ACT Healthy Waterways

Ridding Lake Tuggeranong of harmful algal blooms

franc.2025

October 2025

Ralph Ogden and the

ACT Healthy Waterways team

Options for restoring Lake Tuggeranong

August 2025

ACT Government

ACT Healthy Waterways

Healthy Waterways team

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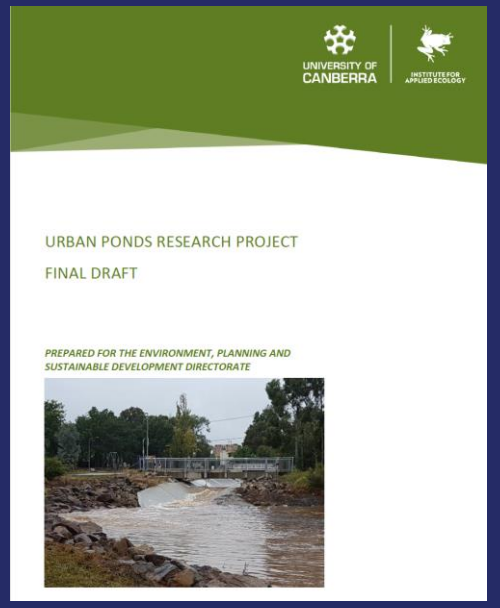
Acknowledgement

We wish to acknowledge the Ngunnawal people as traditional custodians of the land where we conducted this work and recognise any other people or families with connection to the lands of the ACT and region.

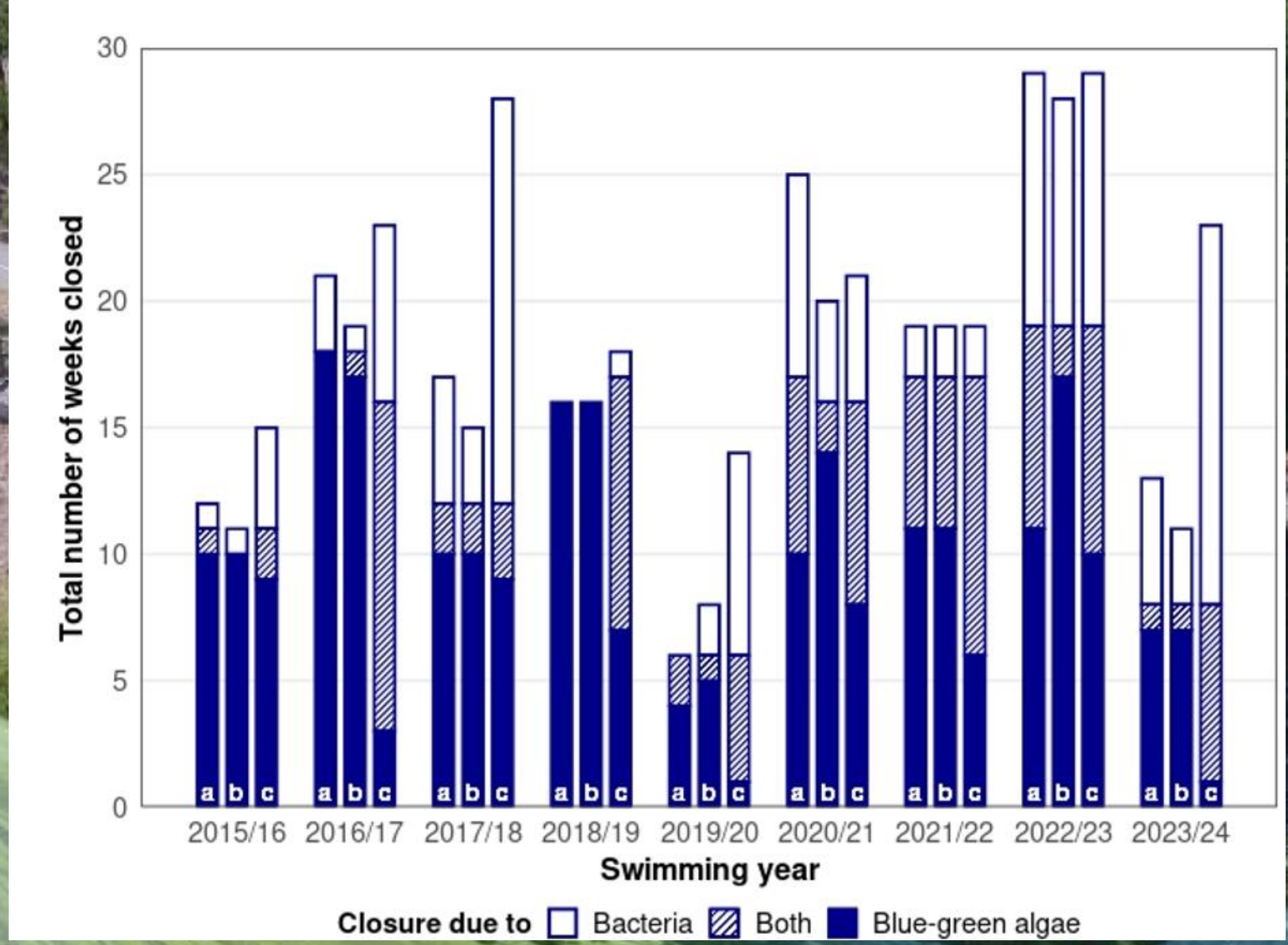
We also recognise Wonnarua Nation as traditional custodians of the land where we are meeting and pay our respects to their elders.

History of ACT Healthy Waterways

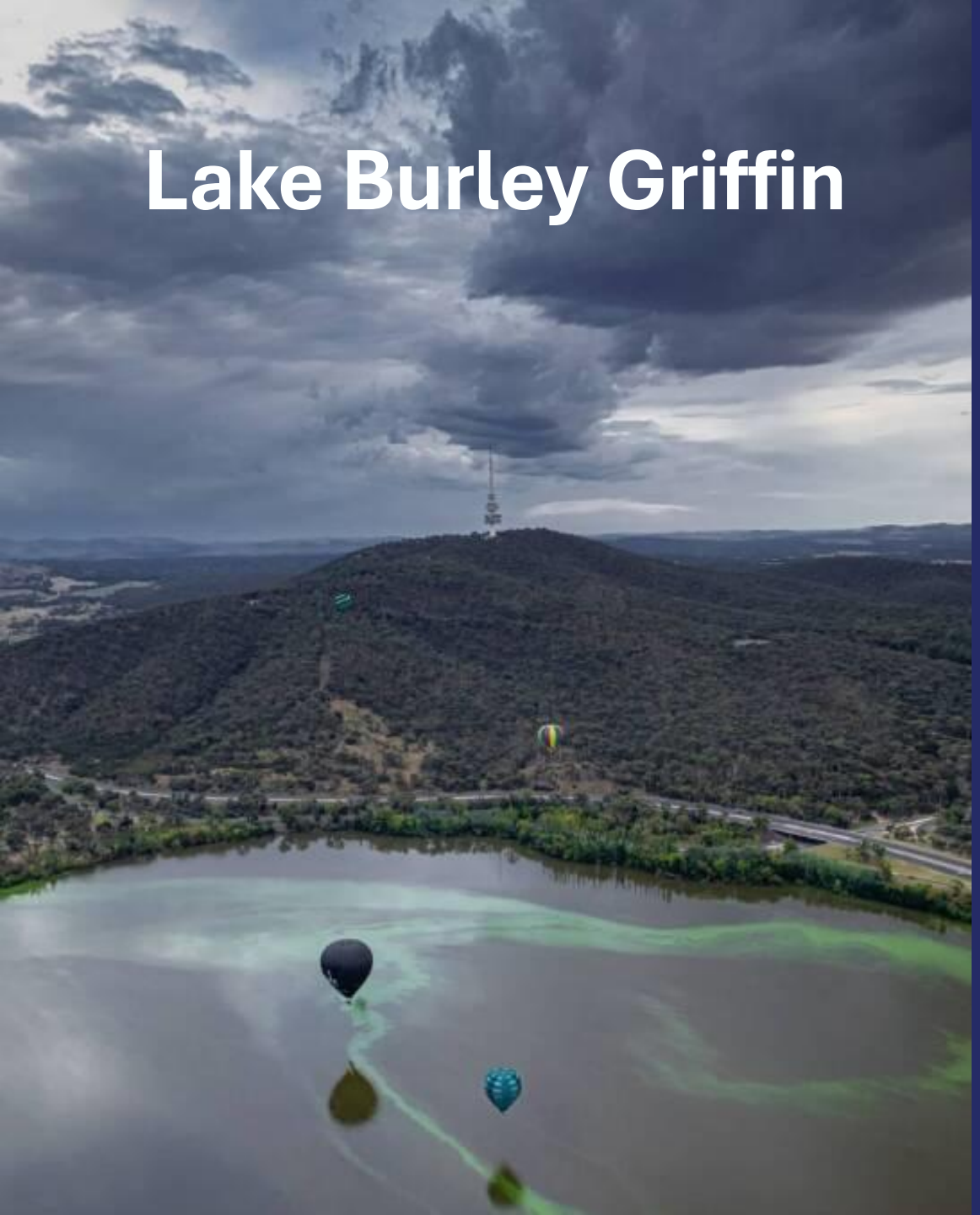
- 2014 – 2021: $94 million (Cwth/ACT)
  - Focus: Protecting Murrumbidgee River
  - But broad focus meant there was negligible observable improvement to any of Canberra's urban lakes!



Toxic algal blooms → health risk, smelly, unsightly



Lake Burley Griffin



Lake Ginninderra

Region
Locally Grown.

Breaking News

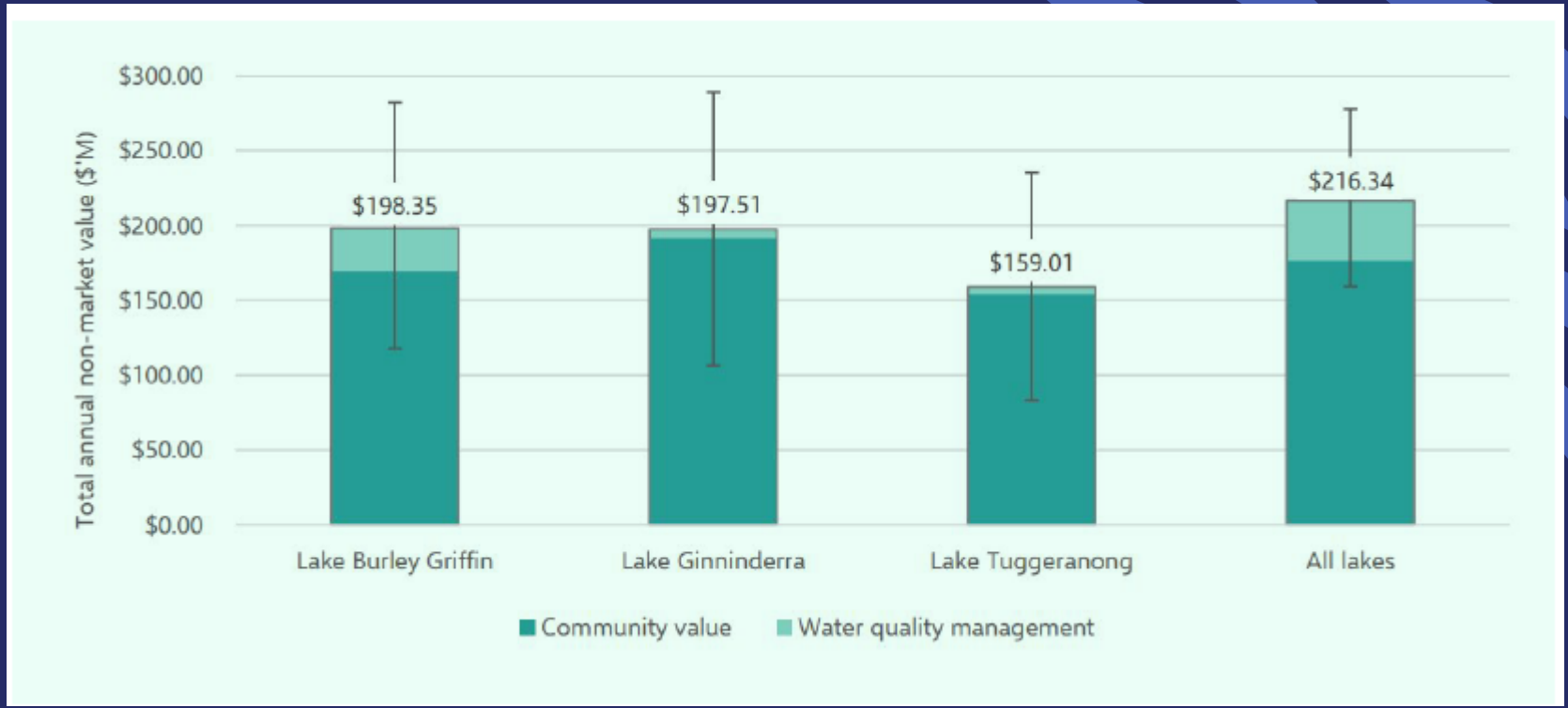
Narrow escape for Dalmatian pup prompts blue-green algae warning

17 September 2025 | By Nicholas Ward

Start the conversation

Value of urban lakes

- Community values 10x the value of the lakes for pollution mitigation
- Most ‘lake users’ are casual visitors who draw value from the amenity and facilities of the lake rather than use them for recreation



Natural Capital Economics (2023)

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Value of urban lakes

- A 2016 survey of >7000 people on lake values (Schirmer & Mylek, 2016): respondents valued in rank order:
  - walking with other people
  - picnics/barbeques
  - cycling and using playground areas
  - swimming in middle of the pack

- The 2018 ACT 'Better Suburbs' community survey (ACT Government, 2018):

  First recommendation (out of 14) was to increase funding for lakes, ponds, wetlands, stormwater and water quality.
  - More important than issues such as street trees, roads, footpaths and public libraries.

History of ACT Healthy Waterways

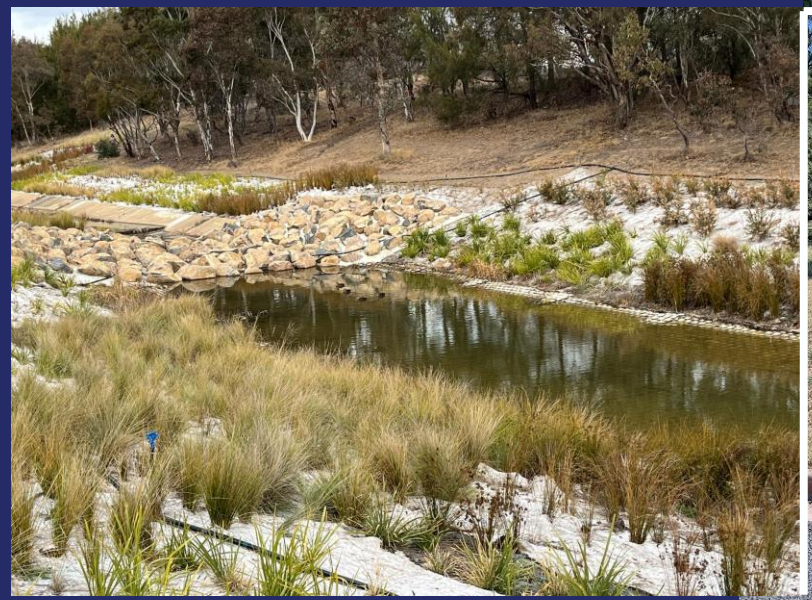
- 2014 – 2021: $94 million (Cwth/ACT)
- 2021 – 2025: $30 million (ACT)

Focus:

– creating plans for solving WQ problems in lakes

– improving water quality

– expanding management options



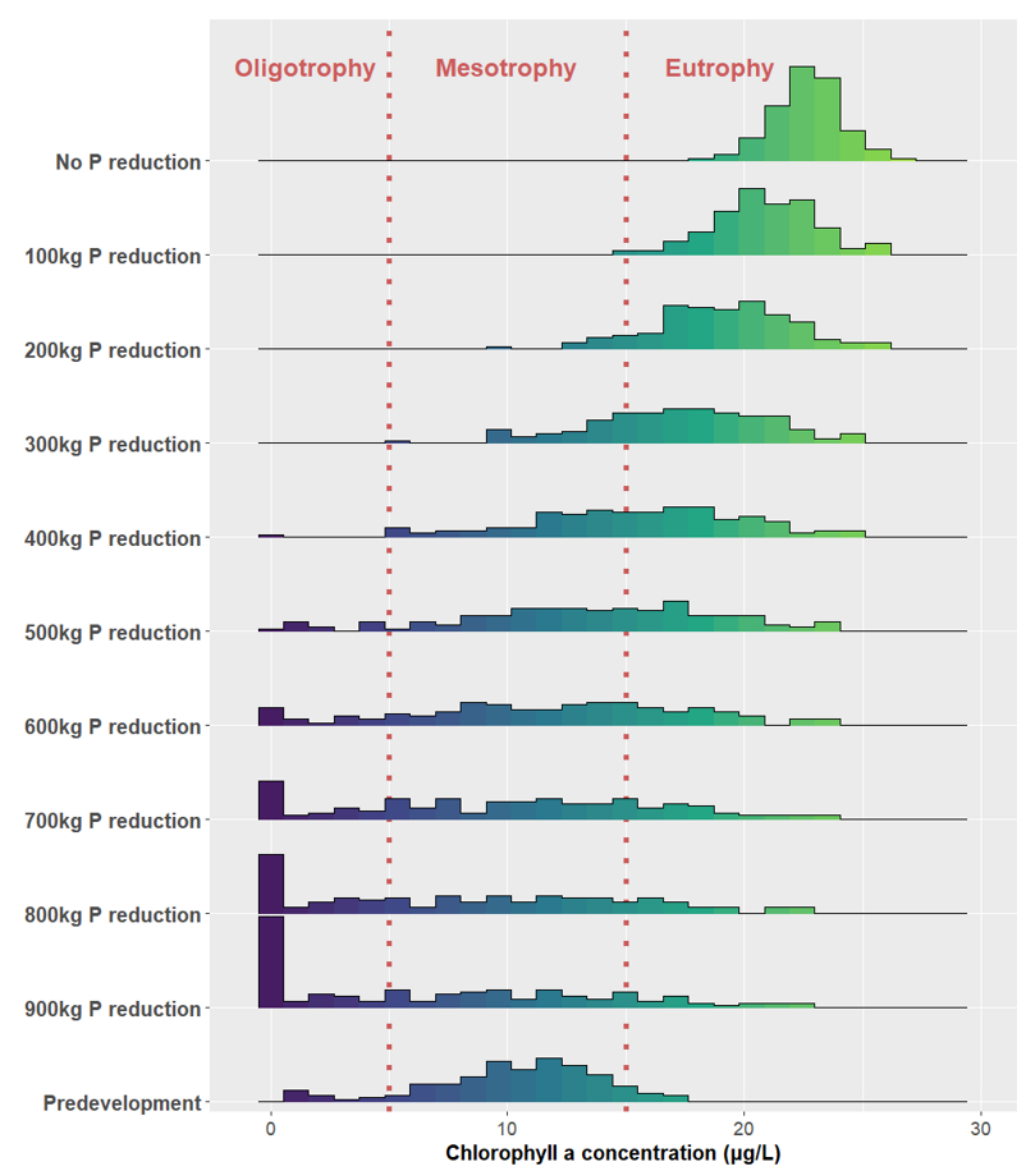
Research findings – Lake Tuggeranong

- U Canberra: Fiona Dyer, Rodney Ubrihien, Manuja Lekammudiyanse & others (causes of blue-green algae)
- Our technical team (modelling, data & scenario analyses)
- Concepts of Change (behavioural change)
- NCEconomics (value of lakes)
- Several others!

Research findings – Lake Tuggeranong

- Phosphorus (P) is the key limiting nutrient for BGA
- Supply of P from either lake sediments or inflows from catchment enough to drive an algal bloom
- Catchment sources 4-5 times supply from sediments
- 50% of P in stormwater is dissolved (mainly ortho-P) readily available for uptake by algae
- 99% of P load entering lake in storms

Target: how much P pollution to mitigate?



Algal response model (Vollenweider):

700kg P per year or

50-60% of current supply

(13% improvement by 7 assets already factored in!)

Reduces incidence from every summer to once in every four summers

Kahn & Dey (2024)

ACT Government

What are our management options? Research

Source of excess nutrients from catchment:

- Diffuse not point sources
- Nutrients entering catchment from:
  - Leaves and grass clippings
  - Fertiliser use
  - Sewage leaks/roots in sewers?
  - Soil erosion

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Ubrihien et al. (2020)

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What are our management options?

- Pollution mitigation > anti-algal
- Modelled cost-effectiveness of options to:
  - Prevent pollution
  - Filter infrastructure
  - Treat pollution or algae in-lake
- Two dozen examined → 10 analysed at 4 levels of investment
- Net Present Value calculated over 30-year timeframe

What's the most effective?

At Source

- Increasing street sweeping
- Better manage fertiliser use: residents
- Adopt better open-space mowing practices
- Retrofit castellated curbs
- Bioretention swales at sports fields

In system

- Install rainwater tanks in households (retention)
- Install stormwater recycling plants
- Build new constructed wetlands
- Maintain wetlands so performing at 100%

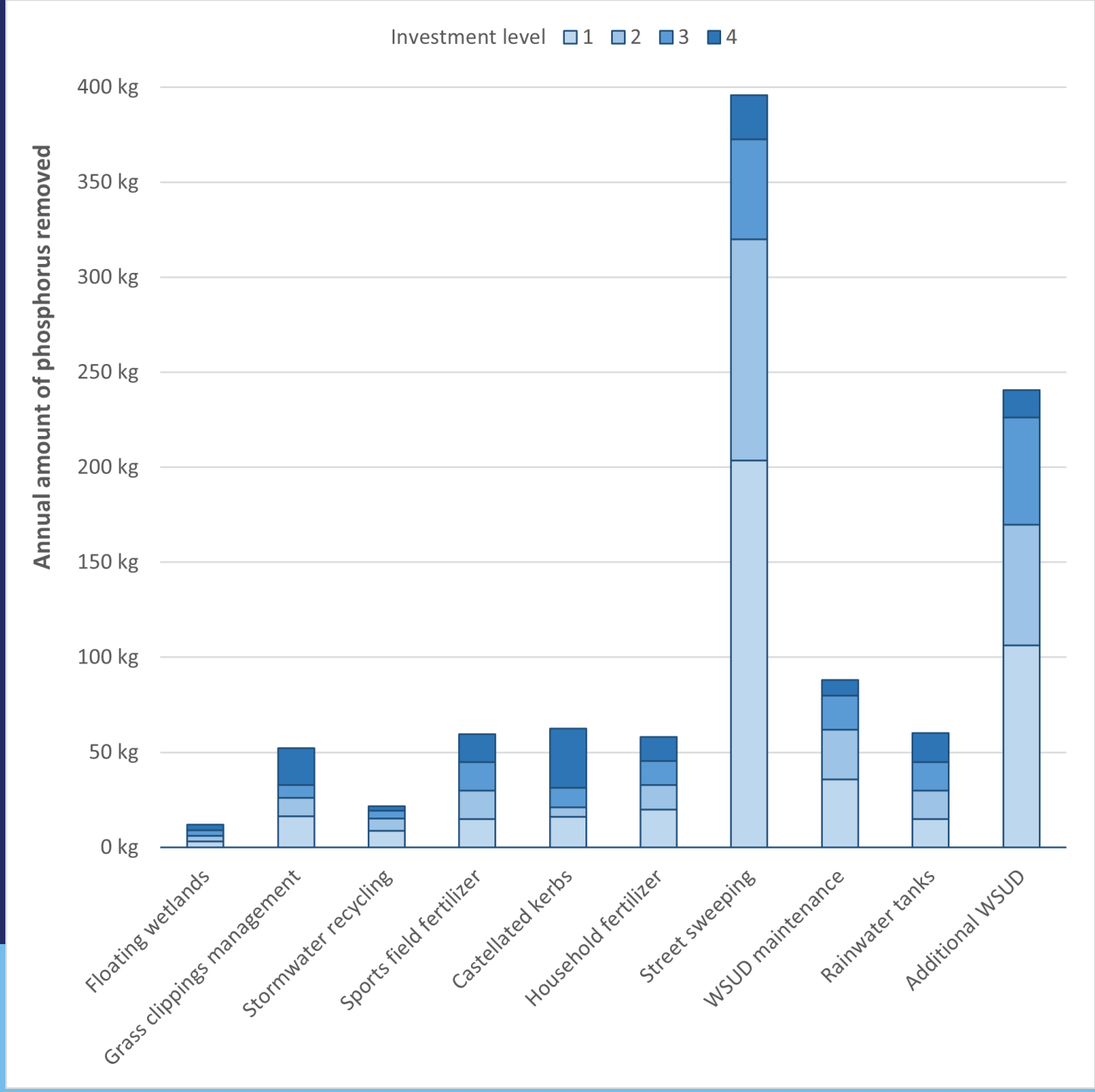
In-lake

- Deploy floating wetlands

Effectiveness of 4 levels of investment in options (Source/MUSIC models)

- Street sweeping > WSUD assets/O&M >> other options
- No silver bullet!

Based on data in Booksmythe et al. (2024)



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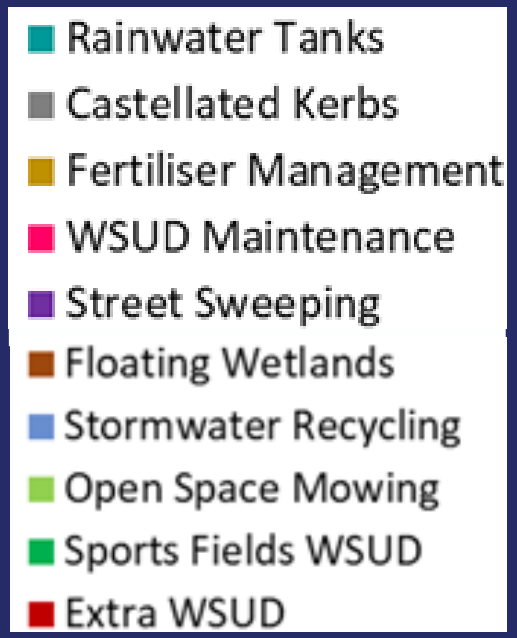
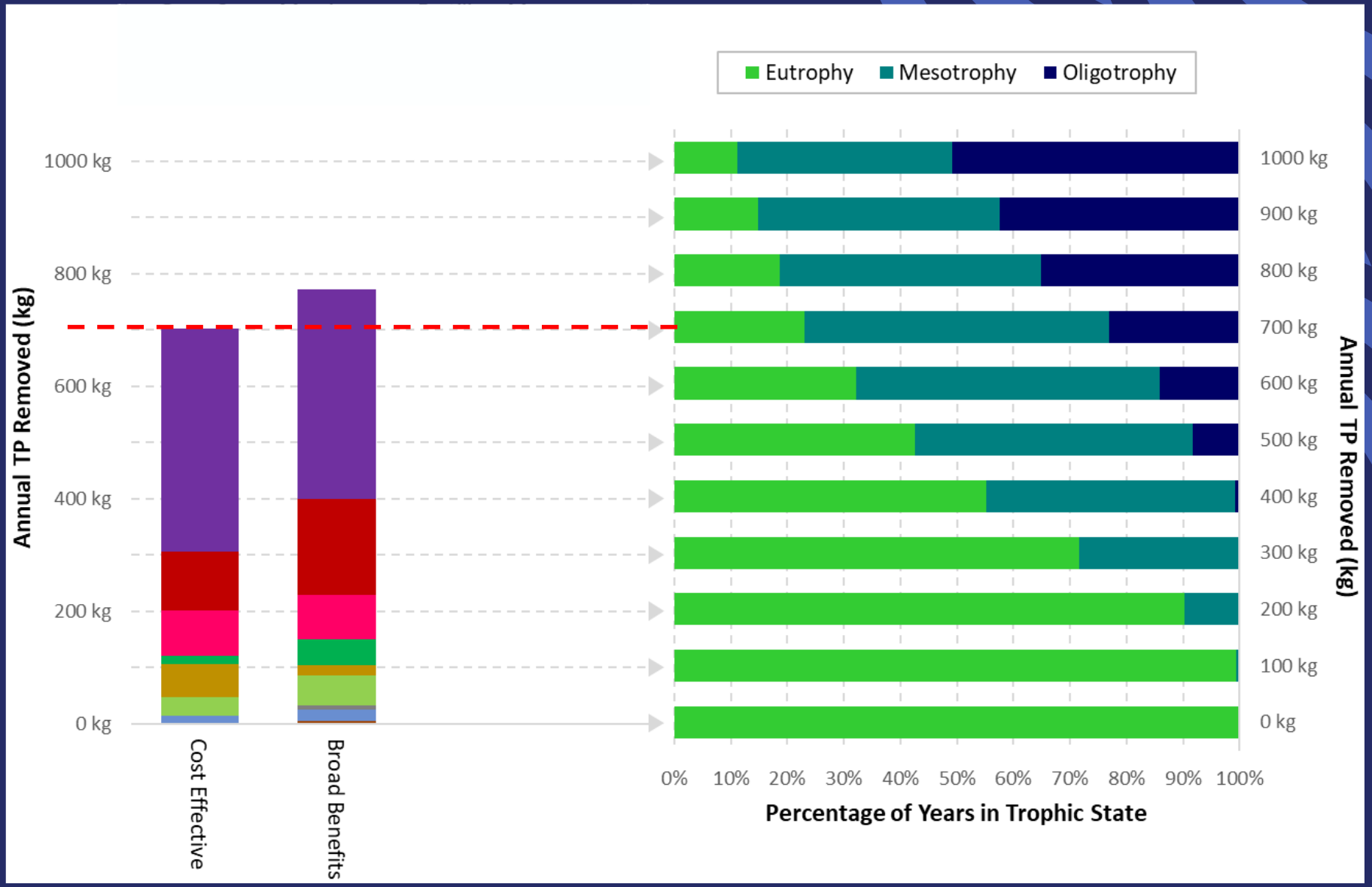
Cost-effectiveness $/kg P

Option	Lowest level of investment	Highest level of investment
Street sweeping	$1,150	$2,369
More WSUD assets	$7,064	$11,716
O&M of assets	$9,465	$11,495
All options	$1,000 - $28,000	

Booksmythe et al. (2024)

Findings for packages – options considered separately





Based on:
Booksmythe et al. 2024
Kahn and Dey (2024)

Findings – options modelled together

Effectiveness of scenarios falls by 12-14% of current supply of P when considered together (Dey et al., 2024)

- Cost effective: from 55% to 41% of current supply
- Broad benefits: from 60% to 48% of current supply
- Cf. target of 50-60%

Why?

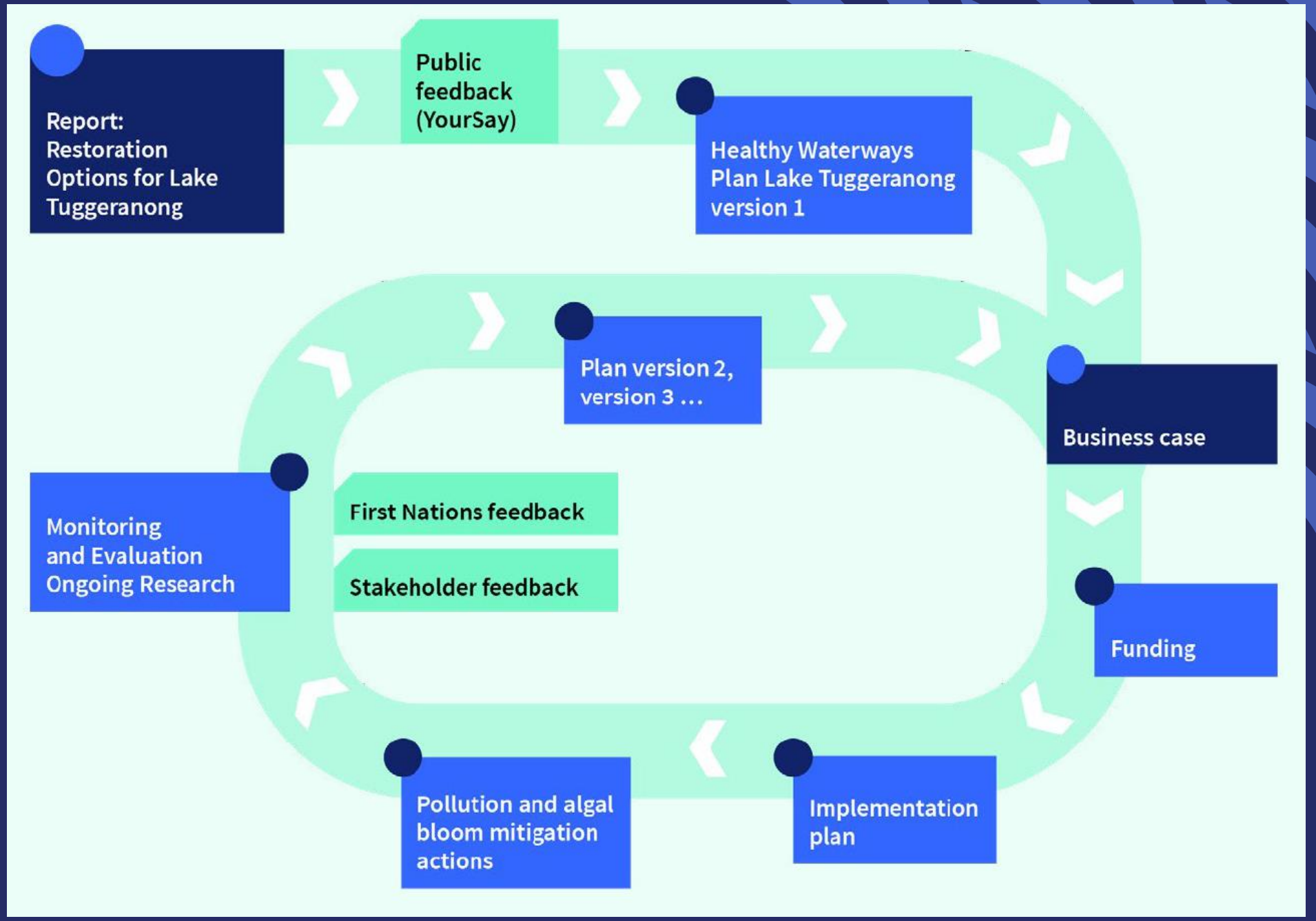
- **Model assumptions**: wetlands filter less as water becomes cleaner
- **Interactive effects**: One option may impact the effectiveness of another

So, can we reach P mitigation targets?

YES!

- Refining the mitigation options will both decrease cost and increase effectiveness, especially:
  - Street sweeping
  - Asset O&M
  - Fertiliser and leaf behavioural change programs
- Several options are yet to be fully explored and thus included in this analysis
  - Poseidon Pellets
  - Anti-algal agents
  - Leaky rainwater tanks

Next steps


Report: Restoration Options for Lake Tuggeranong
Public feedback (YourSay)
Healthy Waterways Plan Lake Tuggeranong version 1
Plan version 2, version 3 …
Business case
Funding
Implementation plan
Pollution and algal bloom mitigation actions
Monitoring and Evaluation Ongoing Research
First Nations feedback
Stakeholder feedback

Lessons learned

1. Dissolved nutrients a key problem in Tugg/ACT urban areas, thus
   - Living infrastructure
   - Macrophyte harvesting
   - Subsurface wetlands
2. Stopping pollution at its source makes sense
   - Can’t build ourselves out of the problem with constructed wetlands etc
     - Not enough area for wetlands
     - Flux of P in storms precludes treatment of 100% of the stormwater
   - Don’t forget roofs!
     - Big surface area
     - Possibly part of problem and solution

Lessons learned

3. Partnerships
   - Find a way to fund research
   - Promote community leadership e.g. managing leaves
   - Collaborate with your construction team for WSUD assets
     - Managing contractor approach is flexible, cost-effective for building a program building multiple assets
   - Implementation depends on other areas of the public service e.g. city operations' street sweepers
   - First Nations land rights issues can derail efforts to engage on custodianship

4. Transitioning from monitoring to sensors will enable a step change in management

Lessons learned

5. Sustainable funding
    - Selling the story
    - Problem-solution approach
    - Evidence needs to be communicated with care
    - Long-term, whole-of-lifecyle analysis needed to compare costs & benefits of management options
    - Projects may not be worth it without considering co-benefits
        - E.g. amenity/recreation values >> WQ value
    - Explore markets

Thank you!!!