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Above Boyra meadows.

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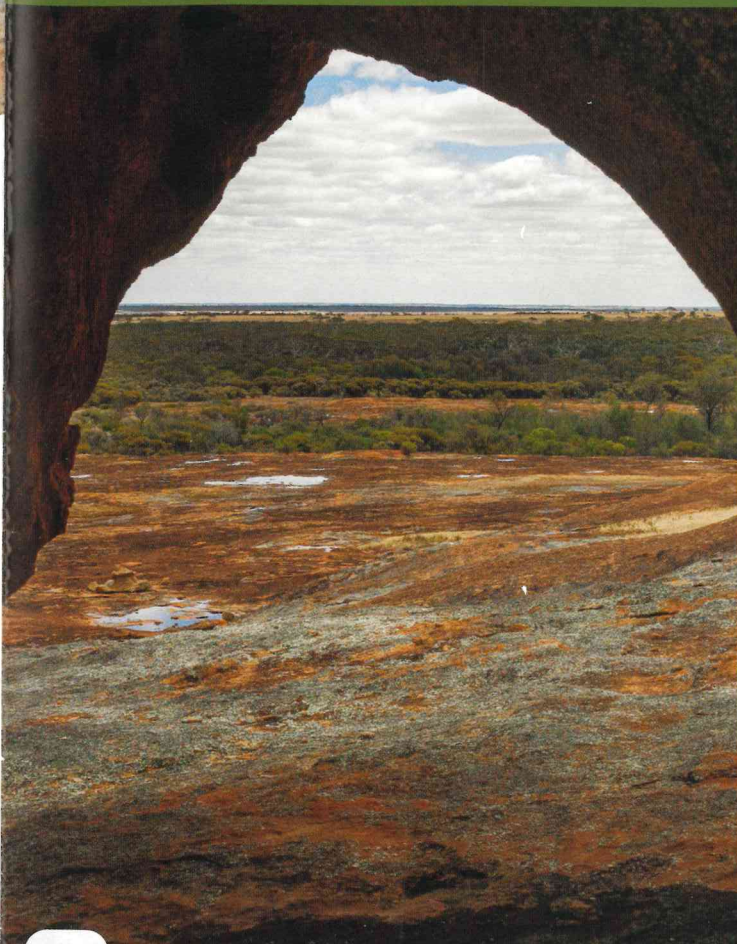
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Photographs courtesy of Natasha Moore, Hayden Cannon and
Parks and Wildlife.

Front cover Looking south-west through weathered granite boulders.

Sandford Rocks Nature Reserve



Visitor information

PAM03970



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Information current at December 2015.
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Above Granite. Below Granite rock shape boulder.

Sandford Rocks Nature Reserve

There are a number of significant granite outcrops in the Western Australian wheatbelt, Sandford Rocks Nature Reserve is one of these. Named after the prominent mining surveyor, Henry Sandford King, it contains a complex mosaic of exposed granite rock with surrounding herb fields, heath and long unburnt woodlands. The granite has been shaped and eroded by wind, rain, lichen and mosses to form the surrounding soils and distinct vegetation assemblages.

The 806ha reserve protects an ancient granite outcrop as well as ephemeral rock pools (gnammas) and a diverse array of flora and fauna, some found only on granite outcrops in this region

The nature reserve is managed for conservation and not only offers a wonderful opportunity to engage with and enjoy nature, but also is an ideal location for learning about the habitats it protects. Granite outcrops are a distinctive natural feature in the wheatbelt landscape. The Sandford Rocks Nature Trail takes you on an exploration of discovery of these ancient granite outcrops and their intriguing wildlife.

The Department of Parks and Wildlife is actively supported in promoting and protecting the natural values of Sandford Rocks Nature Reserve by the Westonia community and the Shire of Westonia.

Getting there

Sandford Rocks Nature Reserve is 322km east of Perth and 10km north-east of Westonia along the Boodarockin Road.



Facilities



From the car park there is a short walk to the west to a bird hide nestling in the woodland on the edge of an ephemeral rock pool. If you sit quietly in the hide, listen and look carefully you could hear or see some of the following birds:

Wedge-tailed eagle, brown falcon, galah, twenty-eight parrot, blue-breasted fairy-wren, singing honeyeater, yellow-throated miner, inland thornbill, chestnut-rumped thornbill, weebill, pied butcher bird, Australian magpie, grey shrike-thrush, rufous whistler, crested bellbird, Australian raven, mallee fowl, brown honeyeater, bronzewing pigeon, red-capped robin, grey fantail, striated pardalote, golden whistler, mulga parrot, elegant parrot, zebra finch, frogmouth, southern boobook owl, shy heathwren, rainbow bee-eater.

Please record your bird sightings from Sandford Rocks in the log book in the bird hide.

Sandford Rocks Discovery Trail

1km – 40 minutes return – Class 3



The trail is a 1km return walk along a marked path. It is a moderate walk trail and you may encounter minor hazards such as short, steep sections and unstable or slippery surfaces.

Caring for Sandford Rocks

Be careful Your safety is our concern but your responsibility.



Be clean Please take your rubbish away with you.

Protect plants and animals. No firearms or pets. Please do not disturb the rock formations as they are part of the critical habitat for many of the reserve's unique species.

Below The bird hide for observing local wildlife.





Above Woodlands, shrubland off granite.



Above Woodlands. Above Pin cushion.



1 Rock of Ages

The huge granite landforms you see before you were once a mass of molten rock (magma) deep beneath the Earth's surface. Internal pressures forced magma upward where it cooled and solidified, still deep below the surface.

Over millions of years, the land surface has been extensively eroded, particularly by wind, rain and the resulting streams. These forces exposed and shaped this huge granite outcrop and helped form the surrounding soils with its distinct vegetation assemblages. Both soil and moisture availability associated with each area controls the pattern of plant distribution and promotes different plant assemblages.

Nine major vegetation assemblages can be found in the reserve: jam woodland (*Acacia acuminata*), gimlet woodland (*Eucalyptus salubris*), wandoo woodland (*Eucalyptus capillosa* and *Eucalyptus salmonophloia*), York gum woodland (*Eucalyptus loxophleba*), black marlock mallee (*Eucalyptus subangusta*), tamma shrubland (*Allocasuarina campestris*), *Acacia sterophylla* shrubland, *Allocasuarina acutivalvis* shrubland and an array of vegetation dominated by pincushions (*Borya*) that grows in the small pockets of soil within the large areas of pavement-like rock.

There are thought to be more than 100 different plant species across these nine classes of vegetation and at least 20 of these are native wattles (*Acacia*).

2 Meadows in Miniature

Look closely at these miniature meadows and the surrounding granite rock. The multi-coloured patterns on the rock that look like paint blotches are actually lichens, mosses and algae.

Run your hand over the surface of the rock. The pitted and scarred granite contrasts with the spongy mosses and dry flaky lichen. In the wet months mosses are green and in the hot

summer months they dry out, becoming dark grey-brown. Both lichens and mosses quickly recover when the first winter rains fall.

Lichens play a part in the breakdown of granite rocks. They secrete very weak acids that slowly loosen the tiny sand grains in the rock surface. The root-like rhizoids of mosses also help loosen sand grains. Both mosses and lichens trap dust, sand and other material. When they die, this matter adds to a seed bed for larger plants. As the surface changes, different types of plants can grow on the rock. This progressive change of plant communities is called succession.

One of the slightly larger species common to granite soils that is also adapted to extremes of wet and dry is the aptly named pincushion or miracle plant (*Borya constricta* and *Borya sphaerocephala*). During summer the plants dry to a brilliant orange and then come to life and turn green once the winter rains start.

3 Survivor Island – micro-habitat specialists

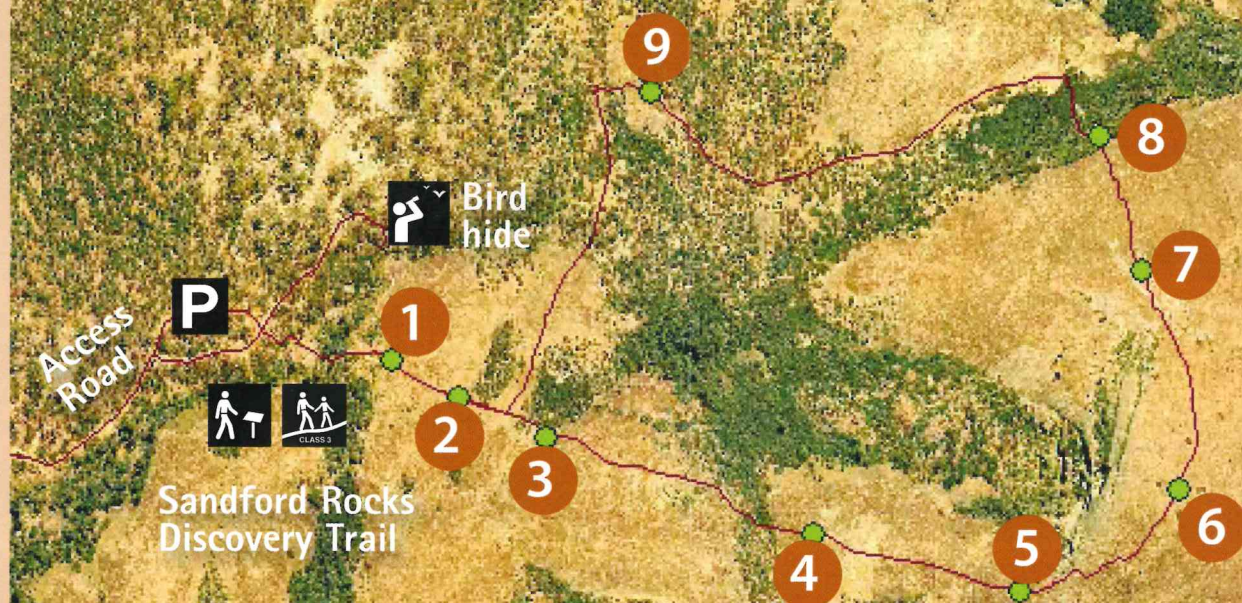
Soil particles and plant matter accumulates in this depression in the rock allowing shrubs and small trees to establish a hold and create an isolated micro-habitat.

Some of the larger trees have distinctive woody cones, these are rock sheoaks (*Allocasuarina heugliana*). Sheoaks do not have obvious leaves. Their needle-like stems, cladodes, function like leaves and minimise moisture loss. If you look closely at a cladode you will see a series of joints. The tiny triangular structures at each joint are all that remain of the leaves.

This species is unusual also in that there are male and female plants. The large woody cones are found only on the female plants.

Sandford Rocks Discovery Trail

1km – 40 minutes return – Class 3



Trail grades



Class 1 Walks catering for people with reduced mobility or those who are wheelchair-assisted. No experience necessary.



Class 2 Well-marked walks catering for a range of visitors. No experience necessary.



Class 3 Walks requiring a moderate level of fitness and may include unstable surfaces.



Class 4 Walks requiring a moderate to high level of fitness. Tracks are often rough and users need to be self-reliant.



Picnic facilities



Parking



Interpretive walk



Bird viewing



Observe Conserve



No pets allowed

There are also many other plant species growing in this island. Depending on the season you might be able to see as many as 40 different species.

Take a moment to listen to the wind blowing through the branches. It can sound like the trees are sighing.

Brown and singing honeyeaters commonly fossick for insects and nectar in the flowering shrubs and amongst the needles of the casuarinas. Other birds, such as the brown quail and the common bronzewing pigeon, are occasionally seen sheltering in the thickets or looking for seeds.

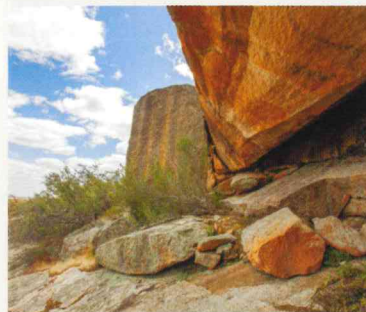
4 Nature's Sculpture

This sculptural granite formation provides a protective habitat for a number of plants and animals and is an ideal place to see how the elements create and shape the landscape.

Jumbled boulders, deep crevices, potholes, loose sheets of granite and the amphitheatre beneath the surveyor's trig point to the north are evidence of the erosive action of wind, rain, heat, cold and plant growth.

When the original molten granite rock cooled and solidified below the Earth's surface, cracks developed in the rock mass. Some of these were later filled with more molten rock forming dykes raised, straight, narrow sections of rock that are more erosion resistant than the surrounding granite. As the Earth's surface erodes, the extreme pressure on the underlying granite is released and results in additional stress cracks being formed parallel to the land surface.

Horizontal cracking resulted in large slabs of granite breaking away from the rock mass while the rectangular blocks are the result of vertical cracking. The features of individual granite boulders are from the subsequent weathering of the slabs and boulders.



Top left Granite outcrops. **Top right** wave shape of granite carved by nature. **Above left** Fracturing of rock. **Above right** Horizontal fracturing on granite.

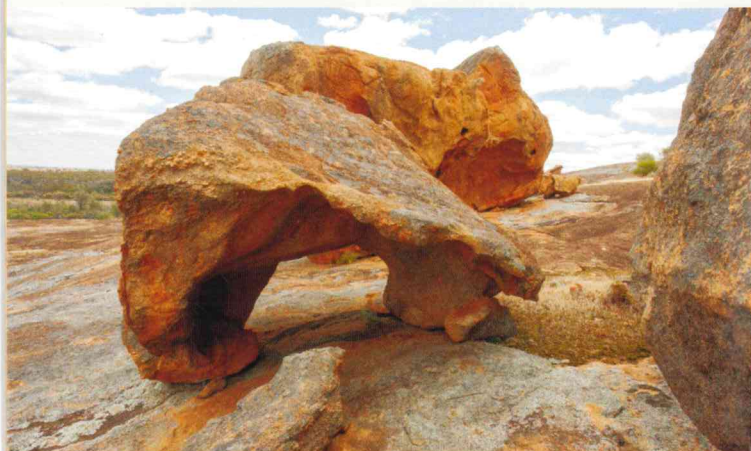
A principal weathering agent is rain water that seeps into cracks in the rocks. Rain water is mildly acidic and chemicals from decaying vegetation increase this acidity. These acids leach minerals from the rock in a process known as chemical weathering.

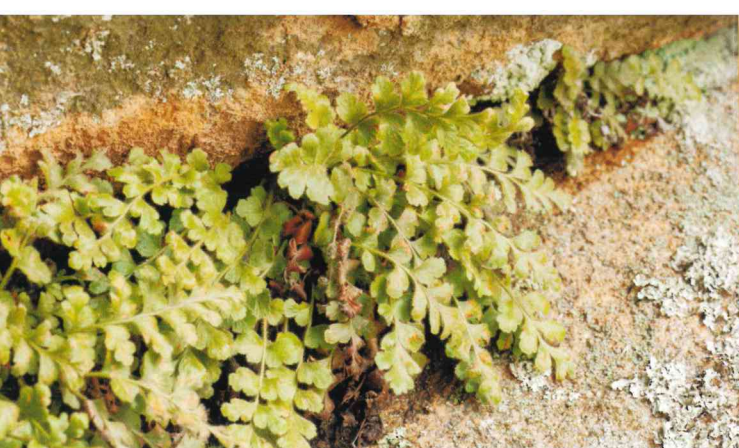
Weathering is more rapid at the edges and corners of granite blocks as more faces of the rock are exposed. When granite rocks are exposed at the Earth's surface the weathered outside of the rock lifts off in sheets. This exfoliation leaves mostly rounded forms.

Standing here, you can see signs of ongoing fracturing in the rock, indicating that more large boulders will eventually fall and continue to create habitats for plants and animals.

As this natural amphitheatre faces roughly south, the environment is slightly cooler and tends to collect and retain more moisture. It provides ideal conditions for many species including ferns, orchids, mosses and lichens. Many animals also take advantage of the protected habitat.

Many years ago this area was thought to be home to a small colony of black-flanked rock-wallabies (*Petrogale lateralis lateralis*). Sadly, with the introduction of feral cats, foxes and rabbits, these wallabies became extinct from this area, probably in the early 1900s. Rock wallabies now survive only in larger protected rocky areas in the central wheatbelt and other reserves in Western Australia, Northern Territory and South Australia.





Above Blanket fern. Below Mud wasp nest.

Today the overhangs and rock crevices are home to other species such as mud wasps, fairy martins, micro bats, owls and echidnas.

Female mud wasps carry mud from the creek below to build the nest. The cells are stocked with a larder of moth larvae or spiders collected from the surrounding area. The female then deposits an egg in the cell and seals it. When the egg hatches into a larva it feeds on this stored food. Ultimately the larva develops into a pupa and then emerges as an adult wasp, a process that can take up to a year.

Another resident enjoying the protection of this sculpted granite boulder is the dainty blanket fern (*Pleurosorus rutifolius*), which prefers cooler damp areas. The leaves are covered with fine hairs and on the underside you may find small brown spots (*sporangia*) in which spores develop prior to being dispersed by the wind and germinating in a suitable protected place. Like the lichens and mosses, ferns help to build and trap soil particles.

When sufficient soil accumulates in a crack or crevice plants such as the granite kunzea (*Kunzea pulchella*) are able to grow. As you proceed to the top of the granite outcrop see if you can spot these gnarled shrubs, some of which resemble bonsais clinging tenaciously to the surface. In the wild, granite kunzea



Above Ornate dragon. Below Silver mallee.

is found exclusively on granite rocks. When it flowers it provides food and shelter for nectar and pollen-feeding insects and birds.

Also watch out for the fleet-footed ornate dragon lizard (*Ctenophorus ornatus*) which, like the mud wasp, is dependent upon the insect residents of Sandford Rocks and the fragile rock formations.

In recent years poaching has destroyed much of the delicate rock shelters across the sheet rock in this reserve. If you look closely you can see the large amount of rock that has been either smashed or removed by people attempting to capture reptiles for sale on the black market. If you see any suspicious behaviour please report it to **Wildlife Watch 1800 449 453**.

5 Silver Mallee Resort

The silver mallee (*Eucalyptus crucis* subsp. *crucis*) is an endangered species unique to central wheatbelt granite formations, often growing in deeper pockets of soil to take advantage of the moisture.

Their unusual shredded, curled dark brown bark along with their stark silver leaves make them easy to spot. The total



remaining wild population is thought to be less than 500 plants.

Spiders and ants are among permanent residents in these pockets of vegetation. Ants using trunks as corridors and spiders building webs between branches, leaves and even underneath bits of lifted bark. Occasional visitors include the brilliant purple peacock beetles that shelter in the forks or bark of the silver mallee. The dense vegetation is also favoured by several species of snakes commonly found throughout the wheatbelt such as the Jan's banded snake (*Simoselaps bertholdi*), Stimson's python (*Antaresia stimsoni*), gwardar (*Pseudonaja mengdeni*) and mulga snake (*Pseudechis australis*). More conspicuous are the honeyeaters that seasonally feast on the nectar of the flowers.

6 Ephemeral Rock Pools

The highest point of the reserve is here at the cairn and trig point. You are surrounded by a myriad of gnammas, or rock holes, that occur commonly on granite outcrops in the south-west of Western Australia. There are two basic types: pan gnammas (irregular, shallow, flat-floored and seasonally filled with water) and pit gnammas (typically subcircular and contain water for longer periods. Gnamma formation is a three-stage process: initiation of a depression, breakup of the rock by wind and running water, and finally clearing of the debris by wind or water. Initial depressions may start with flaking, lichen attack or weathering by acid groundwater on bedrock granite.

Shallow pan gnammas are quite common while the deeper pit gnammas are more scarce. Indigenous Australians have



Above Granite showing course of water flow.

long been familiar with these natural water-storage pits and early miners in the Goldfields soon realised their value. Possibly the earliest record of this is a diagram of a pit gnamma in the 1894 annual report of the West Australian Department of Mines. Through those early years there were many skirmishes between local Aboriginal people, miners and pastoralists over the water in the gnammas.

The animal life of pan gnammas in south-west Australia is now recognised as being the most diverse of any inland rock pools in the world. The rich endemic aquatic fauna is dominated by crustaceans but also contain some invertebrates that have become highly adapted to the seasonal wet and dry cycle with the gnammas filling with water in winter and drying in summer.

The pan gnammas in the reserve can contain many different species. After rain the water can remain for weeks to months, depending on the time of year, and you might be able to see some of the large array of crustacean species or some of the insect species that are widespread across the region. Pans usually have more crustaceans as their eggs are more resistant to desiccation during the dry periods.

Pan gnammas are also a significant water resource for terrestrial animals, both native and feral. Sensor cameras have revealed the diversity of mammals, reptiles and birds that frequent these gnammas, particularly during the long, dry hot summers. With such excellent catchment surfaces even the smallest amount of rainfall will often replenish these gnammas. Unfortunately there are many foxes, feral cats, rabbits and the occasional wild dog drinking from the pans as well as echidnas, kangaroos, euros, goannas, emus, eagles, bustards and a great variety of other birds.

Below Pit gnamma.





Above Looking south across Sandford Rocks to farmland. **Below** Echidna.

Above Damage from car driving on fragile granite.

7 All Shapes and Sizes

While you are at this vantage point, take the opportunity to enjoy the view and consider the constant weathering of granite rock.

From here you can see some of the nine plant assemblages previously described. The taller eucalypt woodlands on the deepest soils and *Allocasuarina* and acacia shrublands on the shallower soils.

Beyond the reserve you can see the surrounding farmland and the small town of Westonia and the adjacent gold mine Edna May. In the distance to the south the turbines of the Collgar Wind Farm about 30km away can be seen.

8 Shrubland Shelter

As you walk through this section dominated by shrubs such as *Allocasuarina campestris*, *Leptospermum erubescens* and *Calothamnus quadrifidus* you can see the signs of other animals that live here. The larger square black scats are left by western grey kangaroos (*Macropus fuliginosus*) and the smaller ones are from euros (*Macropus robustus erubescens*), which make shallow scrapes under bushes to wait out the heat of the day. The messy slightly oval diggings are made by the industrious echidna (*Tachyglossus aculeatus acanthion*), they have poor eyesight but excellent hearing and sense of smell and if you are quiet you might see one, hunting for ants.

Echidna scats are long smooth cylinders about 2cm in diameter. When broken open you can see shiny insect particles, mainly from ants and termites but also beetles



or larvae, and lots of soil. The colour of the scat varies, depending on the colour of the soil. Scats can be found anywhere, but are often close to feeding sites, such as rock piles, termite mounds and meat ant mounds.

Rabbit scats are small, round and contain fine plant particles. Rabbits often deposit their scats on elevated patches of ground that serve as territorial markers. Many scats of many individuals may accumulate in these areas. Rabbit scrapes are usually shallow and rounded at the bottom with a small mound of soil at one end. Many of the scrapes along this trail are quite old, with no fresh soil mounds visible and seed accumulated in the holes. There are also many scats that are pale and dry indicating they are old and that this site has not been in use for a while.

9 Delicate Borya Meadows

As the soil depth decreases only the toughest plants can cope with the harsh conditions. Borya species are called resurrection plants as they can survive the prolonged heat and dryness of summer and revive with the first rains and form flowers and new growth within weeks. Many annuals such as orchids, trigger plants (*Stylidium* sp) and sundews lie dormant and germinate and flower soon after the winter rains start.

The fragility of the area is highlighted by the fact that some of the clearly visible tracks, made illegally by motorbikes and vehicles, are thought to be almost 40 years old. Please keep to the tracks to minimise the impact of your visit, especially when the soil is damp.

Please remember to take care not to damage the fragile habitats of Sandford Rocks, or other granite outcrops, so they can continue to be places where people can enjoy the natural environment and wonder at the wildlife that lives there.