The use of citizen scientists to confirm the presence of platypus (*Ornithorhynchus anatinus*) in north-west Sydney.

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Key Points

- Platypus are an elusive species. The population of platypus in Sydney is not well studied, not well documented and poorly acknowledged. The aim of this project was to engage with the local community to confirm the presence of platypus in north-west Sydney.
- 18 sites in the Cattai and Little Cattai Creek catchment were identified as possible platypus hotspots.
- Environmental DNA sampling was conducted in June 2020. Eight out of 18 sites contained platypus DNA which confirmed the presence of platypus in the north-west of Sydney.
- Providing citizen scientists the opportunity to take ownership in collecting data and contributing to the project allowed the community to connect with the waterways and become advocators for the protection of these urbanising waterways.

Abstract

The platypus is an elusive species. Traditionally they have been hunted for their fur and now face several threats including drought, pollution and like many of our Australian icons, habitat loss from urbanisation. Sydney is undergoing rapid urbanisation. The population of platypus in Sydney is not well studied, is not well documented and poorly acknowledged. The aim of this project was not only to confirm the presence of platypus in the Cattai and Little Cattai Creek catchments in north-west Sydney but to get the community excited and engaged with waterway health using the platypus as an umbrella species.

Working with a local volunteer community environment group, Cattai Hills Environment Network, a media campaign was conducted for the wider community to identify possible 'hotspots' which resulted in the mapping of 18 sample sites.

Community members were recruited as citizen scientists to conduct simple environmental DNA (eDNA) sampling over a weekend in June 2020. Samples at eight out of the 18 sites contained platypus DNA which confirmed the presence of platypus in the north-west of Sydney.

Using citizen scientists, lay members of the community, to be a part of this project, to take ownership in collecting data and contributing to the project allowed the community to connect with the waterways. The more that the community connect with the waterways the more they will work and advocate to protect it. This project could be adapted more broadly, not only for platypus in Sydney, but as a template of a successful citizen scientists project.

Keywords

Citizen Scientists, Environmental DNA, eDNA, platypus, urban ecology, community groups, Hawkesbury Nepean Catchment.

Introduction

Arguably the worlds strangest creature, with a bill like a duck, a tail like a beaver and a mammal that lays eggs. The platypus (*Ornithorhynchus anatinus)* (figure 1) is one of many Australian iconic species. The platypus is an elusive species which inhabits waterways on east coast of Australia and Tasmania (Serena et al. 2014; Bino et al. 2019 & Hawke et al. 2019) and are known to occupy urbanised waterways (Serena et al. 2014). Platypus play an important role in the food chain of aquatic ecosystems.

Figure 1. A platypus in the Hawkesbury Nepean Catchment 27th March 2021 (Photo: Michelle Ryan)

The platypus has been traditionally hunted for their fur and now face a number of threats including drought, pollution and of course, like many of our Australian icons, habitat loss from urbanisation (Bino et al. 2019). Sydney is undergoing rapid urbanisation. The population of platypus in Sydney is not well studied, is not well documented and it is generally accepted that there is no viable platypus population in the Sydney Basin, especially in the north-west of Sydney.

The Cattai and Little Cattai Creek catchment in north west of Sydney is an area undergoing rapid development. Cattai Creek Catchment is part of the North West Priority Growth Area in the new Central River City area under the Greater Sydney Commissions Greater Sydney Region Plan – A Metropolis of Three Cities (NSW Greater Sydney Commission 2018) (figure 2). This priority growth area is expected to add approximately 33,000 additional homes to the area by 2026 (NSW Department of Planning and the Environment 2017).

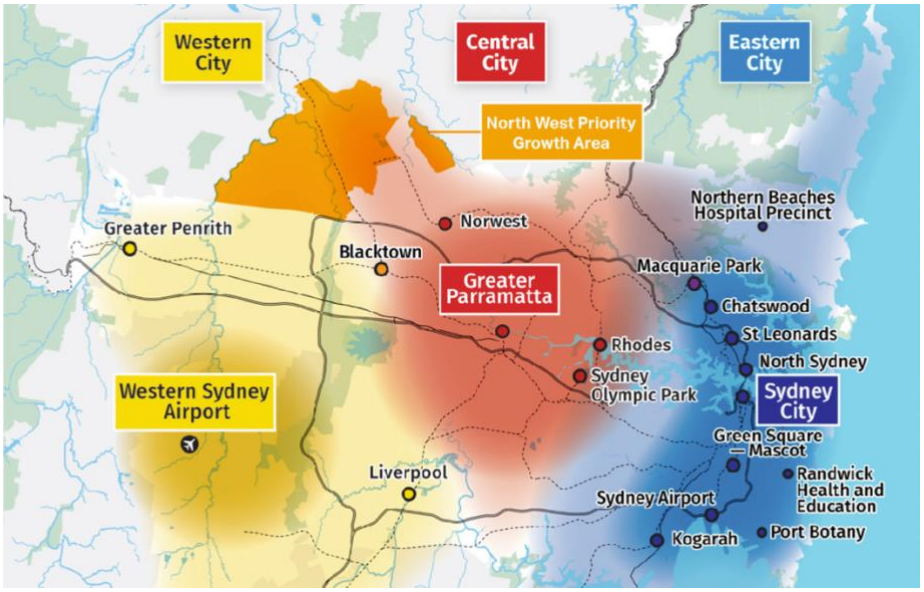

Figure 2. 'A Metropolis of three cities' showing the North West Priority Growth Area (NSW Department of Planning and the Environment 2017)

In 2016 a local conservation group was formed, Cattai Hills Environment Network (CHEN). This group aims to educate the local community and advocate for the health of the environment in the north-west of Sydney. CHEN received a number of anecdotal reports of platypus in their area and wanted to get their members and local community involved in protecting these iconic species. The platypus is an excellent umbrella species for waterway health. They are a great species to use to get the community engaged with local environmental issues and become citizen scientists.

Citizen scientists are members of the general public who collect, analyse or report data that is used in scientific research (Kobori et. al. 2016). There are many benefits to citizen scientists collecting data and participating in research alongside scientists. For the citizen scientists it may improve their knowledge, they may gain new skills, engage with other members of the community creating a more resilient community, getting people out, connecting with nature and alter behaviour and attitude towards environmental issues (Santori et al. 2020). For scientists, working with citizen scientists may allow for larger datasets to be gathered (Poisson et al. 2019), sampling conducted relatively inexpensive and citizens have a range of skills and knowledge they can contribute to the research.

The aim of this project was:

- to confirm the presence of platypus in the Cattai Creek and Little Cattai Creek catchments in north-west Sydney, and
- use citizen science to get the community excited and engaged with waterway health using the platypus as an umbrella species.

Methods

Site Selection

In order to identify potential sites a number of reporting websites were consulted including BioNET, Australian Platypus Monitoring Network, PlatypusSPOT and Platypus Conservation Initiative Platypus Observations. A media campaign was run in local media and social media (figure 3) to connect with locals who have sighted platypus in the Sydney basin specifically in the Cattai and Little Cattai Creek Catchments (figure 4) to report the location to us. We had a number of landholders and fisherman report sightings. From this, we mapped out 18 hot spots to conduct our study in 9 creeks in the Cattai and Little Cattai Creek catchments.

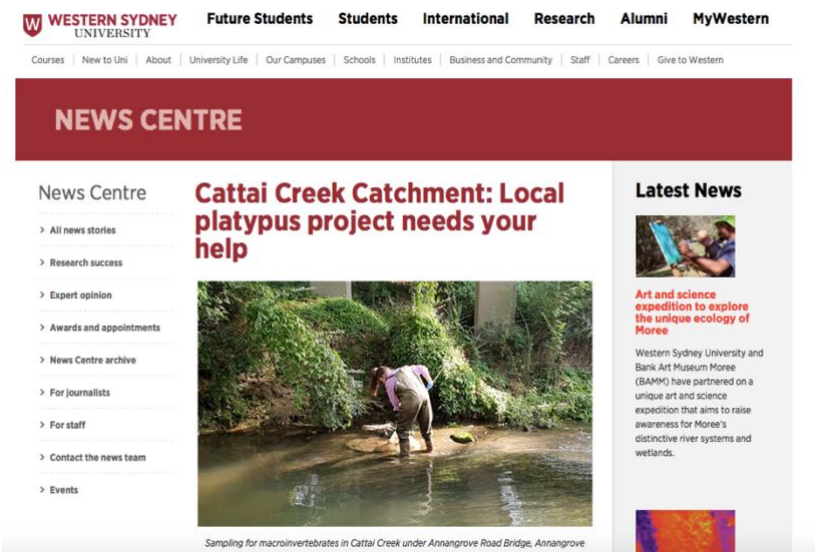

Figure 3: Screenshot of an article used for the media campaign.

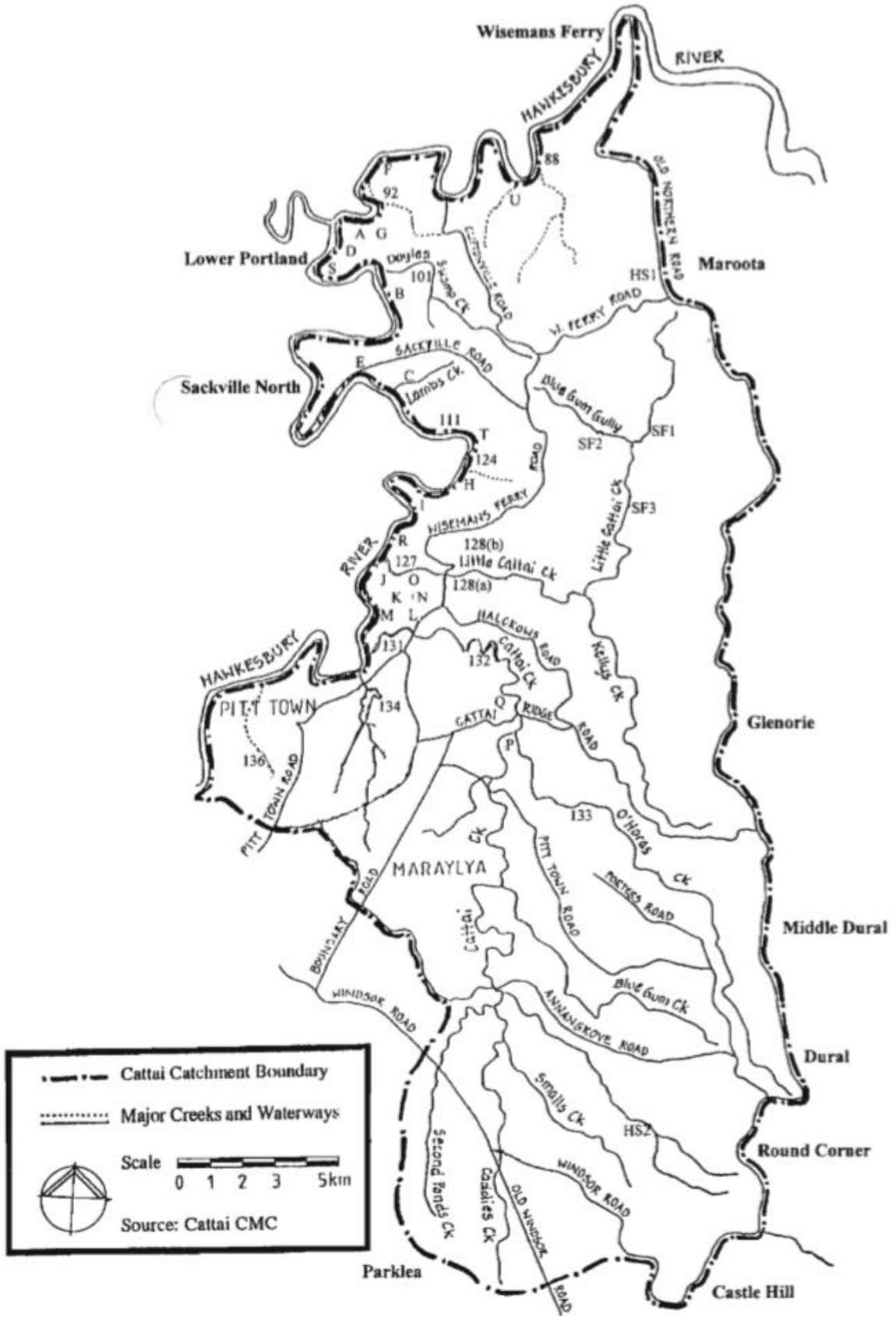

Figure 4. Cattai and Little Cattai Creek Catchment (Cattai Catchment Management Committee (1998)

Sampling methods

In order to engage with the community we recruited 14 citizen scientists from the local area to undertake some of the sampling (figure 5). Using citizen scientists, lay members of the community, to be a part of this project, to take ownership in collecting data and contributing to the project allows the community to connect with the environment. The more that they connect with the environment the more they will work and advocate to protect it.

Figure 5. Citizen scientists and Western Sydney University students undertaking eDNA sampling in Cattai Creek Catchment, June 2020 (Photos by Jacqueline Britton, Sue Martin and Michelle Ryan).

The sampling for this project was utilising Environmental DNA (eDNA). As we were working with community members we needed to use simple sampling techniques, which eDNA was well suited for. As species move within or encounter waterways their DNA is shed and left behind in the water column. eDNA (with and without citizen science) has been used successfully to determine not only the presence of platypus (Lugg et al. 2016; Brunt et al. 2020) but other species worldwide, such as the invasive pygmy mussel in Spain (Miralles et al 2016) and the great crested newt (*Triturus cristatus*) in the UK (Biggs et. al. 2015).

Sampling was conducted from June 12th – 15th 2020. At each site eDNA water samples were taken at the creeks edge, between 60ml and 750ml of creek water was filtered through a 0.22μm filter. The filters were chilled on ice, stored at 4°C and sent to EnviroDNA, Parkville, Victoria on ice for Real-time quantitative Polymerase Chain Reaction (qPCR) analysis (Griffiths, Licul & Weeks 2020).

Results were considered positive if there were two or three positive PCRs (out of six or nine assays for each site respectively) and equivocal if only one (of six) or two (of nine) returned a positive result (Griffiths, Licul & Weeks 2020).

Results and Discussion

Eight out of the 18 sites had platypus DNA detected (table 1). Three sites had a positive result and five had an equivocal result.

Table 1 – Creeks that had positive and equivocal results for platypus eDNA in June 2020.

Creek	Suburb	Result
Little Cattai Creek	Cattai	Equivocal
Little Cattai Creek	Cattai	Positive
Cattai Creek	Maraylya	Equivocal
Cattai Creek	Cattai	Equivocal
Cattai Creek	Annangrove	Equivocal
Cattai Creek	Maraylya	Positive
Blue Gum Creek	Annangrove	Positive
O'Haras Creek	Kenthurst	Equivocal

Using citizen scientists we were able to build upon previous anecdotal sighting information and confirm the presence of platypus in the Cattai and Little Cattai Catchments using eDNA. Scientists partnering with local community groups and citizen scientists is a great way to collect meaningful scientific data which can be used to guide local environmental plans and policies and can contribute to the greater scientific knowledge (Adler et. al. 2020). Santori et. al. (2020) found that citizen scientists who participated more often in citizen science were more knowledgeable about the research issues. They found a behaviour change in citizen scientists who participated in their research project. It was found that after learning about the current decline in turtle populations, the citizen scientists adopted more turtle friendly practices and that the changes in behaviour and attitude of the citizen scientists would likely have a positive impact on the conservation of Australian freshwater turtles.

Cattai Hills Environment Network aim to increase the local community, property owners and farmers knowledge about platypus and platypus threats was achieved. In addition to the knowledge gained by the participating citizen scientists, a media campaign was undertaken to share the findings more broadly and increase public awareness. Media articles highlighted to Sydney's general population that there are platypuses in local urbanised creeks and we need to work to protect these ecosystems (figure 6). CHEN have begun a number of educational campaigns to increase environmental awareness. Through education the intention is to inspire greater conservation efforts for platypus and waterways in north-west Sydney. This education may improve conservation of the platypus in north-west Sydney.

Figure 6. ABC news article outlining the findings of the citizen science study conducted by Western Sydney University and Cattai Hills Environment Network in June 2020.

There has been a lack of data on platypus populations in the local area. This project has provided a greater understanding of their current distribution in north-west Sydney. Further research is currently being undertaken in habitat preferences, food preferences and the health of this population of platypus hanging on in a rapidly urbanising Sydney.

Conclusion

Platypus are present in the Cattai and Little Cattai Creek catchments in the north-west of Sydney. Citizen Scientists played a vital role in this project, from helping to identify sites to collecting eDNA water samples. The Cattai Creek catchment is a catchment that is under pressure from growing urbanisation, so it is important that the presence of platypus is acknowledged, monitored and a plan is put into place to conserve this population.

Acknowledgments

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