CASE STUDY

Hattah-Kulkyne

Environmental works a lifeline for our floodplain Black Box

Environmental infrastructure is making it possible to water ecologically significant stands of Black Box trees (Eucalyptus largiflorens), with research spanning more than seven years showing watered trees are in better condition, flower more, and produce more seedlings than unwatered trees.

Results collated from research at Hattah-Kulkyne National Park under The Living Murray program shows floods stimulate the overall health of Black Box trees, but also deliver important benefits to other flora and fauna living on the floodplain.

These results are important considerations as plans continue to develop a major environmental works project within the National Park to restore large extents of Black Box trees that cannot currently be watered. The project is one of nine being progressed under the Victorian Murray Floodplain Restoration Project (VMFRP).

Thriving Black Box trees underpin the health of our floodplains. Black Box trees can grow to more than 300 years old and, as they age, they develop broad branches, large hollows and deeply fissured bark. Beneath the trees the fallen logs and trunks accumulate in an understorey of shrubs and grasses. The name 'largiflorens' refers to the prolific flowers the trees produce.

Black box woodlands are important for canopy feeding bush birds such as superb fairy-wren, little friarbird and blue-faced Honeyeater. Black box woodlands also support insectivorous bats and the large hollows provided by these trees are used as nesting sites by regent parrots, sulphur crested cockatoos, mallee ringnecks, major mitchells cockatoo and barking owl. Common brushtail possums shelter in tree hollows and large reptiles such as the lace monitor and carpet python hide in the hollows and fallen logs.

VICTORIAN MURRAY FLOODPLAIN RESTORATION PROJECT
HEALTHY LANDSCAPES, STRONG COMMUNITIES

Large old trees die without replacement, placing at risk all the fauna that depend on them.

The problem

Black Box trees are generally situated higher on the floodplain than red gums, which means they need and receive water less often. Black Box will grow in areas that typically get inundated (flooded) 1 to 4 times every 10 years for periods of 2 to 6 months (Johns et al. 2009; Roberts and Marston 2011).

Flood frequency and duration has decreased due river regulation and flow depletion. At Hattah Lakes a flow of 120,000 ML/d is required to inundate significant areas of Black Box Woodland. Under natural conditions these events would have occurred 40 times in 100 years, lasting for around 40 days each time. They now occur 10 times per 100 years and last around 30 days. As a consequence, intervals between floods has increased considerably. Other sites woodland sites along the Murray have experienced similar flood depletion.

Without floods the health of the trees deteriorates. Tree growth slows, flowering declines and seedlings fail to survive. The lack of seedlings means new trees are not added to the population. Large old trees die without replacement, placing at risk all the fauna that depend on them.

Watering our warriors

At Hattah Lakes, pumps and regulators have helped return water to 1,255 ha of Black Box trees, when they need it. This watering doesn't impact on other river users.

This environmental infrastructure package was installed as part of The Living Murray Program in 2012-13, with research into the condition of Black Box stands at Hattah Lakes commencing in 2014. Research tracked the growth, flowering and seed production of Black Box trees at watered sites (flooded in 2014, 2016 and 2017) and unwatered sites.

Results

Overall tree health was higher at the watered sites than the unwatered sites (Figure 1). The flooded trees had a broader crown with more leaves.

Flooding stimulated trees to produce more flowers (Figure 2). Flowers are a source of nectar for range of birds, and also for insects, which in turn provide prey for other fauna.

Black Box Woodlands at the watered sites had more seedlings and saplings than the unwatered sites (Figure 3). The lack of new trees is a significant threat to the long-term viability of Black Box Woodlands. New trees must be recruited to the population to replace old ones as they die, and without flooding the tree population will gradually be depleted along with the hollows and fauna habitat they provide.

The importance of Black Box flooding to the bush birds was also investigated at Hattah Lakes in a six year program that sampled up to 84 sites twice a year (Loyn et al. 2019). Data was collected from 2014 to 2019, and bird abundance and habitat use were measured in relation to the flooding history of woodland sites.

Bush bird abundance was higher in sites that had been recently flooded (Figure 4). The total numbers of bush birds were 60% higher for up to 3 years after a flood event. This points to lasting effects of watering on tree health and the food resources they provide.

Black Box trees produce more flowers after they have been flooded and this contributed significantly to the increased abundance of bush birds. Tree measurements showed that when trees flower strongly (flowering index 5), bird abundance increases dramatically. Flowers and their nectar are consumed by a wide range of birds including Red-rumped Parrots, Australian Ringnecks and Yellow Rosellas.

Food resources in the understorey are also increased by flooding. Ruby Saltbush is a low-growing shrub that produces abundant bright red berries. These are eaten by Regent Parrot and other fruit-eating and seed-eating bush birds. The increased growth of this species after floods contributes to the abundance of these birds.

The effects of Black Box flooding extends through the food web. Birds that eat insects become more abundant in the years that follow flooding, indicating that increased leaf, flower and nectar production was contributing to the prey available to these birds.

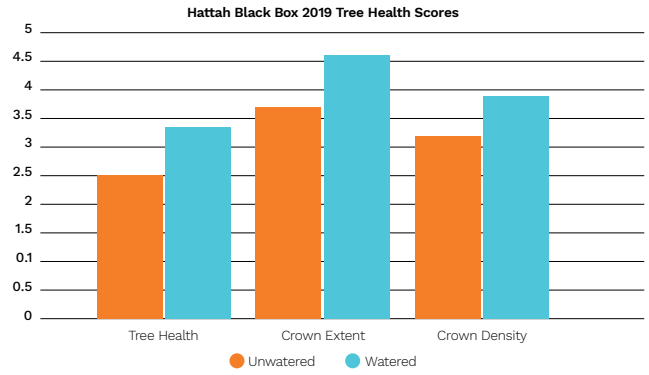

Figure 1. The number of dead adult trees was higher in sites that had not received recent watering

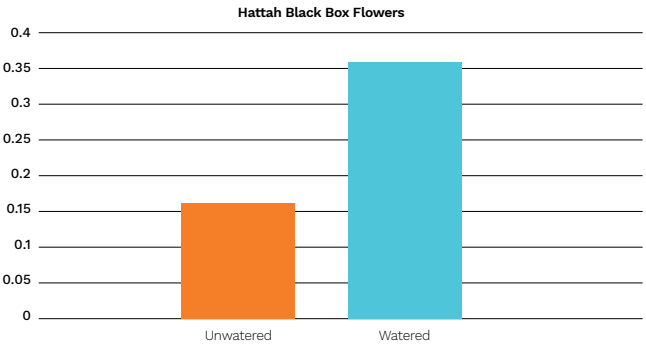

Figure 2. Black box trees produced more flowers when they are watered.

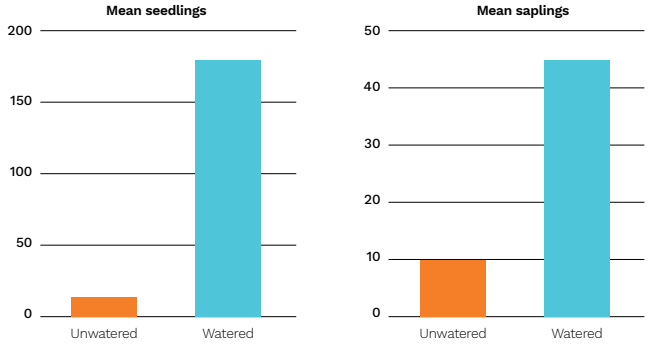

Figure 3. The abundance of seedlings and saplings increases when sites are watered.

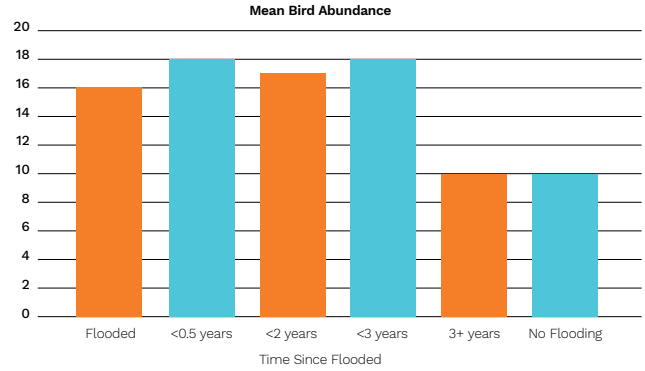

Figure 4. Bird abundance increases in Black Box woodlands for up to three years after flooding.

Discussion

Black Box trees can survive for decades without flooding, but current watering conditions are beyond their capacity to endure, let alone thrive. The research undertaken at Hattah Lakes shows that without flooding, we will lose these important trees and everything they support on the floodplain.

The health of Black Box Woodlands is a key part of the Murray Darling Basin Plan and a target of the Basin-wide Environmental Watering Strategy (MDBA 2019).

The existing environmental infrastructure installed under the Living Murray Project extends our capacity to get water to some of the Black Box at Hattah Lakes. Under the Victorian Murray Floodplain Restoration Project (VMFRP), new infrastructure will help get water to reach the stands of Black Box at Hattah Lakes North, which can't be reached by the existing infrastructure and won't be watered under the increased river flows expected through implementation of the Basin Plan.

The Hattah North project involves building three regulators, 1.3km of levees, and a causeway along with infrastructure to support temporary pumps to allow for the proposed inundation of 1,130 hectares of the floodplain.

Using environmental infrastructure to water these areas will mean less water will be used than natural flooding, and upstream communities won't be flooded for extended periods to get the volume of water needed to reach the higher parts of the floodplain where the Black Box grows.

The existing environmental infrastructure at Hattah Lakes has shown what it can do to save Black Box stands, now it's time to extend what has been proven to work.

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