

Geophysical Research Letters

RESEARCH LETTER

10.1002/2016GL067732

Key Points:

- A substantial portion of the CO₂ released from three lakes was produced exogenously
- Despite positive net ecosystem production, lakes were carbon sources to the atmosphere

Supporting Information:

- Text S1, Data Set S1, and Figure S1

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Citation:

Wilkinson, G. M., C. D. Buelo, J. J. Cole, and M. L. Pace (2016), Exogenously produced CO₂ doubles the CO₂ efflux from three north temperate lakes, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL067732.

Received 11 JAN 2016

Accepted 10 FEB 2016

Accepted article online 13 FEB 2016

Exogenously produced CO₂ doubles the CO₂ efflux from three north temperate lakes

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Abstract It is well established that lakes are typically sources of CO₂ to the atmosphere. However, it remains unclear what portion of CO₂ efflux is from endogenously processed organic carbon or from exogenously produced CO₂ transported into lakes. We estimated high-frequency CO₂ and O₂ efflux from three north temperate lakes in summer to determine the proportion of the total CO₂ efflux that was exogenously produced. Two of the lakes were amended with nutrients to experimentally enhance endogenous CO₂ uptake. In the unfertilized lake, 50% of CO₂ efflux was from exogenous sources and hydrology had a large influence on efflux. In the fertilized lakes, endogenous CO₂ efflux was negative (into the lake) yet exogenous CO₂ made the lakes net sources of CO₂ to the atmosphere. Shifts in hydrologic regimes and nutrient loading have the potential to change whether small lakes act primarily as reactors or vents in the watershed.