

A “BUZZY” SUMMER IN THE FLOWS!



The Flows have been bustling with activity, as volunteers, reserve staff in Forsinard, researchers, students, midges and clegs alike invaded the bogs in large numbers over the dry summer months. Away from the bugs and the bogs, others have been hard at work writing up or preparing new and exciting projects... Here is a quick update of what some people have been up to! We would like to thank all the contributors of this edition of the newsletter, and wish you all a very good autumn.

GOOD NEWS FOR THE HUB!

Research in the Flow Country: looking forward – 4-7th March 2014, Thurso

We are delighted to announce that a second Flow Country Research Conference will take place in Thurso between the 4-7th of March 2014. The ERI and the Thurso cinema will team up again to host the event that will be organised jointly by ERI, CEH, RSPB, and the University of Stirling. The conference will explore current and future research opportunities in the Flow Country and take a critical look at how things have moved on since the last conference, and where the Flow Country Research Hub should be heading. It will include oral and poster sessions as well as a field trip supported by SNH. A first call for contributions and registration will follow in October. *Roxane Andersen (ERI)*

A forest tower in Forsinard!

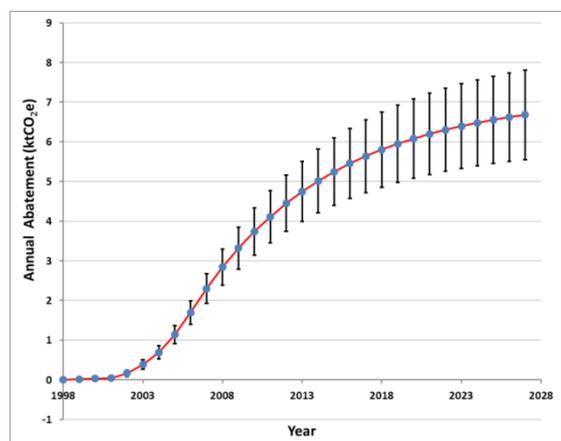
One measure that is missing to get a full carbon story in Forsinard is the above-canopy GHG fluxes from plantations on deep peat. We are very pleased to announce that SNH, through the Green Stimulus programme, has agreed to finance the purchase and installation of an Eddy-Covariance “Forest Tower” in the reserve to benefit the Flow Country Research Hub as a whole. A steering group with representatives from SNH, RSPB, the ERI, JHI, the University of St Andrews and CEH will be in charge of managing the tower and the data. This fourth tower will therefore complement the existing flux network that covers Cross lochs (open bog, the “CEH” tower), Talaheel (felled-to-waste in 1997, the “St Andrews” tower), and Sleach (felled in 2006-2007, the “JHI” tower). *Roxane Andersen (ERI), Neil Cowie (RSPB), Matt Saunders (JHI), Graham Hambley & Tim Hill (U. St Andrews)*

HOT IN THE PRESS!

Peatland restoration in the Flows: potential abatement and estimation of carbon savings

Using available literature, we have estimated the potential abatement from peatland restoration and using a simple model have calculated the carbon savings from past restoration (1998-2012) in the Flow Country. Current (2013) savings are around 4700 tonnes CO₂e, projected to increase to 6700 tonnes CO₂e by 2027. Total savings will accumulate to 1.14 Mt CO₂e by then. This is about 13% of total benefits from past restoration across Scotland.

Steve Chapman, Rebekka Artz and David Donnelly (James Hutton Institute)



Chapman, S., Artz, R., Donnelly, D.. Carbon Savings from Peat Restoration. ClimateXChange enquiry number 1205-02, 1-17. 2012. Edinburgh, ClimateXChange.

Can restoration of afforested peatland regulate pests and disease?

New research carried out by The James Hutton Institute, Aberdeen, suggests a further, as yet unconsidered, benefit from restoring peatlands: controlling ticks and tick-borne diseases. Surveys were carried out at the RSPB's Forsinard reserve where large areas of afforested peatland are being restored. There is a mosaic of forest patches, different-aged restoration felling areas, and undamaged blanket bog, creating an ideal "natural experiment" to test the impact of restoring afforested peatlands on pests and disease. The study revealed that ticks were very abundant in forests, of intermediate abundance in restoration felling areas and almost entirely absent from undamaged blanket bog, thereby suggesting that restoration of afforested peatland helps to almost eradicate ticks. Furthermore, examining the felling areas in more detail showed that tick abundance declined sharply over time, with high tick numbers in the youngest felling areas (felled only 5 years previously), to very few ticks in the oldest (13 year old) felling areas. This shows how ticks decline throughout the restoration process and implies that, while peatland may take more than 13 years to be fully restored, 13 years is almost enough to bring tick populations down to the low levels found in pristine blanket bog. Dung counts, which identify which areas are used more by deer, indicated that one mechanism for the effect is deer habitat preferences. Deer are the main hosts for ticks, and far less dung was counted in blanket bog than in forest or felled areas. Another mechanism was vegetation canopy: ticks survive best when there is good vegetation cover to shelter them from drying out, or from extremes of temperature, rain or frost. Forests provide the best cover to help survive. The study is now published online in the Journal of Applied Ecology.

<http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12141/abstract>

Lucy Gilbert (James Hutton Institute)

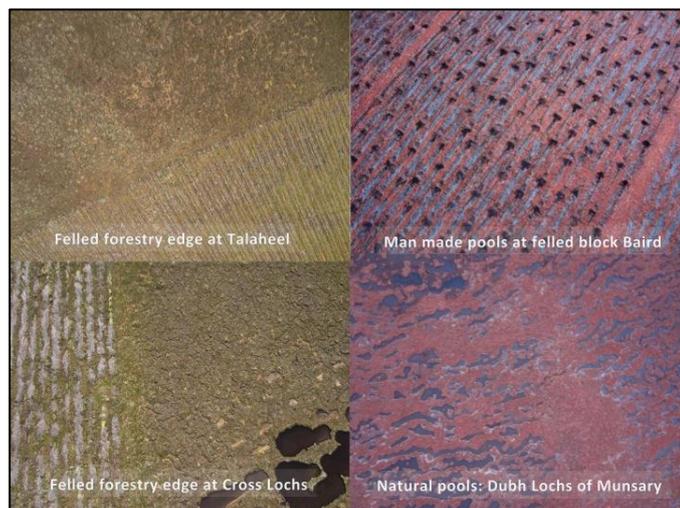
OUT AND ABOUT IN THE BOG...

The bog from above

We recently teamed up with Tim Taylor from exeGesIS to take high resolution (2.5 cm) aerial photographs at the restoration sites in the Flows with a small UAV. Together we spent the second week of August collecting data from 11 sites (> 1 km² each), including the Cross Lochs, Talaheel, Baird, Imrich, Sleach and Leir. Our data are still being processed as we collected a staggering 12,000+ images that need to be aligned, stitched and georeferenced before we can start the image analysis. We are working with the RSPB on a Scottish Government funded project to examine the changes in vegetation composition and topographical structure through the restoration process. Our data include both visual and near infrared images, so there is scope to try out additional metrics, and of course the data can be used to help model the greenhouse gas exchange measurements at the flux towers.



Left to right: Tim Taylor (Major Tim) from ExeGeSis, middle and right Rebekka Artz & Liz Bourne (Ground Control) from the James Hutton Institute, at the cottage at the back of beyond (Munsary). We ventured further ☺



Sample images from the UAV flights (approx. 50 m²). Images on the left are taken with a normal, visual range, camera. Images on the right are in the near infrared spectrum.

Ed Turner (University of Leeds) will be using some of the data for their NERC project on carbon cycling in natural pools and those created through drain blocking. The absolute highlight of the fieldwork was our final day, when we had the rare privilege of flying across the Dubh Lochs of Munsary. Do not be fooled into thinking that this was all fun though – ideal UAV conditions also equal ideal midge conditions! The collective number of midge bites may have been only an order of magnitude lower than the number of images we got. If these data could be of use to any other Flow Country Researchers, please do not hesitate to get in touch: rebekka.artz@hutton.ac.uk.

Liz Bourne and Rebekka Artz (James Hutton Institute)

Nuffield student project on water quality measures in Dyke forest streams and soil water prior to restoration

Alisha Lalmahamode of Thurso high school, undertook a Nuffield placement during July and August working at the Environmental Research Institute with myself. During her time here Alisha assisted with the collection and analysis of soil water samples from plots in Dyke prior to restoration, along with measures in forest and bog control plots. We also collected a round of samples from the 'Dyke streams' – streams draining plots to be restored and the major rivers they flow into, including the Craggie Burn, River Dyke and River Halladale. These measures form part of the pre-restoration work of my PhD – the impact of forest to bog restoration on water quality and carbon exports. Water depth loggers have now been installed, which will soon be followed by flow measurements and then I will be comparing carbon exports from forest, bog and restored streams in the near future and I look forward to updating on this. I am also about to begin collecting stream samples during high flow storm events – which are important events for carbon export calculations. All that's needed is the rain! Big thanks to Alisha for all her hard work and commitment during the placement and also to another visiting student, Geraldine Hoen, particularly for the assistance in setting up the depth loggers. *Paul Gaffney (ERI)*



Alisha setting up the stilling well and pressure sensor

Indulging in Moths

In July and August I began a moth-trapping project as part of ongoing work looking at responses of insects to bog restoration at Forsinard. As a self-confessed moth-geek, such fieldwork is a form of self-indulgence for me, despite the early mornings. It is especially exciting to carry out this work in a part of the country that is as under-recorded for moths as the Flow Country. Moths have several advantages over other invertebrate groups for such research. In particular, as insects go, most



Moth trap in position, Forsinard July 2013

moths have reasonably well-documented feeding strategies and life-histories. This enables community responses to habitat variation to be analysed, not just in terms of diversity, but also in terms of species traits. Additionally, because most moths can be identified on the spot, the catch forms instant data without the need for spending many months sorting through samples in the lab.

The number of moths that are attracted to light varies from night to night depending on a range of factors, foremost among these being temperature. Comparisons between "treatments" therefore need to be based on data collected on the same night using identical kit. For this work, I have been running four traps nightly, one each in forest plantation and in bog and two in areas undergoing restoration management. These are within the tree-felling chronosequence that a number of researchers utilise.

It will take two or three years to generate enough data for some proper analysis, but early indications are that moth abundance and, in particular, species richness are maximised in restoration areas, especially those where grasses currently dominate. Abundance is often high in forest too, although the species count is low. Especially in the earlier nights of trapping in July, a single species, Barred Red, often dominated the catch. Catches in bog areas tend to be less species-rich than those in restoration areas though the moths recorded have include a number that, within the UK, are northern bog and moor specialists; moths such as Manchester Treble-bar and Northern Arches.



Manchester Treble-bar, Forsinard, August 2013



Trap in spruce/pine forest with lots of Barred Reds.

The catches have already included several new vice-country records, and the records generated will help to fill many "white holes" on species distribution maps. And best of all, I get to indulge my moth obsession for a few weeks each summer. My thanks go to RSPB and Fountains Forestry for allowing site access for this work. *Nick Littlewood (James Hutton Institute) email: nick.littlewood@hutton.ac.uk*

THE HUB AT THE IUCN CONFERENCE

The Flow Country Research Hub and the many current research projects in the Flows were introduced to the wider UK peatland community at the 2013 IUCN Conference “Partnership for a New Peatland Era”, that was held in York on Sept. 10-12th during a joint presentation by Rebekka Artz (JHI) and Roxane Andersen (ERI). This year’s IUCN conference set the challenge of 1 million hectares of UK peatlands in good condition or under restoration management by 2020, and provided an opportunity to showcase some examples of working partnerships and early success stories. It was also the official launch of the Peatland Carbon Code (<http://www.iucn-uk-peatlandprogramme.org/peatland-code/the-code>), anticipated to become a key tool in securing the support of the businesses in future peatland work. *Roxane Andersen (ERI)*

NEW TO THE HUB!

Althea Davies, University of St Andrews

I am a palaeoecologist and environmental archaeologist, with a particular interest in the ‘recent’ past (last c.500 years) and the use of palaeoecology as a long-term ecological and land-use record to inform current environmental management. I have worked extensively in the Highlands on palaeoecological, archaeological and current land management issues. In terms of the Flow Country, I am interested in:

- How palaeoecologists can work more closely with managers to understand the peatland ecosystem and anticipate future responses, especially by looking at the overlaps between recent measurements (e.g. post-restoration, carbon flux, vegetation surveys) and longer-term records from palaeo archives (e.g. vegetation dynamics, burning, water-tables, carbon accumulation);
- How do the effects of past management on peat and heathlands compare with impacts on other habitats, including woodlands and grassland, especially in terms of biodiversity, and how have these influenced current habitat composition, structure and trends?
- In terms of the cultural history of the far north of Scotland, I am interested in what archaeology and palaeoecology can learn from the document-rich historical period about management impacts and what influenced management choices (e.g. local resource availability, wider political or social drivers), and conversely, what archaeological thinking can bring to understanding the social and land-use history of the recent past. For example, what were the ecological impacts of the Clearances, how does that affect current biodiversity, and what might that mean for interpreting past settlement dynamics?

For more details or to discuss collaboration, do not hesitate to get in touch!

Althea Davies (U. St Andrews) email: ald7@st-andrews.ac.uk

website: <http://www.st-andrews.ac.uk/gsd/people/ald7/>

The next edition of the newsletter will come out in December, please email details about grants, student progress, field work, publication or any other news to Roxane Andersen (roxane.andersen@uhi.ac.uk) before the 30th of November 2013.