Issue 1. July 2016

The Sundew

Cumbria BogLIFE project newsletter

Welcome to the first edition of ***The Sundew*** - keeping you in touch with the work of the Cumbria BogLIFE project.

This first edition is a bit of a bumper one, as you hear from some of the team about the work we have been doing since the project started last year.

Cumbria BogLIFE is a Natural England project, restoring three lowland raised bog sites in Cumbria:

- Bolton Fell Moss to the north-east of Carlisle
- Roudsea Woods and Mosses National Nature Reserve (NNR) in south Cumbria, and
- Wedholme Flow - one of four raised bogs within the South Solway Mosses NNR to the north-west of Carlisle.

By the end of the project the equivalent of around 1000 Wembley Stadium sized football pitches worth of bog habitat will be improved (751 ha)!

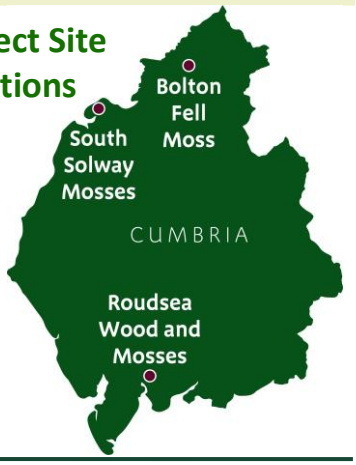
Why restore these bogs? Our top three reasons:

- They are home to a wonderful mix of specialist and rare animals and plants, including the sundew - a carnivorous plant (pictured above).
- Cumbria's peatbogs provide a unique historical environmental record - an archaeological treasure-trove.
- Healthy bogs store carbon from the atmosphere - damaged ones release it, contributing to climate change.

Bringing Cumbria's Raised Bogs to LIFE

Cotton Grass at Bolton Fell Moss
(J Dunbavin, NE)

Project Site Locations



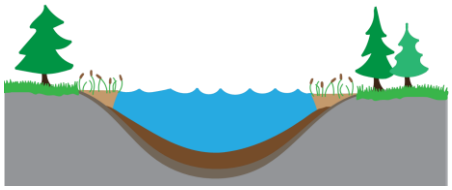
What *are* Lowland Raised Peat Bogs?

Yes, they are **wet**. Yes, they are **boggy**. And yes, they are **full of peat**! They are also home to a wonderful variety of very **specialist animals and plants** – many of which depend on this type of habitat to survive.

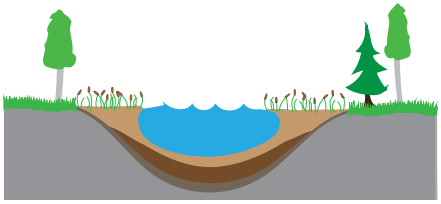
- They have formed since the end of the last ice age, in shallow basins with very poor drainage - where water-logged conditions have limited the types of plants that can grow there *and* slowed their decay.
- Over thousands of years, these partly rotted plants have built up underneath the living bog surface, slowly turning into peat and creating a dome that is higher than the surrounding land – hence the name 'raised' bog.
- The peat in a healthy, undamaged bog is fairly odourless, soft, quite smooth to touch, and is 96% water by weight - yet it is still possible to walk on the living 'crust' of bog plants!

The raised peat bogs within Cumbria can be up to 12 m deep - holding a huge amount of peat, the water held within it and the carbon that has been locked up by the plants over the years.

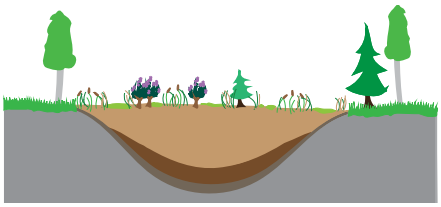
The Formation of Lowland Raised Bogs



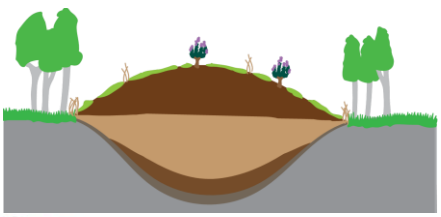
10,000 – 7,500 BC
After the Ice Age hollows lined with a layer of clay filled with water



7,500 – 6,000 BC
Open water slowly turned into Swamp and Fen



6,000 BC+
The wet climate means bog mosses started to become the dominant plant



- present
As peat accumulated, the bog rose above surrounding land, resulting in a 'Raised Bog'

Why bogs need BogLIFE and love

Lowland Raised Bog is one of Western Europe's rarest and most threatened habitats.

Around 94% of this unique habitat has been destroyed or damaged in the UK. 45% of what remains in England lies within Cumbria. Despite a lot of this being protected at a European level, much of it needs restoration to bring it back to its natural state.

Centuries of drainage, peat-cutting, tree planting and agricultural practices have left many of the bogs in a condition that is unsuitable for the specialist bog plants and animals that depend on them.

Some, like Wedholme Flow and Bolton Fell Moss, have undergone large-scale mechanised peat cutting for the horticultural industry. This has left them with a dry, bare peat surface - a hostile and un-natural environment for bog plants and animals.

Bolton Fell Moss (T Crockett, NE)

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Restoration works at Roudsea Woods and Mosses NNR

By Alasdair Brock

My day-to-day job includes overseeing the management of 9 NNRs in North Cumbria. These include Finglandrigg and the South Solway Mosses. As part of the Cumbria BogLIFE Project, I am also involved in managing Lowland Raised Bog restoration works at Roudsea Woods and Mosses NNR and Bolton Fell Moss.

Cumbria BogLIFE is restoring 210ha of badly damaged lowland raised bog at Roudsea. Historic drainage and peat cutting caused the surface of the bog to dry out and the peat to start decomposing. These dry conditions enabled trees and rhododendron to colonise and spread – some areas were incredibly dense, drying the bog out further and blocking out light for the specialist bog wildlife.

Sphagnum mosses colonising shallow pools at Roudsea (A Brock, NE)

Success on Stribers Moss

During the first two years of the project we have been restoring a 90 ha area of Roudsea NNR known as 'Stribers Moss'.

The first phase involved cutting the trees and rhododendron. Contractors UPM TillHill and Openspace carried out the work, and used an innovative piece of kit created by TreeClear to 'flail' the rhododendron. This excavator-mounted circular flail proved incredibly fast and effective in cutting the rhododendron into small pieces.

The second phase of restoration – the re-wetting – was carried out by contractors Barker and Bland, who created a myriad of peat dams on a 20x20m grid over the site. These dams are now slowing the movement of rain water leaving the bog, raising the water table back to surface level, which is what a bog should be. The shallow pools and wet surface are now rapidly re-colonising with bog plants.

Resilient Rhododendron

The flailing and restored water levels have prevented much of the rhododendron from regenerating, but it is an extremely resilient plant and if not controlled will rapidly re-colonise. So, this year we are spraying it using the herbicide glyphosate (*Round-Up*). We would rather not use glyphosate, but currently there is no other cost effective treatment. Along with spraying we are also working very closely with the Holker Estate and other neighbours to reduce and remove all rhododendron plants from the surrounding area, as they will readily seed into the areas we have cleared and will cause problems in the future.

Rhododendron regrowth 1 year after flailing and re-wetting (A Brock)

Next Year we will be restoring the remaining area of damaged bog known as Reake Moss. Rhododendron has already been removed and now tree removal, followed by works to raise the water table to ground level are required.

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Bringing Bolton Fell Moss Back to Life

By Deborah Land

After decades of commercial peat extraction, Bolton Fell Moss is definitely in need of some TLC. Most of the site is bare of vegetation and large drainage ditches running through it have significantly dried out the peat body. The second stage of restoration has been completed over winter 2015-16, despite the dreadful weather in December. Thankfully the rains eventually eased and work recommenced in the New Year and finished in early Spring.

Holding back the water –and just the right amount!

Horseshoe bunding and associated pool creation. Photo Barker & Bland Ltd

Water is held on the bog for as long as possible through the creation of peat bunds, both in the old drainage ditches and across the old milling (peat extraction) fields.

The bunds in the drains allow the slow release of water from the centre of the bog. The bog is now dish-shaped (lower in the middle), rather than its natural dome shape –so rainwater water would create deep 'pools' across the bog, if ditches were totally blocked.

The bunds in the milling fields (as visible in the photos) allow excess water to flow gently to shallow swales, holding enough water onsite, but allowing excess water to move slowly across the site to prevent flooding.

Great care has also been taken to ensure that water leaving the site exits via maintained sediment traps to ensure that local watercourses are kept free of any silt created by the restoration works

Bringing back the plants

This recent stage, restoring an area known as 'Old Mill', has seen evermore innovative ways in addressing the lack of vegetation. Lightweight excavators, perched on bog mats (large planks of wood), sculpted the milled surface, while bespoke machinery, designed entirely for this type of work, applied a living carpet of mosses and vegetation to the surface.

This new and exciting technique takes mosses and vegetation from an established donor site and creates a matrix of mulch and moss fragments. Sphagnum moss is the cornerstone for successful restoration of lowland raised bogs and this mulch of shredded vegetation serves to protect the newly establishing sphagnum moss from the elements by binding it to the surface of the bare peat. As the other bog plants grow, they will also provide protection and a 'matrix' for the mosses to grow within.

Living carpet applied to newly created bunds. Photo Barker & Bland Ltd

What Next?

The contract for the next phase of work, on an area known as 'Russells', will be awarded shortly and will likely see the further development of exciting and innovative techniques to restoration. It is anticipated that the whole of the southern milling fields will have received restorative techniques by spring 2017.

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Monitoring the Changes in the Bogs

By Sarah McCormack

As the Monitoring Officer for the Cumbrian BogLIFE project, my role is to help determine how effective the restoration works are in re-establishing natural 'boggy' conditions. I take measurements of the vegetation (which plants are growing) and hydrology (the water levels) on site.

On a healthy bog, we would expect to see a high proportion of *Sphagnum* moss cover, as well as the presence of other plants such as sundew, bog rosemary, bog cranberry and cotton grass. In terms of hydrology, the water table on an undisturbed bog generally lies within 10 centimetres of the surface of the peat. However, our three sites have undergone varying degrees of management, such as drainage and peat extraction. This has lowered the water tables, which has in turn changed the conditions for plants to grow there and thereby damaged the bogs as a habitat for wildlife.

At Bolton Fell Moss, peat extraction works led to a large proportion of the site having no vegetation cover whatsoever, and water levels up to half a metre below the surface of the peat. In contrast, the mosses at Roudsea have never undergone industrial-scale peat extraction (only domestic peat cutting) so there are no areas of bare peat. However, there are issues with invasive Rhododendron plants, which cover large areas of the bog, drying out the peat and reducing moss cover.

It's all about the base-line surveys!

I record the presence and abundance of vegetation before and after restoration works, to determine how successful the restoration has been in recreating the lowland raised bog habitat. It is really important to know what was there before the work is done, to be able to see what a difference it is making to the habitat.

The same is done for the sites' hydrology - using data loggers which automatically record the height of the water table pre- and post-restoration.

The data from these surveys allows us to compare different restoration methods, improve our practices for the future, and helps us predict how other damaged bog sites might respond to restoration.

A Dipwell at Bolton Fell Moss
The hollow blue tube, pushed down into the peat, has small holes that allow water to penetrate. A little float inside sits at the top of the water table and a microchip inside it records its height at regular intervals.

Baseline vegetation survey at Roudsea (T Crockett, NE)

Our Bogs and Climate Change

One of the most exciting and novel aspects of my work is a project we are setting up to monitor carbon emissions from our Bolton Fell Moss site.

Peatlands are known for their carbon storage properties – the great depth of the peat and the high percentage of carbon contained within means that they store far more carbon than ordinary mineral soil. We know that drainage and drying of peatlands causes them to begin to decompose, releasing the carbon as greenhouse gases into the atmosphere.

In this new project, we'll be taking and analysing gas samples to determine how our restoration works impact the carbon storage capacity of the bog.

Watch this space!

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Connecting Communities, By Tania Crockett

In my role as Communications Officer I have the great pleasure of helping the communities living near our project sites to connect, or reconnect with them. For centuries, Cumbria's lowland raised bogs have played an important part in the life of the communities that have surrounded them. Through working with local schools, groups and public events we hope to bring the bogs back to life in their minds, as well as on their doorstep. Here's a little snippet of what we have been up to so far!

Fir Ends Primary visits Bolton Fell Moss

By Rachel Watson, Class Teacher

"As part of our outdoor education and science curriculum, the children of Key Stage 2 have been studying their local Peat Moss, at Bolton Fell.

The project began with Tania coming into school to introduce the Peat Moss. Only some of the pupils who live in the immediate area knew of the moss and its background, so we learnt some history of our local area too. Following a brief explanation about the bog, the pupils began undertaking some interesting experiments on the school grounds. Pupils worked with Tania to test the soil on our school field looking at absorbency, its PH and composition. It was amazing to see science being combined with practical fieldwork on our school grounds at such a high level and the children being totally engrossed in their investigations.

Two weeks later, the pupils then went out to the Moss to repeat the investigations and to explore what a peat moss feels like, smells like and what it actually is. We were fortunate with the weather and we managed to take out Years 3-5 in small groups. The experience was again one of great value and the children thoroughly enjoyed their time at the moss.

Following our visit, we have completed a mini topic on habitats and adaptation, applying what we learnt from our days and adding a little Fir Ends creativity. We are hoping to continue working with the BogLIFE project and are already planning in future visits."

Memories of the Mosses

People local to Bolton Fell Moss have begun sharing their memories of the moss in years gone by, as we explore the potential of creating an oral history project for the Moss. If you have memories or old photos to share, please do get in touch – we would love to hear from you!

We will be holding another memories event in early Autumn – watch this space for a date!

A Wander on Wedholme

How bouncy is this bog? (T Crockett, NE)

Back in February, on a cold and sunny Sunday, we took a wander on Wedholme Flow and asked you to join us. The 20 who came (17 people and 3 dogs!) were given a behind the scenes tour by Alasdair Brock and had a lovely afternoon exploring their local bog and finding out about its history as a commercial peat cutting site, as well as the wildlife that lives there. We will be taking another stroll sometime soon – watch this space for a date!

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Visiting the Bogs

Roudsea Woods and Mosses NNR : Permissive access (a free permit) is required to visit this very special reserve, which Natural England leases from the Holker Estate. Find out more in the reserve leaflet http://publications.naturalengland.org.uk/publication/5794526008442880

Wedholme Flow (part of the South Solway Mosses NNR): Open access on this reserve, so visit any time. Find out more at: https://www.gov.uk/government/publications/cumbrias-national-nature-reserves/cumbrias-national-nature-reserves

Bolton Fell Moss: There is no public access at present. Access with Natural England staff is possible for accompanied groups and during advertised community events. Watch this space though, as we will be consulting on future access options with the intention of providing some public access to the site.

Bog Beauties

Here are some of our favourite photos from the bogs these last few months. We are going with a 'green' theme this time!

All photos courtesy of and copyright Guy Broome. Below, green tiger beetle; top right, emperor moth caterpillar; bottom right, large emerald moth.

Follow our Facebook Page to see more great pics like this. Post yours, or email them to us at the email below.

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