

LIFE Active Blanket Bog in Wales

Summary of Research and Monitoring

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Objectives:

The LIFE ABBW project is restoring blanket bog across the Lake Vyrnwy catchment (within the Berwyn & South Clwyd SAC) primarily through blocking over 100km of drainage ditches. Research was carried out by both the LIFE project itself, and a NERC UKPopNet consortium of universities. The latter focussed on modelling gaseous exchange from peatlands.

Research carried out by the LIFE project was aimed at addressing the following main questions:

- Does blanket bog vegetation show signs of recovery after drain blocking?
- Does hydrology of the site move towards a more 'natural' system after restoration?
- What impact does restoration work have on livestock welfare and productivity?
- Can drain blocking have impacts on ecosystem services such as: flood risk mitigation, soil erosion, fluvial carbon fluxes, and water quality improvements?

Field methods:

Drain blocking is being carried out sequentially across 5 sub-catchments, one catchment being restored during each winter period from 2006/2007 to the current season. This provides both longitudinal before/after data within each catchment, and experiment/control data across catchments.

Vegetation & sheep surveys were carried out in 2007, 2008 and 2010; covering 1500 quadrats over 5 catchments. Data included full species composition and cover, several measures of vegetation height, peat depth and sheep occurrence.

Hydrology surveys began in November 2007 and continue. Data collection covers four catchments and includes: water table depth, surface water occurrence, basic water chemistry, water colour (absorbance) and calibrated DOC and POC. Also high temporal resolution flow rates from streams and drains.

Sheep welfare issues were addressed by surveying for stock entrapment in unblocked and blocked drains, carrying out tick abundance surveys (20 transects surveyed twice annually for 4 years), and freshwater snail surveys (sheep fluke hosts, 13 pools in two catchments surveyed once).

Key results:

- Drainage had exerted a negative influence on blanket bog vegetation, extending up to 15m from drains. This impact was reversed by drain blocking, with wet tolerant species, including *Sphagnum*s, increasing, and dry tolerant species declining.
- Drain blocking led to slightly higher, and much more stable water tables within about 5m of drains, and a much greater importance of overland flow over the wider area. This, along with pooling in blocked drains appears to have led to a greater retention and slower release of rainwater from the system.
 - Peak flow events are less severe in both drains and streams.



- Water tables are more resistant to periods without rainfall. This leads to more stable discharge in both drains and streams.
- Hydrological changes have led to declines in water colour, and declines in the production and transport of both dissolved and particulate organic carbon. DOC production also shifts towards younger, less humified substances, reflecting the shallower acrotelm. This trend is apparent overall, and during key periods such as during post-drought re-wetting. Preliminary estimates of fluvial organic carbon fluxes show considerable declines in response to blocking.
- Sheep were found to generally avoid drained areas, which also did not appear to offer improved grazing. Drain blocking appears to have increased sheep access into these areas, possibly by providing more drain crossing points. Drain blocking appears to have reduced tick abundance around drains, and has also led to fewer stock losses through entrapment.

Implications:

Restoration at Vyrnwy seems to be improving vegetation condition, and restoring a more 'natural' hydrology. It demonstrates that such projects can deliver improved water quality and reductions in down-stream flood risks. We have observed a considerable reduction in fluvial organic carbon losses from the system, and a marked change in vegetation composition. Both of these will have implications on the effect of restoration on the overall carbon balance of the system. We have also attempted to address all the major concerns raised by hill farmers in the area, and made a considerable first step towards demonstrating that drain blocking is at least neutral, and potentially beneficial to sheep welfare and productivity.



Drain blocking at Lake Vyrnwy using heather bale and peat dams



Removal of self-seeded Sitka spruce at Lake Vyrnwy

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Links:

Project website: www.blanketbogswales.org.uk
UKPopNet website: www.ukpopnet.org

Wilson L., Wilson J., Holden J., Johnstone I., Armstrong A. & Morris M. (2010). Recovery of water tables in Welsh blanket bog after drain-blocking: Discharge rates, time scales and the influence of local conditions. *Journal of Hydrology*, 391, 377-386.

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Wilson L., Wilson J., Holden J., Armstrong A., Johnstone I. & Morris M. (Submitted). The impact of drain blocking on an upland blanket bog during storm and drought events, and the importance of sampling-scale.

Wilson L., Wilson J. & Johnstone I. (In prep.) Restoration of drained blanket bogs by drain blocking: evidence of rapid vegetation recovery.

Wilson L., Wilson J. & Johnstone I. (In prep.) Addressing stakeholder concerns over peatland restoration: a case study of the impacts of drain blocking on hill farmed livestock in Wales.

