Supplemental for

Seasonal controls override forest harvesting effects on the composition of dissolved organic matter mobilized from boreal forest soil organic horizons

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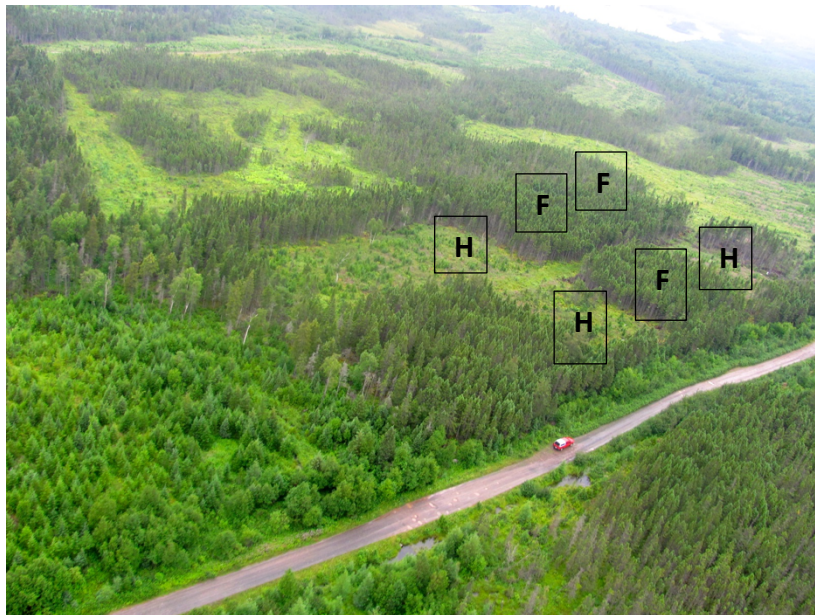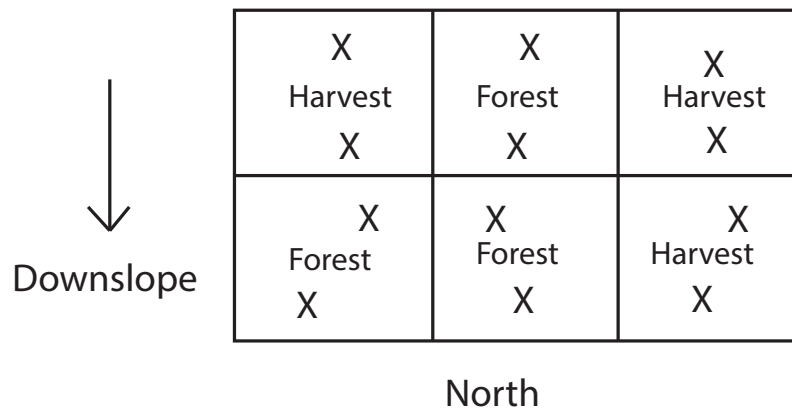
Figure S1. The Pynn's Brook Experimental Forest field experimental design. A north-facing black spruce hillslope site divided into six 50 m × 50 m plots, half of which were randomly selected for harvest 10 years prior to lysimeter installation (a). For this study each of the six plots contains two lysimeter pairs ("X") for a total of 12 harvest (H) and 12 forest (F) lysimeters. An aerial image of the experimental site with labels over the plots used (b). Top figure modified from Bowering et al. (2020).

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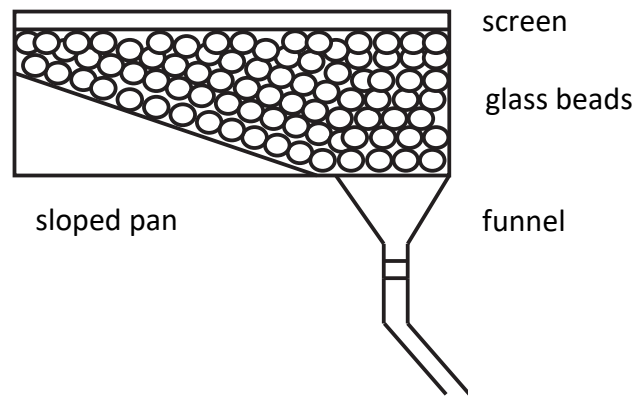
(a) Passive Pan Lysimeter Design

(b) Passive Pan Lysimeter Installation Under Organic Layer

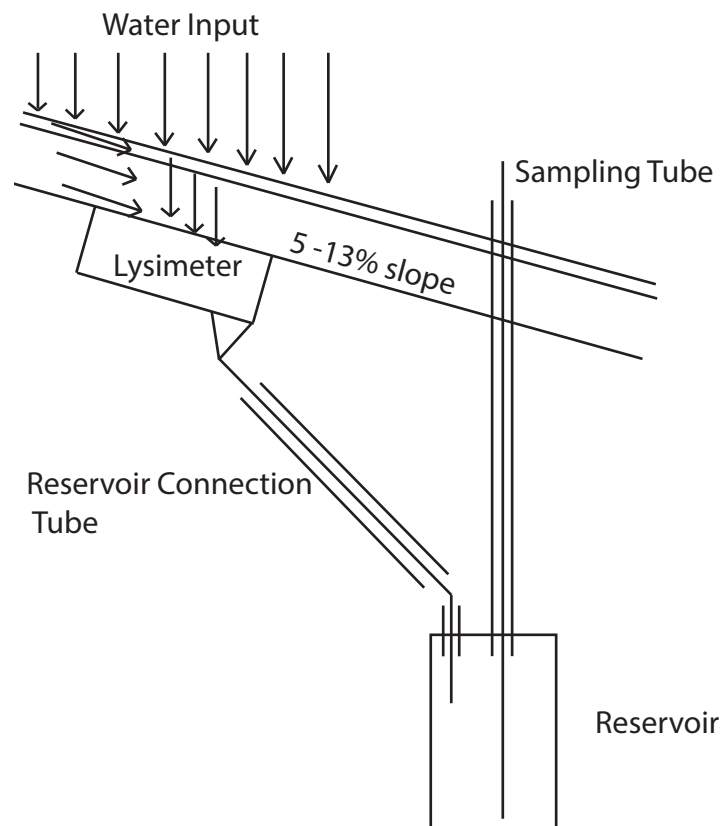



Figure S2. Lysimeters consisted of glass bead filled, high-density polyethylene (HDPE) trays with a sloped bottom connected to a funnel with cross-linked polyethylene (PEX) tubing (a). Each lysimeter was installed under the moss + organic layer on a slope ranging between 5 % and 13 %. Water collected by the lysimeters infiltrated vertically and laterally through moss and organic layers and into a 25 L reservoir from which samples were retrieved (b). Figure modified from Bowering et al. (2020).

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Table S1. Total annual lysimeter captured dissolved fluxes and soil properties. Total dissolved nitrogen (TDN), ammonium (NH_4^+), nitrate (NO_3^-), dissolved organic nitrogen (DON), orthophosphate (PO_4^{3-}) and the C:N of DOM from O horizons. NO - was below detection (B.D.). Mean molar carbon to nitrogen ratio (C:N) and total nitrogen (N) of organic horizon soil. One-way ANOVAs were used to assess significant differences between treatments (bolded, alpha = 0.05). Standard deviation of the mean of 3 plots per treatment provided in parentheses.

| | ------dissolved --- | | | | | | --soil ---------------- | |
	PO_4^{3-} g P m^{-2}	TDN g N m^{-2}	NH_4^+ g N m^{-2}	NO_3^- g N m^{-2}	DON g N m^{-2}	C:N molar	C:N molar	N g N m^{-2}
Forest	0.31 (0.02)	0.81 (0.10)	0.10 (0.01)	B.D.	0.67 (0.09)	66.7 (10.7)	70.1 (5.04)	40 (4.3)
Harvest	0.34 (0.16)	1.19 (0.11)	0.16 (0.07)	B.D.	0.99 (0.09)	61.6 (2.16)	49.7 (12.4)	30 (20)
p value	0.773	**0.0298**	0.373	NA	**0.0384**	0.0523	0.0581	0.456

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Table S2. Concentrations of dissolved organic carbon (DOC), total dissolved nitrogen (TDN), ammonium (NH_4^+), nitrate (NO_3^-), dissolved organic nitrogen (DON), and orthophosphate (PO_4^{3-}) of the total annual solution flux captured by lysimeters. Nitrate was below detection (B.D.) One-way ANOVAs were used to test significant differences between treatments ($\alpha = 0.05$).

Treatment	PO_4^{3-} mg P L^{-1}	TDN mg N L^{-1}	NH_4^+ mg N L^{-1}	NO_3^- mg N L^{-1}	DON mg N L^{-1}
Forest	0.18 (0.12)	0.59 (0.13)	0.084 (0.03)	B.D.	0.49 (0.09)
Harvest	0.11 (0.08)	0.54 (0.15)	0.088 (0.07)	B.D.	0.44 (0.04)
p-value	0.307	0.224	0.972	NA	0.212

Table S3. Repeated measures ANOVA results assessing the effect of collection day and the interaction with treatment on weekly to monthly fluxes. Total dissolved nitrogen (TDN), ammonium (NH_4^+), dissolved organic nitrogen (DON), and orthophosphate (PO_4^{3-}). Post hoc least squares means tests used to determine when significant treatment effect occurred (indicated with asterisks in Figure 1 of main text).

A. PO_4^{3-} flux	df	F-value	p-value
Treatment	1	2.099	0.1615
Day	27	19.79	**<0.0001**
Treatment x Day	27	5.27	**<0.0001**
B. TDN flux	**df**	**F-value**	**p-value**
Treatment	1	7.861	**0.0103**
Day	27	21.309	**<0.0001**
Treatment x Day	27	1.923	**0.0037**
C. NH_4^+ flux	df	F-value	p-value
Treatment	1	2.575	0.1228
Day	27	6.457	**<0.0001**
Treatment x Day	27	2.494	**0.0001**
D. NH_4^+:TDN	df	F-value	p-value
Treatment	1	2.6914	0.1151
Day	21	17.1175	**<0.0001**
Treatment x Day	21	3.3387	**<0.0001**
E. DON flux	df	F-value	p-value
Treatment	1	6.205	**0.0208**
Day	26	19.937	**<0.0001**
Treatment x Day	26	1.618	**0.0281**
F. DOC:DON	df	F-value	p-value
Treatment	1	5.2935	0.0313
Day	21	92.4184	**<0.0001**
Treatment x Day	21	1.6403	**0.0371**

References

Bowering, K. L., Edwards, K. A., Prestegaard, K., Zhu, X., and Ziegler, S. E.: Dissolved organic carbon mobilized from organic horizons of mature and harvested black spruce plots in a mesic boreal region, Biogeosciences, 17, 581–595, https://doi.org/10.5194/bg-17-581-2020, 2020.