Supplement of

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

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Supplemental Section 1. Modeling annual NEE and CH₄ flux from chamber measurements

As described in the body of the report, NEE (in g C·CO₂ m⁻² time⁻¹) is the mass flux of CO₂ 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·CO₂ m⁻² time⁻¹) with a negative sign convention.
ER is the net ecosystem respiration (again in g C·CO₂ 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.
T₅cm 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.

\[
GPP = -GPP_{\text{max}} \cdot \frac{PPFD}{PPFD+b}
\]  

(S1)

For this model, GPP_{\text{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_{\text{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_{\text{max}}, which has the advantage of being simple with few fitting parameters. However, the assumption of a constant GPP_{\text{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_{\text{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.

\[
GPP_{max} = -(a + c \sin((JDAY + 215)/365 \cdot 2\pi))
\]  
(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. \(\exp(T_{5cm} \cdot d)\)) 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. \((1 + WT \cdot e)\)) 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<sub>max</sub> | \(GPP = \frac{-GPP_{max} \cdot PPFD}{PPFD + b}\) | Laine et al. 2006, Strack et al. 2014 |
| Sinusoidal seasonal variation | \(GPP = -(a + c \sin(JDAY/365 \cdot \pi)) \cdot \frac{PPFD}{PPFD + b}\) | N/A |
| With linear temperature and water table effect | \(GPP = -(a + c \sin(JDAY/365 \cdot \pi)) \cdot \frac{PPFD}{PPFD + b} \cdot (1 + T_{5cm} \cdot d) \cdot (1 + WT \cdot e)\) | Pieces taken from Wilson et al., 2016b |
| With exponential temperature and linear water table effect | \(GPP = -(a + c \sin(JDAY/365 \cdot \pi)) \cdot \frac{PPFD}{PPFD + b} \cdot \exp(T_{5cm} \cdot d) \cdot (1 + WT \cdot e)\) | Pieces taken from Wilson et al., 2016b |
| With a full sine period and growing season offset from the calendar year (Eq. 1) | \(GPP = -(a + c \sin((JDAY + 215)/365 \cdot 2\pi)) \cdot \frac{PPFD}{PPFD + b} \cdot \exp(T_{5cm} \cdot d) \cdot (1 + WT \cdot e)\) | Pieces from Wilson et al., 2016b |
ER Modelling
Ecosystem respiration (ER) is modeled according to the $T_{5cm}$ and $WT$. 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 | $ER = a \cdot e^{b \cdot T_{5cm}}$ | Based on data presented in Piechl et al. (2014) |
| Exponential trend in temperature and a linear trend in WT. | $ER = a \cdot e^{b \cdot T_{5cm}} - c \cdot WT$ | N/A |
| With linear temperature and water table effects. | $ER = a \cdot T_{5cm} - (b \cdot WT + c)$ | Strack et al. (2014) |
| Eq. 2 | $ER = (a + b \cdot WT) \cdot \exp\left(c \cdot \left(\frac{1}{(T_{5cm} + 46.02)}\right)\right)$ | Directly from Wilson et al., 2016b |
| Eq. 2 with a sinusoidal variations in ER with JDAY | $ER = \left(a + d \cdot \sin\left(\frac{JDAY + 215}{365} \cdot 2\pi\right) + e \cdot WT\right) \cdot \exp\left(c \cdot \left(\frac{1}{(T_{5cm} + 46.02)}\right)\right) + b$ | 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$_2$ m$^{-2}$ 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 modelledVerse 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 r² and standard deviation of the residuals (in units of g-C-CO₂ 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-CO₂ m⁻² hr⁻¹) | r² | Slope of modelled Verse measured results | STDEV of the residuals (g C-CO₂ 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.

| 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 α<0.05.
* Parameter significant with α<0.10.
account for this bias in sampling period, the collar average
January 5, 2018 rather than the entire calendar year of 2017. Due
to equipment issues, the CH$_4$ Methane  

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

Collar labels are as in Table S3.  

| collar | Parameter (Eq. 2) | $a$ | $b$ | $c$ |
|--------|------------------|----|----|----|
| SC1    |                  | 0.039 ± 0.006** | -5.9E-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.

$$CH_4 \text{ flux} = k \times \left[ 0.205 \times \sin \left( \frac{\text{JDAY}+263}{365} \times 2\pi \right) + \frac{0.205}{3} \sin \left( \frac{\text{JDAY}+218}{365} \times 4\pi \right) + 0.729 \right] \times e^{(213.1 * \left( \frac{1 - 283.15 - 227.13}{283.15 + 227.13} \right) \times 2(283.15 - 227.13)}}$$

where CH$_4$ flux is in g-C$_4$H$_8$ 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](image)
Fig. S2. Measured and modelled CH₄ 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 Eriophorum spp. cover | MAWT 2016 (cm) | MAWT 2017 (cm) | Collar | Percent Sphagnum spp. cover | Percent Eriophorum spp. cover | MAWT 2016 (cm) | MAWT 2017 (cm) |
|--------|----------------------------|-------------------------------|----------------|----------------|--------|----------------------------|-------------------------------|----------------|----------------|
| SC1    | 98                         | 23                            | -8.9           | -8.9           | SBM18  | 68                         | 5                             | -18.5          | -17.8          |
| SC2    | 98                         | 10                            | -18.2          | -18.2          | SBM19  | 15                         | 4                             | -5.0           | -4.3           |
| SC3    | 100                        | 5                             | -19.3          | -19.3          | SBM20  | 45                         | 37                            | -11.4          | -10.7          |
| SC4    | 98                         | 5                             | -22.6          | -22.6          | SBM21  | 89                         | 6                             | -17.7          | -17.0          |
| SC5    | 93                         | 3                             | -7.0           | -7.0           | SBM22  | 47                         | 14                            | -5.1           | -4.4           |
| SC6    | 78                         | 4                             | -13.6          | -13.6          | SBM23  | 78                         | 12                            | -5.4           | -4.7           |
| Ecotype Average | 94 | 8 | -15.0 | -14.9 | Ecotype Average | 57 | 13 | -10.5 | -9.8 |
| CC7    | 0                          | 0                             | -26.1          | -25.1          | SBC24  | 100                        | 6                             | -8.0           | -7.2           |
| CC8    | 0                          | 2                             | -18.4          | -17.4          | SBC25  | 99                         | 1                             | -8.7           | -7.9           |
| CC9    | 0                          | 2                             | -19.7          | -18.7          | SBC26  | 100                        | 2                             | -11.7          | -10.9          |
| CC10   | 0                          | 3                             | -16.7          | -15.7          | SBC27  | 93                         | 39                            | -10.5          | -9.7           |
| CC11   | 0                          | 3                             | -15.0          | -14.0          | SBC28  | 98                         | 2                             | -6.6           | -5.8           |
| Ecotype Average | 0 | 2 | -19.1 | -18.2 | Ecotype Average | 101 | 2 | -6.2 | -5.4 |
| EC12   | 21                         | 55                            | -3.9           | -1.8           | SBC29  | 101                        | 2                             | -6.2           | -5.4           |
| EC13   | 40                         | 80                            | -4.3           | -2.2           | Ecotype Average | 98 | 8 | -8.6 | -7.8 |
| 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 |                |                |                |                |                |
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 | ±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 | ±158 | ±151      | ±219 ±50 | ±155    | ±156    | ±156 ±1  | 2.7 ±3.0    | 8.0 ±1.6       | 12.8 ±2.5      | 1.1 ±0.2       | 1.5 ±0.3       | 2.7 ±0.9               | ±39 ±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 |
| Collar | 2016 ER | 2016 GPP | 2016 NEE | 2017 ER | 2017 GPP | 2017 NEE | CH₄ Flux | 2016 DOC losses | 2017 DOC losses | 2016 DIC losses | 2017 DIC losses | Open water CO₂ 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          |
| Average| 448 ±57 | ±100    | 16 ±79  | 436 ±64 | ±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| 258     | -455    | ±116    | 362     | ±455    | -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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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 ± 0.02                               | -0.2 ± 0.01*                               |                                              | a                                        |           |
| Southern Germany        | Drained fen                      | 7.6                 | 48.68                         | 700       | -46 ± 13.5                       | 13.5                         | 0.31       | 0.0*‡                            |                                              | 0.7 ± 0.4*                                |                                              | b                                        |           |
| Southern Germany        | Drained fen                      | 7.6                 | 48.65                         | 700       | -71 ± 14.8                       | 14.8                         | 0.89       | 0.0*‡                            |                                              | 0.7 ± 0.4*                                |                                              | 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 | Undrained 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         | 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         | 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         | 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         | 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                                        |           |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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 For-        | 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                                     |
| est, Scotland            |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                | 0.067 ± 0.007                             | 0.5 ± 0.2**                                             |                                            | g                                     |
| Flanders Moss For-        | Undrained and Planted (with trees decades before) Bog                              | 2008-2009           | 9.4                             | 56.13    | 1200                             | -12 ± 3                    | 31         | 3.6                 |                                |                                          |                                       |                                            | g                                     |
| est, 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 For-        | Near pristine bog                                                                  | 2008-2009           | 9.4                             | 56.13    | 1200                             | -5                        | 39         | 3.6                 |                                | 0.087                                    | 17.00**                                              |                                            | g                                     |
| est, Scotland            |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | 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           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | 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         |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | h                                     |
| Irish Midlands           |                                                                                   |                     |                                 |          |                                  |                            |            |         |                                |                                          |                                       |                                            | 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains -(g-C m⁻² yr⁻¹) | Reference |
|----------------|------------------|---------------------|-------------------------------|---------|----------------------------------|----------------------------|-----------|--------|---------------------------------|-------------------------------------|---------------------------------|-----------------------------------------------|----------------------------------------|-----------|
| Western Ireland | Drained domestically 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 |
| 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 |
| Study Location          | Site description                          | Year data collected | Latitude | Long term mean annual temp (°C) | 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains (g-C m⁻² yr⁻¹) | Reference |
|------------------------|-------------------------------------------|---------------------|----------|---------------------------------|----------------------------------|-------------------------------|-----------|--------|-------------------------------|----------------------------------------|----------------------------------------|---------------------------------------------|------------------------------------------|-----------|
| New Scoltand, Canada    | Bog Hummock                               | 6.3                 | 44.4     | 1403                            | -16.0                            |                               |           |        | 1.9 ± 0.8*‡                   |                                        |                                        | k                                           |                         |
| Peat Bog               |                                           |                     |          |                                 |                                  |                               |           |        |                               |                                        |                                        |                                             |                         |
| New Scoltand, Canada    | Bog Lawn                                  | 6.3                 | 44.4     | 1403                            | -8.0                             |                               |           |        | 7.7 ± 1.4*‡                   |                                        |                                        | k                                           |                         |
| Peat Bog               |                                           |                     |          |                                 |                                  |                               |           |        |                               |                                        |                                        |                                             |                         |
| New Scoltand, Canada    | Bog Bank                                  | 6.3                 | 44.4     | 1403                            | -4.0                             |                               |           |        | 4.9 ± 3.3*‡                   |                                        |                                        | k                                           |                         |
| Peat Bog               |                                           |                     |          |                                 |                                  |                               |           |        |                               |                                        |                                        |                                             |                         |
| New Scoltand, Canada    | Bog Pool                                  | 6.3                 | 44.4     | 1403                            | 3.0                              |                               |           |        | 10.1 ± 2.2*‡                  |                                        |                                        | k                                           |                         |
| Peat Bog               |                                           |                     |          |                                 |                                  |                               |           |        |                               |                                        |                                        |                                             |                         |
| Bavaria Germany         | Abandoned Peat Cut area                    | 8.5                 | 47.3     | 1483                            | -29.0                            |                               |           |        | 0.0*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Heathland                                 | 8.5                 | 47.3     | 1483                            | -20.2                            |                               |           |        | 0.0*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Drained Heathland                         | 8.5                 | 47.3     | 1483                            | -11.6                            |                               |           |        | 1.9*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Heathland birch and Pine                  | 8.5                 | 47.3     | 1483                            | -17.0                            |                               |           |        | 0.8*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Flooded Heathland                         | 8.5                 | 47.3     | 1483                            | 44.5                             |                               |           |        | 1.4*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Restored bog Heathland                    | 8.5                 | 47.3     | 1483                            | -11.7                            |                               |           |        | 7.1*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Restored bog lawn                         | 8.5                 | 47.3     | 1483                            | -5.3                             |                               |           |        | 2.2*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Undrained bog shrubs                      | 8.5                 | 47.3     | 1483                            | -8.4                             |                               |           |        | 5.5*‡                         |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Undrained Bog Lawn                        | 8.5                 | 47.3     | 1483                            | -6.3                             |                               |           |        | 10.1*‡                        |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Undrained bog hummocks                    | 8.5                 | 47.3     | 1483                            | -9.5                             |                               |           |        | 27.6*‡                        |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Intermediate hummock lawn                 | 8.5                 | 47.3     | 1483                            | -3.8                             |                               |           |        | 24.1*‡                        |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Undrained Bog hummocks                    | 8.5                 | 47.3     | 1483                            | 0.0                              |                               |           |        | 38.3*‡                        |                                        |                                        | l                                           |                         |
| Bavaria Germany         | Grassland                                 | 6.5                 | 47.85    | 1200                            | -110.0                           |                               |           |        | 0.0*‡                         |                                        |                                        | m                                           |                         |
| Allgaeu, Germany        | Grassland                                 | 6.5                 | 47.85    | 1200                            | -51.0                            |                               |           |        | 0.0*‡                         |                                        |                                        | m                                           |                         |
| Allgaeu, Germany        | Drained Fen                               | 6.5                 | 47.85    | 1200                            | -19.0                            |                               |           |        | 1.6*‡                         |                                        |                                        | m                                           |                         |
| Allgaeu, Germany        | Undrained Fen                             | 6.5                 | 47.85    | 1200                            | -9.0                             |                               |           |        | 13.1*‡                        |                                        |                                        | m                                           |                         |
| Germany                 | Fen                                       | 52.8                | 47.3     | 1200                            | -60.0                            |                               |           |        | -0.3*‡                        |                                        |                                        | n                                           |                         |
| Germany                 | Fen                                       | 52.8                | 47.3     | 1200                            | 0.0                              |                               |           |        | 0.3*‡                         |                                        |                                        | n                                           |                         |
| Lakkasuo, Finland       | Drained Minerotrophic Tall Sedge Fen      | 3                   | 61.8     | 700                             | -28.5                            |                               |           |        | 0.149                         |                                        |                                        | o                                           |                         |
| Lakkasuo, Finland       | Drained Ombrotrophic Pine Bog             | 3                   | 61.8     | 700                             | -24.5                            |                               |           |        | 0.006                         |                                        |                                        | o                                           |                         |
| Lakkasuo, Finland       | Pristine Ombrotrophic Pine Bog            | 3                   | 61.8     | 700                             | -16.0                            |                               |           |        | 0.006                         |                                        |                                        | o                                           |                         |
| Lakkasuo, Finland       | Pristine Minerotrophic tall sedge Fen     | 3                   | 61.8     | 700                             | -3.2                             |                               |           |        | 0.006                         |                                        |                                        | o                                           |                         |
| Study Location       | Site description                                         | Year data collected | Latitude | Long term mean annual temp (°C) | 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 CO₂ Emissions (g-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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                          |                               |           |        |                                  |                                        |                                          |                                        | 6.8*11                                         | p         |
| Lower Saxony, Germany| Restored rich Peatland, dominated by grasses             | 8.7 52.48 698       | -35.0    | 1.007                           | -0.0*1                          |                               |           |        |                                  |                                        |                                          |                                        | 6.8*11                                         | p         |
| Lower Saxony, Germany| Restored rich Peatland, dominated by grasses             | 8.7 52.48 698       | 9.5      | -0.069                          | 75.5*1                          |                               |           |        |                                  |                                        |                                          |                                        | 6.8*11                                         | 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                             |                                        |                                          |                                        | 6.8*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                             |                                        |                                          |                                        | 6.8*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                           |                                        |                                          |                                        | 6.8*11                                         | q         |
| Bellacorick, Ireland | Rewetted cutover bog with Juncus/Spahgnnum              | 2009-2013 10.3 54.1 | 1245     | 6.06*11                         | 58 3.8                          | 24*13                         | -74 ±67*11 | 0      | 8.7 ±8*11                        |                                        |                                          |                                        | 6.8*11                                         | q         |
| Bellacorick, Ireland | Rewetted cutover bog with Spahgnnum/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                   |                                        |                                          |                                        | 6.8*11                                         | q         |
| Bellacorick, Ireland | Rewetted cutover bog with 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                        |                                        |                                          |                                        | 6.8*11                                         | q         |
| Bellacorick, Ireland | Rewetted cutover peatland Ireland, composite of microsites | 2009-2013 10.3 54.1 | 1245 | -104 ±80*19,11 | 58 3.8                          | 24*13                         | -104 ±80*19,11 | 0 | 9 ± 2*19,11 |                                        |                                          |                                        | 6.8*11                                         | q         |
| Jurra Mountains, France | Naturally recovering cutover bog 20 years post harvest, Eriophorium 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 | 22 to 32*11,12 | 0 | 2.7*11,12 |                                        |                                          |                                        |                                        | 6.8*11                                         | r         |
| Jurra Mountains, France | Naturally recovering cutover bog 20 years post harvest, Spahgnnum | 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 | 22 to 32*11,12 | 0 | 0.6*11,12 |                                        |                                          |                                        |                                        | 6.8*11                                         | 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                      |                                        |                                          |                                        | 6.8*11                                         | s         |
| Llyn Serw, Wales     | Drained blanket bog, in drain                           | 2009-2011 5.6 53    | 2200     | 0                               | 4.8                             |                               |           |        | 4.5 ±1.5*11                      |                                        |                                          |                                        | 6.8*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                      |                                        |                                          |                                        | 6.8*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                      |                                        |                                          |                                        | 6.8*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                      |                                        |                                          |                                        | 6.8*11                                         | s         |
| 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⁻²yr⁻¹) | Annual CO₂ Emissions (g-C-CO₂ m⁻²yr⁻¹) | Annual N₂O emissions (g N₂O m⁻²yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻²yr⁻¹) | Other Carbon losses or gains (g-C m⁻²yr⁻¹) | Reference |
|---------------------|---------------------------------------------------|---------------------|--------------------------------|----------|----------------------------------|-----------------------------|-----------|--------|---------------------------------|----------------------------------------|----------------------------------------|------------------------------------------|-------------------------------------------|-----------|
| 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 blanket bog                             | 2009-2011           | 5.6                            | 53       | 2200                             | 4.7                         | 4.6       |        | 4.5±1.1*¹¹                      |                                       |                                        |                                           |                                           | s         |
| Nant y Brwyn, Wales | Undrained Blanket bog, within ditch               | 2009-2011           | 5.6                            | 53       | 2200                             | 4.6                         | 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°                 | 14±1.5    |        | -55±1.9**                          | 9±1.7*¹⁹                                 | 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°                | 11.9±1.3  |        | -48±1.6**                          | 14±2.5*¹⁹                                | 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°                       |          |        | -58**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2002               | 1.2                            | 64.2     | 523                              | -16.5°                      |          |        | -60**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2003               | 1.2                            | 64.2     | 523                              | -13.7°                      |          |        | -47**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2004               | 1.2                            | 64.2     | 523                              | -12.2°                      |          |        | -59**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2005               | 1.2                            | 64.2     | 523                              | -8.7°                       |          |        | -58**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2006               | 1.2                            | 64.2     | 523                              | -20.8°                      |          |        | -18**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2007               | 1.2                            | 64.2     | 523                              | -15.7°                      |          |        | -48**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2008               | 1.2                            | 64.2     | 523                              | -18.9°                      |          |        | -105**†⁶                          |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2009               | 1.2                            | 64.2     | 523                              | -17.3°                      |          |        | -41**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2010               | 1.2                            | 64.2     | 523                              | -66**†⁶                     |          |        | -66**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2011               | 1.2                            | 64.2     | 523                              | -14.7°                      |          |        | -79**†⁶                           |                                       |                                        |                                           |                                           | u         |
| Degerö Stormyr, Sweden | Pristine poor fen, open mix of Sphagnum spp. and sedges | 2012               | 1.2                            | 64.2     | 523                              | -10°                        |          |        | -57**†⁶                           |                                       |                                        |                                           |                                           | u         |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains - (g-C m⁻² yr⁻¹) | Reference |
|------------------------|-----------------------------------------------------------------------------------|---------------------------------|---------------------------------|----------|----------------------------------|----------------------------|------------|---------|----------------------------------|----------------------------------------|---------------------------------------|----------------------------------------|-------------------------------------------|-----------|
| 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               | -58 ±21*               | u       |
| Auchencorth Moss, Scotland | Intact ombrotrophic bog with a small proportion of harvesting                  | 2007                            | 55.75                           | 1155     | -12.5°                             | 18.6 ±16.0           | -136 *              | v       |
| Auchencorth Moss, Scotland | Intact ombrotrophic bog with a small proportion of harvesting                  | 2008                            | 55.75                           | 1155     | -12.5°                             | 32.2 ±18.7           | -93.5 *              | v       |
| Auchencorth Moss, Scotland | Intact lowland oligotrophic bog                                                  | 2002-2013                       | 8.3                             | 55.8     | 1018                              | -3.5°                 | -64.1 ±33**            | w       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2004                            | 55.9                             | -4.2°    | 13.1 ±3.1                         | -67.2 ±3.0            | 3.6 ±1.6*              | x       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2005                            | 55.9                             | -4°      | 13.9 ±3.2                         | -84.0 ±4.8            | 4.5 ±1.9*              | x       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2006                            | 55.9                             | -5°      | 16.5 ±3.2                         | -12.5 ±3.4            | 4.6 ±2.0*              | x       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2007                            | 55.9                             | -5.5°    | 11.9 ±1.2                         | -13.5 ±2.3            | 4.2 ±1.9*              | x       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2008                            | 55.9                             | -3.5°    | 15.0 ±1.3                         | -42.7 ±4.7            | 3.6 ±1.6*              | x       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2003                            | 55.9                             | -2.4°    | 13.1 ±3.1                         | -67.9 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2004                            | 55.9                             | -4.2°    | 13.1 ±3.1                         | -75.9 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2005                            | 55.9                             | -4°      | 13.9 ±3.2                         | -79.2 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2006                            | 55.9                             | -5°      | 16.5 ±3.2                         | -32.3 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2007                            | 55.9                             | -5.5°    | 11.9 ±1.2                         | -32.1 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2008                            | 55.9                             | -3.5°    | 15.0 ±1.3                         | -57.4 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2009                            | 55.9                             | -2.6°    | 15.0 ±1.3                         | -59.3 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2010                            | 55.9                             | -7°      | 15.0 ±1.3                         | -42.9 ±33**           | y       |
| Glencar, Ireland       | Intact atlantic blanket bog                                                      | 2011                            | 55.9                             | -5.6°    | 15.0 ±1.3                         | -54.2 ±33**           | y       |
| The Himmelmoor, Germany | Cutover peatland restored (20-30 years prior to the start of the study), Sphagnum spp. vegetation cover | 2011                            | 9                               | 53.75    | 838                              | 16.4 ±39              | 0.054 ±0.07           | z       |
| The Himmelmoor, Germany | Cutover peatland restored (20-30 years prior to the start of the study), "heath," ericaceous shrub vegetation cover | 2011                            | 9                               | 53.75    | 838                              | 84.3 ±105             | -0.023 ±0.12           | z       |
| The Himmelmoor, Germany | Cutover peatland restored (20-30 years prior to the start of the study), Molinia caerulea vegetation cover | 2011                            | 9                               | 53.75    | 838                              | 67.4 ±90              | 0.040 ±0.12           | z       |

Table S9 continued.
| Study Location                     | Site description                                                                 | Year data collected | Mean annual temp (°C) | Latitude | Mean annual precip (mm) | Long term mean annual temp (°C) | Long term mean annual precip (mm) | Mean annual water table (cm) | C/N ratio | Soil pH | Annual DOC losses (g-C m⁻²yr⁻¹) | Annual CO₂ Emissions (g-C-CO₂ m⁻²yr⁻¹) | Annual N2O emissions (g N₂O m⁻²yr⁻¹) | Annual methane emissions (g C-CH₄ m⁻²yr⁻¹) | Other Carbon losses or gains (g-C m⁻²yr⁻¹) | Other Carbon losses or gains (g-C m⁻²yr⁻¹) | Reference |
|----------------------------------|----------------------------------------------------------------------------------|---------------------|-----------------------|----------|-------------------------|--------------------------------|---------------------------------|-------------------------------|-----------|---------|---------------------------------|-------------------------------------------|------------------------------------------|---------------------------------------------|------------------------------------------------|------------------------------------------------|----------|
| The Himmelmoor, Germany          | Active peat industrial extraction site, "deeply drained" bare peat               | 2011                | 9                     | 53.75    | 838                     | 9                               | 53.75                          | 838                           | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| Upper Peninsula, Michigan, USA   | Intact (sub-boreal 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                              | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| 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*                     | 3.8                            | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| 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*                     | 3.7                            | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| Upper Peninsula, Michigan, USA   | Intact (sub-boreal 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*                     | 4                              | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| 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*                     | 3.8                            | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| 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*                     | 3.7                            | 199.1 ±18* | 0.520 ±0.3 | 0.15 ±0.48*                      | 15.1 ±1.14                                 | 0.15 ±0.48*                                | z                                           | 15.1 ±1.14                                     | 0.15 ±0.48*                                | z        |
| Salmisuo mire complex, Eastern Finland | Intact "oligotrophic low sedge Sphagnum papillosum pine fen"                          | 2006                 | 2                     | 62.8     | 667                     | -16.0*                         | 4.2 ±0.5                      | -92.5 ±13** | 3.6 ±0.3*‡ 9 ac |                                      |                                          |                                         |                                                  |                                                    |                                      | ac       |
| Salmisuo mire complex, Eastern Finland | Intact "oligotrophic low sedge Sphagnum papillosum pine fen"                          | 2007                 | 2                     | 62.8     | 667                     | -8.5*                          | 11.4 ±0.8                     | -154.6 ±19** | 6.6 ±0.6*‡ 9 ac |                                      |                                          |                                         |                                                  |                                                    |                                      | ac       |
| Aitoneva, Kihniö, Finland        | Bare peat, cutover bog, abandoned 20 years previously, R1                          | 1994                 | 3.5                   | 62.2     | 700                     | -38.5                           | 11.4 ±0.8                     | 187* +13                       | -0.068* +13,15 | ad                                      |                                            |                                          |                                                  |                                                    |                                      | ad       |
| Aitoneva, Kihniö, Finland        | Bare peat, cutover bog, abandoned 20 years previously, R2                          | 1994                 | 3.5                   | 62.2     | 700                     | -27.9                           | 11.4 ±0.8                     | 156* +13                       | -0.045* +13,15 | ad                                      |                                            |                                          |                                                  |                                                    |                                      | ad       |
| Aitoneva, Kihniö, Finland        | Bare peat, cutover bog, abandoned 20 years previously, C1                          | 1994                 | 3.5                   | 62.2     | 700                     | -33.8                           | 11.4 ±0.8                     | 174* +13                       | 0.003* +13,15 | ad                                      |                                            |                                          |                                                  |                                                    |                                      | ad       |
| Aitoneva, Kihniö, Finland        | Bare peat, cutover bog, abandoned 20 years previously, C2                          | 1994                 | 3.5                   | 62.2     | 700                     | -34.7                           | 11.4 ±0.8                     | 176* +13                       | -0.049* +13,15 | ad                                      |                                            |                                          |                                                  |                                                    |                                      | ad       |
| 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 CO₂ Emissions (g-C CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains (g-C m⁻² yr⁻¹) | Reference |
|----------------|------------------|---------------------|---------------------------------|----------|----------------------------------|------------------------------|----------------|--------|-------------------------------|----------------------------------------|---------------------------------|-------------------------------------------|-------------------------------------------|-----------|
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C1 | 1995 | 3.5 | 62.2 | 700 | -25.8 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C2 | 1995 | 3.5 | 62.2 | 700 | -21.8 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C1 | 1996 | 3.5 | 62.2 | 700 | -30.3 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C2 | 1996 | 3.5 | 62.2 | 700 | -24.3 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C1 | 1997 | 3.5 | 62.2 | 700 | -27.3 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, cutover bog, abandoned 20 years previously, C2 | 1997 | 3.5 | 62.2 | 700 | -26.3 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 1 year post rewetting, R1 | 1995 | 3.5 | 62.2 | 700 | -11.0 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 1 year post rewetting, R2 | 1995 | 3.5 | 62.2 | 700 | 12.5 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 2 year post rewetting, R1 | 1996 | 3.5 | 62.2 | 700 | -10.9 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 2 year post rewetting, R2 | 1996 | 3.5 | 62.2 | 700 | 9.0 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 3 year post rewetting, R1 | 1997 | 3.5 | 62.2 | 700 | -14.1 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Bare peat, rewetted cutover bog, 3 year post rewetting, R2 | 1997 | 3.5 | 62.2 | 700 | 7.0 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Cutover bog, abandoned 20 years previously, Eriophorum vaginatum, R1 | 1994 | 3.5 | 62.2 | 700 | -38.5 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Cutover bog, abandoned 20 years previously, Eriophorum vaginatum, R2 | 1994 | 3.5 | 62.2 | 700 | -27.9 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Cutover bog, abandoned 20 years previously, Eriophorum vaginatum, C1 | 1994 | 3.5 | 62.2 | 700 | -33.8 | | | | | | | | | ad |
| Aitoneva, Kihniö, Finland | Cutover bog, abandoned 20 years previously, Eriophorum vaginatum, C2 | 1994 | 3.5 | 62.2 | 700 | -34.7 | | | | | | | | | ad |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains -(g-C m⁻² yr⁻¹) | Reference |
|----------------|-----------------|---------------------|-------------------------------|---------|-------------------------------|----------------------------|----------|--------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|------------|
| Aitoneva, Kihniö, Finland | Cutover bog, abandoned 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, abandoned 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, abandoned 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, abandoned 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, abandoned 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, abandoned 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 ±7.3³ | | | | | | | 53*³ | | | | ae |
| Fäjemyr, S. Sweden | Intact ombrotrophic raised bog | 2007 6.2 56.25 700 -0.2 ±3.9³ | | | | | | | -108*³ | | | | ae |
| 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 CO₂ Emissions (g C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains (g-C m⁻² yr⁻¹) | Reference |
|----------------------------------------------------|-----------------------------------------|---------------------|---------------------------------|----------|----------------------------------|----------------------------|-----------|---------|---------------------------------|---------------------------------------------|-------------------------------------------|----------------------------------------------|---------------------------------------------|-----------|
| Fäjemyr, S. Sweden                                 | Intact ombrotrophic raised bog          | 2008                | 6.2                             | 56.25    | 700                              | -7.3 ±6.7⁸                   |           |         |                                 | 87⁷*⁹†                                   |                                           |                                              |                                                   | ae         |
| Fäjemyr, S. Sweden                                 | Intact ombrotrophic raised bog          | 2009                | 6.2                             | 56.25    | 700                              | -5 ±3.1⁶                    |           |         |                                 | -105⁷*⁹†                                 |                                           |                                              |                                                   | ae         |
| Saura peatlands, Andøya, Norway                    | Intact Boreal Atlantic Blanket Bog      | 2009                | 3.6                             | 69.12    | 1060                             | -7.2 ±79⁸                   |           |         |                                 | -0.5 ±73*                                |                                           |                                              |                                                   | ae         |
| Saura peatlands, Andøya, Norway                    | Intact Boreal Atlantic Blanket Bog      | 2010                | 3.6                             | 69.12    | 1060                             | -34 ±69*                    |           |         |                                 |                                           |                                           |                                              |                                                   | ae         |
| Saura peatlands, Andøya, Norway                    | Intact Boreal Atlantic Blanket Bog      | 2011                | 3.6                             | 69.12    | 1060                             | -35.7 ±80*                  |           |         |                                 |                                           |                                           |                                              |                                                   | ae         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2008                | 58.35                           | approx.  | -12.6⁸                          | -86.4*¹⁶                    |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2009                | 58.35                           | approx.  | -5.5⁸                           | -182.4*¹⁶                   |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2010                | 58.35                           | approx.  | -5.3⁸                           | -135.6*¹⁶                   |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2011                | 58.35                           | approx.  | -8⁸                             | -88.8*¹⁶                    |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2012                | 58.35                           | approx.  | -7.8⁸                           | -187.2*¹⁶                   |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2013                | 58.35                           | approx.  | -7.9⁸                           | -106.8*¹⁶                   |           |         |                                 |                                           |                                           |                                              |                                                   | af         |
| Northern Scotland                                  | Intact Blanket Bog with pool System     | 2008-2013 Average   | 58.35                           |          | 10.3                            | -114*                       |           |         | 4.33*¹⁹                       |                                           |                                           |                                              |                                                   | af         |
| Lac Le Caron, St. James Bay region, North-western Quebec | Pristine oligotrophic bog              | 2007-2008           | -2.3                            | 52.3     | 735                              | -6.5⁸                       |           |         | -126 ±9*†                      |                                           |                                           |                                              |                                                   | ag         |
| Lac Le Caron, St. James Bay region, North-western Quebec | Pristine oligotrophic bog              | 2008-2009           | -2.3                            | 52.3     | 735                              | -6.7¹⁸                      |           |         | -94 ±9*†                       |                                           |                                           |                                              |                                                   | ag         |
| Lac Le Caron, St. James Bay region, North-western Quebec | Pristine oligotrophic bog              | 2009-2010           | -2.3                            | 52.3     | 735                              | approx. -10³,⁸              |           |         | -90 ±6*†                       |                                           |                                           |                                              |                                                   | ag         |
| 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⁻²yr⁻¹) | Annual CO₂ Emissions (g-C-CO₂ m⁻²yr⁻¹) | Annual N₂O emissions (g N₂O m⁻²yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻²yr⁻¹) | Other Carbon losses or gains (g-C m⁻²yr⁻¹) | Reference
|---------------------------------------------------|----------------------------------------------------------------------------------|---------------------|--------------------------------|----------|-----------------------------------|-------------------------------|-----------|---------|---------------------------------|------------------------------------------|------------------------------------------|---------------------------------------------|---------------------------------------------|------------------
| Lac Le Caron, St. James Bay region, North-western Quebec | Pristine oligotrophic bog                                                        | 2010-2011           | -2.3                           | 52.3     | 735                               | -15.5 ± 5.8                 |           |         | -28 ± 5*† ag                    |                                          |                                          |                                             |                                             | ag               |
| Lac Le Caron, St. James Bay region, North-western Quebec | Pristine oligotrophic bog                                                        | 2011-2012           | -2.3                           | 52.3     | 735                               | -13.4 ± 5.8                 |           |         | -42 ± 5*† ag                    |                                          |                                          |                                             |                                             | ag               |
| Mer Bleue peatland, Ottawa, Ontario                | Intact raised bog                                                                 | 1998-2004           | 6                              | 45.7     | 943                               | 14.9 ± 3.1                  |           |         | -40.2 ± 40.5**† 3,11            | 3.7 ± 0.5**† 3,11                           |                                          |                                             |                                             | 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, Eastern Margin                                         | 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     | 7.9                               | 7**† 3,11                   |           |         | 4.0*† 3,11                      |                                          |                                          |                                             |                                             | ai               |
| Ilomantsi, Eastern Finland                       | Intact oligotrophic (Sphagnum fuscum) Bog (Vegetation cleared from collar)       | 1991-1992           | 62.8                           | -17      | 136                               | 136 ±7                      |           |         |                                 |                                          |                                          |                                             |                                             | aj               |
| Study Location | Site description | Year data collected | Long term mean annual temp (°C) | Long term mean annual precip (mm) | Latitude | Mean annual water table (cm) | C/N ratio | Soil pH | Annual DOC losses (g-C m⁻² yr⁻¹) | Annual CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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 | | | | | 167*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 |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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       | 5.6                              | 178⁺⁷,⁺¹¹                   |           |         |                                 |                                          |                                          |                                             |                                          | aj         |
| Lakkason, Central Finland      | Tall Sedge Fen (Vegetation cleared from collar)        | 1991-1992           | 61.8                            | -2       | 4.5                              | 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⁺¹¹                   |           |         |                                 |                                          |                                          |                                             |                                          | aj         |
| Lakkason, Central Finland      | Drained fen (Vegetation cleared from collar)           | 1991-1992           | 61.8                            | -43      | 4.5                              | 445⁺⁷⁺¹¹                   |           |         |                                 |                                          |                                          |                                             |                                          | aj         |
| Ilomantsi, Eastern Finland     | Herb-rich Flark Fen (Vegetation cleared from collar)   | 1991-1992           | 62.8                            | -10      | 4.5                              | 169⁺⁷⁺¹¹                   |           |         |                                 |                                          |                                          |                                             |                                          | aj         |
| Central Finland                | Low sedge bog                                          | 1991-1992           | 3                               | 61.8     | 709                              | -13.0 ± 6.5               | 3.9       |         | 6.574⁺¹⁺³                           |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Drained low sedge bog                                  | 1991-1992           | 3                               | 61.8     | 709                              | -28.3 ± 9.0               | 3.7       |         | 2.273⁺¹⁺³                           |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Bog Hollow                                             | 1991-1992           | 1.9                             | 62.8     | 650                              | -3.8 ± 5.0                | 3.8       |         | 11.453⁺¹⁺³                          |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Bog Hummock                                            | 1991-1992           | 1.9                             | 62.8     | 650                              | -14.5 ± 5.8               | 3.8       |         | 19.736⁺¹⁺³                          |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Sphagnum fuscum bog                                    | 1991-1992           | 1.9                             | 62.8     | 650                              | -18.9 ± 4.7               | 3.8       |         | 0.48⁺¹⁺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⁺¹⁺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⁺¹⁺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⁺¹⁺³                           |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Drained cotton grass pine bog                          | 1991-1992           | 3                               | 61.8     | 709                              | -14.5 ± 9.0               | 3.8       |         | 2.603⁺¹⁺³                           |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Sfu Pine bog                                            | 1991-1992           | 1.9                             | 62.8     | 650                              | -19.4 ± 9.9               | 4.3       |         | 2.55⁺¹⁺³                            |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Drained Sfu pine bog                                    | 1991-1992           | 1.9                             | 62.8     | 650                              | -24.0 ± 9.9               | 4.3       |         | 0.739⁺¹⁺³                            |                                          |                                          |                                             |                                          | ak         |
| Central Finland                | Dwarf shrub Pine bog                                   | 1991-1992           | 3                               | 61.8     | 709                              | -28.0 ± 7.3               | 3.8       |         | 1.485⁺¹⁺³                           |                                          |                                          |                                             |                                          | ak         |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains -(g-C m⁻² yr⁻¹) | Other | 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   |        | 23.276*³                      |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Tall sedge fen                    | 1991-1992           | 3                              | 61.8     | 709                              | -4.2 ± 3.6                  | 5.6       |        | -0.011*³                      |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Drained Tall sedge fen            | 1991-1992           | 3                              | 61.8     | 709                              | -34.9 ± 15.9                | 4.5       |        | 8.768*³                       |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Tall sedge pine fen               | 1991-1992           | 3                              | 61.8     | 709                              | -20.6 ± 14.8                | 4.4       |        | 0.086*³                       |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Drained Tall-sedge pine fen       | 1991-1992           | 3                              | 61.8     | 709                              | -40.1 ± 15.3                | 4         |        | 28.86*³                       |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Lagg Fen                          | 1991-1992           | 1.9                            | 62.8     | 650                              | -4.8 ± 6.4                  | 4.5       |        | -0.064*³                      |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Drained Herb rich sedge Birches   | 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                | 1.793*³   |        | 10.575*³                      |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Herb rich flark Fen               | 1992                | 3                              | 61.8     | 709                              | -27.5 ± 13.7                | 0.653*³   |        | 28.05*³                       |                                         |                                         |                                          |                                          | ak     |          |
| Central Finland                   | Drained Herb rich flark Fen       | 1992                | 3                              | 61.8     | 709                              | -43.3 ± 10.7                | 0.014*³   |        | -0.178*³                      |                                         |                                         |                                          |                                          | ak     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, Ditches | 1999                | 3                              | 47.883   | 926                              | 407*³                        | 1.427*³   | 2.251*³ | -0.010*³                      |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, bare peat | 1999                | 3                              | 47.883   | 926                              | 280.5*³                     | -0.178*³  | 0.673*³ |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, mosses | 1999                | 3                              | 47.883   | 926                              | 180.4*³                     | -0.110*³  | 0.220*³  |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, herbacious | 1999                | 3                              | 47.883   | 926                              | 399*³                       | 0.014*³   | 0.165*³  |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, shrubs | 1999                | 3                              | 47.883   | 926                              | 164.7*³                     | 21.260*³  | 49.190*³ |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, Ditches | 2000                | 3                              | 47.883   | 926                              | 108.5*³                     | -0.096*³  | 0.316*³  |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, bare peat | 2000                | 3                              | 47.883   | 926                              | 411.8*³                     | -0.110*³  | 0.220*³  |                                         |                                         |                                         |                                          |                                          | al     |          |
| Bios-de-bell Peatland, Quebec    | Cutover peatland, abandoned 20 years prior to study, herbacious | 2000                | 3                              | 47.883   | 926                              | 95.8*³                      | 0.014*³   | 0.165*³  |                                         |                                         |                                         |                                          |                                          | al     |          |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻² yr⁻¹) | Other Carbon losses or gains (g-C m⁻² yr⁻¹) | Reference |
|----------------|------------------|---------------------|--------------------------------|----------|----------------------------------|-----------------------------|-----------|--------|---------------------------------|------------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|-----------|
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study, shrubs | 2000 | 3 | 47.883 | 926 | | | | 54.8*3 | 0.137*3 | 0.178 | | | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 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, abandoned 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, abandoned 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, abandoned 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, abandoned 20 years prior to study, shrubs | 2001 | 3 | 47.883 | 926 | | | | 13.4*3 | 0.014*3 | 0.261 | | | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 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, abandoned 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, abandoned 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, abandoned 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, abandoned 20 years prior to study (pre-restoration), shrubs | 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 |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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, shrubs | 2000 | 3 | 47.883 | 926 | 54.8*3 | - | - | 54.8*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 2 year post restoration, ditches | 2001 | 3 | 47.883 | 926 | 144*4 | - | - | 144*4 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 2 year post restoration, bare peat | 2001 | 3 | 47.883 | 926 | -67.2*3 | - | - | -67.2*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 2 year post restoration, mosses | 2001 | 3 | 47.883 | 926 | -48*3 | - | - | -48*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 2 year post restoration, herba- cious | 2001 | 3 | 47.883 | 926 | -13.4*3 | - | - | -13.4*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study, entire site | 1999 | 3 | 47.883 | 926 | -51.4*3 | - | - | -51.4*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study, entire site | 2000 | 3 | 47.883 | 926 | -46*3 | - | - | -46*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study, entire site | 2001 | 3 | 47.883 | 926 | -39.5*3 | - | - | -39.5*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study, entire site | 2002 | 3 | 47.883 | 926 | -43.8*3 | - | - | -43.8*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Cutover peatland, abandoned 20 years prior to study (pre-restoration), entire site | 1999 | 3 | 47.883 | 926 | -54.8*3 | - | - | -54.8*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 1 year post restoration, entire site | 2000 | 3 | 47.883 | 926 | -31.5*3 | - | - | -31.5*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 2 year post restoration, entire site | 2001 | 3 | 47.883 | 926 | -30.4*3 | - | - | -30.4*3 | - | - | - | - | al |
| Bios-de-bell Peatland, Quebec | Restored cutover peatland, 3 years post restoration, entire site | 2002 | 3 | 47.883 | 926 | -35.9*3 | - | - | -35.9*3 | - | - | - | - | al |
| Black Water, Ireland | Drained industrial harvested raised bog, bare peat, abandoned 1999 | 2011/ 2012 | 9.6 | 53.3 | 948 | -53 | 24.5 | 4.9 | 162*19.11 | 0*19.11 | - | - | - | am |
| Black Water, Ireland | Drained industrial harvested raised bog, bare peat, abandoned 2000 | 2012/ 2013 | 9.6 | 53.3 | 948 | -37 | 24.5 | 4.9 | 111*19.11 | 0*19.11 | - | - | - | am |
| 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⁻²yr⁻¹) | Annual CO₂ Emissions (g-C-CO₂ m⁻²yr⁻¹) | Annual N₂O emissions (g N₂O m⁻²yr⁻¹) | Annual methane emissions (g-C-CH₄ m⁻²yr⁻¹) | Other Carbon losses or gains (g-C m⁻²yr⁻¹) | Reference |
|----------------|-----------------------------------------------------------------------------------|---------------------|-------------------------------|----------|---------------------------------|----------------------------|-----------|--------|-------------------------------|------------------------------------------|-------------------------------------|------------------------------------------|------------------------------------------|-----------|
| Black Water, Ireland | Drained industrial harvested raised bog, bare peat, abandoned 2001                | 2013/2014           | 9.6                           | 53.3     | 948                             | -57                        | 24.5      | 4.9    | 185*                          | 0*                                        | 16*                                                | 0*                                                | -57                                      | am         |
| Black Water, Ireland | Drained industrial harvested raised bog, bare peat, abandoned 2002                | 2014/2015           | 9.6                           | 53.3     | 948                             | -47                        | 24.5      | 4.9    | 145*                          | 0*                                        | 16*                                                | 0*                                                | -47                                      | 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       | 16.9*                           | -106*                                   | 0                                                | 16.9                                                | -106*                                   | 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*                          | 17.2*                                    | 17.2*                                              | 17.2*                                               | -81*                                   | 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*                          | 17.7*                                    | 17.7*                                              | 17.7*                                               | 188*                                  | 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                             | -14                        | 24.5      | 4.9    | 127*                          | 17.2*                                    | 17.2*                                              | 17.2*                                               | 127*                                  | am         |
| Glenvar, Ireland | Drained grassland over organic soil                                               | 2011/2012           | 9.8                           | 53.2     | 1076                            | -22.7                     | 21        | 4.9    | 87*                           | 1.9*                                    | 1.9*                                               | 1.9*                                                | -22.7                                 | am         |
| Glenvar, Ireland | Drained grassland over organic soil                                               | 2012/2013           | 9.8                           | 53.2     | 1076                            | -24.8                     | 21        | 4.9    | 76*                           | 1.1*                                    | 1.1*                                               | 1.1*                                                | -24.8                                 | 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 organic soil, rewetted in 2000                            | 2011-2012           | 9.8                           | 53.2     | 1076                            | -7.3                      | 21        | 4.9    | 1*                            | 5.4*                                    | 5.4*                                               | 5.4*                                                | -7.3                                  | am         |
| Glenvar, Ireland | Rewetted grassland over organic soil, rewetted in 2000                            | 2012-2013           | 9.8                           | 53.2     | 1076                            | -10                      | 21        | 4.9    | -80*                          | 3.4*                                    | 3.4*                                               | 3.4*                                                | -10                                  | am         |
| Glenvar, Ireland | Rewetted grassland over organic soil, rewetted in 2000                            | 2013-2014           | 9.8                           | 53.2     | 1076                            | -14                      | 21        | 4.9    |                               |                                           |                                                    |                                              |                           | am         |
| Glenvar, Ireland | Rewetted grassland over organic soil, rewetted in 2000                            | 2014-2015           | 9.8                           | 53.2     | 1076                            | -14                      | 21        | 4.9    |                               |                                           |                                                    |                                              |                           | am         |
| 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 CO₂ Emissions (g-C-CO₂ m⁻² yr⁻¹) | Annual N₂O emissions (g N₂O m⁻² yr⁻¹) | Annual methane emissions (g-C-CH₄ 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                             | 1.5                        | 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                             | -14                        | 34.2      | 3.4    | -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        |
| Pollagooona rewetted, Ireland | Rewetted Forestry site on peat soil | 2014/ 2015          | 9.8                           | 53       | 845                              | -6.4                       | 24.5      | 3.5    | 102*9,11                         |                                      |                                    |                                          |                                      | 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 slightly different.
5 Data overlaps with Dinsmore et al. 2010
6 Data overlaps with Nilsson et al. 2008, but reported values are slightly different.
7 Data from collars where vegetation inside the collar was removed.
8 Water table values 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  Danevic, 2010
b  Flessa et al., (1998) (data taken from Danevic et al. 2010, table 2)
c  Von Arnold et al. 2005a
d  Von Arnold et al. 2005b (data taken from Danevic 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)
q  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)