IAN BURNS		**OBJECT**	Submission ID: 217898
Organisation:	*N/A*	Key issues:	*Social impacts,Land use compatibility (surrounding land uses),Other issues*
Location:	*New South Wales 2577*		
Attachment:	*Attached overleaf*		

Submission date: 11/24/2024 11:16:15 PM

Submission and research report attached

[redacted]

24/11/2024

Dear Sir /Madam

My wife and I reside on a 62 HA rural property approx. 11.2KM from the proposed plant in a south easterly direction.

General comments

There are a number of significant shortcomings with this proposal and the planning process to date . These have been covered by the over 140 speakers against the proposal at the IPC meetings and the over 1600 (at last week) written objections. These objections cannot be passed over and ignored.

It appears to a layman that as the NSW government has specific plastic recycling targets it was wanting to go ahead with this proposal no matter what. Plastic recycling experts have described this proposal as a "pie in the sky" plan. It also appears the Planning Dept is bereft of any expertise in the plastic recycling industry from their inability to ask the tough questions early and tell the proponent -wrong site -wrong plant. The plastic recycling industry senior executives I have spoken to, described it as "somewhat incredible" this proposal is being seriously considered and consuming the valuable resources of all those involved in the planning process.

The only party benefiting from this entire process is GHD who have done and continue to do what appears to be an extremely poor job. The Commissioners have heard from speaker after speaker of GHD failings. For all other parties - the community , the NSW taxpayer and the proponent, the whole exercise has been at and continues to be at great cost. In addition, there is the anguish this proposal has caused from that fateful letter placed into the letterboxes of some of the affected residents on Christmas eve 2020 and now the alarm felt throughout the Southern Highlands that is incredibly traumatic. The passion of the speakers at the IPC meetings was real, the tears were real, how the commissioners sat there with professional detachment in the presence of such hurt and anxiety was a credit to them.

The proponent has been led down the garden path on the feasibility of the proposed plant in this location by GHD from day one. GHD should know better and offered the frank advice that this is the wrong site and the size of the plant is unrealistic . No Matter what GHD say, the community consultation process has been very poor and as a result the community is outraged and trust in the NSW Government and the planning approval process has seriously been undermined. Why is it up to the residents of the Southern Highlands to say the obvious, wrong location, wrong plant and highly likely the wrong inexperienced and untested proponent?

Microplastics

To top it off, currently the plastic recycling processes used in the recycling industry are seriously flawed, with literally millions and millions of micro plastic particle being released into the environment along with a wide variety of dangerous chemicals.

If it was as easy as running the factory at a negative air pressure and filtering any air and water that leaves the plant, why is that not working in other locations. What about the micro plastics that will leave the building on transport vehicles or attached to staff? How do you provide negative air pressure with opening roller doors that are large enough to admit a large truck, there is not a ventilation system installed in a factory on the planet that can manage the air volume needed.

Who would work in such a high risk environment and the proposal to have school children visit the site is preposterous.

The IPC Commissioners heard from parent after parent, all are hugely concerned about the potential impact of this plant and the released microplastics on the health of their children. The plastics recycling industry is possibly more dangerous than the plastics manufacturing industry, so why should it exist ? Some say we have been conned by the plastics industry and recycling is actually greenwashing the plastics industry. The truth may be to save ourselves from the repercussions of micro plastics is to cut plastics out period! However, that is a growing argument for the near future.

With the dangers of microplastics to all life forms including humanity now increasingly documented in peer reviewed research reports, to even consider this plant within the Sydney's drinking water catchment and not applying the Neutral or Beneficial Effect Test is clearly a serious error. On this alone this proposal should have been denied by the NSW Government from day one.

Current PFOS state of the Wingecarribee River at Berrima.

Is the Sydney water catchment and water supply perfect now? Unfortunately, not , the current Australian Drinking Water Guidelines for PFOS is 70ng/L. The proposed new guidelines currently being discussed with submissions closed on the 22/11/2024 but yet to be adopted is 4ng/L.

We know WaterNSW has issues with PFAS (this includes PFOS) levels in Medlow and Greaves Creek dams in the Blue Mountains, with those water storages now removed from supplying water to Greater Sydney.

Key to this proposal is understanding the existing levels of PFOS in the Wingecarribee River . To gain an insight I would like to share a recently released scientific report (attached) that provides insight to the current PFOS levels of the Wingecarribee River. This report was brought to my notice by Dr Ian Wright from Western Sydney University.

The research report is the first on the accumulation of PFOS in Platypus in NSW. Platypi accumulate PFOS in their livers from the food it consumes made up by a variety of insect larvae, yabbies , small fish and worms. Platypi find food amongst rocks , leaf litter and other material on the bottom of a river or creek.

The results compare the part per micro g/kg (ug/kg) of PFOS as analysed from livers from recovered deceased Platypus from 9 locations in NSW. The results are tabled on page 4 of the report.

Unfortunately, the Platypus from Wingecarribee River at Berrima recorded the 3rd highest level of liver PFOS concentration, recording some 390 ug/kg compared with the Thredbo River at Jindabyne 3 ug/kg , the Bellingen River at Bellingen 4 ug/kg and Taronga zoo Sydney under 1ug/kg. Shockingly, the highest was the Hunter River at Morpeth 1200 ug/kg and Ourimbah Creek, Ourimbah at 740 ug/Kg.

Why is this information relevant to this proposal?

a/ It is extremely naïve to consider that no micro plastics will escape the facility either in the air, on vehicles and vehicle tyres, wastewater and stormwater.

b/ Negatively charged micro plastics are known to contain and attract PFAS chemicals

c/ The site is located adjacent to riparian zones of the Wingecarribee River.

d/ The wastewater from the plastic washing after " processing" will enter the local sewerage system and the storm water will enter the local stormwater system then on to the Wingecarribee River and Greater Sydney's drinking water.

This research report proves the Wingecarribee River already has a significant PFOS problem and I urge the commissioners to adopt the Precautionary Principle.

This plant, on this site, poses a significant potential risk to the Greater Sydney water supply and I urge the Commissioners to recommend against this proposal.

Ian Burns

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SHORT RESEARCH AND DISCUSSION ARTICLE

First report of accumulation of perfluorooctane sulfonate (PFOS) in platypuses *(Ornithorhynchus anatinus)* in New South Wales, Australia

Katherine G. Warwick[1] · Ian A. Wright[1] · Jessica Whinfield[2,3] · Jason K. Reynolds[1] · Michelle M. Ryan[1]

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Abstract
The platypus (*Ornithorhynchus anatinus*) is a semi-aquatic monotreme that occupies a high trophic position in the freshwater ecosystems of eastern mainland Australia and Tasmania. Platypuses are continuously exposed to anthropogenic contaminants including perfluorooctane sulfonate (PFOS). This study examined PFOS concentrations in the livers of deceased platypuses (eight wild; one captive) that were opportunistically collected across NSW over a two- and a half-year period. There was a large variation in PFOS concentrations, ranging from < 1 μg/kg to 1200 μg/kg. This study presents the first report of PFOS contamination in platypuses, revealing their PFOS levels are broadly similar to those found in river otters (*Lutra canadensis*) and lower than those in American mink (*Mustela* vison), both which occupy similar ecological niches in freshwater systems. This study raises concerns about the impact of PFOS on platypus health.

Keywords Aquatic ecology · Bioaccumulation · Contamination · PFOS · Pollution · Platypus

Introduction

The platypus (*Ornithorhynchus anatinus*) is endemic to many rivers and streams in eastern Australia. However, there are growing concerns for their conservation with reports of declining abundance and distribution, including local extirpations (Woinarski et al. 2014). The species is recognised as having a declining population and is listed as "Near Threatened' by the International Union for Conservation of Nature (IUCN) (Woinarski and Burbidge 2016). Platypuses are vulnerable to many impacts associated with human activity including hydrological changes, decline in water quality, increase in litter and discarded fishing line, illegal opera house nets (yabby traps) and water contamination (Grant and Temple-Smith 2003; Serena et al. 2016). Anthropogenic contaminants have the potential to enter waterways and disrupt aquatic ecosystems. Serena and Pettigrove (2005) found a negative correlation between heavy metal contaminants in sediment and platypus population abundance and a previous study by Munday et al. (2002) found persistent organic pollutants in platypus. One anthropogenic persistent waterway contaminant is perfluorooctane sulfonate (PFOS) (Butt et al. 2010) a homologue of PFAS and is defined by having an eight-carbon fluorocarbon chain with a sulfonate acid functional group. PFOS does not readily biodegrade and can persist in the environment for years (Nicole 2020) and has been reported to enter aquatic food chain and potentially bioaccumulate (Kannan et al. 2002; O'Rourke et al. 2022, 2024; Well et al. 2024). To date there have been no studies that examined PFOS concentrations in platypus tissue.

Previous studies of European otters (*lutra lutra)* (O'Rourke et al. 2022, 2024), Northern American river otters (*Lutra canadensis)* and mink (*Mustela vison*) (Kannan et al. 2002) all of which occupy a similar ecological niche, have examined PFOS concentration in liver samples, as such

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SignificanceStatement

This study is the first investigation of PFOS in platypuses *(Ornithorhynchus anatinus).*

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this study also chose to analyse liver samples for comparison. Health concerns for aquatic wildlife from exposure to high concentrations of PFOS include increased liver weight, decreased thyroid function, decreased immunity and neurological disorders (Keller et al. 2012). There are no current detected concentrations that are considered safe for platypus health, however draft guidelines by the Australian government suggest that exposure directly from their diet should not exceed 3.1 μg/kg of wet weight (combined PFOS and PFHxS concentrations) (DCCEEW 2022).

Theoretically, platypuses may be exposed to high levels of PFOS. PFOS can bioaccumulate, and the food source of platypuses, aquatic invertebrates, have been reported to contain substantial PFOS levels (Ahrens and Bundschuh 2014). Platypuses consume up to 21% of their body mass daily, and up to 36% of body mass in lactating females, of aquatic invertebrates (Thomas et al. 2020). Additionally, it is known that aquatic environments have the greatest risk of PFOS contamination, due to surface run off and effluent discharge (Australia and New Zealand guidelines for fresh and marine water quality n.d.). Many studies have documented the accumulation of PFOS in vertebrate species, however these studies focused primarily on livestock, or marine mammals and birds (Ahrens and Bundschuh 2014; Foord et al. 2024). For example, a recent study in Australia examined little penguin (*Eudyptula minor)* scats, eggs and plasma and found 14 homologue of PFAS with PFOS being the most commonly detected (Well et al. 2024). This study found a positive correlation between PFOS concentration and urbanised environments (Well et al. 2024).

American mink and river otters are two of the only freshwater mammal species that have been assessed for PFOS levels, and both are regarded as sentinel species for detecting environmental contaminants in aquatic systems (Kannan et al. 2002). They also occupy a similar ecological niche to the platypus: all three live in freshwater environments and are predators at the top of the aquatic ecosystem. Toxicology studies in mink and otters have recorded very high liver PFOS concentrations (20–5140 μg/kg and 25–994 μg/kg, respectively) (Kannan et al. 2002), with investigations in mink reporting some of the highest PFOS concentrations detected in freshwater sentinel species (Ahrens and Bundschuh 2014). The biomagnification of PFOS by mink was confirmed by a controlled captive feeding study (Ahrens and Bundschuh 2014). The aim of this study was to determine if PFOS were present in the livers of platypuses and if so, at what concentration. If platypuses are consuming PFOS directly from their food source, then it would be expected that platypuses with a lower TVI (higher body fat percentage) would have a higher concentration of PFOS owing to a larger dietary intake compared with platypuses with a higher TVI (lower body fat percentage) (Macgregor et al. 2016). This was achieved by opportunistically collecting and testing samples from incidentally deceased platypuses from New South Wales (NSW).

Materials and methods

Platypus carcasses (n = 9) were collected between 2020 and 2023 from nine locations across NSW (Fig. 1). Of these, eight were from the wild and one from captivity. Liver samples were collected at the same time as necropsy was performed, which for four platypus carcasses (A, D, F and I) were performed within 24 h of death. Five of the platypuses (B, C, E, G and H) were stored in a -20 °C freezer for up to 10 months until a necropsy was performed. For each carcass, a gross necropsy and sample collection was performed at Taronga Zoo, Sydney, by a wildlife veterinarian. The following variables were recorded: Tail volume index (TVI), degree of decomposition, length (tip of bill to end of tail), weight, sex, and age (based on spur morphology) (Grant and Carrick 1978; Williams et al. 2012) (Table 1). A platypus stores approximately 50% of its total fat volume in its tail and as such is TVI is the current industry standard for assessing body condition (Macgregor et al. 2016). A TVI of 1 indicates high fat deposits in the tail and a TVI of 5 indicates emaciation. TVI is assessed by squeezing the edges of the tail together, the closer the edges are to touching each other, the lower the fat deposits in the tail.

Liver samples were used to test for PFOS due to previously published studies of European otters (*Lutra lutra*) and Northern American mink (*Mustela vison*) and river otters (*Lutra canadensis*) that also used liver (Kannan et al. 2002). Given that these species occupy a similar ecological niche, these results are comparable. The livers were wrapped in aluminium foil and stored at -20 °C prior to analysis. The samples were prepared for analysis at the Western Sydney University Hawkesbury Laboratory. Livers were freeze dried at -40 °C over two 18-h cycles using an Edwards Freeze Dryer Modulyo with a Pirani 501 vacuum gauge control. Freeze dried samples were then analysed at EnviroLab, Chatswood, Sydney, (National Association of Testing Authorities accredited) for concentrations of PFOS using solid phase extraction and liquid chromatography tandem mass spectrometry. Due to the freeze-drying process and minimum sample weight required for laboratory analysis (1 g), only a single replicate of liver could be obtained from each platypus. Duplicate samples and matrix spike recoveries were analysed at a frequency to meet or exceed NEPM requirements. The duplicate sample, relative percentage difference (RPD) and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

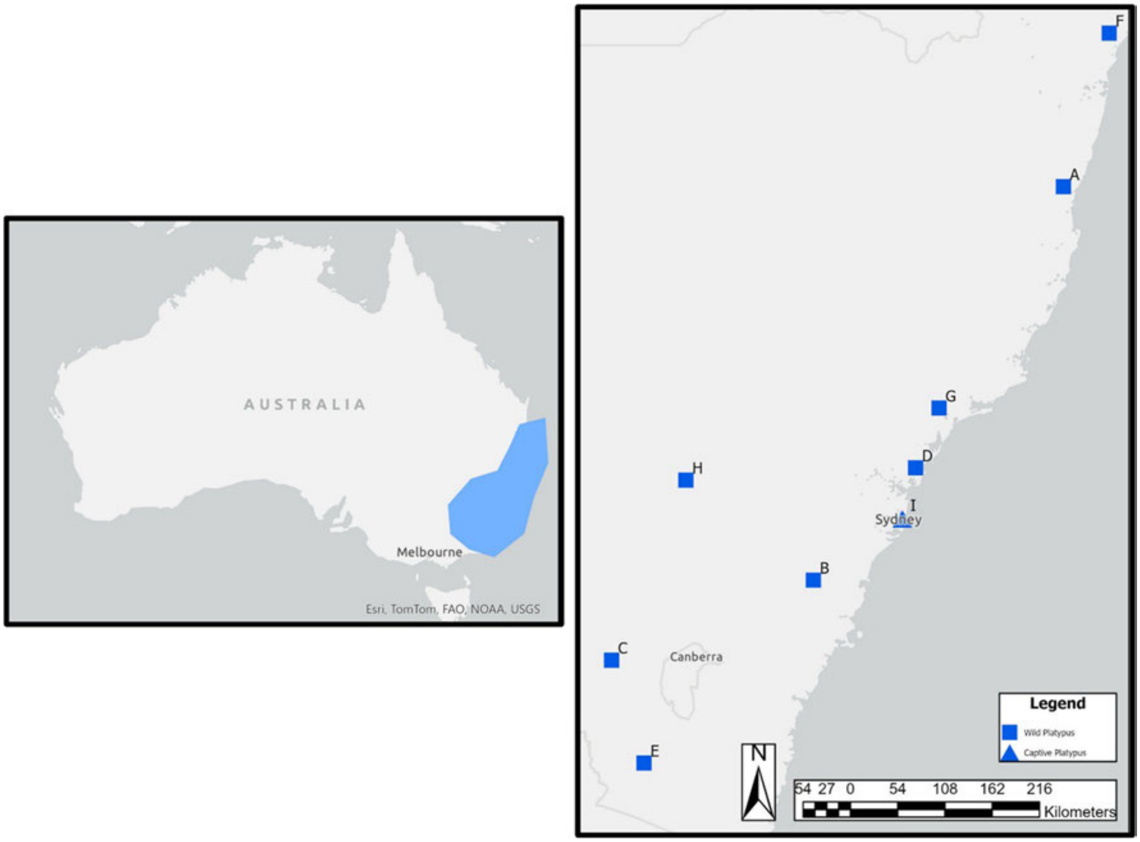

Fig. 1 Location of platypus carcasses collected across New South Wales, Australia

Results and discussion

This study detected concentration of PFOS in eight of the nine individual platypus livers, ranging from 4–1200 µg/kg. The only liver that did not result in detectable PFOS concentrations came from the only captive platypus in the study (Table 1). There are no guidelines on what constitutes safe concentrations of PFOS in wildlife.

In the case with the highest recorded concentration of PFOS (1200 µg/kg, platypus G) the location of origin had no reporting of water testing for PFOS nor is there any publicly available documentation of PFOS contamination based on the NSW Government PFAS Response website (DPI&RD 2024) and NSW EPA (NSW Epa 2024). However, in the upstream catchment (up to 110 km^2) of where the platypus was found, there is a wastewater treatment plant, and a regional airport. Additionally, a fire station was in the immediate vicinity of both this case and the case with the third highest concentration of PFOS (390 µg/kg, platypus B). Whilst this study did not investigate the source of PFOS contamination, research has shown increased concentrations of PFOS associated with airports, and firefighting locations including training facilities (Australian and New Zealand Guidelines fresh and marine quality n.d.; United Nations Environment Programme (2006). The only platypus in this study that had undetectable levels of PFOS was the captive platypus (I). This suggests that the provision of filtered water may reduce the likelihood of PFOS accumulation.

The results of this study show a negative relationship between liver PFOS concentration and body condition, as assessed by the Tail Volume Index (TVI) (Fig. 2). This study found that platypuses with the lowest TVI, and thus best body condition (D and G), had the highest concentrations of PFOS (Table 1). This observed negative relationship could be a result of platypuses in better body condition consuming a higher daily biomass, and therefore being exposed to a higher concentration of PFOS through their food source. This study found no relationship between PFOS concentration and age, sex, total body weight, and/or total body length.

A limitation of this study is that it was not possible to replicate or control external factors. Deceased platypuses were collected opportunistically from across NSW and therefore factors including location, water quality, age, sex, and degree of decomposition could not be controlled. Due to the nature of this sampling method, it was also not possible to have a control or reference sample, although given the widespread nature of PFOS it is unlikely that there is a wild platypus

Table 1 Summary of platypus data. TVI is defined in the methods and materials. Age refers to juveniles (< 12 months), sub-adults (13–24 months) adults (> 24 months)

Platypus	PFOS liver concentration (μg/kg)	Tail Volume Index (TVI)	Weight (grams)	Length (mm)	Sex, age	Wild/Captive	Cause of death	State of decomposition	Location (river, nearest township)
A	4	4	1105	480	Male, adult	Wild	Neurological disease, unknown aetiology	Fresh	Bellinger River, Bellingen
B	390	2	1420	520	Male, adult	Wild	Drowning due to fishing gear	Mild/moderate	Wingecarribee River, Berrima
C	10	3	1653	510	Male, adult	Wild	Drowning due to fishing gear	Mild/moderate	Tumut River, Tumut
D	740	1	671	370	Female, sub-adult	Wild	Open	Advanced	Ourimbah Creek, Ourimbah
E	5	2	682	400	Male, juvenile	Wild	Drowning due to fishing gear	Mild/moderate	Thredbo River, Jindabyne
F	19	3	430	318	Male, juvenile	Wild	Vehicle trauma	Fresh	Marom Creek, Marom Creek
G	1200	1	1170	460	Male, juvenile	Wild	Drowning due to fishing gear	Advanced	Hunter River, Morpeth
H	17	3	1578	540	Male, adult	Wild	Vehicle trauma	Mild/moderate	Unnamed Creek, Orange
I	< 1	3	728	395	Female, adult (26 years)	Captive	Pulmonary oedema, unknown aetiology	Fresh	Taronga Zoo, Sydney

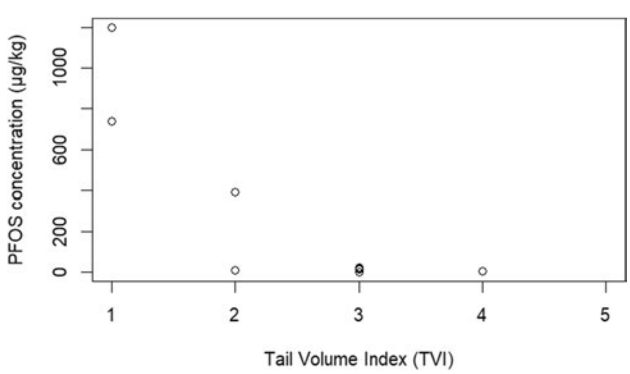

Fig.2 Relationship between Tail Volume Index (TVI) and PFOS concentration (μg/kg) in the liver

population that is completely unaffected by the synthetic chemical.

The results of this study show that platypuses are accumulating PFOS in very high concentrations, at comparable levels to those previously recorded in river otters, but less than what was previously recorded in mink (Kannan et al. 2002). Given the small sample size of this study, only observed concentrations of PFOS were reported on, further research should include statistical analysis to determine if a correlation between TVI and PFOS concentration could be determined and if so, what this means. Future studies should explore health impacts associated with exposure to PFOS and the direct and indirect bioaccumulation pathways.

Ethical approval

This project operated under Western Sydney University Biosecurity and Radiation approval (B14275), New South Wales National Parks and Wildlife Service Scientific permit (SL102542), and Taronga Conservation Society opportunistic sampling request agreement (R22D343).

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Author contributions Katherine G Warwick, Ian A Wright, Jason K Reynolds and Michelle M Ryan contributed to the study conception and design. Material preparations were performed by Katherine G Warwick and Michelle M Ryan. Data collections were performed by Katherine G Warwick, Jessica Whinfield and Michelle M Ryan. Analysis was completed by Katherine G Warwick and Michelle M Ryan. First draft of the manuscript was written by Katherine G Warwick and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data availability Data sets generated during the current study are available from the corresponding author upon reasonable request.

Declarations

Consent to participate Not Applicable.

Consent to publish Not applicable.

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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