From seasonal wetlands
to banksia woodlands:

Restoring the Greater Brixton Street Wetlands

Located just 15 minutes from the CBD, Brixton Street Wetlands supports more than 500 species of flowering plants – a staggering 20 per cent of Perth's floral diversity in only 0.005 per cent of the area. A labour of love to conserve this area has seen it, and all the species it supports, thrive.

by Kate Brown, Grazyna Paczkowska, Anne Harris and Fiona Felton

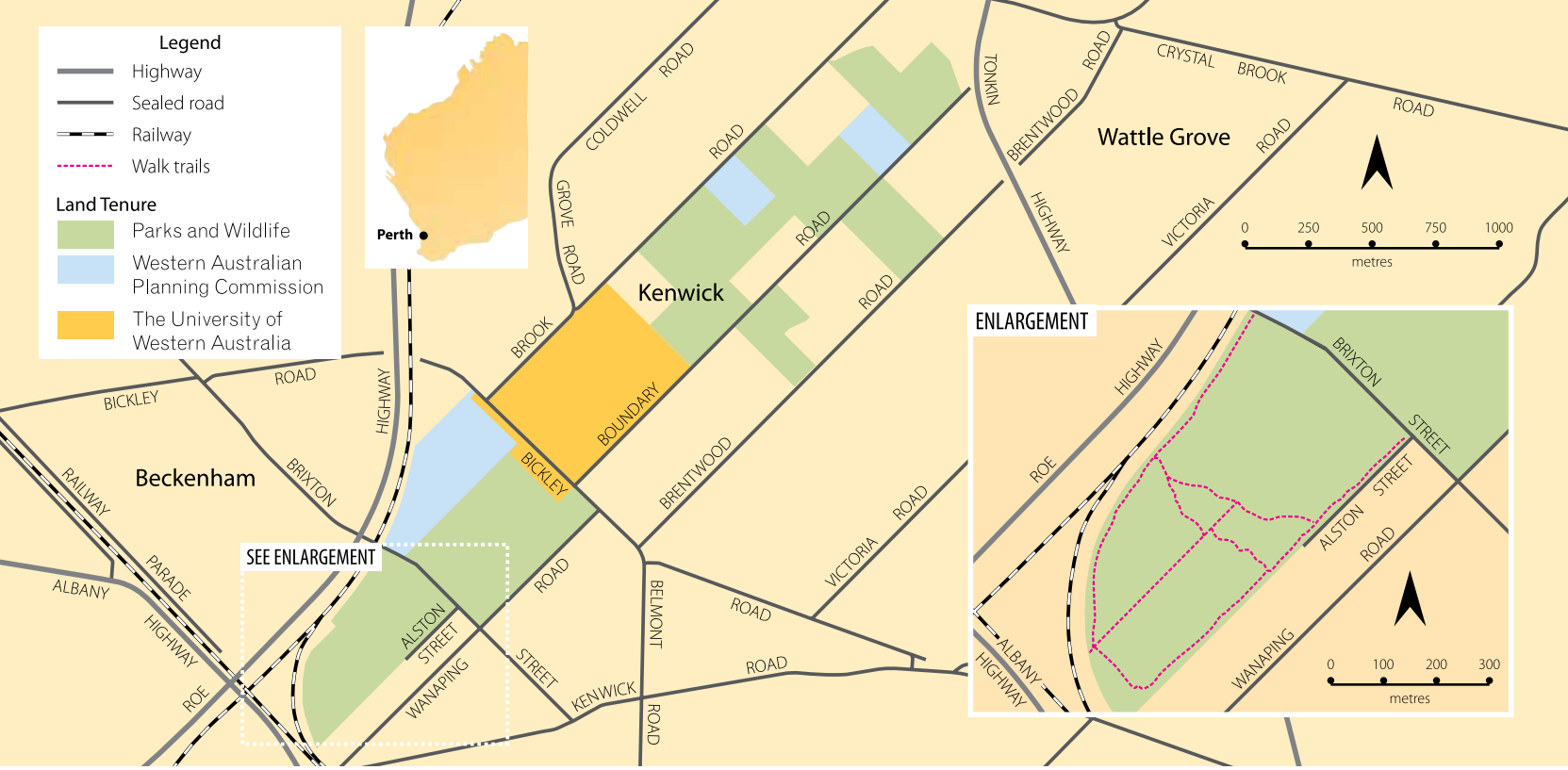
From the seasonal wetlands of the Pinjarra Plain to the banksia woodlands, the Greater Brixton Street Wetlands protects a series of threatened ecological communities that house an incredibly rich and varied floral diversity. The wetlands, only 15 minutes from the CBD, support more than 500 species of flowering plants, 20 per cent of Perth's floral diversity in only 0.005 per cent of the area. Many species are rare and restricted with some only found in the wetlands.

Located on the eastern side of the Swan Coastal Plain in Kenwick, the area protects one of the largest vegetation remnants crossing the winter wet alluvial flats of the Pinjarra Plain. Often flooded through winter and spring, these flats are dominated by tall shrublands of swishbush (*Viminaria juncea*) with a rich understorey of shrubs, herbs and sedges. Large clay pools are often encountered where there are deeper depressions. These deeper pools appear to rely solely on rainwater and are characterised by temporally overlapping suites of annual herbs and geophytes (plants that die down to bulbs, corms or tubers) that flower and set seed as the pools dry through spring. During summer, the clay substrates dry to impervious pans. The seasonal clay-based wetlands of south-west Australia house more than 600 plant species, of which at least half are annual or perennial herbs, many endemic to the claypans.

Opposite page
Main Greater Brixton Street wetlands hosts a raft of species.
Photo – Kate Brown/Parks and Wildlife
Inset above left Red-tailed black cockatoos occur in the area.
Photo – Marc Russo
Inset below left *Utricularia inaequalis* occurs in the wetlands.
Photo – Kate Brown/Parks and Wildlife

Above Flora surveys continue to uncover exciting new finds.
Photo – Juliet Wege/Parks and Wildlife

Illustration – Margaret Pieroni



1. Spider net grevillea (*Grevillea thelemanniana* subsp. *thelemanniana*) **2.** *Ptilotus pyramidatus.* Both species are known only from the Greater Brixton Street Wetlands. **3.** Greater Brixton Street Wetland is the only known location on the Swan Coastal Plain for the *Comesperma griffinii*. *Photos – Kate Brown/Parks and Wildlife*

FLOWERING OVER THE SEASONS IN THE DEEP POOLS

The pools in the claypans are sometimes dominated by shrublands of robin redbreast bush (*Melaleuca lateritia*) and beds of the hoary twine-rush (*Leptocarpus canus*). As the deeper pools fill with winter rains, stalked water ribbon (*Aponogeton hexatepalus*) and the aquatic pennywort (*Hydrocotyle lemnoides*) appear. The water levels start to drop in late winter as flannel flowers (*Tribonanthes* spp.), blue squill (*Chamaescilla gibsonii*) and early nancy (*Wurmbea dioica*) come into flower. Throughout late spring and early summer, sundews (*Drosera* spp.), trigger plants (*Stylidium* spp.) bladderworts (*Utricularia* spp.) and purple small isotome (*Isotoma pusilla*) carpet the drying clay pans followed in early summer by swathes of swamp wallaby grass (*Amphibromus nervosus*).

On slightly higher ground, the winter wet flats of the Greater Brixton Street Wetlands support a complex mosaic of shrublands and sedgelands. Sandy rises are covered in marri/kingia woodlands and to the north where two sand ridges cross the seasonally wet flats, low banksia woodland and callitris shrublands persist.

RESTORATION WORKS

The plant communities of our seasonal wetlands are among the most threatened in Western Australia and have recently been listed under the Commonwealth Environment Protection and Biodiversity Conservation Act as critically endangered. More than 90 per cent has been cleared for agriculture and urban development, and weed invasion is a major threat to those that remain. South African geophytes are serious weeds of seasonal clay-based wetlands and watsonia (*Watsonia meriana* var. *bulbillifera*) and sparaxis (*Sparaxis bulbifera*) in particular can form dense monocultures that displace the herbaceous understorey. Some South African perennial grasses are also a major threat to these systems. Ten years ago, the former Department of Environment and Conservation assumed management responsibility for the wetlands and a number of long-term studies were carried out to investigate how to manage South African geophytes and perennial grasses where they invade the area's seasonal wetlands. The role fire might play in the invasion process and the window of opportunity it offers for control of these weeds has also been investigated. In addition, seed burial trials have been carried out on some of the geophytes to try to understand how long the seed remains viable in the soil following a control program.

Above left *Chamaescilla gibsonii* is one of the species that occurs in the area.
Photo – Kate Brown/Parks and Wildlife

Above right Signage helps visitors understand the values of the area.
Photo – Sallyanne Cousans

Some of the claypan specialists from the Greater Brixton Street wetlands include **1.** Blue squill (*Chamaescilla gibsonii*). **2.** *Rhodanthe pyrethrum*. **3.** Aquatic pennywart (*Hydrocotyle lemnoides*). **4.** Stalked water ribbon (*Aponogeton hexatepalus*). **5.** Spike rush (*Eleocharis keigheryi*). **6.** Claypan granny's bonnet (*Isotropis cuneifolia* subsp. *glabra*).
Photos – Kate Brown/Parks and Wildlife

Our studies have revealed that both watsonia and sparaxis can be controlled very specifically and effectively by particular herbicides with little collateral damage to co-occurring native flora. Seed burial trials indicated the seed of sparaxis remains viable for less than 12 months in the soil and importantly, once these weeds have been controlled, invaded wetland communities recover and native flora slowly moves into areas previously dominated by watsonia or sparaxis. Trials set up to investigate control techniques for haas grass (*Tribolium uniolae*) burnt in a bushfire in the first year of the study, subsequently revealed that seed germinates *en masse* following fire and that the autumn following a summer fire offers a small window of opportunity to control this highly invasive grass. Parks and Wildlife staff have worked closely with local community group The Friends of Brixton Street Wetlands for a number of years to restore disturbed areas and to implement results of these studies across the class 'A' nature reserve.

The reserve was saved from urban development in the early 1990s largely through the efforts of The Friends group. For nearly 30 years the group has been actively raising the profile of the area, generating local interest and supporting and attracting funding for management. They currently organise community walks through the reserve each month and meet weekly in the wetlands to address on-ground management issues. They have also worked hard to raise the profile of all the blocks that make up the Greater Brixton Street Wetlands *Bush Forever* site and in 2015 successfully sought funding through the Perth NRM's Resilient Landscapes Program to begin management of threatening processes across the entire site. The three-year project was a collaborative effort between Armadale Gosnells Landcare Group in partnership with Parks and Wildlife, The University of Western Australia, The Friends of Brixton Street Wetlands and the City of Gosnells. Works to be undertaken include weed mapping and management across the site, trials of different techniques to manage weeds where they are impacting on rare flora, development of a hydrological plan to manage disturbances to surface water flows and some of the drains that cross the reserve, restoration of the disturbed plant communities on the boundary of

the reserve, and studies on the impacts of frequent fire on the threatened communities. Rare flora and invertebrate fauna surveys are also a part of the works program.

The wetlands house an amazing aray of invertebrate fauna including a rare short-tongued native bee (*Leioproctus douglasiellus*), known only from a couple of seasonal wetlands on the Swan Coastal Plain. The bee is not well-studied but it is assumed that it is solitary, ground-nesting and produces a single generation each year, with emergence of adults timed to coincide with flowering of food-plants. In the Greater Brixton Street Wetlands, the bee appears to specifically frequent plants of *Goodenia pulchella*, a small herbaceous perennial confined to winter wet depressions. Adults emerge at the same time the *Goodenia* comes into flower, as the wetlands dry towards the end of spring. The bees probably live for no more than a few weeks making survey and study particularly difficult.

Invertebrate sampling of the deeper pools in the claypans was undertaken by Parks and Wildlife in 2013. The study revealed that the site provides habitat for a rich aquatic invertebrate fauna including a number of rare and highly restricted species. A rare water flea and an undescribed ostracod known only from the claypans at Brixton Street and those in Drummond Nature Reserve were found, as well a rare water mite. Also found in the deeper pools is the shield shrimp *Lepidurus apus*, commonly known as a tadpole shrimp. It is one of a lineage of shrimp-like crustaceans that have had a similar form since the Triassic period and are sometimes considered living fossils.

Thanks to the work of dedicated scientists, individuals and community groups over many years the conservation values of the Greater Brixton Street Wetlands are well recognised. Remarkably though, through the survey efforts of Parks and Wildlife officers, botanical consultants and volunteers, new discoveries continue to be made. These include the *Ptilotus pyramidatus* collected in 2010 from the wetlands, the only collection of the species since 1845. Working with the community and local government to protect and restore the area will hopefully provide not only a safe haven for the disappearing flora and fauna of the Pinjarra Plain but also a place where future generations can get a glimpse of some of the remarkable biodiversity that once extended across the eastern side of Perth's Swan Coastal Plain.

Above left The clay pans are inundated through winter and spring.

Top The beautiful dotted triggerplant (*Stylidium guttatum*) occurs in the area.

Above *Levenhookia pusilla*.
Photos – Kate Brown/Parks and Wildlife

Discover more about Brixton Street wetlands

Scan this QR code or visit Parks and Wildlife's '*LANDSCOPE*' playlist on YouTube.

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