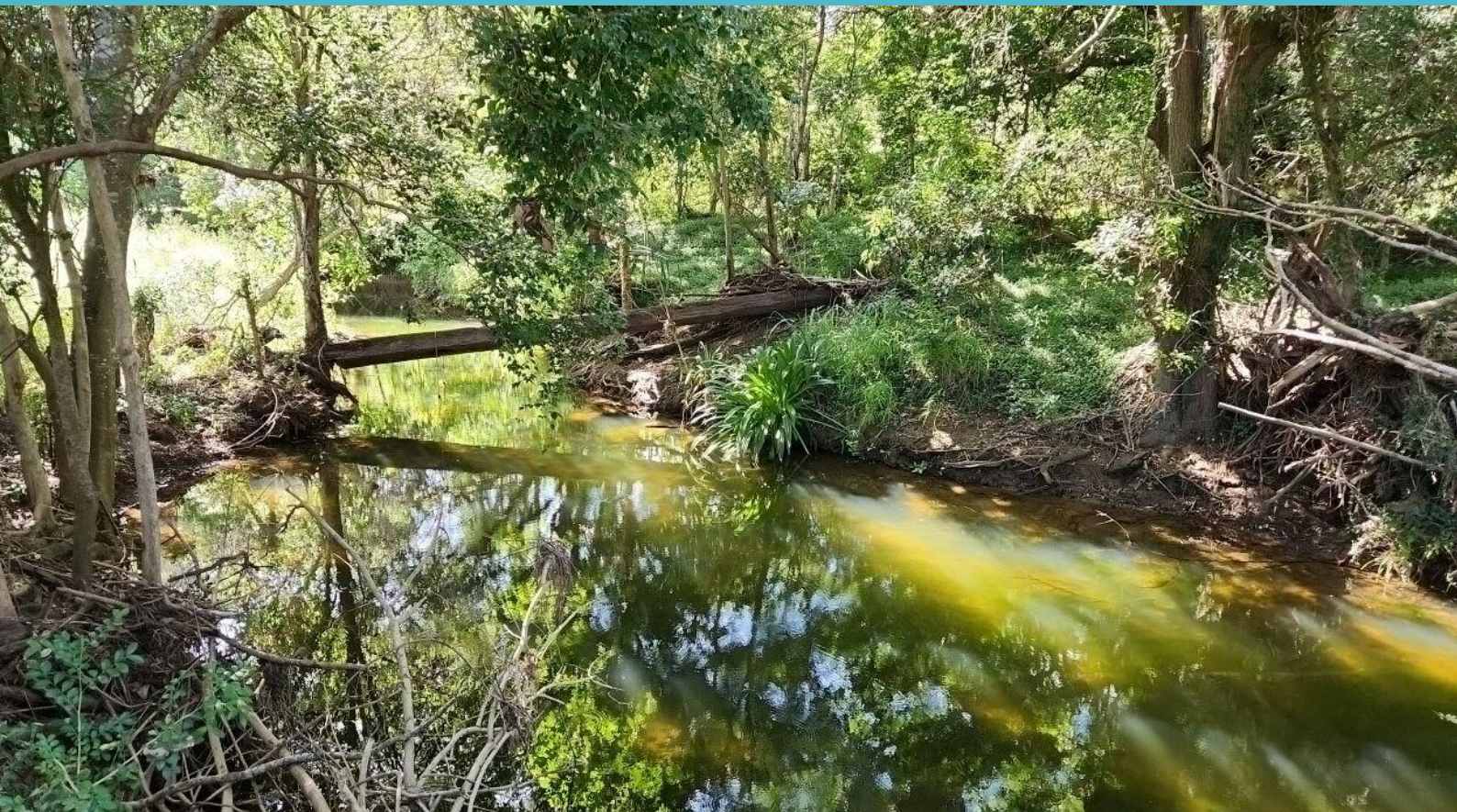


Platypus Survey and Habitat Assessment

Gutchy Creek, Glenwood QLD.



Ecology | Environment | Heritage

www.redleafenv.com.au

Citation: Redleaf Environmental (2023) Platypus assessment: Gutchy Creek, Glenwood QLD. Prepared for the Fraser Coast Regional Council.

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DOCUMENT CONTROL

REPORT TITLE						Platypus and turtle survey of Petrie Creek, Nambour, Queensland					
Document ID				Project Number		23328					
File Path											
Client				Fraser Coast Council				Client Contact		Tracy Bignell	
Rev	Date	Revision Details/Status		Prepared by		Verifier		Approver			
0	24/02/2023	Final		DWF		DF		DF			
1											
2											
Current Revision				Final Report							

APPROVAL							
Signature				Signature			
Name		Dr Darren Fielder		Name		Mr David Flack	
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1 Introduction

1.1 Background

Redleaf Environmental was engaged by Fraser Coast Regional Council (FCRC) to conduct an aquatic survey for platypus within Gutchy Creek at Glenwood Park (LotPlans 61RP153196, 62RP158437, 63RP158437, 64RP152212), in Glenwood, Queensland (Figure 1). This assessment was requested by FCRC in response to proposed works occurring within a short distance (~12 m) from Gutchy Creek, where platypus have previously been recorded. Gutchy Creek is located within the Mary River catchment and is a minor tributary of the Mary River.

The proposed works by Glenwood Community Centre include the removal of an old playground, with a new shed to be installed on the playground's old footprint on LotPlan 63RP158437. Proposed construction activities may include:

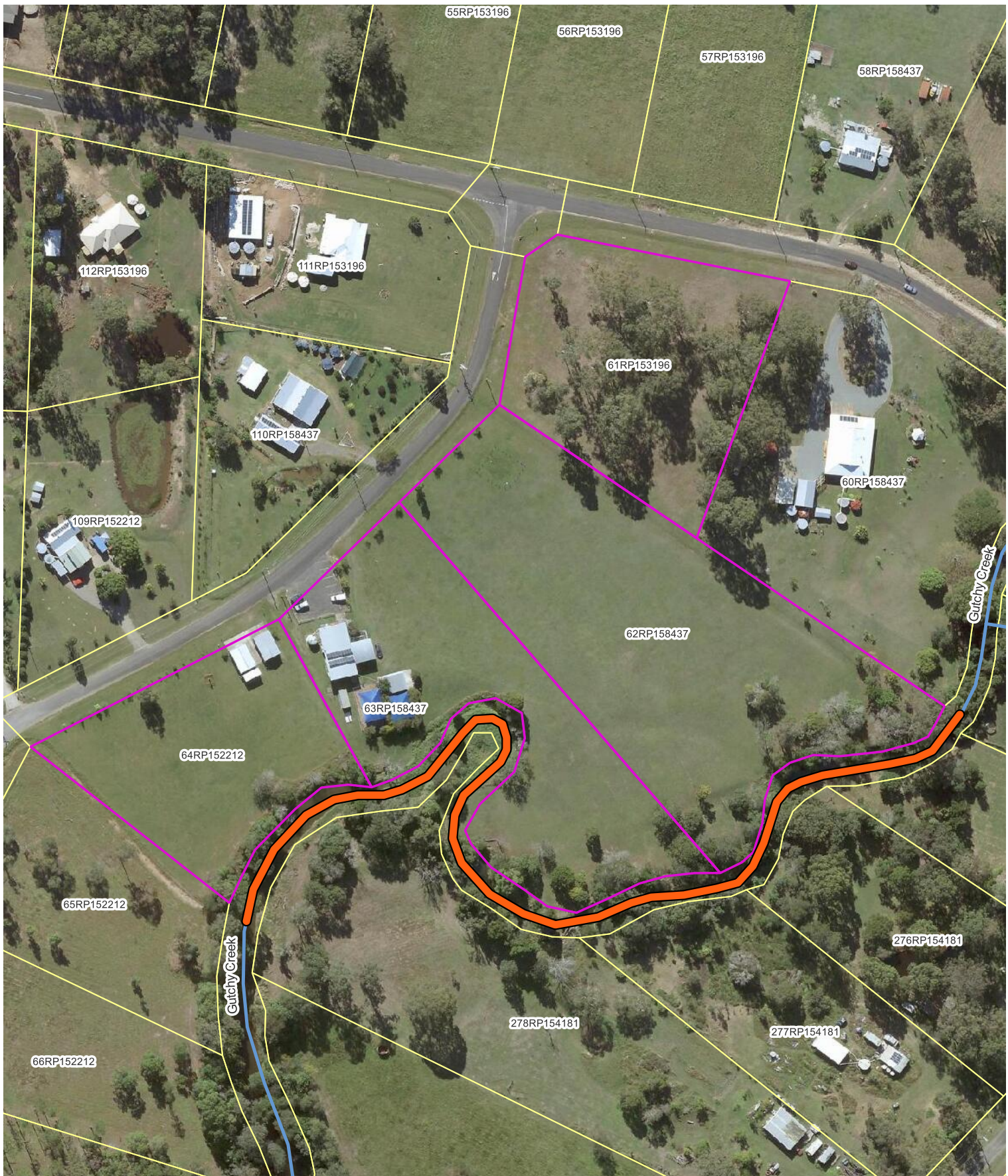
- Demolition of old playground equipment
- Excavation and removal of concrete post footings
- Excavation and stockpiling of old soft fall
- Installation of formwork and construction of the concrete pad
- Construction of the new shed
- Installation of electrical equipment, including associated trenching

This report aims to inform the currently proposed, and future works, and to provide FCRC with validated information regarding platypus in the stretch of Gutchy Creek along the southern border of Glenwood Park.

1.2 Objectives

The aquatic survey and report aim to provide:

- Clarification on the presence/absence and abundance of platypus in Gutchy Creek at Glenwood Park
- Recommendations to enhance the quality of platypus habitat and maintain populations
- Identification of potential threats to the long-term survival of fauna inhabiting the Gutchy Creek stream reach
- Implications for aquatic fauna (with emphasis on platypus) from proposed works



Legend

- Survey reach (699 m)
- VM watercourses QLD
- QLD cadastre (DCDB)
- FCRC property boundaries

CRS: GDA 1994 MGA Zone 56
Projection: Transverse Mercator



0 30 60 m



Scale 1:2,000 (A4)

Figure 1. Platypus assessment reach in Gutchy Creek, Glenwood QLD

Gutchy Creek Platypus Assessment, Glenwood QLD
Fraser Coast Regional Council

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2 Methods

The surveys were conducted under approved scientific and ethics approvals:

- Scientific Purposes Permit WA0037425
- Spotter/Catcher Rehabilitation Permit WA0022686
- General Fisheries Permit #256536
- Ethics Approval CA 2021/09/1546
- Redleaf also adhere to the relevant protocols that are associated with these approvals, for example, the Code of Practice - Care of Sick, Injured or Orphaned Protected Animals in Queensland, Nature Conservation Act 1992.

Platypus were surveyed by one observer during 5:00-7:30 AM (sunrise) and 4:30-7:00 PM (sunset) each day. The observer was positioned at vantage points with binoculars to monitor sections of the survey reach, and each vantage point was monitored for approximately 40 minutes before relocating to the next observation vantage point. These sites were chosen to provide clear line of site along different reaches of Gutchy Creek. No platypus was captured or handled during this survey. Platypus burrows searches were conducted.

2.1 Environmental survey conditions

The aquatic survey was conducted over two days and two nights from the 15th to the 17th February 2023. There was no rainfall during the two-day period, however there had been 42 mm of rainfall on the 14th February prior to the assessment. The daily air temperatures ranged from 17-31°C (local private weather station data) and water temperature at midday was not recorded. The riparian zone retains vegetation for approximately 3 m to 20 m either side of the stream with a high amount of exotic grasses along the banks of the waterway. There is a good structure of native canopy species and groundcover along the banks. Most areas had numerous weedy species present.

There has been nearly ~104 mm of rainfall recorded at Glenwood since the start of 2023 (Figure 2). These data indicate a reasonable wet period for Gutchy Creek prior to conducting the assessment and ensuring connectivity between the deeper pool sections of the creek.

2.2 Survey limitations

Ecological surveys have inherent biases because of the cryptic nature of some species, search effort, time-of-year and the climatic conditions under which the surveys were conducted. The timing of surveys in February was within the active seasons for observing platypus. The data and recommendations made here provide a reliable and true representation of the values of the site.

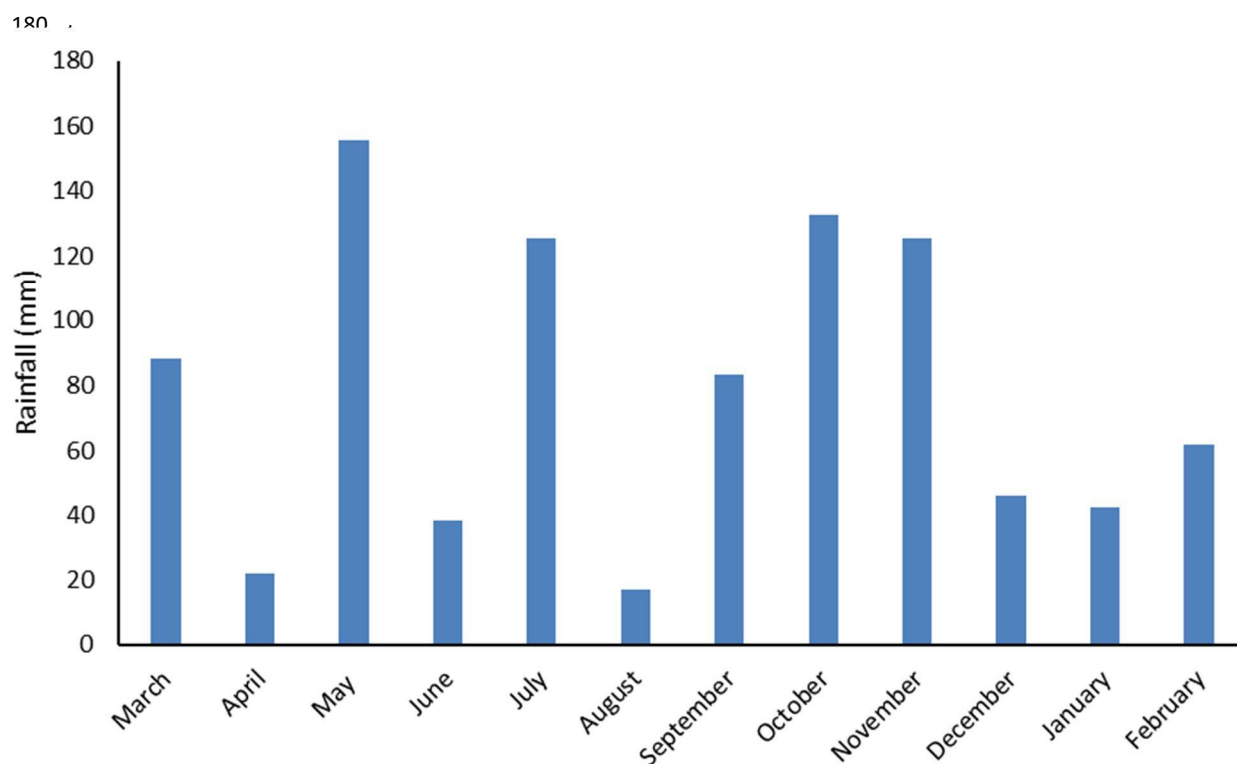


Figure 2 Monthly rainfall data for Glenwood QLD from March 2022 to February 2023 (Site IGLENW1). Data from <https://www.wunderground.com>

3 Desktop assessment

3.1 Platypus

Platypus (*Ornithorhynchus anatinus*) is an egg-laying mammal (monotreme) which is widespread and relatively common along the eastern seaboard of Australia, from Tasmania to far northern Queensland. They are crepuscular and nocturnal in their foraging activities, being predominantly an opportunistic carnivore of benthic invertebrates. Platypus locate prey items using its sensitive bill that is equipped with electro-sensory receptors which aid in the detection of food items. Food is gathered from the stream floor and stored in pouches in the base of the bill, to be eaten when the platypus surfaces. Platypus are normally associated with habitats that include both riverine and riparian features which maintain a supply of benthic prey species and consolidated banks into which resting and nesting burrows can be excavated (Grant & Temple-Smith 1998).

The species has a single breeding season each year, with mating occurring in late winter or spring and young first emerging into the water after 3-4 months of nurture by the lactating females in the nesting burrows (Grant & Temple-Smith 1998). In Queensland, mating occurs in July/August and gestation takes approximately three weeks. The eggs hatch after about 10 days and young develop over a period of up to five months. Maternity burrows are occupied from approximately July to February each year (Table 1).

In one study, Serena et al. (1998) describes 57 platypus burrows: "The horizontal distance from the water's edge to burrow chambers was 0.4-3.7 m (mean $\pm$ s.d. = 1.5 ± 0.9 m, $n = 41$), with burrows found only in banks extending ≥ 0.5 m above the water. Platypus burrows occurred significantly more often than expected along undercut banks and in association with moderate-to-dense vegetation overhanging the water, and significantly less often at sites where banks had a convex profile at water level. As well, the amount of cover provided along the bank by shrubs/small trees and the ground layer of vegetation was significantly greater than expected at platypus burrows along the river. These attributes are believed to help conceal burrow entrances from predators as well as reduce burrow damage through erosion".

Table 1 Estimated period of occupancy of platypus maternity burrows in Queensland

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Platypus breeding cycle												

Green = Gestation; Yellow = Incubation; Orange = Dependant Young

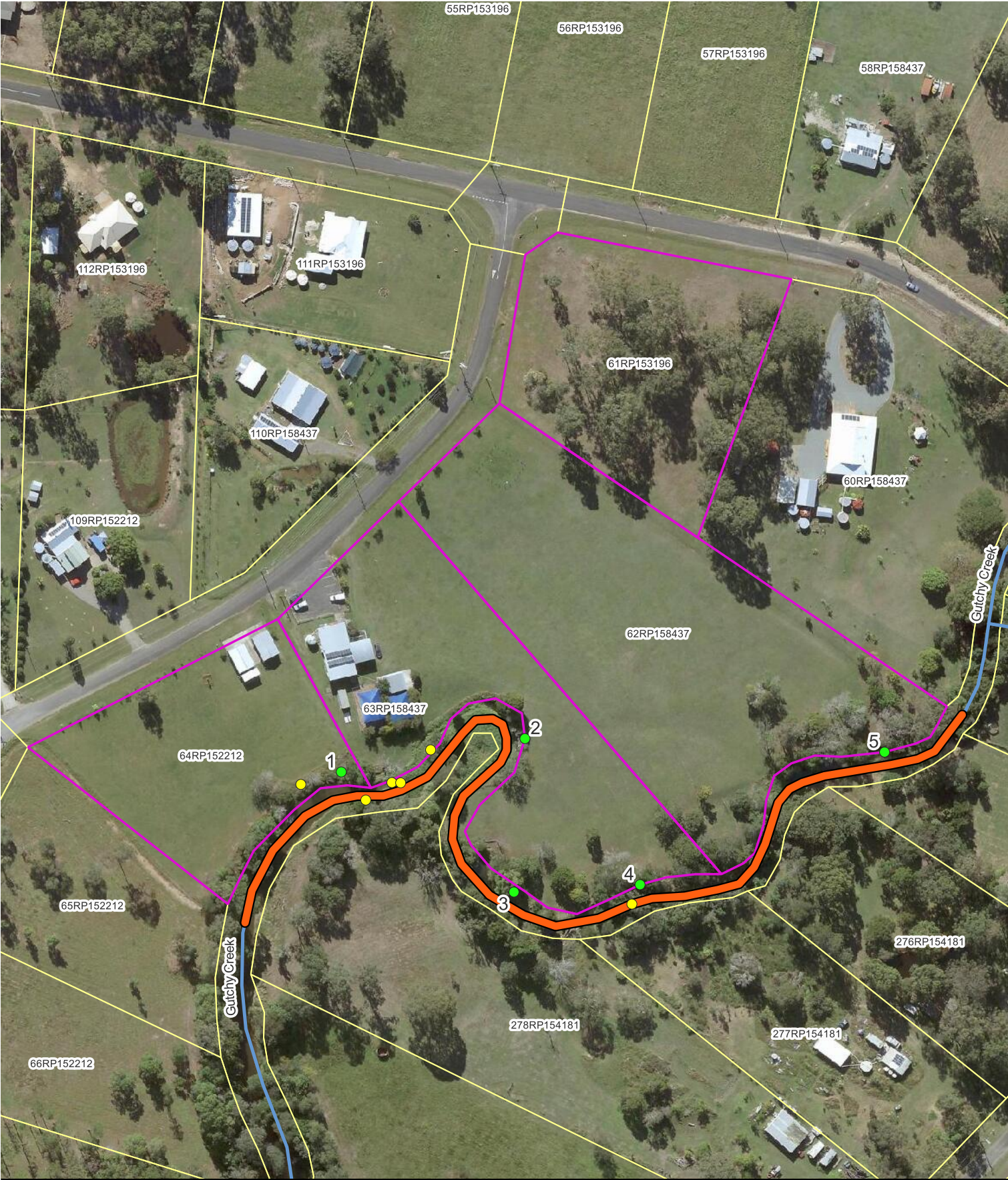
Throughout its range, platypus are restricted to freshwater streams and ponds and so has a discontinuous or fragmented distribution. Despite being considered common throughout its current distribution its abundance is not readily measured and therefore its future conservation status is not easily predicted (Grant & Temple-Smith 2003).

Platypus are known to occur within the study reach with five (5) records dating from October 2022, recorded in Gutchy Creek at Glenwood Park. These records were sourced from the Atlas of Living Australia (ALA) and from community records sourced by Glenwood Wildlife Awareness (Figure 3). No systematic survey effort has been undertaken recently to confirm their ongoing presence and population size.

Table 2 Historical platypus sighting records for Gutchy Creek

Source	Observer	Date	Count	Location	Latitude	Longitude
ALA	Australian Platypus Conservancy	07/09/2022	1	Gutchy Creek, Glenwood	-25.9364	152.6164
Glenwood Wildlife Awareness online database	Bruce Turner	05/11/2022	1	Gutchy Creek, Glenwood	-25.9364	152.6164

Source	Observer	Date	Count	Location	Latitude	Longitude
Glenwood Wildlife Awareness online database	Gabe Van Wyk	11/09/2022	1	Gutchy Creek, Glenwood	-25.9365	152.6163
Glenwood Wildlife Awareness online database	Adrian Moore	04/09/2022	1	Gutchy Creek, Glenwood	-25.9364	152.6161
Glenwood Wildlife Awareness online database	Bruce Turner	29/01/2023	1	Gutchy Creek, Glenwood	-25.9363	152.6165



Legend

- Historical platypus records (ALA & community records)
- Survey site locations
- Survey reach
- VM watercourses QLD
- QLD cadastre (DCDB)
- FCRC property boundaries

CRS: GDA 1994 MGA Zone 56
Projection: Transverse Mercator

0 30 60 m

Scale 1:2,000 (A4)

Figure 3. Historical platypus sightings in Gutchy Creek from 2022-23
Gutchy Creek Platypus Assessment, Glenwood QLD
Fraser Coast Regional Council

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Map Number 1 of 1 Job Number 23328

4 Results of field assessment

4.1 Stream habitat assessment

Gutchy Creek was found to be in a moderate to good condition for physical characteristics with stable bed and banks for much of the study area. There was some bank erosion evident in sections downstream of the Glenwood Community Centre but these were small in area. The bank vegetation was between approximately 3 – 20 m in width either side of the centre line of the stream and found to be continuous along the full length of the creek. Most of the vegetation overhanging the creek's banks was exotic grasses.

Gutchy Creek varies between 2-10 m wide, however the depth of the creek was not measured in this assessment. The large pool immediately upstream of the Glenwood Community Centre (P1) is approximately 10 m in width and is quite turbid providing limited visibility through the water column. The pool narrows to approximately 2 m width at the downstream end. The width of the creek was difficult to determine in several sections of the creek due to the high volume of exotic grasses overgrowing banks, obscuring the view of the banks. The large pool at P4 was approximately 8.5 m wide, with the banks having tree roots extending into the waterway and less overgrown grasses present.

The pools provide excellent habitat for platypus with well-defined bank profile including undercut banks and vertical banks to 1.5 m, large woody debris (i.e., logs) and overhanging vegetation was common along the littoral zone of both sides of Gutchy Creek. The opportunity for platypus burrows was assumed to be the full extent of the deep pool sections.

The riparian vegetation was also home to several water dragons (*Intellagama lesueurii lesueurii*), and rakali (water-rats, *Hydromys chrysogaster*) were also observed on two occasions in the P2 pool and the P4 pool. An eastern long-necked turtle (*Chelodina longicollis*) was also observed in P1. A red-bellied black snake (*Pseudechis porphyriacus*) was observed basking in the early morning between P1 and P2, while a pair of azure kingfishers (*Ceyx azureus*) were observed foraging at each of the survey points over the two days of survey effort. A northern brown bandicoot (*Isodon macrourus*) was also observed moving through the thick grasses alongside the water at P1.

Several introduced tilapia (*Oreochromis mossambicus*) were observed in the deep pool of P1. This species is a restricted noxious pest under the *Biosecurity Act 2014* and can compete with native species for habitat and food. Tilapia also disturb plant beds and can become aggressively territorial during nest building.

No urban debris was recorded during the assessment within the pools. The P1 pool was quite turbid at the time of assessment, so submerged urban debris could not be observed.

Additional fauna species encountered at Gutchy Creek, Glenwood



Rakali observed foraging in the P2 pool during morning survey



Rakali observed foraging in the P4 pool during morning survey



Eastern water dragon observed at P1 resting on overhanging log debris.



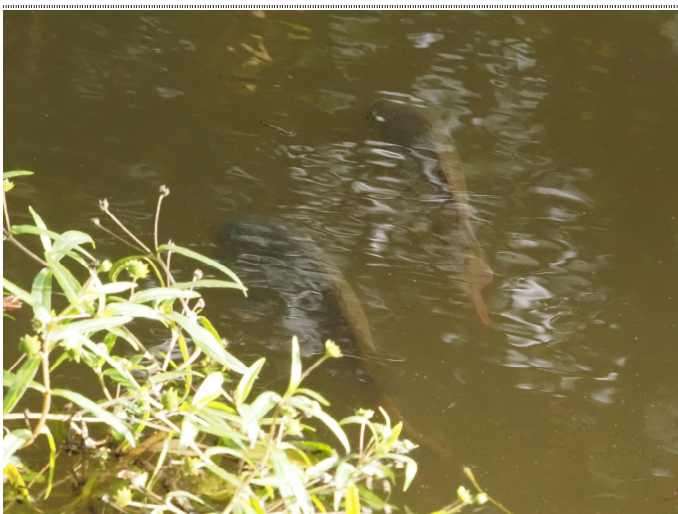
Eastern snake-necked turtle observed at P1.



Red-bellied black snake observed basking at the edge of the creekbank vegetation between P1 and P2.



A pair of azure kingfishers was observed foraging along the entirety of the creek, catching small fish from the water.



A pair of tilapia observed in P1.



Tilapia observed in P1.

4.2 Platypus Surveys

A total of 10.3 hours of platypus search effort were made during the survey period across five (5) locations selected for geographic coverage of study reach (Table 3 and Figure 3). No platypuses were recorded during the survey effort. Video footage of a platypus was obtained by a local resident, who graciously shared the footage with Redleaf Environmental. Analysis of the background habitat characteristics in the footage allowed the exact location of the recording to be determined with a high degree of confidence (Site P4). Discussions with several local residents ascertained a high confidence of the sighting of at least one platypus being observed in several locations along Gutchy Creek behind Glenwood Park. Local residents have also indicated that they have been aware of platypus within Gutchy Creek for several decades, however they did not record any formal observations.

Table 3 Platypus observation effort and sighting records (this study)

Site	Site Description	Hours	Latitude	Longitude
P1	Deep pool, southwest of Glenwood Community Centre (LotPlan 64RP152212)	2.4	-25.936366	152.616220
P2	Deep pool, east of Glenwood Community Centre (LotPlan 63RP158437)	2.0	-25.936127	152.616786
P3	Deep pool with riffle zone, south of Glenwood Community Centre (LotPlan 63RP158437)	2.0	-25.936798	152.616784
P4	Deep pool, southeast of Glenwood Community Centre (LotPlan 63RP158437)	2.4	-25.936721	152.617214
P5	Deep pool, east of Glenwood Community Centre (LotPlan 62RP158437)	1.5	-25.936735	152.617194
Total		10.3		

Platypus individual recorded by local resident at site P4 in Gutchy Creek (14/09/2022)



5 Discussion

5.1 Platypus population

Platypus can be a very cryptic and cautious animal whose presence in a stream can remain unseen for many months or years. The historical records and community sightings indicate a history of a viable and persistent population at Glenwood in Gutchy Creek since 2022. Anecdotally, local residents have reported knowing about the platypus in Gutchy Creek “since they were kids” but did not record or report their observations. This indicates that the platypus have been known to occur in Gutchy Creek for at least several decades. The community recorded platypus sightings (Glenwood Wildlife Aware online database) have been an especially useful dataset to demonstrate the geographic extent of the platypus population, showing its distribution over the full length of the study area since 2022.

5.1.1 Population size

Populations of platypus are limited in the number of individuals that can exist in an area through the productive food capacity of the stream reach. Having a carnivorous diet means they require a substantial food requirement to sustain a population. A study from Shoalhaven River in NSW estimated population densities of between 12.4-14.5 animals per km of channel. Elsewhere, studies of five suburban or outer suburban creeks near Melbourne VIC estimated 1.2-2.1 animals per km of channel. There is a high degree of uncertainty of platypus populations across most of Australia because of the limitations with live-trapping of animals (i.e., logistics of sampling suitable habitat, resource intensive) and the variation in number from environmental disturbances from droughts and floods (estimates referenced from platypus.asn.au).

This current study of Gutchy Creek by Redleaf observed no animals within the 700 m stretch between sites P1 and P5 (see Figure 3). If the community sightings are of the same individual at different times, then it is probable that the population density in this stretch of Gutchy Creek is within the 1.2-2.1 animals per km of channel proposed by Shoalhaven River study. From the data available, a determination of whether the sightings consist of one solitary animal or several individuals. A systematic survey including trapping and release of platypus would be required to determine the population size of platypus more accurately in Gutchy Creek.

It has also been assumed that a connected and even distribution of habitat and food availability is present throughout the study area of Gutchy Creek is present.

5.1.2 Habitat preferences

Platypus have been recorded across eastern Australia in wide variety of habitat types including small alpine streams at 1600 m ASL in the Australian Alps through to freshwater streams at sea level. They generally prefer perennial flowing stream environments but can move overland through terrestrial environments to seek out new water bodies. They have also been historically known from large rivers such as the Murray River from Victoria and New South Wales.

Within Gutchy Creek, the physical habitat for platypus appears to be retained and in good condition with suitable habitat features present for much of the study site. The largest pool is within P1 where it is up to 10 m wide, with the second largest pool being P4. The riparian vegetation and bank stability allow for extensive areas of steep and undercut banks with overhanging foliage cover which are ideal for constructing burrows. Burrow entrances are usually difficult to detect and find in these situations because they can also have the entrances below the water line or anywhere up to 0.5 m above the water's surface (Serena et al. 1998). The smaller sections of P2, P3 and P5 also provide good habitat for platypus even though it is narrower and shallower than either of the main pools.

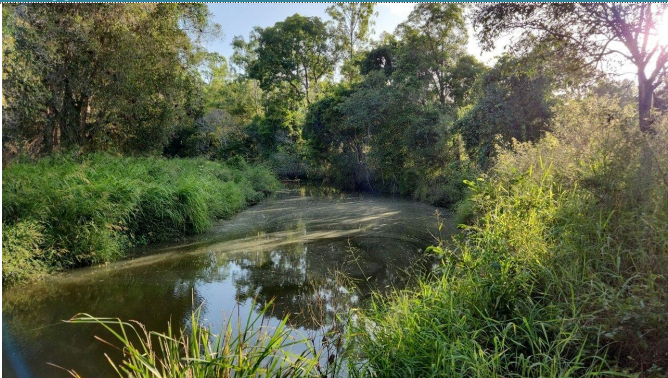
5.1.3 Threatening processes

From a historical perspective, hunting and the fur trade dramatically reduced numbers across Australia more than 120 years ago. Today, platypus continue to persist across most catchments where they have been historically recorded from. However, recent analysis of historical records and sighting databases would indicate a decline in abundance and evidence of local population extinctions (Bino et al. 2019; Hawke et al. 2020). More contemporary threats to platypus populations are urbanisation, habitat destruction, fishing by-catch, invasive and feral species, pollution, disease, and the construction of dams (Bino et al. 2019; Hawke et al. 2020).

Within Gutchy Creek and the suburb of Glenwood, the resident platypus population appears to have persisted in reasonable numbers. This mostly relates to the good physical condition of the creek bed and banks and the well vegetated riparian zone. The aquatic environments of Gutchy Creek also maintain good local connectivity with the study area through minimal disturbances from walkway bridges, footpaths along the creeks edge and other infrastructure such as road and rail crossing points. From discussions with the public whilst doing these surveys, there is a high level of awareness of the platypus population in the creek with many community members expressing their enjoyment and pride in Gutchy Creek. This is to be commended and FCRC should continue to foster this good will for the ongoing management and protection of the aquatic environment and the fauna therein.

Areas for continued monitoring include an ongoing program of rubbish removal and other random urban debris items washed into the creek. Maintaining a healthy riparian zone of native vegetation and the physical bed and banks will help to provide important burrow habitat along the study area.

Platypus habitat features in Petrie Creek



Looking upstream at P1 survey site. Platypus have been sighted here by local residents, but not during survey efforts.



Looking downstream at P1 survey site. Platypus have been sighted here by local residents, but not during survey efforts.



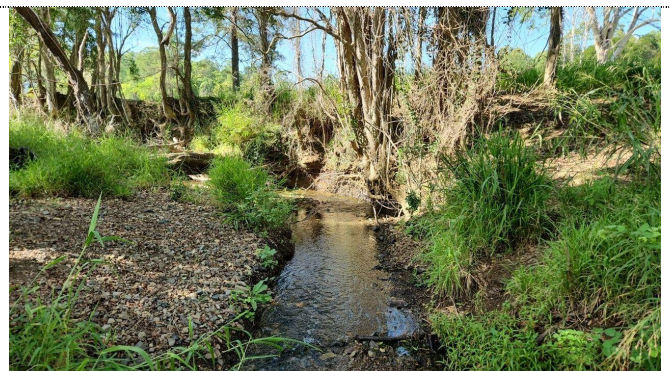
Looking downstream at P2 survey site. Overgrown grasses are hiding the undercut creek bank. A rakali was observed foraging in this pool.



Looking upstream at P2 survey site, showing overgrown exotic grasses hiding the creek bank.



Looking upstream at P3 survey site, showing vegetation overhanging undercut creek banks.

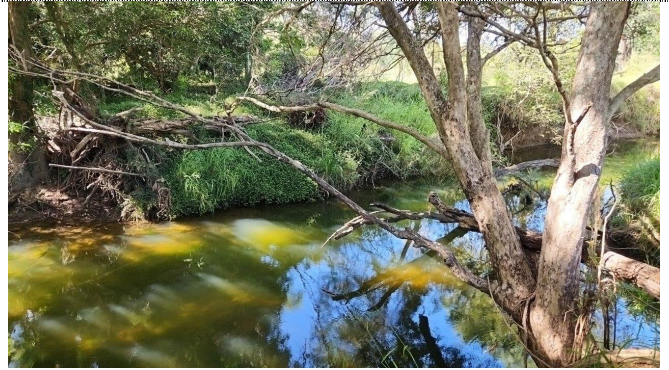


Looking downstream at P3 survey site, showing riffle zone

connecting downstream pools with undercut banks and overgrown roots with upstream pools.



Looking downstream at P4 survey site, showing woody debris and undercut banks indicating platypus burrowing habitat. Platypus have been sighted here by local residents, but not during survey efforts. A rakali was observed foraging in this pool.



Looking upstream at P4 survey site, showing woody debris and undercut banks indicating platypus burrowing habitat. Platypus have been sighted here by local residents, but not during survey efforts. A rakali was observed foraging in this pool.



Looking upstream at P5 survey site, showing woody debris along banks. Eastern water dragons were observed at this pool.



Looking downstream at P5 survey site, showing tree roots overhanging undercut creek bank indicating platypus burrowing habitat.

6 Recommendations

This study was unable to confirm the ongoing presence of platypus as no individuals were observed during the assessment period, however, community records and video captured by a member of the public indicate that platypus are present within Gutchy Creek at the boundary of LotPlans 64RP152212, 63RP158437 and 62RP158437. The platypus are likely to be foraging further upstream and downstream of the survey reach, which may have made observing them in this assessment difficult, particularly if the population density is low.

The study reach was found to be in a moderate to good condition but will need ongoing monitoring and management to maintain a range of instream and riparian features to ensure there are complex habitats (food, shelter and nesting/burrow sites) for resident platypus populations.

Based on this assessment, the impacts to the platypus as a result of the playground removal and shed construction at the Glenwood Community Centre are likely to be low. Recommendations in regard to proposed construction activities at Glenwood Community Centre, and/or future developments:

- If stockpiling old wood chip based soft fall prior to removal from site, stockpiles must be placed at least 50 m away from Gutchy Creek to prevent contamination of the watercourse during heavy rain events.
- Whenever possible, keep heavy vehicles and machinery at least 10 m from the watercourse to minimise the risk of crushing potential platypus burrows in the vicinity.
- If concrete footings for the playground posts are substantially large and will require a moderate amount of excavation to remove them, consider leaving the footings in place and covering them with the new concrete slab if possible, to minimise the risk of impacts to potential platypus burrows in the vicinity.
- Undertake construction works between 7.00 am and 5.00 pm to minimise disturbance to platypus during main foraging activity periods.
- It is unlikely that the works will uncover platypus burrows, however, should a platypus be uncovered during the earthworks, then all construction activities must cease, and the Department of Environment and Science (DES) must be notified for direction on management of the animals, as there are no licensed and experience platypus wildlife carers within the region. The hotline phone number for DES is 1300 130 672 and select menu option 1.

Several recommendations are presented to ensure there is a sustainable and ongoing presence of these aquatic fauna. They are:

- Ongoing monitoring and removal of build-up of instream rubbish and submerged obstacles;
- Control invasive riparian weeds;
- Promote native species recruitment via revegetation and restoration programs;
- Retain large woody debris to create complex aquatic habitats;
- Maintain a healthy riparian zone and protection of the physical bed and banks to provide important platypus burrow habitat along the study area;
- Implement a tilapia control program to minimise impacts on the platypus caused by competition, creek bed modification during nest building, and territorial aggressiveness during the tilapia breeding season; and
- Monitor commercial industries adjacent to Gutchy Creek to prevent point source pollutions entering the waterway potentially resulting in injury or lethal outcomes for fish, turtles and platypus.

Other community and conservation recommendations include:

- Continue platypus surveys within the study area and more broadly within the Gutchy Creek catchment to better understand the extant and number of platypus; and
- Promote and foster community monitoring of platypuses in Gutchy Creek through national, state and local level programs such as the Australian Platypus Conservancy and citizen science projects.

7 References

- Bino, Gilad & Kingsford, Richard & Archer, Michael & Connolly, Joanne & Day, Jenna & Dias, Kimberly & Goldney, David & Gongora, Jaime & Grant, Tom & Griffiths, Josh & Hawke, Tahneal & Klamt, Melissa & Lunney, Daniel & Mijangos, Jose & Munks, Sarah & Sherwin, William & Serena, Melody & Temple-Smith, Peter & Thomas, J. & Whittington, Camilla. (2019). The platypus: evolutionary history, biology, and an uncertain future. *Journal of Mammalogy*. 100. 308-327. 10.1093/jmammal/gyz058.
- Cann, J., 1998. Australian Freshwater Turtles. Beaumont Publishing, Singapore.
- Grant, T., Grigg, G, Beard, L and Augee, M. (1992). Movement and Burrow Use By Platypuses, *Ornithorhynchus anatinus*, In The Thredbo River, New South Wales. Platypus and Echidnas.
- Grant, T.R., Temple-Smith, P.D. 1998. Field biology of the platypus (*Ornithorhynchus anatinus*): Historical and current perspectives. *Philosophical Transactions of the Royal Society B: Biological Sciences* 353 (1372) , pp. 1081-1091
- Grant, T.R., Temple-Smith, P.D. 2003. Conservation of the platypus, *Ornithorhynchus anatinus*: Threats and challenges. *Aquatic Ecosystem Health and Management* 6 (1) , pp. 5-18
- Hamann, M., Schauble, C., Limpus, D.J., Emerick, S., Limpus, C.J., 2004. The Burnett River snapping turtle, *Elseya sp.* [Burnett River], in the Burnett River Catchment, Queensland, Australia. Brisbane.
- Hamann, M., Schauble, C.S., Emerick, S.P., Limpus, D.J., Limpus, C.J., 2008. Freshwater turtle populations in the Burnett River. *Memoirs of the Queensland Museum* 52, 221–232.
- Hawke, T., Bino, G., Kingsford, R.T., Platypus: Paucities and peril. A response to: Limitations on the use of historical and database sources to identify changes in distribution and abundance of the platypus, *Global Ecology and Conservation* (2020), doi: <https://doi.org/10.1016/j.gecco.2019.e00857>.
- Serena, M., Thomas, J.L., Williams, G.A., Officer, R.C.E. 1998. Use of stream and river habitats by the platypus, *Ornithorhynchus anatinus*, in an urban fringe environment. *Australian Journal of Zoology* 46 (3), pp. 267-282



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