Lake Burley Griffin cyanobacterial blooms: the past 10 years

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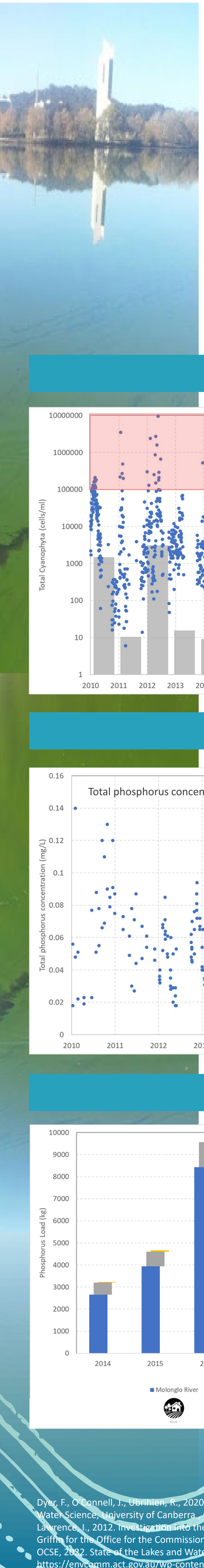
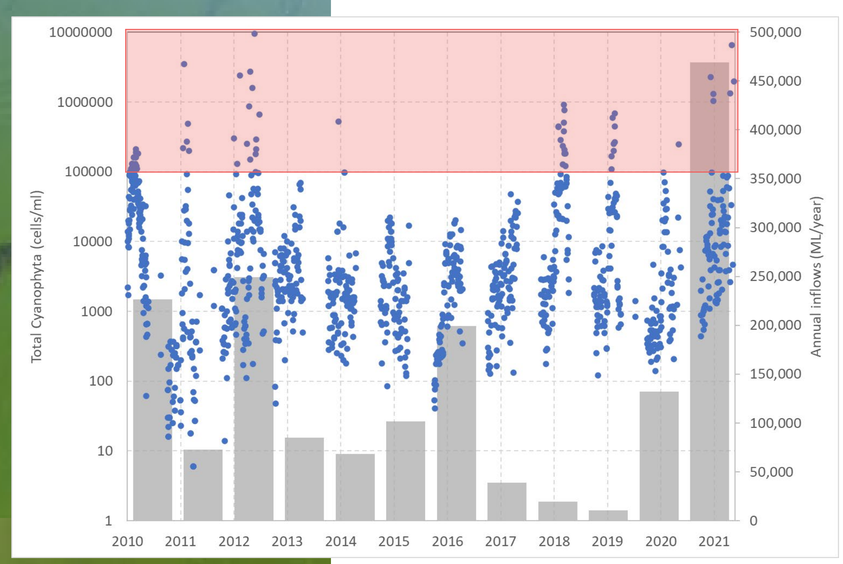


Lake Burley Griffin is an artificial lake in the centre of Canberra. While the lake is important aesthetically and for recreation, it also serves to improve the quality of water flowing downstream from the urban centre and provides valuable habitat for water-dependent species. Lake Burley Griffin has a history of water quality problems that have affected the recreational, aesthetic and commercial functions of the lake, including nuisance plant growth, cyanobacterial blooms and faecal pollution. One of the key public concerns for the lake are cyanobacterial blooms that result in lake closures. Understanding the character and drivers of the blooms is important for informing future management of the lake.

Cyanobacteria and water quality data are collected for the National Capital Authority. Analysis of the cumulative data set was last undertaken in 2011 (Lawrence, 2012). Here we report recent analysis of the cyanobacteria and phosphorus data from the lake that have been undertaken to inform local policy and management (Dyer et al., 2020; OCSE, 2022).

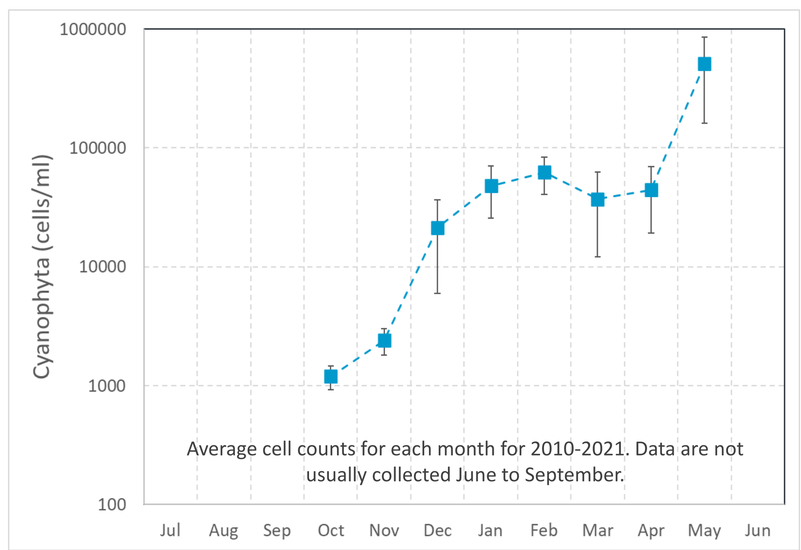
Learning: Existing monitoring data provide insight to the nature of the cyanobacterial blooms in Lake Burley Griffin. The data suggest that internal sources of phosphorus may be an important contributor to the formation of blooms. The data set is not suited to understanding the internal sources of phosphorus and developing this understanding will require further, targeted investigation.

Cyanobacteria

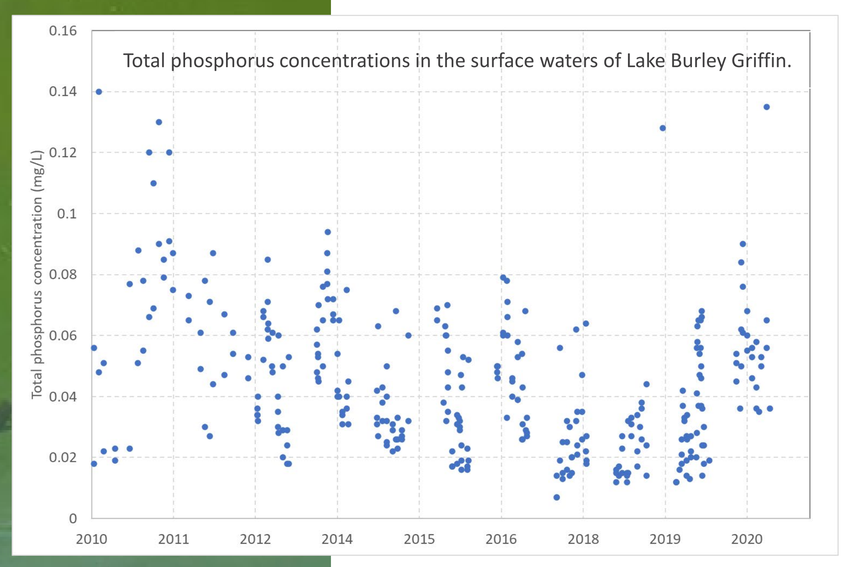


Extreme concentrations (>100,000 cells/ml) of cyanobacteria occur regularly. Suggestions that blooms are more prevalent during dry years has not been evident in the past 12 years.

Strong seasonal patterns in cyanobacteria concentrations occur with peaks occurring in late summer and autumn associated with increased water temperature, long days and stratification of the lake. Some very high cells counts have been observed in late autumn as temperatures decline and the lake water mixes.

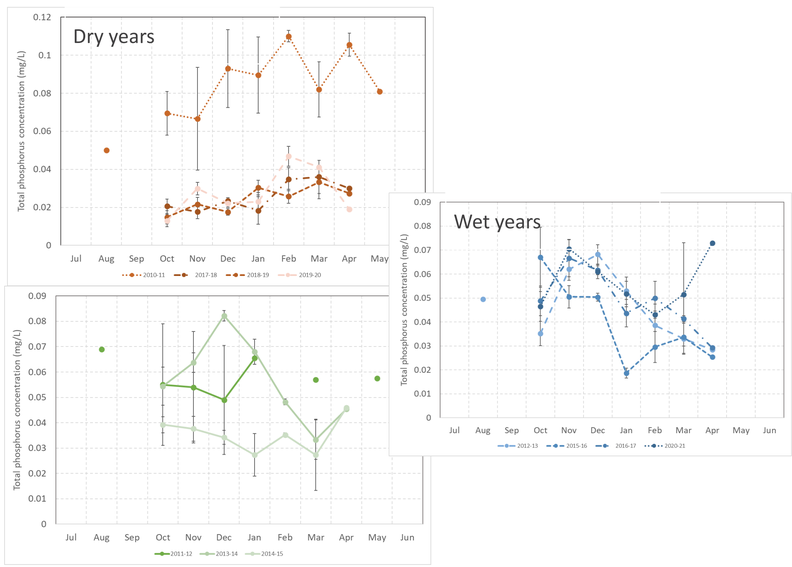


Phosphorus concentrations



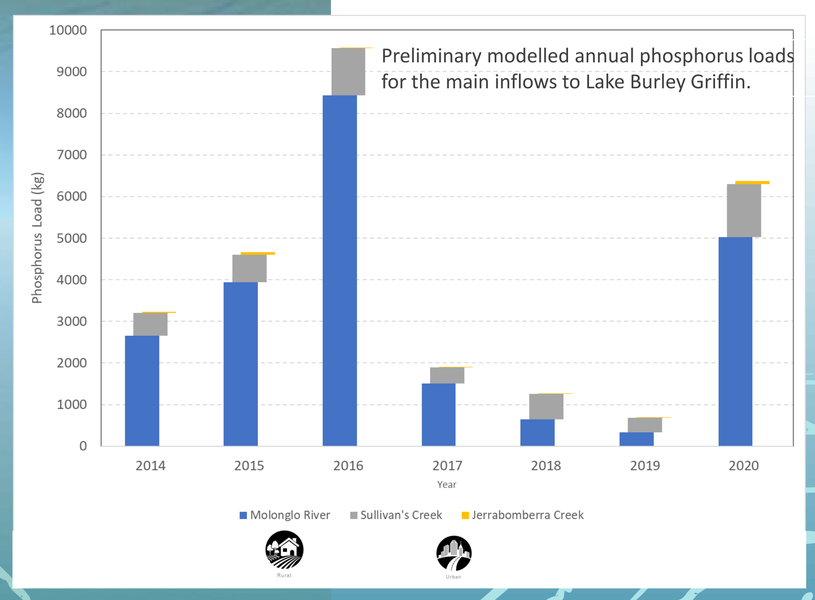
Total phosphorus concentrations in the surface waters vary seasonally. In dry years, the concentrations are greatest in late summer and early autumn. In wet years the concentrations are greatest in spring.

High concentrations of phosphorus are frequently observed in April and May that would be consistent with the transfer of nutrients from the bottom waters as the lake mixes.



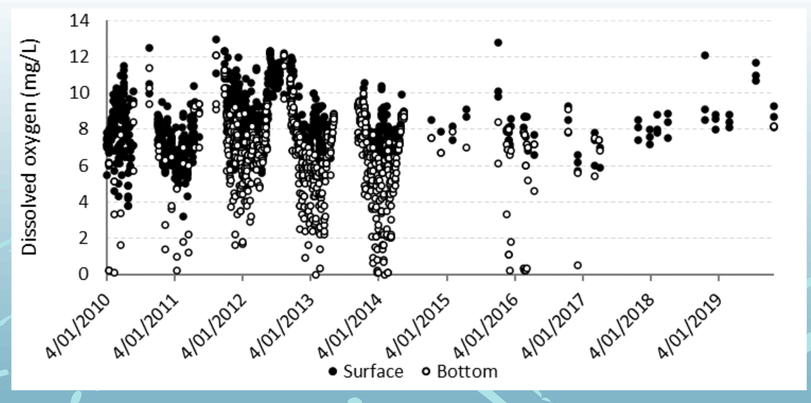
Average monthly TP concentration with standard errors.

External vs internal sources of phosphorus



Modelled phosphorus loads from the main inflows to Lake Burley Griffin are dominated by flows from the Molonglo River, which drains predominantly rural/rural residential areas. The contribution from the urban catchments becomes far more important during dryer periods.

Insufficient data are available to enable an estimation of internal nutrient loads. Dissolved oxygen data shows that the lake stratifies, but that there is some mixing of the water column through the stratified period. This would potentially mix nutrient rich bottom waters to the euphotic zone where they can be accessed by cyanobacteria.



Dyer, F., O'Connell, J., Ubrihien, R., 2020. Managing cyanobacteria in Lake Burley Griffin: Data review and recommendations. A report to the National Capital Authority from the Centre for Applied Water Science, University of Canberra. Canberra, June 2020.
Lawrence, I., 2012. Investigation into the state of Lake Burley Griffin and catchment water quality assessment - Appendix A to Report on the state of the watercourses and catchments for Lake Burley Griffin for the Office for the Commissioner for Sustainability and the Environment. Canberra.
OCSE, 2022. State of the Lakes and Waterways in the ACT. A report from the Office of the Commissioner for Sustainability and the Environment to the ACT Legislative Assembly. https://envcomm.act.gov.au/wp-content/uploads/2022/08/State-of-the-Lakes-Report-Digital.pdf

Australian Government
National Capital Authority

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