

NANYA STATION, WESTERN NEW SOUTH WALES

VEGETATION, FLORA AND FAUNA



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Nanya Station, owned and managed by the University of Ballarat was purchased with assistance from the Department of Environment and Heritage. Ongoing management is supported by the Lower Murray Darling Catchment Management Authority

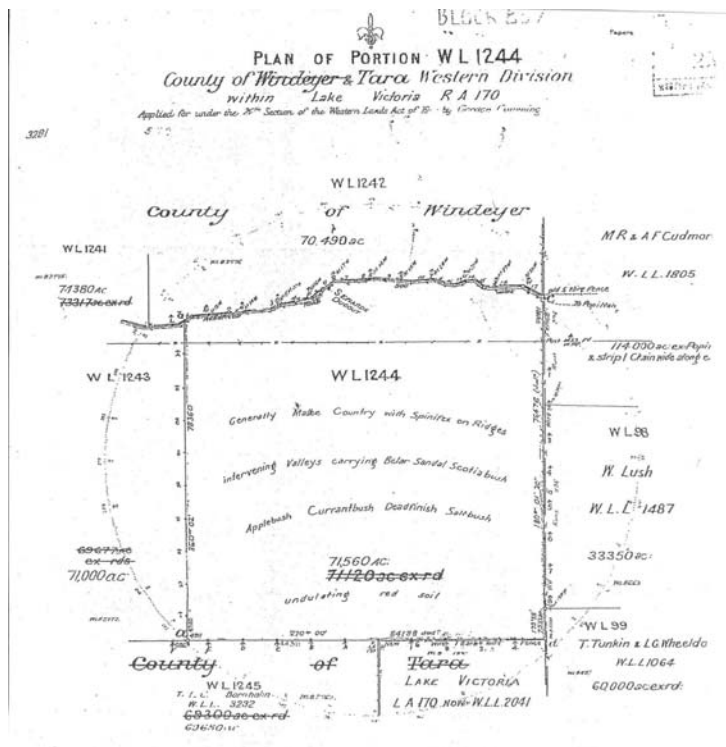


FOREWORD

This booklet has been prepared as an introduction for visitors to Nanya. Nanya is managed for conservation, research and teaching and affords protection to highly significant environments including two endangered communities and seventeen endangered or vulnerable species. On your visit, please respect these values.

NANYA STATION

Nanya Station is located in the Scotia country of far western New South Wales and consists of the Nanya Western Lands Pastoral Lease 3281 – Perpetual Leasehold Lot 1244 in Deposited Plan 762778, Parish of Winnebaga, County of Tara.



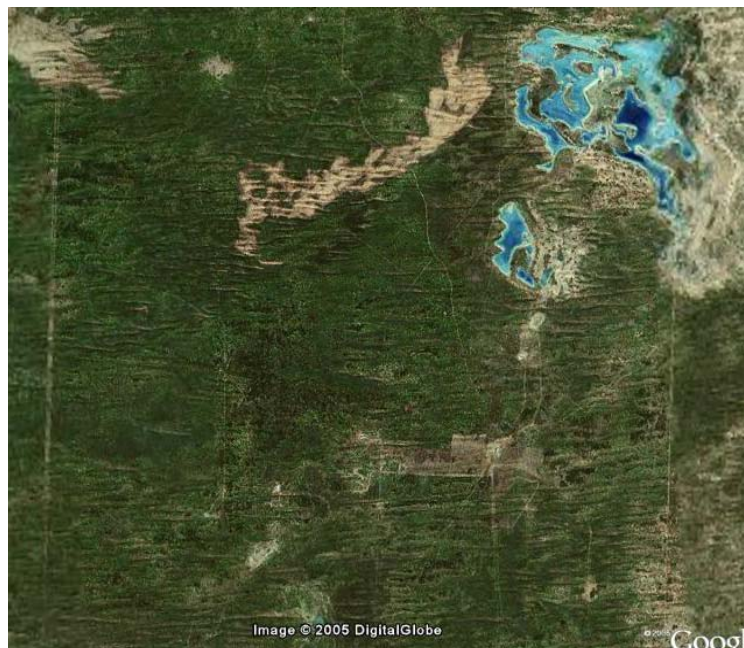
Nanya Homestead complex

BACKGROUND

The Scotia region has one of the shortest stock grazing histories of western NSW. Along with five other properties, Nanya was created as a pastoral lease in 1927. Previously the area was part of the large Lake Victoria lease and stock grazing occurred only in wet years (Withers 1989). The original lease was taken up by Gordon Cummings in 1927. He first dug a dam near the southeast corner of the property. A larger ground tank and homestead at the site of the present complex was later established. An area around the homestead was cleared and cropped to provide feed for the horses used in digging the earth tanks. The ruins of the original building are located between the shearing shed and Homestead Tank. A cottage was built in the 1930s and a more substantial homestead in the early 1950s. The lease was held by Mr Gordon Cummings until 1984 when the lease was purchased by Norm Scadding as an extension to the adjacent lease, Belvedere. It was sold in 1995 to Rob Taylor of Waikerie in the South Australian Riverland and then in 1999 to BeMax Pty. Ltd., a sand mining company.

The Centre for Environmental Management at the University of Ballarat has been involved in studies of the flora and fauna in western New South Wales since 1988. Over the past fifteen years studies were concentrated on the Scotia region because of its significance as a reference area due to its short pastoral history. Of particular significance is a system of natural salt lakes of which the most extensive is the Scotia Discharge Complex situated on Nanya Station. The results of an extensive vegetation survey of the Scotia region (Westbrooke *et al.* 1998) highlighted the significance of the area both in terms of the range of communities in relatively intact condition and the occurrence of species and communities of restricted distribution. The survey revealed the presence of over 300 species of which nine had either not previously been recorded or have restricted distribution in western NSW. Twenty-one plant communities occur on Nanya Station of which two, *Halosarcia lylei* low open shrubland and *Hemichroa diandra*/*Halosarcia*/*Frankenia* low open shrubland, are dominated by species not previously recorded from NSW. *H. lylei* and *Acacia loderi* shrublands are listed as endangered under the NSW Threatened Species Conservation Act.

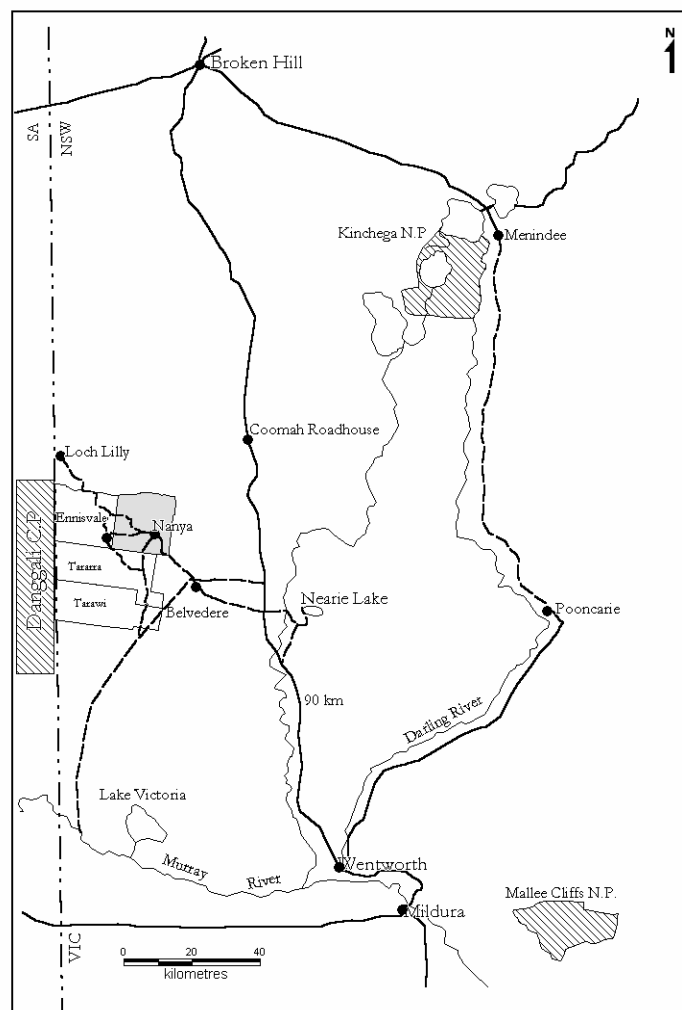
As noted, the area has a relatively short grazing history and, due to the presence of large areas of mallee with a *Triodia* understorey and restricted water supplies, stocking rates have been low. The area thus represents a highly significant refuge for biological diversity. These factors led to the purchase of Nanya Station by the University of Ballarat in 2004 with the assistance of the Department of Environment and Heritage for the purposes of conservation, research, teaching and community education.



A number of measures are being taken to protect and enhance the conservation values of Nanya. These include:

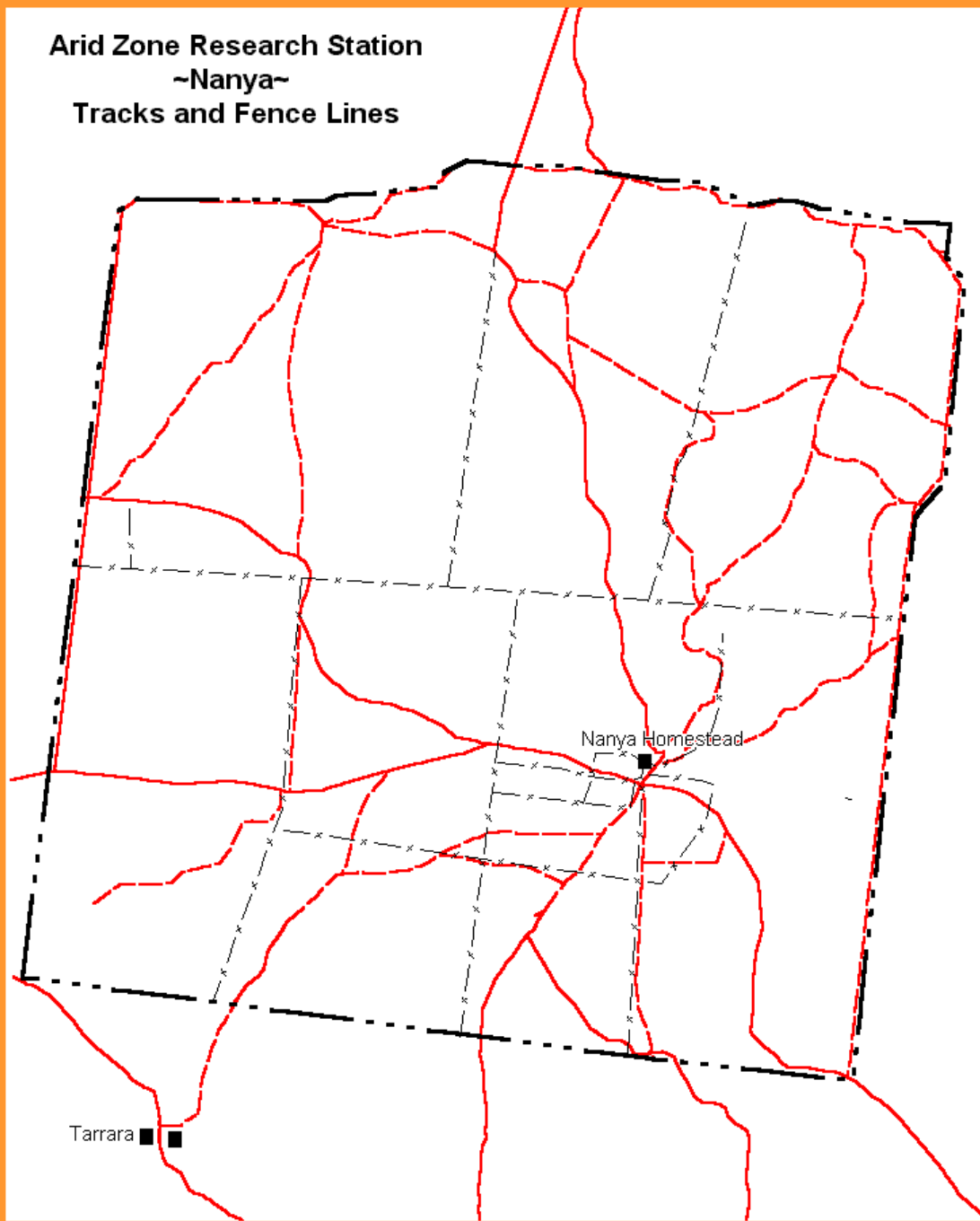
- Reduction in total grazing pressure by closure of ground tanks, goat control and ripping of rabbit warrens. The tank closure is being complemented by research into the biodiversity impacts.
- Assisting regeneration of restricted and endangered communities through total exclusion fencing of critical communities.
- Protecting the Mallefowl population through intensive fox control and survey and monitoring of nest sites.
- Research into:
 - factors affecting distribution of plant and animal species including bats, Birds, reptiles, ants and endangered plant species.
 - Research into the interacting impacts of grazing, fire and flood.\
 - Research into Island biogeography
 - Adaptation of plants to salinity and gypsophily

LOCATION



NANYA STATION

Arid Zone Research Station ~Nanya~ Tracks and Fence Lines



- x — x — Fences
- Major track
- - - Minor track
- - - Property boundary

0 2 4
kilometres



CLIMATE

The climate is classified as cool semi-arid (Dick 1975), the area being within climatic zone 1B for New South Wales (Edwards 1979): temperatures are high in summer and mild in winter with average daily maximum of 32°C in February and 15°C in July and average daily minima of 16°C in February and 5°C in July. The mean annual rainfall is approximately 240 mm; the seasonal distribution of rainfall is fairly even but annual variation is high.

GEOLOGY AND GEOMORPHOLOGY

Nanya lies within the Murray Basin geological province and consists of Quaternary material, with little rock outcropping (Lawrie and Stanley 1980). Two broad land systems dominate the landscape: dunefields consisting of low parallel ridges running east-west composed of red earthy sands and sandy solonised brown soils overlying sandy clays; and calcareous sandplains of loam or sandy loam solonised brown soils often with limestone nodules at the surface (Walker 1991). A number of salt lakes occur on Nanya. The largest complex of salt lakes, referred to as the Scotia Discharge Complex, has been the subject of a detailed hydrological study by Ferguson *et al.* (1995).

LAND SYSTEMS

Topography & land systems

Five distinct land systems occur on Nanya (Walker 1991) (Fig. 3).

Scotia Land System (Sc): this land system is evident through the majority of the property and comprises approximately 75% of the total area. It is typified by broad to narrow swales with earthy sands, loamy texture contrasts soils and solonised brown soils in swales. Isolated flats of brown soils with areas of dense mallee with inedible shrubs and spinifex.

Overnewton Land System (Ov): this land system is evident through the central south western area of the property and comprises approximately 12% of the total area. It is typified by level to slightly undulating sand plains with isolated sandy hummocks and depressions, sand plains of calcareous loams and sandy loams with scattered bluebush and inedible shrubs.

Birdwood Land System (Bw): comprises approximately 8% of the property's area and is evident near the far north east boundary of the property. It is typified by small relict ground water basins and lunettes with extensive associated sand plains and calcareous rises, and grey earths with scattered Belah and mallee.

Ennisvale Land System (Ez): this land system occurs in the north west and south east corners of the property and comprises approximately 4% of the total area. It is typified by level to slightly undulating swales with aligned dunes and isolated flats. Solonized brown soils and red texture contrasts soils and dunes of deep brown sands with dense mallee, inedible shrubs and clumps of Black Bluebush.

Huntingfield Land System (Hu): this land system juts into the central south boundary of the property and comprises approximately 1% of the total area. It is typified by small relict lakes and lunettes with extensive associated sand plains of scalded sandy loam to sandy solonised brown soils with Belah and Rosewood and abundant short grasses. Basin floors of highly saline or calcareous grey clays with scattered shrubs.

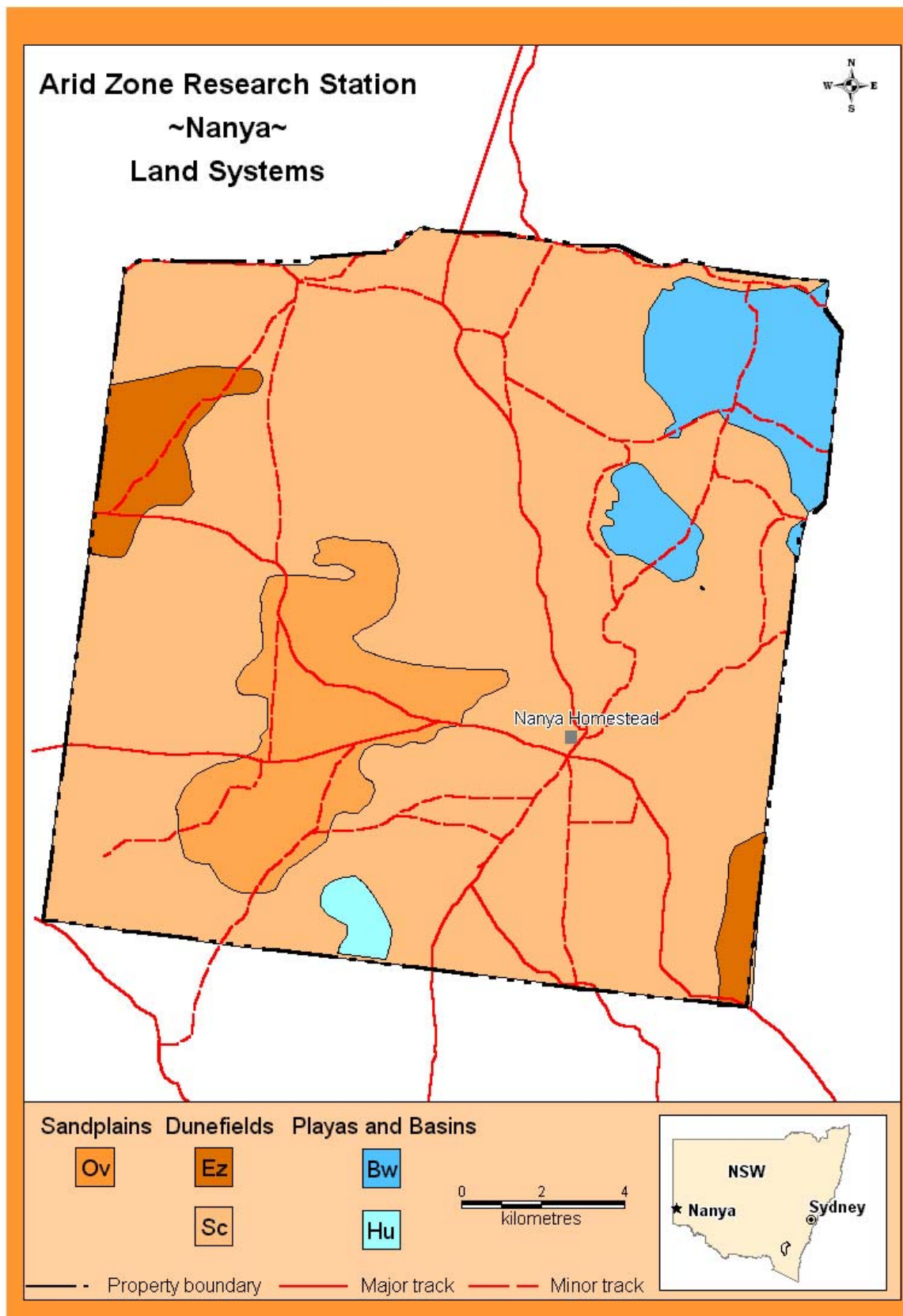


Fig. 3 Land systems of Nanya Station

VEGETATION

The vegetation of Nanya consists predominantly of *Eucalyptus gracilis*/*E. dumosa*/*E. socialis* open shrubland and *Casuarina pauper*/*Alectryon oleifolius* open woodland but 21 distinct communities occur (Table 1). While several of the communities are of limited distribution they add significantly to the conservation values of the property. The approximate percentage area occupied by each community, mean species richness, total species richness, mean percentage weediness and Benson (2006) equivalence of these communities are given in Table 1. Communities are described and illustrated grouped according to structural and floristic attributes.

1. Woodlands

1a. *Casuarina pauper*/*Alectryon oleifolius* woodland/open-woodland with a mixed shrubby understorey



Casuarina pauper, growing to 10-12m, occurs as a dominant species on the brown loamy sands of interdune areas. It is frequently associated with *Alectryon oleifolius* ssp. *canescens* and/or *Myoporum platycarpum*. Commonly associated understorey shrubs are *Enchylaena tomentosa*, *Chenopodium curvispicatum*, *Maireana pentatropis*, *M. georgei*, *Sclerolaena obliquicuspis*, *Eremophila sturtii*, *Olearia muelleri* and *Senna artemesioides*. *Stipa* spp., *Vittadinia cuneata* and *Dissocarpus paradoxus* are frequent in the ground layer.

1b. *Casuarina pauper*/*Alectryon oleifolius* woodland/open-woodland with *Maireana sedifolia* understorey



In the far north and around Sturt Bore in the west a *Casuarina pauper* community characterised by an understorey dominated by *Maireana sedifolia* occurs.

1c. *Casuarina pauper* *Alectryon oleifolius*/*Geijera parviflora* woodland/open-woodland with a mixed shrubby understorey



In the south east corner of the property *Casuarina pauper* woodland occurs in association with *Geijera parviflora*. *G. parviflora* has been shown to have a significant facilitation effect on ground flora.

1d *Callitris glaucophylla* open-woodland



Callitris glaucophylla to 10m occurs as the dominant tree on a few sandy ridges. The community carries an open understorey of herbs and grasses including the native species *Actinobole uliginosum*, *Calandrinia eremaea*, *Calotis hispidula*, *Tetragonia tetragonioides*, *Crassula colorata*, *Rhodanthe moschata* and *Zygophyllum ammophilum* with a high occurrence of exotic weeds including *Brassica tournefortii*, *Bromus rubens*, *Erodium cicutarium*, *Hypochoeris glabra*, *Medicago polymorpha* and *Sisymbrium irio*.

1e *Hakea leucoptera*/*Hakea tephrosperma* low open woodland



In a number of locations a low open-woodland with a near monospecific overstorey of *Hakea leucoptera* or *H. tephrosperma* to 7m occurs with an understorey of grasses and herbs.

2. **Eucalypt shrublands (mallee)**

2a *Eucalyptus oleosa*/*E. gracilis*/*E. dumosa* open-shrubland



Eucalyptus open-shrubland dominated by *E. oleosa*, *E. gracilis*, and *E. dumosa* to 8m. occurs on interdune plains. Understorey shrubs include *Enchylaena tomentosa*, *Chenopodium curvispicatum*, *C. desertorum*, *Atriplex stipitata*, *Maireana pentatropis*, *M. georgei*, *Sclerolaena obliquicuspis*, *Eremophila sturtii*, *Olearia muelleri*, *Senna artemisioides*, *Myoporum platycarpum*, *Dodonaea viscosa* and *Acacia colletioides*. Frequently occurring grasses and herbs include *Stipa* spp., *Vittadinia cuneata* and *Dissocarpus paradoxus*.

2b *Eucalyptus* open-shrubland with *Triodia* understorey



On dune ridges *Eucalyptus* open-shrubland to 8m occurs characterised by the presence of *Triodia scariosa* as the dominant component of the understorey. The most frequent dominants are *Eucalyptus socialis*, *E. dumosa* and *E. gracilis* with *E. oleosa*, *E. costata* and *E. leptophylla* as more occasional associates. Commonly associated shrubs include *Dodonaea viscosa*, *Maireana pentatropis*, *Eremophila glabra* and *Grevillea huegelii*. Associated grasses and herbs include *Stipa* spp., *Podolepis capillaris* and *Vittadinia cuneata*.

2c *Eucalyptus gracilis*/*Melaleuca lanceolata* open-shrubland



In a narrow fringe around the salt lakes a mallee community to 8m occurs in which *Melaleuca lanceolata* is a prominent component. Associated shrubs confined to this community include *Leptospermum coriaceum*, *Acacia rigens* and *Hibbertia virgata*. *Disphyma crassifolium* ssp *clavellatum* is a common component of the ground layer.

2d *Eucalyptus gracilis* open-shrubland with *Disphyma crassifolium* ssp. *clavellatum*



Around the eastern edges of many of the salt lakes is a community dominated by generally aged examples of *Eucalyptus gracilis* with a low understorey dominated by *Disphyma crassifolium* ssp. *clavellatum* and *Maireana pentatropis*.

3. **Acacia shrublands**

3a *Acacia aneura* open-shrubland



Small areas of *A. aneura* tall open shrubland to 8m occur at a number of sites. The disturbed area around the homestead may have included a significant area of this community. Areas of *A. aneura* tall open shrubland are generally surrounded by *Casuarina pauper* woodland. The understorey is dominated by herbs and grasses.

3b *Acacia loderi* open-shrubland



An area of *A. loderi* tall open shrubland to 6 m occurs 1km north of the homestead. *A. loderi* shrubland is listed on the NSW Threatened Species Act as endangered due to lack of regeneration. The area on Nanya has been exclusion fenced to encourage regeneration within this community.

4. Low open shrublands

4a *Dodonaea viscosa* ssp. *angustissima*/*Eremophila sturtii* shrubland/open-shrubland



In a number of areas *D. viscosa* ssp. *angustissima* and/or *E. sturtii* form stands of varying density to 2m. *Acacia burkitti* may also be associated. The understorey consists of a variety of grasses and herbs. This community is regarded as resulting from clearing of eucalypt open-shrubland or *Casuarina pauper* woodland.

4b *Nitraria billardieri* shrubland



Nitraria billardieri is a low rounded shrub which is unpalatable to most grazers. It has tended to increase in areas of heavy grazing such as around water points.

4c *Lycium australe* shrubland

Small areas of low shrubland dominated by *Lycium australe* occur to the east of the salt lake system.

4d *Atriplex vesicaria* low open-shrubland



An extensive open-shrub community dominated by *A. vesicaria* occurs around the salt lakes. Frequently associated species include *Lycium australe*, *Disphyma crassifolium* ssp. *clavellatum*, *Maireana pentatropis*, *Scleroleana obliquicuspis* and *Stipa* spp.

4e *Halosarcia*/*Frankenia*/*Osteocarpum* low open-shrubland



4f *Halosarcia lylei* low open-shrubland

Around the perimeter of many salt lakes is a community dominated by varying proportions of *Halosarcia* spp., *Hemichroa diandra*, *Frankenia* spp. and *Osteocarpum acropterum* ssp. *diminutum*.



A near monospecific community of *Halosarcia lylei* occurs across the bed of smaller salt lakes and around the perimeter of larger lakes.

4g *Halosarcia pergranulata* low open-shrubland



Across many of the smaller lakebeds and around the perimeter of larger lakes is a near monospecific community dominated by *Halosarcia pergranulata*.

4h Gypseous shrubland



Gypseous dunes around the salt lakes and on some islands within the salt lake complex support a low shrubland community dominated by the gypsophile, *Kippistia suaedifolia*.

5. Grasslands/Herblands

5a Grassland



Open areas which are bare for extended periods develop dense *Stipa* grassland after good spring rains.

5a Herbland



An artificial community consisting of largely exotic grasses and herbs with few associated shrubs, occurs around the more reliable groundwater tanks and other highly disturbed areas.

Distribution of plant communities

The distribution of plant communities on Nanya is largely determined by minor changes in topography and associated soil type. *Eucalyptus* open-shrubland with *Triodia scariosa* understorey occurs in sandy soils on the dunes. *Eucalyptus* shrubland with a shrub understorey occurs in the swales. *Casuarina pauper* woodland occurs on calcareous plains of loamy solonised brown soils. *Atriplex vesicaria* low open shrubland is associated with the areas around the salt lake systems and on islands within the salt lakes while *Halosarcia/Osteocarpum/ Frankenia* and *Halosarcia lylei* low open-shrublands occur on and around the fringes of salt lakes.

Conservation values

Significant communities

Halosarcia lylei low open-shrubland has not previously been recorded from NSW (Harden 1990-1993). Whilst the species is not listed as endangered for Australia (Briggs and Leigh 1988) this is the only site in NSW from which it has been recorded and the community is listed under the NSW Threatened Species Act. *Halosarcia/Frankenia/Osteocarpum* low open shrubland frequently includes *Hemichroa diandra* which has not previously been recorded from NSW. This species is not listed as endangered for Australia (Briggs and Leigh 1988) but is endangered in Victoria (Gullan *et al.* 1990). Its widespread occurrence in this area is significant. A small area of *Acacia loderi* open shrubland, listed under the NSW Threatened Species Act, occurs to the north of the homestead complex. The Gypseous low shrubland dominated by *Kippistia suaedifolia*, the *Atriplex vesicaria* shrubland and the *Callitris glaucophylla* open woodland are listed by Benson (2006) as vulnerable.

The distribution of communities is shown on Fig. 4.

Species

Over 300 vascular plant species from 66 families have been recorded from Nanya including 62 (16%) exotics (Appendix 1). The weediness and species richness of each community is given in Table 1. A full listing of species is given as Appendix 1. Reference specimens are held at the University of Ballarat.

Community	Area (ha)	Benson (2006) equivalent	Mean Species Richness	Mean % Weediness	Total Species Richness
1a <i>Casuarina pauper</i> woodland/open-woodland, mixed shrub understorey		58	18	6	206
1b <i>Casuarina pauper</i> woodland/open-woodland, <i>Maireana sedifolia</i> understorey		254	12	33	12
1c <i>Casuarina pauper</i> woodland/ <i>Geijera parviflora</i> open-woodland		57	22	11	57
1d <i>Callitris glaucophylla</i> open-woodland		28	23	5	104
1d <i>Hakea tephrosperma</i> / <i>Hakea leucoptera</i> low open woodland		199	34	13	88
3a <i>Acacia aneura</i> open-shrubland		119	23	9	103
3b <i>Acacia loderi</i> tall open-shrubland		128	24	13	24
3a <i>Eucalyptus</i> spp. open-shrubland - shrub understorey		170/173	21	3	151
3b <i>Eucalyptus</i> spp. open-shrubland - <i>Triodia</i> understorey		171/172	14	1	75
3c <i>Eucalyptus gracilis</i> / <i>Melaleuca lanceolata</i> , open-shrubland		191	19	1	207
3d <i>Eucalyptus gracilis</i> open shrubland			24	25	25
4a <i>Dodonaea</i> / <i>Eremophila</i> shrubland		143	22	14	215
4b <i>Nitraria billardieri</i> shrubland		163			
4c <i>Lycium australe</i> shrubland		196			
4d <i>Atriplex vesicaria</i> low open-shrubland		157	11	5	53
4e <i>Halosarcia</i> / <i>Frankenia</i> / <i>Hemichroa</i> low open-shrubland			8	2	96
4f <i>Halosarcia pergranulata</i> low shrubland		64			
4g <i>Halosarcia lylei</i> low open-shrubland		65	3	0	2
4h Gypseous shrubland		253			
5a <i>Stipa tussock</i> grassland		165	12	25	12
5b Herbland			2	41	37

Table 1. Area, Benson (2006) community equivalent, Species Richness and Weediness of Plant Communities of Nanya Station.

Significant plant species

None of the species recorded is rare or threatened Australia-wide (Briggs & Leigh 1988) but nine have either not previously been recorded, or have restricted distribution in western NSW (Harden 1990-93). *Halosarcia lylei*, *Hemichroa diandra*, *Podotheca angustifolia*, *Dodonaea stenophylla* and *Elachanthus glaber* have not previously been recorded for NSW; *Bergia trimera* and *Ptilotus atriplicifolius* have not been recorded for the south far western province; *Cratystylis conocephala* and *Kippistia suaedifolia* were previously known only from a few sites in NSW and were listed by Pressey (1993) as at risk. Beckers (1997) records *Cratystylis conocephala* and *Kippistia suaedifolia* on Schedule 1, Part 1 endangered species for the Western Zone of NSW but does not list the other six species due to lack of records. With the exception of *Cratystylis conocephala*, *Dodonaea stenozygza* and *Podotheca angustifolia*, which occur within *Eucalyptus* shrubland, these species are associated with the salt lakes.

Disturbance

Despite the relatively short grazing history of the area, some direct and indirect impacts of pastoral activity are evident. An area south and west of the homestead complex was cleared soon after the establishment of the lease. It was cropped for a few years to grow feed for horses used to assist in digging the earth tanks (Geoff Rhodda, Wenba Station pers. comm.) Chaining (the clearing of overstorey trees by dragging a heavy chain between two bulldozers) was used in the 1970's to improve pasture growth. Many of the areas of *Casuarina pauper* open woodland treated in this way now carry *Dodonaea/Eremophila* shrubland. A large number of 'shot lines' were bulldozed in the 1980's during geological survey. These are regenerating but are now notable for species such as *Halganea cyanea*, *Haloragis odontocarpa* and *Solanum esuriale*, associated with fire and/or disturbance.

Species richness of plant communities

More species have been recorded from both the *Casuarina pauper* open-woodland and the *Eucalyptus* shrubland communities than reported from surveys of examples of the communities at Mungo National Park (Westbrooke and Miller 1996) and Mallee Cliffs National Park (Morcom and Westbrooke 1990). Whilst this may be due to variation in sampling effort and seasonal variation in herb species it is likely to be a reflection of the relatively short grazing history of Nanya. Also of note is the high total species richness (215) of the *Dodonaea viscosa* ssp. *angustissima/ Eremophila sturtii* shrubland/open-shrubland. This may reflect its derivation from more than one naturally occurring community.

Fire

Eucalyptus shrubland is highly flammable and large areas were burnt in the wildfires of 1975/6 (Rodda 1978). Fire promoted species such as *Codonocarpus cotonifolius* and *Halganea cyanea* occur in these areas but are now declining. It is also likely that much of the property was burnt in the extensive wildfires that occurred in the region in 1917. A small fire burnt approximately 50ha. of mallee to the west of the salt lake complex in 1985. In December 1996 a wildfire burned 3,000ha in the north west of Nanya and a further fire in December 1997 burned 5,000ha to the southwest of the saltlake complex. Areas of *Casuarina pauper* woodland, having a relatively non flammable understorey, and the chenopod shrublands did not burn in these fires. The distribution of the 1976, 1985, 1996 and 1997 fires is shown on Fig. 5.

Exotic species

Sixty exotic species have been recorded of which only one, *Nicotiana glauca* is a woody perennial. The most frequently occurring exotic species are the grasses, *Schismus barbatus*, *Critesion murinum* ssp. *leporinum* and *Bromus rubens*. Weediness in all communities is significantly lower than that reported for Mungo National Park (Westbrooke and Miller 1996) and Mallee Cliffs National Park (Morcom and Westbrooke 1990) as shown in Table 4.

Location	Total species richness			Mean % weediness		
	1a	3a	3b	1a	3a	3b
Community						
Nanya	206	151	207	6	3	1
Mungo National Park	88	82	140	26	18	2
Mallee Cliffs National Park	62	62	74	11	3	5

Table 4. Total species richness and mean percentage weediness of communities of Nanya compared to Mungo and Mallee Cliffs National Parks

Discussion

Nanya contains highly significant plant communities not represented in conservation reserves, as well as some of the most intact examples of *Eucalyptus* spp. open-shrubland and *Casuarina pauper* woodland in New South Wales. The vegetation communities of south-western NSW have until recently been poorly conserved and the communities of Nanya are of particular significance due to their species richness, low weediness and occurrence of significant species.

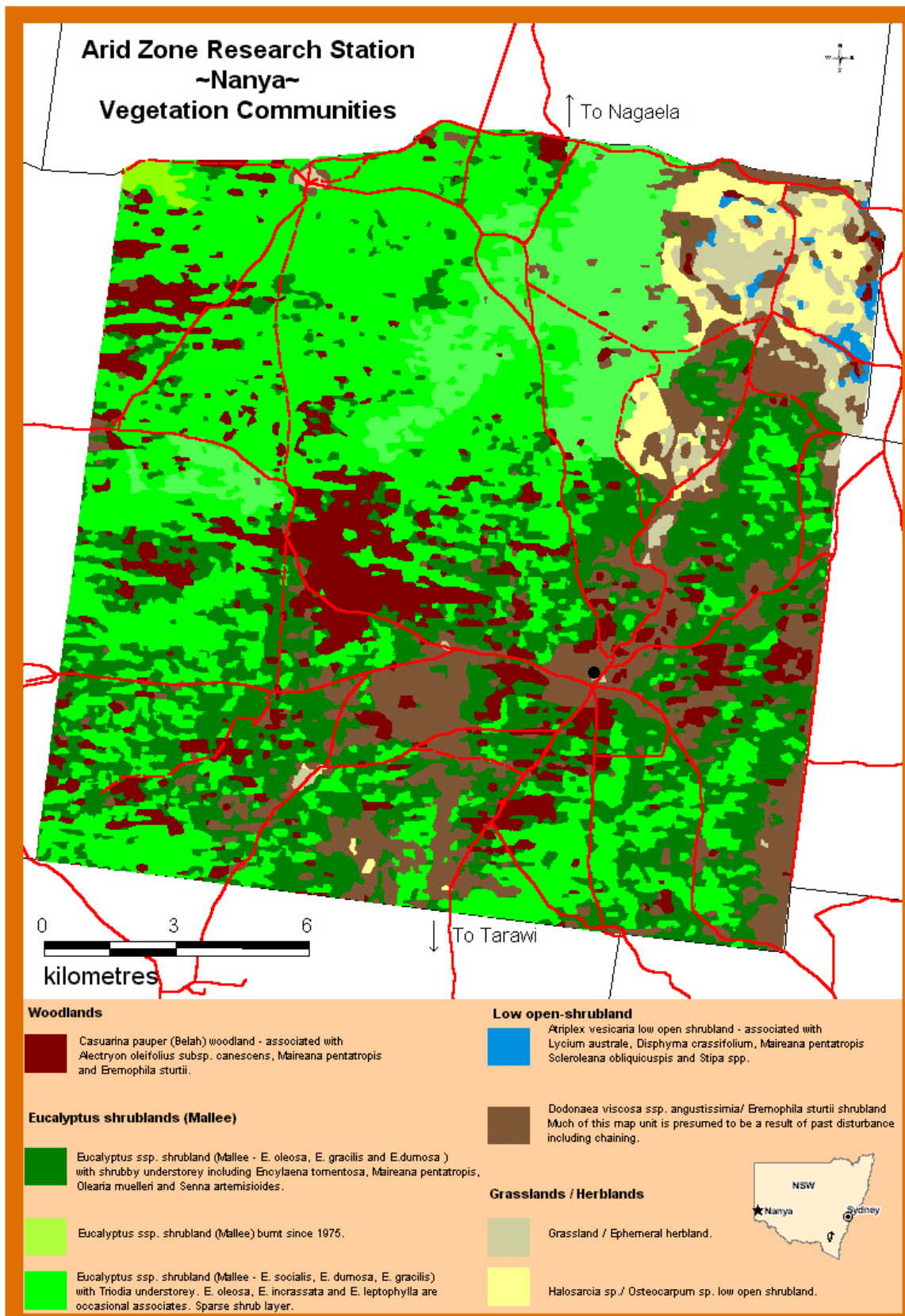


Fig. 4. Vegetation communities of Nanya Station

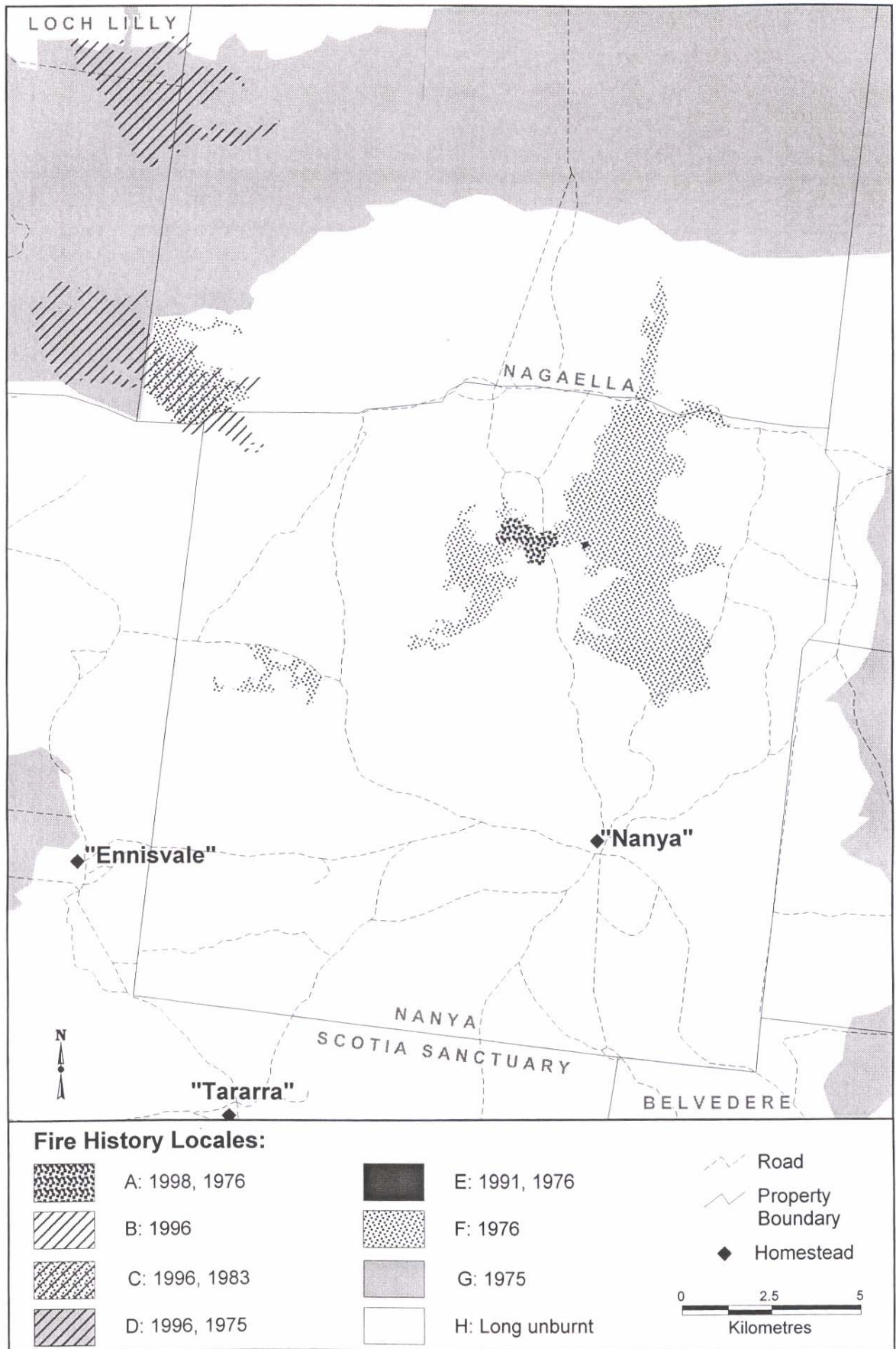


Fig. 5. Nanya fire history



Single plant of *Dodonaea stenozyga*



Assessing *Atriplex vesicaria* community



Northern saltlake



Exclusion fence around *A. Ioderi* scrubland



Myoporum platycarpum regeneration



Assessing mallee vegetation



1997 fire grazing exclusion



One of many islands in the lakes

FAUNA

The relatively intact communities and diverse vegetation of Nanya provides habitat for a wide range of mammals, birds, reptiles and invertebrates. Nanya is known to be home to eighteen species of mammal, eighty-seven species of birds, thirty-five species of reptile and one species of frog. A list of vertebrate species recorded is given as Appendix 2. Three exotic species are present: House Mouse, *Mus musculus* only occurs around the homestead complex, Fox, *Vulpes vulpes*, is the subject of an intensive control program and Feral Goat, *Capra hircus*, is regularly trapped at water points. It is anticipated that a program of closure of watering points will help to eliminate the latter species.

Mammals

The most conspicuous members of the mammal fauna are Western Grey and Red Kangaroos however five small mammals and nine species of bat have also been recorded. Two species of mammal; *Cercartetus coccinnus*, Western Pygmy-possum and *Pseudomys bolami* Bolam's Mouse are listed as endangered under the NSW Threatened Species Conservation (TSC) Act. A further five species of mammals are listed as vulnerable under that Act: *Ningui yvonneae*, Southern Ningui, *Nyctophilus timorensis*, Eastern Long-eared Bat, *Pseudomys hermannsbergensis*, Sandy Inland Mouse, *Saccolaimus flaviventris*, Yellow-bellied Sheathtail Bat and *Vespadelus baverstocki*, Inland Forest Bat.

Birds

Nanya is home to a wide range of bird species. They include the nationally endangered *Leipoa osellata*, Malleefowl, listed under the Commonwealth Environmental Protection and Biodiversity Conservation Act. A number of active nests and live birds has been observed and a program of systematic survey has been initiated to map and characterize all nests. Nanya provides likely habitat, old growth mallee for *Manorina melanotis*, the Black-eared Miner, which is also listed under the Act. These species are also listed as endangered under the NSW TSC Act. A further four further bird species are listed as vulnerable under this Act: *Amytornis striatus*, Striated Grasswren, *Cacatua leadbeateri*, Major Mitchell's Cockatoo, *Cinclosoma castanotus*, Chestnut Quail-thrush, and *Neophema splendida*, Scarlet-chested Parrot.

Reptiles

There is a highly diverse and abundant reptile fauna in all vegetation communities. It includes seven snakes and twenty-eight lizards. One of the lizards, *Tiliqua occipitalis*, Western Blue-tongued Lizard, is listed as vulnerable under the TSC Act.

Amphibia

One burrowing frog, *Neobatrachus centralis*, Trilling Frog has been recorded from Nanya.



Malleefowl



Active Malleefowl nest



Western Pygmy-possum



Bolam's Mouse



Bearded Dragon



Carpet Python



Peregrine Falcon



Major Mitchell's Cockatoo



Emu



Wedge-tailed Eagle

APPENDIX 1 – VASCULAR PLANT SPECIES RECORDED FROM NANYA

Nomenclature according to Harden (1990-1993)

Exotic species denoted thus *

ADIANTACEAE

Cheilanthes austrotenuifolia

AIZOACEAE

Disphyma crassifolium ssp. *clavellatum*

**Mesembryanthemum crystallinum*

**Psilocaulon tenue*

Tetragonia tetragonioides

ALSTROMERIACEAE

Dicrastylis verticillata

AMARANTHACEAE

Hemichroa diandra

Ptilotus sessifolius

Ptilotus erubescens

Ptilotus exaltatus

Ptilotus gaudichaudii

Ptilotus nobilis

Ptilotus obovatus

Ptilotus polystachyus

Ptilotus seminudus

Ptilotus sessilifolius var. *sessilifolius*

Ptilotus spathulatus

APIACEAE

Daucus glochidiatus

ASCLEPIADACEAE

Leichhardtia australis

Rhyncharrhena linearis

ASTERACEAE

Actinobole uliginosum

Angianthus spp.

Angianthus tomentosus

**Arctotheca calendula*

Brachyscome ciliaris

Brachyscome exilis

Brachyscome lineariloba

Brachyscome trachycarpa

Bracteantha bracteata

Calotis cymbacantha

Calotis erinacea

Calotis hispidula

**Carthamus lanatus*

**Centaurea melitensis*

Centipeda cunninghamii

Centipeda minima

Centipeda thespidioides

**Chondrilla juncea*

Chrysocephalum apiculatum s.l.

Chthonocephalus pseudevax

**Cirsium vulgare*

**Conyza bonariensis*

Cratystylis conocephala

**Dittrichia graveolens*

Elachanthus glaber

Eriochlamys behrii

Euchiton sphaericus

Gnephosis arachnoidea

Gnephosis tenuissima

**Hedypnois cretica*

Hyalosperma demissum

Hyalosperma stoveae

**Hypochoeris glabra*

**Hypochoeris radicata*

Isoetopsis graminifolia

Ixiolaena leptolepis

Kippistia suaedifolia

**Lactuca serriola*

Lemooria burkittii

Millotia greevesii

Millotia myosotidifolia

Minuria cunninghamii

Minuria intergerrima

Myriocephalus rhizocephalus

Myriocephalus stuartii

Olearia muelleri

Olearia pimeleoides

Olearia subspicata

**Onopordum acaulon*

Podolepis capillaris

Podotrochea angustifolia

Pogonolepis muelleriana

Pseudognaphalium luteoalbum

Pycnosorus pleiocephalus

**Reichardia tingitana*

Rhodanthe corymbiflora

Rhodanthe microglossa

Rhodanthe moschata

Rhodanthe pygmaea

Rhodanthe stuartiana

Rhodanthe tietkensis

Senecio glossanthus

Senecio minimus

Senecio pinnatifolius

Senecio quadridentatus

Senecio runcinifolius

**Sonchus asper* s.l.

**Sonchus oleraceus*

Stuartina muelleri

Triptilodiscus pygmaeus

Vittadinia cuneata

Vittadinia dissecta

Waitzia acuminata var. *acuminata*

**Xanthium spinosum*

BORAGINACEAE

**Echium plantagineum*

Halgania cyanea

Heliotropium curassavicum

**Heliotropium europaeum*

**Heliotropium supinum*

Omphalolappula concava

Plagiobothrys plurisepalus

BRASSICACEAE

**Alyssum linifolium*
Arabidella trisecta
 **Brassica tournefortii*
 **Carrichtera annua*
Geococcus pusillus
Harmsiodoxa blennodioides
Harmsiodoxa brevipes var. *brevipes*
Lepidium leptopetalum
Lepidium papillosum
Lepidium phlebopetalum
Menkea australis
 **Sisymbrium erysimoides*
 **Sisymbrium irio*
 **Sisymbrium orientale*
Stenopetalum lineare
Stenopetalum sphaerocarpum

CACTACEAE

**Opuntia vulgaris*

CAESALPINIACEAE

Senna artemisioides nothosp. *coriacea*
Senna artemisioides ssp. *filifolia*
Senna artemisioides ssp. *petiolaris*

CAMPANULACEAE

Wahlenbergia communis s.l.
Wahlenbergia gracilentia s.l.
Wahlenbergia gracilis s.l.

CARYOPHYLLACEAE

Gypsophila tubulosa
 **Herniaria cinerea*
Scleranthus minusculus
 **Silene apetala*
 **Spergularia diandra*
 **Spergularia rubra*

CASUARINACEAE

Casuarina pauper

CHENOPODIACEAE

Atriplex acutibractea
Atriplex eardleyae
Atriplex holocarpa
Atriplex lindleyi ssp. *inflata*
Atriplex nummularia
Atriplex stipitata
Atriplex suberecta
Atriplex vesicaria
 **Chenopodium album*
Chenopodium cristatum
Chenopodium curvispicatum
Chenopodium desertorum
Chenopodium melanocarpum
 **Chenopodium murale*
Chenopodium nitrariaceum
Chenopodium spp.
Chenopodium ulicinum
Dissocarpus paradoxus

Einadia nutans
Enchylaena tomentosa var. *tomentosa*
Eriochiton sclerolaenoides
Halosarcia halocnemoides ssp.

halocnemoides
Halosarcia indica
Halosarcia lylei
Halosarcia pergranulata
Halosarcia pterygosperma ssp.
pterygosperma
Maireana appressa
Maireana brevifolia
Maireana ciliata
Maireana decalvans
Maireana erioclada
Maireana georgei
Maireana integra
Maireana lobiflora
Maireana pentatropis
Maireana pyramidata
Maireana radiata
Maireana sedifolia
Maireana trichoptera
Maireana triptera
Maireana turbinata
Malacocera tricornis
Neobassia spp.
Osteocarpum acropterum var. *deminutum*
Rhagodia spinescens
Rhagodia ulicina
Salsola kali
Sclerolaena bicornis
Sclerolaena decurrens
Sclerolaena diacantha
Sclerolaena divaricata
Sclerolaena muricata
Sclerolaena obliquicuspis
Sclerolaena parviflora
Sclerolaena patenticuspis
Sclerolaena tricuspis
Sclerostegia tenuis

CONVOLVULACEAE

Convolvulus erubescens

CRASSULACEAE

Crassula colorata

CUCURBITACEAE

**Citrullus colocynthis*
 **Cucumis myriocarpus*

CUPRESSACEAE

Callitris glaucophylla
Callitris verrucosa

CYPERACEAE

Schoenus subaphyllus

DILLENIACEAE

Hibbertia virgata

ELATINACEAE

Bergia trimera

EUPHORBIACEAE
Beyeria opaca
Chamaesyce drummondii
Poranthera microphylla

FABACEAE
Daviesia ulicifolia
Eutaxia diffusa/microphylla
Indigophora australis
Lotus cruentus
**Medicago laciniata*
**Medicago minima*
**Medicago polymorpha*
**Melilotus indicus*
Swainsona purpurea
Templetonia egena

FRANKENIACEAE
Frankenia connata
Frankenia foliosa
Frankenia pauciflora ssp. pauciflora
Frankenia serpyllifolia

GENTIANACEAE
**Centaurium spicatum*
**Centaurium tenuiflorum*

GERANIACEAE
**Erodium botrys*
**Erodium cicutarium*
Erodium crinitum

GOODENIACEAE
Goodenia fascicularis
Goodenia pinnatifida
Goodenia pusilliflora
Scaevola depauperata
Scaevola spinescens
Velleia connata

GYROSTEMONACEAE
Codonocarpus cotinifolius

HALORAGACEAE
Glischrocaryon behrii
Haloragis aspera
Haloragis odontocarpa
Myriophyllum verrucosum
Myriophyllum sp.

JUNCAGINACEAE
Triglochin calcitrapum

LAMIACEAE
**Marrubium vulgare*
**Salvia verbenaca*
Teucrium racemosum var. racemosum
Westringia rigida

LAURACEAE
Cassytha melantha

LILIACEAE
Bulbine bulbosa
Dianella revoluta
Thysanotus baueri

LOGANIACEAE
Logania nuda

LORANTHACEAE
Amyema linophyllum ssp. orientale
Amyema miquelii
Amyema miraculosum ssp. boormanii
Amyema preissii
Lysiana exocarpi ssp. exocarpi

MALVACEAE
Abutilon fraseri
Lawrenzia glomerata
Lawrenzia squamata
**Malva parviflora*
**Modiola caroliniana*
Radyera farragei
Sida corrugata var. corrugata
Sida intricata

MARSILEACEAE
Marsilea angustifolia
Marsilea costulifera
Marsilea drummondii

MIMOSACEAE
Acacia acanthoclada
Acacia aneura
Acacia brachybotrya
Acacia burkittii
Acacia colletioides
Acacia ligulata
Acacia loderi
Acacia oswaldii
Acacia rigens
Acacia sclerophylla
Acacia wilhelmiana

MYOPORACEAE
Eremophila deserti
Eremophila divaricata ssp. divaricata
Eremophila glabra
Eremophila hillii
Eremophila longifolia
Eremophila maculata var. maculata
Eremophila oppositifolia ssp. oppositifolia
Eremophila scoparia
Eremophila sturtii
Myoporum platycarpum
Myoporum viscosum

MYRTACEAE
Baeckea crassifolia
Eucalyptus costata/incrassata
Eucalyptus dumosa
Eucalyptus gracilis
Eucalyptus leptophylla
Eucalyptus oleosa

Eucalyptus porosa
Eucalyptus socialis
Leptospermum coriaceum
Melaleuca lanceolata

NYCTAGINACEAE
Boerhavia dominii

OLEACEAE
Jasminum didymum ssp. *lineare*

ORCHIDACEAE
Pterostylis biseta s.l.

OXALIDACEAE
Oxalis perennans
**Oxalis pes-caprae*

PITTOSPORACEAE
Billardiera cymosa
Pittosporum phylliraeoides

PLANTAGINACEAE
Plantago cunninghamii
Plantago drummondii
Plantago varia

POACEAE
Agrostis avenacea
Amphipogon caricinus var. *caricinus*
Aristida contorta
Aristida spp.
Bromus arenarius
**Bromus rubens*
Chloris truncata
**Critesion murinum* ssp. *leporinum*
Cynodon dactylon
Danthonia eriantha
Danthonia setacea
Enneopogon intermedius
Eragrostis australasica
Eragrostis dielsii
Eragrostis eriopoda
Eragrostis falcata
Eragrostis setifolia
**Holcus lanatus*
**Panicum capillare*
Paspalidium gracile
**Rostraria pumila*
**Schismus barbatus*
Stipa drummondii
Stipa elegantissima
Stipa scabra ssp. *scabra*
Stipa spp.
Triodia scariosa ssp. *scariosa*
**Vulpia myuros*

POLYGONACEAE
**Emex australis*
Muehlenbeckia diclina
Muehlenbeckia florulenta
Polygonum plebeium
**Rumex crispus*

Rumex tenax

PORTULACACEAE
Calandrinia eremaea

PRIMULACEAE
**Anagallis arvensis*

PROTEACEAE
Grevillea huegelii
Grevillea pterosperma
Hakea leucoptera
Hakea tephrosperma

RANUNCULACEAE
Ranunculus pumilio

RHAMNACEAE
Cryptandra propinqua

RUBIACEAE
Asperula conferta
Synaptantha tillaeaceae

RUTACEAE
Geijera parviflora

SANTALACEAE
Exocarpos aphyllus
Exocarpos sparteus
Santalum acuminatum

SAPINDACEAE
Alectryon oleifolius ssp. *canescens*
Dodonaea bursariifolia
Dodonaea viscosa ssp. *angustissima*
Dodonaea stenozyga

SCROPHULARIACEAE
Limosella australis
Morgania floribunda

SOLANACEAE
Duboisia hopwoodii
Lycium australe
**Lycium ferocissimum*
**Nicotiana glauca*
Nicotiana goodspeedii
Nicotiana occidentalis
Nicotiana simulans
Nicotiana velutina
Solanum coactiliferum
Solanum esuriale
**Solanum nigrum*

THYMELAEACEAE
Pimelea microcephala ssp. *microcephala*
Pimelea simplex ssp. *simplex*
Pimelea trichostachya

TYPHACEAE
Typha domingensis

URTICACEAE
Parietaria debilis

VERBENACEAE
**Verbena supina*

XANTHORRHOACEAE
Lomandra effusa
Lomandra leucocephala ssp. *robusta*

ZYGOPHYLLACEAE

Nitraria billardieri
Tribulus terrestris
Zygophyllum ammophilum
Zygophyllum apiculatum
Zygophyllum aurantiacum
Zygophyllum billardieri
Zygophyllum crenatum
Zygophyllum eremaeum
Zygophyllum glaucum
Zygophyllum iodocarpum
Zygophyllum ovatum

APPENDIX 2 – VERTEBRATE SPECIES RECORDED FROM NANYA

CLASS MAMMALIA

EUTHERIA

Muridae

Pseudomys hermannsbergensis

Pseudomys bolami

**Mus musculus*

Sandy Inland Mouse

Bolam's Mouse

House Mouse

Eballonuridae

Saccolaimus flaviventrus

Sheathtail Bat

Molossidae

Mormopterus planiceps

Little Mastiff Bat

Nyctinomus australis

White-striped Bat

Vespertilionidae

Chalinolobus gouldii

Gould's Wattled Bat

Chalinolobus picatus

Little Pied Bat

Nyctophilus geoffroyi

Lesser Long-eared Bat

Nyctophilus timoriensis timoriensis

Eastern Long-eared bat

Scotorepons balstoni

Greater Long-eared Bat

Vespadelus baverstocki

Inland Forest Bat

Canidae

**Vulpes vulpes*

European Fox

Bovidae

**Capra hircus*

Feral Goat

MONOTREMATA

Tachyglossus aculeatus

Echidna

MARSUPALIA

Dasyuridae

Sminthopsis murina

Common Dunnart

Ningau yvonnii

Yvonne's Ningau

Macropodidae

Macropus rufus

Red Kangaroo

Macropus fuliginosus melanops

Western Grey-kangaroo

Phalangeridae

Cercartetus concinnus

Western Pygmy-possum

CLASS REPTILIA

Boidae

Morelia spilota metcalfei

Victorian Carpet Python

Elapidae

Demansia psammophis

Yellow-faced Whipsnake

Furina diadema

Red-naped Snake

Pseudonaja modesta

Ringed Brown Snake

Simoselaps australis

Coral Snake

Suta nigriceps

Curl Snake

Typhlopidae

Southern Blind Snake

Varanidae

Varanus gouldii

Gekkonidae

Diplodactylus vittatus

Diplodactylus williamsi

Gehyra variegata

Heteronotia binoei

Lucasium damaeum

Nephurus levis

Oedura marmorata

Rhynchoedura omata

Pygopodidae

Delma australis

Pygopus nigriceps

Scincidae

Cryptoblepharus carnabyi

Ctenotus atlas

Ctenotus regius

Ctenotus schomburgkii

Egernia inornata

Egernia striolata

Eremiascincus richardsonii

Lerista labialis

Lerista punctatovittata

Menetia greyii

Morethia boulengeri

Tiliqua occipitalis

Trachydosaurus rugosa

Agamidae

Amphibolurus nobbi coggeri

Ctenophorus fordi

Ctenophorus pictus

Pogona vitticeps

CLASS AMPHIBIA

Myobatrachidae

Neobatrachus centralis

CLASS AVES

Casuariidae

Dromaius novaehollandiae

Megapodiidae

Leipoa ocellata

Anatidae

Chenonetta jubata

Anas superciliosa

Anas gracilis

Podicipedidae

Tachybaptus novaehollandiae

Accipitridae

Elanus axillaris

Milvus migrans

Accipiter cirrhocephalus

Aquila audax

Falconidae

Falco peregrinus

Falco berigora (dead)

Rallidae

Gallinula tenebrosa

Gallinula ventralis

Southern Blind Snake

Sand Goanna

Eastern Stone Gecko

Eastern Spiny-tailed Gecko

Varigated Detalla

Bynoe's Gecko

Beaded Gecko

Smooth Knob-Tailed Gecko

Marbled Velvet Gecko

Beaked Gecko

Southern Legless Lizard

Hooded Scaley-Foot

Carnaby's Wall Skink

Spinifex Stripped Skink

Royal Ctenotus

Desert Skink

Tree Skink

Broad-banded Sand-Swimmer

Speckled Short-limbed Skink

Grey's Skink

Fire Skink

Western Blue-Tongue

Stumpy-Tailed Lizard

Nobbi Dragon

Mallee Military Dragon

Painted Dragon

Central Bearded Dragon

Trilling Frog

Emu

Malleefowl

Australian Wood Duck

Pacific Black Duck

Grey Teal

Australasian Grebe

Black-shouldered Kite

Black Kite

Collared Sparrowhawk

Wedge-tailed Eagle

Peregrine Falcon

Brown Falcon

Dusky Moorhen

Black-tailed Native-hen

Turnicidae*Turnix velox***Charadriidae***Elsayornis melanops**Erythrogonys cinctus**Vanellus miles***Columbidae***Phaps chalcoptera**Ocyphaps lophotes***Cacatuidae***Eolophus roseicapilla**Cacatua sanguinea**Cacatua leadbeateri***Psittacidae***Barnardius zonarius**Psephotus varius**Neophema splendida**Neophema chysostoma**Melopsittacus undulatus***Cuculidae***Cuculus pallidus**Chrysococcyx osculans**Chrysococcyx basalus***Strigidae***Ninox novaeseelandiae***Aegothelidae***Aegotheles cristatus***Halcyonidae***Todiramphus pyrrhopygia***Meropidae***Merops ornatus***Climacteridae***Climacteris picumnus**Climacteris affinis***Neosittidae***Daphoenositta chrysoptera***Maluridae***Malurus splendens***Sub.Fam. Amytornithinae***Amytornis striatus***Pardalotidae***Pardalotus punctatus**Pardalotus striatus**Smicromis brevirostris**Acanthiza apicalis**Acanthiza uropygialis**Acanthiza nana**Aphelocephala leucopsis***Meliphagidae***Acanthagenys rufogularis**Plectorhyncha lanceolata**Manorina flavigula**Lichenostomus virescens**Lichenostomus ornatus**Lichenostomus plumulus**Melithreptus brevirostris**Phylidonyris albifrons**Epthianura tricolor**Epthianura albifrons***Petroicidae***Microeca leucophaea**Petroica goodenovii**Melanodryas cucullata*

Little Button-quail

Black-fronted Dotterel

Red-kneed Dotterel

Masked Lapwing

Common Bronzewing

Crested Pigeon

Galah

Little Corella

Major Mitchell's Cockatoo

Australian Ringneck

Mulga Parrot

Scarlet-chested Parrot

Blue-winged Parrot

Budgerigar

Pallid Cuckoo

Black-eared cuckoo

Horsfield's Bronze-Cuckoo

Southern Boobook

Australian Owlet-nightjar

Red-backed Kingfisher

Rainbow Bee-eater

Brown Treecreeper

White-browed treecreeper

Varied Sittella

Splendid Fairy-wren

Striated Grasswren

Spotted Pardalote

Striated Pardalote

Weebill

Inland Thornbill

Chestnut-rumped Thornbill

Yellow Thornbill

Southern Whiteface

Spiny-cheeked Honeyeater

Striped Honeyeater

Yellow-throated Miner

Singing Honeyeater

Yellow-plumed Honeyeater

Grey-fronted Honeyeater

Brown-headed Honeyeater

White-fronted Honeyeater

Crimson Chat

White-fronted Chat

Jacky Winter

Red-capped Robin

Hooded Robin

Pomatostomidae

Pomatostomus superciliosus

Pomatostomus ruficeps

Cinclosomatidae

Cinclosoma castanotum

Pachycephalidae

Oreoica gutturalis

Pachycephala rufiventris

Pachycephala inornata

Colluricincla harmonica

Dicruridae

Grallina cyanoleuca

Rhipidura leucophrys

Campephagidae

Coracina novaehollandiae

Lalage sueurii

Artamidae

Artamus personatus

Artamus superciliosus

Cracticus torquatus

Streptera versicolour

Gymnorhina tibicen

Corvidae

Corvus coronoides

Corvus mellori

Corcoracidae

Corcorax melanorhamphos

Struthidea cinerea

Motacilidae

Anthus novaeseelandiae

Dicasidae

Dicaeum hiriundinaceum

Hirundinidae

Hirundo neoxena

Hirundo nigricans

Hirundo ariel

Sylviidae

Cinclorhamphus cruralis

Sturnidae

Sturnus vulgaris

White-browed Babbler

Chennut-crowned Babbler

Chestnut Quail-thrush

Crested Bellbird

Rufous Whistler

Gilberts Whistler

Grey Shrike-thrush

Magpie-Lark

Willie Wagtail

Black-faced Cuckoo-Shrike

White-winged Triller

Masked Woodswallow

White-browed Woodswallow

Grey Butcherbird

Grey Currawong

Australian Magpie

Australian Raven

Little Raven

White-winged Chough

Apostlebird

Richard's Pipit

Misteltoebird

Welcome Swallow

Tree Martin

Fairy Martin

Brown Songlark

Common Starling



Pitfall traps used for reptile survey



Striated Grasswrens

SOME PLANTS OF NANYA



Frankenia foliosa



Sclerolaena diacantha



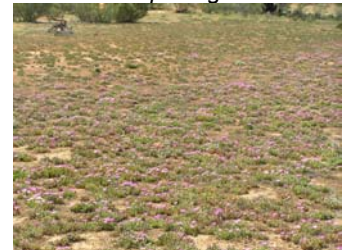
Eremophila glabra



Codonocarpus cotinifolius



Hemichroa diandra



Disphyma crassifolium



Lomandra leucocephala



Dodonia stenozyga



Maireana sedifolia



Exocarpos aphyllus



Eremophila scoparia



Pimelea microcephala



Swainsona formosa



Eremophila maculata



Senna artemisioides



Acacia colletioides



Maireana georgii



Zygophyllum aurantiacum



Grevillea huegelii



Cratystylis conocephala



Alectryon oleifolius

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