Platypus News & Views

Newsletter of the Australian Platypus Conservancy (Issue 90 – November 2022)

BUSHFIRE AND THE PLATYPUS

Numerous studies have concluded that the heat and smoke of bushfires normally don't trigger substantial direct mortality of fish or other aquatic wildlife, though exceptions to this rule can sometimes occur along shallow headwater creeks.

Instead, the most damaging effects of bushfire on fish and other freshwater fauna are likely to be felt well after flames die down, if heavy rain carries large volumes of ash and eroded soil into creeks and rivers via runoff from denuded slopes and gully lines. The resulting high sediment load can result in all or nearly all native fish dying from asphyxiation as dissolved oxygen levels plummet, with potentially dire outcomes for other gilled organisms including aquatic insect larvae – normally the platypus's main food source. Sediment blanketing the bottom of affected water courses is also likely to dissipate only gradually, slowing the trajectory for stream recovery.

In December 2019, a devastating firestorm swept through the densely forested Buffalo River valley in Victoria – part of the Black Summer fire complex that eventually incinerated more than 7 million hectares of land in south-eastern Australia. This was followed by heavy rainfall in early March 2020, when 75 mm of rain was recorded in a single 24-hour period by the Bureau of Meteorology weather station located at Lake Buffalo. Surface flow rapidly spiked in the river upstream of the lake, accompanied by widespread mass movement of soil and burnt material from adjoining steep terrain into the Buffalo River.

The silver lining to these events was that fish populations in the affected portion of the Buffalo River had been monitored before the Black Summer fire by biologists from the Arthur Rylah Institute for Environmental Research (ARI) interested in tracking the status of Macquarie perch (an endangered species). Post-fire funding by the Commonwealth and Victorian governments also made it possible for ARI biologists to survey fish along the Buffalo River in January 2020 (a few weeks after it was affected by bushfire) and December 2020 (35 weeks after large quantities of sediment were washed into the river). The occurrence of platypus in fyke nets used to monitor fish was routinely recorded on all of these occasions.

Fyke nets were again set along the Buffalo River in early March 2021 (as shown at right) – this time by biologists from the Australian Platypus Conservancy keen to assess whether fire-related impacts had adversely affected platypus reproduction. ***(cont. on page 2)***

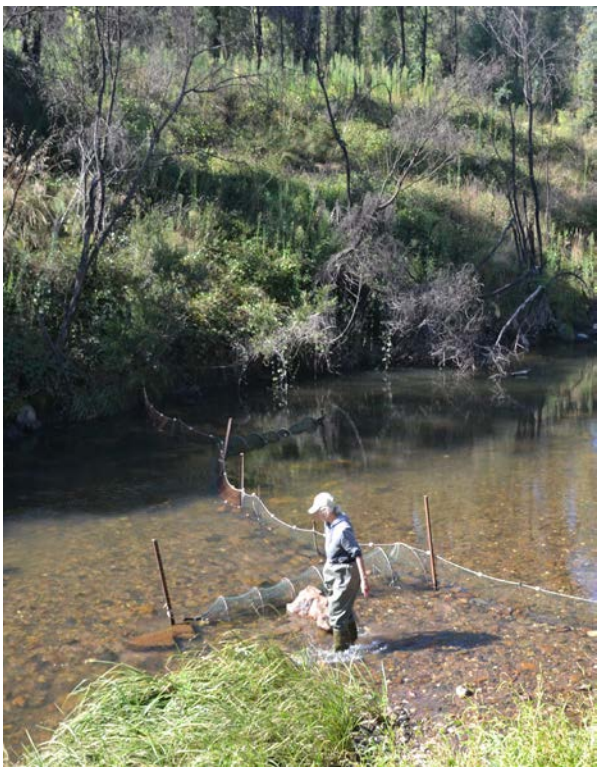


Photo credit: Australian Platypus Conservancy

BUSHFIRE AND THE PLATYPUS *(cont. from page 1)*

A number of interesting findings emerged from the combined fish and platypus fieldwork.

First, there was no compelling evidence that either fish or platypus populations declined in the river as a direct outcome of fire. The mean (or average) numbers of Macquarie perch and two-spined blackfish captured per survey net in January 2020 (soon after fire) were actually somewhat higher than the numbers recorded when nets were set nearly two years previously. Similarly, platypus captures were consistently recorded at every site in fish surveys conducted both before and soon after the 2019 bushfire.

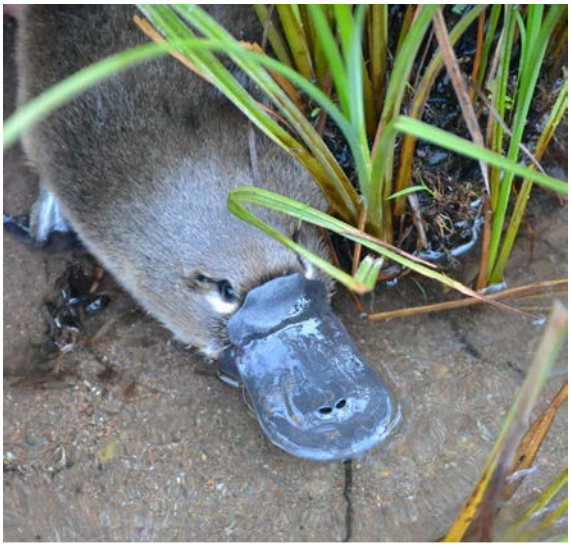
Conversely, numbers of both Macquarie perch and blackfish fell by nearly 90% following the massive siltation event occurring in March 2020.

Happily, there was no indication that platypus numbers declined nearly as much (and possibly not at all) after the siltation event: the animals were again recorded at all fish survey sites in December 2020. In part, this undoubtedly reflects the fact that the platypus relies on lungs rather than gills to breathe and is also able to take refuge in a burrow to avoid the worst of sediment-laden water.

It is less clear how platypus in the Buffalo River managed to survive the sudden post-siltation drop in their food supply that should have occurred. One possibility is that animals may have temporarily shifted their foraging activity to unaffected or less affected habitats (for example, small tributary streams adjoining the main river channel).

Alternatively, if suitable refuge habitats weren't available, a study by Tony Hulbert and Tom Grant has concluded that an adult platypus is likely to have enough body fat to allow it to fast for up to 3 weeks in summer or 2 weeks in winter. It's also possible that the species' diet could have expanded to include dead fish or other organisms killed by sediment, helping to compensate for reduced availability of aquatic insects. Although the platypus lacks true teeth and chews its prey using grinding pads located at the back of its jaw, the species is known to feed opportunistically on small fish that it manages to grab in the wild (see *PN&V* No. 88). Furthermore, some types of prey (such as worms) may remain unaffected by post-fire siltation that causes sizable reductions in insect populations.

In March 2021, the Conservancy was very pleased to capture 12 individuals across four live-trapping sites, including two adult males, four adult (or in some cases possibly subadult) females, and six first-year juveniles (see photo at right). Although there's no way to know if fewer juveniles were weaned along the Buffalo River following the Black Summer bushfire than would have occurred in the absence of burning, the high number of juveniles produced per female (1.5) is consistent with the platypus being reproductively resilient to fire-related impacts. In practice, enough juveniles were produced in the first post-fire breeding season to allow the resident population to potentially double in size, implying that natural recruitment along the Buffalo River should compensate quite rapidly for any adult losses that may have been triggered, directly or indirectly, by fire.



A juvenile male platypus captured in the Buffalo River in March 2021 (Photo credit: Australian Platypus Conservancy)

A peer-reviewed paper summarising the Buffalo River results, co-authored by APC and ARI biologists, has recently been accepted for publication by the journal *Marine and Freshwater Research* and is now available online at http://www.publish.csiro.au/MF/MF22201.

SIZE DOES MATTER: USING eDNA TO DETECT PLATYPUS IN THE LOWER GOULBURN

The Lower Goulburn River – or Kaiela, as it's known to the local Yorta Yorta people – is a very large water body by Australian standards. Typically delivering a whopping 11% of total water flow to the Murray Darling Basin, it measures about 250 km in length from Goulburn Weir in Victoria to the Murray River. The Lower Goulburn's flood plain and aquatic environments have been much altered by land clearing, imposition of regulated flow regimes from weirs, levee banks built to reduce flood risk and (most recently) changes in the rules governing the transfer of irrigation water from Kaiela to the Murray River. This in turn has affected the distribution and abundance of associated native wildlife. For example, the Lower Goulburn now supports only about 10-20% as many native fish as it did at the time of European settlement.

As an important first step towards learning how the flow regime in the Lower Goulburn can best be managed to support a healthy and secure platypus population, the Conservancy was recently asked to find out where the animals now occur there. This study is one of many ongoing investigations by the Goulburn to Murray Trade Review Scientific Advisory Panel to assess whether new operating rules are helping to repair the environmental damage caused by the record volumes of water delivered from Kaiela to the Murray River from 2017 to 2019 (see *PN&V* No. 83).

In practice, this task proved to be quite challenging. The ideal way to proceed – by setting special nets to find out if platypus occur at representative locations – was not considered to be a practical option, particularly given how much area would need to be assessed.

Alternatively, mapping the locations where platypus have recently been seen can be a very cost-effective approach, but relies on people being active on or near the water and motivated to report what they see. In practice, only 21 platypus sightings have been registered on the Atlas of Living Australia since 2000 for sites located along the Lower Goulburn channel.

Given the above, we decided to find out what could be learned by testing for the occurrence of platypus environmental DNA (or eDNA) as an indicator of platypus activity in the vicinity. This can be a very effective platypus detection technique, but we still worried that the Lower Goulburn's sizable channel and the large volume of water it carries would work against us – both by diluting eDNA and by reducing the likelihood that a platypus swims close to a particular sampling spot on any given day.

To address these issues, we decided to collect and filter four water samples per site (rather than just two samples per site as is the case in most platypus eDNA studies), with each sample tested three times for eDNA in the lab (yielding 12 tests for eDNA per site). In addition, up to 2 litres of water were filtered per sample using a battery-powered Smith-Root eDNA filtration system. Though more expensive than hand-held syringes, the Smith-Root backpack system allows *much* more water to be collected and filtered, improving the likelihood that target eDNA becomes trapped in a filter and can be detected later in the lab. Lastly, samples were collected by partnering with biologists working for Ecology Australia, who were already very experienced in deploying this equipment in the field (as shown at right).
(cont. on page 4)

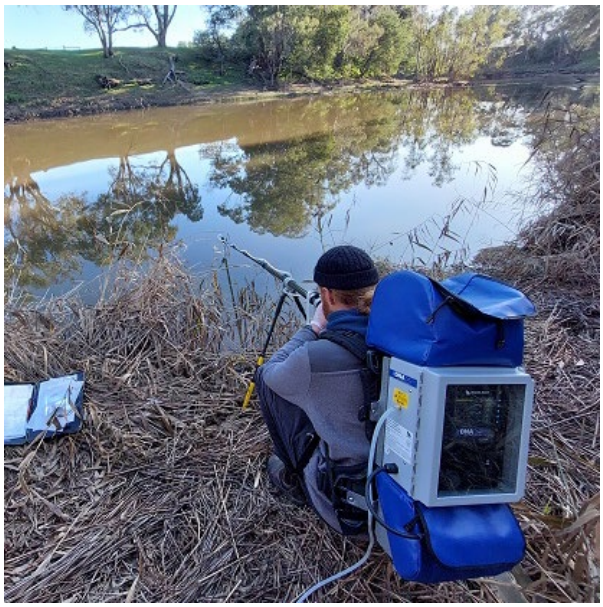


Photo credit: Ecology Australia

USING eDNA TO DETECT PLATYPUS IN THE LOWER GOULBURN *(cont. from p. 3)*

The study's main finding was that platypus eDNA was recorded at 17 of the 20 sites sampled in the Lower Goulburn channel, suggesting that the species remains reasonably widespread there. Interestingly, platypus have been observed within the last 10 years by River Country Adventours owner Rob Asplin and others near the 3 locations where eDNA was not found, implying that animals may still occur at these sites but were simply not detected in our study.

Importantly, platypus eDNA was detected in only one test (out of 12) at eight sites, with 2 or 3 positive tests recorded at another eight sites. This suggests that the extra effort and expense invested in sampling were definitely worthwhile. In particular, we feel quite confident that adopting a sampling regime in which just two water samples were filtered at each site using hand-held syringes would have been much less effective in identifying the presence of platypus eDNA along the Lower Goulburn River.

To help test whether the study's findings accurately reflect the actual distribution of platypus populations in the Lower Goulburn, a replicated round of platypus eDNA sampling and analysis will be conducted next winter.

Meanwhile, we thank the Commonwealth government, Victorian Department of Environment, Land, Water and Planning (DELWP) and the Goulburn Broken CMA for their respective roles in funding or otherwise supporting this project.

BALLARAT'S 'OTTERS' GET A HELPING HAND (AND EYES)

Following a very well-attended rakali information session in early September (see *PN&V* No. 89), a community group has now formed to monitor the rakali population living in Ballarat's Lake Wendouree in Victoria. Twelve survey points have been established around the lake and visual monitoring has commenced, with individual volunteers adopting the same basic technique used by the Australian Platypus Monitoring Network (5-minute scans to record the number of animals observed).

Photo credit: Lissa Ryan

Group Watch surveys – in which volunteers stationed around the lake scan its surface simultaneously to record the number of rakali seen in one hour - will also be conducted at quarterly intervals through the year. The first Group Watch was conducted in mid-November and, despite the wet weather, enough persons participated so all 12 sites could be monitored. Five rakali were spotted across three locations. Anyone interested in participating in future rakali monitoring at Lake Wendouree is encouraged to contact the APC for more details.

We are also pleased to welcome SkyGreen – a company that installs high quality solar power and battery storage for both residential and commercial projects - as the sponsor of the Wendouree Rakali Monitoring project.

Australian Platypus Conservancy

PO Box 115, Campbells Creek VIC 3451
(03) 5416 1478 platypus.apc@westnet.com.au
www.platypus.asn.au
Facebook: Australian Platypus Conservancy (Official)

Platypus News & Views is published by the Australian Platypus Conservancy (ABN 64 255 612 676)