

Supplementary material

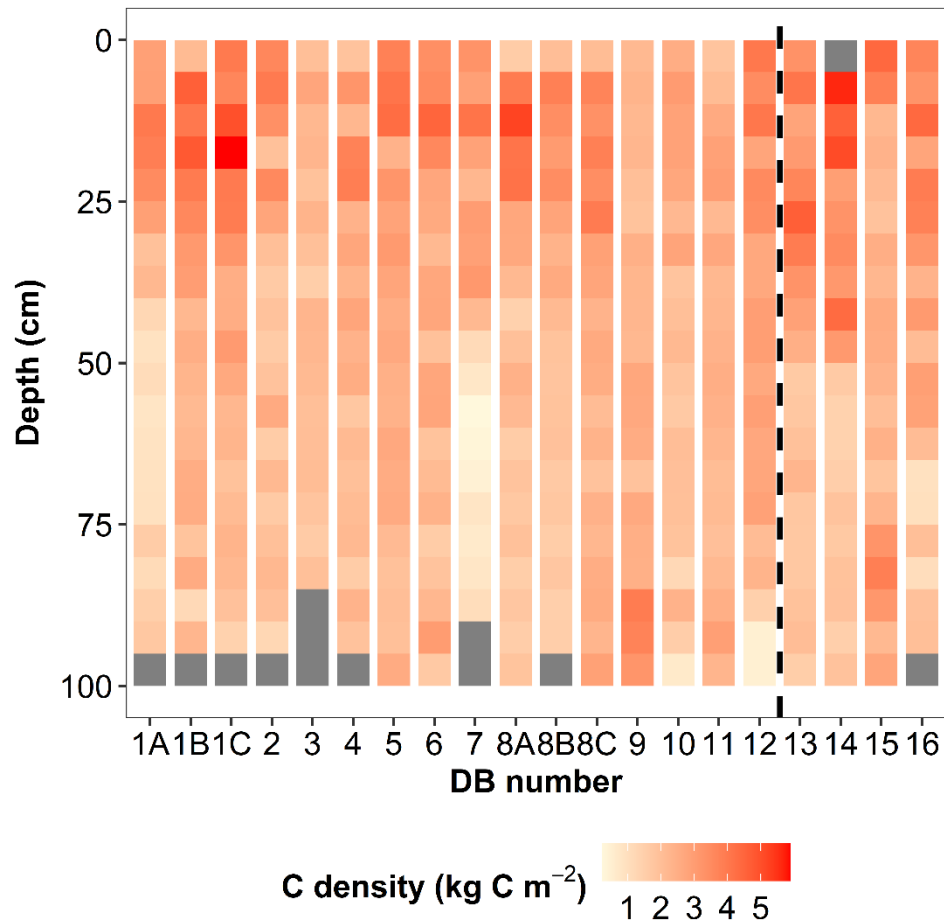


Figure S1: Carbon densities (C density; kg C m⁻²) at 5 cm depth intervals. The regenerative DBs (16) were located on the left side of the dashed line and the conventional DBs (4) were located on the right side. Grey indicated missing data in these depth intervals.

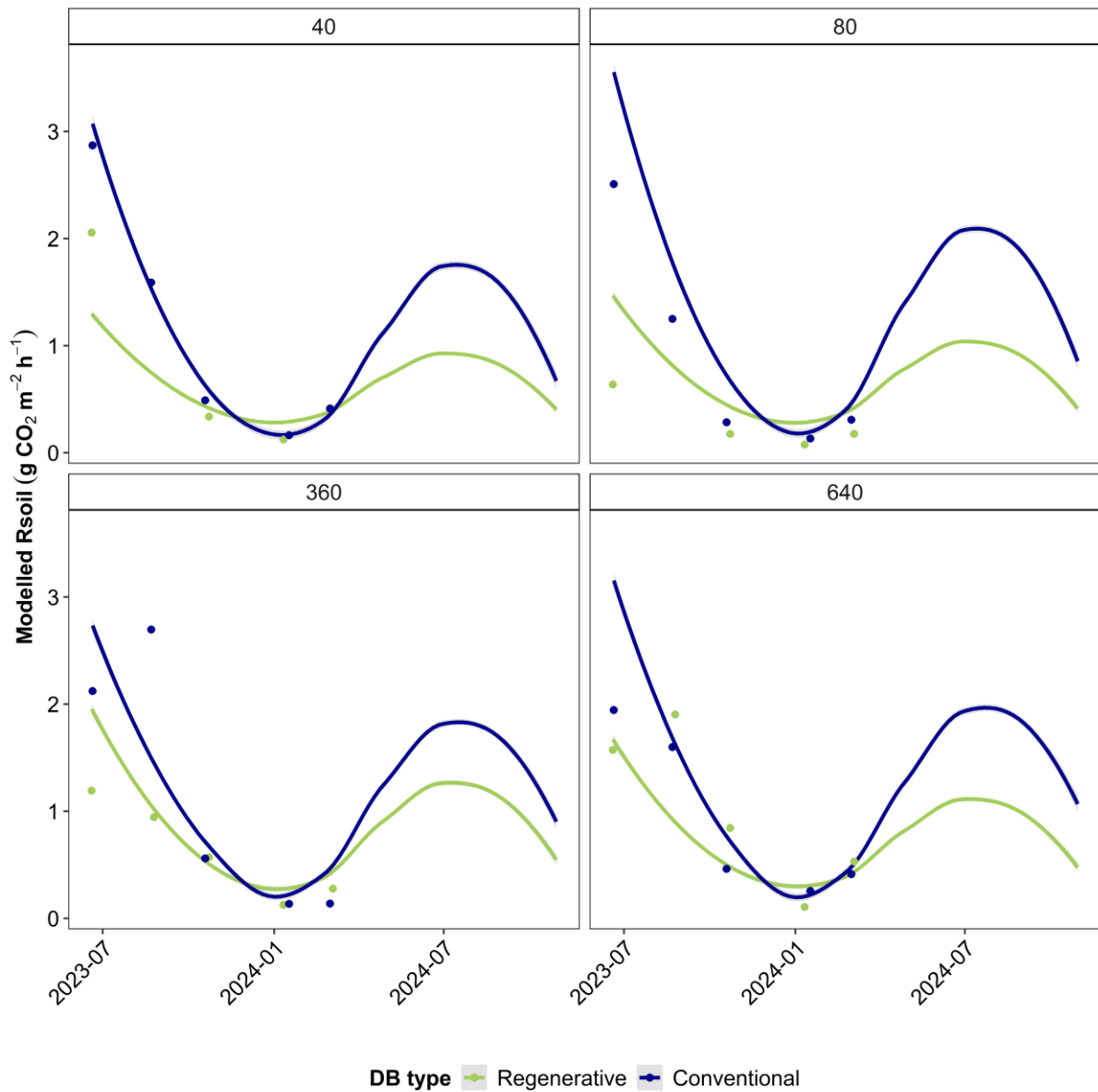


Figure S2: Example of modelled soil respiration (R_{soil} ; g CO_2 m^{-2} h^{-1}) with interpolation vs. measured R_{soil} of DB 3 (regenerative) and DB 14 (conventional) at the four distances to the water's edge (40 cm, 80 cm, 360 cm and 640 cm). The points represent the observed field data and the fitted lines represent the modelled soil respiration computed from the annual interpolated datasets of soil temperature, soil moisture content and exposed carbon using the model estimates from model 3.

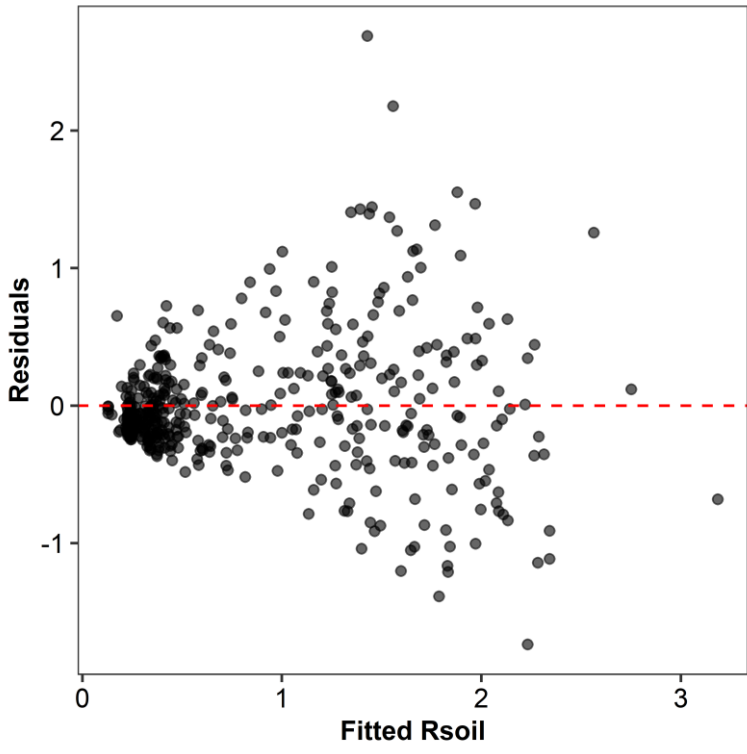


Figure S3: Model fit evaluation of soil respiration model 3 representing the fitted values vs. the residuals. Red dashed line represents 0.

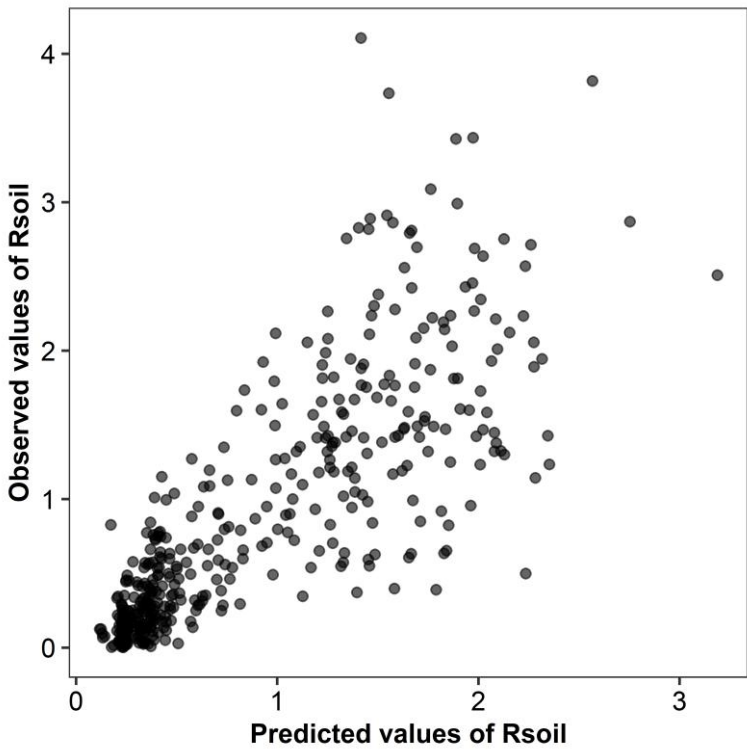


Figure S4: Model fit evaluation of soil respiration model 3 representing the observed values vs. the prediction values

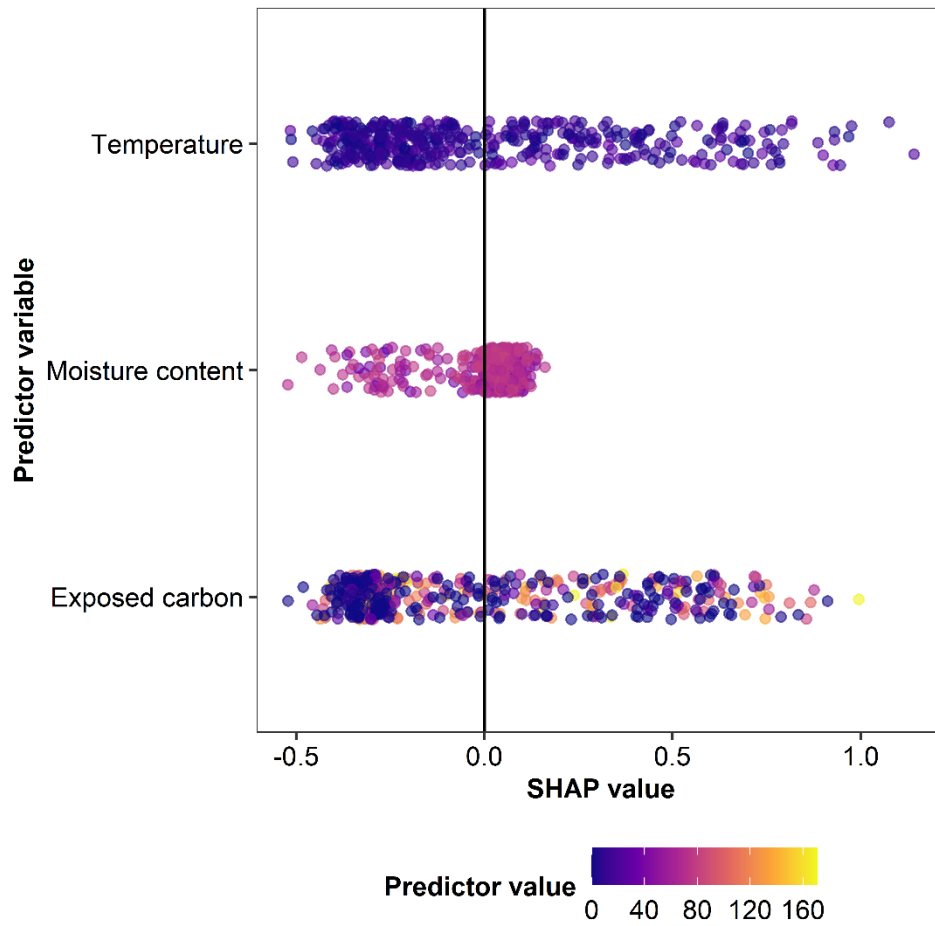


Figure S5: Summary plot of the computed SHAP values. Each jittered point indicates a SHAP value for one of the three predictor variables (soil temperature, moisture content and exposed carbon) for a given predictor value (color gradient).

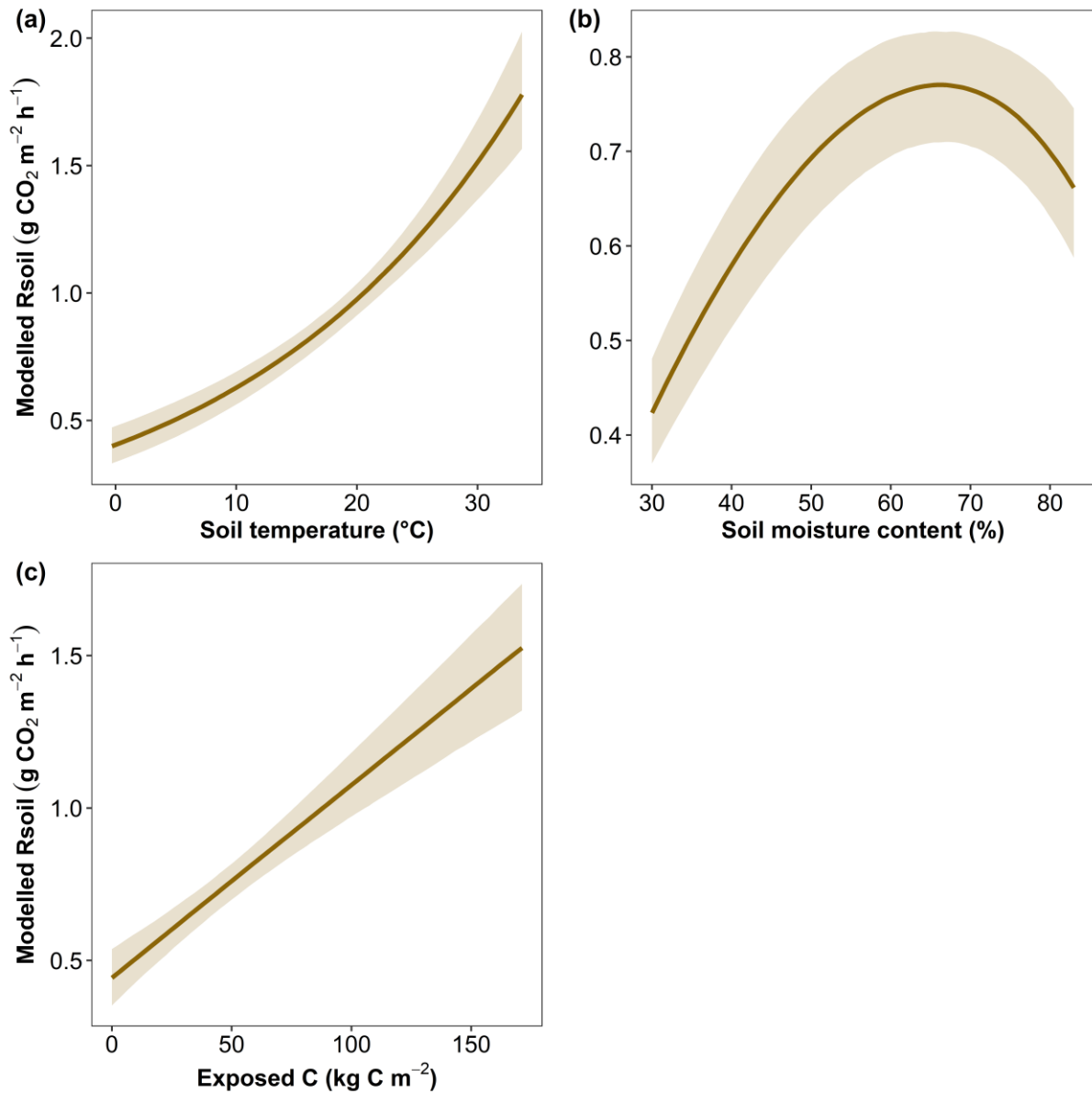


Figure S6: The modelled relations between soil respiration (R_{soil} ; $g\ CO_2\ m^{-2}\ h^{-1}$) and (a) soil temperature ($^{\circ}C$), (b) soil moisture content (%) and, (c) exposed carbon ($kg\ C\ m^{-2}$) based on model 3 ($h = 5.2e-4 \pm 1.2e-4$; $i = 7.7e-6 \pm 2.7e-6$; $j = 4.4e-2 \pm 0.41e-2$; and $k = 0.6 \pm 0.071$). The fitted lines represent the fitted functions with soil respiration based on the observed field data. The shaded area around the lines represent the confidence intervals (0.95 SE).

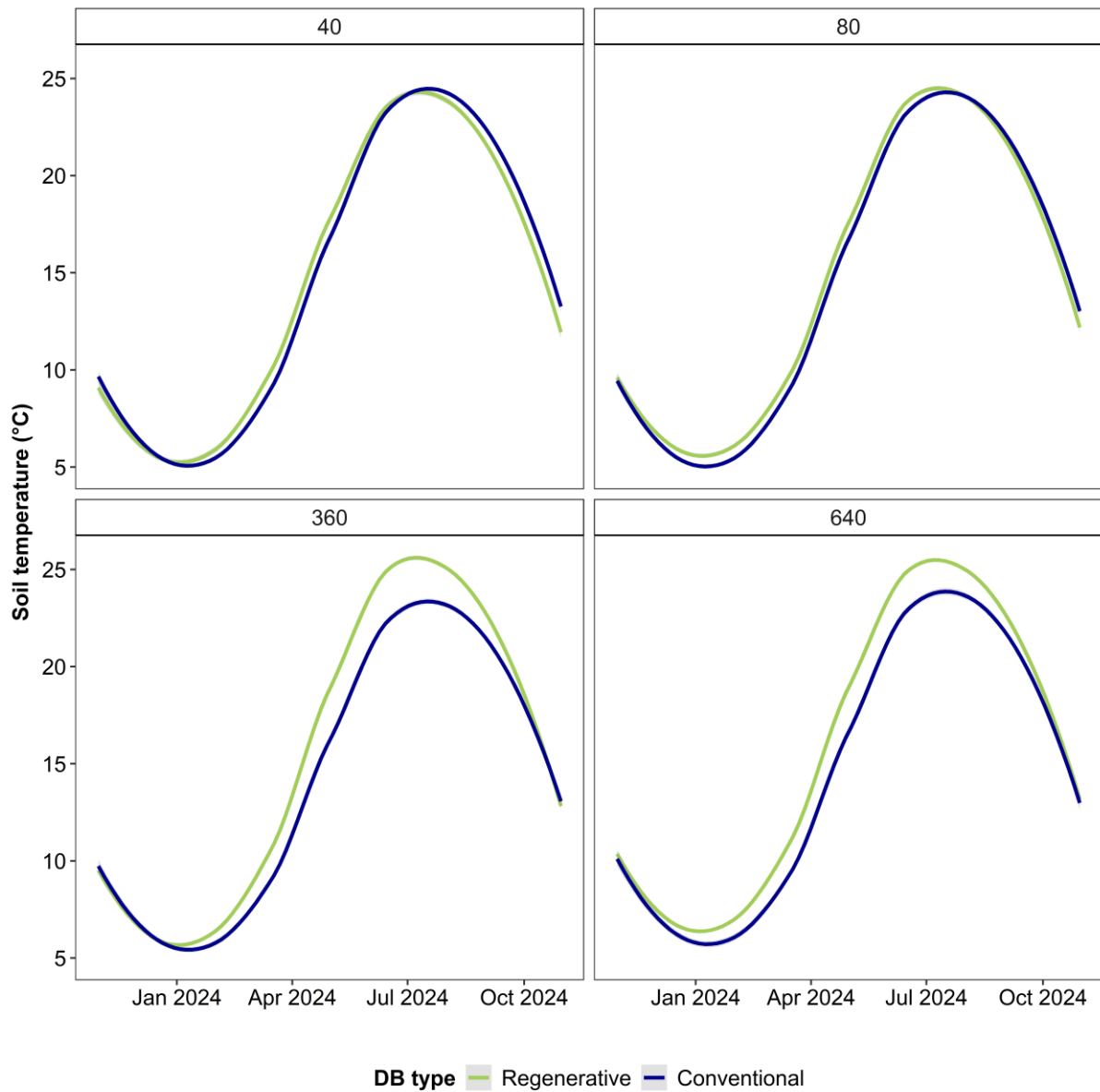


Figure S7: Interpolated soil temperature ($^{\circ}\text{C}$) over a year period for the mean effect of regenerative and conventional DBs at the four distances to the water's edge (40 cm, 80 cm, 360 cm and 640 cm). The fitted lines represent the overall interpolated soil temperature for each DB type (loess smoothed conditional means, span = 0.75); the grey area around the lines represents the confidence interval around the smooth (0.95, SE).

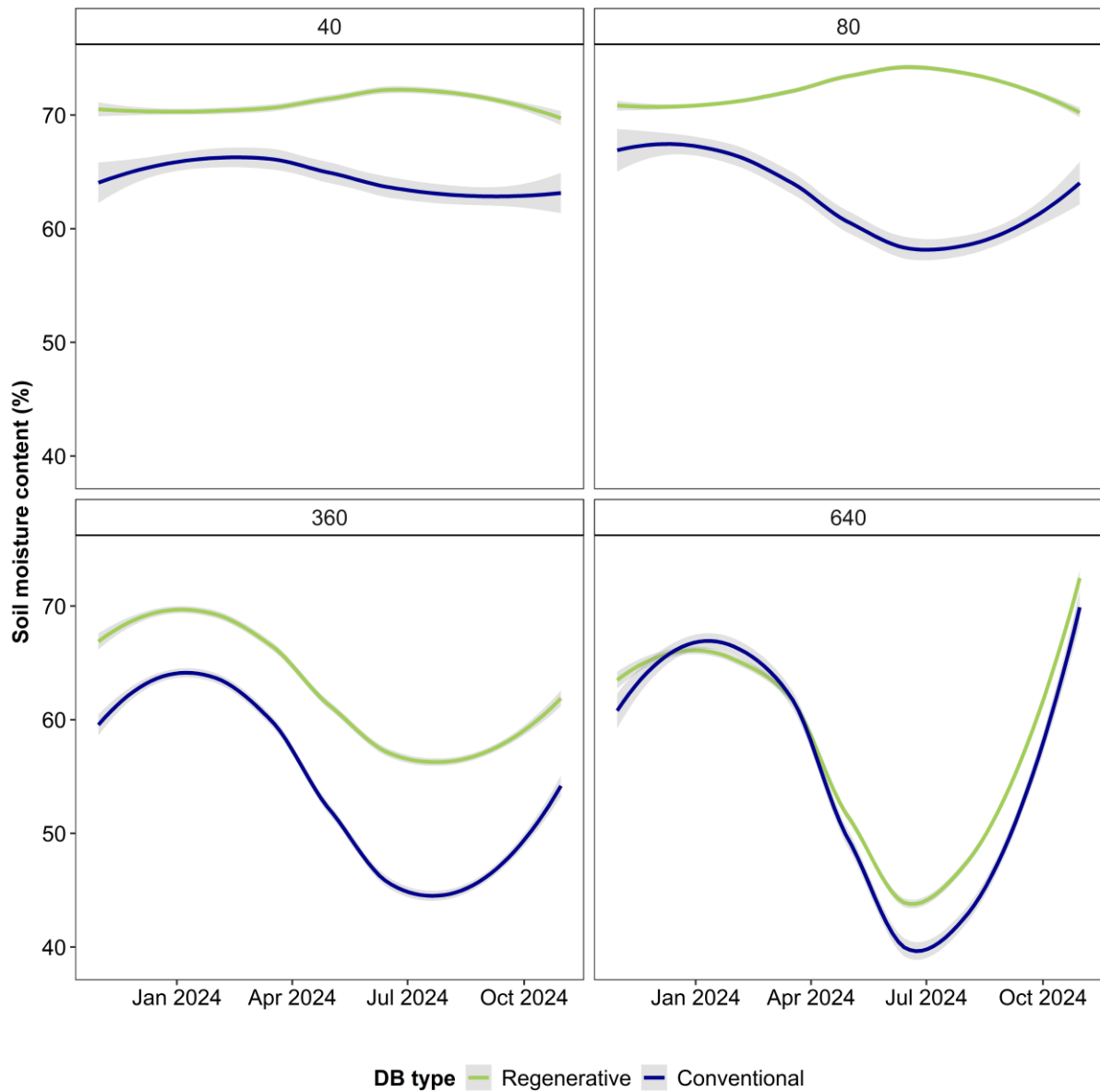


Figure S8: Interpolated soil moisture content (%) over a year period for the mean effect of regenerative and conventional DBs at the four distances to the water's edge (40 cm, 80 cm, 360 cm and 640 cm). The fitted lines represent the overall interpolated soil moisture content for each DB type (loess smoothed conditional means, span = 0.75); the grey area around the lines represents the confidence interval around the smooth (0.95, SE).

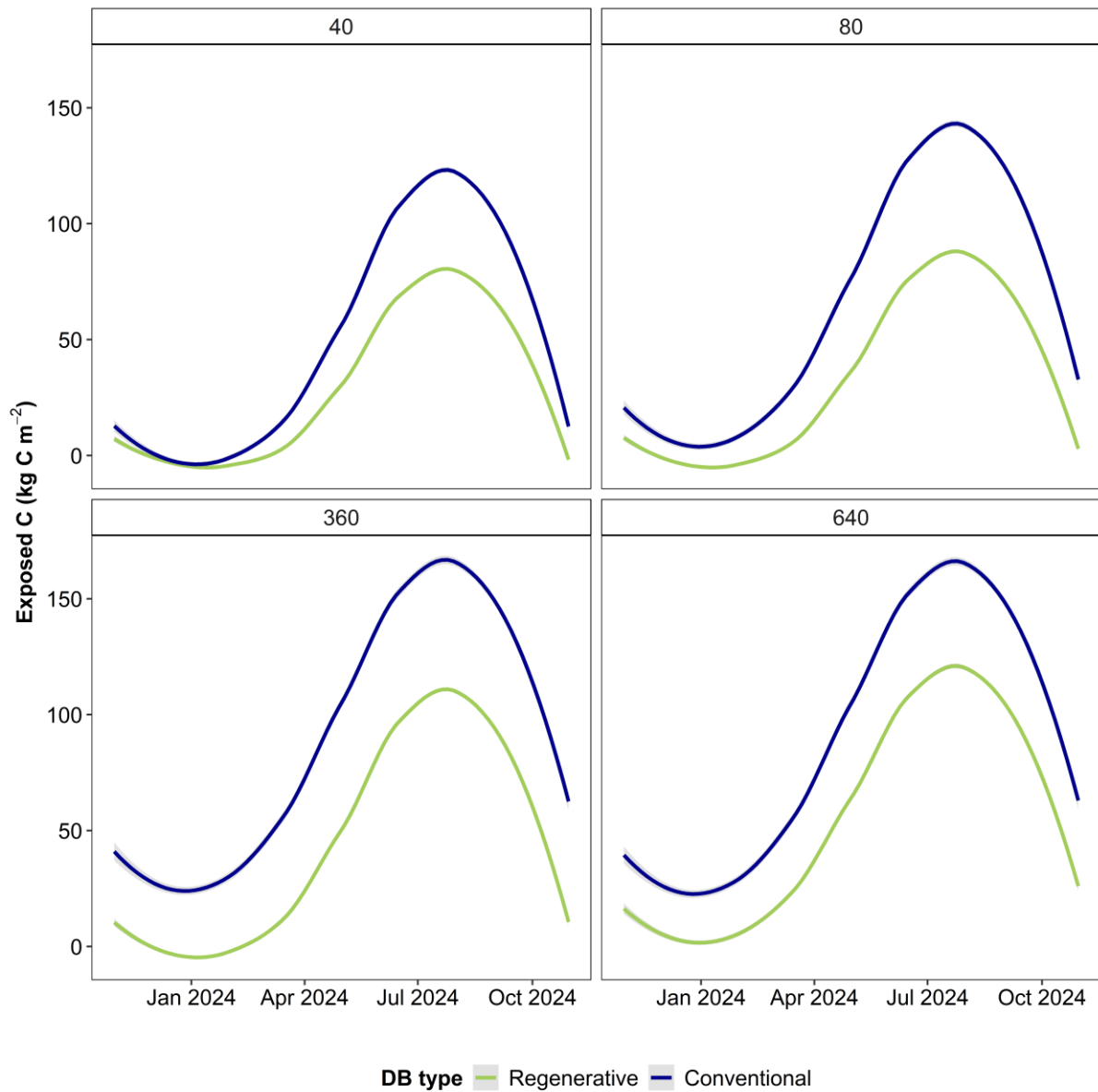


Figure S9: Interpolated exposed carbon (kg C m^{-2}) over a year period for the mean effect of regenerative and conventional DBs at the four distances to the water's edge (40 cm, 80 cm, 360 cm and 640 cm). The fitted lines represent the overall interpolated exposed carbon for each DB type (loess smoothed conditional means, span = 0.75); the grey area around the lines represents the confidence interval around the smooth (0.95, SE).

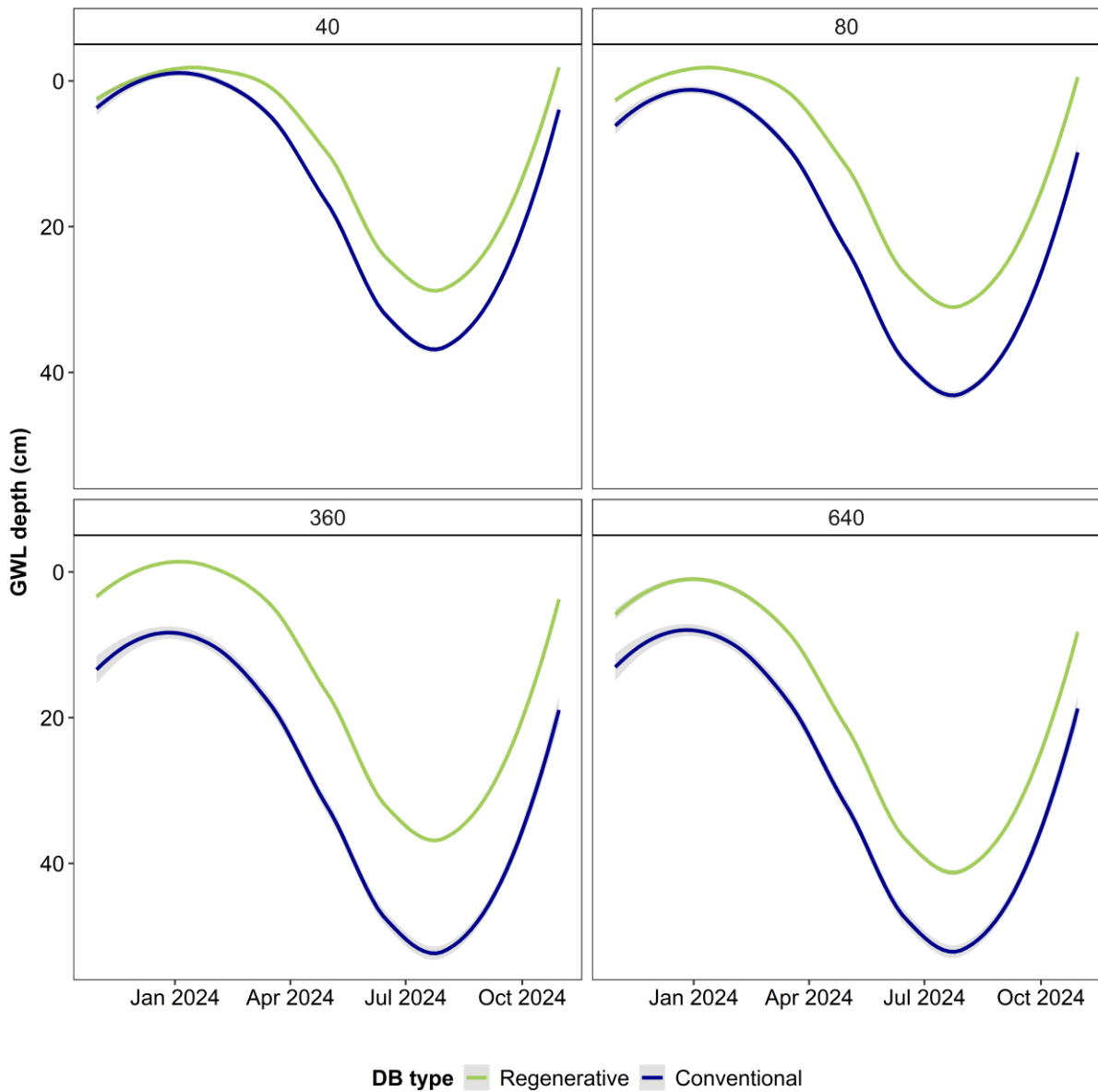


Figure S10: Interpolated groundwater level (GWL) depth (cm) over a year period for the mean effect of regenerative and conventional DBs at the four distances to the water's edge (40 cm, 80 cm, 360 cm and 640 cm). The fitted lines represent the overall interpolated groundwater level depth for each DB type (loess smoothed conditional means, span = 0.75); the grey area around the lines represents the confidence interval around the smooth (0.95, SE).