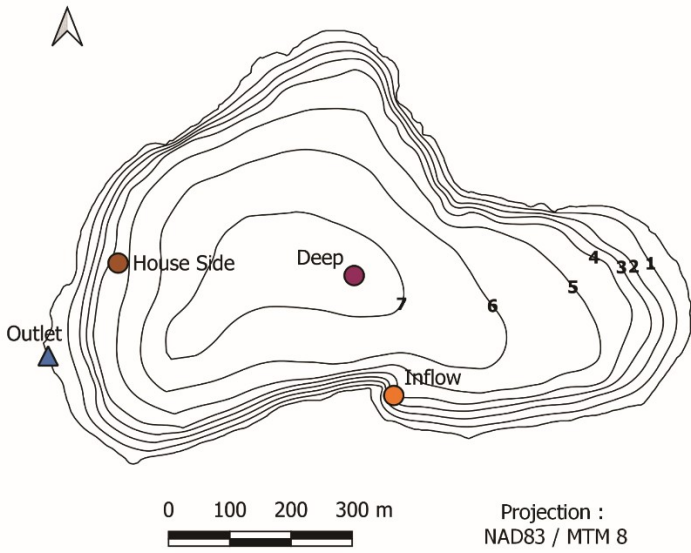
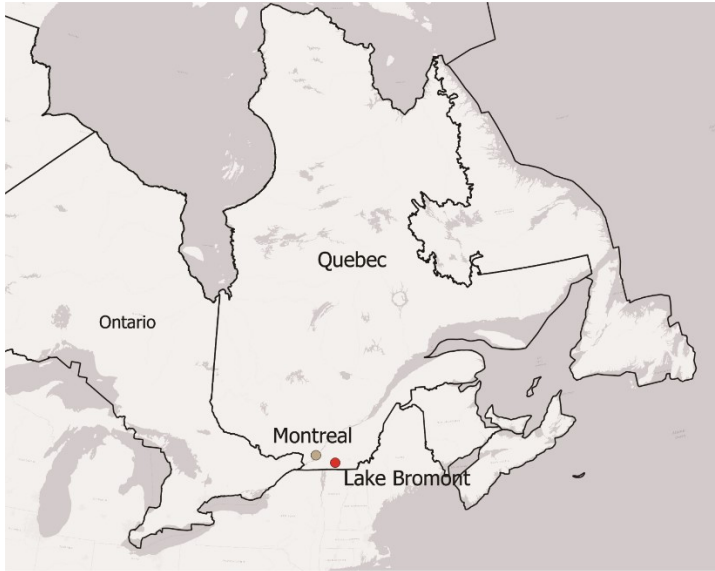


Supplementary material for manuscript “Longevity and efficacy of lanthanum-based P remediation under changing dissolved oxygen availability in a small eutrophic lake”.

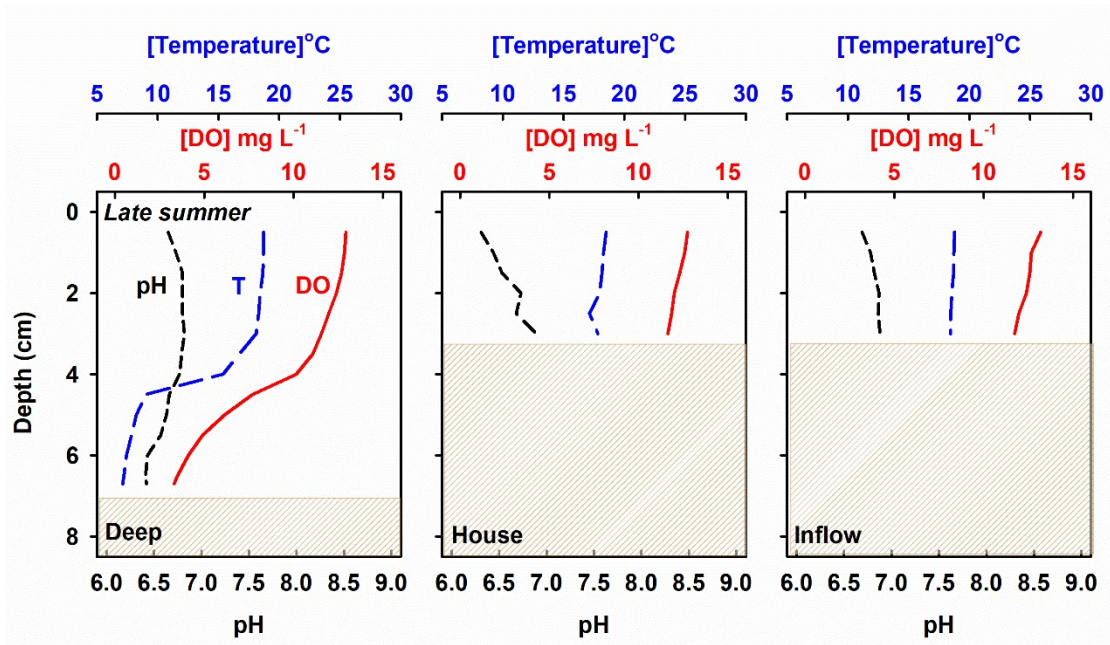
Wessam Neweshy<sup>1</sup>, Dolores Planas<sup>2</sup>, Nicole Sanderson<sup>2</sup> and Raoul-Marie Couture<sup>1,\*</sup>

\* Correspondance : [Raoul.couture@chm.ulaval.ca](mailto:Raoul.couture@chm.ulaval.ca)

- 1- Département de Chimie, Université Laval, Canada and GRIL (Interuniversity Research Group in Limnology).
- 2- Département de Sciences Biologiques, Université de Québec à Montréal, Canada and GRIL (Interuniversity Research Group in Limnology).
- 3- Département de Géographie, Université du Québec à Montréal, Canada and Centre de recherche en géochimie et géodynamique (GEOTOP).

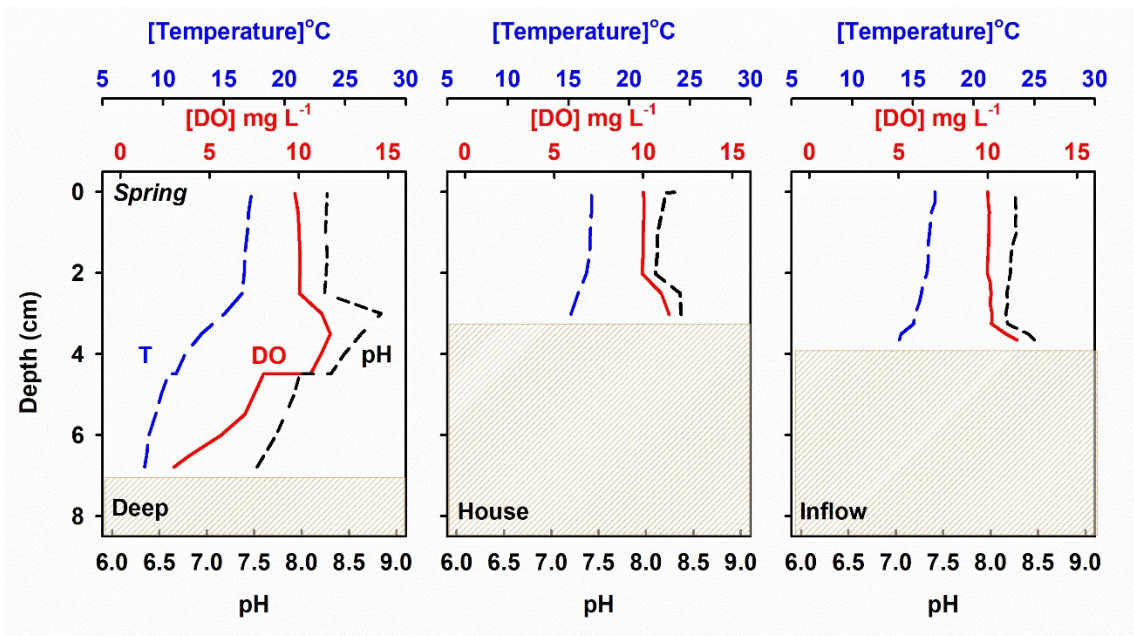


**Figure S1.** Location and bathymetry of Lake Bromont, along with sampling site locations (circles) and lake outlet (triangle).



**Figure**

**e S2.** Water temperature (long dashed lines) , dissolved oxygen (solid lines), and pH measurements (short dashed lines) in the water columns of lake Bromont in the Deep, House and Inflow sites during late summer.



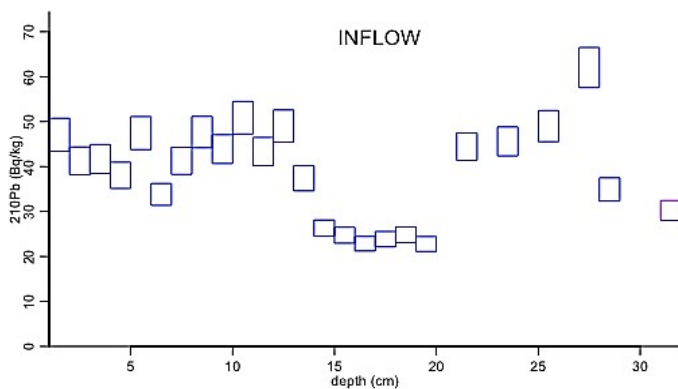
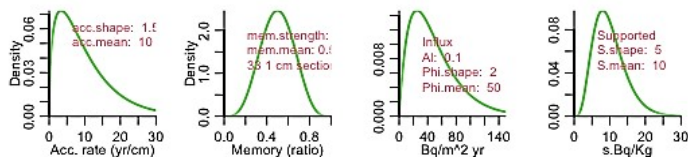
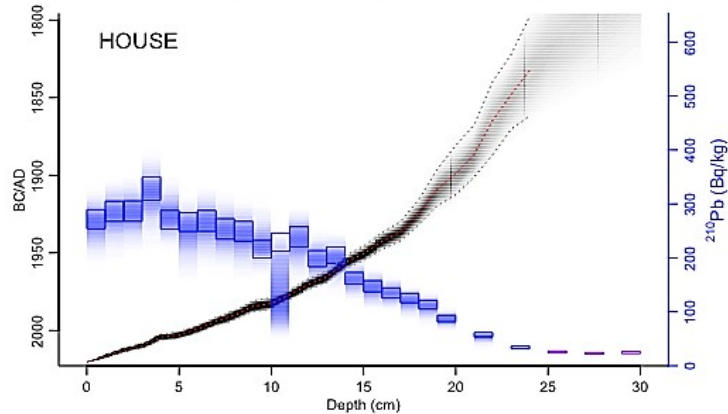
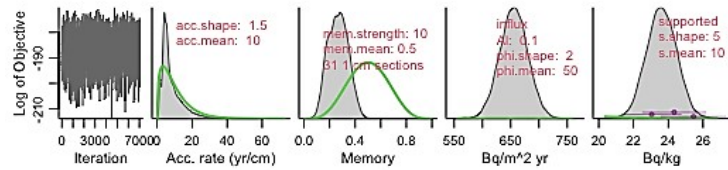
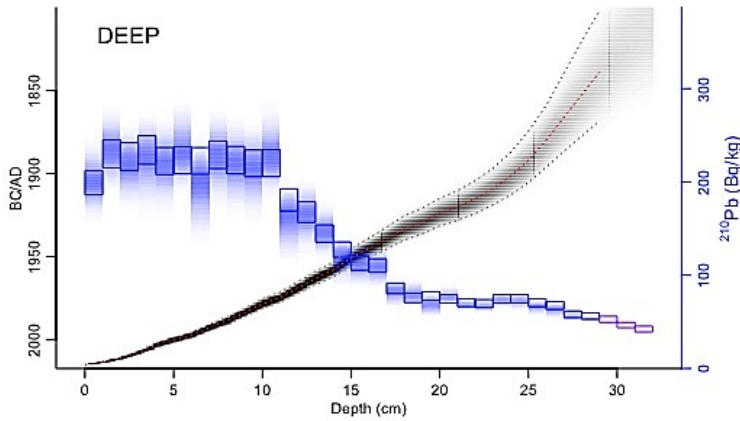
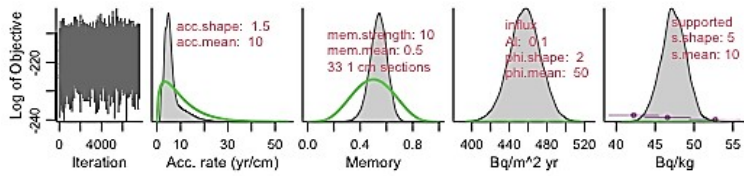
**Figure S3.** Water temperature (long-dashed lines), dissolved oxygen (solid lines), and pH measurements (short-dashed lines) in the water columns of lake Bromont in the Deep, House and Inflow sites during spring.

**Table S1:** Net reaction rates for P estimated by PROFILE at the Deep, House, and Inflow sites in the summer and spring seasons.

Site	Season	Zone nr.	Depth interval (cm)	$R_{net}^P$ ( $\mu\text{M cm}^{-3} \text{s}^{-1}$ )
Deep	Summer	1	0–2	$4.66 \times 10^{-8}$
		2	2–12	$-1.48 \times 10^{-9}$
	Spring	1	0–2.8	$3.25 \times 10^{-10}$
		2	2.8–8.3	$-1.08 \times 10^{-10}$
		3	8.3–10	$1.35 \times 10^{-10}$
	House	Summer	1	0–1
2			1.3–2.7	$2.36 \times 10^{-8}$
3			2.7–12	$-7.54 \times 10^{-10}$
Spring		1	0–6	$-8.96 \times 10^{-10}$
		2	6–12	$8.72 \times 10^{-10}$
Inflow	Summer	1	0–6	$3.77 \times 10^{-9}$
		2	6–12	$2.40 \times 10^{-10}$
	Spring	1	0–3.7	$5.56 \times 10^{-9}$
		2	3.7–5.5	$-2.10 \times 10^{-8}$
		3	5.5–7.3	$3.67 \times 10^{-8}$
		4	7.3–9.2	$-5.36 \times 10^{-8}$
	5	9.2–11	$5.87 \times 10^{-8}$	

**Table S2:** Net reaction rates for La estimated by PROFILE at the Deep, House, and Inflow sites in the summer and spring seasons.

<b>Site</b>	<b>Season</b>	<b>Zone nr.</b>	<b>Depth interval (cm)</b>	<b><math>R_{net}^{La}</math> (<math>\mu\text{M cm}^{-3} \text{s}^{-1}</math>)</b>
<b>Deep</b>	<i>Summer</i>	1	0-6	$1.34 \times 10^{-15}$
		2	6-12	$-7.78 \times 10^{-16}$
	<i>Spring</i>	1	0-8.6	$-8.43 \times 10^{-17}$
		2	8.6-10	$4.29 \times 10^{-15}$
<b>House</b>	<i>Summer</i>	1	0-7.2	$5.52 \times 10^{-16}$
		2	7.2-12	$-3.52 \times 10^{-16}$
	<i>Spring</i>	1	0-1.5	$4.91 \times 10^{-15}$
		2	1.5-12	$-3.57 \times 10^{-16}$
<b>Inflow</b>	<i>Summer</i>	1	0-8	$6.48 \times 10^{-16}$
		2	8-12	$-6.99 \times 10^{-16}$
	<i>Spring</i>	1	0-2.2	$-9.88 \times 10^{-16}$
		2	2.2-3.3	$6.03 \times 10^{-15}$
		3	3.3-5.5	$-4.05 \times 10^{-15}$
		4	5.5-6.6	$7.15 \times 10^{-15}$
5	6.6-11	$-1.04 \times 10^{-15}$		



**Figure S4.** Output of the PLUM model for  $^{210}\text{Pb}$  activity and age estimation modelling at the Deep, House, and Inflow sites. Upper panels represent the prior (green) and posterior (gray) distribution of the model's parameters, with accumulation rates (yr/cm) being shown on the 2<sup>nd</sup> panel from the left. The red text indicates prior parameter values.