THE QUEANBEYAN PLATYPUS AWARENESS AND CONSERVATION STRATEGY 2012

Prepared for
Queanbeyan City Council

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Platypus Awareness and Conservation Strategy

Prepared by M. Serena and G.A. Williams – Australian Platypus Conservancy

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This appendix is also available as a stand-alone report.

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G A Williams and M Serena

Australian Platypus Conservancy

PO Box 22

Wiseleigh VIC 3885

Tel: 03 5157 5568

Email: platypus.apc@westnet.com.au

Website: www.platypus.asn.au
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EXECUTIVE SUMMARY

Queanbeyan City Council (QCC) has a crucial role to play in conserving platypus in the Queanbeyan River and the wider Molonglo River upper catchment area.

The platypus population in the Queanbeyan River is not currently considered to be threatened. Nevertheless, the total number of animals estimated to be resident in this waterway – in the order of 60 individuals - is small in an absolute sense. Future urban growth and climate change are likely to have considerable impact on the river in the near to medium term future. Consequently, the survival of platypus in the Queanbeyan River will depend on positive action to protect and enhance conditions which favour the species. In addition, action to protect platypus within the QCC area will have consequences well beyond the city’s geographic boundaries.

This document outlines a Platypus Awareness and Conservation Strategy for QCC. Three major elements are contained in the PACS:

Making provision for platypus in works protocols and management of public land

A range of recommendations are made to ensure that the needs of platypus are routinely incorporated into the planning and day-to-day management of reserves and public lands which have frontage on natural water bodies. These recommendations are also designed to provide a “blueprint” for implementing riparian management action.

Making provision for platypus in planning procedures

The key recommendation is that all relevant Environmental Significance Overlays (ESO) in QCC should include specific consideration of platypus conservation needs along the Queanbeyan River and the lower reaches of its major tributaries.

In the case of proposed major developments, it is further recommended that an Environmental Impact Statement (EIS) addressing potential platypus-related impacts be required at the planning application stage.

Developing the role of platypus as a biodiversity “flagship” in community education and investigating ecotourism opportunities

Various measures are suggested for improving community awareness of platypus conservation needs as well as utilising the species as an ambassador for biodiversity conservation in QCC.

A key recommendation is to establish a Platypus Conservation Zone close to the CBD. It is also recommended that the feasibility of developing platypus-spotting ecotourism opportunities in Queanbeyan be investigated.
INTRODUCTION

The platypus is one of the world’s most remarkable animals. It is an important biological component of permanent freshwater systems in south eastern Australia and a powerful and popular conservation icon.

Unfortunately, platypus numbers have declined in many urban and rural waterways. Climate change is predicted to further erode the security of many populations. Consequently, developing local conservation plans for the platypus should be a feature of good government throughout the species’ range.

Queanbeyan City Council (QCC) has a crucial role to play in conserving platypus in the Queanbeyan River and the wider upper Molonglo catchment area.

Overview of Platypus Awareness and Conservation Strategy

This document outlines a Platypus Awareness and Conservation Strategy (PACS) to be incorporated as part of the overall Plan of Management (POM) for the Queanbeyan River. Most of the recommendations contained in the PACS will have much broader implications for protecting biodiversity given that conditions that are right for the platypus - a species located at the top of the freshwater food chain – by definition will favour many other aquatic plants and animals.

In addition, this document has been designed to contribute to “best practice” management of public land by identifying opportunities for improving the care and rehabilitation of riparian areas under QCC control and outlining recommended management protocols in relation to platypus and their habitat.

The PACS has also been designed to highlight ways in which municipal planning can assist platypus conservation. This will help QCC meet its obligations to conserve biodiversity values and avoid the acrimonious debates that can develop if there has been a perceived failure by Council to adequately protect platypus and their habitat.

Last but certainly not least, the document outlines opportunities for platypus-based community environmental education, including potential for attracting additional visitors to Queanbeyan to see the animals in their natural habitat.

Structure of PACS

The PACS is presented in distinct sections, some of which are designed for potential use by relevant departments within QCC, as follows:

- Background information
- Platypus status and distribution in Queanbeyan
- Threats to platypus survival in Queanbeyan
- Platypus Conservation Recommendations
- Works protocols for management of public land
- Planning protocols to protect platypus habitat
- Community education and ecotourism development
- Action Plan
Definitions

In this document, the term “Queanbeyan River” will be used to define the section of the river from the wall of Googong Dam to the confluence with the Molonglo River. (The river upstream of Googong Dam will be referred to as the Upper Queanbeyan catchment).

It is recognised that the Queanbeyan River, as so defined, includes short reaches at its upper and lower ends that are not within the boundaries of Queanbeyan City Council. However, all comments and recommendations in this PACS will apply to the full length of the river, unless otherwise stated. Accordingly, QCC should take steps to involve all management authorities responsible for the non-QCC sections in the implementation of the PACS.

In addition to platypus, the Australian water-rat (*Hydromys chrysogaster*) occurs in the Queanbeyan River (see section 2.6). This attractive native rodent is equally deserving of community awareness and conservation efforts. Recommendations in this report concerning platypus should be regarded as also applying to water-rats.

DISTRIBUTION AND STATUS OF THE PLATYPUS IN QUEANBEYAN

Methodology

Live-trapping surveys have traditionally been the basis for assessing platypus status and distribution along waterways. Such work is time-consuming, relies on specialised equipment and can only be legally undertaken after official permits are issued. In addition, existing trapping methods are not particularly effective at assessing platypus numbers when water is deeper than about one metre and/or numerous surveys are carried out in close succession (thereby promoting trap shyness).

No live-trapping surveys for platypus have ever been conducted along the Queanbeyan River and it would not be cost-effective to assess current platypus status and distribution using trapping techniques.

Fortunately, other information is available on which to base a reasonable assessment.

The main categories of information are as follows:

- Platypus by-catch records from fish surveys.
- Findings from a community-based visual monitoring program (*Platypus Count*) and other observational records.
- Evaluation of platypus-related habitat values along the length of the river.

Information from fish surveys

Platypus were recorded as by-catch during fish surveys conducted along the Queanbeyan and Molonglo Rivers from 1973-2006 (Dept. Environment and Recreation ACT, unpub. data).

Although fish and platypus trapping surveys both rely on nets, their outcomes are not necessarily equivalent. In the case of rectangular mesh (or “gill”) nets, fish are most effectively sampled by weighting the bottom margin of nets with lead weights; unfortunately, this often causes entangled platypus to drown (Grant and Carrick 1974). In the case of fyke (or eel) nets, available evidence indicates that fyke nets as deployed in fish surveys (with single wings stretched parallel to the banks) capture only about 15-20% as many platypus as when fyke nets are set specifically to catch this species (with two wings stretched across the entire width of the channel and potential gaps between the net and stream bottom blocked using rocks) (APC unpub. data).
Despite these limitations, by-catch records from fish surveys can contribute useful indicative information about the platypus’s distribution and status. In particular, the percentage of females in a platypus population is expected to reflect local habitat productivity, with more productive platypus habitats supporting a greater percentage of females.

This reflects the fact that breeding females are solely responsible for raising juveniles, and consequently require access to richer and more reliable food resources (mainly in the form of bottom-dwelling aquatic macro-invertebrates) than do males. In absolute terms, an adult female raising twins in captivity has been found to consume about three times more food as compared to when she was not lactating (Holland and Jackson 2002). By comparison, males can more readily make use of relatively poor or suboptimal habitats through much of the year, as their reproductive success only depends on finding and mating successfully with receptive females during the spring breeding season.

From 1973-2006, 168 incidental platypus captures were recorded during fish surveys in the Queanbeyan and Molonglo catchments, including 20 in the Queanbeyan River downstream of Googong Dam, 45 in Googong Dam, 64 in the catchment area upstream of Googong Dam and 39 in the Molonglo River upstream of Lake Burley Griffin (Table 1). Interestingly, the Queanbeyan River downstream of Googong Dam was found to support a higher percentage of females than the Molonglo River and Googong Dam itself (where most of the water body would be too deep for productive platypus foraging). However, it supported fewer females as compared to the upper Queanbeyan catchment upstream of Googong Dam, where habitat conditions are relatively pristine.

Table 1. Distribution of platypus by-catch during fish-surveys in the Queanbeyan and Molonglo catchments from 1973-2006. % females was calculated as a percentage of total captures, excluding animals of unknown gender.

<table>
<thead>
<tr>
<th>Water body</th>
<th>Males</th>
<th>Females</th>
<th>Unknown</th>
<th>Total</th>
<th>% Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molonglo River</td>
<td>26</td>
<td>12</td>
<td>1</td>
<td>39</td>
<td>32%</td>
</tr>
<tr>
<td>Queanbeyan River</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>44%</td>
</tr>
<tr>
<td>Googong Dam</td>
<td>31</td>
<td>14</td>
<td>0</td>
<td>45</td>
<td>31%</td>
</tr>
<tr>
<td>Upper Queanbeyan catchment</td>
<td>30</td>
<td>30</td>
<td>4</td>
<td>64</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>64</td>
<td>7</td>
<td>168</td>
<td>40%</td>
</tr>
</tbody>
</table>

More detailed information on the distribution of platypus in the Queanbeyan downstream of Googong Dam can be gleaned from the results of fish surveys conducted from 1998-2004 (Lintermans et al. 2001; Lintermans and Jekabsons 2004). This work sampled three parts of the river: the Oaks Estate (c. 0.75 km upstream of the Molonglo confluence), Dane Street (c. 0.75 km upstream of the suspension bridge) and Talpa (c. 2 km downstream of Googong Dam). Each survey utilised 10 single-wing fyke nets and 2 rectangular mesh nets per area.
This work resulted in 14 platypus being captured (Table 2). The greatest number of captures and the highest percentage of females were both recorded at Talpa, upstream of the urban area. By comparison, approximately half as many platypus captures were recorded (and half as many females encountered) at Dane Street. No platypus were recorded at Oaks Estate, suggesting that the species occurs at best at low density at the downstream end of the river.

Table 2. Platypus by-catch during fish surveys along the Queanbeyan River downstream of Googong Dam from 1998-2004. % females was calculated as a percentage of total captures, excluding animals of unknown gender.

<table>
<thead>
<tr>
<th>Location</th>
<th>Males</th>
<th>Females</th>
<th>Unknown</th>
<th>Total</th>
<th>% Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oaks Estate</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>----</td>
</tr>
<tr>
<td>Dane Street</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>33%</td>
</tr>
<tr>
<td>Talpa</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>10</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>14</td>
<td>54%</td>
</tr>
</tbody>
</table>

**Visual monitoring**

A community-based visual monitoring program for platypus and water-rats (*Platypus Count*) has been carried out as a joint effort by the Australian Platypus Conservancy and Upper Murrumbidgee Water Watch starting in early 2009. The program is providing data which enables the activity of both species to be tracked on a monthly basis in the area stretching from approximately Dane Street downstream to the weir (Fig. 1).
Activity in both species has been found to vary seasonally, with platypus activity generally peaking in winter/early spring and water-rat activity peaking in late autumn/winter. In both cases, this is likely to reflect the species’ respective annual life history cycles along with the need to forage longer hours in winter in response to cold air and water temperatures. Although visual monitoring does not allow the absolute size of a population to be estimated, it does provide a powerful tool for tracking how well a given population is doing over time. For example, data from the Queanbeyan program made it possible to determine how well local platypus and water-rat populations coped with the one-in-twenty-year flooding that occurred along the Queanbeyan River in December 2010.

**Platypus population assessment based on habitat attributes**

On 16-17 March 2011, APC biologists walked the length of the Queanbeyan River from the Molonglo River confluence upstream to White Rocks, and from Googong Dam downstream for a distance of c. 1.0 kilometre, in order to develop an estimate of platypus numbers along three consecutive sections of the Queanbeyan River. These sections broadly correspond to those sampled in the 1998-2004 fish surveys (see section 2.2):

1) Lower – Molonglo River confluence upstream to main weir wall
2) Middle (Queanbeyan township) – main weir wall upstream to White Rocks
3) Upper – White Rocks upstream to Googong Dam

The quality of platypus habitat in each section was assessed in terms of key platypus-related attributes and other relevant environmental information (see appendix C for details).

Based on the habitat findings, and knowledge of platypus population densities in a broad range of habitat types (derived from APC live-trapping surveys conducted in 27 different river catchments from 1995-2010), estimated densities of resident adults and subadults in the three sections are described below (Table 3). The total size of the resident platypus population in the area stretching from the Molonglo River confluence upstream to the Googong Dam wall is estimated to be in the order of 43-79 animals.
Table 3. Estimated platypus population density (adults and subadults) in three sections of the Queanbeyan River (March 2011).

<table>
<thead>
<tr>
<th>Section</th>
<th>Length (km)</th>
<th>Estimated no. of platypus/km</th>
<th>Estimated total no. of platypus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>3</td>
<td>1-2</td>
<td>3-6</td>
</tr>
<tr>
<td>Middle (Queanbeyan township)</td>
<td>5</td>
<td>2-5</td>
<td>10-25</td>
</tr>
<tr>
<td>Upper</td>
<td>6</td>
<td>5-8</td>
<td>30-48</td>
</tr>
<tr>
<td>Estimated total population</td>
<td></td>
<td></td>
<td>43-79</td>
</tr>
</tbody>
</table>

Status of the platypus in tributaries of the Queanbeyan River and other waterways in the QCC area

There appear to be no confirmed reports of platypus being seen in any of the major (named) tributaries of the Queanbeyan River, including Buttles Creek, Barracks Creek and Jumping (or Valley) Creek. APC biologists inspected the lower reaches of these creeks in March 2011 and concluded that platypus are unlikely to occupy any of them on a permanent basis because flow is unreliable and habitat conditions are generally suboptimal. However, it is possible that a few platypus (especially subadult/non-breeding individuals) may occasionally use these creeks for foraging when flows are adequate.

As part of the long-term plan for expanding the area of usable habitat for platypus in the Queanbeyan River, it would be sensible to incorporate the lower reaches of these tributaries into the scope of the PACS.

In the case of Jerrabomberra Creek, all known platypus records (four animals caught as by-catch during fish surveys in the mid-1970s and two sightings reports in 2003 and 2009 respectively) are associated with the Wetlands Nature Reserve in the ACT, close to the Molonglo River confluence. There is therefore no evidence that any platypus currently occupies the QCC section of Jerrabomberra Creek. Nevertheless, as part of the long-term protection strategy for this species in the upper Molonglo catchment, it would again be sensible to apply all PACS recommendations to Jerrabomberra Creek, including developing a collaborative management plan with ACT authorities.

Status and distribution of Australian water-rats in the Queanbeyan River

In addition to platypus, the Australian water-rat or rakali (*Hydromys chrysogaster*) appears to be well established along the Queanbeyan River.

Formal records for this species are relatively scarce (e.g. only three records for the QCC area are included in the Atlas of NSW Wildlife). This presumably reflects the relatively low level of public awareness of this species, along with the fact that water-rats are rarely recorded as by-catch in fish surveys because of their ability to chew their way out of nets.
However, results of the Platypus Count monitoring program in Queanbeyan have confirmed that this species is widely observed in the township and appears to be reasonably abundant (see 2.3).

Platypus and water-rats co-exist along many waterways in eastern Australia, but Queanbeyan appears to provide an unusually good location to observe both species with almost equal facility. This situation provides a significant market advantage for ecotourism development (see 6.3).

The ecological and conservation requirements of the Australian water-rat are relatively poorly understood, reflecting the fact that the species is difficult to study in the wild. However, as top predators in aquatic systems, platypus and water-rats probably share many of the same general needs. Accordingly, most of the management recommendations in this PACS will be equally applicable to water-rats.

The Australian water-rat is an attractive native rodent that is best thought of as “Australia’s answer to the otter” to avoid possible negative connotations that it is a “rat”. Greater community understanding of this species is highly desirable. Recommendations in this report concerning steps to improve platypus awareness should therefore be regarded as applying equally to water-rats.
THREATS TO PLATYPUS SURVIVAL

Loss or degradation of riparian vegetation

Riparian vegetation is essential to platypus survival in many ways:

- It contributes to the quality of platypus burrow habitat.
- It provides protective cover for platypus when they are active in the water, thereby reducing mortality due to predation.
- It contributes to the development of stable and productive populations of aquatic macro-invertebrates on which the platypus feeds.

Several different studies have reported a significant positive relationship between the distribution of platypus numbers or feeding activity and the number of medium-to-large native trees growing within 20 metres of the water (Holwell et al. 1998; Serena et al. 2000, 2001a, 2001b; Worley and Serena 2000). Similarly, the presence of shrubs and ground cover plants next to or overhanging the water has been linked in a positive manner both to platypus feeding activity (Ellem et al. 1998; Serena et al. 1998a; Worley and Serena 2000) and the animals’ use of burrows (Holwell et al. 1998; Serena et al. 1998b).

In an urban or rural fringe context, protecting (or enhancing) a substantial corridor of indigenous vegetation along both banks of a creek or river will help to screen out loud noise and artificial light, trap litter and pollutants arising in adjoining developed areas, reduce trampling and bank erosion, restrict access by foxes and uncontrolled pets, and generally promote the development of a more diverse and productive freshwater ecosystem.

Studies of platypus foraging behaviour have also found that this species tends to avoid feeding in areas of stream dominated by willows (Serena et al. 1998a, 2000, 2001a, 2001b). The negative relationship between platypus activity and willows does not simply reflect the fact that willows are a non-indigenous species, as (for example) a negative relationship has not been recorded to date between platypus foraging behaviour and the occurrence of riparian poplars (Serena et al. 2000, 2001b). Platypus are likely to find it difficult to extract macro-invertebrates from the fibrous mats of willow roots that characteristically invade shallow water bodies (Serena et al. 2001b), and aquatic insects may be less abundant in pools that have been invaded by willows due to reduced dissolved oxygen levels in summer and autumn (Read and Barmuta 1999; Serena et al. 2000, 2001a).

Studies have shown that removing willows from creek and river banks does not disrupt platypus populations over the short term, provided methods are used which do not affect the structural integrity of banks – e.g. by poisoning willows at or before the time they are cut down, leaving their stumps and roots to decay, and replanting the bank with native vegetation as soon as possible (Serena and Williams 1997).

Platypus habitat is predicted to be most productive where plant species which have evolved in the local area are established on creek or river banks. Nevertheless, a staged (as opposed to wholesale) removal program for weeds (including willows) may in some cases be the best strategy for also achieving the following platypus habitat management objectives:

- Minimise the potential for banks eroding.
- Maintain shade over the water (to reduce fluctuations in water temperature that can deleteriously affect macro-invertebrates and hence the platypus food supply).
- Provide adequate protective cover from predators and direct human disturbance (both for platypus and their burrows).
Much of the Queanbeyan River downstream of Googong Dam, especially downstream of White Rocks, has experienced loss or degradation of riparian vegetation as a consequence of the impact of rural land use and urban development.

Accordingly, significant scope exists for enhancing riparian vegetation as a way of assisting platypus conservation efforts. See recommended actions in:

- Protecting and restoring native riparian vegetation
- Capital works procedures
- Planning guidelines for riparian vegetation buffer zones

**Impacts of development**

Many types of development increase the rate at which stormwater runoff enters and leaves waterways, by expanding the amount of impervious surface in the catchment and/or directing runoff into creeks and rivers via stormwater drains. The resulting alteration of flow regimes, water quality and aquatic habitats can have serious negative impacts on platypus populations. For example, Serena and Pettigrove (2005) found that platypus fail to occupy streams in the Melbourne region characterised by more than 11% total catchment imperviousness, indicating that the species is sensitive to this factor. Similarly, Danger and Walsh (2008) concluded that the platypus is highly sensitive to catchment urbanisation, given that breeding populations are generally absent throughout the Melbourne area from sites with greater than 2.2% direct connected imperviousness (DCI, defined as the amount of impervious surfaces directly linked to natural streams or rivers by impervious stormwater pipes or channels in a given catchment area).

Other types of development, such as golf courses and horticultural complexes, have the potential to increase runoff of a wide variety of chemical contaminants, while elevated nutrients in stream water have been linked to seepage from septic tanks (Bernhardt et al. 2008).

Roads, walking tracks and car parks that are located inappropriately close to water bodies with inadequate intervening vegetation cover can substantially increase the risk that platypus are subject to attacks by predators such as foxes or uncontrolled dogs (Serena 1994). In addition, they can increase direct human disturbance of water bodies and associated impacts such as increased nocturnal noise and light, litter and other pollution, and trampling of burrows.

Toilet blocks and facilities associated with caravan parks and sporting ovals (e.g. dressing sheds, refreshment kiosks and waste receptacles, chemical and equipment storage sheds) located too close to waterways can increase the risk of pollution. Locating such eyesores in or close to the riparian zone can also degrade community appreciation of the value of creeks and rivers, including their role as platypus habitat.

Bright street lights or security lighting located near a creek or river may make platypus more easily detected by predators. In addition, by attracting the winged adults of some kinds of aquatic insect when they emerge at dusk to breed and lay eggs, it is possible that artificial lighting may effectively reduce the platypus’s food supply.

In addition to the longer-term impacts of development on riparian areas, immediate problems may arise for platypus as a by-product of construction activities or routine maintenance (particularly if the latter involves substantial digging or other soil disturbance) carried out on creek or river banks. Based on studies examining the effect on platypus of major stream stabilisation projects, the animals normally do
not abandon their home ranges and adults are unlikely to be killed directly by heavy machinery used to restructure the banks and channel (Serena and Williams 1998a, 2000; Serena et al. 1999a).

However, special consideration must be given to the requirements of females with dependent offspring in the months from September to February, i.e. when eggs and/or dependent juveniles are found in nursery burrows (Grant et al. 1983). In this period females are unable to move their young. In consequence, major bank disturbance at or near the burrow may compromise the survival of mothers as well as their offspring.

Much of the Queanbeyan River is currently or potentially affected by the direct or indirect impacts of urban development. In order to conserve the local platypus population it is essential that a number of planning and management protocols are adopted in order to ensure the long-term health of the river environment.

See recommended actions in:

- Capital works procedures
- Designing and managing walking tracks, picnic areas and other public facilities
- Siting toilet blocks and other structures in sporting/recreational facilities
- Lighting
- Planning guidelines for development of buildings and other infrastructure near platypus habitat

**Infrastructure in stream or river channels**

Platypus typically occupy home ranges extending for a kilometre or (in most cases) more along a creek or river. Breeding males and dispersing juveniles have sometimes been known to move tens of kilometres over a period of days or weeks. In turn, these movements often require the animals to negotiate manmade structures.

Platypus have been observed to travel routinely through a concrete culvert measuring 45 metres in length (Serena et al. 1999b), and may also enter pipes as narrow as 10 centimetres in diameter, though they are apparently unable to back up or turn around in such a confined space and so can die if the pipe becomes blocked or shut at one end (Taylor et al. 1991).

The vertical walls of large concrete weirs or outflow structures (as exemplified by the main weir in Queanbeyan township) can create a very significant obstacle to platypus movement in the channel (Otley and le Mar 1998). Animals electing to move around such a barrier will need to exit the water, increasing their risk of being killed by predators. Platypus can also die after becoming wedged in gateways or mesh barriers placed across water bodies, such as one found drowned in a 5 centimetre gap in a gate regulating flow between two irrigation channels (APC, unpub. data).

Platypus are also known to die after being sucked into water pumps and water-powered generators, with many reports of this type of occurrence received by the APC. Ironically, the likelihood that small juveniles die in this unpleasant manner seems to be increased by the fact that pump and generator sheds are often sited on elevated banks which provide good habitat for nursery burrows.

See recommended actions in:

- Water pumps and water-powered generators
- Pipes, culverts and drop structures
- Planning guidelines for infrastructure in channels
- Platypus education program
Litter

Platypus are highly vulnerable to litter-caused injuries due to the specialised nature of the front feet, which are adapted to serve as highly efficient paddles. The trade-off is that the platypus is incapable of grasping objects with its “hands”. Platypus mainly forage by fossicking in bottom sediment, where items of litter tend to become concentrated, and consequently they run a high risk of getting plastic or rubber loops and rings (such as elastic hair ties, the tamper-proof sealing rings placed around the mouth of beverage and food containers, or loops of nylon fishing line) caught around their bill or head. Because the platypus is incapable of removing such objects by pulling them forward and off, they tend to work their way back along an animal’s body until they can’t move back further, then remain in place, gradually wearing their way through the skin and eventually into the underlying tissue. The APC has received numerous reliable reports of platypus drowning after tangled snarls of fishing line have become snagged on submerged roots or branches, and other individuals are known to have starved when small plastic rings (such as those found around the necks of milk bottles) become lodged around their bill.

Results of platypus live-trapping surveys conducted around Melbourne from mid-1998 through 2007 indicate that around 5% of platypus living in the greater urban area have at least one item of litter tangled around their body at any point in time, with litter removed from the bodies of up to one-third of animals captured along highly urbanised drainages in the 1990s (Serena and Williams 1998b, 2010). Based on the amount of litter observed in the Queanbeyan River during an inspection by APC biologists in March 2011, it is likely that similar levels of entanglement occur there.

Platypus have also been recorded with lacerations to the bill presumed to have been caused by encounters with jagged metal debris or broken glass in the water (Williams and Serena 2006).

Shopping trolleys are probably the commonest class of large metal objects dumped in QCC waterways. At least five dumped trolleys were noted in the Queanbeyan River during the March 2011 inspection by APC staff. While there are no recorded instances of platypus being killed or injured as a by-product of encounters with disintegrating trolleys, the presence of dumped trolleys undermines the public perception of a river as providing valuable wildlife habitat that needs to be conserved on behalf of platypus and other aquatic species.

A trolley deposit system (as implemented by Aldi supermarkets) provides a proven technology that works simply and effectively to virtually eliminate the dumping of trolleys in creeks and other public places.

In addition to possibly mandating this policy for local retailers, QCC should consider a range of other options for reducing litter. See recommended actions in:

- Litter traps
- Platypus education program
Inappropriate angling practices

There are numerous records of platypus being found dead after having been drowned in gill nets, eel nets and enclosed “opera house” traps set to catch yabbies or crayfish, with up to five platypus documented to die overnight in a single opera house trap (Grant et al. 2004; Serena and Williams 2010).

It is illegal to set opera house traps in public waters in eastern NSW and ACT but the practice appears to be common and widespread. Platypus which have drowned in yabby traps are often discarded on the banks and constitute the major class of intact (i.e. non-predated) platypus carcasses that are subsequently found (APC unpub. data). In Queanbeyan, such a carcass was reported this year in the White Rocks area (B. Medway, pers. comm.), which is reputedly also a focus for ad hoc camping activity throughout the warmer months (T. Rucosky Noakes, pers. comm.).

The APC has also received reports from many water bodies across the platypus’s range of animals being found dead on the banks of a river or creek with a fish hook impaled in either the bill or a front foot. In other cases, platypus carcasses have been found floating underwater after trailing fishing line became wrapped around a piece of wood or other object and the animal either drowned or died of exhaustion. An example of this type of mortality occurred on 12 October 2011, when a female platypus was found in the Queanbeyan River near Dodsworth Street with a line and hook wrapped around its neck which was then snagged on an object below the surface of the water.

Platypus are also killed as a result of becoming entangled in discarded fishing line.

QCC should consider a number of actions to reduce the risk of platypus deaths and injuries related to angling. See recommended actions in:

- Recreational Angling and Yabbing
- Platypus Conservation Zone
- Platypus education program
**Predation**

Dogs and house cats have both been documented to kill platypus. In one study in Tasmania, dogs were found to be the leading cause of platypus deaths, accounting for 40% of known mortalities (Connolly *et al.* 1998). Naive juveniles are particularly likely to die in this manner (Serena and Williams 2010).

Foxes are also known to be responsible for platypus mortalities (Brown and Triggs 1990), with most victims probably attacked in areas of relatively shallow water (Serena 1994).

See recommended actions in:

- Dog control policies
- Planning guidelines for pet ownership
- Platypus Conservation Zone
- Platypus education program

**Drought refuges and climate change**

The platypus is adapted to feed only in the water. Accordingly, the possibility that flows along the Queanbeyan River may be compromised in future decades as a by-product of worsening and more frequent droughts could potentially compromise the survival of the local platypus population.

In general terms, platypus occupying waterways that possess sizable expanses of reliable refuge habitat are much more likely to survive exceptionally dry conditions. In the case of the Queanbeyan system, an excellent refuge currently exists in the form of water backed up behind the city’s main weir, which appears to influence flow to approximately as far upstream as Dane Street. This expanse of habitat is undoubtedly one of the key factors (along with the reliable environmental flow currently released from Googong Dam) contributing to the sizable populations of platypus and water-rats found in Queanbeyan township. Water in this section of channel is (typically) quite slow-flowing and moderately deep, providing ideal platypus foraging habitat. Organic matter (in the form of branches, twigs and finer plant materials) which settles out in the slow-moving water is also predicted to provide the basis for a productive macro-invertebrate community, which in turn ensures a reliable food supply for the platypus and an important source of food for water-rats.

Two management questions have recently been raised in relation to management of the pool habitat found immediately behind the city weir:

- Is periodic mechanical removal of aquatic plants from the weir pool compatible with platypus conservation requirements?
- Would a dredging program for the weir pool benefit the local platypus population?

Although the presence of some macrophytes is predicted to benefit the platypus by providing habitat for macro-invertebrates, platypus undoubtedly forage much more effectively in relatively open water as compared to situations where a pool becomes choked with vegetation. The continued occurrence of substantial numbers of platypus and water-rats in and immediately upstream of the weir pool (as recorded by the *Platypus Count* monitoring program) also suggests, *prima facie*, that the aquatic plant removal regime has had no major deleterious impact on these species.

From the viewpoint of platypus, dredging a pool is likely to be quite negative over the short term because it will effectively destroy feeding opportunities until macro-invertebrate communities recover.
However, reflecting the fact that platypus are quite flexible in their feeding behaviour and have home ranges that typically encompass at least a kilometre of channel, this is unlikely to have catastrophic consequences for any individuals as long as substantial alternative feeding habitats are available to them (which is the case along the Queanbeyan.) Over the longer run, the animals are most likely to benefit if dredging increases the amount of pool habitat characterised by a depth of 1-4 metres, i.e. the ideal range for a platypus (Bethge et al. 2003; Grant 2004). Much of the weir pool currently appears to fall within these parameters. Accordingly, there would seem to be no compelling reason to undertake silt removal specifically with a view to improving the quality of platypus habitat at this point in time.

Based on the results from fish surveys (see section 2.2), Googong Dam also is likely to qualify as a potential platypus refuge in times of severe drought (particularly for those individuals living upstream of the dam), though animals are likely to be able to utilise only a fraction of this water body at any given point in time due to depth constraints (with platypus rarely reported to feed in water that is more than five metres deep: Bethge et al. 2003).

See recommended actions in:

- Maintaining drought refuges and environmental flows
- Planning guidelines for drainage
- Platypus education program

Inadequate awareness of platypus conservation needs

Most Australians are aware of the fact that the platypus is one of the world’s most unusual animals. Ironically, this public awareness of the “special” nature of the species has helped foster a widespread misconception that platypus are only likely to be encountered in remote, pristine areas and that their conservation needs can be ignored in urban areas.

Developing a better community appreciation of the species’ distribution and conservation needs in the Queanbeyan area is a key way in which the long-term survival of platypus populations can be fostered.

By the same token, it is important that current knowledge about best-practice platypus management be incorporated into council planning procedures and the routine management of city reserves and public lands.

See recommended actions in:

- Making provision for platypus in planning procedures
- Platypus Conservation Zone
- Platypus education program
PLATYPUS CONSERVATION GUIDELINES: WORKS PROTOCOLS AND MANAGING PUBLIC LAND

Platypus are currently present along the length of the Queanbeyan River within the QCC area. Consequently, it is important that the conservation needs of the species be routinely incorporated into the planning and day-to-day management of reserves and public lands which have frontage on the river and its major tributaries. This includes the activities of “Friends” and Landcare Groups or local Committees of Management, as well as the work of QCC staff and contractors.

In areas where river frontage is privately owned, land-owners should be provided with appropriate incentives to manage their land within the riparian corridor in accordance with the same protocols that apply to public areas.

Protecting and restoring native riparian vegetation

Recommendations

Whenever possible, a buffer zone of native riparian vegetation should be created or maintained (comprising a width of 30 metres on either bank) along the river and its major tributaries. Ideally this zone should be developed as a self-sustaining plant community comprising native trees as well as lower-growing plants (shrubs and ground covers) that overhang the water.

To deter predators and provide protective cover for native wildlife, shrubby vegetation overhanging the water should generally be encouraged to grow on all stream and river banks, including those located next to tracks, roads or footpaths. This is particularly important in places where the banks are relatively low and flat and the adjoining water body is relatively narrow and shallow (less than 3-4 metres wide and 0.5 metres deep). In the case of deeper and/or wider water bodies, it is recommended that, at the very least, a buffer strip of unmown grass at least two metres wide (though ideally more) should be encouraged to grow at the water’s edge, ideally in conjunction with scattered clumps of taller growing plants.

In line with the above, QCC should establish a code of practice to discourage staff, contractors and community volunteers (and private land-owners) from mowing grassed lawn areas all the way to the water’s edge unless there is a specific management imperative to do so (i.e. not simply because unmown grass looks “untidy”).

Willows should be progressively removed from river and creek banks to improve the quality of platypus habitats. Areas where willows have been removed should be replanted as soon as possible with appropriate native trees and shrubs to reduce the potential for erosion. Care should be taken when carrying out willow removal programs in the period from September through February, particularly in areas known to support large numbers of platypus, to avoid damaging nursery burrows in the period when they are being used to incubate eggs and raise young.

The removal of other non-native tree species which are currently found along the urban river corridor is not considered a priority from the perspective of improving the quality of platypus habitat. Nevertheless, the implementation of a strategy to prevent the proliferation of potentially weedy species and establish more native vegetation in Queanbeyan is regarded as a sensible long-term goal to promote biodiversity in the region.

Where a target weed species dominates both banks for a substantial distance (e.g. 300 metres or more), consideration should be given to staging removal programs so the weed is eliminated from one bank in one year and the opposite bank in subsequent years, so some protective cover is maintained in
that section of channel at all times. Areas where weeds have been removed should be replanted as soon as possible with appropriate indigenous trees and shrubs to reduce the potential for erosion.

**Capital works procedures**

**Recommendations**

Major construction or management activities which involve using excavators or other heavy equipment to dig into (or drive over) river banks within 10 metres of the water's edge should not be undertaken during the platypus breeding season – i.e. from September through about February to avoid destroying nesting burrows containing females and their young.

Great care should be taken to reduce the movement of bare or disturbed soil from the banks to the water in the course of construction activities or management actions. Effective sediment traps should be erected, but it is important that these are removed upon completion of the work – e.g. hay bales, if used to trap sediment, should not be abandoned in the river so that baling twine becomes a hazard to platypus and other wildlife.

Areas of bare or disturbed soil should be replanted as quickly as possible with understorey plants and shrubs (as well as trees) to avoid erosion.

To enable natural bottom substrates to be accessible to foraging platypus, concrete should not be substantially employed as a binding agent along the banks or channel. Similarly, gabion baskets should not be employed over very extensive areas to stabilise banks if practical alternatives are available.

**Designing and managing public facilities**

In general terms, walking tracks should be constructed in accordance with the design principles detailed below.

**Recommendations**

To protect the ecological integrity of the river corridor and reduce the incidence of platypus mortality caused by foxes and other terrestrial predators, infrastructure such as roads, access tracks, car parks, caravan parks, picnic/playground areas and sports ovals should ideally be located at least 30 metres from the banks of the river and its major tributaries (and not less than 10 metres, apart from tracks or service roads leading to bridges or viewing platforms, see below).

The area between a footpath or other open public usage area and the bank of the river should be planted whenever possible with shrubs and/or thick ground cover plants to reduce easy access by humans and predators such as foxes and dogs (see section 4.1.2 for further advice).

To discourage the development of *ad hoc* trails down to the water and reduce access by predators, bridges and viewing platforms should ideally be placed at sites where the banks are relatively high and steep and water is reliably deep (at least 0.5 metres or more at the driest time of year). To provide protective cover for platypus in the vicinity of bridges, vegetation overhanging the water should be encouraged to grow along the banks upstream and downstream of the bridge for a distance of at least 20 metres in either direction.

**Siting toilet blocks and other structures in sporting/recreational facilities**

Some of the structures often associated with caravan parks and sporting ovals (such as toilet blocks, dressing sheds, refreshment kiosks and waste receptacles, and storage sheds) can both increase the
risk of pollution and reduce community appreciation of the value of the river as a natural habitat for both platypus and water-rats if located too close to natural water bodies.

Recommendations

Future planning for toilet blocks and miscellaneous infrastructure associated with sporting and recreational facilities should ensure that such facilities are not placed within less than 30 metres of a creek or river.

Lighting

Recommendations

Security lights and floodlights located at parks, sporting and recreation venues, etc. that are located within 100 metres of the river and its major tributaries should be designed to minimise the amount of illumination directed over the water, and fitted with globes producing relatively low amounts of insect-attracting blue and ultraviolet light.

Water pumps and water-powered generators

Recommendations

QCC should conduct an audit of water pumps, water-powered generators and any other similar equipment associated with its operations to ensure that a mesh cover (or equivalent barrier) is fitted, and in good condition, at an appropriate distance around all intake points.

Pipes, culverts and drop structures

Recommendations

QCC should conduct an audit of infrastructure under city management to ensure that:

- Pipes and culverts located along the length of a natural water body or an earthen channel connected to a natural water body have a minimum internal diameter of 0.3 metre and do not project out from the surrounding substrate (i.e. do not create an overhang that cannot be negotiated by platypus).
- Pipes and culverts that are more than 50 metres in length are provided with vertical “breathing bays” at intervals of not more than 30 metres along their length if they are sometimes expected to be filled to capacity after storms.
- Grilles or mesh barriers placed across pipes and culverts located along a natural waterbody or an earthen channel connected to a natural water body (or across the width of a creek or earthen channel) have grid spacings or apertures that are 12 centimetres or more wide.
- Barriers meant to exclude platypus from pipes or artificial channels are constructed of solid materials or have grid spacings or apertures that are less than 2 centimetres wide.
- Concrete drop structures associated with culverts are designed with stepped or slanted faces to allow platypus to scramble up and down safely.

Consideration should be given over the longer term to install a fish ladder to facilitate safe passage of fish and platypus past the main Queanbeyan city weir. In general terms, any structure that can be navigated by a fish is likely to also be used by a platypus. Meanwhile, to help protect platypus from predators when they have to leave the water to move past the weir as it currently stands, it is strongly
recommended that additional vegetation cover be planted at the edge of the weir (both sides) in the form of native shrubs and/or substantial tussock grasses (e.g. *Poa labillardieri*).

**Recreational angling and yabbying**

**Recommendations**

Signage concerning “platypus-friendly” angling practices should be erected at selected locations, especially the caravan park and at the pool immediately upstream of the main weir.

Information concerning “platypus-friendly” angling practices should be a key element in the platypus education program.

Consideration should be given to banning fishing along part or all of the Queanbeyan River over the longer term if there is reason to believe that angling is generating an unacceptable risk to platypus and other wildlife, as indicated by the presence of unattended lines or abandoned lures, hooks or tangled line along the river or by repeated discoveries (twice or more in five years) of platypus or other birds or mammals that have been injured due to use of fishing line or hooks.

Consideration should be given to instituting regular weekend and/or Monday morning patrols in the White Rocks area by appropriate QCC staff to help evaluate whether further action may be required to regulate camping-related activities.

**Dog control policies**

**Recommendations**

Dogs should be required to be controlled on a lead at all times when being exercised within 30 metres of the river in reserves or along walking tracks managed by Council, unless in a designated fenced off-lead dog area.

**Maintaining drought refuges and environmental flows**

The main Queanbeyan city weir should be retained as an important habitat feature for platypus at all times, and particularly during times of drought (see recommendations regarding installation of a fish ladder to improve connectivity along the channel, and measures to reduce the likelihood that platypus are subject to predation when traveling past the weir as it currently stands.)

Enough environmental flow should be released from Googong Dam during times of drought to support a viable platypus population downstream to at least the main city weir.

Periodic mechanical removal of excessive macrophyte growth in the city weir pool should continue, on the proviso that removal operations only occur during daylight hours and that harvested vegetation is largely removed from the site to preclude catastrophic reduction of dissolved oxygen levels due to decomposition.

Any future dredging operations carried out along the Queanbeyan River should ideally be scheduled outside the period when adult female platypus are engaged in raising young (September to February), to avoid potentially compromising reproductive success.
PLATYPUS CONSERVATION GUIDELINES: PLANNING and LOCAL LAWS

Environmental conditions that are right for the platypus, a generalised top predator, will also by definition favour a wide range of other native freshwater species. Accordingly, measures undertaken to protect or enhance the platypus’s environment should contribute to “best practice” management of biodiversity values along waterways.

QCC is unusual amongst city councils in that platypus occur extremely close to its CBD and major residential area. Accordingly, it is appropriate that planning procedures should routinely take the species’ requirements into account.

Making provision for platypus in planning procedures

Recommendations

Environmental Significance Overlays (ESO) for planning control purposes should include consideration of platypus conservation needs along the full length of the Queanbeyan River and the lowest 1-2 kilometres of each of its major tributaries (Buttles, Barracks and Jumping Creeks) given that platypus residing in the river are likely to occupy the latter areas regularly when flow is adequate.

Planning applications in the relevant zone should be specifically assessed in relation to the following potential impact upon platypus conservation requirements:

- Development of buildings or other significant infrastructure in riparian areas
- Removal of mature indigenous trees or tracts of native vegetation in riparian areas
- Design of storm water drainage or wastewater management systems that drain to natural water bodies
- Development of in-stream infrastructure such as pipes, culverts, gateways or pumps
- Pet control in urban growth areas located in or near riparian areas

Recommended guidelines with respect to each of these issues are provided below.

In the case of developments which are required to submit an Environmental Impact Statement (EIS) at the planning application stage, the EIS should specifically address the potential for platypus being negatively affected by the development either directly or indirectly (via their macro-invertebrate food supply). Depending on the nature of the development, it may also be appropriate to require a specific plan for platypus protection to be formulated as an integral part of the development approval process.

Planning guidelines for buildings and other infrastructure near platypus habitat

Recommendations

To protect the ecological integrity of stream and river corridors and reduce disturbance associated with human-generated light and noise, new buildings or other substantial structures (and their associated lawns, garden beds, etc.) should be located at least 30 metres from the banks of water bodies supporting platypus.

To protect the ecological integrity of stream and river corridors and reduce the incidence of platypus mortality caused by foxes and other terrestrial predators, roads and tracks should ideally be located at least 30 metres from the banks of water bodies supporting platypus (and never less than 10 metres, apart from those leading to bridges or viewing platforms, see below).
To discourage the development of ad hoc trails down to the water and reduce easy access by predators, bridges and viewing platforms should be placed at sites where the banks are relatively high and steep and water is reliably deep (at least 0.5 metres or more in the drier months of the year).

To protect the ecological integrity of stream and river and reduce predator impacts, car parks should ideally be located at least 30 metres from the banks of water bodies supporting platypus (and never less than 10 metres). Car parks serving commercial premises that are located less than 30 metres from the banks of a water body should be fenced in a manner which prevents litter from being blown or tossed onto the banks.

New sources of external lighting (street lights, security lights, etc.) located within 100 metres of a water body supporting platypus should be designed to minimise the amount of illumination directed over the water, and fitted with globes producing relatively low amounts of insect-attracting blue and ultraviolet light.

Major construction or maintenance activities which involve using excavators or other heavy equipment to dig into (or drive over) creek or river banks within 10 metres of the water’s edge should not be undertaken along water bodies supporting a breeding platypus population from September through February (and ideally not until mid-March).

Planning guidelines for riparian vegetation buffer zones

**Recommendations**

To protect habitat integrity and reduce the level of disturbance associated with human-generated light and noise, a reserved area at least 30 metres wide should be maintained between the boundary of a new development (e.g. housing estate, recreational facility or commercial premise) and the margin of the river and its major tributaries. Special care should be taken to protect any existing native vegetation in this strip with a view to encouraging a self-sustaining plant community to develop, including mature specimens of the trees originally found in the habitat.

If time is required to establish a corridor of riparian vegetation at the edge of a new development, consideration should be given to fencing the riparian area at least until trees and shrubs are well established.

To deter predators and provide protective cover for native wildlife, shrubby vegetation overhanging the water should generally be encouraged to grow on all stream and river banks, including those located next to tracks, roads or footpaths. This is particularly important in places where the banks are relatively low and flat and the adjoining water body is relatively narrow and shallow (less than 3-4 metres wide and 0.5 metres deep). In the case of deeper and/or wider water bodies, it is recommended that, at the very least, a buffer strip of unmown grass at least two metres wide (though ideally more) should be encouraged to grow at the water’s edge, ideally in conjunction with scattered clumps of taller growing plants.

To provide protective cover for platypus in the vicinity of bridges, native shrubs and ground covers overhanging the water should be encouraged to grow along the banks immediately upstream and downstream of the bridge for a distance of at least 20 metres in either direction.

Approval to remove or substantially lop indigenous trees that are growing within 20 metres of the river or its major tributaries should only be granted if the loss is offset by a substantial number of new indigenous trees planted along the riparian zone.
Planning guidelines for drainage

Recommendation

Storm run-off from new housing or industrial estates should not contribute to increased direct connected imperviousness in the Queanbeyan River catchment (i.e. should be treated in accordance with best practice water-sensitive urban design principles).

Proposed developments that entail the creation of new ponds, lakes or water retarding basins conforming to the specifications below should be required to formally investigate the possibility that the new water feature(s) can be designed in part to provide platypus feeding habitats:

- The new pondage is to be located within 100 metres of the Queanbeyan River.
- Its surface area will comprise 1000 m$^2$ or more.
- Water will be held to a depth of at least 0.5 metres for six or more months of the year.

Planning guidelines for infrastructure in channels

Recommendations

To assist safe passage by platypus along natural water bodies or earthen channels connected to natural water bodies, the following standards should apply to pipes and culverts located in the channel:

- Pipes and culverts should have a minimum internal diameter of 0.3 metre and should not project out from the surrounding substrate (i.e. should not create an overhang that cannot be negotiated by platypus).
- Pipes and culverts that are more than 50 metres in length should be provided with vertical “breathing bays” at intervals of not more than 30 metres along their length if they are sometimes expected to be filled to capacity after storms.
- Grilles or mesh barriers placed across pipes and culverts (or, more generally, across creeks) should have grid spacings or apertures that are 12 centimetres or more in width.
- Concrete drop structures associated with culverts should be designed with stepped or slanted faces to allow platypus to scramble up and down safely.
- Vertical concrete weirs should be designed to facilitate passage by platypus via the equivalent of a fish ladder.

Barriers meant to exclude platypus from pipes or artificial channels should be constructed of solid materials or have grid spacings or apertures that are less than 2 centimetres wide.

In the case of developments proposing the use of water pumps and/or on-stream water-powered generators, a condition of all approvals should be that a mesh cover (or equivalent barrier) with grid spacings or apertures of 2 centimetres or less should be fitted around all intake points.

Planning guidelines for pet ownership

At least one Melbourne council (City of Wyndham) has already made a ban on pet ownership a condition of approval for a housing development situated near an area of platypus significance.

Recommendation

QCC should consider placing restrictions on pet ownership as a condition of approval for any substantial new residential development located within 100 metres of the river.
PLATYPUS CONSERVATION GUIDELINES: COMMUNITY EDUCATION AND ECOTOURISM DEVELOPMENT

The platypus is a very powerful “flagship” for conserving freshwater environments. It can inspire strong community support for improving conditions along the river and addressing general environmental problems.

A number of measures are recommended for increasing the profile of platypus as an ambassador for biodiversity conservation in QCC.

Platypus Conservation Zone

Recommendations

The section of the Queanbeyan River stretching between Queens Bridge and the suspension bridge should be designated as a formal “Platypus Conservation Zone” in order to build public awareness of platypus in QCC and reinforce conservation efforts along the entire length of the waterway.

The Platypus Conservation Zone should comprise the following elements:

- Signage describing the status and conservation needs of the local platypus (and water-rat) populations. Particular emphasis should be placed on the positive role that the community can play in reducing wildlife mortality due to litter and inappropriate angling practices.
- Development of a designated platypus and water-rat viewing point (including signage with “spotting-hints”) which can also be used as the basis for ecotourism and monitoring activities. This would complement usage of the existing pedestrian swing bridge (which is not an ideal platform for wildlife viewing, given that it moves up and down in response to pedestrian traffic) for this purpose.
- Designation of the zone as a “No swimming” area for dogs and also as a “Dogs on lead only” area (in part, to minimise potential future conflict with platypus spotting groups).

Platypus education program

Platypus conservation needs are often neglected simply because the community is not aware of where the species might occur and how their activities affect the animals. Residents and visitors should be made aware of where platypus are found and procedures for:

- Reporting platypus sightings and how to get involved in platypus monitoring activities
- What to do upon finding an injured, displaced or dead platypus
- Reporting any illegal or inappropriate activities which may endanger platypus
- Obtaining advice in relation to specific matters which may have an impact on platypus or platypus habitat

Recommendations

The launch of the Queanbeyan PACS should be supported by a community education campaign to publicise the messages contained in the Strategy, e.g.:

- An information leaflet about platypus conservation in QCC to be circulated to all residents with rates notice (or distributed in a suitable alternative format such as being incorporated into a QCC newsletter/magazine)
A poster containing key platypus conservation messages to be distributed for posting in schools and other public places

A summary of key messages to be included on QCC web-site, linked to the APC site

Consideration should be given to organising regular public information sessions/training workshops about platypus conservation for members of QCC staff, relevant Landcare/Friends groups and interested members of the public.

Consideration should be given to organising an annual series of special classes for grades 3/4 in the QCC area about platypus conservation.

A program of collaboration should be developed with the caravan park to erect signs in the park about platypus conservation and provide all residents with platypus information.

A program of collaboration should be developed with Googong Dam to provide visitors with information about platypus in the Queanbeyan River.

All shops selling fishing equipment should be asked to provide customers with an information note about “platypus-friendly” angling procedures within QCC area.

A drainage stencil program featuring a platypus should be implemented to help reinforce the message that rubbish dropped in the street often ends up in the river.

**Developing platypus-based ecotourism opportunities**

Platypus and water-rats are both seen frequently at easily accessible locations along the Queanbeyan River – a relatively rare phenomenon in south-eastern Australia. Accordingly, there is a significant opportunity to promote Queanbeyan as a leading destination for spotting platypus and water-rats in the wild. The city’s proximity to Canberra, with its high proportion of international visitors, gives Queanbeyan an added market advantage.

Based on platypus-spotting activities in other areas, there is no reason to believe that properly conducted ecotourism would have any negative consequences for local wildlife. In turn, ecotourism would benefit the local economy and help boost community support for platypus conservation measures.

**Recommendations**

QCC’s economic development unit and local tourist promotion groups should be encouraged to examine ways of promoting Queanbeyan as a platypus-spotting destination.

QCC should help to organise/support (for a 2-3 year period) an annual program of platypus-spotting sessions and/or Platypus Group Watch events to serve as a pilot study for developing formal platypus-based ecotourism opportunities.

Subject to successful outcomes from the pilot study, QCC should call for expressions of interest for a license to operate a platypus-based ecotourism service in Queanbeyan.

**Monitoring platypus numbers**

Future monitoring of the Queanbeyan River’s platypus population is needed to help track how the population is faring (e.g. following unforeseen events such as the flooding that occurred in December 2010) and to measure the overall success of PACS actions.
In the case of relatively large waterways such as the Queanbeyan River, platypus live-trapping surveys are neither a cost-effective nor a sustainable way of achieving such monitoring. However, based on results to date, the Platypus Count program administered by the APC and Upper Murrumbidgee Waterwatch offers an effective way of tracking platypus numbers within the Queanbeyan River system.

In addition, systematic collection of records relating to opportunistic platypus sightings (including discoveries of dead platypus) provides valuable supplementary data which can potentially extend the scope of Platypus Count. Encouraging the community to report sightings also contributes to overall awareness of platypus conservation and can potentially lead to the recruitment of new volunteers for the Platypus Count program.

**Recommendations**

QCC should become a formal partner (with the APC and Upper Murrumbidgee Waterwatch) in monitoring the status of platypus and water-rat populations in the Queanbeyan catchment. In particular, QCC should take primary responsibility for tracking and recording community reports of platypus sightings made outside of the Platypus Count program by:

- Actively encouraging residents to report platypus and water-rat sightings (especially of dead animals) as an integral part of directly engaging the community in platypus conservation
- Designating a member of staff to be responsible for maintaining the sightings database and ensuring that other QCC staff are aware of the procedure for passing on reports received from community members or made by council staff or contractors

Copies of a sightings report form and a mortality report form which are recommended for adoption by QCC are attached to this document.

**Platypus emergency procedures**

Platypus carcasses are occasionally discovered in or near the Queanbeyan River by members of the public or QCC staff. It is important that details of such discoveries are recorded in detail to ensure that issues relating to causes of mortalities are properly investigated and potentially highlighted in the local media.

Injured, sick or displaced platypus may also occasionally be encountered due to having a fishing hook lodged in the bill, litter entanglement, or exhaustion associated with juvenile dispersal or natural catastrophes such as floods. Providing timely and appropriate emergency care is likely to be crucial to their survival.

**Recommendation**

QCC should designate a staff position with specific responsibility for:

- Identifying and liaising with local veterinarians who are willing to be on call to handle any platypus requiring emergency treatment
- Identifying and liaising with local wildlife carers who can assist with safely transferring an injured platypus on short notice to a veterinarian
- Making alternative arrangements for an animal to be picked up without delay for veterinary examination if a wildlife carer is not available on a given occasion

Attached is a copy of a basic information sheet about platypus emergency care which is recommended for adoption by QCC.
Platypus-related conservation messages

Messages about key platypus conservation issues should be integrated into general QCC environmental education/community awareness programs, in order to capitalise on the potential of the species to serve as an ambassador for local biodiversity.

Major areas in which platypus can be used to highlight conservation messages include:

- Litter
- Fishing and related activities
- Responsible pet ownership
- Water pumps and water-powered generators
- Management of riparian corridors and private dams accessible to platypus

Recommendation

Key messages about platypus conservation should be integrated into QCC environmental educations programs as follows:

Litter

Platypus (and other wildlife) die or suffer severe injuries after becoming entangled in litter.

All members of the community should be encouraged to reduce the negative impacts of litter on platypus by:

- Picking up litter from the environment, including that left by others
- Cutting through all loops of plastic, rubber or metal (e.g. 6-pack holders, tamper-proof ring seals on food and beverage containers) before disposing of them properly
- Organising and/or supporting “clean up” days in creekside areas

Fishing and related activities

Platypus (and other wildlife) are killed or injured by a range of fishing activities.

Both residents and visitors should be encouraged to follow responsible fishing practices including:

- Picking up all snarled or tangled line and disposing of it properly
- Moving a short distance upstream or downstream to avoid a platypus while angling
- Not cutting the line if a platypus becomes hooked but instead removing before the animal is released
- Using only appropriate and legal nets and lines for fishing and yabbying in public waters in QCC (i.e. no “opera house” or similar enclosed traps; no unattended hooked and baited lines)
- Encouraging landowners not to use “opera house” or similar enclosed traps in water bodies on private land (e.g. dams which may be used by platypus)
- Developing awareness of how to report all illegal and inappropriate fishing activities to Fisheries and Wildlife Officers

Responsible pet ownership

Domestic dogs and cats are both known to kill platypus (and other wildlife). Current responsible pet ownership guidelines should be strengthened to stress the importance for platypus of:
Controlling the movements and behaviour of dogs and cats near lakes, rivers and streams
Obeying on-leash regulations near lakes, rivers and streams
Complying with curfew regulations
Encouraging dogs to swim in public areas only at designated places

**Water pumps and water-powered generators**

Platypus (and other wildlife) can be killed after being sucked into water pumps and water-powered turbines. Owners of such equipment should be reminded to ensure that:

- Adequate guards are fitted around all intake points.
- Guards are checked (and repaired, if necessary) at least twice per year, but especially in late January (i.e. when small juvenile platypus start to emerge from nursery burrows).

**Protecting and enhancing riparian corridors and private dams accessible to platypus**

The condition of riparian habitat is directly linked to the health of platypus populations and of other wildlife species. In addition, farm dams and other such man-made ponds can make a valuable contribution to conservation of platypus (and other aquatic) by increasing the number of animals that an area can otherwise support and creating a reliable refuge habitat during drought.

Private landowners throughout the city should be encouraged to:

- plant native trees and shrubs in riparian areas and around dams (after removing willows and other non-native trees in an appropriate manner, if necessary);
- fencing off waterways and dams to prevent stock access (and replacing with off-stream watering points, as required);
- leaving dead trees and similar “snags” in water to provide a micro-habitat for aquatic invertebrates (the main food of platypus);
- minimising use of vehicles and heavy equipment near banks of waterways and dams;
- avoiding work within 10 m of a water body in the period September to February (when platypus mothers and their young may be in nursery burrows);
- ensuring that dam/weir walls are designed so as not to be a barrier to platypus movement and that all associated pipes and culverts are not a hazard to the animals;
- restricting access of pets to water bodies (see above);
- ensuring that all pumps and water-turbines are fitted with adequate in-take guards;
- preventing litter and pollutants from entering water bodies (especially “farm litter” such as bailing twine, empty chemical drums and discarded sacks, as well as old fencing wire and similar metal objects).
ACTION PLAN

The following plan has been designed to implement the PACS recommendations in an effective manner:

ACTION A. General Co-ordination

A.1. Designate a QCC staff position (hereafter referred to as PACS Co-ordinator) to have responsibility for co-ordinating the implementation of the PACS across QCC operations.

ACTION B. Works protocols and management of public land

B.1. PACS Co-ordinator to ensure that platypus conservation guidelines relating to works protocols and management of public land are circulated to all relevant QCC staff, contractors and local community environment groups, and to organise information sessions/training workshops

B.2. PACS Co-ordinator to ensure that suggested actions to protect and enhance environmental conditions for platypus are considered and implemented as far as possible by relevant QCC departments

B.3. PACS Co-ordinator to arrange for relevant QCC managers to conduct audits of water pumps, water-powered generators, etc. as well as pipes/culverts infrastructure.

B.4. Conduct a feasibility study into the installation of a fish ladder at the main Queanbeyan city weir and develop a plan for providing additional vegetation cover at the edges of the weir.

B.5. Initiate a review of the feasibility of appropriate QCC staff carrying out regular patrols in the White Rocks area.

B.6. Conduct a review of council animal control policies with particular regard to canine “on-leash” rules in riparian corridors, potential introduction of restrictions on pet ownership in new residential development near the river, and a “No swimming” area for dogs in the proposed Platypus Conservation Zone.

B.7. Establish a process of formal liaison with operators of Googong Dam regarding environmental flow policy.

B.8. Keep the macrophyte removal program under review and ensure that dates and details of operations are provided to the Platypus Count program so any impacts on platypus can be monitored.

B.9. Keep the need for dredging operations along Queanbeyan River under review and ensure that, if undertaken, such work is appropriately scheduled in relation to the timing of platypus reproduction and dates of operations are notified to Platypus Count.

ACTION C. Planning

C.1. PACS Co-ordinator to ensure that platypus conservation guidelines relating to planning and local laws are circulated to all relevant QCC staff for consideration and potential implementation.
**ACTION D. Platypus Conservation Zone Project**

D.1. Designate a formal Platypus Conservation Zone.

D.2. Formulate a plan for the Platypus Conservation Zone, including development of a viewing structure and informational signage.


**ACTION E. Education**

E.1. Produce an information leaflet and poster summarising key platypus conservation messages and add a summary of key messages on the QCC web-site.

E.2. Organise a trial series of platypus conservation classes for grades 3/4 students (to be developed into an ongoing program, if successful).

E.3. Implement a platypus-based drainage stencil program.

E.4. PACS Co-ordinator to work with Googong Dam staff to provide dam visitors with information about platypus in the Queanbeyan River.

E.5. Integrate messages about key platypus conservation issues into general QCC environmental education/community awareness programs.

**ACTION F. Monitoring**

F.1. Become a formal partner (with the APC and Upper Murrumbidgee Waterwatch) in monitoring the status of platypus and water-rat populations in the Queanbeyan catchment.

F.2. PACS Co-ordinator to develop and maintain a platypus and water-rat sightings database.

F.3. PACS Co-ordinator to ensure that appropriate platypus and water-rat emergency care procedures are formulated and easily accessed by council staff.

F.4. PACS Co-ordinator to maintain records relating to platypus and water-rat mortalities in general and fishing-related mortalities in particular, so that appropriate consideration can be given to whether bans or restrictions on fishing should be introduced.

**ACTION G. Ecotourism**

G.1. Develop a strategy to highlight Queanbeyan as a platypus-spotting destination.

G.2. Organise a program of platypus-spotting sessions and/or Platypus *Group Watch* events (potentially in conjunction with Upper Murrumbidgee Waterwatch) to serve as a pilot study for developing formal platypus-based ecotourism opportunities.

G.3. Subject to successful outcomes from the pilot study, call for expressions of interest for a license to operate a platypus-based ecotourism service in Queanbeyan.

**ACTION H. Liaison with local businesses**

H.1. PACS Co-ordinator to develop a collaborative program with the local caravan park to erect signs in the park about platypus conservation and “platypus-friendly” angling and provide residents with platypus information.
H.2. PACS Co-ordinator to develop a collaborative program with shops selling fishing equipment to provide customers with an information note about “platypus-friendly” angling procedures.

LITERATURE CITED


SUGGESTED ACTIONS TO PROTECT AND ENHANCE ENVIRONMENTAL CONDITIONS FOR PLATYPUS

There does not appear to be any immediate threat to the survival of the species in Queanbeyan. Nevertheless, it is still prudent to take steps to safeguard the long-term future of platypus within the QCC area, particularly at a time of uncertainty over future climate change, it is sensible to develop an overall plan to protect Queanbeyan's platypus. This plan should be based on three main elements:

- Protection of environmental conditions in the upper section of the Queanbeyan River to ensure that it remains capable of supporting a core breeding population – i.e. not less than 30 adult/subadult platypus – in the long term.
- Improvement to environmental conditions where possible in the middle section of the Queanbeyan River to increase the number of platypus it can support.
- Enhancement of environmental conditions along the lower section of the Queanbeyan River to maintain and improve connectivity with the adjoining sections of the Molonglo River (where habitat rehabilitation should also be encouraged). Such action will reduce the risk that platypus in the Queanbeyan and Molonglo Rivers become separated from each other, resulting in fragmented populations.

Upper section (Googong Dam to White Rocks)

Environmental conditions in the upper section are generally good for platypus. Water quality is high (albeit with some evidence of temperature fluctuations related to releases from Googong Dam). In-stream habitat is complex, with natural pool/riffle/run sequences which encourage diversity of aquatic invertebrates. Carp (which potentially compete with platypus for food) appear to be absent from much of the section, thanks to a barrier at an unknown location which appears to have checked the upstream migration of this introduced fish species (Lintemans and Jekabsons 2004).

The quality of the riparian vegetation is generally high, with only a relatively small amount of invasion by non-native trees, shrubs and weeds. As a consequence, river banks are generally well stabilised (thereby providing good conditions for platypus burrows) and a considerable supply of organic matter and woody debris falls into the water to provide food for aquatic invertebrates (the main prey item for platypus).

Settlement is at low density in this part of the river corridor, with relatively little evidence of human impact. Access to the river is generally difficult.

Given that conditions for platypus are already fairly good, relatively little scope exists for cost-effective habitat improvement in the upper section. Accordingly, the key commitment required from QCC is to ensure that there is no loss of environmental quality.

Suggested actions:

- QCC should ensure that all planning applications which have the potential to impact in any way on the upper section are subject to special consideration with regard to platypus.
- A full survey of weed infestation (with particular focus on willows) in the upper section should be commissioned as soon as possible.
- QCC should develop a public access plan for the upper river (including closing off informal tracks where feasible).
Middle section (White Rocks to city weir)

Platypus appear to be reasonably abundant in the middle section despite the fact that riparian habitat has been substantially modified and human-related impact is high. Because there is scope for improving environmental conditions, this section could potentially support more resident platypus than at present, thereby boosting the overall size of the river’s population.

Habitat enhancement – White Rocks to Suspension bridge

Conditions for platypus in the Queanbeyan River’s middle section can be enhanced through strengthening riparian habitat by selective planting of indigenous trees and shrubs. An appropriate model for this process is provided by the riverside area on the western bank, upstream of the suspension bridge – i.e. near the outdoor “amphitheatre”. Planting by Queanbeyan Landcare has created an effective buffer zone of native vegetation (which will ultimately out-compete the remaining introduced vegetation) and has greatly improved bank stability.

Community access to the river upstream of Dane Street needs to be formalised. The path from Barracks Flat parallel to River Drive is well sited at a considerable distance from the water with a good vegetation buffer zone in the process of becoming established. However, the formal path system currently peters out in the vicinity of Doeberl Reserve and turns into a number of informal tracks to the water which encourage access by predators and people.

Suggested actions:

- Riparian buffer zone re-planting should continue upstream of the suspension bridge, on both banks of the river, where feasible, as far as White Rocks. This is especially important in places where extensive willow removal has already occurred. The process should also include the riverside area of the Golf Club, where the existing riparian buffer zone could usefully be strengthened to improve protection for platypus.
- In the area where a number of properties apparently have title to the middle of the river (on the western side, upstream of Glebe Park), land-owners should be encouraged to manage their river frontage in accordance with specified native vegetation guidelines in order to prevent further loss of riparian habitat to domestic gardens and/or weed infestation.
- Public access at the upstream end of River Drive (near Doeberl Reserve) should be reviewed to improve public amenity and potentially reduce impact on platypus related to the current network of informal tracks.

Habitat enhancement – Suspension bridge to Queens Bridge

From the suspension bridge to Queens Bridge, it is much more difficult to undertake major revegetation without seriously curtailing existing community usage of the riverside zone. Despite this, conditions for platypus could be improved substantially by adopting the following actions:

- Native vegetation should be re-planted so as to establish riparian buffer zones on at least one side of the river (and on both sides where possible) along the entire length of the suspension bridge-Queens Bridge reach. However, such plantings should be at points selected to cause minimal loss of community amenity.
- The current practice of mowing to the water’s edge along much of this reach should be eliminated, so as to leave an unmowed strip at least 2 metres wide near the water’s edge.
- Many of the informal tracks at the water’s edge (especially on the eastern bank) should be replaced with a fully formalised path system.
Habitat enhancement – Queens Bridge to city weir

Platypus are rarely seen in the short reach between Queens Bridge and the main city weir. This may reflect that fact that conditions are generally somewhat shallow because of silt deposition and that levels of human disturbance (including extensive public access to the water’s edge, angling, traffic noise, light pollution and litter) are relatively high.

Nevertheless, this is an important area for platypus conservation in the river as a whole, since passage by animals through the pool and across the weir is vital for maintaining connectivity between the Queanbeyan River and the wider Molonglo catchment.

Suggested actions:

- A narrow native vegetation buffer zone should be planted immediately in front of the Collett Street car-parking area to reduce noise and light pollution from vehicles and trap litter blowing from the shopping centre area.
- Small vegetation zones should be planted near the water at the bridge and weir ends of the “beach” on the eastern bank.
- The amount of lighting from buildings and street-lamps that shines onto the water in this area should be reduced.
- Dense plantings should be developed on either side of the weir to provide increased cover. This is particularly important on the caravan park side of the weir, where the slope is less steep and thus more likely to be preferred by platypus. This area should also then be fenced off to prevent trampling of planting by caravan park residents and to reduce human usage (especially at night).

Lower section

The lower section of the Queanbeyan River, from downstream of the weir to the Molonglo confluence, currently appears to support the lowest numbers of platypus. Accordingly, this section offers the best opportunity to boost carrying capacity of the river and to strengthen the population’s connectivity with the rest of the Molonglo system.

Key opportunities throughout this section include:

- removing current infestations of willows and other introduced species and replacement with a riparian buffer of native vegetation
- addressing problems of litter and stormwater run-off
- formalising paths and general community access to the river

Weir to Morisset Street bridge

As described above, safe access for platypus while crossing the city weir is a key issue for long-term conservation. However, the area immediately below the weir is also currently highly problematic for platypus movement, especially as the low weir situated 30 metres downstream of the main weir poses another barrier, thereby further increasing risk of predation. The general lack of a riparian vegetation buffer zone in this reach compounds the problem.

The caravan park creates a high level of potential human impact on the river as a result of informal tracks to the water’s edge, camp fires near the water, litter and fishing activities. Most caravan park visitors would be unaware of the presence of platypus in the river and some from inter-state may be
unfamiliar with NSW fishing regulations (especially travellers from Queensland, where use of opera house traps is unrestricted).

Suggested actions:

- The relocation of the caravan park to a new site in the long-term should be examined so that this key area of river frontage can be reclaimed for community usage and environmental purposes.
- The caravan park should be required to collaborate on work to enhance native vegetation in the riparian zone, especially around the end of the main weir and near the minor weir, and to establish formal access points to the river to replace the existing *ad hoc* arrangements.
- Revegetation should undertaken on both banks immediately upstream and downstream of Morisset Street bridge to impede access to the river by potential predators and to screen noise and lights from traffic.

**Morisset Street bridge to railway bridge**

Significant opportunities exist along this reach to enhance conditions for platypus in the long-term. In particular, riparian habitat can be greatly enhanced and water quality potentially improved.

The main pathway along this reach is generally well sited and at a good distance from the river but there are a number informal access points to the water which potentially encourage human disturbance.

Suggested actions:

- Efforts to remove willow infestations and re-plant with native revegetation should be a priority in this reach.
- Community access to the river should be formalised with appropriate buffer plantings and a number of informal access points closed off.
- Stormwater inflows, especially the main drain which enters from the Antill Street direction, should be assessed to see if they can be fitted with a litter trap.
- The possibility of diverting some stormwater run-off into filtration ponds/wetlands – for instance at the Morisset Street crossing and the aforementioned main drain – should be investigated.

**Railway bridge to Molonglo confluence**

This reach of the Queanbeyan River is not within the boundaries of QCC. However, it is essential that QCC develop a program of co-operation with ACT Government to ensure that common management principles are applied in this area, given that connectivity between platypus populations in the Queanbeyan and Molonglo Rivers is of vital importance.

Suggested action:

- QCC should encourage ACT Government to implement a long-term program to remove willow infestations, to formalise walking tracks and community access and to remove build up of litter from the river.
DETAILED COMMENTS CONCERNING PLATYPUS HABITAT ACTIONS

Refer to map for photopoint locations.

**Middle section (White Rocks to city weir)**

**Photopoint 1.1. View upstream from southern end of Barracks Flat Pl.**

The reach of the river upstream of the southern end of Barracks Flat Place shows some evidence of human incursion from the western side, with potential impact on platypus – e.g. litter, possible illegal fishing activities.

A community access policy needs to be formulated for this suburban fringe area.

**Photopoint 1.2. View across river to mouth of Jumping Creek**

Platypus are currently unlikely to be present in Jumping Creek on a permanent basis, although occasional use may occur when flows are adequate.

It would be sensible to protect and enhance riparian habitat along the lowest reach of Jumping Creek (i.e. starting c. 1 km from the river) by re-planting a native vegetation buffer and potentially fencing-off from stock access. This would create additional usable habitat for the Queanbeyan River platypus population.

**Photopoint 1.3. View upstream from southern end of Doeberl Reserve**

The formal path system currently ends near Doeberl Reserve. Various informal access tracks to the river have been created upstream of this area, leading to potential impact on riparian habitat and on platypus – e.g. litter, possible illegal fishing activities.

Future public access to this area needs careful consideration to ensure environmental values are protected.
Photopoint 1.4. River Drive area (looking downstream)

The formal path running parallel to River Drive is sited at a good distance from the river and previous plantings are developing into a good riparian vegetation buffer zone.

This pool area is potentially a prime area for platypus. Accordingly, some additional planting of low, thick shrubs in the 2-3 metres closest to the water would further improve protection for platypus from predators and enhance conditions for burrows.

Photopoint 1.5. View up Barracks Creek from its confluence with river

Platypus are currently unlikely to be resident in Barracks Creek on a permanent basis, although occasional use may occur when flows are adequate.

It would be sensible to protect and enhance riparian habitat along the lowest 1 km reach of Barracks Creek by re-planting a native vegetation buffer and formalising community access to the area (including the crossing point for the path over the mouth of the creek).

Photopoint 1.6. View upstream from c. 200 m south of Dane Street

Extensive willow removal has been carried out in the reach between Dane Street and the Barracks Creek confluence. A small amount of re-planting has occurred but many additional native trees and shrubs are urgently needed on both sides of the river to improve platypus habitat. This is particularly important in areas where sandy, unstable banks predominate (to improve future platypus burrow opportunities) and where the existing path on the western side runs relatively close to the river bank (to improve protection for platypus from predators and human disturbance).
Additional planting of trees and shrubs on the eastern side is desirable to increase bank stability and provide a buffer between the river and the rough track running along the top of the bank.

The Golf Club should be encouraged to commit to having a continuous zone of riparian native vegetation along its entire length of river frontage. This would help eliminate existing areas of potential bank instability and improve opportunities for platypus burrows.

It is particularly important that re-planting with native trees and shrubs is undertaken as soon as possible in areas where willow removal has been carried out (including on the western side of the river, as well as the Golf Club bank).
Photopoint 1.9. "Private" riparian reach (looking upstream from Glebe Park southern boundary)

In the area on the western side of the river, upstream of Glebe Park, a number of properties apparently have title to the middle of the river.

Along this reach, areas of riparian habitat have been “domesticated” by planting of introduced trees and shrubs, often with associated weed infestation.

Land-owners should be encouraged to manage their river frontage in accordance with specified native vegetation guidelines in order to prevent further loss of riparian habitat.

Photopoint 1.10. Suspension Bridge area (looking upstream to Glebe Park)

Habitat conditions for platypus are generally good in the reach immediately upstream of the suspension bridge, although some scope exists for improving riparian vegetation in the Glebe Park area.

The habitat rehabilitation work undertaken by Landcare on the western side of the river, immediately upstream of the suspension bridge, provides a general blueprint for other reaches where strengthening of the riparian buffer zone is desirable.

Although some non-native trees remain in this reach, they are generally now being outcompeted by native re-plantings and their presence is not a significant factor in terms of platypus habitat. However, gradual removal of any remaining willows is still desirable in the overall context of willow control.

Photopoint 1.11. Suspension bridge area – views of eastern bank, downstream of bridge

If possible, buffer zones of native vegetation should be re-established on at least one side of the river along the length of the suspension bridge-Queens Bridge reach. Revegetated habitat will favour the establishment of platypus burrows and provide protection against predators and human disturbance.
A prime area for this type of rehabilitation is the bank on the eastern side, immediately downstream of the suspension bridge (see above). This bank is steep and not really safe for public access. It currently lacks a good cover of vegetation, thus making it potentially vulnerable to erosion.

A dense cover of low-growing plants would greatly improve conditions for platypus without interfering with views of the river from nearby residences. Informal tracks close to the water’s edge in this area should be eliminated.

**Photopoints 1.12. Views from Queens bridge looking upstream**

At the downstream end of this reach – i.e. close to Queens Bridge – considerable scope also exists for planting buffer zones of riparian native vegetation, especially near the children’s playground on the eastern bank and in selected spots between the path and river’s edge on the western bank. The practice of mowing almost to the water’s edge along much of this reach should be eliminated, leaving an unmowed strip at least 2 metres wide near the water.
Photopoint 1.13. Views from downstream of Queens Bridge of “beach area” on eastern bank and shopping centre parking area on western bank

The current “beach” area on the east bank represents a considerable length of cleared riparian area offering little cover for platypus against predators and human-related disturbance (including lighting from the bridge and shopping centre). Establishment of several small zones of native vegetation (similar in scale to the one close to the bridge on the western bank) would improve conditions for platypus without compromising community access.

A low screen of vegetation should be planted on the western bank in front of the car-parking strip outside the shopping centre to reduce human impact on the riparian area.

Likewise, additional planting between the path and river’s edge on the west bank would help to screen the caravan park and reduce its human impact on platypus.

Photopoint 1.14. Main city weir

Platypus probably negotiate the weir by clambering around on the western side – i.e. via the grounds of the caravan park. In doing so they are highly vulnerable to predators and human-related problems. The area around the end of the weir should be fenced off from the caravan park and heavily planted to provide more cover for platypus in transit.
Lower section (city weir to Molonglo confluence)

Photopoint 2.1. Small weir/caravan park area

The small weir near the caravan park is another spot where platypus are highly vulnerable to predators and human-related problems.

The areas on both sides of the weir should be heavily planted to provide more cover for platypus in transit.

The caravan park potentially creates a high level of human-related disturbance in a key area for platypus movement along the river.

Until the caravan park can be re-located to a more appropriate site, the lease-holders should be required to collaborate on work to enhance native vegetation in the riparian zone and to establish formal access points to the river to replace existing ad hoc arrangements.

Photopoint 2.2. Morriset Street bridge area

Revegetation should undertaken on both banks immediately upstream and downstream of Morriset Street bridge to impede access to the river by potential predators, reduce human disturbance and screen noise and lights from traffic.

Efforts to remove willow infestations and re-plant with native revegetation should be a priority in the entire reach from Morriset Street to the railway bridge.
Photopoint 2.3.a) views of “beach area” approximately 100m downstream of Morisset Street, showing willow infestation and lack of cover for platypus for a lengthy stretch on western bank

Appropriate buffer plantings are required in open “beach areas” to reduce human-related impacts on platypus.

Photopoint 2.3.b) informal tracks and lack of cover for platypus on eastern bank

The main pathway along this reach on the western side is generally well sited and at a good distance from the river.

However, community access to the eastern side needs formalising and appropriate buffer zones developed to reduce human impact on platypus.
Stormwater inflows, especially the main drain which enters from the Antill Street direction, should be assessed to see if they can be fitted with litter traps (see photos of litter build up in river, below).

The possibility of diverting some stormwater run-off into filtration ponds/wetlands should be investigated, particularly at the aforementioned main drain, (see photo, above, of view from main drain across river) and the Morisset Street crossing.
Community access to the river from the cemetery area should be formalised with appropriate buffer plantings and a number of informal access points closed off.

Efforts to remove willow infestations and re-plant with native revegetation should be a priority throughout all this reach but especially around the deeper pools (e.g. upstream of the railway bridge) which potentially provide good foraging areas for platypus.

Removal of willow infestations should be a long-term goal along this entire section from the railway bridge to the Molonglo confluence.

Community access needs to be formalised with well sited walking tracks and programs to clean-up litter from the river.

Confluence areas tend to be of special importance for platypus movement and are often favoured foraging spots. Riparian habitat around the Molonglo confluence is generally poor and needs to be a priority for riparian rehabilitation work.
BACKGROUND

Platypus and Australian water-rats are both seen frequently in the Queanbeyan River, including that part of the river located close to the city centre. There is accordingly a significant opportunity to promote Queanbeyan as a leading destination for spotting these two attractive native species in the wild. The city’s proximity to Canberra, with its high proportion of international visitors, gives Queanbeyan an added market advantage. Based on platypus-spotting activities in other areas, there is no reason to believe that properly conducted ecotourism would have any negative consequences for the wildlife being observed. Such ecotourism would benefit the local economy and help boost community support for platypus conservation measures.

In addition, by highlighting the occurrence of platypus in the river, the popularity of this iconic species can contribute to building local support for actions to improve environmental conditions along the river.

Accordingly, it is recommended that a formal Platypus Conservation Zone (PCZ) be established along the Queanbeyan River between Queens Bridge and the suspension bridge. This Zone will serve as a focus for ecotourism activities and enhance public awareness of platypus conservation requirements.

PROJECT OUTLINE

The Platypus Conservation Zone should comprise the following elements:

1) Viewing platform

The suspension bridge already provides a good elevated spot for trying to observe platypus and some signage should be placed in this location to highlight its potential as a viewing area (see below). However, the swaying motion and creaking associated with this structure make it less than ideal. Likewise, Queens Bridge is an unsatisfactory area for viewing because of its close proximity to traffic noise and fumes.

Construction of a special viewing platform approximately half way between the two bridges is recommended. This should be sited on a spot providing good opportunities for looking both upstream and downstream. Consideration should also be given to ensuring that enough cover by tall trees, etc. is available on the opposite bank to preclude undue amounts of glare reflecting from the water into viewers’ eyes when the sun is low in the sky (given that early morning/late evening are generally the ideal times to spot a platypus).

Some examples of platforms used at existing platypus-viewing spots are illustrated below as possible models.

It is important that the river bank immediately below the platform should be heavily vegetated to mask the shape of the structure from a platypus perspective and to discourage informal paths or larger denuded areas of soil developing around the platform.

2) Signage

a) PCZ identification signage

Signs identifying the Platypus Conservation Zone (preferably featuring a specially designed PCZ logo) should be positioned around the zone at key locations – e.g. at the suspension bridge, Queens bridge, the viewing platform and three additional points along paths leading to or through the area. The signs
should also carry text and/or symbols identifying key management rules (e.g. dogs on leash only, no swimming for dogs, pick up litter, etc.).

b) Viewing platform area

Appropriate signage should be located at the viewing platform, both to clearly establish the purpose of the structure and to assist visitors in platypus spotting. This should consist of low panels at the front of the structure, positioned so that they do not interrupt the view of the river.

Each panel should cover only one or two topics to avoid a “clutter” of messages. Key topics should include:

- Hints on spotting platypus and water-rats
- Status of platypus and water-rats in Queanbeyan
- Platypus basic facts
- Water-rat basic facts
- Key conservation messages (especially regarding litter and inappropriate angling practices)

c) Suspension bridge

Additional signage relating to platypus spotting and/or conservation should be positioned at one end of the bridge.

d) Other signage

Although not strictly within the PCZ area, signs should be prepared at the same timespecifically relating to “platypus-friendly” fishing techniques to be displayed on the banks of the river in the section between Queens bridge and the main weir and at the caravan park.

Some examples of signage used at existing platypus-viewing spots are illustrated below, together with comments concerning the merits of utilising existing “Platypus Country” signage, as opposed to creating a signage style specifically designed for Queanbeyan. (see “A Note on Signage Style”).

4) Habitat restoration

Efforts should be made to improve habitat conditions for platypus in the PCZ, whilst still recognizing that this is a prime community recreation area with high public usage.

Where possible, buffer strips of native shrubs should be re-established on at least one side of the river along the length of the PCZ. Overhanging vegetation will promote the establishment of platypus burrows and help to protect animals from predators and human disturbance.

This type of rehabilitation is particularly recommended for the eastern bank immediately downstream of the suspension bridge. This bank is steep and not really safe for public access. It currently lacks good vegetation cover, making it potentially vulnerable to erosion. A dense cover of low-growing plants would substantially improve platypus habitat quality at this site without interfering with views of the river from nearby residences.

Considerable scope also exists for planting additional riparian shrubs at the downstream end of the PCZ, especially near the children’s playground on the eastern bank and in selected spots between the path and river’s edge on the western bank.
5) Siting of circuit path

A formal circuit track should be constructed around the PCZ (particularly to direct visitors easily to the viewing-platform). This should be sited to keep people and predators away from re-planted areas (as above) and to eliminate the development of informal tracks close to the water’s edge.

6) PCZ rules

Canine on-leash rules should be enforced within the PCZ. Likewise, dogs swimming in the PCZ section of the river should also be discouraged and ideally prohibited.

Use of enclosed yabby traps in public waters is already prohibited under NSW fishing regulations, but signage regarding this issue is still recommended to improve public awareness. Angling should be allowed to continue in the PCZ but kept under review (and banned if there is reason to believe that angling is generating an unacceptable risk to platypus and other wildlife, as indicated by the presence of unattended lines or abandoned lures, hooks or tangled line along the river or by repeated discoveries (twice or more in five years) of platypus or other birds or mammals that have been injured due to use of fishing line or hooks).

Consideration should also be given to providing “fishing-line disposal receptacles” (see illustration) at a number of points throughout the PCZ (as well as the weir pool and caravan park sections of the river).

The PCZ should also be a focus for community “clean up” days and similar environmental events and activities.
A NOTE ON SIGNAGE STYLE

In developing signage for the PCZ and related areas, there is a choice between developing an image unique to Queanbeyan or adopting the “Platypus Country” style already used by some places in NSW (notably Wyong/Central Coast and Wellington Shires).

The existing “Platypus Country” format will obviously be cheaper to adopt. It can also be argued that Queanbeyan’s reputation as a prime platypus-spotting area will benefit from piggy-backing onto a “brand” that may be increasingly recognisable to tourists.

On the other hand, if Queanbeyan wants to develop its potential for platypus-based ecotourism, it may wish to stress a clear separate identity based on specifically designed signage and logo(s). In addition, it should be noted that the “Platypus Country” format utilises the logo of a commercial company (Australian Geographic). Consequently, QCC may prefer to develop an image not owned by a commercial third party.
EXAMPLES OF VIEWING PLATFORMS AND SIGNAGE

Bombala (NSW) Platypus Reserve

This generally is a very satisfactory facility, although more signage nearer the platform would be helpful to visitors while they are actually looking for platypus.
Signage quality is good, if somewhat limited in quantity. More hints on spotting platypus would be useful.

Kangaroo Island (SA) Platypus Ponds

An overbuilt structure, located too close to the water. Platypus sightings have apparently declined dramatically since this structure (which incorporates long stretches of noisy boardwalk next to the water) replaced informal viewing spots in the bush around the ponds.

A viewing "hide" is also used at this location and provides good opportunities for interpretation.
Burnie (Tasmania) “Fern Glade” Platypus Walk

Several elevated platforms are provided along the length of a riverside walk. These are similar in general design to the Bombala facility but slightly more rustic in terms of materials.
Signage is provided at spots along the trail, together with other interpretation (e.g. a stone sculpture of a platypus).
Skipton (Victoria) Stewart Park

A low-cost rustic-style platform that blends in well with the informal character of the park.

Signage is limited and somewhat cluttered.
Sunbury (Victoria) Emu Bottom Wetlands Reserve

A very low-key facility in a relatively little visited park. Not very suitable in design for a more highly urbanised area with greater visitation.

Signage is limited but quite stylish.
PLATYPUS FACT FILE

EVOLUTION, NAMING, DISTRIBUTION AND STATUS

History of discovery and naming

According to Aboriginal Dreamtime legend, the first platypus were born after an attractive young female duck mated with a lonely and persuasive water-rat. The duck's offspring had their mother's bill and webbed feet and their father's legs and handsome brown fur.

Early written records suggest that indigenous people were aware that the platypus was both egg-laying and venomous – facts that were only confirmed by European scientists after many decades of study. Traditional names for the species included "mallangong" and "tambreet" in New South Wales. Platypus were hunted for food in the water using long spears, but the meat appears not to have been highly prized.

After the British colony in Australia was founded in 1788, the strange appearance of the platypus soon fascinated the new arrivals. Early colonists called the platypus a "water mole" or a "duckbill".

The platypus was first scientifically described by Dr George Shaw in Britain in 1799. His initial reaction to the first specimen was that it was an elaborate hoax. It was not uncommon at the time for exotic forgeries (such as "mermaids" made by joining the body of a monkey to that of a fish) to be brought back to Europe from far-flung parts of the world. Shaw was so convinced that the platypus specimen had been fabricated that he took a pair of scissors to the pelt, expecting to find stitches attaching the bill to the skin.

The “FeeGee Mermaid”, exhibited by P.T. Barnum – a fusion of monkey and fish parts.

The illustration below made to accompany Dr Shaw’s first description of the platypus. Early illustrators had access only to dead specimens and so struggled to capture the qualities of a living platypus.
Dr Shaw named the species *Platypus anatinus*, from Greek and Latin words respectively meaning "flat-footed" and "duck-like". A German scientist named Blumenbach independently proposed a different scientific name in the following year, *Ornithorhynchus paradoxus*, with the first word meaning "bird-like snout" and the second meaning "puzzling".

It then transpired that the term *Platypus* had previously been used in 1793 to name a group of beetles. Accordingly, a different scientific name had to be formulated. This was achieved by combining the names suggested by Shaw and Blumenbach to produce *Ornithorhynchus anatinus*, which remains the official designation of the species today.

In the meantime, the abandoned scientific name "platypus" became the accepted common name for the species.

Given that the word “platypus” is derived from Greek, its plural form should (strictly speaking) be “platypodes” and definitely not platypi (which would be valid only if “platypus” were derived from Latin). However, given that “platypus” has now entered the English language as the common name for the species, the accepted plural is either “platypuses” or “platypus”.

There is no well established term in the English language for a juvenile platypus. This presumably reflects fact that when a young platypus first emerges from its natal burrow it basically looks like a small adult. As juveniles are not normally seen by people at an earlier stage of development, there has never been a need to adopt a special term for a baby platypus. It has been suggested by staff working at Taronga Zoo in Sydney that “puggle” might be used. This word reputedly has had a reasonably long history of use to denote a baby echidna. However, as young platypus and echidnas look very different once they begin to grow up, the use of this term to denote a platypus is considered inappropriate by biologists who work with the species in the wild.

By the same token, there is no collective noun - equivalent to a school of fish or herd of cattle – which applies to the platypus. Platypus are fundamentally solitary in their habits, though more than one individual can sometimes be seen feeding at a given spot. Accordingly, there has never been a need to refer to these animals as a social unit.

**Further reading:**


Related species and evolution

Just five modern species of monotreme (or egg-laying mammal) have been described:

- platypus (*Ornithorhynchus anatinus*)
- short-beaked echidna (*Tachyglossus aculeatus*) (illustrated at right)
- three species of long-beaked echidna (*Zaglossus bruijni, Z. bartoni* and *Z. attenboroughi*)

The platypus lives in Australia, long-beaked echidnas are found in New Guinea, and short-beaked echidnas occur in both Australia and New Guinea.

Based mainly on fossil remains found at Lightning Ridge (in New South Wales) and Dinosaur Cove and Flat Rocks (in Victoria), monotremes appear to have been a fairly diverse and important component of the Australian mammal fauna in the early Cretaceous period (roughly 110 million years ago). Living alongside these early monotremes were dinosaurs, turtles, lungfish and the now extinct ausktribosphenid mammals. These fossils date from a time when Australia was located far south of its current position and was joined to Antarctica as part of eastern Gondwana.

The only monotreme fossils found to date outside Australia belong to *Monotrematum suderamericanum*, described from teeth found in Patagonia (southern Argentina) that have been dated to about 62 million years ago. It is presumed that this discovery reflects the fact that monotremes dispersed to other parts of Gondwana after evolving in Australia.

The earliest known monotreme which unequivocally resembled what we think of as a platypus (based on finding a nearly complete, platypus-like bill) has been named *Obdurodon dicksoni* and dates from approximately 15-20 million years ago. *O. dicksoni* was a bit bigger than the modern platypus and had a larger bill and more powerful jaw muscles relative to the size of its head. In contrast to the current living form, adults also appear to have retained true teeth in the form of relatively thin-enamelled, six-rooted molars. The earliest known remains of the living species have been dated to around 100,000 years ago.

Investigating the evolutionary relationship between echidnas and the platypus has been hampered by the fact that the earliest known echidna fossils are only about 13 million years old. Based on patterns of genetic divergence, it has been hypothesized that the two groups began evolving independently as recently as 19-48 million years ago. Ironically, one of the most “primitive” physical features of monotremes – the typically reptilian design of the bones in the shoulder region – may explain why both the platypus and echidnas have survived so well. Although their limbs extend out from the body in a nearly horizontal plane and are primarily limited to rotational movements, the structure of their shoulder girdle also provides exceptional strength and ability when swimming (platypus) or digging (echidnas).

Further reading:


Distribution and status

Platypus live only in Australia, inhabiting a wide range of flowing and still freshwater bodies from sea level up to an elevation of more than 1600 metres near the top of the Great Dividing Range. The species resides along the eastern and southeastern coast of mainland Australia from the Glenelg River catchment in western Victoria to about as far north as Cooktown in Queensland. In broad terms, populations still occur in about 80% of the river basins in Victoria, all of the east-flowing river systems and about 80% of the west-flowing systems in New South Wales, and around a third of reliably flowing river basins in Queensland. Predation by salt water crocodiles (Crocodylus porosus) and the severe flooding that often occurs along Australian tropical rivers in the wet season may both potentially contribute to the platypus’s northern distributional limit.

Platypus are widely distributed in Tasmania, occupying lakes, ponds and glacial tarns as well as rivers and streams. The species also occurs in the rivers of King Island, which has been isolated from Victoria and Tasmania by the waters of Bass Strait for 10,000 or more years.

Only a few platypus specimens were ever collected in South Australia. Most originated along the Murray River (to as far downstream as Lake Alexandrina), although some were obtained along the Torrens and Onkaparinga Rivers before 1900. It is generally accepted that platypus no longer occur in the wild on the South Australian mainland, although vagrants moving downstream along the Murray River may occasionally enter the state. An introduced population is found near the South Australian mainland on Kangaroo Island, where animals were released in Flinders Chase National Park between 1928 and 1946. The absence of platypus populations to the north and west of South Australia undoubtedly reflects the rarity of reliable surface water in these areas.

The IUCN lists the conservation status of the platypus as of “least concern” and the Australian commonwealth and relevant state governments do not consider the species to be threatened (apart from South Australia, where it is listed as endangered). Nonetheless, there is ample evidence that platypus populations have declined precipitously in many parts of their range.

Factors contributing to the platypus’s vulnerability to predicted longer-term patterns of climate change include the animals’ complete dependence on adequate surface water for survival, their characteristically low population density and low reproductive rate, and the fact that female platypus are likely to be out-competed for food by larger (and more aggressive) males and therefore suffer disproportionately high mortality rates when surface water is severely limited.
Further reading:


APPEARANCE AND PHYSICAL ADAPTATIONS

Size and appearance

Like many other animals, platypus living at the warm end of their range in Queensland are generally somewhat smaller than those found at the cold end of their range in Victoria and Tasmania. The largest platypus recorded to date (in Tasmania) was a male weighing 3.0 kilograms and measuring 0.6 metres in length. On the mainland, adult males typically weigh 1.2-2.4 kilograms and are on average 0.5 metres long, whereas adult females typically weigh 0.7-1.6 kilograms and are on average 0.4 metres long.

The platypus's general appearance is quite distinctive, combining a streamlined, furry body with a broad, paddle-shaped tail, four short legs, and a superficially ducklike bill. To help reduce drag in the water, the male's testes and penis are normally held within the body. A platypus also lacks ear flaps (or pinnae): the ear and eye are both located in a muscular groove placed at the side of the head, which automatically pinches shut when an animal dives to protect the eye and ear underwater.

The platypus bill is supported by a framework of bone (left).

Note the corrugations along the inside edge of the bill (right) which presumably help a platypus to strain out water before swallowing food.
The platypus’s body is covered by dense fur apart from its bill, feet and tail. The bill is covered by smooth skin with a soft, suede-like texture and (unlike a duck’s bill) is quite pliable and fleshy around the edges. The upper surface of the tail is covered by coarse hairs which can stand up to the wear and tear involved in using the tail to help push aside and tamp down soil when a platypus digs or remodels a burrow. In contrast, the tail’s lower surface is covered by short, fine hairs which are replaced each year when an animal moults but then wear away as the tail is dragged over stones and gravel, leaving the tail mostly bald below.

Across their entire range, platypus are dark brown above (except for a small patch of light-coloured fur located next to each eye) and creamy white below (sometimes tinged rusty-red). When the platypus’s eyes are closed underwater, the light-coloured patches give the appearance of eyes remaining open, presumably fooling predators into being less likely to attack.

The upper surface of the bill is uniformly dark grey, with two nostrils located near the tip. The bill’s lower surface can either be uniformly pigmented (below left) or quite mottled (below right).

The platypus’s front foot is furnished with a broad expanse of skin which extends past the front claws to form a large and efficient paddle (below left). The webbing folds under the foot when out of the water, making it easier for a platypus to walk and use the sturdy front claws to dig burrows. The hind feet are used to help change direction and maintain balance in the water. In addition, they are equipped with sharp, curved claws used to groom the fur (below right).
Further reading:


Sensory systems

Vision. The platypus’s eye is small (6 millimetres in diameter) and equipped with a round pupil. The internal structure of the eye is typically mammalian in most respects but includes some reptilian features, such as the presence of double (as opposed to single) retinal cone cells used to perceive colour. The lens resembles those found in otters and sea lions, in being fairly flat at the front and much more curved at the back. This shape reduces the eye’s ability to see fine detail, but improves underwater vision.

Interestingly, the platypus rarely uses sight when submerged - its eyes normally close automatically as soon as it dives. One possible explanation is that the platypus’s ancestors relied on underwater vision more extensively than the modern species does.

Hearing. Platypus ears resemble those of other mammals in most respects but do have a few primitive features, such as the fact that the ear region is encased in cartilage rather than bone. The platypus ear is most sensitive to sound frequencies around 4 kilohertz (exactly the same as in humans) but can hear frequencies as high as 15 kilohertz.

Smell and taste. Aquatic mammals typically don’t rely much on smell to find food or detect predators, as chemical cues tend to be washed away by water. In the case of the platypus, only about half as many genes are linked to standard odour detection as compared to most land-based mammals. However, scientists have been intrigued to learn that the platypus has an exceptionally large number of genes coding for specialised smell receptors in the vomeronasal (or Jacobson’s) organ – paired pouch-like structures located in the roof of the mouth. Vomeronasal organs are found in both reptiles and mammals and are mainly important in social communication – detecting odours produced by other individuals of the same species. Accordingly, these receptors are likely to be used by a platypus to track chemical signs left to mark territorial boundaries or advertise reproductive status, though it’s possible they may also help the platypus find its prey underwater.
The platypus has two grooves at the back of the tongue which are lined with sensory papillae (tiny projections) which are believed to be used to taste food.

**Bill sensory receptors.** The skin of a platypus bill holds tens of thousands of specialised sensory structures providing information needed to navigate underwater and capture prey. Receptors known as “push rods” are sensitive to touch or pressure, either as an outcome of solid objects contacting the skin or water movement. Nerves are activated when the tip of a push rod receptor is displaced by as little as 20 microns (0.00002 metres), which means a platypus can detect the movements of edible invertebrates such as freshwater shrimp or crayfish at a distance of 15-20 centimetres, simply by sensing the associated movement of water.

The bill surface is also thickly dotted with acutely sensitive electroreceptors (“sensory mucous glands”), which respond to the tiny amount of electricity generated when the muscles of aquatic invertebrates contract. Because electricity moves so rapidly through water, the tail flick of a shrimp will be recorded a fraction of an instant earlier by bill electroreceptors as compared to push rods, providing a way for a platypus to judge the distance to a prey item.

**Further reading:**


Venom and spurs

Spurs and venom. The male platypus has a conspicuous spur (similar in size and shape to a dog’s canine tooth) located on the inner hind ankles (right). Adult spurs are typically 12-18 millimetres long and made of keratin, the structural protein found in feathers and human fingernails. The spur is connected to a venom-secreting gland, known as the crural gland. Platypus venom is first produced when a male becomes mature, and more venom is secreted during the spring breeding season than at other times of year. Accordingly, it is believed that platypus spurs and venom have mainly evolved to help adult males compete for mates.

Platypus venom is a clear, slightly sticky fluid. It contains at least 19 different compounds which appear to have evolved quite independently from those found in snake venoms. Platypus venom is not life-threatening to humans, but can cause severe localised swelling and excruciating pain which gradually abates over a period of a few weeks. At its worst, the pain is not very effectively relieved by standard analgesics such as morphine and is only made worse by application of ice packs. However, it can be treated successfully with drugs such as bupivacaine, which act by blocking nerve transmission.

![Venom leaking from the tip of an adult platypus spur.](image)

Platypus spurs are normally held in a relaxed position, folded back against the inner ankle. Particularly during the breeding season, a spurring response will be initiated if the male is touched or stroked on its abdomen in the area between the hind legs. The hind feet are rapidly rotated outwards and upwards, pulling each spur erect and locking it into position against the lower limb bones. Both spurs are then jabbed inwards with great force, impaling any object in their path from two directions.

Although platypus are not particularly aggressive animals, great care should be taken whenever picking up either an adult male or an individual of unknown age and sex. In particular, such an animal should NEVER be supported from below. Instead, grasp the animal firmly by the END half of the tail (which cannot be reached by the spurs) before lifting it up and transferring it to a cloth bag, lidded box or other secure container.
When holding a platypus by the tail, it should be easy to determine if the animal is a male (based on the presence of conspicuous spurs on the ankles).

The appearance of male spurs changes with age. In the case of young juveniles, spurs are relatively short and stubby and covered in a sheath of whitish keratin. This covering gradually wears away, exposing the true spur which continues to grow. The spurs of subadult (second year) males can normally be distinguished from older individuals by the presence of a pink collar of skin which initially extends about one-third up the length of the spur. The collar skin gradually regresses and is very much reduced by the time that males mature at the age of two years.

Examples of a juvenile male spur (left) and subadult male spur (right).

Adult females of any age are easily told apart from males because they do not possess true spurs. However, juvenile females do have a tiny pointed brown or whitish "spur" – typically 1-2 millimetres in length – on their hind ankles. This structure generally disappears within about 8-10 months of a young female’s emergence from a nursery burrow, leaving behind a small pit in the skin.

Juvenile females have a tiny false spur (left, circled) which is lost by the time a female is one year old (right).
Further reading:


Body temperature and torpor

The platypus normally maintains a body temperature close to 32°C. This is a bit lower than the body temperature of most other mammals – for example, the temperature of a healthy human is usually about 37°C. The platypus’s relatively low body temperature is believed to be an adaptation to conserve energy, particularly when an animal is swimming in cold water.

To further reduce heat loss, platypus fur is made up of two layers: an extremely dense undercoat (including up to 900 individual hairs per square millimetre of skin surface) and coarser overlying guard hairs. These layers work together to trap air next to the platypus’s skin when an animal enters the water, so most of the body surface actually remains dry. The combined insulation value of the fur and air layer has been estimated to be similar to a three millimetre layer of neoprene wetsuit material.

Secondly, the platypus has a special network of small intertwined veins and arteries in the pelvic region (known to scientists as a rete mirabile or literally “miraculous network”). This network serves as a countercurrent heat exchange system: cooled blood returning to the heart from the animal’s legs and tail absorbs some warmth from blood being pumped from the chest, reducing the overall loss of body heat to the environment.

One disadvantage of being so well adapted to surviving cold conditions is that the platypus has a propensity to overheat: in captivity, animals become “noticeably lethargic” when the water in display tanks exceeds 29°C, and a platypus has reportedly lost consciousness after being exposed to an air temperature of 35°C for 17 minutes. Overheating is not normally a problem for platypus in the wild, as they prefer to spend their time either immersed in substantial bodies of water or resting in burrows, where average air temperatures typically do not exceed 18-20°C even in summer. However, it does mean that platypus are likely to overheat badly if they try to travel long distances across land in summer, for example to find new feeding sites during a drought.

Observations in both captivity and along a small stream in Victoria suggest that platypus may periodically enter a state of torpor in which the animals allow their body temperature to drop, remaining inactive for up to about six days. This behaviour has only been recorded in the colder months of the year (late May to early September). Interestingly, no records of inactivity have been recorded in the course of platypus radio-tracking studies undertaken in winter along two rivers in New South Wales or a sub-alpine lake in Tasmania, suggesting that low ambient temperatures are necessary but not sufficient to trigger torpid behaviour in this species.
Further reading:


ECOLOGY, BEHAVIOUR AND GENETICS

Diet and foraging

Platypus feed only in the water. The animals mainly find their invertebrate prey by searching along shallow riffles, gleaning items from submerged logs and branches, digging under banks or diving repeatedly to the bottom of pools.

Platypus foraging behaviour in a pool begins with an animal doing a neat, quiet duck dive. The animal swims to the bottom of the channel and uses its bill to detect and seize prey. Rather than waste time chewing its food underwater, the platypus temporarily stores prey items in cheek pouches located at the back of the jaw. It returns to the surface when its oxygen supply runs low (usually within 30-60 seconds of the time it dived, though dives of up to 138 seconds have been recorded) and then typically spends about 10-20 seconds masticating and swallowing food before again diving. The use of dataloggers has confirmed that platypus mainly but by no means exclusively feed at night, with around 25% of animals tracked along a small Victorian stream and 40% of animals tracked in a Tasmanian lake observed to forage frequently during daylight hours.

Platypus typically have a varied diet dominated by insects (especially caddis fly larvae, but also larval and adult water beetles, water bugs, and larval mayflies, damselflies, dragonflies, dobsonflies, midges, craneflies and blackflies). They also dine on freshwater shrimps, snails, “pea shell” mussels, seed-shrimps (or ostracods), water mites and worms. Burrowing crayfish have been found to be an important part of the platypus diet at Lake Lea in Tasmania, and trout eggs are known to be consumed by animals occupying the Thredbo River in New South Wales. After comparing the invertebrates found in different aquatic habitats with those identified in platypus cheek pouches, a researcher working in the Kangaroo Valley of New South Wales has concluded that platypus are particularly partial to the types of prey occupying edge habitats (defined as including pool margins and backwaters, the space below overhanging banks and among submerged vegetation and organic detritus), followed by those in pools and lastly by those associated with riffles.
The platypus’s ability to prey on sizable fish or other vertebrates is restricted by its lack of true teeth. Remains of a small frog (which may have been consumed as carrion) have been found in one platypus cheek pouch sample from the Shoalhaven River in New South Wales. A young platypus is equipped with true molars located at the back of the jaw, which fall out about the time that a juvenile first enters the water and begins to eat solid prey. The teeth are replaced by rough grinding pads which grow continuously to offset natural wear.

Because the platypus is a relatively small, warm-blooded animal, it needs substantial amounts of food to serve as fuel. Studies in captivity have shown that adult males require around 15-28% of their body mass in food each day to maintain good physical condition, with more food consumed in winter and spring than at other times of year. Similarly, the average daily food intake of animals occupying a Tasmanian lake has been estimated to be 19% of body mass. Not surprisingly, the amount of food eaten by lactating females increases markedly as their offspring grow. For example, daily food consumption by a mother of twins in captivity rose to around 80% of her body mass just before the young first emerged from the nesting burrow - roughly three times her daily food consumption in the months before she mated.

Further reading:


Spatial organisation and movements

Based on radio-tracking studies, the home ranges of neighbouring female platypus occupying creeks in the Yarra River catchment near Melbourne often overlap by about half their total length. Adult males occupy areas which are not necessarily shared with other males but typically overlap the home ranges of two or more adult females. In cases where male home ranges do overlap, the males appear to try to avoid each other when active. The home ranges of adult males tracked for a few weeks in these creek habitats typically include 1-7 kilometres of channel, as compared to 1-4 kilometres for adult females. Males and females both visit roughly one-quarter to three-quarters of their total home range in most foraging periods. However, an adult male has been recorded to travel up to 10.4 kilometres (including backtracking) in a single overnight period, whereas the longest corresponding distance for an adult female is 4.0 kilometres.
Along the Goulburn River (where it presumably is much harder for an adult male to exclude other males from a given area, due to the greater width and depth of the channel), male home ranges overlap throughout the year, but less overlap is apparent during the breeding season than at other times of year. Male home ranges have been found to vary in length from 0.55-2.8 kilometres, corresponding to 2.45-15.45 hectares of foraging area. However, animals do not utilise all parts of their home range equally, with an intensively used core area typically comprising 30% of the total home range area. Including backtracking, animals were recorded to travel up to 4.1 kilometres in a given night.

Longer movements by platypus have been documented, including a radio-tagged adult male that travelled more than 15 kilometres (between two creeks in the Yarra River catchment) on at least two occasions within a period of 10 weeks. Based on mark-recapture studies, a young male is known to have moved about 40 kilometres in the Yarra system over a period of 18 months or less (from Andersons Creek to Steels Creek), and a young male travelled nearly 48 kilometres in the Wimmera River catchment over a period of 7 months or less (from the Wimmera River to Mount Cole Creek).

Due to their mobility, platypus may occasionally be seen in virtually any part of a river system where they occur. With respect to conservation management, this mobility has three important consequences:

- Suitable vacant habitats are predicted to be occupied quite promptly by platypus through natural colonisation (particularly if the new habitats are located reasonably close to areas already supporting the species).
- Stretches of river or stream which do not support a resident platypus population may still constitute important habitat for the species, by providing corridors along which breeding males and dispersing juveniles can travel.
- It is essential that manmade structures (weirs, culverts, irrigation control gates, etc.) placed along natural water bodies or manmade channels that are accessible to platypus should be built in a manner which facilitates safe passage by the animals.

**Further reading:**


**Reproduction and life history**

The platypus is a monotreme, or egg-laying mammal. Males and females have a single physical opening (known as the cloaca) which is used both for reproduction and excretion.

Platypus have been observed mating in the wild in Victoria and New South Wales from early August to early November, with animals believed to breed a few weeks earlier in Queensland and a few weeks later in Tasmania. The animals do not appear to form lasting pair bonds: males probably court as many females as possible, and females rear their young without any assistance from their mates. Based on observations made in captivity, a female becomes receptive to males for a period of 4-6 days. Afterwards, she digs or renovates a nesting burrow and then spends 2-5 days collecting vegetation from
the water (leaves, grass, bark strips, etc.) to line the nest. It is believed that wet nesting material is required to help keep platypus eggs and newly hatched young from drying out.

A clutch of 1-3 whitish, leathery-shelled eggs (like those of lizards and snakes) is laid approximately 2-3 weeks after mating. The eggs are incubated underground for around 10 days, clasped between a female’s curled-up tail and belly as she lies on her back or side. The eggs are about 15 millimetres in diameter, and the young are correspondingly small when they hatch (about 9 millimetres in length). Their exit from the egg is assisted by a prominent bump (or caruncle) at the end of the snout, an inwardly curving egg tooth and tiny claws on the front feet.

Platypus eggs (left) are similar to those of reptiles (Photo: David Doubilet, National Geographic, April 2000).

Platypus milk oozes directly onto the belly from pores contained in two round patches of skin (note white patch at right).

After hatching, juveniles (there is no well-established special term for a baby platypus) develop in the nesting burrow for about 3-4 months before entering the water for the first time. Throughout this period, they are nourished only on milk. A female platypus does not have nipples. Instead, milk is secreted directly onto her belly fur from two round patches of skin. Platypus milk is thick and rich, containing on average about 39% solids (as compared to 12% solids in cow milk). The average fat content of platypus milk (22%) is about six times greater than that of cow milk, while its protein content (8%) is more than double the average value for cow milk.

The newly emerged juveniles are fully furred, well co-ordinated and about 80% of their adult length. They apparently are not taught to swim or how to feed by their mother, but have to learn by themselves through trial and error.

Males and females both become mature at the age of two years. However, some females may not produce young until they are four years old or more, with a long-term study carried out by Dr Tom Grant along the Shoalhaven River in New South Wales indicating that less than half of females breed on average in a given year (range = 18-80% over 27 years).

A juvenile soon after first emerging from its nesting burrow (left).

The juvenile mortality rate generally appears to be high, with only a small proportion of young platypus surviving to adulthood. However, it is not uncommon for adults to live for a decade or more. The oldest known platypus (a female) survived to the age of at least 21 years in the wild.
Further reading:


Social behaviour and communication

Although the home ranges of several platypus may overlap at any given spot, individuals (including mothers and their offspring) normally forage independently of each other. Males have been observed grappling vigorously in the water during the spring breeding season, presumably in order to work out who is dominant. In places where several platypus regularly feed within sight of each other (such as some lakes), it is not unusual for one animal to swim directly towards another during the breeding season, generally starting from a distance of 30-100 metres. The second animal sometimes responds by leaving the area (with or without the first animal in hot pursuit). On other occasions, two animals will swim side by side for a short distance or feed near each other for a few minutes before again moving apart.

In captivity, platypus courtship behaviour may be initiated by females as well as males. A pair will gently nuzzle each other’s bill or face one another on the surface with bills nearly touching for up to ten minutes. One animal will rub against the length of the other while gliding past, and a male will use his bill to grasp the tip of the female’s tail and be towed behind her as she swims on or near the water surface, with the pair often travelling in a tight circle. Mating has only been recorded to occur in the water, for periods lasting from a few minutes up to nearly half an hour.

Platypus courtship behaviour in the wild.

When feeling threatened or annoyed, a platypus will voice its displeasure by emitting a querulous growl, similar to the sound made by a broody bantam hen disturbed on her nest. Olfactory cues may also assist communication: in the case of males, scent glands located at the base of the neck become particularly active during the breeding season, emitting a strong, musky odour. Captive males have also been observed producing a yellow, mucilaginous liquid from the cloaca after swimming to a stone or similar object. The liquid settles in a cloud over the object, presumably helping to mark the male’s territory.
Further reading:


Burrows

Platypus resting sites most often consist of burrows located in the consolidated earthen banks of a river, creek or lake. However, the animals have also occasionally been recorded sleeping in a hollow log or within a large pile of twigs and branches emerging from the water, in a natural cave, or (in Tasmania) in a burrow constructed within dense vegetation such as sedge tussocks.

“Nesting” burrows provide shelter for a mother and her offspring for several months, from the time that eggs are laid to the time that young become independent. These burrows are typically 3-6 metres in length (measured in a straight line from the entrance to the nesting chamber), though they can be much longer. The entrance to a nesting burrow is roughly oval in cross-section and just large enough to allow an adult platypus to enter. It also tends to be elevated well above the water along a reasonably steep bank, with its height probably helping to reduce the risk of inundation after storms. Whenever she enters or exits the burrow, a mother of young juveniles blocks the entry tunnel at 2-9 points with compacted soil plugs (or “pugs”), each measuring about 30 centimetres in length. The tunnel often changes direction immediately after a pug, suggesting that its main role is to fool predators into thinking they have come to the end of the burrow.

Dense vegetation on stream banks provides excellent cover for platypus burrows (entrances marked with red arrows) (above left and centre). A burrow entrance, exposed after a drop in water level (above right).

“Camping” burrows mainly provide a safe place for an adult or subadult to sleep. They are shorter than nesting burrows, typically measuring 1-4 metres in length. Based on radio-tracking studies, some camping burrow entrances are located underwater, with the rest typically well hidden by thick vegetation.
or beneath a stably undercut bank or overhanging tree roots. Besides helping to camouflage burrow entrances, such sites provide a relatively secure, hidden route for a platypus to approach or leave a burrow without being seen.

An adult platypus will normally occupy several different camping burrows within a period of a few weeks, with a given burrow sometimes used by different animals at the same or different times. For example, a study carried out in Victoria found that eight radio-tagged platypus each occupied between two and eight burrows over periods of 8-58 days. One burrow was occupied by a subadult male and an adult male for four days in early January (i.e. well outside of the breeding season), and a second burrow was occupied by two grown females for five days in early February. The burrow occupied by the two males was also subsequently occupied by an adult female, more than a year after it was used by the males.

Further reading:


Genetics

Platypus genes are packaged in a set of 52 chromosomes, twelve of which are relatively large and the rest quite small. Like other mammals, the sex of a platypus is determined by inheriting X and Y chromosomes, with females having five pairs of X chromosomes and males having five X chromosomes and five Y chromosomes. However, much of the genetic information contained in platypus sex chromosomes appears to be different from that contained in the sex chromosomes of marsupials and placental mammals, with some evidence suggesting that a gene involved in determining the sex of birds may also be involved in determining the sex of a platypus.

The platypus genome has been estimated to include approximately 18,500 protein-coding genes, which is at the lower end of the range of estimates for the number of human genes. A map of the platypus genome was published in 2008, based on research carried out by more than 100 scientists based at 32 universities and research institutes located in nine different countries. It showed that most platypus genes (82%) also occur in other vertebrate animals such as mice, dogs, chickens, humans and opossums (a North American marsupial). These genes presumably are involved in basic biological functions that haven't altered for hundred of millions of years. The remaining 18% include genes that have developed since the platypus lineage began evolving independently of other modern vertebrates, along with genes that have been retained by the platypus but lost by other species over evolutionary time.

An analysis of microsatellite DNA sampled in two neighbouring river basins in New South Wales (Shoalhaven and Hawkesbury-Nepean) concluded that the two systems were not very divergent, suggesting that platypus move reasonably frequently between them. In another study, Tasmanian platypus were found to be genetically less variable than animals found on the Australian mainland, with
even less variability recorded in the small and very isolated platypus population occupying King Island in Bass Strait.

Further reading:


Platypus death highlights need for anglers to show care

13 October 2011

Queanbeyan City Council’s Group Manager of Sustainability and Better Living, Mr Mike Thompson said the death of a female platypus in the Queanbeyan River today highlights the need for anglers to take care when fishing in local waterways.

“The platypus died as a result of fishing line being wrapped around its neck,” Mr Thompson said.

“Discarded fishing line is a major threat to platypus as they do not use their eyes in the water but the sensors on their bills for foraging. Line tends to wrap around their bills or neck which stops them from eating and affects their breathing. The line may also catch on snags or other objects, tightening around its body and either trapping the animal underwater where it drowns or causing it to die from exhaustion.

“People who fish along the river need to be diligent in recovering their snagged line and avoid using unattended set lines and nets.

“The discovery of a dead platypus is distressing to those involved and to the general community who value the fact that there are platypus in our River and want to see them continue to thrive and live in the area.”

The death of this platypus comes as Council considers its new Draft Plan of Management for the Queanbeyan River and Platypus Awareness and Conservation Strategy.

“The Strategy identifies many things that the community can do to improve the habitat and survival chances for platypus in our urban environment,” Mr Thompson said.

“The Draft Report will be considered by Council in the coming weeks and if endorsed will be placed on public exhibition for comment.

“Queanbeyan is fortunate to have a partnership with the Australian Platypus Conservancy (APC) and ACT Waterwatch who both have official monitoring platypus sighting programs. Residents are encouraged to report sighting to either of these organisations or to Council itself.”

Dr Melody Serena of the APC said, “unfortunately, we know of many cases where a platypus has died as a result of becoming entangled in fishing line. This death is particularly tragic given that the animal was a female and any babies produced by her this spring are now doomed to die of starvation.

“To avoid these sorts of incidents, it's really important that anglers make it their habit to retrieve any lengths of line that get snagged in the water. Also, if they do happen to see a platypus while angling, the best thing to do is to stop fishing for a few minutes until the platypus has moved away so it doesn’t get accidentally hooked.”

For further information contact Council’s Sustainability and Better Living Group on 6285 6574.

ENDS

For more information contact
Ricky Tozer, Communications Coordinator on 6285 6577
AUSTRALIAN WATER-RAT FACT FILE

INTRODUCTION

The rodents that Australians are most likely to come in contact with are recently introduced species that are officially classified as pests: house mice, black rats and brown rats. However, Australia also supports a diverse array of native rodents that have been a part of the local landscape for at least half a million years and in some cases much longer.

The largest of these is the Australian water-rat (also known as rakali), a very attractive animal weighing up to 1.3 kilograms – as big as a medium-sized platypus. The water-rat’s ancestors are believed to have arrived in Australia around 5-10 million years, after swimming (or possibly rafting) from New Guinea.

The Australian water-rat is an aquatic predator which resembles a small otter in many ways:

- Muzzle is blunt and furnished with a dense set of whiskers (below left)
- Hind feet are broad, partly webbed and paddle-like (below centre)
- Tail is well-furred and thick to help serve as a rudder when swimming (below right)
- Body is elongated and streamlined
- Ears are small and can be folded flat against the head for a streamlined profile
- Fur is soft and lustrous, drying quickly and helping to keep the animal warm in the water
EVOLUTION, NAMING, DISTRIBUTION AND STATUS

Naming

The scientific name of the species (*Hydromys chrysogaster*) translates as “golden-bellied water mouse”. Early European settlers sometimes called this animal a “beaver rat”, even though it is actually much more like an otter than a beaver in its behaviour.

In the early 1990s the Australian federal government proposed changing the common name of the Australian water-rat to “rakali”, which is one of the aboriginal terms for the animal. Although rakali has gained some public acceptance as the common name for *Hydromys chrysogaster*, these animals are still more widely known as “water-rats”.

Distribution and status

Australian water-rats occupy a wide variety of natural and manmade freshwater habitats, including swamps, ponds, lakes, rivers, creeks and irrigation channels. They also inhabit brackish estuaries and sheltered ocean beaches. Water-rats are widely distributed on both the mainland and Tasmania and also occur on many offshore islands.

![Distribution of *Hydromys chrysogaster* in Australia](source: Mammals of Australia)

Although very little is known about the current status of water-rats in most parts of their range, capture rates in most areas tend to be quite low. In part, this reflects the fact that water-rats are highly intelligent animals that are naturally wary of entering metal cage traps and also spend a large proportion of their time feeding in the water rather than on land. Water-rats are also very good at escaping from nylon mesh survey nets set in the water, using their sharp teeth to snip holes through the netting and escape.

In addition, water-rats are relatively aggressive animals that do their best to defend a territory through scent-marking and aggressive behaviour towards other individuals. In turn, this will tend to ensure that relatively low numbers of adult water-rats occur in most habitats.

Anecdotal evidence also suggest that water-rat numbers have declined in many places in southeastern Australia particularly since the mid-1990s, probably due to the combined impacts of drought and habitat degradation. More work is needed to map where water-rats occur and determine how the species’ distribution may have changed in recent decades. In turn, this information will provide a factual basis for longer-term population monitoring.
APPEARANCE AND PHYSICAL ADAPTATIONS

Size and appearance

Adult water-rats measure up to 35 cm in length from their nose to rump, with a slightly shorter tail. Adult males typically weigh 0.8 kilograms (up to 1.3 kg) and adult females typically weigh 0.6 kilograms (up to 1.0 kg).

Depending on location, water-rats can vary considerably in colour. The head and back may be nearly black (with golden-yellow belly fur) or some shade of brown or grey (with fawn- to cream-coloured belly fur). However, apart from occasional individuals that have lost the end of their tail through fighting, water-rats are characterised by a distinctive white tip to the tail across their entire geographic range.

Water-rat fur is moulted twice a year, being coarser and denser in winter. As in the case of platypus fur, it consists of a dense, fine layer of underfur covered by coarser guard hairs. Although water-rat fur is reasonably waterproof, it is much less effective than platypus fur at keeping its owner warm – water-rats are unable to maintain their body temperature in water temperatures below 25°C and consequently need to exit cold water at regular intervals in order to warm up in a burrow or other sheltered site.

Related species and subspecies

*Hydromys chrysogaster* has no close relatives in Australia, although several other species of *Hydromys* are found in the New Guinea region. By the same token, the Australian water-rat is not closely related to either the European water vole (a.k.a. water-rat) or the American muskrat.

Several subspecies of *H. chrysogaster* have been proposed over time, generally based on variation in fur colour. Confirmation that valid subspecies occur will probably depend on the findings of future genetic studies.

Illustrations of the Australian water-rat in John Gould’s early 19th century *Book of Australian Mammals* – four species of “Beaver rats” were recognised at that time.

L to R: Golden-bellied, Fulvous, White-bellied and Sooty.
ECOLOGY AND BEHAVIOUR

Foraging behaviour and diet

Water-rats mainly consume aquatic prey (including fish, frogs, turtles, crayfish, crabs, large aquatic insects, mussels and clams), but the remains of terrestrial prey (such as mice and bats) have also been discovered in water-rat faeces. It has been suggested that the proportion of foraging on land may increase in winter when water temperature declines.

Large water-rats have occasionally been documented to kill reasonably large water birds, such as ducks and coots. They will also eat carrion and scavenge for human food scraps. Based on anecdotal reports, water-rats will travel several hundred metres across dry land to dine on delicacies, such as pet food left out regularly on a back porch.

Water-rats are excellent climbers (above left). In addition to sometimes scaling trees to look for prey such as birds and bats, they have been reported running along the roof rafters at Flinders Street Railway Station in central Melbourne.

A water-rat snacks on bread on the banks of the Queanbeyan River (above right).

Water-rats also appear to have the rare ability to be able to kill the introduced cane toads found in Australia’s tropical north. By flipping the toads over before biting them, they avoid the poisonous parotid glands found on the back of the toad’s neck.

After catching their prey, water-rats typically carry it in their mouth to a favourite feeding spot on a log or rock located at the water’s edge or in the channel. Large piles of clam shells, crayfish claws or fish bones and scales can accumulate at such platforms — the remains of many water-rat meals.
A water-rat at a typical feeding platform – in this case, a log in the middle of a weir pool.

**Home range size and movements**

Water-rats are highly territorial, marking their home ranges with a strong scent reminiscent of the odour of cat urine. Apart from females raising dependent offspring, it is presumed that adult water-rats lead solitary lives.

Relatively little is known about home range size and movements in this species. An adult male radio-tracked along a small creek in Victoria was found to have a home range extending at least 3.9 kilometres, whereas three males living in Queensland had home ranges that extended at least 0.9-2.2 kilometres. An overland movement of at least 3 kilometres has also been recorded.

In places where populations are dense there is considerable fighting, as evidenced by a high frequency of bite marks on tails and hind feet. This suggests that juveniles have to disperse from their mother’s home range fairly soon after becoming independent; however, nothing is known about this process.

**Reproduction and life history**

Water-rats can potentially breed throughout the year if conditions are favourable, but mating most typically occurs in late winter to early summer, with juveniles appearing from September to February. The gestation period is around five weeks long. Females generally first breed at the age of about a year and raise two or three litters of young in a good year. A female water-rat only has four nipples and typically raises just two to four babies in a given litter, suckling her young for about a month. After weaning, juveniles remain with their mother for a few more weeks before leaving home for good.

It is believed that water-rats normally survive for a maximum of about 3-4 years in the wild.

**Burrows and activity patterns**

Water-rats occupy burrows located in creek and river banks, or shelter in large hollow logs lying near the water. Radio-tracking studies undertaken by Australian Platypus Conservancy staff have shown that platypus and water-rats will use the same burrows, though probably not at the same time. On one occasion, an adult female platypus occupied a burrow a few weeks after it served as a nursery for a female water-rat with a litter of young. Such behaviour is not especially surprising given that platypus and water-rats are about the same size and both are known to make use of many different burrows over time. It remains unknown whether the two species are equally likely to dig a new burrow in the first place.
Conservation issues

Water-rats are subject to predation by many different species, including snakes, large predatory fish, birds of prey, and cats, dogs and foxes. However, there is no reason to believe that water-rats have ever vanished from any area solely due to predation. By the same token, there is no evidence that any diseases have an important impact on water-rat numbers.

Because water-rats are warm-blooded carnivores which require a lot of food to fuel their energetic lifestyle, the main problem facing the species is most likely to be habitat degradation, if this in turn reduces the animals’ aquatic food supply.

Given that water-rats have a fairly short natural lifespan (in most cases living no more than 3-4 years), local populations may decline in size and even disappear if females fail to reproduce successfully for several years in a row — for example, due to the combined effects of poor habitat quality and ongoing drought.

Water-rats were once widely trapped for their fur and sometimes culled when they were perceived to be a nuisance in irrigation districts. However, they are now fully protected by law as native wildlife.
Unfortunately, many continue to drown in “opera house” traps and other enclosed nets designed to capture yabbies and freshwater crayfish. These nets are also known to kill large numbers of platypus and freshwater turtles. Recreational anglers are therefore strongly advised to consider using lift-style hoop nets or old-fashioned baited lines (without hooks) as wildlife-friendly alternative methods for procuring a meal of yabbies or crays.

Australian water-rats can sometimes come into conflict with humans when they raid fish farms or chicken yards, kill free-ranging guinea pigs in gardens, steal bait from anglers, leave piles of food debris on the decks of moored yachts or on verandahs, or deposit chewed up cane-toads around the edge of swimming pools! However, killing or relocating “problem” water-rats is illegal and subject to substantial fines. In any case, such action is likely to be totally ineffective because dispersing juveniles are likely to recolonise the area in a relatively short space of time. A much more sustainable solution is to learn to live with water-rats by rat-proofing problematic areas and not leaving food around that will attract them.

Co-existence of water-rats and platypus

Platypus and water-rats both function as top predators in Australian freshwater systems and probably compete to some extent for food. However, the size of prey that can be consumed by an adult platypus is limited by the fact that its bill is equipped only with rough grinding pads to help process food. In contrast, a water-rat has a formidable set of sharp incisors to help kill and dismember prey. Interestingly, the grinding surfaces of water-rat molars are quite smooth. Like the grinding pads of the platypus, this adaptation may be particularly effective at dealing with the hard, encased bodies of many aquatic invertebrates.

In practice, very little is known about the ecological and behavioral interactions between platypus and water-rats. The two species are found living together in many places, so water-rats clearly do not automatically exclude platypus from freshwater environments (and vice versa).

However, there are also waterways where only one of the two species is commonly found. In general terms, water-rats are much more likely to persist in badly degraded aquatic habitats than the platypus. This may reflect the fact that the water-rat is able to forage on land and also prey on introduced fish species.

It has been suggested that water-rats may sometimes prey on young platypus but there appears to be no actual documented evidence to support this idea.
Further reading:


