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Low methane emissions from a boreal wetland constructed on oil sand mine tailings

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Supplementary information

Table S1: Published values for methane fluxes from sites with rewetted peatland soils, which also contain a reference to either an undisturbed or an unrestored site.

Seasonal[a]

	Sub-site[b]	Years since rewetting	Flux[c] (mg CH_4 m^{-2} h^{-1})	Ratio of change[d]
Boreal				
Boreal Plains, Canada	Unrestored – Bare Peat		-0.1 [c3]	*
(Strack et al., 2014)	Rewetted – Dry	4	<0.1 [c3]	
	Rewetted – Wet	4	6 [c3]	76.6
Bois-des-Bel	Unrestored - Cutover (year 1)		0.3[c1,g]	*
(Waddington and Day, 2007)	Unrestored - Cutover (year 2)		0.1 [c1,g]	*
	Unrestored - Cutover (year 3)		0.3 [c1,g]	*
	Rewetted (year 1)	1	<0.1 [c1,g]	-0.9
	Rewetted (year 2)	2	0.4 [c1,g]	2.7
	Rewetted (year 3)	3	1.4 [c1,g]	3.6
Kihinö, Finland	Unrestored Tussock (year prior to wetting)		0.2[c1]	*
(Tuittila et al., 2000)	Restored Tussock	1	0.75[c1,f]	2.8
	Restored Tussock	2	2.5[c1,f]	11.5
Konilamminsuo mire (fen), Sweden	Unrestored – Low watertable		<-0.1	*
(Komulainen et al., 1998)	Rewetted – High watertable	1	1.1	132.8
	Rewetted – Average watertable	1	0.2	19.8
Multiple Sites, Finland	Asusuo (Undisturbed)		5.8 [c1]	
(Juottonen et al., 2012)	Kallioneva (Undisturbed)		29.5 [c1]	
	Hirsikangas (Undisturbed)		9.5 [c1]	
	Mean Undisturbed		14.9 [c1]	
	Murtsuo (Rewetted)	11	0.3 [c1]	
	Konilamminsuo (Rewetted)	12	0.1 [c1]	
	Vanneskorpi (Rewetted)	10-11	0.5 [c1]	
	Mean Rewetted		0.1 [c1]	-1.0
Šumava National Park, Czech Republic	Undisturbed Bog – *Trichophorum*		3.8	
(Urbanová et al., 2012)	Undisturbed Bog – Shrub		3.0	
	Unrestored Bog – Shrub		2.2	*
	Unrestored Bog – *Molinia*		0.4	
	Rewetted Bog – *Trichophorum*	1	2.5	0.1
	Rewetted Bog – Shrub Dominated	1	0.4	- 0.8

	Sub-site[b]	Years since rewetting	Flux[c] (mg CH_4 m^{-2} h^{-1})	Ratio of change[d]
Viheriäisenneva mire (bog), Sweden	Unrestored – hollow/lawn		0.3	*
(Komulainen et al., 1998)	Rewetted – hollow-/awn	1	1.5	3.7
	Rewetted – hummock/lawn	1	0.3	0.1
Temperate				
Burns Bog, BC, Canada	Undisturbed	n/a	2.4 [c2]	
(Christen et al., 2016)	Drained-Sedge/*Sphagnum*		2.8 [c2]	*
	Rewetted-Sedge	6	4.5 [c2]	0.6
	Rewetted-Cleared	2	1.6 [c2]	- 0.4
Donaumoos, Germany	Drained – Grassland		-0.01	*
(Wild et al., 2001)	Rewetted – *Typha*	0.2-1	0.2	32.9
	Rewetted – *Typha*	0.2-1	1.3	131.9
Horstemeer, Netherlands	Rewetted relatively dry regions	10	2.2 ± 0.2[c1]	*
(Hendriks et al., 2007)	Rewetted-annually saturated	10	18.4 ± 2.9 [c1]	7.3

Annual[a]

Boreal				
Ahlen-Falkenberger Moor, Germany	Natural Wetland (year 1)		0.7[c4]	
(Beetz et al., 2013)	Natural Wetland (year 2)		0.4[c4]	
	Drained - Intensive Management (year 1)		<0.1[c4]	*
	Drained - Intensive Management (year 2)		<0.1[c4]	*
	Rewetted - Extensive Management (year 1)	3	0.2[c4]	9.5
	Rewetted - Extensive Management (year 2)	4	<0.1[c4]	2.6
Temperate				
Ballacorick, Ireland	Rewetted – Bare Peat (relatively Dry)	Mean of 7-9	<0.1	*
(Wilson et al., 2013)	Rewetted – *Juncus/Spagnum*	Mean of 7-9	1.2	72.1
	Rewetted – *Sphagnum*	Mean of 7-9	1.5	87.4
	Rewetted – *Euiophorum*	Mean of 7-9	0.8	46.3
Glenvar, Ireland	Unrestored – Grazing allowed		0.2 [c4]	*
(Renou-Wilson et al., 2016)	Unrestored – No Grazing		0.3 [c4]	*
	Rewetted – Grazing allowed	15-16	1.9 [c4]	6.8
	Rewetted – No Grazing	17-18	0.9 [c4]	2.0
Himmelmoor, Germany	Unrestored – Extraction site		<0.1 [c1]	*
(Vanselow-Algan et al., 2015)	Restored Heath dominated	3-30	7.2 [c1]	201.0
	Restored Sphagnum dominated	3-30	11.4 [c1]	315.0
	Restored Purple moor grass dominated	3-30	17.0 [c1]	470.1

	Sub-site[b]	Years since rewetting	Flux[c]	Ratio of change[d]
Horstermeer, Netherlands	Rewetted – Relatively Dry	10	2.3	*
(Hendriks et al., 2007)	Rewetted – Wet	10	18.4	7.11
	Ditch	10	9.1	3.0
Schleswing-Holstein, Germany	Drained – Arable land		<0.1	*
(Poyda et al., 2016)	Drained – Moist, agricultural production		<0.1	-0.5
	Drained – Wet, agricultural production		0.2	6.6
	Rewetted	Mean of 20-23	0.8	30.1

Peak flux[a]

Boreal				
Boreal Plains, Canada	Drained - Extraction		-0.05	*
(Strack et al., 2014)	Rewetted	4	16.4	350.9
Temperate				
Turraun, Ireland	Unrestored	0	0.1[e]	
(Wilson et al., 2009)	Restored-*Typha*	10-14	16	159
	Restored-*Phalaris*	10-14	6[e]	59
	Restored-*Eriophoum*/*Carex*	10-14	1.8	17

a – Literature reported seasonal, annual fluxes, or maximum. Scaled to hourly fluxes over the study period for consistency of units used in this study.

b – Sub-sites are labelled with either dominate vegetation, or treatment as worded within each paper.

c – c1 designates mean, c2 designates median, c3 designates midpoint of the given range, c4 designates annual total divided by 8760 hours.

d - % change is the difference between the rewetted site flux and the dry site flux divided by the absolute dry site flux. i.e. the effect of wetting on methane emissions. *indicates which subsite was used for the dry site flux.

e – Values interpreted from figure 2 in Wilson et al. 2009.

f – value interpreted from figure 2 in Tuttila et al 2000.

g – spatially weighted mean flux from table 2 values in Waddington and Day 2007.

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