

Now you see him...



...now you don't

Camouflage in action images by Ronald Surgenor at Ballynahone bog in Co Tyrone

COP onto Peatlands CANN waxes lyrical

Welcome to the Winter edition of the CANN newsletter. An ever-present background for our work over the last 6 months has been the hope for a successful outcome for the COP26 summit. In addition to agreeing cuts on harmful practices, one of the key purposes of the conference was to showcase the most beneficial methods of carbon capture as a way of minimising the impact of the climate chaos that is undoubtedly on the horizon. One of the central messages has been that nature-based solutions, such as the ones that CANN are delivering, are relatively cheap and straightforward and, as well as producing results for carbon sequestration, also benefit the biodiversity crisis (the poor and less-frequentlymentioned cousin of the climate crisis). In fact, a key finding is that one cannot be solved without addressing the other.

As a method of raising awareness of peatland science in the run-up to COP26, the CANN project on Twitter published a series of posts using an ancient form of Japanese poetry, the haiku, (or in this case, the "sci-ku" or scientific haiku), to communicate key nuggets of peatland science with a twist. The sci-ku is short and



Newsletter Edition: 7 Winter 2021/22

The CANN project is supported by the EU's INTERREG VA Programme, managed by the Special EU Programmes Body (SEUPB).

COP onto peatlands their carbon, water, nature fighting climate change

sweet, with just 17 syllables. Anyone can write one, and distilling the scientific principles and messages into this most concise mode of communication appeals to scientists. Arts have a huge role in communicating science to non-scientists and can be a valuable bridging tool in interpreting



scientific ideas. We were told to "COP on to Peatlands" in the sci-ku that was used to launch the booklet of the collected poems published online on the last day of the summit. Explore our more lyrical side: <u>https://thecannproject.org/publications/</u> booklet-of-peat-based-haiku-sci-cu-poems/

Cross party political visits



Clockwise from top left: 1 Edwin Poots (MLA DUP) probing the peat and 2 speaking to Jennifer Fulton (CEO UW) at Cuilcagh. 3 Edwin Poots (MLA DUP) with Trish Fox (UW) at Peatlands Park. 4.Chris Hazzard (MP SF) exploring Cuilcagh with Michelle Gildernew (MLA SF) and 5 Cathy Mason (Chair of Newry, Mourne and Down District Council at Cuilcagh and finally, 6 Conor Murphy (MLA Minister for Finance SF) again at Cuilcagh

With the freeing up of travel regulations, our sites have played host to a constant stream of politicians on fact-finding missions. In May, Edwin Poots MLA explored Cuilcagh, focusing on meeting farmers tackling the net-zero carbon challenge. He heard from local farmers John Sheridan, whose land has been badly affected by erosion, and Aidan and Pascal McGovern, who have been trained, by the project, to carry out delicate restoration work on eroded peatland. Mr Poots also visited Peatlands Park as Minister for the Environment. On this visit he launched the consultation of the new Peatlands Strategy for Northern Ireland and spoke with Dr Trish Fox, our Senior Technical Officer, about plans for drain blocking on



the site. At these events, interpretive panels printed onto lightweight corriboard explaining aspects of the work were used as portable visual aids.

Next to visit Cuilcagh was Cathy Mason, the Chair of Newry Mourne and Down District Council, Lead-Partner in the CANN project, she also invited Chris Hazzard MP for South Down and Michelle Gildernew MP for Fermanagh and South Tyrone. The sun shone as the party examined how coir logs had been laid across eroded peat hags near Lough Atona. Finally, braving the blustery weather of October, Finance Minister Conor Murphy MLA, visited Cuilcagh to discuss the financial costs of re-wetting upland bogs and the financial implications of not doing so. This visit was of particular significance as the COP26 was on the horizon, and Ian Garner of Ulster Wildlife, was able to explain his project looking at the cost-benefit analysis study of dealing with accelerating peatland erosion in Northern Ireland (see more about this on P12).

PEATLAND RESTORATION USING LOCAL MATERIALS

A STEP-BY-STEP LOOK AT HOW ULSTER WILDLIFE IS USING NATURAL MATERIALS TO KEEP THE WATER WHERE IT NEEDS TO BE.

Robocut in action

CUTTING HEATHER

Heather full of well set seed was chosen from an area outside the SAC. Checks were made for heather beetles which can spread. Both an Aller seythe with reciprocating blades, and our Robocut were used to cut the heather on a dry day to ensure did not compost in the bags . The Robocut is great in rougher areas as this can be used with a remote control making it safer for the operator.

²The heather brash which had been semi-mulched by the Robocut was gathered by hand and taken to the bags. The Allen scythe was able to cut longer stems intact without mulching and these were used fo baling.

quad and traile

Iron horse featuring load bed

made from an old door

nova ouchers 3

1

the Allen Scythe

TRANSPORTATION

Mature heather can be difficult to find and transport from remote sites. The farmer who owns the land kindly lent us a quad with a trailer to help remove it from the cutting site, saving labour and time. We then brought it to the remote and sensitive area at ough Atona using the Iron Horse which spreads the weight evenly on the delicate peat.

BALING HEATHER

A box bailer was a traditional mechanism used on small holdings to create haybales on family farms and was an ideal design for our trial of heather ales rather than the cost and complex logistics of eavy machinery. Our Heath Robinson contraption, designed and built by UW's Ronald Surgenor, worked well with a little trial and error.

SHEEP'S WOOL LOGS

The idea of using sheep's wool as an alternative to coir (which has to be shipped in from India) came from local farmers Terry and Aiden McGovern, who carried out the restoration at Lough Atona. They tightly packed the fleeces into coir netting tubes. Once placed they immediately started holding water back. We will see how they hold up over time.

PARTNERSHIP FOR INNOVATION

Some people have criticised the carbon footprint of coir and at the same time local farmers have unused wool which they cannot sell. So CANN partners, Armagh, Banbridge and Craigavon Council, helped the McGovern's to apply for Invest NI's Innovation funding to investigate the potential for development of these sheep wool logs with the assistance of another CANN partner,

IT Sligo.

The unbaled heather is spread onto areas where, even after rewetting with coir , sections of the bare peat are sitting high and dry. The heather will artisan heather baler act as a mulch insulating the peat from frost heave in winter and desiccation in summer. It will trap moisture and make more suitable conditions for germination and provides an extra seed source for re-vegetation

> 5 The baling wasn't 100% effective (as we said, trial and error!) and not all the bales stayed together. As they are looser than the coir rolls, they will be used on flatter areas with lower flow, but they will work with the coir located in the steeper gullies to rewet and re-vegetate the peat.



WORKSHOPS AND TRAINING

In November, we organised a Peatland Restoration workshop. Participants from our sister CABB project, the water service, academia, local farmers and CANN partners gathered on Cuilcagh to lend their labour in return for training in this new material and the techniques for laying them.

Scrub control at Bomackatall

Bomackatall is one of the four Fairy Water Bogs in County Tyrone. Many raised bogs like Bomackatall have a natural woodland periphery. However, because of the building of drains historically, which are still working, this woodland can begin to creep out onto the bog surface, further drying the peat and allowing more seedlings to germinate.

At Bomackatall, this peripheral woodland was becoming quite established with several large pines and sycamore as well as ash, willow and holly. So in September, the Ulster Wildlife CANN team tackled clearing this scrub. Clearing this scrub has two benefits: it will allow an adjacent area of devil's bit scabious, the foodplant of the Annex II species marsh fritillary to expand, and it will enable a clear field of view over the bog for one of the owners, which means he can now see if there is anyone out on the bog, acting as an early alarm for wildfires and arson and preventing illegal shooting.





Hoverfly Eristalis tenax (f)



Green-veined white Pieris napi

Hoverfly Sericomyia silentis



Photos by Trish Fox / UW. Devil's Bit Scabious habitat and some of the other pollinators that will benefit from the scrub clearance.

The larger trees were tackled by Simon Gray and Ronald Surgenor using electric chainsaws to prevent petrochemicals from getting out onto the bog. They were trained as part of the programme of training for staff and volunteers, organised by CANN partner Armagh Banbridge and Craigavon Borough Council. Loppers and saws were used to clear the smaller plants.



New techniques tested at Corbally

Corbally is one of four alkaline fens that makes up the Lecale Fens SAC in Co Down. These fens are calcium-rich and host several plant species that are considered characteristic of undisturbed wetlands and include areas of very rare mire vegetation. They are also home to the Desmoulin's whorl snail and the endangered marsh fritillary butterfly. One of the main risks for the site conservation status is scrubbing up and lack of appropriate grazing to keep the right



mix of grasses and herbs.

In September, a trial was undertaken using the Robocut to cut rank vegetation in the northern area of the fen. Although some areas were too wet for even the Robocut to handle, this trial was very successful. The vegetation was cut, then raked by hand and put into builder's bags. The robocut then dragged the bags off-site. The team

are now planning to





strim the vegetation around an electric fence that has been installed to facilitate the introduction of stock in line with fen management guidelines. Options under an Environmental Farming Scheme (EFS) are being explored with the site's owners to graze the site lightly from June to December (0.075 livestock units/ha).

An **EFS** is a volun-

tary agri-environment scheme that supports farmers and land managers to carry out environmentally beneficial farming practices on agricultural land. **Livestock Units** (LUs) are a way of comparing the nutritional requirements of grazing animals. They help calculate stocking densities. One mature milking cow in calf per hectare per year is 1LU.



Testing times for Testate Amoebae

The effect that restoration has on a peatland can take time to become apparent, so after restoration occurs, peatlands must be monitored to understand how our efforts have impacted each site. Traditionally, this can be done in several ways: measuring the water-table and overall wetness of a site, observing the sphagnum moss cover, and even by seeing how common heather or purple moor grass have become. Unfortunately, these methods can take time and require a trained person to travel to the peatland to record what they see, which is not always possible due to the remoteness of a site or due to weather conditions.

A unique method to assess the success of peatland restoration might be to see how communities of microorganisms react to this restoration. One such group of microorganisms is testate amoebae.



What are Testate Amoebae?

Testate amoebae have a hard shell surrounding them (this is called a test and is how they get the *test* ate part of their name). This shell helps protect them from predators and the environments they live in. This shell also means that they preserve well and can be found in ancient peat buried far beneath the ground. This can be very useful in understanding the history of peatlands. Their robustness also makes it easy to study them today.

How can Testate Amoeba help in Peatland Restoration

Different kinds of testate amoebae respond quite quickly to different moisture levels, making them a potential bio-monitoring tool for drain blocking. They can be observed in various kinds of peatlands, with damaged peatlands having different communities of these testate amoebae than healthy

Testate Amoebae contd.

peatlands, and different again from peatlands that were damaged but have since been restored. So, by looking at the kinds of testate amoebae present in a sample, you can understand the condition of the peatland. For example, if a peatland has been recently restored, but the communities of testate amoebae do not show the peatland to be in a healthier state, it can be a sign that the restoration is not working as intended.

A new study at Queen's University, Belfast

In partnership with Ulster Wildlife, Callum Evans, a PhD student at Queen's University Belfast, will be conducting experiments with testate amoebae collected from different peatlands across Northern Ireland. The study will examine samples of testate amoebae from these peatlands

before and after restoration has been carried out to further understand how these microorganisms can be used to quantify progress and fine-tune future restoration efforts.

In this wonderful picture Callum is getting really stuck in to his new field of study at Peatlands Park. Ulster Wildlife has been collecting and freezing Sphagnum samples (and their loads of amoebae) from Ballynahone, Cranny bogs, Garry Bog and Peatlands Park for several years. These samples have now been passed to Callum for analysis.



© Cash and Hopkinson 1909 from Microworld website

This little fellow, *Hyalosphenia subflava,* is a species that we would be happy not to find as it is a dry-



indicator, present only in drained and degraded peatlands or areas with rapidly fluctuating water tables. The other species pictured in the line-up on the last page are typical of heathier peatlands , as they all prefer wetter conditions, and are found in pools, submerged sphagnum, and bog hummocks, all waterlogged habitats that are less common in degraded peatlands. A wonderful output of this project would be a simple ID guide linked to precise condition ranges for each species. Samples could be taken by non-experts and the amoebae identified in the lab,

giving us a real insight into how the bogs are responding—a very exciting field of study indeed.

Behind every great CAP is a great MAP

One of the key deliverables of the entire CANN project is researching and writing Conservation Action Plans (CAPs) for all 27 sites that the project has been involved in. These plans have guided CANN's work to date and will help direct further work in the next ten years.

Behind every CAP produced is a massive amount of research, mapping and surveying. Much of this is carried out by CANN partners, AFBI (Agri-Food and Biosciences Institute). However, they labour behind the scenes and don't receive much attention.

In line with best practice developed over the years across the whole of Europe, preliminary mapping of each site is carried out using polygons on a Geographic Information System (GIS)

called ArcMap. This mapping is then followed up with ground-truthing (seeing what is actually there) and recording species using a hand-held GIS called the Trimble Geo. This is supported by paper maps . Teams of 2-4 people map each site. On P10-11 there is an article about the 'newfangled 3D imagery' that has been developed by project scientists, which will make a valuable contribution to this work in the future and could well change survey and mapping techniques to make them easier and faster.





Habitat mapping is based on the most recent OSNI/LPS ortho-imagery. An orthoimage is a uniform-scale image where corrections have been made for feature displacement for hedgerows and trees and scale variations caused by terrain, relief, sensor geometry, and camera tilt. Habitats are classified according to the European Nature Information System (EUNIS), EC Habitats Directive Annex I, and Phase 1 Habitat Survey classifications. In addition, surveys were carried out identifying areas affected by Invasive species.

The maps produced are vital in planning our work. For example, this map (left) of Corbally shows precisely the three areas where scrub is invading over alkaline fen outlined in turquoise. In October 2021, Ulster Wildlife staff removed invasive ash, willow, gorse and blackberry from the densely scattered zone (marked bright yellow). They were also able to tackle about half the widely scattered scrub (outlined in turquoise).



Similarly, detailed mapping of Tully Bog has allowed focussed removal of rhododendron down to the level of a single bush.

Further mapping of our sites has been carried out by hydrological engineers from the RPS, Group. They took the airborne LIDAR data that Ulster Wildlife had obtained for all the SACs,



and analysed it using slope and water table information to direct the drain blocking programme.

Their maps define where we can block drains, getting the most bang for our buck, and plan future potential works for the Conservation Action Plans.

As Dr Trish Fox, who heads up our CAP team, says, **"Behind** every great CAP is a great MAP!"

Do 3D Habitat-Mappers dream of electric sheep?

IT Sligo has recently procured novel imaging technology to realise Cuilcagh Mountain SAC/Cuilcagh-Anierin SAC cross-border complex in high-resolution 3D. Post-doctoral researcher, Dr Hagen O'Neill, used this technique to create a highly detailed habitat map, and there are many advantages to using this technology.

Traditionally, habitat mapping involves two components: initial desktop interpretation of the site of interest using satellite and airborne imagery and subsequent fieldwork to verify the created map - also known as 'ground-truthing'. Upland sites can be an expensive and challenging exercise to ground-truth; these areas tend to be difficult to access and feature complex mosaics of related habitats throughout large, contiguous tracts of land. Ground-truthing is often the most time-consuming and costly of the two stages. The poorer the quality of the initial imagery, the more time is needed for this ground-truthing step to clarify visually abstract or ambiguous issues found on the map. Cost-effective measures look to increase the accuracy of the desktop mapping aspect, which will decrease the time needed for boots on the ground.



At 125km², Cuilcagh presents a daunting task for all but the most masochistic habitat mapper.

This is where stereo colour infrared (sCIR) aerial imagery takes centre stage. The novelty of this technique is twofold: the use of nearinfrared imagery; and digital stereo (3D) visualisation of the imagery using a specialised 3D workstation. However, to appreciate why nearinfrared imagery might help us map habitats, we need to forget about the wild and wonderful world of ecology for a moment. Imagine instead, your teenage years and recall your basic physics class (the

cool kids who didn't need no education can refer to their 'The Dark Side of the Moon' poster instead).

When we visualise the world around us, we perceive objects by the light they reflect in the visible spectrum, e.g. a strawberry looks 'red' because all light in the visible spectrum is absorbed except for red, which reflects back into our eyes. Plants and vegetation, some exceptions aside, tend to reflect green... and....well...not a whole lot else. However, foliage comes to life in the near-infrared spectrum and reflects a much wider spectral signature. What was once brown heather, greeny-brown rushes, and browny-green grasses now show up as muted pinks, electric blues, and pastels (think of the suits in Miami Vice!). A previously dull, amorphous brown-green landscape is transformed into an amazing technicolour dreamland, allowing the user to discern differences between habitat and vegetation types more easily.

The 3D element, figuratively and literally, adds another dimension. This nearinfrared imagery can then be viewed in the context of slope, aspect, canopy height, and the layering of different plant species. Essentially, it describes the 'textural' quality of vegetation. For example, rank heather and young heather might be a similar colour but will differ in terms of architecture. The power of near-infrared colour in full-3D is surpassed only by the Eye of Sauron in terms of remote sensing. In October 2020, Bluesky International Limited flew over Cuilcagh and captured images of the entire site in sCIR. However, this photography is only one piece of the puzzle; we needed a state-of-the-art 3D workstation to visualise this imagery. Leading German IT company Schneider-Digital GmbH supplied patented hardware in the form of the **PluraView**. This dual screen monitor overlays two



duplicate images via the ominously named 'beamsplitter', thus creating the 3D effect. Finally, viewing maps in 3D requires dedicated software, and our Hiberno-Teutonic links were strengthened by the acquisition of the 3D viewer **Summit Lite** from another German company, DAT/EM Systems Europe GmbH.

Currently, the 3D habitat mapping of Cuilcagh is well-underway. The accuracy provided by this technology has offered unexpected benefits: the extent of bare peat, not only the location but the size of Sitka spruce invasives, and even the condition of specific habitats can be determined. However, the process can be very taxing, even a misspent youth playing Nintendo could not prepare eyes for the strain of constantly switching from 3D to 2D. Luckily, as ground-truthing is still critical to producing a habitat map, we do get a few breaks - you need to get out into the field and swap Windows and Gates for fences and stonewalls, hard*ware* for hard*work*, and bugs for...well...bugs.

Habitat management on Sliabh Beagh



The team from CANN partners, Monaghan County Council, have been busy on the two Sliabh Beagh SACs.

One year on from installing 2200 peat and wooden dams across the blanket bog, some really positive results are in, especially evidence of active sphagnum growth in the borrow pits from the dam construction

Work began on removal of conifers from the bog in February. The team had to halt again during the bird breeding season (March—September), and was finished in October. The pines were all cut by hand and the felled trees were all removed from the SAC. Pines are great at catching wind-borne pollutants so we did not want to leave them in the SAC.



Investing in the Future : Peatland Restoration

Dr Ian Garner from Ulster Wildlife, presented on current peatland research in Northern Ireland to Finance Minister Conor Murphy when he visited Cuilcagh in October. The work is funded by the Esmée Fairbairn Foundation and the James Hutton Institute. Ian commented that from a cost/ benefit perspective, investing in peatland restoration in support of net-zero aligns well with the UK Committee on Climate Change's report and that the ratios seen are in the range of 1: 2 to 1: 10. The CCC set a target of changing the land use sector from a net carbon source to a net sink by 2030.



About 8% of the UK's peatlands are in Northern Ireland and about 88% of this needs protection and restoration. At current rates it would take 10 years to restore only a quarter of this, so we need to accelerate this work. There is no silver bullet for fighting carbon emissions, we can't wait till 2030 or even 2050 and do it all then. We need to start NOW! There are no non-radical pathways left. We change or get changed!



Pesky Ponticum, a Pain in the Peatlands



The first thing that may spring to mind when you hear the word Rhododendron may be a pretty garden shrub! However, one particular species, the invasive, non-native Rhododendron ponticum, with its masses of purple flowers, causes huge problems on our peatlands and seriously contributes to biodiversity loss across Ireland and Scotland. The thousands of seeds that each flower produces are light and dispersed by wind or water so the plants spread easily. They can also reproduce vegetatively, and as long as the parent shrub grows on dry land, offshoots can survive in really wet conditions, leapfrogging across bogs. The shrub grows up to 8m tall, towering over other species, blocking light and actually giving off a chemical into the soil that stops other seedlings from growing. It can poison livestock and literally sucks bogs dry.

Eradication of such a pernicious plant is difficult, young plants can be uprooted by hand, but larger shrubs have to be cut manually with loppers and chainsaws and the stumps treated with herbicide. Due to its scale, persistence and ease of spread, Rhododendron control will only be successful if work is planned at a landscape scale with thought given to long term management and control.

Rhody control has been a big part of the project's work to "move hectares of land towards favourable conservation status" at many sites.

At Drumnafallow in the Fairy Water bog complex, work to combat rhody was initially started by contractors in 2019 and after that, in 2020–21, carried out by Ulster Wildlife staff and volunteers.





Before (November 2018)

wild raspberries.

At Tully Bog, one huge rhododendron plant was a super-seeder due to its maturity and size, and had the potential to diminish the conservation status of the whole site. So this monster was removed and stumps sprayed, and today all that is left is dead wood and a delicate new growth of

After (September 2021)

Follow up treatment to paint herbicide on the just-cut stumps is vital to prevent re-growth, as is annual work to remove new seedlings from seeds that were dormant in the soil. The site was also remapped by AFBI to define the threat and plan further management and treatment.







Before (Winter 2018)

After (Summer 2021)

Birds and Bees Survey updates

On Islay, regular random health checks are carried out to ensure that habitats are in tip top form. In August one of the randomly assigned survey points turned up a huge surprise for our Conservation Officer: a colony of the rare orchid Irish Lady's Tresses. These lovely plants are only found in 4 other sites on Islay



and a total of 14 flowering spikes were found, making this is the greatest number at any single site to date.



Late breeding success of red grouse on Sliabh Beagh was noted this year with several coveys of more than 10 chicks each recorded by CANN partners, the Golden Eagle Trust. The team from Monaghan County

Council have been supplying grit trays to help these birds.

And finally, despite increased disturbance the hen harriers have had a fairly successful year. On Sliabh Beagh three nests fledged 4,1 and 1 chicks respectively; on Cuilcagh two nests fledged 2 and 3 young, and on Islay, one nest fledged 3 chicks.



Project Partners

Lead Partner: Newry, Mourne and Down District Council (NMDDC).

- Agri-Food and Biosciences Institute (AFBI);
- Argyll and the Isles Coast and Countryside Trust (ACT);
- Armagh City, Banbridge and Craigavon Borough Council (ABCBC);
- East Border Region (EBR);
- Golden Eagle Trust (GET);
- Institute of Technology Sligo (ITS);
- Monaghan County Council (MCC);
- NatureScot (NS);
- Ulster University (UU);
- Ulster Wildlife (UW).

The CANN project partnership also works very closely with National Parks and Wildlife Service (NPWS) in Ireland and the Northern Ireland Environment Agency (NIEA).

Project Funding

The CANN project is supported by the EU's INTERREG VA Programme, managed by the SEUPB. Match funding has been provided by the Department of Housing, Planning and Local Government (Ireland), the Department of Agriculture, Environment and Rural Affairs (Northern Ireland), and NatureScot (Scotland).



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