Case study

Biodiversity of natural and artificial peatland pools

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Background

Peatlands cover ~17% of the UK land surface, much of which is located in the upland headwaters of river catchments. Historically many of these systems have been managed heavily for grazing livestock and game birds, in particular through the creation of artificial drainage channel networks (aka grips). Much research has been undertaken into peatland soils and vegetation, and the hydrological and biogeochemical properties of water bodies in intact and managed peatland. However freshwater ecosystems have been relatively understudied, perhaps because they are viewed as depauperate owing to harsh habitats with predominantly acidic conditions. However, recent drain-blocking initiatives to rewet damaged peatlands have created thousands of new pools, thus providing an impetus to understand better how aquatic ecosystems are structured and function in both intact and restored peatlands.

Approach

We sampled 20 natural and 20 artificially created peatland pools (4-12 years old) during Sept. 2011, March 2012 and June 2012 at sites throughout the north of England (in Teesdale, Geltsdale and the Peak District) to compare the biodiversity of these different habitats.


Naturally formed peatland bog pool


Aerial view of restored peatland showing blocked drains

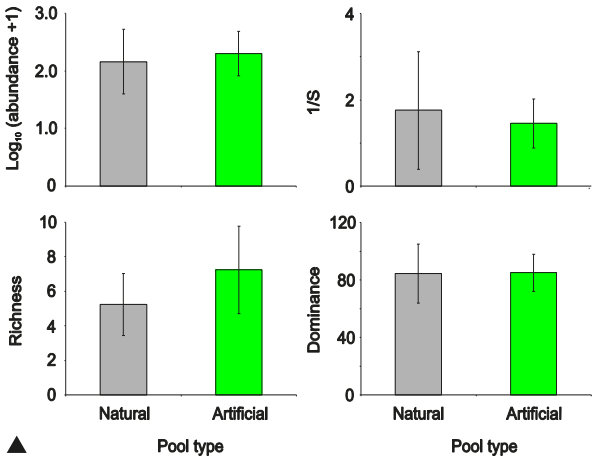

Blocked drain pools

Ten of the artificial pools were steep sided and deep, and the other ten were wider and shallower, to provide an insight into whether pool morphology influenced aquatic biodiversity.

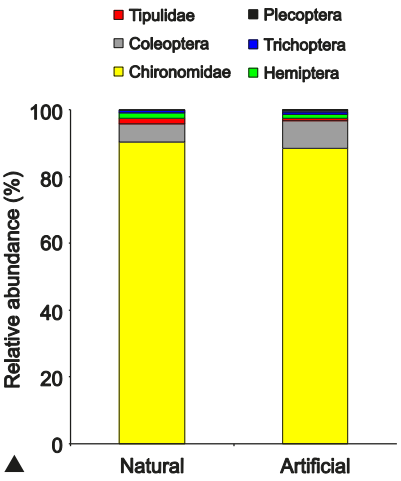
We measured pool environmental variables including pH, EC, water temperature, DO2, DOC and various nutrients/major ions.

Macroinvertebrates were sampled from pools using a 250µm mesh net, then later identified in the laboratory to genus/species for most taxa.

Findings



Sixty-four relatively common macroinvertebrate taxa were identified but community structure in natural peat bog pools was similar to blocked drains despite differences in morphology. Taxonomic richness was significantly higher in artificial pools.



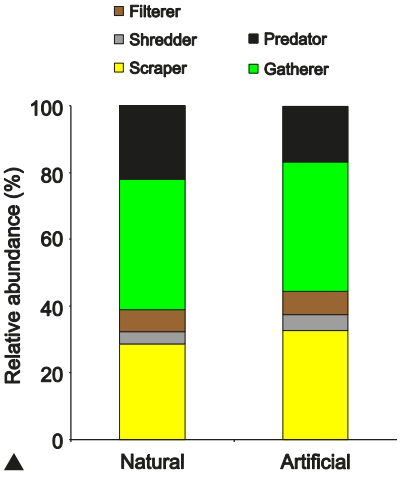
Pools were dominated numerically by Chironomidae larvae (non-biting midges; up to 90% of individuals). Coleoptera (beetles) were the second most abundant group.

Summary

Drain blocking is providing a large number of new standing freshwater habitats that are being colonised readily by a diverse assemblage of aquatic organisms, though pool morphology did not seem to have any obvious effect on aquatic invertebrate biodiversity.

Although we did not find any rare or threatened invertebrates in the pools we surveyed, drain blocking can still be considered beneficial for upland biodiversity because the large scale creation of new habitat will be underpinning increased population sizes which should improve resistance/ resilience of upland biota to future disturbances and environmental change.

In addition to preventing erosion, rewetting peat and increasing C sequestration, these findings highlight a further positive effect of peat restoration for upland ecosystems. However, where complete infilling of drains rather than pool creation is being considered the aquatic biodiversity benefit would not be realised.



Functional feeding group composition was similar between natural and artificial pools, with detritivorous gatherers dominating the communities.

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