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Supplement of

Carbon balance of a restored and cutover raised bog: implications for restoration and comparison to global trends

Michael M. Swenson et al.

Correspondence to: Michael M. Swenson (swensonm@tcd.ie)

Supplemental Section 1. Modeling annual 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. The components of NEE (GPP and ER) were modeled separately on an hourly basis and summed to calculate NEE. GPP and ER were modeled as a function of field variables: temperature, water table, and light level, and Julian day of the year, which were recorded hourly on site throughout the calendar years of 2016 and 2017.

Numerous different models of ER and GPP were tested based on the fit to the field data. Ultimately, Eq. 1 for GPP and Eq. 2 ER (as in the main body of the paper) were found to best explain the variation in the field data for each of the 29 collars. Although the same base models for GPP and ER were used for all 29 collars (i.e. Eq. 1 and Eq. 2 in the in main body of the paper), the empirical fitting parameters were determined separately for each of the 29 collars, based on collar specific field data.

Notation:
GPP is the gross primary production from photosynthesis (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 heterotrophic and autotrophic respiration (both above and below) ground that occur per unit area per time.
a, b, c, d, *&* ***e*** 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.
PPFD 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.
$\boldsymbol{T_{5cm}}$ 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 Modelling
The most important component of modelling GPP is the response to light intensity. For peatland plant species, GPP is often modeled according to Michaelis-Menton kinetics as in Eq. S1.

$$GPP = -GPP_{max} * \frac{PPFD}{PPFD+b} \tag{S1}$$

For this model, GPP_{max} is the maximum rate of primary production at light saturation, and ***b*** is the light intensity at which the GPP is half of GPP_{max}. The negative sign is for sign convention to account for carbon uptake to the peatland. This model has been used in some studies (e.g. Laine et al., 2006, Strack et al., 2014) with a constant $GPP_{max,}$, which has the advantage of being simple with few fitting parameters. However, the assumption of a constant GPP_{max} (tested in Table S1) 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}, previous studies (e.g. Wilson et al., 2013; Wilson et al. 2016b) have added a green leaf area term to the GPP model, where green leaf area was determined in the field using a metric presented in Wilson et al. (2007). Green leaf area was found to vary in a sinusoidal way through-out the year and is different for each species of plant (Wilson et al., 2007). 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, with a potential for measurement bias.

Thus, for this work, rather than use green leaf area, Julian day of the year was introduced into the model according to Eq. S2.

$$GPP_{max} = -(a + c * \sin((JDAY + 215)/365 * 2\pi)) \qquad (S2)$$

In Eq. S2, the ***a*** and ***c*** terms are an empirical parameters fit to the field data for each collar. The ***a*** term is equivalent to the average annual GPP_{max}, and the ***c*** term is the relative seasonal variation in GPP_{max} throughout the year.

Additionally, the modelled GPP was scaled by a temperature effect and a water table effect. The temperature effect on GPP included in Eq. 1 (i.e. exp($\boldsymbol{T_{5cm}}$*$\boldsymbol{d}$)) is similar to results from previous studies (e.g. Piechl et al. 2014). The water table effect on GPP included in Eq. 1 (i.e. $(1 + WT * e)$) was taken from Wilson et al., (2016b). Combining Eq. S2 and Eq. S1 together with the temperature and water level scaling effects gives the base model for calculating GPP (Eq. 1).

Numerous other variations of the temperature effect, water table effect, and seasonal effect on GPP_{max} were also tested to the fit of the field data (Table S1), but the combination in Eq. 1 was found best explain the variation in the field data for each of the 29 collars based on a number of metrics (r^2, SSQ of the residuals, slope).

Table S1. Some example variations of empirical GPP models, which were tested to the fit of the field data in developing Eq. 1.

Description:	GPP models tested	Citation (if applicable)
Constant GPP_{max}	$GPP = -GPP_{max} * \frac{PPFD}{PPFD + b}$	Laine et al. 2006, Strack et al. 2014
Sinusoidal seasonal variation	$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PPFD}{PPFD+b}$	N/A
With linear temperature and water table effect	$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PPFD}{PPFD+b} * (1 + T5cm * d) * (1 + WT * e)$	Pieces taken from Wilson et al., 2016b
With exponential temperature and linear water table effect	$GPP = -(a + c * \sin(JDAY/365 * \pi)) * \frac{PPFD}{PPFD+b} * exp(T5cm * d) * (1 + WT * e)$	Pieces taken from Wilson et al., 2016b
With a full sine period and growing season offset from the calendar year (Eq. 1)	$GPP = -(a + c * \sin((JDAY + 215)/365 * 2\pi)) * \frac{PPFD}{PPFD+b} * exp(T5cm * d) * (1 + WT * e)$	Pieces from Wilson et al., 2016b

ER Modelling

Ecosystem respiration (ER) is modeled according to the $\boldsymbol{T_{5cm}}$ and $\boldsymbol{WT}$. The model used in this study (i.e. Eq. 2 in the main body of the paper) was taken directly from Wilson et al., (2016b). The present study uses the model for a very similar purpose to Wilson et al., (2016b); that is scaling up chamber measurements to model ER over annual time scale in the Irish climate. As with GPP modeling, numerous empirical models were tested to the fit of the field data (Table S2), and Eq. 2 best explained the variation of the field data. A more complex model was tested for modelling ER, which included a sinusoidal variation with respect to Julian day of the year (bottom row of Table S2) similar to Eq. 1. This effect was included because the ER would be expected to be at least partially related to the green leaf area, which would vary over the year. In this case, the more complex model did explain the variation in the field data slightly better than Eq. 2, but this was at the expense of 2 additional fitting parameters. Thus, the slight improvement in fit of this model did not justify the higher degree of complexity.

Table S2. Some example variations of empirical ER models, which were tested to the fit of the field data in developing Eq. 2.

Description:	ER models tested	Citation (if applicable)
Modelled as an exponential temperature effect only	$ER = a * e^{b*T5cm}$	Based on data presented in Piechl et al. (2014)
Exponential trend in temperature and a linear trend in WT.	$ER = a * e^{b*T5cm} - c * WT$	N/A
With linear temperature and water table effects.	$ER = a * T5cm - (b * WT + c)$	Strack et al. (2014)
Eq. 2	$ER = (a + b * WT) * \exp\left(c * \left(\frac{1}{(283.15-227.13)} - \frac{1}{(T5cm+46.02)}\right)\right)$	Directly from Wilson et al., 2016b
Eq. 2 with a sinusoidal variations in ER with JDAY	$ER = \left(a + d * \sin\left(\frac{JDAY + 215}{365} * 2\pi\right) + e * WT\right) * \exp\left(c * \left(\frac{1}{(283.15 - 227.13)} - \frac{1}{(T5cm + 46.02)}\right)\right) + b * WT$	N/A

Tables on NEE model information

The empirical fitting parameters in Eq. 1 and Eq. 2 along with the standard error and statistical significance of the fitting parameters were determined using Minitab 2018©. Table S3 and Table S4 give information on model fitting statistics such n-values, STDEV of the residuals, r^2, range of the data, and slope of modelled vs. measured data for each of the 29 collars, for the Eq. 1 and Eq. 2, respectively. Table S5 and S6 give the best fit model parameters along with standard error and statistical significance of those parameters for each of the 29 collars, for Eq. 1 and Eq. 2, respectively.

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). The ecotypes are labelled by two or three letter codes Sphagnum Cutover (SC), Calluna Cutover (CC), Eriophorum Cutover (EC), Sub-Marginal (SBM), and Sub-Central (SBC).

Collar	Sample size used to calibrate the model	Measured data range (g C-CO_2 m^{-2} hr^{-1})	r^2	Slope of modelled Verse measured results	STDEV of the residuals (g C-CO_2 m^{-2} hr^{-1})	Ratio of STDEV of residuals to data range
SC1	66	0.44	0.831	0.811	0.046	0.103
SC2	71	0.37	0.885	0.863	0.034	0.093
SC3	93	0.45	0.846	0.829	0.039	0.087
SC4	84	0.49	0.830	0.785	0.054	0.110
SC5	78	0.29	0.876	0.837	0.024	0.082
SC6	66	0.45	0.903	0.889	0.037	0.082
CC7	58	0.41	0.864	0.879	0.039	0.094
CC8	67	0.28	0.828	0.808	0.029	0.105
CC9	80	0.38	0.881	0.861	0.040	0.105
CC10	64	0.37	0.885	0.873	0.034	0.093
CC11	51	0.21	0.807	0.839	0.012	0.058
EC12	56	0.27	0.921	0.891	0.023	0.087
EC13	85	0.31	0.880	0.862	0.028	0.090
EC14	51	0.30	0.875	0.844	0.029	0.095
EC15	56	0.31	0.885	0.854	0.030	0.095
EC16	81	0.26	0.871	0.852	0.023	0.089
EC17	73	0.26	0.850	0.811	0.031	0.119
SBM18	60	0.40	0.909	0.911	0.030	0.075
SBM19	73	0.30	0.781	0.764	0.032	0.106
SBM20	104	0.36	0.902	0.883	0.027	0.076
SBM21	104	0.31	0.895	0.887	0.019	0.062
SBM22	97	0.19	0.878	0.863	0.016	0.086
SBM23	70	0.41	0.901	0.859	0.035	0.085
SBC24	68	0.40	0.851	0.852	0.036	0.090
SBC25	106	0.38	0.886	0.866	0.026	0.068
SBC26	81	0.55	0.890	0.889	0.042	0.076
SBC27	95	0.34	0.916	0.887	0.029	0.084
SBC28	96	0.37	0.849	0.829	0.028	0.075
SBC29	70	0.37	0.929	0.912	0.023	0.062

Table S4. Model r^2 and standard deviation of the residuals (in units of g-C-$CO_2 m^{-2} hr^{-1}$) for ER model (Eq. 2). The ecotypes are labelled by two or three letter codes Sphagnum Cutover (SC), Calluna Cutover (CC), Eriophorum Cutover (EC), Sub-Marginal (SBM), and Sub-Central (SBC).

Collar	Sample size used to calibrate the model	Measured data range (g C-CO_2 $m^{-2} hr^{-1}$)	r^2	Slope of modelled Verse measured results	STDEV of the residuals (g C-CO_2 $m^{-2} hr^{-1}$)	Ratio of STDEV of residuals to data range
SC1	31	0.187	0.821	0.793	0.025	0.134
SC2	34	0.186	0.864	0.862	0.020	0.106
SC3	42	0.259	0.758	0.746	0.029	0.112
SC4	38	0.293	0.916	0.932	0.018	0.060
SC5	38	0.139	0.880	0.833	0.014	0.102
SC6	30	0.197	0.841	0.808	0.027	0.137
CC7	33	0.194	0.912	0.918	0.016	0.083
CC8	40	0.142	0.797	0.776	0.017	0.116
CC9	43	0.253	0.839	0.833	0.026	0.103
CC10	32	0.299	0.628	0.575	0.045	0.150
CC11	30	0.157	0.878	0.884	0.015	0.096
EC12	29	0.222	0.918	0.938	0.014	0.064
EC13	39	0.172	0.889	0.868	0.014	0.080
EC14	24	0.159	0.907	0.904	0.013	0.083
EC15	25	0.177	0.896	0.891	0.017	0.095
EC16	37	0.140	0.907	0.867	0.012	0.086
EC17	32	0.157	0.871	0.819	0.017	0.108
SBM18	29	0.235	0.876	0.882	0.020	0.083
SBM19	32	0.174	0.855	0.831	0.017	0.100
SBM20	45	0.153	0.836	0.827	0.017	0.108
SBM21	47	0.164	0.849	0.860	0.017	0.101
SBM22	41	0.093	0.850	0.810	0.011	0.118
SBM23	30	0.192	0.859	0.842	0.018	0.093
SBC24	27	0.169	0.793	0.792	0.022	0.130
SBC25	48	0.151	0.898	0.872	0.014	0.090
SBC26	35	0.250	0.773	0.744	0.034	0.136
SBC27	44	0.247	0.860	0.841	0.021	0.085
SBC28	43	0.192	0.870	0.843	0.014	0.075
SBC29	29	0.184	0.923	0.916	0.014	0.073

Table S5. Collar specific GPP model fitting parameters for Eq. 1 in the main body of the paper, showing the standard error of the fitting parameters and the statistical significance of each fitting parameter. Collar labels are as in Table S3.

	GPP Model 5 parameters				
Collar	***a***	***b***	***c***	***d***	***e***
SC1	0.229 ± 0.059**	404 ± 109**	0.041 ± 0.029*	0.036 ± 0.011**	0.013 ± 0.004**
SC2	0.318 ± 0.067**	438 ± 97**	0.157 ± 0.049**	0.031 ± 0.008**	0.016 ± 0.002**
SC3	0.366 ± 0.072**	455 ± 84**	0.213 ± 0.056**	0.002 ± 0.008	0.006 ± 0.003
SC4	0.396 ± 0.094**	566 ± 122**	0.144 ± 0.055**	0.009 ± 0.009	-0.003 ± 0.005
SC5	0.227 ± 0.042**	390 ± 72**	0.100 ± 0.029**	0.013 ± 0.009	0.016 ± 0.004**
SC6	0.405 ± 0.094**	537 ± 110**	0.205 ± 0.071**	0.013 ± 0.008	0.009 ± 0.005
CC7	0.750 ± 0.325**	700 ± 233**	0.537 ± 0.284**	0.016 ± 0.017	0.020 ± 0.001**
CC8	0.356 ± 0.095**	480 ± 125**	0.207 ± 0.072**	0.010 ± 0.013	0.020 ± 0.002**
CC9	0.345 ± 0.074**	428 ± 84**	0.189 ± 0.055**	0.029 ± 0.010**	0.014 ± 0.002**
CC10	0.366 ± 0.078**	454 ± 117**	0.248 ± 0.062**	0.028 ± 0.009**	0.020 ± 0.001**
CC11	0.104 ± 0.045**	522 ± 189**	0.055 ± 0.033**	0.043 ± 0.019**	0.015 ± 0.003**
EC12	0.188 ± 0.034**	592 ± 126**	0.109 ± 0.030**	0.031 ± 0.010**	0.006 ± 0.004
EC13	0.285 ± 0.045**	513 ± 94**	0.165 ± 0.036**	0.008 ± 0.008	0.008 ± 0.004**
EC14	0.347 ± 0.086**	651 ± 168**	0.208 ± 0.073**	-0.001 ± 0.013	0.021 ± 0.008**
EC15	0.279 ± 0.062**	608 ± 143**	0.154 ± 0.050**	0.022 ± 0.010**	0.017 ± 0.007*
EC16	0.193 ± 0.029**	428 ± 88**	0.122 ± 0.024**	0.012 ± 0.007**	0.013 ± 0.007*
EC17	0.307 ± 0.049**	531 ± 111**	0.190 ± 0.042**	-0.001 ± 0.008	0.011 ± 0.006
SBM18	0.140 ± 0.025**	359 ± 73**	0.097 ± 0.023**	0.071 ± 0.009**	0.018 ± 0.003**
SBM19	0.148 ± 0.042**	282 ± 80**	0.097 ± 0.040**	0.023 ± 0.015*	0.012 ± 0.010
SBM20	0.235 ± 0.039**	460 ± 66**	0.108 ± 0.027**	0.026 ± 0.008**	0.006 ± 0.005
SBM21	0.212 ± 0.033**	460 ± 64**	0.087 ± 0.020**	0.026 ± 0.007**	0.010 ± 0.003**
SBM22	0.152 ± 0.024**	484 ± 66**	0.069 ± 0.017**	0.017 ± 0.009*	0.009 ± 0.006
SBM23	0.218 ± 0.0322**	362 ± 64**	0.124 ± 0.024**	0.042 ± 0.007**	0.025 ± 0.004**
SBC24	0.108 ± 0.026**	346 ± 97**	0.062 ± 0.022**	0.066 ± 0.012**	0.022 ± 0.006**
SBC25	0.229 ± 0.039**	426 ± 66**	0.133 ± 0.029**	0.023 ± 0.006**	0.010 ± 0.005*
SBC26	0.186 ± 0.031**	378 ± 70**	0.136 ± 0.028**	0.041 ± 0.008**	0.003 ± 0.007
SBC27	0.344 ± 0.046**	456 ± 64**	0.201 ± 0.034**	0.011 ± 0.006**	0.009 ±0.004*
SBC28	0.111 ± 0.020**	276 ± 53**	0.057 ± 0.016**	0.063 ± 0.008**	0.031 ± 0.004**
SBC29	0.071 ± 0.0141**	199 ± 41**	0.044 ± 0.014**	0.079 ± 0.011**	0.037 ± 0.004**

** Parameter significant with $\alpha<0.05$.

* Parameter significant with $\alpha<0.10$.

Table S6. Table of collar specific empirical fitting parameters for ER model (Eq. 2) showing the standard error of the fitting parameters and the statistical significance of each fitting parameter. Collar labels are as in Table S3.

	ER Model Parameters (Eq. 2)		
collar	***a***	***b***	***c***
SC1	0.039 ±0.006**	-5.90E-04 ±5E-04	336 ±55**
SC2	0.039 ± 0.008**	9.00E-05 ±4E-04	407 ± 308**
SC3	0.044 ± 0.009**	-3.70E-04 ±4E-04	332 ± 44**
SC4	0.043 ± 0.006**	-7.60E-04 ±2E-04**	348 ±24**
SC5	0.033 ± 0.004**	-2.10E-04 ±3E-04	378 ± 39**
SC6	0.014 ± 0.014	-3.21E-03 ±1E-04**	253 ± 40.5**
CC7	0.042 ± 0.014**	-1.02E-03 ±5E-04**	364 ± 31**
CC8	0.053 ± 0.009**	1.00E-04 ±4E-04	370 ± 40**
CC9	0.063 ± 0.014**	-4.30E-04 ±5E-04	405 ± 38**
CC10	0.092 ± 0.016**	5.00E-04 ±6E-04**	326 ± 62**
CC11	0.029 ± 0.006**	-8.50E-04 ±4E-04**	393 ± 47**
EC12	0.028 ± 0.003**	-1.15E-03 ±3E-04**	536 ± 57**
EC13	0.046 ± 0.003**	-1.23E-03 ±3E-04**	334 ± 36**
EC14	0.047 ± 0.004**	-1.59E-03 ±6E-04**	359 ± 45**
EC15	0.021 ± 0.006**	-2.81E-03 ±7E-04**	369 ± 56**
EC16	0.048 ± 0.003**	-2.59E-03 ±5E-04**	309 ± 36**
EC17	0.049 ± 0.004**	-2.11E-03 ±7E-04**	283 ± 35**
SBM18	0.038 ± 0.012**	-3.10E-04 ±5E-04	471 ± 43**
SBM19	0.044 ± 0.005**	5.00E-04 ±5E-04	482 ± 48**
SBM20	0.045 ± 0.006**	-2.60E-04 ±4E-04	388 ± 36**
SBM21	0.023 ± 0.006**	-7.40E-04 ±3E-04**	435 ± 45**
SBM22	0.026 ± 0.003**	-1.29E-03 ±4E-04**	361 ± 41**
SBM23	0.040 ± 0.005**	5.00E-05 ±7E-04	466 ± 45**
SBC24	0.018 ± 0.007**	-1.16E-03 ±7E-04*	488 ± 78**
SBC25	0.020 ± 0.005**	-1.32E-03 ±4E-04**	379 ± 30**
SBC26	0.044 ± 0.012**	-7.40E-04 ±9E-04	386 ± 51**
SBC27	0.030 ± 0.006**	-1.23E-03 ±6E-04**	374 ± 36**
SBC28	0.019 ± 0.003**	-3.90E-04 ±3E-04	527 ± 45**
SBC29	0.024 ± 0.003**	5.00E-04 ±2E-04**	616 ± 48**

** Parameter significant with $\alpha<0.05$.
* Parameter significant with $\alpha<0.10$.

Methane modelling

Due to equipment issues, the CH_4 flux field measurements were collected from May 11, 2017 to January 5, 2018 rather than the entire calendar year of 2017. This meant that the sampling period had a bias toward the warmer part of the year, which likely would have higher CH_4 emissions. To account for this bias in sampling period, the collar average CH_4 flux was scaled by a factor of 0.80.

This factor was derived from an empirical model based on field measurements, which was developed to determine the temporal variations in CH_4 flux. This empirical model is described here: The field data were first normalized by dividing each measurement by the collar average CH_4 flux. Then, the normalized CH_4 flux data from all collars (n=230) were pooled together.

With this pooled data set, the variations in CH_4 flux were modelled as a function of the JDAY and the T_{5cm} according to Eq. S3. This equation was adjusted to fit the field data based on the r^2 value and the sum of the squares of the residuals, and is composed of an exponential temperature effect multiplied by a seasonal effect. These separate components of the model over 2016 and 2017 can be seen in Fig. S1. It was found that soil temperature alone did not account for the temporal variations in CH_4 flux as well as a temperature effect multiplied by JDAY effect.

$$CH_4\,flux = k * [0.205 * \sin(\frac{JDAY+263}{365} * 2\pi) + 0.205/3\sin(\frac{JDAY+218}{365} * 4\pi) + 0.729] * e^{(213.1*(\frac{1}{283.15-227.13} - \frac{1}{(T5cm+273.15-227.13)})} \quad \text{(S3)}$$

where CH_4 flux is in g-C-CH_4 m^{-2} hr^{-1}, and k is a scaling factor. It was found from Eq. S3 that the average CH_4 flux over the entire 2017 calendar year was 0.80 times the average modelled CH_4 flux of the field sampling dates. This scaling factor was thus used to account for the bias in sampling period. As a check, the modelled values were re-scaled by the collar average flux and compared to the measured CH_4 flux values with an overall r^2 of 0.61 and a slope near unity (0.98) (Fig. S2).

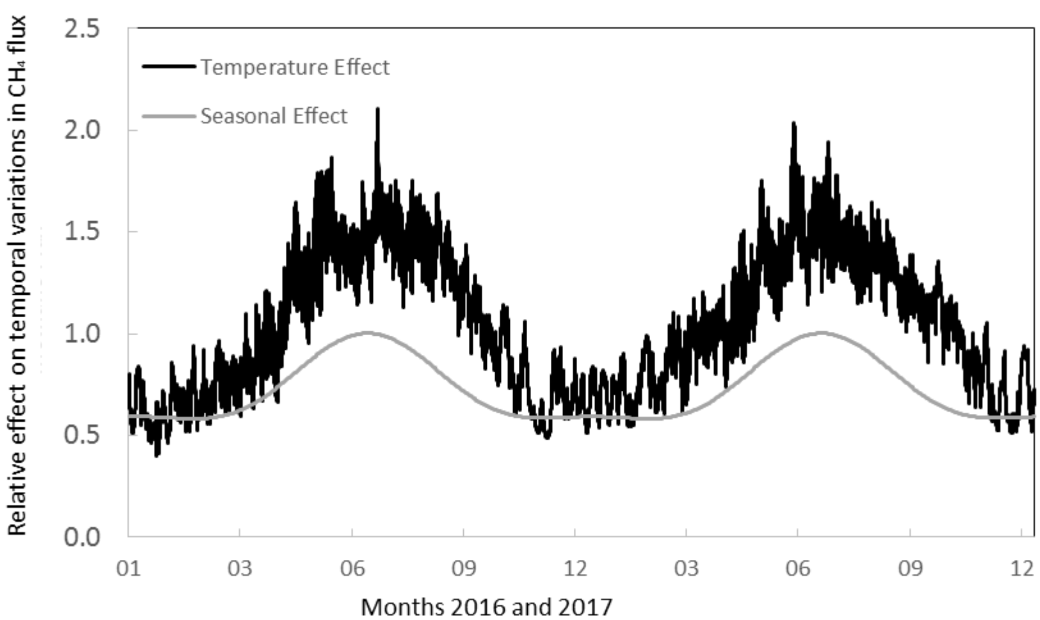

Fig. S1. The relative effect of soil temperature and Julian day of the on the temporal variations in the modelled CH_4 flux according to Eq. S11 over 2016 and 2017

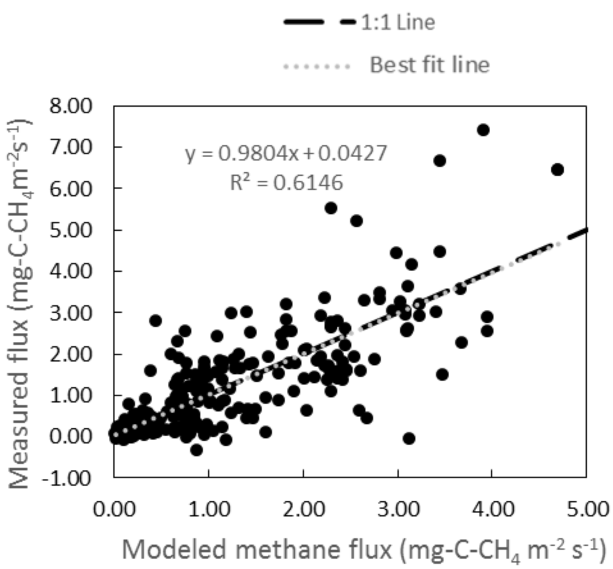

Fig. S2. Measured and modelled CH_4 flux based on the model above.

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

Table S7. 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), Sub-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	13	-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 S8. 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	-53 ±11	441	-501	-61 ±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	380	-508	-128 ±6	393	-526	-133 ±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	501	-523	-23 ±13	508	-523	-15 ±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	605	-647	-42 ±17	608	-636	-28 ±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	347	-383	-37 ±8	353	-392	-40 ±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	586	-588	-2 ±10	551	-592	-40 ±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	476 ±106	-524 ±90	-47 ±43	476 ±98	-528 ±84	-53 ±42	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	717	-506	211 ±10	647	-536	111 ±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	529	-367	162 ±10	492	-381	111 ±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	762	-576	186 ±16	688	-571	118 ±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	821	-530	291 ±14	781	-540	242 ±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	451	-205	246 ±13	397	-199	198 ±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	656 ±158	-437 ±151	219 ±50	601 ±155	-445 ±156	156 ±61	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	364	-368	-3 ±17	349	-368	-19 ±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	469	-447	22 ±16	470	-449	21 ±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	440	-433	7 ±18	430	-445	-15 ±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	361	-440	-79 ±16	317	-452	-135 ±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	351	-382	-30 ±14	315	-387	-72 ±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	522	-417	105 ±18	507	-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	418 ±70	-414 ±33	3 ±61	398 ±82	-420 ±35	-22 ±76	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 S8. 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	479	-431	48 ±11	488	-444	45 ±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	445	-373	72 ±18	364	-376	89 ±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	489	-471	18 ±13	500	-470	30 ±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	392	-367	25 ±14	394	-369	25 ±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	335	-267	68 ±11	331	-268	63 ±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	427	-560	-133 ±12	440	-577	-138 ±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	448 ±57	-412 ±100	16 ±79	436 ±64	-417 ±105	19 ±80	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	321	-379	-58 ±11	307	-394	-87 ±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	386	-444	-58 ±12	375	-447	-72 ±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	543	-558	-15 ±13	547	-554	-8 ±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	443	-558	-115 ±16	436	-561	-126 ±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	248	-380	-130 ±10	247	-405	-159 ±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	240	-338	-89 ±8	258	-368	-101 ±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	364 ±118	-441 ±98	-77 ±45	362 ±116	-455 ±84	-92 ±51	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

Supplemental Section 3. Data collected from literature on peatland C balance and other site information. This section includes the data behind Fig. 11 and Fig. 12 as well as other studies.

Table S9. 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 $m^{-2}yr^{-1}$)	Refer-ence
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 S9 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
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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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 S9 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
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 Hum-mock (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 (Sphag-num fuccum) Bog (Vegetation cleared from collar)	1991-1992		62.8		-16				136[*7,11]				aj
Ilomantsi, Eastern Finland	Drained oligotrophic (Sphag-num 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 S9 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
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 S9 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 Peat-land, 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 Peat-land, 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 Peat-land, 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 Peat-land, Quebec	Cutover peatland, abondoned 20 years prior to study, herba-cious	1999	3	47.883	926					399[*3]		0.014[*3]	0.165	al
Bios-de-bell Peat-land, Quebec	Cutover peatland, abondoned 20 years prior to study, shurbs	1999	3	47.883	926							0.137[*3]	0.178	al
Bios-de-bell Peat-land, 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 Peat-land, 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 Peat-land, 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 Peat-land, Quebec	Cutover peatland, abondoned 20 years prior to study, herba-cious	2000	3	47.883	926					95.8[*3]		0.014[*3]	0.165	al

Table S9 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 S9 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 S9 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 S9 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
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ac Gazovic et al. 2013
ad Tuittila et al. 1999 & Tuittila et al. 2000
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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)