Supplementary material

Table S1. Forest stand average composition in major tree species (percentage of merchantable stand basal area) prior to harvesting, and merchantable basal area (means ± standard deviation [SD]).

Soil province*	Harvesting treatment†	N	*Betula papyrifera*	*Picea glauca*	*Picea mariana*	*Pinus banksiana*	*Abies balsamea*	Other tree species	Merchantable basal area
			(% of basal area)						($m^2 \cdot ha^{-1}$)
B	SOH	39	16	11	16	15	36	6	35 ± 10
	WTH	25	3	11	7	12	31	36	41 ± 8
C	SOH	39	11	13	18	17	24	16	26 ± 7
	WTH	30	14	17	22	21	13	13	20 ± 11
D	SOH	21	16	18	28	15	8	16	15 ± 7
	WTH	12	13	16	29	17	10	16	20 ± 7
E	SOH	11	16	16	16	27	11	14	25 ± 6
	WTH	19	10	15	31	17	16	11	22 ± 6
Average	SOH	110	12	13	17	17	27	13	26 ± 11
	WTH	86	13	16	22	18	15	16	21 ± 9

* Soil province: B = Appalachians, C = Laurentians, D = Abitibi Lowlands, E = Mistassini Highlands.

† Harvesting treatment: SOH = stem-only harvesting, WTH = whole-tree harvesting.

Table S2. Characteristics of the trees measured for site quality index evaluation at the time of soil sampling. Data presented are means ± SD.

Soil province*	Harvesting treatment†	Species	N	DBH (cm)	Age at DBH (yrs)	Height (m)
B	SOH	*Abies balsamea*	117	13.6 ± 2.4	22.1 ± 3.4	9.5 ± 1.1
	WTH	*Abies balsamea*	75	12.4 ± 1.8	19.7 ± 2.0	8.0 ± 1.1
	SOH	*Picea mariana*	76	13.7 ± 1.8	21.4 ± 2.6	8.5 ± 1.1
	WTH	*Picea mariana*	64	13.1 ± 2.0	17.8 ± 2.4	7.6 ± 1.0
	SOH	*Picea glauca*	47	14.1 ± 2.3	21.7 ± 3.7	9.1 ± 1.3
	WTH	*Picea glauca*	46	12.5 ± 2.0	17.1 ± 2.2	7.3 ± 0.9
C	SOH	*Abies balsamea*	71	13.5 ± 3.6	25.3 ± 5.3	10.4 ± 2.5
	WTH	*Abies balsamea*	32	13.4 ± 4.4	26.0 ± 6.1	9.4 ± 3.1
	SOH	*Pinus banksiana*	6	14.4 ± 3.1	18.3 ± 1.6	8.8 ± 0.9
	WTH	*Pinus banksiana*	27	13.9 ± 1.7	19.4 ± 1.7	9.7 ± 0.9
	SOH	*Picea mariana*	99	12.2 ± 2.0	23.2 ± 5.7	8.7 ± 1.4
	WTH	*Picea mariana*	70	12.1 ± 3.4	26.3 ± 10	8.5 ± 2.0
D	SOH	*Abies balsamea*	41	12.4 ± 2.2	25.7 ± 6.0	9.4 ± 1.7
	WTH	*Abies balsamea*	7	12.5 ± 2.9	20.3 ± 3.5	7.6 ± 1.3
	SOH	*Picea mariana*	59	12.0 ± 2.6	22.9 ± 5.3	8.5 ± 1.6
	WTH	*Picea mariana*	33	10.3 ± 1.4	22.6 ± 6.9	7.1 ± 0.8
E	SOH	*Abies balsamea*	2	9.9 ± 0.1	35.5 ± 10.6	8.1 ± 0.4
	WTH	*Abies balsamea*	7	11.2 ± 1.2	29.7 ± 10.9	8.9 ± 1.7
	SOH	*Pinus banksiana*	30	14.3 ± 1.9	22.7 ± 1.7	11.0 ± 1.1
	WTH	*Pinus banksiana*	27	13.8 ± 2.0	21.5 ± 1.8	9.0 ± 1.8
	SOH	*Picea mariana*	33	12.4 ± 1.9	24.5 ± 3.7	9.3 ± 1.0
	WTH	*Picea mariana*	52	9.4 ± 2.4	22.6 ± 5.2	7.2 ± 1.7
Average per species	SOH	*Abies balsamea*	231	13.3 ± 2.8	23.8 ± 5.0	9.7 ± 1.8
	WTH	*Abies balsamea*	121	12.6 ± 2.8	22.0 ± 5.4	8.4 ± 2.0
	SOH	*Pinus banksiana*	36	14.1 ± 2.1	21.8 ± 2.4	10.4 ± 1.5
	WTH	*Pinus banksiana*	54	13.6 ± 2.0	20.1 ± 2.5	9.2 ± 1.5
	SOH	*Picea mariana*	267	12.6 ± 2.2	22.8 ± 4.7	8.7 ± 1.3
	WTH	*Picea mariana*	219	11.5 ± 2.9	22.4 ± 7.6	7.7 ± 1.6
	SOH	*Picea glauca*	47	14.1 ± 2.3	21.7 ± 3.7	9.1 ± 1.3
	WTH	*Picea glauca*	46	12.5 ± 2.0	17.1 ± 2.2	7.3 ± 0.9
Average	SOH		581	13.1 ± 2.5	23.1 ± 4.7	9.3 ± 1.7
	WTH		440	12.2 ± 2.8	21.5 ± 6.4	8.1 ± 1.8

* Soil province: B = Appalachians, C = Laurentians, D = Abitibi Lowlands, E =Mistassini Highlands.

† Harvesting treatment: SOH =stem-only harvesting, WTH =whole-tree harvesting.

Table S3. Parameter estimates of the relationship between soil bulk density (Db) and organic matter (OM) concentration according to great soil texture groups. No significant difference was found between the Sand and the Loam model (F = −1.34, *P* = 1), so these data were fused.

Parameter	Estimate	SE	*t* value	*P*
Sand and loam				
D_{bm}	1.532	0.049	31.2	<0.001
D_{bo}	0.111	0.006	18.6	<0.001
Residual standard error: 0.2335 on 522 d.f.; R^2 = 0.38				
Clay				
D_{bm}	2.152	0.253	8.5	<0.001
D_{bo}	0.109	0.011	10.2	<0.001
Residual standard error: 0.1438 on 39 d.f.; R^2 = 0.66				

NOTE: The modeled relationships are represented by the following equation (Federer *et al.*, 1993):

$$Db = \frac{D_{bm} \times D_{bo}}{F_o \times D_{bm} + (1 - F_o) \times D_{bo}}$$

where D_b represents observed bulk density ($g \cdot cm^{-3}$),

D_{bm} is a constant for bulk density of "pure" mineral soil (without organic matter) ($g \cdot cm^{-3}$),

D_{bo} is a constant for bulk density of "pure" organic matter (without mineral matter) ($g \cdot cm^{-3}$),

F_o is the proportion of organic matter (%/100).

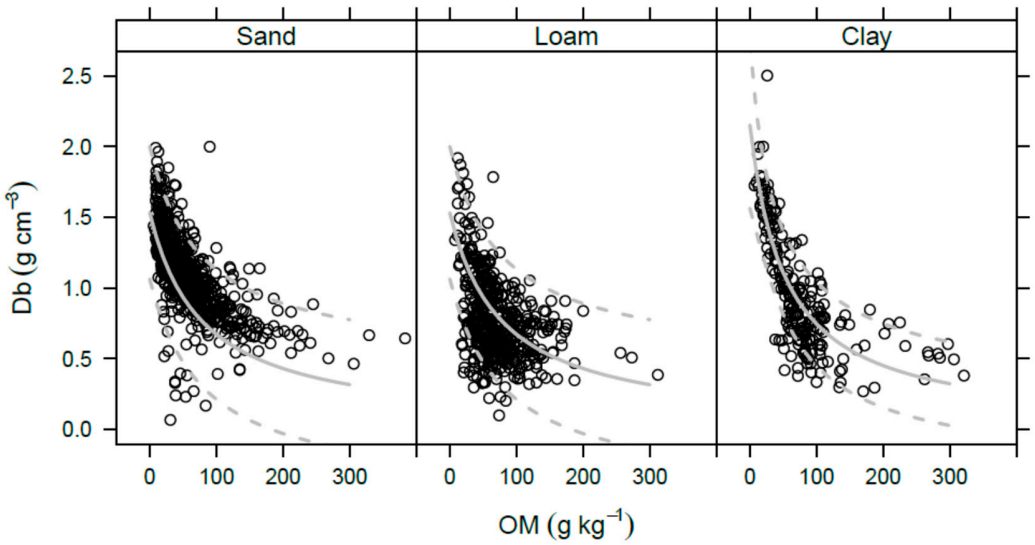

Figure S1. Relationship between soil bulk density (Db) and organic matter (OM) concentration according to great soil texture groups. Lines show model predicted values and 95% confidence interval predictions.

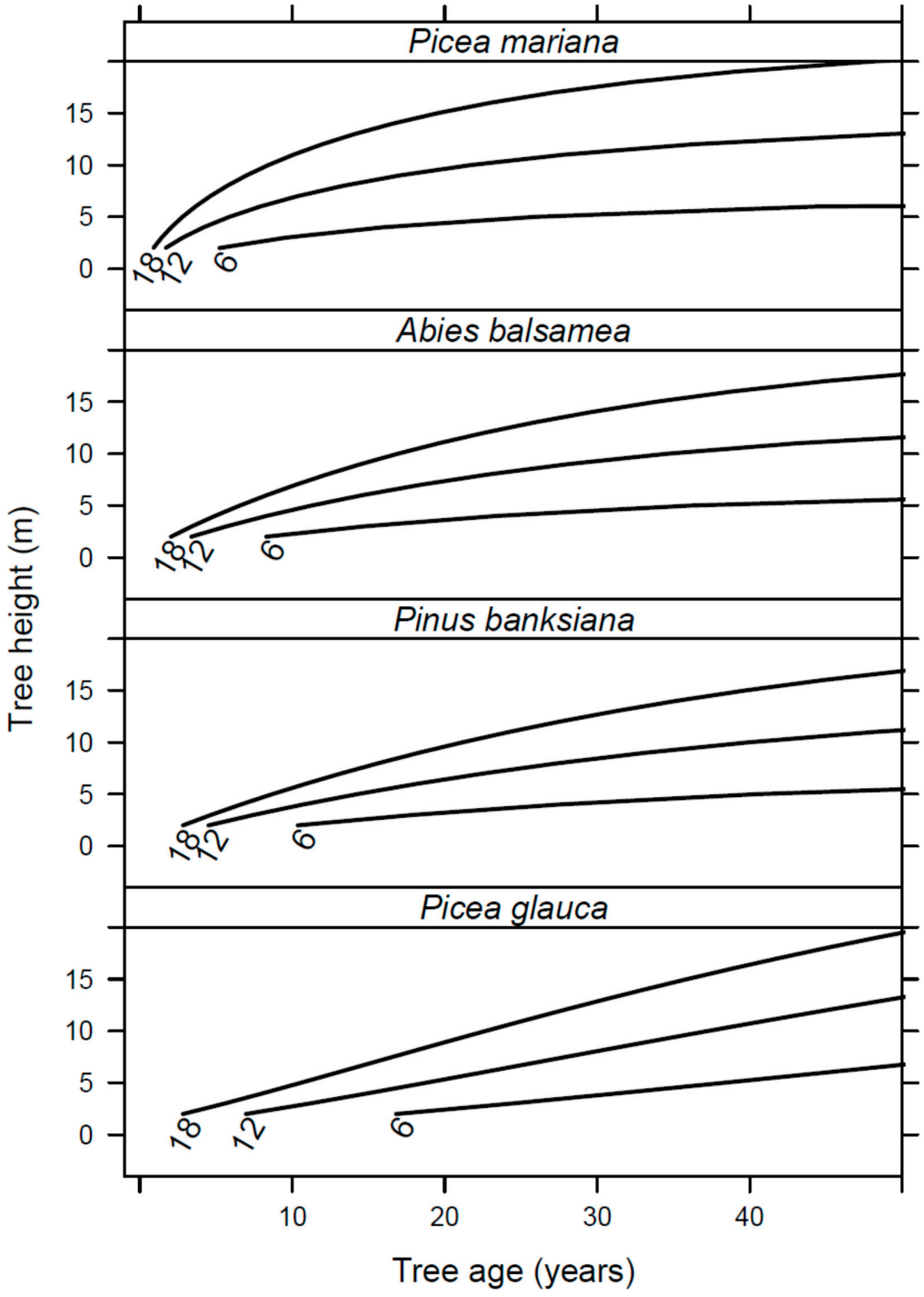

Figure S2. Expected tree height as a function of tree age (at DBH height) for various site quality index (SQI) values. Data is derived from the models of Pothier and Savard [45] for *Picea mariana*, *Abies balsamea*, and *Pinus banksiana*, and of Prégent [46] for *Picea glauca*.

Table S4. Estimated biomass and mineralomass left on the ground after stem-only harvesting (SOH) in the 4 soil provinces, based on tree surveys before harvesting. Data presented are model adjusted means ± standard errors. Within columns, means with the same letters are not different at p = 0.05.

Soil province*	Biomass	N	P	K	Ca	Mg
	($Mg \cdot ha^{-1}$)	($kg \cdot ha^{-1}$)				
B	28 ± 1c	240 ± 12c	32.8 ± 1.9c	119 ± 5c	137 ± 7c	23.2 ± 1.2c
C	21 ± 1b	170 ± 12b	23.9 ± 1.8b	87 ± 6b	103 ± 8b	18.9 ± 1.3b
D	14 ± 1a	104 ± 12a	14.3 ± 2.0a	55 ± 7a	65 ± 9a	12.1 ± 1.5a
E	20 ± 2ab	142 ± 16ab	17.0 ± 2.6ab	66 ± 9ab	79 ± 12ab	16.2 ± 2.0ab
Average	21 ± 1	184 ± 7	24.3± 1.0	89 ± 3	104 ± 4	18.7 ± 0.7
P (Soil province)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

* Soil provinces: B = Appalachians, C = Laurentians, D = Abitibi Lowlands, E = Mistassini Highlands.

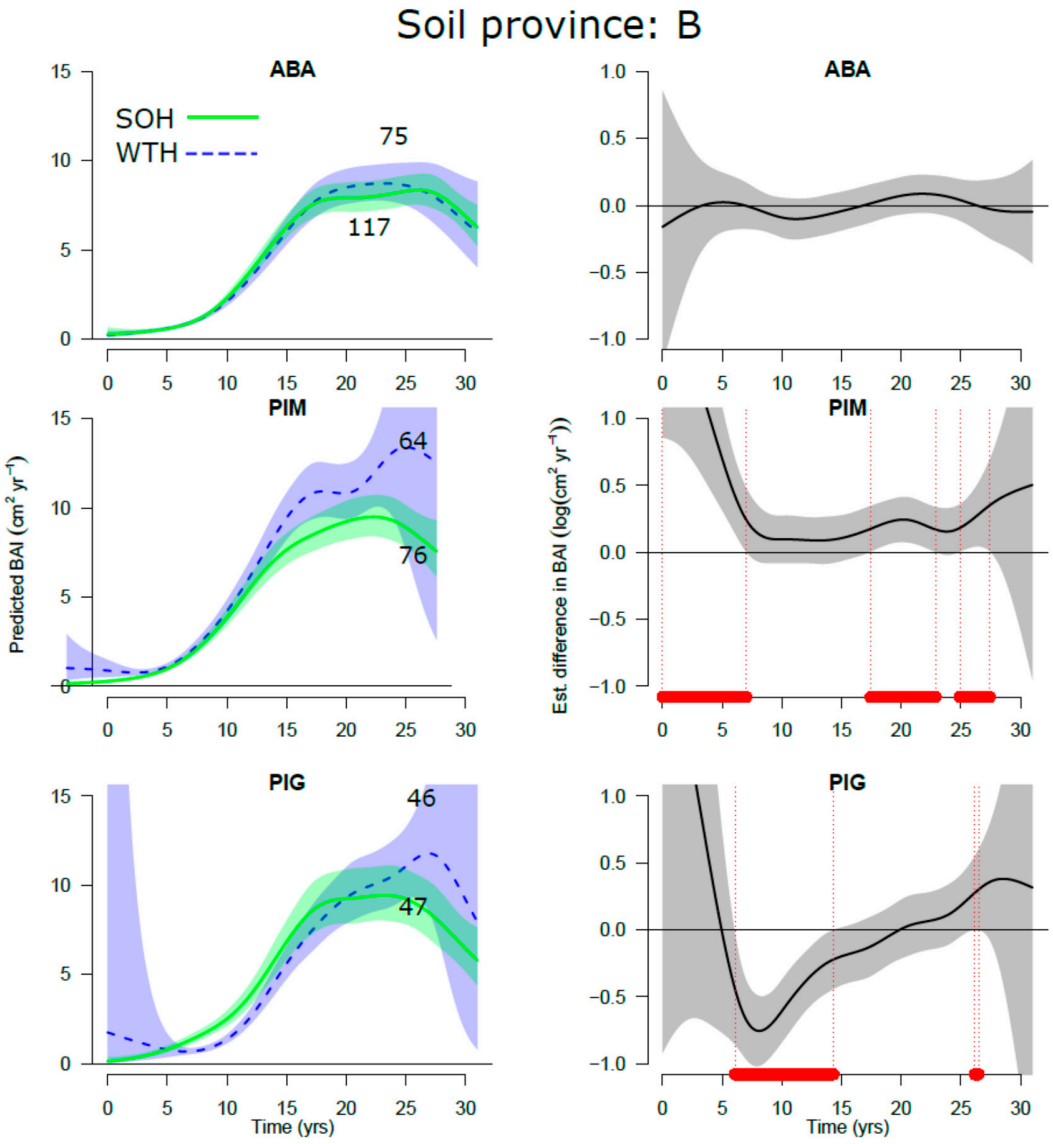

Figure S3. Left panels: Predicted basal area increment (BAI) of individual regenerating tree species (ABA = *Abies balsamea*, PIM = *Picea mariana*, PIG = *Picea glauca*) over time after harvesting treatment (stem-only harvesting [SOH] and whole-tree harvesting [WTH]) in the soil province B (Appalachians). Data presented are model averages (lines) and simultaneous 95th centile confidence intervals (bands) (95%CI). Numbers of samples are displayed for each treatment. Right panels: Estimated difference in BAI (log values, simultaneous 95% CI) between WTH and SOH (WTH minus SOH) smoothed curves. Periods during which treatments differ significantly are highlighted with a red line on the X axis.

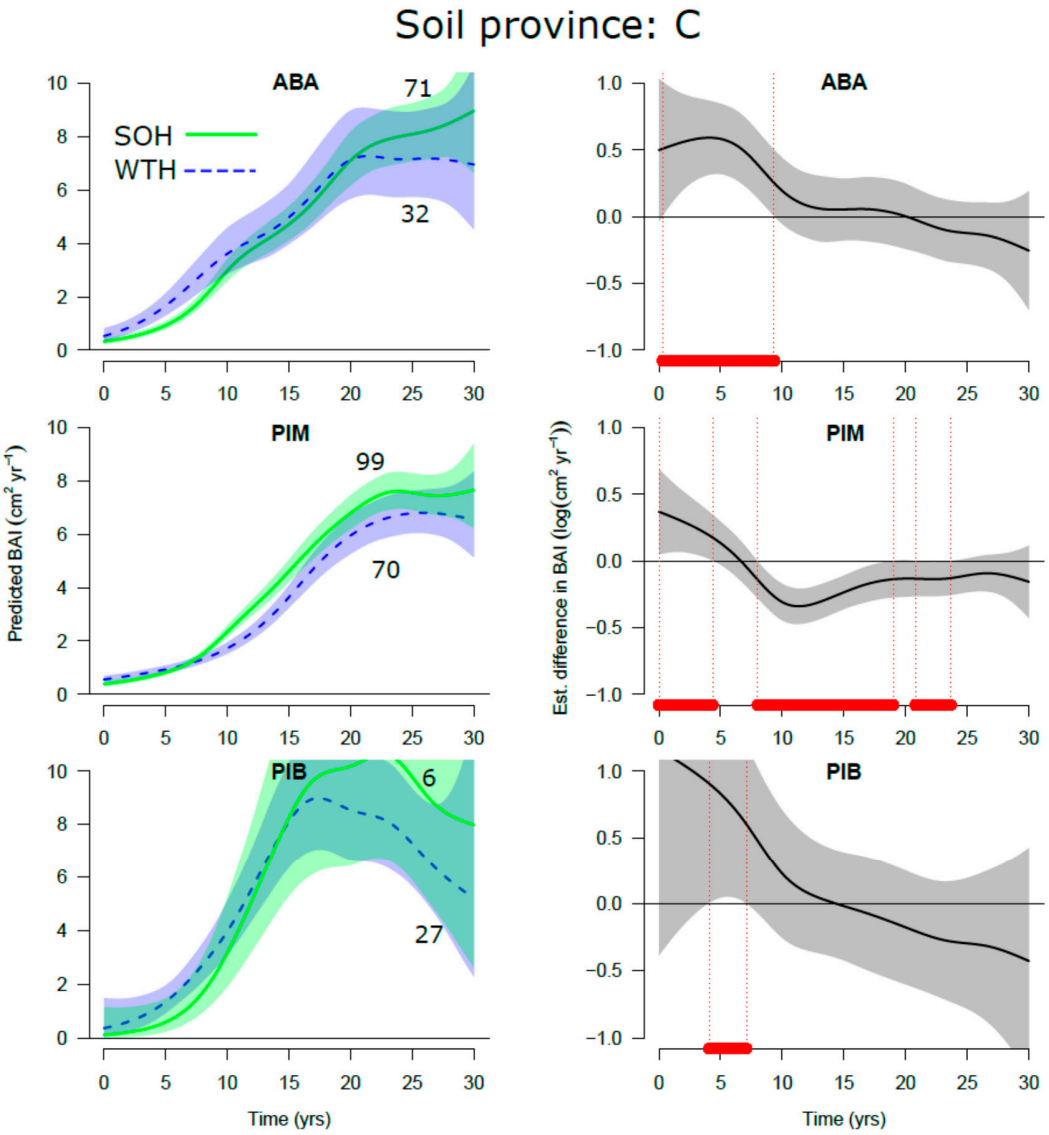

Figure S4. Left panels: Predicted basal area increment (BAI) of individual regenerating tree species (ABA = *Abies balsamea*, PIM = *Picea mariana*, PIB = *Pinus banksiana*) over time after harvesting treatment (stem-only harvesting [SOH] and whole-tree harvesting [WTH]) in the soil province C (Laurentians). Data presented are model averages (lines) and simultaneous 95th centile confidence intervals (bands) (95% CI). Numbers of samples are displayed for each treatment. Right panels: Estimated difference in BAI (log values, simultaneous 95% CI) between WTH and SOH (WTH minus SOH) smoothed curves. Periods during which treatments differ significantly are highlighted with a red line on the X axis.

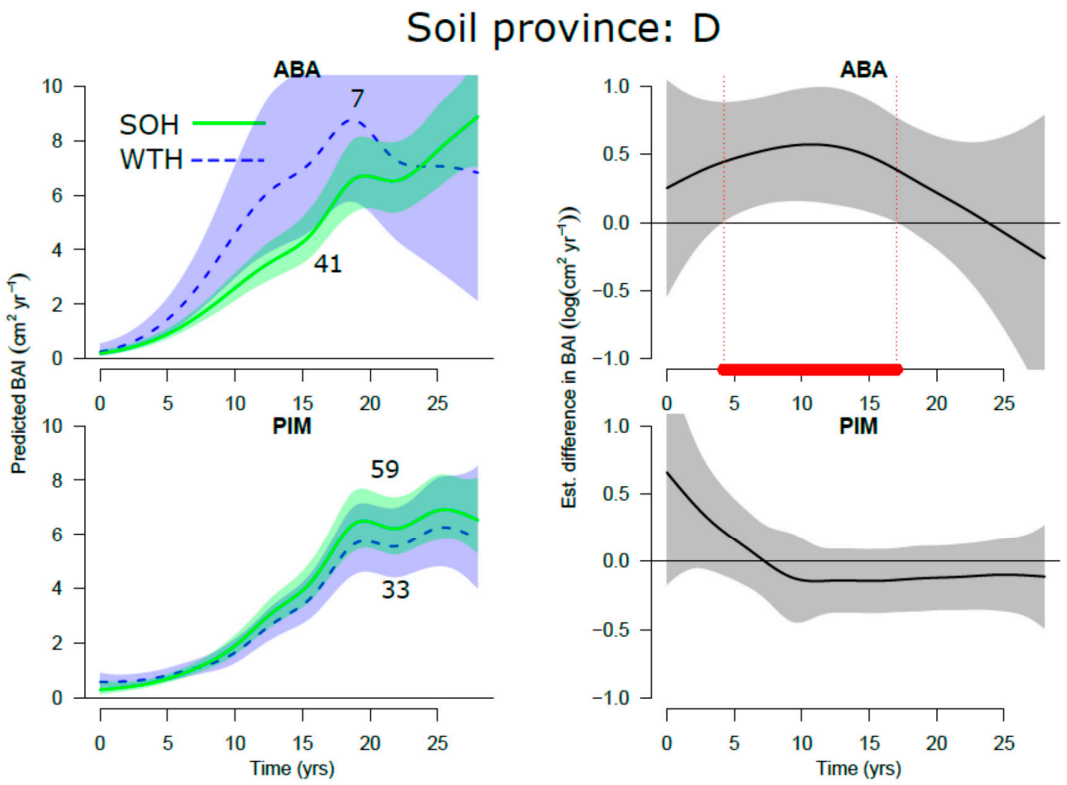

Figure S5. Left panels: Predicted basal area increment (BAI) of individual regenerating tree species (ABA = *Abies balsamea*, PIM *Picea mariana*) over time after harvesting treatment (stem-only harvesting [SOH] and whole-tree harvesting [WTH]) in the soil province D (Abitibi Lowlands). Data presented are model averages (lines) and simultaneous confidence 95th centile intervals (bands) (95% CI). Numbers of samples are displayed for each treatment. Right panels: Estimated difference in BAI (log values, simultaneous 95% CI) between WTH and SOH (WTH minus SOH) smoothed curves. Periods during which treatments differ significantly are highlighted with a red line on the X axis.

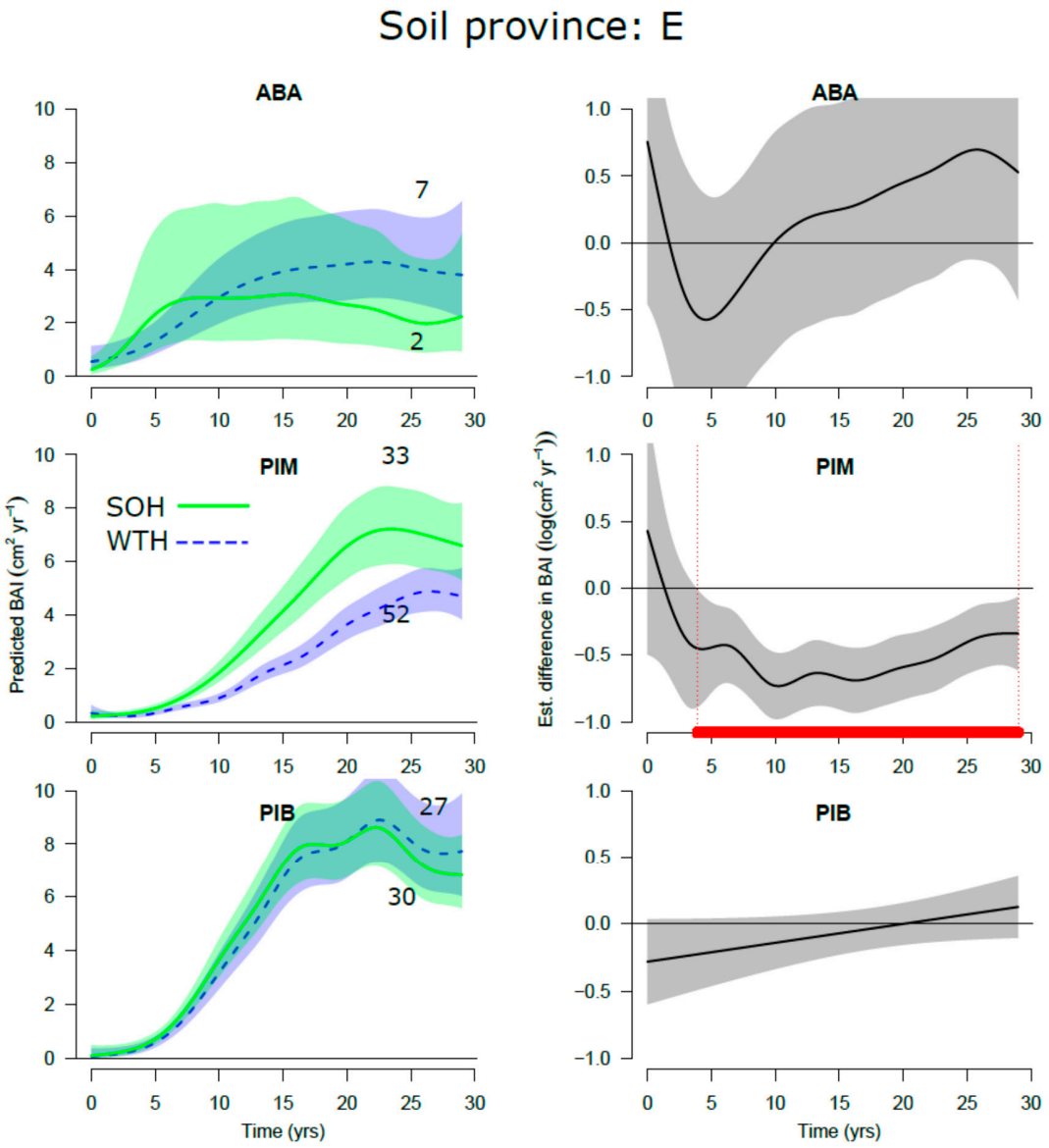

Figure S6. Left panels: Predicted basal area increment (BAI) of individual regenerating tree species (ABA = *Abies balsamea*, PIM = *Picea mariana*, PIB = *Pinus banksiana*) over time after harvesting treatment (stem-only harvesting [SOH] and whole-tree harvesting [WTH]) in the soil province E (Mistassini Highlands). Data presented are model averages (lines) and simultaneous 95th centile confidence intervals (bands) (95% CI). Numbers of samples are displayed for each treatment. Right panels: Estimated difference in BAI (log values, 95% CI) between WTH and SOH (WTH minus SOH) smoothed curves. Periods during which treatments differ significantly are highlighted with a red line on the X axis.

Reference

Federer, C.A., Turcotte, D.E., Smith, C.T., 1993. The organic fraction-bulk density relationship and the expression of nutrient content in forest soils. Can. J. For. Res. 23, 1026-1032.