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- Fig. S1: PAR correction for site $C_{med} W_{low}$, $C_{low} W_{low}$ and $C_{low} W_{high}$ at a distance of 50 metres from the tree line. Dashed line = 1:1 line, continuous line = correction function PAR = $\alpha^* PAR_{station}^{\beta}$.
- 5 6

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Fig. S2: Time series of water table levels at each site (June 1, 2011 to June 1, 2012).

Fig. S3: Reco flux model (A) and GPP flux model (B) of an exemplary measurement campaign (02 May
2012) showing measured data as dots and fits as lines.

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Fig. S4A: Plots of measured Reco fluxes vs. modeled Reco fluxes of all measurement campaignsseperated by site (1 June 2011 to 1 June 2012).

Fig. S4B: Plots of measured NEE fluxes vs. modeled NEE fluxes of all measurement campaignsseperated by site (1 June 2011 to 1 June 2012).

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Fig. S5: Example of a flux measurement where the non-linear fit severely overestimates the flux. N₂O concentrations were close to ambient and (by chance) the second to fourth concentration were almost identical and the first concentration was lower by 20 ppb (which is within typical measurement error). Robust linear fit equaled linear fit with flux = 13 μ g N m⁻² h⁻¹, p = 0.2, AIC=-24. Shaded area depicts confidence band of the linear fit. HMR fit resulted in flux = 96 μ g N m⁻² h⁻¹, p = 21 2E-5, AIC=-59. Since the HMR flux estimate is more than four times the robust linear flux estimate, we used the latter.

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Fig. S6: Annual time lines of CH_4 (A) and N_2O (B) (mean ± standard error of the replicates; June 1, 2011 to June 1, 2012).

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     Table S1: Linear mixed-effects model of R<sub>eco</sub> vs. Water table.
31
      Linear mixed-effects model fit by REML
32
33
       Data: Dat
34
35
        AIC BIC logLik
475.256 496.8599 -229.628
36
37
     Random effects:
38
       Formula: ~WTpeat | site
39
       Structure: General positive-definite, Log-Cholesky parametrization
40
                    StdDev
                               Corr
41
      (Intercept) 2.256385 (Intr)
42
     WTpeatTRUE
                    2.409026 -0.896
43
     Residual
                    1.748395
44
45
46
     Fixed effects: Reco ~ WT * WTpeat
                             Value Std.Error DF t-value
807262 1.705472 105 -0.180163
878873 3.385580 105 -5.428574
119596 1.826929 105 0.612829
                                                        t-value p-value
                        -0.307262
47
      (Intercept)
                                                                   0.8574
48
     WΤ
                       -18.378873
                                                                   0.0000
                         1.119596
49
      WTpeatTRUE
                                                                   0.5413
50
                         2.969354
                                     4.246360 105 0.699270
      WT:WTpeatTRUE
                                                                  0.4859
51
52
       Correlation:
                       (Intr) WT
                                        WTTRUE
53
54
                        0.787
     WΤ
                       -0.922 -0.733
     WTpeatTRUE
55
     WT:WTpeatTRUE -0.628 -0.796
                                        0.752
56
57
58
      Standardized Within-Group Residuals:
                Min
                                  01
                                                Med
                                                                  Q3
                                                                                 Мах
59
      -2.571112023 -0.514414249 -0.005306694
                                                       0.612438896
                                                                       2.697319770
60
     Number of Observations: 114
61
     Number of Groups: 6
62
63
```

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70 Fig. S2



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C_{low} W₂₉ Calibration Data

Fig. S4B









Fig. S6A



