

BogLIFE

Bringing Lowland Raised Bogs to Life

A Bigger Bounce on the Bogs this Spring

Welcome to the Spring 2016 issue of BogLIFE and we definitely have a spring in our step! The ground and tree works we have undertaken this winter have made great strides towards restoring the bounce in our bogs - and who doesn't love to feel the bounce of a spongy wet bog underfoot?!

In this bumper issue we have news and updates from across both projects, including:

- Practical restoration updates and techniques used – scrub tree and rhododendron clearance, re-wetting and re-vegetation;
- The 2015 field season of nightjar monitoring on the Humberhead Peatlands;
- Monitoring ecological change on Bolton Fell Moss;
- Update from Cumbria BogLIFE peatland practitioner workshops;
- Ecosystems Services monitoring of the Cumbria BogLIFE project; and
- Information about both the forthcoming Humberhead Peatlands mid-project workshop and the Cumbria BogLIFE mid-project conference.

Happy bouncing!

Little Moth, Big Smile.

On a walk across the area of Bolton Fell Moss known as 'Reserve', Cumbria Biodiversity Centre's Recording Officer Gary Hedges, finds this tiny little moth and gets excited. It is *Philedonides lunana* - a tortrix which likes bogs, heaths and moors. It hadn't been recorded in Cumbria for more than 30 years. We were there planning a biological recorders 'Bioblitz' event, taking place in late June. Who knows what else we might find there then!



Philedonides lunana © Gary Hedges



'That's LIFE' The Humberhead Peatlands LIFE+ Project Scrub Clearance Programme - Part 1

Over the past winter season 268 hectares of scrub have been cleared from the Humberhead Peatlands NNR, as part of efforts to restore the mire vegetation and reduce water loss in summer. This total comprised: 155 ha of birch succession, occurring at <60% cover of the ground area; 99 ha of dense birch and rhododendron, at >60% cover; and 14 ha of dense rhododendron at 60-100% cover. A wide range of methods was needed to achieve this, depending on ground conditions and the nature of the scrub. The lead contractor for the work was TilHill Forestry, overseeing several subcontractors.



Mulcher, Hatfield Moor. ©Steve Hiner

Self-Propelled, 16 Tonne Mulcher

This was used on one site at Hatfield Moors with relatively shallow, drained peat, but up to 2 m deep in places. It was drier at the surface and had dense stands of single-age birch, estimated to be 15 - 20 yrs old.

Initially, a tractor-pulled low loader brought two machines to site from an adjacent stone track. The mulchers cleared 2 - 3 ha per day, with 29 ha being completed over four weeks of non-continuous operation.

While the standard method is to complete two passes over the scrub to leave a uniform finish, a 1.5 pass method was adopted here. It cleared the trees yet left adequate debris as cover for nightjars, and disturbed the underlying peat surface less. Scrub was left at 10% cover on the site, as scalloped boundary and individual stands, to maintain suitable nesting habitat for nightjar.

Work was held-off after periods of wet weather, to allow ground conditions to become more travelable.

1.2 m Tracked Excavator with Rotary Flail.

These machines were used on intermittently wetter, deeper peat sites to clear both continuous, dense rhododendron and mixed rhododendron and birch of variable age and density. Operating only on Thorne Moors, there were initially four machines, supported by two, tracked fuel bowsers.

An expected clearance rate of 1 ha per day was achieved, and sometimes exceeded, in the mixed variable vegetation; however, progress slowed to 0.5 - 0.75 ha per day in the more mature rhododendron, where material was most dense.

Wheeled all-terrain vehicles (ATVs) were used to transport operators; these were soon converted to run on tracks, to cope with the increasingly wet and softening access routes. This method was not efficient or practical to remove only rhododendron from within mature birch woodland around the perimeter, when chainsaws were used instead.



Excavator flail, Thorne. ©Ed Brightman



Humberhead Peatlands Scrub Clearance Programme – Part 2

Manual Contractor Teams

These teams were employed with chainsaws to tackle larger areas of sparse cover, comprising <60% birch and willow, to cut and treat stumps. They included some areas of dense, >60 % cover where they windrowed arisings; otherwise trees were cut and left in situ.

The contractors were local to the nature reserve and had knowledge and experience of working on it. With three teams of up to four operators per team, scattered trees were cleared at approximately 0.5-0.75 ha per day.

Work was scheduled around wet weather to allow for effective stump treatment. This required hand application of 10 % solution of Roundup BioActive to cut surfaces within 30 min.

In-House Estate Team

Beginning with a team of six at the start of the season, standard operation was cutting with chainsaws and chipping arisings with a vari-track chipper. When the team was reduced to three members in early December, methods deferred to cutting and windrowing material in the sensitive areas of low density birch and willow, similar to the contractor teams' methods.

Mechanical methods were trialled to clear small scrub of all densities. The most effective of these was a dual wheeled tractor, running a PTO (power take-off) driven heavy rotary mower. This cut small rhododendron shrubs and birch with a maximum diameter of 50 mm. Its only limitation was on soft or floating ground. Small, thinner scrub was attempted with a drum flail and knife cutter, mounted to the front of a Softrak ATV.

Both of these were partially successful, but where scrub became thicker in both density and diameter, the Softrak struggled to power the attachment and itself. This was also true of the rotary PTO mower when attached to the ATV.



LIFE+ Estate Team feeding Tracked Chipper ©Natural England



Softrak ATV pulling heavy rotary mower ©Natural England

Looking Ahead

There remains 104 ha of dense scrub and 183 ha of sparse scrub to clear. This is due to be completed by the end of March 2017.

The accessibility of compartments for scrub clearance will be further reduced by next winter, due to rewetting activity being carried out on the bog this year. Whilst this is essential for the restoration of the bog, as the site becomes progressively more saturated it reduces the efficiency of removing the tree cover.

For further information about the Humberhead Peatlands LIFE+ restoration programme contact:

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Nightjar Monitoring on the Humberhead Peatlands

The nightjar (*Caprimulgus europaeus*) is an iconic, threatened species that suffered a sharp decline due to widespread afforestation 50 years ago. It is being monitored as part of the LIFE+ restoration project because Thorne and Hatfield Moors are notified as a Special Protection Area (SPA) under the EU Birds Directive, holding more than 1 % of the British nightjar population. Annual surveys of calling males estimate it to be around 80 to 88 breeding pairs. This work is being led by the The University of York in partnership with Natural England.

2015 Field Season

The aim of the 2015 field season was to understand the nightjar's response to the restoration work, through observation of foraging behaviour, nesting site choice and success, and diet throughout the breeding season.

In June and July 2015, with the help of many hugely dedicated volunteers, we deployed miniature GPS loggers on seven adult nightjars. The birds were caught using wide-mesh mist nets during the evening, and after extraction and ringing, were fitted with GPS units weighing less than 3 percent of the bird's body weight.

The location of a nightjar was recorded every three minutes throughout the night, for up to a week. We then re-caught the birds and downloaded the data from the tag. This allowed us to identify key foraging areas, both inside the SPA and in the wider countryside. The data retrieved from the four birds in 2015 are already giving us insights into their behaviour, with one male bird flying over 30 km in one night.



©Lucy Ryan

An example of one night's GPS tracking data, from a bird breeding on the edge of the peatlands.

Looking Forward

In 2016, our goal is to deploy 20 tags on birds caught in different areas of Thorne and Hatfield Moors, enabling us to observe behavioural responses to changes in the habitat after scrub clearance and re-wetting. We will also be looking at breeding site choice and reproductive success, by searching the moors for nests and weekly monitoring. Efforts will be concentrated on areas known to hold breeding pairs, based on nocturnal surveys.

Chicks will be ringed when of a suitable age. This enables us to identify returning birds the following year, hopefully learning more about juvenile settlement and survival.



A nightjar chick ready to fledge ©Lucy Ryan

The combination of methods used as part of this project will give us a detailed insight into the behavioural ecology of this understudied, cryptic species. It will help inform better management of the SPA's habitats for nightjar.

Lucy Ryan, Doctoral Researcher
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For further information about the Humberhead Peatlands LIFE+ monitoring programme contact:

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Cumbria BogLIFE Practical Restoration

This winter our work has focussed on two of the project's three sites - Roudsea Woods and Mosses and Bolton Fell Moss. Contractors have trialled new and interesting tree and rhododendron removal, peat bunding and re-vegetation techniques.



Roudsea Woods

40 ha of trees and 18 ha of Rhododendron were cleared by Openspace Ltd. 40 ha of re wetting was carried out by Barker and Bland.

Trees were removed using conventional harvesting techniques – excavator mounted cutter heads and forwarders on caterpillar tracks. Brush mats were constructed from felled trees and brush to facilitate excavation. Rhododendron was flailed using a circular hydraulic disc flail with teeth mounted on a 7.5 tonne 1m wide tracked excavator (Treeclear Ltd).

Re-wetting consisted of constructing bunded cells (20 x 10 m to 30 x 30 m), by:

- Digging a trench through the degraded surface layer of peat (around 20-50cm deep). Any cracks along the line of the trench are 'squished' shut using the surrounding undried, undamaged 'plastic' undried peat. All tree roots are dug out along the line of the trench.
- Filling the trench with good 'plastic' peat (from an adjacent 'borrow pit') to ground level, and then raised by another 10 cm above ground.
- Linking bunds together to create four-sided cells to hold water within the bunds, keeping the water table at the surface. The size and shape of cells depends on slope and terrain. The steeper the slope the longer and thinner the cells become.
- Covering bunds with turf or tree/rhododendron brush to prevent them drying out.

Restoring the water table to ground surface level provides conditions on which *Sphagnum* moss spores from the surrounding area land can colonise.

It should also prevent some 80-90 % of tree and rhododendron from re-generating. The remainder will be treated annually with Glyphosate.

Bolton Fell Moss

A 50 ha area of bare peat was re-wetted and re-vegetated by Barker and Bland. The vegetation, harvested from the Pennines, consists of a vegetation carpet including *Polytrichum* mosses, feather mosses (Hypnaceae) and cotton grass. This is co-spread with *Sphagnum*-rich material harvested from other locations. *Sphagnum* species include *S. magellanicum*, *S. papillosum*, *S. cuspidatum* and *S. capillifolium* as well as others.

This 'living carpet' was spread at the same time as peat bunds and dams were constructed. The carpet of material has proven resilient to wind-blow and very heavy rainfall. *Sphagnum* growth is already being observed, although recent very dry weather has slowed the growth.

What we expect next... The cotton grass will break down providing low levels of nutrient. The *Polytrichum* and feather mosses (Hypnaceae), will grow in the short term and help to provide a microclimate for *Sphagnum*. Eventually *Sphagnum* species will dominate these mosses.



Bunding and revegetation at Bolton Fell Moss ©Natural England

Top left: rhododendron cleared at Roudsea ©Natural England

For further information about the Cumbria BogLIFE practical restoration programme contact:

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Cumbria BogLIFE Assessing restoration success: Monitoring ecological change on Bolton Fell Moss

The Cumbria BogLIFE project provides an opportunity to study the response of a rare habitat to a unique form of management – restoration works to re-establish peat-forming conditions on degraded lowland raised bogs.

The novel restoration techniques used in this project were developed in North America and have only in recent years been trialled on European sites. Monitoring restoration impacts on site hydrology, ecology and biogeochemistry is integral to gauging the success of the project and developing the practice of restoration.

The Questions:

The aims of monitoring are to report on the success and limitations of the restoration techniques, namely by answering the following questions:

1. How did the restoration impact vegetation community composition: did it increase species diversity, functional diversity, presence of peat-forming species, *Sphagnum* moss cover?
2. How did the restoration impact site hydrology: did it bring water table levels consistently within +/- 10 cm of the peat surface and reduce water loss from site outflow points?
3. How did the restoration impact peat greenhouse gas fluxes (methane, carbon dioxide, nitrous oxide)? How was the response of greenhouse gas fluxes impacted locally by vegetation composition, hydrology and peat depth?

The Study Site

Of the three sites involved in the Cumbria BogLIFE project, the two sites which were once subject to industrial-scale peat extraction – Bolton Fell Moss and Wedholme Flow – provide an ideal study platform. These sites contain large areas of unvegetated peat and extremely disrupted hydrology, which are common characteristics of formerly milled peatlands. Both sites are divided into several units by deep drainage ditches, and each unit will be restored individually.

Additionally, Walton Moss, a lowland raised bog lying adjacent to Bolton Fell Moss, is a SSSI/SAC which represents a near-pristine site and will be included in the study to provide data for comparison.



Fixed point photography at Bolton Fell Moss ©Natural England

The Study

The study design involves installing an extensive network of hydrological data loggers on each site, both within the peat body (to monitor water table height) and at key outflow points (to monitor water loss from the site).

Within each unit, eight fixed plots will be established for vegetation surveying at randomly generated GPS points. Adjacent to these plots, a gas sampling collar will be inserted into the peat and greenhouse gas fluxes will be sampled every six months and analysed using gas chromatography.

Sampling these sites before and multiple years after restoration will provide insight into the ecological processes involved in successful restoration and the issues involved where restoration doesn't achieve the intended result. Baseline data collection is currently ongoing and updates will be provided within this newsletter, so stay tuned!

For further information about the Cumbria BogLIFE Monitoring programme contact:

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Cumbria BogLIFE Peatland Restoration Workshops – a networking success!

Nature conservation projects funded by EU LIFE have a strong remit to encourage discussion, share knowledge, experience and ideas. The Humberhead and Cumbria BogLIFE projects are proving to be an excellent platform for putting this into action.

During early 2016, Cumbria BogLIFE held a series of workshops hosting 57 delegates from across the UK, Ireland and Sweden, providing them with opportunities to visit two degraded but contrasting bogs – Roudsea Wood & Mosses SAC in the south of the county and Bolton Fell Moss SAC in the north east.

Meeting the contractors

Delegates met the skilled contractors out on site, with their machines and first-hand accounts of the development of innovative restoration techniques being trialled. Sharing and discussing valuable experience of the trials and errors of peatland restoration within Cumbria over the past 20 years.

At Roudsea Mosses TreeClear UK described the development of their bespoke machine, with purpose-built flailing head, and how it efficiently and effectively cleared tall, dense rhododendron. Barker and Bland introduced their approach to rewetting bogs - using banded peat cells that aim to slow water movement through damaged acrotelm layers. A demonstration provided an opportunity for delegates to observe the technique in action and see machine operator sequences the work.

A visit to previously mulched rhododendron areas that had been subject to follow-up rewetting work showed how the dense mat of cuttings left after mulching provided a matrix upon which *Sphagnum* mosses readily re-colonise.

At Bolton Fell Moss, contractors (OpenSpace) showed delegates an area of bare milled peat that they had restored using a number of different techniques using straw mulch and Spagnum pellets to re-introducing bog vegetation during winter 2014/15. Contractors (Barker and Bland) were also on-site as they were completing the restoration of a 50ha milling flat. They describe their differing approach to managing the hydrology and different technique they are trialling for re-introduction bog vegetation using material harvested off-site and introduced as a mulch alongside a nurse-crop.



Cell bunding at Roudsea Wood s and Mosses ©Natural England



Bare peat restoration Bolton Fell Moss ©Natural England

Future networking

A wealth of knowledge, experience, and useful discussion was brought by delegates to the workshops. Building on this we are developing a three day conference, 4 -6 Oct 2016, focussed on showcasing practical peatland restoration techniques used successfully throughout the UK and Europe. See back page for information.

For further information about the Cumbria BogLIFE workshop and conference programme contact us at:

cumbria.boglife@naturalengland.org.uk



Cumbria BogLIFE. What bogs do for us - the Ecosystems Services approach

Ecosystem Services are the benefits we get from nature which can include energy, food, water, clean air, climate stability as well as mental and emotional wellbeing. Lowland raised bogs can make a significant valuable contribution to these ecosystem services, an obvious example would be the capture of carbon from the atmosphere.

Robustly capturing and reporting on the benefits that have been gained as a result of the restoration work within the project is an essential element within the EU LIFE programme. Cumbria BogLIFE project is currently developing data collection, collation and analysis methodology that will allow a full evaluation to be made at the end of the project in 2019. Included within this study, is also consideration of the impact on various socio-economic factors.

Creating a Logic Model

In developing this work the project team firstly created a logic model that identified the causal pathways that underlie the rationale for the LIFE project. This linked the project's outcomes directly with the activities.

The key ecosystem services identified within this stage were wide ranging and surprising. The provision of timber for energy and materials, the regulation of greenhouse gas emissions, sequestration of carbon, elimination of non-native species, impacts on biodiversity, changes in the quality and quantity of water run-off were just a few of the more easily recognisable ones. Identifying the cultural ecosystem services, proved to be more demanding; those associated with the places which people interact with nature and the cultural practices which they interact that enhances their well-being.



Area cleared of rhododendron at Roudsea Woods and Mosses
©Natural England



Community event at Wedholme Flow ©Natural England

Gathering Data

At present we are within the second stage of project development, gathering environmental data on all three project sites, as well as working closely with environmental consultants AECOM to formulate how we will gather suitable data that will ensure cultural ecosystem services are captured and evaluated. Cultural ecosystem data will be captured at project events and involve the creation of a series of interesting and innovative community engagement activities. The outcome of this work will not only be a better understanding of what benefits are gained from other LIFE projects and raised bog restoration, but a better understanding of what others think and feel about the work we are doing.

For further information about the Cumbria BogLIFE Ecosystem Services programme contact:

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Forthcoming Workshop and Conference

Making Moor Space

27th September 2016

Thorne – South Yorkshire

LIFE+ Project – Restoring the Humberhead Peatlands, Mid-Project Workshop

This is an opportunity for you to join a one-day workshop and find out how Natural England and our partners are helping to restore the precious lowland raised bog habitat of the Humberhead Peatlands National Nature Reserve, covering Thorne, Hatfield, Crowle and Goole Moors, in South Yorkshire, England.

Come along and see how European investment has been used so far to manage the water levels using dams, weirs and bunds and by clearing scrub vegetation to reduce the amount of water being sucked out of the peat. And how through the recreation of boggy conditions, invertebrates are flourishing and the European Nightjar is thriving.

The workshop will combine lively and engaging onsite sessions, delivered by the people undertaking the work on the ground. There will also be a chance for you to learn about the techniques being used, the lessons learned and the results so far.

You can also meet the researchers and local amateurs who have contributed and shaped the Humberhead Peatlands over the years.

For the workshop programme and booking form please email:

humberhead.peatlands@naturalengland.org.uk

Places are limited so please book early.

We are able to offer these events **free of charge**, as they have been generously funded by the European Union LIFE+ Nature and Biodiversity Projects:

Humberhead Peatlands: LIFE13NAT/UK/00451
Cumbria BogLIFE: LIFE13NAT/UK/00443

Restoring Peatlands – The Development of Best Practice Techniques

4th-6th October 2016

Penrith – northwest England

Cumbria BogLIFE Mid-Project Conference

Planning and managing restoration work on peatlands, especially raised bogs, can be challenging. Demanding and fragile ground conditions, protected species mitigation, limited access, significant costs, local community concerns and getting the right skilled contractors to ensure success, are all key factors to be considered. The requirement to get our peatlands into suitable eco-hydrological condition has also never been so urgent.

The EU LIFE funded Cumbria BogLIFE team is therefore pleased to offer a 3 day conference showcasing some of the most successful and innovative peatland restoration projects from across the UK and Europe. Bringing together land managers, researchers and other peatland professionals to share experience, knowledge and discuss the development of best practice over the last 20 years.

The conference will comprise a mix of presentations, workshops and site visits. Although with a strong bias towards raised bog, it will be of great interest to anyone involved in the following areas of peatland restoration work: removal of trees from deep peat, raising and stabilising water levels in peat using cell bunding and other techniques, removal of invasive species (including rhododendron), re-establishing bog vegetation on previously milled bare peat and creating valuable lost bog-edge habitat.

Save the date. Booking details to follow. Please email: cumbria.boglife@naturalengland.org.uk to ensure you are on our mailing list



Contact Us and Keep in Touch



bog bush cricket © Richard Smith, Natural England

Humberhead Peatlands

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 www.facebook.com/humberheadpeatlands

www.gov.uk/government/publications/humberhead-peatlands-restoration-life-project

Restoring Humberhead Peatlands LIFE+ Project (LIFE13 NAT/UK/000451)



raft spider *Dolomedes fimbriatus*
© Rob Petley-Jones, Natural England

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www.gov.uk/government/publications/cumbrian-bogs-life-project

Restoration of degraded lowland raised bogs on three Cumbrian SSSIs/SACs (LIFE 13 NAT/UK/000443)

For general BogLIFE Newsletter enquiries, or to be added to our mailing list please contact:

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