Saving a Wheatbelt wetland refuge

Unseasonal heavy rainfall earlier this year brought much life to Toolibin Lake, filling it for the first time in more than 20 years. But it also brought some unexpected challenges in managing this fragile Ramsar-listed wetland.

by Karla Graham

Amid the patchwork of agricultural land of Western Australia's Wheatbelt lies Toolibin Lake, an important refuge for plants and animals, especially waterbirds. For decades, government departments, local community members and stakeholders have worked to ensure this wetland continues to survive and thrive, despite the pressures of altered hydrology and other threats to natural resources. In February 2017, unseasonal rainfall filled the lake for the first time in more than 20 years, causing much celebration, along with some unique and welcome challenges for those working to conserve the lake.

Previous page
Main The February 2017 rainfall brought much interest to the lake.
Photo – Deanna Rasmussen/DBCA

Above The newly filled Toolibin Lake.
Photo – Karla Graham /DBCA

WATER RETURNS TO THE LAKE

Early this year, more than 160 millimetres of rain was recorded at Toolibin Lake over three days. Hydrologists calculated that about 4,100 megalitres filled the lake, which rose to two metres deep. Nearby, Dulbining and Walbyring lakes, and two un-named wetlands, also received the rain.

Importantly, the rainwater that filled Toolibin Lake was devoid of the salt that usually threatens this wetland. Early days saw the environment re-awaken with a chorus of frog calls ready to begin the breeding cycle; as whirls appeared on the water from tiny invertebrates and bejeweled damselflies; and flocks of waterbirds revelled in the ideal feeding and breeding conditions. By late March, the first sightings of new life could be spotted on the lake.

As a seasonal wetland, Toolibin Lake naturally goes through wet and dry phases. This has contributed to the formation of wooded wetlands, as dry periods enable trees to regenerate in an area that receives an annual average rainfall of 300 to 400 millimetres. However, in recent years, Toolibin Lake has had to withstand the pressures of changes in climate, human-induced impacts on the water table and naturally occurring salinity, collectively known as 'altered hydrology'.

Toolibin is the one of the largest and last remaining inland freshwater lakes in the State's south-west, and the largest in the area that features the threatened ecological community made up of sheoak (*Casuarina obesa*) and paperbark (*Melaleuca strobophylla*). Once common throughout the Wheatbelt, many examples of this type of community have now succumbed to altered hydrology.

Due to its biological diversity, Toolibin is listed as a threatened ecological community with the Australian Government and is internationally recognised as a Wetland of International Importance under the Ramsar Convention.

WATERBIRDS FLOCK BACK

With more than 90 per cent of the surrounding catchment cleared of native vegetation, the lake and surrounding nature reserves provide a stronghold for native plants and animals, including waterbirds.

Since 1965, 50 species of waterbird have been recorded at the lake, including the freckled duck, which has a very small (500 to 1,000) breeding population in south-west WA. This is the highest number of species recorded at any inland south-west wetland.

The February rain event presented a perfect opportunity to carry out a waterbird survey at Toolibin Lake. Parks and Wildlife Service staff spent a day identifying and counting waterbirds. They counted 800 individuals from 12 species, including Eurasian coots, grey teals, pink-eared ducks, hoary-headed grebes, swans and Australasian shovelers, and recorded 63 chicks. The next day, at nearby Walbyring Lake, they counted 592 individuals from 12 species, including 41 chicks. The abundance of waterbirds in these areas is comparable to surveys from 1996, but species richness was much lower. There were very few large wading birds (herons, spoonbills and egrets) and no cormorants. Black swans have taken up residence at the lake again and have been recorded breeding. The surveys will be repeated in spring and summer if water remains in these wetlands to provide more

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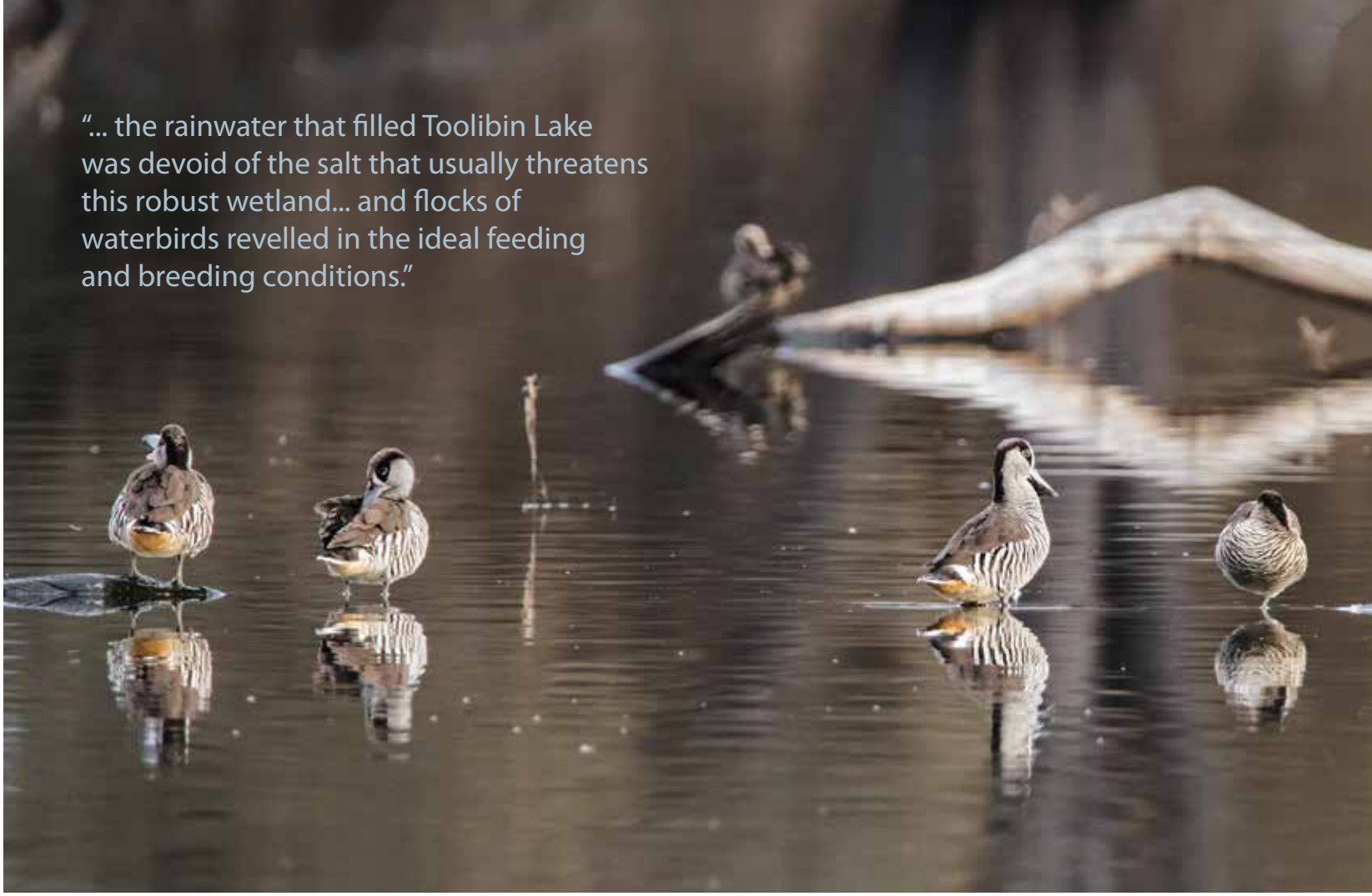

accurate comparisons to those carried out in 1996.

The area surrounding Toolibin Lake also boasts more than 300 native plant species and 10 native mammal species as well as a wide diversity of insects, reptiles, amphibians and terrestrial birds.

AN ALTERNATE FATE

Just a few kilometres from Toolibin Lake, positioned lower in the landscape, you'll find Taarblin Lake. This monochrome landscape, with its desolate lake bed of petrified trunks and limbs, lies in stark contrast to the vibrant Toolibin Lake. The heavily salt-affected Taarblin Lake provides a sobering glimpse at what Toolibin Lake might have looked like if management intervention hadn't been undertaken.

Since 1994, management of Toolibin Lake has been guided by the *Toolibin Lake Recovery Plan*. Implementing the actions outlined in the plan has relied on the tireless work of Parks and Wildlife Service staff, members of the community, hydrologists, private landholders and volunteers, with support from natural resource management groups such as the South West Catchments Council, Wheatbelt NRM and other stakeholders.

Above Pink-eared ducks are one of the species that occurs at Toolibin Lake.
Photo – Roz Barber

Left The desolate Taarblin Lake.
Photo – Maria Lee/DBCA

Management actions have included constructing a channel, feeder drains and sump to move saline surface water away from the lake; installing a series of pumps on the lake bed to remove and lower groundwater levels; constructing a waterway to move highly saline water through the catchment and away from other natural resources, and carrying out broadscale revegetation on private property and Crown land to help manage altered hydrology and benefit agricultural productivity and biodiversity. This approach was recognised in 2002 when the Toolibin Lake recovery team and its

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technical advisory group were awarded the Institute of Engineers of Australia National Salinity Prize for innovation in managing salinity.

A revised *Toolibin Lake Catchment Plan*, which is expected to be released this year, will present an opportunity to audit this approach, and garner continued support for managing this remarkable wetland.

DIVERSIONARY TACTICS

One of the key infrastructural components in the fight against altered hydrology at Toolibin Lake is a seven-kilometre-long, 20-metre-wide diversion channel constructed in 1995 around the western edge of the lake. This channel was designed to redirect saline water flows from upstream away from the lake itself, and into the sacrificial Taarblin Lake, which had already collapsed. A series of removable metal gates installed at the northern end of the channel are closed to direct freshwater into Toolibin Lake, and opened to divert water away when salinity levels become unacceptable. The rain event of February 2017 was the first time the channel had been tested against such a large event.

When the rain fell, Parks and Wildlife Service staff saw a golden opportunity to allow freshwater into Toolibin. The water quality was tested upstream and staff determined it was fresh enough to be let into the lake. They then closed the metal gate panels, thereby closing off the diversion channel and allowing the nourishing freshwater to flow directly into Toolibin Lake. Staff tested the water quality periodically and opened the gates when the fresh flows ceased.

MANAGING GROUNDWATER

But it's not just the water above ground that contributes to the lake's health. The groundwater is closely monitored for its proximity to the lake bed. If the groundwater rises through the soil profile, it brings salt to the root zones of plants, causing their death and the collapse of stands of trees, particularly the two deep-rooted species after which the threatened ecological community is named – paperbark and sheoak.

During the past decade, periodic monitoring on the lake floor and within the catchment enabled the department to monitor groundwater levels. Hydrologists will use this data to develop models that detail how and when water and salt moves through the catchment in order to make recommendations for on-ground works that will help stall any rising of the water table that might be happening.

At the beginning of this year, monitoring the groundwater levels at Toolibin Lake involved driving across the dry lake floor, taking measurements from the top of bores drilled down through the surface of the lake to the water table below. But now, conservation staff make their way around the 300-hectare lake via boat, deftly manoeuvring on the calm waters around sheoak and paperbark trees, stopping at each of the 19 bores now partially submerged to record groundwater levels.

Opposite page
Left Diversion gates can be opened and shut depending on the saline levels of the water.
Photo – Gary Mills/DBCA

Above Pumps are used to remove saline water away from Toolibin.
Photo – Karla Graham/DBCA

Right All staff from the department's Narrogin and Merredin offices helped secure a breach of the diversion channel by hand.
Photo – Deanna Rasmussen/DBCA

Far right Aerial footage showed the extent of the inundation, which had not been seen in more than 20 years.
Photo – Peter White/DBCA

One method being used to combat rising groundwater is the use of pumping stations. A system of groundwater pumps, some powered by wind and the others electrically, are installed across the lake to pump saline water away from Toolibin into Taarblin Lake.

Many of these recovery actions have only been made possible through the strong collaborations forged between the recovery team and the owners of adjacent farming properties. The extent and interdependency of the Toolibin Lake catchment, which covers some 48,977 hectares, means a collaborative, landscape-scale approach to conservation is the only true method of conserving this Wheatbelt wetland. Indeed, many of the revegetation projects associated with the lake's health have occurred on private property, or via the purchase of high conservation value land by the State Government. Just last year, more than 7,000 seedlings were planted on private property at a farm within the catchment.

UNEXPECTED CHALLENGES

While having the lake fill for the first time in more than 20 years was fantastic news, it also presented some interesting challenges to overcome. A week after the fill, staff discovered a breach in the bund wall of the diversion channel. Without a fast fix, hydrologists predicted the ecological benefit of the fill would be lost as the water drained out. With extreme waterlogging in the reserve and surrounding properties, using heavy machinery to plug the breach was not possible. So within 24 hours, all staff from the department's Narrogin and Merredin offices arrived on the scene to plug the breach by hand. A slow and arduous day of work ensued, with staff

Above Snail orchids are one of 300 native plant species that occur at Toolibin Lake. *Photo – Ray McKnight/DBCA*

Below The transformed landscape. *Photo – Deanna Rasmussen/DBCA*

Do it yourself

Where is it? Toolibin Lake, on Wickepin-Harrismith Road, 20 kilometres south-east of Wickepin, is a 2.5 hours' drive south-east of Perth.

Facilities There is a1.6-kilometre interpretive walk trail, interpretive shelter and signage, barbecue area, picnic tables, toilets, lakeside seating, and a large car park.

See Pink-eared ducks, grey teals, shovelers, black swans; Dulbining Lake and wetlands, Walbyring Lake, salmon gum woodlands, melaleuca thickets, heathland and open jam woodlands with a diversity of wildflowers including orchids.

Stay Stay a while at Dryandra Woodland (fee payable, book at parkstay.dbca.wa.gov.au) or in accommodation cabins at Lions Dryandra Woodland Village (dryandravillage.org.au). Take a drive to Toolibin and surrounding nature reserve during the day, then at night, book a tour at the Barna Mia nocturnal wildlife experience in Dryandra Woodland, where you can go spotlighting and see six species of threatened mammals including the woylie, bilby and mala (fee payable).

Entry No entry fee into Toolibin Lake.

Contact DBCA's Wheatbelt Region office on (08) 9881 9200, or visit dbca.wa.gov.au.

loading about 1,800 sandbags with 50 tonnes of sand, transporting the bags via boat to the bund wall, then stacking them in place to plug the breach. By day's end, they had constructed a substantial sandbag wall and succeeded in retaining the fresh water in Toolibin Lake.

As predicted, the waterbird activity has brought increased fox activity back to the lake, so fox baiting is being undertaken as part of the department's wildlife recovery program *Western Shield*. And the fill was a setback to some of the revegetation that had been taking place on the lake bed. The sheer volume and unexpected timing of the rain washed away hundreds of sheoak seedlings planted over the past three years as part of a density trial, in what one staff member described as bittersweet.

WHAT THE FUTURE HOLDS

Inevitably, the water level from this year's fill will slowly recede and eventually empty, but with the site being a seasonal wetland, this natural recession is part of a long-term cycle. As the lake water evaporates, salinity levels will increase but management guidelines are in place to deal with this situation. Feeder drains and a sump have been constructed on the lake floor and as water quality decreases surface water can be pumped away from the lake.

The fill has given the lake vegetation a much-needed boost and, for the first time in more than 20 years, the department has had an opportunity to test all infrastructure installed during the past two decades to manage surface and groundwater, and study the characteristics of the lake when full. Lessons learnt from this event will inform future plans and management decisions at the lake.

With continued intervention, passion and commitment, department staff are optimistic Toolibin Lake will remain an ecological refuge well into the future, with hopes the next fill event will take place sooner than 20 years from now.

Karla Graham is a publications officer at the Department of Biodiversity, Conservation and Attractions. Karla can be contacted on (08) 9219 9818 or by email (karla.graham@dbca.wa.gov.au).