3 Flora

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3.1 Summary

Selected mound springs in the NE Kimberley (Carlton Hill station) north of Kununurra and in the SW Kimberley were sampled for flora during August 2017, with an additional spring north of Broome (Nimalarragan) sampled during March 2018. Quadrat based floristic data was collected at a total of nine mound springs with twelve 50 x 50 quadrats established. The limited sampling attempted to document the core mound spring habitat but did not capture the full array of plant communities associated with each spring. Some additional quadrat sampling was undertaken of the plant communities adjoining springs but was not comprehensive except at Nimalarragan wetland in 2018. Here the inner mound spring habitat and an array of *Melaleuca* dominated vegetation, and coastal flats were sampled. Within mound springs, a total of 79 taxa (species, subspecies and varieties) were recorded including six species listed as of conservation significance. Alien taxa were uncommon with only 3 species (*Phoenix dactylifera*, *Musa acuminata* and *Passiflora foetida*) recorded within core discharge areas at few springs.

The springs sampled during the current survey occurred in similar geomorphologic settings where hinterland groundwater discharges at the landward interface with coastal flats. The floristic composition of spring vegetation differed between the NE Kimberley and SW Kimberley with the Carlton Hill springs including richer assemblages of aquatic species, rainforest elements and a group of tropical taxa at their western distributional limit. Collectively these NE and SW Kimberley coastal springs are distinct from the mound springs of the central Kimberley documented in previous studies. The Walyarta springs are also a distinct, but relatively depauperate group, compositionally related to the coastal springs of the SW Kimberley with some floristic elements more typical of the Pilbara.

3.2 Methods

3.2.1 Field sampling

The current study sampled springs in the NE Kimberley on the northern edge of Carlton Hill Station (seven springs, nine quadrats), and in the SW Kimberley on the western side of Dampier Peninsular (two springs) and the eastern side of King Sound (one spring) (Appendix 2, Figure 2).

At springs surveyed during August 2017, the full vegetation zonation of each spring was not sampled. Vegetation and floristics were sampled with a single 50 x 50 m quadrat placed to sample the vegetation representative of areas of major groundwater discharge and organic soils. For springs with surface water expression (i.e. pools), quadrats captured the mosaic of small surface pools and vegetation on elevated organic mounds and flats. Areas of high groundwater discharge also featured floating root mats peripheral to pools. Several springs

particularly in the Carlton Hill study area showed significant zonation, including peripheral moats with deeper water and open canopies relative to the often-closed *Melaleuca* canopies of the central area of the spring. These fringing moats were not sampled systematically during the current survey and were often dominated by *Typha domingensis* and *Phragmites karka*. Two examples of common fringing communities were sampled at Attack Spring (quadrat KMS 11B – fringing supra-tidal *Melaleuca alsophila* flat), and Long Spring (quadrat KMS13B – fringing Melaleuca woodland with *Typha domingensis*).

Sampling at Nimalarragun Wetland in March 2018 (quadrats NCP 1-8) was more comprehensive, including both mound spring vegetation (quadrats NCP 3 & 7) and the plant communities of the adjoining wetland and nearby supratidal coastal flats (quadrats NCP 1,2,4-6,8) (Appendix 2, Figure 2).

The locations of quadrats within mound springs broadly corresponded to the habitats sampled for aquatic invertebrates (when undertaken) by Pinder *et al* (chapter 3 of this report).

Quadrats were marked with steel pegs and labelled with a triangular aluminium tag stamped with quadrat code at the primary corner. Locations of the labelled corner were recorded using handheld GPS (Table 2, Appendix 2). Within each quadrat comprehensive plant collections including aquatics were made to generate quadrat species lists that were complete as possible. Charophytes were also collected although determinations were not completed prior to the preparation of this report.

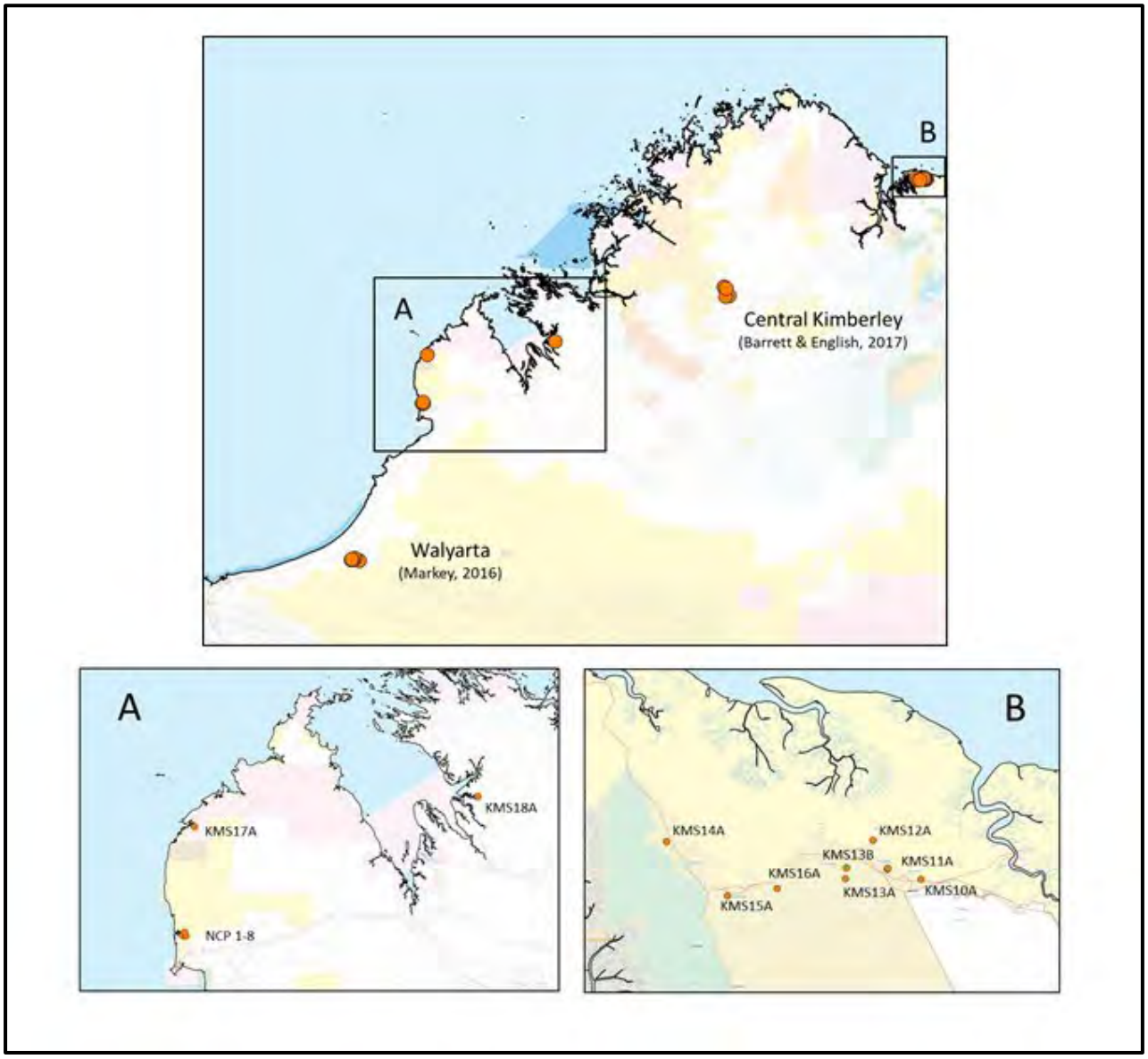

Figure 2. Map showing locations of Kimberley mound spring sampled for flora in 2017 & 2018 (see Table 2). Inset A, SW Kimberley and B; Carlton Hill NE Kimberley. Springs sampled in the central Kimberley (Barrett & English, 2017) and Walyarta (Markey, 2016) were used in the biogeographic analysis.

3.2.2 Specimen identification

Plant material was determined to the lowest possible taxonomic rank. Nomenclature, alien/native status and conservation codes follow the Western Australian Herbarium (2019) and Jones (2018) respectively. The broader distributional patterns of taxa were examined using the specimen data from *Florabase* (Western Australian Herbarium, 2019) the Atlas of Living Australia (2019) and GBIF.org (2019). Representative voucher collections have been lodged with the Western Australia Herbarium (PERTH) with collection labels annotated with *voucher for* 'Kimberley Mound Springs Survey' and 'Nimalarragun Survey' respectively.

Table 2. Flora quadrats sampled 2017-18.

Flora Quadrat Code	Quadrat Latitude (WGS 84)	Quadrat Longitude (WGS 84)	Survey region	Wetland name	Habitat	Vegetation description	sample date
NCP01	-17.773439	122.256313	Dampier Peninsular	Nimalarragun claypan	Supra-tidal Samphire	Low chenopod shrubland of *Tecticornia indica* subsp. *julacea* and *Tecticornia halocnemoides* subsp. *tenuis* over very open low grassland of *Eragrostis falcata*.	08-Mar-18
NCP02	-17.773916	122.253968	Dampier Peninsular	Nimalarragun claypan	Supra tidal flat	Sparse tussock grassland of *Panicum decompositum* over low closed heathland/low closed shrubland of *Tecticornia indica* subsp. *julacea, Vincetoxicum carnosum* and *Hibiscus panduriformis*, over low sparse sedgeland of *Fimbristylis cymosa* and *Fimbristylis rara*.	08-Mar-18
NCP03	-17.781576	122.263149	Dampier Peninsular	Nimalarragun claypan	Spring riparian margin	Open forest of *Melaleuca cajuputi* over sparse forbland of *Acrostichum speciosum*, over low sparse sedgeland of *Fimbristylis cymosa*, *Fimbristylis polytrichoides* and *Sporobolus mitchellii*.	08-Mar-18
NCP04	-17.768746	122.256750	Dampier Peninsular	Nimalarragun claypan	Upland spring margin	Low woodland of *Melaleuca alsophila* over low isolated trees of *Timonius timon* over low sedgeland of *Fimbristylis cymosa* and low grassland of *Sporobolus mitchellii.*	09-Mar-18
NCP05	-17.781169	122.259328	Dampier Peninsular	Nimalarragun claypan	Spring upper margin	Low woodland of *Melaleuca alsophila* over tall sparse shrubland of *Acacia colei* var. *colei* over low isolated shrubs of *Hibiscus panduriformis*, *Vincetoxicum carnosum* and *Gymnanthera oblonga* over isolated grasses and sedges of *Panicum mindanaense* and *Fimbristylis* sp.	09-Mar-18
NCP06	-17.780197	122.249588	Dampier Peninsular	Nimalarragun claypan	Supra-tidal flat	Isolated clumps of grasses of *Panicum decompositum* with emergent *Melaleuca alsophila* over low sparse chenopod shrubland of *Tecticornia indica* subsp. *julacea.*	10-Mar-18
NCP07	-17.781518	122.268472	Dampier Peninsular	Nimalarragun claypan	Mound spring	Open forest of *Melaleuca cajuputi* over woodland of *Timonius timon*, over fenland of *Acrostichum speciosum*	10-Mar-18
NCP08	-17.760147	122.262702	Dampier Peninsular	Nimalarragun claypan	Seasonally wet Pindan flat	Low open woodland of *Corymbia opaca*, *Melaleuca alsophila* and *Corymbia paractia* over low isolated clumps of *Bauhinia cunninghamii* and *Acacia colei* over closed grassland of *Chrysopogon pallidus* and *Sorghum sp.*, over sparse forbland of *Buchnera* spp., *Calandrinia tepperiana* and mixed herbaceous Fabaceae.	11-Mar-18
KMS10A	-14.902755	128.704084	Carlton Hill North Kimberley	Unnamed spring	Mound spring	Tall open forest of *Melaleuca leucadendra* over vineland of Apocynaceae spp. and *Flagellaria indica*, over low open vines of *Flagellaria indica* over low open fernland of *Cyclosorus interruptus*.	01-Aug-17
KMS11A	-14.896823	128.684779	Carlton Hill North Kimberley	Attack Spring	Mound spring	Tall open forest of *Melaleuca leucadendra* over low isolated vines of *Flagellaria indica* over tall isolated rushes of *Typha domingensis* over isolated clumps of sedges and ferns of *Cyclosorus interruptus* and *Cyperus platystylis.*	01-Aug-17

Flora Quadrat Code	Quadrat Latitude (WGS 84)	Quadrat Longitude (WGS 84)	Survey region	Wetland name	Habitat	Vegetation description	sample date
KMS11B	-14.896382	128.685083	Carlton Hill North Kimberley	Attack Spring	Supra-tidal margin of mound spring	Low isolated trees of *Melaleuca alsophila* over tall shrubland of *Melaleuca alsophila* over low open sedgeland of Cyperaceae sp.	02-Aug-17
KMS12A	-14.880484	128.676647	Carlton Hill North Kimberley	Unnamed spring	Mound spring	Open forest of *Melaleuca leucadendra* over low woodland of *Timonius timon* and *Melochia* sp. over low sparse vineland of *Flagellaria indica* and sparse sedgeland of *Cyperus haspan* and *Cyperus javanicus* over low isolated clumps of ferns of *Cyclosorus interruptus*.	02-Aug-17
KMS13A	-14.902392	128.660870	Carlton Hill North Kimberley	Long Spring	Mound spring	Tall open forest of *Melaleuca leucadendra* over low open woodland of *Sterculia holtzei* and *Nauclea orientalis* over low isolated palms of *Pandanus spiralis* over tall isolated sedges of *Typha domingensis* over emergent ferns and isolated aquatics of *Cyclosorus interruptus* and *Nymphaea violacea.*	03-Aug-17
KMS13B	-14.896122	128.661569	Carlton Hill North Kimberley	Long Spring	Mound spring	Woodland of *Melaleuca leucadendra* over tall rushland of *Typha domingensis*.	03-Aug-17
KMS14A	-14.881075	128.559330	Carlton Hill North Kimberley	Unnamed spring	Mound spring	Low open forest of *Melaleuca alsophila*, *Lumnitzera racemosa* and *Thespesia populneoides* over low isolated clumps of sedges of *Fimbristylis* sp. and *Malvaceae* sp. indet., over low isolated tussock grassland of *Panicum seminudum* var. *seminudum.*	04-Aug-17
KMS15A	-14.912050	128.593906	Carlton Hill North Kimberley	King Gordon Spring	Mound spring	Tall woodland of *Melaleuca leucadendra* over low woodland of *Nauclea orientalis* and *Pandanus spiralis* over low isolated vines of *Flagellaria indica* over isolated clumps of forbs of *Adenostemma lavenia* var. *lanceolatum* over low sparse sedgeland of *Fimbristylis* sp. (cf. AA Mitchell 7822).	04-Aug-17
KMS16B	-14.907897	128.622158	Carlton Hill North Kimberley	Bamboo Spring	Brackish wetland on Supra-tidal flat	Tall open forest of *Melaleuca leucadendra* over low isolated vine clumps of *Flagellaria indica* over low isolated clumps of ferns of *Acrostichum aureum* and rushes *Typha domingensis* over isolated aquatics *Nymphaea violacea* and *Ceratophyllum demersum.*	04-Aug-17
KMS17A	-17.151627	122.318308	Dampier peninsular	Bunda Bunda Spring	Mound spring	Closed forest of *Carallia brachiata* and *Sesbania formosa* over isolated trees of *Sesbania formosa* over low isolated trees of *Timonius timon* and *Gymnanthera oblonga* over low fernland of *Cyclosorus interruptus*, *Acrostichum speciosum* and *Lygodium microphyllum*.	07-Aug-17
KMS18A	-16.978531	123.952859	Eastern King Sound	Big Spring	Mound spring	Tall woodland of *Melaleuca leucadendra* over woodland of *Terminalia microcarpa*, *Sesbania formosa* and *Nauclea orientalis* over tall sparse fernland of *Lygodium microphyllum* over *Pandanus spiralis* over tall sparse fernland of *Acrostichum speciosum*.	08-Aug-17

3.2.3 Data analysis –regional compositional patterns

To provide some perspective on the compositional patterns of the springs sampled during the current survey, floristic data sampling core mound spring vegetation from previous surveys was combined with the current survey data to generate a presence absence matrix for multivariate analysis. Additional data included six quadrats from the Walyarta/Mandora Marsh (Markey, 2016) and six quadrats from central Kimberley springs (Barrett & English, 2017). The combined data yielded a 22 quadrat x 167 species matrix. A quadrat association matrix was generated using the Bray -Curtis measure of dissimilarity and ordinated using the non-metric multidimensional scaling (nMDS) routines in PRIMER 7 (Clarke & Gorley, 2015).

3.3 Results

3.3.1 Flora diversity

Within the 12 quadrats sampling well developed mound spring vegetation a total of 79 taxa (species, subspecies and varieties) was recorded. An additional 130 taxa were recorded from the periphery of mound springs and in adjoining plant communities, with these records dominated by records from Nimalarragan wetland where sampling was more comprehensive (Appendices 2 and 3).

Mound spring species richness ranged from 5 to 26 taxa per 50x50 m quadrat (2500m^2). Average species richness was 14 taxa per quadrat. Species richness was related in part to habitat heterogeneity. At Big Spring (KMS18A – 26 taxa) the site included a mosaic of habitats, with pools, adjacent areas with a dense of canopy of *Melaleuca cajuputi* interspersed with small areas of sandy substrate that were not subject to inundation. Other species rich sites with limited areas of surface water and relatively open canopies were similarly relatively species rich (e.g. KMS12A – 22 taxa). Species poor sites were characterised by closed canopies of *Melaleuca* spp., and extensive areas of surface water (e g. Bamboo Spring, KMS16A).

3.3.2 Conservation significant taxa.

Despite having extensive distributions outside Western Australia, typically extending across tropical Northern Australia, five taxa recorded during the current surveys are deemed of conservation significance due to the limited number of records within Western Australia. Two additional taxa have limited distributions within the SW Kimberley. Priority flora categories follow Jones (2018).

- ***Acrostichum aureum*** **(Priority 1).** The Golden Mangrove fern has a pantropical distribution but with few known records in WA. Previously recorded from Big Spring in the SW Kimberley and the Charnley River area, *A. aureum* was recorded during the current survey at Bamboo Spring (KMS 16B). At Big Spring, *Acrostichum speciosum* occurred in the quadrat (KMS18A).

- ***Adenostemma lavenia var. lanceolatum*** **(Priority 3).** Scattered occurrences across northern Australia to southern Queensland. Also limited records from New Guinea and Borneo.

- ***Colocasia esculenta*** **var. *aquatilis* (Priority 3).** Taro (*Colocasia esculenta*) has a pan-tropical distribution facilitated by human introductions, with uncertainty as to the original natural range. Debate also exists regarding the recognition of varieties within *C. esculenta* (see Orchard, 2006). The putative wild type Taro recorded in Western Australia and the northern Australia is recognized as *C. esculenta* var. *aquatilis*. Current survey material conformed to *Colocasia esculenta var. aquatilis,* possessing stolons and a single diminutive (3-4 cm) tuber. The single occurrence was recorded from the margin of an unnamed spring at Carlton Hill (KMS10A) (Figure 3C)**.** In the Kimberley caution is required in determining the status of Taro collections in the vicinity of current and abandoned settlements where cultivated varieties can be encountered.

- ***Corymbia paractia*** **(Priority 1).** Recorded from Nimalarragun wetland at the upslope margin of the mound spring (adjacent to quadrat NCP 07). This taxon (Cable Beach Ghost Gum) is narrowly restricted to the Broome area, and occurs at the interface between Pindan and coastal sands.

- ***Utricularia aurea*** **(Priority 2).** Distributed from the Kimberley across tropical northern Australia, extending down the east coast to NSW with scattered inland occurrences. Widely distributed in Asia to India. Recorded at numerous quadrats in small pools within mound springs (Figure 4B). Often recorded growing with *Ceratophyllum demersum.*

- ***Sterculia holtzei*** **(Priority 1).** The only known WA occurrence was confirmed during the current survey at Long Spring (KMS 13) Carlton Hill Station. S. holtzei is widespread in the Northern Territory associated with permanently wet substrates including springs and rainforest patches (Figure 3A).

- ***Stylidium pindanicum*** **(Priority 3).** With a discrete distribution in the west Kimberley centred on Dampier Peninsular with an outlier near Fitzroy Crossing, *S. pindanicum* was recorded during the current survey in seasonally wet pindan flats on the northern periphery of Nimalarragun wetland within its current range.

3.3.3 Notable taxa.

Cyperus platystylis: Only known from two previous collections from WA (in the vicinity of Kununurra), *C. platystylis* was recorded during the current survey at two springs in the Carlton Hill area (KMS11A, KMS13A). It is at its western distributional limit near Kununurra and Carlton Hill but widespread in floodplains in the NT extending down the east coast to northern NSW, with scattered occurrences in New Guinea and SE Asia. The seed of this species is distinctive, being covered in pale spongy tissue which provides flotation, aiding dispersal in wetland habitats.

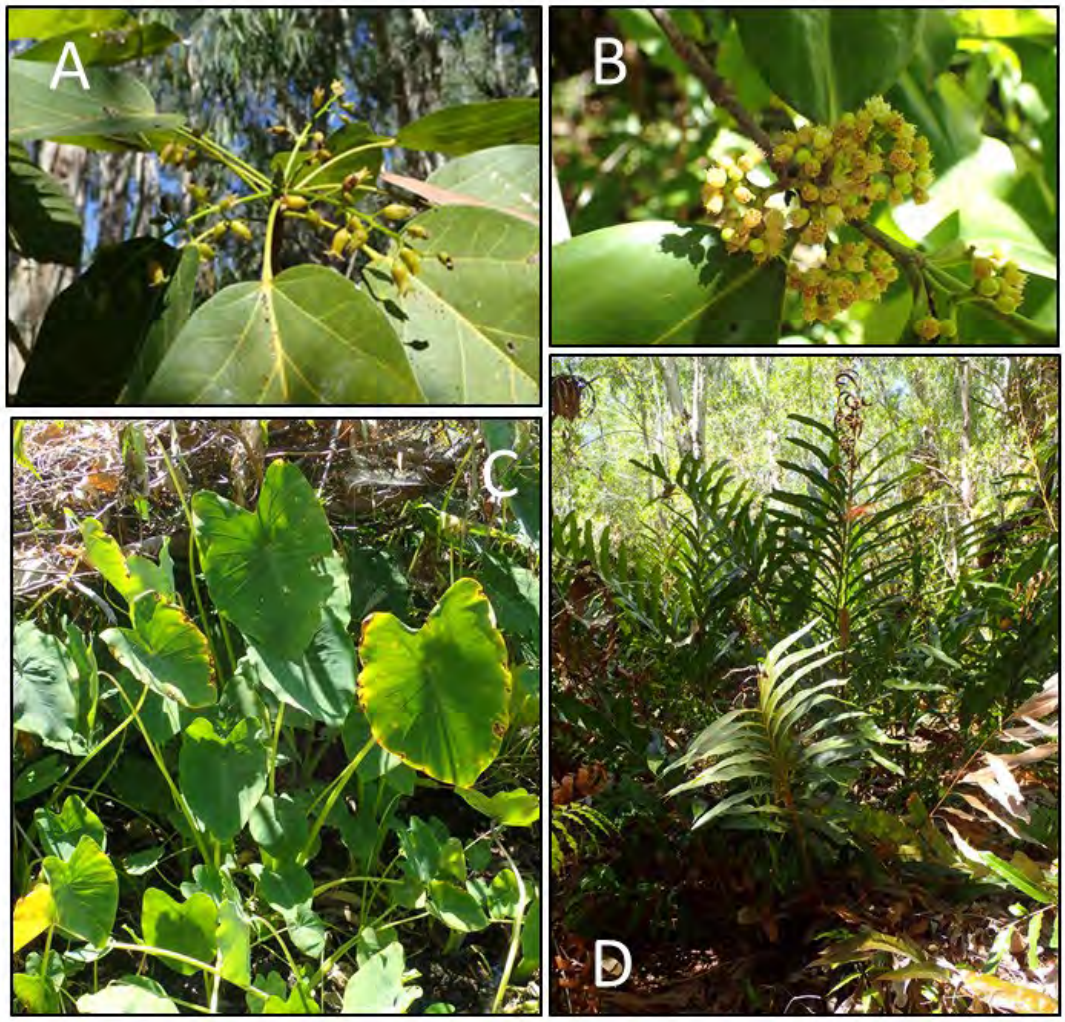

Figure 3. Taxa recorded from Kimberley mound springs. A, Sterculia holtzei (P3); B, Carallia bracteata; C, Colocasia esculenta var. aquatilis; D, Acrostichum speciosum.

- ***Fimbristylis sp.*:** (M.N. Lyons & J. Pryde KMS 039 –PERTH sheet 09163018): *Fimbristylis* material collected from King Gordon Spring (KMS 15A) and the vicinity of Haley's Spring (KMS 12A) could not be placed in current formal and phrase name taxa based on material in PERTH. The material matches earlier collections by A.A. Mitchell from King Gordon Swamp in August 2004 (A.A. Mitchell 7822, PERTH sheet 07833660). Further taxonomic work is required to determine if the collections justify the application of an informal (phrase) name. Additional collections include PERTH - M.N. Lyons & J. Pryde KMS 040 - KMS 042.

- ***Mucuna gigantea* subsp. *gigantea*:** This taxon is at its western distributional limit in the NE Kimberley with 3 previous records including the Berkeley River area (NW of Wyndham) and the Carlton Hill springs (Brolga Spring). Recorded during the current survey at KMS 10A and KMS 12 A. The distribution of *M. gigantea* subsp. *gigantea* extends across northern Australia down the east coast to northern NSW, with

scattered occurrence in SE Asia and the SW pacific islands. Occurrences are mostly near coastal.

- ***Nauclea orientalis***: The western most Kimberley population was recorded at Big Spring (KMS 18A) in the West Kimberley (a record from Broome townsite is likely a planting), with additional survey records from Long Spring north Kimberley (Carlton Hill). *Nauclea orientalis* occurs across northern Australia, New Guinea and SE Asia, preferring alluvial soils often associated with rivers across most of its range. Suitable habitat in the Kimberley is tightly restricted to springs, creek lines and rivers, where dry season drought is ameliorated.

- ***Phyla nodiflora***: A cosmopolitan species with a core native distribution in Central America and southern North America, with a broader pan-tropical distribution regarded as variously comprising naturalised and native occurrences. In Western Australia, *P. nodiflora* is regarded as naturalised. Recent phylogenetic studies and the existence of collections pre-dating European settlement confirm that *P. nodiflora* is represented in Australia by both native lineages and post-European introductions (Gross *et al*., 2017). Populations in northern Australia, including those recorded in the current survey, occurring distant from human settlement /disturbance should be regarded as native. *P. nodiflora* was recorded during the current survey on the margin of Nimalarragan and the damp periphery of several springs in the Carlton Hill study area.

3.3.4 Alien taxa

Ten species of non-native weeds were recorded from the survey (see comments above regarding *Phyla nodiflora*) (Appendix 2). Most alien taxa (8 taxa) were recorded from the margins of Nimalarragan wetland noting that sampling intensity was greater for this area than elsewhere. Alien taxa were essentially absent from all the core mound spring vegetation sampled during the survey will the exception of *Phoenix dactylifera* at Big Spring (King Sound) and the widespread *Passiflora foetida* var*. hispida.* Weed records of note are detailed below.

- ***Azadirachta indica* (Neem).** Scattered individuals were recorded on the southern margins of both the mound spring and broader wetland area of Nimalarragun wetland. All individuals observed were juvenile and not reproductive in 2018. Neem has escaped from cultivation and is a Declared Pest Plant in Western Australia. It is highly invasive and competitive particularly in riparian habitats. Without ongoing control measures, it represents a major threat to the values of Nimalarragun.

- ***Musa acuminata* (Banana).** A single population of banana was recorded on the eastern side of Bunda Bunda spring on the Dampier Peninsular. The population was well known to the traditional owners suggesting it was not of recent origin. It is likely to persist but is limited to a discrete patch of not more than 25m^2 without apparent spread.

- ***Parkinsonia aculeata* (Parkinsonia).** *Parkinsonia* is a Declared Pest Plant in Western Australia. Populations were recorded at scattered localities in terrestrial habitats at Carlton Hill and a subsidiary wetland in the vicinity of Nimalarragun wetland, Dampier Peninsula.

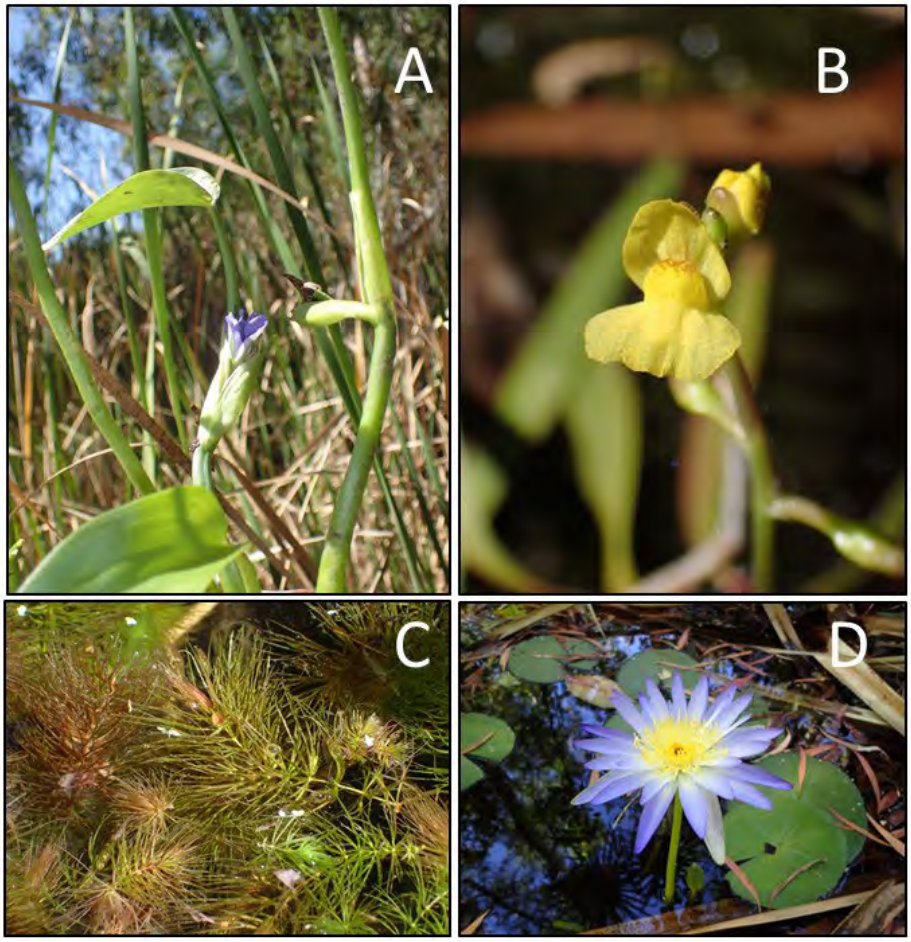

Figure 4. Selected aquatic taxa from mound springs. The springs in the Carlton Hill area showed a diverse array of aquatics habitats. A, Hygrophila angustifolia; B, Utricularia aurea; C, Ceratophyllum demersum; D, Nymphaea violacea.

- ***Phoenix dactylifera* (Date Palm).** A population of approximately 10 plants was recorded at Big Spring adjacent to the floristic sampling quadrat (KMS18A). Individuals appeared to be suckers, and tall fertile plants were not observed. The entire spring area has not been comprehensively searched for additional infestations.

- ***Tamarindus indica* (Tamarind).** A single juvenile plant was recorded from the periphery of Nimalarragan wetland having likely spread from nearby mature plants at Waterbank Station. Tamarind is naturalised around Broome and numerous locations across the Kimberley (and northern Australia).

3.3.5 Composition and regional patterning.

Figure 5 shows a two-dimensional ordination of mound spring floristic data (quadrat) from the current survey combined with data from the central Kimberley (Barrett & English, 2016) and from Walyarta (Markey, 2016). The clustering by region and separation in ordination space reflects differences in mound spring floristic composition between the four areas (see Figure 2).

Examination of a sorted two-way table (derived from clustering of species and quadrats) revealed central Kimberley springs were characterised by a large group of herbaceous taxa including *Eriocaulon inapertum, Fimbristylis tetragona, F. cephalophora, Germainia truncatiglume, Stylidium dunlopianum* and *Xyris complanata.* These springs support sedgeland and grasslands on organic soils distinct from the typically closed canopy Melaleuca dominated springs in the coastal Kimberley. Overstorey elements in the central Kimberley included *Banksia dentata*.

Springs in the north Kimberley (Carlton Hill) included a greater number of taxa typical of the high rainfall Kimberley including both wetland and rainforest elements of the flora (e.g. *Flagellaria indica, Carallia bracteata, Nauclea orientalis*) and occurrences of taxa that reach their distributional limit in the NE Kimberley (e.g. *Sterculia holtzei, Glochidion sumatranum, Mucuna gigantea*). Many of the springs in this region featured high groundwater discharge rates and included extensive aquatic habitats both within the central mound spring and periphery, as moats and outflow channels. These pools supported several aquatic taxa not recorded from springs elsewhere in the survey including *Ceratophyllum demersum, Hygrophila angustifolia, Nymphaea violacea* and *Utricularia aurea* (Figure 4).

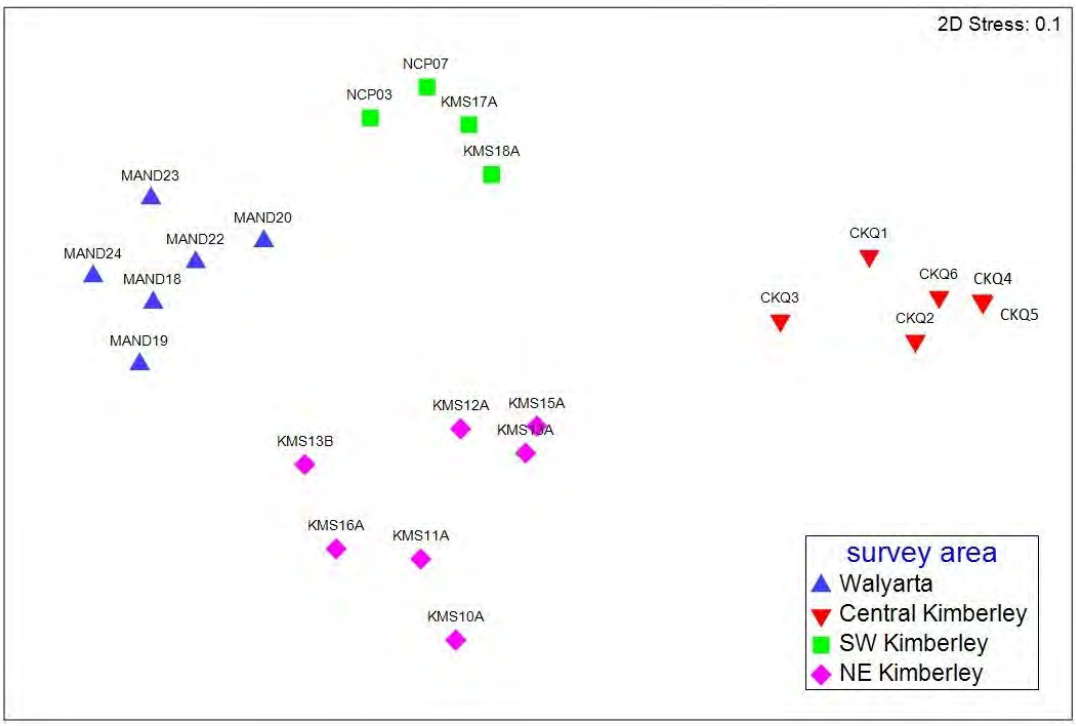

Figure 5. Two-dimensional nMDS ordination of organic mound spring floristic quadrats

Springs in the SW Kimberley on Dampier Peninsula and the eastern side of King Sound lacked the richness in aquatic species and many of the high rainfall rainforest elements recorded in the North Kimberley, although they do include SW outliers of some rainforest taxa including *Carallia brachiata, Nauclea orientalis,* and *Timonius timon.*

The high rainfall floristic elements of the Kimberley were absent from the mound springs at Walyarta (Mandora Marsh) (Markey, 2016). These springs included several riparian taxa more typical of the adjacent Pilbara IBRA region including *Acacia ampliceps*. Many springs were dominated by *Melaleuca alsophila Sesbania formosa,* and *Acrostichum speciosum.* Taxa recorded in the understorey and spring fringes e.g. *Eragrostis falcata,* and *Schoenoplectus subulatus* were not recorded at the sampled Kimberley Springs.

The flora of Kimberley organic mound springs is assembled from a pool of tropical taxa that occupy a range of mesic habitats across northern Australia. These elements include both wetland taxa, including aquatics, and components of the rainforest and vine-thicket flora. The proportion of these different floristic components at an individual spring is related to the hydrological and edaphic conditions at a given spring. Within the Kimberley further sampling and analysis is required to refine the very broad patterns revealed in the current study. Sampling of a broader array of springs types would enable the mound springs to be placed in context with other spring types within the Kimberley.

Damage by stock seeking shelter and water is a significant issue for Kimberley mound springs. In the current survey this was most evident at Carlton Hill sites in the north Kimberley (Figure 6).

Figure 6. Disturbance of springs by cattle at Carlton Hill. A, cattle entering core spring area seeking water cause compaction along trails; B, extensive pugging in areas that would be shallow pools.

3.4 References

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Appendix 2. Quadrat descriptions for floristic survey

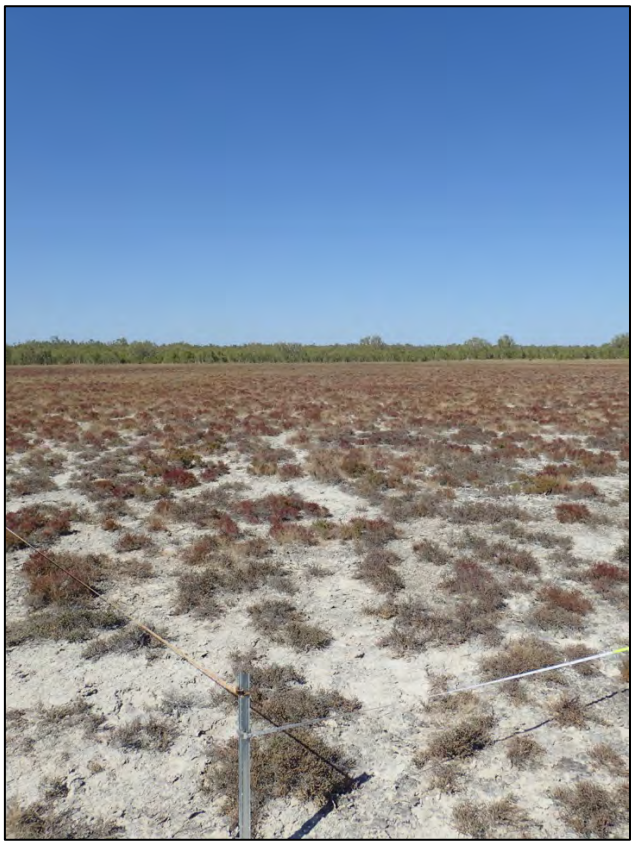
Vegetation quadrats sampled in 2017 & 2018 vegetation and flora surveys. Note quadrats NCP 1, 2 & NCP 4-6 are quadrats sampling vegetation peripheral to core spring habitats at Nimalarragun Wetland

Site: NCP01

Lat/Long (WGS 84): -17.773439°S 122.256313°E **Sample date:** 08-Mar-18

Region: Dampier peninsular. **Locality:** Nimalarragun claypan **Habitat:** Supra tidal flat

Vegetation: Low chenopod shrubland of *Tecticornia indica* subsp. *julacea* and *Tecticornia halocnemoides* subsp. *tenuis* over very open low grassland *of Eragrostis falcata*.



Species
Eragrostis falcata
Fimbristylis rara
Sporobolus virginicus
Tecticornia halocnemoides* subsp. *tenuis
Tecticornia indica* subsp. *julacea
Xerochloa imberbis

Site NCP02

Lat/Long (WGS 84):-17.773916°S 122.253968°E **Sample date:** 08-Mar-18

Region: Dampier peninsular **Locality:** Nimalarragun claypan **Habitat**: Supra tidal flat

Vegetation: Sparse tussock grassland of *Panicum decompositum* over low closed heathland/low closed shrubland of *Tecticornia indica* subsp. *julacea*, *Vincetoxicum carnosum* and *Hibiscus apodus*, over low sparse sedgeland of *Fimbristylis cymosa* and *Fimbristylis rara*.

Species	*Fimbristylis rara*	*Pluchea rubelliflora*
** Chloris barbata*	*Flaveria trinervia*	*Portulaca pilosa*
Vincetoxicum carnosum	*Gymnanthera oblonga*	*Sesbania cannabina*
Dactyloctenium radulans	*Hibiscus apodus*	*Sesuvium portulacastrum*
Ectrosia danesii	*Melaleuca alsophila*	*Stemodia florulenta*
Euphorbia **aff.** *hassallii*	*Panicum decompositum*	*Tecticornia* **indica subsp.** *julacea*
Fimbristylis cymosa	*Phyla nodiflora*	

Site: NCP04

Lat/Long (WGS 84):-17.768746°S 122.256750°E **Sample date:** 09-Mar-18

Region: Dampier peninsular **Locality**: Nimalarragun claypan **Habitat:** Spring margin

Vegetation: Low woodland of *Melaleuca alsophila* over low isolated trees of *Timonius timon* over low sedgeland of *Fimbristylis cymosa* and a low grassland of *Sporobolus mitchellii*.

Species
Ammannia baccifera
Bergia ammannioides
Eragrostis cumingii
Euphorbia hirta
Ficus aculeata* var. *indecora
Fimbristylis cymosa
Fimbristylis polytrichoides
Flueggea virosa* subsp. *melanthesoides
Gymnanthera oblonga
Hibiscus apodus
Melaleuca alsophila
Panicum mindanaense
Phyllanthus maderaspatensis
Sesbania cannabina
Sporobolus australasicus
Tamarindus indica
Vincetoxicum carnosum

Site: NCP05

Lat/Long (WGS 84):-17.781169°S 122.259328°E **Sample date:** 09-Mar-18

Region: Dampier peninsular **Locality:** Nimalarragun claypan **Habitat:** Upland spring margin

Vegetation: Low woodland of *Melaleuca alsophila* over tall sparse shrubland of *Acacia colei* var. *colei* over low isolated shrubs of *Hibiscus panduriformis, Vincetoxicum carnosum* and *Gymnanthera oblonga* over isolated grasses and sedges of *Panicum mindanaense* and *Fimbristylis* sp.

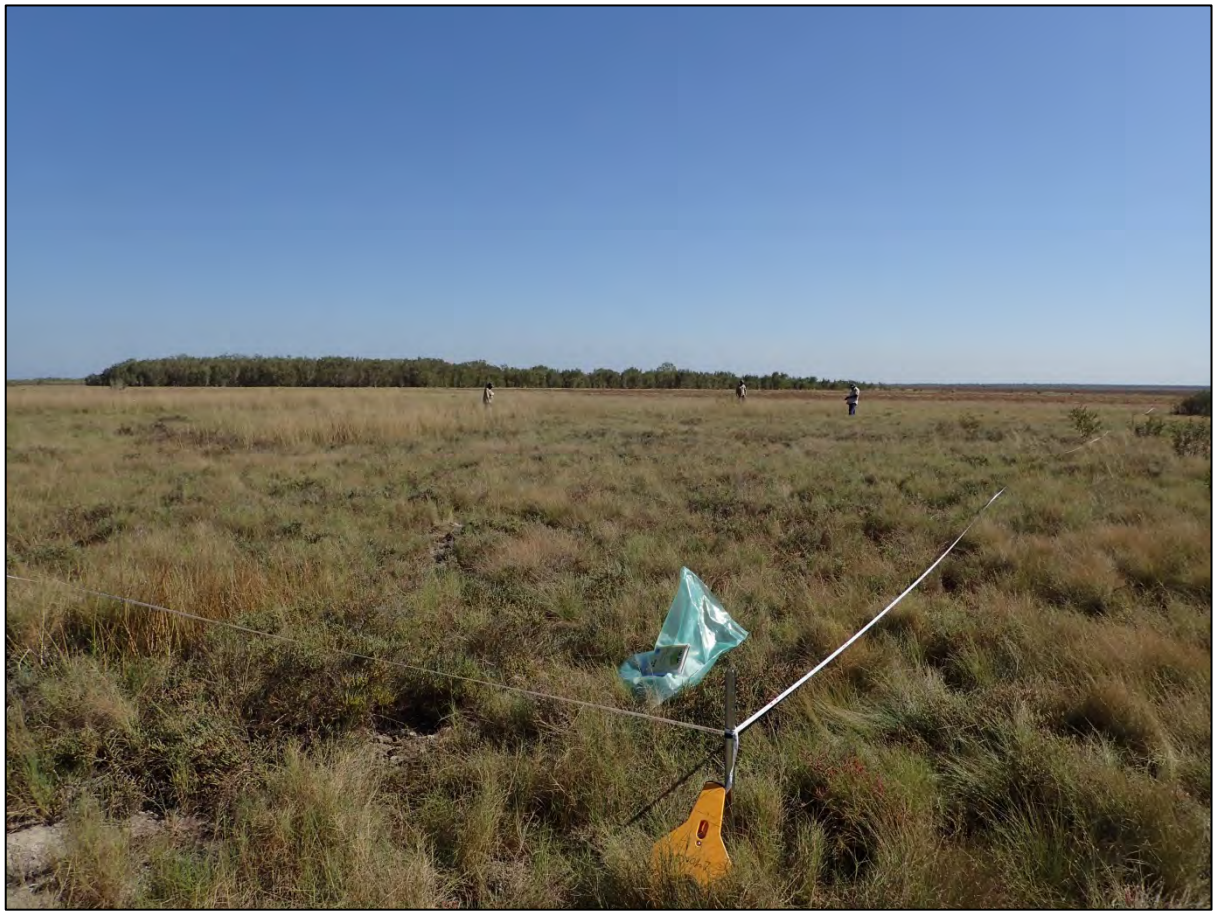
Species
Acacia colei* var. *colei
Atalaya hemiglauca
****Azadirachta indica***
Blumea sp. indet.
Brachychiton diversifolius
Calandrinia tepperiana
***Chrysopogon sp.* indet.**
Corchorus aestuans
Digitaria bicornis
Eragrostis cumingii
Euphorbia hirta
Fimbristylis polytrichoides
Grewia breviflora
Gymnanthera oblonga
Hibiscus apodus
Melaleuca alsophila
Panicum mindanaense
****Passiflora foetida var. hispida***
Phyllanthus maderaspatensis
Rhynchosia minima
Sesbania cannabina
Setaria surgens
Sporobolus australasicus
Thaumastochloa pubescens
Timonius timon
Tinospora smilacina
Vincetoxicum carnosum

Site NCP06

Lat/Long (WGS 84): -17.780197°S 122.249588°E **Sample date:** 10-Mar-19

Region: Dampier peninsular **Locality:** Nimalarragun claypan **Habitat:** Supra-tidal flat

Vegetation: Isolated clumps of grasses of *Panicum decompositum* with emergent *Melaleuca alsophila* over low sparse chenopod shrubland of *Tecticornia indica* subsp. *julacea*.



Species
Diplachne fusca subsp. fusca
Fimbristylis cymosa
Fimbristylis polytrichoides
Fimbristylis rara
Gymnanthera oblonga
Hibiscus apodus
Melaleuca alsophila
Panicum decompositum
Phyla nodiflora
Pluchea rubelliflora
Schoenoplectus subulatus
Sesbania cannabina
Sesuvium portulacastrum
Sporobolus virginicus
Tecticornia indica* subsp. *julacea
Vincetoxicum carnosum

Site NCP03

Lat/Long (WGS 84): -17.781576°S 122.263149°E **Sample date:** 08-Mar-19

Region: Dampier peninsular. **Locality:** Nimalarragun claypan **Habitat:** Spring riparian margin.

Vegetation: Open forest of *Melaleuca cajuputi* over sparse fernland of *Acrostichum speciosum*, over low sparse sedgeland of *Fimbristylis cymosa*, *Fimbristylis polytrichoides* and *Sporobolus mitchellii*.

Species
Ceratophyllum demersum
Chloris barbata
Eragrostis cumingii
Fimbristylis cymosa
Fimbristylis ferruginea
Fimbristylis polytrichoides
Gymnanthera oblonga
Hibiscus apodus
Landoltia punctata
Melaleuca alsophila
Melaleuca cajuputi
****Passiflora foetida var. hispida***
Sporobolus mitchellii
Vincetoxicum carnosum

Site NCP07

Lat/Long (WGS 84): -17.781518°S 122.268472°E **Sample date:** 08-Mar-19

Region: Dampier peninsular. **Locality:** Nimalarragun claypan **Habitat:** Mound Spring

Vegetation: Open forest of *Melaleuca cajuputi* over woodland of *Timonius timon*, over fernland of *Acrostichum speciosum*

Species
Acacia colei* var. *colei
Acrostichum speciosum
Fimbristylis ferruginea
Gymnanthera oblonga
Melaleuca cajuputi
Pandanus spiralis
****Passiflora foetida* var. *hispida***
Schoenoplectus subulatus
Timonius timon

Site KMS10A

Lat/Long (WGS 84): -14.902755°S 128.704084°E **Sample date:** 04-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Un-named spring **Habitat:** Mound spring

Vegetation: Tall open forest of *Melaleuca leucadendra* over vineland of Apocynaceae spp. and *Flagellaria indica*, over low open vines of *Flagellaria indica* over low open fernland of *Cyclosorus interruptus*.

Species
Colocasia esculenta* var. *aquatilis
Cyclosorus interruptus
Flagellaria indica
Glochidion sumatranum
Marsilea crenata
Melaleuca leucadendra
Merremia gemella
Mucuna gigantea* subsp. *gigantea
Scleria lingulata
Sterculia holtzei

Site KMS11A

Lat/Long (WGS 84): -14.896823°S 128.684779°E **Sample date** 01-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Attack Spring **Habitat:** Mound spring

Tall open forest of *Melaleuca leucadendra* over low isolated vines of *Flagellaria indica* over tall isolated sedges of *Typha domingensis* over isolated clumps of sedges and ferns of *Cyperus platystylis* and *Cyclosorus interruptus*.

Species
Ceratophyllum demersum
Cyclosorus interruptus
Cyperus platystylis
Fimbristylis cymosa
Flagellaria indica
Fuirena ciliaris
Glochidion sumatranum
Lemna aequinoctialis
Melaleuca leucadendra
Persicaria subsessilis
Scleria lingulata
Typha domingensis
Utricularia aurea

Site KMS11B

Lat/Long (WGS 84): -14.896382°S 128.685083°E **Sample date:** 02-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Attack Spring **Habitat:** Supra-tidal margin of mound spring

Low isolated trees of *Melaleuca alsophila* over tall shrubland of *Melaleuca alsophila* over low open sedgeland of *Cyperaceae sp.* indet.

Species
Melaleuca alsophila
Sporobolus sp. indet.
Xerochloa imberbis

Site KMS12A

Lat/Long (WGS 84): -14. 880484°S 128. 676647°E **Sample date:** 02-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Un-named spring **Habitat: M**ound spring

Vegetation: Open forest of *Melaleuca leucadendra* over low woodland of *Timonius timon* and *Melochia* sp. over low sparse vineland of *Flagellaria indica* and sparse sedgeland of *Cyperus haspan* and *Cyperus javanicus* over low isolated clumps of ferns of *Cyclosorus interruptus*.

Species
Abutilon indicum* var. *australiense
Acrostichum speciosum
Adenostemma lavenia* var. *lanceolatum
Calotropis procera
Cayratia trifolia
Ceratopteris thalictroides
Cyclosorus interruptus
Cyperus haspan* subsp. *juncoides
Cyperus javanicus
Decaisnina angustata
Ficus racemosa
***Fimbristylis sp.* (PERTH - M.N. Lyons & J. Pryde KMS 039)**
Flagellaria indica
Fuirena ciliaris
Glochidion sumatranum
Hibiscus tiliaceus
Ludwigia octovalvis
Luffa sp.
Melaleuca leucadendra
Mucuna gigantea* subsp. *gigantea
Vincetoxicum carnosum

Site KMS13A

Lat/Long (WGS 84): -14. 902392°S 128. 660870°E **Sample date:** 03-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Long Spring (Swamp) southern extension.

Habitat: Mound spring

Vegetation: Tall open forest of *Melaleuca leucadendra* over low open woodland of *Sterculia holtzei* and *Nauclea orientalis* over low isolated palms of *Pandanus spiralis* over tall isolated sedges of *Typha domingensis* over emergent ferns and isolated aquatics of *Cyclosorus interruptus* and *Nymphaea violacea.*

Species
Carallia brachiata
Ceratopteris thalictroides
Cyclosorus interruptus
Cyperus javanicus
Eleocharis geniculata
Flagellaria indica
Glochidion disparipes
Hygrophila angustifolia
Melaleuca leucadendra
Nymphaea violacea
Pandanus spiralis
Sterculia holtzei
Timonius timon
Typha domingensis
Utricularia aurea

Site KMS13B

Lat/Long (WGS 84): -14. 896122°S 128. 661569°E **Sample date:** 03-Aug-17

Region: North Kimberley - Carlton Hill**. Locality:** Un-named spring **Habitat**: Mound spring

Vegetation: Woodland of *Melaleuca leucadendra* over tall rushland of *Typha domingensis*.

Species
Cyperus platystylis
Melaleuca leucadendra
Paspalum scrobiculatum
Typha domingensis
Vincetoxicum carnosum

Site KMS14A

Lat/Long (WGS 84): -14. 881075°S 128. 559330°E **Sample date:** 04-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Un-named spring **Habitat:** Brackish wetland on supra-tidal flat.

Vegetation: Low open forest of *Melaleuca alsophila, Lumnitzera racemosa* and *Thespesia populneoides* over low isolated clumps of sedges of *Fimbristylis* sp. and Malvaceae sp., over low isolated tussock grassland of *Panicum seminudum* var*. seminudum*

Species
Vincetoxicum carnosum
Excoecaria ovalis
Lumnitzera racemosa
Melaleuca alsophila
Panicum seminudum* var*. seminudum
Schoenoplectus subulatus
***Sporobolus sp.* indet.**
Thespesia populneoides
Vincetoxicum carnosum

Site KMS15A

Lat/Long (WGS 84): -14. 912050°S 128. 593906°E **Sample date:** 04-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** King Gordon Spring **Habitat:** Mound spring

Vegetation: Tall woodland of *Melaleuca leucadendra* over low woodland of *Nauclea orientalis* and *Pandanus spiralis* over low isolated vines of *Flagellaria indica* over isolated clumps of forbs of *Adenostemma lavenia* var. *lanceolatum* over low sparse sedgeland of *Fimbristylis* sp. (M.N. Lyons & J. Pryde KMS 039).

Species
Acacia neurocarpa
Adenostemma lavenia var. lanceolatum
Carallia brachiata
Ceratopteris thalictroides
Cyperus sp. indet.
Fimbristylis sp. (*M.N. Lyons & J. Pryde KMS 039*)
Flagellaria indica
Hygrophila angustifolia
Ludwigia octovalvis
Luffa aegyptiaca
Melaleuca leucadendra
Monochoria vaginalis
Nauclea orientalis
Nymphaea violacea
Pandanus spiralis
Timonius timon
Typha domingensis
Utricularia aurea

Site KMS16A

Lat/Long (WGS 84): -14. 907897°S 128. 622158°E **Sample date:** 04-Aug-17

Region: North Kimberley - Carlton Hill. **Locality:** Bamboo Spring **Habitat:** Mound spring

Vegetation: Tall open forest of *Melaleuca leucadendra* over low isolated vine clumps of *Flagellaria indica* over low isolated clumps of ferns of *Acrostichum aureum* and *Typha domingensis* over isolated clumps of aquatics *Nymphaea violacea* and *Ceratophyllum demersum*.

Species
Acrostichum aureum
Ceratophyllum demersum
Lemna aequinoctialis
Melaleuca leucadendra
Nymphaea violacea
Scleria lingulata
Typha domingensis

Site KMS17A

Lat/Long (WGS 84): -17.151627°S 122.318308 **Sample date** 07-Aug-17

Region: Dampier Peninsular **Locality:** Bunda Bunda Spring **Habitat:** Mound spring

Vegetation: Closed forest of *Carallia brachiata* and *Sesbania formosa* over isolated trees of *Sesbania formosa* over low isolated trees of *Timonius timon* over low fernland of *Cyclosorus interruptus*, *Acrostichum speciosum* and *Lygodium microphyllum*.

Species
Acrostichum speciosum
Carallia brachiata
Cassytha filiformis
Cyclosorus interruptus
Gymnanthera oblonga
Lumnitzera racemosa
Lygodium microphyllum
Mallotus nesophilus
Melaleuca cajuputi
Musa acuminata
****Passiflora foetida* var. *hispida***
Sesbania formosa
Timonius timon

Site KMS18A

Lat/Long (WGS 84): -16.978531°S 123.952859°E **Sample date:** 08-Aug-17

Region: Dampier peninsular **Locality:** Big Spring **Habitat:** Mound spring

Vegetation: Tall woodland of *Melaleuca leucadendra* over woodland of *Terminalia microcarpa*, *Sesbania formosa* and *Nauclea orientalis* over tall sparse fernland of *Lygodium microphyllum* over low woodland of *Pandanus spiralis* over tall sparse fernland *of Acrostichum speciosum*.

Species
Acrostichum speciosum
Bauhinia cunninghamii
Carallia brachiata
Ceratophyllum demersum
Ceratopteris thalictroides
Echinochloa colona
Eleocharis spiralis
Ficus aculeata var. *indecora*
Ficus virens
Ficus virens var. *virens*
Fimbristylis cymosa
Fimbristylis ferruginea
Fimbristylis littoralis
Fuirena umbellata
Gymnanthera oblonga
Lemna aequinoctialis
Lygodium microphyllum
Marsilea hirsuta
Melaleuca cajuputi
Nauclea orientalis
Pandanus spiralis
**Passiflora foetida* var. *hispida*
Schoenoplectiella mucronata
Stenochlaena palustris
Sesbania formosa
Terminalia microcarpa
Vincetoxicum carnosum

Appendix 3. Flora species list tabulated to show taxa occurrences by region and habitat.

List includes quadrat records and non-quadrat collections. Non-native taxa are annotated with *

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
Acanthaceae		Hygrophila angustifolia			1		1	
Aizoaceae		Sesuvium portulacastrum				1		1
Apocynaceae		Calotropis procera			1	1	1	1
		Gymnanthera oblonga			1	1		1
		Vincetoxicum carnosum				1		1
Araceae		Colocasia esculenta var. aquatilis		Wild population (diminutive solitary tuber).	1		1	
		Landoltia punctata			1		1	
		Lemna aequinoctialis			1			1
Arecaceae	*	Phoenix dactylifera		Population recorded at Big Spring (KMS18A).	1			1
Asteraceae		Adenostemma lavenia var. lanceolatum	P3	Scattered distribution across northern Australia in springs and rainforest patches	1		1	1
		Blumea integrifolia				1		1
		Blumea saxatilis				1		1
	*	Flaveria trinervia				1	1	
		Pluchea rubelliflora				1		1
		Pterocaulon intermedium				1		1
Blechnaceae		Stenochlaena palustris				1		1
Boraginaceae		Heliotropium curassavicum				1	1	
Byblidaceae		Byblis filifolia				1	1	
Capparaceae		Capparis lasiantha				1	1	

Family	Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
Celastraceae	Stackhousia intermedia				1		1
Ceratophyllaceae	Ceratophyllum demersum			1		1	
Chenopodiaceae	Tecticornia halocnemoides subsp. tenuis				1		1
	Tecticornia indica subsp. julacea				1	1	
	Tecticornia indica subsp. leiostachya				1	1	
	Tecticornia pergranulata subsp. elongata				1	1	1
Combretaceae	Lumnitzera racemosa			1	1		1
	Terminalia microcarpa			1		1	1
Convolvulaceae	Merremia gemella			1		1	1
	Merremia gemella				1		1
	Xenostegia tridentata				1	1	
Cucurbitaceae	Cucumis melo				1	1	1
	Luffa aegyptiaca			1			1
	Luffa saccata			1			1
Cyperaceae	Bulbostylis barbata				1		1
	Cyperus bifax				1		1
	Cyperus conicus				1	1	
	Cyperus cunninghamii subsp. cunninghamii				1	1	
	Cyperus haspan				1	1	1
	Cyperus haspan subsp. juncoides			1			1
	Cyperus javanicus			1		1	1
	Cyperus platystylis		3rd WA record, at western distributional limit near Kununurra and Carlton Hill	1	1	1	
	Eleocharis geniculata			1			1
	Eleocharis spiralis			1		1	1
	Eleocharis sundaica				1		1
	Fimbristylis cymosa			1	1		1

Family	Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
	Fimbristylis ferruginea			1			1
	Fimbristylis littoralis			1			1
	Fimbristylis polytrichoides			1	1	1	
	Fimbristylis rara				1		1
	Fimbristylis sp. (M.N. Lyons & J. Pryde KMS039)		matches PERTH Colln. (AA Mitchell 7822)	1			1
	Fuirena ciliaris			1			1
	Fuirena umbellata			1		1	
	Schoenoplectiella mucronata			1			1
	Schoenoplectus subulatus			1	1		1
	Scleria lingulata			1		1	
Droseraceae	Drosera broomensis				1		1
Elatinaceae	Bergia ammannioides				1		1
Euphorbiaceae	Euphorbia aff. hassellii				1	1	
	Euphorbia hirta				1		1
	Excoecaria agallocha				1	1	
	Excoecaria ovalis				1	1	1
	Mallotus nesophilus			1		1	1
Fabaceae	Acacia ampliceps				1		1
	Acacia colei var. colei			1	1	1	
	Acacia holosericea				1	1	1
	Acacia neurocarpa			1	1		1
	Bauhinia cunninghamii			1			1
	Canavalia papuana				1	1	
	Cathormion umbellatum subsp. moniliforme				1		1
	Chamaecrista absus				1		1
	Desmodium filiforme				1		1
	Dichrostachys spicata				1		1

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
		Indigofera colutea				1	1	
		Mucuna gigantea subsp. gigantea			1		1	
	*	Parkinsonia aculeata				1	1	
		Rhynchosia minima				1		1
		Sesbania cannabina				1		1
		Sesbania formosa			1			1
	*	Stylosanthes hamata				1	1	1
	*	Stylosanthes scabra				1	1	
	*	Tamarindus indica				1	1	
		Vigna radiata var. sublobata				1		1
		Zornia muelleriana subsp. congesta				1	1	
Flagellariaceae		Flagellaria indica			1		1	
Hydrocharitaceae		Najas tenuifolia			1		1	
Lauraceae		Cassytha filiformis			1		1	
Lentibulariaceae		Utricularia aurea	P2	At western limit of distribution in Kimberley with unconfirmed Pilbara outlier	1			1
Loranthaceae		Decaisnina angustata			1			1
Lygodiaceae		Lygodium microphyllum			1			1
Lythraceae		Ammannia baccifera				1		1
Malvaceae		Abutilon indicum var. australiense			1		1	
		Brachychiton diversifolius				1		1
		Corchorus aestuans				1	1	
		Grewia breviflora				1		1
		Hibiscus apodus			1	1	1	
		Hibiscus tiliaceus			1		1	
		Melochia corchorifolia				1		1
		Sida acuta var. acuta				1		1

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
		Sterculia holtzei	P1	Only WA occurrence, core distribution in NT	1			1
		Thespesia populneoides				1		1
		Urena lobata				1	1	1
		Waltheria indica				1	1	1
Marsileaceae		Marsilea crenata			1		1	
		Marsilea hirsuta			1		1	
Meliaceae	*	Azadirachta indica		On the margins of Nimalarragan wetland		1		1
Menispermaceae		Tinospora smilacina				1		1
Montiaceae		Calandrinia tepperiana				1		1
Moraceae		Ficus aculeata var. indecora			1	1		1
		Ficus hispida var. hispida				1		1
		Ficus racemosa			1			1
		Ficus virens			1			1
		Ficus virens var. virens			1			1
Musaceae	*	Musa acuminata		Recorded at Bunda Bunda likely historical planting.	1			1
Myrtaceae		Corymbia bella				1	1	1
		Corymbia opaca				1		1
		Corymbia paractia	P1	Margin of Nimalarragan wetland at interface with Pindan		1	1	
		Eucalyptus microtheca				1		1
		Melaleuca alsophila			1	1		1
		Melaleuca cajuputi			1			1
		Melaleuca dealbata				1		1
		Melaleuca leucadendra			1	1	1	
		Melaleuca nervosa				1		1

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
		Melaleuca viridiflora				1		1
Nymphaeaceae		Nymphaea violacea			1		1	1
Onagraceae		Ludwigia octovalvis			1		1	
Orobanchaceae		Buchnera asperata				1		1
		Buchnera linearis				1	1	1
		Buchnera ramosissima				1	1	1
Pandanaceae		Pandanus spiralis			1	1		1
Passifloraceae	*	Passiflora foetida var. hispida			1	1	1	
Phrymaceae		Uvedalia linearis var. lutea				1		1
Phyllanthaceae		Flueggea virosa subsp. melanthesoides				1	1	1
		Glochidion disparipes			1			1
		Glochidion sumatranum			1			1
		Phyllanthus maderaspatensis				1		1
Picrodendraceae		Petalostigma pubescens				1	1	
Plantaginaceae		Stemodia florulenta				1		1
Plumbaginaceae		Plumbago zeylanica				1		1
Poaceae		Aristida hygrometrica				1	1	
		Arundinella nepalensis				1		1
	*	Cenchrus ciliaris				1	1	
	*	Cenchrus setigera				1		1
	*	Chloris barbata			1	1	1	
		Chrysopogon pallidus				1	1	
		Cynodon dactylon				1	1	1
		Dactyloctenium radulans				1		1
		Digitaria bicornis				1	1	
		Diplachne fusca subsp. fusca				1	1	
		Echinochloa colona			1			1
		Ectrosia danesii				1		1

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
		Eragrostis cumingii			1	1	1	
		Eragrostis falcata				1	1	
		Eriachne obtusa				1		1
		Panicum decompositum				1		1
		Panicum mindanaense				1	1	
		Panicum seminudum var. seminudum				1		1
	*	Paspalum distichum				1	1	1
		Paspalum scrobiculatum			1	1	1	
		Phragmites karka			1		1	
		Schizachyrium fragile				1		1
		Setaria surgens				1		1
		Sorghum stipoideum				1	1	
		Sporobolus australasicus				1	1	
		Sporobolus mitchellii			1			1
		Sporobolus virginicus				1		1
		Thaumastochloa pubescens				1	1	1
		Xerochloa imberbis				1	1	1
Polygonaceae		Persicaria subsessilis			1			1
Pontederiaceae		Monochoria vaginalis			1		1	
Portulacaceae	*	Portulaca pilosa				1	1	
Pteridaceae		Acrostichum aureum	P1	Recorded at Bamboo Spring (KMS16A) with a previous collection from Big Spring (KMS18A)	1		1	
		Acrostichum speciosum			1			1
		Ceratopteris thalictroides			1		1	1
Rhizophoraceae		Carallia brachiata			1		1	1
		Rhizophora stylosa				1		1
Rubiaceae		Nauclea orientalis			1		1	1

Family		Taxon	Conservation code	Taxon comments	Mound Springs	Peripheral to Mound Springs	North Kimberley - Carlton Hill	West Kimberley – Dampier Peninsular and King Sound
		Oldenlandia mitrasacmoides				1		1
		Spermacoce dolichosperma				1	1	
		Timonius timon			1	1	1	1
Sapindaceae		Atalaya hemiglauca				1		1
Solanaceae	*	Physalis angulata				1		1
Stylidiaceae		Stylidium pindanicum	P3	Pindan fringing coastal flats		1		1
Thelypteridaceae		Cyclosorus interruptus			1			1
Typhaceae		Typha domingensis			1	1		1
Verbenaceae		Phyla nodiflora		Northern Australian clade regarded as native	1	1		1
Vitaceae		Cayratia trifolia			1		1	