

# NEWSLETTER



Ainsdale NNR, photo by Nathalie J. Hunt via <https://www.flickr.com/photos/29979480@N03/>

## Last Summer's Vegetation & Soil Surveys

Well, we made it out there! We held in-house vegetation surveys at Ainsdale Sand Dunes, Derbyshire Dales and Fenn's, Whixall & Bettisfield Mosses National Nature Reserves, with a total of 93 Natural England staff and 13 external volunteers taking part. We won't go into the processes and risk assessment iterations, rather remember the pleasures of meeting up outdoors and huddling over the conveniently sized 2m<sup>2</sup> permanent plots; and, greatly improving our botanical ID skills on sand dune, limestone grassland and lowland raised bog. We did a wellbeing survey too, which showed that surveyors were significantly more satisfied with life and happier, after taking part in the LTMN surveys!



Soils sampling happens in the autumn. This time, we bravely took on eight sites, which was double the normal work for Dr. Matt Shepherd, LTMN team and NEFU diehards, and site staff. Each site has five large permanent plots, within which are four 2m<sup>2</sup> sub-plots. Sampling must never take place in the same location, so the sub-plots have to change position each round, and we have to be really careful setting up, using the permanent marker as reference, along with photos, compasses, tape measures and high accuracy gps. Then, we set too, digging holes in an extremely meticulous fashion and dropping samples into labelled bags. It's fantastic fun!



The Long Term Monitoring Network is the daughter project of the Environmental Change Network (ECN), which aims to track long-term environmental change across a range of habitats, as well as the possible drivers of change.

We record vegetation, butterflies, soils, climate, air pollution and land management through regular surveys and on-site monitoring.

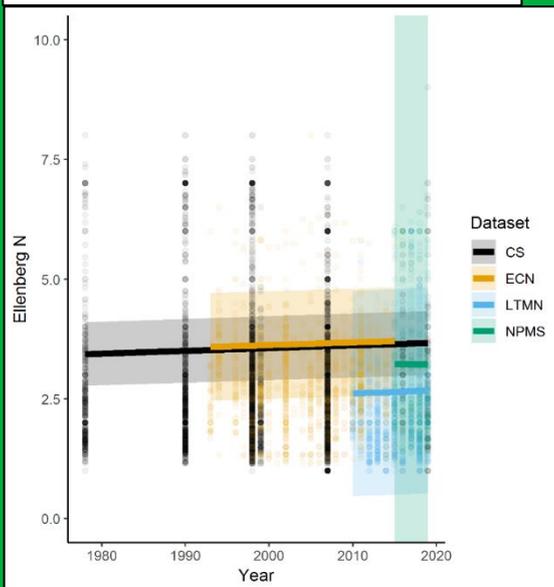
There are 37 sites representing 10 target habitats across England. The project began in 2009 with some sites now having 2-3 years worth of data.

Data is available through Natural England's Access to Evidence catalogue.

Long-term data like this is key to tracking the impacts of things like climate breakdown on our environment.

## Can combining LTMN data with other long term datasets improve our understanding of vegetation change?

**Figure 1:** Trends over time in Ellenberg N for each vegetation monitoring scheme. Confidence intervals are shown around the fitted trend.



*The UK Centre for Ecology & Hydrology did an interesting study, which we mentioned in a previous newsletter but here are the key results.*

Our LTMN vegetation data was combined with Environmental Change Network (ECN), Countryside Survey (CS) and National Plant Monitoring Scheme (NPMS) data, focussing on heath and bog vegetation, to see if this provided greater analytical power and improved understanding of vegetation change.

Raw datasets were standardised, vegetation indicators selected and several rounds of modelling carried out.

Ellenberg values, which indicate plant species' environmental preferences, proved especially useful, as there was tight agreement between the schemes for rates of change for Ellenberg N (soil fertility) and Ellenberg R (soil acidity), although the average levels were different.

Common Standards Monitoring (CSM) positive and negative indicator plant species proved less useful, as there was substantial disagreement between schemes in the temporal patterns.

Air pollutant loads (sulphur and nitrogen) and climate (annual precipitation, July temperature, January temperature), were introduced as co-variates to try to explain variation and change in the integrated Ellenberg signals.

Out of this boiling pot came new evidence for the link between nitrogen deposition and long-term change in Ellenberg N in UK heath and bog vegetation. Ellenberg N was found to increase in CS, ECN and LTMN datasets at a remarkably similar rate, which was striking, given that LTMN commenced only in 2010. Such a trend towards more nutrient-loving plant species appears to have occurred over many years and is continuing – although it was not possible to determine if this is a lagged response to the historical load or a more dynamic response to nitrogen deposition and soil accumulation.

The results also supported the hypothesis that reduction in sulphur deposition has been a key driver of change in Ellenberg R i.e. vegetation recovery, although it was not possible to discount the importance of other drivers. There was some evidence that this response was less in peaty soils, possibly due to buffering by the soils' natural organic acids.

Overall, the study highlighted the individual value of all these schemes, each of which was established for different reasons, and the added value of bringing their various spatial and temporal strengths together in a single analysis.

For further details see:

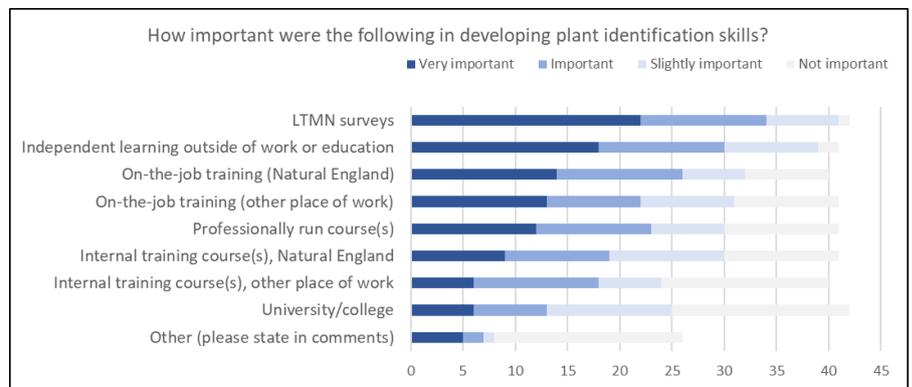
Risser, H.A., Jarvis, S.G., Henrys, P.A., Maskell, L.C., Tomlinson, S.J., West, B., Smart, S.M., & Monteith, D.T. (2021). Harmonisation and integrated modelling of UK long-term vegetation data: a case study focussed on heath & bog habitats [Final report in draft].

## The benefits of attending LTMN vegetation surveys

We asked the attendees of the 2021 in-house vegetation surveys to complete two questionnaires, the first one a week or two before the survey started, and the second in the week immediately after the survey. Both questionnaires were anonymous and could have been completed in less than 5 minutes. There were 55 responses to the first questionnaire and 43 to the second out of a total of about 80 potential participants. LTMN team members didn't complete the questionnaire, but volunteers who don't work for Natural England were encouraged to take part and weren't identified separately in the results.

The purpose of the questionnaires was to make an initial assessment of any wellbeing and training benefits of the surveys, so that the results could be used as part of the evaluation of LTMN and in planning the future of the project.

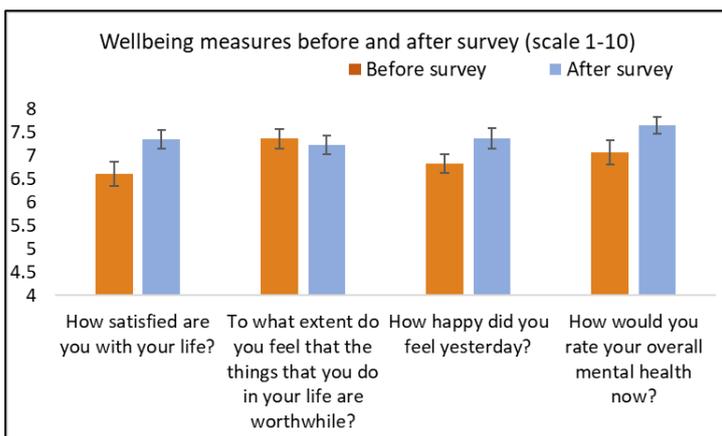
For those who responded, LTMN was perceived, collectively, as being more beneficial than any other mechanism for developing plant identification skills. Restrictions on numbers because of Covid meant that we had a high proportion of skilled surveyors taking part in the 2021 surveys. We asked a similar question about the importance of different mechanisms for learning about plant ecology and monitoring and again LTMN surveys were collectively perceived as the most important.



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We also asked a question about the motivation for taking part in the surveys. Although when all responses were included the most important reason for taking part was the enjoyment of the survey, those who require plant identification skills for their jobs collectively scored identification skills and ecological knowledge as the most important reason for attending LTMN surveys. From the 23 answers to the free text question "Are there any other comments that you would like to make about the impacts of LTMN surveys on you or your role in Natural England?", references to the benefits of in-person connections with others, particularly when this has been lacking due to home working, national team working, or the pandemic, was most often mentioned (by 13 responses). The other most common themes were the boost to identification skills (9 responses) and boost to mental health (8 responses).

Finally, in both questionnaires the attendees were asked some standard wellbeing questions. Three of the four wellbeing questions indicate an increase in wellbeing levels after the vegetation survey, and when analysed using T-tests the results were significant for the first, third and fourth questions.



This has been a quick and simple survey, and it would be useful to look at the subject in more depth in future years. The initial indication is that it would be beneficial for LTMN to be considered as a strategic solution for upskilling staff where this is necessary.

We would like to thank everybody who completed the surveys, and to request that if you attend vegetation surveys in 2022 that you look out for a similar request and please answer the questions if you can. It should be quick and painless! If anyone has a particular interest in this and is able to offer any help or advice, please do get in touch.

## ***LTMN protocol development: Lichen identification***

Lichens form part of many of the vegetation communities LTMN repeat monitors across our site network. In practice however the standard of lichen recording within permanent vegetation plots has varied between surveys and sites over the years, due – mainly – to the availability of lichen expertise on each survey, the relative importance placed on recording lichens per se at different times (logistically as well as ecologically), and to differing opinions regarding whether lichens (and indeed bryophytes) growing on substrates other than ‘soil’ should be recorded.

Given that lichens are not just integral components of many semi-natural habitats but also key indicators of environmental conditions, we have been reviewing and seeking to improve our approach to lichen monitoring within LTMN. This on-going work is concerned both with how we make lichen monitoring within our permanent vegetation plots more comprehensive and consistent across surveys, and also with investigating the scope for using lichens as indicators of environmental factors (especially air quality) more widely across our sites in the future.

LTMN is now in the process of producing a lichen recording protocol that will enhance the existing LTMN vegetation survey protocol. The aim is to enable non-experts to at least record the morphological types of lichen present, and where possible record readily identifiable species. This will give us a better picture of lichen diversity within vegetation plots and potentially further afield. We are very fortunate (and grateful!) that former LTMN team-member and lichen enthusiast Susie Smith is leading on producing the lichen guidance sheets for use on our surveys.

The first guidance sheet will focus on terricolous (ground-dwelling) lichens, and covers key species and morphological categories of Cladonia lichens along with some other groups. For those of you who plan to attend future in-house LTMN surveys prepare to get your eye in for heathtails, pixie-cups, squamules and crusts amongst other things!

Lichens are organisms usually composed of a fungus (the mycobiont) and one or more algae and/or cyanobacteria (the photobiont) existing in a symbiotic relationship. They exhibit a range of growth forms (both between and within species) and are taxonomically complex, meaning that identification to species level can be difficult and generally requires a certain level of expertise.

The unique physiology of lichens makes them particularly sensitive to certain environmental factors, which in turn means they can be useful indicators of environmental and habitat conditions. Air pollution levels, including atmospheric nitrogen and (largely historically) sulphur, have an impact on lichen species composition, with this being more clearly measurable in epiphytic communities (where the relationship is less complicated by other factors). Light levels are another important factor, and where light levels diminish this is generally unfavourable for lichen diversity (and could for example be a secondary effect of nutrient enrichment leading to more shading at ground level).

We plan further guidance sheets on saxicolous (rock dwelling) and corticolous (bark dwelling) lichens, and aim to make guidance sheets that are site-specific where there are key species / assemblages present. We are also currently commissioning external lichen contractors to survey a number of our sites where information is scarce, and this will help inform both the guidance sheets and our plans for LTMN to make wider use of lichens as environmental indicators in the future.



# SPOTLIGHT ON A SITE – INGLEBOROUGH

The mountain of Ingleborough has supported the livelihoods of countless people who've lived and farmed in its shadow for thousands of years. Swathes of bare limestone slabs stretch across the skyline to meet the likes of abandoned Viking settlements and crumbling limekilns. Drystone walls ramble through hay meadows like footprints left behind by the farmers that built them. The entire landscape has been steadily moulded by human influence which has made for some of the Yorkshire Dales' most breath-taking views. However, like most of the British countryside, its land has been stripped bare as the previous century saw considerable farming intensification and over grazing. Some areas currently managed by NNR staff have demonstrated the site's potential for restoration by reducing grazing pressure across a 25-year time period, allowing shrubs and small trees to re-establish. The enhanced diversity of plants in these areas has made way for the beginning of an even bigger rewilding project that will conceivably transform the site for the better!

The Wild Ingleborough project was launched as recently as Summer 2021 as a collaborative effort between the Yorkshire Wildlife Trust, The University of Leeds, Natural England, The Woodland Trust, The United Bank of Carbon and WWF. Its primary focus has been to broaden Ingleborough's native woodland and rehabilitate its peat bogs to both remove and store carbon as well as reducing instances of flooding. The area's natural tree line will be restored in part through natural regeneration and partly through tree planting across areas where seed banks have depleted. This will increase connectivity between nearby nature reserves and encourage the return of vulnerable species such as curlew – of which there are only two pairs remaining within the project area.

By working closely with local farmers and landowners to assist in the creation of a wilder Ingleborough, the project aims to embrace the local community as an integral part of any positive impacts the project will have. Financial incentives will be provided to farmers utilising more sustainable farming practises and the University of Leeds will carry out academic monitoring of the project to provide evidence for a restorative approach that is still relatively new. This has the potential to encourage new policies that will benefit rural communities as well as nature recovery.

The first phase of Wild Ingleborough has already begun with 3,000 native trees planted across 300 hectares of land. For anyone interested in rewilding, Ingleborough is sure to become a blueprint in restoration that would be unfeasible to miss.

Located along the northern face of the West Yorkshire three peaks' second highest mountain, Ingleborough NNR covers approximately 1,014 hectares as part of a larger SSSI. The summer of 2022 will mark the fourth LTMN survey of the site with the first taking place in 2010: a year after the project first began. There are 50 permanent plots across a variety of habitats, just 2 of which can be described as woodland plots.

Ingleborough exhibits an impressive variation in its geology, generating a range of habitats across the site. Small base rich wetlands are painted with clusters of Bird's-eye primrose and iconic limestone pavements contrast with patches of Bloody crane's-bill. Sprawls of Juniper across limestone rock outcrops lead to calcareous grasslands where Wild thyme wafts through the air and Common rock-rose can be found. The full range of moorland habitats occur as acid soils deepen to create upland dry heath, dominated by Bilberry and Purple moor grass. Across the wetter boggy areas tangles of Cranberry creep through beds of moss and Round-leaved sundew.

Visitors to the site can also expect to witness some of the stunning wildlife that is supported by Ingleborough's dynamic landscape. Species that call the NNR home include the Short-eared owl, Black grouse, Cuckoo, Brown argus butterfly, Red squirrel and Roe deer.

For more info please visit:  
<https://www.wildingleborough.com/>

## Student Placement: My Experience

My name is Jade Brooks-Johnston, I am an undergraduate Wildlife Biology student at Manchester Metropolitan University. My placement with Natural England started in June 2021 so I have been fortunate enough to take part in both vegetation and soil surveys this year. The ongoing pandemic has made it difficult for students like me to complete fundamental practical work throughout my course so being given the opportunity to spend so much time in the field has been invaluable to me. My botanical ID skills grew exponentially as I began with virtually zero prior experience and ended the summer with albeit basic – but very much improved! – knowledge of vascular plants in a variety of habitats.

As my time as part of the long term monitoring network is briskly coming to an end, I wanted to express my gratitude to all of the Natural England staff who've gladly shared their knowledge and unique perspectives with me throughout the last nine months. I truly wish you all the best of luck in the future.

## Looking forward to this summer

The 2022 Vegetation Surveys are just around the corner!

The Lizard,  
Cornwall,  
20<sup>th</sup> – 24<sup>th</sup> June

Saltfleetby -  
Theddlethorpe  
Dunes, Lincolnshire,  
4<sup>th</sup> – 8<sup>th</sup> July

Dersingham Bog,  
Norfolk,  
25<sup>th</sup> – 29<sup>th</sup> July

Ingleborough,  
West Yorkshire,  
15<sup>th</sup> – 19<sup>th</sup> August



Round-leaved sundew at Dersingham Bog, Norfolk



The Lizard NNR, photo by Reiner Göttinger via <https://flic.kr/p/2iNMDJ7>

## The LTMN Team – Who's Who?

**Kate Fagan**, Senior Advisor – Project Manager

**Matthew Shepherd**, Senior Soil Specialist – responsible for the soils protocol

**Dan Pedley**, Lead Advisor – responsible for the air quality protocol and weather protocol

**Sarah Grinsted**, Lead Advisor – responsible for the vegetation protocol and butterflies protocol

**Victoria Sloan**, Lead Advisor – responsible for the land management protocol

**Elise McDowell**, short-term Lead Advisor – data analyst

**Jade Brooks-Johnston**, Student Placement – responsible for data quality assurance and general support

**Wendy Holland**, Team Leader – for LTMN staff as well as others