

RED HOT LIST: FLAGSHIP 2

DESERT SPRING
PLANTS

One pig or one mine could wipe out the entire population of Moses panic (an undescribed *Panicum* species). It is a tussocky grass known from a single small spring wetland and heavily grazed. Photo: Rod Fensham

In the Spring 2016 issue of *Wildlife Australia* I introduced a project called *Red Hot Red List: No Surprises, No Regrets*, the aim of which is to highlight the plight of Australia's most imperilled plant species, identify and prioritise conservation actions, and alert community groups, scientists and landholders. To be eligible for the Red Hot list, a species must be rare, and declining from threats that we can feasibly overcome. Flagship species can be used to leverage conservation effort for a group of plants that are in the same region or suffer from the same threats.

Botanist **Jen Silcock** introduces a recently discovered grass chosen to represent Australia's imperilled spring plants.

If it could be wished that any superstition should remain among us, it is that which attached a peculiar sacredness to the pure spring.

Blackwood's Edinburgh Magazine, 1858

Water springs have been revered and celebrated in all cultures over thousands of years, through offerings and sacrifices, rituals and mythologies. Springs assume special significance in drylands for being essential to life and for their contrast with the surrounding desert. As permanent, stable wetlands in inhospitable landscapes, they often give rise to a dazzling diversity of specialised endemic species – plants, fish and invertebrates (particularly snails), many as yet unknown to science – which are stranded in their tiny pools. Since the Industrial era the focus on springs and aquifers has often shifted to exploitation, with disastrous consequences for these precious oases and their inhabitants.

Springs occur throughout inland Australia, but the largest clusters or 'supergroups' emanate from the Great Artesian Basin underlying one-fifth of mainland Australia. They are of two types. Outcrop springs flow from exposed recharge beds along the eastern margins of the basin, so the water is fairly fresh and the flows can fluctuate in response to recent rainfall history. They harbour few specialised species. The discharge springs emerge

where the overlaying rock of an aquifer is thin or weak and the basement rocks are impervious to water. They are mainly in arid areas far from where the water entered the basin. The water is old, alkaline and does not fluctuate with rainfall. It creates shallow wetlands of great antiquity, isolation and unusual water chemistry – a combination which has generated a remarkable concentration of specialised endemic plants. Some form dense, spongy mats or carpets, while others occur as scattered plants within the spring wetland.

Twenty plant species (not including mosses and liverworts) are unique to Great Artesian Basin discharge spring wetlands and associated groundwater scalds. Some such as the salt pipewort (*Eriocaulon carsonii*) and milfoil (*Myriophyllum artesium*) are widespread across numerous supergroups, while others are restricted to one spring complex, some to a single spring. For example, the Pelican Creek spring complex (in the Barcardine supergroup) hosts two endemic pipeworts (*Eriocaulon giganteum*, *Eriocaulon aloefolium*), undescribed *Gunniopsis* and *Peplidium* species and the recently described *Pluchea alata*; and the Springvale group has the bladderwort *Utricularia ameliae* (a carnivorous plant) and an undescribed *Isotoma* species. The many undescribed species attest to a taxonomic backlog in the face of burgeoning discoveries of distinctive plants.



Keelback Spring, in the Moses group, with a paperbark (*Melaleuca leucadendra*) thicket in the background, has small vents (in the foreground) which are rich in endemic species. Photo: Rod Fensham

The grass survives as fewer than 50 plants in a single spring wetland.

These plants have persisted despite the extinction of many springs due to exploitation of bore water for grazing, excavation of springs, weeds and feral animals (particularly pigs). Surveys of springs over the past two decades have revealed that 40% of discharge spring groups have become completely inactive since pastoral settlement, while some springs within another 14% of groups have vanished. Great Artesian Basin discharge spring wetlands are listed as a nationally endangered ecological community, and 11 spring plants are considered endangered or critically endangered. These are mostly restricted to a single spring complex, and extremely vulnerable to any disturbance. While feral pig control and reduction of grazing pressure (including from domestic stock and kangaroos) will help them, all remain vulnerable to chance events (such as disease and extreme weather) and ongoing demands for groundwater.

An imperilled grass

A recently discovered perennial grass, the Moses panic (an undescribed *Panicum* species), has been chosen for the Red Hot list. It survives as fewer than 50 plants in a single spring wetland, one of the Moses Springs at the north-eastern edge of the Barcardine supergroup. It is heavily grazed by cattle and kangaroos, and its habitat is threatened by demands on groundwater from coal mining in the Galilee Basin.

The proposed Adani Carmichael Mine is only 10 kilometres from the Moses springs, and our understanding of hydrogeology

in the area is too poor to predict the impact on springs of groundwater use, including dewatering the shallow aquifer overlying the coal deposits. The Moses panic underscores the tenuousness of spring habitats, and how much we have yet to learn about these beguiling pools and their inhabitants. ■

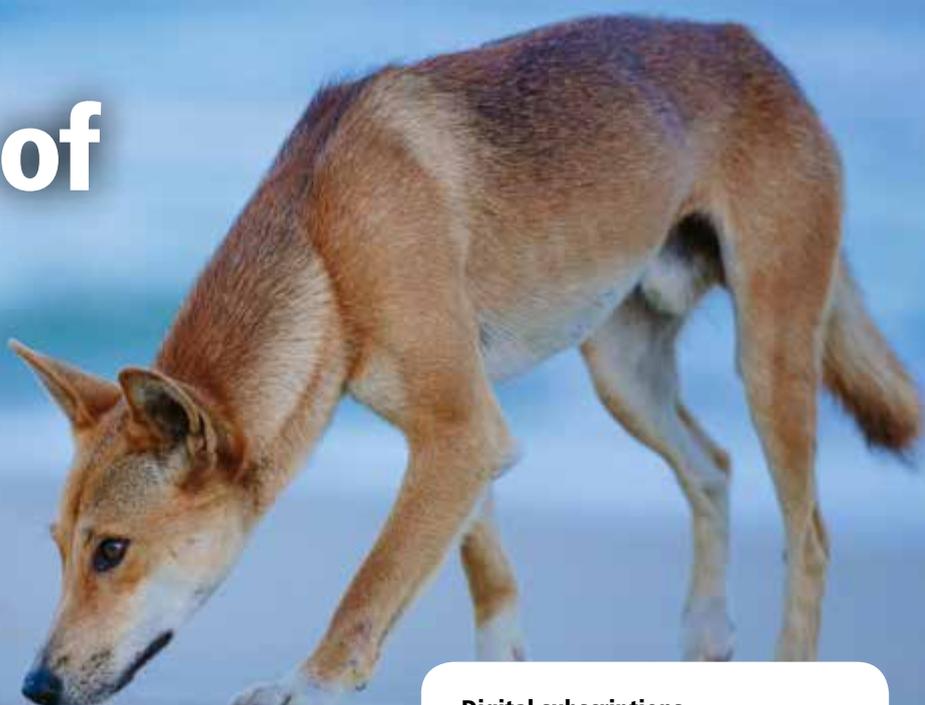
READING: Fairfax RJ, Fensham RJ. 2002. In the footsteps of J. Alfred Griffiths: a cataclysmic history of Great Artesian Basin springs in Queensland. *Australian Geographical Studies* 40:210–30 ■ Fensham RJ, Silcock JL, Laffineur B, MacDermott HJ. 2016. *Lake Eyre Basin Springs Assessment Project: Hydrogeology, cultural history and biological values of springs in the Barcardine, Springvale and Flinders River supergroups, Galilee Basin springs and Tertiary springs of western Queensland*. Available online ■ Powell OC, Silcock JL, Fensham RJ. 2015. Oases to oblivion: The rapid demise of springs in the south-eastern Great Artesian Basin, Australia. *Groundwater* 53: 171–78 ■ Silcock JL, Healy AJ, Fensham RJ. 2015. Lost in time and space: re-assessment of conservation status in an arid-zone flora through targeted field survey. *Australian Journal of Botany* 62:674–88

DR JEN SILCOCK is a post-doctoral research fellow with the University of Queensland's Threatened Species Hub. She is currently living in the Mulga Lands of southwest Queensland, enjoying the diverse flowering forbs and brimming waterholes in the wake of the best winter-spring rainfall in 30 years.



This spring wetland at Edgbaston (in the Barcardine supergroup) shows habitats typical of Great Artesian Basin discharge springs. The flow conditions in the basin have probably not changed for at least a million years, and the concentration of endemic plants and animals associated with springs implies that some have provided continuous habitat for millions of years. Photo: Rod Fensham

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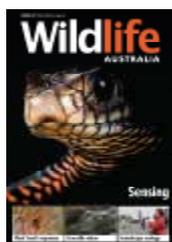
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