



The hydrology of natural and artificial bog pools

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Twelve bog pools were monitored over a 3.5-year period (2012-2015) in the Cross Lochs blanket peatland in the Flow Country of northern Scotland. Six pools were located in a natural pool complex while the other six were in an adjacent area where the peat had been ditched in the 1970s. The ditches had been subsequently dammed with peat in 2002 resulting in dozens of artificial pools along each ditch, with one pool upslope of each dam. The natural pools ranged in area from 15 m² to 850 m², while the artificial pools are a more uniform size at c.3 – 4 m². Following a dry first summer, water levels in the 12 pools were lower throughout the subsequent winter and spring than they were in proceeding years showing strong inter-annual variability in pool levels even for winter months. Over the three year study, water level fluctuations in the natural pools were very different to those in the artificial pools. The natural pools showed subdued responses to rainfall and, after rainfall, slow falls in water level dominated by evaporation; the hydraulic conductivity of the peat was very low at depths of 30 and 50 cm below the peat surface around the pools (median values of 2.49×10^{-5} and 1.09×10^{-5} cm s⁻¹ respectively). The artificial pools had much larger monthly interquartile ranges of water levels and a greater rise and fall of pool water level in response to each individual rainfall event compared with the natural pools. Thus the biogeochemistry and carbon cycling processes that occur within the natural pools is not likely to be replicated in the artificial pools as their hydrological behaviour is quite different. Slope position was a factor in terms of hydrological response of pools with those further downslope having higher relative water levels for longer periods of time compared to upslope pools. Thus we anticipate that local biogeochemical processes in and around bog pools may be impacted by slope position and by whether they are natural pools or artificial pools created through ditch blocking.