

Table S1. Results of repeated measure linear mixed models assessing the effects of plot type, collection day and the interactive effect of collection day and plot type (forest and harvested) on temporal variations in lysimeter captured dissolved organic carbon (DOC) fluxes, water fluxes and DOC concentration. P-values shown with significant results in bold (alpha = 0.05). Post hoc least squares means tests used to determine significant differences between plot type shown in Figure 1D-F (asterisks)

	df	F value	p-value
A. DOC flux $\text{g C m}^{-2} \text{d}^{-1}$			
plot type	1	3.88	0.0616
collection day	29	23.49	<0.0001
plot type x collection day	29	1.51	0.0183
B. Water flux $\text{L m}^{-2} \text{d}^{-1}$			
plot type	1	4.98	0.0361
collection day	29	26.71	<0.0001
plot type x collection day	29	2.36	0.0004
C. [DOC] mg L^{-1}			
plot type	1	7.27	0.0132
collection day	24	48.45	<0.0001
plot type x collection day	24	2.90	<0.0001

Table S2. Results of one way plot nested ANOVAs assessing the effects of plot type on annual lysimeter captured dissolved organic carbon (DOC) fluxes, water fluxes and DOC concentration. P-values shown with significant results in bold (alpha = 0.05). Plot type differences shown in Figure 2A-C (asterisks).

	df	F value	p-value
A. DOC flux g C m⁻²			
plot type	1	23.49	0.0084
B. Water flux L m⁻²			
plot type	1	10.07	0.0337
C. [DOC] mg L⁻¹			
plot type	1	7.27	0.0903

Table S3. Linear mixed effects model results examining the effects of plot type, sample year (2013, 2014, 2015), and their interaction on soil respiration. $\alpha = 0.05$

Source	DF	F	p-value
Plot type	1	4.79	0.0721
Year	2	87.28	<0.0001
Year x Plot type	2	5.13	0.0060

Table S4. Least square means for multiple comparisons of soil respiration ($\text{CO}_2 \text{ m}^{-2} \text{ s}^{-1}$) in black spruce forests across plot type (harvested and forest) and sample years (2013–2015). Soil respiration was measured during the snow-free growing season. $\alpha = 0.05$

Treatment_Year		Mean	Std.	DF	t	p-value
		Diff.	Error			
Forest_2013	Harvested_2013	-0.465	1.488	2148	-0.31	0.7546
	Forest_2014	-7.227	0.898	2148	-8.05	<.0001
	Forest_2015	-8.562	0.922	2148	-9.28	<.0001
Harvested_2013	Harvested_2014	-1.337	0.898	2148	-1.49	0.1366
	Harvested_2015	-3.741	0.922	2148	-4.06	<.0001
Forest_2014	Harvested_2014	5.424	1.524	2148	3.56	0.0004
	Forest_2015	-1.334	0.953	2148	-1.40	0.1619
Harvested_2014	Harvested_2015	-2.403	0.953	2148	-2.52	0.0118
Forest_2015	Harvested_2015	4.355	1.552	2148	2.81	0.0051

Table S5. Mean cumulative soil respiration (R_s) for the snow-free growing season in 4 harvested plots and 4 forest plots. N refers to number of plot scale replicates. Values connected by the same letter are not significantly different determined by lsmeans tests shown in table S4 .

Treatment	Year	N	R_s (Mg C ha¹)
Forest	2013	4	6.06 ± 0.41 ^a
	2014	4	7.14 ± 0.55 ^{bc}
	2015	4	7.85 ± 0.59 ^c
Harvested	2013	4	5.53 ± 0.32 ^a
	2014	4	6.20 ± 0.27 ^a
	2015	4	6.49 ± 0.29 ^b

Table S6. Regression analysis among soil respiration, R_s ($\mu\text{mol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$), soil temperature, T_s ($^{\circ}\text{C}$), and soil moisture content, M_s (m^3/m^3), and $T_s \times M_s$ interactions in the harvested and forest plots. R_s , T_s , and WC_s were measured concurrently at biweekly interval during the snow free season (May 1–Nov 30) from 2013–2015. $\alpha = 0.05$

Plot type	Variable	DF	Parameter Estimate	Standard Error	t	p-value
Forest	Intercept	1	0.986	0.579	1.7	0.0892
	T_s	1	0.278	0.055	5.08	<.0001
	M_s	1	-0.037	0.019	-1.93	0.0544
	$T_s \times M_s$	1	0.004	0.002	2.17	0.0306
Harvested	Intercept	1	1.543	0.432	3.57	0.0004
	T_s	1	0.145	0.032	4.60	<.0001
	M_s	1	-0.071	0.014	-4.99	<.0001
	$T_s \times M_s$	1	0.006	0.001	5.58	<.0001

Table S7. Hydraulic properties of O horizons collected from forest and harvested plots. Measurements were made using a automated HYPROP system, providing volumetric water content of the soil at initial saturation and field capacity. See methods for further measurement details.

Water Content (% volume)		
	Initial	Field Capacity at 33kPa
Harvested		
1	58.4	14.1
2	62.1	18.6
3	76.3	23.1
4	76.2	21.0
Forest		
1	67.8	18.2
2	75	19.3
3	77.5	17.4
4	77.1	12.8