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Determining the effect of peatland drainage and restoration on the rate of microbial activity in an upland blanket peat.

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Blanket peat is an important terrestrial carbon store. However, heightened levels of degradation in response to environmental change have resulted in an increased loss of dissolved organic carbon (DOC) and an associated rise in the level of discolouration in catchment waters. A significant threat to peatland sustainability has been the installation of artificial drainage ditches. Although recent restoration schemes have pursued drain blocking as a possible strategy for reducing degradation, fluvial carbon loss and water discolouration, little is known about the influence of drainage and drain blocking on the biological processes operating within these soils. This paper investigates the effect of open cut drainage and drain blocking on microbial activity within an upland blanket peat, and attempts to determine whether the observed increases in DOC released from a drained peat are the result of enhanced DOC production via the stimulation of the micro-organisms responsible for the decomposition of organic material. Peat soil samples were extracted at varying depths from three treatments (intact peat, drained peat, and drain-blocked peat) in an upland catchment in the UK. Microbial activity was measured via laboratory experimentation that incorporated the use dehydrogenase enzyme assays to assess the level of electron transport system (ETS) activity occurring within each treatment. The assessment of ETS activity is an established method of measuring microbial activity in soils and aquatic environments, which involves the reduction of yellow tetrazolium salts, such as INT [2-(*p*-iodophenyl)-3-(*p*-nitrophenyl)-5-phenyl tetrazolium chloride], to red formazan products that can be detected spectrophotometrically. The results from the INT-assays will be presented to show whether the increased release of DOC from an artificially drained blanket peat

is a result of an increased rate of ETS (microbial) activity and therefore DOC production. Furthermore, the findings will indicate whether drain blocking is successful in restoring the levels of such activity/productivity to those of a pre-drainage state.