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WATER CORPORATION

Management of toxic cyanobacteria in waste stabilisation ponds

Removal of cyanobacteria and microcystins from waste stabilisation ponds by hydrogen peroxide addition

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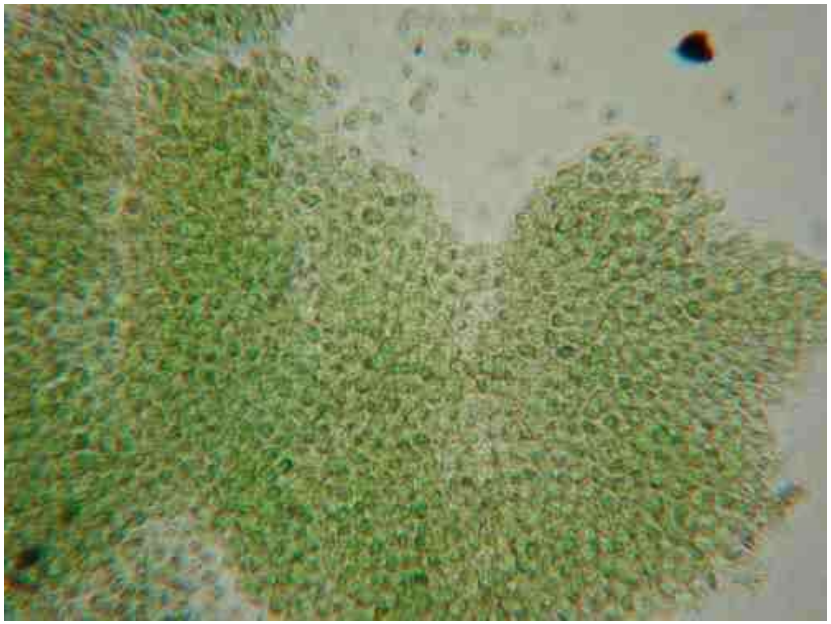
Significance

- Treatment options assist us in developing management plans
- Cyanobacteria in WSPs often overlooked as they are low priority compared to drinking water and recreational reservoirs

Merredin WWTP (Barrington 2009)

Cyanobacteria and cyanotoxins

- Harmful to humans and the environment
  - Shading of underlying organisms
  - Oxygen depletion
  - Acute and chronic effects of toxins
  - Bioaccumulation of toxins



Microcystis aeruginosa (Ghadouani 2006)

Cyanobacteria in WSPs

- WWTPs discharge to environment or reuse
- Inhibit treatment
  - Shading
  - Toxins
  - Increased BOD
  - Sludge and suspended solids
- Inadequate treatment of effluent

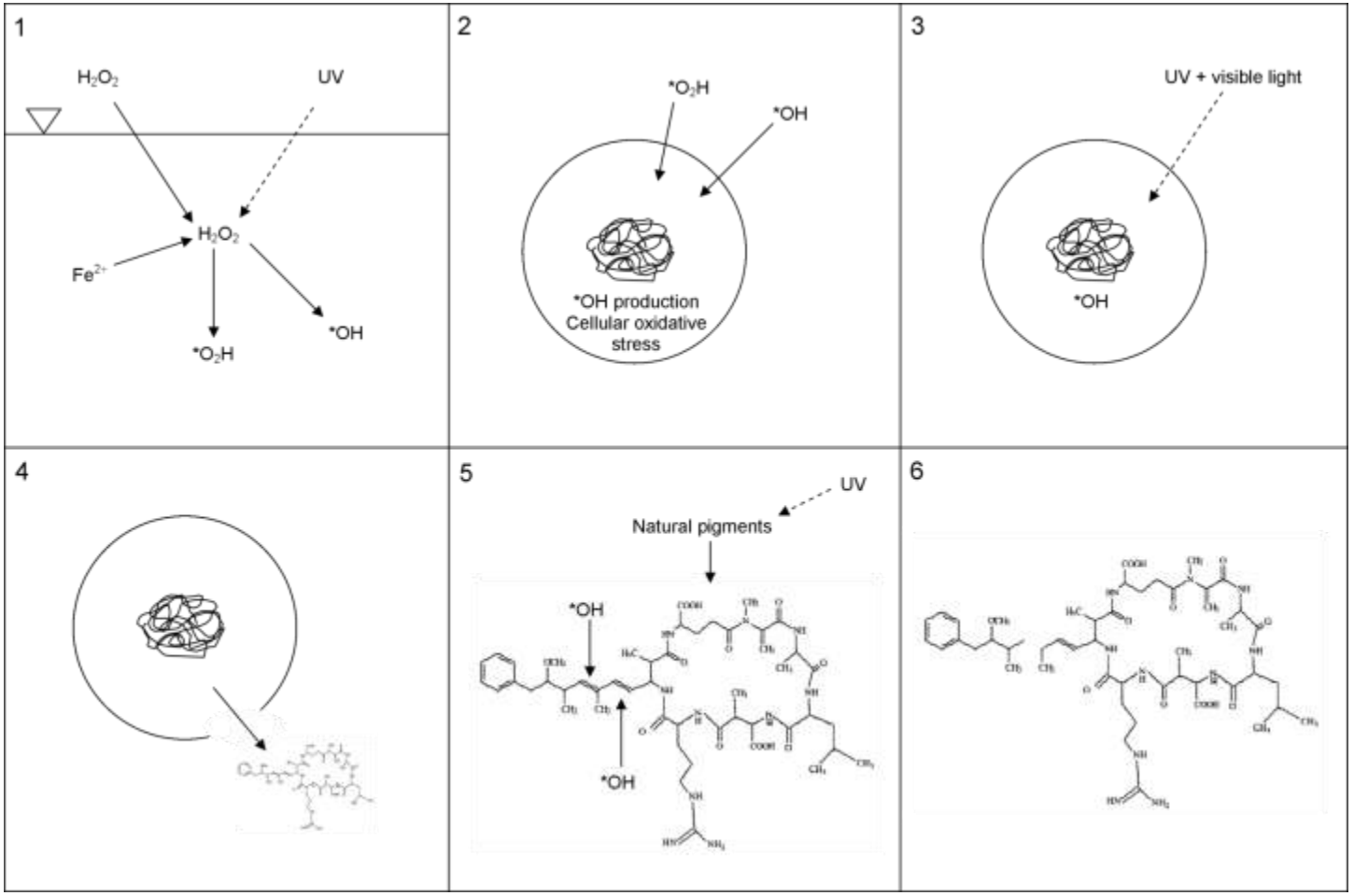
Merredin WWTP (Barrington 2009)

Current cyanobacterial treatment

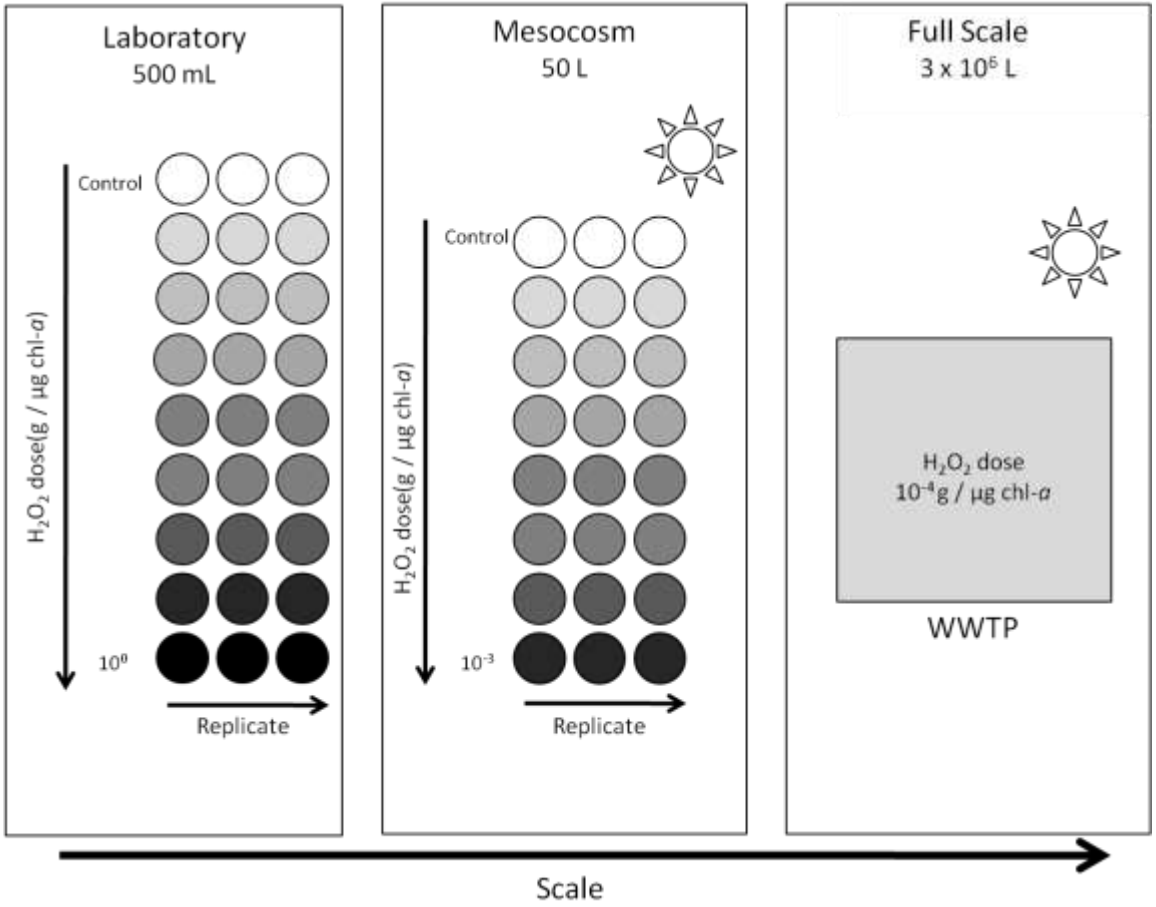
- Dangerous by-products (eg. trihalomethanes)
- Accumulation of metals (eg. aluminium, copper)

- Current management focused towards drinking water and recreational reservoirs
- Based on mitigating risk to human health, not the environment

The potential of hydrogen peroxide

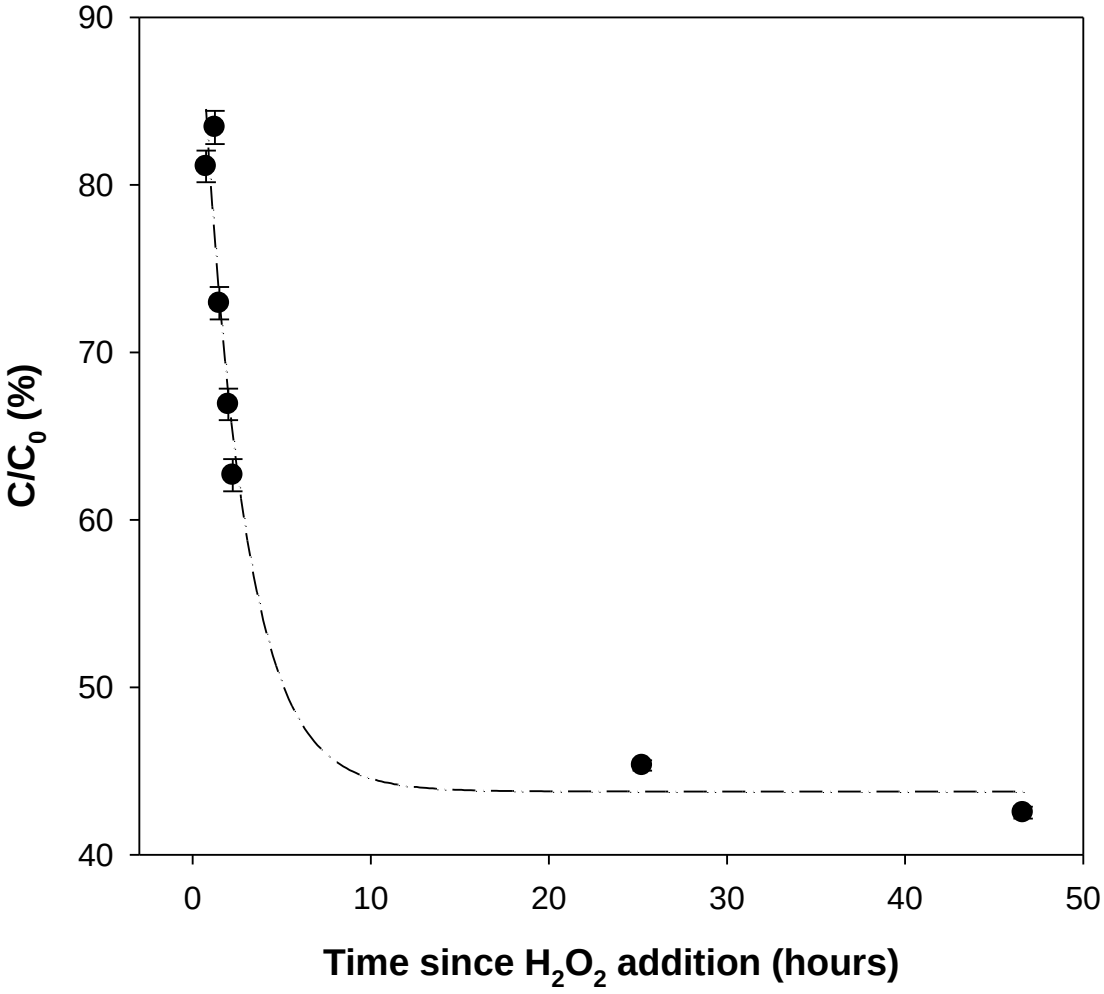


Experimental design- Cyanobacteria



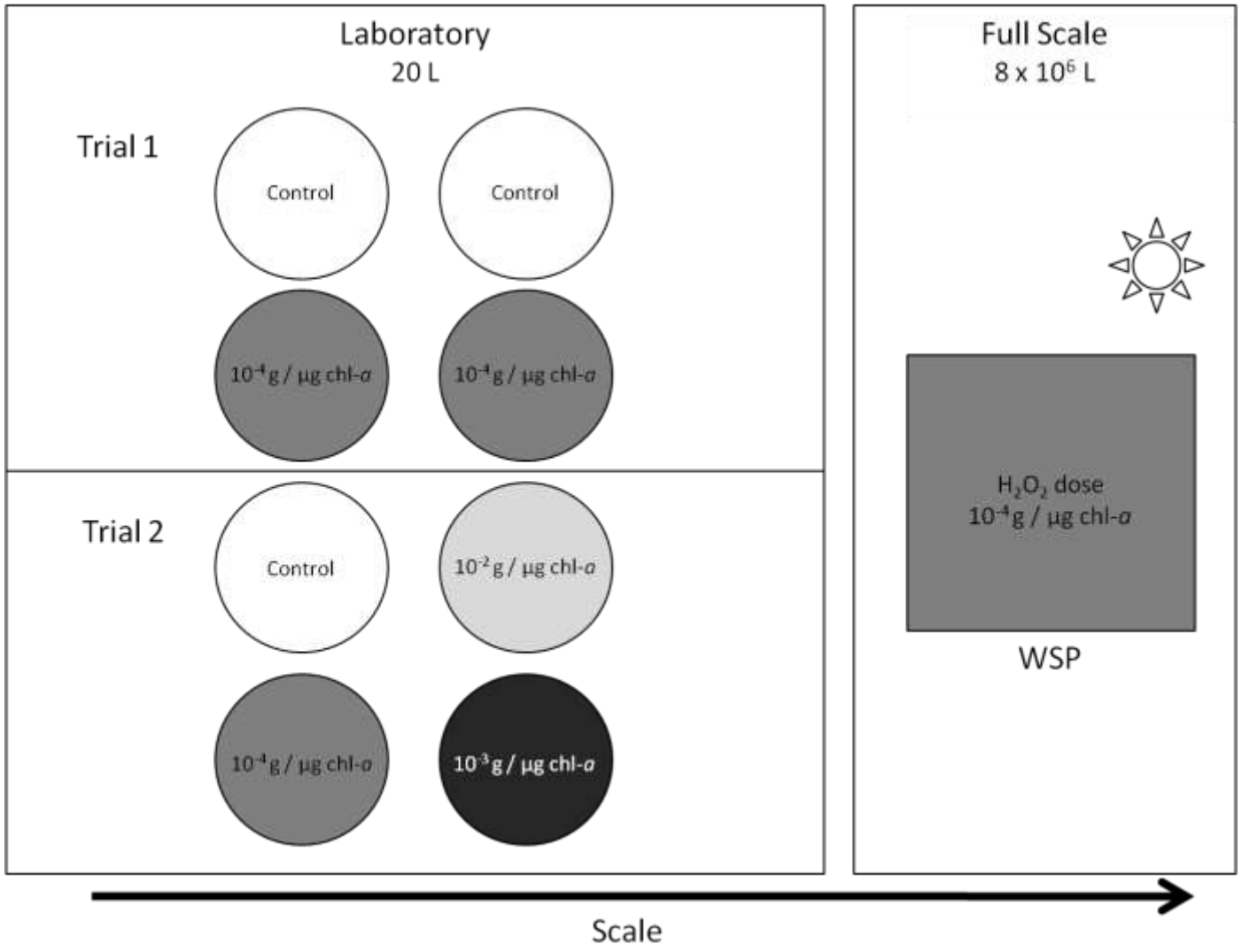
Barrington, D. J. & Ghadouani, A. 2008, 'Application of hydrogen peroxide for the removal of toxic cyanobacteria and other phytoplankton from wastewater', *Environmental Science & Technology, vol. 42, no. 23, pp. 8916-8921.*
Barrington, D. J., Ghadouani, A. & Ivey, G. N. 2011, 'Environmental factors and the application of hydrogen peroxide for the removal of toxic cyanobacteria from waste stabilization ponds', *Journal of Environmental Engineering*

Full-scale field trial



Barrington, D. J., Ghadouani, A. & Ivey, G. N. 2011, 'Environmental factors and the application of hydrogen peroxide for the removal of toxic cyanobacteria from waste stabilization ponds', *Journal of Environmental Engineering*

Experimental design- cyanotoxins



Cyanotoxins

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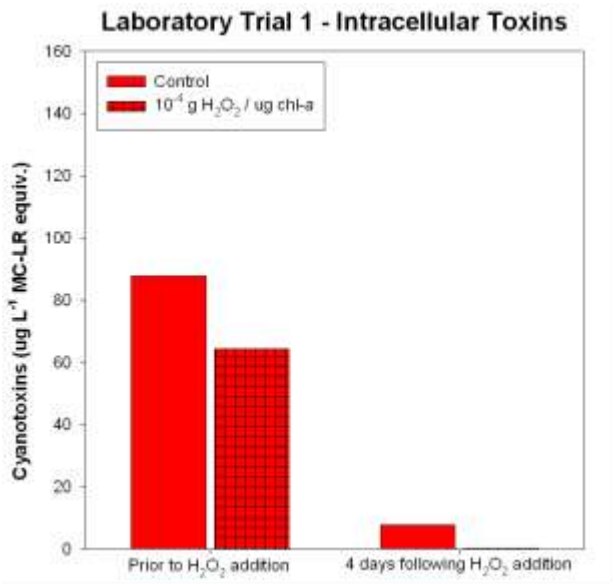

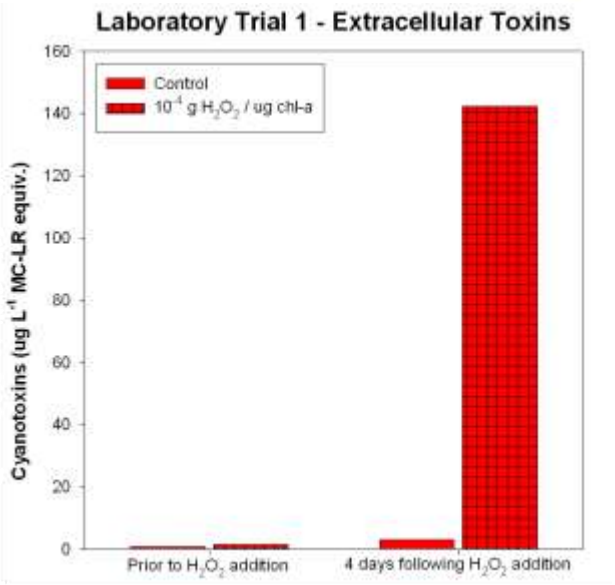

	Initial Total Coliforms (cells / 100 mL)	Final Total Coliforms (cells / 100 mL)
Control	>240000	>240000
Dosed Mesocosm	>240000	<10

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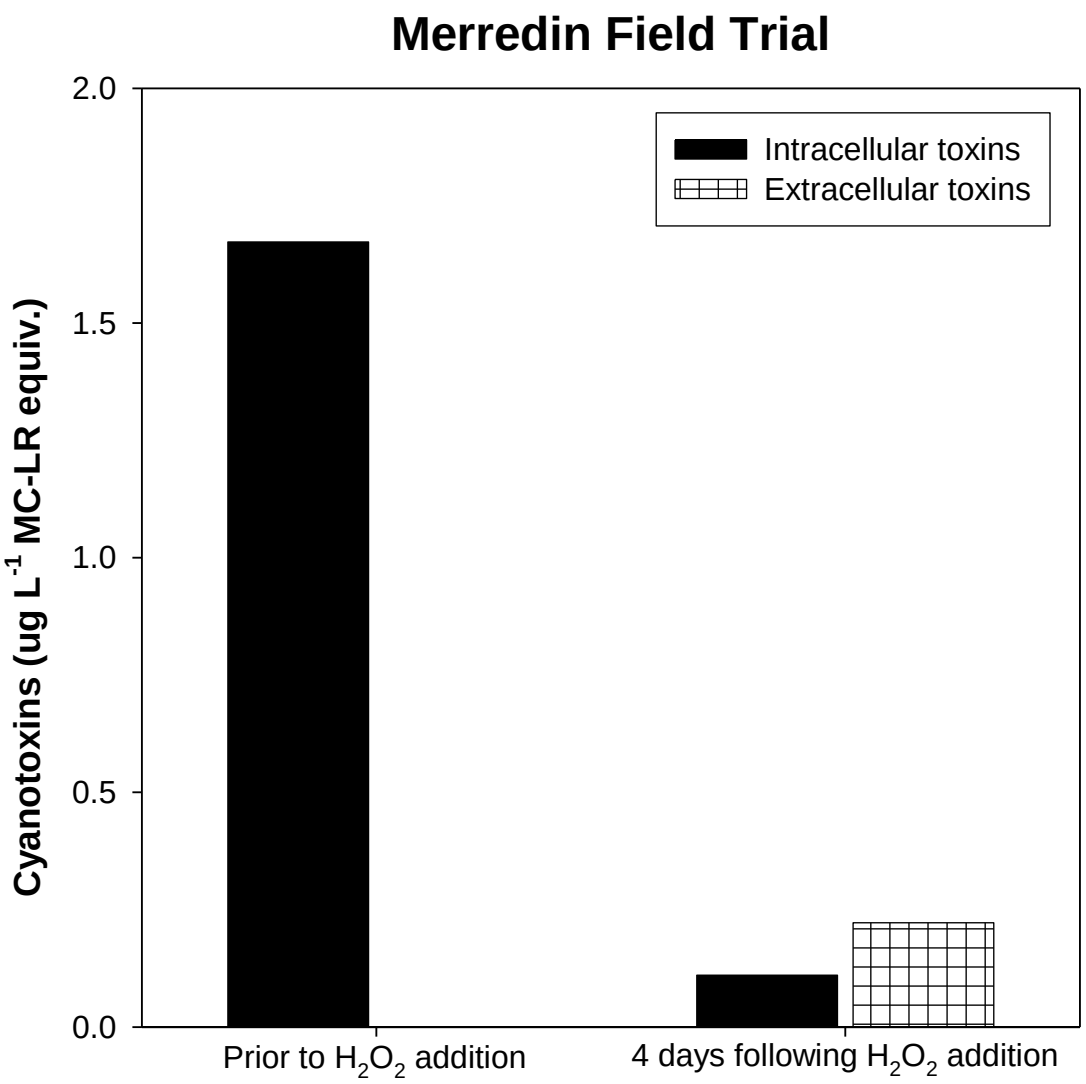

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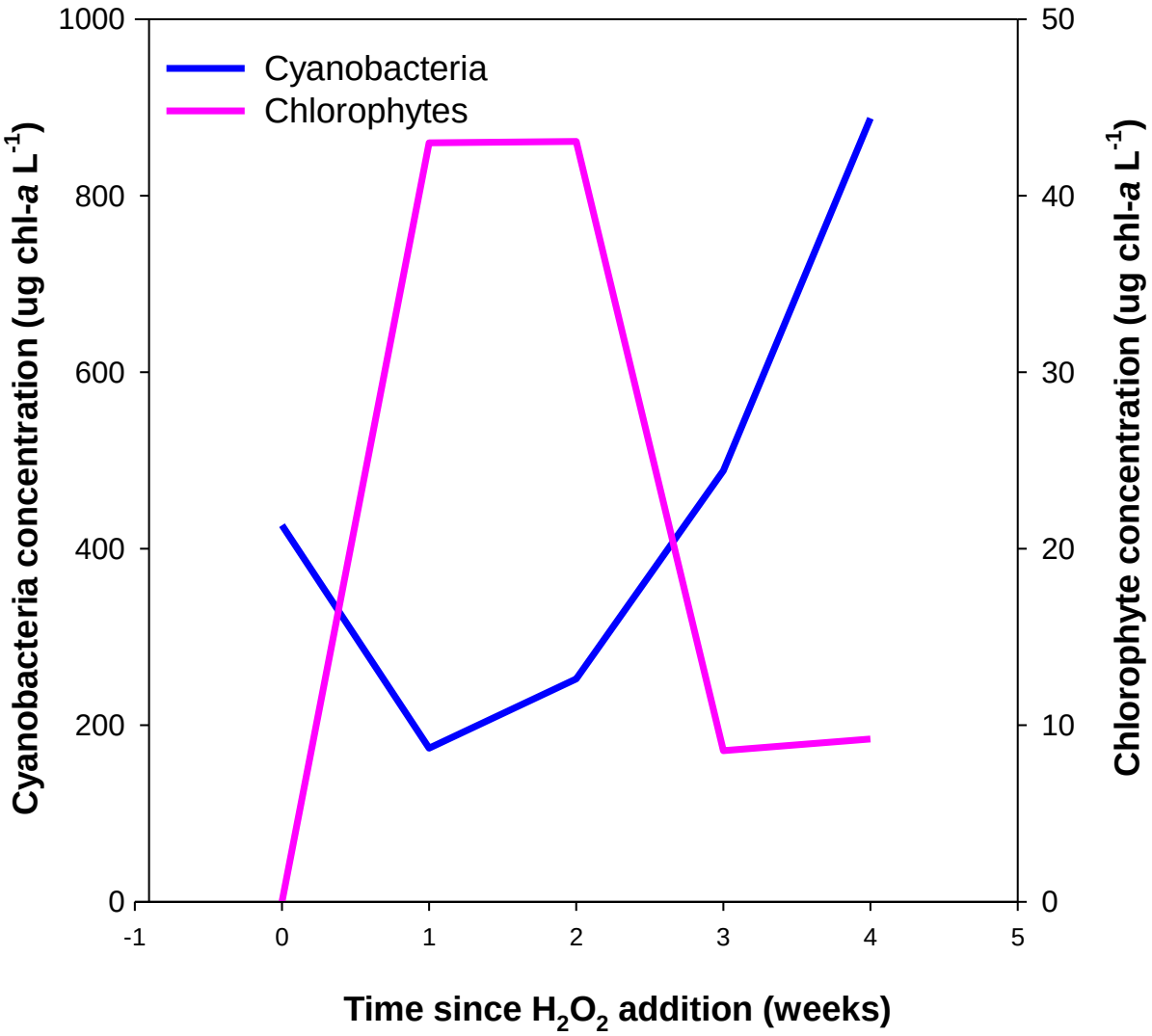

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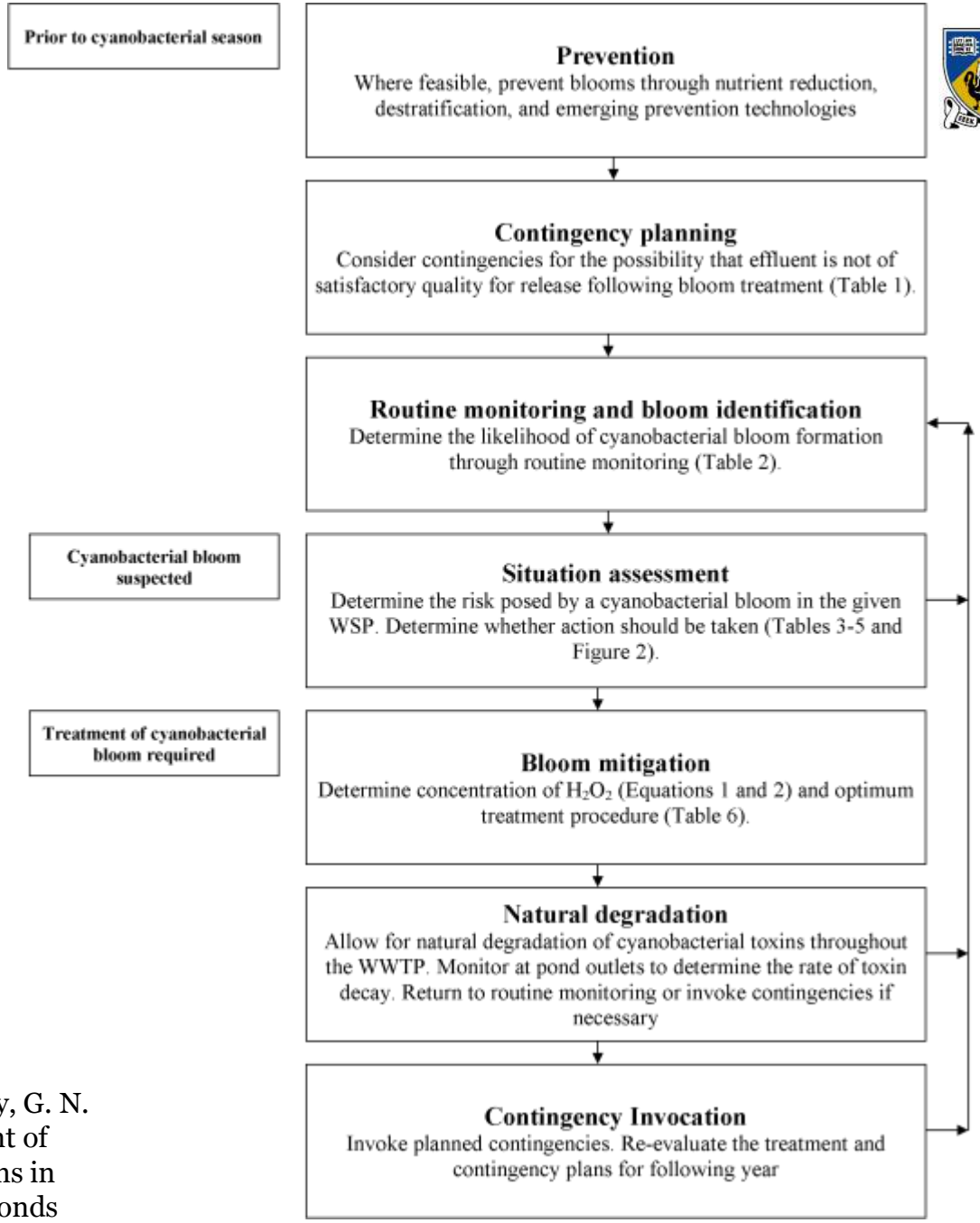

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Barrington, D. J., Ghadouani, A. & Ivey, G. N. *In prep*, Management of cyanobacterial blooms in waste stabilization ponds

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Merredin WWTP (Barrington 2009)