



**Supplementary Figure 1 (S1). There is significant variation in metabolic pathways in only forest soil samples at high C:N. Log2 fold change in the regulation of metabolic pathways in (A) forest soil and (B) wetland soil when comparing High vs Low C:N ratio ranges. The Low C:N ratio group serves as the reference in both panels, with positive or negative log2 fold changes indicating upregulation or downregulation in the High C:N range relative to the Low C:N range. Functional abundances were predicted using PICRUSt2 and analyzed using DESeq2, with significantly differentially abundant pathways filtered according to  $p < 0.05$  and  $\log_2\text{FoldChange} \pm 1$ .**