Cape Range Bush Blitz

Vascular Plants

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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

FloraBase the West Australian Flora

https://florabase.dpaw.wa.gov.au

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List of contributors

List of contributors to this report.			
Name	**Institution/affiliation**	**Qualifications/area of expertise**	**Level/form of contribution**
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Abstract

During June 2019, the Cape Range Bush Blitz species discovery program vascular floristic team assessed and established a series of floristic quadrats in areas that were previously very difficult to access. These included areas throughout the RAAF Bombing range and Upper Yardie Creek. Due to the lack of rainfall prior to the expedition, many vascular plants were not in flower or had identifiable flowering structures. This impacted the quality of samples taken and the quantity of species identified. There was however the opportunity to collect the type collection of the endemic *Hibbertia* sp. Cape Range (Cape Range Buttercup) which now will be formally described. The compilation of materials for a field guide to the 21 endemic plants of Cape Range area was also expanded upon and there was also a large Range extension of *Daviesia pleurophylla* from the tip of the Cape to the RAAF Bombing Range. In addition to these successes the relict population of *Livistonia alfredii* was monitored and recommendations given for future management strategies.

1. Introduction

Although the area has had many visits by professional and amateur botanists over the last 50 years, Cape Range National Park and its surrounds have been previously poorly surveyed. In addition to this the area is very rugged and many areas are difficult to access, including the RAAF Bombing range.

The Biogeography of Cape Range Western Australia indicates that the peninsular has many species at their range ends, numerous endemics and a high diversity of vascular plants, indicating that many new records could be expected. Unfortunately, due to the lack of rainfall during the last year only a few species could be positively identified as having definitive range extension. This was as expected.

However, two as yet unnamed species were collected over multiple sites, which is promising. And many local species were identified bringing the total to 21 floristic species endemic to the Cape.

2. Methods

2.1 Site selection

Quadrats were selected to encompass the range of geologies, soil types and microhabitats that were being sampled by the WA Museum terrestrial zoologists (standard survey sites). These being SS1 and SS2. The SS2 site was sampled in two parts due to being located among the dunes and offering differing microhabitats. SS2 encompassed the floral composition along the pitfall traps installed by the faunal teams whereas SS2-Q2 surveyed an adjacent microhabitat along the dune ridge.

RA01 was randomly chosen due to being representative of the land scape and in the middle of the flat in between a dune and creek bed. This was accessed by vehicle with security escort where no surveys had previously been conducted. The sites DR02, DR03 and DR04 also required a security escort as well as being helicopter access only. These three sites were chosen as representative sites along the dune ridge, the swale and the slope connecting the two. These three sites come under the TZ11 proposed terrestrial site designated by the Bush Blitz team.

SSE was chosen to its proximity to the last remnant site of *L. alfredii*. It is an indicative overview of the majority of the landscape.

TZ9, located on a red dune, was also randomly chosen due to it being representative of the surrounding area. It was also chosen as an assumed local for Calytrix

TZ13 was chosen due to being a dune located on the western side of the cape and was also the local of other faunal collection teams.

TZ14 site was chosen as an opportunistic collection of specimens found growing around the only freshwater source found in the Cape. Helicopter access was required as the specimens were collected at the bottom of the gorge.

Sites SH01, SH02 and SH03 were sites randomly chosen along shot Gun Canyon road. These provided an opportunity to assess the biodiversity of representative points along a popular tourist route.

Additional opportunistic collection of selected species occurred where interesting and known priority species were identified or if the species were alien to the Cape Range region.

2.2 Survey techniques

Quadrats 20 x 20 meters in size were implemented for the majority of the sites, with methods listed below; or opportunistic collection of some species was implemented where it was either impractical to install a quadrat, or only one plant was able to be sampled.

2.2.1 Methods used at standard survey sites

At the two standard survey sites 20 x 20 quadrats were cordoned off using a measuring tape and an optical square. Once the edges of the square were marked, the flora was systematically catalogued from tallest species to shortest. Where applicable two or more representative samples were taken from each species. Collected specimens were coded and bagged. They were then pressed between paper and cardboard and dried for storage and identification.

Due to the lack of rainfall recorded prior to survey, many of the plant species taken displayed minimal to no observable floral structures. This in some cases led to an inability to positively ID some to a species level. It also limited the amount of ephemeral species in our selected areas.

If collection had occurred one to two months later in the year, it is presumed that more flowering species would have been identified.

2.3 Identifying the collections

After the specimens were dried and frozen at the WA Herbarium, they were transported to the reference herbarium where Identification was primarily conducted by Greg Keighery with assistance from Alice O'Connor and then catalogued by Kelly Lilburn. FloraBase: the West Australian Flora was used to confirm names along with The Australian Plant Name Index (APNI). Range extensions were confirmed by Greg Keighery.

A list collated from FloraBase (2019) about the Cape Range floristic assemblage assisted in confirming assorted cursory identifications. In addition to this the 'Biogeography and composition of the flora of the Cape Range' written by Greg Keighery and Neil Gibson (1993) assisted with potential range extensions and identifications.

3. Results and Discussion

Appendix 1 lists all vascular plants recorded during the Bush Blitz.

3.1 Un-named or not formalised taxa

Table 1. Putatively un-named or not formalised taxa	
Taxon	**Comment**
Calytrix sp. Learmonth	Locations established, cutting material collected
Hibbertia 'capensis'	Type collection made

3.2 Putative new 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.

Due to the lack of rainfall recorded prior to the collection of the specimens no definable putative species were identified.

Table 2. Putative new species (new to science)	
Species	**Comment**
None	Due to very dry conditions no new putative species were identified

3.3 Exotic and pest species

The old naval base contains a large range of introduced plants that are maintaining themselves or increasing. This is especially true of the trees and shrubs, several of which are not recorded as weedy in Cape Range or present in the area. When this site is redeveloped care should be taken in the disposal of removed vegetation. *Tecoma stans* is one of the introduced species located on the base.

Perhaps the most significant weed of the base area is the non-local form of *Albizzia lebbek* (native to Kimberley region of WA). This tree has fruited extensively and has spread outside the base to the west into the adjacent Bundegi coastal reserve, via the disturbance along a pipleline track. Plants of this species are fire resistant and taller than most surrounding vegetation and with a broad canopy will overshadow the native vegetation. This species should be removed from this reserve before it spreads further.

Cenchrus ciliaris, more commonly known as buffel grass, is an invasive species that is difficult to control once it has become established. Native to tropical and sub-tropical regions of Africa and western Asia, it is a hardy apomictic pastoral species used not only for grazing but occasionally for mine site rehabilitation and erosion control (Marshall, Lewis and Ostendorf, 2012). It is now commonly found throughout Australia due to being ideally suited to the harsh dry environments and can become a problem due to its invasiveness and its potential effect on biodiversity. While the levels of buffel grass recorded are not in high abundance and not cause for direct concern, if left unchecked with no future monitoring it can become problematic to control when in abundance. While the quadrats were limited to 20x 20 meter area, it is important to note that the sites chosen were indicative of the majority of the landscape. Therefore it can be extrapolated that the same amount of buffel can be found throughout the surrounding areas. TZ13 had the highest abundance of recorded invasion. It is recommended that this area be recorded for future monitoring. Site description and location can be found in Appendix 1.

Table 3. Exotic and pest species recorded			
Exotic/pest species	**Location sighted/observed**	**Indication of abundance**	**Comments**
Albizzia lebbek	Harold E. Holt, Coastal Reserve, Exmouth Townsite	Scattered to abundant	See comments
Aloe vera var *officinalis*	Exmouth Townsite, Harold E Holt	Vacant lots, abundant	Minor weed of station camps
Cenchrus ciliaris	SSE	*1%*	
Cenchrus ciliaris	SS2	*1%*	
Cenchrus ciliaris	SS2-Q2	*1%*	
Cenchrus ciliaris	TZ13	*<5%*	
Tecoma stans	Harold Holt Navy Base	Plants scattered around buildings	Known weed in tropics
Vitex trifoliata	Harold Holt Navy Base	Plants scattered around buildings	Known weed in tropics

3.4 Threatened species

Table 4. Threatened species			
Species	**Listing status and level (EBPC, State/Territory)**	**Location sighted/observed**	**Indication of abundance**
Calytrix sp. Learmonth (S. Fox EMopp 1)	P1	DR03	Uncommon
Calytrix sp. Learmonth (S. Fox EMopp 1)	P1	SSE	Uncommon
Calyxtrix sp. Learmonth (S. Fox Emopp 1)	P1	BB21-03	Uncommon
Calytrix sp. Learmonth (S. Fox EMopp 1)	P1	Dune 2 – BB21-01	Uncommon
Acacia ryaniana Maslin	P2	DR03	Common
Acacia ryaniana Maslin	P2	SS2Q2	Common
Acacia ryaniana Maslin	P2	SH03	Common
Daviesia pleurophylla Crisp	P2	Dune 1	Uncommon
Daviesia pleurophylla Crisp	P2	BB23-02	Uncommon
Stackhousia umbellata C.A.Gardner & A.S.George	P3	SH02	Common

3.5 Range extensions

Table 5. Range extensions or significant infill in distribution records for species			
Species	**Location sighted/observed**	**Distance from nearest known record (km)**	**Comments**
Acacia colei	Exmouth UCL	150	Not recorded from

			peninsular
Dactyloctenium radulans	Exmouth UCL	150	Not recorded from peninsular

3.6 Genetic information

No genetic sampling was undertaken for this study.

4. Information on species lists

Due to the lack of rainfall recorded prior to survey, many of the plant species taken displayed minimal to no observable floral structures. This in some cases led to an inability to positively ID some to a species level. It also limited the amount of ephemeral species in our selected areas. In addition to this it is unclear if any new species were found due to the poor conditions in which the specimens were collected.

5. Information for land managers

1. Monitoring of the relict population of the iconic Millstream Palm, *Livistonia alfredii*. Although not conservation listed, this population is of considerable historical and provenance value. The highly disjunct population of this species in Cape Range was visited and the number of live and dead plants recorded. At present only a single seedling of the eastern sub-population this population was alive, and this was in relatively poor condition. Unfortunately indicating that the population is effectively non-viable. A series of flood events appear to have affected the area which may the cause of the deaths of the adult plants. However, this seems an unusual cause, because plants in the Pilbara occur along watercourses subject to cyclonic floods. Although the population is in Cape Range National Park, the population is remote and difficult to access. A detailed report will be prepared for the managers of this species.

2. The Commonwealth Bombing Range was visited several times both on a general survey and establishing survey quadrats. In general the whole area was in excellent condition, with little evidence of feral herbivores or weeds. The range contained a large area of red sandplain and dunes which on our brief inspections contained many of the Cape Range Endemics (e.g. *Daviesia pleurophylla*) normally only found in the isolated dunes at the tip of the Cape. The area also contains many small limestone outcrops within this dune field which are not found elsewhere in the protected areas of Cape Range (Meisner, 2009). The varying amounts of sand overlying these outcrops or their lower slopes gives rise to variable habitats, including what appears to be the major habitat of *Calytrix* sp. Learmonth.

The quadrats established by ourselves, Gibson & Keighery (1993) and Meisner (2009) should enable a floristic comparison of the similarities and differences of these dunal systems. A comparison of the vertebrate faunas of the northern and southern dunes has shown that they are dissimilar.

Finally a series of species appear to be only found on the peninsular on these southern dunes, e.g. *Eucalyptus eudesmoides*, *Calothamnus oldfieldii* and *Mirbelia* sp. Carnarvon (JS Beard 6008). A more detailed flora survey during a “better” season would be illuminating.

The high quality of the Defence sandplain would form a very significant addition to the National Park, if defence wishes to relinquish this area. However, their management is currently endorsed.

3. The lower slopes of the Range on the eastern side of the Range is currently entirely outside the protected system. We located populations of many Cape Range endemics in the lower creek systems and the vegetation/floristics of this habit are very different to that of the main

range. This rocky area seems to be of limited use to Exmouth Gulf Station. If at all possible an extension of the National Park to at least the main road between Charles Knife Road and Shothole Canyon would be very desirable.

4. The permanent fresh water wetland upstream of the Yardie Creek estuary in the national park is a unique habitat for plants and animals. A quadrat was established to document the vegetation of this wetland. The whole Yardie Creek System appears to contain many unusual habitats and should be listed as a wetland of national significance.

5. The deep canyons of the northern portion of the range are also a unique poorly understood habitat. These canyons are difficult to access, but have deeper soils, increased runoff, shelter from intense solar radiation and probably less frequent intense fires. There are a number of highly disjunct rarely recorded vascular plant taxa that have been sporadically recorded in such areas, ,e.g. *Melaleuca bracteata* from Shothole canyon, *Diplolaena grandiflora* from upper Yardie Creek (collected 1956 then 2017) and *Sowerbaea laxiflora* recorded near Mount King in 1956 and not re-located since. These difficult to access areas require careful fire planning and further survey.

6. The northern sandplains UCL between the lighthouse and the Harold E Holt Base should be added to the National Park.

6. Other significant findings

We found that populations of the new *Hibbertia* species on the main range and to the south have some significant differences. Those on the massive limestones are tall open robust multi-stemmed large leaved shrubs that were in full flower. However, those from the southern portion of the species range on red sands over limestone or on deeper red sands were slender multi-stemmed low, small leaved shrubs that were not in flower or bud. We are not able at present to understand how taxonomically significant these differences are.

7. Conclusions

We established a series of floristic quadrats in areas that were previously very difficult to access (Upper Yardie Creek and the RAAF Bombing Range). These will be added to Nature Map along with the other quadrats collected on the peninsular. We were able to collect the type collection of the endemic *Hibbertia* sp. Cape Range (Cape Range Buttercup) which now will be formally described.

We were also able to compile some materials for a field guide to the 21 endemic plants of Cape Range area. This will be concluded when we are able to access flowering material next year hopefully.

We were able to monitor the relict population of *Livistonia alfredii*, and list a series of recommendations to increase the size of Cape Range National Park to include the eastern slopes of the range, northern sandplain and to encourage the Department of Defence to continue managing the large area of southern sandplain.

Acknowledgements

Thanks to all the other participants, the BHP volunteers and especially the cook. We would also like to acknowledge the fantastic logistical job undertaken by the Bush Blitz crew.

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Appendices

Appendix 1. List of Vascular plants recorded during the Cape Range Bush Blitz

Acanthaceae	*Dicladanthera forrestii F.Muell.*
Apocynaceae	*Cynanchum viminale subsp. australe (R.Br.) Meve & Liede*
Apocynaceae	*Marsdenia australis (R.Br.) Druce*
Asparagaceae	*Acanthocarpus verticillatus A.S.George*
Asparagales	*Acanthocarpus humilis A.S.George*
Asphodelaceae	*Aloe vera var. officinalis (Forssk.) Baker*
Asteraeae	*Olearia sp ? Damperii*
Asteraeae	*Olearia sp. Kennedy Range (G. Byrne 66)*
Asteraeae	*Pluchea dentex Benth.*
Bignoniaceae	*Tecoma stans (L.) Kunth*
Boraginaceae	*Halgania cyanea Lindl.*
Borgaginaceae	*Heliotropium ovalifolium Forssk.*
Borgaginaceae	*Trichodesma zeylanicum (Burm.f.) R.Br.*
Celastraceae	*Stackhousia umbellata C.A.Gardner & A.S.George*
Chenopodiaceae	*Dysphania cristata (F.Muell.) Mosyakin & Clemants*
Chenopodiaceae	*Rhagodia preissii subsp. obovata (Moq.) Paul G.Wilson*
Chenopodiaceae	*Threlkeldia diffusa R.Br.*
Colchicaceae	*Wurmbea odorata T.Macfarlane*
Commelinaceae	*Commelina ensifolia R.Br.*
Convolvulaceae	*Ipomoea yardiensis A.S.George*
Convolvulaceae	*Ipomoea costata Benth.*
Convolvulaceae	*Ipomoea muelleri Benth.*
Cyperaceae	*Cyperus vaginatus R.Br.*
Dilleniaceae	*Hibbertia "capensis'*
Dilleniaceae	*Hibbertia spicata F.Muell.*
Euphorbiaceae	*Euphorbia drummondii Boiss.*
Euphorbiaceae	*Euphorbia boophthona C.A.Gardner*
Fabaceae	*Acacia arida Benth.*
Fabaceae	*Acacia coriacea DC.*
Fabaceae	*Acacia coriacea DC. subsp. Coriacea*
Fabaceae	*Acacia gregorrii F.Muell.*
Fabaceae	*Acacia ligulata Benth.*
Fabaceae	*Acacia ryaniana Maslin*
Fabaceae	*Acacia sclerosperma F.Muell.*
Fabaceae	*Acacia arida Benth.*
Fabaceae	*Acacia bivenosa DC.*
Fabaceae	*Acacia colei Maslin & L.Thomson var. colei*
Fabaceae	*Acacia pyrifolia DC.*
Fabaceae	*Acacia spathulifolia Maslin*
Fabaceae	*Acacia stellaticeps Kodela, Tindale & D.A.Keith*
Fabaceae	*Acacia tetragonophylla F.Muell.*
Fabaceae	*Albizia lebbeck (L.) Benth.*
Fabaceae	*Crotalaria cunninghamii R.Br.*

Fabaceae	*Daviesia pleurophylla Crisp*
Fabaceae	*Indigofera bivoperda Morrison*
Fabaceae	*Indigofera boviperda Morrison subsp. boviperda*
Fabaceae	*Indigofera chamaeclada subsp. pubens Peter G.Wilson & Rowe*
Fabaceae	*Leptosema macrocarpum (Benth.) Crisp*
Fabaceae	*Rhynchosia minima (L.) DC.*
Fabaceae	*Senna glutinosa (DC.) Randell*
Fabaceae	*Swainsona formosa (G.Don) Joy Thomps.*
Fabaceae	*Swainsona formosa (G.Don) Joy Thomps.*
Geraniaceae	*Erodium cygnorum Nees*
Goodeniaceae	*Dampiera incana R.Br.*
Goodeniaceae	*Goodenia cusackiana (F.Muell.) Carolin*
Goodeniaceae	*Scaevola cunninghamii DC.*
Goodeniaceae	*Scaevola tomentosa Gaudich*
Goodeniaceae	*Scaevola spinescens R.Br.*
Gyrostemonaceae	*Gyrostemon ramulosus Desf.*
Hemerocallidaceae	*Tricoryne corynothecoides Keighery*
Lamiaceae	*Clerodendrum tomentosum var. lanceolatum (F.Muell.) Munir*
Lamiaceae	*Quoya loxocarpa (F.Muell.) B.J.Conn & Henwood*
Lamiaceae	*Vitex trifolia L.*
Loranthaceae	*Amyema preissii (Miq.) Tiegh.*
Malvaceae	*Brachychiton gregorii F.Muell.*
Malvaceae	*Hannafordia quadrivalvis F.Muell.*
Malvaceae	*Hannafordia quadrivalvis subsp. recurva C.F.Wilkins*
Malvaceae	*Hibiscus sturtii Hook.*
Malvaceae	*Hibiscus sturtii var. truncatus Fryxell*
Myrtaceae	*Beaufortia sprengelioides (DC.) Craven*
Myrtaceae	*Calothamnus borealis Hawkeswood subsp. Borealis*
Myrtaceae	*Calytrix sp. Learmonth (S. Fox EMopp 1)*
Myrtaceae	*Corymbia opaca (D.J.Carr & S.G.M.Carr) K.D.Hill & L.A.S.Johnson*
Myrtaceae	*Eucalyptus xerothermica L.A.S.Johnson & K.D.Hill*
Myrtaceae	*Melaleuca cardiophylla F.Muell*
Myrtaceae	*Thryptomene dampieri Rye*
Olacaceae	*Jasminum didymum G.Forst.*
Olacaceae	*Olax aurantia A.S.George*
Pittosporaceae	*Pittosporum phillyreoides DC.*
Plantaginaceae	*Stemodia sp. Carnarvon (W.R. Barker 2154)*
Plumbaginaceae	*Plumbago zeylanica L.*
Poaceae	*Cenchrus ciliaris L.*
Poaceae	*Eragrostis lanipes C.E.Hubb.*
Poaceae	*Erogrostus sp.*
Poaceae	*Paspalidium clementii (Domin) C.E.Hubb.*
Poaceae	*Spinifex longifolius R.Br.*
Poaceae	*Triodia angusta N.T.Burb.*
Poaceae	*Triodia basedowii E.Pritz*
Poaceae	*Triodia epactia S.W.L.Jacobs*
Poaceae	*Triodia wiseana C.A.Gardner*

Proteaceae	*Banksia ashbyi subsp. boreoscaia A.S.George*
Proteaceae	*Grevillea eriostachya Lindl.*
Proteaceae	*Grevillea stenobotrya F.Muell*
Proteaceae	*Grevillea variifolia C.A.Gardner & A.S.George subsp. variifolia*
Proteaceae	*Grevillea variifolia subsp. bundera Keighery*
Proteaceae	*Grevillea eriostachya Lindl.*
Proteaceae	*Grevillea stenobotrya F.Muell.*
Proteaceae	*Hakea stenophylla R.Br.*
Proteaceae	*Hakea lorea (R.Br.) R.Br. subsp. lorea*
Proteaeceae	*Banksia ashbyi Baker f.*
Santalaceae	*Exocarpos sparteus R.Br.*
Santalaceae	*Exocarpus aphyllus R.Br.*
Santalaceae	*Santalum spicatum (R.Br.) A.DC.*
Santalaceae	*Santalum lanceolatum R.Br.*
Sapindaceae	*Diplopeltis ? eriocarpa*
Scrophulariaceae	*Eremophila longifolia (R.Br) f.Muell*
Scrophulariaceae	*Eremophila sp.*
Solanaceae	*Solanum lasiophyllum Poir.*
Surianaceae	*Stylobasium spathulatum Desf.*
Thymelaeaceae	*Pimelea ammocharis F.Muell.*
Typhaceae	*Typha domingensis Pers*
Zygophyllaceae	*Tribulus macrocarpus Benth.*

Appendix 2. Financial Statement

I hereby certify that all funds for this project have been spent in the manner and for the purposes specified by the contract.

Name: _____

Signed: _____

Date: _____