



Australian Government

Great Barrier Reef
Marine Park Authority



Restoration of Reef Islands Project

Phase 1: Island Threat Assessment

Rapid ecological assessment report:

Douglas Islet

Cairncross Islets

Wallace Islet

October 2024



We acknowledge the Gudang Yadhaykenu Traditional Owners who are the custodians of the Yamarrinh Wachangan Islands which includes Sinclair, Douglas, Cairncross and Wallace islets and recognise their continuing connection to lands, waters and community.

Table of Contents

Table of Contents	3
1 Introduction	5
1.1 Aims and objectives	5
1.2 <i>Pisonia grandis</i> (grand devil’s claws)	5
1.3 Target islands	6
1.4 Target threats to <i>Pisonia grandis</i>	8
1.4.1 <i>Pulvinaria urbicola</i> (urbicola soft scale)	8
1.4.2 Other invertebrate threats to <i>Pisonia</i> forests	10
2 Island report cards	11
2.1 Douglas Islet	12
2.1.1 Vegetation and flora	12
2.1.2 Fauna	13
2.1.3 Invertebrate threats to <i>Pisonia grandis</i> forest	14
2.1.4 Other identified threats	15
2.2 Cairncross Islets	19
2.2.1 Vegetation and flora	19
2.2.2 Fauna	21
2.2.3 Invertebrate threats to <i>Pisonia grandis</i> forests	22
2.3 Wallace Islet	26
2.3.1 Vegetation and flora	26
2.3.2 Fauna	28
2.3.3 Invertebrate threats to <i>Pisonia grandis</i> forests	29
2.3.4 Other identified threats	30
3 Bibliography	34
Attachment A - Methods	36
Flora and vegetation methods	36
Fauna methods	37
Invertebrate methods	37
Attachment B – Field data	39
Attachment B1 - Flora species	39
Attachment B2 - Summary Vegetation Site Data - June 2024 survey	47
Attachment B3 - Voucher specimens - June 2024 survey	57
Attachment B4 - Health Check Data Sheets June 2024	61
Attachment B5 – Fauna survey data	62
Attachment B6 – Invertebrate field data	66
Attachment C – Field photos	70
Attachment C1 – Douglas Islet	71
Attachment C1 – Wallace Islet.....	73
Attachment C1 – Cairncross Islets	75

Version control

Version	Title	Prepared by	Reviewed by	Date prepared
v0.1	Draft rapid ecological assessment report – Douglas, Cairncross and Wallace islets	David Fell, Terry Reis, Anthony Rice, Andrew Palmer-Brodie	Naomi Maxwell Samantha Gibbs	24/09/2024
v1.0	Final rapid ecological assessment report – Douglas, Cairncross and Wallace islets	Andrew Palmer-Brodie	Naomi Maxwell	30/10/2024

Citation: Aestra, 2024, *Rapid ecological assessment report – Douglas, Cairncross and Wallace islets*, prepared for the Great Barrier Reef Marine Park Authority, Commonwealth of Australia.

Acknowledgements

We would like to acknowledge Gudang Yadhaykenu Traditional Owners represented by the Ipima Ikaya Aboriginal Corporation (IIAC) and give special thanks to Angelina Williams, Connie Young and Waisie Yoelu for cultural oversight of the field surveys. We also give our thanks to Louisa Taylor Ahmat for her assistance in coordinating IIAC involvement.

We would also like to acknowledge the support and advice from:

- the field team for their expertise
 - David Fell, David Fell Environmental
 - Dr Anthony Rice, Granite Belt IPM
 - Terry Reis, Reis Ecology
 - Dr Colette Thomas, Reef Authority
- Callum Cornin and Mission Helicopters for their safe and professional transportation.
- Kathy Grice, Queensland Department of Agriculture and Fisheries for advice on plant pathogens
- Michael Gorton, Northern Australia Quarantine Service for parasitoid identification.
- Helen Nahrung and colleagues for advice on the naturalised status of *P. urbicola*.

1 Introduction

The Restoration of Reef Islands Project (the Project) aims to facilitate the rehabilitation or enhancement of habitat values for selected islands in the Great Barrier Reef World Heritage Area.

The Project includes two components, Component 1 which focusses on islands with known threats (such as weeds and pests) and Component 2 which focusses on understanding potential threats to islands with *Pisonia grandis*. The Project provides a proof of concept for the delivery of assessment and planning of on-ground management and intervention actions in partnership with Traditional Owners, the Queensland Parks and Wildlife Service (QPWS) through the Reef Joint Field Management Program (the Program) and industry.

This report relates to rapid ecological assessments undertaken on Component 2 islands, all of which are located north of Townsville, Queensland.

1.1 Aims and objectives

This report is intended to rapidly quantify the biodiversity values and threats present on target islands supporting *P. grandis* in the northern Great Barrier Reef. The report provides a snapshot of ecological threats which may be affecting *P. grandis* and an overview of island condition which can be used to inform and support management for the islands.

The rapid assessment was not intended to provide a comprehensive assessment of the vegetation, flora, fauna or invertebrate diversity of the islands visited.

The field surveys completed utilised a rapid survey approach to quickly assess the islands for threats and values ([Attachment A](#)). A particular focus of the field surveys was the identification of the presence of soft scale (*Pulvinaria urbicola*) which has caused substantial impacts to *P. grandis* forests in the southern parts of the Great Barrier Reef. The rapid assessment is intended to provide information complimentary to the work of QPWS and Traditional Owner groups.

The assessment also included sampling of roots and soil for ectomycorrhizal fungi and genetic analyses to improve understanding of the symbiotic requirements of *Pisonia* forests. While samples were collected during the field surveys, no processing or analysis of these surveys is presented in this report. Samples collected are stored with James Cook University for future processing and are not discussed further in this report.

1.2 *Pisonia grandis* (grand devil's claws)

Pisonia grandis (family Nyctaginaceae) is the target species of this survey (Plate 1). It is a large tree which occurs on islands across the tropical Indo-Pacific region between the latitudes of 24°N and 24°S (Walker, 1991). The species is a semi-deciduous tree which grows to variable heights with large leaves and sticky barbed seeds that become entangled in the feathers of nesting seabirds (Plate 1). The species utilises this mechanism to move seeds between island ecosystems (Walker, 1991).

Across its range, *P. grandis* forest (*Pisonia* forest) is declining globally as a result of land clearing for coconut plantations and agriculture (Walker, 1991). Within the Great Barrier Reef, there is approximately 150 ha of *P. grandis* forest spread across approximately 44 islands, with the largest forests in the southern part of the Great Barrier Reef.

The term 'Pisonia forest' has been used to describe ecosystems which support *P. grandis* as the dominant or co-dominant element of the vegetation. In Queensland, *Pisonia* forest is of high conservation value with the vegetation community described as '*Pisonia grandis* low closed forest' (Regional Ecosystem (RE) 3.2.29). The community has a biodiversity status (Qld) of 'endangered', while its conservation status under the *Vegetation Management Act 1999* (Qld) is 'of concern'.

Pisonia forests are uniquely important for seabird breeding and support important ecological processes on coral cay islands. Wedge-tailed shearwaters (*Puffinus pacificus*) nest in burrows under *Pisonia* roots and mulch, while black noddies (*Anous minutus*), great frigatebirds (*Fregata minor*), and other seabirds are known to nest or roost in or under large *Pisonia* trees.

Within the Great Barrier Reef, most areas of *Pisonia* forest are protected, however, local declines in the extent of *Pisonia* forest have been associated with wildfire (e.g., Mitirinchi (Quoin) Island), historic phosphate mining (e.g., Lady Elliot Island; in addition to the broader Pacific), and outbreaks of soft scale insect (e.g., Tryon Island).

While the islands supporting *Pisonia* forest in the southern Great Barrier Reef are more well understood, it is unclear whether northern forests (located north of Townsville) are currently declining, stable or improving, or how the forests may respond to climate change and other threatening processes. This Project is focussed on islands in the northern Great Barrier Reef to address part of this knowledge gap.



Plate 1 *Pisonia grandis* flowers (left) and forest (right), Images: David Fell, 2024

1.3 Target islands

Target islands for Component 2 surveys were selected in consultation with the Reef Authority and QPWS. They included islands with historical records of *P. grandis*. Four islands were included in the scope of this survey, including:

- Sinclair Islet.
- Douglas Islet.
- Cairncross Islets.
- Wallace Islet.

The location of target islands as part of this study are shown in Figure 1.

A decision was made following the commencement of survey not to conduct an assessment of Sinclair Islet due to inclement weather. This was supported by discussions with Traditional Owner which indicated that Sinclair Islet did not have large trees, indicating it was unlikely to have records of *P. grandis*.

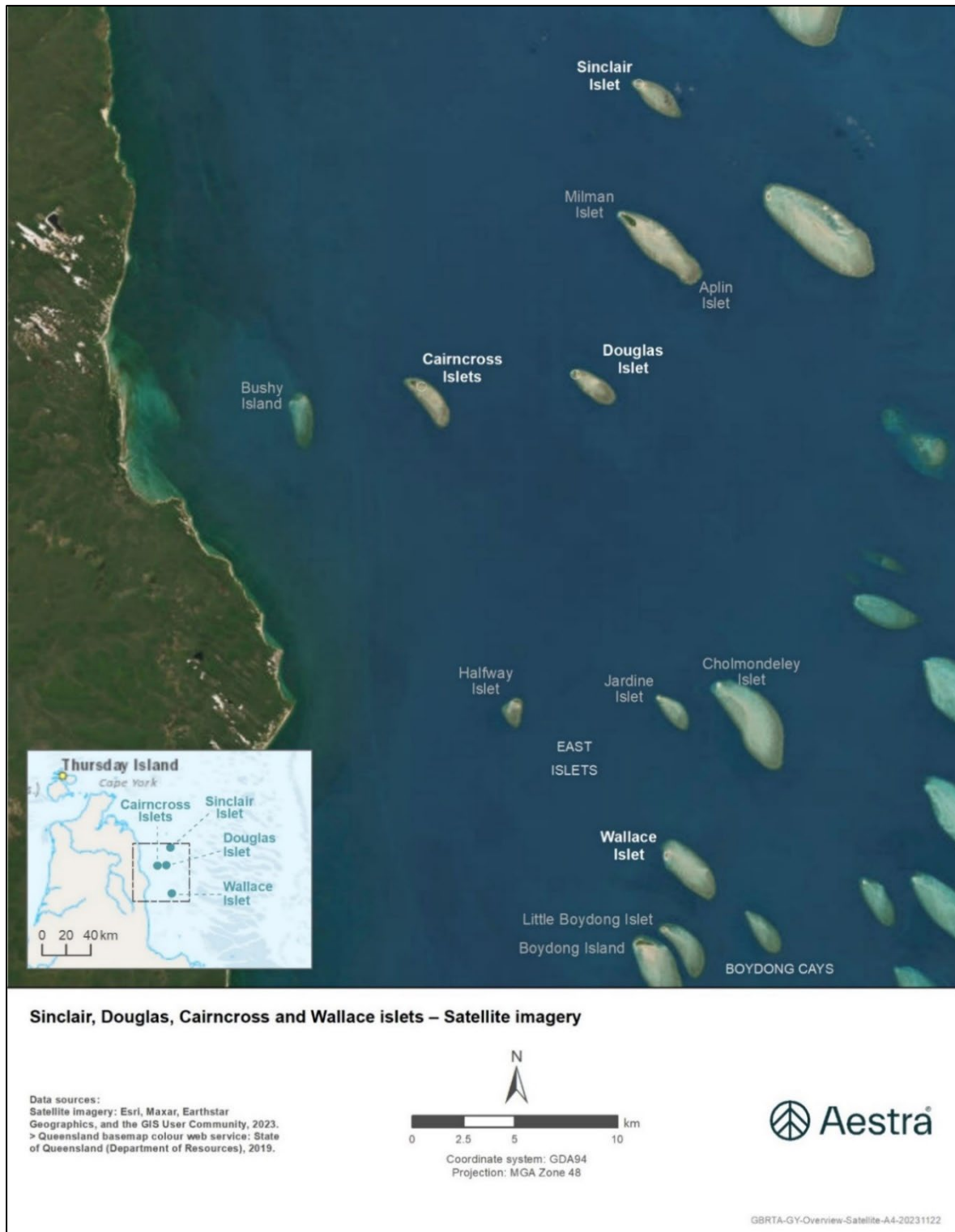


Figure 1: Overview map of location of target islands for Component 2 rapid assessments

1.4 Target threats to *Pisonia grandis*

Pisonia forests have adapted to environmental stresses such as drought and periodic seawater inundation which are typical of coral cay environments. However, these ecosystems are under pressure from factors including climate change, associated sea level rise and changes in groundwater hydrology (e.g., salt water intrusion into freshwater lenses). These processes place species such as *P. grandis* under increased pressure. In addition, *P. grandis* are known to be susceptible to outbreaks of soft scale and other invertebrates which have caused severe impacts on some island ecosystems (e.g., Smith *et. al.*, 2004).

While threats including climate change, changes in hydrological conditions, coral cay erosion and storm events are likely to impact this ecological community, the rapid assessments completed for this study were targeted to focus on impacts from soft scale, invertebrates, and weeds.

Further studies (which are more detailed in nature) are required to address the knowledge gaps associated with other known threats and the potential for those processes to impact *P. grandis*. Targeted assessment was out of scope of this assessment.

1.4.1 *Pulvinaria urbicola* (urbicola soft scale)

Pulvinaria urbicola (Cockerell) (Hemiptera: Coccidae) is a soft scale thought to be native the West Indies but which has now spread to over 60 countries across the globe, including Australia (confirmed through discussions with H. Nahrung, M.Gorton, P. Gullen and T.K. Q in *pers comm.*; García Morales *et.al.*, 2016). The species has a large host range and is known to feed on 91 genera and 45 families (García Morales *et.al.*, 2016), however, despite the broad range of hosts, it was not considered a significant pest in Australia until outbreaks in the Great Barrier Reef Marine Park in the early 1990s.

The species (Plate 2) had been recorded in *Pisonia* forests on several coral cays in the Great Barrier Reef for several decades (R. Bull, cited in Olds, 2018), however it wasn't until the mid to late 1990's that *P. urbicola* (Cockerell) came to land managers attention when it caused complete destruction of a 16 ha *P. grandis* forest on Coringa Southwest Islet in the Coringa-Herald National Nature Reserve, and a few years later was threatening *Pisonia* forest on nearby cays (Smith *et.al.*, 2004).



Plate 2 Inside of green tree ant (*Oecophylla smaragdina*) nest showing pulvinaria soft scale (*Pulvinaria urbicola*) on *Pisonia grandis* leaf, Wallace Islet. (left, green ants with immature scale, right, mature scale insects). Images Ant Rice, 2024



Plate 3 *Cryptolaemus larva* feeding on *urbicola* scale on *Pisonia grandis* leaf (left, Image: Ant Rice, 2024), *Cryptolaemus larva* and scale (right, Image: Naomi Maxwell, 2024).

In a diverse, balanced ecosystem, soft scales are well controlled by a suite of invertebrate natural enemies which comprise predators such as the native ladybird beetle (*Cryptolaemus montrouzieri*) and parasitoids which lay their eggs in the scale (Plate 3). It is only when this controlling guild of natural enemies is disrupted that scale insects can multiply, and the population become eruptive causing significant damage to its host species. Disruption of natural enemy's control of scale can be man-made (e.g., by using pesticides which impact natural enemies) or can occur naturally.

Ants attending scale insects in mutualistic relationships can help protect the scale from natural enemy attack and can lead to increased scale infestations. As protein levels in plant sap tend to be low, scale insects must imbibe large quantities of sap to fulfill their dietary requirements. This results in an excess of sugars that the scale insect exudes. This exuded sugar is very attractive to ants and in return for a sugary meal, some ant species will protect and farm the scale, moving them to fresh parts of the plant as populations increase and protecting them from natural enemy attack. This attendant ant behaviour allows scale populations to flourish as the pressure from natural enemies is reduced.

Another compounding factor that enables scales to proliferate at the expense of its host, is moisture stress. While drought can negatively impact many herbivorous insect species, the increased nutrient value of the sap in water stressed trees can benefit those insects that feed on it. Plants that are water stressed, especially during droughts, tend to have higher levels of nitrogen which has been shown to improve the reproductive rate of scale (various authors cited in Frank, 2021). In addition, temperatures tend to be higher at times of drought which can also increase the reproductive rate of scale insects, increase the reproductive rate of attending ants and make their periods of activity longer. This improves the ant's efficacy in protecting and tending the scale insects. In conjunction, parasitoids that don't feed on their reproductive hosts, rely on floral nectaries and pollen from flowers that may not be as abundant during drought conditions. As a result, the populations of nature predators, and as a result their efficacy as regulation agents, may be reduced (Jactel *et al.*, 2019). The cumulative impact of these factors to *P. grandis* is shown in Figure 2.

If, as indicated above, *P. urbicola* has been widespread in *Pisonia* forest in the Great Barrier Reef Marine Park for decades without causing significant damage, it suggests that a suite of natural enemies has also been present and keeping scale in check. Consequently, the outbreaks on Coringa South West Islet, North East Herald and other islands in the 1990's and early 2000's seems to indicated a collapse of the natural enemy populations of the scale insect. Moreover, because the release of natural enemies and control of exotic ants restored stability back to the island ecosystem, the balance between scale/ant mutualism and natural enemy efficacy appears to be a key driver of the stability of the *Pisonia* forests with the Great Barrier Reef.

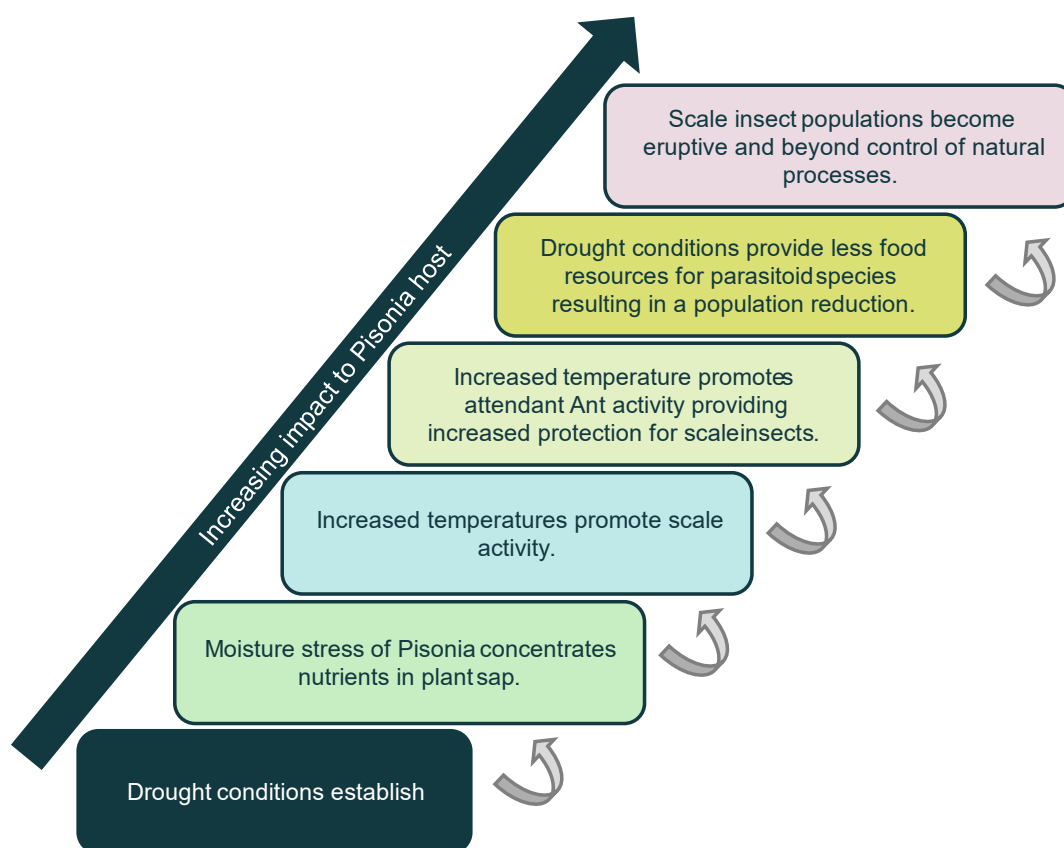


Figure 2: Scale insects have an increased impact to host species such as *Pisonia* under drought conditions.

1.4.2 Other invertebrate threats to *Pisonia* forests

In addition to scale insects, there are other invertebrate herbivores that potentially represent threats to *Pisonia* forest on the coral cays of the Great Barrier Reef. These include native hawkmoth caterpillars *Hippotion* spp, (Lepidoptera: Sphingidae) and native giant grasshoppers *Valanger irregularis* (Orthoptera: Acrididae) (Olds *et al.*, 2019).

Outbreaks of hawkmoth in 2001 caused severe defoliation at North East Herald Island and South East Magdelaine Island leading to releases of the native egg parasitoids *Trichogramma pretiosum* and *T. carverae* to control the outbreak (Smith *et al.*, 2004).

It is unclear what led to these outbreaks but as with the scale outbreaks mentioned above, the efficacy of the natural enemies that normally keep these herbivores in check appears to have been compromised. As this period coincides with the early stages of the millennium drought it may have been environmental factors that impacted the balance of natural predators.

Changes to the climate are likely to exacerbate or compound these issues over the long term. With longer and more frequent droughts predicted and the potential for associated moisture stress to increase the number of defoliator invertebrates, threats to *Pisonia* forest are expected to remain high into the future.

2 Island report cards

This Project utilised a rapid assessment method to provide a snapshot of threats and values on target islands ([Attachment A](#)). The findings of the rapid assessments are summarised for each island in an 'island report card' provided below. Field survey data is consolidated at [Attachment B](#) and additional field photos are provided at [Attachment C](#).

Spatial information on the target islands is provided in the associated geodatabase. The geodatabase includes information on the vegetation, location of survey points and records for flora and fauna species observed during the field surveys.

The islets targeted include vegetated sandy coral cays on coralline sand and reef rubble, which remain in a relatively undisturbed state. They are known to support important nesting and breeding habitat for marine turtles and seabirds. The islets are important examples of coral cays in the Great Barrier Reef that support conservation significant regional ecosystems identified as being endangered or of concern under the *Nature Conservation Act 1992* (Qld) (NCA).

The rapid assessment targeted the following islands:

- Sinclair Islet.
- Douglas Islet.
- Cairncross Islets.
- Wallace Islet.

Sinclair, Douglas, Cairncross, and Wallace islets are part of the Yamarrinh Wachangan Islands (formerly the Denham Group) National Park (NP) which is managed as part of the Cape York Peninsula Aboriginal Lands (CYPAL; NP-CYPAL). The islets are located in the far north of the Great Barrier Reef, approximately 500 km north of Cooktown and approximately 100 km south-east of Thursday Island (Figure 1).

CYPAL lands are jointly managed by Traditional Owners and QPWS as National Park and form part of a living cultural landscape for Gudang-Yadhaykenu Traditional Owners and have traditional and contemporary cultural significance (Ipima Ikaya Registered Native Title Body Corporate, 2024). The rapid ecological assessment was completed in coordination with the Ipima Ikaya Aboriginal Corporation (IIAC) and was overseen by their representatives.

Field staff were transported to the islands via helicopter from Bamaga. Field surveys were led by David Fell (David Fell Environmental – Botanist / Team leader), Dr Ant Rice (Granite Belt IPM – Entomologist), and Terry Reis (Reis Environmental – Fauna ecologist), with field support from:

- Angelina Williams (Ipima Ikaya Aboriginal Corporation) – IIAC Cultural Custodian.
- Connie Young (Ipima Ikaya Aboriginal Corporation) – IIAC Cultural Custodian.
- Waisie Yoelu (Ipima Ikaya Aboriginal Corporation) – IIAC Ranger.
- Dr Colette Thomas (Reef Authority) – Reef Authority Project Manager.
- Naomi Maxwell (Aestra) – Aestra Project Director.
- Callum Cornin (Mission Helicopters) – Pilot.

2.1 Douglas Islet

Douglas Islet has an area of approximately 2.5 ha. Its key natural values are its stands of *P. grandis* forest, which provide important nesting habitat for the pied imperial pigeon (Figure 3).



Douglas Islet desktop snapshot

- *Tenure*: National Park (CYPAL)
- *Group*: Yamarrinh Wachangan Islands (formerly the Denham Group)
- *Size*: 2.5 ha
- *Known active threats*: Historical record of black crazy ant. Regional record of black crazy ants from Milman Islet. No other threats recorded.
- *Known key natural values*: *P. grandis* forest, important nesting site for pied imperial pigeon.

Traditional Owner representative:

- Ipima Ikaya Aboriginal Corporation

Figure 3 Douglas Islet snapshot (Image: David Fell, 2024).

2.1.1 Vegetation and flora

Closed forest dominated by *P. grandis* on Douglas Islet has previously been recorded by Walker (1991) and in Regional Ecosystem (RE) mapping (DESI, 2024). The *Pisonia* dominated forest covers the majority of the 2.5 ha island (Figure 4), and is formed by large trees to 18-24 m in height and ranging between 80-230 cm Diameter Breast Height (DBH). The canopy is closed at an estimated 80-90% cover.

Within the forest, there is a sparse subcanopy layer with *Pisonia*, *Manilkara kauki*, and *Garuga floribunda* occurring rarely. Trailing vines of *Cayratia acris*, *Ipomoea violacea*, *Tinospora smilacina*, and *Dioscorea bulbifera* become dense in light gaps and on outer margins. A sparse to mid dense shrub layer is dominated by

Capparis lucida, *C. nummularia*, *Phyllanthus novae-hollandiae* and *Pisonia* saplings, which are joined by rare saplings of *Celtis philippensis*, *Antiaris toxicaria* var. *macrophylla*, *Ficus virens*, *Ficus drupacea* and *Diospyros maritima*. The groundcover supports an abundance of *Pisonia* seedlings, with dense patches of bird dispersed rainforest seedlings such as *Calophyllum sil*, *Aglaiia* sp., and *Podocarpus grayae*. The erect herb *Pouzolzia zeylanica* is common throughout the forest system, as is *Achyranthes aspera*. Leaf litter and humus layer is dense.

The forest type is confirmed as consistent with the mapped RE 3.2.29 (*Pisonia grandis* closed forest). *Pisonia* trees appeared in good health, with dense leaf cover starting to yellow and no evidence of tree senescence or trunk death. Some sand accretion was noted on the western side, which was covering low branches and trunks, although the trees retained full leaf.

The exposed southern end of Douglas Islet has a small area of herbland-grassland of *Sesuvium portulacastrum*, *Lepturus repens* and *Ipomoea pes capre* subsp. *brasiliensis* which transitions to a patch of low closed shrubland dominated by *Clerodendrum inerme*, *Suriana maritima* and *Abutilon albescens*. The latter shrubland merges into low *Pisonia* forest. On the northern end of the island the vegetation is a low closed forest, with *Pisonia* (7-9 m), fringing *Premna serratifolia* dominant shrubland and a large emergent *Gyrocarpus americanus* to 15 m. The mixed open tussock grassland and fringing shrubland on beach and dunal areas are previously identified by Walker (1991) and are consistent with RE 3.2.24c (Mixed open tussock grassland and open forblands).

Desktop searches identified 22 flora species previously recorded for Douglas Islet, only two of which are vouchered in the Queensland Herbarium. The field survey recorded 59 species, bringing the known flora of the island to 65 species and representing a 64% increase in the known flora. Five species previously recorded were not observed. These were; *Terminalia arenicola*, *Euphorbia atoto*, *Euphorbia tannensis* subsp. *tannensis*, *Sophora tomentosa* subsp. *australis*, and *Spinifex longifolius*.

The survey collected 24 vouchers for inclusion in the Queensland Herbarium and Australian Tropical Herbarium (Attachment B3 - Voucher specimens - June 2024 survey).

2.1.2 Fauna

2.1.2.1 Species Recorded

The survey of Douglas Islet recorded a total of 18 fauna species, comprised of 17 birds and one reptile (Figure 5). Table 1 includes recorded species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), those listed as vulnerable under the NC Act and those species not previously documented for the island. These species and the other species recorded are listed in Attachment B5.

Table 1 Notable terrestrial vertebrate species recorded for Douglas Islet, 26 - 27 June 2024

Scientific Name*	Common Name*	EPBC Act	NC Act	Comments
<i>Anous minutus</i>	Black noddy	Ma	C	At least three birds present, seen in flight around the island.
<i>Crocodylus porosus</i>	Estuarine crocodile	Ma, M	V	Tracks seen in sand on both days.
<i>Esacus magnirostris</i>	Beach stone-curlew	-	V	Pair seen on rock shelf to the east of the islet.
<i>Fregata ariel</i>	Lesser frigatebird	Ma, M	SL	One seen flying over islet. Not previously recorded#.
<i>Fregata minor</i>	Great frigatebird	Ma, M	SL	Two seen flying over islet. Not previously recorded#.
<i>Pitta versicolor</i>	Noisy pitta	-	C	One heard in wooded habitat. Not previously recorded#.
<i>Todiramphus sordidus</i>	Torresian kingfisher	-	C	Three seen along foreshore and perched on edge of wooded habitat. Not previously recorded#.

* This report follows the WildNet (Wildlife Online) (Queensland Government, 2024) nomenclature for fauna.

Not known for Douglas Islet in the WildNet and/or Atlas of Living Australia (ALA, 2024) databases.

Douglas Islet was in good condition for terrestrial vertebrate species and appeared to be little disturbed. There was some marine debris, however this was not in sufficient quantity to be considered a significant threat to any fauna.

The fauna species recorded on Douglas Islet are all typical of such habitats, including the four species not previously included in the WildNet and ALA databases. A pair of beach stone-curlews (vulnerable under the NC Act) were seen on 26 June 2024. Birds along the shoreline were otherwise limited to common, widespread species such as eastern reef egret (*Egretta sacra*) and striated heron (*Butorides striata*).

The only tern recorded was black noddy, which was present in very small numbers. No tern species are known to nest on Douglas Islet based on the desktop assessment and there was no evidence of nesting during the survey. Based on feathers, the *Pisonia* forest is being used by black noddy for roosting and possibly as a daytime resting site or shelter. One freshly deceased bird was found in wooded habitat, however the cause of death was not evident. Whitewash (white excreta) was very common in parts of the forest, most notably on the leeward side. The lack of nesting seabirds is consistent with previous records for the island. Similar assessments conducted in October 1988, noted that there were no seabirds nesting on Douglas Islet, but the presence of eight dead black noddies and the spread of white excreta indicated a nocturnal roosting population (Walker, 1991). Frigatebirds such as the great frigatebird and lesser frigatebird and other seabirds, may also be using the forest, including the canopy, as a roost site.

Two white-bellied sea-eagles (*Haliaeetus leucogaster*) were observed nesting on Douglas Islet. The sea-eagle is an opportunistic carnivore (Marchant and Higgins, 1993) and would kill noddies and other seabirds opportunistically.

Other potential predators present include the silver gull (*Chroicocephalus novaehollandiae*), nankeen night-heron (*Nycticorax caledonicus*) and buff-banded rail (*Gallirallus philippensis*). The buff-banded rail has a varied diet which includes eggs (Marchant and Higgins, 1993), similarly silver gull is a well-known predator of eggs and nestlings of ground-nesting waders and terns (Higgins and Davies, 1996), while nankeen night-heron will take nestlings (Marchant and Higgins, 1990). However, the presence of these species is unlikely to preclude nesting by seabirds or shorebirds. There were no vestiges of nests observed, but it is expected that the migratory pied imperial-pigeon (*Ducula bicolor*) would nest in the *Pisonia* during the warmer months as more than 2,000 pairs have been recorded in the past.¹

Four recorded bird species, bar-shouldered dove (*Geopelia humeralis*), noisy pitta (*Pitta versicolor*), mangrove golden whistler (*Pachycephala melanura*) and ashy-bellied white-eye (*Zosterops citrinella*), would essentially be restricted to the *Pisonia* forest. The whistler and the white-eye are very typical of offshore islands and possibly breed on the island. The pitta may have been in transit. Four baited camera traps were left on the island overnight, targeting *Rattus* species. The cameras recorded only eastern reef egret and buff-banded rail.

The small number of species recorded reflects the small size of the island, the limited variety of habitat and resources, the distance from the mainland or much larger islands, the time of year and the short time spent on the island. That the survey recorded four bird species not previously documented for the islet suggests it has had limited survey in the past. A survey when summer visitors, such as migratory waders, pied imperial-pigeon, rufous fantail (*Rhipidura rufifrons*) and black-winged monarch (*Monarcha frater*), are present would undoubtedly record more species.

No mammal species has been documented for the island, and although a single night's use of four camera traps may be insufficient to be able to state that no rodent species occurs, it is considered likely that any rodent present on the island would have been attracted to a bait. There was no evidence of tracks, scratches, food caching or scent to suggest rodents are present.

2.1.3 Invertebrate threats to *Pisonia grandis* forest

The soft scale *Pulvinaria urbicola* was present on *P. grandis* trees on Douglas Islet. The scale was widespread, present at all five sampling sites, albeit at low numbers, with 1-50 scales recorded across each of the five sites sampled (Figure 6). Four of the five sites surveyed had attendant ants. The *Pisonia* trees appeared healthy, and the scale seemed unlikely to damage the forest in the short term.

¹ Nesting data for the islets is taken from information provided by the Reef Authority (GBRMPA, 2011 and GBRMPA, date unknown), as well as records from WildNet, the Atlas of Living Australia and the Denham Group National Park Management Statement 2013, unless otherwise noted.

Ant surveys recorded seven species of ants, with three species (*Crematogaster* sp1, *C. sp2* and *Tapinoma melanocephala*) collected while attending scale. Of the remainder, *Tetramorium bicarinatum* is a known mutualist of scale, *Polyrhachis cydista*, and *Polyrhachis sp nr cupreata* have congeners who are mutualists with scale. Species from the genus *Strumigenys*, also detected during the surveys, are not likely to be mutualists with scale.

While no predators or parasitoids were collected from Douglas Islet, they are likely to be present and keeping the population of scale suppressed. Because the study was coincident with an extended period of above average rainfall, interpreting this data from just one observation is unlikely to give a reliable measure of the threat posed to the forest by the scale, *P. urbicola*. Given that scale has been recorded on the island, a repeat visit and assessment of the population of scale on the *Pisonia* forest is strongly recommended but should be timed to follow an extended period of dry weather when conditions will favour the build-up of scale and the forest is under its greatest threat. The 10-branch end method utilised by this survey would be able to be implemented by QPWS rangers with some instruction on the approach.

Little evidence of natural enemies of pulvinaria scale was found which may be because scale was scarce in the foliage that was easily accessible. However, amongst the scale sent for confirmation of identification a single specimen was found to be parasitised by a larval parasitoid (Michael Gorton *pers. comm*).

The light trap was set up and left overnight but due to the prevailing wet and windy conditions, despite the trap having a drain hole, the trap filled with water and the specimens were eventually discarded.

2.1.4 Other identified threats

Field surveys identified the presence of a fungal pathogen that was impacting *Pisonia* trees on Douglas Islet. The fungal pathogen collected from island in *Pisonia* leaves is yet to be diagnosed definitively but the disease is likely to be caused by the pathogen *Septoria* sp. The pathogen has previously been collected from Heron, North West and Mast Head islands, as well as North East Herald Cay from 1968 to 1999 (K. Grice *pers. comm*). The proliferation of the disease has probably been facilitated by the prevailing wet weather and above average rainfall over the last few months (K. Grice *pers. comm*). The specimens have been sent to Biosecurity Queensland for molecular identification.



Plate 4 Fungal lesions recorded on Douglas Islet (left, upper leaf surface) (right, lower leaf surface). Images: Ant Rice, 2024.

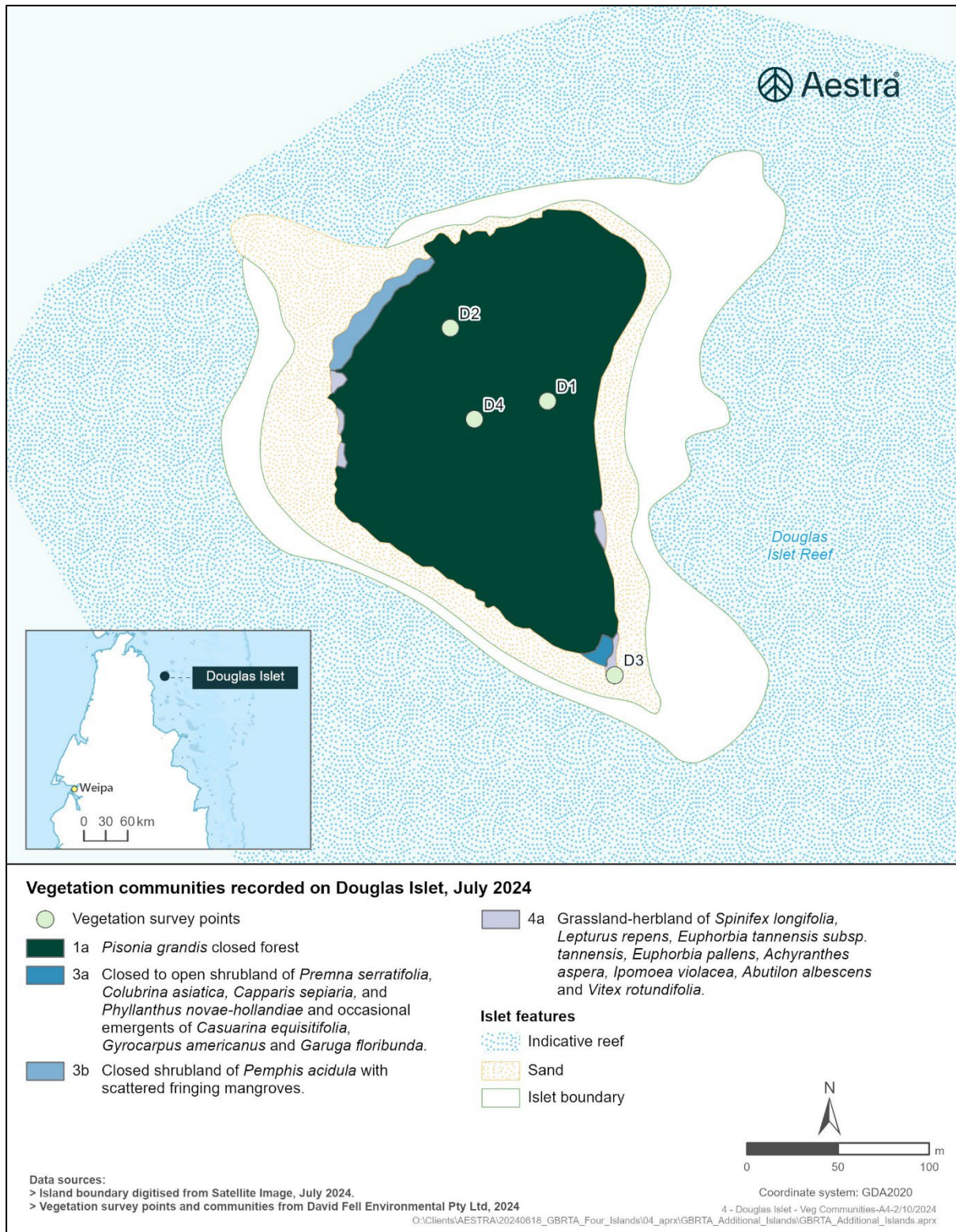


Figure 4 Vegetation communities, Douglas Islet, June 2024

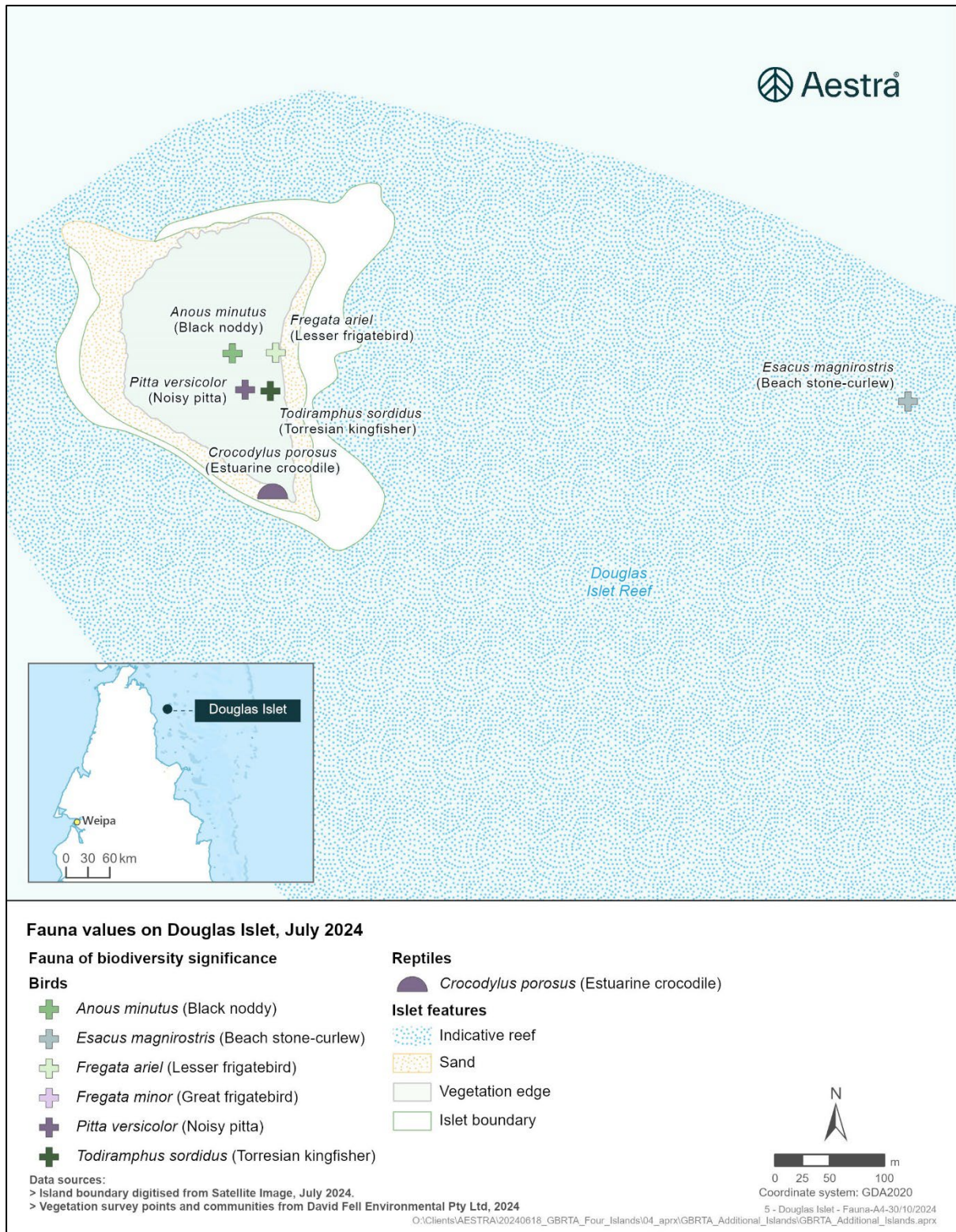


Figure 5 Fauna species recorded, Douglas Islet, June 2024

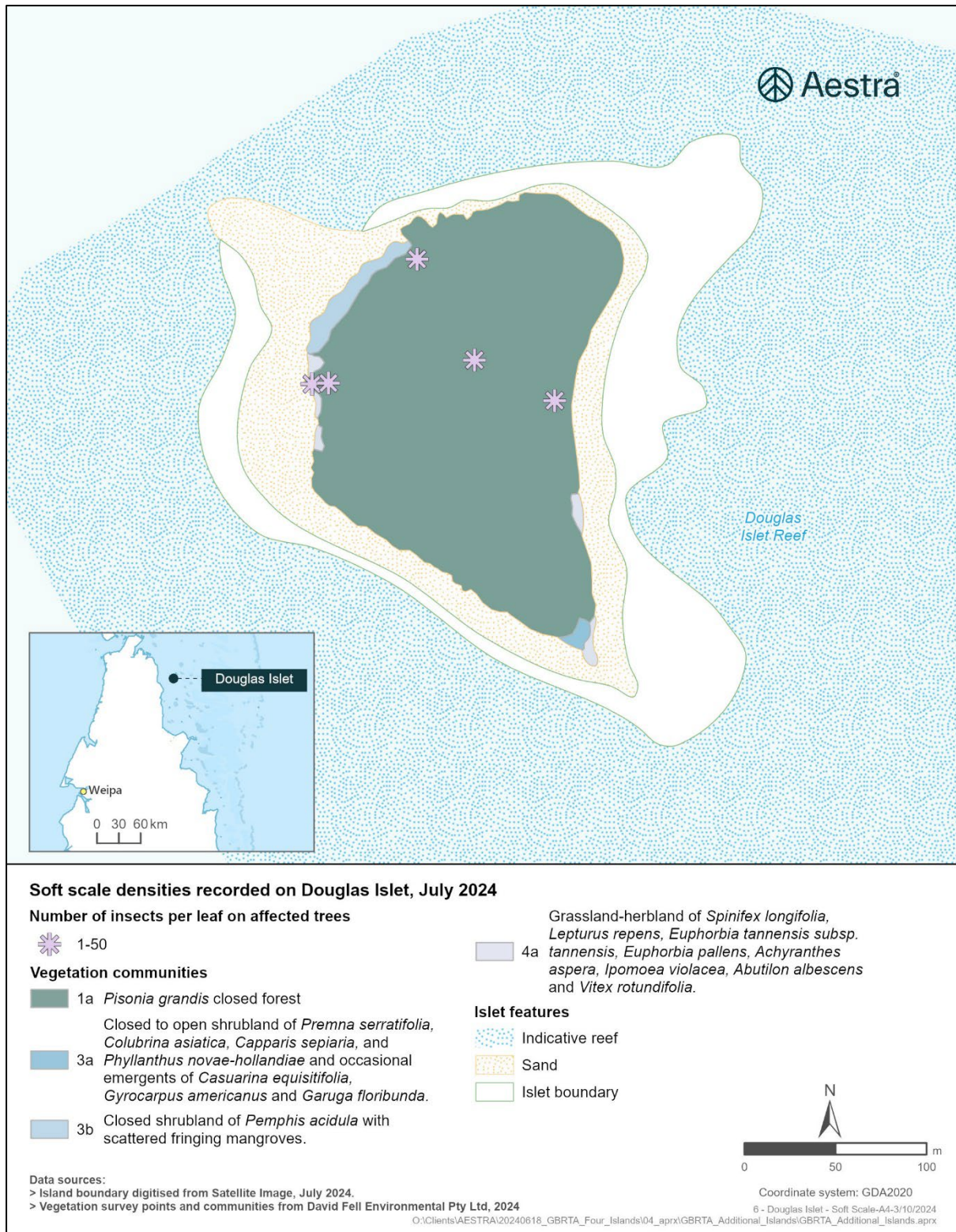


Figure 6 Scale density recorded, Douglas Islet, June 2024

2.2 Cairncross Islets

Cairncross Islets comprises three islets which are identified as A, B and C, with A being the main islet. The islets are 20.8 ha, 18 ha and 1.6 ha in size, respectively, and are home to a highly diverse forest ecosystem including large *P. grandis* trees (Figure 7).



Cairncross Islets desktop snapshot

- *Tenure*: National Park (CYPAL)
- *Group*: Yamarrinh Wachangan Islands (formerly the Denham Group)
- *Size*: Islet A (main island) – 20.8 ha, B – 18 ha, C – 1.6 ha
- *Known active threats*: Historical record of black crazy ant. Regional record of black crazy ants from Milman Islet. No other threats identified.
- *Known key natural values*: Highly diverse forest ecosystem which support large *P. grandis* trees.

Traditional Owner representative:

- Ipima Ikaya Aboriginal Corporation

Figure 7 Cairncross Islets snapshot (Image: David Fell, 2024).

2.2.1 Vegetation and flora

The vegetation on Cairncross Islets is described as being one of the most diverse coral cay ecosystems in the Great Barrier Reef (Walker, 1991). The closed forest dominated by *P. grandis* has been previously described by Walker (1991) and in RE mapping (DESI, 2024) as RE 3.2.29 (*Pisonia grandis* closed forest) / 3.2.28a (Semi-deciduous notophyll vine forest - *Manilkara kauki* (Wongai plum) dominant (80% of the island)) and RE 3.2.30 (*Pemphis acidula* low closed forest (20% of the island)) (see Aestra, 2024).

Records of *P. grandis* on Cairncross Islets date back to surveys in the 1840's and 1850's, with estimates of trees being 17.4 m in height and 6 m in diameter (Walker, 1991). Surveys in 1988 identified approximately 20 mature trees in the centre of the island as a minor but emergent component of a well-developed closed canopy forest system up to 20 m in height and featuring *Garuga floribunda*, *Ficus virens* and *Gyrocarpus americanus* with little or no vegetative spread or growth of *P. grandis* seedlings (Walker, 1991). *Pisonia grandis* was confirmed to occur at Islet A only.

The field survey collected vegetation data across the islet at 14 sites including three basal area measurements using a bitterlich gauge, one health check in *Pisonia* forest, and walking traverses (Attachment B). The field survey confirms the presence of well-developed and diverse vegetation cover on the island with a range of structural and floristic types noted (Figure 8). The island features mature stands of *Pisonia* in the centre, consistent with the mapped RE 3.2.29 (*Pisonia grandis* closed forest). The trees are robust and well developed, reaching a height of 25 m and with DBH ranging between 80-200 cm. There were 22 *Pisonia* trees recorded, all of which appeared in good health with dense leafy cover, no dieback and no obvious trunk rot or senescence observed.

The *Pisonia* trees occur in association with the obligate deciduous trees, *Antiaris toxicaria* var. *macrophylla*, *Garuga floribunda* and *Gyrocarpus americanus*, all of which were leafless, or almost so, at the time of survey. Although these species occur within the *Pisonia* stand, they also form the dominant canopy floristics of a discrete Deciduous notophyll vine forest type which could be separated from the *Pisonia* forest at a 1:10 000 mapping scale. This fully deciduous type has not been previously described on land zone 2 (Quaternary coastal sand deposits) in the Cape York Bioregion. For convenience, and given its limited area, it could be tentatively placed within RE3.2.28 (Semi-deciduous notophyll vine forest on beach ridges, coral atolls, shingle cays and sand cays). The subcanopy features *Manilkara kauki*, *Diospyros maritima* and *Antiaris toxicaria* with a sparse to mid dense shrub layer of *Phyllanthus novae-hollandiae*, *Capparis lucida*, *Capparis nummularia*, *Aglaia elaeagnoidea*, *Celtis philippensis*, *Pleomele angustifolia*, *Mimusops elengi*, *Ganophyllum falcatum*, *Ptychosperma elegans*, *Glycosmis trifolia*, *Micromelum minutum*, *Capparis sepiaria*, *Salacia disepala*, *Diospyros compacta*, *Drypetes deplanchei*, *Carissa laxiflora*, and *Eugenia reinwardtiana*. The most common vines appeared to be *Cayratia acris* and *Ipomoea violacea*. Other vines included *Flagellaria indica*, *Tinospora smilacina*, *Causonis trifolia*, *Pachygone australis*, *Cansjera leptostachya*, *Malaisia scandens* and *Dioscorea bulbifera*. Groundcovers are typically sparse with patches of *Pouzolzia zeylanica*, *Achyranthes aspera*, *Tacca leontopetaloides* and *Proiphys amboinensis*, together with dense seedlings of *Antiaris toxicaria*. *Pisonia* seedlings and sapling shrubs were rare.

In addition to the *Pisonia* dominant and *Antiaris*-*Garuga* deciduous closed forests described above, Cairncross Islets contain stands of evergreen notophyll vine forest dominated by *Manilkara kauki* also consistent with RE3.2.28. Canopy height varies from a low closed forest (7-9 m) where wind sheared on the southeastern side, to a closed forest (10-12 m) in more protected situations with occasional *Garuga floribunda*, *Celtis philippensis*, *Terminalia muelleri* and *Vavaea amicorum* on margins. The shrub layer features *Flagellaria indica*, *Vavaea amicorum*, *Drypetes deplanchei*, *Glycosmis trifolia*, *Ptychosperma elegans*, *Eugenia reinwardtiana*, *Cansjera leptostachya* and saplings of *Antiaris toxicaria*. A sparse groundcover has patches of *Panicum trichoides* and *Priophys amboinensis*. Restricted examples of *Manilkara* low closed forest are also present on Islet B.

Coastal shrubland with emergent *Garuga floribunda* and *Manilkara kauki* occur on the exposed southeastern side of the island. The shrubland is dominated by dense shrubby groves of *Premna serratifolia*, *Colubrina asiatica*, *Capparis sepiaria*, *Phyllanthus novae-hollandiae*, and *Clerodendrum inerme*, with rare *Grewia papuana* and occasional vines of *Tinospora smilacina* and *Abrus precatorius*. The groundcover is sparse with patches *Pouzolzia zeylanica* and *Panicum trichoides*. The occurrence is identified as RE 3.2.31 (*Premna serratifolia* closed scrub. Restricted to coral atolls, shingle cays and sand cays).

Premna shrublands intergrade with *Casuarina equisetifolia* woodland with grassy and herbaceous groundcovers and occasional shrubs of *Suriana maritima* and *Scaevola taccada*. A small polygon is identified as RE3.2.6 (*Casuarina equisetifolia* woodland to open forest on foredunes on mainland and islands).

Dense shrublands of *Pemphis acidula* on exposed beach rock fringe part of the eastern shoreline and the southwestern margin of Islet A. Cairncross Islets B and C which are connected to the main islet by a narrow tidal spit, are also vegetated by *Pemphis acidula* shrubland, although there are also small areas of low closed *Manilkara* forest and fringing seashore stalky grass *Lepturus repens* closed herbland on coralline sand deposits. A few stands of mangrove also occur along the shorelines of Islet B and C but these are either very small clumps of *Rhizophora stylosa* or low scattered individuals of *Avicennia marina* var. *eucalyptifolia* and *Aegialitis annulata*. The *Pemphis* community is consistent with RE 3.2.30 (*Pemphis acidula* low closed forest).

Grasslands - herbland consistent with RE 3.2.24b occur on the exposed dunes on the southern side of Islet A. These are dominated by *Lepturus repens*, *Euphorbia tannensis* var. *tannensis*, *Euphorbia pallens*, *Achyranthes aspera*, *Abutilon albescens*, *Ipomoea pes-capre* subsp. *brasiliensis*, *Ipomoea violacea*, *Xenostegia tridentata*,

Commelina ensifolia, *Boerhavia mutabilis*, *Josephinia imperatricis*, and *Cyperus pedunculatus* with fringing shrubs of *Suriana maritima* and *Premna serratifolia*.

The 73 species previously recorded for Cairncross (70 WildNet records and 73 species vouchered in the Queensland Herbarium) indicate a greater level of previous field work on this island comparative to some of the other islands in the region. The field survey recorded 89 species bringing the known flora of the islet to 108 species (a 30% increase). There were 23 species which had previously been recorded that were not observed during this survey. The survey collected 12 vouchers for inclusion to the Queensland and Australian Tropical Herbarium (Attachment B3 - Voucher specimens - June 2024 survey).

2.2.2 Fauna

The fauna survey of Cairncross Islets recorded 24 species, comprised of 22 birds and two reptiles (Figure 9). Table 2 includes those species listed under the EPBC Act. These species and the other species recorded are listed in [Attachment B5](#). All species recorded are known for the islet in the WildNet and/or ALA databases.

Table 2 Terrestrial vertebrate species listed under the EPBC Act recorded for Cairncross Islets, 27 June 2024

Scientific Name	Common Name	EPBC Act	NC Act	Comments
<i>Calidris tenuirostris</i>	Great knot	V, Ma, M	CR	One seen on rock shelf.
<i>Charadrius leschenaultii</i>	Greater sand plover	V, Ma, M	V	Two seen on a rock shelf.
<i>Charadrius mongolus</i>	Lesser sand plover	E, Ma, M	E	At least 18 birds present along foreshore, mostly on a rock shelf.
<i>Crocodylus porosus</i>	Estuarine crocodile	Ma, M	V	One seen basking on a rock shelf. Tracks seen in sand some distance from the individual observed.
<i>Fregata ariel</i>	Lesser frigatebird	Ma, M	SL	One seen in flight.
<i>Pandion haliaetus cristatus</i>	Eastern osprey	Ma, M	SL	Five birds present. Likely nest on the middle islet.
<i>Pluvialis fulva</i>	Pacific golden plover	Ma, M	SL	Two seen on sandflats.
<i>Thalasseus bergii</i>	Crested tern	Ma, M	SL	One seen on foreshore.

Cairncross Islets were in good condition for terrestrial vertebrate species. Though most of the survey was spent on Islet A, it appeared to be little disturbed. There was some marine debris but not in sufficient quantity to be considered a significant threat to any fauna.

Cairncross Islets has a range of habitat types available for fauna species. The forest supported six forest/woodland bird species, including orange-footed scrubfowl (*Megapodius reinwardt*) and rose-crowned fruit-dove (*Ptilinopus regina*). Both species are well known from offshore islands. There were numerous old nests attributed to pied imperial-pigeon (*Ducula bicolor*); in 1983, 6,500 pairs bred on Cairncross Islets. Five eastern osprey were also observed. Initially they were seen near a nest on Islet B. It is likely that the birds were a pair and their three most recent young that haven't dispersed. It is likely the nest belonged to the pair, though white-bellied sea-eagle was also present. There is no known breeding record of eastern osprey for Cairncross Islets.

Five species of wader were recorded, including three threatened migratory species, great knot, greater sand plover and lesser sand plover. At least 18 lesser sand plovers were present, which is a notable number of overwintering birds. Australian pied oystercatcher was also present. This species has been known to breed on

Cairncross Islets. A comparatively large expanse of foraging habitat for waders is exposed at low tide and Cairncross Islets may be a locally important site for migratory waders, either as a staging post during migration or as a longer-term site. Cairncross Islets provide both substantial foraging and roosting habitat. Thirteen species of migratory sandpipers and plovers have been recorded previously.

Bridled tern (*Onychoprion anaethetus*), Australian pied oystercatcher and sooty oystercatcher (*Haematopus fuliginosus*) have been previously reported breeding on Cairncross Islets. There are no details available regarding years or numbers for the three species. Australian pied oystercatcher breeds between June and January, though there was no evidence of breeding during the survey. Similarly, sooty oystercatcher breeds July to December and bridled tern is likely to breed mid-year in the region. Despite surveys during the known breeding season for the three species, no signs of breeding were observed.

The only tern species recorded was crested tern, which is not known to breed there. No black noddy were recorded and there is no breeding record for Cairncross Islets, though there are database records of its presence. Whitewash was only patchily present suggesting the islets weren't being used as a roost site at the time of survey by large numbers of seabirds.

Potential predators of seabirds and shorebirds recorded were white-bellied sea-eagle, silver gull, nankeen night-heron, buff-banded rail and eastern osprey. Eastern osprey mostly eats fish but seabirds have been recorded as prey (Marchant and Higgins, 1993). The presence of these species is unlikely to preclude nesting by seabirds or shorebirds.

Coastal snake-eyed skink (*Cryptoblepharus litoralis litoralis*) was recorded on shoreline rocks. Other than estuarine crocodile and marine turtles, it is the only reptile known from the Yamarrinh Wachangan Islands.

The survey recorded approximately one third of the species previously recorded for Cairncross Islets. A survey when summer visitors are present, such as migratory waders and birds such as pied imperial-pigeon, rufous fantail and satin flycatcher (*Myiagra cyanoleuca*) may be present, would undoubtedly record more species.

No mammal species has been documented for the islets. There was no evidence of tracks, scratches, food caching or scent to suggest rodents are present.

2.2.3 Invertebrate threats to *Pisonia grandis* forests

Pulvinaria urbicola was present on Cairncross Islet but in very low numbers on shoots that were growing within reach. Four of the six sites sampled had no scale and the two sites that had scale present had only 1-50 scale over the 100 leaves sampled at each site (Figure 10). The trees looked healthy and under no immediate threat from the scale insect. However, similar, to Douglas Islet several ant species capable of forming mutualistic relationship with scale were collected. Two species from the genus *Crematogaster*, at least one *Pheidole* sp. and the green tree ant (*Oecophylla smaragdina*) are known mutualists of the scale and can contribute to outbreaks of the scale when conditions are favourable.

No evidence of natural enemies of pulvinaria scale was found. This may be because scale was scarce in the foliage that was easily accessible.

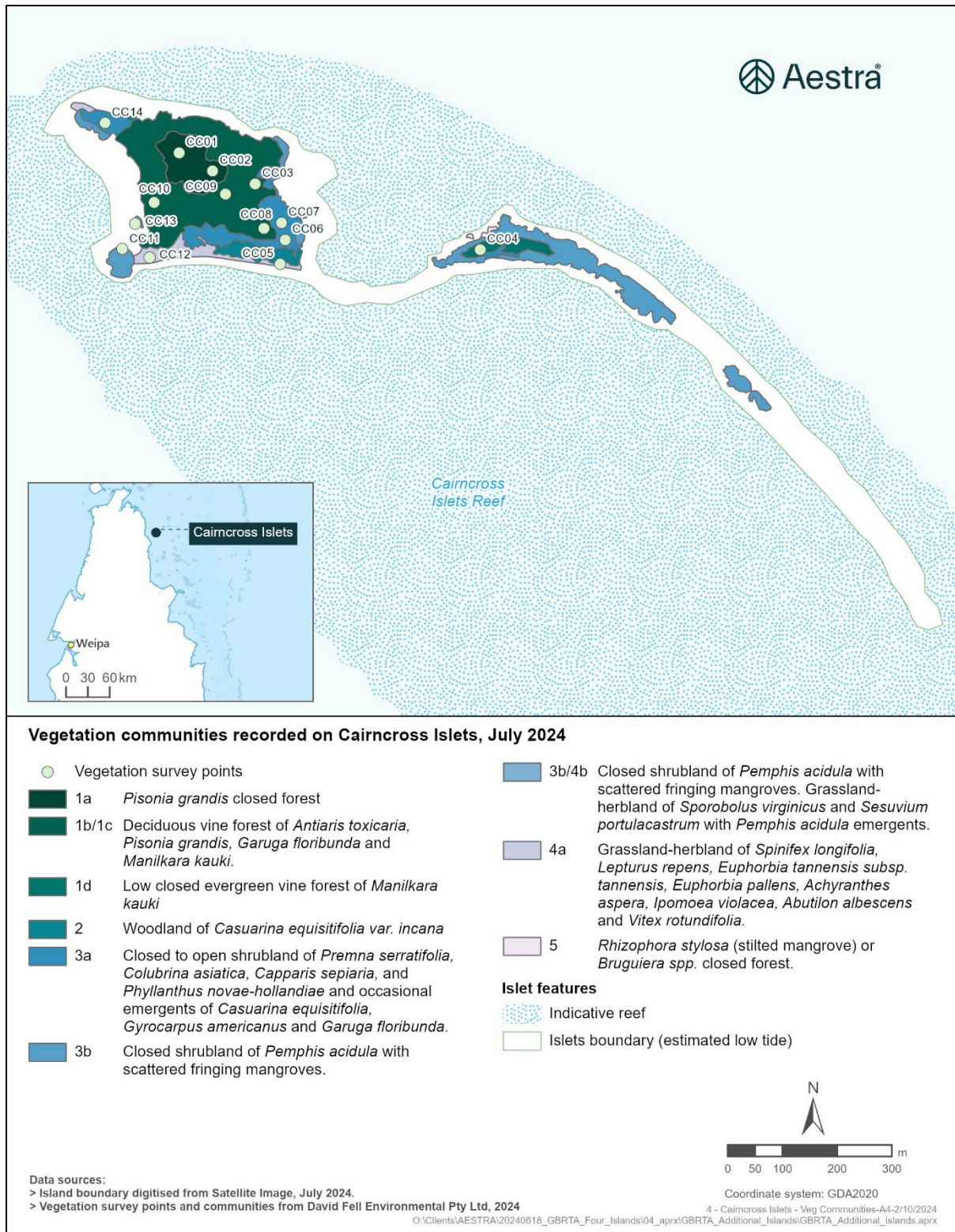
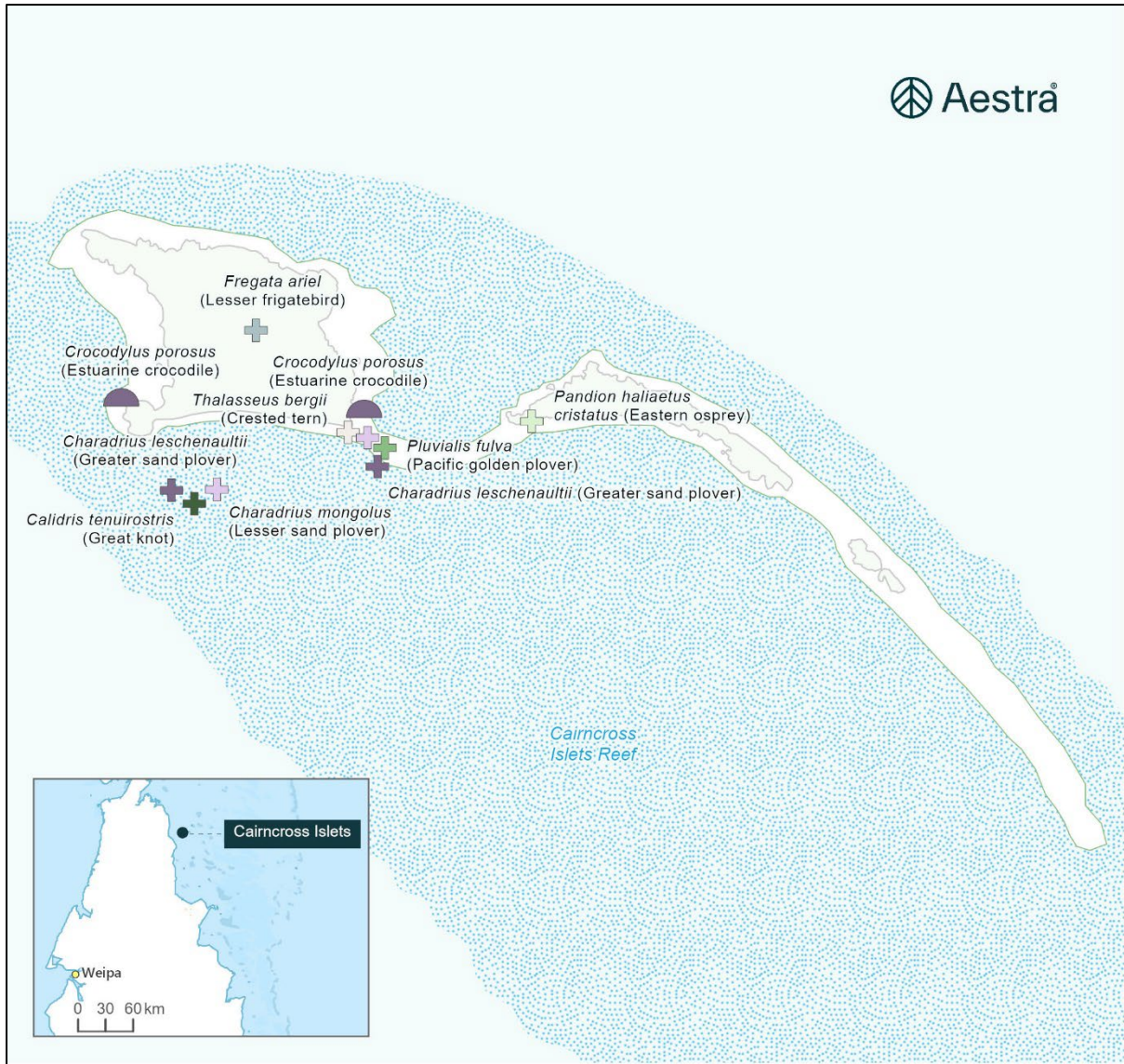


Figure 8 Overview of vegetation communities on Cairncross Islets



Fauna values on Cairncross Islets, July 2024

Fauna of biodiversity significance

Birds

- Calidris tenuirostris* (Great knot)
- Charadrius leschenaultii* (Greater sand plover)
- Charadrius mongolus* (Lesser sand plover)
- Fregata ariel* (Lesser frigatebird)
- Pandion haliaetus cristatus* (Eastern osprey)
- Pluvialis fulva* (Pacific golden plover)

Thalasseus bergii (Crested tern)

Reptiles

Crocodylus porosus (Estuarine crocodile)

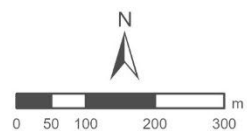
Islet features

- Indicative reef
- Vegetation edge
- Islets boundary (estimated low tide)

Data sources:

- > Island boundary digitised from Satellite Image, July 2024.
- > Vegetation survey points and communities from David Fell Environmental Pty Ltd, 2024

O:\Clients\AESTRA\20240618_GBRTA_Four_Islands\04_aprx\GBRTA_Additional_Islands\GBRTA_Additional_Islands.aprx



Coordinate system: GDA2020
5 - Cairncross Islets - Fauna-A4-3/10/2024

Figure 9 Fauna species recorded, Cairncross Islets, June 2024

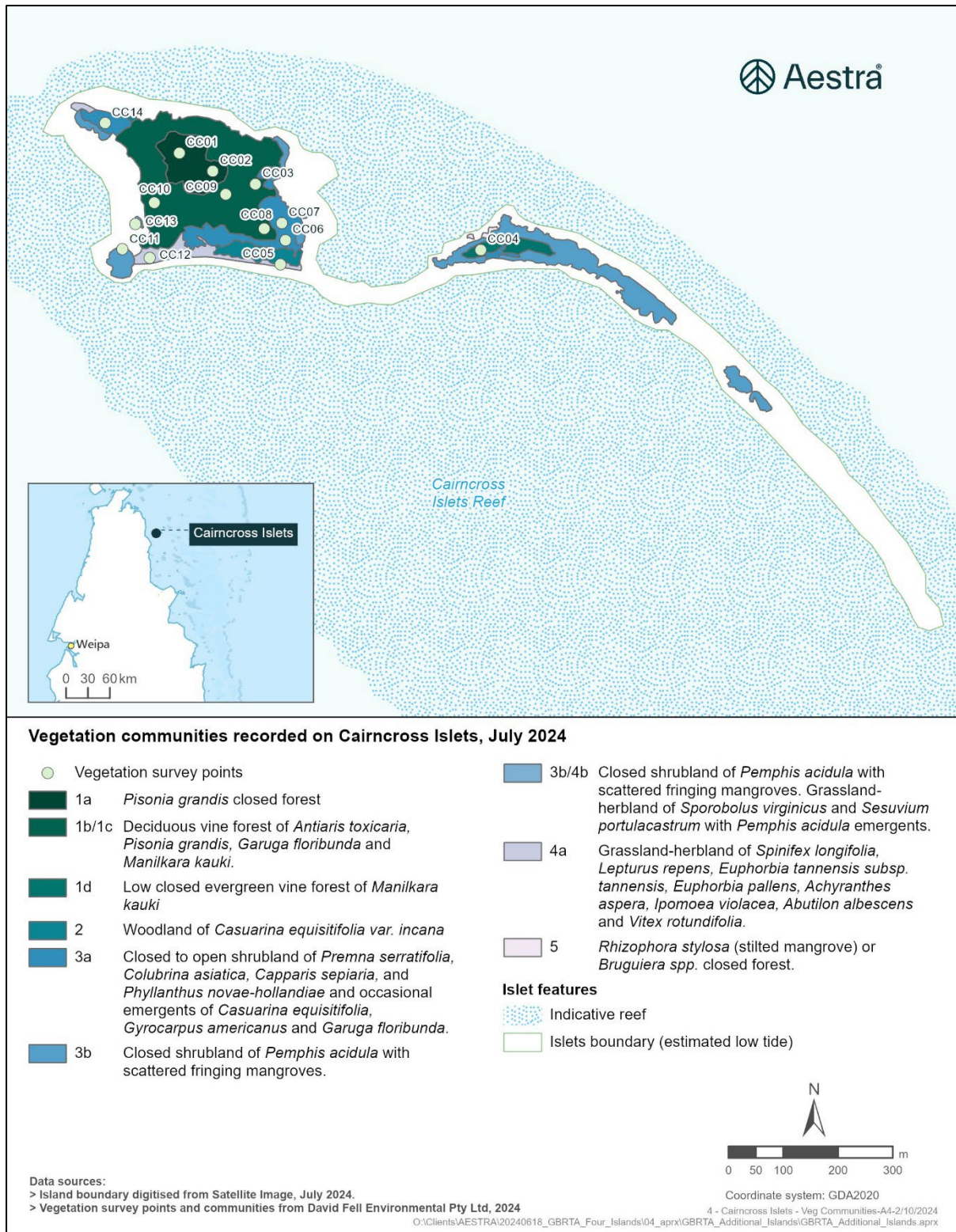


Figure 10 Scale density recorded, Cairncross Islets, June 2024

2.3 Wallace Islet

Wallace Islet is an oval-shaped sand cay approximately 2.2 ha in size, composed of coral sand and reef rubble (Figure 11) (King, 1989).



Wallace Islet snapshot

- *Tenure*: National Park (CYPAL)
- *Group*: Yamarrinh Wachangan Islands (Denham Group)
- *Size*: 2.2 ha
- *Known active threats*: Historical record of black crazy ant. Regional record of black crazy ants from Cholmondeley Islet. No other known threats identified.
- *Known key natural values*: Important nesting site for roseate tern and crested tern.

Traditional Owner representative:

- Ipima Ikaya Aboriginal Corporation

Figure 11 Wallace Islet snapshot (Image: David Fell, 2024)

2.3.1 Vegetation and flora

Wallace Islet's vegetation has previously been described by King (1989) and Walker (1991). The field survey collected vegetation data across the islet at four sites together with foot traverses ([Attachment A](#)). The most extensive vegetation of the island is a mixed closed tussock grassland to forbland which is consistent with

mapped RE 3.2.24b (mixed open tussock grassland and open forblands or shrublands on exposed foredunes and islands). There is a stand of fringing *Casuarina equisetifolia* woodland on the western shoreline. A dense patch of low closed *P. grandis* forest occurs in the centre of the northern end of the island (Figure 12).

The *Pisonia* forest forms a low closed forest that ranges from 5 – 9 m in height with a few emergent trees to 12-14 m. It is consistent with the currently mapped RE 3.2.29 (*Pisonia grandis* closed forest). The forest is wind sheared on the eastern side, and highest in the central north of the stand. The population ranges in size from 5 cm to 89 cm DBH (mean 36 cm). The majority of trees are multi stemmed. The only other species recorded within the stand were three shrubs of *Manilkara kauki* (1.5-3 m in height) and vines of *Ipomoea violacea*. A fallen trunk of what is thought to be a *Manilkara* was found within the forest indicating the previous presence of a mature tree. Apart from the few *Manilkara* shrubs there was no shrub layer or vegetative groundcover. Leaf litter was measured at 10 random points with a mean depth of 6 cm. There were no seedlings of *Pisonia* observed.

The grassland - herbland community is dominated by the graminoids *Spinifex longifolius* and *Lepturus repens* with scattered low to prostrate shrubs of *Abutilon albescens* and *Vitex rotundifolia* and rare emergent shrubs to 1-2 m of *Cordia subcordata*, *Phyllanthus novae-hollandiae*, *Scaevola taccada*, and *Suriana maritima*. Common herbs were *Achyranthes aspera*, *Euphorbia pallens*, *E. tannensis*, *Commelina ensifolia* and *Boerhavia mutabilis*. Creeping vines of *Ipomoea pes-capre* subsp. *brasiliensis*, and *Ipomoea violacea* were common. Species which appear restricted to just above the shorelines are *Sesuvium portulacastrum*, *Tribulus cistoides*, *Salsola kali* with rare *Cocos nucifera* (< 1m in height). A single shrub of *Pemphis acidula* occurs on the northern west shoreline. A seedling germinant of *Xylocarpus* sp. was noted on the shoreline and considered unlikely to survive long after germination.

The *Casuarina* dominated woodland on the western shoreline is not identified on RE mapping and is considered consistent with RE3.2.6 (*Casuarina equisetifolia* woodland to open forest on foredunes on mainland and islands). It is noted that the *Casuarina* woodland appears to be a more recent colonisation, as it does not appear to be present on the 1979 aerial image, nor is it mentioned by King (1989). The groundcover is sparse with patches of the erect herbs *Euphorbia tannensis*, *Achyranthes aspera* and *Lepturus repens*. A few recruiting saplings of *Pisonia* and approximately five *Pisonia* seedlings were noted to have established under the *Casuarina* stand, however, these individuals were in poor condition.

The flora of Wallace Islet was previously known from 22 WildNet records of which nine species are vouchered in the Queensland Herbarium. The field survey recorded 39 species bringing the known number of species recorded to 40 (45% increase). There are 26 plant families, the most dominant being Poaceae (5 species), Convolvulaceae (4), and Euphorbiaceae (3). Only one of the previously recorded species (*Urochloa pubigera*) was not observed during this survey. The native flora consists of 35 species with two species being introduced. Introduced species are *Dactyloctenium aegyptium* (a grass), and *Ipomoea nil* (a vine). The latter was recorded as common in grassland on the northern side of the island and climbing on the lower edge of the *Pisonia* forest. It is recommended that the growth of *Ipomoea nil* be monitored to ensure that it does not impact the *Pisonia* forest.

The stand of low closed forest *Pisonia* forest on Wallace Islet showed some evidence of stress. While still appearing healthy (i.e., in full leaf with no obvious canopy dieback), a few *Pisonia* trees had dry rot in trunks and there was no seedling regeneration present within the main stand.

Vulnerability to climate change has been identified as a threatening process to sand and coral cays, given they are extremely low lying and have shallow freshwater lens (Turner and Battinoff, 2007; Aestra, 2024). Evidence of impacts from rising sea levels in the form of inundation and erosion was observed at Wallace Islet. Scattered plastics debris were observed in the centre of the islet and erosion of the eastern shoreline appears to have reduced the grassland buffer to the adjacent *Pisonia* forest edge by to 2-3 m.

Coastal erosion processes appear to be active on the eastern side of the island as evidenced by a 1 m sand scarp which is within 2-3 m of the *Pisonia* forest and by comparing the current position of the *Pisonia* forest edge (GPS located during the survey) with available historic aerial imagery. Preliminary evidence suggests that the erosion processes will continue to erode the eastern side of the islet and thus negatively impact the *Pisonia* forest over the long term. Likely impacts will be the deterioration in size and health of the *Pisonia* stand through loss of trees and the negative influence of edge effects such as increases of wind and salt exposure and microclimate. The western side of the island appears to be accreting with the colonisation of *Casuarina* and evidence of *Pisonia* succession which is likely to see a shift in the vegetation patterns on the island over the long term.

On Wallace Islet, the loss of *P. grandis* through erosion may result in a loss of resilience to the remaining forest through edge effects, resulting in tree loss and dieback. This will in turn increase the opportunity for succession of colonising shrub, herb and grass species which currently inhabit most of the islet.

2.3.2 Fauna

The fauna survey of Wallace Islet recorded 21 species, comprised of 20 birds and one reptile (Figure 13). Table 3 includes those species listed under the EPBC Act and/or listed as threatened under the NC Act. These species and the other species recorded are listed in [Attachment B2](#). All species recorded are known for the islet in the WildNet and/or ALA databases.

Table 3 Terrestrial vertebrate species listed under the EPBC Act and/or threatened under the NC Act recorded for Wallace Islet, 26 - 28 June 2024

Scientific Name	Common Name	EPBC Act	NC Act	Comments
<i>Anous minutus</i>	Black noddy	Ma	C	At least five birds present, mostly seen flying around the islet. Two birds were seen perched in <i>Pisonia</i> .
<i>Arenaria interpres</i>	Ruddy turnstone	V, Ma, M	SL	One seen on sandflats foraging and roosting on rock shelf.
<i>Charadrius leschenaultii</i>	Greater sand plover	V, Ma, M	V	Two seen on rock shelf.
<i>Charadrius mongolus</i>	Lesser sand plover	E, Ma, M	E	Three seen on rock shelf.
<i>Crocodylus porosus</i>	Estuarine crocodile	Ma, M	V	One seen in water close to beach.
<i>Esacus magnirostris</i>	Beach stone-curlew	-	V	Four bird present. Seen on sandflats and rock shelf.
<i>Fregata ariel</i>	Lesser frigatebird	Ma, M	SL	Three seen in flight.
<i>Fregata minor</i>	Great frigatebird	Ma, M	SL	Eight seen in flight.
<i>Pandion haliaetus cristatus</i>	Eastern osprey	Ma, M	SL	One seen in flight.
<i>Pluvialis fulva</i>	Pacific golden plover	Ma, M	SL	Two seen foraging on sandflats and roosting on rock shelf.
<i>Thalasseus bergii</i>	Crested tern	Ma, M	SL	Two seen along foreshore.
<i>Tringa brevipes</i>	Grey-tailed tattler	Ma, M	SL	One seen foraging on sandflats.

Wallace Islet was in good condition for terrestrial vertebrate species. It appeared to be little disturbed. There was some marine debris but not in sufficient quantity to be considered a significant threat to any fauna.

Only three bird species were recorded in the patch of *Pisonia* forest during the two visits to Wallace Islet, black noddy, eastern reef egret and varied honeyeater (*Gavicalis versicolor*). A pair of eastern reef egret (*Egretta sacra*) were nesting in the *Pisonia* and two black noddies perched within the forest during the survey.

There was no evidence of black noddies nesting however, there has been a number of previous records for the island. Black noddies breed all year round, with greatest numbers in winter (King and Limpus, 1989), though seasonally on some islands and possibly irregularly on some islands (Higgins and Davies, 1996). King and Limpus (1989) documented black noddy breeding on Wallace Islet in the years 1976, 1985 and 1982, with the most nests, 634, in August 1982. In March 1986 they recorded four birds but no breeding. There is no known breeding event on Wallace Islet since 1982. While whitewash was common and it is likely black noddy is roosting in the forest no evidence of nesting was present. Other seabird species, such as frigatebirds may roost in the canopy as well. Similarly, pied imperial-pigeon (*Ducula bicolor*) has been reported as breeding on the island but no detail is available on the breeding population numbers. No evidence of their nests was found during the field surveys.

The monospecific *Pisonia* forest is small and provides few resources for forest/woodland bird species. A number of species are known from database records but species such as rufous fantail (*Rhipidura rufifrons*) may only visit during migration and species such as spangled drongo (*Dicrurus bracteatus*) and mangrove golden whistler may be short-term visitors from nearby islands or the mainland. White-breasted woodswallow (*Artamus leucorhynchus*)

and sacred kingfisher (*Todiramphus sanctus*) were present but appeared to be more associated with the casuarinas and, in the case of the kingfisher, along the shoreline.

Five migratory waders and two resident species, beach stone-curlew and Australian pied oystercatcher (*Haematopus longirostris*), were recorded. Beach stone-curlew is known to breed on Wallace Islet and it is possible that the oystercatcher does as well. All the waders were seen in small numbers and foraged on sandflats exposed by the falling tide and rested on rock shelves when the flats were submerged. A substantial foraging area is present. Eighteen species of migratory sandpiper and plover have been recorded for Wallace Islet and, although some may use it only as a staging post, it is likely to be a locally important site for these species.

As noted above, black noddy was last recorded breeding on Wallace Islet in 1982. Six other tern species have also been recorded breeding on the islet but the most recent record is crested tern in 1990. Wallace Islet is described as previously a major breeding location, 5,000 pairs in 1986. It is not known if any tern species still breeds on Wallace Islet and no evidence of nesting was identified.

Potential predators of seabirds and shorebirds recorded were white-bellied sea-eagle, silver gull, nankeen night-heron, buff-banded rail and eastern osprey. presence of these species is unlikely to preclude nesting by seabirds or shorebirds.

Similarly to Cairncross Islets, the survey recorded approximately one third of the species previously recorded for Wallace Islet. A survey when summer visitors are present, such as migratory waders and land birds may be present, would undoubtedly record more species. Though many of the recorded land birds are likely to be very short-term visitors due to the size and nature of the wooded habitat.

No mammal species has been documented for Wallace Islet. There was no evidence of tracks, scratches, food caching or scent to suggest rodents are present.

2.3.3 Invertebrate threats to *Pisonia grandis* forests

Pulvinaria urbicola was present and abundant on Wallace Islet but its distribution was uneven (Figure 14). Of the five sites sampled, two had 50-500 scale, two had relatively low levels (1-50) and one had no scale at all. Abundance of the scale was strongly linked to the nests of native arboreal green tree (weaver) ants (*Oecophylla smaragdina*). The green tree ant uses silk produced by its larval stage to bind leaves together to form nests. The ant is a known mutualist of scale, and on Wallace Islet the inside of the ant's nests were heavily infested with immature and mature scale (refer to Plate 2 in Section 1.4.1). Green tree ants are very aggressive and will actively attack if their nests are disturbed, making them very effective mutualists with the scale insect.

The predatory ladybird beetle, *Cryptolaemus montrouzieri* was abundant on Wallace Islet, occurring on 30% of leaves sampled. *Cryptolaemus* larvae were observed feeding on scale insects where there were no attendant ants present, however the ants were observed attacking adult *Cryptolaemus* beetles (Plate 5).

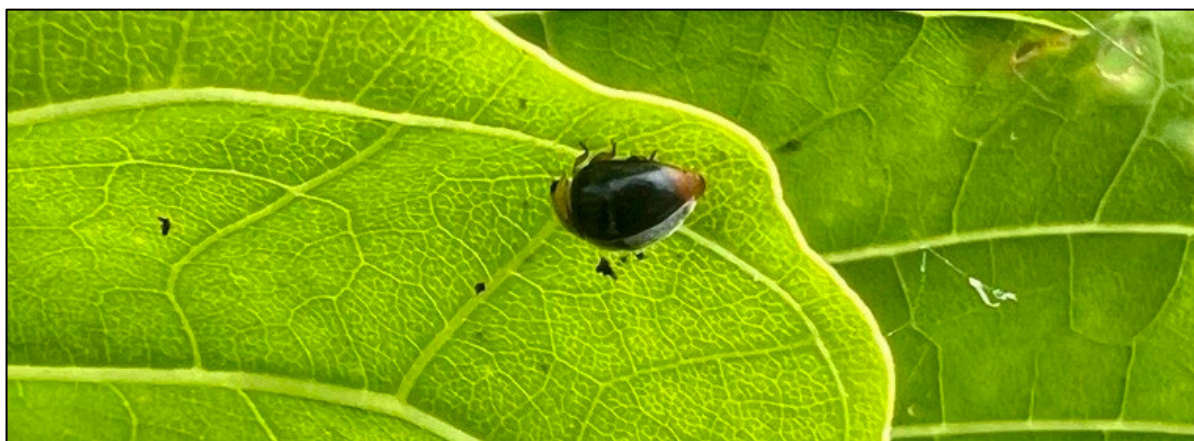


Plate 5 Mature *Cryptolaemus montrouzieri*, Wallace Islet (Image: Naomi Maxwell, 2024)

Despite *Cryptolaemus* being abundant around the infestations of scale, there was no evidence that they could prey on scale located within ant nests. It is also likely that the ants would repel potential parasitoids from within and near their nests. Despite collecting several hundred live scale insects from shoots and stems near the ant nests, and holding them for 14 days, no evidence of parasitism was found. Two scale insects showing evidence of parasitism were collected away from the ant nests and they yielded one specimen of the scale parasitoid *Coccophagus ceroplastae* (Hymenoptera: Aphelinidae).

In an almost-closed system such as the *Pisonia* stand on Wallace Islet, new arrivals of natural enemies may be relatively uncommon. Consequently, having safe refuges for urbicola scale (which provide a food source for natural enemies) may add some stability to the system by ensuring there are always at least some prey or hosts for natural enemies to exploit and survive. In agroecosystems where the dynamics of pests and their natural enemies have been well studied, it is recognised that without an alternative food source natural enemies won't survive or remain in an ecosystem, and that at least some pests are required to keep natural enemies present, which, in turn, can help prevent pest populations from becoming eruptive.

Two parasitoids from families Pteromalidae and Chalcididae were collected from a sweep of *Pisonia* foliage. They are not likely natural enemies of scale insects, however members of these families are commonly found attacking caterpillars and beetle larvae which indicates that outbreaks of other insect herbivores may also have natural controls.

2.3.4 Other identified threats

Field surveys identified the presence of a fungal pathogen that was impacting *Pisonia* trees on Wallace Islet. The same lesions were spotted on *Pisonia* trees on Douglas Islet. The fungal pathogen is yet to be diagnosed definitively but the disease is likely to be caused by the pathogen *Septoria* sp. Refer section 2.1.4.

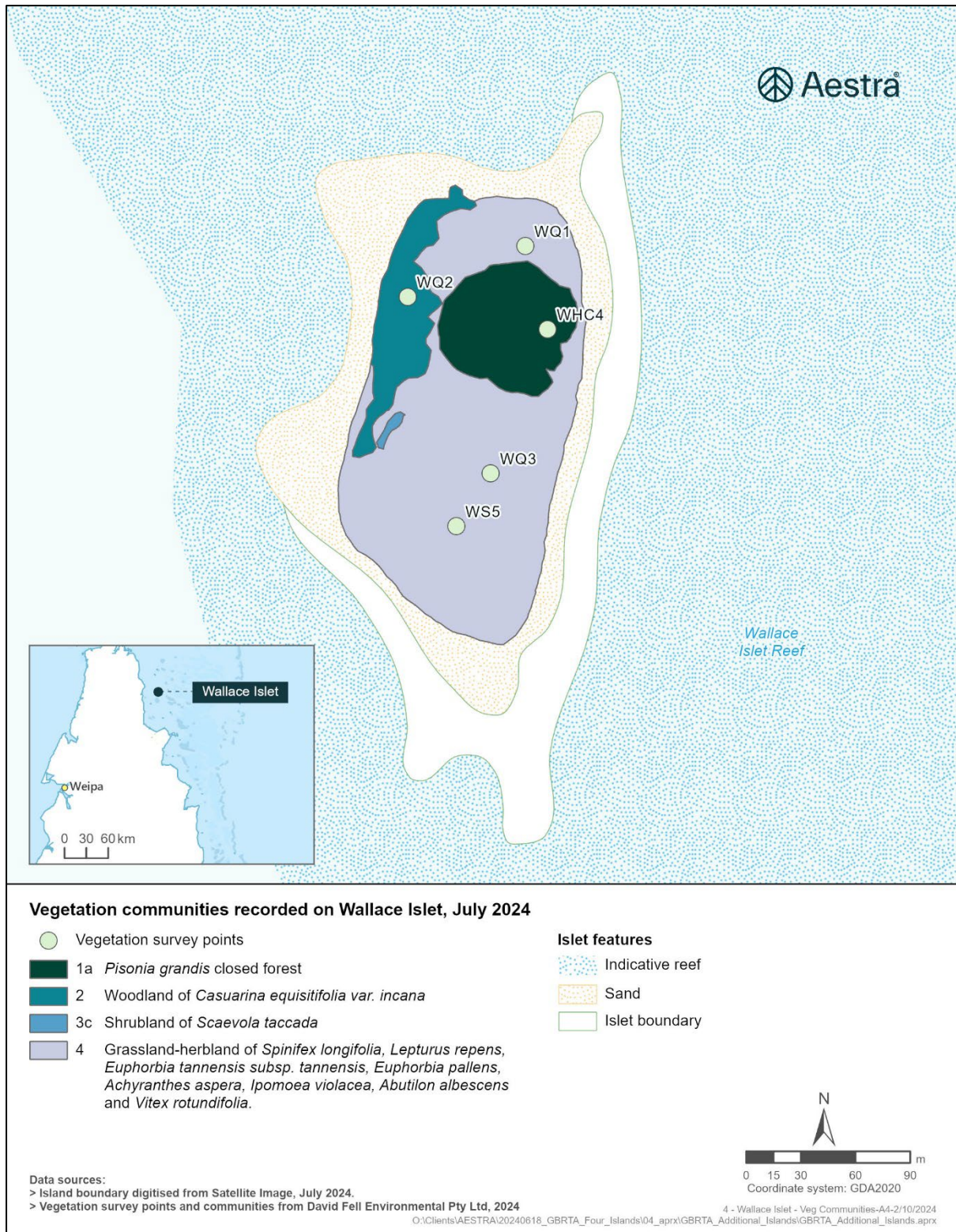


Figure 12 Vegetation communities, Wallace Islet, June 2024

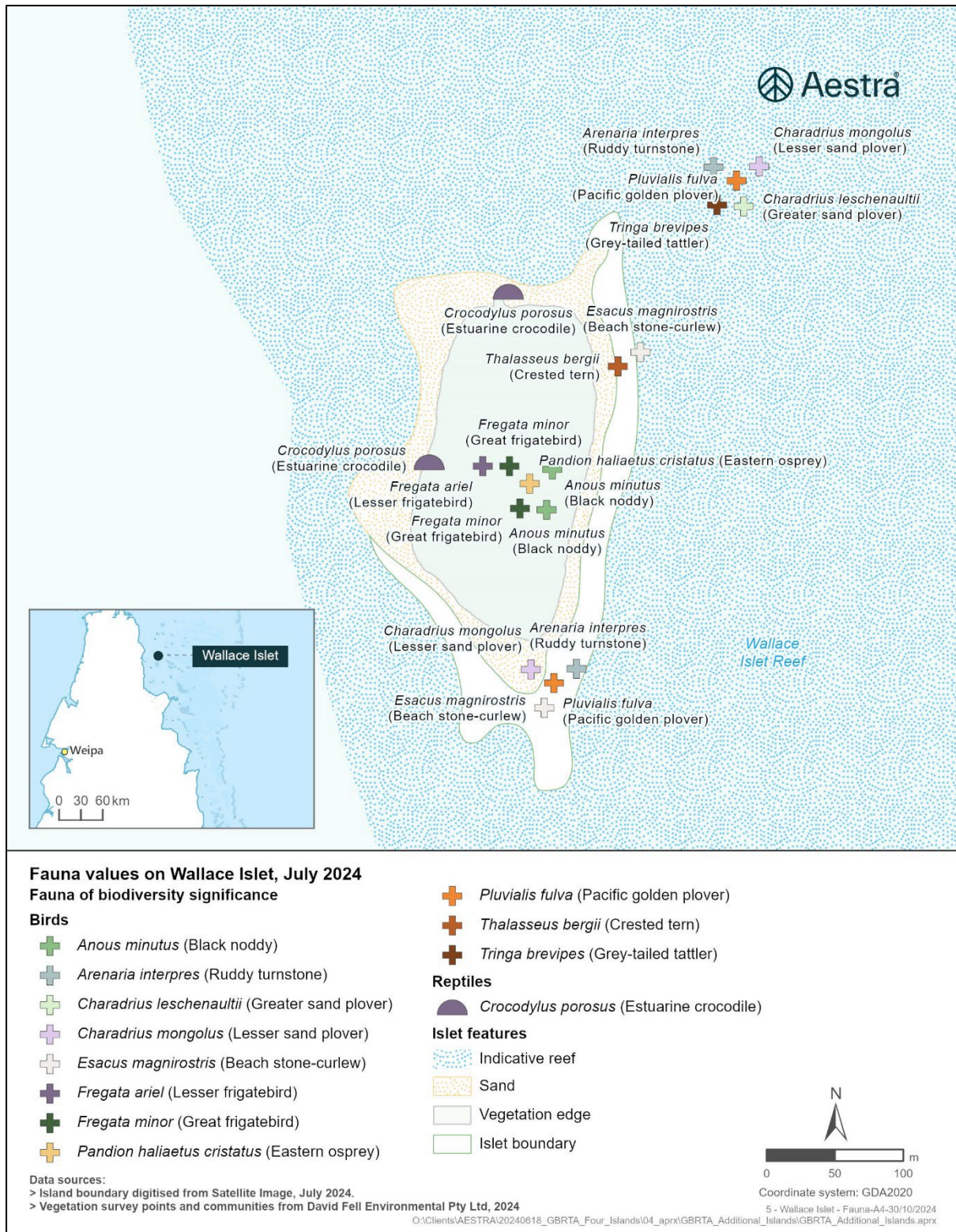


Figure 13 Fauna species recorded, Wallace Islet, June 2024

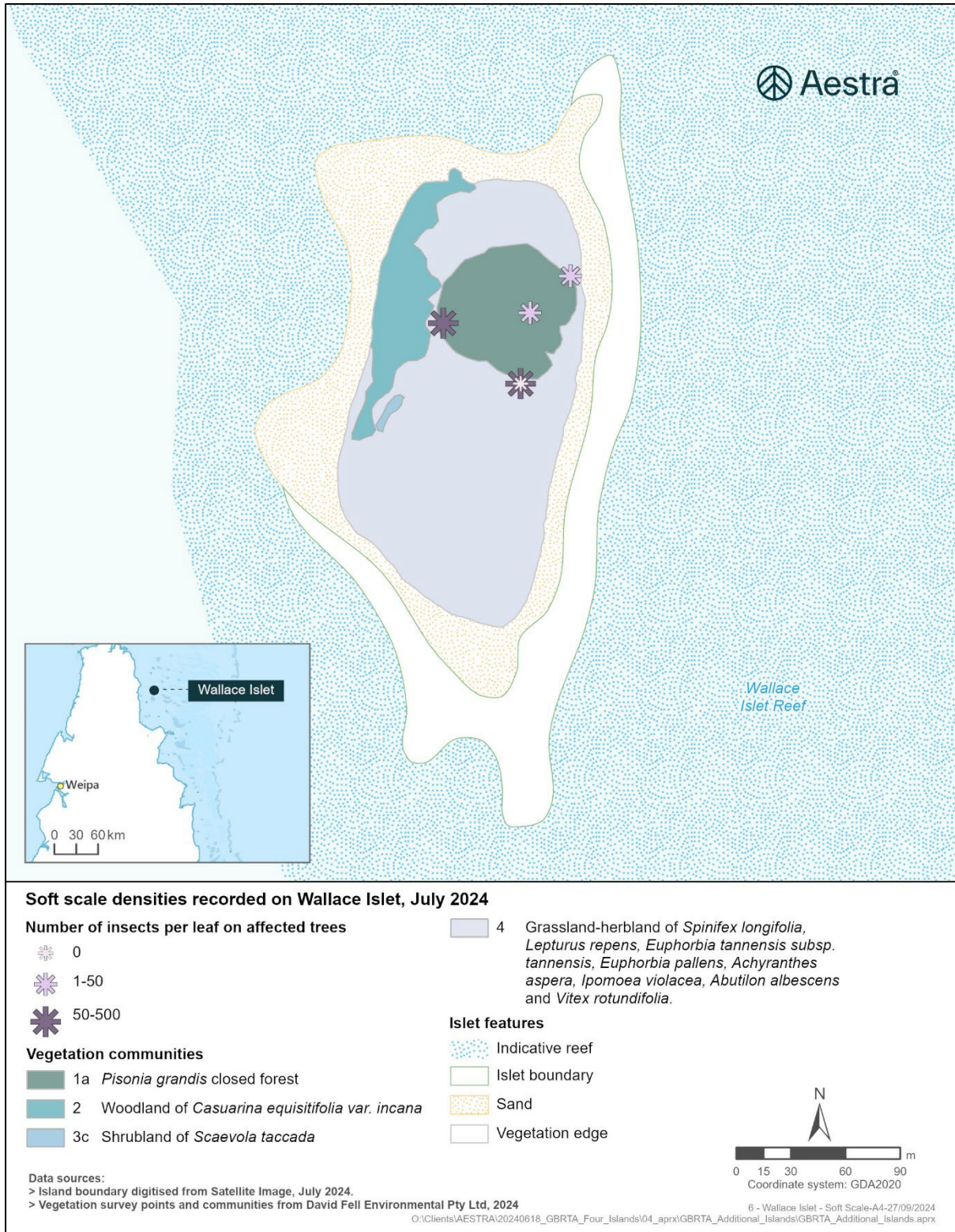


Figure 14 Scale density, Wallace Islet, June 2024

3 Bibliography

- ALA 2024, Atlas of Living Australia, <https://www.ala.org.au>.
- BirdLife Australia, 2024, Birddata support and FAQs, <https://birddata.birdlife.org.au/help/survey-techniques>.
- Buckley, 1987, Ant-plant-homopteran interactions, *Advances in Ecological Research*, Vol. 16:53-85.
- Commonwealth of Australia, 2020, Wildlife Conservation Plan for Seabirds, Australian Government Department of Agriculture, Water and the Environment, Canberra.
- Denham Group National Park, date unknown, provided by the Great Barrier Reef Marine Park Authority.
- Department of Environment and Science, Queensland Herbarium Records, Sinclair Islet July 2005, Key Sites: J. Clarkson and G. Kelly 4/12/87; J. De Campo 14/12/88, J. Clarkson 1/12/05, Queensland.
- Department of the Environment, 2024a. *Chelonia mydas* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1765.
- Department of the Environment, 2024b. *Eretmochelys imbricata* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1766.
- Earth Systems and Climate Change Hub, 2021, Tropical cyclones and climate change in the Great Barrier Reef Region, National Environmental Science Programme. Available from https://nespclimate.com.au/wp-content/uploads/2021/04/ESCC_Tropical-cyclones-in-the-GBR_Brochure.pdf, accessed 22 February 2024.
- Frank, S.D. 2021 Review of the direct and indirect effects of warming and drought on scale insect pests of forest systems. *Forestry* **94**, 167–180
- Freebairn C, 2006, The scale insect *Pulvinaria urbicola* and the hawkmoth *Hippotion velox* on *Pisonia grandis* on NE Herald Islet in the Coringa-Herald National Nature Reserve: August 2006. Department of Primary Industries and Fisheries, Queensland Government.
- Freebairn C, 2007, The scale insect *Pulvinaria urbicola* and the hawkmoth *Hippotion velox* on *Pisonia grandis* on NE Herald Islet, Coringa-Herald National Nature Reserve: May 2007. Report to the Department of Environment and Water Resources, Queensland Government.
- García Morales M, Denno BD, Miller DR, Miller GL, Ben-Dov Y, Hardy NB. 2016. *ScaleNet: A literature-based model of scale insect biology and systematics*. Database. doi: 10.1093/database/bav118. <http://scalenet.info> 13/9/2024.
- Gorton, M, 2024, Northern Australia Quarantine Service, personal communication, 18 September 2024.
- Great Barrier Reef Marine Park Authority (Reef Authority), 2011, Denham Group National Park Protected Area, unpublished.
- Great Barrier Reef Marine Park Authority (Reef Authority), date unknown, Douglas Islet Protected Area, unpublished.
- Grice K, 2024, Queensland Department of Agriculture and Fisheries, personal communication 17 July 2024.
- Higgins PJ and Davies SJJF, (eds) 1996, Handbook of Australian, New Zealand and Antarctic birds, Vol. 3: snipe to pigeons, Oxford University Press, Melbourne.
- Jactel, H., Koricheva, J., Castagnèyrol, B. 2019. Responses of forest insect pests to climate change: not so simple. *Current Opinion in Insect Science* **35**:103–108
- King BR and Limpus CJ, 1989, Seabird islands No. 191 Wallace Island, Great Barrier Reef, Queensland, Corella, Vol. 13: 43-44.
- Olds, J.A. (2018) Management of cottony urbicola scale and African big-headed ants in the Capricorn and Bunker Group: *Pulvinaria urbicola* and *Pheidole megacephala* impacts on *Pisonia grandis*. Internal Report. Ecological Assessment Unit, Queensland Parks and Wildlife Service, Department of Environment and Science, Queensland Government.

Olds, J., Congram A., and McDougall, A. (2019) Invertebrates: scale, ants and moths – key threats to *Pisonia grandis*. In: Hemson G., Melzer R. and Russell M. eds (2020) Environmental Assessment of the Coringa Islets and Herald Cays in the Coral Sea Marine Park, December 2019. Queensland Parks and Wildlife Service and Partnerships, Queensland Department of Environment and Science.

Marchant S and Higgins PJ, (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 and Higgins PJ, (eds) (1993) Handbook of Australian, New Zealand and Antarctic birds. Vol. 2: raptors to lapwings, Oxford University Press, Melbourne.

Melzer R. 2019. Natural Values Health Checks. A guide to undertaking Health Checks for key natural values. Version 1.8, August 2021. Ecological Assessment Unit, Queensland Parks and Wildlife Service & Partnerships, Department of Environment and Science, Queensland Government.

Neldner, V.J., Butler, D.W. and G.P. Guymer (2019) Queensland's regional ecosystems: Building a maintaining a biodiversity inventory, planning framework and information system for Queensland, Version 2.0, Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

Queensland Government 2024, WildNet database, <https://www.qld.gov.au/environment/plants-animals/species-information/wildnet>.

Queensland Department of National Parks, Recreation, Sport and Racing, 2013, *Denham Group National Park Management Statement 2013*, Queensland Government.

Queensland Department of Environment, Science and Innovation 2024 Regional Ecosystem Database. Accessed online 10 June 2024.

Smith, D., Papacek, D., Hallam, M. and Smith, J. (2004) *Biological control of Pulvinaria urbicola (Cockerell) (Homoptera: Coccidae) in a Pisonia grandis forest on North East Herald Cay in the coral sea*. General & Applied Entomology, 33 . 61-68.

Turner, M. and Batianoff, G.N., 2007, *Vulnerability of island flora and fauna in the Great Barrier Reef to climate change*. In: Johnson, Johanna E., and Marshall, Paul A., (eds.) Climate Change and the Great Barrier Reef: a vulnerability assessment. Great Barrier Reef Marine Park Authority and Australian Greenhouse Office, Townsville, QLD, Australia, 667-716.

Walker TA, 1991, *Pisonia Islands of the Great Barrier Reef*, Atoll Research Bulletin No. 350

Attachment A - Methods

The field surveys were carried out between 25th and 29th of June 2024, with surveys on the 29th being opportunistic only. The surveys aimed to assess values, health and threats to island landscapes supporting *Pisonia* forests. The team which comprised a botanist, an entomologist and a fauna ecologist was supported by a Traditional Owners/custodians and project staff of the Reef Authority and Aestra. Based out of Bamaga, a Bell 407 helicopter was used to travel to target islands each day. Weather conditions during the survey period were unfavourable with overcast skies and strong gusting south easterly winds and showers disrupting the planned schedule and restricting time on islands.

Flora and vegetation methods

Prior to the commencement of field survey, a desktop review of the known ecological values of each islet was carried out by Aestra (2024) from the following sources:

- an extract of the Queensland Herbarium database July 2005, Key Sites: J. Clarkson and G. Kelly 4/12/87; J. De Campo 14/12/88, J. Clarkson 1/12/05 provided by the Reef Authority.
- records from the Atlas of Living Australia.
- unpublished reports by the Reef Authority (GBRMPA, 2011 and GBRMPA, unknown).
- WildNet data.
- Denham Group National Park Management Statement 2013.
- Records for *P. grandis* from the Australasian Virtual Herbarium are shown where available.
- Published papers of Walker (1991), King (1989) and Turner and Batainoff (2007).
- Regional Ecosystem mapping (Qld Department Environment Science and Innovation).

Field Survey

Survey sites were selected using satellite imagery, with a focus on:

- Detection of the presence of *Pisonia* trees.
- Rapid assessment of *Pisonia* population size, species associations and health.
- QPWS health check.
- Collation of flora lists and detection of weeds.
- Collection of site data to support any future vegetation mapping and inform RE classification.

The field survey collected vegetation structural and floristic data at 24 sites applying quaternary and tertiary site detail (Neldner *et. al.*, 2019) and QNPWS Health Checks (Melzer *et. al.*, 2019). Health checks were carried out on all islets with three sites in *P. grandis* habitat and one in grassland/herbland. Site locations and traverses were captured using a Garmin GPS and Avenza App. Images were taken using an Olympus tough digital camera and iPhone 11. Vouchers of botanical specimens were collected for verification of identification and inclusion into the Queensland Herbarium and the Australian Tropical Herbarium ([Attachment B3](#)).

Table 4 Survey timing

Date	Island	Arrive	Depart	Time on islands (hours)
25/6/24	Douglas	1.40 pm	3.55 pm	2 hrs 15 min
26/6/24	Douglas	12.00 pm	3.00 pm	3 hrs
26/6/24	Wallace	3.10 pm	4.40 pm	1 hour 30 min
27/6/24	Cairncross	10.00 am	4.40 pm	6 hrs 40 min
28/6/24	Wallace	11.40 am	4.05 pm	4 hrs 25 min
			Total	17 hrs 50 min

Fauna methods

Survey methods implemented included 20-minute bird surveys. Twenty-minute surveys match the duration recommended by Birdlife Australia, though they would be conducted in a 2 ha of variable shape (Birdlife Australia, 2024). Given that Wallace Islet is 2.2 ha and Douglas Islet is 2.5 ha only the survey duration of this method was implemented.

All surveys were either confined to wooded areas or included at least 10 minutes spent within a wooded area. Two 20-minute surveys were conducted on Douglas Islet and Wallace Islet, with the Wallace surveys conducted on different days. Three 20-minute surveys were conducted on Cairncross Islet A due to its larger size.

The islets were surveyed by meanders (for 20-minute surveys and all other time spent on the islets), targeting areas of *P. grandis* and suitable habitat for waders, terns and gulls (Charadriiformes), but also attempting to traverse a substantial percentage of each islet. All terrestrial vertebrates were identified by direct observation, calls, tracks and other signs.

Numbers of individual species were recorded where possible, with particular attention paid to species considered threatened or migratory under Commonwealth and/or Queensland legislation. Also considered was the presence of possible predators on waders and terns, evidence of feral species, particularly *Rattus* species and evidence of roosting and breeding activity by any species, but especially terns and shorebirds.

Four camera traps (motion cameras), baited with a mixture of peanut butter, rolled oats and sardines, were implemented on Douglas Islet for one night. This method was intended to be implemented on Wallace and Cairncross Islets but was not implemented due to concerns that poor weather conditions may have precluded the survey team from returning to collect the cameras.

Invertebrate methods

Scale density and mutualism assessment

A preliminary check for presence of scale on *Pisonia* trees was conducted and if present, scale density and ant mutualism assessments were conducted using the ten branch-end method (Freebairn, 2006, Hempson *et al.* 2019). The method requires the end of ten branches with approximately ten leaves randomly or, if availability limited, opportunistically be selected per site. At each site, visual assessments were undertaken to determine abundance scores/infestation categories of soft scale (number of scales per leaf): 0; 1 - 50; 50 - 500; and > 500.

The number of sites per island was determined by time on ground and tree morphology – some large mature trees had few available shoots that were accessible within reach. A sample of scale specimens were collected from each Island into 5 ml tubes of 70% ethanol for confirmation of identification. Scale samples were submitted for expert identification.

If ants or natural enemies were present at the scale infestation, the species and abundance were estimated and representative specimens of each species were collected into 5 ml tubes of 70% ethanol for later identification.

Scale that appeared to be parasitized was collected opportunistically for rearing out to enable further identification of parasitoids, but where there was no observable evidence, bulk collections were made in the hope of some being parasitised. The number of samples taken for rearing was determined by logistics and time on island. Live scales were held on sections of leaf and stems in ventilated field tubes 100 mm x 25 mm at ambient temperature until either death or the emergence of parasitoids occurred. Parasitoids successfully reared from scale samples were identified in-house at Granite Belt IPM with the option for confirmation as required by external experts.

Ant assemblage assessment

The ant assemblage present on each island was investigated and ant sampled using baited traps to identify the number and diversity of species present. The method outlined below is modified from methods outlined in Freebairn, 2006 and Hempson *et al.*, 2019. By placing baits in 5 ml tubes, collecting and retrieval of ants is much quicker, and by including honey as a bait, ant species foraging for sugars are also attracted to the bait stations.

A series of 5 ml tubes was baited with three baits: peanut butter, jam and fish-based cat food. The baited traps were laid out in groups of three comprising one of each bait type and placed either opportunistically or laid out in transect and marked with flagging tape for easy retrieval. The location of each set of tubes was recorded using GPS and location photographs taken. The traps collected prior to departing the island and most were set for about two to three hrs. Traps were picked up and sealed for later processing. Ants were pooled by bait type and

island and were preserved in either 70% ethanol or propylene glycol and identified in-house at Granite Belt IPM. Ants were also collected opportunistically as they were encountered.

Moths and other insect assemblage assessment

Wet weather, time and logistical constraints firstly, precluded a systematic deployment of light traps, but also forced a re-assessment of priorities so time could be allocated effectively. On-ground decisions were made to prioritise scale threats to *Pisonia* forest, ant mutualisms and ant assemblages. Nevertheless, a single light trap was set up and left for one night on Douglas Islet to detect other species that may represent threats to vegetation on island. Following the survey on Douglas Islet it was determined that this method would not be more broadly deployed due to time constraints.

Fungal Pathogen

While on survey, team members noted lesions in many *Pisonia* leaves with some leaves heavily infested. The lesions had developed through the leaf and were visible on the underside as well. The team decided to collect specimens and send them off for analysis.

Live leaves displaying symptoms were collected from Douglas and Wallace islets and were wrapped in paper towel and sealed in a ziplock bag and posted to plant pathologists at Queensland Department of Agriculture and Fisheries in Mareeba Queensland for identification.

Attachment B – Field data

Attachment B1 - Flora species

The species list incorporates all known flora records for the target islands combining records of the June 2024 field survey with existing records sourced from WildNet and other documentation provided by the Reef Authority for Sinclair, Douglas, Cairncross and Wallace islets. Note that Sinclair Islet was not visited and includes only those species known from the desktop searches. Nomenclature follows Bean (2023); (*) denotes introduced species.

The field survey of Douglas, Cairncross and Wallace islets recorded 94 species. This increases the known flora for the three islands from 89² to 124 vascular species. The most common of the 62 families are Poaceae and Leguminosae (seven native), Moraceae (six species), Lamiaceae (five species), and Euphorbiaceae (four native). Cairncross Islet is the largest island and the most diverse with 106 species recorded (Table 5). No conservation listed species were recorded.

Five introduced species were recorded: *Euphorbia hirta*, *Phyllanthus amarus*, *Ipomoea nil*, *Dactyloctenium aegyptium*, and *Cocos nucifera* (Table 6). Drift seeds recorded along the shorelines were *Cocos nucifera*, *Entada phaseoloides*, *Mucuna gigantea*, *Barringtonia asiatica*, *Barringtonia racemosa*, *Terminalia catappa*, *Rhizophora stylosa*, *Xylocarpus sp.*, *Nypa fruticans* and an unidentified Fabaceae seed. Occasional fronds of *Nypa fruticans* and stems of *Metroxylon sagu* also occur on shorelines.

Table 5 Summary of flora species

Island	No. of Species WildNet + BRI	No. of Species June 2024 Rapid Survey	Total Species per island	Island Area (ha)
Sinclair	45	Not surveyed	45	4.1
Wallace	23	39	40	2.2
Douglas	22	58	58	2.5
Cairncross	72	81	107	20.8

² Includes data provided by the Reef Authority including unpublished reports by the Reef Authority (GBRMPA, 2011 and GBRMPA, date unknown), as well as records from WildNet, the Atlas of Living Australia and the Denham Group National Park Management Statement 2013.

Table 6 Flora species recorded (* denotes introduced species).

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Acanthaceae	<i>Avicennia marina</i> var. <i>eucalyptifolia</i>	Grey mangrove	T				X	X			fruit	
Amaranthaceae	<i>Achyranthes aspera</i>	Chaff flower	H	X		X	X	X		X	fruit	
Amaranthaceae	<i>Amaranthus undulatus</i>		H		X	X		X			fruit	DI23
Amaryllidaceae	<i>Proiphys amboinensis</i>	Cardwell lilly	H				X	X				
Apocynaceae	<i>Carissa laxiflora</i>	Northern conkleberry	S			X	X	X				
Apocynaceae	<i>Vincetoxicum carnosum</i>		V				X					
Araceae	<i>Amorphophallus galbra</i>		H				X					
Arecaceae	<i>Cocos nucifera</i> *	Coconut palm	P	X		X		X		X		
Arecaceae	<i>Ptychosperma elegans</i>	Solitaire palm	P				X	X				
Asteraceae	<i>Bidens biternata</i>		H				X	X		X		
Asteraceae	<i>Wollastonia biflora</i>	Beach daisy	H	X			X					
Boraginaceae	<i>Argusia argentea</i>	Octopus bush	S				X	X			flw	
Boraginaceae	<i>Cordia subcordata</i>	Sea trumpet	T	X	X	X	X	X		X		
Burseraceae	<i>Garuga floribunda</i>	Garuga	T			X		X				
Calophyllaceae	<i>Calophyllum sil</i>	Crocodile bark	T			X						
Cannabaceae	<i>Celtis paniculata</i>		T			X		X				DI22
Cannabaceae	<i>Celtis philippensis</i>	Native Celtis	T			X	X	X			juv. fruit	DI06
Capparaceae	<i>Capparis lucida</i>		S			X	X					
Capparaceae	<i>Capparis nummularia</i>		S	X		X		X				CC03

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Capparaceae	<i>Capparis quiniflora</i>		S			X	X					
Capparaceae	<i>Capparis sepiaria</i>		S					X				
Casuarinaceae	<i>Casuarina equisetifolia</i> subsp. <i>incana</i>	Coastal oak	T				X	X	X	X	spore	WI13
Celastraceae	<i>Pleurostyliia opposita</i>		T				X					
Chenopodiaceae	<i>Salicornia quinqueflora</i> subsp. <i>quinqueflora</i>		H				X					
Chenopodiaceae	<i>Salsola australis</i>		H	X	X	X	X		X			
Chenopodiaceae	<i>Suaeda australis</i>		H			X	X	X		X		WI07
Cleomaceae	<i>Arivela viscosa</i>	Tickweed	H	X		X		X		X	flw	DI18
Combretaceae	<i>Terminalia arenicola</i>	Beach almond	T	X	X							
Combretaceae	<i>Terminalia muelleri</i>	Australian almond	T			X	X	X				DI10
Commelinaceae	<i>Commelina ensifolia</i>	Scurvy grass	H	X		X	X	X		X	flw	DI16
Convulvulaceae	<i>Ipomoea nil</i> *		V						X	X	flw	WI01
Convulvulaceae	<i>Ipomoea pes-caprae</i> subsp. <i>brasiliensis</i>	Goatsfoot	V	X	X	X	X	X	X	X	flw	WI14
Convulvulaceae	<i>Ipomoea violacea</i>		V	X	X	X	X	X	X	X	flw	DI15
Convulvulaceae	<i>Xenostegia tridentata</i>		V	X	X	X	X	X	X	X	fruit	DI20, WI06
Cucurbitaceae	<i>Cucumis althaeoides</i>		V							X		
Cucurbitaceae	<i>Diplocyclos palmatus</i> subsp. <i>palmatus</i>	Striped cucumber	V				X	X				DI21
Cyperaceae	<i>Bulbostylis barbata</i>		SE				X					

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Cyperaceae	<i>Cyperus pedunculatus</i>		SE	X	X	X	X	X	X	X		
Cyperaceae	<i>Cyperus stoloniferus</i>		SE					X				
Dioscoraceae	<i>Dioscorea bulbifera</i>	Aerial yam	V			X		X				DI04
Dracaenaceae	<i>Dracaena angustifolia</i>	Native draceana	S				X	X				
Ebenaceae	<i>Diospyros compacta</i>	Ebony	T					X				
Ebenaceae	<i>Diospyros maritima</i>	Sea Ebony	T			X	X	X				
Euphorbiaceae	<i>Euphorbia atoto</i>		H	X	X			X	X	X		
Euphorbiaceae	<i>Euphorbia hirta</i> *	Asthma plant	H					X				
Euphorbiaceae	<i>Euphorbia pallens</i>		H	X				X		X	flw	CC09, WI10
Euphorbiaceae	<i>Euphorbia tannensis</i> subsp. <i>tannensis</i>		H	X	X		X	X	X	X	fruit	WI11
Euphorbiaceae	<i>Macaranga tanarius</i>	Macaranga	S				X	X				
Flagellariaceae	<i>Flagellaria indica</i>	Whip vine	V			X	X	X				
Goodeniaceae	<i>Scaevola taccada</i>	Cardwell cabbage	S	X	X	X	X	X	X	X		
Hernandiaceae	<i>Gyrocarpus americanus</i>	Helicopter tree	T			X		X			flw	DI05
Hernandiaceae	<i>Hernandia nymphaeifolia</i>	Lantern bush	S			X		X				
Lamiaceae	<i>Clerodendrum inerme</i>	Coastal lolly bush	S	X		X	X	X				
Lamiaceae	<i>Premna serratifolia</i>	Coastal Premna	S	X	X	X	X	X				
Lamiaceae	<i>Vitex rotundifolia</i>		S	X				X	X	X	flw	WI15
Lamiaceae	<i>Vitex trifolia</i>		S	X								
Lauraceae	<i>Cassytha filiformis</i>	Dodder laurel	V	X			X	X				

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Leguminosae	<i>Abrus precatorius</i> subsp. <i>precatorius</i>	Gidee gidee	V				X	X				
Leguminosae	<i>Canavalia rosea</i>		V	X		X		X			flw	
Leguminosae	<i>Entada phaseoloides</i>	Matchbox bean	T			X		X		X		
Leguminosae	<i>Erythrina insularis</i>	Island coral tree	T			X	X	X				DI12
Leguminosae	<i>Guilandina bonduc</i>	Nicker nut	S			X	X	X		X		
Leguminosae	<i>Sophora tomentosa</i> subsp. <i>australis</i>	Beach sophora	S	X	X		X					
Leguminosae	<i>Vigna marina</i>	Dune bean	V	X			X					
Lythraceae	<i>Pemphis acidula</i>		S	X	X	X	X	X	X	X	flw	
Malvaceae	<i>Abutilon albescens</i>		S	X		X		X	X	X	flw	DI21
Malvaceae	<i>Hibiscus tiliaceus</i>	Cotton tree	T				X					
Malvaceae	<i>Thespesia populnea</i>	Pacific Rosewood	T			X	X	X				
Meliaceae	<i>Aglaia elaeagnoidea</i>	Coastal boodyara	T					X				
Meliaceae	<i>Vavaea amicorum</i>		T							X		CC10
Meliaceae	<i>Xylocarpus granatum</i>	Cedar mangrove	T					X		X		
Menispermaceae	<i>Pachygone ovata</i>		V				X	R				CC12
Menispermaceae	<i>Tinospora smilacina</i>	Snake vine	V			X		X				
Moraceae	<i>Antiaris toxicaria</i> var. <i>macrophylla</i>	Poison fig	T			X		X				DI08, CC02
Moraceae	<i>Ficus drupacea</i>	Red fig	T			X						DI02
Moraceae	<i>Ficus opposita</i>	Sandpaper fig	S	X								

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Moraceae	<i>Ficus rubiginosa</i> forma <i>rubiginosa</i>		T				X					
Moraceae	<i>Ficus</i> sp.		T			X	X	X				CC11
Moraceae	<i>Ficus virens</i> var. <i>virens</i>	White fig	T			X	X	X				
Myrtaceae	<i>Eugenia reinwardtiana</i>	Beach cherry	S				X	X				
Nyctaginaceae	<i>Boerhavia albiflora</i> var. <i>albiflora</i>		H	X		X	X	X	X	X	flw	DI24, WI02
Nyctaginaceae	<i>Boerhavia mutabilis</i>		H	X								
Nyctaginaceae	<i>Pisonia grandis</i>	Grand devil's claw; bird lime tree	T	X	X	X	X	X	X	X	flw	DI11, WI03
Olacaceae	<i>Olax pendula</i>		S				X	X				CC08
Opiliaceae	<i>Cansjera leptostachya</i>		V				X					
Opiliaceae	<i>Opilia amentacea</i>		V				X	X				
Pandanaceae	<i>Pandanus tectorius</i>	Pandanus	Pa				X					
Pedaliaceae	<i>Josephinia imperatricis</i>		H	X				X				
Phyllanthaceae	<i>Phyllanthus amarus</i> *		H				X					
Phyllanthaceae	<i>Phyllanthus novae- hollandiae</i>		S			X	X	X	X	X		
Plumbaginaceae	<i>Aegialitis annulata</i>	Club mangrove	S				X	X				
Poaceae	<i>Dactyloctenium aegyptium</i> *	Coast button grass	G	X			X			X		WI09
Poaceae	<i>Digitaria</i> sp.		G					X		X		
Poaceae	<i>Lepturus repens</i>	Stalky grass	G	X	X	X	X	X	X	X	seed	X

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Poaceae	<i>Panicum trichoides</i>		G			X	X	X			flw	CC05
Poaceae	<i>Spinifex longifolius</i>	Beach Spinifex	G		X			X	X	X	seed	WI12
Poaceae	<i>Sporobolus virginicus</i>	Sand couch	G	X	X	X	X	X		X		
Poaceae	<i>Themeda arguens</i>		G					X				
Poaceae	<i>Thuarea involuta</i>	Tropical beachgrass	G	X								
Poaceae	<i>Urochloa pubigera</i>		G						X			
Portulacaceae	<i>Sesuvium portulacastrum</i> subsp. <i>portulacastrum</i>	Sea purslane	H	X	X	X	X	X		X	flw	
Portulacaceae	<i>Portulaca australis</i>		H	X			X					
Putranjivaceae	<i>Drypetes deplanchei</i>	Grey boxwood	T				X	X				
Rhamnaceae	<i>Colubrina asiatica</i>		S	X				X			flw	CC04
Rhizophoraceae	<i>Rhizophora stylosa</i>	Spotted mangrove	T				X	X				CC06
Rubiaceae	<i>Guettarda speciosa</i>	Beach gardenia	T	X		X	X	X			flw	
Rubiaceae	<i>Psydrax odorata</i>		T			X						DI09
Rubiaceae	<i>Spermacoce buckleyi</i>		H	X								
Rutaceae	<i>Glycosmis trifoliata</i>	Glycosmis	S			X	X	X				DI13
Rutaceae	<i>Micromelum minutum</i>	Clusterberry	S				X	X				
Santalaceae	<i>Exocarpos latifolius</i>	Broad-leaved ballart	S				X	X				
Sapindaceae	<i>Dodonaea viscosa</i> subsp. <i>viscosa</i>	Hop bush	S				X					
Sapindaceae	<i>Ganophyllum falcatum</i>	Scaly Ash	T			X	X	X				DI14

Family	Scientific name	Common name	Life Form	Sinclair Wildnet + BRI	Douglas Wildnet + BRI	Douglas June 24	Cairncross Wildnet + BRI	Cairncross June 2024	Wallace Wildnet + BRI	Wallace June 2024	Phenology June 24	Voucher for ID
Sapotaceae	<i>Manilkara kauki</i>	Wongai	T		X	X	X	X		X	juvft	DI07, CC01,
Sapotaceae	<i>Mimusops elengi</i>	Mimusops	T									
Scrophulariaceae	<i>Myoporum boninense</i> <i>subsp. australe</i>		S	X								
Sparrmanniaceae	<i>Grewia papuana</i>		V			X		X				
Sparrmanniaceae	<i>Triumfetta procumbens</i>		H	X			X					
Surianaceae	<i>Suriana maritima</i>		S	X		X	X	X	X	X	flw	DI17
Taccaceae	<i>Tacca leontopetaloides</i>	Native Arrowroot	H			X		X	X	X		
Urticaceae	<i>Laportea interrupta</i>		H			X	X					
Urticaceae	<i>Pouzolzia zeylanica</i>		H			X	X	X		X	flw	DI01, CC07
Vitaceae	<i>Causonis trifolia</i>	Native grape	V		X	X		X	X	X		X
Vitaceae	<i>Cayratia acris</i>	Hairy grape	V				X	X				DI03
Zingiberaceae	<i>Curcuma australasica</i>	Cape York Lilly	H				X					
Zygophyllaceae	<i>Tribulus cistoides</i>	Bulls head vine	H	X	X	X	X	X	X	X	flw	DI18

Attachment B2 - Summary Vegetation Site Data - June 2024 survey

Table 7 Vegetation site summary data

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
WQ1	Quaternary	25/6/2024	DGFell	-11.44734	143.03223	8m	Grasslands - herbland dominated by <i>Spinifex longifolius</i> with dense (100%) groundcover of <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> , <i>Achyranthes aspera</i> , <i>Abutilon albescens</i> , <i>Ipomoea violacea</i> , <i>Commelina ensifolia</i> with <i>I. nil</i> .	North side of islet	N
WQ2	Quaternary	26/6/2024	DGFell	11.44759	143.03165	8m	Woodland of <i>Casuarina equisetifolia</i> var. <i>incana</i> (8-11m) with a very sparse shrub layer of rare scattered <i>Pisonia</i> sapling shrubs (2 only). Groundcover of dead <i>Lepturus</i> grass, <i>Lepturus repens</i> , <i>Euphorbia tannensis</i> var. <i>tannensis</i> , <i>Arivella viscosa</i> , <i>Achyranthes aspera</i>	West side of islet	N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							and low shrubs of <i>Abutilon albescens</i> .		
WQ3	Quaternary	27/6/2024	DGFell	11.44846	143.03206	6m	Grasslands - herbland dominated by <i>Spinifex longifolius</i> with dense (100%) groundcover of <i>Euphorbia tannensis var. tannensis</i> , <i>Achyranthes aspera</i> , <i>Abutilon albescens</i> , <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> , <i>Ipomoea violacea</i> , <i>Xenostegia tridentata</i> , and <i>Commelina ensifolia</i> .	South side of islet	N
WHC4	Health check	28/6/2024	DGFell	11.44775	143.03234	7m	Low closed forest of <i>Pisonia grandis</i> .	North centre of island	Y
WS5	Health check secondary	29/6/2024	DGFell	11.44872	143.03189	8m	Grasslands - herbland dominated by <i>Spinifex longifolius</i> with dense (100%) groundcover of <i>Euphorbia tannensis var. tannensis</i> ,	South side of islet	Y

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							<i>Achyranthes aspera</i> , <i>Abutilon albescens</i> , <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> , <i>Ipomoea violacea</i> , <i>Xenostegia tridentata</i> , <i>Commelina ensifolia</i> .		
D1	Quaternary	25/6/2024	DGFell	11.23697	142.99232	5m	Closed forest of <i>Pisonia grandis</i> to 18m with scattered <i>Manilkara kauki</i> and <i>Garuga floribunda</i> in second tree layer		N
D2	Quaternary	26/6/2024	DGFell	11.23661	142.99184	8m	Closed forest of <i>Pisonia grandis</i> (20-24m) with rare <i>Manilkara kauki</i> in second tree layer and sparse shrub layer with <i>Capparis lucida</i> . Sparse groundcover with patches of <i>Pouzolzia zeylanica</i> , scattered <i>Pisonia</i> seedlings and dense leaf litter. Occasional vines of <i>Cayratia acris</i> .	Centre of island	N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
D3	Quaternary	27/6/2024	DGFell	11.23832	142.99265	9m	Herbland-grassland of <i>Sesuvium portulacastrum</i> , <i>Lepturus repens</i> and <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> fringing low closed shrubland with dense <i>Clerodendrum inerme</i> , <i>Suriana maritima</i> and <i>Abutilon albescens</i> .	South end	N
D4	Health Check	28/6/2024	DGFell	11.23706	142.99196	22m	Closed forest of <i>Pisonia grandis</i> to 18m with scattered <i>Manilkara kauki</i> and sparse shrub layer with <i>Phyllanthus novae-hollandiae</i> and <i>Capparis nummularia</i> .	Centre of island	Y
D5	Quaternary	29/6/2024	DGFell	11.2364	142.99676	16m	Low closed forest with <i>Pisonia grandis</i> (7-9m) with <i>Premna serratifolia</i> and emergent <i>Gyrocarpus americanus</i> to 15m.	North end of islet	N
CC01	Health Check	27/6/2024	DGFell	11.24057	142.92076	7m	Closed forest dominated by <i>Pisonia grandis</i> and		Y

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							<i>Antiaris toxicarya</i> with <i>Garuga floribunda</i> . Subcanopy of <i>Manilkara kauki</i> with <i>Diospyros maritima</i> and <i>Antiaris</i> .		
CC02	Tertiary	27/6/2024	DGFell	11.24087	142.92131	7m	Closed forest of <i>Pisonia grandis</i> , <i>Antiaris toxicaria</i> and <i>Garuga floribunda</i> with rare <i>Diospyros maritima</i> and <i>Mannilkara kauki</i> .		N
CC03	Quaternary	27/6/2024	DGFell	11.24108	142.92201	12m	Closed forest of <i>Manilkara kauki</i> (7-9m) with windsheared canopy and occasional <i>Garuga floribunda</i> , <i>Celtis phillipensis</i> and <i>Terminalia muelleri</i> on margins. Sparse groundcover with patches of <i>Panicum trichoides</i> and <i>Priophys amboinensis</i> .		N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
CC04	Quaternary	27/6/2024	DGFell	11.24216	142.9257	2m	Low closed forest of <i>Manilkara kauki</i> (3-6m) with <i>Terminalia muelleri</i> and <i>Premna serratifolia</i> on margins and trailing vines of <i>Ipomoea violacea</i> , and rare <i>Flagellaria indica</i> . Occurs on deposits of coralline sand and shell rubble with dense fringing shrublands of <i>Pemphis acidula</i> .	Cairncross Islet B	N
CC05	Quaternary	27/6/2024	DGFell	11.2424	142.92242	2m	Grassland-herbland on exposed dune surface with <i>Lepturus repens</i> , <i>Boerhavia mutabilis</i> , <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> and <i>Josephinia imperatricis</i> .	South end	N
CC06	Quaternary	27/6/2024	DGFell	11.242	142.9225	3m	Coastal shrubland (strand) of dense <i>Premna serratifolia</i> with occasional <i>Phyllanthus novae-hollandiae</i> and rare <i>Olax pendula</i> . Scattered stands of <i>Casuarina</i>	South east side	N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							<i>equisetifolia</i> on margins.		
CC07	Quaternary	27/6/2024	DGFell	11.24172	142.92244	5m	Coastal shrubland with emergents of <i>Garuga floribunda</i> and <i>Manilkara kauki</i> over dense shrubby groves of <i>Premna serratifolia</i> , <i>Colubrina asiatica</i> , <i>Capparis sepiaria</i> , <i>Phyllanthus novae-hollandiae</i> and <i>Grewia papuana</i> . Occasional vines of <i>Tinospora smilacina</i> and <i>Abrus precatorius</i> . Sparse groundcover with <i>Pouzolzia zeylanica</i> , and patches of <i>Panicum trichoides</i> .	South east side	N
CC08	Quaternary	27/6/2024	DGFell	11.24181	142.92215	8m	Closed forest (10-12 m) dominated by <i>Manilkara kauki</i> with <i>Terminalia muelleri</i> , <i>Diospyros maritima</i> and <i>Celtis philippensis</i> . Shrub layer of <i>Flagellaria indica</i> , <i>Vavaea amicorum</i> , <i>Drypetes deplanchei</i> ,	South end	N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							<i>Glycosmis trifolia</i> , <i>Ptychosperma elegans</i> , <i>Eugenia reinwardtiana</i> , <i>Cansjera leptostachya</i> and <i>Antiaris toxicaria</i> .		
CC09	Quaternary	27/6/2024	DGFell	11.24125	142.92152	10m	Closed forest of <i>Antiaris toxicaria</i> , <i>Manilkara kauki</i> , and <i>Garuga floribunda</i> with rare <i>Vavaea amicorum</i> (19m ² BA1). Scattered understorey with <i>Glycosmis trifolia</i> , <i>Capparis nummularia</i> , and <i>Cansjera leptostachya</i> .		N
CC10	Quaternary	27/6/2024	DGFell	11.24139	142.92035	11m	Closed forest dominated by <i>Antiaris toxicaria</i> and <i>Manilkara kauki</i> with <i>Garuga floribunda</i> and <i>Terminalia muelleri</i> . Understorey with <i>Eugenia reinwardtiana</i> and <i>Glycosmis trifolia</i> .		N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
CC11	Quaternary	27/6/2024	DGFell	11.24215	142.91982	10m	Closed shrubland of <i>Pemphis acidula</i> on intertidal beach rock.	South end	N
CC12	Quaternary	27/6/2024	DGFell	11.24229	142.92027	8m	Grassland-herbland on exposed dune surface with <i>Lepturus repens</i> , <i>Euphorbia pallens</i> , <i>Cyperus pedunculatus</i> and <i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i> with finging shrubs of <i>Suriana maritima</i> and <i>Premna serratifolia</i> .	South end	N
CC13	Quaternary	27/6/2024	DGFell	11.24174	142.92004	6m	Herbland of <i>Sesuvium portulacastrum</i> with <i>Sporobolus virginicus</i> and shrubs of <i>Pemphis acidula</i> on intertidal beach rock shelves on SW side of island.	South west side	N
CC14	Quaternary	27/6/2024	DGFell	11.24008	142.91954	6m	Closed shrubland of <i>Pemphis acidula</i> , <i>Premna serratifolia</i> and <i>Clerodendrum inerme</i> with <i>Themeda arguens</i>	North side of islet	N

Site #	Site Type	Date	Recorder	Lat	Long	Alt. (GPS)	Vegetation Structural and Floristic Summary	Note	QPWS Health Check
							in groundcover with patches of <i>Euphorbia hirta</i> on disturbed edges near National Park sign and helipad.		

Attachment B3 - Voucher specimens - June 2024 survey

Table 8 Flora voucher specimens collected by David Fell

Location	Coll. #.	Coll. date	Family	Genus Species
Cairncross Islet, Denham Group, Yamarrinh Wachangan Islands NP-CYPAL	DGF CC01	29/7/2024	Sapotaceae	<i>Manilkara kauki</i>
Cairncross Islets	DGF CC02	29/7/2024	Moraceae	<i>Antiaris toxicaria</i> var. <i>macrophylla</i>
Cairncross Islets	DGF CC03	29/7/2024	Capparaceae	<i>Capparis nummularia</i>
Cairncross Islets	DGF CC04	29/7/2024	Rhamnaceae	<i>Colubrina asiatica</i>
Cairncross Islets	DGF CC05	29/7/2024	Poaceae	<i>Panicum trichoides</i>
Cairncross Islets	DGF CC06	29/7/2024	Rhizophoraceae	<i>Rhizophora stylosa</i>
Cairncross Islets	DGF CC07	29/7/2024	Urticaceae	<i>Pouzolzia zeylanica</i>
Cairncross Islets	DGF CC08	29/7/2024	Olacaceae	<i>Olax pendula</i>
Cairncross Islets	DGF CC09	29/7/2024	Euphorbiaceae	<i>Euphorbia pallens</i>
Cairncross Islets	DGF CC10	29/7/2024	Meliaceae	<i>Vavaea amicorum</i>
Cairncross Islets	DGF CC11	29/7/2024	Moraceae	<i>Ficus</i>
Cairncross Islets	DGF CC12	29/7/2024	Menispermaceae	<i>Pachygone australe</i>
Douglas Islet, Denham Group, Yamarrinh Wachangan Islands NP-CYPAL 78 km south-east of Bamaga.	DGF DI01	25/7/2024	Urticaceae	<i>Pouzolzia zeylanica</i>
Douglas Islet	DGF DI02	25/7/2024	Moraceae	<i>Ficus drupacea</i>

Location	Coll. #.	Coll. date	Family	Genus Species
Douglas Islet	DGF DI03	25/7/2024	Vitaceae	<i>Cayratia acris</i>
Douglas Islet	DGF DI04	25/7/2024	Dioscoraceae	<i>Dioscorea bulbifera</i>
Douglas Islet	DGF DI05	25/7/2024	Hernandiaceae	<i>Gyrocarpus americanus</i>
Douglas Islet	DGF DI06	25/7/2024	Ulmaceae	<i>Celtis philippensis</i>
Douglas Islet	DGF DI07	25/7/2024	Sapotaceae	<i>Manilkara kauki</i>
Douglas Islet	DGF DI08	25/7/2024	Moraceae	<i>Antiaris toxicaria</i> var. <i>macrophylla</i>
Douglas Islet	DGF DI09	25/7/2024	Celastraceae	<i>Pleurostyliia opposita</i>
Douglas Islet	DGF DI10	25/7/2024	Combretaceae	<i>Terminalia muelleri</i>
Douglas Islet	DGF DI11	25/7/2024	Nyctaginaceae	<i>Pisonia grandis</i>
Douglas Islet	DGF DI12	25/7/2024	Leguminosae	<i>Erythrina insularis</i>
Douglas Islet	DGF DI13	25/7/2024	Rutaceae	<i>Glycosmis trifolia</i>
Douglas Islet	DGF DI14	25/7/2024	Sapindaceae	<i>Ganophyllum falcatum</i>
Douglas Islet	DGF DI15	25/7/2024	Convolvulaceae	<i>Ipomoea violacea</i>
Douglas Islet	DGF DI16	25/7/2024	Commelinaceae	<i>Commelina cyanea</i>
Douglas Islet	DGF DI17	25/7/2024	Surianaceae	<i>Suriana maritima</i>

Location	Coll. #.	Coll. date	Family	Genus Species
Wallace Islet, Denham Group, Yamarrinh Wachangan Islands NP-CYPAL.	DGF DI18	25/7/2024	Zygophyllaceae	<i>Tribulus cistoides</i>
Wallace Islet	DGF DI19	25/7/2024	Cleomaceae	<i>Arivela viscosa</i>
Wallace Islet	DGF DI20	25/7/2024	Convolvulaceae	<i>Xenostegia tridentata</i>
Wallace Islet	DGF DI21	25/7/2024	Malvaceae	<i>Abutilon albescens</i>
Wallace Islet	DGF DI22	25/7/2024	Ulmaceae	<i>Celtis paniculata</i>
Wallace Islet	DGF DI23	25/7/2024	Amaranthaceae	<i>Amaranthus undulatus</i>
Wallace Islet	DGF DI24	25/7/2024	Nyctaginaceae	<i>Pisonia grandis</i>
Wallace Islet	DGF WI01	29/7/2024	Nyctaginaceae	<i>Ipomoea nil</i>
Wallace Islet	DGF WI02	29/7/2024	Nyctaginaceae	<i>Boerhavia</i>
Wallace Islet	DGF WI03	29/7/2024	Sapotaceae	<i>Manilkara kauki</i>
Wallace Islet	DGF WI04	29/7/2024	Nyctaginaceae	<i>Pisonia grandis</i>
Wallace Islet	DGF WI05	29/7/2024	Convolvulaceae	<i>Ipomoea violacea</i>
Wallace Islet	DGF WI06	29/7/2024	Convolvulaceae	<i>Xenostegia tridentata</i>
Wallace Islet	DGF WI07	29/7/2024	Chenopodiaceae	<i>Sueda australis</i>
Wallace Islet	DGF WI08	29/7/2024	Poaceae	<i>Lepturus repens</i>
Wallace Islet	DGF WI09	29/7/2024	Poaceae	<i>Dactyloctenium aegyptium</i>
Wallace Islet	DGF WI10	29/7/2024	Euphorbiaceae	<i>Euphorbia pallens</i>

Location	Coll. #.	Coll. date	Family	Genus Species
Wallace Islet	DGF WI11	29/7/2024	Euphorbiaceae	<i>Euphorbia tannensis</i>
Wallace Islet	DGF WI12	29/7/2024	Poaceae	<i>Spinifex sericeus</i>
Wallace Islet	DGF WI13	29/7/2024	Convolvulaceae	<i>Ipomoea pes-capre</i> subsp. <i>brasiliensis</i>
Wallace Islet	DGF WI14	29/7/2024	Lamiaceae	<i>Vitex rotundifolia</i>
Wallace Islet	DGF WI15	29/7/2024	Vitaceae	<i>Causonis trifolia</i>

Attachment B4 - Health Check Data Sheets June 2024

Attachment B5 – Fauna survey data

The following species list consolidates WildNet records and records from other documentation provided by the Reef Authority into a consolidated list for Douglas, Cairncross and Wallace islets.

Table 9 Terrestrial vertebrate survey (25-28 June 2024) and database records for Cairncross Islets, Douglas Islet and Wallace Islet (# denotes new record for the island)

Scientific Name	Common Name	EPBC Act	NC Act	Cairncross Islets	Douglas Islet	Wallace Islet
<i>Anous minutus</i>	black noddy	Ma	C		X	X
<i>Arenaria interpres</i>	ruddy turnstone	V, Ma, M	SL			X
<i>Artamus leucorhynchus</i>	white-breasted woodswallow	-	C	X	X	X
<i>Butorides striata</i>	striated heron	-	C	X	X [#]	
<i>Calidris tenuirostris</i>	great knot	V, Ma, M	CR	X		
<i>Charadrius leschenaultii</i>	greater sand plover	V, Ma, M	V	X		X
<i>Charadrius mongolus</i>	lesser sand plover	E, Ma, M	E	X		X
<i>Chroicocephalus novaehollandiae</i>	silver gull	-	C	X	X	X
<i>Crocodylus porosus</i>	estuarine crocodile	Ma, M	V	X	X	X
<i>Cryptoblepharus litoralis litoralis</i>	coastal snake-eyed skink	-	C	X		
<i>Egretta sacra</i>	eastern reef egret	-	C	X	X	X
<i>Esacus magnirostris</i>	beach stone-curlew	-	V		X	X
<i>Fregata ariel</i>	lesser frigatebird	Ma, M	SL	X	X [#]	X
<i>Fregata minor</i>	great frigatebird	Ma, M	SL		X [#]	X
<i>Gallirallus philippensis</i>	buff-banded rail	-	C	X	X	X
<i>Gavicalis versicolor</i>	varied honeyeater	-	C	X		X
<i>Geopelia humeralis</i>	bar-shouldered dove	-	C	X	X	
<i>Haematopus longirostris</i>	Australian pied oystercatcher	-	C	X		X
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	-	C	X	X	X
<i>Megapodius reinwardt</i>	orange-footed scrubfowl	-	C	X		
<i>Nycticorax caledonicus</i>	nankeen night-heron	-	C	X	X	X

Scientific Name	Common Name	EPBC Act	NC Act	Cairncross Islets	Douglas Islet	Wallace Islet
<i>Pachycephala melanura</i>	mangrove golden whistler	-	C	X	X	
<i>Pandion haliaetus cristatus</i>	eastern osprey	Ma, M	SL	X		X
<i>Pitta versicolor</i>	noisy pitta	-	C		X	
<i>Pluvialis fulva</i>	Pacific golden plover	Ma, M	SL	X		X
<i>Ptilinopus regina</i>	rose-crowned fruit-dove	-	C	X		
<i>Thalasseus bergii</i>	crested tern	Ma, M	SL	X		X
<i>Todiramphus sanctus</i>	sacred kingfisher	-	C	X	X	X
<i>Todiramphus sordidus</i>	Torresian kingfisher	-	C		X [#]	
<i>Tringa brevipes</i>	grey-tailed tattler	Ma, M	SL			X
<i>Zosterops citrinella</i>	ashy-bellied white-eye	-	C	X	X	

Timed bird survey results

The twenty-minute bird surveys (Table 10 - Table 12) were conducted at times not conducive to higher levels of activity of birds typical of the wooded habitats on the visited islands. The timing of the surveys was due to logistic constraints. It rained during the first survey on Cairncross Islet. On Douglas Islet, the surveys were mostly conducted in the forest. The very small, wooded area on Wallace Islet resulted in much of the first survey being conducted in open habitats, including shoreline, the second survey focussed on the *Pisonia* forest.

Table 10 Twenty-minute bird survey records for Cairncross Islets, 27 June 2024

Scientific Name	Common Name	Start time	Finish Time	Record type	Number of individuals
<i>Geopelia humeralis</i>	Bar-shouldered dove	12.30	12.50	Seen	2
<i>Egretta sacra</i>	Eastern reef egret			Seen	4
<i>Gavicalis versicolor</i>	Varied honeyeater			Heard	1
<i>Megapodius reinwardt</i>	Orange-footed scrubfowl	13.28	13.48	Heard	1
<i>Gavicalis versicolor</i>	Varied honeyeater			Heard	1+
<i>Pachycephala melanura</i>	Mangrove golden whistler			Heard	1
<i>Megapodius reinwardt</i>	Orange-footed scrubfowl	14.54	15.14	Heard	1
<i>Gavicalis versicolor</i>	Varied honeyeater			Heard	1+
<i>Pachycephala melanura</i>	Mangrove golden whistler			Heard	1

Table 11 Twenty-minute bird survey records for Douglas Islet, 26 June 2024

Scientific Name	Common Name	Start time	Finish Time	Record type	Number of individuals
<i>Nycticorax caledonicus</i>	Nankeen night-heron	13.43	14.03	Seen	2
<i>Gallirallus philippensis</i>	Buff-banded rail			Seen & heard	2
<i>Todiramphus sordidus</i>	Torresian kingfisher			Heard	1
<i>Pachycephala melanura</i>	Mangrove golden whistler			Heard	1+
<i>Geopelia humeralis</i>	Bar-shouldered dove	14.19	14.39	Seen & heard	2
<i>Egretta sacra</i>	Eastern reef egret			Seen	1
<i>Pachycephala melanura</i>	Mangrove golden whistler			Seen & heard	3
<i>Zosterops citrinella</i>	Ashy-bellied white-eye			Seen & heard	1

Table 12 Twenty-minute bird survey records for Wallace Islet, 26 & 28 June 2024

Scientific Name	Common Name	Start time & date	Finish Time	Record type	Number of individuals
<i>Fregata ariel</i>	Lesser frigatebird	15.30 26 June	15.50	Seen	3
<i>Fregata minor</i>	Great frigatebird			Seen	8
<i>Egretta sacra</i>	Eastern reef egret			Seen	1
<i>Nycticorax caledonicus</i>	Nankeen night-heron			Seen	1
<i>Haematopus longirostris</i>	Australian pied oystercatcher			Seen	6
<i>Charadrius mongolus</i>	Lesser sand plover			Seen	1
<i>Pluvialis fulva</i>	Pacific golden plover			Seen	2
<i>Anous minutus</i>	Black noddy			Seen	3
<i>Chroicocephalus novaehollandiae</i>	Silver gull			Seen	2
<i>Todiramphus sanctus</i>	Sacred kingfisher			Seen	1
<i>Gavicalis versicolor</i>	Varied honeyeater			Seen & heard	2
<i>Artamus leucorhynchus</i>	White-breasted woodswallow			Seen & heard	3
<i>Egretta sacra</i>	Eastern reef egret			12.40 28 June	13.00
<i>Gavicalis versicolor</i>	Varied honeyeater	Seen & heard	2		

Attachment B6 – Invertebrate field data

Table 13 Scale density assessment results

Scale density	Scale rating
0	Absent
1-50	Low
50-500	Moderate
500+	High

ID	Date	Location	Latitude	Longitude	No. branch ends	Scale density	Ants present	Comments
1	26/06/2024	Douglas Islet	-11.23705	142.992468	8	1-50	Y	
2	26/06/2024	Douglas Islet	-11.23685	142.992073	4	1-50	Y	
3	26/06/2024	Douglas Islet	-11.236353	142.99179	10	1-50	N	
4	26/06/2024	Douglas Islet	-11.236968	142.991272	10	1-50	Y	
16	29/06/2024	Douglas Islet	-11.236963	142.991353	4	1-50	Y	
6	27/06/2024	Cairncross Islet	-11.240666	142.920807	10	0	N	
7	27/06/2024	Cairncross Islet	-11.240666	142.920807	10	0	N	
8	27/06/2024	Cairncross Islet	-11.240769	142.920844	10	1-50	N	
9	27/06/2024	Cairncross Islet	-11.24079	142.921097	5	1-50	Y	
10	27/06/2024	Cairncross Islet	-11.240488	142.921016	10	0	N	
15	29/06/2024	Cairncross Islet	-11.240108	142.920461	10	0	Y	
5	26/06/2024	Wallace Islet	-11.448103	143.03221	5	50-500	Y	<i>C. montrouzieri</i> present - common
11	28/06/2024	Wallace Islet	-11.447805	143.031829	10	50-500	Y	
12	28/06/2024	Wallace Islet	-11.448103	143.03221	10	0	N	
13	28/06/2024	Wallace Islet	-11.447573	143.032456	10	1-50	Y	<i>C. montrouzieri</i> present on 30% leaves - very common
14	28/06/2024	Wallace Islet	-11.447754	143.032257	10	1-50	N	

Table 14 Invertebrate samples collected

Latitude	Longitude	Location	Taxon	Collected	Trap method	ID	Comments	Known scale mutualist?
Various	Various	Cairncross Islet	Chrysomelidae	Hand	N/A	TBC		N/A
Various	Various	Cairncross Islet	Formicidae (Ant)	Hand	N/A	<i>Crematogaster sp1</i>		Genus - Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Baited traps	Fish	<i>Oecophylla smaragdina</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Hand	N/A	<i>Oecophylla smaragdina</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Baited traps	Honey	<i>Pheidole sp</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Baited traps	Peanut Butter	<i>Pheidole sp</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Baited traps	Fish	<i>Pheidole sp</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Hand	N/A	<i>Pheidole sp</i>		Yes
Various	Various	Cairncross Islet	Formicidae (Ant)	Hand	N/A	<i>Polyrhachis (Hedomyrma) cupreata</i> group		No
Various	Various	Cairncross Islet	Melyridae	Hand	N/A	<i>Dicranolaius bellulus</i>		N/A
-11.24067	142.9208	Cairncross Islet	Chloropidae	Hand	N/A	FAM: Chloropidae		N/A
-11.24067	142.9208	Cairncross Islet	Chrysomelidae	Hand	N/A	FAM: Chrysomelidae S FAM: Halticinae		N/A
-11.24039	142.9209	Cairncross Islet	Formicidae (Ant)	Hand	N/A	<i>Crematogaster sp1</i>	Attending scale	Genus - Yes
-11.24039	142.9209	Cairncross Islet	Hemiptera (Scale)	Hand	N/A	<i>P.urbicola</i>		N/A
-11.24077	142.9208	Cairncross Islet	Hemiptera (Scale)	Hand	N/A	TBC	Sent to Michael Gorton (NAQS) for ID	N/A
Various	Various	Douglas Islet	Sphingidae	Hand C.T.	N/A			N/A
-11.23696	142.9914	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Crematogaster sp2</i>	Attending scale	Genus - Yes
-11.23696	142.9914	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Tapinoma melanocephala</i>	Attending scale	Yes

Latitude	Longitude	Location	Taxon	Collected	Trap method	ID	Comments	Known scale mutualist?
-11.23697	142.9913	Douglas Islet	Ascomycete (Fungus)	Hand	N/A	<i>Septoria</i> sp TBC		N/A
-11.23619	142.9923	Douglas Islet	Ascomycete (Fungus)	Hand	N/A	<i>Septoria</i> sp TBC		N/A
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Creumatogaster</i> sp1	Attending scale	Genus - Yes
-11.23685	142.9921	Douglas Islet	Formicidae (Ant)	ex botanist	N/A	<i>Creumatogaster</i> sp1		Genus - Yes
-11.23697	142.9913	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Creumatogaster</i> sp2	Attending scale	Genus - Yes
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Baited traps	Fish	Nil		N/A
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Polyrhachis</i> (Hedomyrma) <i>cupreata</i> group	Not tending scale	No
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Hand	N/A	<i>Polyrhachis cydista</i>	Not tending scale	No
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Baited traps	Honey	<i>Strumigenys</i> sp nr <i>belua</i>		No
-11.23697	142.9913	Douglas Islet	Formicidae (Ant)	On field bag	N/A	<i>Tapinoma melanocephala</i>		Yes
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Baited traps	Honey	<i>Tapinoma melanocephala</i>		Yes
-11.23705	142.9925	Douglas Islet	Formicidae (Ant)	Baited traps	Peanut Butter	<i>Tetramorium bicarinatum</i>	Native, clypeal margin not notched	Unknown
-11.23705	142.9925	Douglas Islet	Hemiptera (Scale)	Hand	N/A	TBC	Sent to Michael Gorton (NAQS) for ID	N/A
-11.23685	142.9921	Douglas Islet	Hemiptera (Scale)	Hand	N/A	TBC		N/A
-11.23697	142.9913	Douglas Islet	Hemiptera (Scale)	Hand	N/A	TBC		N/A
-11.44775	143.0323	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>Creumatogaster</i> sp1	Attending scale	Genus - Yes
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Honey	<i>Iridomyrmex anceps</i>		Yes
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Fish	<i>Iridomyrmex anceps</i>		Yes

Latitude	Longitude	Location	Taxon	Collected	Trap method	ID	Comments	Known scale mutualist?
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Peanut Butter	<i>Monomorium pharaonis</i>		Unknown
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Honey	<i>Tetramorium bicarinatum</i>		Yes
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Peanut Butter	<i>Tetramorium bicarinatum</i>		Yes
Various	Various	Wallace Islet	Formicidae (Ant)	Baited traps	Fish	<i>Tetramorium bicarinatum</i>		Yes
-11.44799	143.0319	Wallace Islet	Ascomycete (Fungus)	Hand	N/A	<i>Septoria</i> sp TBC		N/A
-11.4481	143.0322	Wallace Islet	Coccinellidae	Hand	N/A	<i>Cryptolaemus montrouzieri</i>		N/A
-11.44711	143.0324	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>CreMATogaster</i> sp3		Genus - Yes
-11.44711	143.0324	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>Iridomyrmex anceps</i>		Yes
-11.4481	143.0322	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>Oecophylla smaragdina</i>		Yes
-11.44775	143.0323	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>Paratrechinasp nr minutula</i>		Yes
-11.4481	143.0322	Wallace Islet	Formicidae (Ant)	Hand	N/A	<i>Polyrhachis cydista</i>		No
-11.4481	143.0322	Wallace Islet	Hemiptera (Scale)	Hand	N/A	<i>P. urbicola</i>		N/A
-11.44781	143.0318	Wallace Islet	Hemiptera (Scale)	Hand	N/A	TBC	Sent to Michael Gorton (NAQS) for ID	N/A
-11.44775	143.0323	Wallace Islet	Hymenoptera	Hand	N/A	<i>Coccophagus ceroplastae</i>		N/A
-11.4481	143.0322	Wallace Islet	Microhymenoptera	Pooter from net	N/A	Family Chalcididae	Likely parasitoid of moth pupae	N/A
-11.4481	143.0322	Wallace Islet	Microhymenoptera	Pooter from net	N/A	Family Pteromalidae	Not likely parasitoid of scale	N/A
-11.4481	143.0322	Wallace Islet	Microhymenoptera	Pooter from net	N/A	TBC		N/A

Attachment C – Field photos

Attachment C1 – Douglas Islet



Plate 6 remote camera trap set up, Douglas Islet (T. Reis, 2024)



Plate 7 white-wash & noddy feathers, Douglas Islet (T Reis, 2024)



Plate 8 marine debris, Douglas Islet (T Reis, 2024)



Plate 9 croc slide, Douglas Islet (D Fell, 2024)



Plate 10 vegetation structure, Douglas Islet (D Fell, 2024)

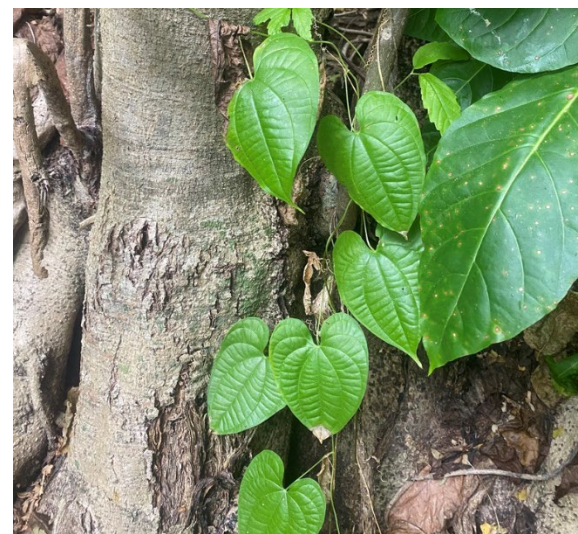


Plate 11 Dioscorea bulbifera, Douglas Islet (D Fell, 2024)



Plate 12 *Capparis nummularia*, Douglas Islet (D Fell, 2024)



Plate 13 *Pleurostyliya opposita*, Douglas Islet (D Fell, 2024)



Plate 14 *Pemphis acidula*, Douglas Islet (D Fell, 2024)

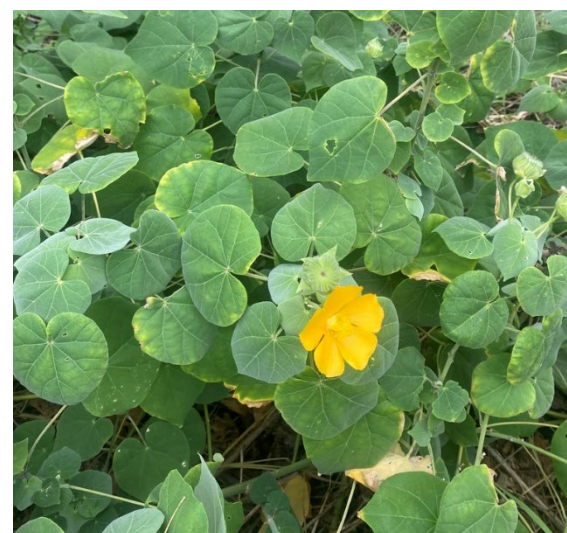


Plate 15 *Abutilon albescens*, Douglas Islet (D Fell, 2024)



Plate 16 Mature *Pisonia grandis* flowers (D Fell, 2024)



Plate 17 *Pisonia grandis* seedlings and juveniles (D Fell, 2024)

Attachment C1 – Wallace Islet



Plate 18 Australian pied oystercatcher (T Reis, 2024)



Plate 19 Lesser sand plover and ruddy turnstone (T Reis, 2024)



Plate 20 Beach stone-curlew, Wallace Islet (T Reis, 2024)



Plate 21 Black noddy, Wallace Islet (T Reis, 2024)



Plate 22 White-wash on Pisonia grandis (T Reis, 2024)



Plate 23 Marine debris, Wallace Islet (T Reis, 2024)



Plate 24 Aerial image, Wallace Islet (D Fell, 2024)



Plate 25 Strand vegetation, Wallace Islet (D Fell, 2024)



Plate 26 Edge of *Pisonia grandis*, Wallace Islet (D Fell, 2024)



Plate 27 *Pisonia grandis* (D Fell, 2024)



Plate 28 Grassland community, Wallace Islet (D Fell, 2024)



Plate 29 Stand of *Casuarina equisetifolia* (D Fell, 2024)

Attachment C1 – Cairncross Islets



Plate 30 Middle islet, towards Cairncross West (T Reis, 2024)



Plate 31 Pacific golden plover, (T Reis, 2024)



Plate 32 Cairncross Islets rock platform (T Reis, 2024)



Plate 33 Helicopter landing site with navigation marker (D Fell, 2024)



Plate 34 *Cordia subcordata* fringing closed forest (D Fell, 2024)

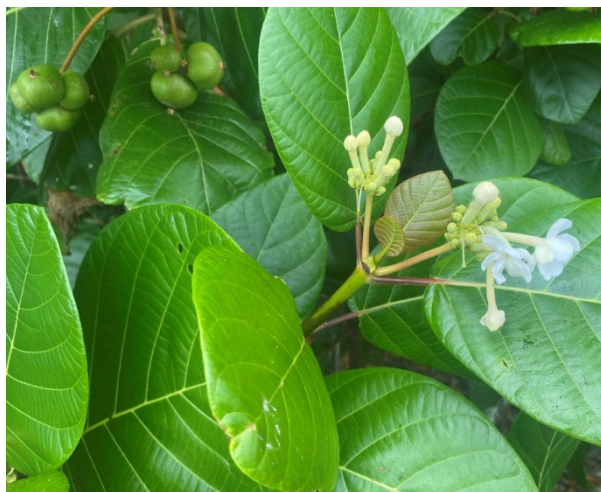


Plate 35 *Guettarda speciosa* (D Fell, 2024)

