



Australian Government

Great Barrier Reef  
Marine Park Authority



# RESTORATION OF REEF ISLANDS PROJECT

*RAPID ECOLOGICAL ASSESSMENT*  
*Brook (North) Island and Eva Island*

April 2025

A Great Barrier Reef Joint Field Management Program Priority Project

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*We acknowledge the Girramay and Bandjin Traditional Owners who are the custodians of Brook (North) Island and Eva Island, and the Traditional Owners of the Sea Country this project was conducted on.*

*We recognise their continuing connection to lands, waters and community and pay our respects to their Elders, past, present and emerging.*

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## Version control

Version	Title	Prepared by	Reviewed by	Date prepared
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We would also like to acknowledge the support and advice from:

- the field team for their expertise
  - David Fell, Principal Botanist, David Fell Environmental
  - Dr Anthony Rice, Entomologist, Granite Belt IPM
- Absolute North Charters and Michael Acheson for their safe and professional transportation.

# 1. Introduction

This report summarises a rapid ecological assessment of Brook (North) Island and Eva Islands which aimed to provide updated information on the distribution and condition of *Pisonia grandis* (Pisonia) on the target islands.

This study was completed as part of the Restoration of Reef Islands Project (the Project) which aims to facilitate the rehabilitation or enhancement of habitat values for selected islands in the Great Barrier Reef World Heritage Area. The Project has been delivered using funding supplied by the Reef Trust administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water.

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*. This report relates to Component 2 of the Project.

## 1.1. Aims and objectives

This report is intended to rapidly quantify the biodiversity values and threats present on target islands supporting *Pisonia* in the northern Great Barrier Reef. The report provides a snapshot of ecological threats which may be affecting *Pisonia* and an overview of the condition of *Pisonia* vegetation which can be used to inform and support future 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 utilised a rapid survey approach to quickly assess the islands for threats and values (refer to [Attachment A for further detail on field methods](#)). A particular focus of the field surveys was the identification of the presence of soft scale (*Pulvinaria urbicola*) which has caused substantial impacts to *Pisonia* forests in the southern parts of the Great Barrier Reef. The rapid assessment is intended to provide information complimentary to the work of Queensland Parks and Wildlife Service (QPWS) and Traditional Owner groups.

The assessment also included sampling of *Pisonia* leaves to support future genetic research. 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. Survey location

The field surveys were conducted on Brook (North) Island (65 ha) and Eva Island (3 ha), located approximately 32 km east of Cardwell, Queensland. Girramay and Bandjin Traditional Owners are the custodians of Brook (North) and Eva islands.

## 1.3. Survey overview

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 islands are located in the Wet Tropical coast bioregion in north Queensland within the Great Barrier Reef World Heritage Area. Brook (North) Island is situated in the Family Island Group some 30 km ENE of Cardwell. Eva Island is located off the northeast coast of Hinchinbrook Island approximately 32 km east of Cardwell (Figure 2).

Field staff were transported to the islands via vessel from Lucinda. Field surveys were led by Naomi Maxwell (Aestra) with cultural oversight provided by Girramay and Bandjin Elders and Rangers and technical specialists David Fell (Botanist) and Dr Anthony Rice (Entomologist). A full list of field survey participants is found in Table 1.

Table 1: Field survey participants

Name	Position
Abe Muriata	Girramay Elder and cultural advisor
Tracy Pryor	Bandjin Elder and cultural advisor
Jamie Sibley	Bandjin cultural advisor
Talisha Mothe	Girramay cultural advisor
Chris Mariata	Girringun Ranger
Shantaishe Congoo	Girringin Ranger
Naomi Maxwell	Field leader
Dr Anthony Rice	Entomologist
David Fell	Botanist



Figure 1: Field survey participants on Brook (North) Island, December 2024 (Image: Reef Authority, 2024)

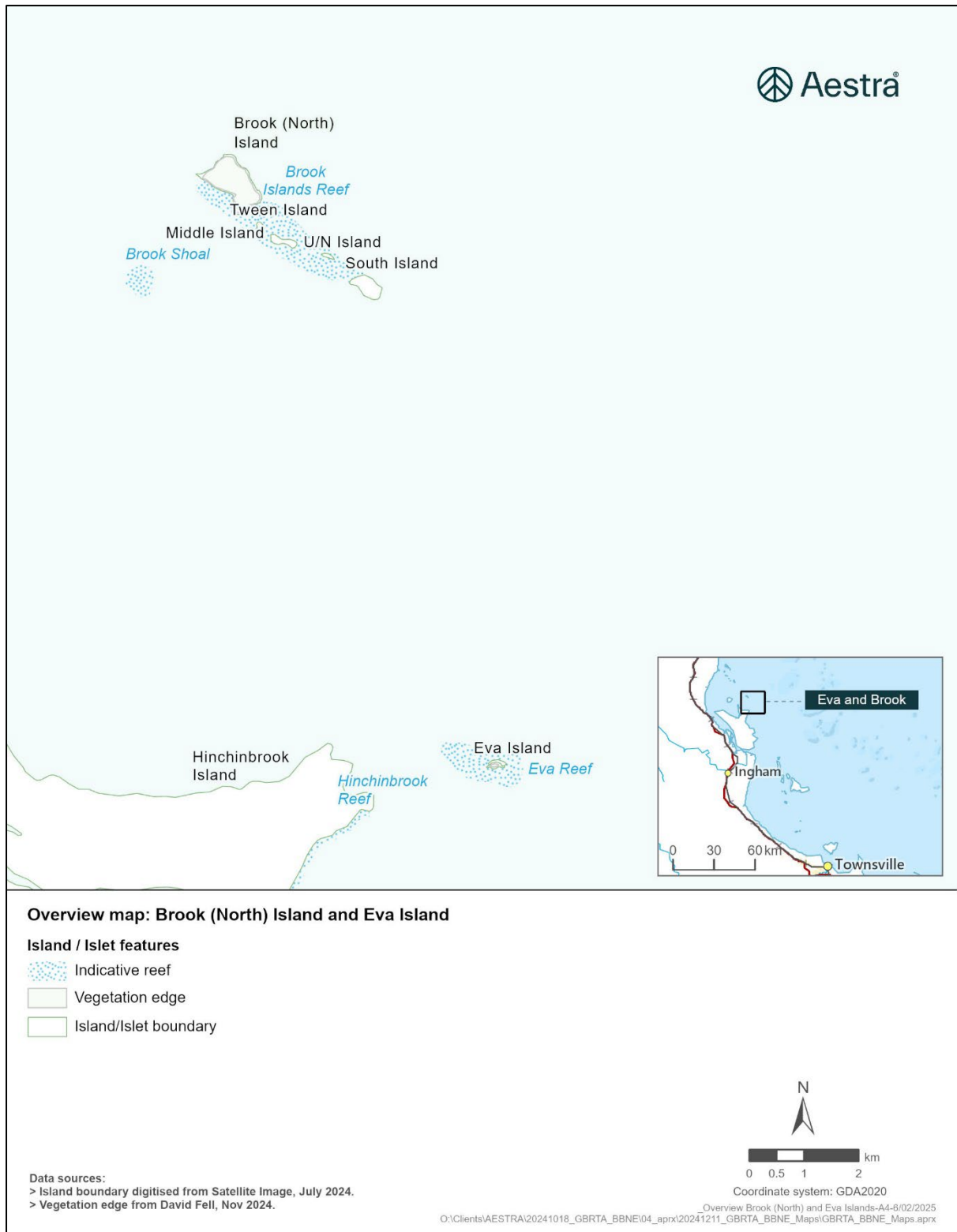


Figure 2: Overview map of Brook (North) Island and Eva Island

## 2. Vegetation and flora

### 2.1. *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. The species utilises this mechanism to move seeds between island ecosystems (Walker, 1991).

Across its range, *Pisonia* 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 *Pisonia* forest spread across approximately 44 islands, with the largest forests in the southern part of the Great Barrier Reef (Walker, 1991).

*Pisonia* occurs as the dominant or co-dominant element in some vegetation communities on coral cays or as small isolated populations, or individuals within other regional ecosystem types. In north Queensland, *Pisonia* forest is of high conservation value with the vegetation community described as '*Pisonia grandis* closed forest restricted to a few scattered sand cays' (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'. In Southeast Queensland, where the major distribution of *Pisonia* occurs, the vegetation community is described as '*Pisonia grandis* low closed forest. Restricted to established cays' (Regional Ecosystem (RE) 12.2.21), while its biodiversity status (Qld) and conservation status under the *Vegetation Management Act 1999* (Qld) are both 'of concern'.

*Pisonia* trees are important for seabird breeding and support important ecological processes particularly on coral cay islands. Species such as 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.



Plate 1 *Pisonia grandis* on Brook (North) Island (Image: D Fell, 2024)

Within the Great Barrier Reef, most areas of *Pisonia* forest are protected, however, local declines in the extent of *Pisonia* 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 (Tyrone Island) (Freebairn, 2006).

## 2.2. Target threats to *Pisonia grandis*

*Pisonia* trees are adapted to environmental stresses such as seasonal drought, periodic seawater inundation and maritime exposure which are typical of coral cay environments. However, the species is 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, beach erosion and storm events are likely to impact this species, 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 the species and its habitat. Targeted assessment was out of scope of this survey.

### 2.2.1. *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 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 *Pisonia* 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 (left, green ants with immature scale, right, mature scale insects). Images: A Rice, 2024



Plate 3 *Cryptolaemus larva feeding on urbicola scale on Pisonia grandis leaf (left, Image: A. 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 *Pisonia* is shown in Figure 3.

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 have 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.

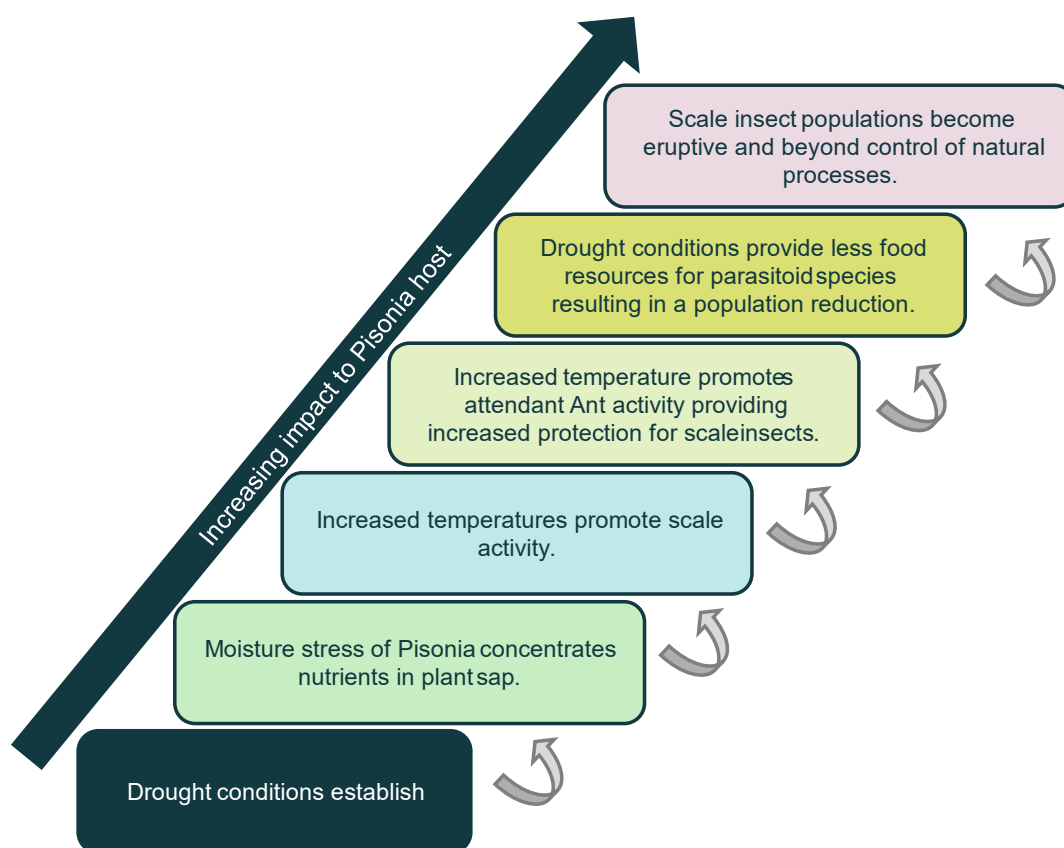


Figure 3: Scale insects have an increased impact to host species such as *Pisonia* under drought conditions.

### 2.2.2. 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.

## 3. Island report cards

### 3.1. Brook (North) Island

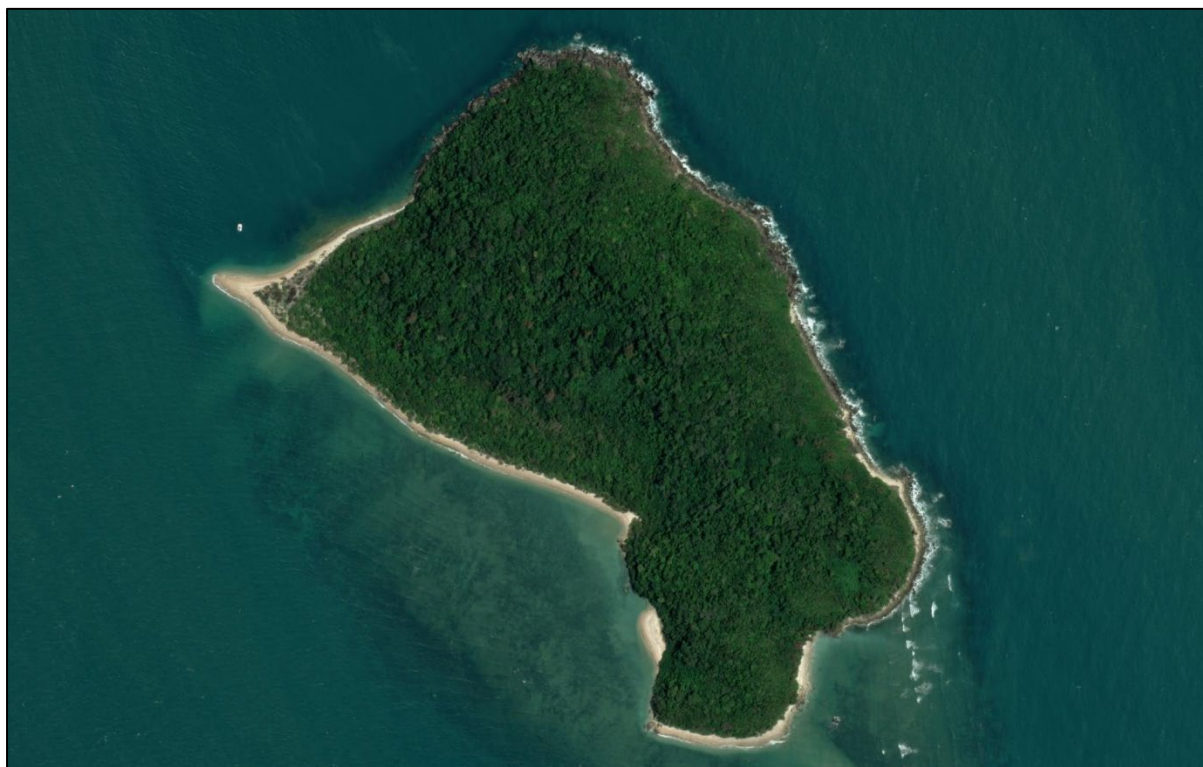


Figure 4: Brook (North) Island snapshot (Image: Maxar World Imagery, 2024).

#### 3.1.1. Vegetation and flora

The presence of *Pisonia* trees on Brook (North) Island was known through the work of Walker (1991) who referred to two trees at the northern end of the island. On reaching the island, the survey team initially identified the location of the *Pisonia* stand from the vessel. The survey confirms a population of three mature multi-stemmed trees at 8-12 m in height with estimated DBH of 30-50 cm (Plate 4; Figure 5). *Pisonia* trees appeared in good health with new leaves shooting from branchlet tips following a period of deciduousness during the hot dry season. There was no evidence of tree senescence or fungal activity.

The *Pisonia* population occurs on the margin of the foredune in littoral rainforest habitat (Figure 6). Characteristic foreshore species include *Hibiscus tiliaceus*, *Sophora tomentosa*, *Pandanus tectorius*, *Guilandina bonduc*, *Guettarda speciosa*, and *Clerodendrum inerme*. The littoral rainforest habitat is closed (80-90% cover) with *Aglaiia elaeagnoidea*, *Terminalia arenicola*, *Terminalia muelleri*, *Macaranga tanarius*, *Mimusops elengi*, *Melia azedarach*, *Pleiogynium timorense*, *Miliusa brahei* and *Celtis philippensis*. Characteristic subcanopy and understorey species include *Diospyros hebecarpa*, *Diospyros compacta*, *Drypetes deplanchei*, *Elaeodendron melanocarpum*, *Eugenia reinwardtiana*, *Glycosmis trifolia*, *Ixora timorensis*, *Kopsia arborea*, *Mononom australe*, *Ochrosia elliptica*, and *Sterculia quadrifida*. The forest type is consistent with RE 7.2.1 (Mesophyll vine forest on beach ridges and sand plains of beach origin).

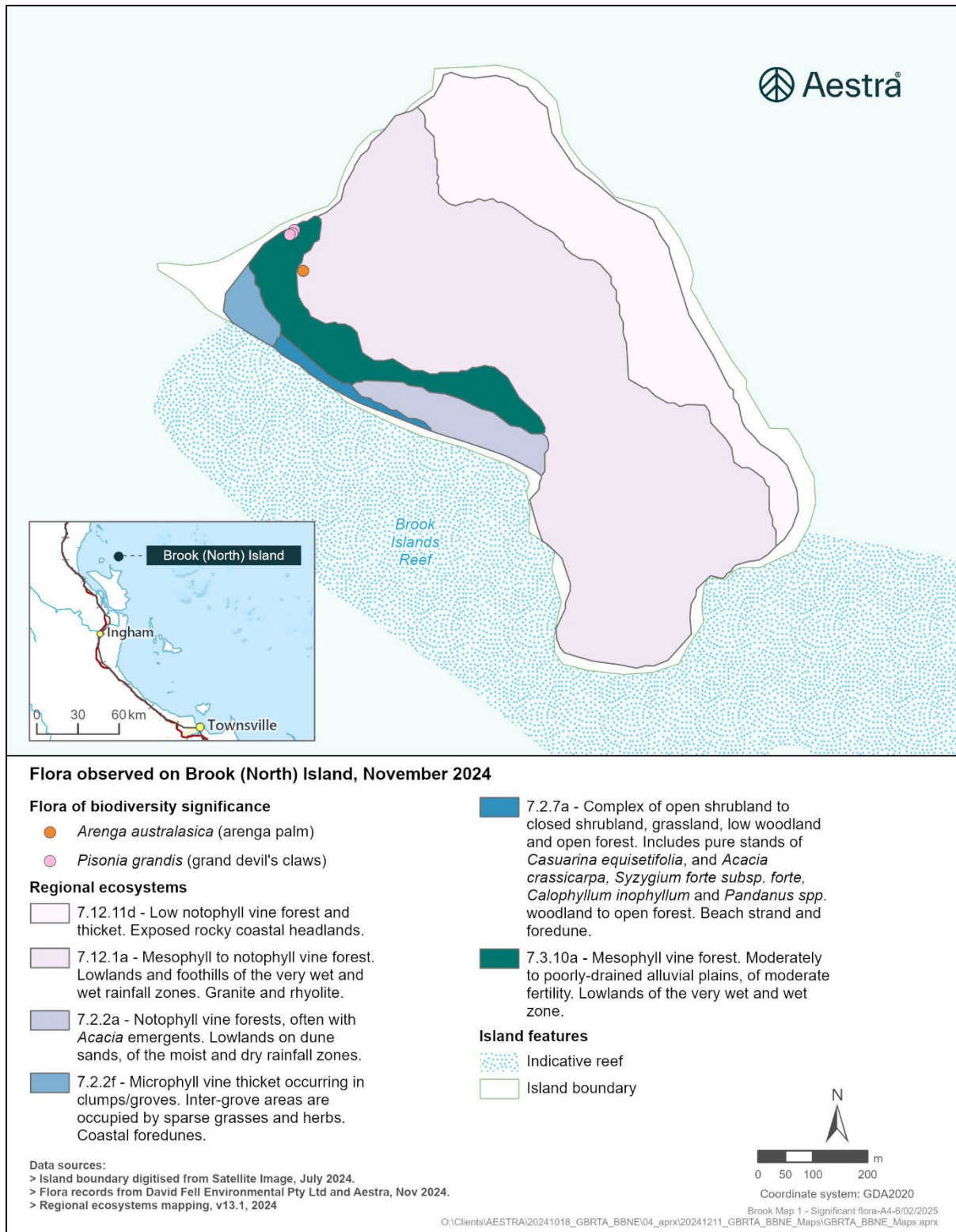


Figure 5: *Pisonia grandis* records, Brook (North) Island, November 2024

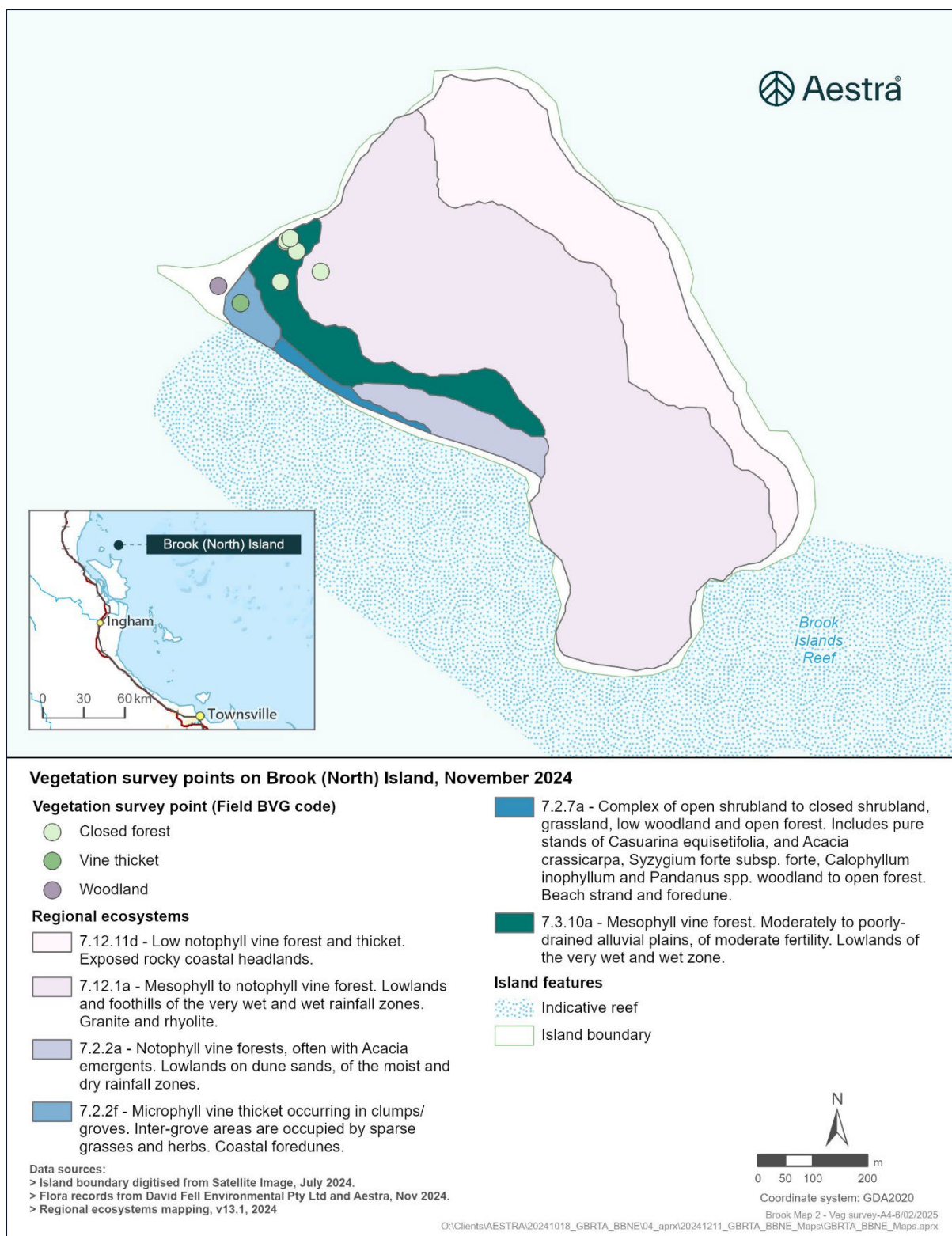


Figure 6: Vegetation on Brook (North) Island, November 2024



Plate 4: Three *Pisonia* trees located on the northern foreshore of Brook (North) Island in littoral rainforest (Image: David Fell, 2024).

Survey effort for additional *Pisonia* stands were limited to a circumnavigation of the island in the charter vessel using binoculars to scan the shoreline for possible *Pisonia* trees. Foot traverses over the remainder of the island were constrained by limited time and the extreme heat. No further populations were observed however the on-ground assessment was limited to a small area on the northern side of the island. The northern sand spit is vegetated by an open dune woodland (RE 7.2.7) dominated by *Casuarina equisetifolia* var. *incana* with scattered shrubs of *Scaevola taccada*, *Guettarda speciosa*, *Myoporum montanum*, *Sophora tomentosa* and *Eugenia reinwardtiana*.

Extending inland from the casuarina stand is a conspicuous band of low vine thicket (RE 7.2.2) at 5-10 m height and forming multi species groves of shrubs and small trees. The substrate is coralline and sand deposits. Characteristic species include *Mimusops*, *Diospyros compacta*, *Drypetes deplanchei*, *Sophora tomentosa* and *Eugenia reinwardtiana* with scattered emergent *Pandanus tectorius*.

Continuing inland, a better developed littoral rainforest community features *Alstonia scholaris*, *Dysoxylum latifolium* together the typical littoral species described above. This vegetation continues to the base of the slope where robust populations of *Arenga australasica* palms occur. The palm populations continue up onto the boulder strewn granite slopes within well-developed mesophyll rainforest which continues over the hilly portions of the island.

Some of the tree species observed in the mesophyll vine forest (RE 7.3.1) include *Castanospermum australe*, *Syzygium cormiflorum*, *Anthocarapa nitidula*, *Alstonia scholaris*, *Cryptocarya hypospodia*, *Monoom australe*, *Schefflera actinophylla* and *Terminalia sericocarpa* with an abundance of the palms *Arenga australasica* and

*Ptychosperma elegans*. The eastern side of the island was not accessed on the ground and observed from the vessel as wind sheared low rainforest and thicket with boulder outcrop.

Desktop searches identified 70 species previously recorded for the island. The field survey recorded 116 species bringing a combine species list to 139 species ([Attachment B2](#)). The survey collected 11 vouchers for inclusion to the Queensland Herbarium, Australian Tropical Herbarium and Girringun Rangers ([Attachment B3](#)).

There are six introduced species now recorded for the island (Figure 7). A historic record of Lantana (*Lantana camara*) and tobacco bush (*Solanum mauritianum*) was sourced from WildNet data was not observed during the survey. Survey records are coconut (*Cocos nucifera*), tridax daisy (*Tridax procumbens*), stinking passion flower (*Passiflora foetida*), Singapore daisy (*Sphagneticola trilobata*), coral berry (*Rivina humilis*) and corky passionfruit (*Passiflora suberosa*). The infestation of Singapore daisy was limited to a small area of approximately 10m x 3m on the frontal dune in the vicinity of the *Pisonia* population. The corky passionfruit was a single plant on the edge of the frontal dune on the northern shoreline.

### 3.1.2. Incidental fauna records

Incidental sightings of fauna on Brook (North) Island that were not the target of the present survey were recorded where possible. Fauna sighted and recorded were Torresian imperial pigeons (*Ducula bicolor*) and orange-footed scrubfowl (*Megapodius reinwardt*).

### 3.1.3. Invertebrate threats to *Pisonia grandis* forest

No pulvinaria soft scales were found on *Pisonia* trees on Brook (North) Island. The trees were just emerging from a period of senescence and beginning to shoot from the tips of branches, which precluded the implementation of the ten leaf, ten-branch method of inspection. However, evidence from Eva Island suggests that the scale is able to survive and flourish on stems and branch ends when no leaves are available.

All branch ends that were within reach (approximately 25) were inspected for the presence of scale. A single soft scale, similar in appearance to pulvinaria was found on an adjacent *Clerodendrum inerme* whose branchlets were closely intermingled with *Pisonia*. The scale has been lodged with the Northern Australia Quarantine Strategy (NAQS) for further identification, however given *Clerodendrum* is not a recognised host for *Pulvinaria urbicola* (Garcia Morales *et al.*, 2024), it is likely to be a different species. No other invertebrate threats to *Pisonia* were noted.

Ants from several genera were collected from Brook (North) Island, including some invasive species, and species that are known mutualists of scale. Two species of *Pheidole* (distinct from the invasive *P. megacephala*) were collected, and with about 56 Australian native species in the genus (Shattuck, 1999), and a lack of taxonomic keys to the Australian species, these could well be native. The genus is a noted attendant of scale.

*Tapinoma melanocephalum* is an introduced invasive pest that has become naturalised in Australia and throughout the tropical regions of the world. *Tetramorium lanuginosum* is often described as a tramp ant species, however according to Anderson (2000) is 'almost certainly an Australian native' species. It is very similar to the exotic invasive *T. bicarinatum*, but can be distinguished by the bifid and trifid setae on the dorsum of the mesonotum. Both species are noted mutualists of scale insects. *Paratrechina obscura* is a native species not noted for attending scale. *Oecophylla smaragdina* (green weaver ant) is ubiquitous in the monsoonal forests of Northern Australia and was noted as a strong mutualist of pulvinaria on Wallace Island (Plate 2). *Crematogaster* has 20 to 30 Australian native species, and the genus is not noted for having tramp species. They are however noted mutualists with scales.

Given that no scale insects that are likely to be *P. urbicola* were observed during the field survey and that the *Pisonia* trees observed were in good condition, no further action is considered necessary at this point in time. It is recommended that the *Pisonia* trees are monitored for scale opportunistically as part of the Reef Joint Field Management Program's operations and that further assessment is completed if a significant number of scale are observed or the health of the trees declines.

## Recommendations

*Pisonia grandis* on Brook (North) Island at the time of survey were in good condition and not considered to be adversely affected by invertebrate threats. It is recommended that the health and presence of scale is monitored opportunistically by Girringun Rangers during their broader operational activities.

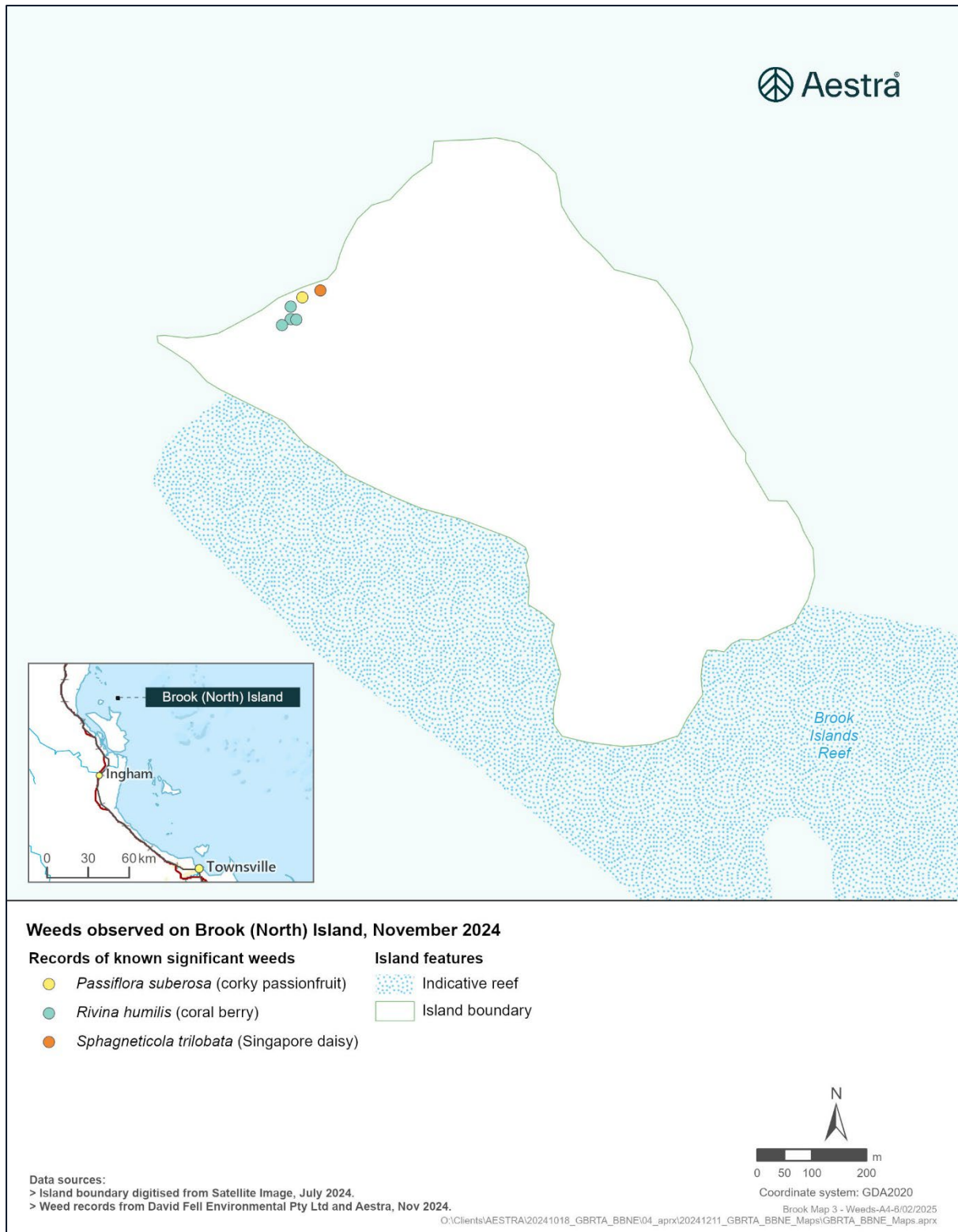


Figure 7: Known significant weeds observed on Brook (North) Island, November 2024.

## 3.2. Eva Island



Figure 8: Eva Island (Image: Maxar world imagery, 2024).

### 3.2.1. Vegetation and flora

Previous studies on Eva Island are limited to those reported in Walker (1991) and the recent Worboys and Zorn (2024). Walker documents several trees and shrubs on rock in mixed forest not more than 10 m in height. Worboys and Zorn (2024) describe the island's vegetation cover as vine forest on rocky granite boulder slopes with an open 8-10 m canopy dominated by *Ficus drupacea* and *Ficus rubiginosa forma glabrescens*, with a heavy cover of vines including *Cissus hastata* and *Ipomoea violacea*. Species in the ground stratum included *Setaria australiensis*, *Cyperus javanicus*, and *Commelina ensifolia*. The vegetation is mapped at 1: 3,500 scale as RE 7.12.11d and provides habitat for the vulnerable species *Arenga australasica*. The RE has an “of concern” biodiversity status and is consistent with the EPBC listed Littoral Rainforest community. Worboys and Zorn (2024) also record the presence of *Pisonia* with observation limited to a single tree.

The field survey was limited to observations from the vessel and a brief on ground survey. The presence of a number of *Pisonia* trees on the island was confirmed from the vessel. Access to *Pisonia* was difficult and achieved by alighting from a tender boat, climbing onto granite boulders and walking up a steep bouldery slope on the northern side of the island. A short period on the ground enabled a rapid assessment of *Pisonia* health and description of the general vegetation cover (Figure 9).

Vegetation cover aligned to the recent description of Worboys and Zorn (2024) with the steep granite boulder slopes supporting a low vine forest to thicket with dominant *Ficus* spp. as consistent with RE7.12.11d (Figure 10). Additional conspicuous species include *Terminalia catappa*, *Schefflera actinophylla*, *Trema orientalis*, *Pandanus tectorius* and *Pisonia grandis*. Palms of *Arenga australasica* and *Ptychosperma elegans* were common with the former forming dense clumps on and below the steep ridge crest. Sprawling vines are abundant and dominated by *Cissus hastata*, *Flagellaria indica*, and *Ipomoea violacea*. Groundcover was limited to gaps in the rock outcrops where *Commelina ensifolia*, *Lepturus repens* and *Cyperus javanicus* were common.

The size of the *Pisonia* population was difficult to assess given the limited access and time on island, however, it is estimated up to 50 individuals. The two trees assessed on the ground appeared in good health with fresh leaf shoots and no sign of fungal attack or senescence. Other trees observed by binoculars from the vessel similarly appeared in good health with new leafy growth observed.

The survey recorded 23 flora species (Attachment B1). In combination with the list of Worboys and Zorn (2024), the island flora is 34 species. One species, Seashore Paspalum (*Paspalum vaginatum*) is introduced. Vouchers were collected for seven species (Attachment B3).

### 3.2.2. Incidental fauna records

Incidental sightings of fauna on Eva Island that were not the target of the present survey were recorded where possible. Fauna sighted and recorded included a white-bellied sea eagle (*Haliaeetus leucogaster*) observed at nest on the northern side of the island, bridled terns (*Onychoprion anaethetus*) in abundance across the island, and Torresian imperial pigeons (*Ducula bicolor*).

### 3.2.3. Invertebrate threats to *Pisonia grandis* forests

Due to time constraints (25 mins on the ground), only a single *Pisonia* tree was examined for scale on Eva Island. The tree was heavily infested with scale and was just pushing out new growth following a period of senescence. Similarly to the tree examined on Brook (North) Island, the lack of mature leaves precluded the ten-leaf, ten-branch end assessment method. Instead, five groups of five terminal shoots (n=25) were examined. Of those examined, 17 of 25 were infested with soft scale (68%). Scale was beginning to infest the new emerging leaves on infested terminal shoots. Additionally, there were several immature grasshoppers that appeared to be *Valangar irregularis* (giant grasshopper), a known defoliator of *Pisonia* trees (Freebairn, 2007) (Plate 5).



Plate 5: *Valangar irregularis* (giant grasshopper), Eva Island, December 2024. (Image: A. Rice, 2024).

A single moth egg (Plate 22) was also collected for rearing but attempts to get the larva to feed on alternative hosts failed and the caterpillar died as a first instar before it could be identified. The dorsal horn identified it as belonging to the hawkmoth family (Sphingidae).

Approximately 15 shoots encrusted with scales were collected and held in ventilated plastic containers to monitor for possible parasitoid emergence. Once shoots are removed from the host plant, scales will usually die within a few days and any parasitoids within them also die. Only parasitoids that are of the right stage of maturity when the shoots are cut from the host plant are able to emerge, so this method yields low levels of parasitoid emergence compared to the number of host scales that may be parasitised. To maximise yield, large numbers of scale were collected (1000 - 1500), and two parasitoids emerged. They were identified as the native *Coccophagus ceroplastae* (Howard) which is one of the species released on NE Herald Island in 2001 to help control an outbreak of pulvinaria soft scale (Smith *et.al.* 2004).

## Recommendations

*Pisonia grandis* trees on Eva Island are in good condition, however a high portion of branch ends were infested with scale. Given the abundance of scale observed and the presence of the giant grasshopper, it is recommended that the health of *Pisonia grandis* on Eva Island including the abundance of scale is monitored every two years.

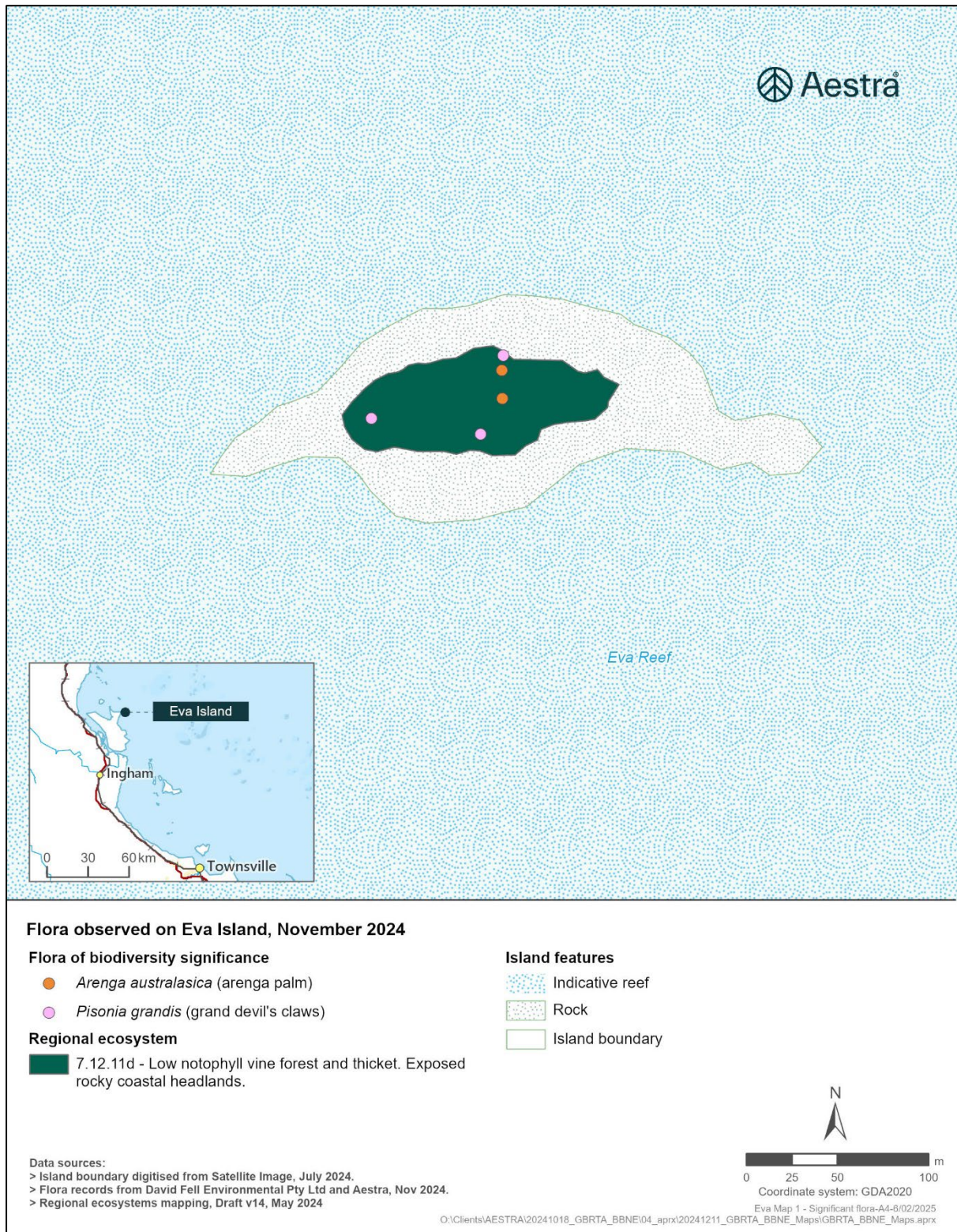


Figure 9: *Pisonia grandis* records, Eva Island, November 2024

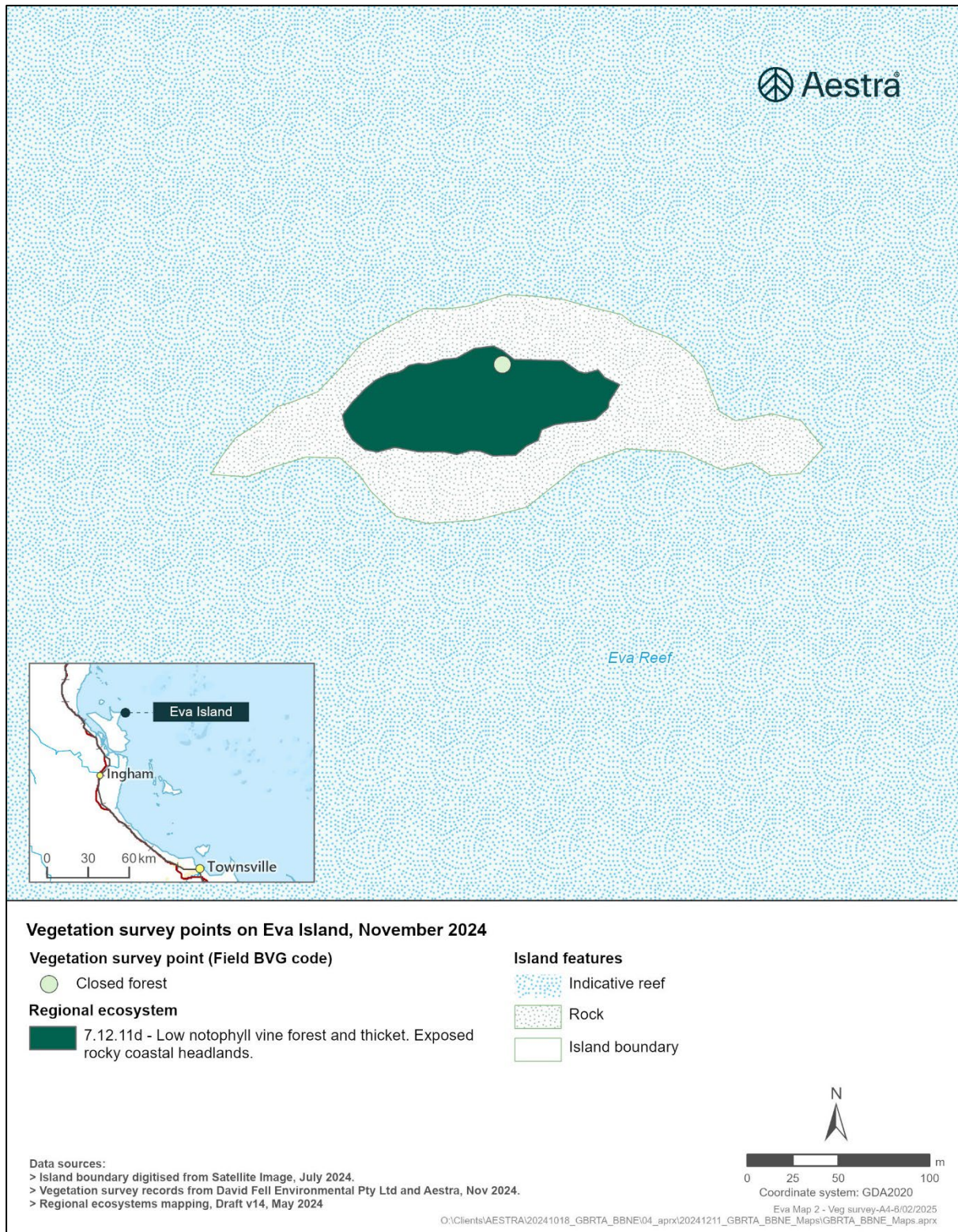


Figure 10: Vegetation on Eva Island, November 2024

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## **Attachment A – Methods**

The field surveys were carried out between 26th and 27th of November 2024. The surveys aimed to assess values, health and threats to island landscapes supporting *Pisonia* forests. The team which comprised a botanist, and an entomologist was supported by a Traditional Owners/custodians and Aestra project staff. Based out of Lucinda, a vessel was used to travel to target islands each day. Weather conditions during the survey period were fine and hot with 5-10 knot winds and a low swell.

### **Flora and vegetation methods**

Prior to the commencement of field survey, a brief desktop review of the known ecological values of each island was carried out from the following sources:

- records from the Atlas of Living Australia (ALA, 2024)
- WildNet data (Queensland Government, 2024).
- Records for *P. grandis* from the Australasian Virtual Herbarium.
- Published papers of Walker (1991), and Turner and Batiannoff (2007).
- Technical reports (Worboys and Zorn 2024).
- Regional Ecosystem mapping (Qld Department Environment Science and Innovation).

### **Field Survey**

- Detection of the presence of *Pisonia* trees.
- Rapid assessment of *Pisonia* population size, species associations and health.
- 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 site detail (Neldner et. al., 2019) and QNPWS Health Checks (Melzer et. al., 2019). Health checks were carried out on Brook (North) Island in *Pisonia grandis* habitat.

Site locations and traverses were captured using ArcGIS Field Maps application. Images were taken using an Olympus tough digital camera and iPad. Vouchers of botanical specimens were collected for verification of identification and inclusion into the Queensland Herbarium and the Australian Tropical Herbarium ([Attachment B3](#)).

Table 2 Survey timing

Date	Island	Arrive	Depart	Time on islands (hours)
26/11/24	Brook (North) Island	9.00 am	2.30 pm	5 hrs
27/11/24	Eva Island	9.00 am	9.40 am	<1 hour

## Fauna methods

Opportunistic observations of fauna species were made where possible and recorded using Field Maps.

## Invertebrate methods

A targeted invertebrate assessment was undertaken for species that were likely to have an impact on the resilience of *Pisonia grandis* communities on target islands. The methodology assumed that the main entomological threats to the ecology of the target islands was posed by the urbicola soft scale (*Pulvinaria urbicola*) and the mutualistic relationships that it develops with many species of ants.

The identification of target areas for invertebrate assessment was carried out collaboratively with the field team, and in particular the team botanist. The methodology was implemented flexibly to allow it to be refined as needed to suit conditions on the ground.

### *Scale density and mutualism assessment*

A scale density and mutualism assessment was conducted using the ten branch-end method (Freebairn, 2006, Hempson *et al.* 2019). To sample for the presence of scale, the end of ten branches with approximately ten leaves were opportunistically selected per 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 were dependent on the size of the *Pisonia grandis* stand, and this method was supplemented with additional 'off-site' examination of trees where required, in particular to ascertain the presence of natural enemies. Scale specimens were collected into 5 ml tubes of 70% ethanol for confirmation of identification. Scale samples were submitted for expert identification.

If ants were attending the scale infestation, the number of species and abundance were estimated per leaf. Specimens of each species were collected into 5 ml tubes of 70% ethanol for later identification. The presence of predators was also visually assessed during the ten branch-end inspection and samples of any potential predators were collected for further identification.

### *Natural enemies*

Scale was visually assessed for natural enemies as well as evidence of parasitism and predation. Any scale that were apparently parasitized were collected for rearing out for further identification of parasitoids. The number of samples taken for rearing was determined by logistics and decided in the field. Parasitized scale samples were held on sections of leaf in ventilated field tubes 100mm x 25mm and held at ambient temperature until either death or the emergence of parasitoids occurred. Parasitoids successfully reared from scale samples were submitted to relevant experts for specialist identification.

In the event that there were large amounts of scale and natural enemies were not obvious, additional time was spent (where possible) undertaking targeted searches for natural enemies on plants affected by scale.

### *Ant assemblage assessment*

The ant assemblage present on each island was investigated and sampled using baited traps to identify the number and diversity of species present.

A series of 5 ml tubes were baited with three baits: peanut butter, honey and fish-based cat food. The baited traps were laid out in groups of three comprising one of each bait type and separated by approx. 0.1m. Between six-ten baiting sites were established per island (depending on size). Baited sites were selected to cover the range of different habitat types present (e.g., *Pisonia* forest, beach margins) and marked with flagging tape for easy retrieval. The location of each set of tubes was recorded using GPS.

After installation, the traps were retrieved prior to leaving the island and sealed for further processing. All traps and flagging tape were collected and removed on completion of the survey. Ants were preserved and identified in-house at Granite Belt IPM QLD. Any suspected species of biosecurity concern were sent off for confirmation of identification by a specialist.

In addition to the baited traps, sampling of the ant fauna was supplemented by opportunistic collections of ants as they were found during island traverses.

*Insert herbivory damage assessment*

Opportunistic assessments of insect herbivory were completed during broader field surveys. Assessment of herbivory damage targeted *Pisonia* species, however other important island forming species like *Cordia* subcordata were also considered. If evidence of herbivory was identified at a problematic level, a targeted search was undertaken for larvae on the affected individuals. Photographs and samples of larvae found were collected for later identification. Notes on tree health and condition were taken for affected individuals (if isolated) and general observations were captured if evidence of herbivory was more widespread.

## **Attachment B: Field data**

### **Attachment B1 - Flora species**

The species list incorporates all known flora records for the target islands combining records of the November 2024 field survey with existing records sourced from WildNet and Worboys and Zorn (2024). Botanical nomenclature follows Bean (2024); (\*) denotes introduced species.

*Table 3 Summary of flora species*

<b>Island</b>	<b>No. of Species WildNet + BRI</b>	<b>No. of Species November 2024 Rapid Survey</b>	<b>Total Species per island</b>	<b>No. of Families</b>	<b>No. Introduced</b>	<b>No. of Threatened</b>	<b>Island Area (ha)</b>
Brook (North) Island	70	113	139	55	6	2	65
Eva Island	27	24	34	25	1	1	3

Table 4: Flora species recorded (\* denotes introduced species).

Life Form – A (aroid), Fe (fern), G (grass), H (herb), P (palm), Pa (pandan), S (shrub), V (vine)

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Pteridiophytes (Ferns & fern allies)									
Aspleniaceae	<i>Asplenium nidus</i>	Birds nest fern	Fe			X			
Polypodiaceae	<i>Drynaria quercifolia</i>		Fe			X	X		
Polypodiaceae	<i>Platycerium superbum</i>	Staghorn fern	Fe			X			
Angiosperms (Flowering plants)									
Acanthaceae	<i>Acanthus ilicifolius</i>	Holly mangrove	S				X		
Acanthaceae	<i>Pseuderanthemum variabile</i>	Pastel flower	H			X			
Amaranthaceae	<i>Deeringia amaranthoides</i>		V				X		
Anacardiaceae	<i>Buchanania mangoides</i> (Vulnerable)		T	V				X	
Anacardiaceae	<i>Pleiogynium timorense</i>	Burdekin plum				X	X		
Anacardiaceae	<i>Semecarpus australiensis</i>	Tar tree	T			X	X		
Annonaceae	<i>Miliusa brahei</i>					X	X		
Annonaceae	<i>Monoon australe</i>	Cape canary beech	T			X	X		
Apocynaceae	<i>Alstonia scholaris</i>	Milky pine	T			X	X		
Apocynaceae	<i>Alyxia spicata</i>	Chain fruit	S			X	X		
Apocynaceae	<i>Hoya australis subsp. australis</i>	Wax flower	V			X		X	X
Apocynaceae	<i>Kopsia arborea</i>	Kopsia	T			X	X		
Apocynaceae	<i>Ochrosia elliptica</i>	Ochrosia	S			X	X		
Apocynaceae	<i>Tabernaemontana orientalis</i>	Northern banana bush	S			X	X		

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Araliaceae	<i>Heptapleurum actinophyllum</i>	Umbrella tree	T			X	X	X	
Arecaceae	<i>Archontophoenix alexandrae</i>	Alexandra palm	P			X			
Arecaceae	<i>Arenga australasica</i> (Vulnerable)	Sugar palm	P	V		X	X	X	X
Arecaceae	<i>Calamus australis</i>	Wait a while	V			X	X		
Arecaceae	<i>Cocos nucifera</i> *	Coconut	P		LI	X			
Arecaceae	<i>Ptychosperma elegans</i>	Elegant palm	P			X	X	X	X
Asteraceae	<i>Sphagneticola trilobata</i> *	Singapore Daisy	H		HI	X			
Asteraceae	<i>Tridax procumbens</i> *	Tridax daisy	H		LI	X			
Asteraceae	<i>Wallastonia biflora</i>	Beach daisy	H			X			
Boraginaceae	<i>Argusia argentea</i>	Octopus bush	S			X	X	X	
Boraginaceae	<i>Cordia subcordata</i>	Orange trumpet tree	T			X	X		
Calophyllaceae	<i>Calophyllum inophyllum</i>	Beach calophyllum	T			X			
Cannabaceae	<i>Trema orientalis</i>	Poison peach	T			X		X	X
Capparaceae	<i>Capparis lanceolaris</i>	Native caper	S			X	X		X
Capparaceae	<i>Capparis lucida</i>		S						X
Casuarinaceae	<i>Casuarina equisetifolia</i> var. <i>incana</i>	Coastal oak	T			X	X		
Celastraceae	<i>Elaeodendron melanocarpum</i>	Black olive plum	S			X			
Combretaceae	<i>Lumnitzera</i> sp.		S				X		
Combretaceae	<i>Terminalia arenicola</i>	Brown damson	T			X			
Combretaceae	<i>Terminalia catappa</i>	Beach almond	T			X		X	
Combretaceae	<i>Terminalia muelleri</i>	Australian almond				X		X	
Combretaceae	<i>Terminalia sericocarpa</i>	Damson plum				X			
Commelinaceae	<i>Commelina ensifolia</i>	Scurvy weed	H			X		X	X

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Convolvulaceae	<i>Ipomoea pes capre subsp. brasiliensis</i>	Goats foot convolvulus	V			X			
Convolvulaceae	<i>Ipomoea violacea</i>	Morning glory	V			X		X	X
Cyperaceae	<i>Cyperus eglobosus</i>		Se				X		
Cyperaceae	<i>Cyperus enervis</i>		Se				X		
Cyperaceae	<i>Cyperus javanicus</i>	Java sedge	Se					X	X
Dracaenaceae	<i>Dracaena angustifolia</i>	Native Draceana	Se			X	X		
Ebenaceae	<i>Diospyros compacta</i>					X			
Ebenaceae	<i>Diospyros hebecarpa</i>	Scrub ebony	T			X	X	X	
Ebenaceae	<i>Diospyros maritima</i>	Sea ebony	T			X			
Euphorbiaceae	<i>Macaranga tanarius</i>	Macaranga	T			X			
Flagellariaceae	<i>Flagellaria indica</i>	Whip vine	V			X		X	X
Goodeniaceae	<i>Scaevola taccada</i>	Sea cabbage	S			X	X		
Lamiaceae	<i>Clerodendrum inerme</i>	Beach clerodendrum	S			X			
Lamiaceae	<i>Premna serratifolia</i>	Coastal premna	S			X		X	X
Lamiaceae	<i>Vitex trifolia</i>	Vitex	S			X			
Lauraceae	<i>Beilschmiedia obtusifolia</i>	Blush walnut	T			X	X		
Lauraceae	<i>Cassytha filiformis</i>	Dodder laurel	V			X			
Lauraceae	<i>Cryptocarya hypospodia</i>	Northern pepperberry	T			X	X		
Lauraceae	<i>Endiandra wolfei</i>		T			X	X		
Laxmaniaceae	<i>Geitonoplesium cymosum</i>	Scrambling lily				X			
Leguminosae	<i>Acacia crassicarpa</i>	Spoon wattle	T						X
Leguminosae	<i>Canavalia rosea</i>	Beach bean	V			X			

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Leguminosae	<i>Castanospermum australe</i>	Blackbean	T			X			
Leguminosae	<i>Dalbergia candenatensis</i>		S						X
Leguminosae	<i>Dendrolobium umbellatum var. umbellatum</i>	Horse bush	S			X			
Leguminosae	<i>Derris trifoliata</i>		V				X		
Leguminosae	<i>Entada phaseoloides</i>	Matchbox bean	V						
Leguminosae	<i>Erythrina variegata</i>	Coral tree	T			X			
Leguminosae	<i>Falcataria toona</i>	Mackay cedar	T			X			
Leguminosae	<i>Guilandina bonduc</i>	Nicker nut	S			X	X		
Leguminosae	<i>Milletia pinnata</i>	Oil tree	T			X			
Leguminosae	<i>Mucuna gigantea</i>	Burney bean	V			X			
Leguminosae	<i>Sophora tomentosa subsp. australis</i>	Silverbush	S			X	X		
Leguminosae	<i>Thespesia populnea</i>	Pacific rosewood	T			X			
Malvaceae	<i>Abutilon albescens</i>	Lantern bush	S			X			
Malvaceae	<i>Hibiscus tiliaceus</i>	Beach hibiscus	T			X			
Meliaceae	<i>Aglaia elaeagnoidea</i>	Coastal boodyara	T			X	X		
Meliaceae	<i>Aglaia sapindina</i>		T			X	X		
Meliaceae	<i>Dysoxylum alliaceum</i>		T				X		
Meliaceae	<i>Dysoxylum latifolium</i>		T			X	X		
Meliaceae	<i>Dysoxylum parasiticum</i>	Yellow mahogany	T				X		
Meliaceae	<i>Melia azederach</i>	White cedar	T			X			
Menispermaceae	<i>Hypserpa decumbens</i>		V			X			X
Menispermaceae	<i>Pachygone ovata</i>		V			X			

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Menispermaceae	<i>Tinospora smilacina</i>	Snake vine	V			X			
Moraceae	<i>Ficus drupacea</i>	Red fig	T			X		X	X
Moraceae	<i>Ficus hispida var. hispida</i>	Hairy fig	S			X			
Moraceae	<i>Ficus microcarpa</i>		T			X		X	X
Moraceae	<i>Ficus rubigonosa var. glabrescens</i>	Small-fruited fig	T			X		X	X
Moraceae	<i>Ficus virens</i>	White fig	T			X		X	X
Moraceae	<i>Maclura cochinchinensis</i>	Cockspur	S			X			
Myristicaceae	<i>Myristica globosa subsp. muelleri</i>	Nutmeg	T			X		X	
Myristicaceae	<i>Myristica insipida</i>	Nutmeg	T			X	X		
Myrtaceae	<i>Acmena hemilampra subsp. hemilampra</i>		T						X
Myrtaceae	<i>Corymbia tessellaris</i>	Moreton bay ash	T			X	X		
Myrtaceae	<i>Eugenia reinwardtiana</i>	Cedar bay cherry	S			X	X		
Myrtaceae	<i>Syzygium angophoroides</i>	Swamp satinash	T				X		
Myrtaceae	<i>Syzygium claviflorum</i>		T				X		
Myrtaceae	<i>Tabernaemontana pandacqui</i>		S				X		
Nyctaginaceae	<i>Boerhavia mutabilis</i>		H			X	X		
Nyctaginaceae	<i>Pisonia aculeata</i>		V			X			
Nyctaginaceae	<i>Pisonia grandis</i>	Birdlime tree	T			X		X	X
Olacaceae	<i>Jasminum didymum</i>		V						X
Olacaceae	<i>Ximenia americana</i>	Sea lemon	S			X			
Oleaceae	<i>Chionanthus ramiflorus</i>	Northern olive	T			X	X		
Oleaceae	<i>Jasminum elongatum</i>		V			X	X		

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Oleaceae	<i>Jasminum simplicifolium subsp. australiense</i>	Stiff native jasmine	V			X	X		
Orchidaceae	<i>Dendrobium discolor</i>	Golden Orchid	O			X			
Pandanaceae	<i>Pandanus tectorius</i>	Screw pine	Pa			X	X	X	X
Passifloraceae	<i>Passiflora foetida</i> *	Stinking passion flower	V		LI	X			
Passifloraceae	<i>Passiflora suberosa</i> *	Corky passion flower	V		LI	X			
Poaceae	<i>Eleusine indica</i> *	Crows foot grass	G		HI				
Poaceae	<i>Lepturus repens</i>	Pacific needle grass	G			X		X	
Poaceae	<i>Paspalum vaginatum</i> *		G		LI				X
Poaceae	<i>Setaria australiensis</i>		G						X
Poaceae	<i>Sporobolus virginicus</i>	Salt water couch	G			X			
Poaceae	<i>Thaurea involuta</i>		G			X			
Putranjivaceae	<i>Drypetes deplanchei</i>	Yellow boxwood	T			X	X		
Rhamnaceae	<i>Colubrina asiatica</i>	Shampoo bush	S			X			
Rhamnaceae	<i>Rhamnella vitiense</i>		V			X	X		
Rhizophoraceae	<i>Bruguiera gymnorhiza</i>		T				X		
Rhizophoraceae	<i>Rhizophora stylosa</i>		T				X		
Rubiaceae	<i>Coelospermum paniculatum var. paniculatum</i>		V				X		
Rubiaceae	<i>Aidia racemosa</i>	Archer cherry	T			X	X		
Rubiaceae	<i>Guettarda speciosa</i>	Beach gardenia	T			X	X		
Rubiaceae	<i>Ixora timorensis</i>	Native ixora	S			X	X		
Rubiaceae	<i>Morinda citrifolia</i>	Noni	S			X			

Family	Species	Common Name	Lifeform	Conservation Status	Weed Status	Brook (North) Island Nov 24	Nth Brook Wnet/ALA	Eva Island Nov 24	Eva (Worboys & Zorn 2024)
Rutaceae	<i>Glycosmis trifoliata</i>	Glycosmis	S			X			
Rutaceae	<i>Melicope vitiflora</i>		T				X		
Rutaceae	<i>Micromelum minutum</i>	Lime berry	T			X			
Santalaceae	<i>Exocarpos latifolius</i>	Broad-leaved ballart				X			
Sapindaceae	<i>Ganophyllum falcatum</i>	Scaly ash	T			X			
Sapindaceae	<i>Guioa acutiflora</i>	Northern guioa	T			X			X
Sapotaceae	<i>Chrysophyllum sp.</i>		T				X		
Sapotaceae	<i>Mimusops elengi</i>	Mimusops				X			
Sapotaceae	<i>Palaquium galactoxylum</i>	Cairns pencil cedar	T			X	X		
Sapotaceae	<i>Planchonella cotinifolia</i>		T				X		
Sapotaceae	<i>Planchonella obovata</i>	Northern yellow boxwood	T			X	X		
Solanaceae	<i>Solanum mauritianum*</i>	Tobacco bush	S				X		
Solanaceae	<i>Solanum viridiflorum</i>					X	X	X	X
Stemonuraceae	<i>Gomphandra australiana</i>		T				X		
Sterculiaceae	<i>Heritiera littoralis</i>	Looking glass mangrove	T			X	X		
Sterculiaceae	<i>Sterculia quadrifida</i>	Peanut tree	T			X			
Ulmaceae	<i>Celtis philippensis</i>	Celtis	T			X			
Urticaceae	<i>Dendrocnide moroides</i>	Stinger	S				X		
Verbenaceae	<i>Lantana camara*</i>	Lantana	S		HI		X		
Vitaceae	<i>Cissus hastata</i>		V			X		X	X
Zygophyllaceae	<i>Tribulus cistoides</i>	Bull head burr	H				X		

## Attachment B2 - Summary Vegetation Site Data - November 2024 survey

Survey ID	Location	Site type	Veg structure and flora summary	Mapped RE	Field RE	Notes
DF_4	Brook (North) Island	Quaternary	Littoral rainforest	7.3.10a	7.2.2	Littoral Rainforest with scrub fowl mound.
DF_5	Brook (North) Island	Quaternary	Littoral rainforest	7.3.10a	7.2.3	Littoral Rainforest, north end of island.
Brook (North) Island	Brook (North) Island	Brook (North) Island	Brook (North) Island	Brook (North) Island	Brook (North) Island	Brook (North) Island
DF_7	Brook (North) Island	Health check	Littoral rainforest	7.3.10a	7.2.2	Scattered 1-5% coral berry, no fire evidence. Three <i>Pisonia</i> trees healthy and shooting with new leaves and no scale. Stems healthy with sprouts from coppicing fallen branches. North end of island.
DF_8	Brook (North) Island	Quaternary	Dune woodland of <i>Casuarina equisetifolia</i>	7.2.2f	7.2.7	Woodland <i>Casuarina equisetifolia</i> dominant with shrubs of <i>Scaevola taccada</i> and <i>Geuttarda speciosa</i> on sand spit. North end of island.
DF_9	Brook (North) Island	Quaternary	Shrubland - vine thicket	7.2.2f	7.2.2	On coralline deposits shrub land /thicket to 5-7 m with occasional emergent pandanus and clumps of vine thicket shrubs. Common species are <i>Mimusops elengi</i> , <i>Diospyros compacta</i> , <i>Drypetes deplanchei</i> , <i>Sophora tomentosa</i> , and <i>Eugenia reinwardtiana</i> . North end of island.
DF_10	Brook (North) Island	Quaternary	Closed forest	7.2.2f	7.2.2	Well developed littoral rainforest on dune sand on slight rise. Canopy 12-25 m of <i>Chionanthus ramiflorus</i> , <i>Mimusops elengi</i> , <i>Diospyros compacta</i> , <i>Diospyros hebecarpa</i> and <i>Sterculia quadrifida</i> . Traverse at nth end island.
DF_11	Brook (North) Island	Quaternary	Lowland rainforest on granite	7.12.1a	7.12.1a	Well-developed rainforest on lower granite slopes with <i>Castanospermum australe</i> , <i>Syzygium cormiflorum</i> , <i>Cryptocarya hypospodia</i> , <i>Alstonia scholaris</i> , and <i>Dysoxylum latifolium</i> . High abundance of <i>Arenga</i> palms with <i>Ptychosperma elegans</i> . Base of hill slope north end of island.
DF_13	Eva Island	Quaternary	Vine thicket on steep granitic boulder slopes	7.12.1a	7.12.1a	<i>Ficus virens</i> , <i>Pisonia grandis</i> , <i>Flagellaria indica</i> , <i>Cissus hastata</i> , <i>Ficus obliqua</i> , <i>Ficus rubiginosa forma glabrescens</i> , and <i>Arenga australasica</i> . North side.

### Attachment B3 - Voucher specimens - November 2024 survey

Table 5 Flora voucher specimens Brook (North) Island and Eva Islands - 26 & 27 November 2024

Collecting no.	Family	Genus	Species	Location	Latitude	Longitude	Datum	Regional Ecosystem	Habitat	Descriptive notes
DGF NB01	Petiveriaceae	<i>Rivina</i>	<i>humilis</i>	Brook (North) Island	-18.137°	146.278°	WGS84	RE7.2.2	Littoral rainforest with <i>Pisonia grandis</i> , <i>Aglaia elaeagnoidea</i> , and <i>Terminalia arenicola</i> .	Perennial herb to 60 cm. Occasional in groundcover in scattered shade above the shoreline.
DGF NB02	Nyctaginaceae	<i>Pisonia</i>	<i>grandis</i>	Brook (North) Island	-18.137858°	146.278°	WGS84	RE7.2.2	Littoral rainforest with <i>Pisonia grandis</i> , <i>Aglaia elaeagnoidea</i> , and <i>Terminalia arenicola</i> .	Tree 15 m, multi-stemmed with pale trunk and newly shooting leaves. Only 3 trees close together just above northern shoreline.
DGF NB03	Leguminosae	<i>Erythrina</i>	<i>variegata</i>	Brook (North) Island	-18.13761	146.2791	WGS84	RE7.2.2	Littoral rainforest with <i>Pisonia grandis</i> , <i>Aglaia elaeagnoidea</i> , and <i>Terminalia arenicola</i> .	Tree 6 m with pods. Uncommon on edge of shoreline.
DGF NB04	Asteraceae	<i>Sphagneticola</i>	<i>trilobata</i>	Brook (North) Island	-18.13764	146.279	WGS84	RE7.2.2	Shoreline margin of littoral rainforest with <i>Aglaia elaeagnoidea</i> , <i>Hibiscus tiliaceus</i> and <i>Terminalia arenicola</i> .	Prostrate perennial herb. One small patch on top of the low foredune.
DGF NB05	Passifloraceae	<i>Passiflora</i>	<i>suberosa</i>	Brook (North) Island	-18.13764	146.279	WGS84	RE7.2.2	Shoreline margin of littoral rainforest with <i>Aglaia elaeagnoidea</i> , <i>Hibiscus tiliaceus</i> and <i>Terminalia arenicola</i> .	Slender vine. Single occurrence on top of foredune.

Collecting no.	Family	Genus	Species	Location	Latitude	Longitude	Datum	Regional Ecosystem	Habitat	Descriptive notes
DGF NB06	Capparaceae	<i>Capparis</i>	<i>lanceolata</i>	Brook (North) Island	-18.13819	146.279	WGS84	RE7.2.2	Littoral rainforest with <i>Aglaia elaeagnoidea</i> , <i>Terminalia arenicola</i> , <i>Mimusops elengi</i> , <i>Pleiogynium timorense</i> and <i>Miliusa brahei</i> .	Understorey vine with alternate leaves. Uncommon in understorey.
DGF NB07	Leguminosae	<i>Sophora</i>	<i>tomentosa</i>	Brook (North) Island	-18.13891	146.2776	WGS84	RE7.2.2	Open woodland of <i>Casuarina equisetifolia</i> var. <i>incana</i> .	Shrub with pubescent pinnate leaves and pendulous pods. Common on shoreline and in regenerating <i>Casuarina</i> woodland.
DGF NB08	Sapotaceae	<i>Mimusops</i>	<i>elengi</i>	Brook (North) Island	-18.13829	143.2792	WGS84	RE7.2.7	Littoral rainforest on sand with <i>Alstonia scholaris</i> , <i>Dysoxylum latifolium</i> , <i>Sterculia quadrifida</i> and <i>Arenga australasica</i> .	Tree 15 m with cylindrical trunk and vertical fissured black/greyish outer bark. Occasional in understorey.
DGF NB09	Solanaceae	<i>Myoporum</i>	<i>montanum</i>	Brook (North) Island	-18.13891	146.2776	WGS84	RE7.2.7	Open woodland of <i>Casuarina equisetifolia</i> var. <i>incana</i> .	Shrub 1.2m. Rare in dune woodland.
DGF NB10	Myrtaceae	<i>Eugenia</i>	<i>reinwardtiana</i>	Brook (North) Island	-18.13829	146.2783	WGS84	RE7.2.2	Low shrubby vine thicket with <i>Diospyros compacta</i> , <i>Pandanus tectorius</i> , <i>Drypetes deplanchei</i> and <i>Dendrolobium umbellatum</i> .	Shrub 1.2m with opposite leaves. Common throughout low vine thicket and extending into understorey of better developed littoral rainforest.
DGF NB11	Leguminosae	<i>Dendrolobium</i>	<i>umbellatum</i>	Brook (North) Island	-18.13829	146.2783	WGS84	RE7.2.2	Low shrubby vine thicket with <i>Diospyros compacta</i> ,	Shrub 2m with trifoliolate leaves and constricted pods. Uncommon in

Collecting no.	Family	Genus	Species	Location	Latitude	Longitude	Datum	Regional Ecosystem	Habitat	Descriptive notes
									<i>Pandanus tectorius</i> , <i>Drypetes deplanchei</i> and <i>Dendrolobium umbellatum</i> .	understorey of littoral rainforest.
DGF EV1	Nyctaginaceae	<i>Pisonia</i>	<i>grandis</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.11	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	Tree 4.5 m and 52 cm DBH, with pale multi-stemmed trunk and new leaf shoots. Occasional on steep granite slopes, northern side of island.
DGF EV2	Moraceae	<i>Ficus</i>	<i>microcarpa</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.11	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	Tree 6-8 m with spreading crown. Common on steep granite slopes on northern side of island.
DGF EV3	Flagellariaceae	<i>Flagellaria</i>	<i>indica</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.11	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	Robust vine. Occasional on steep granite slopes on northern side of island.
DGF EV4	Solanaceae	<i>Solanum</i>	<i>viridiflora</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.11	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	Shrub 1 m. Uncommon on steep rocky granite slope on north side of island.
DGF EV5	Commelinaceae	<i>Commelina</i>	<i>ensifolia</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.12	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus</i>	Prostrate herb with fleshy leaves. Common groundcover trailing in crevices and on

Collecting no.	Family	Genus <sup>1</sup>	Species <sup>1</sup>	Location	Latitude	Longitude	Datum	Regional Ecosystem	Habitat	Descriptive notes
DGF EV6	Arecaceae	<i>Arenga</i>	<i>australasica</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.12	<i>virens</i> and with <i>Arenga australasica</i> . Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	granite boulder slabs on northern side of island. Robust multi-stemmed palm with pale whitish leaf undersides. Abundant on ridge crests in clumps.
DGF EV7	Nyctaginaceae	<i>Pisonia</i>	<i>grandis</i>	Eva Island	-18.23548	146.3252	GDA2020	RE7.12.12	Vine forest on granite boulder slopes with <i>Pisonia grandis</i> , <i>Ficus microcarpa</i> , <i>Ficus virens</i> and with <i>Arenga australasica</i> .	Tree 6 m with buds and flowers. Occasional on steep granite slopes, northern side of island accessed by tinnie with Giringun Rangers. Approx. 20-40 trees on the island.

## Attachment B4 - Health Check Data Sheet

<b>Park name (&amp; section):</b>	<b>Brook (North) Island Island, Family Group. 30 km ENE of Cardwell, Qld.</b>
Recorder/s:	D. G. Fell

Value1: *Pisonia grandis* population

### Site Details (for permanent and non-permanent sites):

Site Id.	GPS Location (Datum: )	Permanent site & photo point established (Y/N)	Approx site area	Date assessed (d/m/y)
1 DF NB4	-18.137984 146.278525	N	20x20	26/11/24

Use the name provided in the management plan/statement (or Values Assessment & Assessment & Monitoring Strategy if no plan)

### Condition class summary

Record: the Condition Class that you determine for the value (ecosystem, vegetation community, habitat) at each inspection site for each Health Check Indicator (HCI); your general impression of the condition of the value across the park for each HCI (based on site results and other observations – note that the Condition Class you record as your

general impression IS NOT an 'average' of the Condition Classes at each site. It IS your considered opinion about the state of the value across the park based on the site results and your observations as you drive/walk/fly between sites); and the overall condition of the value across the park based on the IUCN definitions (Table 2.2). Where it is relevant, provide information on factors contributing to the Condition Class assigned to an inspection site, in Table 2.3. Details relevant to your determination of the General Impression and Overall Condition Class can be recorded in Table 2.4 and the notes field below Table 2.4, respectively.

*If a new location for a significant pest species is found during the inspection it must be recorded in the relevant departmental databases (e.g. Pest Management System, WildNet) and a specimen lodged with Qld Herbarium.*

Table 2.1 Record of the Condition Class for a key ecosystem/habitat.

Key: **G = good**; **GC = good with some concerns**; **SC = significant concern**; **C = critical**; NA = not applicable.

Health Check Indicator	Condition Class					General impression
	Site 1	Site 2	Site 3	Site 4	Site 5	
1. Infestations of ecosystem-changing pest plants	SC					GS
2. Infestations of pest plants other than ecosystem-changers	SC					GS
3. Risk of future invasion by significant pest plants not already present	G					G
4. Rainforest invasion	G					G
5. Woody thickening (other than by rainforest species)	G					G
6. Overgrazing/browsing by feral animals, stray stock or natives	G					G
7. Trampling, digging or rooting ..... or trampling by visitors	G					G
8. Impacts on wetlands	NA					NA
9. Vehicle impacts	NA					NA
10. Dumping	G					G
11. Ground cover	SC					SC
12. Fire damage to fire-sensitive and non fire-dependent ecosystems	G					G
13. Fire damage to peat-based ecosystems	G					G
14. Age class distribution in fire-adapted ecosystems in conservation....	G					G
15. Severe wildfire in fire-adapted wooded ecosystems	NA					NA
16. Severe storm, cyclone or tornado in wooded ecosystems	G					G
17. Overtopping, erosion and associated impacts resulting..... from.....	SC					SC
18. Tree/shrub health and dieback	G					G
19. Key features for faunal biodiversity in terrestrial ecosystems	G					G
20. Recruitment of canopy species	G					G

**Overall Condition Class** (refer Table 2.2)

Table 2.2 Overall Condition Class – what the categories mean

Description of overall condition class				
Good	The Key Value is in good condition and is likely to be maintained for the foreseeable future, provided the current conservation measures are maintained.			
Good with some concern	The Key Value is likely to be essentially maintained over the long-term with minor additional conservation measures to address existing concerns.			
Significant concern	The Key Value is threatened by a number of current and/or potential threats. Significant additional conservation measures are required to preserve the value over the medium to long-term.			
Critical	The Key Value is severely threatened. Urgent additional large-scale conservation measures area required			
Trigger for management response:	Maintain effort	Minor attention required	Requires prompt decision &/or planned course of action	Requires urgent decision re course of action

Table 2.3 Information, including key issues/threats, relevant to determining the condition of the value at Site/s

Health Check Indicator	Notes: <i>If you don't use a separate notes page for each site then record the relevant site number below against each set of notes</i>
1. Ecosystem-changing pest plants	A small infestation of Singapore daisy was noted on the fore dune on edge of littoral forest near the Pisonia population. Also noted that there is an historic record of Lantana on the island which was not located during the rapid survey. Coral berry plants were recorded at 1-5% cover scattered throughout the groundcover in and around the Pisonia population. A single plant of Corky passion fruit was recorded on the foreshore close to the Pisonia population.
2. Pest plants other than ecosystem-changers	Stinking passion flower was recorded on the island at low densities.
3. Risk of future invasion by significant pest plants	The presence of the Lantana record flags a future threat particularly following cyclonic disturbance events.
4. Rainforest invasion	Not applicable.
5. Woody thickening (other than by rainforest species)	Not applicable.
6. Over-grazing/over-browsing by feral animals, stray stock or native animals	Not applicable.
7. Trampling, digging or rooting ... or trampling...	No evidence of feral animal.
8. Impacts on wetlands	No wetlands.
9. Vehicle impacts	No vehicles on the island.
10. Dumping	No evidence of dumping.
11. Ground cover	Vegetative groundcover sparse with leaf litter and sand.
12. Fire damage to fire-sensitive & non fire-dependent ecosystems	No evidence of fire.

Health Check Indicator	<i>Notes: If you don't use a separate notes page for each site then record the relevant site number below against each set of notes</i>
13. Fire damage to peat-based ecosystems	Not applicable.
14. Age class distribution in fire-adapted ecosystems	Not applicable.
15. Severe wildfire in fire-adapted ecosystems	Not applicable.
16. Severe storm, cyclone, tornado	No evidence of impact.
17. Overtopping, scouring & assoc. impacts resulting	No evidence of impact.
18. Tree/shrub health and dieback	No evidence of impact.
19. Key features for faunal biodiversity in terrestrial	Canopy healthy with intact rainforest structure providing nesting habitat for avifauna.
20. Recruitment of canopy species	Seedlings of canopy trees noted in groundcover .

## Attachment B5 – Incidental fauna records

The following species list outlines the incidental fauna records made during the field surveys. \* denotes exotic species.

Table 6 Incidental fauna records, November 2024

Scientific Name	Common Name	EPBC Act	NC Act	Brook (North) Island	Eva Island
<i>Ducula bicolor</i>	Torresian imperial pigeon		Least concern	X	X
<i>Haliaeetus leucogaster</i>	White-bellied sea eagle		Least concern		X
<i>Megapodius reinwardt</i>	Orange-footed scrub-fowl			X	
<i>Onychoprion anaethetus</i>	Bridled tern	Migratory	Special least concern	X	X
<i>Rhinella marina</i> *	Cane toad		-	X	

## Attachment B6 – Invertebrate field data

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

Table 7 Scale density assessment results

ID	Date	Location	No. branch ends	Scale density	Ants present	Comments
AR_4	26/11/2024	Brook (North) Island				
AR_5	26/11/2024	Brook (North) Island				
AR_6	26/11/2024	Brook (North) Island				
AR_7	26/11/2024	Brook (North) Island				Opportunistic collection of ants
AR_8	26/11/2024	Brook (North) Island		1-50	Y	Host Clerodendrum adjacent to Pisonia Michael Gorton to confirm ID
AR_8b	26/11/2024	Brook (North) Island				Collected attending scale (AR_8)
AR_4-7 and 9-12a	26/11/2024	Brook (North) Island				Ant traps - honey
AR_4-7 and 9-12b	26/11/2024	Brook (North) Island				Ant traps - peanut butter
AR_4-7 and 9-12c	26/11/2024	Brook (North) Island				Ant traps - fish
AR_4-7 and 9-12d	26/11/2024	Brook (North) Island				Ant traps - opportunistic collection
AR_10	26/11/2024	Brook (North) Island				Ant traps
AR_11	26/11/2024	Brook (North) Island				Ant traps
AR_12	26/11/2024	Brook (North) Island				Ant traps
AR_14	27/11/2024	Eva Island				Scale on Pisonia - will send to Michael Gorton (NAQS) to confirm ID
AR_14a	27/11/2024	Eva Island				Ar15 Lepidoptera egg on Pisonia shoot 1st instar larvae family sphingidae. Attempted to feed other known host foliage but died before ID could be confirmed
AR_15	27/11/2024	Eva Island			Y	AR15 Eva Island. Bulk scale for parasitoid rearing
AR_15a	27/11/2024	Eva Island			Y	Ant trap - honey
AR_15b	27/11/2024	Eva Island			Y	Ant trap - peanut butter
AR_15c	27/11/2024	Eva Island			Y	Opportunistic collection

## **Attachment C: Field photos**

### **Attachment C1 – Brook (North) Island**



*Plate 6 Healthy Pisonia grandis shooting new leaves (D Fell, 2024)*



*Plate 7 Closed canopy littoral rainforest on Brook (North) Island (D Fell, 2024)*



*Plate 8 Arenga palm (Arenga australasica) on Brook (North) Island (D Fell, 2024)*



*Plate 9 Well developed lowland rainforest on granite slopes with a high abundance of Arenga palm (D Fell, 2024)*



Plate 10 Coral berry (*Rivina humilis*) on Brook (North) Island (D Fell, 2024)



Plate 11 Corky passionfruit (*Passiflora suberosa*) on Brook (North) Island (D Fell, 2024)



Plate 12 Singapore daisy (*Sphagneticola trilobata*) on Brook (North) Island (D Fell, 2024)



Plate 13 Orange-footed scrubfowl (*Megapodius reinwardt*) mound on Brook (North) Island (D Fell, 2024)



Plate 14 Dune woodland dominated by *Casuarina equisetifolia* on northern spit of Brook (North) Island (D Fell, 2024)



Plate 15 Cane toad (*Rhinella marina*) observed on Brook (North) Island (D Fell, 2024)



Plate 16 Low closed forest with scrubland vine thickets and emergent Pandanus on Brook (North) Island (D Fell, 2024)



Plate 17 Cedar bay cherry (*Eugenia reinwardtiana*) on Brook (North) Island (D Fell, 2024)

## Attachment C1 – Eva Island



Plate 18 *Pisonia grandis* on Eva Island (D Fell, 2024)



Plate 19 *Arenga palm (Arenga australasica)* on Eva Island (D Fell, 2024)



Plate 20 Scale on *Pisonia* (A Rice, 2024)



Plate 21 Bulk scale on *Pisonia* (A Rice, 2024)



*Plate 22 Moth egg collected on Pisonia shoot (A Rice, 2024)*



*Plate 23 Vine thicket on granite boulder, Eva Island (D Fell, 2024)*

