Supplemental Section 1. Modeling NEE and CH_4 flux from chamber measurements
As described in the body of the report, NEE (in g C-CO_2 m^{-2} $time^{-1}$) is the mass flux of CO_2 from the surface of the peatland to the atmosphere. NEE is defined as the sum of GPP and ER with negative and positive sign convention respectively. GPP and ER are modeled separately as a function of field variables temperature, water table, and light level, which were recorded hourly on site.

Here, the progression of GPP and ER models and the thought behind them is be outlined in more detail.

Notation:
GPP is gross primary production (in g C-CO_2 m^{-2} $time^{-1}$) with a negative sign convention
ER is the net ecosystem respiration (again in g C-CO_2 m^{-2} $time^{-1}$) with a positive sign convention. This term takes into account all of the respiration both above and below ground, heterotrophic and autotrophic that occur per unit area per time.
a, b, c, d, e, f, g, h, and ***i*** are empirical fitting parameters specific to each model. The physical meaning of these fitting parameters will be described in some more detail below.
JDAY is the Julian day of the year.
PAR is the light intensity (μmol m^{-2} s^{-1}). This measure of light level takes into account μmol of photons in the photosynthetic wavelength only and is not directly equivalent to light power.
$\mathbf{T_{5cm}}$ is the soil temp at 5 cm depth in degrees Celsius.
WT is the water table with respect to ground level in cm with the sign convention that a negative value is depth below the ground surface.

GPP Models
The most important part of a GPP model is the response to light. GPP is often modeled according to Michaelis-Menton kinetics as in Eq. S1.

$$GPP = -a * \frac{PAR}{PAR+b} \tag{S1}$$

In this model, GPP is modeled as a function of light level only. For this model, the ***a*** term is the maximum rate of primary production at light saturation (GPP_{max}), and ***b*** is the light intensity at which the GPP is half of GPP_{max}. This model has the advantage of being simple with few fitting parameters and has been used to model GPP in some studies (for example Laine et al. 2006, Strack et al. 2014). However, it assumes that GPP_{max} is constant through-out, and fails to account for much of the variability found in the field data for this study.

To account for the seasonal variability in GPP_{max}, Wilson et al. (2013) and Wilson et al. (2016b) add a green leaf area term to the GPP model, where green leaf area is determined in the field using a metric presented in Wilson et al. (2007). Green leaf area is found to vary in a sinusoidal way through-out the year and is different for each species of plant. However, green leaf area is an unusual and somewhat labor intensive piece of field data to collect on a large scale, especially when collars contain a diverse mixture of plant species. Further, the total green leaf area for a plot has to be estimated or modeled based on a sub-sample of plants in the plot. This means that there is error in the estimate of green leaf area, and the GPP would be based on an input variable with a potential for measurement bias. For this work, rather than use green leaf area, Julian day of the year is introduced into the model. Green leaf area is assumed to vary in a sinusoidal way through-out the year, and the relative importance of seasonal variation is determined by the best fit to the field data using parameter ***c*** in Eq. S2-S4. The ***a*** term is equivalent to GPP_{max} when it is at a minimum (assumed here to be January 1).

$$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PAR}{PAR+b} \quad \text{(S2)}$$

This model is much better at explaining the variability in field GPP data than Eq. S1, result. In order to further improve the fit to the field data, the effect of soil temperature and water table were also added to the GPP model. This was done in a few different ways.

In Eq. S3, the effect of soil temperature and water table is included as simple linear terms. If these, things are not important factors, the empirical parameters ***d*** and ***e*** will reduce to zero, and this model will be equivalent to Eq. S2.

$$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PAR}{PAR+b} * (1 + T5cm * d) * (1 + WT * e) \quad \text{(S3)}$$

Also, more complicated expression were tested to explain the soil temperature and water table effect on GPP (Eq. S4).

$$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PAR}{PAR+b} * \left[\exp\left(-0.5 * \frac{T5cm-d}{e}\right)\right] * \left(\frac{1}{1+i*\exp(-(WT+h)}\right) * \left(1 - \frac{g}{1+f*\exp(-WT+12)}\right) \quad \text{(S4)}$$

where temperature is modeled after Wilson et al. (2016b), and water table is modeled in a non-linear fashion such that there is a water table at which GPP is a maximum after Piechl et al. (2014). This model explains the variability slightly better than Model 3, but is much more complicated and requires fitting 9 different empirical parameters.

Finally, in Eq. 2 (from the main body of the paper and reproduced below), WT is added as a simple linear term, but temperature is modeled as an exponential term where it assumes that biological zero is essentially 0 degrees C. Further, the seasonal fluctuation in GPP_{max} was changed from sin(JDAY/365*π) to sin((JDAY+255))/365*2π) to include the entire sine period over the year. This means that the parameter ***a*** becomes the average annual GPP_{max} and ***c*** is the seasonal fluctuations in GPP_{max}. The (JDAY+215) term offsets the timing such that the minimum GPP_{max} occurs on Julian day 59 and the maximum GPP_{max} occurs on Julian day 241. This offset was varied and optimized to give the best fit with field measurements for all collars.

$$GPP = -(a + c * \sin((JDAY + 215)/365 * 2\pi)) * \frac{PAR}{PAR+b} * exp(T5cm * d) * (1 + WT * e) \quad \text{(1)}$$

This model explains the variability in field GPP data better than Eq. S1-S4 and is reasonably simple. The Eq. 1 was thus chosen to model GPP for all of the collars at Abbeyleix. Unlike Wilson et al. (2016b), the same model was used for all of the collars, so that systematic model bias does not introduce apparent differences between ecotypes. Model fit parameters for Eq. 1 are presented in Table S1 and the r^2, slope, and standard deviation of the residuals is presented in Table S3 for each of the 29 collars in this study. For each collar, this model was also checked to ensure that there is not a bias or trend in the residuals with respect to independent variables.

ER Models

Ecosystem respiration (ER) is modeled according to the T_{5cm} and water table. The simplest model tested for ER is Eq. S5, which assumes an exponential increase in biological respiration with temperature after the trends in Piechl et al. (2014), and the effect of water table is not included.

$$ER = a * e^{b*T5cm} \tag{S5}$$

Slightly more complex, Eq. S6 and S7 include both soil temperature and water table in modeling ER. Soil temperature and WT effect on ER is modeled as a linear relationship in Eq. S7 as in Strack et al. (2014), and Eq. S5 and S6 are combined to produce Eq. S7.

$$ER = a * T5cm - (b * WT + c) \tag{S6}$$
$$ER = a * e^{b*T5cm} - c * WT \tag{S7}$$

The Eq. S8 is taken from Wilson et al. (2016b). This model preforms well at explaining the variance in the ER data (r^2 ranges from 0.62 to 0.923) with only 3 empirical fitting parameter.

$$ER = (a + b * WT) * \exp\left(c * \left(\frac{1}{(283.15-227.13)} - \frac{1}{(T5cm+46.02)}\right)\right) \tag{S8}$$

Finally, the Eq. 2 (from the main body of the paper reproduced below) is similar to Eq. S10 but includes the expected seasonal variation in green leaf area (and thus autotrophic respiration) as a function of Julian day of the year.

$$ER = \left(a + d * \sin(\frac{JDAY+215}{182.5} * 2\pi) + e * WT\right) * \exp\left(c * \left(\frac{1}{(283.15-227.13)} - \frac{1}{(T5cm+46.02)}\right)\right) + b * WT \tag{2}$$

Empirical fitting parameters for Eq. 2 and Eq. S10 are shown in Table S2. All of these models were compared to explain the variance of the ER field data on a collar specific basis. The Eq. 2 and S10 both perform well at explaining the variance in the ER field data. The Eq. 2 has a higher r^2 and standard deviation of the residuals the residuals (Table S3.) than Eq. S10 for all collars, but this is at the expense of two additional fitting parameters. Using Eq. 2 improves the relative error by 8.9% on average compared to Eq. S10.

Table S1. Collar specific GPP model fitting parameters for Eq. 1 in the main body of the paper. The ecotypes are labeled by two or three letter codes Sphagnum Cutover (SC), Calluna Cutover (CC), Eriophorum Cutover (EC), Sub-Marginal (SBM), and Sub-Central (SBC).

	GPP Model 5 parameters				
Collar	***a***	***b***	***c***	***d***	***e***
SC1	0.228629	404.1333	0.040973	0.036105	0.013391
SC2	0.317656	437.8192	0.157065	0.030603	0.015712
SC3	0.36619	455.3312	0.212723	0.002357	0.005653
SC4	0.395682	566.0143	0.143814	0.008529	-0.00278
SC5	0.22711	390.4548	0.099739	0.013199	0.016052
SC6	0.405187	537.3388	0.204815	0.012647	0.008678
CC7	0.750273	699.6754	0.536624	0.01556	0.019726
CC8	0.355618	480.1086	0.207424	0.01029	0.020114
CC9	0.344963	427.5879	0.189444	0.028985	0.014413
CC10	0.365619	453.7127	0.248343	0.027675	0.02017
CC11	0.103523	521.9221	0.055265	0.043176	0.015283
EC12	0.18758	591.7241	0.109202	0.030929	0.006438
EC13	0.284899	513.0967	0.165136	0.008394	0.008072
EC14	0.346543	651.2158	0.208094	-0.00051	0.021068
EC15	0.279346	607.5263	0.154217	0.022373	0.016572
EC16	0.193411	428.2823	0.122165	0.01175	0.013054
EC17	0.307362	530.9699	0.190077	-0.00092	0.010712
SBM18	0.13964	358.5696	0.096993	0.071381	0.017882
SBM19	0.1477	281.7201	0.096946	0.022982	0.012021
SBM20	0.235006	459.9398	0.108024	0.025718	0.00621
SBM21	0.212146	459.5104	0.086819	0.02565	0.010224
SBM22	0.152372	483.9821	0.069488	0.016523	0.009432
SBM23	0.217659	361.6539	0.124133	0.042236	0.024515
SBC24	0.108202	346.3706	0.061654	0.066152	0.022423
SBC25	0.229194	425.7324	0.133059	0.023313	0.00952
SBC26	0.185815	378.3783	0.136099	0.041353	0.003406
SBC27	0.343987	455.7104	0.200757	0.010784	0.009224
SBC28	0.110573	276.1813	0.057354	0.062639	0.031408
SBC29	0.071213	199.0137	0.043785	0.078578	0.037384

Table S2. Table of collar specific empirical fitting parameters for two ER models. Collar labels are as in Table S1.

	ER Model Parameters (Eq. 2)					ER Model Parameters (Eq. S8)		
collar	***a***	***b***	***c***	***d***	***e***	***a***	***b***	***c***
SC1	0.022055	-0.00361	550.4884	0.002769	0.000566	0.038654	-0.05936	335.8318
SC2	0.03509	-0.00057	463.7616	0.002289	0.000364	0.039016	0.009038	407.2254
SC3	0.05726	0.000283	268.2933	0.012503	-0.00016	0.04371	-0.03743	332.3358
SC4	0.039683	-0.00057	387.4256	0.003076	-0.00038	0.043065	-0.07551	347.8267
SC5	0.025286	-0.00204	510.8429	0.00074	0.000572	0.032709	-0.0209	377.7663
SC6	0.02857	0.002662	165.6974	0.007325	-0.005	0.01402	-0.32056	252.6829
CC7	0.066034	-0.00037	324.2279	0.018094	0.000155	0.041766	-0.10211	363.6781
CC8	0.075905	0.00178	210.6603	0.010395	-0.00065	0.053453	0.009631	370.0434
CC9	0.087033	0.00176	279.1307	0.008407	-0.00112	0.062572	-0.04296	404.9583
CC10	0.109245	-0.00241	484.5702	0.046476	0.004204	0.092039	0.05	326.2933
CC11	0.03807	0.001208	268.9542	0.005459	-0.00158	0.028598	-0.08525	392.6906
EC12	0.030644	0.001292	473.4721	3.55E-05	-0.00189	0.027889	-0.11531	535.6771
EC13	0.041249	-0.00287	436.1785	1.21E-09	0.000511	0.045643	-0.12273	334.1294
EC14	0.046732	-0.00092	363.8419	0.001037	-0.00096	0.046828	-0.15867	358.6237
EC15	0.020202	-0.00043	388.6968	9.22E-09	-0.00248	0.020847	-0.28085	368.9234
EC16	0.050805	-0.00262	269.1823	0.004447	-0.00074	0.047521	-0.25851	309.0473
EC17	0.047795	-0.00213	302.712	0.008541	-0.00021	0.048772	-0.21081	282.8662
SBM18	0.042307	-0.00015	457.5012	0.005368	6.14E-06	0.037966	-0.03093	471.2578
SBM19	0.044379	-0.00098	531.9473	6.59E-09	0.0013	0.043983	0.05	482.4479
SBM20	0.059647	0.001859	255.2026	0.009079	-0.00111	0.045206	-0.02556	388.4561
SBM21	0.024457	-0.00048	481.8333	0.005527	-0.00023	0.023158	-0.0739	435.3405
SBM22	0.026037	5.22E-05	349.6984	0.001173	-0.0013	0.025729	-0.12871	360.914
SBM23	0.042617	8.79E-06	423.8694	0.009455	0.000282	0.039957	0.005305	466.2228
SBC24	0.015263	-0.00122	546.0615	0.003186	-0.00057	0.017966	-0.11639	488.4011
SBC25	0.025216	0.000795	307.927	0.005466	-0.00174	0.020013	-0.13247	378.7412
SBC26	0.062593	0.00156	275.2068	0.022015	-0.00109	0.044358	-0.07407	385.7125
SBC27	0.038127	-0.00032	387.2152	0.012996	-5.2E-05	0.029898	-0.12318	373.9362
SBC28	0.015668	-0.0012	603.1505	0.003171	0.000106	0.019002	-0.03933	527.0428
SBC29	0.024333	-0.0009	639.9997	0.000441	0.000823	0.023986	0.05	615.7781

Table S3. Model r^2 and standard deviation of the residuals (in units of g-C-CO_2m^{-2}hr^{-1}) for GPP model (Eq. 1) and ER models (Eq. 2 and Eq S10). Collar Labels are as in Table S1.

	GPP model (Eq. 1)			ER model (Eq. 2)			ER model (Eq. S8)		
collar	r^2	Slope	STDEV of the residuals	r^2	Slope	STDEV of the residuals	r^2	Slope	STDEV of the residuals
SC1	0.831	0.811	0.046	0.855	0.794	0.022	0.821	0.793	0.025
SC2	0.885	0.863	0.034	0.870	0.846	0.019	0.864	0.862	0.020
SC3	0.846	0.829	0.039	0.779	0.774	0.028	0.758	0.746	0.029
SC4	0.830	0.785	0.054	0.920	0.926	0.017	0.916	0.932	0.018
SC5	0.876	0.837	0.024	0.896	0.828	0.013	0.880	0.833	0.014
SC6	0.903	0.889	0.037	0.854	0.839	0.022	0.841	0.808	0.027
CC7	0.864	0.879	0.039	0.934	0.935	0.014	0.912	0.918	0.016
CC8	0.828	0.808	0.029	0.820	0.820	0.016	0.797	0.776	0.017
CC9	0.881	0.861	0.040	0.846	0.854	0.026	0.839	0.833	0.026
CC10	0.885	0.873	0.034	0.828	0.823	0.030	0.628	0.575	0.045
CC11	0.807	0.839	0.012	0.885	0.895	0.015	0.878	0.884	0.015
EC12	0.921	0.891	0.023	0.919	0.936	0.014	0.918	0.938	0.014
EC13	0.880	0.862	0.028	0.905	0.890	0.013	0.889	0.868	0.014
EC14	0.875	0.844	0.029	0.908	0.910	0.013	0.907	0.904	0.013
EC15	0.885	0.854	0.030	0.896	0.889	0.017	0.896	0.891	0.017
EC16	0.871	0.852	0.023	0.933	0.935	0.010	0.907	0.867	0.012
EC17	0.850	0.811	0.031	0.885	0.842	0.016	0.871	0.819	0.017
SBM18	0.909	0.911	0.030	0.880	0.883	0.019	0.876	0.882	0.020
SBM19	0.781	0.764	0.032	0.861	0.828	0.017	0.855	0.831	0.017
SBM20	0.902	0.883	0.027	0.854	0.856	0.016	0.836	0.827	0.017
SBM21	0.895	0.887	0.019	0.867	0.869	0.016	0.849	0.860	0.017
SBM22	0.878	0.863	0.016	0.850	0.812	0.011	0.850	0.810	0.011
SBM23	0.901	0.859	0.035	0.890	0.872	0.016	0.859	0.842	0.018
SBC24	0.851	0.852	0.036	0.802	0.787	0.022	0.793	0.792	0.022
SBC25	0.886	0.866	0.026	0.908	0.902	0.013	0.898	0.872	0.014
SBC26	0.890	0.889	0.042	0.836	0.837	0.029	0.773	0.744	0.034
SBC27	0.916	0.887	0.029	0.910	0.910	0.017	0.860	0.841	0.021
SBC28	0.849	0.829	0.028	0.880	0.836	0.014	0.870	0.843	0.014
SBC29	0.929	0.912	0.023	0.938	0.888	0.012	0.923	0.916	0.014

Methane modelling

As mentioned in the body of the paper, CH_4 fluxes are subject to much more random variation than CO_2 fluxes, which have a strong diuranal variation. The CH_4 flux, thus, can be calculated from the average CH_4 flux over a period. In this study, due to instrument issues, the field measurements of CH_4 flux were conducted over a limited period. So, a model was constructed for the purpose of extrapolating the field data to the entire study period. The field data of CH_4 flux from all collars was normalized by the collar average CH_4 flux and lumped together to model the average temporal variation in CH_4 flux. The variations in CH_4 flux was modelled according to day of year and soil temperature. The best fit empirical equation was Eq. S11. In this equation, the effect of temperature was similar to ER in Eq. S10. This was multiplied by a seasonal variation term, which is based on the best fit to the data. The relative effect of T_{5cm} and JDAY on the temporal variations in CH4 flux is shown in Fig. S1. The temporal variation in methane fluxes was extrapolated from this model. It was found that the annual CH_4 flux was 0.80 times the average of the field measurements from each collar. It is not surprising that the collar averages had to be reduced by a factor of 0.80 the field measurements were conducted from April 2017 to January 2018 and exclude three winter months.

$$CH_4\,flux = C * [0.205 * \sin(\frac{JDAY+263}{365} * 2\pi) + 0.205/3\sin(\frac{JDAY+218}{365} * 4\pi) + 0.729] * e^{(213.1*(\frac{1}{283.15-227.13} - \frac{1}{(T5cm+273.15-227.13)})} \quad \text{(S11)}$$

where CH_4 flux is in g-C-CH_4m^{-2}hr^{-1} and C is the average methane flux at a given collar.

Table S6. This table shows various aspects of the carbon and greenhouse gas balance and other information for Boreal and Temperate peatlands collected from literature. Notes and references are listed below the table.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Ljubljana Marsh, Slovenia	Drained fen grassland	2005	10	45.97	1400	-53.2 ± 22	11.7	7.5		478*[1,7]	5.83 ± 0.03	0.2±0.01*		a
Ljubljana Marsh, Slovenia	Drained fen grassland	2005	10	45.97	1400	-96.7 ± 14.4	11.1	7.6		492*[1,7]	4.21 ± 0.02	0.2 ±0.01*		a
Ljubljana Marsh, Slovenia	Undrained forested bog	2005	10	45.98	1400	-24.4 ± 13.8	16.5	4.6		332*[1,7,10]	5.77 ± 0.02	0.2±0.01*‡		a
Ljubljana Marsh, Slovenia	Drained forested bog	2005	10	45.98	0-0.8	-54.7 ± 16.4	19.3	4.3		487*[1,7,10]	9.52	-0.2±0.01*‡		a
Southern Germany	Drained fen		7.6	48.68	700	-46 ± 13.5	13.5				0.031	0.0*‡		b
Southern Germany	Drained fen		7.6	48.65	700	-71 ± 14.8	14.8				0.089	0.0*‡		b
Southern Sweeden, Asa Experimental Forest	Drained Dicidious forested Birch Bog	2000-2002	5.6	57.13	662	-15 ± 4	22	3.4		631*[1,10]	0.2 ± 0.11	0.7 ± 0.4*‡		c
Southern Sweeden, Asa Experimental Forest	Drained Dicidious forested Alder Bog	2000-2002	5.6	57.13	662	-18 ± 5	16	4.5		662*[1,10]	0.9 ± 0.35	0.7±0.4*‡		c
Southern Sweeden, Asa Experimental Forest	Undrained Dicidious forested Alder Bog	2000-2002	5.6	57.13	662	-1 ± 3	21	4.2		402*[1,10]	0.1 ± 0.05	5.7±2.3*‡		c
Southern Sweeden, Asa Experimental Forest	Drained Coniferous Bog	2000-2002	5.6	57.13	662	-27± 1.7	28			514*[1,10]	0.08 ± 0.05	0.0±0.08*‡		d
Southern Sweeden, Asa Experimental Forest	Drained Coniferous Bog	2000-2002	5.6	57.13	662	-22 ± 2.1	26			430*[1,10]	0.05 ± 0.03	0.2±0.2*‡		d
Southern Sweeden, Asa Experimental Forest	Drained Coniferous Bog	2000-2002	5.6	57.13	662	-17 ± 1	40			466*[1,10]	0.04 ± 0.05	0.8±0.3*‡		d
Southern Sweeden, Asa Experimental Forest	Undrained Coniferous bog	2001-2002	5.6	57.13	662	-7 ± 1	47			371*[1,10]	0.03 ± 0.04	8.6 ± 2.9*‡		d
Lakkasuo, Finland	Undrained tall Sedge Fen	1991-1992	3	61.81	700	-4	26.1	5.6		189*[1,7]	0.006	22.6*‡		e
Lakkasuo, Finland	Drained Tall Sedge Fen	1991-1992	3	61.81	700	-33	24.4	4.5		358*[1,7,10]	0.149	0.0*‡		e
Lakkasuo, Finland	Undrained tall sedge pine fen	1991-1992	3	61.81	700	-10	34.4	4.4		273*[1,7,10]	0.015	7.3*‡		e

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Lakkasuo, Finland	Drained tall sedge pine fen	1991-1992	3	61.81	700	-33	21.8	4		344*[1,7,10]	0.047	0.1*‡		e
Lakkasuo, Finland	Undrained dwarf shrub pine bog	1991-1992	3	61.81	700	-19	52.6	3.8		350*[1,7,10]	0.003	1.8*‡		e
Lakkasuo, Finland	Drained dwarf shrub pine bog	1991-1992	3	61.81	700	-31	52.6	3.8		362*[1,7,10]	0.012	0.6*‡		e
Lakkasuo, Finland	Undrained cotton grass pine bog with Sphagnum fuscum hummocks	1991-1992	3	61.81	700	-11	89.4	3.8		165*[1,7,10]	0.007	4.1*‡		e
Lakkasuo, Finland	Drained cotton grass pine bog with Sphagnum fuscum hummocks	1991-1992	3	61.81	700	-24	90.8	3.8		243*[1,7,10]	0.005	2.1*‡		e
	Undrained fen		1.9	62.75	650	-10					0.003	0.2*‡		f
Flanders Moss Forest, Scotland	Drained and planted (with trees decades before) bog	2008-2009	9.4	56.13	1200	-30 ± 5	31.5	3.6			0.074 ± 0.013	0.1 ± 0.1*‡		g
Flanders Moss Forest, Scotland	Undrained and Planted (with trees decades before) Bog	2008-2009	9.4	56.13	1200	-12 ± 3	31	3.6			0.067 ± 0.007	0.5 ± 0.2*‡		g
Flanders Moss Forest, Scotland	Undrained bog (may be affected by proximity to drained forested bog)	2008-2009	9.4	56.13	1200	-10 ± 1	27	3.7			0.017 ± 0.020	5.8 ± 3.5*‡		g
Flanders Moss Forest, Scotland	Near pristine bog	2008-2009	9.4	56.13	1200	-5	39	3.6			0.087	17.00*‡		g
Irish Midlands	Drained industrial harvested bog, lacking vegetation	2007-2009	9.3	53.2	970	-58.5 ± 18	45.9	4.3		182 ± 7*†				h
Irish Midlands	Drained industrial harvested bog, lacking vegetation	2011-2014	9.8	53.3	907	-49 ± 13	24.5	4.9		153 ± 12*†				h
NW Ireland	Drained industrial harvested bog, lacking vegetation	2012-2013	10.3	54.1	1245	-26 ± 10	57.7	3.8		138 ± 14*†				h
Irish Midlands	Drained industrial harvested bog, lacking vegetation	2002-2003	9.3	53.2	807	-28.5 ± 10	24.8	6.3		286 ± 21*†				h
NE Scotland	Drained industrial harvested bog, lacking vegetation	2003-2004	8	57.6	851	-26 ± 10	37	3.85		93 ± 34*†				h
Northern England	Drained industrial harvested bog, lacking vegetation	2013-214	10.2	53.5	867	-49.5 ± 16	36.6	2.9		170 ± 28*†				h
Irish Midlands	Drained domesticlly harvested bog	2006-2007	9.3	53.3	970	-49 ± 34.1	34.1	4		176 ± 20*†				h
Irish Midlands	Drained domesticlly harvested bog	2006-2007	9.3	53.1	804		42.2	3.8		203 ± 29*†				h

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Western Ireland	Drained domesticlly harvested bog	2013-2014	10	53.4	1193	-53 ± 3	39	4.4		174 ± 28[*†]				h
Northern Germany	Rewetted Minerotrophic fen		9	53.6	711	-12	12.3				0.294	0.1[*‡1,2]		i
Northern Germany	Rewetted Minerotrophic fen		9	53.6	711	-3 ± 5.6	13.3				0.227	0.8[*‡1,2]		i
Northern Germany	Rewetted Minerotrophic fen		9	53.6	711	-18	12.4				0.246	-0.1[*‡1,2]		i
Northern Germany	Rewetted Minerotrophic fen		9	53.6	711	-28 ± 3.6	11.8				9.627	-0.3[*‡1,2]		i
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-62.9 (range -114 to -27)		5.4		126.6[*†3,11]		0.0[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-56.3 (range -106 to -39)		5.4		89.3[*†3,11]		-0.1[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-40.8 (range -65 to -27)		5.4		120.4[*†3,11]		0.0[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-21.3 (range -55 to -2)		5.4		-162.5[*†3,11]		0.2[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-23 (range -50 to -4)		5.4		-53.5[*†3,11]		-0.1[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-7.8 (range -19 to 0)		5.4		22.3[*†3,11]		0.4[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-13.2 (range -42 to 2)		5.4		-35.8[*†3,11]		1.1[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-19.8 (range -47 to 0)		5.4		-47.4[*†3,11]		0.2[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-6.4 (range -40 to 13)		5.4		-188.7[*†3,11]		6.0[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-11.4 (range -68 to 10)		5.4		13.3[*†3,11]		37.3[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-24.9 (range -73 to -3)		5.4		-120.8[*†3,11]		-0.2[*‡3,11]		j
Alberta, Canada	Restored harvested bog, 3 years post restoration	2011-2012	0.2	55.3	522	-28.2 (range -54 to -8)		5.4		-125.5[*†3,11]		-0.0[*‡3,11]		j
Alberta, Canada	Unrestored bog with bare peat	2011-2012	0.2	55.3	522	-97.8 (range -106 to -93)		5.4		680.1[*†3,11]		-0.4[*‡3,11]		j
Alberta, Canada	Unrestored bog with bare peat	2011-2012	0.2	55.3	522	-38.7 (range -70 to -22)		5.4		328.0[*†3,11]		-0.1[*‡3,11]		j
Alberta, Canada	Unrestored bog with bare peat	2011-2012	0.2	55.3	522	-35 (range -79 to -17)		5.4		126.3[*†3,11]		-0.2[*‡3,11]		j

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
New Scoltand, Canada Peat Bog	Bog Hummock		6.3	44.4	1403	-16.0						1.9 ± 0.8[*‡1]		k
New Scoltand, Canada Peat Bog	Bog Lawn		6.3	44.4	1403	-8.0						7.7 ± 1.4[*‡1]		k
New Scoltand, Canada Peat Bog	Bog Bank		6.3	44.4	1403	-4.0						4.9 ± 3.3[*‡1]		k
New Scoltand, Canada Peat Bog	Bog Pool		6.3	44.4	1403	3.0						10.1 ± 2.2[*‡1]		k
Bavaria Germany	Ababdoned Peat Cut area		8.5	47.3	1483	-29.0						0.0[*‡1]		l
Bavaria Germany	Heathland		8.5	47.3	1483	-20.2						0.0[*‡1]		l
Bavaria Germany	Drained Heathland		8.5	47.3	1483	-11.6						1.9[*‡1]		l
Bavaria Germany	Heathland birch and Pine		8.5	47.3	1483	-17.0						0.8[*‡1]		l
Bavaria Germany	Flooded Heathland		8.5	47.3	1483	44.5						1.4[*‡1]		l
Bavaria Germany	Restored bog Heathland		8.5	47.3	1483	-11.7						7.1[*‡1]		l
Bavaria Germany	Restored bog lawn		8.5	47.3	1483	-5.3						2.2[*‡1]		l
Bavaria Germany	Undrained bog shrubs		8.5	47.3	1483	-8.4						5.5[*‡1]		l
Bavaria Germany	Undrained Bog Lawn		8.5	47.3	1483	-6.3						10.1[*‡1]		l
Bavaria Germany	Undrained bog hummocks		8.5	47.3	1483	-9.5						27.6[*‡1]		l
Bavaria Germany	Intermediate hummock lawn		8.5	47.3	1483	-3.8						24.1[*‡1]		l
Bavaria Germany	Undrained Bog hollow		8.5	47.3	1483	0.0						38.3[*‡1]		l
Allgaeu, Germany	Grassland		6.5	47.85	1200	-110.0						0.0[*‡1]		m
Allgaeu, Germany	Grassland		6.5	47.85	1200	-51.0						0.0[*‡1]		m
Allgaeu, Germany	Drained Fen		6.5	47.85	1200	-19.0						1.6[*‡1]		m
Allgaeu, Germany	Undrained Fen		6.5	47.85	1200	-9.0						13.1[*‡1]		m
Germany	Fen			52.8		-60.0						-0.3[*‡1]		n
Germany	Fen			52.8		0.0						0.3[*‡1]		n
Lakkasuo, Finland	Drained Minerotrophoc Tall Sedge Fen		3	61.8	700	-28.5					0.149	0.0[*‡]		o
Lakkasuo, Finland	Drained Ombrotrophic Pine Bog		3	61.8	700	-24.5					0.006	1.7[*‡]		o
Lakkasuo, Finland	Pristine Ombrotrophic Pine Bog		3	61.8	700	-16.0					0.006	3.5[*‡]		o
Lakkasuo, Finland	Pristine Minerotorphic tall sedge Fen		3	61.8	700	-3.2					0.006	31.3[*‡]		o

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Lower Saxony, Germany	Restored rich Peatland, dominated by grasses		8.7	52.48	698	-57.0					0.794	-0.1[*1]		p
Lower Saxony, Germany	Restored rich Peatland, dominated by grasses		8.7	52.48	698	-35.0					1.007	-0.0[*1]		p
Lower Saxony, Germany	Restored rich Peatland, dominated by grasses		8.7	52.48	698	9.5					-0.069	75.5[*1]		p
Bellacorick, Ireland	Drained Bare peat	2009-2013	10.3	54.1	1245	-26[11]	58	3.8	31[13]	138 ± 11[*†11]	0	0[*‡11]		q
Bellacorick, Ireland	Drained Cutover bog with Juncus vegetation	2009-2013	10.3	54.1	1245	-26.3[11]	58	3.8	31[13]	42 ± 23[*†11]	0	0[*‡11]		q
Bellacorick, Ireland	Rewetted cutover bog with bare peat	2009-2013	10.3	54.1	1245	-1.56[11]	58	3.8	24[13]	57±30[*†11]	0	0.1[*‡11]		q
Bellacorick, Ireland	Rewetted cutover bog with Juncus/Spahgnum	2009-2013	10.3	54.1	1245	6.06[11]	58	3.8	24[13]	-74 ± 67[*†11]	0	8.7±8[*‡11]		q
Bellacorick, Ireland	Rewetted cutover bog with Spahgnum/Eriophorium	2009-2013	10.3	54.1	1245	12.7[11]	58	3.8	24[13]	-84 ± 103[*†11]	0	11.2 ± 11.2[*‡11]		q
Bellacorick, Ireland	Rewetted cutover bog wth Eriophorium angustifolium	2009-2013	10.3	54.1	1245	6.22[11]	58	3.8	24[13]	-260 ± 179[*†11]	0	5.3 ± 3[*‡11]		q
Bellacorick, Ireland	Rewetted cutover peatland Ireland, composite of microsites	2009-2013	10.3	54.1	1245		58	3.8		-104 ±80[*†9,11]		9 ±2[*‡9,11]		q
Jurra Mountains, France	Naturally recovering cutover bog 20 years post harvest, Eriophorum vaginatum	2003-2005	6.6	47.3	1417	Measured but mean value not reported				-67 to -166[*11,12]		1.5 to 3.9[*11,12]		r
Jurra Mountains, France	Naturally recovering cutover bog 20 years post harvest, Spahgnum	2003-2005	6.6	47.3	1417	Measured but mean value not reported				-93 to -183[*11,12]		0.5 to 2.7[*11,12]		r
Jurra Mountains, France	Naturally recovering cutover bog 20 years post harvest, bare peat	2003-2005	6.6	47.3	1417	Measured but mean value not reported				22 to 32[*11,12]		0.2 to 0.6[*11,12]		r
Llyn Serw, Wales	Drained blanket bog, upslope of drain	2009-2011	5.6	53	2200	-5.5 ± 0.7		4.9				4.1 ± 0.5[*‡11]		s
Llyn Serw, Wales	Drained blanket bog, in drain	2009-2011	5.6	53	2200	0		4.8				4.5 ± 1.5[*‡11]		s
Llyn Serw, Wales	Drained blanket bog, downslope of drain	2009-2011	5.6	53	2200	-14.7 ± 2.6		4.8				2.4 ± 0.3[*‡11]		s
Llyn Serw, Wales	Drain-blocked blanket bog, upslope of drain	2009-2011	5.6	53	2200	-3 ± 0.5		4.9				6.5 ± 2.2[*‡11]		s
Llyn Serw, Wales	Drain-blocked blanket bog, within drain, unvegetated	2009-2011	5.6	53	2200	0		4.9				2.8 ± 0.8[*‡11]		s

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Refer-ence
Llyn Serw, Wales	Drain-blocked blanket bog, within drain, vegetated	2009-2011	5.6	53	2200	0		4.9				53.9±8.5[*11]		s
Nant y Brwyn, Wales	Drain-blocked blanket bog, down slope of drain	2009-2011	5.6	53	2200	-2.7 ± 0.3		4.9				4.5±1.1[*‡11]		s
Nant y Brwyn, Wales	Undrained blanked bog	2009-2011	5.6	53	2200			4.7				4.6±0.7[*‡11]		s
Nant y Brwyn, Wales	Undrained Blanket bog, within ditch	2009-2011	5.6	53	2200	-1.2		4.6				3.8±2.0[*‡11]		s
Degerö Stormyr mire, Northern Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2004	1.2	64.2	523	approx. -11[8]			14±1.5	-55 ±1.9**		9 ±1.7[*‡9]	5.2 ±0.8	t
Degerö Stormyr mire, Northern Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2005	1.2	64.2	523	approx. -8.5[8]			11.9±1.3	-48 ±1.6**		14±2.5[*‡9]	1.4 ±0.4	t
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2001	1.2	64.2	523	-6.6[8]				-58[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2002	1.2	64.2	523	-16.5[8]				-60[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2003	1.2	64.2	523	-13.7[8]				-47[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2004	1.2	64.2	523	-12.2[8]				-59[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2005	1.2	64.2	523	-8.7[8]				-58[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2006	1.2	64.2	523	-20.8[8]				-18[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2007	1.2	64.2	523	-15.7[8]				-48[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2008	1.2	64.2	523	-18.9[8]				-105[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2009	1.2	64.2	523	-17.3[8]				-41[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2010	1.2	64.2	523					-66[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2011	1.2	64.2	523	-14.7[8]				-79[**†6]				u
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2012	1.2	64.2	523	-10[8]				-57[**†6]				u

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains - (g-C $m^{-2}yr^{-1}$)	Refer-ence
Degerö Stormyr, Sweden	Pristine poor fen, open mix of Sphagnum spp. and sedges	2001-2012 average	1.2	64.2	523	-14.1 ±4.4[8,11]				-58 ±21**[11]				u
Auchencorth Moss, Scotland	Intact ombrotrophic bog with a small proportion of harvesting	2007		55.75	1155	-12.5[8]			18.6 ±16.0	-136*†	0.0034 ±0.0017[9]	0.29*‡[9]	14.1 ±3.4	v
Auchencorth Moss, Scotland	Intact ombrotrophic bog with a small proportion of harvesting	2008		55.75	1155	-12.5[8]			32.2 ±18.7	-93.5**†	0.0063 ±0.00054[9]	0.35*‡[9]	21.0 ±5.4	v
Auchencorth Moss, scotland	Intact lowland oligotrophic bog	2002-2013	8.3	55.8	1018	-3.5[8]				-64.1 ±33**[5,8,11]				w
Glencar, Ireland	Intact atlantic blanket bog	2004		55.9		-4.2[8]			13.1 ±3.1	-67.2 ±3.0**†		3.6 ±1.6*‡[9]		x
Glencar, Ireland	Intact atlantic blanket bog	2005		55.9		-4[8]			13.9 ±3.2	-84.0 ±4.8**†		4.5 ±1.9*‡[9]		x
Glencar, Ireland	Intact atlantic blanket bog	2006		55.9		-5[8]			16.5 ±3.2	-12.5 ±3.4**†		4.6 ±2.0*‡[9]		x
Glencar, Ireland	Intact atlantic blanket bog	2007		55.9		-5.5[8]			11.9 ±1.2	-13.5 ±2.3**†		4.2 ±1.9*‡[9]		x
Glencar, Ireland	Intact atlantic blanket bog	2008		55.9		-3.5[8]			15.0 ±1.3	-42.7 ±4.7**†		3.6 ±1.6*‡[9]		x
Glencar, Ireland	Intact atlantic blanket bog	2003		55.9		-2.4[8]				-67.9**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2004		55.9		-4.2[8]				-75.9**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2005		55.9		-4[8]				-79.2**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2006		55.9		-5[8]				-32.3**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2007		55.9		-5.5[8]				-32.1**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2008		55.9		-3.5[8]				-57.4**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2009		55.9		-2.6[8]				-59.3**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2010		55.9		-7[8]				-42.9**†[4]				y
Glencar, Ireland	Intact atlantic blanket bog	2011		55.9		-5.6[8]				-54.2**†[4]				y
The Himmelmoor, Germany	Cutover peatland restored (20-30 years prior to the start of the study), Sphagnum spp. vegetaiton cover	2011	9	53.75	838					16.4 ±39*	0.054 ±0.07	75 ±52*		z
The Himmelmoor, Germany	Cutover peatland restored (20-30 years prior to the start of the study), "heath," ericaceous shrub vegetaiton cover	2011	9	53.75	838					84.3 ±105*	-0.023 ±0.12	48 ±9.8*		z
The Himmelmoor, Germany	Cutover peatland restored (20-30 years prior to the start of the study), Molinia caerulea vegetaiton cover	2011	9	53.75	838					67.4 ±90*	0.040 ±0.12	99 ±78*		z

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
The Himmelmoor, Germany	Active peat industrial extraction site, "deeply drained" bare peat	2011	9	53.75	838					199.1 ±18*	0.520 ±0.3	0.15 ±0.48*		z
Upper Peninsula, Michigan, USA	Intact (sub-broeal poor fen) Peatland, mostly open with Sphagnum ground cover, wetted from berm in 1930's	2010-2011	5.1	46.3	835	-12 ±0.8		4		-167.7**†[3]		15.1*[14]		aa
Upper Peninsula, Michigan, USA	Intact (Poor Fen Sub-boreal) Peatland, mostly open with sphagnum ground cover	2010-2011	5.1	46.3	835	-21.2 ±0.8[8]		3.8		-83**†[3]		13*‡[14]		aa
Upper Peninsula, Michigan, USA	Intact (poor fen sub-boreal) Peatland, mostly open with sphagnum cover, dried from berm in 1930's	2010-2011	5.1	46.3	835	-36.8 ±0.8[8]		3.7		-35.2**†[3]		4.2*[14]		aa
Upper Peninsula, Michigan, USA	Intact (sub-broeal poor fen) Peatland, mostly open with Sphagnum ground cover, wetted from berm in 1930's	2009-2010	5.1	46.3	835	-15.0 ±0.8[8]		4				2.317*‡[1,3,9]		ab
Upper Peninsula, Michigan, USA	Intact (Poor Fen Sub-boreal) Peatland, mostly open with sphagnum ground cover	2009-2010	5.1	46.3	835	-26.2 ±0.8[8]		3.8				0.987*‡[1,3,9]		ab
Upper Peninsula, Michigan, USA	Intact (poor fen sub-boreal) Peatland, mostly open with sphagnum cover, dried from berm in 1930's	2009-2010	5.1	46.3	835	-42.0 ±0.8[8]		3.7				0.456*‡[1,3,9]		ab
Salmisuo mire complex, Eastern Finland	Intact "oligotrophic low sedge Sphagnum papillosum pine fen"	2006	2	62.8	667	-16.0[8]			4.2 ±0.5	-92.5±13**†		3.6±0.3*‡[9]		ac
Salmisuo mire complex, Eastern Finland	Intact "oligotrophic low sedge Sphagnum papillosum pine fen"	2007	2	62.8	667	-8.5[8]			11.4 ±0.8	-154.6±19**†		6.6±0.6*‡[9]		ac
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, R1	1994	3.5	62.2	700	-38.5				187*†[3]		-0.068*‡[3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, R2	1994	3.5	62.2	700	-27.9				156*†[3]		-0.045*‡[3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C1	1994	3.5	62.2	700	-33.8				174*†[3]		0.003*‡[3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C2	1994	3.5	62.2	700	-34.7				176*†[3]		-0.049*‡[3,15]		ad

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C1	1995	3.5	62.2	700	-25.8				163[*†3]		0.057[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C2	1995	3.5	62.2	700	-21.8				154[*†3]		-0.021[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C1	1996	3.5	62.2	700	-30.3				132[*†3]		0.058[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C2	1996	3.5	62.2	700	-24.3				117[*†3]		0.036[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C1	1997	3.5	62.2	700	-27.3				189[*†3]		-0.025[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, cutover bog, abondoned 20 years previously, C2	1997	3.5	62.2	700	-26.3				193[*†3]		-0.046[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 1 year post rewetting, R1	1995	3.5	62.2	700	-11.0				116[*†3]		0.027[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 1 year post rewetting, R2	1995	3.5	62.2	700	12.5				73[*†3]		-0.062[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 2 year post rewetting, R1	1996	3.5	62.2	700	-10.9				86[*†3]		0.027[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 2 year post rewetting, R2	1996	3.5	62.2	700	9.0				59[*†3]		-0.062[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 3 year post rewetting, R1	1997	3.5	62.2	700	-14.1				136[*†3]		0.048[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Bare peat, rewetted cutover bog, 3 year post rewetting, R2	1997	3.5	62.2	700	7.0				88[*†3]		0.064[*‡3,15]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, R1	1994	3.5	62.2	700	-38.5				127[*†3]		0.275[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, R2	1994	3.5	62.2	700	-27.9				76[*†3]		0.538[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C1	1994	3.5	62.2	700	-33.8				105[*†3]		0.412[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C2	1994	3.5	62.2	700	-34.7				107[*†3]		0.389[*‡3]		ad

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Refer-ence
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C1	1995	3.5	62.2	700	-25.8				-20[*†3]		1.121[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C2	1995	3.5	62.2	700	-21.8				-39[*†3]		1.247[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C1	1996	3.5	62.2	700	-30.3				37[*†3]		0.595[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C2	1996	3.5	62.2	700	-24.3				9[*†3]		0.789[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C1	1997	3.5	62.2	700	-27.3				24[*†3]		0.995[*‡3]		ad
Aitoneva, Kihniö, Finland	Cutover bog, abondononed 20 years previously, Eriophorum vaginatum, C2	1997	3.5	62.2	700	-26.3				24[*†3]		1.041[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 1 year post rewetting, R1	1995	3.5	62.2	700	-11.0				-92[*†3]		1.762[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 1 year post rewetting, R2	1995	3.5	62.2	700	12.5				-192[*†3]		3.078[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 2 year post rewetting, R1	1996	3.5	62.2	700	-10.9				-31[*†3]		1.281[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 2 year post rewetting, R2	1996	3.5	62.2	700	9.0				-100[*†3]		2.311[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 3 year post rewetting, R1	1997	3.5	62.2	700	-14.1				-57[*†3]		1.602[*‡3]		ad
Aitoneva, Kihniö, Finland	Eriophorum vaginatum, re-wetted cutover bog, 3 year post rewetting, R2	1997	3.5	62.2	700	7.0				-160[*†3]		2.757[*‡3]		ad
Fäjemyr, S. Sweden	Intact ombrotrophic raised bog	2006	6.2	56.25	700	-3 ±7.3[8]				53[**†]				ae
Fäjemyr, S. Sweden	Intact ombrotrophic raised bog	2007	6.2	56.25	700	-0.2 ±3.9[8]				-108[**†]				ae

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Refer-ence
Fäjemyr, S. Sweden	Intact ombrotrophic raised bog	2008	6.2	56.25	700	-7.3 ±6.7[8]				87**†				ae
Fäjemyr, S. Sweden	Intact ombrotrophic raised bog	2009	6.2	56.25	700	-5 ±3.1[8]				-105**†				ae
Saura peatlands, Andøya, Norway	Intact Boreal Atlantic Blanket Bog	2009	3.6	69.12	1060					-7.2±79**				ae
Saura peatlands, Andøya, Norway	Intact Boreal Atlantic Blanket Bog	2010	3.6	69.12	1060					-0.5±73**				ae
Saura peatlands, Andøya, Norway	Intact Boreal Atlantic Blanket Bog	2011	3.6	69.12	1060					-34±69**				ae
Saura peatlands, Andøya, Norway	Intact Boreal Atlantic Blanket Bog	2012	3.6	69.12	1060					-35.7±80**				ae
Northern Scotland	Intact Blanket Bog with pool System	2008		58.35		approx. -12.6[8,16]				-86.4**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2009		58.35		approx. -5.5[8,16]				-182.4**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2010		58.35		approx. -5.3[8,16]				-135.6**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2011		58.35		approx. -8[8,16]				-88.8**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2012		58.35		approx. -7.8[8,16]				-187.2**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2013		58.35		approx. -7.9[8,16]				-106.8**†[16]				af
Northern Scotland	Intact Blanket Bog with Pool System	2008-2013 Average		58.35					10.3	-114**		4.33*‡[9]		af
Lac Le Caron, St. James Bay region, North-western Quebec	Pristine oligotrophic bog	2007-2008	-2.3	52.3	735	-6.5[3,8]				-126±9**†				ag
Lac Le Caron, St. James Bay region, North-western Quebec	Pristine oligotrophic bog	2008-2009	-2.3	52.3	735	-6.7[3,8]				-94±9**†				ag
Lac Le Caron, St. James Bay region, North-western Quebec	Pristine oligotrophic bog	2009-2010	-2.3	52.3	735	approx. -10[3,8,16]				-90±6**†				ag

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Lac Le Caron, St. James Bay region, North-western Quebec	Pristine oligotrophic bog	2010-2011	-2.3	52.3	735	-15.5[3,8]				-28±5[**†]				ag
Lac Le Caron, St. James Bay region, North-western Quebec	Pristine oligotrophic bog	2011-2012	-2.3	52.3	735	-13.4[3,8]				-42±5[**†]				ag
Mer Bleue peatland, Ottawa, Ontario	Intact raised bog	1998-2004	6	45.7	943				14.9 ±3.1	-40.2 ±40.5[**11]		3.7±0.5[*3]		ah
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Lawn, Western Margin	1992-1993		63.7		0.0	61		-0.75[17]	-49[*†3,11]		8.3[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Ridge, Western Margin	1992-1993		63.7		-28.5	72.2		0.75[17]	-5[*†3,11]		0.1[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Pool, Western Margin	1992-1993		63.7		121.9	73		0[17]	181[*3,11]		4.5[*3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Lawn, Intermediate	1992-1993		63.7		-1.7	61.7		-0.8[17]	-17[*†3,11]		4.7[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Ridge, Intermediate	1992-1993		63.7		-25.7	62.5		0.8[17]	-21[*†3,11]		0.2[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Lawn, Plateau	1992-1993		63.7		-8.1	71.5		4.65[17]	35[*†3,11]		2.2[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Ridge, Plateau	1992-1993		63.7		-19.3	99.8		0.6[17]	-41[*†3,11]		0.3[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Lawn, Eastern Margin	1992-1993		63.7		0.5	56		2.1[17]	-6[*†3,11]		3.5[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Ridge, Eastern Margin	1992-1993		63.7		-24.1	63.5		0.8[17]	-19[*†3,11]		0.1[*‡3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog, Pool, Eastern Margin	1992-1993		63.7		19.9	42.8		0[17]	267[*3,11]		14.9[*3,11]		ai
Stor-Amyran, Umea, Sweden	Intact Raised Bog Entire site	1992-1993		63.7					5.45[17]	7[*†3,11]		4.0[*‡3,11]		ai
Ilomantsi, Eastern Finland	Intact oligotrophic (Sphagnum fuccum) Bog (Vegetation cleared from collar)	1991-1992		62.8		-17				136[*7]				aj

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Ilomantsi, Eastern Finland	Intact Oligotrophic Bog Hollow (Vegetation cleared from Collar)	1991-1992		62.8		-4		3.8		98*[7,11]				aj
Ilomantsi, Eastern Finland	Intact Oligotrophic Bog Hummock (Vegetation cleared from Collar)	1991-1992		62.8		-12		3.8		127*[7,11]				aj
Lakkason, Central Finland	Intact Oligotrophic Low Sedge Bog (Vegetation cleared from Collar)	1991-1992		61.8		-11		3.9		203*[7,11]				aj
Lakkason, Central Finland	Drained Oligotrophic Bog (Vegetation cleared from Collar)	1991-1992		61.8		-23		3.7		309*[7,11]				aj
Ilomantsi, Eastern Finland	Intact oligotrophic (Sphagnum fuccum) Bog (Vegetation cleared from collar)	1991-1992		62.8		-16				136*[7,11]				aj
Ilomantsi, Eastern Finland	Drained oligotrophic (Sphagnum fuccum) Bog (Vegetation cleared from collar)	1991-1992		62.8		-21				160*[7,11]				aj
Lakkason, Central Finland	Intact oligotrophic cotton grass/pine bog (Vegetation cleared from Collar)	1991-1992		61.8		-15		3.8		164*[7,11]				aj
Lakkason, Central Finland	Drained oligotrophic (cotton grass/pine) bog (Vegetation cleared from Collar)	1991-1992		61.8		-20		3.8		238*[7,11]				aj
Lakkason, Central Finland	Intact oligotrophic cotton grass/pine bog (Vegetation cleared from Collar)	1991-1992		61.8		-12		3.8		323*[7,11]				aj
Lakkason, Central Finland	Drained oligotrophic (cotton grass/pine) bog (Vegetation cleared from Collar)	1991-1992		61.8		-14		3.8		359*[7,11]				aj
Lakkason, Central Finland	Intact oligotrophic dwarf shrub/pine bog (Vegetation cleared from collar)	1991-1992		61.8		-22		3.8		359*[7,11]				aj
Lakkason, Central Finland	Drained oligotrophic dwarf shrub/pine bog (Vegetation cleared from collar)	1991-1992		61.8		-31		3.8		340*[7,11]				aj
Ilomantsi, Eastern Finland	Intact oligotrophic dwarf shrub/pine bog (Vegetation cleared from collar)	1991-1992		62.8		-15				289*[7,11]				aj

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Central Finland	Drained oligotrophic dwarf shrub/pine bog (Vegetation cleared from collar)	1991-1992		62.2		-55		3.8		606[*7]				aj
Ilomantsi, Eastern Finland	Lagg Fen (Vegetation cleared from collar)	1991-1992		62.8		-6				178[*7,11]				aj
Lakkason, Central Finland	Tall Sedge Fen (Vegetation cleared from collar)	1991-1992		61.8		-2		5.6		188[*7,11]				aj
Lakkason, Central Finland	Drained fen (Vegetation cleared from collar)	1991-1992		61.8		-30		4.5		356[*7,11]				aj
Ilomantsi, Eastern Finland	Tall sedge pine fen (Vegetation cleared from collar)	1991-1992		62.8		-20		4.4		270[*7,11]				aj
Lakkason, Central Finland	Drained fen (Vegetation cleared from collar)	1991-1992		61.8		-36		4		342[*7,11]				aj
Ilomantsi, Eastern Finland	Herb-rich sedge birch-pine Fen (Vegetation cleared from collar)	1991-1992		62.8		-38		4.5		585[*7,11]				aj
Lakkason, Central Finland	Herb-rich Flark Fen (Vegetation cleared from collar)	1991-1992		61.8		-16		4.5		178[*7]				aj
Lakkason, Central Finland	Drained fen (Vegetation cleared from collar)	1991-1992		61.8		-43				445[*7]				aj
Ilomantsi, Eastern Finland	Herb-rich Flark Fen (Vegetation cleared from collar)	1991-1992		62.8		-10				169[*7,11]				aj
Central Finland	Low sedge bog	1991-1992	3	61.8	709	-13.0 ± 6.5		3.9				6.574[*3]		ak
Central Finland	drained low sedge bog	1991-1992	3	61.8	709	-28.3 ± 9.0		3.7				2.273[*3]		ak
Central Finland	Bog Hollow	1991-1992	1.9	62.8	650	-3.8 ± 5.0		3.8				11.453[*3]		ak
Central Finland	Bog Hummock	1991-1992	1.9	62.8	650	-14.5 ± 5.8		3.8				19.736[*3]		ak
Central Finland	Sphagnum fuscum bog	1991-1992	1.9	62.8	650	-18.9 ± 4.7						0.48[*3]		ak
Central Finland	Cotton grass pine bog with Sfu hummocks	1991-1992	3	61.8	709	-19.1 ± 8.7		3.8				3.611[*3]		ak
Central Finland	Drained cotton grass pine bog with Sfu hummocks	1991-1992	3	61.8	709	-26.3 ± 8.6		3.8				2.018[*3]		ak
Central Finland	Cotton grass pine bog with Sfu hummocks	1991-1992	3	61.8	709	-11.9 ± 6.5		3.8				4.935[*3]		ak
Central Finland	Drained cotton grass pine bog	1991-1992	3	61.8	709	-14.5 ± 9.0		3.8				2.603[*3]		ak
Central Finland	Sfu Pine bog	1991-1992	1.9	62.8	650	-19.4 ± 9.9		4.3				2.55[*3]		ak
Central Finland	Drained Sfu pine bog	1991-1992	1.9	62.8	650	-24.0 ± 9.9		4.3				0.739[*3]		ak
Central Finland	Dwarf shrub Pine bog	1991-1992	3	61.8	709	-28.0 ± 7.3		3.8				1.485[*3]		ak

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Central Finland	Dwarf shrub Pine bog	1991	1.9	62.8	650	-7.5 ± 3.5		4.1				4.688*3		ak
Central Finland	Dwarf shrub Pine bog	1991-1992	1.9	62.8	650	-15.75 ± 7.4						7.106*3		ak
Central Finland	Tall sedge fen	1991-1992	3	61.8	709	-4.2 ± 3.6		5.6				23.276*3		ak
Central Finland	Drained Tall sedge fen	1991-1992	3	61.8	709	-34.9 ± 15.9		4.5				-0.011*3		ak
Central Finland	Tall sedge pine fen	1991-1992	3	61.8	709	-20.6 ± 14.8		4.4				8.768*3		ak
Central Finland	Drained Tall-sedge pine fen	1991-1992	3	61.8	709	-40.1 ± 15.3		4				0.086*3		ak
Central Finland	Lagg Fen	1991-1992	1.9	62.8	650	-4.8 ± 6.4		4.5				28.86*3		ak
Central Finland	Drained Herb rich sedge Birch-Pine fen	1991-1992	1.9	62.8	650	-41.9 ± 4.8		4.5				-0.064*3		ak
Central Finland	Drained Herb rich sedge Birch-Pine fen	1993	1.9	62.8	650	-45.4 ± 1.5		4.7				-0.18*3		ak
Central Finland	Herb rich flark Fen	1991-1992	1.9	62.8	650	-14.2 ± 3.75						10.575*3		ak
Central Finland	Herb rich flark Fen	1992	3	61.8	709	-27.5 ± 13.7						1.793*3		ak
Central Finland	Drained Herb rich flark Fen	1992	3	61.8	709	-43.3 ± 10.7						0.653*3		ak
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, Ditches	1999	3	47.883	926					407*3		1.427*3	2.251	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, bare peat	1999	3	47.883	926					280.5*3		-0.178*3	0.673	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, mosses	1999	3	47.883	926					180.4*3		-0.110*3	0.220	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, herbacious	1999	3	47.883	926					399*3		0.014*3	0.165	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, shurbs	1999	3	47.883	926							0.137*3	0.178	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, Ditches	2000	3	47.883	926					164.7*3		21.260*3	49.190	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, bare peat	2000	3	47.883	926					108.5*3		-0.096*3	0.316	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, mosses	2000	3	47.883	926					411.8*3		-0.110*3	0.220	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, herbacious	2000	3	47.883	926					95.8*3		0.014*3	0.165	al

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, shurbs	2000	3	47.883	926					54.8[*3]		0.137[*3]	0.178	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, Ditches	2001	3	47.883	926					106.4[*3]		7.206[*3]	10.925	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, bare peat	2001	3	47.883	926					85.6[*3]		0.014[*3]	0.233	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, mosses	2001	3	47.883	926					56.8[*3]		0.055[*3]	0.563	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, herbacious	2001	3	47.883	926					84.2[*3]		-0.014[*3]	0.124	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, shurbs	2001	3	47.883	926					13.4[*3]		0.014[*3]	0.261	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, (pre-restoration), Ditches	1999	3	47.883	926					352.8[*3]		5.078[*3]	6.725	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study (pre-restoration), bare peat	1999	3	47.883	926					260.7[*3]		-0.178[*3]	0.673	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study (pre-restoration), mosses	1999	3	47.883	926					180.4[*3]		-0.110[*3]	0.220	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study (pre-restoration), herbacious	1999	3	47.883	926					399[*3]		0.014[*3]	0.165	al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study (pre-restoration), shurbs	1999	3	47.883	926							0.137[*3]	0.178	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, ditches	2000	3	47.883	926					112[*3]		1.537[*3]	4.145	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, bare peat	2000	3	47.883	926					79.5[*3]		0.014[*3]	0.357	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, mosses	2000	3	47.883	926					-12.3[*3]		-0.110[*3]	0.220	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, herbacious	2000	3	47.883	926					-473.7[*3]		0.014[*3]	0.165	al

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, shurbs	2000	3	47.883	926					54.8[*3]				al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, ditches	2001	3	47.883	926					144[*4]		3.253[*]	6.959	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, bare peat	2001	3	47.883	926					73.7[*3]		0.096[*3]	0.398	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, mosses	2001	3	47.883	926					-67.2[*3]		0.192[*3]	0.480	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, herbacious	2001	3	47.883	926					-48[*3]		3.129[*3]	4.172	al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, shurbs	2001	3	47.883	926					13.4[*3]				al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, entire site	1999	3	47.883	926	-51.4[8]				263.6± 65.9[*†3,9]		-0.077[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, entire site	2000	3	47.883	926	-46[8]				137.2± 34.3[*†3,9]		0.591[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, entire site	2001	3	47.883	926	-39.5[8]				76.1±19.0[*†3,9]		0.257[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study, entire site	2002	3	47.883	926	-43.8[8]						0.7[*‡9]		al
Bios-de-bell Peatland, Quebec	Cutover peatland, abondoned 20 years prior to study (pre-restoration), entire site	1999	3	47.883	926	-54.8[8]				245.5± 61.4[*†3,9]		0.103[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 1 year post restoration, entire site	2000	3	47.883	926	-31.5[8]				-9.9±2.5[*†3,9]		0.231[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 2 year post restoration, entire site	2001	3	47.883	926	-30.4[8]				-19.9±5.0[*†3,9]		0.899[*‡3,9]		al
Bios-de-bell Peatland, Quebec	Restored cutover peatland, 3 years post restoration, entire site	2002	3	47.883	926	-35.9[8]						3.1[*‡9]		al
Black Water, Ireland	Drained industrial harvested raised bog, bare peat, abondoned 1999	2011/ 2012	9.6	53.3	948	-53	24.5	4.9		162[*†9,11]		0[*‡9,11]		am
Black Water, Ireland	Drained industrial harvested raised bog, bare peat, abondoned 2000	2012/ 2013	9.6	53.3	948	-37	24.5	4.9		111[*†9,11]		0[*‡9,11]		am

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Refer-ence
Black Water, Ireland	Drained industrial harvested raised bog, bare peat, abon-doned 2001	2013/ 2014	9.6	53.3	948	-57	24.5	4.9		185[*†9,11]		0[*‡9,11]		am
BlackWater, Ireland	Drained industrial harvested raised bog, bare peat, abon-doned 2002	2014/ 2015	9.6	53.3	948	-47	24.5	4.9		145[*†9,11]		0[*‡9,11]		am
Black Water, Ireland	Rewetted (heavily degraded) peatland, "Phragmites australis and Carex sp. the dominant species", rewetted 1999	2011/ 2012	9.6	53.3	948		24.5	4.9		-106[*9,11]		16.9[*9,11]		am
Black Water, Ireland	Rewetted (heavily degraded) peatland, "Phragmites australis and Carex sp. the dominant species", rewetted 1999	2012/ 2013	9.6	53.3	948	1	24.5	4.9		-81[*9,11]		17.2[*9,11]		am
Black Water, Ireland	Rewetted (heavily degraded) peatland, "Phragmites australis and Carex sp. the dominant species", rewetted 1999	2013/ 2014	9.6	53.3	948	-10.3	24.5	4.9		188[*9,11]		17.7[*9,11]		am
Black Water, Ireland	Rewetted (heavily degraded) peatland, "Phragmites australis and Carex sp. the dominant species", rewetted 1999	2014/ 2015	9.6	53.3	948	1.4	24.5	4.9		127[*9,11]		17.2[*9,11]		am
Glenvar, Ireland	Drained grassland over organic soil	2011/ 2012	9.8	53.2	1076	-22.7	21	4.9		87[*9,11]		1.9[*9,11]		am
Glenvar, Ireland	Drained grassland over organic soil	2012/ 2013	9.8	53.2	1076	-24.8	21	4.9		76[*9,11]		1.1[*9,11]		am
Glenvar, Ireland	Drained grassland over organic soil	2013/ 2014	9.8	53.2	1076	-27	21	4.9						am
Glenvar, Ireland	Drained grassland over organic soil	2014/ 2015	9.8	53.2	1076	-29	21	4.9						am
Glenvar, Ireland	Rewetted grassland over organ-ic soil, rewetted in 2000	2011-2012	9.8	53.2	1076	-7.3	21	4.9		1[*9,11]		5.4[*9,11]		am
Glenvar, Ireland	Rewetted grassland over organ-ic soil, rewetted in 2000	2012-2013	9.8	53.2	1076	-10	21	4.9		-80[*9,11]		3.4[*9,11]		am
Glenvar, Ireland	Rewetted grassland over organ-ic soil, rewetted in 2000	2013-2014	9.8	53.2	1076	-14	21	4.9						am
Glenvar, Ireland	Rewetted grassland over organ-ic soil, rewetted in 2000	2014-2015	9.8	53.2	1076	-14	21	4.9						am

Table S6 continued.

Study Location	Site description	Year data collected	Long term mean annual temp (°C)	Latitude	Long term mean annual precip (mm)	Mean annual water table (cm)	C/N ratio	Soil pH	Annual DOC losses (g-C $m^{-2}yr^{-1}$)	Annual CO_2 Emissions (g-C-CO_2 $m^{-2}yr^{-1}$)	Annual N_2O emissions (g N_2O $m^{-2}yr^{-1}$)	Annual methane emissions (g-C-CH_4 $m^{-2}yr^{-1}$)	Other Carbon losses or gains -(g-C $m^{-2}yr^{-1}$)	Reference
Moyar Drained, Ireland	Drained Raised Bog	2013/ 2014	10	53.3	1193	-51.6	39	4.4		115*†[9,11]				am
Moyar Drained, Ireland	Drained Raised Bog	2014 / 2015	10	53.3	1193	-47.5	39	4.4		158*†[9,11]		0.8*‡[9,11]		am
Moyar Rewetted, Ireland	Rewetted Raised Bog, rewetted 2012	2013/ 2014	10	53.3	1193		39	4.4		-20*†[9,11]		18.7*‡[9,11]		am
Moyar Rewetted, Ireland	Rewetted Raised Bog, rewetted 2012	2014/ 2015	10	53.3	1193	1.5	39	4.4		-77*†[9,11]		20.6*‡[9,11]		am
Sopwell rewetted, Ireland	Rewetted Forestry site on peat soil	2014/ 2015	9.3	54	1173	-14	34.2	3.4		560*[9,11]		2.6*		am
Pollagoona rewetted, Ireland	Rewetted Forestry site on peat soil	2014/ 2015	9.8	53	845	-6.4	24.5	3.5		102*[9,11]		2*		am

Notes

* Measured with chambers

** Measured with Eddy Covariance Flux Towers

† Data included in Fig. 11

‡ Data included in Fig. 12

1 Annual Values calculated from mean flux data.

2 Data taken from winter flux measurements.

3 Data from Growing season only.

4 Data overlaps with Koehler et al. 2011 but reported values are sightly different..

5 Data overlaps with Dinsmore et al. 2010

6 Data overlaps with Nillsson et al. 2008, but reported values are slightly different.

7 Data from collars where vegetation inside the collar was removed.

8 Water table vlaues reported are averaged over a landscape scale, i.e. only 1 water table measurement is reported for entire area.

9 Collar data scaled up to the landscape scale.

10 Forest floor measurements of NEE, carbon balance not representative of the entire ecosystem respiration.

11 Values averaged over multiple years.

12 Range of fluxes given only.

13 DOC flux estimated but not measured in the field.

14 CH4 flux estimated but not directly measured at this site.

15 CH4 flux for bare peat areas not directly reported in the paper, it is calculated from the total reported landscape flux, the flux for vegetated areas, and the percent vegetation cover.

16 Estimated from plots presented in paper

17 DOC fluxes are not measured at the outflow of the catchment and are exceptionally low.

References

a Danevcic, 2010

b Flessa et al., (1998) (data taken from Danevcic et al. 2010, table 2)

c Von Arnold et al. 2005a

d Von Arnold et al. 2005b (data taken from Danevcic et al., 2010, table 2)

e Laine et al., 1996

f Nykanen et al., 1995 (Data taken from Danevic et al. 2010)

g Yamulki et al. 2012

h Wilson et al. 2015

i Huth et al. 2012

j Strack et al. 2014

k Dalva et al. 2001 (data taken from Junkurst and Fieldler 2007)

l M. Drosler (Data taken from Junkurst and Fieldler, 2007)

m Fieldler et al. 1998 (Data taken from Junkurst and Fieldler, 2007)

n J. Augustin (Data taken from Junkurst and Fieldler, 2007)

o Martikainen et al. 1995 (Data taken from Junkurst and Fieldler, 2007)

p Meyer et al. 1999 (Data taken from Junkurst and Fieldler, 2007)

g Wilson et al. 2016b

r Bortoluzzi et al. 2006

s Cooper 2014

t Nilsson et al 2008

u Peichl et al. 2014

v Dinsmore et al. 2010

w Heftler et al. 2015

x Koehler et al. 2011

y McVeigh et al. 2014

z Vaneslow-Algan 2015

aa Chimner et al. 2017

ab Ballantyne et al. 2014

ac Gazovic et al. 2013

ad Tuittila et al. 1999 & Tuittila et al. 2000

ae Lund et al 2015

af Levy and Gray 2015

ag Stranchen et al. 2016

ah Roulet et al. 2007

ai Waddington and Roulet 2000

aj Silvola et al. 1996

ak Nykanen et al 1998

al Waddington et al. 2010; Waddington and Day 2007

am Renou-Wilson et al. 2018 (in press) and Renou-Wilson et al. (Irish EPA 2012-B-MS-9 report)

Supplemental Section 2. Collar and ecotype aspects of the carbon balance measured in this study.

Table S4. This table shows the percent *Sphagnum spp.* and *Eriophorum spp.* cover in each collar and MAWT in 2016 and 2017. The ecotypes are labeled by two or three letter codes Sphagnum Cutover (SC), Calluna Cutover (CC), Eriophorum Cutover (EC), Sum-Marginal (SBM), and Sub-Central (SBC).

Collar	Percent *Sphagnum spp.* cover	Percent *Eriophorium Spp.* cover	MAWT 2016 (cm)	MAWT 2017 (cm)
SC1	98	23	-8.9	-8.9
SC2	98	10	-18.2	-18.2
SC3	100	5	-19.3	-19.3
SC4	98	5	-22.6	-22.6
SC5	93	3	-7.0	-7.0
SC6	78	4	-13.6	-13.6
Ecotype Average	94	8	-15.0	-14.9
CC7	0	0	-26.1	-25.1
CC8	0	2	-18.4	-17.4
CC9	0	2	-19.7	-18.7
CC10	0	3	-16.7	-15.7
CC11	0	3	-15.0	-14.0
Ecotype Average	0	2	-19.1	-18.2
EC12	21	55	-3.9	-1.8
EC13	40	80	-4.3	-2.2
EC14	50	65	0.3	2.4
EC15	24	43	-5.2	-3.1
EC16	54	38	4.2	6.3
EC17	22	25	-9.6	-7.5
Ecotype Average	35	51	-3.1	-1.0

Collar	Percent *Sphagnum spp.* cover	Percent *Eriophorium Spp.* cover	MAWT 2016 (cm)	MAWT 2017 (cm)
SBM18	68	5	-18.5	-17.8
SBM19	15	4	-5.0	-4.3
SBM20	45	37	-11.4	-10.7
SBM21	89	6	-17.7	-17.0
SBM22	47	14	-5.1	-4.4
SBM23	78	12	-5.4	-4.7
Ecotype Average	57	3	10.5	-9.8
SBC24	100	6	-8.0	-7.2
SBC25	99	1	-8.7	-7.9
SBC26	100	2	-11.7	-10.9
SBC27	93	39	-10.5	-9.7
SBC28	98	2	-6.6	-5.8
SBC29	101	2	-6.2	-5.4
Ecotype Average	98	8	-8.6	-7.8

Table S5 This table shows all of the measured aspects of the carbon balance for each of the collars in this study and ecotype averages in 2016 and 2017 where the collar labels are as in table S4. All components of the carbon balance are in g C $m^{-2} yr^{-1}$ and the 100-year GWP is in units of tonnes CO_2-eq $ha^{-1} yr^{-1}$.

Collar	2016 ER	2016 GPP	2016 NEE	2017 ER	2017 GPP	2017 NEE	CH_4 Flux	2016 DOC losses	2017 DOC losses	2016 DIC losses	2017 DIC losses	Open water CO_2 evasion	2016-2017 Average Carbon balance	2016-2017 Average GWP
SC1	489	-492	-3 ±11	474	-501	-28 ±11	9.2 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	8.5 ±27.5	4.1 ±1.6
SC2	398	-508	-110 ±6	408	-526	-118 ±6	9.4 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-91 ±25	0.5 ±1.6
SC3	540	-523	16 ±13	552	-523	29 ±13	1.5 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	38 ±27	2.0 ±1.6
SC4	620	-647	-27 ±17	620	-636	-16 ±17	0.5 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-6 ±30	-0.1 ±1.7
SC5	358	-383	-26 ±8	359	-392	-33 ±8	4.0 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-11 ±25	1.2 ±1.6
SC6	601	-588	13 ±10	578	-592	-14 ±10	9.8 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	24 ±26	4.9 ±1.6
Ecotype Average	501 ±107	-524 ±90	-23 ±44	498 ±102	-528 ±84	-30 ±48	5.7 ±5.1	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-6.0 ±53	2.1 ±2.4
CC7	742	-506	236 ±10	693	-536	157 ±10	3.9 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	215 ±26	9.5 ±1.6
CC8	545	-367	179 ±10	524	-381	143 ±10	1.7 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	177 ±26	7.1 ±1.6
CC9	775	-576	199 ±16	719	-571	148 ±16	1.3 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	189 ±29	7.4 ±1.6
CC10	887	-530	358 ±14	867	-540	327 ±14	3.2 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	360 ±28	14.5 ±1.6
CC11	461	-205	256 ±13	416	-199	218 ±13	3.3 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	254 ±27	10.7 ±1.6
Ecotype Average	682 ±175	-437 ±151	246 ±45	644 ±176	-445 ±156	199 ±48	2.7 ±3.0	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	239 ±83	9.8 ±3.5
EC12	367	-368	-1.4 ±17	363	-368	-6 ±17	16.6 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	28 ±30	7.9 ±1.7
EC13	473	-447	26 ±16	455	-449	6 ±16	16.7 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	47 ±29	8.6 ±1.7
EC14	435	-433	1.7 ±18	422	-445	-24 ±18	12.0 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	15 ±30	5.5 ±1.7
EC15	360	-440	-80 ±16	314	-452	-138 ±16	12.4 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-82 ±29	2.1 ±1.7
EC16	332	-382	-49 ±14	292	-387	-94 ±14	15.1 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-42 ±28	4.7 ±1.6
EC17	530	-417	113 ±18	508	-420	87 ±18	12.4 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	127 ±30	9.8 ±1.7
Ecotype Average	416 ±76	-414 ±33	2 ±53	392 ±84	-42035	-28 ±56	14.2 ±3.6	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	16 ±84	6.4 ±3.5

Table S5. Continued.

Collar	2016 ER	2016 GPP	2016 NEE	2017 ER	2017 GPP	2017 NEE	CH_4 Flux	2016 DOC losses	2017 DOC losses	2016 DIC losses	2017 DIC losses	Open water CO_2 evasion	2016-2017 Average Carbon balance	2016-2017 Average GWP
SBM18	495	-431	64 ±11	505	-444	61 ±11	3.1 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	85 ±27	4.3 ±1.6
SBM19	449	-373	76 ±18	477	-376	101 ±18	5.9 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	114 ±30	6.6 ±1.7
SBM20	510	-471	39 ±13	523	-470	53 ±13	12.4 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	77 ±28	7.9 ±1.6
SBM21	412	-367	45 ±14	413	-369	44 ±14	3.4 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	67 ±28	3.9 ±1.6
SBM22	336	-267	69 ±11	332	-268	64 ±11	9.7 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	95 ±27	7.5 ±1.6
SBM23	453	-560	-107 ±12	465	-577	-113 ±12	14.6 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	-77 ±27	3.2 ±1.6
Ecotype Average	443 ±63	-412 ±100	31 ±47	452 ±70	-417 ±105	35 ±51	8.2 ±5.5	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	7.2 ±2.8	60 ±77	5.6 ±2.7
SBC24	345	-379	-34 ±11	326	-394	-68 ±11	12.9 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-24 ±27	4.5 ±1.6
SBC25	391	-444	-52 ±12	384	-447	-63 ±12	9.5 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-34 ±27	2.7 ±1.6
SBC26	596	-558	38 ±13	609	-554	54 ±13	1.2 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	62 ±27	2.7 ±1.6
SBC27	458	-558	-100 ±16	461	-561	-100 ±16	18.8 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	- 67 ±29	5.3 ±1.6
SBC28	271	-380	-109 ±10	265	-405	-141 ±10	13.8 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-97 ±26	3.0 ±1.6
SBC29	281	-338	-57 ±8	298	-368	-70 ±8	19.3 ±2.8	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-30 ±26	6.9 ±1.6
Ecotype Average	390 ±123	-443 ±96	-52 ±45	390 ±127	-455 ±84	-65 ±49	12.6 ±7.3	8.0 ±1.6	12.8 ±2.5	1.1 ±0.2	1.5 ±0.3	2.7 ±0.9	-32 ±65	4.0 ±2.5