Platypus News & Views

Newsletter of the Australian Platypus Conservancy (Issue 73 – August 2018)

PLATYPUS BREEDING BEHAVIOUR: HOW TO WIN A MATE

Late winter and early spring mark the start of the platypus breeding season in Victoria and New South Wales, with animals in the warmer parts of Queensland probably initiating breeding a little earlier in the year and those in Tasmania reproducing somewhat later.

However, a great deal remains to be learned about how animals choose their mates and the period over which this may occur. Happily, some interesting new findings on this front have recently emerged, thanks to studies carried out in captivity at Healesville Sanctuary by head platypus keeper Jessica Thomas as part of her PhD research program.

In brief, platypus behaviour was monitored over a number of breeding seasons using motion-activated infrared video cameras to monitor six interconnected ponds. The ponds were characterised by different depths and flow rates, with native plants growing around their margins. In some years the ponds housed a single adult male and female, with one male and two females housed together in other years.

In all years it was found that male activity started to increase about three months before actual courtship behaviour was recorded, presumably triggered by a seasonal increase in testosterone levels (which have been shown in a study conducted in New South Wales to start rising in May and reach a peak in August). At first, females responded by leaving a pond when the male arrived. However, by August they started to become more tolerant, remaining in a pond with the male and swimming past him repeatedly (though without any physical contact occurring between the two). The male eventually was allowed to grasp the tip of the female's tail in his bill and swim in a circular fashion with her (or be towed behind her as she twisted and turned) in a courtship ritual performed on or near the water surface (as shown at right).

Females most typically mated with a male over a period of about two weeks, with each mating event typically lasting 3-4 minutes. Interestingly, the posture adopted by males while mating varied with their body size. A relatively large male (1.6 kilograms) mounted his female partner from above and behind, wrapping his tail beneath her body and holding onto her hind feet and the back of her body with his front feet to maintain his position. In contrast, a smaller male (1.1 kilograms) had to resort to lying on his side next to his female partner while maintaining his position by grasping her neck with his bill and using his hind feet to grip her body.

Once a female had finished with mating, she again began to avoid the male, who in turn became less active once he had mated with every female occupying the ponds.

The feeling that one is left with after reading Jessica's account of her findings (now published in *Behaviour*, volume 155, pages 27-53) is that essential attributes for a male platypus during the breeding season include stamina and persistence, whereas for a female platypus they include sound judgment and quick thinking. In each year of the study, a male tried to mate with a female on two or more occasion before courtship formally began, and was successfully rebuffed when the female wriggled away and fled to another pond.

PLATYPUS BREEDING BEHAVIOUR: HOW TO BUILD A NEST

Platypus burrows are divided into two varieties: those occupied by an adult female along with her eggs or dependent offspring (nesting burrows) and all other burrows (camping burrows).

The entrance to a platypus nesting burrow in the wild

In contrast to platypus camping burrows, nesting burrows are usually longer, structurally more complex and are furnished with nesting material. The observations of early naturalists such as Harry Burrell indicate that platypus nests may incorporate leaves, flexible stems, strips of bark and roots from a variety of plants (grasses, reeds, eucalypts, sometimes even willows) which typically are arranged so they line the burrow's main chamber apart from where it joins the tunnel leading to the burrow entrance. Nesting material deteriorates and is not replaced as youngsters grow, suggesting that it's mainly important during incubation and/or early juvenile development.

A wealth of new information on platypus nest-building behaviour has recently become available thanks to the video-based behavioural research conducted by Jessica Thomas at Healesville Sanctuary over a number of breeding seasons (see page 1).

Firstly, Jessica determined that nesting material is only ever collected by females after they've mated, implying that the behaviour is triggered by hormonal changes during gestation. To be more specific, nest-building behaviour was initiated 7-15 days after mating and continued for a period of 2-5 nights, ending shortly before the female retired to the burrow to incubate her clutch of one or two eggs.

On average, a female spent more than 8 hours preparing her nest, making 9 to 39 trips to carry suitable material to the nesting chamber. This was only collected from the surface of the water: the female used her bill to bundle it up and then pass it under her body to the tail. The tail was then curled forward to hold the bundled material against the female's belly as she swam to the burrow entrance. This wasn't a particularly efficient mode of transport - at least half of the material carried into the burrow was dropped as the female made her way along the tunnel to the nesting chamber. There was also no indication that nesting material was ever retrieved by a female after being dropped, presumably because manipulating such material so it can be held between the tail and belly is difficult or impossible for a platypus to achieve after it exits the water.

Jessica provided females with a range of possible materials to use for nesting, including mat-rush leaves (*Lomandra longifolia*), tussock grass leaves (*Poa ensiformis*) and leaves and strips of bark from swamp gum (*Eucalyptus ovata*) and manna gum (*E. viminalis*). Of these, grass and (especially) mat-rush leaves were most consistently selected. Four nests were examined after a nesting burrow had been abandoned early in its use. In each case, grass and mat-rush leaves had been intertwined and pressed together to form a hollow sphere or cup, lined (in one case) with eucalypt leaves.

Platypus burrows are located underground, so the temperature inside a nesting chamber is unlikely to vary by more than a few degrees while it's in use. This suggests that the main function of a platypus nest is not to keep the eggs and young warm. Instead - particularly given that wet materials are used to construct a nest - it's more likely to be needed to help maintain humid conditions in the burrow. As in the case of newborn marsupials, a newly hatched platypus is very undeveloped, probably measuring less than 20 mm in length. Not being equipped with a marsupial's moist pouch, it seems likely that platypus nest-building behaviour has mainly evolved to prevent small juveniles (and also possibly eggs) from drying out when their mother has to leave the nesting burrow to find food or carry out other duties.

***PLATYPUS COUNT*: STILL GOING WITH THE FLOW**

As you may recall from articles in *PN&V* no. 58 and 70, there is growing evidence that the volume and reliability of stream or river flow can affect platypus breeding success.

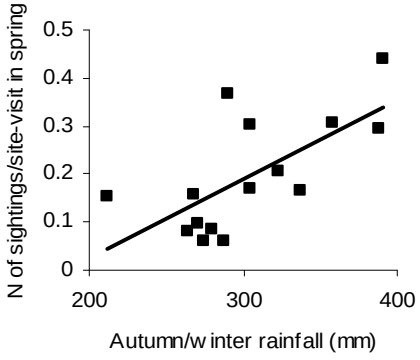
In particular, platypus population data for both the Shoalhaven River in New South Wales and urban streams near Melbourne indicate that more youngsters are likely to appear in summers following relatively wet autumns and winters as compared to in drier periods. This pattern is believed to reflect a generally positive effect of stream and river flow on platypus food supplies and hence female fat reserves: plenty of flow in autumn and winter provides the right conditions for aquatic macro-invertebrates to thrive, and well-fed females are more likely to mate in the following spring.

The platypus's spring breeding season is also typically an excellent time to spot this species in the wild. Adult males are predictably very active as they patrol breeding territories and keep tabs on the breeding status of local females (see page 1). Meanwhile, those adult females that are preparing to mate are under pressure to spend a lot of time feeding before they start to raise young. Females that have not yet entered oestrus (or have already mated) may also tend to feed more during the day in a bid to avoid unwanted attention from pushy males.

Based on all of the above, it occurred to us that that if more females breed following relatively wet autumn-winter periods, overall platypus activity in the spring breeding season (and hence the number of sightings made during daylight hours) should follow the same pattern: more sightings should be recorded in those springs that follow relatively wet autumn-winter periods.

To test this hypothesis, we needed to investigate how the mean (or average) frequency of spring platypus sightings actually varies from one year to the next in relation to autumn-winter rainfall and/or flow. In practice, we decided to first analyse data obtained along the Yarra River in the Melbourne suburb of View Bank, where platypus activity has been monitored by a founding member of the *Platypus Count* program (Lyn Easton) from 2003 to the present - a period that encompassed some quite wet autumn-winter periods (especially in 2010 and 2011) along with a mix of dry to moderate rainfall periods both before and after the wetter ones. Happily, we were also able to obtain reliable rainfall and flow data for the entire period of interest, for View Bank itself (rainfall records courtesy of the Bureau of Meteorology) and the Yarra River just upstream from View Bank (flow records courtesy of Melbourne Water).

As shown in the graph below, autumn-winter rainfall and subsequent platypus activity in spring proved to be positively associated at View Bank, with less than a 1% statistical likelihood that the calculated trend line is due to chance.



To complete the analysis, we also confirmed that autumn-winter rainfall at View Bank was significantly correlated with mean daily flow in nearby parts of the Yarra. It is therefore fair to conclude that platypus activity in spring was positively associated with flow (as well as rainfall) in the previous autumn and winter.

WATER-RATS BREAKING THE ICE

The Australian water-rat (or rakali) is an adaptable species that is known to occupy a very wide range of aquatic habitats. A new record for how high it can occur in mountainous regions has been recently established as a result of some fascinating observations from Kosciuszko National Park. These have been shared with the APC by Dr Ken Green, who has worked for the past 40 years to document the plants and animals found at elevations above 1500 metres.

We believe that the previously recognised 'mountaineering record' for the species was around 1500 metres, set at Lake Catani in Mount Buffalo National Park in Victoria. However, Dr Green reports that in November 1998 he observed a water-rat swimming in Betts Creek at 1740 metres. Then, in mid-June 2009 he noted an animal at an even higher elevation – 1900 metres at Blue Lake, where ice is known to freeze to a depth of a metre or more. On this particular day some early ice had formed in the water but, unperturbed, the water-rat was seen to be both swimming in the water and walking over nearby ice and snow on land.

Dr Green's observations are among more than 100 new rakali records for the ACT and nearby areas that have been received since the APC launched its community-based survey for this species (funded by the Wettenhall Environment Trust) at ANU in early August. You can assist this project by reporting rakali sightings via the APC website (www.platypus.asn.au), or by emailing the details of when and where you saw a water-rat to platypus.apc@westnet.com.au.

WORKSHOP – HOW TO MONITOR PLATYPUS AND RAKALI POPULATIONS

The APC will be presenting a workshop on Sunday 9 September 2018 at Tetoora Road Community Centre, organised by the Mount Worth and District Landcare Group. The event will include presentations on conserving both the platypus and water-rats/rakali. Information about how to go about spotting these species in the wild and a more general discussion of research and monitoring techniques will also be included. The presentations will be followed by an observation session along the West Tarwin River. For further information and bookings contact Merrin Butler on merrin_butler@hotmail.com.

PUBLIC TALK ON PLATYPUS – MALMSBURY 28 OCTOBER

The APC will be presenting a free talk about platypus on Sunday 28 October 2018 at Malmsbury starting at 2.30pm, hosted by the Malmsbury Landcare Group.

HELPING US TO HELP THE PLATYPUS

Many of the Conservancy's projects are funded by grants from management agencies, philanthropic trusts or corporate sponsors. Donations from individuals and environmental groups also contribute enormously to the APC's work, by supporting platypus population monitoring, public education programs and studies that can't otherwise be readily funded. If you would like to help out, remember that donations and bequests to the Australian Platypus Conservancy are tax-deductible.

Australian Platypus Conservancy

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