Platypus News & Views

Newsletter of the Australian Platypus Conservancy (Issue 85 – August 2021)

CHEAPER, FASTER – A NEW METHOD TO DETECT PLATYPUS DNA ON THE HORIZON

Detecting trace amounts of platypus DNA carried in water (aka eDNA) can be a very useful tool for mapping where platypus occur, particularly in places that aren't often or easily visited by human observers.

However, extracting and identifying eDNA currently depends on trained technicians working under carefully controlled laboratory conditions – thereby adding to the cost of tests and often requiring water samples to be transported long distances for processing.

To address these shortcomings, Meysam Afarmajani (a PhD student in La Trobe University's Agriculture BioSolutions lab) is currently working in co-operation with staff at Bio2Lab (an environmental technology company also based at La Trobe University) to develop a reliable field protocol for platypus eDNA testing that can be conducted in real time at relatively low cost. Testing is carried out using a weather-proof hand-held device known as the Genie III (http://www.optigene.co.uk/instruments/instrument-genie-iii/).

The key to this new technology is a much faster and simpler process for DNA amplification (the step in eDNA testing that encourages a target organism's DNA to replicate over and over again so it eventually can be detected). As a bonus, the new method is less sensitive than previous eDNA-testing procedures to natural inhibitors such as phenols and tannins commonly found in creek and river water. It also works better to amplify DNA from relatively chunky source material such as cell fragments, which often make up the bulk of eDNA in natural waterways.

In practice, the Genie III can screen up to 6 water samples simultaneously in under 30 minutes. To ensure the whole process is as straightforward as possible, samples are analysed using a kit that's been preloaded with measured amounts of the chemicals needed for analysis – all the operator has to do is add water, ideally after filtering samples to remove contaminants and concentrate any eDNA that's present. Each kit includes two control samples to check that the screening process is working properly and test samples haven't been contaminated by the operator.

The cost of testing water samples for eDNA using the new method is also expected to be reduced considerably as compared to current commercial alternatives.

Along with developing appropriate new genetic probes for platypus DNA, the research team will conduct extensive studies in the lab and field to optimise the new protocol and assess its specificity and sensitivity.

The Conservancy is pleased to have been asked to assist with field trials, as we believe the new method will create huge opportunities to improve practical understanding of how factors such as water temperature, turbidity and flow affect eDNA detectability.

The new method is also likely to be a game changer for community-based platypus monitoring - making it possible for the first time to conduct enough replicated eDNA testing at the scale of a creek, river reach or sub-catchment to support a statistically valid analysis of population trends at reasonably low cost.

BEST PRACTICE NEEDED FOR eDNA REPORTING

Like any other platypus survey technique, eDNA testing is subject to many sources of bias and error that can contribute to false positive results (platypus DNA is detected even though platypus aren't found at the site) or false negatives (platypus DNA remains undetected at a place where the animals do occur).

In flowing water, eDNA can potentially be carried downstream from its original source. In relatively still water, DNA particles tend to drift down to the bottom, eventually being lost from the water column. In both situations, the persistence and detectability of eDNA in the environment can also be affected by water temperature, salinity, turbidity, the amount of UV light reaching the water surface and microbial activity – as well as animal behaviour (how far individuals travel, where and how they forage, how much they congregate or avoid each other), the type of source material (blood, mucus, urine, faeces or skin cells), and how often target DNA is inadvertently carried from one site to another on the feet of waterbirds or in predator scats.

An additional limitation that needs to be taken into account when interpreting platypus eDNA findings is that this technique currently only yields presence-absence data. In other words, there is no way to know from a positive finding how many animals occur there.

To help illustrate why these considerations are important, consider the case of the Coliban River in north central Victoria (shown at right), where a recent study found that eDNA was detected unequivocally at just 43% of the 28 sites where water samples were collected.

The Coliban River, upstream of Metcalfe

On the face of it, this sounds like a pretty poor result – platypus appear to be missing from more than half of the area available to them! However, drill down a little deeper into the data, and a different picture starts to emerge.

Nine of the 16 sites where platypus eDNA failed to be detected were located in or near the Coliban River mainstem. Of these, more than half were sites that regularly stop flowing in summer (and often dry up completely), mainly at the top end of the system. One additional negative result was assigned to a pond located more than 100 metres from the river, and two negatives were recorded in fairly atypical parts of the channel located a short distance downstream of dam walls. The final site yielded an 'Equivocal' result on the one occasion it was tested, suggesting that additional testing was warranted before concluding that platypus were not present.

Six of the remaining seven negative sites were located along small creeks that are best described as shallow and intermittent – flowing in winter and spring and then largely drying up in summer. The final negative site (located along the Little Coliban River, which again flows intermittently in places) actually yielded one 'Equivocal' result.

Following on from the above, we strongly recommend that platypus eDNA reporting should explicitly distinguish between sites that provide reliable surface water for platypus foraging and those that only hold water intermittently (especially those that may have done so even at the time of European settlement). In addition, we recommend that unusual or exceptional circumstances that are expected to reduce or limit platypus use of a site should be highlighted. Lastly, the relative size of different waterways must be taken into account when reporting on the overall status of platypus in a catchment or sub-catchment based on eDNA findings – negative outcomes along very small creeks should obviously count for less (in populations terms) than those along sizable river channels.

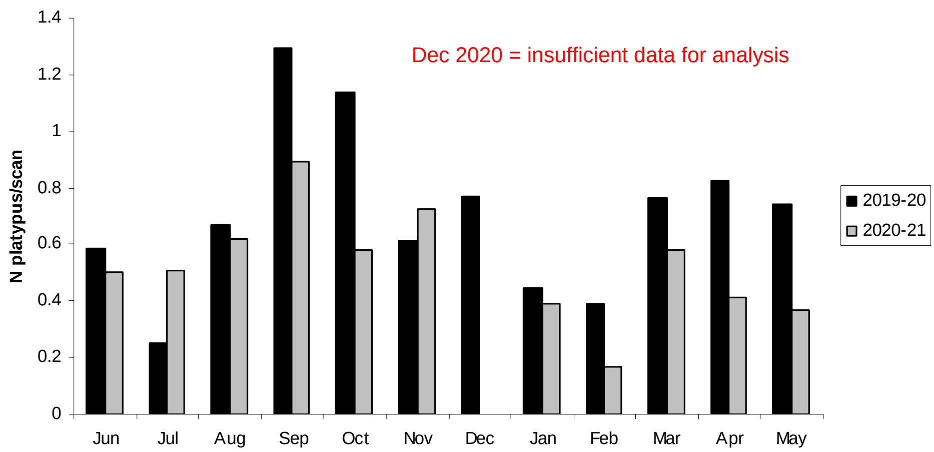
A STITCH IN TIME FOR DELORAINE'S PLATYPUS?

The Australian Platypus Monitoring Network (APMN) is a next generation citizen science program that uses standardised visual survey methods to monitor platypus populations.

APMN was launched by the Conservancy in May 2019 (see *PN&V No.74* and *76*), with two full years of results now available for sites where the program was rolled out before covid restricted opportunities for direct community engagement. One such monitoring area was established along the Meander River at Deloraine in Tasmania (shown at left), where APMN monitoring has uncovered a worrying trend in the number of platypus sightings.

Led by passionate local platypus champion Anne Gilles, more than 1200 standardised scans were conducted at four sites distributed along the section of river flowing through Deloraine in the two years from June 2019 to May 2020.

As summarised on a monthly basis below, the mean (or average) number of platypus sightings recorded per scan dropped from 0.70 in Year 1 (June 2019 to May 2020) to 0.52 in Year 2 (June 2020 to May 2021). The difference in the amount of platypus activity recorded in the two years is statistically significant, and equates to platypus usage being reduced by 26% across the survey area in the second year.



Over this same period, local residents were becoming increasingly concerned about heightened levels of turbidity and sedimentation evident in the Meander, apparently due to vegetation removal and increased livestock activity on river banks occurring farther upstream. The data produced through APMN has helped to substantiate these concerns, so a sound case could be made to the Tasmanian Department of Primary Industries, Parks, Water and Environment to initiate on-ground inspections and water-testing as part of an ongoing investigation of contributing factors. It is hoped that this will lead to any issues that continue to degrade local river health being addressed sooner rather than later. Fortunately, the Deloraine platypus population remains comparatively abundant, so numbers should recover if underlying problems can be corrected.

The events at Deloraine illustrate how APMN can empower individuals and communities to help protect local platypus populations. Persons interested in joining APMN – either to track how well platypus are doing on a private property or as part of a larger monitoring group working in a shared public area – are encouraged to visit the APMN website for more information (www.platypusnetwork.org.au) or else contact the Conservancy directly for advice.

NEW PLATYPUS MANAGEMENT GUIDELINES

Photo: John Bundock

The Platypus Management Guidelines section featured on the APC website (www.platypus.asn.au) has just been updated and expanded to better inform platypus conservation action by agencies, environmental groups and interested individuals. All of the following topics are now covered:

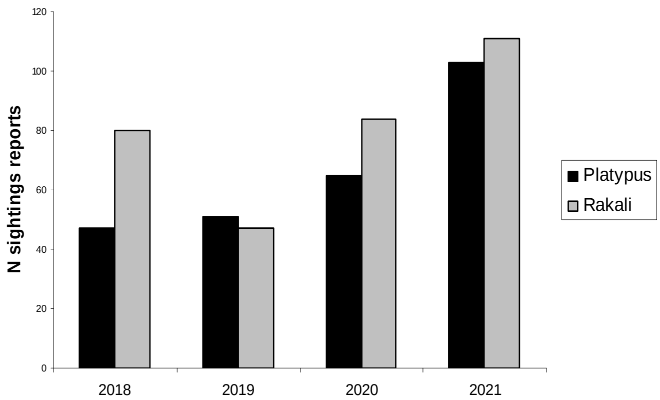
Maintaining a suitable flow regime in managed river systems
Platypus drought refuges
Protecting and improving bank habitats
Instream woody habitat (logs and branches)
Managing stormwater drainage
Water quality and sediment contaminants
Use of heavy machinery in and near waterways
Culverts, pipes and grilles
Walking tracks, viewing platforms, bridges and street lighting
Weir walls, drop structures and fishways
Water pumps and small-scale hydro-power generators

SOUTH AUSTRALIA TO PHASE OUT OPERA HOUSE TRAPS

Following the news that New South Wales is banning use of enclosed yabby nets from 30 April 2021 (see *PN&V No. 84*), we've been very pleased to learn that South Australia has notified its intention to phase out opera house trap use by 30 June 2023. We strongly commend both governments for taking positive action to remove a major threat to platypus and rakali living in their jurisdictions.

A RECORD NUMBER OF RECORDS

In *PN&V No. 84* we described the APC's ongoing contribution to platypus and rakali sighting records held by the Atlas of Living Australia. Interestingly, winter 2021 marks the first time that we will be submitting more than 100 new records for both species in the same seasonal quarter. The number of reported sightings of platypus in particular has been rising steadily in recent years, as shown at right for the last four winters.



This trend may be partly attributable to growing public awareness of platypus conservation issues (and possibly more people exercising near waterways during periods of Covid lockdown). However, it's also consistent with platypus numbers having genuinely increased in at least some river systems – particularly those where flow management and/or platypus habitat quality have been substantially improved through the activities of management agencies and hard-working community groups such as Landcare.

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)