2,091	195 2,195
Qld Flora[5]	Species	396	70	9,424	9,890

Forests and woodlands dominated by *Welchiodendron longivalve* (143 species) support the greatest number of species, with evergreen and semi evergreen vine forests and thickets (97 species) and deciduous and semi deciduous vine forests and thickets (82 species) (**Table 4**). Many rainforest species occur in all of these habitats. The low number of introduced plant species recorded on the island provides an indication that remnant habitats retain a relatively undisturbed condition. Additional systematic surveys in grasslands, pandanus woodlands and mangroves are likely to increase the number of flora species recorded on the island.

Table 4. Summary of the vascular flora of Mabuiag Island in relation to broad vegetation groups, vegetation communities, and regional ecosystems.

Broad Vegetation Group	No. of species recorded[6]
Welchiodendron closed & open forests & woodlands (BVG 4)	143
Evergreen & semi evergreen vine forests & thickets (BVG 1)	97
Cleared land and non remnant regrowth (Cl, Re)	92
Deciduous and semi deciduous vine forest and vine thickets (BVG 2)	82

[3] Cape York flora utilises Henderson (2002).
[4] Batianoff and Dilleward (1997) identify 552 continental islands along the east coast of Queensland within the Great Barrier Reef Marine Park (GBRMP), a total land area of about 1 627 km^2.
[5] Bostock and Holland (2007).
[6] Numerous species are recorded in multiple habitats.

Broad Vegetation Group	No. of species recorded[6]
Shrubland and shrubland complexes (BVG14, VC14b – RE3.3.68)	75
Grasslands and grassland complexes (BVG17, VC17a – RE3.3.62)	59
Paperbark shrublands & woodlands (BVG 13)	20
Rock Pavements (BVG 18)	44
Mangrove forest, woodland and shrubland complexes (BVG 24, VC24a- RE3.1.1/ 3.1.2)	22
Paperbark open forests (BVG 7)	20
Pandanus dom.t woodland and shrubland (BVG11, VC11a – RE3.3.62)	13
Bamboo (VC27a – Non Remnant)	1

5.2.1 Plant Species with Conservation Significance (Priority Species)

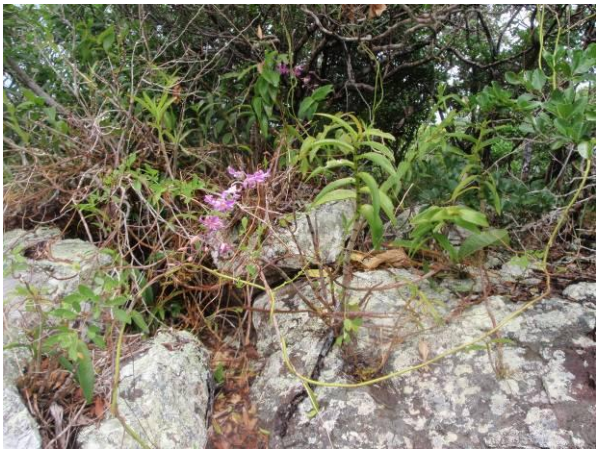
Mabuiag Island supports one species listed on the EBPC Act, three species on the NC Act, and 17 regionally significant species. This accounts for 5% of the island flora. These are identified as 'priority species' for Mabuiag Island and the Torres Strait region. The summaries provided below, together with a review of the local and regional threats that are affecting each species (see **Appendix C),** utilise the available scientific literature, consultation with experts and field knowledge. The information is relevant to future review of the 'Back on Track (BOT) species prioritisation framework' process.

Table 5. Endangered, Vulnerable and Near-Threatened flora species reported or predicted to occur on Mabuiag Island.

Species	National EPBC	State NC Act	Broad Habitat	Source of Record/s
Known to Occur				
Cycas badensis (Cycadaceae)	-	V	Open forests, woodlands, grasslands.	Herbrecs, 3D
Diospyros sp. (Bamaga BP Hyland 2517)	-	V	Rainforest and Welchiodendron forests.	Wannan & Bousi (2003), 3D Survey.
Psydrax reticulata (Rubiaceae)	-	V	Shrublands, rock pavements, Welchiodendron forests.	3D Survey
Dendrobium x superbiens (Orchidaceae)	V	V	Rock pavements at altitude	3D Survey

***National Significance (*EPBC Act)**

***Dendrobium x superbiens* (Vulnerable):** A natural hybrid orchid between *Dendrobium biggibum* (Cooktown Orchid) and *D. discolor* (Golden Orchid). This orchid is scattered from Torres Strait to Portland Roads on north eastern Cape York Peninsula (Jones 2006, Lavarack & Gray 1992). On Mabuiag it is restricted to exposed rock pavement shrublands and is locally rare. The parent species *D. bigibbum* is largely restricted to Cape York Peninsula whereas *D discolor*, occurs along the Queensland coast as far south as Gladstone (Landsberg & Clarkson 2004). Landsberg and Clarkson (2004) report that most known populations are vulnerable to settlement pressures (clearing, exotic animals, weeds, changed fire regimes) and have been heavily collected from the Torres Straight Islands. On Mabuiag, its spectacular year-round flowers make it vulnerable to collection pressure although the habitat is difficult to access. Other potential habitats occur on a number of Torres Strait Islands, and between Portland Roads and northern Cape York Peninsula. The species is however naturally restricted and further surveys are required to determine its local and regional distribution.

Photograph 1 & 2. Flowers of *Dendrobium x superbiens* (left) and typical rock pavement/shrubland habitat (right).

State Significance (NC Act) 1992

***Cycas badensis* (Cycadaceae)- Vulnerable:** Two populations of cycad were recorded on Mabuiag in November 2010. The populations occur in grassland habitat. *Population 1* on the eastern side of the island consists of two individuals whilst *Population 2* located on the western coast supports between 50-100 plants. The species has been identified as *Cycas badensis*, a species endemic to the Torres Strait Islands which is listed as Vulnerable under both Federal and State legislation. Haddon (1912a: 135) noted dietary use of these plants in Torres Strait: '*I have heard that on some western islands an inferior kind of sago was made from the pith of a cycad palm*'. Traditional use of Cycads as a food resource is documented from other northern Australian regions and Papua New Guinea (Bradley 2005).

***Dendrobium x superbiens* (Vulnerable)** - see description above

***Psydrax reticulata* (Vulnerable)**: A shrub or small tree to 6m which is common throughout vine thickets, shrublands and acid volcanic rock pavements on the majority of continental islands of Torres Strait as well as occurring near the tip of Cape York Peninsula. The species is a bioregional endemic reaching its northern limits of distribution on Torres Strait continental islands with survey records from Mua, Badu, Dauan, Zuna, Warral, Gebbar, Prince of Wales, Wednesday, and Naghir. The plant is a common component of the vegetation of exposed rhyolite and granite hills. The habitat on steep rocky slopes is mostly protected from fire impacts and the habitat is presently free of any major weeds. Herbaceous weeds with wind dispersed seeds, such as praxelis which occurs in the village area, are a potential threat to the species habitat in the longer term. Despite the need for a reassessment of its conservation status toward delisting, it should be considered a regionally significant taxon given its endemicity whilst being at the limit of its known geographical range.

Photograph 3 & 4. *Psydrax reticulata* in flower (left); and typical rock pavement/shrubland habitat with ranger David Amber (right).

***Diospyros* sp. (Bamaga BP Hyland 2517) (Vulnerable)**: A low shrub of 1-3m height restricted to evergreen and semi deciduous vine forests and thickets. The species is a bioregional endemic reaching its northern limits of distribution on the Torres Strait continental islands. Its occurrence on Mua, Badu, Dauan, Prince of Wales, and Naghir is restricted to small pockets of suitable habitat where the plant may be locally common. As for *Psydrax reticulata*, despite a need for a reassessment of its conservation status, it should be considered a regionally significant taxon.

Photograph 5. *Diospyros* sp. (Bamaga BP Hyland 2517).

Regional Significance

The classification of regionally significant species used herein 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. It is supported by thorough field knowledge of the flora gained through field surveys and analysis of available data sets and literature. The 17 species recognised are summarised below in **Table 6.**

Table 6. Regionally significant flora species of Mabuiag Island.

Regionally Significant Species	Comments	Photograph
Actephila venusta **(Euphorbiaceae)**	A low understorey shrub 1-3m. A northern Australian endemic known from Northern Territory (NT) and Cape York Peninsula (CYP). Disjunct occurrences on a number of Torres Strait continental islands i.e. Mabuiag, Badu, Mua, Prince of Wales, and Dauan represent the northern limit of distribution.	
Aristolochia chalmersii **(Aristolochiaceae)**	A slender twiner endemic to the CYP Bioregion. The record from Mabuiag in coastal vine thicket is disjunct and represents the northern limit of distribution. It is a host for the larvae of the Cairns birdwing butterfly (*Triodes euphorion*), the red swallowtail (*Atrophaneura polyorus queenslandicus*) and the big greasy (*Cressida cressida*) (Ross and Halford 2007).	No image available.
Crotalaria **sp. (Torres Strait J.R. Clarkson 2044) (Fabaceae)**	A highly disjunct species only known from a few islands in Torres Strait and the northern Barrier Reef continental islands. Populations on Mabuiag are known from Herbarium specimen with limited details regarding habitat and abundance. The Mabuiag occurrence is disjunct representing the northern limit of distribution.	No image available.
Erythroxylum **sp. (Mosquito Creek J.R. Clarkson 9991+) (Erythroxylaceae)**	This shrub growing to 2-5m in height is nowhere common, being found on Mabuiag within shrublands and rock pavements on rhyolite hills. It is endemic to northern Queensland reaching its northern limit of distribution on Mabuiag. Other disjunct occurrences in Torres Strait include Pulu, Badu, Prince of Wales, Hammond and Friday Islands. Further detailed floristic surveys will no doubt increase the known range and distribution of the species on the island.	
Euonymus australiana **(Celastraceae)**	A shrub reaching 2-4m height which is uncommon in understorey of better developed examples of vine forest. The Badu population is restricted to vine forest on Mt Mulgrave. In the Torres Strait it is also known from Mua and Dauan. The occurrence is highly disjunct and represents the most northern limit of distribution of a north Queensland endemic.	
Gunnesia pepo **(Apocynaceae)**	A monotypic genus endemic to northern Queensland. An uncommon slender understorey vine with opposite leaves. Its occurrence in welchiodendron open forests of rhyolite foothills on Mabuiag is disjunct and represents the northern-most limit of its distribution. It is known from northern Cape York Peninsula in seasonally dry forests and vine thickets. It has also been recorded on Badu Island (Fell pers. obs. 2010) with suitable habitat on Mua Island.	

Regionally Significant Species	Comments	Photograph
Haplostichanthus fruticosus **(Annonaceae)**	A shrub to 2m found in the understorey of vine thicket and forest, and Welchiodendron forests on rhyolite slopes. The species is endemic to the Cape York Bioregion with a distribution from the McIllwraith Range in the south to Mabuiag Island in the north. The Mabuiag occurrence is disjunct representing part of its northern-most limit of distribution. In Torres Strait it was previously known from Mua Island (Jessup 2007), however it also occurs on Badu and on Dauan (Stanton *et al.* 2009). The fruits are globular and red 7-8mm diameter and bird dispersed. Food plant for the larval stages of the green spotted triangle butterfly (Sankowsky & Neilsen 2002).	
Maniltoa lenticellata **var. *lenticellata*** **(Caesalpiniaceae)**	This tree with compound alternate leaves occurs north from the Nesbit River in north-east CYP York to Papua New Guinea (PNG). Disjunct occurrences known from well-developed evergreen and semi-deciduous vine forest on rhyolite and granite substrates on Badu, Mua, Dauan, Prince of Wales and Mabuiag Islands. On Mabuiag, it is rare and only known from vine forest understorey of closed forest dominated by Mango.	
Melaleuca saligna ***(*****Myrtaceae)**	A small paperbark tree with pendulous narrow leaves. The occurrence on Mabuiag is disjunct and represents the northern-most limit of its Australian distribution.	
Miliusa traceyi **(Annonaceae)**	A shrub or tree to 8m. Endemic to northern Australia where it is known from seasonal vine thickets and forests in the NT and CYP Peninsula. This species is a common component of Welchiodendron forests and vine thickets on the majority of Mabuiag the continental islands of Torres Strait. These occurrences are disjunct and in combination represent the species' northern limits of distribution. The species habitat is in good condition and self-maintaining. The species provides a food plant for the larval stages of the fivebar swordtail, fourbar swordtail, green spotted triangle, pale green triangle and the green triangle butterflies (Sankowsky & Neilsen 2000).	
Rhodamnia australis **(Myrtaceae)**	An understorey shrub to small tree reaching 3-6m height. The occurrence on Badu in the understorey of welchiodendron forests (4a) is disjunct and represents part of its northern limit of geographical range. In the Torres Strait it also occurs on Mabuiag (1d, 2x), and Mua (3a) and Iama. A northern Australian endemic known from CYP and the NT.	

Regionally Significant Species	Comments	Photograph
Lycianthes shanesii **(Solanaceae)**	A shrub to small tree in the understory of vine forest and thicket. A Queensland endemic known from CYP, north eastern Queensland and southwards as far as coastal central Queensland. Recorded on Pulu and Mabuiag in vine forest and vine thicket. These records are disjunct and represent the northern limit of species distribution.	
Syzygium bungadinnia **(Myrtaceae)**	A tree to 20m restricted on Mabuiag to evergreen notophyll vine forest on sheltered gullies and slopes. An endemic to the CYP bioregion occurring from Iron Range in the south to the Torres Strait Islands, although possibly also occurring in PNG. The Mabuiag occurrence is part of a number of highly disjunct populations, which currently represent the northern limits of species distribution. Known also from Mua, Mer, and Dauan. The fruit from this species is edible.	
Triflorensia australis **(Rubiaceae)**	An understorey shrub reaching 2-4m height found on Mabuiag Island in evergreen notophyll vine forest on sheltered gullies and slopes. Known also from Badu, Mua, Mer, Dauan, and Prince of Wales Islands. The Mabuiag occurrence is part of a number of highly disjunct populations which represent the northern limit of species distribution. A northern Australian endemic which also occurs in the NT.	No image available.
Uvaria rufa **(Annonaceae)**	A scrambling shrub or liane known from vine forest and thicket habitats between Coen and Thailand. Occurrences on Mabuiag as well as Badu, Mua, Prince of Wales and Iama are disjunct and restricted. The species habitat is in good condition and self-maintaining.	

5.2.2 Introduced Plants (Weeds)

Information on weed species has been sourced from Stanton *et al.* (2009), Queensland Herbarium specimen data, (DERM 2008, 2011), field data of Fell (2009, 2010), and personal communication with Barbara Waterhouse from the Australian Quarantine Inspection Service (AQIS).

With reference to **Appendix D**, 70 introduced species are known to occur on the island. The majority are associated with heavily disturbed and developed areas within and surrounding the Mabuiag community and fringing disturbed sites such as major roads and tracks, refuse sites, airfield, recreation areas and old settlement sites.

Declared Weeds

Rubber Vine - *Cryptostegia grandiflora* (Class 2)

Rubber vine (*Cryptostegia grandiflora*) is a Class 2 weed (under the LP Act) which was located in a house yard near the Mabuiag airfield during field work in November 2010. The plants, which were planted as garden ornamentals, were robust and healthy and in full flower. Rangers have since destroyed the plants.

Yellow Bells – *Tecoma stans* (Class 3)

Yellow bells is a shrub or small tree to 5 m high which is a native of tropical America. The plant is now present through the Americas to south-western Argentina, and in northern and eastern Australia. Seeds are wind dispersed with papery wings. Yellow bells is a common ornamental on numerous islands with potential to invade rock pavements shrublands and grassy woodlands. Yellow bells is widespread throughout the community and is in the initial stages of invading rock pavement margins. The species poses significant threat to habitats surrounding the township although is not considered a major threat to broader habitats on the island due to the extremely depauperate nature of the islands soils.

Environmental Weeds Present

Remnant vegetation throughout the broader island area is generally free from environmental weeds although species such as stinking passionflower (*Passiflora foetida*) tend to be scattered in most habitats. Species such as mintweed (*Hyptis suaveolens)*, red Natal grass (*Melinis repens*) and Townsville stylo's (*Stylosanthes spp.*) are becoming established on exposed rock pavements particularly on the eastern shore line near the community. These rocky pavement habitats appear to be vulnerable to invasion of weeds with wind-dispersed seeds. Praxelis is a highly invasive erect, branched, unpleasant-smelling herb first observed at the far southern end of Mabuiag settlement in 2004 by Barbara Waterhouse. This species is known to invade rock pavements in the Mareeba and Mt Molloy districts and therefore is considered a threat to similar habitats on Mabuiag Island. Robust regeneration of mintweed seedlings was observed at a number of sites. Other common leguminous weeds include alyce clover (*Alysicarpus vaginalis*), phasey bean (*Macroptilium lathyroides*), beggar weed (*Desmodium tortuosum*), velvet bean (*Mucuna pruriens* var*. utilis*), centro (*Centrosema molle*), streaked rattlepod (*Crotalaria pallida* var. *obovata*), sensitive weed (*Mimosa pudica* var*. unijuga*), coffee bush (*Senna occidentalis*) and ringworm shrub (*Senna alata*).

Escaped garden plants such as coral vine (*Antipogon leptopous*), cupids flower (*Ipomoea quamoclit*), and scarlet flower *(I. hederifolia*), clerodendrum (*Clerodendrum thomsoniae*) and yellow bells (*Tecoma stans* var*. stans*) have become established in isolated patches on the edge of the Mabuiag community area. Vines of the genus Ipomoea are similarly invading rock pavement areas and have a capacity to quickly invade disturbed land following fire. Other species such as tridax daisy (*Tridax procumbens*), sida (*Sida acuta*) and snake weed (*Stachytarpheta jamaicensis*) are widespread throughout disturbed areas and, in combination with the aforementioned, are rapid colonizers of disturbed areas.

Grassy weeds are widespread throughout the disturbed areas of the island and pose a significant threat to grasslands and grassy woodland habitats. Of foremost concern is annual mission grass *(Pennisetum pedicellatum* subsp. *unispiculum*), which is an aggressive species capable of inducing habitat change by altering fire behaviour. Other introduced grasses recorded from the island include: Indian couch (*Bothriochloa pertusa*), Mossman River grass *(Cenchrus echinatus*), Rhodes grass *(Chloris gayana*), purpletop Rhodes grass *(Chloris virgata*), couch *(Cynodon dactylon*), crowsfoot *(Eleusine indica*), red Natal grass *(Melinis repens*), button Grass *(Dactyloctenium aegyptium*), sabi grass *(Urochloa mosambicensis*), and itchgrass *(Rottboellia cochinchinensis*). Giant reed *(Arundo donax*) and bamboo *(Bambusa* sp.) are robust graminoids known to be used for cultural purposes. They are limited in occurrence with distribution closely aligned with cultural sites. Information on those weeds considered as the highest threat to biodiversity on the island are summarised in **Table 7** below.

Table 7. Major environmental weeds of Mabuiag Island.

Species	Comments	Photograph[7]
Praxelis (*Praxelis clematidea*)	A highly invasive erect, branched, unpleasant-smelling herb with hairy stems and foliage. Collection notes of Waterhouse (2004) refer to a small infestation of several square metres at a house at the far southern end of Mabuiag settlement being the first record on the island. This species is known to invade rock pavements in the Mareeba and Mt Molloy districts and therefore is considered a threat to similar habitats on Mabuiag. Known also from Badu, Mua, and Erub.	
Butterfly pea (*Clitoria ternatea*)	This vigorous sprawling vine is one of a number of leguminous vines and herbs which occur throughout the disturbed parts of the island. Butterfly pea is a tropical perennial legume adapted to a range of soils and climates in northern (tropical and subtropical) Australia. Current infestations are restricted to disturbed areas however evidence from Mabuiag suggests its potential to invade native vegetation. Seeds are likely to be dispersed by vectors such as machinery, water and grazing horses. Ongoing monitoring and prompt control of any infestations outside the community area is recommended.	
Siratro (*Macroptilium atropurpureum*)	Siratro is widespread on Mabuiag occurring throughout the community area 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 and woodlands.	

[7] All photographs D.Fell & D. Stanton unless otherwise noted.

Species	Comments	Photograph[7]
Indian Calapo (*Calopogonium mucunoides*)	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 that siratro and butterfly pea however existing infestations within the Mabuiag community have the potential to spread into adjoining vegetation.	
Annual mission grass *(Pennisetum pedicellatum* subsp. *unispiculum*)	A robust annual grass known from the community area. Level of infestation is not known. 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). Burning is known to promote further mission grass establishment.	 (source NT Govt.) http://www.nt.gov.au/nreta/ natres/weeds/find/missiongrass.html)
Mintweed (*Hyptis suaveolens)*	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, Cape York Peninsula and north-eastern Queensland and southwards as far as south-eastern Queensland. On Mabuiag it is widespread in and around the community and is becoming prominent on rock pavement shrublands. The seeds are dispersed by wind and water.	
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. Prolific on margins of Mabuiag community forming dense infestations. Strong regeneration observed after fire.	
Scarlet flower (*Ipomoea hederifolia*)	A slender vine originally from tropical America, now naturalised in CYP, NEQ and southwards to north-eastern New South Wales. Recorded on disturbed margins of the community invading swampy woodlands and vine thicket.	

Species	Comments	Photograph[7]
Coral Vine (*Antipogon leptopous*)	A sprawling vine with attractive pink flowers native of Mexico. An infestation on rock pavement on the edge of the Mabuiag community indicates that this weed may be a future problem. It has tuberous rhizomes.	

Weed Threats

Those weeds currently not recorded on Mabuiag yet which are considered capable of causing long-term changes to the island's vegetation are detailed in **Table 8**.

Table 8. Major weed threats - Mabuiag Island.

Species	Comments	Photograph[8]
Leucaena (*Leucaena leucocephala)*	Leucaena is an exotic small tree up to about 6 m tall with fine bipinnate leaflets. The weed is present on Boigu, Saibai, Mua, Erub, Mer and Thursday Island and Horn Island. Dense infestations on Boigu pose a significant threat to the islands cultural and natural values. Ongoing monitoring and control is required for any occurrences of Leucaena in the town area of Mabuiag.	 **Leucaena on Boigu Is (Nov 10)**
Lantana (*Lantana camara*)	Lantana is a Class 3 Declared Weed and listed as Weed of National Significance (WONS). It is currently widespread on Mer, Erub and Ugar and poses a potential threat to Mabuiag Island habitats. On-going monitoring and prompt control of any infestations is recommended.	 **Lantana on Erub (late dry 07)**
Gamba grass (*Andropogon gayanus*)	Gamba is a Class 2 Declared Weed that has not yet been recorded in Torres Strait Islands. It is however considered a serious potential threat. Together with annual mission grass it is listed as a Key Threatening Processes under the EPBC Act. It is widespread in the Bamaga district of northern Cape York Peninsula (Fell *et al.* 2009). The grass is an aggressive colonist which develops a standing biomass of 5-7 times that of native species resulting in extremely intense fires (Rossiter *et al*. 2003).	 **Gamba grass near Injinoo (April 09).**

5.2.3 Plants with Cultural Significance

Information on useful plants of Mabuiag Island compiled in this study has been sourced from local Goemulgal people through the Mabuygiw Rangers and from a review of the available literature including Haddon (1912a, 1912b). It is intended as a foundation to inform ongoing recording of Traditional Ecological Knowledge (TEK) as part of the Land and Sea Ranger working on country

[8] All photographs D.Fell unless otherwise noted.

plans. As such, the information and species recorded should be viewed as preliminary in nature. More detailed ethnobotanical studies within a formal TEK system are required to complement the existing list of useful plants and local language names. This includes information on uses, seasonality, habitat, distribution, abundance, phenology, and the relationships to story and culture.

The preliminary list provided in **Appendix E** recognises 50 species with known uses. This represents 11% of the island flora. Of these, 19 have language names which have been documented to date. Nine species (18%) are naturalised some of which [e.g. stinking passionflower (*Passiflora foetida),* bamboo *(Bambusa vulgaris),* and mango (*Mangifera indica*)] may occur within intact vegetation, the latter two often occur in the vicinity of old settlement and garden sites. Others such as cassava (*Manilhot esculenta),* tree cashew (*Anacardium occidentale)*, sisal hemp (*Agave vivipara* var. *vivipara),* ringworm shrub *(Senna alata),* giant reed (*Arundo donax),* and tridax daisy *(Tridax procumbens)* are abundant in community areas and disturbed margins. Uzu (*Syzygium branderhorstii*) is a favoured fruit tree often planted in gardens. As yet this species has not been recorded in the vine forests of Mabuiag indicating that it is has been domesticated. It occurs naturally in remnant vine forest on Erub, Mer, Dauan, and Mua.

The majority of the useful species (64%) are used as a food resource. The fruits of 21 shrubs and trees and an additional three vines (*Ampelocissus acetosa, Cassytha filiformis, Passiflora foetida*) are eaten. Four species (*Terminalia catappa, Cycas* sp., *Sterculia quadrifida,* and *Pandanus sp.*) have nut like seeds which are either eaten raw or processed before consumption. A further four species produce tubers which are edible although they may require processing (*Crinum uniflorum, Dioscorea transversa, D. esculenta*, and *Mucuna pruriens*).

Material uses such as for timber products (e.g. *Acacia polystachya, Manilkara kauki, Tabernaemontana orientalis*), decoration (e.g. seeds of *Abrus precatorius, Erythrina insularis* and *E. variegata, Entada phaseoloides*), rope or binding (e.g. *Hibiscus tiliaceus, Flagellaria indica*) account for 34% of the used plants, with a small proportion (6%) being utilised for both food and material uses. The small proportion of plants used for medicinal purposes (6%) and cultural uses (2%) is more a reflection of the limitations of the information compiled to date.

6.0 Fauna (Animals)

As for the majority of Torres Strait Islands there is a considerable lack of systematic survey of fauna habitats on the island. Avifauna (birds) have been the best studied component of Torres Strait's terrestrial fauna. Other records are incidental, or part of broader regional surveys targeted towards particular groups (e.g. Draffan *et al.* 1983, Clarke 2004, Garnet *et al*. 2000, Hall 2008, Helgen 2004). Recent surveys on Mabuiag (Conics 2009a; Hitchcock *et al.* 2009; Watson & Hitchcock in press) represent the most comprehensive data available for the island. In addition, there is little available information on the cultural significance of terrestrial fauna species. Some data on this topic can be found in the *Reports of the Cambridge Anthropological Expedition to Torres Straits* (Haddon 1901-1935).

Recent collecting efforts (Conics 2009; Hitchcock *et al.* 2009; Watson and Hitchcock in press) include accurate GPS coordinates for collected and photographed terrestrial vertebrates making Mabuiag one of the few islands in the Torres Strait where these records (albeit limited) can be matched to habitat zones. Systematic collecting across the range of habitats is however likely to greatly increase the number of known species and further contribute to the identification and development of management strategies. It is therefore recommended that surveys become an identified Mabuygiw Ranger work activity, supported by relevant specialists.

A desktop review of reports and databases identified 123 fauna species that have been reported for Mabuiag Island (**Appendix G**). This includes three frog, 26 reptile, 87 bird and seven mammal species. Of these, one reptile, one bird and three mammal species are introduced. An additional seven species have been identified by the Protected Matters Search Tool as possibly occurring. This can be compared with the 384 terrestrial fauna species that have been reported for the broader Torres Strait Island group (see **Appendix G**) which includes 14 frog, 67 reptile, 263 bird and 40 mammal species.

Watson and Hitchcock (in press) identify 102 species known for the island, based on vouchered specimens (Australian Museum and Queensland Museum collections), photographs, Anabat recordings and field observations[9]. The fauna comprises three frog species; 16 reptiles [three goannas, two snakes, 12 geckos, lizards and skinks, and the Saltwater Crocodile (*Crocodylus porosus*)]; 75 birds (one introduced); and eight mammals [three bats, a rodent (Grassland Melomys, *Melomys burtoni*), and four introduced species being dog, horse, pig and cat (see **Appendix G**).

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 Mabuiag clan totems include dog (*umay*), flying-fox (*sapur*), snake (*thabu*) and crocodile (*koedal*) (Haddon & Rivers 1904:154). Language names have been documented by Watson & Hitchcock (in press) for some 40 animal species on Mabuiag (refer **Appendix G**).

[9] Due to percievied innacuracies, WildNet records were not included.

The calls of some birds are recognised 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 headdresses.

6.2 Fauna Habitat Values

Mabuiag presents one of the most intensely sampled continental islands in the Torres Strait due both to its relatively small size coupled with a number of targeted fauna survey efforts completed on the island under a number of programs. Habitats are largely intact except in the vicinity of the township and airstrip where there has been some substantial disturbance coupled with invasion of exotic weeds around the community margins. Upland habitats present a relatively complex mosaic of rainforest, vine thicket, shrubland and rock pavement communities which for the large part are unsampled. It is in these habitats where the greatest chance of finding species new to the island exist

Given its small size, the terrestrial fauna of Mabuiag is not as varied as that found on its larger and more habitat diverse neighbours, Badu and Mua (see Ingram 2008; Watson and Hitchcock in press). For example, the Death Adder (*Acanthophis* sp.) is known on Badu (Fell and Stanton, pers. obs.) and the emerald monitor (*Varanus prasinus*) on Mua (Whittier and Moeller 1993) and Boigu (Fell and Stanton, pers. obs.), but Goemulgal report that neither species is found on the island.

Significant habitat value may also be found in the adjacent smaller islands including Pulu where the coastal sheathtail bat (*Taphozous australis*) has been observed roosting among boulders at a number of locations. The species is also likely to occur on Mabuiag and other surrounding islets (Hitchcock *et al*. 2009).

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 Commonwealth's EPBC Act including those listed as Migratory.
- Species listed under Endangered, Vulnerable or Near-Threatened under 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.

6.3.1 Endangered, Vulnerable and Near-Threatened Species

Twenty-three of the 384 species reported or predicted for the Torres Strait are listed as Critically Endangered, Endangered, Vulnerable or Near-Threatened (EVNT) under the EPBC Act and/or NC

Act with fifty-eight species are listed as Migratory under the EPBC Act (see **Appendix G**). The following section provides an overview of those species that are known to occur, or potentially occur on Mabuiag Island. **Table 9** lists those EVNT species known or predicted to occur on Mabuiag Island with profiles for predicted species provided in **Appendix H.**

Table 9. Endangered, Vulnerable and Near-Threatened fauna species[1] reported or predicted[2] to occur on Mabuiag Island.

Scientific Name[3]	Common Name	EPBC Act	NC Act	BoT[5]	Broad Habitat	Comments[6]
SPECIES REPORTED						
Crocodylus porosus	Salt-water crocodile	M	V	-	Estuaries/shorelines/beaches	Unpublished record.
Esacus magnirostris	Beach stone-curlew		V	high	Estuaries/shorelines/beaches	Unpublished record.
Numenius madagascariensis	Eastern curlew	M	NT	-	Estuaries/shorelines/beaches	Database record.
Taphozous australis	Coastal sheathtail bat		V	high	Open forest, grasslands, coastal shrublands, mangroves, monsoon forest and melaleuca swamp forests. Rarely found roosting more than several km from the sea. Roosts / breeds in coastal caves, rock piles / fissures.	Unpublished record.
SPECIES PREDICTED						
Pteropus conspicillatus	Spectacled flying-fox	V	LC	high	Mangroves, closed forests, swamp forests.	Predicted by the EPBC Protected Matters Search Tool – occurrence considered unlikely.
Hipposideros cervinus	Fawn leaf-nosed bat		V	High	Forests and woodlands, particularly along creeks with intact riparian vegetation.	Based on potential habitat.
Nyctimene cephalotes	Torresian tube-nosed bat		NT		Closed forests, mangroves, woodlands and shrublands.	Based on potential habitat.
Varanus prasinus	Emerald monitor		NT	-	Mangroves/closed forests.	Unpublished record.
Lepidodactylus pumilis	Slender chained gecko		NT		Closed forests, mangroves, woodlands and shrublands.	Based on potential habitat.
Emoia atrocostata	Littoral whiptail-skink		NT		Mangroves, rocky foreshores	Based on potential habitat.
Sternula albifrons	Little tern	M	E	?	Estuaries/shorelines/ beaches	Predicted by the EPBC Protected Matters Search Tool. Listed under the EPBC Act as *Sterna albifrons* (Bonn Convention,

Scientific Name[3]	Common Name	EPBC Act	NC Act	BoT[5]	Broad Habitat	Comments[6]
						CAMBA, JAMBA, ROKAMBA).
Accipiter novaehollandiae	Grey goshawk	-	NT		Closed forest and riparian woodlands.	Based on potential habitat.
Tadorna radjah	Rajah shelduck		NT		Estuarine margins.	Based on potential habitat.
Ephippiorhynchus asiaticus	Black necked stork		NT		Estuaries/shorelines/beaches	Based on potential habitat.
Haematopus fuliginosus	Sooty oystercatcher		NT		Estuaries/shorelines/beaches	Based on potential habitat.

1) Listed as 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: 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, Watson & Hitchcock in press), WildNet database and/or reports and other grey literature (*e.g.* Watson 2009). These sources are not necessarily mutually exclusive.

Salt-water crocodile *(Crocodylus porosus)*

EPBC Act: Migratory (Bonn Convention); NC Act: Vulnerable

Listed as estuarine crocodile under the Queensland Nature Conservation (Wildlife) Regulation 2006.

The salt-water crocodile occurs in tidal rivers, coastal floodplains and swamps, extending hundreds of kilometres inland along major drainage systems, but is also seen regularly in the open ocean (Webb et al. 1983; Read *et al.* 2004; Wilson & Swan 2010). The species is found from India through south-east Asia to the western Pacific and northern Australia (Wilson & Swan 2010). In Australia the species is most common in large areas of productive wetlands and estuaries (Fukuda *et al.* 2007). In Queensland, salt-water crocodiles are mainly found in coastal areas north of the Fitzroy River (QPWS 2007) with the highest densities in Queensland found in north-west Cape York Peninsula (Read *et al*. 2004; EPA 2007). Salt-water crocodile is known from Mabuiag Island (Watson 2009) and is also known from Saibai and Thursday Islands (OZCAM 2011) and Boigu Island (Schaffer 2010). The species is likely to occur throughout the Torres Strait. On Mabuiag Island salt-water crocodiles are likely only in mangroves and along the shoreline.

The salt-water crocodile is still threatened by drowning in fishing nets (Ehmann 1992) with juveniles more likely to become entangled. This does not appear to pose a major threat to the species (EPA 2007). A lack of suitable nesting habitat appears to be the most significant limiting factor for the recovery of the species in Queensland (Read *et al.* 2004). On Mabuiag Island the salt-water crocodile may be threatened by clearing of mangroves, entanglement in fishing nets, and by direct human persecution. These threats are likely to be minor.

Beach Stone-curlew *(Esacus magnirostris)*

NC Act: Vulnerable

Beach stone-curlew is also 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 (active at dawn or dusk) 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. The species occurs on Mabuiag Island (Conics 2009b; Watson 2009, Watson & Hitchcock in press).

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). On Mabuiag Island the species may be threatened by feral species and disturbance by humans, particularly when nesting.

Coastal Sheathtail Bat *(Taphozous australis)*

NC Act: Vulnerable

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

The coastal sheathtail bat is seldom found more than a few kilometres from the ocean, where it roosts in sea caves, rock fissures, boulder piles and, occasionally, in buildings (Churchill 2008; Richards 2008). Colonies are usually of two to 25 individuals, though up to 100 have been recorded. The species is often found on islands and will forage on nearby mainland (Churchill 2008). Foraging occurs in a wide range of habitats, including open eucalypt forest, coastal heathlands, grasslands, sand dune scrub, monsoon forests and mangroves (Duncan et al. 1999; Churchill 2008). Little is known of its breeding biology but most births probably occur from September to November (Churchill 2008; Richards 2008).

The coastal sheathtail bat occurs from Shoalwater Bay on the central Queensland coast north to Torres Strait and extralimitally in New Guinea (Duncan et al. 1999; Churchill 2008). In the Torres Strait there are 15 Australian Museum specimens from Possession Island (OZCAM 2011), two WildNet records (DERM 2010f) and a Queensland Museum specimen (reported in Conics 2008b) from Mua, and observations and Anabat recordings from Pulu (Hitchcock *et al*. 2009, Watson 2009). There are possible Anabat recordings for Mabuiag (Conics 2009b) but Pulu is in such close proximity to Mabuiag that individuals would move between islands readily.

Major threats to the species probably include loss of foraging habitat from coastal development and roost disturbance, particularly in the southern part of their range (Duncan et al. 1999). On Mabuiag Island the coastal sheathtail bat would be threatened by disturbance to any roosts and maternity sites and by loss of foraging habitat including mangroves, forest, woodland and shrubland.

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 Boigu, Mua, Badu, Mer and Erub, and there is a single WildNet record from Mabuiag (DERM 2010e) and an unpublished record from Iama (Conics 2008a). The species is likely, at least on passage, on any island that has suitable foraging habitat.

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 30-100 m (Taylor & Bester 1999) and sometimes are disturbed within 250 m of approach (Higgins & Davies 1996). Pollution may have also reduced food availability (Higgins & Davies 1996).

The single record of this conspicuous species suggests that eastern curlews are scarce visitors to Mabuiag Island. On Mabuiag 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.

6.3.2 Additional Possible EVNT species

The assessment of species with potential to occur on Mabuiag has been derived from a combination of desk top data searches, habitat assessment and local knowledge. Profiles for these species are available in **Appendix H**.

Reptiles

It is likely, given its occurrence on other Torres Strait Islands such as Mua, Mer and Saibai that the slender chained gecko will occur on Mabuiag Island. It is also likely that the littoral whiptail-skink will occur on Mabuiag as Emoia species are efficient rafters and colonise islands on floating debris (Wilson 2005).

Birds

Radjah shelduck, black-necked stork and grey goshawk have been recorded for Badu Island, about 10 km to the south of Mabuiag, and on Badu's close neighbour Mua Island. Suitable habitat for the three species is present on Mabuiag and their presence there is likely, at least sporadically. Badu Island is the most northern known location for grey goshawk, as birds in the Moluccas, New Guinea and the Solomons are now considered to be either *A. hiogaster* or *A. griseogularis* (Christidis & Boles 2008). Its presence on Mabuiag Island, if identified, would be of some distributional significance. Sooty oystercatcher may occur on rocky shores and little tern, a widespread species in the Torres Strait, is expected to occur.

Mammals

A leaf-nosed bat (*Hipposideros sp.*) was recorded on Mabuiag by Anabat (Watson 2009). The animal was thought most likely to be diadem leaf-nosed bat (*H. diadema*) but fawn leaf-nosed bat is known from Mua Island, 17 km to the south, and it may occur on Mabuiag. Torresian tube-nosed bat is also reported for Mua Island but doubts about the validity and identification of the species mean that it is difficult to predict its occurrence. Given its mobility, spectacled flying-fox may also occur, though a lack of actual database or published records in Torres Strait for such a readily identifiable species raises some doubts.

Although not predicted by the Protected Matters Search Tool, the difficulty in detecting the presence of water mouse due to its habits and preferred habitat means that its presence cannot be discounted from any area of suitable habitat without substantial field survey work. Mabuiag lacks the ideal of a mosaic of suitable habitat types but the presence of mangroves means that the species should be considered during any future fauna survey on the island.

6.3.3 Migratory Species

One terrestrial reptile, salt-water crocodile, and 57 bird species listed as Migratory under the EPBC Act have been recorded from the Torres Strait Islands. Salt-water crocodile is also listed as Vulnerable under the NC Act and its life history has been discussed in **Section 6.3**. Two of the birds, eastern curlew and little tern, are also listed as Near-Threatened and Endangered respectively, and their life histories have been discussed in **Appendix H**.

The 57 known Migratory bird species consist of 47 non-passerines and 10 passerines. The majority (37 species) belong to the Order Charadriiformes which includes oystercatchers, stone-curlews, pratincoles, plovers, sandpipers and terns. These birds may be separated into two groups; waders and terns.

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 10** lists those migratory species that are known or predicted to occur on Mabuiag Island. Further discussion of these species within groups based on behavioural traits and habitat use is provided in **Appendix I.**

Table 10. Migratory[1] species reported or predicted[2] to occur on Mabuiag Island.

Scientific Name[3]	Common Name	Status[4]		Comments[5]
		EPBC Act	NC Act	
SPECIES REPORTED				
Crocodylus porosus	Salt-water crocodile	M	V	Unpublished record.
Apus pacificus	Fork-tailed swift	M	LC	Unpublished record.
Ardea modesta[6]	Eastern great egret	M	LC	Unpublished record.
Ardea ibis[7]	Cattle egret	M	LC	Unpublished record.
Egretta sacra	Eastern reef egret	M	LC	Database, published & unpublished records.
Haliaeetus leucogaster	White-bellied sea-eagle	M	LC	Database & unpublished records.
Pluvialis fulva	Pacific golden plover	M	LC	Database & unpublished records.
Pluvialis squatarola	Grey plover	M	LC	Published record.
Charadrius mongolus	Lesser sand plover	M	LC	Database, published & unpublished records.
Charadrius leschenaultii	Greater sand plover	M	LC	Database & unpublished records.
Numenius phaeopus	Whimbrel	M	LC	Database, published & unpublished records.
Numenius madagascariensis	Eastern curlew	M	NT	Database record.
Xenus cinereus	Terek sandpiper	M	LC	Unpublished record.
Actitis hypoleucos[8]	Common sandpiper	M	LC	Database record.
Tringa brevipes[9]	Grey-tailed tattler	M	LC	Database & unpublished records.
Tringa nebularia	Common greenshank	M	LC	Published & unpublished records.
Arenaria interpres	Ruddy turnstone	M	LC	Database & unpublished records.
Calidris ruficollis	Red-necked stint	M	LC	Database, published & unpublished records.

Scientific Name[3]	Common Name	Status[4]		Comments[5]
		EPBC Act	NC Act	
Calidris acuminata	Sharp-tailed sandpiper	M	LC	Unpublished record.
Calidris ferruginea	Curlew sandpiper	M	LC	Database record.
Onychoprion anaethetus[10]	Bridled tern	M	LC	Database record.
Hydroprogne caspia	Caspian tern	M	LC	Unpublished record.
Sterna sumatrana	Black-naped tern	M	LC	Database, published & unpublished records.
Merops ornatus	Rainbow bee-eater	M	LC	Database, published & unpublished records.
Rhipidura rufifrons	Rufous fantail	M	LC	Unpublished record.
Myiagra cyanoleuca	Satin flycatcher	M	LC	Unpublished record.
SPECIES PREDICTED				
Hirundapus caudacutus[11]	White-throated needletail	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered likely to occur.
Gallinago hardwickii	Latham's snipe	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered unlikely to occur.
Coracina tenuirostris melvillensis	(Melville) cicadabird	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered likely to occur.
Monarcha frater	Black-winged monarch	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered likely to occur.
Symposiarchus trivirgatus[12]	Spectacled monarch	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered likely to occur.
Hirundo rustica	Barn swallow	M	LC	Predicted by the EPBC Protected Matters Search Tool – considered likely to occur.

1. Listed as Migratory under the EPBC Act 1999.
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: V = Vulnerable, NT = Near-Threatened, M = Migratory, LC = Least Concern (Common).
5. Known from Museum records, published literature (*eg* Draffan *et al*. 1983; Wilson 2005), WildNet database and/or reports and other grey literature (*eg* Watson 2009). These sources are not necessarily mutually exclusive.
6. 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).
7. Listed under CAMBA as *Ardeola ibis*, listed under JAMBA as *Bubulcus ibis*.
8. Also listed under CAMBA and ROKAMBA as *Tringa hypoleucos*.
9. Also listed under the Bonn Convention and JAMBA as *Heteroscelus brevipes*.
10. Listed under the EPBC Act as *Sterna anaethetus* (CAMBA, JAMBA).
11. Also listed under the EPBC Act as *Chaetura caudacuta* (ROKAMBA).
12. Listed under the EPBC Act as *Monarcha trivirgatus* (Bonn Convention).

6.3.4 Additional Possible Migratory species

Of the other 25 species of Migratory bird known from the Torres Strait (**Appendix G**), eastern osprey *(Pandion cristatus)*, bar-tailed godwit *(Limosa lapponica)*, black-tailed godwit (*L. limosa*), wandering tattler (*Tringa incana*), great knot (*Calidris tenuirostris*), red Knot (*C. canutus*), sanderling (*C. alba*), white-winged black tern (*Chlidonias leucopterus*), common tern (*Sterna hirundo*), roseate tern (*Sterna dougallii*), little tern, lesser crested tern (*Thalasseus bengalensis*), oriental cuckoo (*Cuculus optatus*) and black-faced monarch (*Monarcha melanopsis)* are expected to occur on Mabuiag Island on a

regular basis. The remaining eight species are all possible as sporadic (not annual) visitors except for double-banded plover (*Charadrius bicinctus)*, which is considered very unlikely based on known movements and glossy ibis (*Plegadis falcinellus*) and wood sandpiper (*Tringa glareola)* which are limited by a lack of suitable freshwater wetlands.

6.3.5 Species of Regional Significance

There is no terrestrial fauna species known from Mabuiag Island that is considered of regional significance at this stage, other than EVNT and Migratory species as already discussed. Future survey work on the island may identify such species (**Section 6.5**).

6.4 Pest Fauna Species

Exotic (introduced) fauna species reported for Mabuiag Island are Asian house gecko, house sparrow (*Passer domesticus)*, dog, cat, pig and horse (*Equus caballus)*. Asian 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 Mabuiag (*Gehyra* spp.) and the slender chained gecko is also predicted to occur. Dubious dtella *Gehyra dubia* is 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 Asian house gecko requires survey effort. This could be combined with other, higher priority, reptile survey. House Sparrow is unlikely to pose any threat to native species on Mabuiag Island and no action is required for the species.

Dogs are reportedly present in considerable numbers on the island and pose a risk to environmental health (Conics 2009b). Dogs are a threat to ground nesting birds such as beach stone-curlew and are a disturbance factor for waders, terns and radjah shelduck and black-necked stork, should they occur.

Cats are reported for the island (Watson 2009) but no level of abundance is provided. 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. Cat predatory behaviour appears largely opportunistic, though small mammals are preferred. Therefore, should house cats have access to relatively undisturbed habitats it is likely that they would have a substantial impact on native fauna, particularly mammals (Barratt 1997). At this stage only grassland melomys (*Melomys burtoni*) has been recorded on Mabuiag Island but further survey work may identify additional native ground-dwelling mammals. Cats would kill melomys and would also prey on small birds, reptiles and frogs.

Pigs are reported for the island (Watson 2009) but no level of abundance is provided. Pigs present a threat directly to frogs, reptiles and birds through predation. Ground-dwelling birds are particularly vulnerable. They also have indirect impacts through habitat destruction and degradation. Any wetland or riparian area is especially susceptible to damage by pigs. Horse is reported (Watson 2009), but apparently a single individual is present (Hitchcock pers. comm. 2011). The animal would cause minor habitat degradation. Large numbers of horses are capable of substantial habitat modification and destruction and control measures would be required.

6.5 Priorities for Future Fauna Survey

It is important that the faunal values of Mabuiag Island be more comprehensively identified so that the most important conservation elements are managed appropriately. In addition to general systematic survey methods for the compilation of the fauna species assemblage for the island, the following actions are recommended:

Medium Priority

- Identification of roosts and maternity sites for coastal sheathtail bat.
- Population estimate for beach stone-curlew to allow monitoring of breeding success.
- Clarification of the presence of emerald monitor and identification of habitats used by the species.
- Identification of any breeding areas for terns.
- Identification of the most important foraging and high roost sites for waders.
- Survey of rocky shores for littoral whiptail-skink and sooty oystercatcher.
- Survey for slender chained gecko and, if so, identification of any overlap in habitat use with Asian house gecko.

Low Priority

- Trapping survey for water mouse. The *Draft Recovery Plan for the Water Mouse* (DERM 2009) included the following key recovery actions:
  - *Identify habitats supporting populations of the water mouse and map the current distribution*
  - *Confirm current distribution of the water mouse*
  - *Conduct surveys and ecological assessments of potential water mouse habitat*
  - *Describe key biological and ecological features of the water mouse and its habitat*
  - *Determine whether genetic variation exists across populations of the water mouse*.
- Identification of the presence of any species of tube-nosed bat through consultation with residents and, if reported, conduct mist-netting to identify the species.
- Identification of the presence of radjah shelduck and black-necked stork through consultation with residents and, if reported, identification of suitable habitat.

7.0 The Role of Fire in Savanna Landscapes

Most of Cape York Peninsula, and hence Torres Strait Island plant communities will burn if enough fuel is present. The exceptions are rainforest communities, communities of rocky areas and some wetland areas such as mangroves and the deeper permanent swamps. We know from the historical record and anthropological studies that the landscape of Cape York Peninsula when Europeans arrived was the product of traditional burning practices that had changed little over many thousands of years and had led to stability in the nature of the plant communities and the way they were distributed across the landscape. The loss of traditional burning practices in recent times has led to a loss of that stability as vegetation types that had evolved under particular fire regimes were subjected to new regimes[10]. This destabilisation has led to widespread loss of plant communities and inevitably will be found to have led to serious loss of the species of plants and animals that depend upon them.

In the history of the indigenous occupation of Cape York Peninsula and Torres Strait Islands, there were dramatic changes in plant communities as the climate shifted under a rapid succession of global ice ages, but these changes happened over thousands of years. It is clear from the nature of recent changes however that they have been greater in the periods of as little as fifty years than occurred in those in those millennia prior to European arrival. It is not the change itself that is the problem but its rapidity. Species cannot evolve rapidly enough to accommodate it and the inevitable result will be the loss of species.

The reasons that aboriginal people used fire have been well documented (Russell Smith *et al.* 2009). They included managing to favour various species of food plants, to protect sacred places, to attract game or drive them towards the spears of hunters and to create open landscapes that made travel easy and ambush by enemies difficult. Above all however, they burnt for their own safety. As people who used fire in their daily lives they had to burn to manage the fuel around them, thus avoiding situations where a stray spark landing in heavy fuel could threaten their lives.

The use of fire in the Torres Strait Islands is evident on the majority of islands and there is no doubt that its ongoing use has been fundamental in shaping and modifying vegetation cover and influencing habitat diversity across the islands. McNiven (2008) notes the ethnographic record of Haddon (1935) where fire use forms an integral part of garden preparation and land cleaning in the late 1800's, and evidence of fire is also in the pollen and phytolith record (Rowe 2006, Parr and Carter 2003).

The fire dependence of the non-rainforest communities is related largely to the regeneration strategies of the species within them. Some have woody fruits which have to be cracked by heat to release the seed and most require bare ground and sunlight for those seeds to germinate and grow. Many perennial grasses begin to decline and die after several years without fire. Some species will only generate from seed and others are capable of resprouting after fire. Of those species that will

[10] Fire regimes are defined by the frequency of fires and their season of occurrence, both of which have relationship to their relative severity

germinate and grow through heavy litter, all still require sunlight to survive and most will not persist under a wildfire regime of infrequent hot fires.

In post - European northern Australia, altered fire regimes have led to massive loss of open forest and woodland habitats in the high rainfall areas, particularly the east coast of Cape York Peninsula. In that area fire has disappeared completely because of the complexity of the landscape, with numerous streams and rainforest areas which have made it impossible for individual fires to spread very far. The result has been widespread development of a dense understory of shrubs and trees which is preventing the regeneration of the canopy. The end result will be the replacement of open forest areas with rainforest related vegetation. In areas of shallow soils dominated by shrubs, there has been a progressive loss of species as they reach the end of their life cycle and die without replacement.

The land management imperatives that now arise as a result of the influences discussed above are to maintain fire in those plant communities that will still support it in order to stabilise them against further change, and to ensure that the prevailing fire regime is one of numerous small cool fires rather than widespread late dry season fires.

8.0 Profiles for Mabuiag Island Habitats

The following section presents a summary of current knowledge, management requirements and recommended management actions for the habitats that occur on Mabuiag Island. The information presented has been derived from prior and recent field survey efforts, review of previous reports and published literature, input from experts at technical workshops, and consultation with island rangers.

8.1 Evergreen/Semi-evergreen Vine Forest and Vine Thicket

8.1.1 Status of Ecological Knowledge

As per mapping of Stanton *et al.* (2009), semi-evergreen vine forest and thicket is restricted to upper mountain tops and steep gully lines, typically in the central and elevated eastern portion of the island which collect moisture from low cloud or are protected from wind exposure (see **Figure 3**). The habitat is represented by two distinctive variations, being a notophyll vine thicket comprising Evergreen notophyll vine thicket dominated by *Buchanania arborescens* amongst other evergreen species, and a taller variant on gully lines characterised by *Acacia polystachya* and *Syzigium bungadinnia.* The latter represents a more complex variant of *Welchiodendron longivalve* dominant closed forest with scattered *Welchiodendron* occurring throughout the habitat. Evergreen vine forest and thicket represents the maximum development of vine forest in the study area. Despite limited floristic sampling made in association with broader regional biodiversity surveys, some 97 species of plants have been recorded. Similarly, fauna surveys in this habitat have been limited. The vegetation communities (1d, 1h) that comprise this habitat are endemic to Torres Strait being restricted to the near western island group. Vegetation community 1d is restricted to Mabuiag with minor occurrences also found on Mulgrave Peak (on Badu Island) and possibly an unsampled example on Gebbar Island which was observed from helicopter. Vegetation community 1f, to all current knowledge is unique to

Mabuiag Island where it occurs on rocky talus in the vicinity of Kuyaman Thoera, a high point on Mabuiag Island, which is the resting place of Mabuiag's legendary warrior culture-hero, Kuyam.

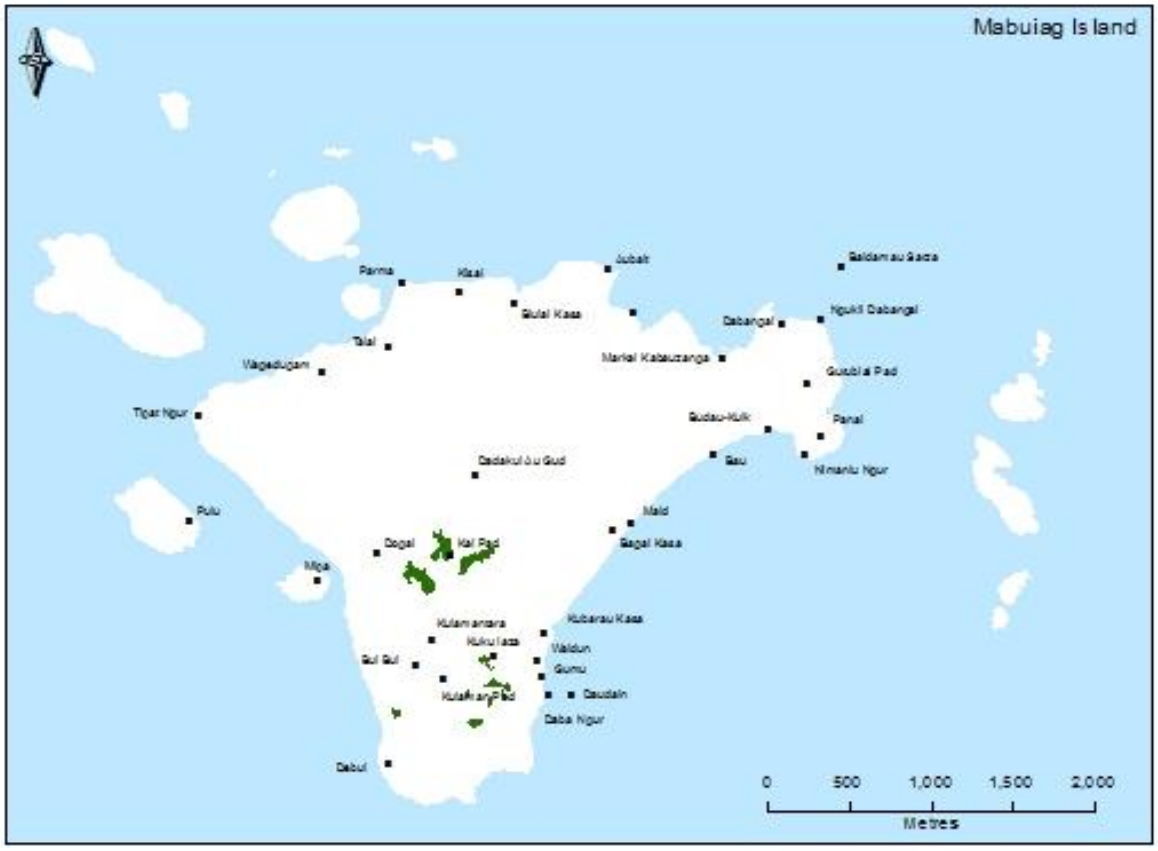


Figure 3. Distribution of evergreen notophyll vine forest (place names after Lawrie 1970).

Photograph 6 (left). Evergreen vine thicket type 1h on high peak of Mabuiag, and; **Photograph 7.** Semi-evergreen vine forest community 1d with *Syzygium bungadinnia.*

8.1.2 Ecological / Cultural Considerations

Habitat Condition: Due to its geographic distribution, restricted largely to areas of steep, rugged topography and its general tendency to be enclosed within a broad buffer of non-flammable vegetation, this habitat has been largely unaffected by human occupation. The vegetation margins

are stable, constrained by both topography and local edaphic (soil and substrate) condition and no evidence of anthropogenic alteration, invasion by exotic species, or incursion by fire is noted.

Fauna: The fauna assemblage associated with this habitat is poorly sampled and as such, poorly known. Further structured survey effort and opportunistic sampling/observation would greatly improve the current knowledge of the baseline fauna assemblage. It is expected that targeted fauna survey would considerably increase the known assemblage of reptile species. The vine forest also provides potential habitat for the Torresian tube-nosed bat, grey goshawk, emerald monitor, slender chain gecko, fawn leaf-nosed bat.

Flora: Despite limited floristic sampling some 97 species of plants have been recorded in this habitat. Significant species are:

- *Diospyros* sp. (Bamaga BP Hyland 2517) (Vulnerable).
- *Haplostichanthus fruticosus* (regionally significant).
- *Miliusa traceyi* (regionally significant).
- *Uvaria rufa* (regionally significant).
- *Maniltoa lenticellata var. lenticellata* (regionally significant).
- *Actephila venusta* (regionally significant).
- *Syzygium bungadinnia* (regionally significant).
- *Triflorensia australis* (regionally significant).

Cultural Perspectives: The proximity of this vegetation to Kuyaman Thoera, the resting place of Kuyam, places particular cultural significance on these habitats. The habitat hosts an abundant array of cultural resources with 17 species of useful plants recorded being dominated by trees and shrubs producing edible fruit. Numerous stone arrangements on upper and lower slopes are indicative of past cultural use, but systematic cultural heritage surveys have not yet taken place in this habitat zone.

8.1.3 Management Implications

This habitat is robust, buffered from the impacts of footslope fires and as such, requires little action in terms of active management. Major recommendations for management relate to continued collection and documentation of the floristic and faunal assemblage and cultural resources as well as informal monitoring of habitat health through site observation. Informal observation of habitat condition including health of canopy (monitoring for dieback) and presence of invasive weed species, should be undertaken on a regular annual to bi-annual basis. Observations should be made along an established access route to ensure consistency and this access route should be mapped using a GPS. 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.

This is possibly the least known habitat on the island in terms of faunal assemblage. Documentation of all animals observed (including invasive/exotic species) should be undertaken with photographs and collections (preserved in freezer) where possible for future formal identification by authorities or agencies. There is considerable scope for a structured fauna survey program to be undertaken within this habitat which may include nocturnal spotlighting, mist-netting, and Anabat recording. This program would however require a collaborative approach utilising expert guidance with support from the Mabuygiw Rangers on the ground. Given the limited information on fauna within this habitat, it would be of particular importance to note any observed increase in the population of invasive species, particularly feral cats, which may have dramatic impacts on the native fauna assemblage.

The habitat supports numerous cultural and regionally significant species some of which are poorly known. Whilst data collection, collections and pressings of plant species within this habitat can be undertaken on an opportunistic basis it is however pertinent to ensure that such actions have relevance to the local community. As such, it is recommended that a data and specimen collection program should initially focus on plants of cultural/resource significance and local plant names compiled in an appropriately stored reference collection. Scientific names for plant species can be applied when the opportunity arises.

8.1.4 Summary of Recommended Management Actions

The information provided in **Table 11** below aims to summarise the key issues, actions and priorities so as to aid the transfer of information into the Mabuiag 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 of damage the islands natural or cultural values in the short term (0-5years).
- **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 a knowledge gap 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 11. Summary of management actions for evergreen and semi evergreen vine forests

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Fauna composition within this habitat is poorly known.	Design and implement a structured fauna survey and trapping program utilising collaborative research. Maintain focus on ethnotaxonomy to feed into TEK.	High

Management Category	Context/Issue	Actions	Priority
Plant Surveys	Flora composition is documented although limited to rapid surveys in dry season. 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 poorly known. Plant and animal lists provided in the appendices provide a good foundation for increasing TEK and ethnotaxonomy.	Collect and collate TEK knowledge within this habitat gained through fauna and flora survey actions on an ongoing basis.	High
Fire Management	No major issues identified. The habitat is mostly protected in rocky gullies and hillsides.	No specific management actions required. Management of surrounding flammable vegetation country by early dry season mosaic burning to limit impact of late season wildfires.	Moderate
Threatened Species Management	Flora: 8 significant species are known to occur. While the ecology of these species is poorly documented, the habitat is robust with no immediate threats recognised. Fauna: Composition of fauna within this habitat is poorly known.	Flora: No management actions required. Carry out ongoing surveys as identified above. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
Invasive Species Management	Flora: No existing weed issues identified however a number of species known from disturbed areas pose a threat in the long term. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: No active weed control or management currently required. Carry out monitoring for new weed infestations particularly on habitat edges on an annual or bi annual basis. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members.	Moderate Immediate
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.	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. Observations should be made along an established access route to ensure consistency and this access route should be mapped using GPS.	High

8.2 Deciduous / Semi Deciduous Vine Forest and Thicket

8.2.1 Status of Ecological Knowledge

This habitat exists as restricted pockets amongst the more extensive *Welchiodendron* dominant forests and woodlands, typically forming on the pavements of upper rocky slopes and limited areas on exposed coastal headlands. Vine thickets on coastal headlands (VC2f) are typically low (3-6m), windswept, and formed by a mix of evergreen and deciduous species that vary dependent on site conditions. Species typically include *Buchanania arborescens, Millettia pinnata, Sterculia* sp. (Annan River L.J. Brass 20319), *Terminalia subacroptera, Cochlospermum gilivraei* and *Pouteria sericea.*

Photograph 8 (left). Fully deciduous vine thicket (VC2x) on top of Kuyam's Hill, Mabuiag, and; **Photograph 9.** Low windswept vine thicket on an exposed coastal headland, east coast of Mabuiag.

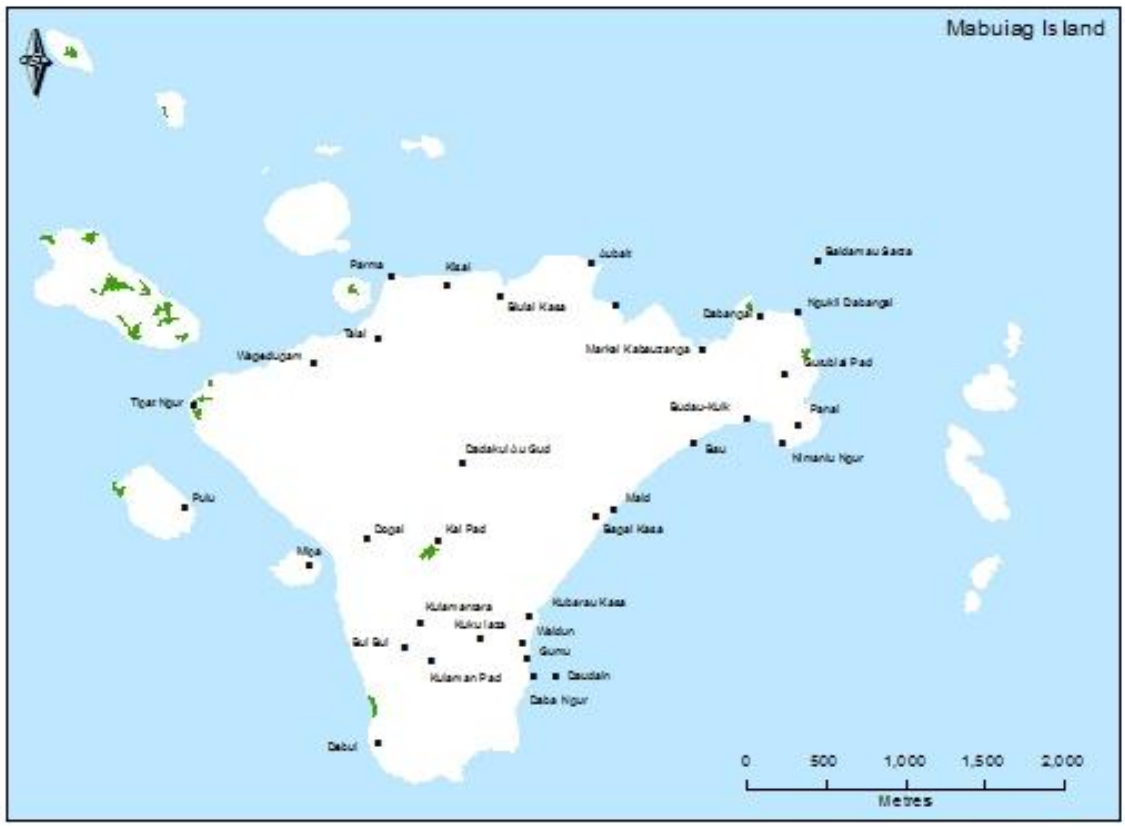


Figure 4. Distribution of deciduous / semi-deciduous vine thicket on Mabuiag (place names after Lawrie 1970).

Purely deciduous forms of vine forest comprising *Bombax ceiba var. leiocarpum, Terminalia subacroptera, Cochlospermum gillivraei* and *Sterculia quadrifida* develop on pavements in less exposed locations, typically on the leeward side of hillslopes and coastal headlands. In all examples of this habitat, sub-canopy and ground covers are poorly developed because of the low stature and rocky substrate, although annual herbs and vines may be prevalent during the wet season. Restricted occurrences of vine thicket are also associated with beach ridges developed in embayments although these are poorly developed, often with woodland structure. The habitat has been subject to limited floristic sampling with the only botanical collections made in association with broader regional biodiversity surveys (October 2008) during a period of heavy seasonal leaf fall. Fauna survey in this habitat has similarly been limited although Conics (2009) indicate survey of a single trapline transect was completed during studies association with the Sustainable Landuse Planning Project (Conics 2009a).The vegetation communities (2f, 2u and 2x) are relatively widely distributed on islands of the near western and inner island group. They are best developed on Mabuiag in the vicinity of Kuyaman Thoera at the highest point on Mabuiag Island on bare pavement and talus.

8.2.2 Ecological / Cultural Considerations

Habitat Condition: These are typically small, isolated occurrences in scattered locations on the island. The best-developed locality occurs near Kuyaman Thoera where it is buffered by an extensive tract of well-developed closed welchiodendron forest. Other examples are located on rocky headlands where they are fringed by grassland and open woodland/shrubland communities which may be subject to fire incursion on the margins. These habitats are typically stable, controlled by the rocky pavements on which they occur, although they may suffer edge effects from fire and weed incursion, particularly on habitats associated with coastal headlands. The seasonal loss of leaf cover, facilitating light penetration to the forest floor, provides opportunities for the establishment of exotic species that are not present in evergreen forest communities. Whilst lantana (*Lantana camara)* has not been recorded on Mabuiag its presence on other islands (e.g. Erub, Mer) and its ability to establish itself in forest canopy gaps identifies it as a potential threat. Currently mintweed (*Hyptis suaveolens*) is widespread on vine thicket margins on coastal headlands, with scattered occurrences of red Natal grass (*Melinis repens*). Butterfly pea (*Clitoria ternatea*) is widespread in disturbed areas and is beginning to invade vine thicket margins at more accessible locations near the coast. Evidence from Mer, Erub and Iama and from the Northern Territory (Smith 2003) and Pacific Islands (Space and Flynn 2002) suggest that poinciana (*Delonix regia*) is a potential threat given its ability to invade vine thickets.

Fauna: The fauna assemblage associated with this habitat is poorly sampled and as such, poorly known. Further structured survey effort and opportunistic sampling/observation would greatly improve the current knowledge of baseline fauna assemblage. The rocky nature of the habitat may be particularly suitable for a range of skink and gecko species including the poorly known slender chained gecko (*Lepidodactylus pumilis*) a species restricted to Torres Strait, the northern tip of Cape York Peninsula and southern Papua New Guinea that has been recorded on neighbouring Mua

(Ingram 2008). Suitable or foraging habitat may also be provided for a range of potentially occurring species including Torresian tube-nosed bat, grey goshawk, emerald monitor, fawn leaf-nosed bat.

Flora: Despite limited floristic sampling some 82 species of plants have been recorded representing 21% of the islands flora. Significant species are:

- *Psydrax reticulata* (Vulnerable).
- *Haplostichanthus fruticosus* (regionally significant).
- *Miliusa traceyi* (regionally significant).
- *Uvaria rufa* (regionally significant).
- *Actephila venusta* (regionally significant).
- *Triflorensia australis* (regionally significant).

Introduced species are limited to margins where butterfly pea, mintweed, stinking passionflower, red Natal grass and crowsfoot grass (*Eleusine indica*).

Cultural Perspectives: This habitat is typically in close proximity to sites of high cultural importance, particularly habitats associated with rock headlands and those occurring on Kuiaman Pad. The habitat hosts an abundant array of useful plants predominately trees, shrubs and vines producing edible fruit. Stone arrangements on upper and lower slopes are indicative of past cultural use.

8.2.3 Management Implications

Although at present the habitat remains in natural condition, there is a high risk of the establishment of invasive species causing long-term environmental degradation through alteration to species composition and changing fire regimes on habitat margins. Butterfly pea, siratro (*Macroptlium atropurpureum*), and Indian calapo (*Calopogonium mucunoides*), are robust legume vines which are a future threat to this habitat together with the invasive herbs such as mintweed, praxelis and red natal grass. Lantana (*Lantana camara),* bellyache bush *(Jatropha gossypiifolia)* are currently not present on Mabuiag however they occur on other islands in the region and should be considered a potential threat. Any isolated poinciana trees in or on the margins of vine thicket habitat should be assessed to determine invasiveness.

Minimal active management is required at present although this may change if any future infestation of exotic species is detected through monitoring programs. Monitoring of selected locations for infestation of weed species should be undertaken on a six monthly basis including observations taken late in the wet season at maximum growing season. Legume weeds such as butterfly pea, siratro and Indian calapo together with the herbs praxelis and mintweed should be a focus for monitoring. The establishment of formal monitoring and photographic sites should be considered in selected vine thicket habitats starting with those in closest vicinity to disturbed areas. Monitoring sites can be marked with a star picket with photographs taken towards designated directions. 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.

Documentation of all animals observed (including invasive/exotic species) should be undertaken with photographs and possible collections (preserved in freezer) where possible for future formal identification by appropriate scientific experts. There is considerable scope for a structured fauna survey program to be undertaken although simple diurnal searches for skinks and geckos under rocky slabs would be a suitable starting point. The presence and impacts of feral cats requires a structured program involving sand pads, nocturnal spotlighting and observation, and trapping.

Additional floristic survey should be undertaken in wet season conditions focusing on annual herbs and vines. Collections and subsequent pressings of plant species within this habitat can be undertaken on an opportunistic basis. It is however pertinent to ensure that such actions have relevance to the local community. As such, it is recommended that a floristic collection program should initially focus on plants of cultural/resource significance and local plant names compiled within a reference collection. Scientific names for plant species can be applied when the opportunity arises.

8.2.4 Summary of Recommended Management Actions

Table 12. Summary of management actions for deciduous and semi-deciduous vine thickets

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Fauna composition within this habitat is poorly known.	Design and implement a structured fauna survey and trapping program utilising collaborative research. Maintain focus on ethnotaxonomy to feed into TEK.	High
Plant Surveys	Flora composition is poorly documented and limited to rapid surveys in dry season. There is a 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 poorly known. Plant and animal lists provided in the Appendices provide a good foundation for increasing TEK and ethnotaxonomy.	Collect and collate TEK knowledge within this habitat gained through fauna and flora survey actions on an ongoing basis.	High
Fire Management	The habitat is potentially impacted by late season wildfires although the rocky nature of the substrate provides some protection from fire. The incursion of exotic species, particularly lantana, may considerably alter the flammability of deciduous vegetation rendering it susceptible to incursion by severe late season fires.	Management of surrounding country by dry season mosaic burning to limit impact of late season wildfires.	Moderate

Management Category	Context/Issue	Actions	Priority
Threatened Species Management	Flora: The ecology of this habitat is poorly documented, however the habitat is presently robust and self-maintaining. Threats to significant flora species are from weed infestation and late season fires. Fauna: Composition of fauna within this habitat is poorly known.	Flora: Carry out ongoing surveys as identified above. Monitor habitat for weed incursions (see monitoring). Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
Invasive Species Management	Flora: Existing weeds known from the habitat include Mintweed, Red natal grass and butterfly pea. A number of species from disturbed areas pose a threat in the long term such as praxelis and poinciana. Lantana and rubber vine are potential threats. 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 active weed control currently required. Carry out monitoring for new weed infestations particularly on habitat edges on an annual or bi-annual basis. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting consultation with community members. Develop a trapping/ structured control program based on results.	Moderate Immediate
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.	Carry out monitoring of selected locations for infestation of weed species on a six monthly basis including observations taken late in the wet season at maximum growing season. Leguminous weeds such as butterfly pea, siratro and Indian calapo together with the herb praxelis and mintweed should be a focus for monitoring. Lantana also poses a considerable threat to habitat stability. Establishment of formal monitoring and photographic sites in selected vine thicket habitats is recommended starting with those in closest vicinity to disturbed areas. Monitoring sites can be marked with a star picket with photographs taken towards designated directions.	High

8.3 Welchiodendron Dominant Closed to Open Forests and Woodlands

8.3.1 Status of Ecological Knowledge

This is an extensive closed to open forest community that occupies the lower footslopes, hill slopes, gully lines and other sheltered locations throughout the island. General canopy heights range from 10 to 18m with *Welchiodendron longivalve* being the dominant species, although mixing with vine forest species including *mipa* (*Terminalia subacroptera), Canarium australianum* and *thuul* (*Acacia polystachya).* The habitat merges with semi-evergreen vine forest (1d) in sheltered locations. The habitat is typically associated with boulder slopes where the rocky substrate prevents the incursion of

severe fire into the forest margins. Sparse grassy ground cover is evident in some localities which provides some evidence that Welchiodendron is tolerant of low intensity fire. High species diversity occurs where a vine thicket understorey is well-developed.

8.3.2 Ecological / Cultural Considerations

Habitat Condition: A robust habitat that is resistant to incursion of intense fire events and other elements of degradation including weed infestation. All habitats observed were in pristine condition. Welchiodendron is often used for firewood although harvesting is restricted to younger trees and shrubs and the process of firewood harvesting has had limited impact on the habitat condition.

Fauna: Similar to other forest habitats on Mabuiag, the fauna assemblage associated with this habitat is poorly sampled and as such, poorly known. Further structured survey effort and opportunistic sampling/observation would greatly improve the current knowledge of the baseline fauna assemblage. The closed nature of the canopy coupled with the inherent rockiness of the substrate provide potential habitat for a range of skink and gecko species including the slender chained gecko, Torresian tube-nosed bat, grey goshawk, emerald monitor, fawn leaf-nosed bat.

Flora: This habitat is the most species rich on the island with some 143 species of plants have been recorded. A high proportion of species also occur in vine forests and thicket habitats. Significant species are:

- *Psydrax reticulata* (Vulnerable).
- *Diospyros* sp. (Bamaga BP Hyland 2517) (Vulnerable).
- *Haplostichanthus fruticosus* (regionally significant)
- *Actephila venusta* (regionally significant)
- *Syzygium bungadinnia* (regionally significant)
- *Gunnesia pepo* (regionally significant)
- *Crotalaria* sp. (Torres Strait J.R. Clarkson 2044)

Introduced species are limited to scattered occurrences of mintweed, and stinking passionflower, with red Natal grass, butterfly pea and siratro occurring on disturbed margins.

Photograph 10. Well-developed closed forest of *Welchiodendron longivalve* on Kuyam's Hill, Mabuiag.

Cultural Perspectives: This is the most extensive habitat on Mabuiag occurring from footslopes to hilltops. Apart from limited use as firewood, Welchiodendron is largely unutilised as a resource. Decreased cultural burning on the island will almost certainly result in an expansion of this habitat at the expense of grassland and shrubland habitats. Considering the extent of welchiodendron dominant habitat on the island, an increase in its extent at the expense of more restricted habitat types including grasslands and shrublands should be considered detrimental to island habitat diversity. The habitat hosts a range of cultural resources including food trees and shrubs, and many cultural heritage sites are also known to occur within in it.

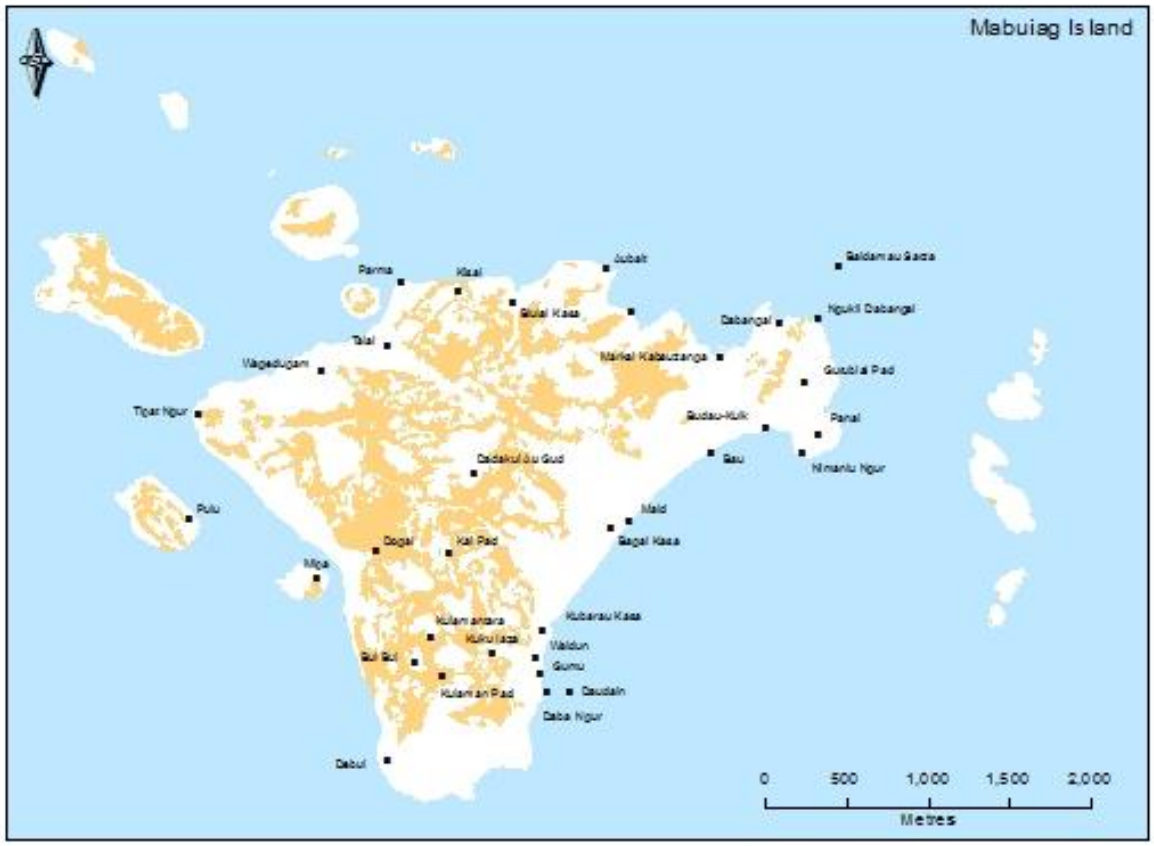


Figure 5. Distribution of welchiodendron dominant forest and woodland on Mabuiag (place names after Lawrie, 1970).

8.3.3 Management Implications

This is a robust habitat requiring limited active management. Its widespread distribution and habitat integrity in the face of regular anthropogenic burning indicates that fire presents little risk to habitat quality and extent. The establishment of exotic species, most notably lantana, poses the greatest risk to habitat integrity in the long term although minimal active management is required at present. Monitoring for invasive species should be a routine component of the ranger work program and undertaken in areas in the vicinity of current disturbance, particularly around the township and refuse sites.

8.3.4 Summary of Recommended Management Actions

Table 13. Summary of management actions for welchiodendron forests

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Fauna composition within this habitat is poorly known.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	High
Plant Surveys	Information of flora composition is robust yet limited to rapid surveys in dry season. 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.	Moderate
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 ethnotaxonomy.	Collect and collate TEK knowledge gained through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	Resistant to incursion of intense fire events due to rocky nature of substrate. Major issue for fire management is to prevent the expansion of this habitat at the expense of more restricted habitat types.	Fire management of surrounding country required to limit expansion into adjacent/ grassland/shrubland habitats.	Moderate
Threatened Species Management	Flora: The habitat is robust and self-maintaining. Threats to significant flora species from late season fires may arise particularly where vine thicket understoreys are developed. Fauna: Composition of fauna within this habitat is poorly known.	Flora: Monitor habitat for weed incursions (see monitoring). Consideration for management of surrounding country by dry season mosaic burning to limit impact of late season wildfires on vine thicket species understoreys. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
Invasive Species Management	Flora: Existing weed issues are minor and limited to scattered occurrences of mintweed, stinking passionflower, with red Natal grass. Species such as butterfly pea and siratro known from disturbed areas poses a long term threat to habitat integrity. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: No active weed control or management currently required. Carry out monitoring for infestations of existing weeds such as mission grass and praxelis particularly on habitat edges. Also for new weed infestations on an annual or bi annual basis. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members.	Moderate Immediate
Monitoring	Observations relating to any changes to habitat condition should be documented so that the risk these	Carry out informal observation of habitat condition including health of canopy (monitoring for dieback)	High

Management Category	Context/Issue	Actions	Priority
	changes pose to long-term habitat stability can be assessed and appropriate management responses formulated.	and presence of invasive weed species, on a regular annual to bi-annual basis. Observations should be made along an established access route to ensure consistency and this access route should be mapped using GPS.	

8.4 Melaleuca Dominant Open Forests

8.4.1 Status of Ecological Knowledge

This habitat occurs within a broad dune swale in the vicinity of the Mabuiag township, where it forms a low closed forest dominated by the paperback *Melaleuca saligna* (VC7b) (**Figure 6**). Habitat extent has been significantly impacted by development activities, reducing its occurrence by over 40%. It now exists as fragmented remnants behind dunes and along drainage lines. The dune swale was dry at the time of assessment and it is likely that any periods of waterlogging are short-lived and highly seasonal. Geographically, the occurrence of *Melaleuca saligna* on Mabuiag is of high significance, being the Australia's northern limit of a species not known to occur in Papua New Guinea.

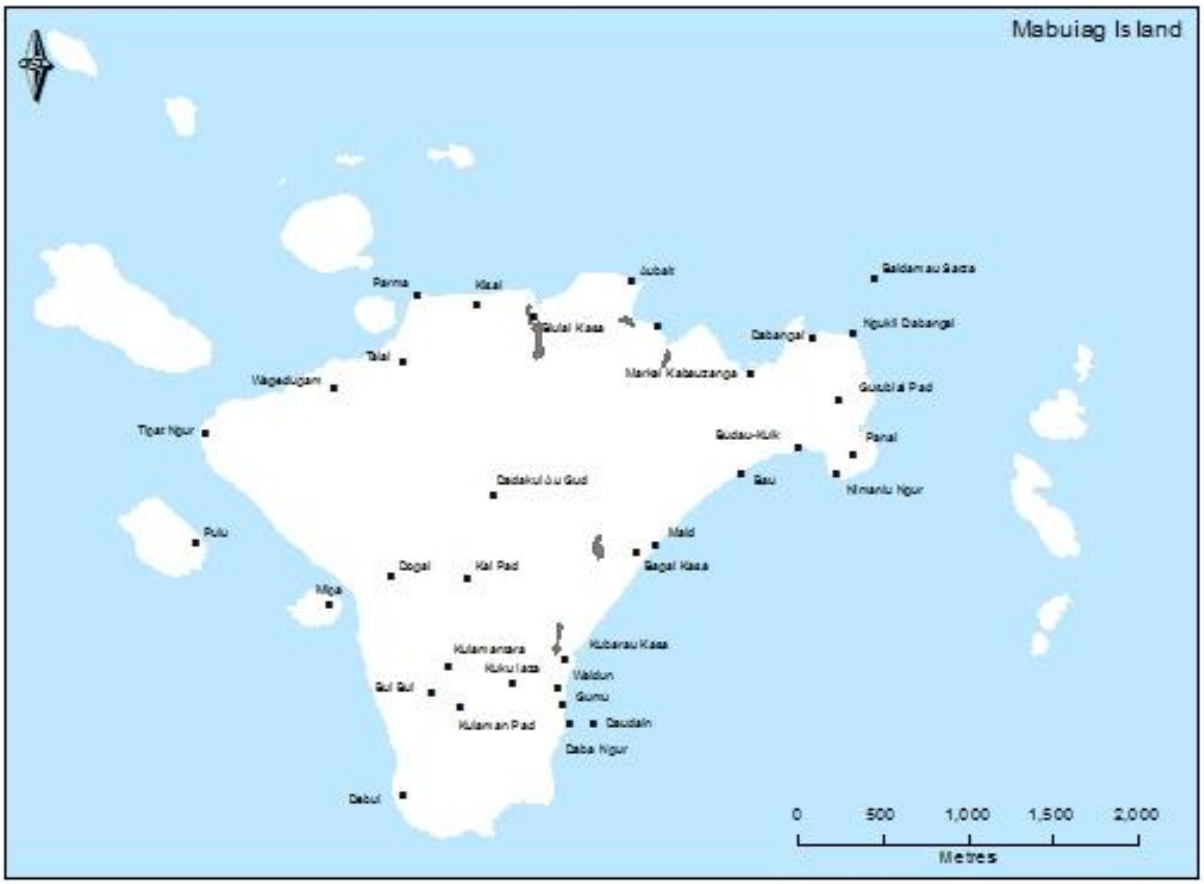


Figure 6. Distribution of *Melaleuca saligna* dominant open forest (place names after Lawrie, 1970).

Photograph 11. Fragmented occurrence of *Melaleuca saligna* open forest on a dune swale behind Mabuiag township.

8.4.2 Ecological / Cultural Considerations

Habitat Condition: This habitat was heavily fragmented during development of the current township area and has likely suffered from long-term anthropogenic impact due to its proximity to the island's most arable landscape. Remnant areas are generally highly fragmented, lack continuity with the adjacent intact habitats, and appear to have a reduced frequency of firing events. As such, these habitats, where they occur in the vicinity of the township and access roads, are congested with a range of shrubs and vines, typically with a dense sprawling cover of native vines such as whip vine (*Flagellaria indica).* Habitats associated with drainage lines on the eastern portion of the island are typically in better condition, although their extent is extremely limited. Due to broad scale clearing and utilisation of the land adjacent to this habitat near the Mabuiag settlement, the habitat margins are choked with a range of exotic weed species including siratro (*Macroptilium atropurpureum*), streaked rattlepod *(Crotalaria pallida),* mintweed *(Hyptis suaveolens),* butterfly pea *(Clittorea ternatea),* secca stylo *(Stylosanthes hamata),* and tridax daisy *(Tridax procumbens).* These weeds, through incursion into the forest margins, are likely to present a major factor contributing to continued habitat degradation.

Fauna: The fauna assemblage associated with this habitat is poorly known. The limited habitat extent and poor condition or remnants significantly reduces its utility as fauna habitat although may provide a habitat niche for a number of potentially occurring species including the grey goshawk, the Torresian tube-nosed bat, emerald monitor and slender chained gecko.

Flora: Only 20 species have been recorded in this community reflecting its limited distribution. *Melaleuca saligna* is the only conservation significant species known from the habitat, reaching its northern limit of distribution on Mabuiag.

Cultural Perspectives: The major occurrence of this habitat overlaps with a significant cultural area, which includes an old village site (*Maidth*), a relict mound-and-ditch agricultural system (*guwa*), and an old grave, marked by a cement headstone (Neal 1989). Preservation of these remnant areas is most likely due to its unsuitability for other land utilisation purposes, being seasonally waterlogged

and subject to flooding. Further ethnoecological work is required to determine the extent of culturally significant species however species such as paperbark (*Melaleuca saligna*), whip vine (*Flagellaria indica*), and *Melastoma malabathricum* are known to be utilised.

8.4.3 Management Implications

The degraded nature of the best-developed examples of this habitat highlights the requirement for intervention to prevent further habitat decline. The most critical management requirement is to control the further expansion of weeds, particularly those vines on habitat margins such as siratro (*Macroptilium atropurpureum*) and butterfly pea (*Clitoria ternatea*) which have the potential to smother the canopy and shrub layers.

The re-introduction of fire into the habitat as a management tool has some merit. The highly restricted nature of the habitat combined with the dense nature of the developing shrub layer however limits the utility of fire as a management tool, meaning fire will only ignite under the driest, hottest, and hence most severe climatic conditions. Burning under these regimes poses the risk of severe scorching of adjacent upslope shrubland communities. Fuel reduction burning of the adjacent grassy margins should be undertaken mid-dry fire season (August/September) as later more severe burns may possibly damage natural shrubland regeneration around the forest margins, create an opportunity for expansion of weeds into the forest margins as well as pose a threat to adjacent remnant habitats and human infrastructure. As in all instances concerning the use of fire as a management tool, it is important to document the timing of fire events, allowing fire management regimes to be fine-tuned.

Systematic surveys of the cultural heritage values of this habitat zone, and, in consultation with the community, consideration of protecting the area of relict mound-and-ditch gardens (e.g. fencing) should also be a critical management consideration.

8.4.4 Summary of Recommended Management Actions

Table 14. Summary of management actions for *Melaleuca saligna* dominant open forests.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Known cultural heritage values are relict mound-and-ditch gardens.	Implement systematic surveys of the cultural heritage values of this habitat zone, and, in consultation with the community, consideration of protecting the area of relict mound-and-ditch gardens through fencing and signage.	Immediate
Fauna Surveys	The limited habitat extent and poor condition of remnants significantly reduces its utility as fauna habitat although it is likely to provide a habitat niche for some specialist species.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Moderate
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in dry 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	Moderate

Management Category	Context/Issue	Actions	Priority
		photograph plants with known uses/values and that may have been used in the past, and catalogue.	
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 ethnotaxonomy.	Collect and collate TEK knowledge gained through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	Resistant to incursion of intense fire events.	Manage adjacent grassy margins by burning in mid-dry fire season (August/September) to limit impact of late season wildfires. Document the timing of fire events.	Immediate
Threatened Species Management	Flora: The integrity of the regionally significant *Melaleuca saligna* is threatened by the potential for damaging late season fires and weed invasion from margins. Fauna: Composition of fauna within this habitat is poorly known.	Flora: Monitor habitat for weed incursions (see monitoring). Manage adjacent grassy margins by dry season mosaic burning to limit impact of late season wildfires. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Immediate High
Invasive Species Management	Flora: Control the further expansion of weeds, particularly those vines on habitat margins such as siratro (*Macroptilium atropurpureum*) and butterfly pea (*Clitoria ternatea*) which have the potential to smother the canopy and shrub layers. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Active weed management required on margins. Methods to control target weeds such as butterfly pea and siratro are provided in the prescriptive weed management profiled produced by Biosecurity Queensland. Carry out monitoring for new weed infestations particularly on habitat edges on an annual or bi annual basis. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members.	Immediate Immediate
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.	Carry out monitoring for infestation of weed species on a six monthly basis including observations taken late in the wet season at maximum growing season. Legume weeds such as butterfly pea, and siratro together with the herbs snakeweed, praxelis and mintweed should be a focus for monitoring. Establish formal monitoring and photographic sites in habitats in closest vicinity to disturbed areas. Monitoring sites can be marked with a star picket with photographs taken towards designated directions.	Immediate

8.5 Pandanus Dominant Shrublands and Woodlands

8.5.1 Status of Ecological Knowledge

The best development of this habitat occurs on the north facing island coastline, coincident with a broad area of alluvial outwash. A degraded example is also located on a dune swale behind the island township, although the derivation of this occurrence is related to disturbance to a former dune swale open forest. The provenance of these woodlands is unclear although they are intimately associated with broader grassland and melaleuca dominant shrubland habitats which occur in the near vicinity. Observations suggest that pandanus occupies the lower portion of the landscape on swampier locations which are seasonally moist and occasionally waterlogged. The pandanus appears particularly tolerant of hot fire and it appears seed germination events are at least partially stimulated by fire.

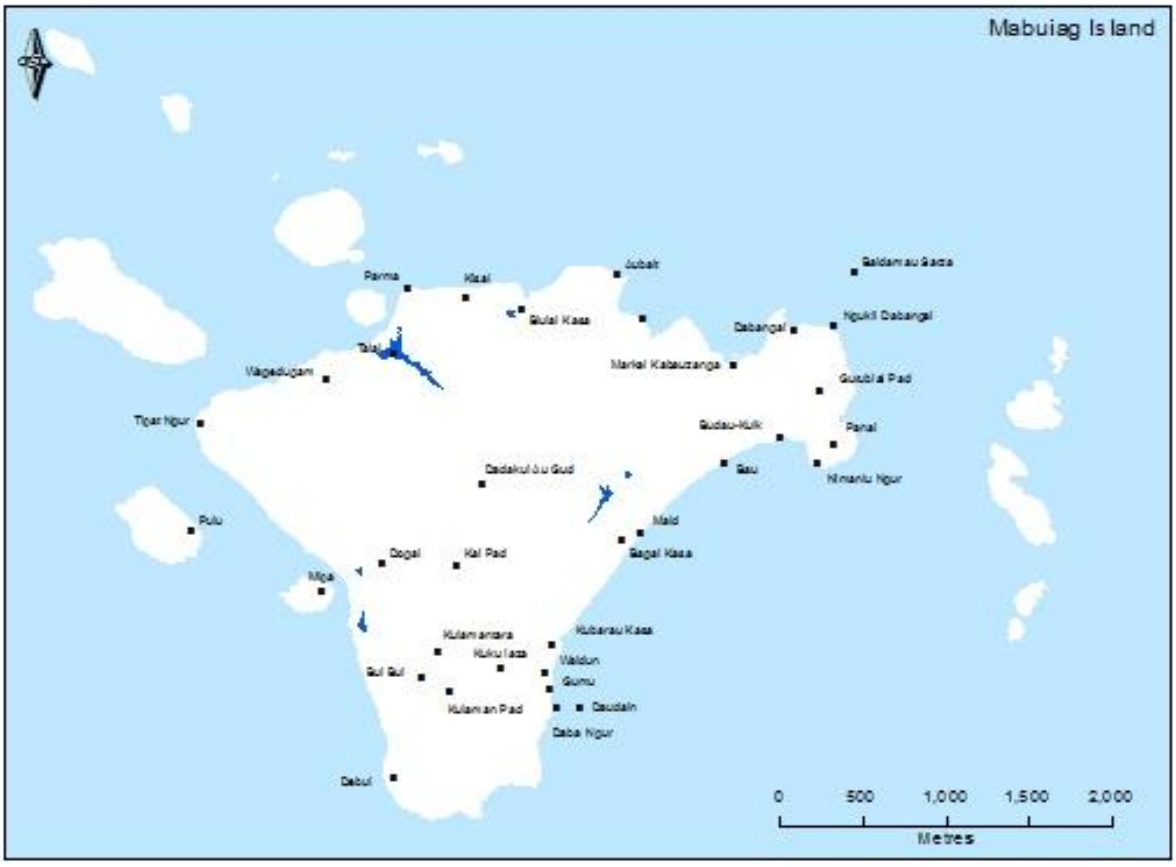


Figure 7. Distribution of pandanus dominant open woodland and shrubland (place names after Lawrie 1970).

Photograph 12. *Pandanus Spiralis* dominant woodland with well developed grassy cover on an alluvial outwash plain, north facing coast of Mabuiag.

8.5.2 Ecological / Cultural Considerations

Habitat Condition: On the northern side of the island, the habitat is in excellent condition with well-developed grassy ground cover comprising native species. Weeds are limited to minor occurrences of leguminous creepers including siratro, butterfly pea, and Townsville stylo on disturbed margins. There is however, some indication of major changes to the composition of the ground cover in some areas, particularly in moister locations where broad leaf paperbark (*Melaleuca virdiflora)* seedlings are establishing in the grassy groundcover. This is perhaps an indication of an early stage of shrubland invasion that may significantly change the structure and ecological function of the habitat. Such habitat change, most notably occurring as a dramatic thickening of shrub layers will possibly lead to the long term loss of this habitat from Mabuiag Island and an overall loss of island habitat diversity. In the vicinity of Mabuiag Township, observations suggest that the ground cover of pandanus woodland is being increasingly modified by weeds such as siratro.

***Fauna*:** This is a component of a broader grassland habitat assemblage surveyed for fauna by Conics (2009a) who reported healthy populations of the rodent species grassland melomys (*Melomys burtonii*). Comprehensive surveys across a range of seasonal conditions are however lacking.

Flora: Limited detailed floristic survey within this habitat has been carried out with 13 species recorded. This number is based on rapid site survey associated with vegetation mapping and excludes a number of weeds which occur in heavily disturbed areas close to the community. Whilst a number of additional herbs and grasses are likely to be recorded with further survey, floristic diversity is expected to be low given the limited extent of the habitat. The significant species *Cycas badensis* is known to occur in this habitat.

Cultural Perspectives: The major occurrence of this habitat on the north-facing side of the island coincides with an old occupational and associated garden site at Wagadagam. The grassy nature of the habitat is the product of long-term anthropogenic fire practice, which maintained these grassy areas for ease of access and gardening. It is likely that these grassy shrubland and woodland areas have been in a relatively stable state for extended periods, possibly the length of human occupancy, which on Mabuiag may exceed 4 000 yrs.

8.5.3 Management Implications

It is feasible that without targeted intervention, these grassy woodland areas will thicken considerably within several years to resemble the habitat detailed in the following section (see **Section 8.6**). This apparent nucleation and thickening of *Melaleuca viridiflora* in these former grassland and grassy woodland areas if unattended will ultimately lead to loss of habitat diversity. It will also result in significant alteration to a landscape that has had long-term cultural significance.

Any management action should aim to maintain the current landscape function which is considered important from both an ecological and cultural perspective. Recommendations for landscape maintenance are provided below although, ultimately, management direction will be guided by the desires of the local community and representative rangers. The significant northern occurrence of this habitat requires intervention to prevent broad scale change in habitat structure from a grassy woodland to paperbark dominant shrubland. Control of shrubby thickening in areas affected by shrubland invasion can be best achieved by a late season fire regime which has the best opportunity to destroy regenerating shrub layers. Burning immediately after the first seasonal storm events (storm burning) will effectively promote grassy cover over shrubs and this should be considered as a management option. The frequency of late dry season fires can be reduced once shrubby thickening is controlled to a more consistent mosaic of early to mid-dry season fires (August to October) with burning completed on a 2 – 3 year cycle. Whatever fire regime is implemented, it is important that the timing and frequency be recorded for future reference. This will allow practice to be adjusted and refined to improve management outcomes.

The future maintenance of this habitat would benefit from establishment of permanent marked photographic monitoring points, providing a record of temporal changes in habitat structure and condition. Monitoring for invasive pest species should be undertaken vigilantly on major access points. Any weed nucleation points should be subject to immediate eradication and plants that cannot be identified in the field collected for formal identification. Although heavily degraded, pandanus dominant woodland habitats near the current Mabuiag settlement would benefit from measures to control and/or eradicate the dense cover of exotic vines, which have choked native ground covers.

8.5.4 Summary of Recommended Management Actions

Table 15. Summary of management actions for pandanus dominant woodlands and shrublands.

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Subject to a previous fauna survey however no comprehensive surveys across a range of seasonal conditions.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Moderate
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in dry season.	Carry out additional flora field surveys across seasons with focus on herbs and grasses. Collect leaf specimens and photograph plants with known uses/values and that may have been used in the past, and	Moderate

Management Category	Context/Issue	Actions	Priority
		catalogue.	
Threatened Species Management	Flora: A population of Cycad occurs in this habitat.	Flora: Confirm identification of the Mabuiag cycad through Qld Herbarium. Rangers assisted by researcher to develop and implement a monitoring program to determine long term population trends. This program to consist of mapping population using GPS, and assessment of the population structure, health and trends. Fire management of the habitat as a whole needs to consider the cycad population. In CYP, burning of cycad habitat every two to seven years during the cool time of the year (June – July) when the plants are not coning or with seed ready for dispersal is recommended (Forster 2010). Monitoring of invasive grassy weeds (such as Mission Grass and Gamba Grass) that either directly compete with the cycads or increase fuel loads is a priority.	Immediate
	Fauna: Composition of significant fauna within this habitat is poorly known.	Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	High
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 ethnotaxonomy.	Collect and collate TEK knowledge on Cycads and other plants through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	The northern occurrence of this habitat requires intervention to prevent broad scale change in habitat structure from a grassy woodland to paperbark dominant shrubland.	Develop a fire plan for the habitat guided by the following. • In areas subject to significant shrubby thickening, implement a late season fire regime, which seeks to burn immediately after the first storms so as to promote grassy cover over shrubs. • Once shrubby thickening is controlled reduce the frequency of late dry season fires to a more consistent mosaic of smaller fires burnt from early to mid-dry season fires (May to October) on a 2 – 3 year cycle. • Record the timing and frequency of burning events for future reference so as to allow practice to be adjusted and refined to improve management outcomes. • Incorporate the management of the cycad population into the burning program with consideration to times of seed and cone production. • Incorporate the protection of	Immediate

Management Category	Context/Issue	Actions	Priority
		cultural sites into burning plans by burning these with early season cool burns to prevent damage by hot late season fires.	
Invasive Species Management	Flora: Weeds on habitat margins such as siratro (*Macroptilium atropurpureum*) and butterfly pea (*Clitoria ternatea*) which have the potential to smother the groundcover. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Active weed management required on margins of the habitat near the community. Methods to control target weeds such as butterfly pea and siratro should be sourced from NRM agencies. Carry out monitoring for new weed infestations particularly on access tracks on an annual or bi annual basis and implement control. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members. Implement control measures where appropriate.	Immediate Immediate
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.	Carry out monitoring for infestation of weed species on a six monthly basis including observations taken late in the wet season at the maximum growing period. Formal monitoring and photographic sites can be established with a star picket with photographs taken towards designated directions. Monitor cycad populations as identified above.	Immediate
Cultural Heritage	Known cultural heritage values occur in the vicinity of the habitat such as wells and bamboo patches.	Implement systematic surveys of the cultural heritage values of this habitat. In consultation with the community, give consideration to protecting/managing these values through fencing and signage.	Immediate

8.6 Melaleuca Dominant Shrublands and Woodlands

8.6.1 Status of Ecological Knowledge

The major occurrence of this habitat is located on the island's north-western coast where it occurs on acid-intermediate volcanic rocks (andesite), merging with floristically and structurally similar habitats on alluvial substrates. *Melaleuca viridiflora* is the dominant species, mixing with *Pandanus* sp. and *Welchiodendron longivalve* on footslope and upper slope areas respectively. Ground cover is dominated by native grasses including *Heteropogon triticeus*, *Themeda triandra*, *Imperata cylindrica* and *Mnesithea rottboellioides.* The habitat is indicative of a period where burning pressure was periodically released in a former grassland habitat, being either total fire abstinence, or more likely an absence of hot fire events. The even size distribution of shrubs is indicative of a single episode of mass shrub regeneration that has advanced. Evidence from habitats on Cape York Peninsula and southern Papua New Guinea suggests that such shrubby invasion generally occurs very rapidly and once established, is difficult to reverse.

Photograph 13 & 14. *Melaleuca viridiflora* dominant woodland on acid/intermediate dominant footslope, north facing coast of Mabuiag.

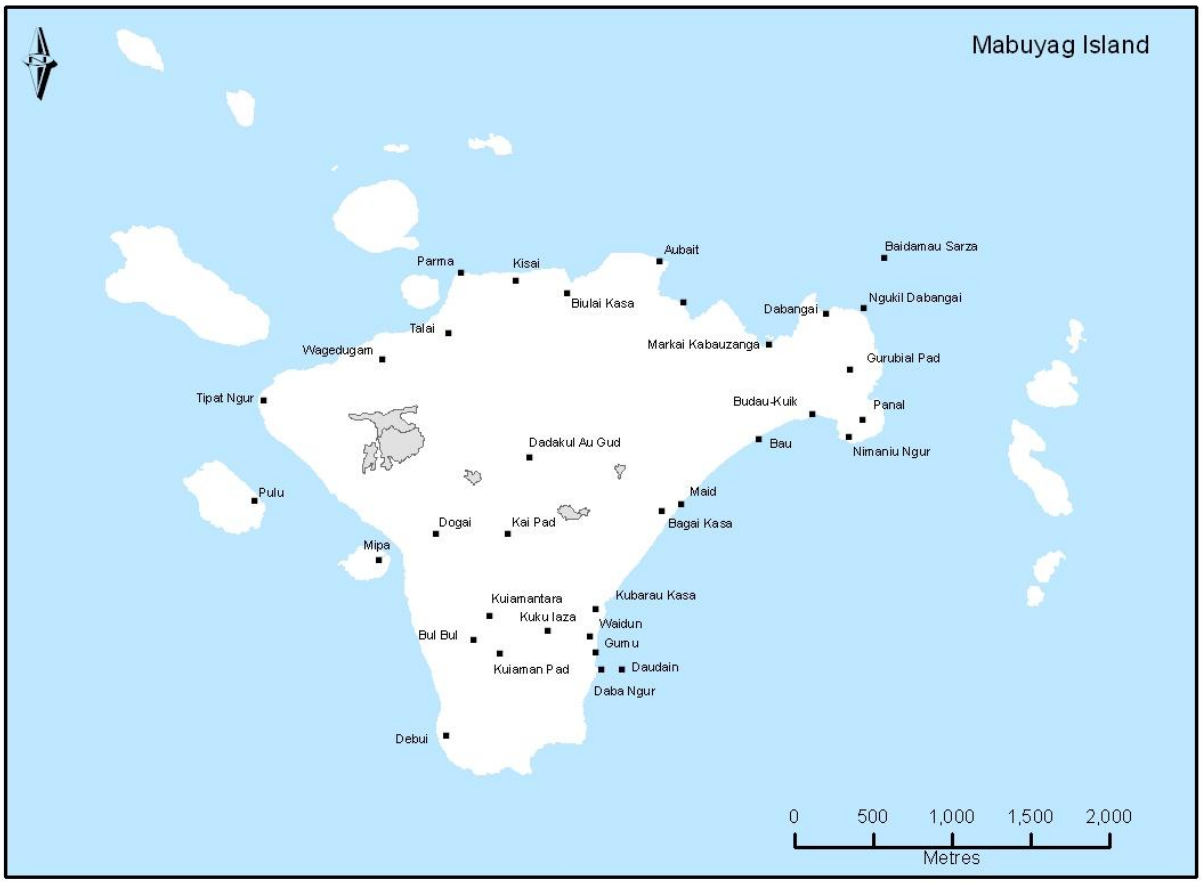


Figure 8. Distribution of melaleuca dominant open woodland and shrubland (place names after Lawrie 1970).

8.6.2 Ecological / Cultural Considerations

Habitat Condition: Given that this is a habitat in transition it becomes difficult to make a general comment on ecosystem condition as it could be readily considered representative of degraded grassland. In a bioregional context, grasslands are considered to be of high conservation value (Neldner *et al.* 1997) which is reflected in an 'Of Concern' biodiversity status and vegetation management status. A range of degrading processes, of which shrubland encroachment is fundamental, also threatens grassland habitat. Aside from this, the habitat is largely free from exotic

weeds, possesses well-developed native grass cover and is therefore considered to be in good condition.

Fauna: The fauna assemblage has been subject to survey by Conics (2009) who reported healthy populations of the rodent species *Melomys burtonii* (grassland melomys). Comprehensive survey across a range of seasonal conditions is however lacking.

Flora: This community has received limited floristic sampling with 20 species being recorded as part of rapid vegetation survey. No significant species are currently known. Further surveys in the wet and post wet season will likely increase species diversity particularly for herbs and graminoids.

Cultural Perspectives: The major occurrence of this habitat on the north facing side of the island is near an old occupational site (Wagadagam). It is expected that these areas were utilised traditionally for cultivation due to the relative fertility of the soil which is derived from the andesite geology. It is recommended that cultural heritage surveys be undertaken in this area, given the potential for impacts through hot firing.

8.6.3 Management Implications

The process of succession (shrubland encroachment) responsible for the development of this habitat is indicative of the considerable potential for more widespread invasion of grassland habitats across the island, particularly if traditional burning practice is interrupted. This invasion is likely to occur rapidly through the process of irruption (Russell-Smith *et al.* 2004) and result in irreversible changes to habitat. Whilst little would be gained from any measure to return this habitat to grassland, it is critical from the perspective of habitat diversity that the natural grass cover is maintained and that shrubland encroachment does not proceed to the point that the habitat can no longer carry fire. Landscape function will be maintained only through a regime of appropriate fire management.

The degraded state of the access track to the western side of the island has restricted access to this habitat and adjoining grassland habitats. As a result, these habitats have not been fired as regularly as those on the more accessible eastern side of the island. This lack of access creates opportunities for rangers to manage the burning of these habitats.

It is therefore necessary that appropriate fire regimes be maintained within this habitat. Important factors to consider are that:

1) low intensity early dry season burns will not reverse the vegetation structural changes occurring as a result of thickening of the melaleuca dominant shrub layer;
2) late dry season burns of greater intensity will generally destroy shrubby proliferation, although a high frequency of intense fires will most likely simplify the floristic complexity of the grassy ground cover, and;
3) hot burns under suitable conditions after the first storms will destroy shrubby regeneration whilst facilitating rapid regeneration of the grassy ground cover.

4) When shrubby thickening is under control, a reduction in the frequency of late dry season fires to a more consistent mosaic of smaller burns should be adopted for habitat maintenance.

Whatever the fire regime implemented, it is important that the timing and frequency be recorded for future reference. Key elements are date, time of day, wind direction, temperature, humidity, estimate of pre-burning fuel loads, and estimation of area burnt. This will allow practice to be adjusted and refined to improve management outcomes. Monitoring for invasive pest species should be undertaken vigilantly on major access points. Any nucleation points should be subject to immediate eradication and plants that cannot be identified in the field collected for formal identification. Likely species are Townsville stylo, butterfly pea, siratro and introduced grasses such as annual mission grass.

Given the important cultural context of grassland habitats, cultural heritage surveys should be undertaken, particularly in areas in proximity to areas of known traditional settlement. Cool burns of grassland habitat should be undertaken around areas known or with potential culturally significant sites to allow cultural surveys and provide protection of values such as boo shells and bamboo patches from damaging hot fires.

8.6.4 Summary of Recommended Management Actions

Table 16. Summary of management actions for Melaleuca dominant woodlands and shrublands.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Known cultural heritage values occur in the vicinity of the habitat.	Implement systematic surveys of the cultural heritage values of this habitat zone, and, in consultation with the community, consideration of protecting/managing any significant sites through fencing and signage.	Immediate
Fauna Surveys	Subject to a previous fauna survey however no comprehensive surveys across a range of seasonal conditions.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Moderate
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in dry season.	Carry out additional flora field surveys across seasons with focus on 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: Composition of significant fauna within this habitat is poorly known.	Flora: No actions. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
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 ethnotaxonomy.	Collect and collate TEK knowledge through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	Maintain landscape function	Develop a fire plan for the habitat	Immediate

Management Category	Context/Issue	Actions	Priority
	through appropriate fire regimes.	guided by the following. • Discourage shrubby proliferation through a late season fire regime, which seeks to burn immediately after the first storm events (storm burning) so as to promote grassy cover over shrubs. • Once shrubby thickening is controlled reduce the frequency of late dry season fires to a more consistent cycle i.e. mid-dry season fires (August to October) on a 2 – 3 year cycle. • Record the timing and frequency of burning events for future reference so as to allow practice to be adjusted and refined to improve management outcomes. • Incorporate the protection of cultural sites into burning plans.	
Invasive Species Management	Flora: The habitat is currently weed free. Potential invasive species are Townsville stylo, butterfly pea, siratro and introduced grasses. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Carry out monitoring for new weed infestations particularly on access tracks on an annual or bi annual basis and implement control where necessary. Fauna: Invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members. Implement control where appropriate.	High Immediate
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.	Carry out monitoring for infestation of weed species on a six monthly basis including observations taken late in the wet season at maximum growing season. Formal monitoring and photographic sites can be established with a star picket with photographs taken towards designated directions. Formal sites would be of particular benefit to monitoring the effectiveness of burning regimes.	Immediate

8.7 Shrublands and Shrubland Complexes

8.7.1 Status of Ecological Knowledge

Shrubland distribution on Mabuiag is controlled largely by exposure to salt laden trade winds and skeletal (shallow) soil development on the predominant acid volcanic lithology (rhyolite). These communities are generally located on south-east facing headlands which are exposed to the prevailing south trade winds. Occurrences are also associated with exposed hilltops away from the immediate coast. The habitat forms complexes which range from fire tolerant to pyrophobic

(vegetation that is fire intolerant) dependent on species composition. Pyrophytic habitats are represented by VC14a, which presents as a shrubland to dwarf open shrubland with canopy heights ranging from 0.5m to 1.5m. The dominant shrub species include *Melaleuca viridiflora, Welchiodendron longivalve, Asteromyrtus brassii*, *Lithomyrtus retusa, Psydrax reticulata, Alyxia spicata* and *Acacia brassii.* Groundcover is dominated by stunted shrubs with a minor contribution to cover from *Dianella* sp*., Schoenus* sp*., Themeda triandra, Cassytha filiformis* amongst other species.

The degree of fire tolerance, as well as ability to carry a fire, is dependent on species composition. Shrubbier pyrophobic thickets are typically dominated by *Welchiodendron longivalve* (VC14c), particularly on steeper hillslope positions, and distribution ranges from footslopes extending well upslope to exposed ridge crests and peaks. Whilst *Welchiodendron longivalve* is generally the dominant species, it mixes with *Acacia polystachya, Cochlospermum gillivraei, Melaleuca stenostachya, Alyxia spicata, Terminalia subacroptera* and *Psydrax reticulata,* forming VC14d with increasing dominance of deciduous shrub species. On the more exposed upper slopes, *Welchiodendron longivalve* mixes with *Acacia brassii,* the latter species becoming predominant on the rockier pavements where it forms dense scrubby thickets.

Photograph 14 (left). Dwarf shrubland community 14a on exposed east facing headland of Mabuiag, and; **Photograph 15.** *Acacia brassi* dominant low scrub mixed with rock pavement on Mabuiag's upper pavements.

8.7.2 Ecological / Cultural Considerations

Habitat Condition: The majority of shrublands are unaffected by human influence, other than anthropogenic burning regimes, and are in natural condition. Some areas in the vicinity of the township and airstrip have been impacted by frequent hot fires burnt upslope, which has noticeably reduced the diversity and complexity of the shrub layers. These fire-scarred areas are typically occupied by scattered shrubs such as *Planchonea careya* and *Welchiodendron longivalve* over a simple cover of native grasses and sedges. Weeds are limited to mintweed which is becoming increasingly evident on disturbed rock pavements and rocky slopes.

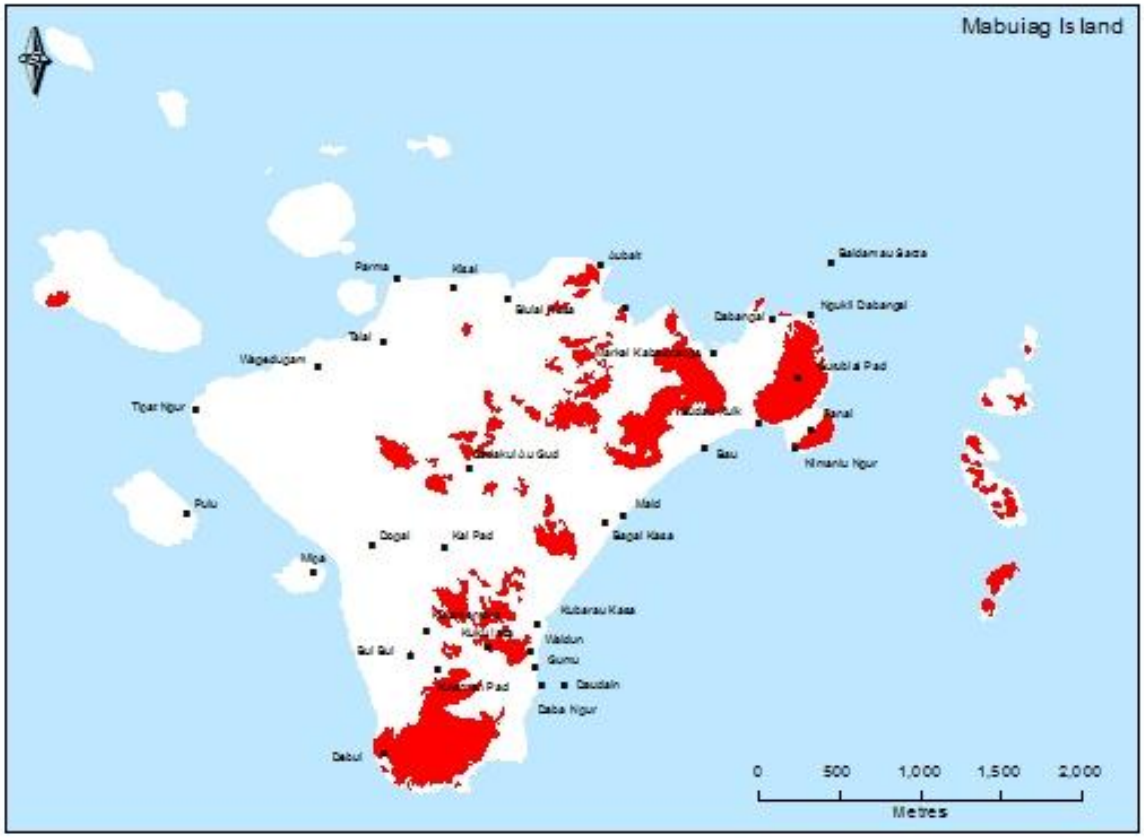


Figure 9. Distribution of shrubland and shrubland complex habitats (place names after Lawrie 1970).

Fauna: No systematic survey of fauna has been undertaken in this habitat and the nature of the fauna assemblage is largely unknown. The vegetation type may provide foraging habitat for coastal sheathtail bat and habitat for the slender chained gecko. The impact on native fauna species by feral animals (cats and dogs) needs to be ascertained.

Flora: This community has received limited floristic sampling with 75 species being recorded as part of rapid vegetation survey sites. Significant species are:

- *Psydrax reticulata* (Vulnerable).
- *Cycas* sp. (regionally significant).
- *Miliusa traceyi* (regionally significant).
- *Erythroxylum* sp. 'Mosquito Point' (regionally significant).

Further surveys in the wet and post wet season will likely increase species diversity, particularly for herbs and graminoids.

Cultural Perspectives: This habitat is naturally stable with current distribution controlled by the harsh edaphic conditions it occupies (i.e. steep exposed sites with rock outcrop and shallow skeletal soils) which limits is development, in combination with traditional burning practices. Numerous stone arrangements have been recorded in this zone but are not threatened by burning. On occasion, however, other cultural materials including bone and shell fragments are found in association with

these features. It is recommended that ongoing cultural heritage recording of sites be undertaken by the Mabuygiw Rangers in collaboration with appropriate specialists.

8.7.3 Management Implications

The stable nature of this habitat type means that little management intervention is required. As the historic fire management regime is unknown, documentation of fire history including, size, intensity, and seasonal considerations, would be beneficial for long-term maintenance of habitat integrity. A reduction in high intensity fire events near the township would have a positive impact on species and habitat diversity in areas that are currently suffering from fire degradation.

8.7.4 Summary of Recommended Management Actions

Table 17. Summary of management actions for shrublands and shrubland complexes

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Known cultural heritage values occur within the habitat.	Implement systematic surveys of the cultural heritage values of this habitat. In consultation with the community, give consideration to protecting/managing these values through fencing and signage.	Immediate
Fauna Surveys	No previous surveys.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	High
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in 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: Four significant species known. Fauna: Composition of significant fauna within this habitat is poorly known.	Flora: Populations of *Cycas badensis* require mapping and protection from destructive fires. Undertake training to identify significant species so as to enable locations to be recorded and mapped on an opportunistic basis. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
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 ethnotaxonomy.	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 on footslopes close to the community.	Identify and map fire degraded footslopes close to the community. Record the timing and frequency of burning events for future reference so as to allow practice to be adjusted and refined to improve management outcomes.	Immediate

Management Category	Context/Issue	Actions	Priority
		Reduce the frequency and intensity of fire events on footslopes in the vicinity of the township to allow gradual recovery of species diversity and habitat structure in fire degraded areas. These areas should be subject to mosaic burning commencing in the early dry season. Establish permanent monitoring sites (see monitoring).	
Invasive Species Management	Flora: The habitat supports scattered infestations of mintweed and red Natal grass. Praxelis and blue top are potential threats. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Carry out mapping of existing weeds and monitoring for new weed infestations on an annual or bi annual basis and implement control where necessary. Fauna: Invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with community members and 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.	Carry out monitoring for changes in vegetation structure and infestation of weed species on a six monthly basis including observations taken late in the wet season at maximum growing season. Formal monitoring and photographic sites can be established with a star picket with photographs taken towards designated directions.	Immediate

8.8 Coastal Dune Complexes

8.8.1 Status of Ecological Knowledge

Coastal dune habitats occur as a number of extremely minor occurrences, generally on the landward fringe of mangrove forests forming a mix of vine thicket, grassland and shrubland. The community occupies late Holocene dune features which are generally unstable landform features prone to redistribution during extreme tidal or storm events. For this reason, the habitat is poorly developed and lacking floristic and structural diversity. This habitat has not been adequately ground surveyed and the complexity of floristic representation requires further assessment. A limited occurrence of this community on nearby Pulu Islet in the form of herblands and grasslands is considered typical where an open grassland and forbland complex is dominated by *Heteropogon contortus, H. triticeus* and *Ipomoea pes-capre* subsp*. brasiliensis,* with associated occurrences of *Vigna marina, Anisomeles malabarica, Sesuvium portulacastrum, Cayratia trifolia, Cleome viscosa, *Tridax procumbens, Themeda arguens,* and *Crinum uniflorum.* Scattered shrubs may include *Clerodendrum inerme, Colubrina asiatica,* and *Premna serratifolia*.

Photograph 16. A poorly formed chenier sand ridge which has been severely impacted to the point of being de-vegetated by frequent burning events.

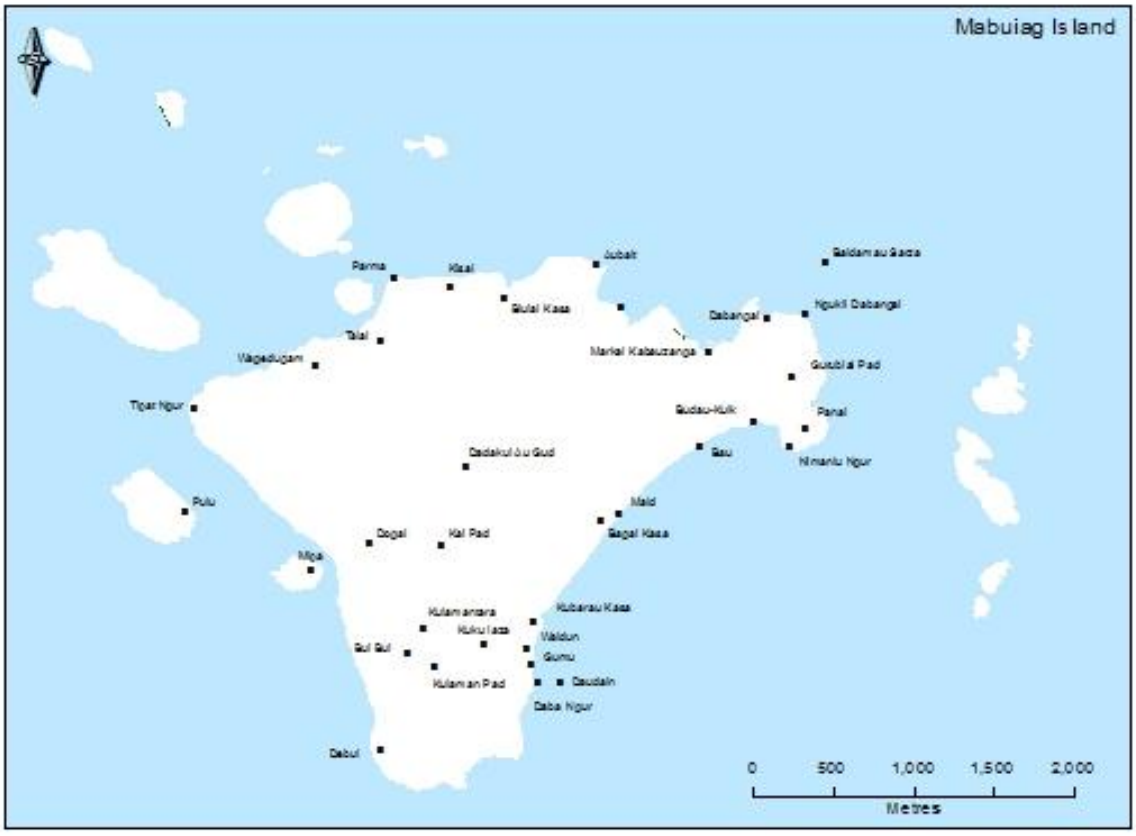


Figure 10. Distribution of coastal dune complex habitats (place names after Lawrie 1970).

8.8.2 Ecological / Cultural Considerations

Habitat Condition: The condition of these habitats is largely unknown. They do however generally abut fire prone vegetation and several examples surveyed were heavily degraded due to frequent fire incursion. Areas of bare sand are particularly prone to invasion by exotic weed species such as mintweed.

Fauna: The community may form habitat for the nesting of marine turtles and a number of bird species including beach stone curlew (*Esacus magnirostris*) which is listed as 'vulnerable' under state legislation and the eastern curlew which is a migratory species under the EPBC Act and Near-Threatened under the NC Act.

Flora: The habitat has not been subject to floristic survey.

Cultural Perspectives: The full extent of cultural utilization of these habitats is unknown. Shell middens and significant cultural sites (e.g. the Great Kod on Pulu) are known to occur within this habitat.

8.8.3 Management Implications

The restricted nature of these habitats means that a targeted management programme would have limited effect on island wide biodiversity outcomes. The location of these sandy slivers should be more conclusively mapped with subsequent survey for invasion of exotic plant species undertaken during general management activities. Being transitional features prone to disturbance, it is expected that frequent hot fires would have a destabilising effect on habitat ecology. Hot fires also have the potential to degrade cultural sites such as shell middens, conch shells and dugong bones (Hitchcock *et al.* 2009). For this reason, cultural heritage surveys are recommended as a priority management action.

Limited active management is required for this habitat due to its restricted distribution although during routine management duties, habitats should be surveyed for exotic plant species invasion. Fuel reduction burning should be undertaken as a means to protect any identified culturally sensitive sites from degradation. Burning in and around the margins of these sites should occur at the earliest possible point where fire will carry with the aim to reduce fuel loads and therefore limit the likelihood of severe late season fires. Back burning to prevent severe wildfire incursion should be undertaken wherever the habitat adjoins fire promoting vegetation (e.g. grasslands).

8.8.4 Summary of Recommended Management Actions

Table 18. Summary of management actions for coastal dune complexes.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Known cultural heritage values occur within the habitat.	Implement systematic surveys of the cultural heritage values of this habitat with consideration given to protecting/managing any significant sites.	Immediate
Fauna Surveys	No previous surveys.	Design and implement a structured fauna survey program supported by specialists. Maintain focus on culturally significant species, threatened species and ethnotaxonomy to feed into TEK.	High
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in 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: Composition of significant fauna within this habitat is poorly known.	Flora: No actions. Fauna: Further baseline information required (see fauna surveys) before discrete	Moderate High

Management Category	Context/Issue	Actions	Priority
		management actions can be defined.	
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 ethnotaxonomy.	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.	Undertake fuel reduction burns or a program of back burning along the margins of foredune habitats to prevent wildfire incursion, particularly where habitat for threatened species or sites of cultural significance are identified. Record the timing and frequency of burning events for future reference so as to allow practice to be adjusted and refined to improve management outcomes. Identify and protect cultural sites form high intensity fire by early season burning regime where possible.	Immediate
Invasive Species Management	Flora: The habitat supports scattered infestations of mintweed and red Natal grass. Praxelis and blue top are potential threats. 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: Carry out mapping of existing weeds and monitoring for new weed infestations on an annual or bi annual basis and implement control where necessary. Fauna: Invasive fauna to be derived from fauna survey results. Assess cat activity levels by installation/monitoring of sand pads, 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.	Carry out monitoring for changes in vegetation structure and infestation of weed species on a six monthly basis including observations taken late in the wet season at maximum growing season.	High

8.9 Grassland and Grassland Complexes

8.9.1 Status of Ecological Knowledge

Grassland communities are most extensive on the island's north coast. The reasons for this distribution are unclear although it is undoubtedly related to traditional occupation (settlements and agriculture) and associated burning practice as well as edaphic conditions. The best-developed grasslands are those formed on andesitic lithologies, due to deeper soil development that allows the spread of fire without the impediment of bare rock pavements. In these locations, the habitat is represented by a range of grasses, most notably *Imperata cylindrica*, *Themeda triandra, Mnesithea rottboellioides, Ischaemum spp.* and *Heteropogon triticeus.* The species composition is similar for

grasslands occurring on rocky hillslopes although low stunted shrubs are characteristic around rocky outcrops. Neldner *et al.* (1997) acknowledge the bioregional conservation value of native grassland habitats which are assigned 'of concern' biodiversity and vegetation management status by the state on account of their limited distribution and impacts from changed fire regimes, shrubby thickening, and weed invasions. It should however be acknowledged that the majority of these habitats in the Torres Strait context are products of a cultural burning practice that has been maintained since earliest island occupation, a period of > 4 000 years. Removal of anthropogenic burning from these habitats will undoubtedly lead to rapid congestion with shrubs preceding encroachment of more advanced shrubland and woodland ecosystems. This landscape process is likely to be extremely rapid with an irruption of shrubs across the broader habitat extent rather than gradual encroachment advancing from adjacent habitat margins, a process described by Russell–Smith *et al*. (2004). There is strong evidence that this process is already affecting some representative habitats on the island.

Photograph 17 (Left). A large area of grassland at Wagadagam on Mabuiag's north coast where it is formed on andesite; and, **Photograph 18.** Dense recruitment of *Melaleuca viridiflora* shrubs occurs throughout the grassland.

Habitat Condition: Grasslands are generally free from exotic weeds although occasional environmental weeds may occur in more accessible sites. Shrubby encroachment is threatening some habitats, particularly in swampier locations on the island's northern coastline where *Melaleuca viridiflora* is rapidly thickening in some areas.

Fauna: Conics (2009a) reported healthy populations of the rodent species grassland melomys (*Melomys burtonii*). Comprehensive surveys across a range of seasonal conditions are however lacking.

Flora: Fifty-nine species are recorded for the habitat. Weeds are limited to two species indicating the high integrity of the grasslands. Additional surveys in the wet season would increase the number of herb and graminoid species and importantly derive benchmark condition data for long term monitoring. Significant species are limited to *Cycas badensis* which occurs in association with grassy pandanus woodland on the western side of the island.

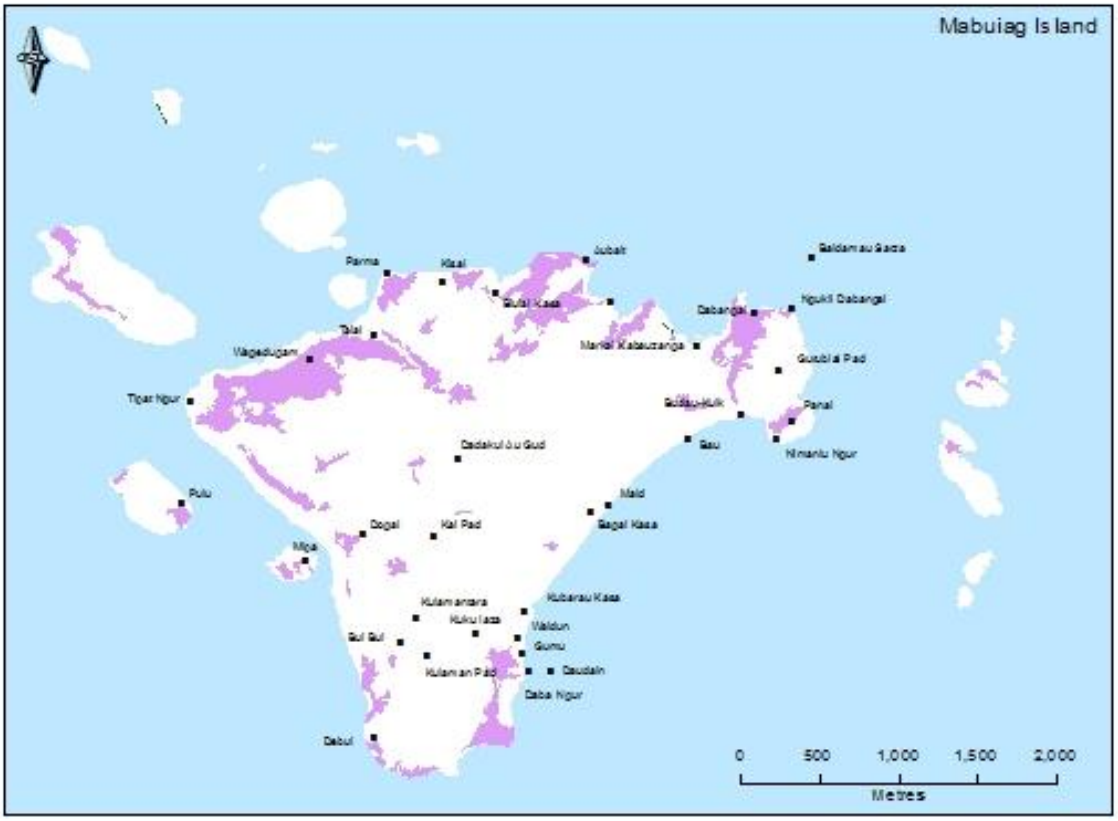


Figure 11. Distribution of grassland habitats (place names after Lawrie 1970).

8.9.2 Ecological / Cultural Considerations

Cultural Perspectives: This habitat has been maintained by cultural burning practices, most likely since the times of earliest occupation. The best-developed grasslands are coincident with old settlement and/or gardening areas and through fire, would have been kept clean and shrub free to aid access. The important cultural component of the landscape that these habitats represent should be acknowledged in cultural and landscape management planning. This includes managing for the maintenance of bamboo groves and other significant cultural places.

8.9.3 Management Implications

There is already clear evidence of shrubby encroachment in some locations within this habitat. Without appropriate fire regimes, there is considerable risk that grassland areas will congest with woody shrubs, being lost as a landscape element in all but the most exposed locations. The process of shrubby encroachment threatens grassland habitats throughout much of Cape York Peninsula, the result of altered fire regimes associated with grazing, weed invasion and the cessation of traditional landscape burning practices. There is also considerable threat from the introduction of exotic grass species which may considerably change the ecology of these habitats. Fifteen species of introduced grass are currently known from Mabuiag (see **Appendix D**). These include more vigourous species such as annual mission grass (*Pennisetum pedicellatum* subsp. *unispiculum*), Rhodes grasses

(*Chloris gayana* and *Chloris virgata),* itch grass *(Rottboellia cochinchinensis*) and sabi grass (*Urochloa mosambicensis), which* are known to invade native ecosystems to varying extents. 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. It has the ability to remain green until the late dry season providing fuel for fires which occur later and that are hotter than normal seasonal fires (DEWHA 2011). Burning is known to promote further mission grass establishment.

Gamba grass (*Andropogon gayanus*) is a recently declared Class 2 weed and is also listed as a Key Threatening Processes under the EPBC Act. It has not yet been recorded in Torres Strait however is a serious potential threat to grassland habitats. It is widespread in the Bamaga district of northern Cape York Peninsula (Fell *et al.* 2009). The grass is an aggressive colonist which develops a standing biomass of 5-7 times that of native species (Rossiter *et al*. 2003) resulting in extremely intense savanna fires, significantly altering habitat ecology. Tropical legumes such as siratro, butterfly pea, Townsville stylo, streaked rattlepod, and leucaena also pose a threat to grasslands. As for the invasive grasses, the most likely avenue for establishment and invasion is dispersal by vehicles and machinery along access tracks and following any mechanical disturbance.

General burning regimes for grasslands should promote patchiness with burning conducted across a range of seasonal conditions from early to late dry season. Maintaining patchiness in burnt and unburnt features is important for conservation management (Russell-Smith *et al.* 2003) and stratifying fires across a range of seasonal condition will promote patchiness. The inherent rockiness of the island will also promote patchiness in fire distribution. It should be noted that high frequency/low severity fire events will not arrest the process of shrubby thickening if it is at an advanced stage and may ultimately result in the gradual loss of grassy ground layers.

The grassland at Wagadagam also hosts one of a few scattered copses of bamboo (*Bambusa* sp.) known to occur on the island, which are a significant cultural resource requiring protection. Bamboo burns with hot fires generally resulting in death of the plant and indicative of a shallow rooting system (J. Russell-Smith, pers. comm. 2010). Any fire regime implemented should consider the requirement to preserve this cultural resource.

8.9.4 Summary of Recommended Management Actions

Management action should aim to maintain the current landscape function, which is considered important from both ecological and cultural perspectives. Recommendations for landscape maintenance are provided below although ultimately, management direction will be guided by the desires of the local community and representative rangers.

Table 19. Summary of management actions for grasslands and grassland complexes.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Known cultural heritage values occur in the vicinity of the habitat such as wells, settlement sites, gardens and	Implement systematic surveys of the cultural heritage values of this habitat. In consultation with the	Immediate

Management Category	Context/Issue	Actions	Priority
	Bamboo patches.	community, give consideration to protecting/managing these values through fencing and signage. Prior back-burning may be required to protect the Bamboo copse and well site if late season fires become a component of the prescribed management practice.	
Fauna Surveys	Subject to a previous fauna survey however no comprehensive surveys across a range of seasonal conditions.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Moderate
Plant Surveys	Information on flora composition is incomplete and limited to rapid surveys in dry season.	Carry out additional flora field surveys across seasons with focus on herbs and grasses. Collect leaf specimens and photograph plants with known uses/values and that may have been used in the past, and catalogue.	Moderate
Threatened Species Management	Flora: A population of Cycad occurs in this habitat at the location of Talai Fauna: Composition of significant fauna within this habitat is poorly known although not expected to be rich is species diversity	Flora: Confirm identification of the Mabuiag cycad through Qld Herbarium. Ranger assisted research to develop and implement a monitoring program to determine long-term population trends. This program should consist of mapping the current population using GPS, and assessment of the population structure, health and trends. Fire management of the habitat as a whole needs to consider the cycad population. In CYP, burning of cycad habitat every two to seven years during the cool time of the year (June – July) when the plants are not coning or with seed ready for dispersal is recommended (Forster 2010). Monitoring of potential invasive grassy weeds (such as annual mission grass and gamba grass) that either directly compete with the cycads or increase fuel loads is a priority. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Immediate Moderate
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 ethnotaxonomy.	Collect and collate TEK through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	The habitat requires management to prevent broad scale change to habitat structure. General burning regimes for grasslands should promote patchiness with burning conducted across a range of seasonal conditions from early to	Develop a fire plan for the habitat guided by the following. • Areas subject to shrubby thickening should be considered for a prescriptive late season fire regime which	Immediate

Management Category	Context/Issue	Actions	Priority
	late dry season. Maintaining patchiness in burnt and unburnt features is important for conservation management and stratifying fires across a range of seasonal condition will promote patchiness.	will destroy generating shrubs. Burning immediately prior to storm events (storm burning) so as to promote grassy cover over shrubs. • Areas not subject or prone to shrubby thickening should be burnt in mosaics across a range of seasonal conditions. • Once shrubby thickening is controlled reduce the frequency of late dry season fires to a more consistent cycle i.e. mid-dry season fires (August to October) on a 2 – 3 year cycle. • Record the timing and frequency of burning events for future reference so as to allow practice to be adjusted and refined to improve management outcomes. • Incorporate the management of the Cycad population into the burning program with consideration to times of seed and cone production. • Incorporate the protection of cultural sites into burning plans.	
Invasive Species Management	Flora: Grasslands are currently free of major invasive species however, potential weeds are known from disturbed areas within and on the vicinity of the Mabuiag community, and elsewhere in the region. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Monitoring for invasive pest species particularly exotic grasses should be undertaken every 6 months on major access points and tracks. Collect, record location using GPS, and photograph weeds that cannot be identified in the field so as formal identification can be achieved. Any nucleation points should be subject to immediate eradication. Fauna: Composition of invasive fauna to be derived from fauna survey results. 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
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.	Establish permanent monitoring points in grassland areas showing indications of long-term habitat change using star pickets with photographs taken towards designated directions. Carry out monitoring on a six monthly basis including observations taken late in the wet season at maximum growing season. More detailed assessment of monitoring plots to determine the benchmark condition of groundcover and species assemblages should be considered within a ranger	Immediate

Management Category	Context/Issue	Actions	Priority
		assisted research program. Monitor cycad populations as identified above.	

8.10 Rock Pavement Communities

8.10.1 Status of Ecological Knowledge

This habitat is extensive on Mabuiag Island on upper to lower slope positions on acid volcanic rocks. It comprises a complex of bare rock interspersed with shrubland, the latter typically occupying cracks and crevices where sufficient moisture and nutrient is provided to allow shrubland development. The shrubland component typical comprises deciduous vine thicket species ranging in height from 1.5 to 6 m dominated by species such as *Cochlospermum gillivraei, Canarium australianum, Terminalia subacroptera, Psydrax banksii* and *Psydrax reticulata* (VC18a). Where *Acacia brassii* forms the dominant shrub component, the habitat is mapped as VC18c.

8.10.2 Ecological / Cultural Considerations

Habitat Condition: The majority of rock pavements, due to their inherent infertility and exposure, are unaffected by ecological changes that occur due to human influence. Some areas in the vicinity of the township and on coastal headlands have been impacted by exotic weeds including mintweed (*Hyptis suaveolens*) and exotic grasses including fed Natal grass (*Melinis repens*). These species are wind dispersed and typically occur in crevices and gaps between rock outcrops. The extent to which these species have displaced native species is not known.

Fauna: A limited fauna survey of this habitat has been undertaken by Conics (2009a) who recorded a number of common reptiles and the grassland melomys (*Melomys burtonii*). Further structured survey effort and opportunistic sampling/observation would greatly improve current knowledge of the baseline fauna assemblage. Although not a rock pavement specialist, the slender chained gecko may find habitat in these areas. Areas of bare rock rubble in littoral areas may also host the littoral whip-tailed skink.

Flora: A total of 44 species have been recorded from rock pavement habitat. Significant species are:

- *Psydrax reticulata* (Vulnerable).
- *Dendrobium x superbiens* (Vulnerable).
- *Erythroxylum* sp. 'Mosquito Point' (regionally significant).

Cultural Perspectives: A large number of stone arrangements, including stone piles and turtle effigies, are recorded on rocky areas across the island, most abundantly on island high points which have a specific view or aspect. These rock piles are highly culturally significant and indicate the cultural importance of this habitat.

Photograph 19 (Left). Deciduous shrubland habitat 18a with dominant *Cochlospermum gillivraei* forming within a broader expanse of *Welchiodendron longivalve* dominant shrubland, and; **Photograph 20.** Bare pavement mixing with *Acacia brassii* dominant shrubland to form VC18b.

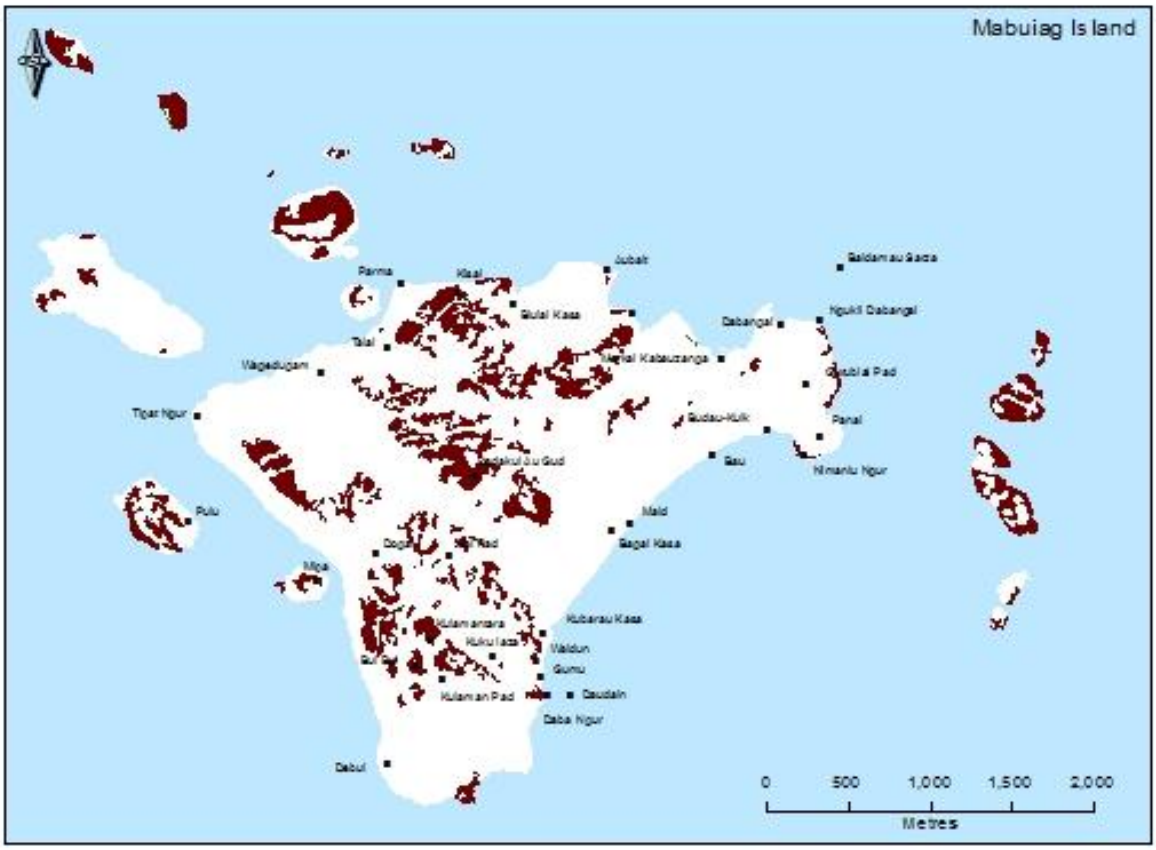


Figure 12. Distribution of rock pavement habitats (place names after Lawrie 1970)

8.10.3 Management Implications

The stable nature of this habitat type means that little management intervention is required. As the historic fire management regime is unknown, documentation of fire history including size, intensity and seasonal considerations would be beneficial for long-term maintenance of habitat integrity. A reduction in high intensity fire events in the vicinity of the township would have a positive impact on species and habitat diversity in areas that are currently suffering from fire degradation. Currently weed infestations are limited to areas of mintweed and red Natal grass which tends to be more

prevalent on coastal headland pavements near disturbed areas. Other species such as praxelis, which has been recorded from the village area, and bluetop are considered a threat to rock pavements however no infestations are currently evident.

8.10.4 Summary of Recommended Management Actions

Limited active management is required in this habitat although the following actions should be undertaken routinely.

Table 20. Summary of management actions for rock pavement habitats.

Management Category	Context/Issue	Actions	Priority
Fauna Surveys	Subject to a previous fauna survey, however no comprehensive surveys across a range of seasonal conditions.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Moderate
Plant Surveys	Information of flora composition is incomplete and limited to rapid surveys in dry season.	Carry out additional flora field surveys across seasons with focus on herbs and grasses. Collect leaf specimens and photograph plants with known uses/values that may have been used in the past, and catalogue.	Moderate
Threatened Species Management	Flora: A population of the Vulnerable *Dendrobium x superbiens* occurs in this habitat. Fauna: Composition of significant fauna within this habitat is poorly known.	Flora: Carry out field surveys to determine the extent of distribution and population of the Vulnerable Orchid *Dendrobium x superbiens*. Fauna: Further baseline information required (see fauna surveys) before management actions can be defined.	High High
Traditional Ecological Knowledge	Plant and animal lists provided in the Appendices provide a good foundation for increasing TEK and ethnotaxonomy.	Collect and collate TEK through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	The habitat by its physical nature generally excludes fire although it is expected that there would be some incursion during severe fire events.	Document fire history where any significant incursions are noted including size, intensity and seasonal considerations. Reduce high intensity fire events in the vicinity of the township.	Immediate
Invasive Species Management	Flora: Potential weeds are known from disturbed areas within and on the vicinity of the community. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats and dogs.	Flora: Undertake monitoring for invasive species particularly Praxelis and exotic grasses. Collect, record location using GPS, and photograph weeds that cannot be identified in the field so as formal identification can be achieved. Any nucleation points should be subject to immediate eradication. Fauna: Composition of invasive fauna to be derived from fauna survey results. 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.	High High
Monitoring	Observations relating to any changes to habitat condition should	Establish permanent photographic monitoring points in rock	Immediate

Management Category	Context/Issue	Actions	Priority
	be documented so that the risk these changes pose to long-term habitat stability can be assessed and appropriate management responses formulated.	pavement habitats at risk of degradation (near settlement areas or access routes) with photographs taken towards designated directions. Carry out monitoring on a six monthly basis including observations taken late in the wet season.	
Cultural Heritage	Known cultural heritage values occur throughout the habitat.	Implement systematic surveys of the cultural heritage values of this habitat. In consultation with the community, give consideration to protecting/managing these values through fencing and signage.	Immediate

8.11 Mangrove Forest, Woodland and Shrubland Complexes - Thag

8.11.1 Status of Ecological Knowledge

Narrow belts of mangrove closed forest (*thag*) are found on broad embayments and sheltered enclaves around a large part of the island, including narrow tidal inlets near the island settlement. The habitat has not been subject to detailed floristic survey.

Photograph 21. Mangrove forest fringing the coastline on the north coast of Mabuiag Island; and
Photograph 22. Disturbed margin of mangrove forest fringing the dump.

8.11.2 Ecological / Cultural Considerations

Habitat Condition: The habitat exhibits high integrity although harvesting of specific mangrove species for firewood is occurring in accessible locations. Communities occupying the small tidal inlets (creek mouths) in the vicinity of the township are highly disturbed on margins due to timber collection and alteration of natural tidal and drainage flows. Mangrove shrublands on the margins of the refuse tip have been impacted by clearing and windblown debris such as plastic bags. The presence of rats, cats and dogs around the community is likely to have impacted on mangrove fauna.

Fauna: Mangrove ecosystems provide habitat and foraging values for a range of avifauna, reptiles and mammals including the saltwater crocodile (*Crocodylus porosus*), emerald monitor and coastal sheathtail bat and a number of culturally significant species (Bani 2004). A number of the significant migratory bird species listed in **Table 9** are associated with estuarine habitats. Knowledge of the terrestrial fauna of mangrove communities in Torres Strait is extremely limited and surveys are

warranted. The potential presence of the false water mouse in suitable habitats should also be investigated.

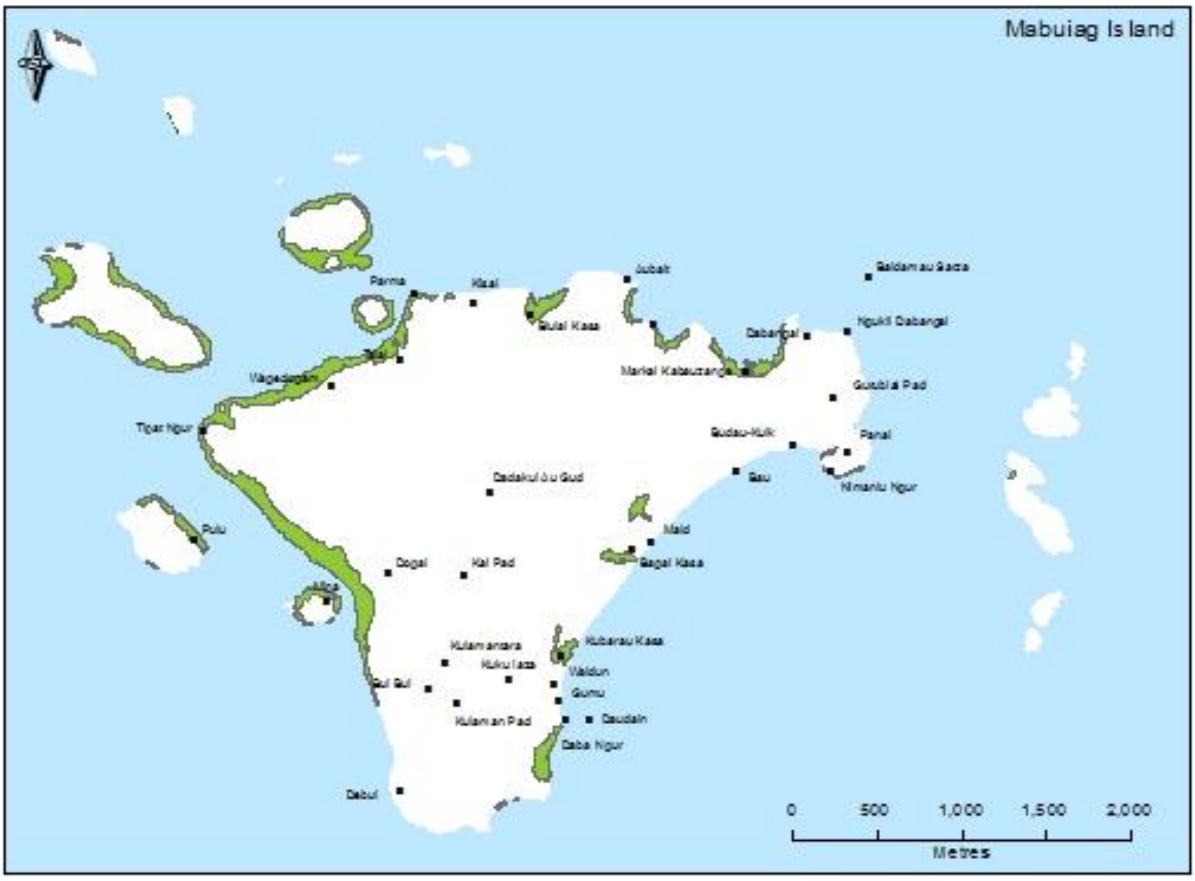


Figure 13. Distribution of mangrove forest habitats (place names after Lawrie 1970).

Flora: The limited survey effort of mangrove habitats is reflected in that only 22 species are recorded to date comprising 14 trees, five shrubs, three vines and one sedge. Further surveys are likely to increase the floristic diversity. The occurrence of the mangrove trumpet tree (*Dolichandrone spathacea*) (Near-Threatened, NC Act) is possible.

Cultural Perspectives: Mangrove communities provide an important cultural resource for the Mabuiag people, both as hunting grounds and material resources such as timber firewood and construction. A number of species are still used for purposes such as firewood and fencing, and the making of dyes and glues. The pods of a species called *biu* were used in the past to make an edible paste. *Githalay* (mud crabs, *Scylla serrata*) are obtained from mangroves, as well as shellfish for food and bait.

8.11.3 Management Implications

These habitats are largely self-maintaining although excessive timber extraction may be altering the ecology of the habitat in accessible locations near the community. Disturbance associated with the refuse site and nearby access tracks in the form of vegetation removal, sand extraction, and plastic bag incursion is creating local impacts. The extent of impact of feral cats and rats in the habitat is unknown. Active management required for this habitat should focus on an assessment of areas

harvested for mangrove timber and development of a harvesting plan which will prevent over-utilisation and subsequent degradation of the resource. Recommendations for management and monitoring of mangrove ecosystems on Boigu Island are identified in Burrows (2010) who indicates that a thorough knowledge of plants and fauna of mangrove ecosystems is essential for understanding and monitoring changes expected with climate change and other human pressures. Further biological surveys are therefore warranted. The highly invasive weed Pond Apple (*Annona glabra*) has been recorded from Horn Island and is considered a potential threat to mangrove habitat.

8.11.4 Summary of Recommended Management Actions

Table 21. Summary of management actions for mangrove (*thag*) habitats.

Management Category	Context/Issue	Actions	Priority
Cultural Heritage	Cultural heritage values may occur throughout the habitat.	In consultation with the community, and the Cultural Heritage Project, incorporate cultural survey data into the GIS system and consider protection/management of sites.	Immediate
Fauna Surveys	Not subject to previous fauna survey.	Design and implement a structured fauna survey and trapping program supported by specialists. Maintain focus on culturally significant species and ethnotaxonomy to feed into TEK.	Immediate
Plant Surveys	Information on flora composition is incomplete and limited to rapid surveys in dry season.	Carry out additional flora field surveys. Collect leaf specimens and photograph plants with known uses/values and that may have been used in the past, and catalogue.	Immediate
Threatened Species Management	Flora: The mangrove trumpet tree (*Dolichandrone spathacea*) is a Near-Threatened species with potential to occur. Fauna: Numerous migratory birds and a number of potential EVNT fauna species are known to utilise this habitat.	Flora: Field surveys required to determine the presence of mangrove trumpet tree. Fauna: Further baseline information required (see fauna surveys) before discrete management actions can be defined.	Moderate High
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 ethnotaxonomy.	Collect and collate TEK through fauna and flora survey actions, and from interviews with elders on an ongoing basis.	High
Fire Management	No issues evident.	No actions.	Moderate
Invasive Species Management	Flora: A number of weeds are known from the disturbed margins of mangroves areas within and on the vicinity of the community. The highly invasive weed pond apple (*Annona glabra*) has been recorded from Horn island and is considered a potential threat. Fauna: Composition of invasive fauna within this habitat is poorly known. Potential for impacts on fauna by feral cats, dogs and rats.	Flora: Undertake monitoring for invasive species on mangrove margins near the community and refuse site. Train rangers on identification of pond apple. Fauna: Composition of invasive fauna to be derived from fauna survey results. Assess cat and dog activity levels by installation and monitoring of sand pads on nearby tracks, nocturnal spotlighting, and consultation with	High Immediate

Management Category	Context/Issue	Actions	Priority
		community members. Implement control where appropriate.	
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.	Establish permanent monitoring points at locations currently experiencing disturbance with photographs taken towards designated directions. Carry out monitoring on a six monthly basis.	Immediate
Other	Ghost Nests may occur on the margins of mangrove vegetation. Plastic bags originating from the dump blow into adjoining mangroves. Mangroves are being over harvested in some locations, particularly near settlement areas.	Carry out ongoing surveys for Ghost Nets along the Mabuiag mangrove coastline. Limit impacts of plastic bags by fencing along margins of mangroves. Implement a mangrove harvesting management program which designates specific harvesting areas for rotation.	Immediate

8.12 Cleared / Degraded Areas

Areas where native habitat has been disturbed through development for housing and infrastructure purposes are restricted to the eastern parts of the island and account for nine hectares of the island area. Cleared and degraded areas support a number of processes with significant potential to degrade natural ecosystems.

Photograph 23. A recently disturbed site showing infestation of siratro (*Macroptilium atropurpureum*), and exotic grasses and; **Photograph 24 (right)**. Lower slopes on the edge of the airstrip are being transformed from shrubland/woodland into grassland by the regular burning.

The proliferation of exotic weed species presents by far the most serious threat to the integrity of natural habitats across the island. Of the 92 plant species recorded in cleared and disturbed areas of Mabuiag, 70 are exotic species (see **Appendix D**). Whilst the majority are widespread species not considered overly threatening to natural habitats, others are highly invasive as observed and documented from nearby islands and throughout the broader region. The legume species butterfly pea, siratro, Indian calopo, and beggar weed which are mentioned throughout the document are prolific throughout disturbed areas, and are becoming increasingly evident on the margins of native habitats. Occurrences of praxelis and blue top known from the town area pose a threat to rock pavement habitats. Grasses such as annual mission grass are problematic given its invasive

potential and the limited knowledge of its local distribution. A number of other weeds which have not yet been recorded on the island are potential threats and these include gamba grass, lantana, bellyache bush, and pond apple. The recent discovery of a number of rubber vine plants in a house yard is an example of how highly invasive weeds which are planted as ornamentals may become established.

Fires that are routinely ignited within and on the margins of the community to clean up rubbish and growth of long grass are instrumental in the protection of life and property. However, there is evidence that adjoining habitats which occur close to the community (i.e. shrublands and pandanus woodlands) are being simplified in structure and species composition due to constant fire incursion.

8.12.1 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 AQIS. A close partnership between the AQIS 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.

A structured program of asset protection burning within and on the margins of the community is a starting point to limit habitat conversion of the adjoining habitats. This will involve responsibilities and protocols for community burning to be developed in coordination between the council and rangers.

8.12.2 Summary of Recommended Management Actions

Table 22. 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 protecting/managing these values through fencing and signage.	Immediate
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
Fire Management	Adhoc asset protection burning occurring within and on margins of community is impacting on adjoining habitats.	Seek to develop local responsibilities for asset protection burning with consideration for habitat impacts.	Immediate
Invasive Species Management	Flora: Many weeds are known from within and on the disturbed margins the community.	Flora: Undertake a comprehensive program of weed assessment around the community followed by strategic control and eradication. Monitor success of past and recent	Immediate Immediate

Management Category	Context/Issue	Actions	Priority
		control measures on known populations of highly invasive weeds. Foster a close partnership between the AQIS field botanists and the rangers program as an important foundation to protecting the island from highly invasive weeds. Train rangers in weed identification. <u>Fauna</u>: 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
	<u>Fauna</u>: Populations of cats, dogs and rats originate from the community area.		
Monitoring	NA	See invasive plant species.	-

8.0 References

Allison, A. 2006. *Reptiles and amphibians of the Trans-Fly Region, New Guinea*. Pacific Biological Survey, Bishop Museum, Hawaii.

Baittinoff, G.N. and Dillewaard, H.A. (1997). Floristic analysis of the Great Barrier Reef continental islands. Queensland Herbarium, Department of Environment, Indooroopilly, Qld.

Bani, E. (2004). Evidence of cultural custodianship. In R. Davis (ed.), *Woven Histories Dancing Lives: Torres Strait Islander Identity, Culture and History*, pp. 31-32. Aboriginal Studies Press, Canberra.

Baker-Gabb, D.J. (1986). Ecological release and behavioural and ecological flexibility in marsh harriers on islands. *Emu*, **86**: 71-81.

Barratt, D.G. (1997). Predation by house cats, *Felis catus* (L.), in Canberra, Australia. I. Prey composition and preference. *Wildlife Research*, **24**: 263-277.

Barrett, G., A. Silcocks, S. Barry, R. Cunningham & R. Poulter (2003). *The new atlas of Australian birds*. Birds Australia, Melbourne.

Baxter, R. (2010). *Trip report Torres Strait (Boigu-Saibai-Dauan) 16th-23rd Oct 2008*. http://www.birdingtours.com.au/ts.html

BirdLife International (2011). *Species factsheet*: Apus pacificus. Downloaded from http://www.birdlife.org on 04/01/2011.

Blakers, M., Davies, S.J.J.F. and Reilly, P.N. (1984). *The atlas of Australian birds*. Melbourne University Press, Melbourne.

Boland, C.R.J. (2004a). Breeding biology of rainbow bee-eaters (*Merops ornatus*): a migratory, colonial, cooperative bird. *Auk*, **121**: 811-823.

Boland, C.R.J. (2004b). Introduced cane toads are active nest predators and competitors of rainbow bee-eaters *Merops ornatus*: observational and experimental evidence. *Biological Conservation*, **120**: 53-62.

Bonaccorso, F. (1999). *Bats of Papua New Guinea*. Conservation International, Washington.

Borsboom, A. (2007). *Nomination to re-classify the 'rare'* Varanus prasinus *to 'Near-Threatened' under the Nature Conservation Act 1992*. Biodiversity Sciences Environmental Sciences Division, Environmental Protection Agency.

Bostock, P.D. and Holland, A.E. (eds.) (2010). *Census of the Queensland Flora 2010*. Queensland Herbarium, Environment protection Agency, Brisbane.

Bradley, J. J. (2005). 'Same time poison, same time good tucker': The cycad palm in the south west Gulf of Carpentaria'. *Journal of Australian Studies* 29: 86, 119 – 133

Buden, D.W. (2007). Reptiles of Satawan Atoll and the Mortlock Islands, Chuuk State, Federated States of Micronesia. *Pacific Science*, **61**: 415-428.

Bureau of Meteorology (BOM) (2008a). Rainfall Statistics, Recording Station 027011 – Mabuiag Island. Available at www.bom.gov.au/climate/averages.

Bureau of Meteorology (BOM) (2008b). Rainfall Statistics, Recording Station 027001 – Badu Island. Available at www.bom.gov.au/climate/averages.

Bureau of Meteorology (BOM) (2008c). Rainfall Statistics, Recording Station 027011 – Dauan Island. Available at www.bom.gov.au/climate/averages.

Bureau of Meteorology (BOM) (2008b). Rainfall Statistics, Recording Station 027009 – Dauan Island.

Burrows, D.W. (2010). *Wetland Assessment of Boigu Island, Torres Strait*. ACTFR Report No. 10/06. Australian Centre for Tropical Freshwater Research, James Cook University, Townsville.

Case, T.J., Bolger, D.T. & Petren, K. (1994). Invasions and competitive displacement among house geckos in the tropical Pacific. *Ecology*, **75**: 464-477.

Chantler, P. (1999). 'Apodidae (Swifts),' in *Handbook of the Birds of the World. Vol. 5. Barn-owls to hummingbirds*, eds. J. del Hoyo, A. Elliott & J. Sargatal, Lynx Edicions, Barcelona.

Christidis, L. & Boles, W.E. (2008). *Systematics and taxonomy of Australian birds*. CSIRO Publishing, Collingwood.

Churchill, S. (2008). *Australian bats*. Second Edition. Allen & Unwin, Crows Nest.

Clarke, R.H. (2004). The avifauna of northern Torres Strait: Notes on a wet-season visit. *Australian Field Ornithology* 21: 49-66.

Conics (2009a). Mabuiag Island Environmental Report: Torres Strait Sustainable Land Use Plan Habitat and Fauna Assessment. Unpublished Report to Torres Strait Regional Authority.

Churchill, S. (2008). Australian Bats (2nd Edition) Jacana Books, Crows Nest.

Clancy, G.P. (1986). Observations of nesting beach thick-knees *Burhinus neglectus* at Red Rock, New South Wales. *Corella*, **10**: 114-118.

Clancy, G.P. (2010). Causes of mortality in the black-necked stork *Ephippiorhynchus asiaticus* in New South Wales. *Australian Field Ornithology*, **27**: 65-75.

Clarke, R.H. (2004a). A record of the emerald monitor *Varanus prasinus* from Boigu Island, Torres Strait, Australia. *Herpetofauna*, **34**: 70-71.

Clarke, R.H. (2004b). The avifauna of northern Torres Strait: Notes on a wet-season visit. *Australian Field Ornithology*, **21**: 49-66.

Clarke, R.H. (2006). Papuan spine-tailed swifts *Meamsia novaeguineae* on Boigu Island, Torres Strait, Queensland. *Australian Field Ornithology*, **23**: 125-129.

Clarke, R.H. (2007). Orange-bellied fruit-dove *Ptilinopus iozonus* on Boigu Island, Torres Strait: The first record for Australian Territory. *Australian Field Ornithology*, **24**: 44-48.

Clarke, R.H., Gosford, R., Boyle, A., Sisson, L. & Ewens, J.G. (2010). A specimen record of the little paradise-kingfisher *Tanysiptera hydrocharis* from Torres Strait, Queensland: A new bird for Australian Territory. *Australian Field Ornithology*, **27**: 165-173.

Cogger, H.G. (2000). *Reptiles & amphibians of Australia*. Reed New Holland, Sydney.

Conics (2008a). *Iama Island Environmental Report: Torres Strait Sustainable Land Use Plan Habitat and Fauna Assessment.* Unpublished Report to Torres Strait Regional Authority.

Commonwealth of Australia (1995). *Regional Forest Agreements – The Commonwealth Position.* Commonwealth of Australia: Canberra.

Conics (2008b). *St Pauls environmental report: Torres Strait sustainable land use plan habitat and fauna assessment – St Pauls Community, Mua Island*. Unpublished Report to Torres Strait Regional Authority.

Conics (2009a). *Badu environmental report: Torres Strait sustainable land use plan habitat and fauna assessment – Badu*. Unpublished Report to Torres Strait Regional Authority.

Conics (2009b). *Mabuiag (Mabuyag Island) environmental report: Torres Strait sustainable land use plan habitat and fauna assessment – Mabuiag (Mabuyag Island)*. Unpublished Report to Torres Strait Regional Authority.

Covacevich, J.A. & Couper, P.J. (1994). Type specimens of frog and reptile species, Queensland Museum: Recent additions and new information. *Memoirs of the Queensland Museum,* **37**: 53-65.

Covacevich, J., Ingram, G.J. & Czechura, G.V. (1982). Rare frogs and reptiles of Cape York Peninsula, Australia. *Biological Conservation*, **22**: 283-294.

Debus, S. (1998). *The birds of prey of Australia: A field guide to Australian raptors*. Oxford University Press, Melbourne.

DERM (2009). *National recovery plan for the water mouse (false water rat)* Xeromys myoides. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Brisbane: Department of the Environment and Resource Management.

Department of Environment and Resource Management (2010). *Torres Strait Natural Resource Management Region Back on Track Biodiversity Planning Tool,* Department of Environment and Resource Management, Brisbane.

DERM (2010a). *Wildlife Online Extract. Latitude: 9.2622 Longitude: 142.2095 Distance: 6 km*. Department of Environment and Resource Management. Extracted 15 October 2010.

DERM (2010b). *Wildlife Online Extract. Latitude: 9.5874 Longitude: 143.7703 Distance: 9 km*. Department of Environment and Resource Management. Extracted 18 October 2010.

DERM (2010c). *Wildlife Online Extract. Latitude: 9.8999 Longitude: 142.7747 Distance: 12 km*. Department of Environment and Resource Management. Extracted 15 October 2010.

DERM (2010d). *Wildlife Online Extract. Latitude: 9.9149 Longitude: 144.052 Distance: 25 km.* Department of Environment and Resource Management. Extracted 15 October 2010.

DERM (2010e). *Wildlife Online Extract. Latitude: 9.9534 Longitude: 142.1817 Distance: 10 km.* Department of Environment and Resource Management. Extracted 18 October 2010.

DERM (2010f). *Wildlife Online Extract. Latitude: 10.1846 Longitude: 142.266 Distance: 9 km*. Department of Environment and Resource Management. Extracted 15 October 2010.

DERM (2010g). *Wildlife Online Extract. Latitude: 10.1149 Longitude: 142.156 Distance: 7 km*. Department of Environment and Resource Management. Extracted 15 October 2010.

DERM (2011a). *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.

DERM (2011b). *Wildlife and ecosystems: Fawn leaf-nosed bat.* Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/az_of_animals/micro_bats_the_insect_terminators/fawn_leafnosedbat.html. Last updated 1 December 2010.

Department of Sustainability, Environment, Water, Population and Communities (2011). Advice to the Minister for the Environment, Water, Heritage and the Arts from the Threatened Species Scientific Committee (the Committee) on Amendments to the List of Key Threatening Processes under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Online @ http://www.environment.gov.au/index.html. Accessed 16 Feb 2011.

Draffan, R.D.W., Garnett, S.T. and Malone, G.J. (1983). Birds of the Torres Strait: An annotated list and biogeographical analysis. *Emu* 83: 207-234.

Driscoll, P.V. & Ueta, M. (2002). The migration route and behaviour of eastern curlews *Numenius madagascariensis*. *Ibis*, **144**: 119-130.

DSEWPC (2011a). *Apus pacificus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat.

DSEWPC (2011b). *Ardea ibis* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat.

DSEWPC (2011c). *Ardea modesta* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat.

DSEWPC (2011d). *Australian Faunal Directory*. Department of Sustainability, Environment, Water, Population and Communities, Canberra. http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/index.html.

DSEWPC (2011e). Conilurus penicillatus — *Brush-tailed Rabbit-rat, Brush-tailed Tree-rat*. Species Profile and Threats Database. Department of Sustainability, Environment, Water, Population and Communities, Canberra. http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=132

DSEWPC (2011f). *Hirundapus caudacutus* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: http://www.environment.gov.au/sprat.

DSEWPC (2011g). *Protected Matters Search Tool*. Department of Sustainability, Environment, Water, Population and Communities. http://www.environment.gov.au/epbc/pmst/index.html.

Dorfman, E.J., Lamont, A. & Dickman, C.R. (2001). Foraging behaviour and success of black-necked storks (*Ephippiorhynchus asiaticus*) in Australia: Implications for management. *Emu*, **101**: 145-149.

Duncan, A., Barker, G.B. & Montgomery, N. (1999). *The action plan for Australian bats*. Environment Australia, Canberra.

Ehmann, H. (1992). *Encyclopedia of Australian animals: Reptiles*. Angus and Robertson, Sydney.

EPA (2007). *Nature conservation (Estuarine Crocodile) plan 2007 and management program 2007-2017*. Environmental Protection Agency, Queensland.

Freeman, A.N.D. (2003). The distribution of beach stone-curlews and their response to disturbance on far north Queensland's Wet Tropical Coast. *Emu*, **103**: 369-372.

Frith, H.J. (1977). *Waterfowl in Australia*. A.H. and A.W. Reed, Sydney.

Fukuda, Y., Whitehead, P. & Boggs, G. (2007). Broad-scale environmental influences on the abundance of saltwater crocodiles (*Crocodylus porosus*) in Australia. *Wildlife Research*, **34**: 167-176.

Fell, D.G. (2009). Report on the Vegetation and Flora of Pulu Islet: DG Fell Flora Surveys May 2009. Unpublished report to Arafura Consulting.

Fell D.G., Lifu M., McIntyre-Tamwoy S., Roberts C., Leung L., Lynch A.J.J., Charlie B. and Lifu T. (2009). *Significant Species and Habitats of Greater Lockerbie Scrub, Cape York Peninsula, Queensland.* Unpublished report to the Queensland Government Department of Environment and Resource Management, Brisbane.

Franklin, D. C., Matthews, R. and Lawes, J. (2010). History of the East Point monsoon forest**.** *Northern Territory Naturalist* (2010) 22: 2-16.

Garnett, S.T. and Crowley, G.M. (2000). *The Action Plan for Australian Birds*. Environment Australia, Canberra.

Geering, A., Agnew, L. & Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing, Collingwood.

Greene, H.W. (1986). Diet and arboreality in the emerald monitor, *Varanus prasinus*, with comments on the study of adaptation. *FIELDIANA Zoology NEW SERIES*, No. **31**. Publication 1370.

Gynther, I.C. & Janetzki, H. (2008). 'Water Mouse *Xeromys myoides*,' in *The mammals of Australia*, Third Edition. eds. S. Van Dyck, & R. Strahan, Reed New Holland, Sydney.

Haddon, A.C. (ed.) (1901-1935). *Reports of the Cambridge Anthropological Expedition to Torres Straits*. 6 Volumes. Cambridge University Press, Cambridge.

Haddon, A.C. (1908). Religion. Pp. 241-280. In Haddon, A.C. (ed.) *Reports of the Cambridge Anthropological Expedition to Torres Straits. Volume 6: Sociology, Magic and Religion of the Eastern Islanders*. Cambridge: Cambridge University Press.

Haddon, A.C. (1912a). Food and its preparation and narcotics. In A.C. Haddon (ed.), *Reports of the Cambridge Anthropological Expedition to Torres Straits. Volume 4: Arts and Crafts,* pp. 130-143. Cambridge University Press, Cambridge.

Haddon, A.C. (1912b). Horticulture. In A.C. Haddon (ed.), *Reports of the Cambridge Anthropological Expedition to Torres Straits. Volume 4: Arts and Crafts*, pp. 144-151. Cambridge University Press, Cambridge.

Haddon, A.C. (1912c). Science. Pp. 218-237. In Haddon, A.C. (ed.) *Reports of the Cambridge Anthropological Expedition to Torres Straits. Volume 4: Arts and Crafts*. Cambridge: Cambridge University Press.

Haddon, A.C. & Rivers, W.H.R. (1904). Totemism. Pp. 153-193. In Haddon, A.C. (ed.) *Reports of the Cambridge Anthropological Expedition to Torres Straits. Volume 5: Sociology, Magic and Religion of the Western Islanders*. Cambridge: Cambridge University Press.

Hall, L.S. (2008). Large-eared Flying-fox, *Pteropus macrotis*. In: S. Van Dyck and R. Strahan (eds), *The Mammals of Australia*, pp. 441-442. Third Edition. Reed New Holland, Sydney.

Heatwole, H. (1975). Biogeography of reptiles on some of the islands and cays of eastern Papua-New Guinea. *Atoll Research Bulletin*, No. **180**.

Hediger, H. (1933-34). Beitrag zur herpetologie und zoogeographie neu Britanniens und einiger umliegender Gebiete. *Jahrbűcher*, **65**: 441-582.

Helgen, K.M. (2004). On the identity of flying-foxes, genus *Pteropus* (Mammalia: Chiroptera), from islands in the Torres Strait, Australia. *Zootaxa* 780: 1-14.

Higgins, P.J. ed. (1999). *Handbook of Australian, New Zealand and Antarctic birds, Vol. 4, Parrots to dollarbird.* Oxford University Press, Melbourne.

Higgins, P.J. & Davies, S.J.J.F. eds. (1996). *Handbook of Australian, New Zealand and Antarctic birds, Vol. 3, Snipe to pigeons*. Oxford University Press, Melbourne.

Higgins, P.J, Peter, J.M. & Cowling, S.J eds. (2006a). *Handbook of Australian, New Zealand and Antarctic birds. Vol. 7. Boatbill to starlings. Part A: Boatbill to larks*. Oxford University Press, South Melbourne.

Higgins, P.J, Peter, J.M. & Cowling, S.J eds. (2006b). *Handbook of Australian, New Zealand and Antarctic birds. Vol. 7. Boatbill to starlings. Part B: Dunnock to starlings*. Oxford University Press, South Melbourne.

Hoskin, C.J. (2010). The invasion and potential impact of the Asian house gecko (*Hemidactylus frenatus*) in Australia. *Austral Ecology*, DOI: 10.1111/j.1442-9993.2010.02143.x.

Ingram, G.J. (2008). The terrestrial vertebrates of Mua, western Torres Strait. *Memoirs of the Queensland Museum, Cultural Heritage Series,* **4**: 619-628.

Kushlan, J.A. & Hancock, J. (2005). *Herons*. Oxford University Press, Oxford.

Hitchcock, G. (1998). First record of the false water-rat, *Xeromys myoides* (Rodentia: Muridae), in New Guinea. *Science in New Guinea*, **23**: 141-144.

Henderson, R.J.F. (2002) (Ed.). Names and Distribution of Queensland Plants, Algae and Lichens. Queensland Herbarium Envioenmental Protection Agency, Brisbane.

Hitchcock, G., McNiven, I.J. and the Pulu Indigenous Protected Area (IPA) Committee (2009). Pulu Indigenous Protected Area Plan of Management. Melbourne: Arafura Consulting. June 2009.

Ingram, G.J. (2008). The terrestrial vertebrates of Mua. In B. David, L. Manas and M. Quinnell (eds), *Gelam's Homeland: Cultural and Natural History on the Island of Mua, Torres Strait*, pp. 619-628. Memoirs of the Queensland Museum (Cultural Heritage Series) 4(2).

Landsberg, J. and Clarkson, J. R. (2004). Threatened Plants of Cape York Peninsula. Queensland Parks and Wildlife Service, Envivonmental protection Agency, Cairns.

Lane, B. A. (1987). *Shorebirds in Australia*. Nelson Publishers, Melbourne.

Lauro, B. & Nol, E. (1995). Patterns of habitat use for pied and sooty oystercatchers nesting at the Furneaux Islands, Australia. *Condor*, **97**: 920-934.

Lawrie, M. (1970). *Myths and Legends of the Torres Strait.* University of Queensland Press, St Lucia Brisbane.

Low, T. (1995). *The animals of Brisbane: A vertebrate status review.* Unpublished report prepared for Brisbane City Council.

Maddock, M. (2000). 'Herons in Australasia and Oceania,' in *Heron Conservation*, eds. J.A. Kushlan & H. Hafner, Academic Press, Sydney.

Marchant, S. & Higgins, P.J. eds. (1990). *Handbook of Australian, New Zealand and Antarctic birds, Vol. 1, Ratites to Ducks, Part B, Australian pelican to ducks*. Oxford University Press, Melbourne.

Marchant, S. & Higgins, P.J. eds. (1993). *Handbook of Australian, New Zealand and Antarctic birds, Vol. 2, Raptors to lapwings.* Oxford University Press, Melbourne.

McKilligan, N. (2005). *Herons, egrets and bitterns: Their biology and conservation in Australia*. CSIRO Publishing, Collingwood.

Menkhorst, P.W. & Knight, F. (2004). *A field guide to the mammals of Australia*. Oxford University Press, Melbourne.

McNiven, I.J. and Hitchcock, G. (2004). Torres Strait Islander marine subsistence specialisation and terrestrial animal translocation. *Memoirs of the Queensland Museum (Cultural Heritage Series)* 3(1): 105-162.

McNiven, I.J. & D. Wright (2008). Ritualised marine midden formation in Western Zenadh Kes (Torres Strait). In G. Clark, F. Leach and S. O'Connor (eds), *Islands of Inquiry: Colonisation, Seafaring and the Archaeology of Maritime Landscapes*. *Terra Australis* 29: 133-147.

Neal, R.A. (1989). An Archaeological Inspection of Alternative Telecom Locations on Mabuiag and Yam Islands, Torres Strait. Unpublished report to Queensland Department of Community & Ethnic Affairs. Pirripoint Pty Ltd, Helidon, Queensland.

Neldner, V. J., Fensham, R. J. Clarkson, J. R. and Stanton, J. P. (1997). The natural grasslands of Cape York Peninsula, Australia. Description, distribution and conservation status. *Biological Conservation* 81: 121-136.

Neldner, V.J. and Clarkson, J.R. (1995). *Vegetation Survey Mapping of Cape York Peninsula*. In: Cape York Peninsula Land Use Strategy. Office of the Co-ordinator General and Department of Environment and Heritage, Government of Queensland, Brisbane.

Neldner, V. J., Wilson, B. A., Thompson, E. J. and Dilleward, H. A. (2005). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland.* Version 3.1. Updated September 2005. Queensland Herbarium, Environmental Protection Agency, Brisbane.

NSW NPWS (2002). *Threatened species of the upper north coast of New South Wales: Fauna*. NSW Parks and Wildlife Service, Coffs Harbour.

Olsen, P. (1998). Australia's raptors: diurnal birds of prey and owls. *Supplement to Wingspan*, **8**: I-XVI.

OZCAM (2011). *BioMaps*. Online Zoological Collections of Australian Museums. http://www.biomaps.net.au/biomaps2/. Searched 11-18/2/2011.

Pavey, C.R. & Burwell, C.J. (2008). 'Fawn Leaf-nosed Bat *Hipposideros cervinus*,' in *The mammals of Australia*, Third Edition. eds. S. Van Dyck & R. Strahan, Reed New Holland, Sydney.

Pavey, C.R. & Kutt, A.S. (2008). 'Large-eared Horseshoe Bat *Rhinolophus philippinensis*,' in *The mammals of Australia*, Third Edition. eds. S. Van Dyck & R. Strahan, Reed New Holland, Sydney.

Pringle, J.D. (1985). *The waterbirds of Australia: The National Photographic Index of Australian wildlife*. Angus and Robertson, North Ryde.

Pringle, J.D. (1987). *The shorebirds of Australia: The National Photographic Index of Australian wildlife*. Angus and Robertson, North Ryde.

QPWS (2007). *Distribution and abundance of the estuarine crocodile (*Crocodylus porosus *Schneider, 1801) in waterways of Queensland's populated east coast*. Report to Hon. Lindy Nelson-Carr MP Minister for the Environment and Multiculturalism. Queensland Parks and Wildlife Service.

Read, M.A., Miller, J.D., Bell, I.P. & Felton, A. (2004). The distribution and abundance of the estuarine crocodile, *Crocodylus porosus*, in Queensland. *Wildlife Research*, **31**: 527-534.

Reid, T. & Park, P. (2003). Continuing decline of eastern curlew, *Numenius madagascariensis*, in Tasmania. *Emu*, **103**: 279-283.

Richards, G.C. (2008). 'Coastal Sheath-tailed Bat *Taphozous australis*,' in *The mammals of Australia,* Third Edition. eds. S. Van Dyck, & R. Strahan, Reed New Holland, Sydney.

Ross, E. M. & Halford, D. A. (2007). Aristolochiaceae. *Flora of Australia* 2: 244-258. Australian Government Publishing Service, Canberra.

Rossiter N. A., Setterfield. S. A., Douglas, M.M. and Hutley, L. B. (2003). Testing the fire grass cycle: alien grass invasion in the tropical savannas of northern Australia. *Diversity and Distributions* 9, 169-176.

Russell-Smith, J., Stanton, J. P., Edwards, A. C. and Whitehead, J. P. (2004). Rainforest invasion of Eucalypt-dominanted woodland savanna, Iron Range, north-eastern Australia: II. Rates of landscape change. *Journal of Biogeography* 31: 1305-1316.

Russell-Smith, J, Whitehead, J. P., Williams, R. J. and Flannigan, M. (eds) (2003). Fire and savanna landscapes in northern Australia: regional lessons and global challenges. *International Journal of Wildland Fire* 12 247-440.

Russell-Smith, J, Whitehead, Cooke, P. (eds) (2009). Culture, Ecology and Economy of Fire Management in North Australian Savannas: Rekindling the Wurk Tradition. *Tropical Savannas CRC, CSIRO Publishing, Collingwood, Victoria*.

Sankowsky, G and Neilson, L (2002). A Garden on the Wing. Zodiac Publications, Australia.

Schaffer, J. (2010). *Wetland assessment of Boigu Island, Torres Strait: Part B – reptiles*. Report No. 10/06. Australian Centre for Tropical Freshwater Research, James Cook University, Townsville.

Shine, R. (2010). The ecological impact of invasive cane toads (*Bufo marinus*) in Australia. *Quarterly Review of Biology*, **85**: 253-291.

Smith, N.M. (2003). Weeds of the Wet/Dry tropics of Australia. Environment Centre of the Northern Territory, Darwin.

Space J. C. and Flynn, T. (2002). Report to the Government of SaMua on Invasive Plant Species of Environmental Concern. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai'i, USA.

Stanton, D. J, Fell, D. G., and Gooding, D. O. (2009). *Vegetation Communities and Regional Ecosystems of the Torres Strait Islands, Queensland, Australia.* Unpublished report to the Torres Strait Regional Authority, land and Sea Management Unit.

Taylor, I.R. & Bester, A. (1999). The response of foraging waders to human recreation disturbance at Rhyll, Phillip Island, Victoria. *Stilt*, **35**: 67.

Terborgh, J. & Faaborg, J. (1973). Turnover and ecological release in the avifauna of Mona Island, Puerto Rico. Auk, **90**: 759-779.

Tidemann, C.R., Yorkston, H.D. & Russack, A.J. (1994). The diet of cats, *Felis catus*, on Christmas Island, Indian Ocean. *Wildlife Research*, **21**: 279-285.

Tucker, A.D., Limpus, C.J., McCallum, H.I. & McDonald, K.R. (1997). Movements and home ranges of *Crocodylus johnstoni* in the Lynd River, Queensland. *Wildlife Research*, **24**: 379-396.

Tyler, M.J. (1972). 'An analysis of the lower vertebrate faunal relationships of Australia and New Guinea,' in: *Bridge and barrier: The natural and cultural history of Torres Strait*, ed. D. Walker, Australian National University, Canberra.

Ueta, M., Antonov, A., Artukhin, Y. & Parilov, M. (2002). Migration routes of eastern curlews tracked from far east Russia. *Emu*, **102**: 345-348.

Van Dyck, S. (1996). *Xeromys myoides* Thomas, 1889 (Rodentia: Muridae) in mangrove communities of North Stradbroke Island, southeast Queensland. *Memoirs of the Queensland Museum,* **42**: 337-366.

Watson, J.J. (2009). *Terrestrial vertebrate fauna of the Pulu Indigenous Protected Area, Torres Strait*. Report to Arafura Consulting.

Watson, J.J. & Hitchcock, G. in prep: The terrestrial vertebrate fauna of Mabuiag. *Memoirs of the Queensland Museum, Cultural Heritage Series.*

Webb, G.J.W., Sack, G.C., Buckworth, R. & Manolis, S.C. (1983). An examination of *Crocodylus porosus* nests in two Northern Australian freshwater swamps, with an analysis of embryo mortality. *Australian Wildlife Research*, **10**: 571-605.

Wells, R.W. (2002). Taxonomic notes on the genus *Cyrtodactylus* (Reptilia: Gekkonidae) in Australia. *Australian Biodiversity Record*, **2002**: 1-8.

Whittier, J.M. & Moeller, D.R. (1993). *Varanus prasinus* (the emerald goanna) on Mua Island, Torres Strait, Australia. *Memoirs of the Queensland Museum*, **34**: 130.

Wilson, S. (2005). *A field guide to reptiles of Queensland*. Reed New Holland, Sydney.

Wilson, S. & Swan, G. (2010). *A complete guide to reptiles of Australia*. Third Edition. New Holland Publishers, Sydney.

Wink, M., Sauer-Gürth, H. & Witt, H.-H. (2004). 'Phylogenetic differentiation of the osprey *Pandion haliaetus* inferred from nucleotide sequences of the mitochondrial cytochrome b gene.' in *Raptors Worldwide*, eds. R.D. Chancellor & B.-U. Meyberg, WWGBP/MME, Budapest.

Woinarski, J. (2007). 'False water-rat *Xeromys myoides*,' in *Lost from our landscape: threatened species of the Northern Territory*, eds. J. Woinarski, C. Pavey, R. Kerrigan, I. Cowie & S. Ward, Northern Territory Department of Natural Resources, Environment and The Arts, Palmerston.

9.0 Glossary

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. Cotton Tree *Bombax ceiba*).

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

Endemic: A plant or animal that has at least 75% of its known range within a bioregion or which has a total range of 100,000 square km or less (Commonwealth of Australia 1995).

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

Goemulayg: A Mabuiag person.

Geomulgal: The Mabuiag people (including people with ancestral connections to Mabuiag

Goemulgaw: Belonging to Mabuiag people.

Holocene: The current geological epoch, which began approximately 11 thousand years ago. Between five thousand years ago and the present is considered to be 'Late Holocene'.

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

Mabuiag: The community island, previously spelt Mabuiag

mina pawa*:* Good ways / appropriate behaviours

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.

Pyrophytic: In relation to vegetation, refers to a habitat which benefits or regenerates following a fire event.

Pyrophobic: In relation to vegetation, a vegetation type which is fire intolerant, or is killed or damaged by a fire event.

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

Regional Ecosystem: The primary unit against which Queensland's *Vegetation Management Act* (1999) is regulated and as such, the classification 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. Expert Panel Attendees

Expert	Organisation	Expertise	Inputs
David Stanton	3D Environmental	Vegetation and landscape mapping and assessment.	• Specialist knowledge of Torres Strait vegetation community distribution, condition and landscape (geology, geomorphology).
David Fell	3D Environmental	Flora survey, species identification, species distribution and significant flora.	• Specialist knowledge of Torres Strait and CYP flora and habitats.
David Gooding	3D Environmental	GIS analyst.	• Development and management of Torres Strait GIS.
Peter Stanton	Private Consultant	Landscape scale ecological and fire management.	• Specialist regional knowledge of CYP ecology • Practical implementation of ecological management practices i.e. fire, weeds, vegetation change
Dr Jeremy Russell-Smith	Consultant - North Australian Indigenous Land & Sea Management Alliance (NAILSMA)	Sustainable ecological and cultural resource management.	• PNG and regional northern Australian context • Advice on integrated fire and cultural resource management • Emissions abatement in tropical savanna fire regimes.
Dr Garrick Hitchcock	Arafura Consulting	Environmental anthropology and cultural resource use and management Torres Strait and PNG.	• Cultural landscape context • Integration of cultural resource values • Cultural use of fauna, flora and habitats.
Terry Reis	Biodiversity Assessment and Management	Fauna ecology.	• Identification and review of fauna values • Fauna survey methods • Management of habitat for fauna values.
Other engaged parties			
Dr Paul Forster	EHP - Qld Herbarium	Taxonomy and distribution of Qld flora.	• Threatened flora distribution • Conservation and listing context.
Keith Macdonald	EHP Threatened Species Unit	Fauna and flora ecology and distribution.	• Back on Track methodology. • Threatened fauna and flora distribution • Conservation and listing context.
Tony O'Keeffe Michael Bradby	TSRA LMSU	Land and Sea Program and Ranger Project.	• Project background, management and liaison. • Protocols and process.

Appendix B. Queensland Government 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[11]	**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)	-

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

Appendix C. Summary of Flora with Conservation Significance

Species	National EPBC	State NC Act	Regionally Significant	Habitat	Threat Name	Threat Impact	Threat Details
Dendrobium x superbiens (Orchidaceae)	Vulnerable	Vulnerable	-	18	Collectors	Loss &/or removal of individuals	Plants have been collected illegally, and this species is under threat in some areas of northern Qld. Collection maybe for personal use (i.e. gardens) or for profit (i.e. sold to nurseries). Illegal collection may be by locals and those from other communities. Specialist orchid collectors travel widely to collect orchids as part of recreation.
Psydrax reticulata (Rubiaceae)	-	Vulnerable	-	2, 4, 14, 18	Potential decline in species regional stronghold.	Loss or removal of individuals.	No major threats identified. Habitat is widespread. Requires reassessment under the NC Act based on updated knowledge of habitat and distribution in the Torres Strait Region.
Diospyros sp. (Bamaga BP Hyland 2517) (Ebenaceae)	-	Vulnerable	-	1, 4	Inappropriate fire regimes	Potential habitat degradation and loss of individuals.	Vine forest habitat is restricted. Watching brief to ensure stronghold populations retained in the region. Requires reassessment under the NC Act based on updated knowledge of habitat and distribution in the Torres Strait region.
Cycas sp. (DGF10541*) (Cycadaceae)*	-	-	Highly disjunct population. Possible island endemic.	11, 14	Inappropriate fire regimes. Collectors	Potential habitat degradation and loss of individuals. Loss &/or removal of individuals and or seeds.	Population is small (50-100 individuals) and restricted to 2 locations on island. Taxonomy and population structure/health not known. Therefore vulnerable to stochastic events. Plants have been collected illegally in other regions. Collection maybe for personal use (i.e. gardens) or for profit (i.e. sold to nurseries). Illegal collection may be by locals and those from other communities. Specialist cycad collectors travel widely to collect as part of recreation.
Gunnesia pepo (Apocynaceae)	-	-	Bioregional endemic Disjunct population Limit of Range	4	Inappropriate fire regimes	Potential habitat degradation and loss of individuals.	Habitat is widespread on the island. Watching brief to ensure stronghold populations retained in the region.
Actephila venusta (Phyllanthaceae)	-	-	Bioregional endemic Disjunct population Limit of Range	1	Inappropriate fire regimes	Potential habitat degradation and loss of individuals.	Habitat is widespread on the island. Watching brief to ensure stronghold populations retained in the region.
Maniltoa lenticellata var. *lenticellata* (Caesalpiniaceae)	-	-	Locally restricted Disjunct population	1	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.

Species	National EPBC	State NC Act	Regionally Significant	Habitat	Threat Name	Threat Impact	Threat Details
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
Erythroxylum sp. (Mosquito Pt JR Clarkson 9991+) (Erythroxylaceae)	-	-	Bioregional endemic Disjunct population Limit of Range	14, 18	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
Aristolochia chalmersii (*Aristolochiaceae)*	-	-	Bioregional endemic Disjunct population Limit of Range	2, Cl/Re	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population on coastal dune complexes very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
					Sea level rise	Loss/reduction of habitat, and loss of individuals.	Restricted habitat and population may be impacted by rising sea levels. Watching brief to ensure stronghold populations retained in the region.
Uvaria rufa (Annonaceae)	-	-	Locally Rare Disjunct population	2	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
Haplostichanthus fruticosus (Annonaceae)	-	-	Bioregional endemic Disjunct population Limit of Range	1, 2, 4	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
Miliusa traceyi (Annonaceae)	-	-	North Australian endemic Disjunct population Limit of Range	1, 14	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.
Syzygium bungadinnia (Myrtaceae)	-	-	Bioregional endemic Disjunct population Limit of Range Locally restricted	1, 4	Inappropriate fire regimes.	Potential habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region.
					Weed Invasion	Habitat degradation and loss of individuals.	Habitat and population very restricted on the island.

Species	National EPBC	State NC Act	Regionally Significant	Habitat	Threat Name	Threat Impact	Threat Details
Triflorensia australis (Rubiaceae*)*	-	-	Disjunct population Limit of Range Locally restricted	2	Inappropriate fire regimes. Weed Invasion	Potential habitat degradation and loss of individuals. Habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region. Habitat and population very restricted on the island.
Arytera divaricata (Sapindaceae)	-	-	Disjunct population Limit of Range Locally restricted	1	Inappropriate fire regimes. Weed Invasion	Potential habitat degradation and loss of individuals. Habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region. Habitat and population very restricted on the island.
Lycianthes shanesii (Solanaceae)	-	-	Disjunct population Limit of Range Locally restricted	1	Inappropriate fire regimes. Weed Invasion	Potential habitat degradation and loss of individuals. Habitat degradation and loss of individuals.	Habitat and population very restricted on the island. Watching brief to ensure stronghold populations retained in the region. Habitat and population very restricted on the island.

Appendix D. Introduced Plants of Mabuiag

BOTANICAL NAME		**Common Name**	**Life Form**	**Habitat**	
Family	**Species**			**Remnant Vegetation (BVG)**	**Non Remnant (Disturbed)**
Acanthaceae	*Asystasia gangetica subsp. gangetica**	Chinese Violet	H	-	X
	Barleria cristata	Porcupine Flower	S		X
Agavaceae	*Agave vivipara var. vivipara*	Sisal hemp	S	-	X
Amaranthaceae	*Alternanthera brasiliana*	Purple Joyweed	H	-	X
	Amaranthus viridis	Green Amaranth	H	-	X
	Celosia argentea	Cockscomb	H	-	X
Anacardiaceae	*Anacardium occidentale*	Cashew	S	-	X
	Mangifera indica	Mango	T	1	X
Apocynaceae	*Catharanthus roseus*	Pink Periwinkle	H	-	X
Arecaceae	*Cocos nucifera*	Coconut	P	-	X
Asteraceae	*Acanthospermum hispidum*	Star Burr	H	-	X
	Aegeratum conyzoides	Purpletop	H	-	X
	Bidens bipinnata	Beggars Tick	H	-	X
	Eleutheranthera ruderalis	Ogiera	H	-	X
	Praxelis clematidea	Praxelis	H	-	X
	Tridax procumbens	Tridax Daisy		-	X
	Zinnia violacea	Elegant Zinnia	H	-	X
Bignoniaceae	*Tecoma stans var. stans*	Yellow Bells	S	-	X
Caesalpiniaceae	*Delonix regia*	Poinciana/Christmas Tree	T	-	X
	Senna alata	Ringworm Shrub	S	-	X
	Senna occidentalis	Coffee Bush	S	-	X
	Tamarindus indica	Tamarind	T	-	X
Caricaceae	*Carica papaya*	Paw Paw	S	-	X
Commelinaceae	*Commelina benghalensis*	Jio	H	-	X
Convolvulaceae	*Ipomoea hederifolia*	Scarlet Creeper	V	-	X
	Ipomoea quamoclit	Cupids Flower	V	-	X
Dioscoreaceae	*Dioscorea esculenta*	Lesser Yam	V	-	X

BOTANICAL NAME		**Common Name**	**Life Form**	**Habitat**	
Family	**Species**			**Remnant Vegetation (BVG)**	**Non Remnant (Disturbed)**
Euphorbiaceae	*Chamaesyce hirta*	Asthma Plant	H	-	X
	Euphorbia cyathophora	Painted Spurge	H	-	X
	Euphorbia heterophylla	Painted Spurge	H	-	X
	Manihot esculenta	Cassava	H	-	X
Fabaceae	*Alysicarpus vaginalis*	Alyce Clover	H	-	X
	Calopogonium mucunoides	Indian Calapo	V	-	X
	Centrosema molle	Centro	V	-	X
	Clittorea ternatea	Butterfly Pea	V	2, 14, 18	X
	Crotalaria pallida var. obovata	Streaked Rattlepod	S	-	X
	Desmodium tortuosum	Beggar Weed	H	-	X
	Macroptilium atropurpureum	Siratro	V	-	X
	Macroptilium lathyroides	Phasey Bean	V	-	X
	Mucuna pruriens var. utilis	Velvet Bean	V	-	X
	Stylosanthes hamata	Townsville stylo	H	14, 17, 18	X
Lamiaceae	*Clerodendrum thomsoniae*	Bleeding Heart Vine	S	-	X
	Hyptis suaveolens	Mintweed	H	2, 4, 14, 18	X
	Stachytarpheta jamaicensis	Snakeweed	H	-	X
Malvaceae	*Gossypium barbadense*	Cotton	S	-	X
	Sida acuta	Spiny headed Sida	H	-	X
Mimosaceae	*Mimosa pudica var. unijuga*	Sensitive Weed	H	-	X
Musaceae	*Musa sp.*	Banana	S	-	X
Passifloraceae	*Passiflora foetida*	Stinking Passionflower	V	2, 11, 14, 17	X
Phyllanthaceae	*Phyllanthus amarus*	Phyllanthus	H	-	X
Poaceae	*Arundo donax*	Giant Reed	G	13	
	Bambusa sp.	Bamboo	G	17	X
	Cenchrus echinatus	Mossman River Grass	G	-	X
	Chloris gayana	Rhodes Grass	G	-	X
	Chloris virgata	Purple Top Rhodes Grass	G	-	X
	Cynodon dactylon	Couch Grass	G	-	X
	Dactyloctenium aegyptium	Coast Finger Grass	G	-	X

BOTANICAL NAME		**Common Name**	**Life Form**	**Habitat**	
Family	**Species**			**Remnant Vegetation (BVG)**	**Non Remnant (Disturbed)**
	Digitaria ciliaris	Summer Grass	G	-	X
	Eleusine indica	Crowsfoot Grass	G	2	
	Melinis repens	Red Natal Grass	G	-	X
	Pennisetum pedicellatum subsp. unispiculum	Mission Grass	G	-	X
	Poaceae (DGF10547+)		G	-	X
	Rottboellia cochinchinensis	Itch Grass	G	-	X
	Urochloa mosambicensis	Sabi Grass	G	-	X
Polygonaceae	*Antipogon leptopus*	Coral Vine	V	-	X
Rubiaceae	*Spermacoce remota*	False Buttonweed	H	-	X
Scrophulariaceae	*Scoparia dulcis*	Bitter Broom	H	-	X
Solanaceae	*Physalis angulata*	Gooseberry	H	7	
Urticaceae	*Pilea microphylla*	Military Fern	F	-	X
Unknown	*Unknown garden shrub (DGF10546)*		S	-	X
Total Species					**70**

* denotes introduced species with known traditional and or contemporary use.

Appendix E. Preliminary List of Useful Wild Plants for Mabuiag Island

D.G. Fell & G. Hitchcock _6 December 2010 Version 2

Language Name Kala Lagau Ya	Common Name	Scientific Name	Life Form	Broad Use	Part Used	Broad Habitat
mumu	Finger Cherry	*Rhodomyrtus macrocarpa*	Shrub	Food	Edible fruit	Vine forest & thickets
abau	Noni Plum Rotten Cheesefruit	*Morinda citrifolia*	Shrub	Medicinal	Edible fruit	Vine forest & thickets, Paperbark open forests, community areas.
meke	Sea Almond	*Terminalia catappa*	Tree	Food	Outer skin of fruit eaten when ripe. Inner nut eaten when dry.	Community areas.
mipa	No Common Name	*Terminalia subacroptera*	Shrub or small tree	Food	Fleshy skin of small purplish-black fruit eaten when ripe.	Vine forest & thickets, Welchiodendron forests, woodlands & shrublands.
bomer	Corkscrew Palm	*Pandanus Spiralis*	Palm	Food Material	Kernel of individual fruit segments hammered out when dry and eaten. Leaves used for baskets etc.	Pandanus grasslands.
yarakakur	Peanut Tree	*Sterculia quadrifida*	Tall shrub to tree	Food	Nut flavoured seeds within a woody follicle are eaten	Vine forests & thickets.
weiba	Nonda Plum	*Parinari nonda*	Tree	Food	Outer flesh of fruit is eaten when fully ripe.	Open forests & woodlands.
kuper	White Apple	*Syzygium forte* subsp. *forte*	Tree	Food	Fleshy white fruit are eaten when ripe.	Vine forests.
kaway	Red Bush Apple or Lady Apple	*Syzygium suborbiculare*	Tree	Food	Fleshy red fruit eaten when ripe. A good shade tree.	Open forests & woodlands.
ubar	Wongai	*Manilkara kauki*	Tree	Food Material	Fruit are eaten. Strong timber favoured for carving. Seeds used for necklaces.	Vine forests & thickets.
duduam	Water Lily	*Nymphaea* sp.	Aquatic	Food	Ovaries of flower eaten.	Wetlands
mergey	Black Currant Bush	*Antidesma parviflora*	Shrub	Food	Small purplish-black fruit eaten (stains hands and mouth)	Vine forest & thickets, Welchiodendron forests, woodlands & shrublands.
uzu	Lockerbie Satin Ash	*Syzygium branderhorstii*	Shrub/Tree	Food	Fruit eaten. This plant grows in the wild on Mua, Erub, Dauan however is planted in domestic gardens.	Town
biiu	Mangrove	*Rhizophora [apiculata?]stylosa*	Tree	Food	Pod was eaten after processing (no longer consumed).	Mangroves
urgi	Yellow Plum	*Ximenia americana*	Shrub	Food	Fruit with yellowish flesh is eaten.	Edge of Mangroves
kuman	Native Grape	*Ampelocissus acetosa*	Vine	Food	Small black grape like fruits are eaten when ripe.	Vine forest & thickets, Welchiodendron forests, woodlands & shrublands.
dua	Tar Tree or Marking Nut Tree	*Semecarpus australiensis*	Tree	Food	Part of fruit is eaten. Part of fruit together with leaves and sap are	Vine forest & disturbed areas.

Language Name Kala Lagau Ya	Common Name	Scientific Name	Life Form	Broad Use	Part Used	Broad Habitat
					highly toxic causing inflammation.	
woeywi	Mango	*Mangifera indica**	Tree	Food	Fruit eaten.	Disturbed areas.
thuul	Hickory Wattle	*Acacia polystachya*	Tree	Material	Timber favoured for the making of dugong spears (whaps), building timber and firewood.	Welchiodendron forests, woodlands & shrublands.
TBD	Sandpaper Fig	*Ficus opposita*	Shrub	Food Material	Small fruit ripen black and are edible. Leaves rough and sandpapery.	Welchiodendron forests, woodlands & shrublands.
TBD	Ground Lily	*Crinum uniflorum*	Tuber	Food	The tuber is dug and is scraped tin preparation of a paste. Used like gasi.	
TBD	Dodder Laurel Devils twine	*Cassytha filiformis*	Vine	Food	Small fruit eaten as a snack when ripe.	Vine forest & thickets, Welchiodendron forests, woodlands & shrublands.
TBD	Wild Passionfruit	*Passiflora foetida**	Vine	Food	Small fruit eaten as a snack when ripe.	Welchiodendron forests, woodlands & shrublands, grasslands, Paperbark open forests, vine thickets, shrublands.
TBD	White Currant	*Flueggea virosa* subsp. *melanthesoides*	Shrub	Food	Small white fruit eaten as a snack when ripe.	Vine forest & thickets, Welchiodendron forests, woodlands & shrublands, grasslands.
TBD	Cedar Bay Cherry	*Eugenia reinwardtiana*	Shrub	Food	Small black fruit eaten as a snack when ripe.	Welchiodendron forests, woodlands & shrublands, vine thickets.
TBD	Gidee Gidee	*Abrus precatorius*	Vine	Material	Black and red seeds used for decorative purposes i.e. necklaces and bracelets.	Welchiodendron forests, woodlands & shrublands, vine thickets.
TBD	Little Gooseberry Tree	*Buchanania arborescens*	Tree	Food	Small black fruits eaten as a snack when ripe.	Vine forests & thickets.
TBD	Coral Tree	*Erythrina variegata*	Tree	Material	Glossy red seeds used for decorative purposes i.e. necklaces and bracelets.	Vine forests and thickets.
TBD	Coral Tree	*Erythrina insularis*	Tree	Material	Glossy red seeds used for decorative purposes i.e. necklaces and bracelets.	Vine forests and thickets.
TBD	Matchbox Bean	*Entada phaseoloides*	Vine	Material	Large flat glossy brown seeds used for dancing decorations and instruments in music.	Vine forests & thickets, mangroves edges.
TBD	Cottonwood Hibiscus	*Hibiscus tiliaceus*	Tree	Material	Fibrous bark used for fibre in tying and making of bags etc.	Coastal grasslands & mangrove edges.
TBD	Whip Vine	*Flagellaria indica*	Vine	Material	Cane like stems used for tying, binding and carrying fish.	Welchiodendron forests, woodlands & shrublands, vine forests & thickets, paperbark open forests.
TBD	Sisal hemp	*Agave vivipara* var. *vivipara**	Succulent shrub	Material	Leaves dried and processed for fibre used for decorative skirts.	Disturbed areas.
TBD	No common name	*Sesuvium portulacastrum*	Succulent	Feed	Fleshy leaves used for feeding	Coastal grasslands.

Language Name Kala Lagau Ya	Common Name	Scientific Name	Life Form	Broad Use	Part Used	Broad Habitat
			herb	(fattening pigs)	pigs.	
TBD	Cashew	*Anacardium occidentale**	Shrub	Food	Fruit eaten.	Disturbed areas.
TBD	No common name	*Tabernaemontana orientalis*	Shrub	Material (making shanghais)	Forks of small branches favoured for shanghai (slingshot) construction.	Vine forests & thickets.
TBD	Sea Trumpet	*Cordia subcordata*	Shrub/Tree	Material	Timber	Vine thickets (dunes), Coastal grasslands, edge of mangroves.
TBD	Ringworm shrub	*Senna alata**	Shrub	Medicinal	Decoction from leaves used for treatment of ringworms.	Disturbed areas.
TBD	Cycad	*Cycas* sp.	Shrub	Food	Seeds once used for food after processing.	Grasslands.
TBD	Yam	*Dioscorea esculenta*	Vine	Food	Tuber used for food.	Welchiodendron forests, woodlands & shrublands, vine thickets.
TBD	Yam	*Dioscorea transversa*	Vine	Food	Tuber used for food.	Welchiodendron forests, woodlands & shrublands, vine thickets.
TBD	Cassava	*Manilhot esculenta**	Shrub	Food	Tuber used for food.	Disturbed areas.
TBD	Sea Cabbage	*Scaevola taccada*	Shrub	Spiritual	Leaves broken off plant causes wind to blow strongly.	Coastal grasslands (seashore).
TBD	Broad leaved Ballart	*Exocarpos latifolius*	Shrub	Food	Small fruit eaten when ripe.	Welchiodendron forests, woodlands & shrublands, vine thickets.
TBD	Pemphis	*Pemphis acidula*	Shrub	Material	Timber used for firewood.	Mangrove margins.
TBD	Bamboo	*Bambusa vulgaris**	Bamboo	Material	Stems used for construction and various purposes.	
TBD	No Common name	*Arundo donax**	Tall grass	Material	Stems used for small spears.	
TBD	Tridax	*Tridax procumbens**	Annual herb	Medicinal	Decoction of leaves used for treating cuts and sores.	Disturbed areas.
TBD	Pacific Rosewood	*Thespesia populneoides*	Shrub/Tree	Material	Round fruit used for toys.	Mangrove margins.
TBD	Pacific Rosewood	*Thespesia populnea*	Shrub/Tree	Material	Round fruit used for toys.	Mangrove margins.

* denotes introduced species

Appendix F. Preliminary Flora Species List – Mabuiag Island, Torres Strait, Queensland.

D.G. Fell & D.J. Stanton 3D Environmental_6 December 2010 Version 2

Nomenclature follows Bostock & Holland (2010) 'Census of the Queensland Flora'.

* Denotes naturalised or doubtfully naturalised taxa according to Bostock & Holland (2010).

# Denotes culturally significant species

Unnamed taxa are followed by a collection number (i.e. DGF10153) pending formal identification at Qld Herbarium.

LIFE FORM

F	Fern
H	Herb
H(a)	Herb aquatic
O(e)	Orchid (epiphtye)
E	Epiphyte
V	Vine
S	Shrub
S/T	Shrub/Tree
T	Tree

BROAD VEGETATION GROUPS (BVG) (from Stanton, Fell & Gooding 2009)

1	Evergreen/Semi-evergreen vine forest and thicket
2	Deciduous/Semi deciduous vine forest and thicket
4	Closed forest, open forest and woodland dominated by *Welchiodendron longivalve*
7	Open forest dominated by Paperbark (*Melaleuca*)
11	Woodland and shrubland dominated by Pandanus
13	Woodland and shrubland dominated by Paperbark (*Melaleuca*)
14	Shrublands and shrubland complexes
17	Grasslands and grassland complexes
18	Rock pavements
24	Mangroves
B	Bamboo groves
Cl/Re	Cleared and heavily disturbed regrowth

SUMMARY

433 taxa (4 ferns, 429 angiosperms)
363 native
70 naturalised (16%)
103 families
257 genera

Major families (native)

Fabaceae 29 (7.8%)
Apocynaceae 21 (5.7%)
Rubiaceae 19 (5.1%)
Myrtaceae 16 (4.3%)
Cyperaceae 12 (3.2%)
Poaceae 12 (3.2%)
Phyllanthaceae 10 (2.7%)
Convolvulaceae 9 (2.4%)
Lamiaceae 9 (2.4%)
Sapindaceae 8 (2.2%)
Vitaceae 8 (2.2%)
Other 83%

PRELIMINARY FLORA SPECIES LIST – MABUIAG ISLAND, TORRES STRAIT, QUEENSLAND[12].

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
Pteridophytes	**(Ferns and fern allies)**														
Adiantaceae	*Cheilanthes tenuifolia*	F									1				1
	Doryopteris concolor	F			1										1
Polypodiaceae	*Drynaria quercifolia*	F	1	1	1				1		1			1	6
	Drynaria sparsisora	F		1											1
Plantae	**Conifers and Cycads**														
Cycadaceae	Cycas badensis. (DGF10541+, DGF10524+)	S					1		1						1
Angiosperms	**(Flowering Plants)**														
Acanthaceae	*Acanthus ilicifolius*	S										1			1
	Asystasia australasica	H		1					1						2
	*Asystasia gangetica subsp. gangetica**	H												1	1
	Brunoniella australis	H								1					1
	Hygrophila angustifolia	H												1	1
	Hygrophila sp. (DGF10153+)	H												1	1
	Hypoestes floribunda var. floribunda	H			1										1
	Pseuderanthemum variable	H							1						1
Agavaceae	*Agave vivipara var. vivipara*#*	S												1	1

[12] Species list valid up to December 2010.

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
Aizoaceae	*Sesuvium portulacastrum#*	H								1					1
Amaranthaceae	*Achyranthes aspera*	H												1	1
	*Alternanthera brasiliana**	H												1	1
	Alternanthera denticulata	H				1									1
	Amaranthus interruptus	H												1	1
	*Amaranthus viridis**	H												1	1
	*Celosia argentea**	H												1	1
Amaryllidaceae	*Crinum pedunculatum*	G	1												1
	Crinum uniflorum	G				1									1
	Proiphys amboinensis	G							1						1
Anacardiaceae	*Anacardium occidentale*#*	S												1	1
	Buchanania arborescens#	T	1		1						1				3
	Mangifera indica#*	T	1												1
	Semecarpus australiensis#	T		1										1	2
Annonaceae	*Haplostichanthus fruticosus* (Regionally Significant)	S	1	1	1										3
	Melodorum leichhardtii	V	1												1
	Miliusa traceyi (Regionally Significant)	T	1						1						2
	Uvaria rufa (Regionally Significant)	V		1											1
	Uvaria sp. (DGF8908+)	V			1										1
Apocynaceae	*Alyxia spicata*	V		1	1				1						3
	Apocynaceae (DGF10052=)	V		1											1
	*Catharanthus roseus**	H												1	1
	Cynanchum carnosum	V				1						1			2
	Dischidia major	V(e)			1										1
	Dischidia nummularia	V(e)			1									1	2
	Dischidia ovata	V(e)			1										1
	Dischidia sp. (DGF10053+)	V(e)			1										1
	Dischidia sp. (DGF10054+)	V(e)			1										1
	Dischidia sp. (DGF8905+)	V(e)			1										1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Gunnesia pepo (Regionally Significant)	V			1										1
	Gymnanthera oblonga	V										1			1
	Hoya australis subsp. sanae	V									1				1
	Hoya sp. (DGF8874+)	V							1						1
	Hoya sp. (DGF8897+)	V									1				1
	Hoya sp. (DGF8907+)	V		1	1										2
	Ichnocarpus frutescens	V			1				1		1				3
	Parsonsia sp. (=DGF8853+)	V			1										1
	Marsdenia sp. (DGF8872+)	V			1										1
	Sarcostemma viminale subsp. brunonianus	V		1							1				2
	Secamone elliptica	V	1	1											2
	Tabernaemontana orientalis	S	1												1
	Wrightia pubescens subsp. penicellata	S	1	1					1	1					4
	Wrightia versicolor	T	1												1
Araliaceae	*Polyscias elegans*	S	1												1
	Schefflera sp. (DGF8902+)	T(e)	1												1
Arecaceae	*Cocos nucifera**#*	P												1	1
Aristolochiaceae	*Aristolochia chalmersii* (Regionally Significant)	V		1											1
Asteraceae	*Acanthospermum hispidum**	H												1	1
	*Aegeratum conyzoides**	H												1	1
	*Bidens bipinnata**	H												1	1
	Cyanthillium cinereum	H					1								1
	Epaltes australis	H								1					1
	*Praxelis clematidea**	H												1	1
	Sigsbeckia orientalis	H								1					1
	*Tridax procumbens**													1	1
	*Zinnia violacea**	H												1	1
Avicenniaceae	*Avicennia marina subsp. eucalyptifolia*	T										1			1
Bignoniaceae	*Tecoma stans var. stans**	S												1	1
Bombacaceae	*Bombax ceiba var. leiocarpum#*	T		1	1				1						3

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Campnostemon shultzii	T										1			1
Boraginaceae	*Cordia subcordata#*	T								1					1
Burseraceae	*Canarium australianum*	T	1	1	1				1		1				5
	Garuga floribunda var. floribunda	T		1											1
Byblidaceae	*Byblis liniflora* (DGF9942+)	H			1					1					2
Caesalpiniaceae	*Caesalpinea bonduc*	S								1					1
	*Delonix regia**#*	T												1	1
	Maniltoa lenticellata var. lenticellata (Regionally Significant)	T	1												1
	*Senna alata**#*	S												1	1
	*Senna occidentalis**	S												1	1
	*Tamarindus indica**#*	T												1	1
Capparaceae	*Capparis quiniflora*	S	1	1					1						3
Caricaceae	*Carica papaya**#*	S												1	1
Celastraceae	*Elaeodendron melanocarpum*	S	1	1											2
	Euonymus australiana (Regionally Significant)	S	1												1
	Salacia chinensis	S	1												1
	Salacia disepala	S	1												1
Chenopodiaceae	*Salsola kali*	H								1					1
Chrysobalancaceae	*Maranthes corymbosa*	T	1		1										2
	Parinari nonda#	T	1		1			1	1	1					1
Cleomaceae	*Cleome viscosa*	H												1	1
Clusiaceae	*Calophyllum sil*	T	1		1										2
Cocholospermaceae	*Cochlospermum gillivraei#*	S		1	1				1	1	1				5
Combretaceae	*Lumnitzera racemosa*	S										1			1
	Terminalia catappa#	T												1	1
	Terminalia subacroptera#	S	1	1	1	1			1		1				6
Commelinaceae	*Commelina benghalensis**	H												1	1
	Commelina diffusa	H			1									1	2
	Cyanotis axillaris	H									1				1
	Murdannia graminea (DGF9960+)	H			1										1

BOTANICAL NAME		**Life Form**	**Broad Vegetation Group**												**No. of Habitats**
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
Convolvulaceae	*Convolvulaceae* (DGF8873+)	V		1	1										2
	Evolvulus alsinoides	H								1					1
	*Ipomoea hederifolia**	V												1	1
	Ipomoea mauritiana	V		1		1			1						3
	Ipomoea pes-capre subsp. brasliensis#	V								1					1
	*Ipomoea quamoclit**	V												1	1
	Ipomoea sp. (DGF10532+)	V								1					1
	Ipomoea sp. (DGF9946+)	V			1										1
	Jacquemontia paniculata var. paniculata	V			1										1
	*Merremia quinquefolia (*DGF9937)	V			1										1
	Operculina sp.	V								1					1
	Xenostegia tridentata	H									1				1
Cucurbitaceae	*Diplocyclos palmatus*	V			1										1
	Muellerargia timorensis	V		1											1
Cyperaceae	*Abildgaardia ovata*	G			1										1
	Bulbostylis barbata	G				1									1
	*Cyperaceae (*DGF10506+)	G										1			1
	Cyperaceae (DGF9953+)	G								1					1
	Cyperaceae (DGF9963+)	G			1										1
	Cyperaceae (DGF9964+)	G			1										1
	Cyperus aquatilis	G				1				1					2
	Cyperus sp. (DGF9941+)	G								1					1
	Fimbristylis sp.	G							1						1
	Gahnia aspera	G			1										1
	Schoenus sp. (DGF10519+)	G						1	1						2
	Scleria sphacelata	G								1					1
Dilleniaceae	*Dillenia alata*	T	1		1										2
Dioscoreaceae	*Dioscorea esculenta*#*	V			1										1
	Dioscorea sp.	V												1	1
	Dioscorea transversa#	V	1						1		1				3

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
Dracaenaceae	*Pleomele angustifolia*	S	1	1	1										3
Ebenaceae	*Diospyros compacta*	S									1				1
	Diospyros hebecarpa	T	1	1	1										3
	Diospyros sp. (Bamaga BP Hyland 2517) (Near-Threatened)	S	1		1										1
	Diospyros sp. (DGF10058+)	S	1												1
	Diospyros sp. (DGF10511+)	S	1		1										3
	Diospyros sp. (Mt White PI Forster PIF14415)	S		1	1				1						3
Elaeocarpaceae	*Elaeocarpus arnhemicus*	T	1		1										2
Erythroxylaceae	*Erythroxylum sp*. (Mosquito Pt JR Clarkson 9991+)[13] (Regionally Significant)	S							1		1				2
Euphorbiaceae	*Acalypha lanceolata*	H												1	1
	Breynia cernua	S			1										1
	*Chamaesyce hirta**	H												1	1
	Cleidion sp. (DGF8902+)	S	1		1										2
	Croton arnhemicus	S	1	1	1				1		1				5
	*Euphorbia cyathophora**	H												1	1
	*Euphorbia heterophylla**	H												1	1
	Euphorbia tannensis subsp. tannensis	H								1					1
	Excoecaria agollocha#	T		1								1			1
	Macaranga tanarius#	S	1		1										2
	Manihot esculenta#*	H												1	1
Fabaceae	*Abrus precatorius#*	V									1				1
	Aeschynomene indica	H			1										1
	*Alysicarpus vaginalis**	H												1	1
	*Calopogonium mucunoides**	V												1	1
	Canavalia cathartica	V					1								1
	Canavalia papuana	V				1		1							2
	*Centrosema molle**	V												1	1

[13] see DGF10055+, 10528+

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	*Clitorea ternatea**	V												1	1
	*Crotalaria pallida var. obovata**	S												1	1
	Crotalaria sp. (DGF8897+)	S						1							1
	*Crotalaria sp. (*Torres Strait J.R.Clarkson 2044)	S			1										1
	*Cullen badocanum (*DGF10542=)	S								1					1
	Dalbergia densa var. australis	V		1	1				1						3
	*Derris sp. (*check *D. rubrocalyx*)	V	1												1
	Derris trifoliata#	V		1								1			2
	Desmodium sp. (DGF10538+)	H			1		1			1					3
	*Desmodium tortuosum**	H												1	1
	Entada phaseoloides#	V		1											1
	Erythrina insularis#	T		1											1
	Erythrina variegata#	T	1												1
	Fabaceae vine (DGF10543+)	V											1		1
	Galactia tenuiflora	H								1					1
	Indigofera linifolia	H			1					1					2
	Indigofera polygaloides	H			1										1
	*Macroptilium atropurpureum**	V												1	1
	*Macroptilium lathyroides**	V												1	1
	Milletia pinnata	T	1	1											2
	Mucuna gigantea	V	1												1
	*Mucuna pruriens var. utilis**	V												1	1
	Mucuna sp. (DGF10529+)	V			1				1						2
	Rhynchosia minima var. australis	H												1	1
	*Stylosanthes hamata**	H												1	1
	Tephrosia filipes subsp. filipes	H			1										1
	Tephrosia juncea	H			1						1			1	3
	Tephrosia sp. (DGF8901+)	H						1							1
	Vigna marina	V								1					1
	Vigna radiata var. sublobata	V								1					1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Zornia muriculata subsp. muriculata	H								1					1
Flagellariaceae	*Flagellaria indica #*	V	1	1	1	1								1	5
Goodeniaceae	*Scaevola taccada #*	S								1					1
Haemodoraceae	*Haemodorum sp. (DGF10512+)*	G						1							1
Hemerocallidaceae	*Dianella caerulea s.l. (DGF9947+)*	G			1				1						2
Hugoniaceae	*Hugonia jenkinsii*	V	1		1										2
Johnsoniaceae	*Tricoryne anceps subsp. pterocaulon*	H			1						1				2
Lamiaceae	*Anisomeles malabrica*	H												1	1
	Clerodendrum inerme	S				1									1
	Clerodendrum longiflorum var. glabrum	S	1												1
	Clerodendrum sp. (DGF9943+)	S			1										1
	*Clerodendrum thomsoniae**	S												1	1
	Gmelina dalrympleana #	T			1	1									2
	Gmelina sp. (DGF10540+)	S									1				1
	*Hyptis suaveolens**	H		1	1				1					1	3
	Plectranthus scutellarioides	H												1	1
	Premna acuminata	S			1				1						2
	Premna serratifolia	S		1											1
	*Stachytarpheta jamaicensis**	H												1	1
Lauraceae	*Cassytha filiformis*	V			1			1	1						3
	Cassytha pubescens	V				1			1						2
	Cassytha sp. (DGF8915+)	V							1						1
	Cryptocarya exfoliata	S	1		1										2
	Endiandra glauca	T	1		1										2
	Litsea glutinosa	S	1		1										2
Laxmanniaceae	*Eustrephus latifolius*	V			1										1
Lecythidaceae	*Barringtonia asiatica (town planting only)*	T												1	1
	Planchonia careya	S								1					1
Loganiaceae	*Mitrasacme sp. (DGF10514+)*	H												1	1
Loranthaceae	*Loranthaceae (DGF8906+)*	M			1										1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
Lythraceae	*Pemphis acidula #*	S										1			1
	Sonneratia alba	T										1			1
	*Sonneratia sp. (*DGF10525+)	T										1			1
Malvaceae	*Gossypium barbadense**	S												1	1
	Hibiscus tiliaceus #	T		1								1			2
	*Malvaceae (*DGF10548+)*	S												1	1
	*Sida acuta**	H												1	1
	Sterculia quadrifida #	T		1											1
	Thespesia populnea	T								1					1
	Thespesia populneoides #	T		1								1			1
Melastomataceae	*Melastoma malabathricum subsp. malabathricum #*	S				1									1
	Memecylon pauciflorum var. pauciflorum	S	1	1	1										3
Meliaceae	*Aglaia eleagnoidea*	T	1		1										2
	Dysoxylum acutangulum subsp. foveolata (DGF8871+)	T	1		1										2
	Turraea pubescens	S	1		1				1						3
Menispermaceae	*Hypserpa decumbens*	V			1										1
	*Menispermaceae (*DGF10534+)	V	1												1
	Menispermaceae (DGF10537+)	V	1												1
	Pachygone ovata	V	1		1										2
	Stephania japonica var. timorense	V			1										1
Mimosaceae	*Acacia auriculiformis #*	T							1						1
	Acacia brassii	S			1			1	1		1				4
	Acacia humifusa	S							1						1
	Acacia leptocarpa	S				1									1
	Acacia polystachya #	T	1	1	1				1		1				5
	Acacia simsii	S			1				1						2
	Acacia sp. (DGF8868+)	S							1						1
	Acacia sp. (DGF8889+)	S									1				1
	Acacia sp. (DGF8893+)	S						1							1
	Acacia sp. (DGF9965+)	S			1										1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Cathormion umbellatum subsp. moniliforme	S		1						1					2
	*Mimosa pudica var. unijuga**	H												1	1
Moniminaceae	*Wilkiea rigidifolia*	S	1												1
Moraceae	*Antiaris sp.* (DGF8909+)	T	1												1
	Antiaris toxicarya var. macrophylla	T	1	1											2
	Ficus aculeata	S	1												1
	Ficus obliqua	T		1											1
	Ficus microcarpa var. microcarpa	S	1												1
	Ficus superba var. henneana	T	1												1
	Streblus brunonianus	S	1	1											2
	Trophis scandens subsp. scandens #	V	1												1
Musaceae	*Musa sp.**	S												1	1
Myristicaceae	*Myristica insipida*	T	1												1
Myrsinaceae	*Aegiceras corniculatum*	S										1			1
Myrtaceae	*Asteromyrtus brassii*	S							1						1
	Eugenia reinwardtiana #	S		1					1						2
	Lithomyrtus obtusa	S							1		1				2
	Lithomyrtus retusa	S			1				1		1				3
	Melaleuca saligna (Regionally Significant)	T				1	1			1					3
	Melaleuca sp.	S							1						1
	*Melaleuca sp. (*DGF10522+)	S							1						1
	Melaleuca viridiflora	S					1	1	1	1					4
	Osbornia octodonta	S										1			1
	Rhodamnia australis (Regionally Significant)	S	1	1											2
	Rhodomyrtus macrocarpa #	S	1	1	1										3
	Syzygium angophoroides	T			1										1
	Syzygium bungadinnia (Regionally Significant)	T	1		1										2
	Syzygium forte subsp. forte #	T	1		1										2
	Syzygium suborbiculare #	T		1	1										2

BOTANICAL NAME		**Life Form**	**Broad Vegetation Group**												**No. of Habitats**
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
	Welchiodendron longivalve #	T			1			1	1		1				4
Nyctaginaceae	*Boerhavia dominii*	H								1					1
Nyphaeaceae	*Nymphaea sp. (*see DF image)	H(a)												1	1
Olacaceae	*Ximenia americana #*	S		1											1
Oleaceae	*Chionanthus ramiflora*	S	1		1				1		1				4
	Jasminum aemulum	V	1	1											2
	Notelaea longifolia	S		1	1						1				3
Onagraceae	*Lugwigia octovalvis*	H			1										1
Opiliaceae	*Opilia armentacea*	V	1	1	1										3
Orchidaceae	*Dendrobium discolor*	O	1	1	1										3
	Dendrobium x superbiens (Vulnerable)	O									1				1
	Dendrobium sp.	O												1	1
	Orchidaceae (DGF10057+)	O									1				1
Pandanaceae	*Pandanus conicus #*	P					1	1							2
	Pandanus sp. #	P		1		1	1	1	1	1					6
Passifloraceae	*Passiflora aurantia var. aurantia*	V			1										1
	Passiflora foetida #*	V		1			1		1	1				1	5
Phyllanthaceae	*Actephila venusta (Regionally Significant)*	S	1												1
	Antidesma parviflora #	V							1						1
	Breynia oblongifolia	S			1										1
	Bridelia tomentosa	S									1				1
	Cleistanthus peninsularis	S	1	1	1				1		1				5
	Flueggea virosa subsp. melanthesioides #	S			1										1
	Glochidion disparipes	S			1										1
	Glochidion sp. (DGF10045+)	S							1						1
	*Phyllanthus amarus**	H												1	1
	Phyllanthus novae-hollandiae	S			1				1						2
	Phyllanthus sp.	H							1						1
Plumbaginaceae	*Aegialitis annulata*	S										1			1
Poaceae	*Alloteropsis semialata*	G							1						1

BOTANICAL NAME		**Life Form**	**Broad Vegetation Group**												**No. of Habitats**
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
	*Aristida sp. (*DGF9987+)	G							1	1					2
	Arundinella nepalensis	G								1					1
	Arundinella setosa	G								1					1
	Arundo donax #*	G						1							1
	Bambusa sp. #*	G								1				1	2
	*Cenchrus echinatus**	G												1	1
	Cenchrus elymoides var. brevisetosus	G								1					1
	*Chloris gayana**	G												1	1
	*Chloris virgata**	G												1	1
	Cymbopogon ambiguus	G								1					1
	Cymbopogon sp. (DGF9962+)	G			1										1
	*Cynodon dactylon**	G												1	1
	*Dactyloctenium aegyptium**	G												1	1
	*Eleusine indica**	G		1											1
	Eragrostis sp. (DGF9959+)	G			1										1
	Heteropogon contortus	G								1				1	2
	Heteropogon triticeus	G			1		1	1	1	1	1			1	7
	Imperata cylindrica	G					1	1						1	3
	Ischaemum australe	G				1	1	1		1					4
	Ischaemum fragile	G								1					1
	Ischaemum polystachyum	G								1					1
	*Melinis repens**	G												1	1
	Oplismenus aemulus	G	1												1
	Panicum mindanaense	G							1	1				1	3
	Panicum seminundum	G								1					1
	*Pennisetum pedicellatum subsp. unispiculum**	G												1	1
	Phragmites karka #	G												1	1
	Poaceae (DGF10547+)*	G												1	1
	Poaceae (DGF8898+)	G						1							1
	Poaceae (DGF9950+)	G			1										1

BOTANICAL NAME		**Life Form**	**Broad Vegetation Group**												**No. of Habitats**
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
	*Poaceae (*DGF9951+)	G			1										1
	*Rottboellia cochinchinensis**	G												1	1
	Sarga plumosum	G						1			1				2
	Schizachyrium fragile	G							1		1				2
	Sorghum nitidum forma nitidum	G			1					1					2
	Spinifex longifolius	G								1					1
	Thaumastochloa sp.	G							1		1				2
	Themeda arguens	G		1	1					1				1	4
	Themeda triandra	G			1			1	1	1					4
	Thuarea involuta	G								1					1
	*Urochloa mosambicensis**	G												1	1
	Urochloa piligera	G				1									1
	Unknown grass	G		1											1
Polygonaceae	*Antipogon leptopus**	V												1	1
Putrangivaceae	*Drypetes deplanchei*	S/T	1	1	1				1						4
Rhamnaceae	*Alphitonia excelsa*	S/T			1						1				2
	Colubrina asiatica	S								1					1
	Zizyphus oenopolia	S							1		1				2
Rhizophoraceae	*Bruguiera exaristata*	T										1			1
	Bruguiera gymnorhiza	T										1			1
	Bruguiera parviflora	S										1			1
	Carallia brachiata	T	1		1										2
	Rhizophora apiculata	T										1			1
	Rhizophora stylosa	T										1			1
	Rhizophora sp. (DGF10527+)	T										1			1
Rubiaceae	*Aidia racemosa*	T	1												1
	Cyclophyllum maritimum	S	1	1	1										3
	Guettarda speciosa	T		1											1
	Hydnophytum moseleyanum	E			1										1
	Ixora timorensis	S							1						1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Morinda citrifolia #	S												1	1
	Morinda reticulata	V			1										1
	Mymecodia platyptera subsp. antoinii	E			1										1
	Pavetta brownii var. brownii	S		1											1
	Pogonolobus reticulatus	S			1				1						2
	Psychotria coelospermum	S		1											1
	*Psychotria sp. (*DGF10509+)	S			1										1
	Psychotria sp. (DGF8885+)	S	1		1										2
	Psydrax banksii	S	1	1							1				3
	Psydrax reticulata (Vulnerable)	S		1	1				1		1				4
	*Psydrax sp. (*DGF10059+)	S	1												1
	Psydrax sp. (DGF8884+)	S			1										1
	Spermacoce papuana	H								1					1
	*Spermacoce remota**	H												1	1
	Triflorensia australis (Regionally Significant)	S		1											1
Rutaceae	*Allophylus cobbe*	S	1												1
	Glycosmis trifoliata	S		1											1
	Melicope peninsularis	T	1	1	1										3
	Micromelum minutum	S	1	1											2
	Murraya ovatifoliolata	S							1						1
	Zanthoxylum parviflorum	T							1						1
Santalaceae	*Exocarpos latifolius #*	S		1	1				1		1				4
Sapindaceae	*Arytera bifoliolata*	S	1	1	1										3
	Arytera divaricata (Regionally Significant)	T	1												1
	Cupaniopsis anacardioides	T	1	1										1	3
	Dodonaea polyandra	S			1										1
	*Dodonaea sp. (*DGF10503+)	S			1				1						2
	*Dodonaea sp. (*DGF8867+)	S							1		1				2
	Dodonaea viscosa subsp. viscosa	S			1										1

BOTANICAL NAME		Life Form	Broad Vegetation Group												No. of Habitats
Family	Species		1	2	4	7	11	13	14	17	18	24	B	Cl/Re	
	Ganophyllum falcatum	T	1	1											2
Sapotaceae	*Manilkara kauki* #	T	1	1					1						3
	Pouteria obovata	T	1												1
	Pouteria obovoidea	T	1												1
	Pouteria sericea	S/T	1	1	1										3
Scrophulariaceae	*Scoparia dulcis**	H												1	1
Simaroubiaceae	*Harrisonia brownii*	S			1										1
Smilacaceae	*Smilax australis*	V	1	1	1										3
	Smilax calophylla	V	1												1
	Smilax sp.	V		1					1						2
Solanaceae	*Lycianthes shanesii* (Regionally Significant)	S	1												1
	Physalis angulata *	H				1									1
Sparmanniaceae	*Grewia oxyphylla*	S	1	1											2
Sterculiaceae	*Heritiera littoralis*	T			1										1
	Sterculia quadrifida #	T	1	1	1				1		1				5
Taccaceae	*Tacca leontopetaloides*	G			1										1
Thymeliaceae	*Phaleria octandra*	S	1		1										2
Ulmaceae	*Trema tomentosa*	S			1										1
Urticaceae	*Pilea microphylla*	H												1	1
Violaceae	*Hybanthus enneaspermus*	H								1					1
	Hybanthus sp. (DGF9997)	H								1					1
Vitaceae	*Ampelocissus acetose* #	V	1		1		1								3
	Cayratia maritima	V								1					1
	Cayratia sp. (DGF9938)	V			1										1
	Cissus adnata	V			1				1						2
	Cissus opaca	V		1							1				2
	Cissus repens	V			1										1
	*Cissus sp. (*trifoliate serrate)	V				1									1
	*Vitaceae (*DGF10064)	V	1												1
Zingiberaceae	*Alpinia sp.*	G												1	1

BOTANICAL NAME		**Life Form**	**Broad Vegetation Group**												**No. of Habitats**
Family	***Species***		**1**	**2**	**4**	**7**	**11**	**13**	**14**	**17**	**18**	**24**	**B**	**Cl/Re**	
	Zingiber zerumbet #	G			1										1
	Curcuma australasica	G			1										1
Zygophyllaceae	*Tribulus cistoides*	H												1	1
Unknown	*Trifoliate Vine (*DGF10063)	V	1												1
	Unknown garden shrub (DGF10546)*	S												1	1
	Buchnera linearis (DGF9945+)	H			1										1
Total species recorded per habitat			**97**	**82**	**143**	**20**	**13**	**20**	**75**	**59**	**44**	**22**	**1**	**92**	
Total native species per habitat			**95**	**79**	**142**	**20**	**11**	**19**	**74**	**57**	**44**	**22**	**0**	**22**	
Total naturalised species per habitat			**2**	**3**	**1**	**0**	**2**	**1**	**1**	**2**	**0**	**0**	**1**	**70**	

Appendix G. Terrestrial Fauna Species List For Mabuiag Island and Surrounding Islets

Family	*Species*	Common Name	Status			Mabuiag Records	Language Name[14]
AMPHIBIANS			**EPBC**	**NC Act**	**BoT**		
Myobatrachidae	*Limnodynastes ornatus*	Ornate Burrowing Frog		LC		Qld Museum (QM J87218; QM J87338; QM J87353)	Kutube or Kut
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		Australian Museum, Qld Museum (QM J87352) (Mabuiag), WildNet & unpublished records.	Kutube or Kut
Hylidae	*Litoria gracilenta*	Dainty Green Tree Frog		LC			
Hylidae	*Litoria infrafrenata*	White-lipped Tree Frog		LC		Unpublished record (Call heard on Mabuiag, G. Hitchcock pers. comm.))	
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.						
Ranidae	*Rana daemeli*	Wood Frog		LC			
Bufonidae	*Rhinella marina*	Cane Toad		I			
REPTILES							
Crocodylidae	*Crocodylus porosus*	Salt-water Crocodile	M	V		Unpublished record (G. Hitchcock pers. obs., Community information), photograph.	Koedal
Gekkonidae	*Cyrtodactylus louisiadensis*	Ring-tailed Gecko		LC			
Gekkonidae	*Gehyra baliola*	Short-tailed Dtella		LC			Sis or Teybak
Gekkonidae	*Gehyra dubia*	Dubious Dtella		LC		WildNet record.	Sis or Teybak

[14] Source: Watson & Hitchcock in press

Gekkonidae	*Gehyra variegata*	Tree Dtella		LC		Australian Museum record.	
Gekkonidae	*Hemidactylus frenatus*	House Gecko		I		WildNet & unpublished records. Australian Museum record.AMS R 48571, Qld Museum record QM J87339.	Sis or Teybak
Gekkonidae	*Heteronotia binoei*	Bynoe's Gecko		LC			
Gekkonidae	*Lepidodactylus lugubris*	Mourning Gecko		LC			
Gekkonidae	*Lepidodactylus pumilis*	Slender Chained Gecko		NT			
Gekkonidae	*Nactus eboracensis*	no common name		LC			
Gekkonidae	*Nactus 'pelagicus'*	Pelagic Gecko		LC			
Gekkonidae	*Oedura rhombifer*	Zigzag Velvet Gecko		LC			
Gekkonidae	*Pseudothecadactylus australis*	Giant Tree Gecko		LC			
Pygopodidae	*Lialis burtonis*	Burton's Snake-lizard		LC		WildNet & unpublished records. Pulu.	Su
Scincidae	*Bellatorias frerei*	Major Skink		LC		Photograph (Kuikusagai or Redfruit Island), WildNet & unpublished records.	Auarrpathaithabu
Scincidae	*Carlia coensis*	Coen Rainbow-skink		LC		Australian Museum record.	
Scincidae	*Carlia longipes*	Closed-litter Rainbow-skink		LC		WildNet & unpublished records. Qld museum QM J87348 (Pulu)	Moegay
Scincidae	*Carlia quinquecarinata*	no common name		LC			
Scincidae	*Carlia sexdentata*	no common name		LC		WildNet record. Qld Museum record QM J87342; QM J87536 Mabuiag	
Scincidae	*Carlia storri*	Brown Bicarinate Rainbow-skink		LC			
Scincidae	*Cryptoblepharus litoralis litoralis*	Supralittoral Shinning-skink		LC		WildNet & unpublished records. Qld Museum QM J87345 (Pulu)	
Scincidae	*Cryptoblepharus virgatus*	Cream-striped Shinning-skink		LC		Australian Museum, AMS R 48564-7; Qld museum records QM J87341 (Mabuiag); QM J87343-4 (Pulu); WildNet & unpublished records.	Moegay
Scincidae	*Ctenotus inornatus*	Bar-shouldered Ctenotus		LC			
Scincidae	*Ctenotus robustus*	Robust Ctenotus		LC		Unpublished record.	
Scincidae	*Ctenotus spaldingi*	Straight-browed Ctenotus		LC		Australian Museum. Qld Museum records QM J87350; QM J87533 (Mabuiag). & unpublished records.	Ziziruk
Scincidae	*Emoia atrocostata*	Littoral Whiptail-skink		NT			
Scincidae	*Emoia longicauda*	Shrub Whiptail-skink		LC		Qld Museum record QM J89282 (Mabuiag), Unpublished record.	

Scincidae	*Eremiascincus pardalis*	Lowlands Bar-lipped Skink		LC			
Scincidae	*Eugongylus rufescens*	Bar-lipped Sheen-skink		LC		Qld Museum record QM J87534 (Mabuiag) Unpublished record.	
Scincidae	*Glaphyromorphus crassicaudus*	Cape York Mulch-skink		LC		Australian Museum & unpublished records.	
Scincidae	*Glaphyromorphus nigricaudis*	Black-tailed Bar-lipped Skink		LC			
Scincidae	*Glaphyromorphus pumilis*	Dwarf Mulch-skink		LC			
Scincidae	*Lygisaurus macfarlani*	Translucent Litter-skink		LC		Australian Museum, AMS R 48562 (Mabuiag); Qld Museum QM J87347 (Pulu), WildNet & unpublished records.	Moegay
Agamidae	*Lophognathus temporalis*	Swamplands Lashtail		LC			
Agamidae	*Chlamydosaurus kingii*	Frilled Lizard		LC			
Agamidae	*Diporiphora bilineata*	Two-lined Dragon		LC		Unpublished record. Community Information.	
Varanidae	*Varanus gouldii*	Gould's Goanna		LC			
Varanidae	*Varanus indicus*	Mangrove Monitor		LC		Photograph (Mabuiag)	
Varanidae	*Varanus mertensi*	Mertens' Water Monitor		LC			
Varanidae	*Varanus panoptes*	Yellow-spotted Monitor		LC		Qld Museum QM J87337 (Mabuiag), Unpublished record.	Karum
Varanidae	*Varanus prasinus*	Emerald Monitor		NT		Unpublished record.	
Varanidae	*Varanus scalaris*	Spotted Tree Monitor		LC		Australian Museum AMS R 48581; Photograph (Pulu) & unpublished records.	Thamay
Varanidae	*Varanus tristis*	Black-tailed Monitor		LC			
Typhlopidae	*Ramphotyphlops braminus*	Flowerpot Blind Snake		I			
Typhlopidae	*Ramphotyphlops leucoproctus*	Cape York Blind Snake		LC		Qld Museum QM J87535 (Mabuiag). Unpublished record.	
Typhlopidae	*Ramphotyphlops polygrammicus*	North-eastern Blind Snake		LC			
Boidae	*Antaresia cf childreni*	Children's Python		LC			
Boidae	*Antaresia maculosa*	Spotted Python		LC		Unpublished record.	
Boidae	*Liasis fuscus*	Water Python		LC			
Boidae	*Morelia amethistina*	Amethyst Python		LC		WildNet & unpublished records. Hitchcock pers. obs. 2009 (Mabuiag).	Thabu
Boidae	*Morelia kinghorni*	Scrub Python		LC			

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			
Colubridae	*Dendrelaphis* sp.	tree snake species				Unpublished record.	
Colubridae	*Stegonotus cucullatus*	Slaty-grey Snake		LC			
Colubridae	*Stegonotus parvus*	Slate-brown Snake		LC			
Elapidae	*Acanthophis praelongus*	Northern Death Adder		LC			
Elapidae	*Demansia vestigiata*	Black Whipsnake		LC			
Elapidae	*Furina tristis*	Brown-headed Snake		LC			
Elapidae	*Pseudechis papuanus*	Papuan Black Snake		LC			
BIRDS							
Megapodiidae	*Alectura lathami*	Australian Brush-turkey		LC			
Megapodiidae	*Megapodius reinwardt*	Orange-Footed Scrubfowl		LC		Unpublished record. Fell pers. obs. 2009 Widul Is.	Surka
Phasianidae	*Coturnix ypsilophora*	Brown Quail		LC			
Anseranatidae	*Anseranas semipalmata*	Magpie Goose		LC		Unpublished record.	
Anatidae	*Dendrocygna guttata*	Spotted Whistling-Duck		LC			
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		Draffan et al. (1983), Unpublished record.	Ad [general name for ducks]
Podicipedidae	*Tachybaptus novaehollandiae*	Australasian Grebe		LC			
Columbidae	*Columba livia*	Rock Dove		I			
Columbidae	*Chalcophaps indica*	Emerald Dove		LC			
Columbidae	*Geopelia striata*	Peaceful Dove		LC			
Columbidae	*Geopelia humeralis*	Bar-shouldered Dove		LC		WildNet, published & unpublished records.	Kuduluk
Columbidae	*Ptilinopus magnificus*	Wompoo Fruit-Dove		LC		Unpublished record.	
Columbidae	*Ptilinopus superbus*	Superb Fruit-Dove		LC			

Columbidae	*Ptilinopus regina*	Rose-crowned Fruit-Dove		LC		Unpublished record.	
Columbidae	*Ptilinopus iozonus*	Orange-Bellied Fruit-Dove		LC			
Columbidae	*Ducula mullerii*	Collared Imperial-Pigeon		LC			
Columbidae	*Ducula bicolor*	Pied Imperial-Pigeon		LC		WildNet, published & unpublished records.	Goeynaw
Columbidae	*Lopholaimus antarcticus*	Topknot Pigeon		LC			
Podargidae	*Podargus strigoides*	Tawny Frogmouth		LC			
Podargidae	*Podargus papuensis*	Papuan Frogmouth		LC			
Eurostopodidae	*Eurostopodus mystacalis*	White-throated Nightjar		LC		Unpublished record.	Roega
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			
Apodidae	*Hirundapus caudacutus*[5]	White-throated Needletail	M	LC		Predicted by the EPBC Protected Matters Search Tool	
Apodidae	*Mearnsia novaeguineae*	Papuan Spine-tailed Swift		LC			
Apodidae	*Apus pacificus*	Fork-tailed Swift	M	LC		Unpublished record.	
Apodidae	*Apus affinis*	House Swift		LC			
Anhingidae	*Anhinga novaehollandiae*	Australasian Darter		LC		Unpublished record.	
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		Unpublished record.	
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican		LC		WildNet, Stanton & Fell pers. obs. 2007 + photograph	Awai
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			
Ardeidae	*Ardea modesta*[6]	Eastern Great Egret	M	LC		Unpublished record.	Karbai ?
Ardeidae	*Ardea intermedia*	Intermediate Egret		LC		Unpublished record.	Karbai ?
Ardeidae	*Ardea sumatrana*	Great-billed Heron		LC			
Ardeidae	*Ardea ibis*[7]	Cattle Egret	M	LC		Unpublished record.	Karbai ?
Ardeidae	*Butorides striata*	Striated Heron		LC		WildNet & unpublished records.	
Ardeidae	*Egretta picata*	Pied Heron		LC		Published (Draffan et al. 2003) & unpublished records.	Kiapit
Ardeidae	*Egretta novaehollandiae*	White-faced Heron		LC			
Ardeidae	*Egretta garzetta*	Little Egret		LC			
Ardeidae	*Egretta sacra*	Eastern Reef Egret	M	LC		WildNet, Published (Draffan et al. 2003) & unpublished records.	Karbai ?
Ardeidae	*Nycticorax caledonicus*	Nankeen Night-Heron		LC		WildNet & unpublished records.	Gawt ?
Threskiornithidae	*Plegadis falcinellus*	Glossy Ibis	M	LC			
Threskiornithidae	*Threskiornis molucca*	Australian White Ibis		LC		Unpublished record.	Bukari
Threskiornithidae	*Threskiornis spinicollis*	Straw-necked Ibis		LC		Unpublished record.	Bukari
Threskiornithidae	*Platalea regia*	Royal Spoonbill		LC		Unpublished record.	
Accipitridae	*Pandion cristatus*[8]	Eastern Osprey	M	LC			
Accipitridae	*Elanus axillaris*	Black-shouldered Kite		LC		Unpublished record.	
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard		LC			
Accipitridae	*Aviceda subcristata*	Pacific Baza		LC			
Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	M	LC		WildNet & unpublished records.	Ngagalaig
Accipitridae	*Haliastur sphenurus*	Whistling Kite		LC			
Accipitridae	*Haliastur indus*	Brahminy Kite		LC			
Accipitridae	*Milvus migrans*	Black Kite		LC			
Accipitridae	*Accipiter fasciatus*	Brown Goshawk		LC		Unpublished record.	
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*	Red Goshawk	V	E	high		

	radiatus						
Accipitridae	*Aquila gurneyi*	Gurney's Eagle		LC			
Falconidae	*Falco cenchroides*	Nankeen Kestrel		LC			
Falconidae	*Falco berigora*	Brown Falcon		LC			
Falconidae	*Falco longipennis*	Australian Hobby		LC		Unpublished record.	Awb ?
Falconidae	*Falco peregrinus*	Peregrine Falcon		LC			
Gruidae	*Grus rubicunda*	Brolga		LC			
Rallidae	*Porphyrio porphyrio*	Purple Swamphen		LC		Unpublished record.	Milu
Rallidae	*Eulabeornis castaneoventris*	Chestnut Rail		LC			
Rallidae	*Rallina tricolor*	Red-necked Crake		LC			
Rallidae	*Gallirallus philippensis*	Buff-banded Rail		LC		WildNet & unpublished records.	
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			
Rallidae	*Amaurornis moluccana*	Pale-vented Bush-hen		LC			
Otididae	*Ardeotis australis*	Australian Bustard		LC			
Burhinidae	*Burhinus grallarius*	Bush Stone-curlew		LC			
Burhinidae	*Esacus magnirostris*	Beach Stone-curlew		V	high	Unpublished record.	
Haematopodidae	*Haematopus longirostris*	Australian Pied Oystercatcher		LC		Unpublished record.	
Haematopodidae	*Haematopus fuliginosus*	Sooty Oystercatcher		NT			
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt		LC		Unpublished record.	
Charadriidae	*Pluvialis fulva*	Pacific Golden Plover	M	LC		WildNet & unpublished records.	
Charadriidae	*Pluvialis squatarola*	Grey Plover	M	LC		Published record.	
Charadriidae	*Charadrius ruficapillus*	Red-capped Plover		LC			
Charadriidae	*Charadrius bicinctus*	Double-banded Plover	M	LC			
Charadriidae	*Charadrius mongolus*	Lesser Sand Plover	M	LC		WildNet, published & unpublished records.	
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover	M	LC		WildNet & unpublished records.	
Charadriidae	*Erythrogonys cinctus*	Red-kneed Dotterel		LC			
Charadriidae	*Vanellus miles*	Masked Lapwing		LC		WildNet, published & unpublished records.	Kerkere
Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	M	LC		Predicted by the EPBC Protected Matters	

						Search Tool	
Scolopacidae	*Gallinago megala*	Swinhoe's Snipe	M	LC			
Scolopacidae	*Limosa limosa*	Black-tailed Godwit	M	LC			
Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	M	LC			
Scolopacidae	*Numenius minutus*	Little Curlew	M	LC			
Scolopacidae	*Numenius phaeopus*	Whimbrel	M	LC		WildNet, published & unpublished records.	Kalu ?
Scolopacidae	*Numenius madagascariensis*	Eastern Curlew	M	NT		WildNet record.	
Scolopacidae	*Xenus cinereus*	Terek Sandpiper	M	LC		Unpublished record.	
Scolopacidae	*Actitis hypoleucos*[9]	Common Sandpiper	M	LC		WildNet record.	
Scolopacidae	*Tringa brevipes*[10]	Grey-tailed Tattler	M	LC		WildNet & unpublished records.	
Scolopacidae	*Tringa incana*[11]	Wandering Tattler	M	LC			
Scolopacidae	*Tringa nebularia*	Common Greenshank	M	LC		Published & unpublished records.	
Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	M	LC			
Scolopacidae	*Tringa glareola*	Wood Sandpiper	M	LC			
Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	M	LC		WildNet & unpublished records.	
Scolopacidae	*Calidris tenuirostris*	Great Knot	M	LC			
Scolopacidae	*Calidris canutus*	Red Knot	M	LC			
Scolopacidae	*Calidris alba*[12]	Sanderling	M	LC			
Scolopacidae	*Calidris ruficollis*	Red-necked Stint	M	LC		WildNet, published & unpublished records.	
Scolopacidae	*Calidris melanotos*	Pectoral Sandpiper	M	LC			
Scolopacidae	*Calidris acuminata*	Sharp-tailed Sandpiper	M	LC		Unpublished record.	
Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	M	LC		WildNet record.	
Turnicidae	*Turnix maculosus*	Red-backed Button-quail		LC		WildNet & unpublished records.	Gururu
Turnicidae	*Turnix pyrrhothorax*	Red-chested Button-quail		LC			
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	M	LC			
Glareolidae	*Stiltia isabella*	Australian Pratincole		LC		Unpublished record.	
Laridae	*Anous stolidus*	Common Noddy	M	LC		WildNet & unpublished records.	
Laridae	*Anous minutus*	Black Noddy		LC			
Laridae	*Onychoprion anaethetus*[13]	Bridled Tern	M	LC		WildNet record.	
Laridae	*Onychoprion fuscata*	Sooty Tern		LC		WildNet record.	
Laridae	*Sternula albifrons*[14]	Little Tern	M	E	high		
Laridae	*Gelochelidon nilotica*	Gull-billed Tern		LC		WildNet & unpublished records.	

Laridae	*Hydroprogne caspia*	Caspian Tern	M	LC		Unpublished record.	
Laridae	*Chlidonias hybrida*	Whiskered Tern		LC			
Laridae	*Chlidonias leucopterus*	White-winged Black Tern	M	LC		Unpublished record.	
Laridae	*Sterna dougallii*	Roseate Tern	M	LC			
	Sterna striata	White-fronted Tern		LC			
Laridae	*Sterna sumatrana*	Black-naped Tern	M	LC		WildNet, published & unpublished records.	Sara ?
Laridae	*Sterna hirundo*	Common Tern	M	LC			
Laridae	*Thalasseus bengalensis*[15]	Lesser Crested Tern	M	LC			
Laridae	*Thalasseus bergii*	Crested Tern		LC		WildNet & unpublished records.	Sara ?
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull		LC		WildNet, published & unpublished records.	Kekey
Cacatuidae	*Probosciger aterrimus*	Palm Cockatoo		NT			
Cacatuidae	*Eolophus roseicapilla*	Galah		LC			
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo		LC		Unpublished record.	
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet		LC			
Psittacidae	*Cyclopsitta* species	fig-parrot species					
Psittacidae	*Eclectus roratus*	Eclectus Parrot		LC			
Psittacidae	*Geoffroyus geoffroyi*	Red-cheeked Parrot		LC			
Cuculidae	*Centropus phasianinus*	Pheasant Coucal		LC			
Cuculidae	*Eudynamys orientalis*	Eastern Koel		LC		Published & unpublished records.	
Cuculidae	*Urodynamys taitensis*	Long-tailed Cuckoo				Unpublished record.	
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo		LC			
Cuculidae	*Chalcites basalis*	Horsfield's Bronze-Cuckoo		LC			
Cuculidae	*Chalcites osculans*	Black-eared Cuckoo		LC			
Cuculidae	*Chalcites lucidus*	Shining Bronze-Cuckoo		LC			
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		Published & unpublished records.	
Cuculidae	*Cuculus optatus*[16]	Oriental Cuckoo	M	LC			
Strigidae	*Ninox connivens*	Barking Owl		LC		Unpublished record.	
Strigidae	*Ninox novaeseelandiae*	Southern Boobook		LC			
Tytonidae	*Tyto longimembris*	Eastern Grass Owl		LC			
Alcedinidae	*Ceyx azureus*	Azure Kingfisher		LC			
Alcedinidae	*Ceyx pusilla*	Little Kingfisher		LC			
Halcyonidae	*Tanysiptera sylvia*	Buff-breasted Paradise-Kingfisher		LC			
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		Unpublished record.	
Halcyonidae	*Todiramphus sanctus*	Sacred Kingfisher		LC		Published & unpublished record.	Zaikas
Halcyonidae	*Todiramphus chloris*	Collared Kingfisher		LC		Unpublished record.	
Meropidae	*Merops ornatus*	Rainbow Bee-eater	M	LC		WildNet, published & unpublished records.	Birubiru
Coraciidae	*Eurystomus orientalis*	Dollarbird		LC		Unpublished record.	
Pittidae	*Pitta erythrogaster*	Red-bellied Pitta		LC			
Pittidae	*Pitta versicolor*	Noisy Pitta		LC			
Ptilonorhynchidae	*Ptilonorhynchus nuchalis*	Great Bowerbird		LC			
Acanthizidae	*Sericornis beccarii*	Tropical Scrubwren		LC			
Acanthizidae	*Gerygone levigaster*	Mangrove Gerygone		LC			
Acanthizidae	*Gerygone magnirostris*	Large-billed Gerygone		LC			
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			
Meliphagidae	*Manorina melanocephala*	Noisy Miner		LC			
Meliphagidae	*Ramsayornis modestus*	Brown-backed Honeyeater		LC		Published & unpublished records.	

Meliphagidae	*Conopophila albogularis*	Rufous-banded Honeyeater		LC			
Meliphagidae	*Myzomela obscura*	Dusky Honeyeater		LC			
Meliphagidae	*Myzomela erythrocephala*	Red-headed Honeyeater		LC			
Meliphagidae	*Cissomela pectoralis*	Banded Honeyeater		LC			
Meliphagidae	*Lichmera indistincta*	Brown Honeyeater		LC		WildNet & unpublished records.	
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*	Tawny-breasted Honeyeater		LC			
Pomatostomidae	*Pomatostomus temporalis*	Grey-crowned Babbler		LC			
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		LC		WildNet & unpublished records.	
Campephagidae	*Coracina papuensis*	White-bellied Cuckoo-shrike		LC		Unpublished record.	
Campephagidae	*Coracina lineata*	Barred Cuckoo-shrike		LC			
Campephagidae	*Coracina tenuirostris melvillensis*	(Melville) Cicadabird	M	LC		Predicted by the EPBC Protected Matters Search Tool	
Campephagidae	*Lalage tricolor*	White-winged Triller		LC			
Campephagidae	*Lalage leucomela*	Varied Triller		LC			
Pachycephalidae	*Pachycephala melanura*	Mangrove Golden Whistler		LC		Unpublished record.	
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			
Artamidae	*Artamus leucorynchus*	White-breasted Woodswallow		LC		Published (Draffen et al. 2003) & Unpublished record.	Poesay
Artamidae	*Artamus cinereus*	Black-faced Woodswallow		LC			
Artamidae	*Artamus minor*	Little Woodswallow		LC			

Artamidae	*Cracticus quoyi*	Black Butcherbird		LC			
Dicruridae	*Dicrurus bracteatus*	Spangled Drongo		LC		Unpublished record.	San
Rhipiduridae	*Rhipidura rufifrons*	Rufous Fantail	M	LC		Unpublished record.	
Rhipiduridae	*Rhipidura phasiana*	Mangrove Grey Fantail		LC			
Rhipiduridae	*Rhipidura rufiventris*	Northern Fantail		LC			
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail		LC			
Corvidae	*Corvus orru*	Torresian Crow		LC			
Monarchidae	*Myiagra ruficollis*	Broad-billed Flycatcher		LC		Unpublished record.	
Monarchidae	*Myiagra rubecula*	Leaden Flycatcher		LC		WildNet, published & unpublished records.	
Monarchidae	*Myiagra cyanoleuca*	Satin Flycatcher	M	LC		Unpublished record.	
Monarchidae	*Myiagra alecto*	Shining Flycatcher		LC		WildNet, published & unpublished records.	
Monarchidae	*Myiagra inquieta*	Restless Flycatcher		LC			
Monarchidae	*Monarcha melanopsis*	Black-faced Monarch	M	LC			
Monarchidae	*Monarcha frater*	Black-winged Monarch	M	LC		Predicted by the EPBC Protected Matters Search Tool	
Monarchidae	*Symposiarchus trivirgatus*[17]	Spectacled Monarch	M	LC		Predicted by the EPBC Protected Matters Search Tool	
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		WildNet, published & unpublished records.	
Acrocephalidae	*Acrocephalus australis*[18]	Australian Reed-Warbler	M	LC			
Megaluridae	*Megalurus timoriensis*	Tawny Grassbird		LC			
Timaliidae	*Zosterops citrinella*	Pale White-eye		LC		WildNet & unpublished records.	
Timaliidae	*Zosterops lateralis*	Silvereye		LC			
Hirundinidae	*Hirundo rustica*	Barn Swallow	M	LC		Predicted by the EPBC Protected Matters Search Tool	
Hirundinidae	*Hirundo neoxena*	Welcome Swallow		LC		Unpublished record.	

Hirundinidae	*Petrochelidon ariel*	Fairy Martin		LC			
Hirundinidae	*Petrochelidon nigricans*	Tree Martin		LC		Unpublished record.	
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		Unpublished record.	
Nectariniidae	*Nectarinia jugularis*	Olive-backed Sunbird		LC		WildNet, published & unpublished records.	Baimut or Mut
Estrildidae	*Poephila personata*	Masked Finch		LC			
Estrildidae	*Lonchura punctulata*	Nutmeg Mannikin		I			
Estrildidae	*Lonchura castaneothorax*	Chestnut-breasted Mannikin		LC		WildNet, published & unpublished records.	Baibai baimut
Passeridae	*Passer domesticus*	House Sparrow		I		Unpublished record.	
Motacillidae	*Motacilla* sp.	Yellow Wagtail species	M	LC			
Frigatidae	*Frigata minor*	Great Frigate Bird		LC		Unpublished record.	Waumer
Frigatidae	*Frigata ariel*	Lesser Frigate Bird		LC		Unpublished record.	Waumer
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	*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		Unpublished record.	Sapur
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			
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	*Taphozous australis*	Coastal Sheathtail Bat		V	high	Unpublished record. Published record for Pulu.	Ap
Molossidae	*Chaerephon jobensis*	Northern Freetail-bat		LC			
Molossidae	*Mormopterus beccarii*	Beccari's Freetail-bat		LC		Unpublished record.	
Vespertilionidae	*Chalinolobus nigrogriseus*	Hoary Wattled 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			
Muridae	*Conilurus penicillatus*	Brush-tailed Tree-rat	V	LC			
Muridae	*Hydromys chrysogaster*	Water-rat		LC			
Muridae	*Melomys burtoni*	Grassland Melomys		LC		Unpublished record. Qld Museum [Mabuiag Apr 09] x 4 – reg. nos pending; QM JM18926-27	
Muridae	*Melomys capensis*	Cape York Melomys		LC			
Muridae	*Melomys rubicola*	Bramble Cay Melomys	E	E	high		
Muridae	*Mus musculus*	House Mouse		I			
Muridae	*Pseudomys delicatulus*	Delicate Mouse		LC			
Muridae	*Rattus exulans*	Pacific Rat		I			
Muridae	*Rattus rattus*	Black Rat		I			
Canidae	*Canis lupus*	Dingo, Domestic Dog		I		Unpublished record.	Umay
Felidae	*Felis catus*	Cat		I		Unpublished record.	
Equidae	*Equus caballus*	Horse, Brumby		I		Unpublished record.	
Suidae	*Sus scrofa*	Pig		I		Unpublished record.	Burum

Bovidae	*Capra hircus*	Goat		I			
Cervidae	*Cervus timorensis*	Rusa Deer		I			

- 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; Conics 2008a, b; 2009a, b; 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, Ramble Cay, Erub (Darnley), Mer, Mabuiag, Iama (Yam), Mua, Badu, Possession, Thursday, Wednesday, Horn, Hammond and Prince of Wales Islands.
- 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.
- Nomenclature follows the Australian Faunal Directory maintained by DSEWPC. http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/index.html
- 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.
- Also listed under the EPBC Act as *Chaetura caudacuta* (ROKAMBA).
- 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).
- Listed under CAMBA as *Ardeola ibis*, listed under JAMBA as *Bubulcus ibis*.
- 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).
- Also listed under CAMBA and ROKAMBA as *Tringa hypoleucos*.
- Also listed under the Bonn Convention and JAMBA as *Heteroscelus brevipes*.
- Also listed under the Bonn Convention and JAMBA as *Heteroscelus incanus*.
- Also listed under ROKAMBA as *Crocethia alba*.
- Listed under the EPBC Act as *Sterna anaethetus* (CAMBA, JAMBA).

Appendix H. Profiles of Terrestrial Fauna Species Potentially Occurring on Mabuiag Island and Surrounding Islets

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 in 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 nearby Badu Island, and described it as an uncommon summer visitor throughout the Torres Strait. It has also been observed on Mua Island (T. Reis pers obs. March 2011). The species has yet to be reported for Mabuiag Island but is expected to occur.

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). Should the species be found on Mabuiag Island it is potentially threatened by native predators, flooding of nesting sites (including high tides), and adverse weather conditions only if breeding occurs.

Fawn Leaf-nosed Bat (Hipposideros cervinus)

NC Act: Vulnerable

Fawn leaf-nosed bat is also considered of 'High' priority under the Back on Track species prioritisation framework (DERM 2011a).

Fawn leaf-nosed bats occur in rainforest, gallery forest and open eucalypt forest. The species roosts in caves and mines in colonies mostly of 20 to 100 individuals and occasionally of up 900 individuals. Individuals are occasionally found roosting in buildings. Foraging occurs below the canopy and the species also forages around buildings and in open areas. Fawn leaf-nosed bats eat a variety of insects and move along well established pathways, often creeks and gullies (Churchill 2008; Pavey & Burwell 2008).

Fawn leaf-nosed bats are widespread in Malaysia, Indonesia, the Philippines, New Guinea and the western Pacific. In Australia it is restricted to Cape York Peninsula, north of Coen (Churchill 2008; Pavey & Burwell 2008). In the Torres Strait the fawn leaf-nosed bat is known from Thursday Island (WildNet database record) and there is a Queensland Museum record (reported in Conics 2008b) and four WildNet records (DERM 2010f) for Mua Island. The species is not known from Mabuiag Island but may occur in forests and woodlands, particularly along creeks with intact riparian vegetation.

Fawn leaf-nosed bats are threatened by roost destruction. It is believed that roost disturbance, habitat alteration and predation by cats also threaten this species (DERM 2011b). These threats would be relevant on Mabuiag Island should the species be present.

Water Mouse (Xeromys myoides)

EPBC Act: Vulnerable. **NC Act:** Vulnerable

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

The water mouse (also known as the false water-rat) is nocturnal and lives in mangroves, saltmarsh, sedges lakes near foredunes and coastal freshwater swamps. It is a capable swimmer but prefers to follow the receding tide to forage for crustaceans, molluscs and flatworms. During the day, or when foraging areas are inundated the water mouse shelters in a nest, termitarium-like mounds up to 60 cm high, in tunnels in natural and human-made banks, and in mud structure associated with hollow tree trunks. The nests, regardless of type or structure, primarily serve as diurnal refuges and reproductive sites. Nests often occupy naturally elevated ground and utilise the bases of fallen trees or logs for support of the nest structure (Van Dyck 1996; Gynther & Janetzki 2008).

The water mouse is patchily distributed in the Northern Territory, and from the Gold Coast to Proserpine in Queensland (Menkhorst & Knight 2004). The species has been recorded from New Guinea (Hitchcock 1998). It is not likely to occur on Mabuiag Island but its occurrence should be considered a possibility until a reasonable level of targeted survey work is conducted.

The species is threatened by swamp and mangrove reclamation, feral predators, changes to water tables, offshore pollution, the spread of weeds and the impacts of grazing (Woinarski 2007; Gynther & Janetzki 2008). On Mabuiag the species would be dependent on mangroves and would be threatened if mangrove habitat was destroyed.

Slender Chained Gecko (Lepidodactylus pumilis)

NC Act: Near-Threatened

The slender chained gecko is found in southern New Guinea, the Torres Strait and the tip of Cape York Peninsula (Covacevich *et al*. 1982; Ehmann 1992). In the Torres Strait there is a WildNet database record from Mer Island (DERM 2010d), and a Queensland Museum specimen (reported in Conics 2008b) and a record by Ingram (2008) from Mua Island. There are also Australian Museum specimens from Saibai, Masig, Mer, Hammond and Prince of Wales islands (OZCAM 2011) and it is likely the species occurs more widely through the region than is yet documented.

The species is arboreal and occurs in open and closed forests and coastal habitats (Ehmann 1992; Wilson & Swan 20010) and in human dwellings (Wilson 2005). It is likely to occur on Mabuiag Island in habitats other than grasslands and on coastal dunes.

Threats to the species are unknown. Ehmann (1992) states the species is common and secure. However, the species is not known from any national park or other reserve affording protection (Covacevich *et al*. 1982). The slender chained gecko may be threatened by loss of habitat due to clearing and/or rising sea levels and storm surges as a result of climate change and by competition with Asian house gecko (*Hemidactylus frenatus)*, in both natural habitats and on buildings (Case 1994; Buden 2007; Hoskin 2010). Asian house gecko is present on Mabuiag Island but is unlikely to pose a threat to any possible population of slender chained gecko unless the introduced species spreads into natural habitats.

Littoral Whiptail-skink (Emoia atrocostata)

NC Act: Near-Threatened

The littoral whiptail-skink is found on rocky shores and in foreshore vegetation, including mangrove forests. It shelters in rock recesses and crevices, in tree root crevices and in logs. It readily swims in tidal pools and can remain submerged for short periods (Heatwole 1975; Ehmann 1992). Cogger (2000) states that the species also occurs in lowland forests, coastal scrubs and grasslands near beaches but Hediger (1933-34 in Heatwole 1975) states that it is never found more than 100 m from the sea.

The littoral whiptail-skink is widespread from Japan, through south-east Asia and into the south-west Pacific. It is found on the tip of Cape York Peninsula and islands of the Torres Strait (Ehmann 1992; Wilson 2005). Cogger (2000) considers its distribution poorly known and despite references to its occurrence on Torres Strait Islands there is no available record for any island except Boigu Island (Wilson 2005; Schaffer 2010). Ingram (2008) refers to a WildNet record from Mua but the species was not returned by a search of the database in 2010 (DERM 2010f) and the validity of the record is uncertain. It is a common mangrove species in some areas and is especially abundant on rocky foreshores (Cogger 2000). *Emoia* species are efficient rafters and colonise islands on floating debris (Wilson 2005) and it is likely to occur on Torres Strait Islands other than Boigu. If not already present on Mabuiag Island there is an on-going likelihood of colonisation.

Threats are unknown, however small reptiles, including littoral whiptail-skink, are eaten by cats (*Felis catus)* on Christmas Island. However, the species made up a very small percentage of known prey (Tidemann *et al.* 1994), possibly due to cats spending little time foraging in foreshore habitats. The littoral whiptail-skink would be threatened by any loss of mangroves due to clearing or storm damage.

Emerald Monitor (*Varanus prasinus)*

NC Act: Near-Threatened

The emerald monitor is an arboreal species, living in the upper canopy of rainforest and monsoon forest (Wilson 2005), in palm forest, mangroves (Greene 1986; Cogger 2000), cocoa plantations (Greene 1986), vine thickets (Schaffer 2010) and around lagoons (Cogger 2000). The species uses its prehensile tail to forage among slender branches and outer foliage (Wilson & Swan 2010) and eats mainly katydids and other small arthropods and occasionally rodents (Greene 1986). Emerald monitors lay eggs in termite mounds in trees (Greene 1986; Ehmann 1992).

The emerald monitor is widespread in New Guinea. In Australia it is restricted to several islands in the Torres Strait, south to Mua Island, where it is known as Wyniss (Wilson & Swan 2010). The species is known from Boigu (Clarke 2004a; Schaffer 2010, Stanton & Fell pers. obs. Nov 2011); Mua (Whittier & Moeller 1993; Wilson 2005; Ingram 2008; DERM 2010f), Badu (Borsboom 2007 in Conics 2009a) and Mer islands (DERM 2010d; OZCAM 2011). Local people spoken to on Mabuiag in 2009 stated that the species is not present on the island (Hitchcock pers. comm. 2010), although there is potential habitat (vine thicket, closed forest and mangroves) and an unconfirmed record (Conics 2009b).

Ehmann (1992) states the emerald monitor is very sparse but secure. However, this assessment includes *Varanus keithhornei* of the McIlwraith and Iron Ranges of Cape York Peninsula (Wilson & Swan 2010), which has been elevated to species status, having formerly been considered conspecific with *V. prasinus* (Covacevich & Couper 1994). The emerald monitor is one of the most poorly known monitors (Greene 1986) and threats to the species in Australia are unknown. However, in Papua New Guinea the species is targeted by the pet trade, though the threat is considered low (Allison 2006). The emerald monitor is highly desired by reptile keepers and illegal collecting could become a threat in the Torres Strait. The species would be threatened by habitat clearance. Given its known diet the emerald monitor does not appear susceptible to mortality through attempted ingestion of cane toads *Rhinella marina* as per many other species of varanid (*e.g.* Shine 2010). Other than general habitat loss it is difficult to predict threats relevant to Mabuiag Island until the presence of the species is confirmed and its island specific habitat use identified.

Radjah Shelduck (*Tadorna radjah)*

NC Act: Near-Threatened

The radjah shelduck prefers shallow brackish waters, typically coastal and including estuarine mudflats, tidal creeks and mangrove swamps (Blakers *et al*. 1984; Pringle 1985). In the dry season the species congregates on permanent swamps and lagoons and artificial waterbodies such as sewage farms (Pringle 1985; Marchant & Higgins 1990). They are rarely found more than 20 metres

from a waterbody (Frith 1977; Marchant & Higgins 1990). Breeding occurs in the wet season, mostly between December and February in north-east Queensland. Nests are placed in large hollow branches in trees in, or close to, water (Frith 1977).

Radjah shelducks occur in eastern Indonesia, New Guinea and tropical Australia, with occasional records further south (Blakers *et al*. 1984; Pringle 1985). The species has disappeared from the Kimberleys and more southern Australia but remains common with no sign of decline through most of its current Australian distribution (Garnett & Crowley 2000). In the Torres Strait the radjah shelduck is known from Mua (Draffan *et al*. 1983; Ingram 2008), Badu (Draffan *et al*. 1983) and Boigu islands (Clarke 2004b; DERM 2010a). Draffan *et al*. (1983) reports the species from a further five Torres Strait Islands, all in the south-western group of islands and including Horn and Thursday islands. The proximity of Badu and Mua islands to Mabuiag means that the radjah shelduck almost certainly occurs, at least sporadically. It would be most likely on the fringes of the mangroves.

The species is threatened by reclamation of habitat for agricultural activities and infrastructure (Marchant & Higgins 1990) as well as indiscriminate shooting (Pringle 1985) but despite the decline of some sub-populations the species is not considered to be threatened nationally (Garnett & Crowley 2000) and may be increasing in some areas (Pringle 1985). Radjah shelduck is likely only to be an occasional visitor to Mabuiag Island and local threats would appear minimal.

Black-necked Stork (Ephippiorhynchus asiaticus)

NC Act: Near-Threatened

The black-necked stork occurs in swamps, estuarine mudflats and other littoral habitats and on floodplains, in irrigated crops and occasionally open grassy woodland. The species is most frequently associated with open freshwater rather than saline habitats (Pringle 1985; Marchant and Higgins 1990).

The black-necked stork occurs from Pakistan through south-east Asia to New Guinea and Australia. It is widespread in northern and eastern Australia and occurs through much of Queensland (Marchant and Higgins 1990), though is not abundant anywhere. The sparse distribution of the species is probably due to the requirement of large areas of freshwater swamps for the maintenance of even one pair (Pringle 1985). Black-necked stork has been recorded on Boigu (Draffan *et al*. 1983; Clarke 2004b; DERM 2010a) and Badu islands (Draffan *et al*. 1983; DERM 2010g). Ingram (2008) refers to a WildNet record from Mua but the species was not returned by a search of the database in 2010 (DERM 2010f), though it is likely to occur. Draffan *et al*. (1983) reports the species from a further seven Torres Strait Islands, all in the south-western group of islands and including Horn, Prince of Wales and Thursday islands. There is limited habitat on Mabuiag Island for the species but it is likely to occur sporadically. Breeding is less likely.

The black-necked stork feeds on a variety of aquatic prey items including crustaceans, fish, amphibians, reptiles and arthropods. The species is very sparsely distributed throughout its range and it appears that the maintenance of even one pair may require large areas of freshwater swamps.

Breeding is very poorly known, although they nest in tall trees, both live and dead, in or near freshwater swamps (Pringle 1985; Marchant & Higgins 1990; Dorfman *et al*. 2001).

Although the black-necked stork is thought to be threatened by disturbance and habitat loss it has not been greatly affected by the intensification of land-use in eastern Australia (Garnett & Crowley 2000). Nonetheless, the species is threatened by the use of chemicals including herbicides and insecticides near wetlands, the loss of suitable nesting trees, disturbance of waterbodies by livestock, loss of wetlands due to agriculture and development, and possibly by ingestion of Cane Toads *Rhinella marina* (Garnett & Crowley 2000; Dorfman *et al*. 2001; NSW NPWS 2002; Clancy 2010). In New South Wales collision with powerlines is the greatest known cause of mortality (Clancy 2010). In the Torres Strait the species is most likely to be threatened by disturbance during foraging and at nest sites and possibly hunting.

Grey Goshawk (Accipiter novaehollandiae)

NC Act: Near-Threatened

The grey goshawk occurs in woodland and forest in coastal and subcoastal northern and eastern Australia. It prefers areas of mature forest with dense canopy, though it will forage in open country, and also uses plantation forests and mangroves (Marchant & Higgins 1993). In northern Australia it is more typical of riverine forest (Debus 1998). Prey includes mammals, birds, reptiles, frogs and invertebrates. Breeding is poorly known but nesting occurs in wooded areas, often near permanent water. The breeding season varies with location and in Queensland mostly occurs from July to November and the nest is usually high in the canopy of a tall tree (Marchant & Higgins 1993).

The species was formerly considered to extend beyond Australia through New Guinea north to the Moluccas and east to the Solomons (Marchant & Higgins 1993). The grey goshawk is now regarded as being restricted to Australia, with extralimital birds now considered to be either *A. hiogaster* or *A. griseogularis* (Christidis & Boles 2008). In the Torres Strait the grey goshawk is known from Mua, Badu and Red Wallis islands (Draffan *et al.* 1983; Conics 2008b, 2009a). The congeneric brown goshawk *Accipiter fasciatus* is present on Mabuiag Island but uses more open forests and woodlands. If grey goshawk occurs on Mabuiag Island it is most likely in closed forest and riparian woodland.

The grey goshawk remains common in tropical and subtropical Australia (Debus 1998) but there has been a slight decrease in populations since European settlement (Olsen 1998). The species is threatened by loss of habitat and human persecution (Blakers *et al*. 1984; Olsen 1998). Should it be present on Mabuiag Island threats to the species are currently likely to be minimal. It would be threatened by any future habitat loss.

Sooty Oystercatcher (Haematopus fuliginosus)

NC Act: Near-Threatened

The sooty oystercatcher is restricted to marine coastal habitats, with a preference for rocky headlands and ledges, coral reefs, and sandy beaches near intertidal mudflats and rocky areas, usually within 50

m of the shore line (Blakers *et al*. 1984; Marchant & Higgins 1993). They forage around exposed rocks at low tide for molluscs, crustaceans, other invertebrates and small fish. The species is resident, maintaining territories all year round (Marchant & Higgins 1993).

Sooty oystercatchers are endemic to Australia, not extending north to New Guinea despite records from the Torres Strait. The species breeds in all Australian states and is most common in south-eastern Australia (Pringle 1987; Marchant & Higgins 1993). Draffan *et al*. (1983) reports the species from Poruma (Coconut), Channel Rock, Twin and Saddle Islands and considered it a non-breeding visitor to Torres Strait. There is also an unconfirmed record from Iama (Conics 2008a). The sooty oystercatcher can be inconspicuous on rocky shores and if present only sporadically may be under-recorded in the area 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)* and Cats (*Felis catus)* (NSW NPWS 2002). These threats would be relevant to the species if it occurs on Mabuiag Island.

Torresian Tube-nosed Bat (Nyctimene cephalotes)

NC Act: Near-Threatened

In Australia the Torresian tube-nosed bat is known only from three specimens from Mua Island. Another tube-nosed bat of uncertain identification, possibly *N. cephalotes*, has been collected from central eastern Cape York Peninsula (Duncan *et al*. 1999). Churchill (2008) considers these records from Torres Strait and Cape York Peninsula dubious and questions both the taxonomy and identification of species within the genus. The Torresian tube-nosed bat is widespread in New Guinea and specimens are known from the coast immediately adjacent to Torres Strait (Duncan *et al*. 1999).The specimens from Mua were caught on the edge of rainforest and open grassy woodland, and the species is found in lowland rainforest in Papua New Guinea (Bonaccorso 1999). It may also inhabit mangroves as there are records from south coastal New Guinea (Duncan *et al*. 1999). There is no record of any species of tube-nosed bat for Mabuiag Island but the species could possibly occur in closed and open forest on the island. No threat is known at present, but removal of rainforest or mangrove habitat would pose a serious threat if the Australian distribution of this species were limited to Torres Strait and Cape York Peninsula (Duncan *et al*. 1999).

Appendix I. Profiles of Migratory Fauna Species Potentially occurring on Mabuiag Island 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, 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). There appears to be little freshwater habitat on Mabuiag Island and threats to waders appear limited to disturbance on mudflats, beaches and around mangroves. This will be most relevant prior to return passage in autumn.

Terns

Life history*:* Terns, with gulls, belong to the family Laridae. The terns include the noddies, a group of largely tropical pelagic species. Four Migratory tern and one noddy species have been recorded from Mabuiag Island, 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 Mabuiag 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 great 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 Mabuiag 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 Mabuiag Island.

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). There is no record of eastern osprey for Mabuiag Island but it is expected to occur. Neither species is likely to be threatened by current land use practices on Mabuiag Island.

Glossy Ibis (*Plegadis falcinellus*)

The glossy ibis is usually seen as single individuals or small groups. It feeds on aquatic invertebrates and occurs in terrestrial wetlands, preferring inland freshwater wetlands with abundant aquatic flora (Pringle 1985; Marchant & Higgins 1990). The species is widespread, occurring in Europe, Africa, Asia and North America. It occurs in much of Australia but is more widespread in the wetter northern and eastern areas. Glossy ibis breeds in dense colonies, often with other species of ibis and waterbirds (Marchant & Higgins 1990).

Threats: The species is generally uncommon and erratic in occurrence (Pringle 1985) and is threatened by destruction or modification of wetlands, invasion of wetlands by weeds and predation of breeding birds (Marchant & Higgins 1990). Occurrence on Mabuiag Island is unlikely and threats would be minimal should it occur.

Oriental Cuckoo (*Cuculus optatus*)

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). Oriental Cuckoo is likely to be a sporadic, possibly annual, visitor to Mabuiag Island, in almost any habitat other than grasslands, but 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 *Rhinella marina* have been found to prey on the eggs and nestlings (Boland 2004b). Rainbow bee-eater could occur in, or over, all habitats on Mabuiag Island. 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 Mabuiag Island and would use a majority of the habitats present. Breeding by any species would be limited, if any breeding occurs, and black rat has not been reported. Threats would appear to be limited to habitat loss should land use practices change.

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 overheard wires.

Yellow wagtail is listed under the EPBC Act as *Motacilla flava* s. 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 wagtail in Australia are unknown. None of these species is known from Mabuiag Island and should they occur threats would be minimal. Other than Australian reed-warbler, increased clearing of wooded areas would actually benefit the species.