Rungulla Bush Blitz

Vascular Plants, Fungi and Vegetation Communities

2 – 13 May 2022

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Nomenclature and taxonomy used in this report is consistent with:

The Australian Plant Name Index (APNI)

http://www.anbg.gov.au/databases/apni-about/index.html

The Australian Plant Census (APC)

http://www.anbg.gov.au/chah/apc/about-APC.html

The Catalogue of Australian Liverworts and Hornworts

http://www.anbg.gov.au/abrs/liverwortlist/liverworts_intro.html

The Australian Fungi List (AFL) [exceptions noted]

https://fungi.biodiversity.org.au/nsl/services/search/names

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Abstract

Four botanists, in two teams, spent a total of 12 collecting days at Rungulla, between 30 April and 13 May 2022.

Vegetation structure and floristics were assessed at seven sites (including two standard sites) in c. 5 Regional Ecosystems. These sites included assessment of BioCondition attributes associated with vegetation and habitat condition and represented the first collection of standard site data in at least one of these Regional Ecosystems.

A total of 403 individual collections, representing 251 species of vascular plants, 2 mosses and 39 fungi were made during the expedition. Plant tissue was collected into silica gel for many collections to assist ongoing and future molecular phylogenetic studies.

The collections made during this survey approximately doubled the number of vascular plant collections for the Park, which numbered approximately 230 before the survey (approximately 630 collections after the survey), and almost doubling the number of vascular plant species recorded for the park.

Approximately 170 vascular plant collections represented new records for the park, including numerous range extensions or infilling of distributional information for a number of species. Approximately 435 plant species are now recorded for Rungulla.

Notable collections for the Park include the first record for a number of species including the Nature Conservation Act listed *Kardomia squarrulosa* (Vulnerable) and additional records of *Drosera burmanni* (Special Least Concern), *Drummondita calida* (Vulnerable), *Labichea brassii* (Near Threatened), *Leptospermum pallidum* (Near Threatened), *Pluchea punctata* (Endangered), *Solanum carduiforme* (Vulnerable), and *Stylidium tenerum* (Special Least Concern).

Collection of *Kardomia squarrulosa* at Rungulla National Park represents a significant range extension of approximately 250km from the White Mountains National Park sandstone block in the Desert Uplands Bioregion. Similarly, the currently undescribed *Hemigenia* sp. (White Mountains) and *Aristida burraensis* were newly found at Rungulla ,and represent similar range extensions from the White Mountains area.

Material collected on the expedition confirmed the occurrence of *Eucalyptus ammophila* at Rungulla National Park. Previous collections made in 2010 were only tentatively identified as this species.

A number of valuable collections of the genus *Triodia* were made from various localities within the Park. These include the first collections from the Reserve of both *T. microstachya* and a related undescribed species, here referred to as *Triodia* sp. Bush Blitz Rungulla 1. The latter species has been recorded from elsewhere in north-eastern Australia but has previously been confused with *T. microstachya*. The co-occurrence of both species at the same sites at Rungulla have helped to confirm their status as distinct species.

A total of 39 species of fungi were collected, all being new records for the park. Most are significant range extensions or help fill large collecting holes in distributions. A number represent undescribed species, previously known to be widespread in northern Australia, but Rungulla collections help define their distribution limits. A collection of *Campylomyces tabacinus* is a 1000 km range extension from SE QLD / NSW and is the first collection in 50 years. The new material allowed the species to be analysed genetically for the first time, allowing the genus to be placed in the Order Polyporales, where it possibly requires a new family. *Campylomyces* had previously been unplaced even to Order.

1. Introduction

Location

Bush Blitz is a continent-wide biodiversity discovery partnership between the Australian Government, BHP and Earthwatch Australia. Parks Australia coordinates the Bush Blitz program, organising multidisciplinary biodiversity surveys in targeted areas across Australia assessed as being of priority for taxonomic and ecological research. The program has been running since 2009 and will continue until 2023 and has undertaken previous survey expeditions in various parts of Queensland including the Ookola (2015) and Quinkan traditional lands (2017) on Cape York Peninsula.

Rungulla is situated approximately 100 km south-west of the township of Forsyth in the Etheridge Shire (Figure 1, 2). The National Park and adjoining Resources Reserve (collectively referred to as the 'Reserve' hereafter) were gazetted in 2015 following the purchase of the former Gilbert River and Rungulla holdings by the Queensland Government. The Reserve was purchased and declared for the purpose of conserving its unique cultural, historic and natural values and encompasses a range of landscape types on the traditional lands of the Ewamian peoples.

The Reserve covers an area of approximately 1295 km^2 in the uppermost reaches of the Gilbert and Flinders River systems that drain to the north and west to the Gulf of Carpentaria (Figure 2).

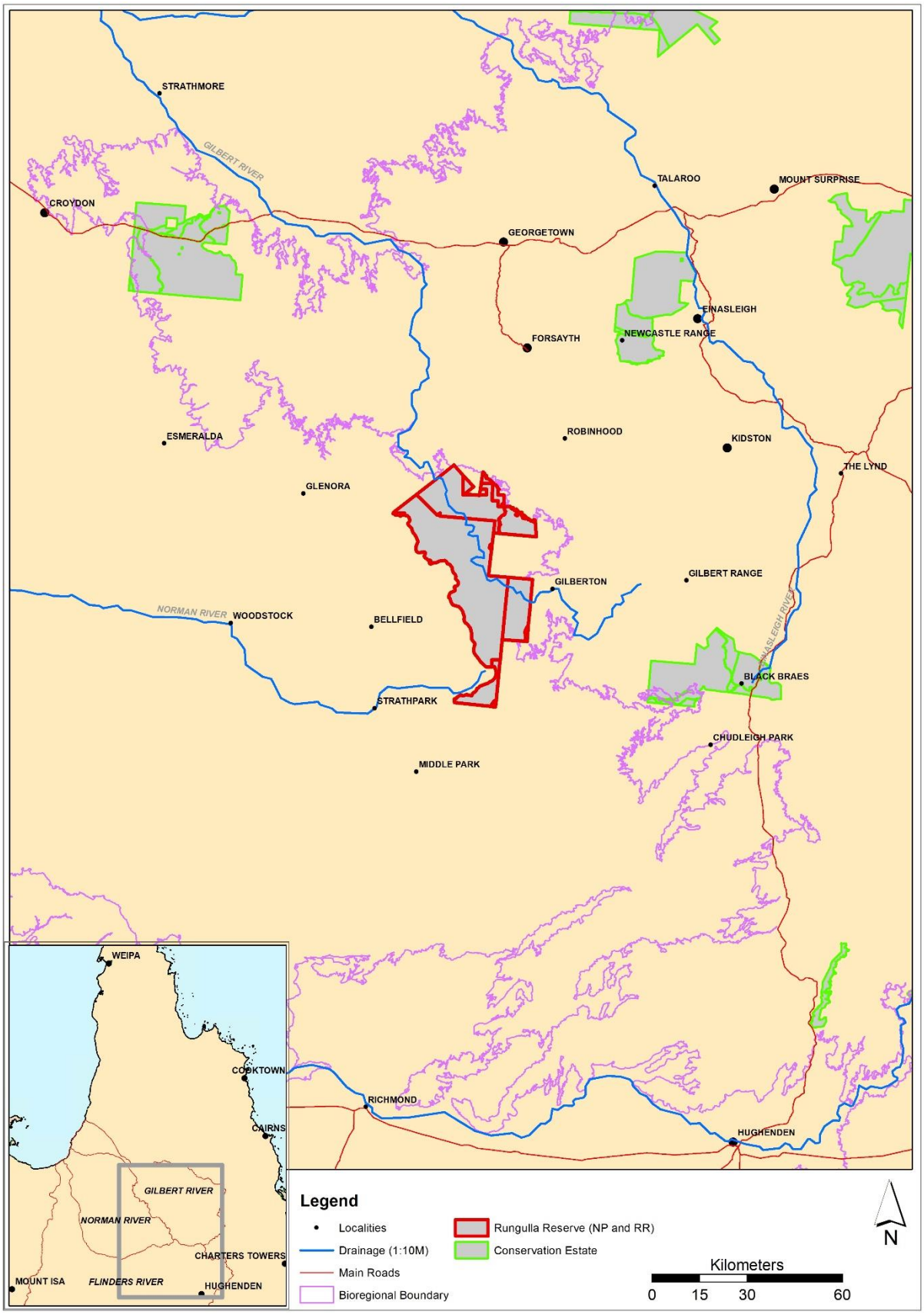

Figure 1. Location of Rungulla National Park and adjoining resources reserves in north Queensland.

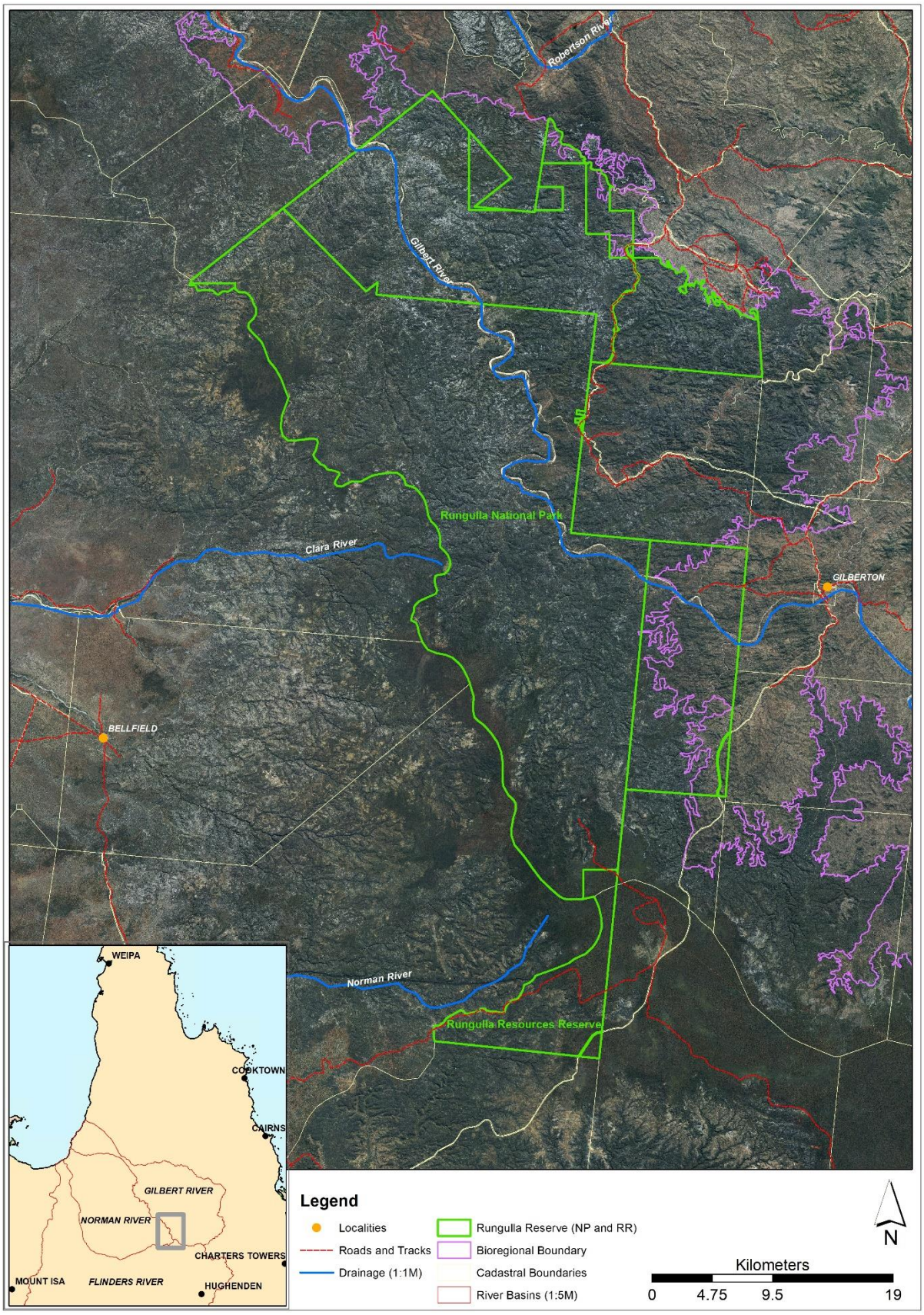

Figure 2. Rungulla National Park and adjacent Resources Reserve boundaries.

Landscape, geological and biological context

Geologically, the Rungulla area is situated on the margins of the Georgetown and Carpentaria Lowlands Regions (Draper et al. 1998) and represents the junction of the relatively complex Proterozoic – Palaeozoic region to the east with the relatively simple Mesozoic – Cainozoic region to the west (Figure 3).

The Georgetown Region is characterised by a diverse range of granites and metamorphic rocks of Proterozoic and early Palaeozoic age with variable overlying cover of Mesozoic sedimentary rocks. Outcropping rocks of the Proterozoic Ethridge province are prominent in the eastern part of Rungulla area with a range of both fine-grained sedimentary (e.g mudrock) and igneous (i.e. metabasalt (Dead Horse Metabasalt) and metadolerite (Corbett Formation)) rocks represented. At the very western margin of the Georgetown Province, cover of Mesozoic Era (Jurassic to Cretaceous) sedimentary rocks becomes more prominent with the arenites of the Hampstead Sandstone extending into the adjacent Carpentaria Lowlands Region.

The Carpentaria Lowlands Region is characterised by broad expanses of relatively thin, flat-lying Mesozoic and Cainozoic sedimentary cover associated with the Carpentaria (Staaten River Sub-basin) and northern Eromanga Basins (McConachie et al. 1998; Withnell et al. 1998). In the eastern part of this Region (where Rungulla is situated), Basin cover is underlain by the older metamorphic rocks of the Etheridge Province as discussed above.

Mesozoic cover represents a number of distinct depositional periods with the Jurassic aged, variously sized sedimentary materials of the Eulo Queen group (including micaceous sandstone siltstone and mudstone of the Loth Formation and pebbly quartzose sandstone and conglomerate of the Hampstead Sandstone –) overlain by the younger (Jurassic/Cretaceous aged) calcite-cemented sandstones of the Gilbert River Formation. These sediments are hypothesised to have been sourced predominantly from the east.

Extensive Cainozoic materials overly much of the Mesozoic cover of the Carpentaria Lowlands Region, although along the eastern margin of the Region where it adjoins the Georgetown Region this is less well-developed. Mesozoic cover of Tertiary Duricrust and associated unconsolidated sands have largely developed in situ on the Gilberton Plateau/Gregory Range in the southern parts of the National Park.

The Mesozoic sandstone dominated lithologies of the Rungulla area gives rise to the characteristic hills and plateaus of the Upper Gilbert, Norman and Saxby River catchments at the margins of the Einasleigh Uplands physiographic division (Perry. 1964). These landforms are characteristic of several Landsystems including Ortona and Torwood with the high-plains and tablelands of the Boorooman landsystem largely associated with the younger Cainozoic deposits of the Gilberton Plateau/Gregory Range (Perry et al. 1964). Higher-relief hills and mountains of the metamorphic province to the east are typical of the Kilbogie landsystem on the eastern margins of the area.

The Reserve is dissected north-south by the major drainage of the Gilbert River and its tributaries with the upper reaches of the Norman and Saxby Rivers (Flinders system) draining a small portion of the south-west of Rungulla from the summit of the Gregory Range to the west. These major drainage systems are actively dissecting and eroding the basement and overlying geologies resulting in significant deposition of alluvial material along the terraces and floodouts of these systems as well as contributing to the formation of the characteristic stepped landscape of ledges and scarps common through much of the Reserve.

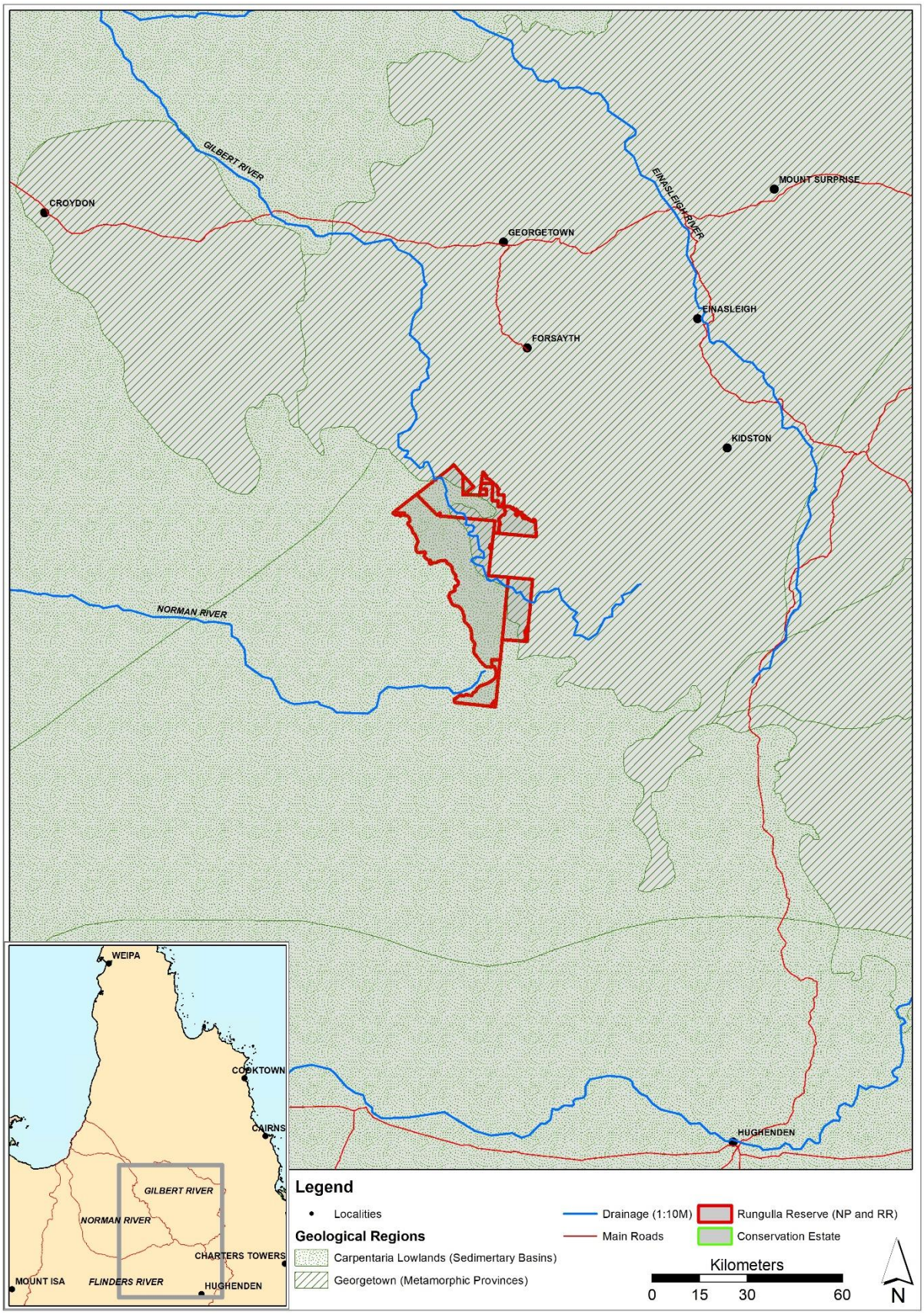

Figure 3. The position of Rungulla Reserve relative to geological units, Georgetown (hashed) and Carpentaria Lowlands Regions (stippled).

Rungulla is situated on the boundary between the Gulf Plains (GUP) and Einasleigh Uplands (EIU) bioregions with the reserve boundary forming the boundary between the two bioregions in the north-eastern part of the National Park (see Figure 2). The majority of the Reserve is situated within the Gilberton Plateau Subregion of the GUP and represents the highest parts of the Bioregion with strong affinities to the adjacent EIU (Morgan, 1999a). This subregion is characterised by the outcropping Mesozoic sediments and overlying lateritised Tertiary surfaces described for the Carpentaria Lowlands geological region (above). These geologies and landforms harbour a mosaic of Eucalypt dominated sclerophyllous woodlands interspersed with more mesic habitats associated with springs and watercourses that support a range of non-Eucalypt vegetation types including spring open-forests.

Minor areas of the eastern and northern parts of the Reserve fall within the Kidston Subregion of the EIU. This subregion has strong affinities geologically and geomorphologically with the adjacent Gilberton Plateau subregion of GUP. Outcrop of basement Etheridge Province metamorphic rocks are prominent with outliers of the Mesozoic sedimentary cover more prominent to the west also a strong feature of these areas of the Reserve. Average annual rainfall within this section of the Reserve may be up to 100mm greater than the western parts of the Reserve with the structural development of the vegetation in this area reflecting this relative increase in moisture availability.

Climate

The climate of the Rungulla Reserve is typical of the seasonal wet/dry tropics of northern Australia. Climate data from the nearest long-term weather monitoring facility (Georgetown Post Office, c. 100 km north of the Reserve) is presented in Figure 4 (source: BOM 2022). The climate of the study area is highly seasonal (Figure 4), with approximately 85% of mean annual precipitation falling during the wet season months of December to March. Mean monthly minimum and maximum temperatures range between 12.0 °C (July) and 36.6 °C (November) with long term values for May ranging between 16.1 °C and 30.4 °C.

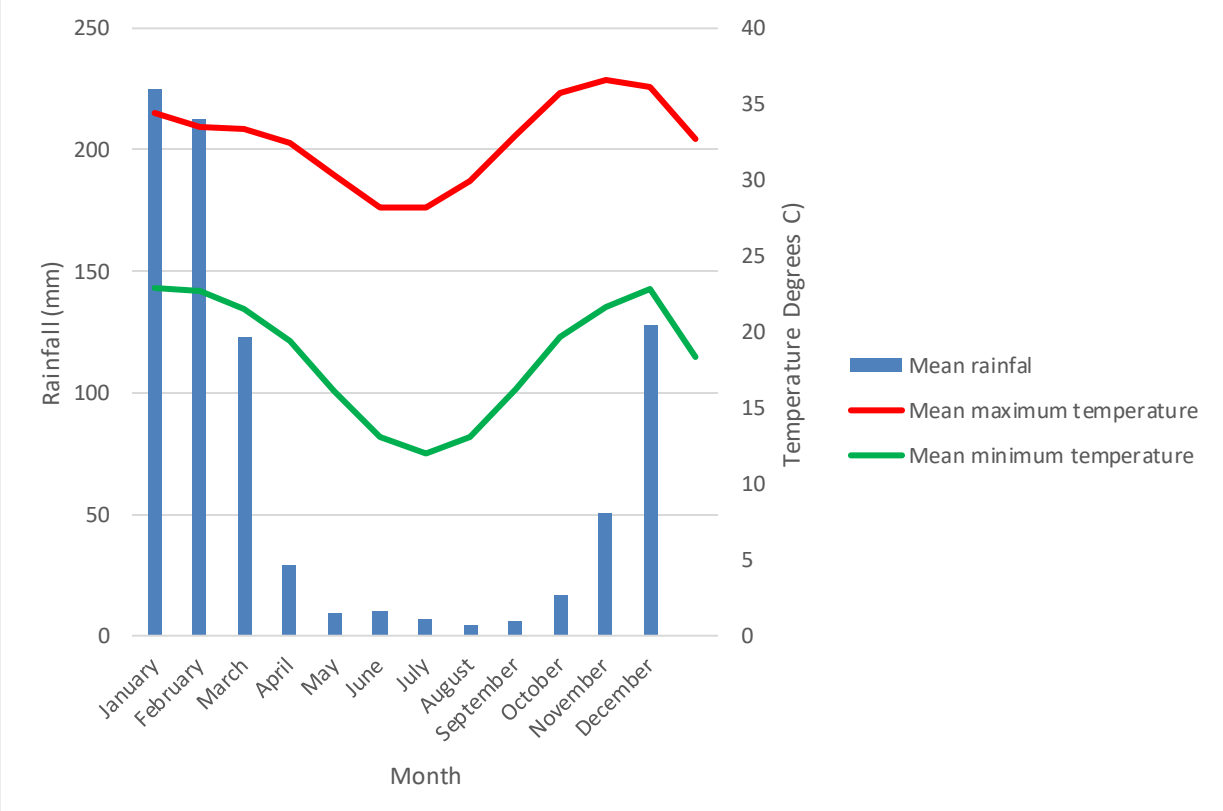

Figure 4. Rainfall and temperature at Georgetown, the closest long-term weather station to Rungulla.

Cultural context

Rungulla (pronounced Roong-ala) National Park and Resources Reserve (Rungulla) lies within the lands of the Ewamian (pronounced Oor-a-min) People who have an ongoing connection with, and play an active role in, managing and caring for Country. The Ewamian language, formed within the Agwamin society, tragically became unspoken following the loss of contact with country during the 1980's (https://www.ewamian.com.au/countryculture), despite persisting through around 100 years of displacement following the arrival of European settlers. Surviving Ewamian Peoples are reviving their language and cultural practices, for which traditional cultural sites play an important ongoing role, including those within the Rungulla Reserve.

Target groups and previous survey effort

This survey focussed on two major 'plant' (in the widest sense) groups:

- Vascular plants (Kingdom Plantae: Tracheophyta) – a lineage of plants that possess well developed veins (vascular tissue) in their stems, roots and leaves. Vascular plants include the majority of familiar land plants: flowering plants, ferns, conifers, cycads and fern allies (Figure 3). A few non-vascular mosses (Kingdom Plantae: Bryophyta) were collected incidentally.
- Fungi (Kingdom Fungi) – a diverse range of heterotrophic eukaryotic organisms that are closer to animals than plants but have historically been studied by botanists. Most fungi produce microscopic fruit bodies, if any. Fungi targeted were restricted to those forming macroscopic fruit bodies, primarily of the Phylum Basidiomycota, but also a few from Phylum Ascomycota. The collection of fungi was opportunistic, and greatly facilitated by three days of aseasonal rainfall during the second week of the survey, allowing collection of many species that would have otherwise been undetected.

Approximately 1004 plant collection records from the Rungulla area (10 km buffer) are currently stored in either the Queensland Herbarium (BRI) corporate database (HERBRECS) or accessible via the Australasian Virtual Herbarium (AVH). This includes 332 collection records from the Reserve itself. These collection records represent c. 231 individual taxa (489 from larger buffer area) at an average collection density of 0.37 collections/km^2 with a significant geographical bias towards the northern sections of the Reserve (Figure 5). This level of collection effort is approximately half of the average number of collections/km^2 for Queensland (0.63/km^2) and the EIU Bioregion (0.72/km^2), although it is worth noting that this is almost double the average collection effort for the GUP Bioregion (0.15/km^2) more broadly.

Native flora and fauna species that are considered at risk of extinction are protected under Queensland *Nature Conservation Act* 1992 (NC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act). Depending on the assessed level of risk, rare flora species can be listed as Critically Endangered (CR), Endangered (E), Vulnerable (V) or Near Threatened (NT), the latter being a NC Act classification only. All other taxa are typically categorised as Least Concern (LC). An additional level of classification is afforded to those Least Concern taxa of particular management interest which may be designated as Special Least Concern (SLC) under the NC Act.

A total of 65 records of 16 taxa scheduled under the Queensland NC Act or the Commonwealth EPBC Act have been previously collected from the Reserve and its immediate surrounds. These taxa are listed in **Table 1**.

Table 1. The 16 Scheduled species previously recorded for Rungulla Reserve and adjacent area, derived from 65 records of these species at BRI.

Taxon	NCA status	Records	Notes
Blechnum orientale	SLC	5	Recorded within Rungulla NP
Brachychiton paradoxus	SLC	1	
Cymbidium canaliculatum	SLC	1	
Drosera burmannii	SLC	1	Recorded within Rungulla NP
Drosera serpens	SLC	2	
Drummondita calida	V	6	Recorded within Rungulla NP
Geodorum densiflorum	SLC	1	
Leptospermum pallidum	NT	4	Recorded within Rungulla NP
Labichea brassii	NT	18	
Pluchea punctata	E	7	Recorded within Rungulla NP
Pteris platyzomopsis	SLC	1	
Solanum carduiforme	V	10	Recorded within Rungulla NP
Stylidium rotundifolium	SLC	1	
Stylidium tenerum	SLC	2	
Utricularia caerulea	SLC	4	
Utricularia gibba	SLC	1	

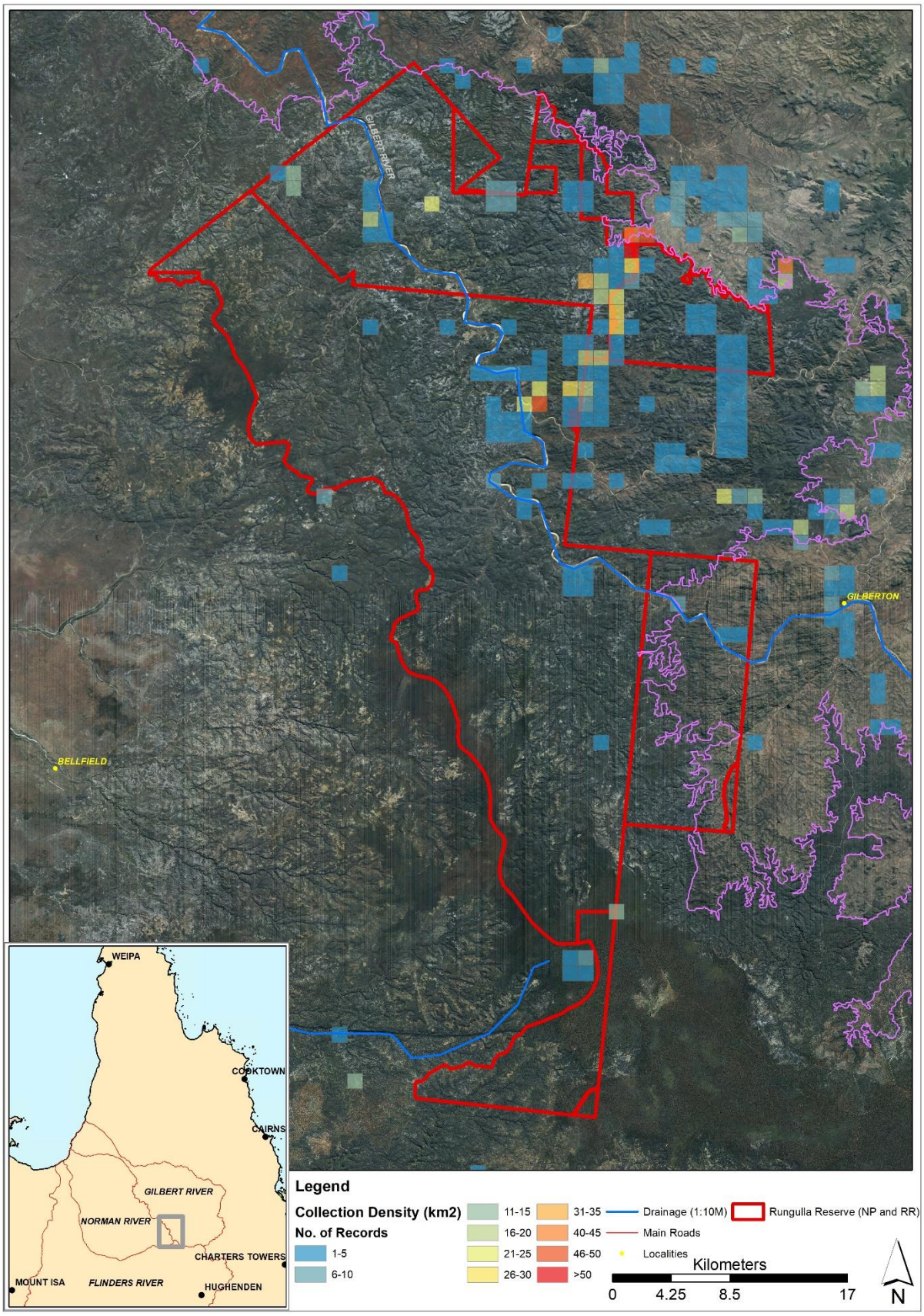

Figure 5. Previous collection effort for vascular plants in the Rungulla Reserve and surrounds.

Survey aims

Given that the Rungulla area is a relatively undercollected part of Queensland, it was recognised that at the highest level, any sampling would contribute to the overall state of knowledge for the area. However, a number of specific aims were also identified in the preliminary phases of survey planning which included:

- Better representation of Sandstone flora with a focus on areas with potential for new species or records for the Reserve.
- Targeted collections from geographic extremities of the Reserve, where inaccessible without a helicopter.
- Additional sampling in previously uncollected spring and lake habitats.
- Targeted and opportunistic collection of fungi.
- Resolution of identity of Mallee Eucalypt (currently called *Eucalyptus ammophila*) previously collected in the Reserve.
- Additional sampling in Regional Ecosystems identified as a priority for site data collection to improve circumscription of vegetation communities.

2. Methods

2.1 Site selection

Site selection for the vegetation and botanical sampling during the Rungulla Bush Blitz was largely pre-determined and based on a number of factors including access, previous sampling effort and habitat diversity.

Given the largely under-sampled nature of the locality as a whole it was recognised that any sampling would contribute to the overall state of knowledge for the area whilst recognising that there were likely to be target areas with higher potential of supporting novel taxa for the area given the time of year at which the survey was conducted.

With this in mind a hierarchy of site priority was established that aimed to accommodate the varied objectives of the field team. These are briefly outlined in the following subsections.

2.1.1 Standard Survey Sites

Two Standard Survey Sites were established in close proximity to the Rungulla National Park ranger complex and airstrip. These sites were chosen in conjunction with the team from TERN Ecosystem Surveillance/AusPlots program with ease of access by participants on the survey and post-survey field teams a priority.

In an effort to place sites in distinct habitats, the two sites were chosen on distinct geomorphic surfaces associated with different land forming processes. These can by broadly characterised as an unconsolidated alluvial (Landzone 3) and metamorphosed bedrock (Landzone 11) situation with details of site location provided in Table 3.

2.1.2 Regional Ecosystems

Vegetation across Queensland is mapped by the Queensland Herbarium at 1:100 000 scale. The vegetation mapping, also called regional ecosystem2 mapping, informs legislated land use planning and conservation management across the state. Although satellite data and aerial photography provide the foundation for the mapping, data from on ground site assessments ("CORVEG sites") is essential for ensuring its accuracy. Queensland Herbarium staff identified a number of lithologies and landform patterns as priorities for survey, due to a paucity of sites on these geologies.

These analyses were incorporated into the site selection criteria for the survey with the general collection locations detailed in Table 2 and the specific locations of detailed vegetation assessment sites provided in Table 3.

2.1.3 Sites of Botanical Interest

Pre-survey reconnaissance and expert knowledge identified a number of locations within the survey area where previous collecting efforts would suggest a higher diversity of vascular plants may occur. These were typically centred around areas of prolonged water availability in the landscape such as perennial springs and areas of higher topographic heterogeneity likely to support a more diverse range of microhabitat conditions. This included landform elements such as sandstone pavements, gullies and gorges where topographic diversity creates micro-climatic and ecological differences in parameters such as fire regime that facilitate the maintenance of floral diversity in the broader landscape.

In many instances (e.g. RUN_BB03) these sites of botanical interest overlapped or were co-located with priority sites identified for detailed vegetation assessment.

2.1.4 Geographic Extremities

The physical extent of Rungulla NP covers about 90 km north-south, but only about 45 km east-west at its widest point. Road access is limited to the northern, western and southern extremities of the park, in part due to extensive incision of the ranges. It was expected that the narrow shape of the park would intersect with the distributions of a greater range of species than would be predicted on the basis of geological and vegetation units alone, especially at the northern and southern extremities of the park. Consequently, several sites were selected near geographic extremities of the reserve, specifically targeting potentially disjunct landforms and microhabitats near boundaries.

Previous collecting had therefore previously been focussed close to roads, except for a previous vascular plant survey utilising a helicopter (Ford 2010). Additional sites were chosen to cover gaps in previous collecting activities, not already covered by the aforementioned gap-filling strategies.

2.1.5 Opportunistic Sites

Heavy unseasonal rainfall limited use of the helicopter for three days in the second week of the survey. During this time, one spring site was accessed by vehicle, before flooding of small creeks prevented further road access. The remainder of this down time was utilised to collect fungi around the Rungulla Ranger station, including along the nearby Gilbert River.

A complete list of all major flora collection sites is given in Table 2, and the detailed vegetation assessment sites in Table 3. Both are mapped in Figure 6.

Table 2. Localities and coordinates of major flora collection sites visited during the Rungulla Bush Blitz expedition 03 – 12 May 2022.

Location (Site Number)	Date Visited	Coordinates	Notes
Heli 1 BB1	04/05/2022	-19.3933, 143.4543	Rungulla National Park. Approximately 29 km South South-East of Rungulla airstrip. Woodland on coarse-grained, terraced sediments. Sandstone plateau.
Heli 2 BB2	04/05/2022	-19.3603, 143.5428	Rungulla National Park. Approximately 25 km South South-East of Rungulla airstrip. Woodland on coarse-grained, terraced sediments. Sandstone plateau.
Heli 3 BB3	04/05/2022	-19.3202, 143.5673	Rungulla National Park. Approximately 22 km South East of Rungulla airstrip. Eucalypt woodland on metamorphic hills and rises with perennial tussock grasses.
Heli 4 BB4	05/05/2022	-19.0002, 143.4051	Rungulla National Park. Approximately 17 km North West of Rungulla airstrip. Corymbia woodland on low rises of conglomeritic sandstone.
Carson's Spring BB5	05/05/2022	-19.0531, 143.5043	Rungulla National Park. 5 km North of Rungulla airstrip. Melaleuca leucadendra tall open forest in spring.
Sandstone BB6	05/05/2022	-19.052173, 143.506605	Rungulla National Park. Approximately 9.85 km North of Rungulla airstrip. Eucalypt woodland on sandy wash in gully between sandstone rises and low hills.
Polycarpa BB7	05/05/2022	-19.058658, 143.518198	Rungulla National Park. Approximately 9.5 km North North-East of Rungulla airstrip. Corymbia woodland with Melaleuca nervosa on sandy plain in gully between sandstone rises.
Drummondita BB8	05/05/2022	-19.053, 143.5169	Rungulla National Park. Approximately 10 km North North-East of Rungulla airstrip. Eucalypt Corymbia woodland on low rises of conglomeritic sandstone.
River Road BB9	06/05/2022	-19.1111, 143.4596	Rungulla National Park. Approximately 3 km North of the Rungulla airstrip. Riparian open-forest on alluvium.
Gilbert River BB10	06/05/2022	-19.1341, 143.4679	Rungulla National Park. 300 m West of Ranger compound. Riparian woodland complex.
Heli 6 BB11	07/05/2022	-18.9837, 143.3788	Rungulla National Park. Approximately 20 North West of Rungulla airstrip. Mixed Eucalypt and Corymbia woodland on low rises of conglomeritic sandstone.
Green Ant Spring BB12	07/05/2022	-19.0948 143.5734	Rungulla National Park. Approximately 11 km North East of Rungulla airstrip. Eucalypt open-forst in gully within sandstone low-hills.

Pluchea BB13	07/05/2022	-19. 063411, 143.518856	Rungulla National Park. Approximately 9 km North East of Rungulla airstrip. Metamorphic footslopes of sandstone rises with Eucalyptus woodland.
Rungulla Airstrip BB14	8/05/2022	-19.13489, 143.47423	Rungulla National Park airstrip, 300 m east of Ranger Station.
Pavement BB15	8/05/2022	-19.00807, 143.29131	Rungulla National Park, 23.3 km NW of Ranger Station and airstrip. On small sandstone ridge on plateau above creek.
Swamp BB16	8/05/2022	-19.46692, 143.52382	Rungulla National Park, 48.4 km south of Ranger Station and airstrip. On sand flat at edge of ephemeral upland swamp on broad plateau.
Southern boundary BB17	8/05/2022	-19.57045, 143.48451	Rungulla National Park, 37.3 km south of Ranger Station and airstrip. On pebbly quartzite and sandy plateau, shrubs and heath.
Plateau/Creek BB18	9/05/2022	-19.38982, 143.52646	Rungulla National Park, 29.9 km south of Ranger Station and airstrip. On rocky surface of plateau above incised creek on sandstone range.
Rungulla Ranger Base BB19	10/05/2022	-19.13392, 143.47069	Rungulla National Park, Ranger Station Open eucalypt woodland.
Spring BB20	10/05/2022	-19.12567, 143.501483	Rungulla National Park, 3.3 km ENE of Rangeer Station and airstrip Below sandstone ridge.
Mesa BB21	11/05/2022	-18.95657, 143.49086	Rungulla National Park, 19.7 km north of Ranger Station and airstrip. On grassy scree slope below sandstone massif.
Pandanus Creek BB22	11/05/2022	-18.95243, 143.40517	Rungulla National Park, 21.3 km NNW of Ranger Station and airstrip. On sand flat near creek in gully on sandstone range, amongst grasses and shrubs in open eucalypt woodland.
Gullies BB23	12/05/2022	-19.062, 143.58533	Rungulla National Park, 14.4 km NE of Ranger Station and airstrip. On log in deep leaf litter on sandstone scree slope on side of incised gully on sandstone range.

Table 3. Location details for detailed vegetation assessment sites sampled during the Rungulla Bush Blitz Expedition 03 – 12 May 2022.

Location (Site Number)	Date Visited	Coordinates	Notes
Rungulla National Park c. 230m South East of Ranger Base and c.170m to the West of airstrip. Overlies TERN AusPlots fenced exclosure site and is Bush Blitz Standard Site No.1. (RUN_BB01)	03/05/2022	-19.13515, 143.47257	Bush Blitz Standard Survey Site 1 Woodland on alluvial plain adjacent to airstrip. Previous TERN AusPlots 1 hectare monitoring site.
Rungulla National Park c. 2.4km East of the Airstrip. (RUN_BB02)	03/05/2022	-19.12736, 143.49388	Bush Blitz Standard Survey Site 2 Eucalypt woodland on metamorphic lower slopes.
Rungulla National Park - southern end. Approximately 29 km South of airstrip. (RUN_BB03)	04/05/2022	-19.39324, 143.45430	Woodland on coarse-grained, terraced sediments. Sandstone plateau.
Rungulla National Park c. 25.5 km South South-east of Airstrip. (RUN_BB04)	04/05/2022	-19.36027, 143.54282	Eucalypt woodland to open forest on outwash plain from sandstone hills. Deep sandy soil.
Rungulla National Park c. 17 km North West of airstrip. (RUN_BB05)	05/05/2022	-19.000460, 143.407831	Corymbia woodland on low rises of conglomeritic sandstone.
Rungulla National Park c. 4km North West of the airstrip on River Road. (RUN_BB06)	06/05/2022	-19.107810, 143.441028	Eucalypt (Mallee) low woodland on upper slopes of low sandstone hills.
Rungulla National Park, approximately 19 km North West of the Ranger base. (RUN_BB07)	07/05/2022	-18.985561, 143.383899	Eucalypt woodland on sandstone plateau.

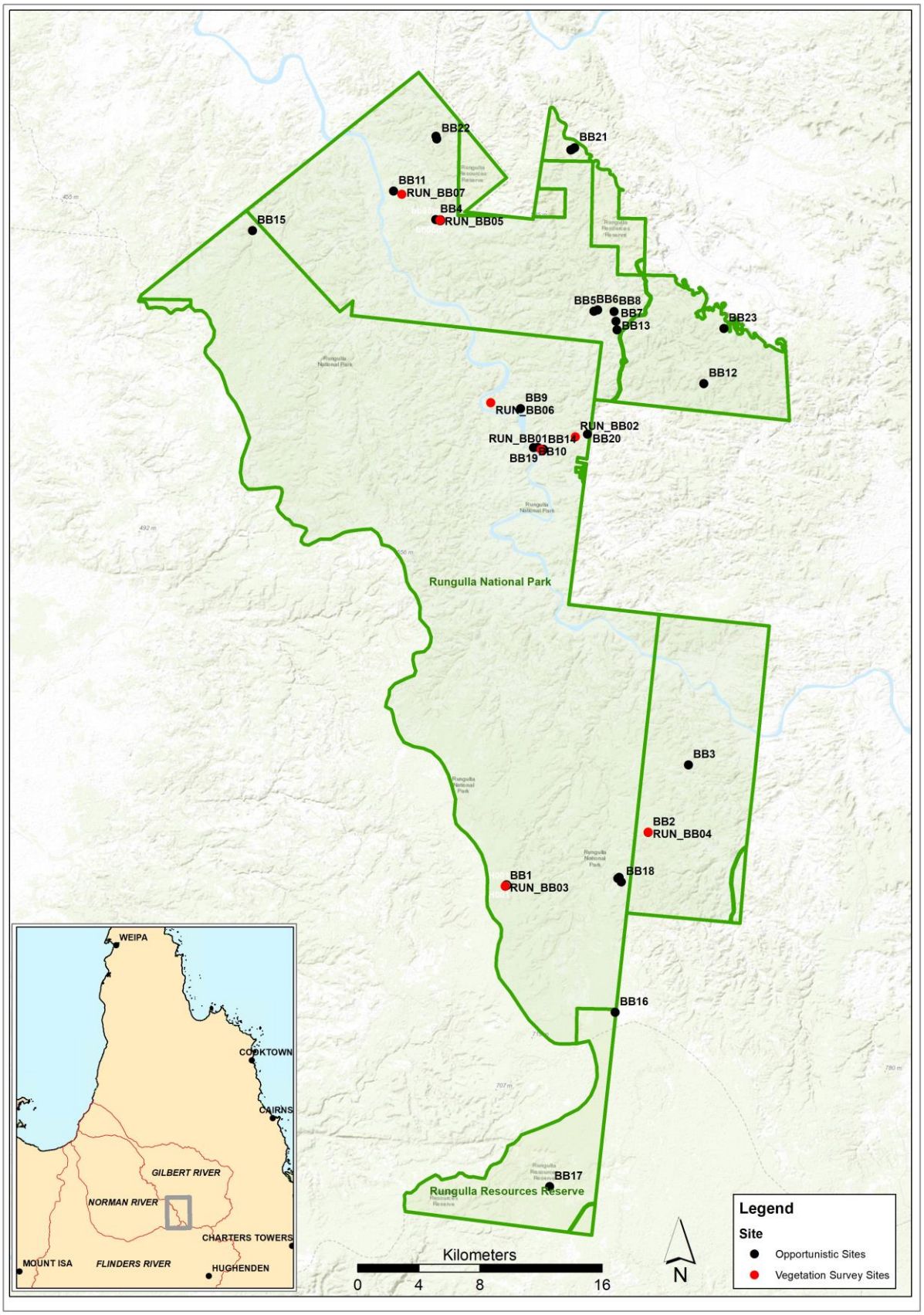

Figure 6. Map of the Botanical collecting sites within the Rungulla Reserve

2.2 Survey techniques

2.2.1 Collection of plant specimens

Plant specimens were collected in the field, photographed whilst fresh, preserved in the field (either pressed between newspaper or stored whole in Kew mixture) or stored and transported in thick plastic bags, and processed at the end of each workday.

Fungal specimens were photographed in the field while fresh, and returned to the base camp for processing. Specimens were dried in a food dehydrator at 45°C for 1-2 days, and stored in zip-loc bags to prevent atmospheric re-hydration.

Apart from a few significant plant records, only fertile (*i.e.* bearing buds, flowers or fruits) material was collected, as infertile material is both difficult to identify and makes for poor research specimens. Samples were documented, pressed and dried following standard herbarium methodology (Queensland Herbarium 2013).

Subsamples of selected specimens were dried in silica gel for future genetic analysis.

2.2.2 Methods used at standard and regional ecosystem survey sites

The goal of the assessments made at both the two standard survey sites and the regional ecosystem survey sites was not just to compile a species list, but to provide a formal structural description of the vegetation community in line with recognised vegetation description standards and a description of the habitat attributes (Biocondition) of those sites for reference purposes. The vegetation and habitat assessments made at these sites followed the Queensland Herbarium's Secondary site assessment methodology (Neldner *et al*. 2022). Data gathered using this methodology feeds directly into the Queensland State Government's QBEIS database, providing a foundation for vegetation classification and mapping across the state.

The vegetation description obtained using the secondary site assessment methodology informed the work of other scientists participating in the Rungulla Bush Blitz, and data collected has been incorporated into the QBEIS database. The assessment was undertaken in a 10 × 50 m plot centred on the site marker peg.

Data collected included:

• Location information;

• Detailed site physical description, including landform, slope, soils and local geology;

• Summary of observations of apparent disturbance, including storm damage, fire, grazing, weed invasion and erosion;

• Structural summary, including determination of species that are prominent in each of the vegetation strata (*i.e.* emergent stratum, canopy and subcanopy strata, shrub strata and ground layer) and their heights;

• Crown cover of woody strata as measured along a 50 m transect line;

• Basal area (a surrogate measure of biomass) and woody stem counts;

• Assessments and identification of ground cover within 5 × 1 m^2 quadrats along the 50 m transect

• Compilation of a full species list;

• Collection of specimens of fertile plants.

Variable plot size (50 × 10, 50 × 20) dependent upon vegetation structure for additional habitat attributes including:

• Location information;

• Detailed site physical description, including landform, slope, soils and local geology;

• Summary of observations of apparent disturbance, including storm damage, fire, grazing, weed invasion and erosion;

• Structural summary, including determination species that are prominent in each of the vegetation strata (*i.e.* emergent stratum, canopy and subcanopy strata, shrub strata and ground layer) and their heights;

The sample sites were surveyed at the start of the dry season, when perennial plants could be reliably recorded, as well as the larger ephermeral species. However, conditions were too dry for some smaller ephermeral or geophytic herbs, which may have gone undetected. Site selection specifically targeted locations where these smaller ephemeral species may have persisted in the landscape in more favourable micro-habitats at the time of year that the survey was conducted (e.g. streams in the sandstone plateau still containing flowing water or pools).

2.3 Identifying the collections

Plants were identified by morphological characters with the assistance of both dichotomous and interactive keys. Where needed, identifications were checked in the NT Herbarium reference and main collections, preferably against collections determined by taxonomic specialists for the group being identified.

There is no single regional treatment of the flora of the Einasleigh or Gulf Plains Bioregions. Consequently a range of primary or secondary literature were used to identify the collections either in the field or at the Australian Tropical Herbarium (CNS) or the Queensland Herbarium (BRI). These included:
• *Plants of Cape York* (Beasley 2009). The best available illustrated field guide, prepared by the late John Beasley.
• *A field guide to the eucalypts of the Cape York Peninsula Bioregion* (Clarkson 2009). The definitive guide to all eucalypts and bloodwoods on Cape York.
• *Australian Tropical Rainforest Plants Edition 6*. (Hyland *et al*. 2010) provides a comprehensive key to rainforest plants of Cape York.
• *A guide to the herbaceous and shrub legumes of Queensland* (Hacker 1990). The most comprehensive guide to Fabaceae of the study area. Its treatment of the genus *Tephrosia* is somewhat dated.
• A broad range of technical botanical literature was used in the identification of collections (e.g. Andrews 1990, and relevant keys provided in KeyBase (2022)).
• Various volumes of *Flora of Australia* were also used as well as several unpublished keys and identification notes held by the host institutions or report authors.

In addition to Australian Tropical Herbarium staff and associates, Queensland Herbarium staffand associates assisted with the identification of vascular plant collections.
All names were checked for currency against the Australian Plant Name Index (www.anbg.gov.au/apni/).

Fungal identification

Fungal specimens were identified using a combination of external features (macromorphology), microscopic examination of cellular anatomy (400-1000x magnification, using a compound Leica microscope fitted with Differential Interference Contrast (DIC) filters for increased resolution, and DNA sequencing of specimens that could not be unequivocally identified on morphology alone.

Fungal DNA sequencing was performed by extracting DNA using a standard CTAB extraction protocol, PCR-amplification of two loci, the standard barcoding locus ITS (Internal Transcribed Spacer), and also the Large Subunit of nuclear ribosomal DNA (nLSU). These two loci have different rates of evolution, and are the most widely utilised genetic markers for fungi; consequently they represent the most well-represented datasets in publicly available sequence repositories (e.g. GenBank), allowing the most-representative molecular comparisons with previous published research. Following PCR, products were cleaned using biotinylated paramagnetic beads, and cycle sequencing / fragment separation performed by Australian Genome Research Facility, Brisbane, QLD, using standard primers. Sequencing and data processing methods were as described in Bougher & Barrett (2020).

Since no compilations (Fungas) exist for Australian tropical fungi, species were identified using a large of taxonomic papers relevant to each genus, although most were relevant only for excluding certain species from further consideration. DNA sequences generated for this study were critically evaluated with the most similar sequences on GenBank, and identified in light of published and morphologically-validated phylogenetic studies for each genus, in some cases supplemented with an extensive ITS/nLSU dataset for tropical Australian fungi generated by one of us (MB).

The taxonomy of Australian fungi, and indeed global fungi, is incomplete. Consequently several species could only be identified to species complex (indicated by "aff". or "?").

Names follow the Australian Fungi List (AFL: https://fungi.biodiversity.org.au/nsl/services/search/names) maintained by the Australian National Species List (asNSL) when the species is included, or the global Index Fungorum, (IF: http://www.indexfungorum.org) and its corresponding Species Fungorum (SF) database, where not represented in the AFL, with the following exceptions that follow more recent systematic publications:

- *Funalia* (aff.) *caperata* is incorrectly placed in the genus *Coriolopsis* and *Cerrena* in the AFL and IF/SF databses respectively; placement in either genus is falsified by numerous molecular studies published over the last decade.
- *Phlebiopsis crassa* follows IF/SF, rather than the AFL, which retains the species in the genus *Porostereum*, i.e. the record has not been updated in light of recent phylogenetic studies.
- *Irpex flavus* follows Li et al. (2022), rather than the AFL and IF/SF which retain the species in the genus *Flavodon*, i.e. the records have not been updated in light of recent phylogenetic studies.

Order and family designations follow the recent phylogenetic studies and family-level classifications for each group; no currently available fungal family level classification synthesises captures all relevant studies, necessitating a more critical interpretation of the literature.

3. Results and Discussion

VASCULAR PLANTS

A total of 364 individual collections of vascular plants were made during the expedition, representing 251 species of vascular plants and 2 mosses. All species are listed in Appendix 1. Plant tissue was collected into silica gel for many collections to assist ongoing and future molecular phylogenetic studies.

The collections made during this survey approximately doubled the number of vascular plant collections for the Park, which numbered approximately 230 before the survey (approximately 630 collections after the survey), and almost doubling the number of vascular plant species recorded for the park. Approximately 170 vascular plant collections represented new records for the park, including numerous range extensions or infilling of distributional information for a number of species. Approximately 435 plant species are now recorded for Rungulla.

Notable collections for the Park include the first record for a number of species including the Nature Conservation Act listed *Kardomia squarrulosa* (Vulnerable), and additional records of *Drosera burmanni* (Special Least Concern), *Drummondita calida* (Vulnerable), *Labichea brassii* (Near Threatened), *Leptospermum pallidum* (Near Threatened), *Pluchea punctata* (Endangered), *Solanum carduiforme* (Vulnerable), and *Stylidium tenerum* (Special Least Concern).

Collection of *Kardomia squarrulosa* at Rungulla National Park represents a significant range extension of approximately 250km from the White Mountains National Park sandstone block in the Desert Uplands Bioregion. Similarly, the currently undescribed *Hemigenia* sp. (White Mountains) and *Aristida burraensis* were newly found at Rungulla ,and represent similar range extensions from the White Mountains area.

Material collected on the expedition confirmed the occurrence of *Eucalyptus ammophila* at Rungulla National Park. Previous collections made in 2010 were only tentatively identified as this species.

Several valuable collections of the genus *Triodia* were made from various localities within the Park. These include the first collections from the Reserve of both *T. microstachya* and a related undescribed species, here referred to as *Triodia* sp. Bush Blitz Rungualla 1. The latter species has been recorded from elsewhere in north-eastern Australia, but has previously been confused with *T. microstachya;* more information on this taxon is provided in section 3.1. The co-occurrence of both species at the same sites at Rungulla have helped to confirm their status as distinct species.

Appendix 1 lists all vascular plants and mosses recorded during the Bush Blitz. Collections made during this Bush Blitz will result in 364 specimens being added to public collections and an equivalent number of records added to publicly accessible databases. Some of the important vascular plants located during the survey are illustrated in Figures 7-9.

The rugged sandstone geology of Rungulla NP provides an isolated island of substrate for a number of sandstone-specialist plants. Consequently Rungulla NP is a disjunct outlier for a number of plant species, acting as a cross-roads linking other biogeographical areas (see Table 13 for more examples):

• To the south, especially in the White Mountains NP: e.g. *Kardomia squarrosa*, *Hemigenia* sp. White Mountains, *Aristida burraensis.*

• To the west, as long disjunctions to sandstone areas around Mt Isa (*Triodia molesta*, *Scaevola* sp. Rungulla 1, *Spermacoce* sp. Rungulla 1, *Seringia adenolasia*, *Lithomyrtus hypoleuca*.

• To the east, as outlier populations of species typically occurring on higher elevation and higher-rainfall areas on the Great Dividing Range: *Lophostemon suaveolens*, *Ipomoea abrupta, Pandanus spiralis*.

Figure 7. Significant flora of Rungulla. Top row (l-r): *Aristida burraensis* (N); plant, inflorescence, old inflorescence. Second row (l-r): *Cryptandra pogonoloba* (N); *Cryptandra ?pogonoloba* (N); *Drummondita calida* (C), detail of flower, plant. Third row (l-r): *Scaevola* sp. Rungulla 1 (D, N); *Eucalyptus ammophila* (N), habit, fruit. Fourth row (l-r): *Dampiera adpressa* (N); *Labichea brassii* (C). (C) = conservation listed. (D) = disjunct distribution. (N) = new record for Rungulla,

Figure 8. Significant flora of Rungulla. Top row (l-r): *Kardomia squarrulosa* (N); plant, detail of flower. Second row (l-r): *Lithomyrtus hypoleuca* (D); *Seringia adenolasia* (D). Third row (l-r): *Leptospermum pallidum* (C); plant, fruit; *Lophostemon suaveolens* (D); plant, leaves. Fourth row (l-r): *Xanthostemon umbrosus* (D); *Thysanotus chinensis*. (C) = conservation listed. (D) = disjunct distribution. (N) = new record for Rungulla.

Figure 9. Significant flora of Rungulla. Top row (l-r): *Dicarpidium monoicum* (N); *Ipomoea abrupta* (bush food), plant, fruit. Second row (l-r): *Fissidens perobtusus* (moss, N); *Pandanus spiralis* (D), living, recently killed by fire. Third row (l-r): *Prostanthera* sp. Gilbert River (C), plant, flower; *Schoenus aff. kennyi* (N), plant, inflorescence. Fourth row (l-r): *Spermacoce* sp. Rungulla 1 (N), *Xanthorrhoea johnsonii*, *Xylomelum scottianum*. (C) = conservation listed. (D) = disjunct distribution. (N) = new record for Rungulla.

Fungi

A total of 51 fungal specimens representing 39 species (Appendix 2) were collected during the Bush Blitz. This is an unusually high number of specimens and species, given that the survey was conducted during the dry season when fungi are expected to be mostly dormant. However, fungal fruiting and therefore detectability was greatly improved by three days of un-seasonally heavy rainfall experienced during the expedition.

Based on the species recorded, the funga of Rungulla National Park Is typical of regularly-burnt woodlands of the Australian Monsoon Tropics biome, and most species are also known elsewhere in northern Australia, from the Kimberley, Top End of the Northern Territory, and/or northern Queensland.

Wood-rotting saprophytes were by far the dominant ecological guild for the species detected (30 of 39 species), however this is no doubt driven by survey biases toward more persistent fruit bodies (sporophores) rather than a real ecological pattern. Three ectomycorrhizal species (one each of *Crocinoboletus*, *Pisolithus*, *Tylopilus*), three saprophytes on soil/leaf litter/dung (one each of *Cyathus*, *Geastrum*, *Gymnopus*), and two plant pathogens (*Pericladium*, *Triodiomyces*) were collected. A single yeast (*Saitozyma podzolica*) was inferred to be present based on a contaminant DNA sequence from an herbarium specimen of *Coltricia*; the *Saitozyma* species identity was only confirmed from molecular data (ITS, 100% BLAST match to many reference sequences), and is not represented by a specimen or culture.

Only larger fungi with macroscopic fruit bodies were collected for this survey. Microfungi (those producing sporulating structures not visible to the naked eye) are expected to be at least 10X more diverse. Even the larger fungi will be significantly richer than documented in this brief survey, but collecting them all would require repeated wet-season survey over many years. Environmental DNA (e-DNA) sequencing provides a more rapid method of assessing diversity of both macro-and micro-fungi; however, sequences generated from taxonomically validated specimens, as generated for this study, are critical to enable e-DNA studies.

Although the fungal diversity detected will be a small portion of total species present, and will be dwarfed by environmental sequencing data, wood rotting fungi are typically poorly represented in environomics datasets, and fruitbody-based survey is thus complementary.

Several apparently undescribed fungi were collected. Most of these putative undescribed species are known, having previously been collected elsewhere in northern Australia by one of us (MB), however the Rungulla collections provide significant range extensions, helping to plot their distribution, and will contribute toward their naming and characterisation.

Four species (all in the family Hymenochaetaceae) putatively represent species not previously known, although all may be present in herbarium collections, hidden under other names, since DNA sequencing is required for accurate delimitation in this family.

None of the fungi are considered rare or threatened; even the few species known from few (1-3) collections are probably widespread but in low abundance across northern Australia.

A single presumed introduced fungus, *Cyathus stercoreus*, was found on cattle dung.

The most significant find was the rediscovery (after nearly 50 years) and large range extension for *Campylomyces tabacinus*, a specialist on bark of living Eucalyptus trees. The specialised fruit bodies of this species form clusters of small discs with a gelatinised internal structure, that curl up like an eyelid and contract back to a small knob in dry conditions, re-expanding within hours following rain. Their unusually large spores (~30 µm long) are probably an adaptation for increased resources needed for colonisation of bark, a low-humidity microhabitat. This is the type species of the genus *Campylomyces*, and the Rungulla specimens have allowed the first DNA sequences from genus and species, which show the genus belong in the order Polyporales, not Gloeophyllales as previously assumed. It belongs to an isolated group in the order, and possibly to an entirely new family.

Some of the important fungi located during the survey are illustrated in Figures 10 and 11.

Figure 10. Fungi of Rungulla. Top row (l-r): *Asterostroma cervicolor*, *Campylomyces tabacinus*. Second row (l-r): *Coltricia* sp. Rungulla 1, *Coltricia* sp. Rungulla 2, Third row (l-r): *Crocinoboletus* sp. Rungulla 1, *Tylopilus* sp. Rungulla 1. Fourth row (l-r): *Cyathus stercoreus* (introduced, on cow dung), *Duportella tristicula*.

Figure 11. Fungi of Rungulla. Top row (l-r): *Dacrymyces spathularia; Pycnoporus* sp. Rungulla 1, cap beneath, cap above, pores. Second row (l-r): *Gloeoporus chlorinus*, *Pisolithus albus*, Third row (l-r): *Perenniporia aff. aurantiaca*, *Phlebiopsis crassa*. Fourth row (l-r): *Phellinus* sp. Rungulla 1, *Trichaptum* sp. Rungulla 1.

3.1 Un-named or not formalised taxa

Table 4. Putatively un-named or not formalised taxa	
Taxon	**Comment**
Triodia sp. Bush Blitz Rungulla 1	Morphologically similar to *T. microstachya*, with which it co-occurred at several locations in the Rungulla NP. This species is known to occur SE of the Gulf of Carpentaria, and in a few locations in NE QLD, but is currently not described, nor listed as a phrase name in either the NT or QLD (M.D. Barrett, currently revising the genus *Triodia*). Lemmas have short lobes, similar to *T. microstachya*, but reliably have at least a few hairs along the central midrib, in at least the lower-most lemma in a spikelet, in contrast to *T. microstachya*, which is always completely glabrous. At Rungulla they can be most easily distinguished by their inflorescence axes, 2-3 mm thick at the base in *T. microstachya*, c. 1 mm thick in T. sp. Bush Blitz Rungulla 1. Both species form discrete genetic lineages in ETS and ITS trees. The co-occurrence of both species at Rungulla helped to cement their delimitation.

3.2 Putative species new to science

In this report, 'putative new species' means an unnamed species that, as far as can be ascertained, was identified as a new species as a direct result of this Bush Blitz.

Table 5. Putative new species (new to science)	
Species	**Comment**
Geastrum sp. Bush Blitz Rungulla 1	An earthstar found as a single unopened (possibly immature) specimen. It is unclear whether further maturation would have resulted in formation of the typical earth-star-puffball form, or if this is an example of sequestration, remaining as a truffle-like form to maturity (which is possible, since mature spores were abundant in the specimen). Although a full morphological description is not possible based on this single specimen, DNA sequences do not match any of the species now delimited globally, and morphologically the specimen is unique in the genus *Geastrum* in having gasterospores amongst normal basidiospores in the gleba (powerery spore mass), compared to only basidiospores in all other *Geastrum* species.
Coltriciella sp. Bush Blitz Rungulla 1 and *Coltriciella* sp. Bush Blitz Rungulla 2	*Coltriciella* species form small brown fruit bodies with pores on the underside, usually on a short stem. Historically, most species have been considered part of a global species, *Coltriciella dependens*, but recent molecular phylogenetic work indicates the presence of many species, with *C. dependens* being a northern-temperate species. Taxonomy of these species requires global revision, and microscopic differences are subtle. Molecular phylogenetic analyses demonstrate that two species are present amongst the four specimens gathered at Rungulla, and that they differ from other molecular lineages obtained from Australia. Consequently, they are indicated here as putative new species. However much further investigation of the genus is needed before they can be formally recognised.
Fomitiporia sp. Bush Blitz Rungulla 1	*Fomitiporia* species form hard, woody, brown brackets on the side of living and dead trees. Some are important pathogenic species. This species was collected from a fallen eucalypt branch, but it is unknown whether the fungus was causal in branch drop, prior to subsequent fruiting on the dead branch. Molecular phylogenetic analyses show that the single Rungulla collection does not match any species described globally, nor any of the sequences obtained from elsewhere in Australia (which include sequences of all named Australian species and several other putative new species). Consequently, the Rungulla specimen is listed here as a putative new species. However much further research on the genus in Australia is required before it can be formally named.

3.3 Exotic and pest species

Prior to the Rungulla Bush Blitz survey 33 of the species recorded for the Reserve were considered to be introduced species that have naturalised in Queensland. This survey expedition recorded another 5 introduced species which are listed in Table 3 (below). This includes the first record of an introduced Fungus for the Reserve (*Cyathus stercoreus*) a species thought to be associated with introduced grazing stock.

The majority of the introduced species collected during the survey are considered relatively minor economic, agricultural or environmental threats although it is worth noting that both Rubber Vine (*Cryptostegia grandiflora*) and American Rat's Tail Grass (*Sporobolus jacquemontii*) are listed as Category 3 Restricted Invasive Plants under the *Biosecurity Act (2014)* and there are legal obligations on landholders to manage these species on their land.

Generally speaking, exotic plant density was low in the areas of the Reserve associated with the drier hills and plateaus. This most likely reflects both a lower likelihood of exotic animal traffic and less-favourable growing conditions for many of the exotic species identified in Table 6.

Weed density was noticeably higher in areas with a comparatively higher availability of water and thus forage materials such as along sections of the Gilbert River frontage and Six Mile creek in the eastern part of the Reserve. Historical access for cattle along the Gilbert River is likely to have increased the abundance of exotic plant species found on the more favourable and well-watered alluvial soils adjacent to the river. Similarly, signs of recent and ongoing cattle disturbance were abundant along intermittent drainage systems in the east of the reserve, particularly where these still held standing water.

Given the opportunistic nature and limited spatial coverage of this survey, it is difficult to prioritise specific geographic areas that may be a focus for current or future weed control efforts. Etheridge Shire Council are currently in the process of developing a Biosecurity Plan that will identify priorities for weed and pest management at the local scale. Future weed control efforts should endeavour to align as closely as possible with the principles and targets of this Plan.

A single presumed introduced fungus, *Cyathus stercoreus*, was found on cattle dung. Given the restricted substrate preference, this species is not weedy, but probably provides beneficial ecological services decaying cattle dung. No control measures are recommended.

Table 6. Exotic and pest species recorded			
Exotic/pest species	**Location collected**	**Indication of abundance**	**Comments**
Acanthospermum hispidum	River track, Rungulla National Park, S of Georgetown.	Occasional	
*Cryptostegia grandiflora**	River track, Rungulla National Park, S of Georgetown.	Present along watercourses.	Weed of National Significance. Category 3 restricted plant (Biosecurity Act, 2014)
Datura ferox	River track, Rungulla National Park, S of Georgetown.	Occasional	
Mesosphaerum suaveolens	0.4 km E of ranger station, Rungulla National Park, S of Georgetown (SS1)	Occasional	Present around infrastructure and high visitation areas.
*Richardia scabra**	River track, Rungulla National Park, S of Georgetown.	Occasional	
*Salvia misella**	River track, Rungulla National Park, S of Georgetown.	Occasional	
Scoparia dulcis	Mushroom Rock, near River track, Rungulla National Park, S of Georgetown.	Occasional	
Senna occidentalis	River track, Rungulla National Park, S of Georgetown.	Occasional	
Sida acuta	Rungulla National Park. Approximately 1 km North of Rungulla airstrip	Occasional	
Sida cordifolia	0.4 km E of ranger station, Rungulla National Park, S of Georgetown (SS1)	Occasional	
*Sporobolus jacquemontii**	River track, Rungulla National Park, S of Georgetown.	Occasional	Category 3 Restricted Plant (Biosecurity Act, 2014)
Triumfetta pentandra	0.4 km E of ranger station, Rungulla National Park, S of Georgetown (SS1)		
Cyathus stercoreus *(Fungi: Basidiomycota: Agaricales: Nidulariaceae)	Near Airstrip, Rungulla National Park	Only 1 collection seen, but likely widespread	Introduced based on its habit on cattle dung. However, not considered invasive and is likely beneficial in degrading cattle dung. No action is recommended.

* Denotes newly recorded for the Rungulla Reserve during this survey.

3.4 Threatened species

A total of 11 records representing nine Threatened, Near Threatened or otherwise scheduled species were collected during the Rungulla Bush Blitz survey, details of which are presented in Table 4. Seven of these species had been previously recorded for the Rungulla Reserve with one additional threatened species (*Kardomia squarrosa)* being recorded during this survey expedition.

Four of the six scheduled species recorded during this survey are sub-shrubs or shrubs closely associated with the sandstone habitats of the Reserve. These species are discussed in further detail below with specific commentary regarding the management of these habitats provided in Section 5.

Additionally, 4 records of three Special Least Concern taxa were also collected during the survey. All these species had been previously recorded for the National Park.

Table 7. Threatened species

Species	Listing status and level (EBPC, State/Territory)	Location sighted/ observed	Indication of abundance
Blechnum orientale	Special Least Concern	BB5, BB12	Common at Carsons Spring and occasional at Green Ant Spring. Always in association with +/- permanently wet situations.
Drosera burmannii	Special Least Concern	BB4	Rare in damp sandy soils on sandstone plateau associated with possibly perennial drainage features.
Drummondita calida	Vulnerable (QLD)	BB08, BB17, BB18, RUN_BB05	Common in localised areas on sandstone.
Kardomia squarrosa	Vulnerable (QLD)	BB01, RUN_BB03, BB18	Occasional along margins of gorge at site BB18.
Labichea brassii	Near Threatened	BB01, BB11, BB15, BB23	Occasional in sandstone gorges in southern section of Rungulla National Park. Three collections, two from north-west section of Park in sandstone gully, one from the east section.
Leptospermum pallidum	Near Threatened	Art site near Ranger Station (sight record)	Rare and very localised.
*Pluchea punctata**	Endangered	BB13	Small localised population on narrow lower-slope adjacent to ephemeral drainage line.
Stylidium tenerum	Special Least Concern	BB4	Locally common in damp sandy soils on sandstone plateau associated with possibly perennial drainage features. Sheltered sites under rock overhangs. Only found at a single location.
*Solanum carduiforme**	Vulnerable	BB6, Various	Found at a number of locations

**Species recorded but not collected during this survey.*

***Kardomia squarrulosa* (Domin) Peter G. Wilson**

Kardomia squarrulosa is an open spreading shrub to approximately 3 m tall with opposite, decussate leaves to c. 2mm in length and small white flowers clustered towards the tips of the branches. Although no targeted reproductive studies have been performed on this species, it is reasonable to assume that it is likely to be an 'obligate seeder' (i.e. only regenerating from seed sources) like many other taxa in this and closely related genera in Myrtaceae (e.g. *Lithomyrtus*, *Petraeomyrtus* (DEPWS, 2022)). Expert opinion (A.R. Bean *pers. comm.*) suggests that this species is unlikely to reach reproductive maturity for five or more years after establishment with a precautionary estimate of favourable fire interval being between 10 and 20 years.

This species was previously included within *Babingtonia* Lindl. (Bean, 1997) and prior to this *Baeckea* L. (Linnaeus, 1753) before being placed in the segregate genus *Kardomia* Peter G. Wilson (Wilson et al., 2007) that is centred on the eastern Australian taxa previously considered part of *Babingtonia*.

In the southern section of the Reserve (within the National Park), *K. squarrulosa* was collected close to sites RUN_BB03, BB01 and BB18. It was found growing on the margins of the plateau on the edge of the precipitous scarps that marked the edge of the incised gorges that cut through the sediments of the Loth Formation. This species was not encountered in similar landscape and topographic situations within the Reserve on other lithologies such as the conglomeritic Hampstead Sandstone. These plateau edges of the western sides of the gorge support woodlands of *Eucalyptus similis* and *E. chartaboma* with *Callitris intratropica* prominent in the upper tree layers.

The presence of *C. intratropica* in these situations is perhaps indicative of fine scale fire protection on the westerly rims of these gorges from the predominantly south-easterly fires that affect the southern part of the Reserve. *C. intratropica* was largely absent from the plateau surface more generally and is known to be sensitive to frequent and/or intense fire. If *K. squarrulosa* is indeed dependent upon seed to ensure reproductive success as hypothesised it is not inconceivable that its persistence at sites in association with *C. intratropica* reflects a relatively benign fire regime in comparison to the majority of the Reserve area.

Kardomia squarrulosa was previously only known from White Mountains/Burra Range and the Just Range area to the west of Charters Towers and the collections from the southern end of the Park represent a range extension of c. 213 km for the species. It would not be unreasonable to assume that the species could be present in habitat of a similar type and quality that may exist between the currently known locations.

Kardomia squarrulosa is listed as Vulnerable under the NC Act. Before this survey the known Extent of Occurrence (EoO) and Area of Occupancy (AoO) were 2721 km^{2}and 28 km^2 respectively. No documentation exists to identify the specific IUCN listing criteria or threatening processes that are likely to be impacting upon the survival of this species. However, it is reasonable to assume that like other sandstone shrubs with similarly small populations, disjunct distributions, and small overall ranges that land management and genetic threats are of key significance to this species.

Following the collections of this species during the survey, preliminary recalculation of range parameters suggests that the EoO and AoO have increased to 13 683 km^2 and 36 km^2 respectively, still fulfilling the geographical requirements for listing of the species as Vulnerable under the IUCN Guidelines (IUCN, 2022).

***Drummondita calida* (F.Muell.) Paul G. Wilson**

Drummondita calida is a dense shrub with many ascending branches to approximately 4m tall. The leaves are crowded and alternate with white, solitary flowers. Type material for the species was originally collected in the Gilbert River area by Daintree sometime between 1865 and the publication of the basionym (*Philotheca calida*) in 1869 by Ferdinand von Mueller.

Drummondita calida was the name applied to all the northern Australian material in the genus with Duretto (2018) recently splitting the Northern Territory material into a new taxon (*Drummondita borealis* Duretto) based principally on a number of distinct floral features. *Drummondita calida* is now applied to the Queensland material with the range of the species encompassing a narrow corridor of suitable sandstone habitats between Buleringa National Park in the north and Gregory Range Station near Richmond in the south. Before this survey it was represented by 11 collections at the Queensland Herbarium and 5 at the Australian Tropical Herbarium with this survey adding another two (GT, NJC) collections distributed between the two institutions.

Previously listing advice for the species cited the small Area of Occupancy (AoO not likely to exceed 40 km^2 maximum), small population size, hypothesised poor genetic connectivity between populations and a number of identified plausible threatening processes that resulted in the species being listed as Vulnerable under the NC Act.

The current EoO and AoO for the species are approximately 8729 km^2 and 40 km^2 respectively which are consistent with the listing of the species as Vulnerable under Criterion B of the IUCN guidelines (IUCN, 2022). However, it is worth noting that with a narrower circumscription of the species, a number of the metrics used to undertake national level assessments (e.g. Extent of Occurrence (EoO) and AoO) would have changed and thus may impact the status applied to the species at a future assessment date.

Drummondita calida was collected or recorded at a number of locations during this survey, all of which were situated within the previously known EoO (BB08, BB17, BB18 and RUN_BB05). These additional records resulted in an increase in the AoO to 52 km^2. These figures are still consistent with the geographical requirements for listing of the species as Vulnerable under Criterion B of the IUCN guidelines (IUCN, 2022) provided the additional population and threat Sub-criteria are fulfilled.

***Solanum carduiforme* F.Muell.**

Solanum carduiforme is a clonal, erect, spinescent herb or sub-shrub to c. 1m tall. The leaves are deeply lobed, pale green, concolorous and densely stellate pubescent. The species is currently listed under the NC Act as Vulnerable. *Solanum carduiforme* was previously listed under the EPBC Act but was delisted in 2013 as a result of new information regarding the distribution of the plant in Western Australia and the Northern Territory (DEC, 2010).

Solanum carduiforme was previously know from two sites within the Reserve on the track to Carson Springs. The species was again observed at sites BB6 and BB7 on the Carson Springs track during this survey although no specimens were collected given the sterile state and the existing collections from within close proximity (100-500 m).

Solanum carduiforme was locally common at sites where it was encountered on deeper sandy soils (Tenosols) surrounding sandstone outcrops (Hampstead Sandstone) in gullies and valleys between the major plateau units. Vegetation was typically *E. chartaboma* woodland with *Triodia microstachya* hummock grasslands and it is assumed that fire intervals in these areas may have been greater given the often large stature of observed hummocks.

Pluchea punctata A.R.Bean

Pluchea punctata is a perennial, viscid daisy endemic to the Rungulla area of Queensland. The stems are spreading to 0.8 m, the leaves are sessile and linear to narrowly oblanceolate and conspicuously punctate glandular. It was first described in 2011 from type material collected the previous year (Bean, 2011).

It is currently only known from two collections at one location on the road from Rungulla National Park to Forsyth on lower metamorphic slopes of sandstone rises and low-hills with woodland to open-woodland of *Eucalyptus microneura* and *Triodia* spp. (molesta) hummock grassland.

Previous estimates suggested a population size at the type locality of between 40 – 50 individuals with additional searching in apparently suitable habitat nearby not locating any additional patches of the species. This led to the listing of the species as Critically Endangered under IUCN Criterion D in the NC Act (2020).

Targeted searches in the vicinity of the type locality were conducted during the Rungulla Bush Blitz. However, no new collections or locations of *P. punctata* were obtained. These targeted surveys included a basic census of population size and extent at the known location and yielded an estimate of approximately 100 – 300 individuals within an area of approximately 0.75 – 1 hectare in size. The structure of the population was significantly skewed toward large multi-stemmed adults although there was some suggestion that there were smaller single-stemmed seedlings present in certain areas within the extent surveyed.

Labichea brassii C.T.White & W.D.Francis

Labichea brassii is a perennial shrub or sub-shrub to 3m tall. It has compound leaves with 5-7 leaflets which are typically elliptic in outline and pungently pointed. The large, distinctive, yellow flowers occur in many-flowered racemes. *Labichea brassii* sens lat. was previously considered to range from Mount Mulligan in the north-east to Middle Park Station to the immediate south west of Rungulla National Park in the south west at approximately five separate localities. A more recent, narrower circumscription of *L. brassii* (Bean, 2017) that separates the population at Mount Mulligan into a new species (*Labichea mulliganensis* (A.R.Bean) based on leaflet morphology has reduced the range of *L. brassii* sens. strict. to those populations occurring between Middle Park Station in the south and Forest Home Station between Georgetown and Croydon in the north. *Labichea brassii* had been previously collected from various locations in the northern end of the park and immediately to the west of the Reserve on Middle Park Station in the south.

The species as previously considered (*Labichea brassii* sens. lat.) is listed in the NC Act as Near Threatened under Criterion D due to its small population sizes, few locations and low AoO. Current estimates of the EoO and AoO of 3394 km^2 and 44 km^2 respectively suggest that the species has restricted range and support its listing under a threatened category.

Labichea brassii was collected at a number of locations during the Bush Blitz (BB01, BB11, BB15 and BB23), although all of these occurrences were within the currently known EoO. The newly calculated AoO for the species is approximately 60 km^2. These geographical attributes at least partially qualify the species for further consideration as a threatened category under the IUCN Guidelines based on Criterion B. Fire is likely to be impacting the survivorship of the species, particularly in the longer term under changing climatic regimes which hare likely to further intensify fire characteristics, although the likelihood that this species is able to resprout after fire affords some level of resilience against these impacts.

3.5 Plant species range extensions

Table 8. Range extensions or significant infill in distribution records for species			
Species	**Location sighted/ observed**	**Distance from nearest known record (km)**	**Comments**
Aristida burraensis		130 km	Previously only known from White Mountains NP area.
Cyanothamnus warangensis	BB01, RUN_BB03	170 km	Previously only known from White Mountains NP and a small area SW of Charters Towers.
Dampiera adpressa	BB18	167 km	Range extension north from the previous known northern extent of the species.
Hemigenia sp. (White Mountains D.G.Fell DF1379)	BB01	175 km	Previously only known from White Mountains NP, and a single record W of Pentland.
Kardomia squarrulosa	BB01, RUN_BB03, BB18	213 km	Previously only known from White Mountains NP.
Triodia sp. aff. *microstachya*	BB4	170 km	Previously known from south of the Gulf of Carpentaria, and a few disjunct locations in NE QLD, including the White Mountains NP.

***Aristida burraensis* B.K.Simon**

Aristida burraensis is a perennial tussock grass to between 0.5 and 1 m tall. The species is currently known from the White Mountains/Burra Range, Porcupine Gorge, Maiden Springs and the Quilps Tableland areas to the west of Charters Towers and north of Hughenden occurring in eucalypt woodland on sandstone.

Aristida burraensis was collected from the far north-east of the Reserve on the slopes of a Mesozoic sandstone plateau, which represents a range extension of approximately 130 km from the closest previously known location in the Maiden Springs area. The previous EoO for the species was 11021 km^2 with the revised value of 23145 km^2 representing a 210% increase with a maximised AoO of 56 km^2. It is likely that further survey in suitable habitat within the EoO would result in infilling of the distribution for this species.

***Cyanothamnus warangensis* (Duretto) Duretto & Heslewood**

Cyanothamnus warangensis is a small, spindly shrub to approximately 2 m tall with pinnately compound leaves having 5-7 narrow leaflets. Previously known as *Boronia warangensis* (Duretto) the species was transferred to the reinstated Genus *Cyanothamnus* based on largely molecular evidence along with other members of the previously recognised *Boronia* Section *Cyanothamus* (Duretto et al. 2020).

The flowers of *C. warangensis* are white and typically occur in clusters of 7 or more. It is worth noting that the material collected in the southern section of the Park typically had flowers occurring in clusters of between 3 and 5 (occasionally up to 7). This is fewer than the number indicated in the diagnosis for the species (Duretto, 2003) but greater than the other closely related species *C. montimulliganensis* that typically has flowers in clusters of 1-3. Peduncle lengths were otherwise consistent with those cited for *C. warangensis* and it is assumed that the variation in flower number is acceptable given notes by other authors (e.g. Jackes, 2021) that indicate fewer flowers in clusters being observed at other localities.

It is also unclear exactly how distinct the character delineation between *C. warangensis* and *C. occidentalis* in this part of both the species ranges. Aspects of the morphology of the material collected at Rungulla is consistent with both species descriptions and it is difficult to definitively assign the material to either species based on the published literature and identification resources alone. Comparison with herbarium material is also somewhat inconclusive, although the material collected from the southern section of the Park was a better match to material determined as *C. warangensis* rather than *C. occidentalis* overall. Further studies, including molecular analyses may be required to resolve the taxonomy of this material more completely in the future. Again, although no specific ecological or life-history studies have been undertaken on this species, it would appear plausible that like other species within the genus (and *Boronia* sens. lat.), reproduction is likely to be reliant on seed production (obligate seeder) and hence frequent broad-scale disturbance has the potential to impact upon the reproductive success of the species over time (DEPWS, 2022).

Cyanothamnus warangensis was previously known from the White Mountains/Burra Range and Just Range to the west of Charters Towers. The Collections form Rungulla Reserve extend the range of this species by approximately 170 km. Although not currently listed as a threatened species under the NC or EPBC Acts, *C. warangensis* is considered a restricted range species when assessed objectively against the available occurrence data. Before this survey, the estimated EoO for the species was 2558 km^2 and the AoO 60 km^2 which meets the geographic criteria for consideration as Endangered under Category B of the IUCN listing guidelines (IUCN, 2022).

Cyanothamnus warangensis was collected in the southern section of the park (BB01) and was associated with the pale finer-grained sandstone terraces of the Loth Formation in similar habitat to both *K. squarrulosa* and *Hemigenia* sp. (White Mountains D.G.Fell DF1379). After the extension of the species range to Rungulla Reserve, the EoO (10 082 km^2) and AoO (64 km^2) still at least partially fulfill Sub-criteria B1 and B2 for consideration as Vulnerable under the IUCN listing guidelines.

Although occurring extensively throughout the Reserve, the narrow terraces of exposed pale, finer-grained (clayey?) sandstone below the level of the adjacent Tertiary cover and above the more incised, coarser sediments of the gorge environments represent a relatively restricted substrate type within the landscape restricted to the upper reaches of the Gilbert River drainage system. These exposed terraces perhaps represent a specific level in the stratigraphy which is not extensively exposed through other areas of the Loth Formation and thus a potentially rare habitat type within the Park.

Figure 12 shows habitat typical for the species as described on vegetation site RUN_BB03 with a sparse to mid-dense cover of trees such as *Eucalyptus chartaboma* and *Corymbia serendipita* over a diverse shrubby mid-stratum and a mixed hummock grass and shrub ground stratum (RE 2.10.2x5b).

As can be seen in Figure 12 fire appears to be influencing the structure of the community with significant lignotuber resprouting evident from overstorey trees and an apparent young stage of growth in the *Triodia molesta* hummock and understorey shrub layers found in this RE. Although the reproductive life-history and response after fire of *C. warangensis* is not definitively known, if it is indeed an obligate seeder like other species within *Boronia* sens. lat., current fire regimes may be negatively impacting upon the reproductive success of the species within the Park. The potential exists for improved fire management practices to ensure the long-term survival of the species within the Park (see Section 5).

Figure 12: Typical habitat of *Kardomia squarrulosa* and *Cyanothamnus warangensis* at vegetation survey site RUN_BB03.

***Hemigenia* sp. (White Mountains D.G.Fell DF1379)**

Hemigenia sp. (White Mountains D.G.Fell DF1379) is a currently undescribed species of small woody sub-shrub/shrub with purple flowers in the Lamiaceae family known from the White Mountains/Burra Range, Cape River area and the upper Garden Creek drainage system to the south of Lake Moocha. *Hemigenia* sp. (White Mountains D.G.Fell DF1379) is currently not listed under the NC or EPBC Acts. The species' geographic attributes suggests that it is of restricted range with a currently estimated EoO of 2662 km^2 and AoO of 60 km^2.

The species was collected from one locality (BB01) in the southern section of the National Park during the survey, representing an approximately 175 km range extension for the species outside its previously known distribution. It was found on the edges of the sandstone plateau on skeletal soils (Rudosols) of the Loth Formation on the margins of the incised gorges eroding into the plateau surface. It was found in *Eucalyptus similis*, *E. chartaboma* and *Callitris intratropica* woodland. Preliminary update of the species populations geographic attributes suggest it meets at least some of the requirements for listing under Criterion B of the IUCN Guidelines as a Vulnerable species with an estimated EoO and AoO of 6414 km^2 and 64 km^2 respectively.

3.6 Plant species newly recorded for the Reserve

Approximately 170 of the species recorded during the 2022 survey were new records for Rungulla Reserve, although many had been recorded not far outside the boundaries. A selection of the new species records is listed in table 9.

Table 9. Selected newly recorded Vascular Plant species for the Rungulla Reserve

Species	Location sighted/observed	Comments
Aristida burraensis	BB21	
Acacia multisiliqua	BB15	
Centrolepis banksii	BB23	
Centrolepis exserta	BB23	
Cryptandra pogonoloba	BB17	
Cyanothamnus warangensis	BB01, RUN_BB03	Previously only known from White Mountains NP and a small area SW of Charters Towers
Dampiera adpressa	BB18	
Dicarpidium monoicum	BB22	
Hemigenia sp. (White Mountains D.G.Fell DF1379)	BB01	Previously only known from White Mountains NP, and a single record W of Pentland
Kardomia squarrulosa	BB01, RUN_BB03	Previously only known from White Mountains NP
Schoenus aff. kenneyi	BB20	
Spermacoce sp. Rungulla 1	BB21	
Thysanotus chinensis	BB20	
Triodia sp. Bush Blitz Rungulla 1	BB15	Previously known from south of the Gulf of Carpentaria, and a few disjunct locations in NE QLD, including the White Mountains National Park

Fungi new species records

Since there were no previous fungal records for Rungulla NP, all fungi collections (listed in Appendix 2) represent new records for the Park. The majority are range extensions of at least 200 km.

3.7 Genetic information

Genetic sub-sampling was undertaken from most plant and fungal collections, for the purposes of future systematic evaluation in wider studies.

Of the plant samples, only selected *Triodia* samples have been extracted and sequenced for selected loci, for the purpose of identifying taxa for this report. DNA sequences will be deposited in a public database (GenBank) to facilitate future mapping and taxonomy of Australian *Triodia* species.

Most of the fungi samples were sequenced for the fungal DNA barcoding marker ITS (Internal Transcribed Spacer of the nuclear ribosomal DNA, nrDNA), and the adjacent 26S large subunit (nLSU) of nrDNA, for the purposes of identification to species. A selection of fungal samples was also sequenced for a more variable single-copy locus, translation elongation factor 1α (tef-1). These samples will be uploaded to a public database (GenBank) to facilitate future mapping and taxonomy of tropical fungi.

Some preliminary conclusions from these data are discussed in the sections on fungi under Results and Discussion (section 3), and for *Triodia* in section 3.1.

3.8 Biocultural collections information

Ewamian Traditional Plant Knowledge

Not many traditional uses of plant species were recorded due to the ethnobotanist not having the opportunity to work with the traditional Custodians. Further, the separation of Ewamian people from their homelands and culture have resulted in significant loss of traditional plant knowledge.

Out of a total of 251 plant species collected, nine plant species were used for medicine and eight plant species for food (usages compiled from the Tropical Indigenous Ethnobotany Centre Database, or other references, as listed in Table 10). Just two species had other uses.

The results of this study highlight areas of knowledge which would benefit from further collaborative survey work in Ewamian Country. Lack of time and vehicle access prevented a detailed survey of the study area. The NP itself was not accessed thoroughly as it required extensive walking and transport into hard to access areas. Future work is therefore recommended to cover more areas and collect additional data on traditional plant use in collaboration with Ewamian Elders and Knowledge Holders. Further recording and documenting of traditional plant use and cultural site mapping should take place with more of the Elders, and the scientific plant names and traditional uses in the Ewamian language dictionary should be updated and reinvigorated back into the Ewamian community.

Natural medicines and bush tucker products could be developed to provide financial benefits in conjunction with ventures such as ecotourism.

Table 10. Plants recorded with cultural usage.			
Genus	**Species**	**Traditional Use**	**Origin of knowledge**
Abutilon	*oxycarpum*	String, twine	Tropical Indigenous Ethnobotany Centre Database
Acacia	*oxycarpum*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Alphitonia	*excelsa*	Medicinal, washing	Tropical Indigenous Ethnobotany Centre Database
Alyxia	*spicata*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Breynia	*oblongifolia*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Capparis	*canescens*	Food	Tropical Indigenous Ethnobotany Centre Database
Carissa	*lanceolata*	Medicinal	The Queensland Flora. F.M. Bailey 1899. Parts 3-4
Evolvulus	*alsinoides* var. *decumbens*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Ficus	*rubiginosa*	Food	Tropical Indigenous Ethnobotany Centre Database
Grevillea	*pteridifolia*	Food	Tropical Indigenous Ethnobotany Centre Database
Heteropogon	*triticeus*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Ipomoea	*abrupta*	Food (tuber)	Tropical Indigenous Ethnobotany Centre Database
Melaleuca	*viridiflora*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Melastoma	*malabathricum* subsp. *malabathricum*	Food	Tropical Indigenous Ethnobotany Centre Database
Ocimum	*caryophyllinum*	Medicinal	Tropical Indigenous Ethnobotany Centre Database
Parinari	*nonda*	Food	Tropical Indigenous Ethnobotany Centre Database
Santalum	*lanceolatum*	Food	Tropical Indigenous Ethnobotany Centre Database
Pandanus	*spiralis*	Food	North Queensland Ethnography, Bulletin 1-8, W.E. Roth

3.9 Vegetation Community information

The detailed vegetation structure and floristic information collected at the survey plots during the survey allowed characterisation of the vegetation communities at these localities (see section 2.2.2). When combined with field land resource observations, ancillary land resource mapping and geology information, these data can be classified according to the Queensland Herbarium's Regional Ecosystem (RE) framework for that point and used to inform the Regional Ecosystem mapping. Outcomes of these assessments are presented in Table 11.

Table 11. Detailed vegeation site locations and Regional Ecosystem information for locations sampled during the Rungulla Bush Blitz 03 – 12 May 2022.

Site Name	Coordinates	Site Level	Description	RE and Cons. Status
RUN_BB01	-19.13515, 143.47257	Secondary and BioCondition attributes	*Eucalyptus microneura*, *E. whitei*, *E. leptophleba*, *Corymbia confertiflora* and *C. tessellaris* woodland with sparse secondary tree and shrub layers. Grassy tussock grass dominated ground layer of *Heteropogon contortus*, *Chrysopogon fallax* and *Aristida* spp. On alluvial plain.	Mapped as: 2.11.1a RE at site: 2.3.21j
RUN_BB02	-19.12736, 143.49388	Secondary and BioCondition attributes	*Eucalyptus whitei* and *Corymbia pocillum* woodland to open-woodland with *Heteropogon contortus* and *H. triticeus* tussock grassland on lower slope of low hills of metabasalt.	Mapped as: 2.11.1a RE at site: 2.11.1a
RUN_BB03	-19.39324, 143.45430	Secondary and BioCondition attributes	*Eucalyptus chartoboma*, *E. similis* and *Corymbia serendipita +/- E. whitei* woodland with heathy shrub layer of *Boronia* spp., *Acacia* spp., *Jacksonia* sp., *Grevillea* spp. etc. and *Triodia molesta*, *T. molesta* and *Eriachne obtusa* hummock grass ground layer. Plateau summit surface on sandstone.	Mapped as: 2.10.2x5b RE at site: 2.10.2x5b merging into 2.10.2x5a
RUN_BB04	-19.36027, 143.54282	Tertiary	*Eucalyptus similis +/- Erythrophleum chlorostachys* and *Callitris intratropica* Low open-forest to open forest. Mixed hummock grassland of *Triodia bitextura* and *Eriachne* spp. on sandy outwash plain from low rises of sandstone.	Mapped as: 2.10.2x5b RE at site: 2.5.20
RUN_BB05	-19.000460, 143.407831	Secondary and BioCondition attributes	*Corymbia serendipita* and *Eucalyptus chartaboma* open woodland with sparse shrub layer of mixed *Acacia multisiliqua*, *Drummondita calida* and *Calytrix exstipulata* with *Triodia molesta* hummock grassland on pebbly conglomeritic sandstone.	Mapped as: 2.10.2x5a/2.10.9/2.10.5a (80/15/5) RE at site: 2.10.2x5a
RUN_BB06	-19.107810, 143.441028	Secondary and BioCondition attributes	*Eucalyptus provecta* low mallee woodland with *Triodia* spp. open hummock grassland.	Mapped as: 2.11.1a; RE at site: 2.10.4
Run_BB07	-18.985561, 143.383899	Secondary and BioCondition attributes	*Corymbia serendipita* and *Eucalyptus chartaboma* woodland with open shrubland of *Calytrix exstipulata*, *Grevillea decora* and *Acacia* spp. with *Triodia microstachya* hummock grassland on sandstone plateau summit surface.	Mapped as: 2.10.2x5a/2.10.9/2.10.5a (80/15/5) RE at site: 2.10.2x5a

Detailed vegetation assessments revealed some inconsistencies between the observed vegetation community and that shown in current mapping. In some cases, this might be due to scale *e.g.* the vegetation community mapped at site RUN_BB06 (Table 11) is a small area of Landzone 10 associated with nearby island outcrops of Mesozoic sandstone within a broader area of metamorphosed sediments that are not depicted at the available scale of the geology mapping. Consequently, these small areas have not previously been recognised (in the most part) at the 1:100 000 scale of the RE mapping. Other mapping inconsistencies are largely due to a lack of ground truthing in this poorly explored area although it is generally considered that the mapping overall is an accurate representation of the RE's on the Reserve.

Of particular benefit to the RE survey and mapping program was the opportunity the Rungulla Bush Blitz expedition afforded to obtain a more detailed understanding of the floristic composition and diversity of the RE's sampled on the Reserve. Although these RE's are readily mappable based on their dominant floristics, discrete photopatterns and association with specific geologies, landscape positions and landforms, this does not comprehensively represent the full range of floristic values supported by these ecosystems. Detailed plot-based sampling has provided a more complete picture of the range of taxa supported by each of these RE's particularly in the subordinate vegetation strata and in some cases the special values (e.g. threatened or range restricted taxa) found in these ecosystems.

Of particular note are the diverse range of obligate seeding species that are found in the shrub and ground layer in RE's found on the sediments of the Hampstead Sandstone and Loth Formation. Understorey vegetation layers in these situations (i.e. RUN_BB03, RUN_BB05 and RUN_BB07) were characterised by a high density of shrubs and sub-shrubs that would appear to have close affinities with the shrubland RE 2.10.12.

Regional Ecosystem 2.10.2x5b (RUN_BB03) was found to occur in the southern section of the Reserve on the exposed terraces of the Loth Formation (Jl) where the pale, clayey sandstone where outcropping beneath the retreating edge of the overlying Tertiary land surface. In these situations, the shrub layer was particularly well-developed with woody species also co-dominating the ground stratum in many situations and was characterised by species such as *Cyanothamnus warangensis*, *Kardomia squarrulosa*, and *Hemigenia* sp. (White Mountains D.G.Fell DF1379) species of particular note given their disjunction from the previously known extent of occurrence in the White Mountains area to the west of Charters Towers (see below for further discussion).

4. Information on species lists

Plant and fungi species were identified using the most recent available literature. However the taxonomy of some plants, and many fungi, is incomplete and subject to ongoing research. Several plant species belong to taxonomically complex groups, and the Rungulla specimens could not be confidently placed to a known species. Such uncertainties are listed with the qualifiers "?" or "aff.", followed by the closest species name. Future research may demonstrate that the collections fall within the boundaries of the indicated species, or that they belong to other, as yet undescribed species.

Species of plants and fungi collected or officially recorded during the Rungulla Bush Blitz are listed in Appendix 1 and 2 respectively. These lists do *not* include species previously collected from the Rungulla Reserve that were not recorded during the survey. Collections made during this survey may not be visible until sometime in 2023, depending on specimen processing by host herbaria.

5. Information for land managers

The majority of the important plant and fungi collections made during the expedition were associated with the sandstone hills, ranges and plateaus within the Reserve. The long, relatively stable geological history of these Mesozoic sandstones and the prolonged erosion of these landsurfaces has resulted in a relatively high degree of topographic and thus-micro-habitat diversity in the landscape that has facilitated the development of similarly rich flora and funga.

Superimposed on this biophysical diversity has been the active management of these landscapes by Traditional Owners over many millennia. Traditional fire regimes have contributed to the maintenance of habitat and floristic diversity at the landscape scale with specific burning practices likely to have contributed to the development of a complex fire/vegetation mosaic within the plateau which has by extension influenced the extent and distribution of particular species within the Reserve into contemporary times.

The extent and distribution of floristic values within the landscape has undoubtedly been altered because of European settlement, occupation and development. The floristics and structure of the vegetation on the frontage country associated with major watercourses and drainage systems has apparently been substantially altered as a result of this prolonged land-use change, with exotic species now a prominent component of the understorey vegetation layers along much of the Gilbert River visited during the survey.

Conversely, the maintenance of floral diversity in the more remote 'sandstone' areas of the Reserve has been assisted by the relatively inaccessible and 'unproductive' character of the country from an agricultural perspective resulting in a low incidence of feral disturbance and exotic species within these micro-habitats.

Obligate Seeding shrubs

Many of the species of interest recorded during the Rungulla Bush Blitz were found within eucalypt woodland habitats associated with sandstone plateaus. These habitats support a range of floristic associations and RE's that reflect the complex biophysical history of the plateau. Fire has played an important role in the evolution of this sclerophyllous vegetation and this range of habitat diversity coupled with the ubiquitous nature of fire in the landscape has facilitated the evolution of a diversity of responses to burning across the flora.

Many of the widespread and common taxa (as well as some of the less common) have evolved effective resprouting mechanisms to cope with regular fire with epicormic and lignotuber resprouting commonly observed in many species. Others are effective clonal or vegetative spreaders allowing their persistence after fire. Of particular interest from a land management perspective are a group of species that sit at the other end of the fire response spectrum, those that are only known to reproduce from seed (obligate seeders).

Obligate seeding species typically establish a soil or canopy seed bank of propagules from which the species regenerates after fire has killed the established cohort of plants at a site. They typically require a disturbance-free period of time from establishment to reproductive maturity.

Fire regime information available for the Reserve is presented in Figures 13-15. These illustrate the nature of the fire frequency, seasonality and current return period between 2000 and 2021 (NAFI, 2022).

Figure 13 indicates that the majority of the Reserve has experienced relatively infrequent fire (1-4 fires) over the available time series equating to a fire every 5 – 10+ years. However, it is worth noting that the southern sandstone sections of the Reserve have a much more frequent fire regime with much of this area experiencing 5 – 10 fires over the past 20 years equating to a return interval of between 2 and 4 years.

Similarly, Figure 14 indicates that the fires that occur in these areas (and indeed much of the Reserve) tend to often also occur in the later part of the fire season and are thus likely to be more intense in character and potentially larger in size due to the more favourable fire weather conditions.

Figure 15 indicates that a large proportion of the Reserve has burnt within the last four years with the majority of the sandstone uplands again falling within this category, burning in the previous season.

Although it is not possible to definitively characterise the fire regimes under which the flora of the sandstone plateau habitats evolved it is likely that it was quite different to that which has been in place since European colonisation of the area and the onset of agricultural development. Traditional burning practices were likely to have resulted in a more complex fire regime mosaic across the landscape through the continual and active fire management practices that over the period of many millennia has contributed to the maintenance of the floral values of the plateau.

In contemporary times, it is not unreasonable to assume that with the cessation of active traditional management by indigenous peoples and the implementation of altered fire management practices, this has placed different pressures on the maintenance of fire sensitive or dependant plant species that inhabit the sandstone plateau. For example, the combination of potentially intense, large, and frequent fire within sandstone habitats may represent a significant threat to the ongoing maintenance of obligate seeding plant populations characteristic of this habitat type.

Similar trajectories for plants with similar functional traits have been observed in areas of Arnhemland in the Northern Territory, where the removal of traditional burning practices have been shown to have a significant negative impact upon the obligate seeding shrub assemblages characteristic of the Western Arnhemland Sandstone Plateau (Russell-Smith, 2006; Russell-Smith et al. 2009; TSSC, 2011) leading to the listing of the shrubland vegetation complex as a threatened ecological community under the EPBC Act (DoE, 2022). Structurally, floristically, ecologically and functionally it would appear that there are significant parallels between the sandstone woodland complex of Rungulla and those of the Western Arnhemland Plateau.

As mentioned previously, *Kardomia squarrulosa* is reliably thought to be an obligate seeding species that does not produce any viable reproductive material until at least year five. This infers an optimal precautionary fire interval of between 10 and 20 years to ensure that plants can establish, mature and intersect with conditions favourable for the production of viable propagules to ensure resilience against fire disturbance. Current fire frequencies in the known localities for this species suggest that the return intervals are shorter than those considered likely to be optimal for the survival of the species.

Consequently, it could reasonably be assumed that higher frequency fires with shorter return intervals than those needed for a plant to establish and achieve reproductive maturity or those that result in destruction of stored propagules due to higher intensities pose a significant threat to the ongoing maintenance of the population in the Reserve.

It is worth noting that the listing advice for the Arnhem Plateau Sandstone Shrubland Complex under the EPBC Act noted the potential threat climate change posed to this community as increased climate variability and extremity contributed to the further alteration of prevailing fire regimes. It is not unreasonable to assume that a similar trend toward larger, more intense and frequent fires could be expected in the Gulf Plains and Einasleigh Uplands bioregions under a generally warming climate without active fire management to mitigate the effects of climate change.

Within the current landscape, the importance of topographic refugia from fire is likely to be integral to the maintenance of these obligate seeding species (and others) within the Reserve. Implementation of fire management practices that maximise the potential for 'fire refugia' to exist through a combination of targeted seasonal burning using the natural topographic features of the landscape, active fire suppression around key assets (both natural and anthropogenic) and creation of 'age mosaics' that include patches of 'long unburnt' (> 10 years without fire) vegetation which will contribute substantially to the maintenance of the flora, vegetation and overall biodiversity values of the Reserve into the future.

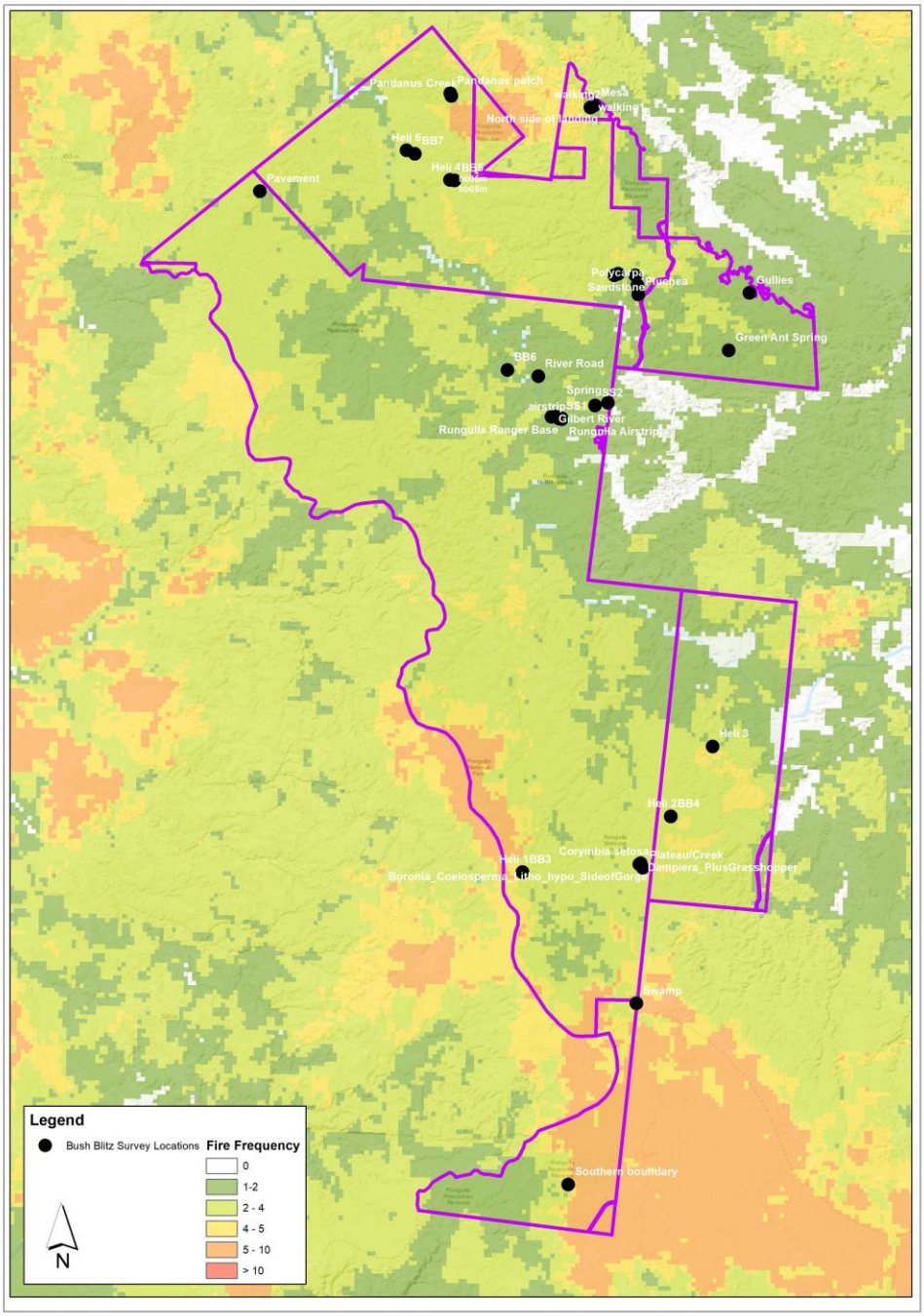

Figure 13: Fire Frequency.

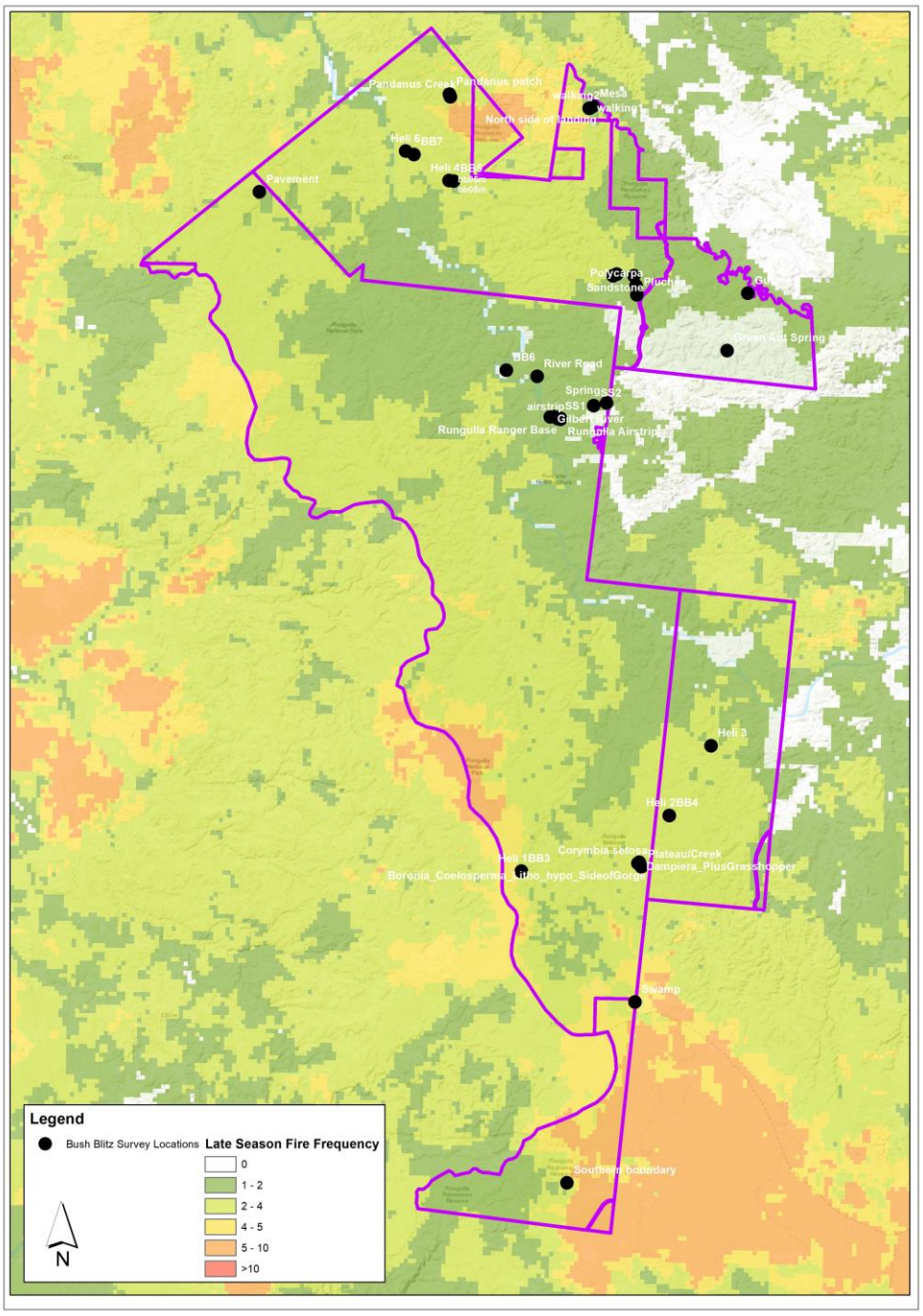

Figure 14: Late-season Fire Frequency.

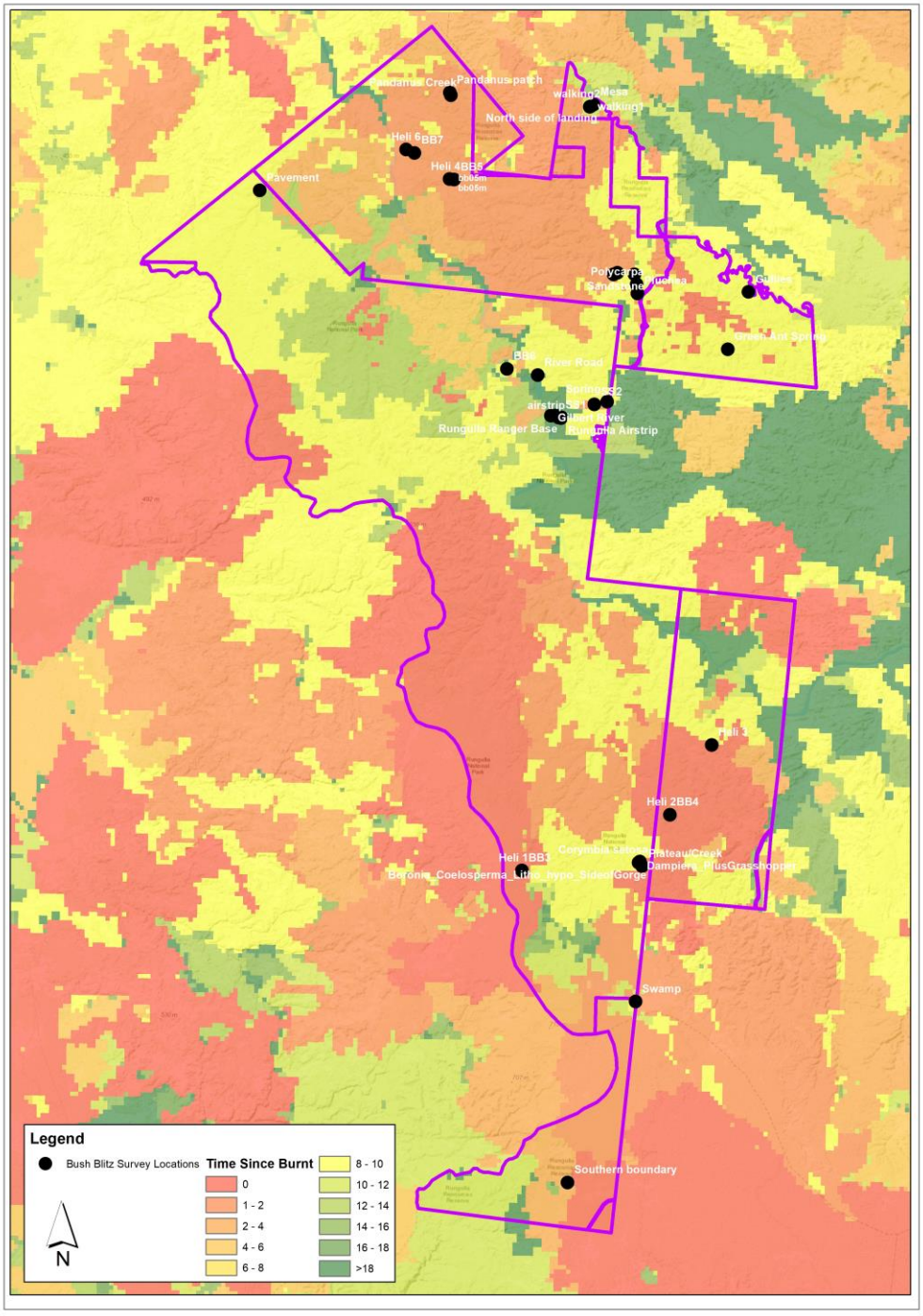

Figure 15: Time Since Last Burnt.

Of particular interest was site BB22, in the north-east of the park. This site was embedded in a network of deep gullies and rugged sandstone, and was the only location for many km where a helicopter could be landed, due to both steep slopes and dense vegetation. The gullies at this site contained vegetation that had not been burnt for 8-10 years (Fig 15). It is of note that *Xylomelum scottianum* plants, recovering after fire, were still only a maximum of 2 m tall, and showed no sign of being reproductive; this site was the only location where this species was observed. The leaf litter in these gullies was up to 20 cm deep, while scarcely any leaf litter could be found elsewhere in the park. Unfortunately only 2 botanists visited this location on the last day, and although a few arthropods were collected, including a scorpion and an opilione, the abundant arthropod fauna observed in the leaf litter went unsampled, and no equivalent site was found by other teams. These brief observations suggest that this area may naturally have a relatively low fire frequency, and be a refugium for numerous species. It is recommended that, should the opportunity arise, future faunal survey should target this unique site, as it may harbour a significant leaf-litter fauna not found elsewhere in the Park. Consideration should also be given to maintaining patches of long-unburnt vegetation, in places where it can be naturally sustained, for conservation of fire-affected species such as *Xylomelum*.

Table 12. Locally restricted species for which Rungulla NP is an important conservation reserve

Species	**Occurrence in Rungulla NP**	**Comments**
Aristida burraensis	BB21	
Cyanothamnus warangensis	BB01, RUN_BB03	
Hemigenia sp. (White Mountains D.G.Fell DF1379)	BB01	
Kardomia squarrulosa	BB01	
Labichea brassii	BB01, BB11, BB15, BB23	

Table 13. Species which have range limits at Rungulla		
Species	**Occurrence in Rungulla NP**	**Comments (distribution of species, is the Rungulla population disjunct?)**
Acacia orthocarpa	Various including RUN_BB03, RUN_BB05, RUN_BB07	Very widespread species in northern Australia, Rungulla is the NW limit for the species.
Adenanthera abrosperma	Only a single tree seen in a gully in the north end of the park	Endemic to Cape York Peninsula, south to Rungulla NP.
Aristida burraensis	BB21	White Mountains NP and nearby, Rungulla population is disjunct and northern range limit.
Astrotricha pterocarpa	Scattered plants on sandstone ranges	Great Dividing Range, disjunct distribution in vicinity of Rungulla NP is western-most range limit.
Cyanothamnus warangensis	BB01, RUN_BB03	White Mountains NP and nearby, Rungulla population is disjunct and northern range limit.
Dampiera adpressa	BB18	Widespread in central Queensland, northern limit at Rungulla National Park, somewhat disjunct from net population to the south.
Dicarpidium monoicum	RUN_BB05, RUN_BB07	Primarily Kimberley and Top End, eastern limit at Rungulla
Drummondita calida	BB08, BB18RUN_BB)5	White Mountains NP to Rungulla. Northern limit at Rungulla National Park.
Eucalyptus ammophila	BB04	Northern limit at Rungulla National Park.
Hemigenia sp. (White Mountains D.G.Fell DF1379)	BB01	Previously known from White Mountains NP, disjunct northern population at Rungulla
Ipomoea abrupta	BB22	Disjunct SW-most population in QLD
Kardomia squarrulosa	BB01, BB18	Previously known from White Mountains NP, disjunct northern population at Rungulla
Labichea brassii	BB01, BB11, BB15, BB23	Found in 4 disjunct areas in North QLD. The core distribution of the species is centred on Rungulla NP. Two other areas are found north and south of Rungulla (which may be found to be continuous with Rungulla NP with future collecting).
Labichea rupestris	BB18	Rungulla NP forms a somewhat disjunct area for the species, and close to the northern limit Distribution is scattered from near Rungulla NP south to Bigge Range, NW of Taroom
Leptospermum pallidum	BB21, Near Ranger station	Western-most population at Rungulla, disjunct from White Mountains NP and another in vicinity of Greenvale
Lithomyrtus hypoleuca	BB23	Primarily Top End of NT, Kakdu to Mt Isa, very disjunct population at Rungulla
Lophostemon suaveolens	Very localised along creek, BB22	FNQ, very common along the Great Dividing Range, and inland in the vicinity of White Mountains NP, with a disjunct population at

		Rungulla National Park
Pandanus spiralis	Very localised along creek, BB22	Disjunct population from others in QLD to the east of Rungulla
Prostanthera sp. Gilbert River (MDGoodwin+ C4040)	Several locations, e.g. BB18, BB23	Endemic to Rungulla, and a couple of populations to the south
Scaevola sp. Rungulla 1	BB18	It is unclear whether this collection represent *S. browniana* subsp. *browniana* or *S. revoluta*. Either way, the Rungulla collection represent a very significant disjunction, the closest being near Mt Isa.
Schoenus aff. kennyi	BB18	Taxon limits uncertain, but appears limited to area around Rungulla NP
Seringia adenolasia	Several locations, e.g. BB22	Disjunct population from Kakadu NP, NT (also a few very localised QLD records)
Triodia molesta	Many: BB15, BB17, BB20	Although extensive at Rungulla, this species has its NE limit at Rungulla and is disjunct from populations near Mt Isa
Triodia sp. Bush Blitz Rungulla 1	BB!5	Significant infill; known form White Mountains NP, also NW of Cairns and NE NT.
Xanthostemon umbrosus	BB15	Disjunct population from other QLD records to the east in the Grat Dividing Range

6. Conclusions

The Rungalla Bush Blitz significantly increased knowledge of the flora and fungi of the National Park, and contributed important new data that will assist conservation of several threatened plants. Probable new species discoveries, and many new records improve our understanding of the rugged dissected sandstone geological formations of the park as an island for many plant and fungi species, allowing persistence of outlier populations at the limit of their range, otherwise occurring to the south, east and west.

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Grateful thanks to the Ewamian Traditional Owners, and the Queensland Parks and Wildlife rangers who made the trip possible. Thanks to all of the Bush Blitz crew and helicopter pilots for their hard work establishing and maintaining camp, running logistics, and getting the botanists and mycologist to site safely and efficiently.

Thanks to the Management of both ATH and BRI for supporting the participation of staff in the Bush Blitz program.

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References

Bain J.H.C and Draper J.J 1997 North Queensland Geology. Australian Geological Survey Organisation Bulletin 240 and Queensland Department of Mines and Energy Queensland Geology 9. Commonwealth of Australia and State of Queensland.

Bean, A.R. (20 February 1997), Reinstatement of the genus *Babingtonia* Lindl. (Myrtaceae, Leptospermoideae). *Austrobaileya* 4(4): 642

Bean, A.R. (1 December 2011), Two new species of *Pluchea* Cass. (Asteraceae: Plucheinae) from Queensland, Australia. *Austrobaileya* 8(3): 343-345

Bean, A.R. (18 December 2017), *Labichea mulliganensis* A.R.Bean (Leguminosae: Caesalpinioideae), a new species from Queensland. *Austrobaileya* 10(1): 196-197

Bougher NL, Barrett MD. (2020). Fungi and slime moulds recorded in surveys at Kings Park and Bold Park – urban bushlands Perth, Western Australia. *Journal of the Royal Society of Western Australia* 41(4): 191-251.

Department of the Environment (2022). Arnhem Plateau Sandstone Shrubland Complex in Community and Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 2022-09-30T11:39:31AEST.

Department of Environment Parks and Water Security (2022) *HOLTZE Specimen Database: Ecological Attributes Module*. Palmerston, Northern Territory.

Duretto, M.F. (28 April 2003), Notes on *Boronia* (Rutaceae) in eastern and northern Australia. *Muelleria* 17: 31-32

Duretto, M.F. (14 November 2018), *Drummondita borealis* Duretto (Rutaceae), a new species from the Northern Territory, and a revised description for *D. calida* (F.Muell.) Paul G.Wilson from Queensland. *Austrobaileya* 10(2): 237

Duretto, M.F., Heslewood, M.M. & Bayly, M.J. (June 2020), *Boronia* (Rutaceae) is polyphyletic: Reinstating *Cyanothamnus* and the problems associated with inappropriately defined outgroups. *Taxon* 69(3): 494

IUCN Standards and Petitions Committee. 2022. Guidelines for Using the IUCN Red List Categories and Criteria. Version 15.1. Prepared by the Standards and Petitions Committee. Downloadable from https://www.iucnredlist.org/documents/RedListGuidelines.pdf.

Jackes, B.R. (2021) *Plants of the Burra Range – White Mountains National Park, North Queensland, Australia*. James Cook University, Townsville.

Li Y, He SH, Chen CC, Nakasone KK, Ma HX. (2022) Global Taxonomy and Phylogeny of Irpicaceae (Polyporales, Basidiomycota) With Descriptions of Seven New Species and Proposals of Two New Combinations. *Front Microbiol.* 13:911978. doi: 10.3389/fmicb.2022.911978. PMID: 35794917; PMCID: PMC9251475

McConachie B.A., Dunster J.N., Wellman P., Denaro T.J., Pain C.F., Habermehl M.A. and Draper J.J. (1997) Chapter Nine. Carpentaria Lowlands and Gulf of Carpentaria Regions. et al. chapter 9 Carpentaria Lowlands Region. in *North Queensland Geology* Bain J.H.C and Draper J.J (eds). Commonwealth of Australia and State of Queensland.

Morgan G. (1999a) *Gulf Plains* in P.S. Sattler and R.D. Williams, The Conservation Status of Queensland Bioregional Ecosystems. Environmental Protection Agency, Brisbane.

Morgan G. (1999b) Einasleigh Uplands P.S. Sattler and R.D. Williams, The Conservation Status of Queensland Bioregional Ecosystems. Environmental Protection Agency, Brisbane.

Queensland Herbarium, (2016). Collection and preserving plant specimens, a manual. 2 nd edition. Department of Science, Information Technology and Innovation, Brisbane.

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Richter, D., Addicott, E.P. and Appelman, C.N. (2022) Methodology for survey and mapping of

regional ecosystems and vegetation communities in Queensland. Version 6.0. Updated April 2022. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

North Australian Fire Information (NAFI) (2022) Fire monitoring website for north Australian and remote area fire area managers (www.firenorth.org.au) Charles Darwin University. Darwin, Northern Territory.

Perry R. A., Sleeman J. R., Twidale C. R., Prichard C. E., Slatyer R. 0., Lazarides M., and Collins F. H. (1964). General Report on Lands of the Leichhardt-Gilbert Area, Queensland, 1953-54. Land Research Series No. 11. Commonwealth Scientific and Industrial Research Organization, Australia.

Russell-Smith J (2006). Recruitment dynamics of the long-lived obligate seeders *Callitris intratropica* (Cupressaceae) and *Petraeomyrtus punicea* (Myrtaceae). *Australian Journal of Botany* 54: 479–485.

Russell-Smith J, Ryan P and Cheal DC (2002). Fire regimes and the conservation of sandstone heath in monsoonal northern Australia: frequency, interval, patchiness. Biological Conservation 104: 91–106.

Russell-Smith J, Whitehead PJ and Cooke P (2009c). Culture, Ecology and Economy of Fire Management in Northern Australian Savannas. Rekindling the Wurrk Tradition. CSIRO Publications, Melbourne.

Sattler P.S. and Williams R.D. (eds) (1999), The Conservation Status of Queensland Bioregional Ecosystems. Environmental Protection Agency, Brisbane.

TSSC (2011). Listing Advice — Arnhem Plateau Sandstone Shrubland Complex. Available on the internet at: http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl

Wilson, Peter G., Heslewood, M.M. & Quinn, C.J. (5 September 2007), Re-evaluation of the genus *Babingtonia* (Myrtaceae) in eastern Australia and New Caledonia. *Australian Systematic Botany* 20(4): 316

Withnell I.W, Mackenzie D.E., Denaro T.J., Bain J.H.C., Oversby B.S., Knutson J., Donchank P.J.T., Champion D.C., Wellman P., Cruikchank B.I., Sun S.S. and Pain C.F. (1997) Chapter Three. Georgetown Region. in *North Queensland Geology* Bain J.H.C and Draper J.J (eds). Commonwealth of Australia and State of Queensland.

Withnell I.W, Draper J.J , Mackenzie D.E., Knutson J., Blewett R.S., Hutton L.J., Bultitude R.J., Wellman P., Donchank P.J.T., Champion D.C., Wellman P., McConachie B.A. Bain J.H.C., Donchak P.J.T., Lang S.C., Domagala J. and Rienks I.P. (1997) Chapter Fourteen. Review of Geological Provinces and Basins of North Queensland. Pain C.F. in North Queensland Geology Bain J.H.C and Draper J.J (eds). Commonwealth of Australia and State of Queensland.

Appendix 1. List of Vascular Plant species collected during the Rungulla Bush Blitz

Family	Full name	Common name	Putative new species?	Threatened (EPBC)?	Threatened (NCA)?	Exotic/pest	Collector	Comment
Acanthaceae	Brunoniella acaulis		No	No	No	No	MDB	
Acanthaceae	Dipteracanthus australasicus subsp. corynothecus		No	No	No	No	ARB	
Acanthaceae	Nelsonia campestris		No	No	No	No	ARB	
Acanthaceae	Rostellularia adscendens subsp. (Irvinebank A.R.Bean+ 5461)		Yes	No	No	No	ARB	
Amaranthaceae	Gomphrena flaccida		No	No	No	No	MDB	
Apocynaceae	Cryptostegia grandiflora	Rubber vine	No	No	No	Yes	ARB	
Apocynaceae	Cynanchum leptolepis		No	No	No	No	ARB	
Apocynaceae	Cynanchum viminalis		No	No	No	No	NJC	
Apocynaceae	Leichhardtia viridiflora subsp. tropica		No	No	No	No	ARB	
Asparagaceae	Lomandra confertiflora subsp. pallida		No	No	No	No	MDB	
Asparagaceae	Thysanotus chinensis		No	No	No	No	MDB	
Asteraceae	Acanthospermum hispidum	Star burr	No	No	No	Yes	ARB	
Asteraceae	Cyanthillium cinereum		No	No	No	No	ARB	
Asteraceae	Peripleura spechtii		No	No	No	No	MDB	
Asteraceae	Pterocaulon verbascifolium		No	No	No	No	ARB	
Blechnaceae	Blechnum orientale		No	No	No	No	NJC	
Boraginaceae	Trichodesma zelanicum		No	No	No	No	NJC	
Cannabaceae	Trema tomentosa	Poison peach	No	No	No	No	ARB	
Caryophyllaceae	Polycarpaea corymbosa		No	No	No	No	NJC	
Caryophyllaceae	Polycarpaea spirostylis		No	No	No	No	NJC	
Centrolepidaceae	Centrolepis banksii		No	No	No	No	MDB	
Centrolepidaceae	Centrolepis exserta		No	No	No	No	MDB	
Chrysobalanaceae	Parinari nonda	Nonda plum	No	No	No	No	ARB	
Cleomaceae	Arivela viscosa		No	No	No	No	NJC	
Combretaceae	Terminalia aridicola subsp. chilligoensis		No	No	No	No	NJC	
Convolvulaceae	Bonamia media		No	No	No	No	NJC	
Convolvulaceae	Cuscuta chinensis		No	No	No	No	MDB	
Convolvulaceae	Evolvulus alsinoides var. decumbens		No	No	No	No	ARB	
Convolvulaceae	Evolvulus alsinoides var. indet.		No	No	No	No	MDB	
Convolvulaceae	Ipomoea abrupta		No	No	No	No	MDB	
Convolvulaceae	Ipomoea eriocarpa		No	No	No	No	NJC	
Convolvulaceae	Ipomoea plebeia		No	No	No	No	ARB	
Convolvulaceae	Jacquemontia paniculata		No	No	No	No	NJC	
Convolvulaceae	Polymeria sp. (Chillagoe K.R.McDonald KRM328)		Yes	No	No	No	ARB	
Cupressaceae	Callitris intratropica		No	No	No	No	MDB	
Cyperaceae	Anthelepis undulata		No	No	No	No	NJC	
Cyperaceae	Baumea rubiginosa		No	No	No	No	NJC	
Cyperaceae	Cyperus castaneus		No	No	No	No	MDB	
Cyperaceae	Cyperus decompositus		No	No	No	No	NJC	
Cyperaceae	Cyperus haspan subsp. juncoides		No	No	No	No	NJC	
Cyperaceae	Cyperus microcephalus subsp. microcephalus		No	No	No	No	MDB	
Cyperaceae	Cyperus microcephalus subsp. saxicola		No	No	No	No	NJC	
Cyperaceae	Fimbristylis dichotoma		No	No	No	No	NJC	
Cyperaceae	Fimbristylis nutans		No	No	No	No	NJC	
Cyperaceae	Fimbristylis pauciflora		No	No	No	No	NJC	
Cyperaceae	Fimbristylis spaerocephala		No	No	No	No	MDB	
Cyperaceae	Fimbristylis trigastrocarya		No	No	No	No	MDB	
Cyperaceae	Fuirena umbellata		No	No	No	No	NJC	
Cyperaceae	Gahnia aspera	Rough saw-sedge	No	No	No	No	ARB	
Cyperaceae	Rhynchospora brownii		No	No	No	No	ARB	
Cyperaceae	Rhynchospora pterochaeta		No	No	No	No	MDB	
Cyperaceae	Schoenus aff. kennyi		No	No	No	No	MDB	
Cyperaceae	Schoenus kennyi		No	No	No	No	ARB	
Cyperaceae	Scleria brownii		No	No	No	No	NJC	
Cyperaceae	Scleria rugosa		No	No	No	No	NJC	
Cyperaceae	Scleria sphacelata		No	No	No	No	MDB	
Dilleniaceae	Hibbertia lepidota		No	No	No	No	NJC	
Droseraceae	Drosera burmannii		No	No	No	No	NJC	Special Least Concern Species in QLD.
Eriocaulaceae	Eriocaulon fistulosum		No	No	No	No	NJC	
Euphorbiaceae	Cassytha filliformis		No	No	No	No	NJC	
Euphorbiaceae	Euphorbia biconvexa		No	No	No	No	ARB	
Euphorbiaceae	Euphorbia mitchelliana var. mitchelliana		No	No	No	No	MDB	
Euphorbiaceae	Euphorbia tanensis subsp. eremophila		No	No	No	No	NJC	
Fabaceae	Acacia lazaridis		No	No	No	No	NJC	
Fabaceae	Acacia leptostachya		No	No	No	No	NJC	
Fabaceae	Acacia multisiliqua		No	No	No	No	NJC	
Fabaceae	Acacia orthocarpa		No	No	No	No	NJC	
Fabaceae	Adenanthera abrosperma		No	No	No	No	MDB	

Appendix 1. List of Vascular Plant species collected during the Rungulla Bush Blitz

Family	Full name	Common name	Putative new species?	Threatened (EPBC)?	Threatened (NCA)?	Exotic/pest	Collector	Comment
Fabaceae	Cajanus acutifolius		No	No	No	No	NJC	
Fabaceae	Cajanus marmoratus		No	No	No	No	ARB	
Fabaceae	Chamaecrista absus var. absus		No	No	No	No	ARB	
Fabaceae	Crotalaria brevis		No	No	No	No	ARB	
Fabaceae	Crotalaria juncea		No	No	No	No	NJC	
Fabaceae	Crotalaria medicaginea var. medicaginea		No	No	No	No	NJC	
Fabaceae	Crotalaria novae-hollandiae subsp. novae-hollandiae		No	No	No	No	ARB	
Fabaceae	Crotalaria pallida var. obovata		No	No	No	No	ARB	
Fabaceae	Crotalaria verrucosa		No	No	No	No	ARB	
Fabaceae	Desmodium brachypodum		No	No	No	No	NJC	
Fabaceae	Desmodium filiforme		No	No	No	No	ARB	
Fabaceae	Desmodium rhytidophyllum		No	No	No	No	NJC	
Fabaceae	Glycine tomentella		No	No	No	No	ARB	
Fabaceae	Indigofera colutea		No	No	No	No	ARB	
Fabaceae	Indigofera hirsuta		No	No	No	No	ARB	
Fabaceae	Indigofera linifolia		No	No	No	No	ARB	
Fabaceae	Indigofera linnaei		No	No	No	No	NJC	
Fabaceae	Indigofera sericovexilla		No	No	No	No	NJC	
Fabaceae	Jacksonia ramosissima		No	No	No	No	ARB	
Fabaceae	Labichea brassii		No	No	Yes	No	ARB	
Fabaceae	Labichea rupestris		No	No	No	No	ARB	
Fabaceae	Leptosema oxylobioides		No	No	No	No	NJC	
Fabaceae	Mirbelia viminalis		No	No	No	No	ARB	
Fabaceae	Rhynchosia minima var. minima		No	No	No	No	ARB	
Fabaceae	Senna leptoclada		No	No	No	No	NJC	
Fabaceae	Senna occidentalis	Coffee senna	No	No	No	Yes	ARB	
Fabaceae	Senna oligoclada		No	No	No	No	ARB	
Fabaceae	Sesbania cannabina var. cannabina		No	No	No	No	ARB	
Fabaceae	Sesbania cannabina var. cannabina		No	No	No	No	NJC	
Fabaceae	Tephrosia astragaloides		No	No	No	No	ARB	
Fabaceae	Tephrosia conspicua		No	No	No	No	NJC	
Fabaceae	Tephrosia sp. (Pannikan Springs A.R.Bean+ 5612)		Yes	No	No	No	ARB	
Fabaceae	Vachellia clarksoniana		No	No	No	No	ARB	
Fabaceae	Zornia adenophora		No	No	No	No	MDB	
Fabaceae	Zornia stirlingii		No	No	No	No	ARB	
Fissidentaceae	Fissidens perobtusus		No	No	No	No	MDB	Moss
Gleicheniaceae	Dicranopteris linearis		No	No	No	No	NJC	
Goodeniaceae	Dampiera adpressa		No	No	No	No	MDB	
Goodeniaceae	Goodenia gracilis		No	No	No	No	MDB	
Goodeniaceae	Scaevola aff. revoluta		No	No	No	No	MDB	
Haloragaceae	Gonocarpus acanthocarpus		No	No	No	No	ARB	
Hypericaceae	Hypericum gramineum		No	No	No	No	MDB	
Lamiaceae	Anisomeles ornans		No	No	No	No	NJC	
Lamiaceae	Callicarpa candicans		No	No	No	No	ARB	
Lamiaceae	Hemigenia sp. (White Mountains D.G.Fell DF1379)		Yes	No	No	No	ARB	
Lamiaceae	Mesosphaerum suaveolens	hyptis	No	No	No	Yes	ARB	
Lamiaceae	Ocimum caryophyllinum		No	No	No	No	ARB	
Lamiaceae	Prostanthera sp. Gilbert River (MDGodwin+ C4040)		No	No	No	No	MDB	
Lamiaceae	Salvia misella		No	No	No	Yes	ARB	
Leucobryaceae	Campylopus sp. Bush Blitz Rungulla 1		No	No	No	No	MDB	Moss
Lindsaeaceae	Lindsaea ensifolia subsp. ensifolia		No	No	No	No	NJC	
Loganiaceae	Mitrasacme nudicaulis var. nudicaulis		No	No	No	No	MDB	
Loranthaceae	Diplatia grandibractea		No	No	No	No	ARB	
Lycopodiaceae	Palhinhaea cernua		No	No	No	No	GPT	
Malvacea	Melhania oblongifolia		No	No	No	No	ARB	
Malvaceae	Abutilon hannii		No	No	No	No	ARB	
Malvaceae	Corchorus pumilio		No	No	No	No	NJC	
Malvaceae	Corchorus sericeus subsp. densiflorus		No	No	No	No	MDB	
Malvaceae	Corchorus sidioides		No	No	No	No	NJC	
Malvaceae	Dicarpidium monoicum		No	No	No	No	NJC	
Malvaceae	Hibiscus leptocladus		No	No	No	No	NJC	
Malvaceae	Hibiscus meraukensis		No	No	No	No	ARB	
Malvaceae	Hibiscus setulosus		No	No	No	No	NJC	
Malvaceae	Malvastrum americanum		No	No	No	No	ARB	
Malvaceae	Seringia adenolasia		No	No	No	No	NJC	
Malvaceae	Sida acuta		No	No	No	Yes	NJC	
Malvaceae	Sida cordifolia	Flannel weed	No	No	No	Yes	ARB	
Malvaceae	Sida hackettiana		No	No	No	No	ARB	

Appendix 1. List of Vascular Plant species collected during the Rungulla Bush Blitz

Family	Full name	Common name	Putative new species?	Threatened (EPBC)?	Threatened (NCA)?	Exotic/pest	Collector	Comment
Malvaceae	Sida macropoda		No	No	No	No	NJC	
Malvaceae	Sida rohlenae		No	No	No	No	ARB	
Malvaceae	Triumfetta aff. micracantha		No	No	No	No	MDB	
Malvaceae	Triumfetta micracantha		No	No	No	No	ARB	
Malvaceae	Triumfetta pentandra		No	No	No	Yes	ARB	
Melastomataceae	Melastoma malabathricum subsp. malabathricum		No	No	No	No	NJC	
Meliaceae	Turraea pubescens		No	No	No	No	ARB	
Menispermaceae	Tinospora smilacina		No	No	No	No	ARB	
Myrtaceae	Calytrix leptophylla		No	No	No	No	NJC	
Myrtaceae	Corymbia gilbertensis		No	No	No	No	MDB	
Myrtaceae	Eucalyptus ammophila		No	No	No	No	ARB	
Myrtaceae	Eucalyptus cameldulensis		No	No	No	No	MDB	
Myrtaceae	Eucalyptus chartaboma		No	No	No	No	MDB	
Myrtaceae	Eucalyptus leptophleba	Molloy box	No	No	No	No	ARB	
Myrtaceae	Eucalyptus provecta		No	No	No	No	ARB	
Myrtaceae	Eucalyptus setosa		No	No	No	No	MDB	
Myrtaceae	Kardomia squarrulosa		No	No	Yes	No	ARB	
Myrtaceae	Leptospermum pallidum		No	No	Yes	No	MDB	Near Threatened (NCA)
Myrtaceae	Lithomyrtus hypoleuca		No	No	No	No	MDB	
Myrtaceae	Lithomyrtus microphylla		No	No	No	No	ARB	
Myrtaceae	Lithomyrtus retusa		No	No	No	No	NJC	
Myrtaceae	Lophostemon grandiflorus subsp. riparius	Northern swamp mahogany	No	No	No	No	NJC	
Myrtaceae	Lophostemon suaveolens		No	No	No	No	MDB	iNaturalist record
Myrtaceae	Melaleuca fluviatilis		No	No	No	No	NJC	
Myrtaceae	Melaleuca foliolosa		No	No	No	No	NJC	
Myrtaceae	Melaleuca nervosa subsp. nervosa		No	No	No	No	ARB	
Myrtaceae	Syzygium eucalyptoides subsp. eucalyptoides		No	No	No	No	ARB	
Myrtaceae	Xanthostemon umbrosus		No	No	No	No	MDB	
Olacaceae	Ximenia americana	Wild plum	No	No	No	No	ARB	
Onagraceae	Ludwigia octovalvis		No	No	No	No	NJC	
Pandanaceae	Pandanus spiralis		No	No	No	No	MDB	iNaturalist record
Phyllanthaceae	Flueggea leucopyrus		No	No	No	No	ARB	
Phyllanthaceae	Phyllanthus hebecarpus		No	No	No	No	ARB	
Phyllanthaceae	Synostemon elachophyllus subsp. elachophyllus		No	No	No	No	NJC	
Picrodendraceae	Petalostigma pubescens	Quinine tree	No	No	No	No	ARB	
Plantaginaceae	Scoparia dulcis	Scoparia	No	No	No	Yes	ARB	
Plantaginaceae	Stemodia lythrifolia		No	No	No	No	ARB	
Poaceae	Aristida burraensis		No	No	No	No	MDB	
Poaceae	Aristida calycina var. calycina		No	No	No	No	MDB	
Poaceae	Aristida sciuroides		No	No	No	No	ARB	
Poaceae	Arundinella setosa		No	No	No	No	ARB	
Poaceae	Cleistochloa subjuncea		No	No	No	No	ARB	
Poaceae	Cymbopogon obtectus		No	No	No	No	NJC	
Poaceae	Cymbopogon refractus		No	No	No	No	NJC	
Poaceae	Digitaria breviglumis		No	No	No	No	ARB	
Poaceae	Digitaria minima		No	No	No	No	MDB	
Poaceae	Ectrosia agrostoides		No	No	No	No	ARB	
Poaceae	Ectrosia confusa		No	No	No	No	MDB	
Poaceae	Enneapogon lindleyanus		No	No	No	No	NJC	
Poaceae	Enneapogon nigricans		No	No	No	No	ARB	
Poaceae	Eragrostis fallax		No	No	No	No	MDB	
Poaceae	Eragrostis schultzii		No	No	No	No	NJC	
Poaceae	Eriachne ?humilis		No	No	No	No	MDB	
Poaceae	Eriachne mucronata		No	No	No	No	NJC	
Poaceae	Eriachne obtusa		No	No	No	No	NJC	
Poaceae	Eriachne pallescens var. pallescens		No	No	No	No	NJC	
Poaceae	Eriachne sp. Dugald River (Dugald River B.K.Simon+ 3007)		No	No	No	No	MDB	
Poaceae	Eriachne stipacea		No	No	No	No	ARB	
Poaceae	Eriachne vesiculosa		No	No	No	No	NJC	
Poaceae	Heteropogon triticeus		No	No	No	No	MDB	
Poaceae	Panicum effusum		No	No	No	No	NJC	
Poaceae	Panicum trichoides		No	No	No	No	ARB	
Poaceae	Paspalidium distans		No	No	No	No	NJC	
Poaceae	Perotis rara		No	No	No	No	NJC	
Poaceae	Schizachyrium fragile		No	No	No	No	NJC	
Poaceae	Sporobolus australasicus		No	No	No	No	ARB	
Poaceae	Sporobolus jacquemontii	Rat's tail grass	No	No	No	Yes	ARB	
Poaceae	Sporobolus pulchellus		No	No	No	No	MDB	

Appendix 1. List of Vascular Plant species collected during the Rungulla Bush Blitz

Family	Full name	Common name	Putative new species?	Threatened (EPBC)?	Threatened (NCA)?	Exotic/pest	Collector	Comment
Poaceae	Themeda avenacea		No	No	No	No	NJC	
Poaceae	Triodia bitextura		No	No	No	No	NJC	
Poaceae	Triodia microstachya		No	No	No	No	NJC	
Poaceae	Triodia molesta		No	No	No	No	NJC	
Poaceae	Triodia pungens		No	No	No	No	NJC	
Poaceae	Triodia sp. Bush Blitz Rungulla 1		No	No	No	No	NJC	
Poaceae	Tripogonella loliiformis		No	No	No	No	MDB	
Poaceae	Urochloa holosericea subsp. holosericea		No	No	No	No	NJC	
Polygalaceae	Comesperma pallidum		No	No	No	No	ARB	
Pontederiaceae	Monochoria cyanea		No	No	No	No	NJC	
Portulacaceae	Portulaca pilosa		No	No	No	Yes	NJC	
Proteaceae	Grevillea decora subsp. decora		No	No	No	No	ARB	
Proteaceae	Grevillea glauca	Bushman's clothes peg	No	No	No	No	ARB	
Proteaceae	Grevillea mimosoides		No	No	No	No	NJC	
Proteaceae	Xylomelum scottianum		No	No	No	No	MDB	
Pteridaceae	Cheilanthes brownii		No	No	No	No	GPT	
Pteridaceae	Cheilanthes distans		No	No	No	No	GPT	
Pteridaceae	Cheilanthes sieberi		No	No	No	No	GPT	
Pteridaceae	Pellaea muelleri		No	No	No	No	NJC	
Rhamnaceae	Cryptandra ?pogonoloba subsp. pogonoloba		No	No	No	No	MDB	
Rhamnaceae	Cryptandra pogonoloba subsp. pogonoloba		No	No	No	No	MDB	
Rubiaceae	Gardenia tessellaris		No	No	No	No	NJC	
Rubiaceae	Larsenaikia ochreata		No	No	No	No	ARB	
Rubiaceae	Pavetta granitica		No	No	No	No	ARB	
Rubiaceae	Richardia scabra		No	No	No	Yes	ARB	
Rubiaceae	Spermacoce sp. Bush Blitz Rungulla 1		No	No	No	No	NJC	
Rubiaceae	Spermacoce sp. Bush Blitz Rungulla 2		No	No	No	No	NJC	
Rubiaceae	Synaptantha tillaeacea		No	No	No	No	MDB	
Rutaceae	Boronia bowmanii		No	No	No	No	NJC	
Rutaceae	Cyanothamnus occidentalis		No	No	No	No	MDB	
Rutaceae	Cyanothamnus warangensis		No	No	No	No	ARB	
Rutaceae	Drummondita calida		No	No	Yes	No	NJC	Vulnerable NCA
Rutaceae	Geijera salicifolia	broad-leaved wilga	No	No	No	No	ARB	
Salicaceae	Homalium brachybotrys		No	No	No	No	ARB	
Sapindaceae	Dodonaea filifolia		No	No	No	No	MDB	
Sapindaceae	Dodonaea hispidula var. hispidula	hop bush	No	No	No	No	ARB	
Sapindaceae	Dodonaea oxyptera	hop bush	No	No	No	No	ARB	
Sapotaceae	Planchonella pohlmaniana		No	No	No	No	ARB	
Sapotaceae	Sersalisia sericea		No	No	No	No	NJC	
Solanaceae	Datura ferox	Thorn apple	No	No	No	Yes	ARB	
Solanaceae	Solanum carduiforme		No	No	Yes	No	ARB	
Solanaceae	Solanum crebrispinum		No	No	No	No	NJC	
Stylidiaceae	Stylidium eriorrhizum		No	No	No	No	MDB	
Stylidiaceae	Stylidium tenerum		No	No	No	No	NJC	Special Least Concern Species in QLD.
Violaceae	Pigea enneasperma		No	No	No	No	ARB	
Violaceae	Pigea stellarioides		No	No	No	No	ARB	
Vitaceae	Causonis trifolia		No	No	No	No	ARB	
Xanthorrhoeaceae	Xanthorrhoea johnsonii	Grass tree	No	No	No	No	ARB	
Xyridaceae	Xyris complanata		No	No	No	No	NJC	
Zygophyllaceae	Tribulopsis pentandra		No	No	No	No	NJC	

Appendix 2. List of Fungi species collected during the Rungulla Bush Blitz

Family	Species	Common name	Putative new species	Threatened (EPBC Act)	Threatened (State/Territory Act)	Exotic/pest	Collector	Comment
Auriculariaceae	*Auricularia cornea*	Hairy wood ear	No	No	No	No	MDB	
Auriculariaceae	*Auricularia aff. pusio (undescribed)*	Savanna tripe fungus	No (undescribed but previously known)	No	No	No	MDB	
Boletaceae	*Crocinoboletus sp. Bush Blitz Rungulla 1 (undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Boletaceae	*Tylopilus griseipurpureus*		No	No	No	No	MDB	
Corticiaceae	*Punctularia strigosozonata*		No	No	No	No	MDB	
Dacrymycetaceae	*Dacryopinax spathularia*	Fan-shaped jellly fungus	No	No	No	No	MDB	
Geastraceae	*Geastrum sp. Bush Blitz Rungulla 1 (undescribed)*	Earthstar	Yes	No	No	No	MDB	
Polyporales incertae sedis	*Campylomyces tabacinus*		No	No	No	No	MDB	
Gloeophyllaceae	*Gloeophyllum sp. Bush Blitz Rungulla 1 (?undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Gloeophyllaceae	*Gloeophyllum sp. Bush Blitz Rungulla 2 (?undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Hymenochaetaceae	*Coltriciella sp. Bush Blitz Rungulla 1 (undescribed)*		Yes	No	No	No	MDB	
Hymenochaetaceae	*Coltriciella sp. Bush Blitz Rungulla 2 (undescribed)*		Yes	No	No	No	MDB	
Hymenochaetaceae	*Fomitiporia sp. Bush Blitz Rungulla 1 (undescribed)*		Yes	No	No	No	MDB	
Hymenochaetaceae	*Fulvifomes ?resinaceus*		No	No	No	No	MDB	
Hymenochaetaceae	*Phellinus sp. Bush Blitz Rungulla 1(undescribed)*	Woody Conk	No (undescribed but previously known)	No	No	No	MDB	
Hypoxylaceae	*Daldinia eschscholzii*		No	No	No	No	MDB	
Irpicaceae	*Gloeoporus chlorinus*		No	No	No	No	MDB	
Irpicaceae	*Irpex flavus (=Flavodon flavus)*	Yellow teeth	No	No	No	No	MDB	
Nidulariaceae	*Cyathus stercoreus*		No	No	No	Yes	MDB	
Nigrofomitaceae	*Trichaptum sp. Bush Blitz Rungulla 1 (undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Omphalotaceae	*Gymnopus similis*		No	No	No	No	MDB	
Panaceae	*Panus aff. fulvus*		No	No	No	No	MDB	
Peniophoraceae	*Asterostroma cervicolor*		No	No	No	No	MDB	
Peniophoraceae	*Duportella tristicula*		No	No	No	No	MDB	
Phanerochaetaceae	*Phlebiopsis crassa*		No	No	No	No	MDB	
Polyporaceae	*Funalia aff. caperata*		No	No	No	No	MDB	
Polyporaceae	*Perenniporia aff. aurantiaca (undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Polyporaceae	*Perenniporia sp. Bush Blitz Rungulla 1 (undescribed)*		No (undescribed but previously known)	No	No	No	MDB	
Polyporaceae	*Polyporus arcularius (=Lentinus arcularius)*	Spring polypore	No	No	No	No	MDB	
Polyporaceae	*Polyporus aff. thailandensis*		No	No	No	No	MDB	
Polyporaceae	*Pycnoporus coccineus*	Scarlet Bracket fungus	No	No	No	No	NJC	
Polyporaceae	*Pycnoporus sp. Bush Blitz Rungulla 1 (undescribed)*		No (second collection)	No	No	No	MDB	
Polyporaceae	*Trametes hirsuta*		No	No	No	No	MDB	
Polyporaceae	*Trametes marianna*		No	No	No	No	MDB	
Schizophyllaceae	*Schizophyllum commune*	Split gill	No	No	No	No	MDB	
Sclerodermataceae	*Pisolithus albus*	White dye-ball fungus	No	No	No	No	MDB	
Trimorphomycetaceae	*Saitozyma podzolica*	Oeaginous yeast	No	No	No	No	MDB	
Ustilaginaceae	*Pericladium grewiae*		No	No	No	No	MDB	
Ustilaginaceae	*Triodiomyces ?altilis*		No	No	No	No	MDB	