



The impact of peatland drain-blocking on dissolved organic carbon loss: results from a national survey

Alona Armstrong (1), Joseph Holden (2), Paul Kay (2), Brian Francis (3), Miles Foulger (4), Sarah Gledhill (4), Adrian McDonald (2), and Andrew Walker (4)

(1) Lancaster University, Lancaster Environment Centre, Lancaster, United Kingdom (alona.armstrong@lancaster.ac.uk), (2) School of Geography, University of Leeds, Leeds, LS2 9JT, UK, (3) Department of Mathematics and Statistics, Lancaster University, Lancaster, LA1 4YF, UK, (4) Yorkshire Water Services, Halifax Road, Bradford, BD6 2LZ, UK

Peatlands are important terrestrial carbon stores and consequently it is necessary to ensure they are well managed. Many peatlands were drained using open ditches and this has been associated with an increase in dissolved organic carbon concentrations. Therefore, recent peatland restoration schemes include blocking these open drains using a variety of methods. Previous studies examining the impact of drain-blocking on dissolved organic carbon concentration are limited in their spatial and temporal coverage. Consequently, it is uncertain if drain-blocking consistently reduces dissolved organic carbon concentrations and the longer term impacts are unknown. This study combines an extensive UK-wide survey across 32 study sites and intensive monitoring of six drains, three of which were unblocked and three of which were blocked seven years prior to data collection. The UK-wide survey indicated that dissolved organic carbon concentrations were significantly lower in blocked drains: the mean dissolved organic carbon concentration of water sampled from blocked drains was 28% less than that sampled from unblocked drains. However, this pattern was not evident at all sites. Quasi-continuous monitoring of an unblocked and blocked drain at the intensive monitoring site indicated no significant differences in total dissolved organic carbon flux: the blocked drain exported 31,592 kg km⁻² yr⁻¹ and the unblocked drain 30,123 kg km⁻² yr⁻¹. Fort-nightly grab samples from three blocked and three unblocked drains at the intensively monitored site, however, did conform to the general national pattern of lower dissolved organic carbon in blocked drains. These results demonstrate that drain-blocking can be an effective management strategy for reducing DOC loss in disturbed peat catchments. The caveat remains, however, that there will be a number of sites where no significant change will occur.