Restoring Damaged Blanket Bog

Long-term monitoring of the effects of restoration on hydrology and vegetation at three sites in England

S. Ross, G. Hammond, A. Keen, P. Anderson, P. Worrall

Penny Anderson Associates Ltd.

Funded by United Utilities

Introduction

- PAA was commissioned by United Utilities to monitor blanket bog restoration at sites across England under the Sustainable Catchment Management Programme (SCaMP).
- Restoration aimed to restore and/or improve the hydrological functioning and vegetation community types on the sites.
- The projects began in 2006/07 and continues today.
- Presentation aims to provide an overview of key results up to 2013/14.

Penny Anderson Associates Ltd
Consultant Ecologists

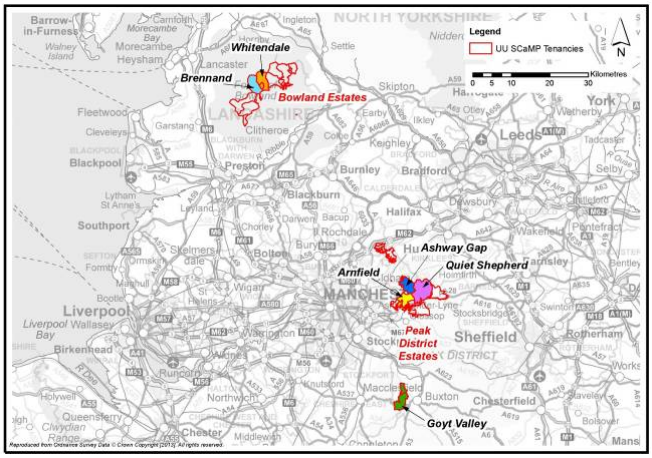
Sustainable Catchment Management Programme (SCaMP)

- SCaMP is an innovative and large scale project designed to:
  - Improve catchment quality
  - Meet nature conservation objectives
  - Improve raw water quality
  - Ensure a sustainable future for agricultural tenants
- Key aims are:
  - To restore habitats towards target condition
  - To improve water quality, particularly colour
  - To reduce run-off rates, sediment load and downstream flooding
  - To improve carbon retention and reduce carbon loss

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

Sites Assessed



Peak District:
- Goyt Valley
- Longdendale

Bowland
- Brennand

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

Prior to Restoration




- Areas of extensive bare peat, significant drainage and gully erosion.
- Effect of grazing and burning regimes over decades.
- Poor vegetation condition and loss of peat from the moorland.

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

Restoration Measures



Across 12,300ha blanket bog:

•85km grips blocked with peat or plastic dams.

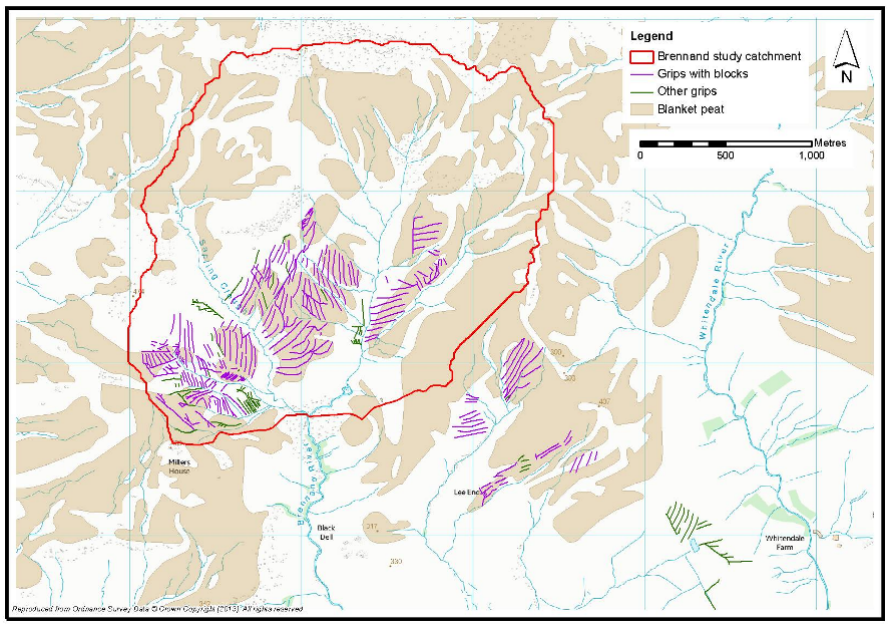
•470ha eroding bare peat treated with nurse crop, heather brash, geojute textile.

•Experimental coir roll installation.

•Grazing and burning regimes reduced/removed

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage



Our knowledge is your advantage

Monitoring Approach

- Vegetation (quadrats within plots).
- Hydrology (water-table level in peat, stage discharge, rainfall gauge).
- Water quality (colour as DOC, turbidity as POC).

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

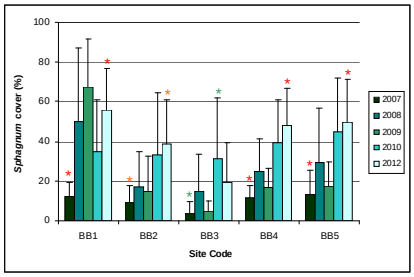
Assessment of Restoration Measures

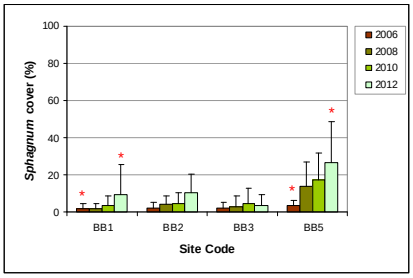
- Grip blocking (peat and plastic dams) – Goyt Valley & Brennand sites.
- Bare peat restoration (lime, seed & fertiliser +/- geojute textile) – North Longdendale sites.
- Coir roll installation – localised area on North Longdendale.
- In combination with changes to grazing and burning regimes (either removed or reduced) across all sites.

Penny Anderson Associates Ltd
Consultant Ecologists

Key Results: Grip Blocking

Significant increases in *Sphagnum* cover: Brennand (L) & Goyt (R)



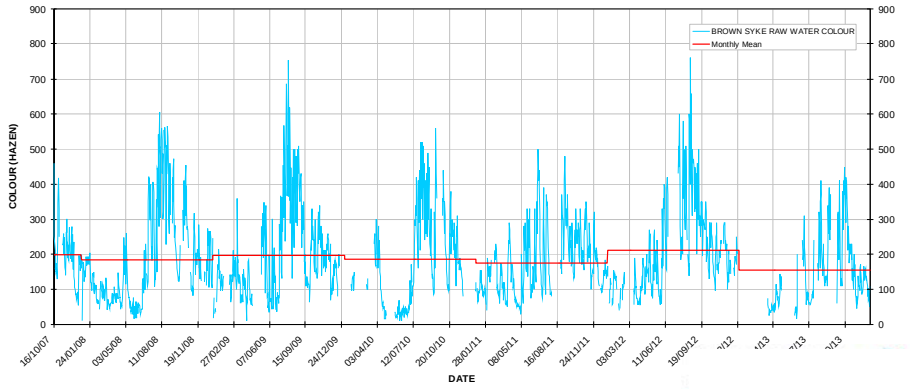


- BB1 = no grips
- BB2 – BB5 = grips blocked 2010, peat
- 2007 = baseline
- 2008 = grazing changed, grips not blocked
- 2009 – 2012 = post blocking

- BB1 & BB2 = grips blocked 2006, peat
- BB3 = grips blocked 2010, peat
- BB5 = grips blocked 2006, peat & plastic

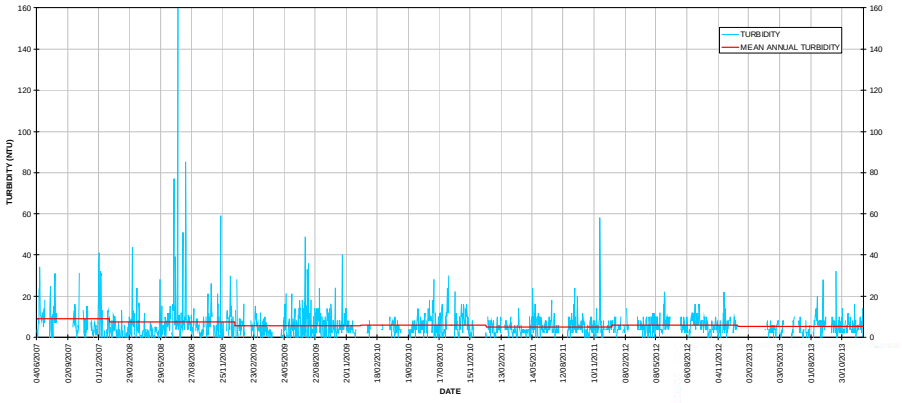
Key Results: Grip Blocking

Small but significant reductions in **colour** over time – Brennand (below) & Goyt.



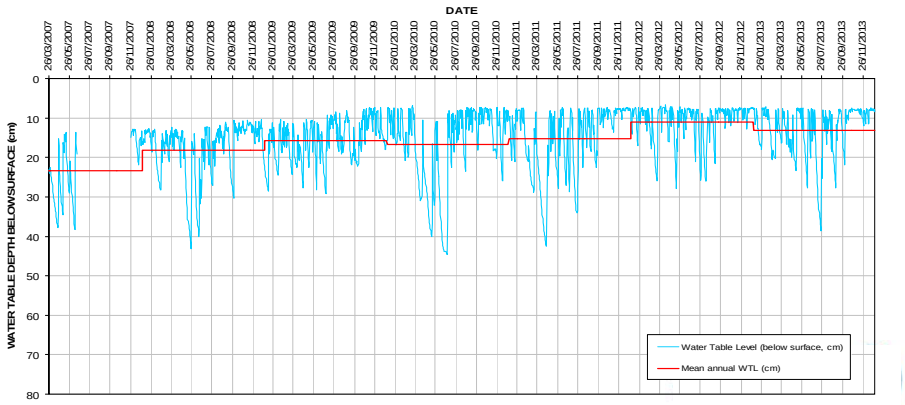
Key Results: Grip Blocking

Trend towards declining raw water **turbidity** over time at Brennand (below) while Goyt remains +/- stable.



Key Results: Grip Blocking

Trend towards higher and more stable **peat water-table levels** over time at Goyt (below) however Brennand shows no consistent trends.




May 2007


Feb 2009


Oct 2012


June 2013


June 2014

On Brennand where water table monitoring results are unclear, there is localised evidence of the benefits of blocking grips.

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

Many of the trends on well-vegetated blanket bog are difficult to detect through fixed point photography, but some are discernable – Goyt Valley (below).

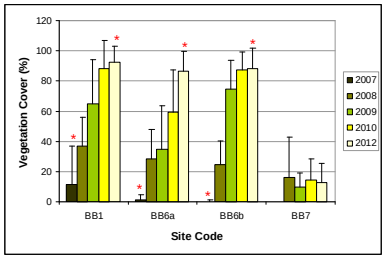
2007 2010 2012

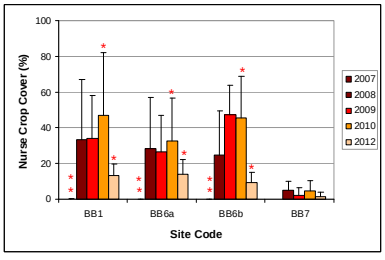
Penny Anderson Associates Ltd
Consultant Ecologists

Key Results: Bare Peat Restoration

Significant increase in vegetation cover across treated plots on North Longdendale.

Nurse crop (largely Highland bent, *Agrostis castellana*) establishes quickly then reduces in cover.



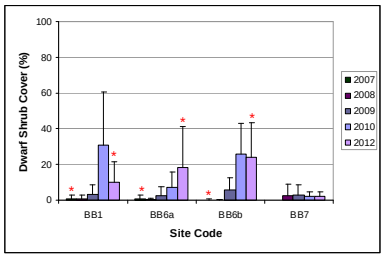


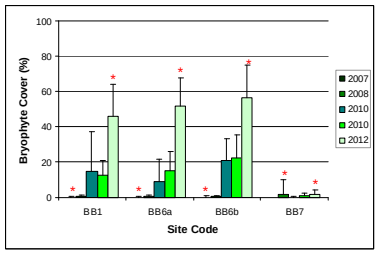
- BB1 = mounds of bare peat with lime, seed and fertiliser (LSF)
- BB6 = bare peat slopes with LSF, brash (a – geojute; b + geojute)
- BB7 = untreated bare peat slopes

Penny Anderson Associates Ltd
Consultant Ecologists

Key Results: Bare Peat Restoration

Dwarf shrubs (largely heather, *Calluna vulgaris*) begin to establish.
Along with mosses *Campylopus introflexus* and *Hypnum jutlandicum*.





Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

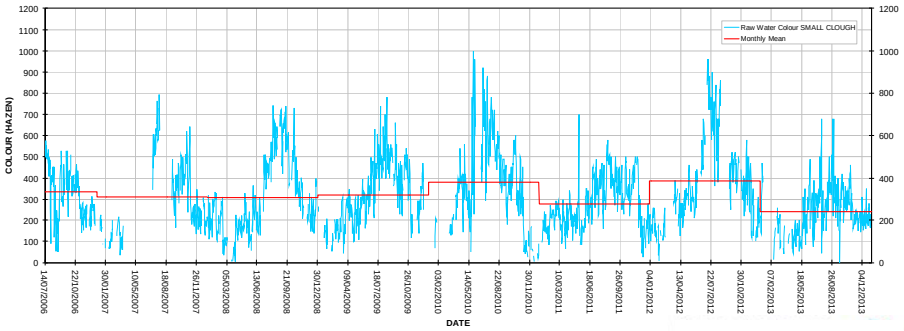
Key Results: Bare Peat Restoration

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

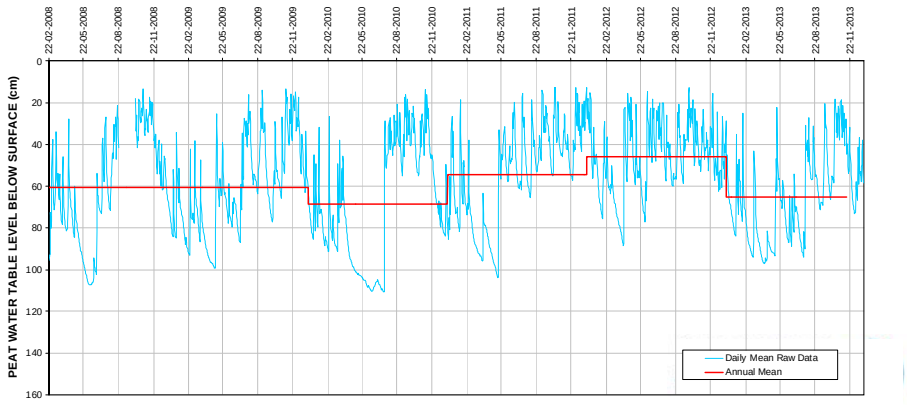
Key Results: Bare Peat Restoration

Trend towards lower **colour** over time, but this is only statistically significant when assessing post-treatment data only (after 2008).



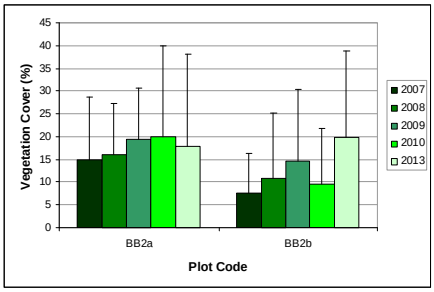
Key Results: Bare Peat Restoration

Trend towards increasing and more stable **water table levels** over time, except for 2013 – still vulnerable to dry periods.



Key Results: Bare Peat Restoration

Removed sheep grazing only. BB2a – no coir rolls; BB2b – coir rolls added
Plot without coir rolls appeared to do better…?



Penny Anderson Associates Ltd
Consultant Ecologists

Key Results: Bare Peat Restoration

There is significant recovery of vegetation on the plots with coir rolls.
Recovery dominated by vegetative expansion of common cotton-grass, *Eriophorum angustifolium.* No evidence of seedling establishment.

Penny Anderson Associates Ltd
Consultant Ecologists

Our knowledge is your advantage

Summary

- Significant reductions in bare peat and increases in vegetation cover.
- *Sphagnum* cover is increasing, responds quickly if greater cover remains.
- Removing/reducing grazing and burning alone results in positive change.

- Stabilising bare peat important in re-vegetation of bare peat.
- Nurse crop treatment is effective.
- Additional heather brash and geojute encourages more rapid re-vegetation of slopes, geojute important on steeper slopes.

- Water quality is improving with reductions in colour (and turbidity), although still problematic on severely eroded catchments.
- Water table levels are generally increasing and stabilising, but vulnerable to dry periods where severe erosion has occurred.

Penny Anderson Associates Ltd
Consultant Ecologists