



## Peatland respiration

Proper monitoring of ecosystem respiration ( $R_{ECO}$ ) is costly and labour intensive. Water table height is the single predictor that has shown the strongest relationship with peatland  $CO_2$  respiration, as it represents the proportion of the aerated layer susceptible to decomposition. Here we explore this relationship for Icelandic peatlands, using data collected from 80 monitoring points distributed between 18 different sites around the country (Figure 1).

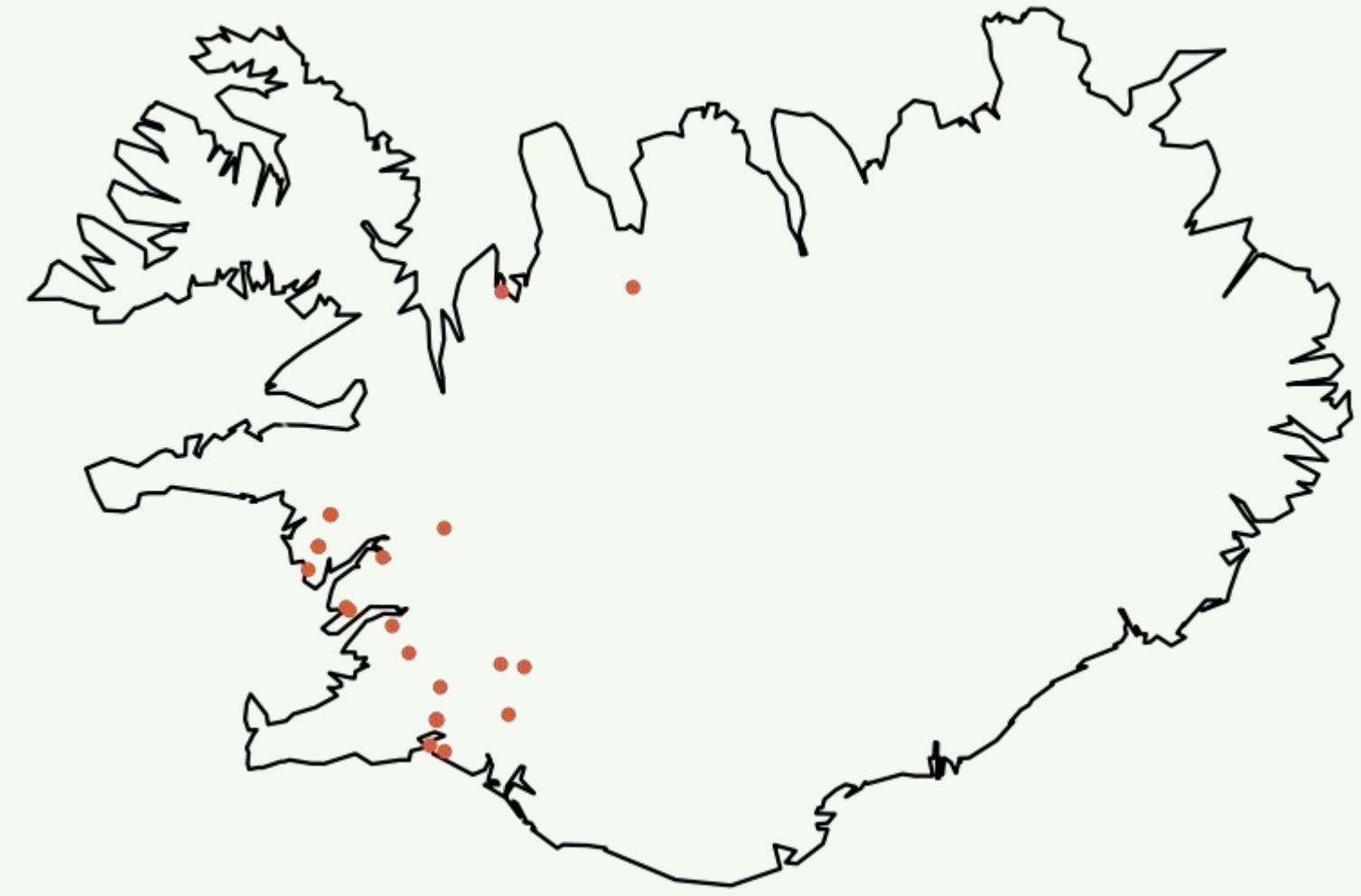


Figure 1. Peatland monitoring sites are primarily located in SW Iceland, but future plans include increasing coverage of other parts of the country.



Figure 2. Monitoring site in undisturbed *Carex lyngbyei* fen, SW Iceland. Each has a dipwell for water table observations and three collars on which a portable soil fluxmeter may be placed.  $R_{ECO}$  is measured by covering the chamber with a light-blocking material in order to exclude primary production.

## Peatland monitoring

The first peatland monitoring project was set up to assess restoration success and lasted from 2018-2021, but since 2022 new sites have been established with the incentive to gather data on greenhouse gas emissions (Figure 2). Measurements take place every 1-4 weeks, with more frequent visits during the growing season. Monitoring points are of various states ranging from intact to severely degraded, with some having been rewetted.

$$\text{Water table } \downarrow = R_{ECO} \uparrow$$

Days with ground frost were eliminated from the analysis as frost influences the height of the water table, resulting in the period from June 1<sup>st</sup> to September 30<sup>th</sup> being used. Daily values of  $CO_2$  respiration and water table height were derived by linear interpolation, and one mean calculated for each monitoring point per growing season. When plotted linearly, the relationship between variables is significant ( $p < 0.001$ ) (Figure 3). The strength of the fit ( $R^2 = 0.33$ ) may hopefully be improved with a growing dataset and exploration of non-linear relationships.

### $R_{ECO}$ increases as water table declines

(June 1<sup>st</sup> to September 30<sup>th</sup> 2018-2023)

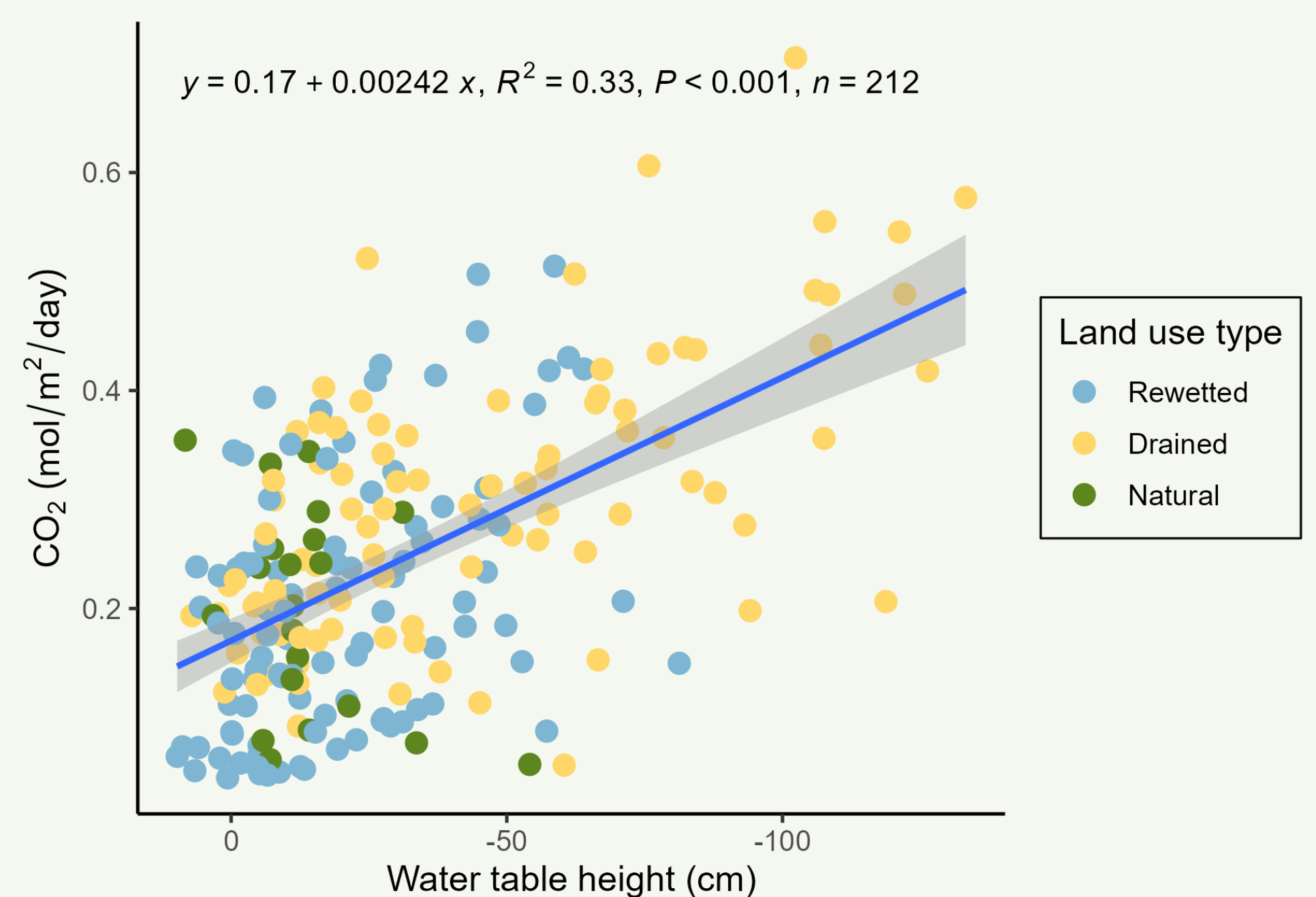
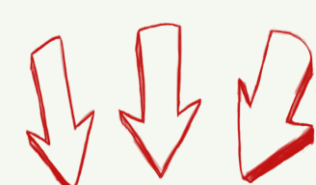


Figure 3. Preliminary results of the linear relationship between water table height and  $CO_2$  respiration over the growing season from monitoring of Icelandic peatlands between 2018-2023. Different land use types are shown in different colours.



$$\text{Net ecosystem respiration (NEE)} = \text{ecosystem respiration (R}_{ECO}) - \text{gross primary production (GPP)}$$

