

Biodiversity survey pilot project at Charles Darwin Reserve, Western Australia

Vascular Plants

Report to Australian Biological Resources Study, Department of the Environment,
Water, Heritage and the Arts, Canberra



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Cover picture: View of York gum (*Eucalyptus loxophleba*) woodland below a greenstone ridge, with extensive *Acacia* shrubland in the distance, northern Charles Darwin Reserve, May 2009. (Photo T.D. Macfarlane).

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Project aim

This project was conceived to carry out a biological survey of a reserve forming part of the National Reserve System, to provide biodiversity information for reserve management and to contribute to taxonomic knowledge including description of new species as appropriate.

Survey structure

A team of scientists specialising in different organism groups each with a team of Earthwatch volunteer assistants, driver and vehicle, carried out the survey following individually devised field programs, over the 1 week period 5-9 May 2009.

Science teams

Five science teams, each led by one of the scientists, specialised on the following organism groups:

Plants, Insects (Lepidoptera), Insects (Heteroptera), Vertebrates , Arachnids.

Plants were collected by the Plants team and also by some of the animal scientists, particularly Celia Symonds, in order to accurately document the insect host plants. These additional collections were identified along with the other flora vouchers, and contribute to the flora results reported here.

Flora: introduction

The Charles Darwin Reserve consists of a mosaic of plant communities which inhabit extensive plains of yellow sand, red sandy clay or loam, granite rocks, lateritic breakways, greenstone ridges or hills, and wetlands such as salt lakes, claypans and ephemeral swamps. The vegetation includes extensive areas of species-rich shrubland of several variants that are representative of flora considered characteristic of the Wheatbelt, *Acacia*-dominated shrubland on red soil plains, and *Eucalyptus* woodlands on heavier clay-containing soils, and these are of different kinds: York Gum (*E. loxophleba*) woodland, Salmon Gum (*E. salmonophloia*) woodland, and Gimlet (*E. salubris*) woodland, and chenopod shrublands on saline sites. The vegetation can be

considered as containing significant proportions of types characteristic of the Wheatbelt and of the arid zone Rangelands.

The Reserve was formerly White Wells pastoral station and was grazed intermittently by sheep for about 80 years (Nicholson 2007). However the vegetation was not cleared, except for a relatively small area near the homestead which has been cropped. Overlaying the mosaic of plant communities is another mosaic, of fire history, and the age since fire can have as dramatic a visual effect as differences in vegetation type. Examples are evident in parts of the Reserve now. Recency of fire can also govern the occurrence of species since some live for only a short time after fire (or physical disturbance such as track work). The condition of the vegetation and therefore the success of biological survey work is also affected substantially by the season and the amount of rain that has fallen in the preceding period.

The vegetation and species of plants occurring in the Charles Darwin Reserve are moderately well known, but as the results of this survey show, the Reserve has not been exhaustively surveyed. The list of possibly new taxa also demonstrates that the Reserve flora is consistent with the general situation in south western Australia, which is that taxonomic knowledge is far from complete.

Previous collecting has been fairly extensive, and has been carried out by WA volunteer groups including the WA Wildflower Society and the WA Naturalists Club, the Agriculture Department Rangelands Survey group (Payne et al. 1998), Bush Heritage reserve managers, environmental consultants, Department of Environment and Conservation (DEC) flora officers, and passing botanists. A large proportion of the records have been made over many years by botanists from throughout Australia and elsewhere passing along the Great Northern Highway which traverses the south east corner of the Reserve. A longer stretch of the Highway falls within the buffer zone used in the preparation of the list and is one reason for the wider WAHERB list exceeding the Reserve list (see below) by such a large number of species (Map1).

The Survey

Objectives of the flora survey

The flora survey was based on covering as many habitat types as possible over as wide a range of the reserve as possible. Plots were not used since the emphasis was on the species diversity and inventory rather than vegetation communities, although other surveys have used a plot-based approach in parts of the reserve previously.

In keeping with the overall project plan, there was a particular focus on species that for any reason were suspected of not having been collected on the reserve, that were in flower at the time since the survey was carried out at a season when most species are not in flower, and any species seen in fruit where the collection of fruits was considered likely to be a useful addition to Herbarium scientific collections. In addition, requests made by colleagues were fulfilled as far as possible, relating to rare species, putatively new species or variation that needed to be checked. An especial search was made for plants in my particular taxonomic specialty groups, *Wurmbea*

and other petaloid monocots, and grasses. The seasonal conditions meant that weeds, which are mostly annuals here, were scarcely visible.

Of particular interest for the overall project were species that might be new records for the reserve, and species that might be new to science.

Methods

In preparation for the survey I prepared species lists for the Reserve from the Western Australian Herbarium specimen database WAHERB as a guide to species known to be present and to aid recognition of new records. There were two lists, the first of which will be referred to as the wider WAHERB list, covered the Reserve plus an arbitrary buffer chosen so as to limit the inclusion of habitats that are not characteristic of the Reserve such as the large salt lakes and the Mt Gibson range. It comprised about 570 vascular plant taxa and 60 non-vascular plants and fungi. The buffer was included so as to improve the prospect of obtaining a species list that was reasonably indicative of the flora of the Reserve. The second list, the Reserve list, used coordinates closely approximating the Reserve boundaries (i.e. excluding the buffer), and comprised about 350 vascular plant taxa. This list indicates what species have actually been collected from the Reserve, and as expected it was significantly less complete than the wider list, given that the Reserve has not been thoroughly surveyed for flora. There are other less complete lists in existence, one important one having been supplied by ABRS from Federal Government databases, and that one has been reconciled with the Reserve list here.

Most regions of the Reserve were visited, including as many as possible of the known vegetation types and soil and geological substrates. The vegetation is varied and complex in distribution. Very few species were in flower, but selected collections were made when flowers were encountered, when fruiting collections seemed likely to be useful, when the identity of plants needed to be checked for this or other science projects, or when new records were suspected.

The work was assisted by Earthwatch volunteers and staff and I was also accompanied most of the time by Dr Matt Appleby, Bush Heritage plant ecologist, who was seeing the Reserve for the first time and who discussed species, plant communities and ecological and management issues. Dr Peter Lang from the TERN team also joined the team when possible, which allowed us to share our knowledge of the flora from our respective state perspectives.

Identifying the collections and vouchering

Plant identification was based on my existing knowledge supplemented by advice from other botanists, specialists in the taxonomy of particular groups (see acknowledgements), available keys in floras and revisions, online resources especially the Western Australian Herbarium's FloraBase Web resource and the AVH (Australia's Virtual Herbarium), and WA Herbarium collections. The sterile state of many collections has made the process more difficult than usual.

Most collections were retained for lodgement in the Western Australian Herbarium as vouchers verifying the records, but very poor specimens were not kept. The vouchers are readily retrieved from the WAHERB database by querying for “CDR” in the voucher field. The records are accessible to AVH queries and contribute to the AVH maps.



Figure 1. *Eremophila latrobei* subsp. *latrobei*, flowering during the biological survey of the Charles Darwin Reserve. (Photo T.D. Macfarlane).

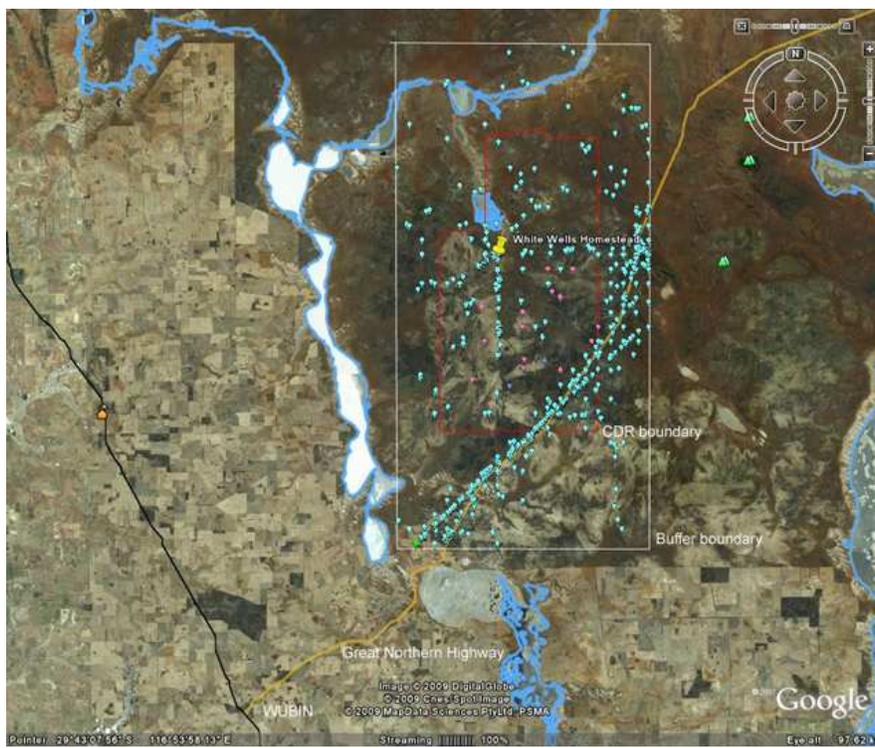
Results

The species list

A full list of the vascular plants of the Charles Darwin Reserve (CDR) based on known specimen records is presented in Appendix 1. The list contains 372 taxa, including species, subspecies, and varieties, with care taken to avoid double counting of taxa at species and infraspecies level. For this report the list is simply presented alphabetically by genus.

The flora list was rather strictly limited to the area within the boundaries of the Reserve in keeping with the objectives. One consequence is that an idea of the collecting intensity can be gained. A comparison of the 372 taxa of this list with the c. 570 taxa of the wider Waherb list prepared at the outset suggests that many species that could be expected to occur in the vegetation types on the CDR have not yet been collected there. There may also be some effect of the buffer area possibly including habitats not present on the Reserve, but the buffers were selected to reduce this. Figure 1 shows the distribution of collections prior to the survey.

Because of the strict limitation of the list to the CDR the new taxon records reported here include some that could be regarded as merely minor new occurrences of taxa that are widespread and common in the general region. However it is important that the biodiversity actually present on the reserve be documented for reserve management reasons, for demonstrating conservation of as many species and plant communities as possible, and for adding to general floristic knowledge, so all records are reported.



Map 1. Distribution of collections for the Charles Darwin Reserve and the buffer region (Western Australian Herbarium collection), showing the concentration along Great Northern Highway.

Taxa newly recorded for Charles Darwin Reserve

Appendix 1 includes an indication of taxa thought to be newly recorded for the Reserve as a result of the collections made during this May 2009 survey by the plant research team led by me, and by other scientists whose collections I undertook to identify. The latter are not individually indicated, but the information is on record. The new records are for convenience presented separately in Table 1.

Taxon	Comment
Acacia acuminata	Widespread, a local collecting gap, occurring as a narrow phyllode variant
Acacia assimilis var. assimilis	Widespread, local collecting gap
Acacia aulacophylla	Widespread, poorly collected in the region
Acacia exocarpoides	Widespread, at southwesterly edge of distribution
Acacia kalgoorliensis	Widespread but very scattered
Acacia umbraculiformis	Widespread, local collecting gap
Arthropodium dyeri	Widespread, local collecting gap
Atriplex vesicaria	Widespread, local collecting gap
Baeckea sp. Bencubbin-Koorda (M.E. Trudgen 5421)	A considerable northward extension
Bossiaea walkeri	Widespread but relatively under-collected
Chamaexeros fimbriata	Widespread but regional collecting gap
Chamaexeros macranthera	Previously recorded from buffer area. Limited distribution in CDR
Comesperma volubile	Widespread but regional collecting gap
Cryptandra imbricata	Moderately widespread, poorly collected in the region
Cryptandra micrantha	Moderately widespread, inadequately collected
Enekbatus sessilis ms	Moderately widespread, an easterly extension
Eremophila latrobei subsp. latrobei	Widespread, flowering irregularly, in flower during survey
Eucalyptus leptophylla	Widespread, poorly collected in region
Grevillea nematophylla	Widespread, local collecting gap, an arid zone species at its western limit
Hakea francisiana	Widespread, local collecting gap
Kunzea pulchella	Widespread but specific habitat (granite rocks)
Lepidosperma sp. Blue Hills (A. Markey & S.	Recently recognised taxon, range

Dillon 3468)	poorly known.
<i>Melaleuca longistaminea</i> subsp. <i>longistaminea</i>	Relatively widespread, an eastward extension
<i>Mirbelia ramulosa</i>	Widespread, minor local collecting gap
<i>Patersonia drummondii</i>	Widespread, local collecting gap, a significantly variable taxon
<i>Philotheca brucei</i> subsp. <i>brucei</i>	Widespread and common, local collecting gap
<i>Psammomoya choretroides</i>	Widespread, local collecting gap
<i>Senna artemisioides</i> subsp. <i>petiolaris</i>	Very scattered distribution, regional collecting gap
<i>Tecticornia</i> aff. <i>halocnemoides</i>	Part of a widespread species complex, poorly known so range uncertain. Identification with a phrase name is premature.
<i>Wurmbea</i> sp. White Wells (T.D. Macfarlane et al. TDM 4345)	Discovered for the first time in the CDR in 2008, also occurs outside the CDR
<i>Xerolirion divaricata</i>	Previously known from reserve but apparently not collected, specific to breakaways

Table 1. Taxa newly recorded from the Charles Darwin Reserve based on the collections of the survey.

A selection of species newly recorded or collected from the Reserve (photos by T.D. Macfarlane)



Figure 2. *Patersonia drummondii*, newly recorded for the Charles Darwin Reserve.



Figure 5. *Xerolirion divaricata*, growing on a harsh breakaway site, central Charles Darwin Reserve. This is the only population known in the Reserve.



Figure 3. *Chamaexeros macranthera*, northern edge of the Charles Darwin Reserve, with old capsules (fruits), the plants forming large long-lived tufts.



Figure 6. *Cryptandra micrantha*, in post-fire sandplain, southern Charles Darwin Reserve.



Figure 4. *Chamaexeros fimbriata*, central Charles Darwin Reserve in woodland, flowering June 2008.



Figure 7. *Enekbatus sessilis* ms, with distinctive red foliage probably resulting from drought stress. In post-fire sandplain, southern Charles Darwin Reserve.

Species excluded from the Reserve list

There are a few species that have appeared in database extracts or other lists which the checking carried out for this project suggests do not occur in the CDR, as listed in Table 2. The reason for the erroneous records is probably usually incorrect identification of specimens or inaccurate geographic coordinates on the specimen or in the database (e.g. *Melaleuca filifolia*), and both of these types of errors are indicated by records that seem far out of range. Genuine outliers can occur but in these cases it is considered unlikely. *Rulingia kempeana* is not listed in the table even though there are no WA records from the region, because the available records of the species are widely scattered and it could occur there. The *Jacksonia* case probably originated by a confusion of names between the western Australian *J. rhadinoclada* and the eastern Australian *J. rhadinoclona* via synonymy with *J. stackhousei* or (correctly) *stackhousii*.

Eucalyptus	foecunda
Hibbertia	recurvifolia
Melaleuca	adnata
Melaleuca	filifolia
Rulingia	loxophylla
Jacksonia	stackhousei

Table 2. Species previously listed for the CDR or surrounding area which do not occur there.

Un-named taxa

Taxa occurring on the Reserve or within the adjacent buffer region which are putative un-named taxa are listed in Table 3. In general these require research to determine their taxonomic status. Often such taxa are inadequately collected, in the sense of insufficient knowledge of their geographic range and how they approach their closest relatives, insufficient material to determine their variation, or the available material lacking relevant stages such as flowers. The prospect of the formal description and naming of these taxa being able to be accelerated varies. It is likely that not all of these putative taxa will ultimately be described as new, because they may turn out to have an existing name, or because they prove not to be different or different enough to warrant recognition and naming.

There are also 20 specimens in PERTH not named to species, which may yield further un-named taxa when checked.

None of the putatively un-named taxa are thought to be endemic to the Reserve.

Acacia sp. Goodlands (B.R. Maslin 7761)
Acacia sp. Kalannie (B.R. Maslin 7706)
Acacia sp. narrow phyllode (B.R. Maslin 7831)
Baeckea sp. Perenjori (J.W. Green 1516)
Bossiaea sp. Jackson Range (G. Cockerton & S. McNee LCS 13614)

Calandrinia sp. Bungalbin (G.J. Keighery & N. Gibson 1656)
Calandrinia sp. ridged papillate (M. Hislop & E. Hudson MH161)
Calandrinia sp. Truncate capsules (A. Markey & S. Dillon 3474)
Calytrix sp. Paynes Find (F. & J. Hort 1188)
Hemigenia sp. Yuna (A.C. Burns 95)
Lepidosperma sp. Wolga Rock (S.D. Hopper 6513)
Leucopogon sp. Clyde Hill (M.A. Burgman 1207)
Microcorys sp. Mt Gibson (S. Patrick 2098)
Micromyrtus sp. Warriedar (S. Patrick 1879A)
Senna sp. Austin (A. Strid 20210)
Sida sp. Dark green fruits (S. van Leeuwen 2260)
Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
Wurmbea sp. Paynes Find (C.J. French 1237)
Wurmbea sp. White Wells (T.D. Macfarlane et al. TDM 4345)
Wurmbea sp. Wanarra (T.D. Macfarlane et al. TDM 4348)
Baeckea benthamii Trudgen ms
Baeckea megaflorea Trudgen ms
Chamelaucium pauciflorum subsp. thryptomenioides (D.A.Herb.) N.G.Marchant & Keighery ms

Table 3. Putatively un-named or unformalised taxa in or adjacent to the Charles Darwin Reserve.

New species to be described

Three of the un-named taxa belong to one of my specialist research groups, the genus *Wurmbea* (Colchicaceae), often known by the common name Nancy. Two of these occur on the Reserve and the third occurs on the neighbouring pastoral property and is very likely to grow around granite on the Reserve as well but has not been searched for as yet. All of these species have been recognised as new in the past two years, and two of them were seen for the first time in 2008, on or adjacent to the CDR. This association with the Reserve makes it appropriate for me and my colleagues to undertake the formal description of them in association with this survey project, even though they were not collected during the survey itself because the survey was too early in the year. However an already named congener, *W. densiflora*, with which *W.* sp. Paynes Find has long been confused, was collected during the survey. At the time I considered it to be a new record but subsequently noted it in the ABRS list, apparently based on a herbarium record not seen by me. These *Wurmbea* species represent a good example of taxa which are being discovered through fieldwork carried out at appropriate times and in good seasons, and since many of the new discoveries are in pastoral areas, they will be conserved on reserves such as the CDR.

These new species are currently in preparation for publication (Macfarlane, Brown & French, in prep.).

Wurmbea sp. Paynes Find (C.J. French 1237)
Wurmbea sp. White Wells (T.D. Macfarlane et al. TDM 4345)
Wurmbea sp. Wanarra (T.D. Macfarlane et al. TDM 4348)

Table 4. New species to be described in association with the CDR survey project.

***Wurmbea* sp. Paynes Find**

Formal phrase name: *Wurmbea* sp. Paynes Find (C.J. French 1237)

This recently recognised species has been long confused with *W. densiflora*. It is quite widespread, and is known from Charles Darwin Reserve (e.g. the collection *M.G. Corrick 11608*, PERTH). It is a tall plant with 2-8 pink flowers in a relatively loose inflorescence, the petals spreading widely so that the flower is more or less flat, the nectaries are concealed, and the anthers are yellow. It flowers in Spring, August to September.

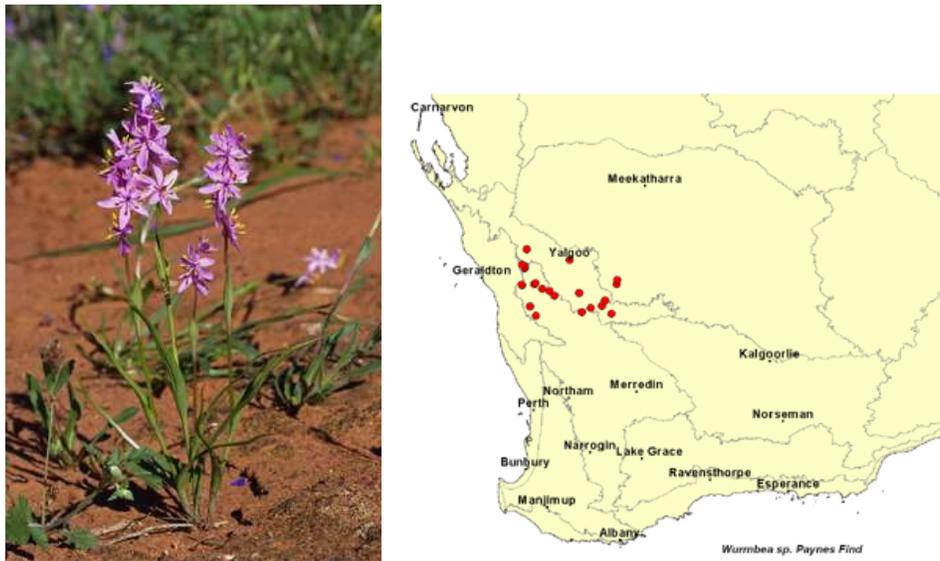


Figure 8. *Wurmbea* sp. Paynes Find (C.J. French 1237), plant (photo A.P. Brown) and map.

***Wurmbea* sp. White Wells**

Formal phrase name: *Wurmbea* sp. White Wells (T.D. Macfarlane et al. TDM 4345)

This recently discovered species was first recognised as a distinct species at the Charles Darwin Reserve, and has subsequently been found elsewhere, and may also have been collected in earlier years. It is closely related to *W. inframediana*, which grows further north. It is a small plant about 10 cm tall, with 1-5 pink or almost white flowers in a relatively compact inflorescence, the petals bearing nectaries that are straight, and the anthers are dark red. It flowers in Winter, June to July.

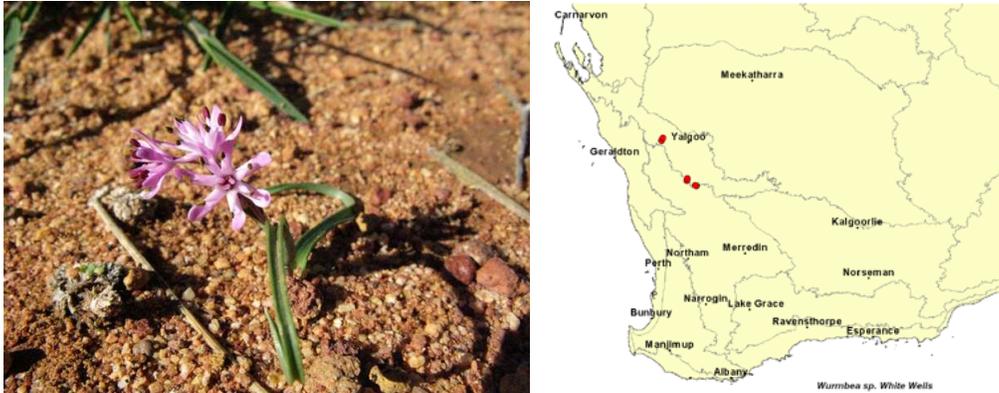


Figure 9. *Wurmbea* sp. White Wells, plant (photo T.D. Macfarlane) and map.

***Wurmbea* sp. Wanarra**

Formal phrase name: *Wurmbea* sp. Wanarra (T.D. Macfarlane et al. TDM 4348)

Discovered for the first time in 2008 and still only known from two locations close together just east of Charles Darwin reserve, this species is expected to also occur on the Reserve around granitic outcrops. The plants are small, 2-5 cm tall, with usually separate male and female plants. The flowers are white to pink-tinged, the petals each bearing two small marginal nectaries the same colour as the rest of the petal. It flowers in Winter, June to July.

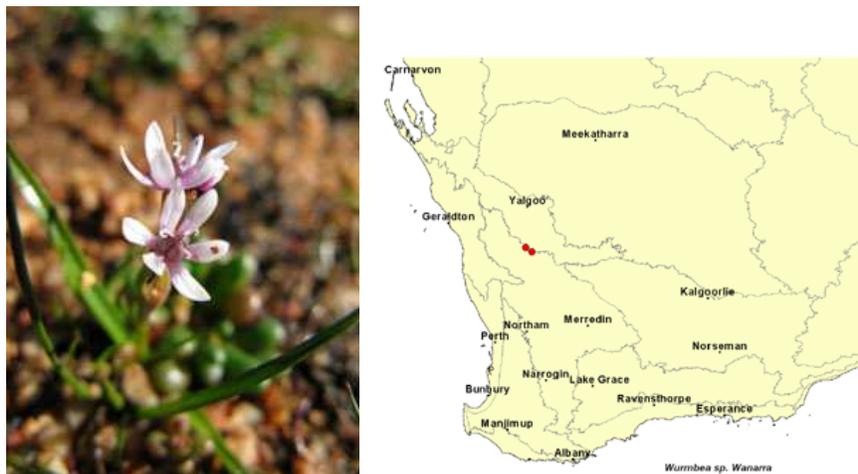


Figure 10. *Wurmbea* sp. Wanarra, female plant (photo T.D. Macfarlane) and map.

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References

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Appendix 1. List of vascular plants known to occur on the Charles Darwin Reserve (as at August 2009).

Number of taxa: 372 (including subspecies and varieties but without double counting at species and infraspecific levels). Listed alphabetically by genus.

Sources:

1. WAHERB, specimen database of the Western Australian Herbarium, within the boundaries of the Reserve.
2. + indicates additions from the survey collections (31 taxa):
Macfarlane collection, May 2009 (plus a July 2008 visit)
Symonds collection, May 2009
Lang collection, May 2009
3. (+) indicates additions sourced from an ABRS list within the boundaries of the Reserve (10 taxa). Some of these records may be vouchered at Herbaria other than PERTH. These additions are consistent with the range of the species. A few other records were not accepted as being probably erroneous.
4. * indicates a naturalised non-native taxon.

Acacia acanthoclada subsp. *glaucescens*
Acacia acuaria
Acacia acuminata +
Acacia andrewsii
Acacia aneura
Acacia anthochaera
Acacia assimilis subsp. *assimilis* +
Acacia aulacophylla +
Acacia burkittii
Acacia cerastes
Acacia colletioides
Acacia coolgardiensis
Acacia duriuscula
Acacia effusifolia
Acacia erinacea
Acacia exocarpoides +
Acacia formidabilis
Acacia inceana subsp. *conformis*
Acacia jennerae
Acacia jibberdingensis
Acacia kalgoorliensis +
Acacia kochii
Acacia latior
Acacia lineolata subsp. *lineolata*
Acacia longiphyllodinea
Acacia longispinea
Acacia murrayana
Acacia obtecta

Acacia prainii
Acacia ramulosa var. *ramulosa*
Acacia resinimarginea
Acacia restiacea
Acacia sericocarpa
Acacia sibina
Acacia sp. Goodlands (B.R. Maslin 7761)
Acacia sp. Kalannie (B.R. Maslin 7519)
Acacia sp. narrow phyllode (B.R. Maslin 7831)
Acacia steedmanii subsp. *steedmanii*
Acacia stereophylla var. *stereophylla*
Acacia tetragonophylla
Acacia tysonii
Acacia umbraculiformis +
Acacia yorkrakinensis subsp. *acrita*
Actinobole uliginosum
Actinotus humilis
Allocasuarina acutivalvis subsp. *prinsepiana*
Allocasuarina campestris
Allocasuarina dielsiana
Allocasuarina tessellata
Aluta aspera subsp. *hesperia* (*Thryptomene aspera* subsp. Paynes Find (C.A. Gardner 11996))
Alyogyne hakeifolia
Alyogyne pinoniana
Alyxia buxifolia
Amphipogon caricinus var. *caricinus*
Amyema nestor
Amyema preissii
Angianthus tomentosus
Anthotroche pannosa
Aristida contorta
Arthropodium dyeri +
Astroloma serratifolium
Atriplex bunburyana
Atriplex stipitata
Atriplex vesicaria +
Austrostipa elegantissima
Austrostipa trichophylla
Baeckea benthamii
Baeckea elderiana
Baeckea sp. Bencubbin-Koorda (M.E. Trudgen 5421) +
Bellida graminea
Blennospora drummondii
Borya constricta
Bossiaea sp. Jackson Range (G. Cockerton & S. McNee LCS 13614)
Bossiaea walkeri +
Brachyscome pusilla
 * *Bromus rubens*
Brunonia australis
Bursaria occidentalis

Caladenia roei
Calandrinia eremaea
Calandrinia translucens
Callitris columellaris
Calothamnus aridus
Calothamnus gilesii
Calycopeplus paucifolius
Calytrix glutinosa
Calytrix leschenaultii
Calytrix sp. Paynes Find (F. & J. Hort 1188)
Cephalopterum drummondii
Chamaexeros fimbriata +
Chamaexeros macranthera +
Cheilanthes adiantoides
Cheiranthra simplicifolia
Chthonocephalus pseudevax (+)
Codonocarpus cotinifolius
Comesperma griffinii
Comesperma integerrimum
Comesperma volubile +
Commersonia stowardii
Cryptandra apetala
Cryptandra imbricata +
Cryptandra micrantha +
Cyanicula amplexans (+)
Cyanostegia angustifolia
Cyanostegia microphylla
Dampiera eriocephala
Dampiera incana var. *fuscescens*
Dampiera luteiflora
Dampiera wellsiana
Daucus glochidiatus
Dianella revoluta
Dicrastylis parvifolia
Dicrastylis soliparma
Dodonaea adenophora
Dodonaea inaequifolia
Dodonaea viscosa subsp. *angustissima*
Drosera macrantha subsp. *macrantha*
Duboisia hopwoodii
Ecdeiocolea monostachya
Enchylaena lanata
Enekbatus sessilis ms +
Enekbatus stowardii ms (*Baekkea stowardii*)
Eremophila clarkei
Eremophila decipiens subsp. *decipiens*
Eremophila eriocalyx
Eremophila forrestii subsp. *forrestii*
Eremophila glabra subsp. *elegans*
Eremophila glutinosa
Eremophila latrobei subsp. *latrobei* +

Eremophila miniata
 Eremophila oldfieldii subsp. angustifolia
 Eremophila oldfieldii subsp. oldfieldii
 Eremophila oppositifolia subsp. angustifolia
 Eremophila serrulata
 Eremophila shonae subsp. shonae
 Eriachne ovata
 Eriachne pulchella
 Erodium cygnorum
 Erymophyllum glossanthus
 Erymophyllum ramosum subsp. involucreatum
 Erymophyllum tenellum
 Eucalyptus brachycorys
 Eucalyptus celastroides subsp. virella
 Eucalyptus clelandii
 Eucalyptus erythronema var. marginata
 Eucalyptus ewartiana
 Eucalyptus horistes
 Eucalyptus kochii subsp. amaryssia
 Eucalyptus kochii subsp. plenissima
 Eucalyptus leptophylla +
 Eucalyptus leptopoda subsp. arctata
 Eucalyptus loxophleba subsp. supralaevis
 Eucalyptus moderata
 Eucalyptus petraea
 Eucalyptus salmonophloia
 Eucalyptus salubris
 Eucalyptus stowardii
 Eucalyptus subangusta subsp. pusilla
 Eucalyptus subangusta subsp. subangusta
 Euryomyrtus recurva
 Exocarpos aphyllus
 Frankenia laxiflora
 Gahnia drummondii
 Gastrolobium laytonii
 Gilberta tenuifolia
 Gilruthia osbornei
 Glischrocaryon angustifolium
 Glischrocaryon flavescens
 Gneposis tenuissima
 Gonocarpus confertifolius var. confertifolius
 Gonocarpus confertifolius var. helmsii
 Goodenia berardiana
 Goodenia perryi
 Goodenia pinifolia
 Grevillea biformis subsp. biformis
 Grevillea extorris
 Grevillea hakeoides subsp. stenophylla
 Grevillea juncifolia subsp. temulenta
 Grevillea levis
 Grevillea nematophylla +

Grevillea obliquistigma subsp. *cullenii*
Grevillea obliquistigma subsp. *obliquistigma*
Grevillea paradoxa
Grevillea pityophylla
Grevillea pterosperma
Grevillea subtiliflora
Grevillea teretifolia (+)
Grevillea yorkkrakinensis
Gypsophila tubulosa
Gyrostemon racemiger
Hakea francisiana +
Hakea invaginata
Hakea minyma
Hakea recurva subsp. *arida* (+)
Hakea recurva subsp. *recurva*
Halgania cyanea var. *Allambi Stn* (B.W. Strong 676)
Halgania gustafsenii var. *Mid West* (G. Perry 370)
Halgania integerrima
Hannafordia bissillii subsp. *latifolia*
Hemigenia botryphylla
Hemigenia ciliata
Hemigenia sp. *Yuna* (A.C. Burns 95)
Hemigenia tomentosa
Hibbertia arcuata
Hibbertia glomerosa var. *glomerosa*
Hibbertia stenophylla
Homalocalyx aureus
Homalocalyx thryptomenoides
Hyalosperma glutinosum subsp. *glutinosum*
Hyalosperma glutinosum subsp. *venustum*
Hyalosperma zacchaeus
Hybanthus floribundus subsp. *floribundus*
Indigofera occidentalis
Isotoma hypocrateriformis
Jacksonia rhadinoclada
Keraudrenia integrifolia
Keraudrenia velutina subsp. *velutina*
Kunzea pulchella +
Lachnostachys verbascifolia var. *verbascifolia*
Lechenaultia macrantha
Lepidosperma costale
Lepidosperma sp. *Blue Hills* (A. Markey & S. Dillon 3468) +
Lepidosperma sp. *Volga Rock* (S.D. Hopper 6513)
Leptosema aphyllum
Leptosema daviesioides
Leucopogon sp. *Clyde Hill* (M.A. Burgman 1207)
Levenhookia leptantha
Levenhookia stipitata
Lobelia rarifolia
Lobelia winfridae
Lomandra effusa

Lysiana murrayi
Maireana brevifolia
Maireana diffusa
Maireana georgei
Maireana planifolia
Maireana thesioides
Maireana trichoptera
Malleostemon roseus
Malleostemon tuberculatus
Marsilea drummondii
Melaleuca atroviridis
Melaleuca calyptroides
Melaleuca conothamnoides
Melaleuca cordata
Melaleuca eleuterostachya
Melaleuca fabri
Melaleuca fulgens
Melaleuca hamata
Melaleuca hamulosa
Melaleuca lateriflora subsp. *acutifolia*
Melaleuca leiocarpa
Melaleuca longistaminea subsp. *longistaminea* +
Melaleuca nematophylla
Melaleuca radula
Melaleuca stereophloia
Melaleuca vinnula
Microcorys sp. Mt Gibson (S. Patrick 2098)
Micromyrtus acuta
Micromyrtus clavata
Micromyrtus racemosa var. *racemosa*
Mirbelia bursarioides
Mirbelia longifolia (+)
Mirbelia microphylla
Mirbelia ramulosa +
Mirbelia rhagodioides
Monachather paradoxus
Monotaxis bracteata
Muehlenbeckia adpressa
Myriocephalus pygmaeus
Nicotiana rotundifolia
Olearia dampieri
Olearia humilis
Olearia muelleri
Olearia pimeleoides
Opercularia vaginata
Patersonia drummondii +
Persoonia manotricha
Persoonia pentasticha
Petalostylis cassioides
Phebalium canaliculatum
Phebalium megaphyllum

Phebalium tuberosum
Philotheca brucei subsp. *brucei* +
Philotheca deserti subsp. *deserti*
Philotheca glabra
Philotheca nutans
Philotheca sericea
Philotheca thryptomenoides
Philotheca tomentella
Phlegmatospermum drummondii
Pimelea aeruginosa
Pimelea angustifolia
Pimelea forrestiana
Pityrodia terminalis
Podolepis capillaris
Podolepis lessonii
Pogonolepis stricta (+)
Prasophyllum gracile
Prostanthera eckersleyana
Prostanthera patens
Psammomoya choretroides +
Ptilotus drummondii
Ptilotus eriotrichus
Ptilotus exaltatus
Ptilotus gaudichaudii var. *gaudichaudii*
Ptilotus gaudichaudii var. *parviflorus*
Ptilotus holosericeus
Ptilotus obovatus
Ptilotus polystachyus var. *polystachyus*
Rhagodia drummondii
Rhagodia eremaea
Rhodanthe chlorocephala subsp. *rosea*
Rhodanthe chlorocephala subsp. *splendida*
Rhodanthe pygmaea
Rhodanthe spicata
Ricinocarpos velutinus
Rulingia kempeana (+)
Rulingia luteiflora
Santalum acuminatum
Santalum spicatum
Scaevola hamiltonii
Scaevola restiacea subsp. *restiacea*
Scaevola spinescens
Schoenia cassiniana
Schoenus subaphyllus
Sclerolaena drummondii
Sclerolaena gardneri
Senna artemisioides subsp. *filifolia*
Senna artemisioides subsp. *petiolaris* +
Senna flexuosa
Senna glutinosa subsp. *chatelainiana*
Senna pleurocarpa

Senna sp. Austin (A. Strid 20210)
Senna *stowardii*
Sida sp. dark green fruits (S. van Leeuwen 2260)
Solanum *coactiliferum*
Solanum *lasiophyllum*
Solanum *nummularium*
Solanum *oldfieldii*
Stackhousia *monogyna*
Stenanthemum *poicilum*
Stenopetalum *filifolium*
Stylidium *limbatum*
Stylidium *yilgarnense*
Tecticornia *disarticulata*
Tecticornia aff. *halocnemoides* +
Tetragonia *moorei* (+)
Thelymitra *petrophila* (+)
Thomasia *tremandroides*
Thryptomene *costata*
Thryptomene *cuspidata*
Thysanotus *patersonii*
Thysanotus *rectantherus*
Trachymene *cyanopetala*
Tricoryne *elatior*
Tripogon *loliiformis*
Velleia *discophora*
Velleia *rosea*
Verticordia *eriocephala*
Verticordia *interioris*
Verticordia *rennieana*
Waitzia *acuminata* var. *acuminata*
Westringia *cephalantha*
Wrixonia *prostantheroides*
Wurmbea *densiflora* (+)
Wurmbea sp. Paynes Find (C.J. French 1237)
Wurmbea sp. White Wells (T.D. Macfarlane et al. TDM 4345) +
Xerolirion *divaricata* +
Zygophyllum *angustifolium*
Zygophyllum *eremaeum*
Zygophyllum *fruticulosum*
