

# Platypus longevity: a new record in the wild and information on captive life span

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**Handling Editor:**

Ross Goldingay

**Received:** 10 November 2023

**Accepted:** 26 January 2024

**Published:** 13 February 2024

**Cite this:**

Serena M *et al.* (2024)  
*Australian Mammalogy* 46, AM23048.  
doi:[10.1071/AM23048](https://doi.org/10.1071/AM23048)

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## ABSTRACT

We report on a male platypus (*Ornithorhynchus anatinus*) who was tagged in November 2000 at the age of 1 year and recaptured in September 2023, when nearly 24 years old, in a small creek system in Melbourne's southeastern suburbs. By comparison, a female platypus recently reached the age of 30 years in captivity, though with signs of ageing that may have precluded her survival if she were living in the wild. Ten other captive individuals have lived to an age of more than 20 years in recent decades.

**Keywords:** Dandenong Creek catchment, Healesville Sanctuary, male reproductive costs, Monbulk Creek, monotreme, Ornithorhynchidae, platypus life history, platypus survival in zoos, senescence.

## Introduction

By definition, long-lived mammals are subject to relatively low mortality risk as adults. Positive associations between species-specific longevity and a low metabolic rate or adaptations to survive hypoxia have also been posited, possibly because these attributes select for biochemical features that also tend to protect animals against disease and ageing (Omotoso *et al.* 2021; Shilovsky *et al.* 2022). Both attributes plausibly apply to the platypus (*Ornithorhynchus anatinus*), which can remain submerged for at least 11 min (Evans *et al.* 1994) and expends metabolic energy at around half the rate of amphibious eutherian mammals of similar size (Grant and Dawson 1978; Bethge *et al.* 2001). To date, the maximum known life span for a wild platypus (a female who was lactating when last captured in the upper Shoalhaven River in New South Wales) is 21 years (Grant 2004).

We report here on a new longevity record for a platypus living in the wild and identify some possible contributing factors. We also provide a comprehensive list of platypus life spans recently exceeding 20 years in captivity.

## Methods

### Study area

Monbulk Creek is a small water course (typically 1–4 m wide) that arises in Dandenong Ranges National Park and flows for approximately 15 km to join Ferny Creek in Melbourne's southeastern suburbs (Fig. 1). Median daily discharge from 1 January 2000 to 30 June 2023 at an automated gauging station located roughly midway along its length was 6.2 ML (range = 0–1085 ML) (station 228229 operated by Melbourne Water; records available for 81% of days in the period of interest). Mark–recapture studies indicate that Monbulk Creek supports a small platypus population, comprising 12–29 resident animals in the period from 1997 to 2007 (Serena *et al.* 2014). The population is believed to be effectively isolated: the only other platypus population found within the same drainage basin since 2000 occupied the Dandenong Creek headwaters until it apparently became extinct ~10 years ago (Melbourne Water, unpubl. data); it was segregated from the Monbulk Creek population by >20 km of badly degraded stream channel or underground concrete piping.



**Fig. 1.** The site in Monbulk Creek where male 01F6-03FF was captured in April 2023. Photograph by G. Snowball.

### Capture, marking and measurements

Platypus survey nets were set by the Australian Platypus Conservancy (APC) at 18 sites distributed along the length of Monbulk Creek from February 1996 to February 2007 (mean sampling effort = 20.5 nights site<sup>-1</sup>), and by Ecology Australia (EA) at five sites distributed along 4.1 km of Monbulk Creek's upper reaches in both April and September 2023. On all occasions, fyke nets were deployed in pairs (facing upstream and downstream) at several sites in the afternoon and attended overnight at intervals of  $\leq 2$  h (Serena and Williams 2012). Each platypus was marked when first captured with a uniquely coded transponder tag implanted subcutaneously between the scapulae (Grant and Whittington 1991). Age and sex were identified based on the appearance and size of calcaneal spurs (measured in a straight line along the outer aspect) and/or spur sheaths, with three male age classes (juvenile 1–12 month, subadult 13–24 month, adult  $\geq 25$  month) and two female age classes (juvenile 1–12 month, adult or subadult  $\geq 13$  month) identified; a standard hatching date of 1 November was assumed to apply (Williams et al. 2013). Animals were weighed to  $\pm 10$  g (using a hand-held spring balance from 1996 to 2007) or  $\pm 1$  g (using an electronic balance in 2023); dorsal body length from bill tip to tail tip was estimated to the nearest mm using dial or electronic callipers (bill and bill shield) and a small flexible tape measure (rest of the body). To estimate physical condition, tail thickness and turgidity were manually assessed and assigned to a standard five-point ordinal scale (Tail Volume Index, TVI) (Grant and Carrick 1978).

### Captive life span assessment

The following pieces of information were extracted from the Zoo and Aquarium Association Australasia (ZAA) platypus studbook in November 2023 ( $n = 69$  animals held in captivity since 1975) for individuals living  $> 20$  years: sex;

**Table 1.** Body mass, condition class (TVI), total body length and spur lengths (left, right) of adult male 01F6-03FF.

Date	Weight (g)	TVI	Total length (mm)	Spur length (mm)
17.11.2000	1750	2	473	18.7, 18.6
17.04.2023	2006	3	479	
25.09.2023	1850	4	490	9.5, 9.6

TVI can vary from 1 (very fat) to 5 (very thin). See Methods for details of how measurements were obtained.

source (wild- or captive-hatched); known or (for wild juveniles entering captivity when  $\leq 6$  month old) presumed hatching date; institution where first held; and life span/current age.

## Results and discussion

### Platypus longevity in the wild: a new record

In total, 62 *O. anatinus* were marked and released along Monbulk Creek from 1996 to 2007, including 43 adults or subadults (23 males, 20 females) and 19 juveniles (14 males, 5 females); 6 adults or subadults (4 males, 2 females) were marked and released in 2023.

Male 01F6-03FF was first captured on 17 November 2000 at a site located  $\sim 3.5$  km upstream of the Ferny Creek confluence. Based on spur morphology, he was classified as a newly subadult male (12.5 month old) with 'very sharp' spurs. He weighed 1750 g and his condition was rated as above average (TVI = 2) (Table 1). He was recaptured on 17 April 2023 at a site located  $\sim 9.2$  km upstream of his initial capture site (similar to distances achieved by other males recaptured in this system: Serena et al. 1999) and again on 25 September 2023 ( $\sim 0.7$  km downstream of his April capture site), when he was 23.9 years old. His weight declined modestly (by  $\sim 8\%$ ) from April to September 2023, consistent with previous findings that adult male condition is lower in spring than in other months (Gust and Handasyde 1995; Connolly et al. 2016). His spurs were only about half as long in 2023 as compared with 2000, presumably due to gradual abrasion by the channel substrate (Williams et al. 2013), but still appeared to be sharp enough to be used to compete for mates; dark staining as seen around the spur base is a typical feature of sexually mature adult males (Fig. 2).

Mating effort has been inferred to drive male mortality in a wide range of polygynous mammals, due to aggressive interactions, reduced foraging effort and/or altered activity patterns that in turn contribute to adverse health outcomes and increased predation risk (e.g. Lukas and Clutton-Brock 2014; Thompson and Georgiev 2014). For example, in the case of the platypus, the upper Shoalhaven River in NSW



**Fig. 2.** Male 01F6-03FF's venom-delivering spur in September 2023. Photograph by A. Ewing.

supports a comparatively dense platypus population ( $\sim 12$  resident animals  $\text{km}^{-1}$ ), with females comprising a mean 84% of adults or subadults and males generally not encountered beyond the age of 7 years (Grant 2004; Serena and Grant 2017). Following on from findings for other mammals, these attributes are plausibly linked, insofar as high female density is predicted to contribute both to the value of a male defending an area containing multiple potential mates and to likely high costs of sexual competition (Serena and Grant 2017). By comparison, Monbulk Creek supports many fewer animals per unit length of channel (with a recorded maximum of 1.6 platypus  $\text{km}^{-1}$ : Serena *et al.* 2014) and has a fairly even sex ratio (this study), suggesting that each male may typically seek to defend at most one or two females during the breeding season. Other factors potentially contributing to relatively low male reproductive costs in Monbulk Creek include its narrow channel (which in theory should make it easier for a male to defend a receptive female efficiently and exclude intruders: Gardner and Serena 1995; Gust and Handasyde 1995) and the fact that this population is spatially isolated (thereby presumably reducing the total number of intruders). However, further studies are needed to confirm the relevance of these factors to male longevity in the wild.

### Platypus longevity in captivity

The ZAA studbook lists nine known-age individuals (either captive-bred or acquired from the wild as juveniles  $\leq 6$  month old) that have lived  $> 20$  years, including four males and five females (Table 2). Two other animals originally acquired from the wild as adults died in captivity at a minimum age of 21.4 years (male) and 23.7 years (female). The longest-lived male and female were respectively born in captivity (in 1998)

**Table 2.** Life span of nine known-age captive animals living  $> 20$  years.

Sex	Year hatched	Source (institution)	Life span (years)
Female	1993	W (HS)	30 <sup>B</sup>
Female	1995	W (TZ)	27.0
Female	1986	W (DF)	25.5
Male	1998	C (HS)	25 <sup>B</sup>
Male	1995	W (TZ)	24.0 <sup>A</sup>
Male	2000	C (HS)	23 <sup>B</sup>
Female	1982	W (MZ)	22.7
Female	2002	C (TZ)	21 <sup>B</sup>
Male	2002	C (HS)	21 <sup>B</sup>

<sup>A</sup>Escaped from enclosure and presumed to have died.

<sup>B</sup>Denotes animal was still alive in Nov. 2023. Source = W (hatched in wild), C (captive-bred). Institution = Healesville Sanctuary (HS), Taronga Zoo (TZ), David Fleay Wildlife Park (DF), Melbourne Zoo (MZ).

and the wild (in 1993) and are still alive in November 2023, at 25 and 30 years of age. The 30-year-old female continues to feed normally and is healthy, apart from arthritis developing in one wrist and cataracts occurring in both eyes; her muted response to loud noises suggests that she is also becoming deaf (JLT, pers. obs.). These observations suggest that an age of 24 years, as documented along Monbulk Creek, may approach the maximum longevity expected in the wild due to the onset of age-related physical dysfunction.

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**Data availability.** The data that support this study will be shared upon reasonable request to Jessica L. Thomas (captive records) or the corresponding author (records from the wild).

**Conflicts of interest.** The authors declare no conflicts of interest.

**Declaration of funding.** Platypus live-trapping studies were funded by Melbourne Water, City of Knox, Primelife Corporation and Yarra Ranges Council from 1996 to 2007, and by Melbourne Water in 2023. JLT's involvement was facilitated by funding provided to Healesville Sanctuary by Dr Audrey Harvey, Dr Dennis Wilson and Helen Wilson.

**Acknowledgements.** We thank the many volunteers (too numerous to name individually) and Matthew Linn (EA) and Alice Ewing (EA) for assisting with platypus live-trapping activities, and Alice Ewing for providing permission to reproduce the spur image used in Fig. 2. We also thank the Zoo and Aquarium Association Australasia for authorising our use of platypus studbook records, and Tom Grant and Ross Goldingay for helpful feedback on an earlier draft of this manuscript. Research activities in Monbulk Creek were authorised by the Victorian Department of Energy, Environment and Climate Action (Wildlife Research Permits 95-208 through 10003546, APC; Wildlife Research Permit 10010423, EA) and the Victorian Fisheries Authority (Fisheries Permit RP 553, APC; Fisheries Permit RP 1142, EA), with annual oversight and approvals provided by the Australian Platypus Conservancy AEEC (Project 95/1) and Ecology Australia AEEC (Project 08.22).

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