

Playing the Long Game in the Wyre Forest

MARK DUFFELL

Wandering through the Wyre Forest you may come across an occasional tree marked with a blue band and small silver disk embossed with 'LTMN'. Look around a bit more and you may chance upon a yellow 'plastic' block nestling in the woodland floor (Fig. 1). Congratulations you - have relocated one of fifty permanent plots located throughout the forest. The mysterious letters LTMN refer to the Long Term Monitoring Network which was created by Natural England (NE) and numerous partners to create a cost effective network of sites providing evidence on the effect of changing climate, air pollution and land management on the natural environment (Nisbet, Smith and Holdsworth 2017). It works alongside and complements the UK Environmental Change Network (ECN) established in 1992 and between the LTMN and ECN they record the weather and air quality (through a dedicated network of stations and sensors), birds and butterflies (using transects), soils (through sampling and laboratory analysis) and finally vegetation surveys.



Figure 1. Blue band and metal tags on a tree indicating the location of a LTMN plot.

Mark Duffell

There are now 37 LTMN sites throughout England in a variety of habitats including broadleaved woodland, heathland, neutral grassland, various bogs, mires and fens, sand dunes and salt marshes. They are all currently located within National Nature Reserves (NNRs), so in most cases NE can control or be informed of any management changes: in the case of the Wyre Forest some of the plots are within areas managed by the Forestry Commission. Sampling of these sites is regularly undertaken (approximately every 5 years), with recording of physical, chemical, and biological variables all being measured in a standardised way; further measurements are made on several NNRs by Met Office weather stations.

Each individual site has fifty permanent quadrats, each marked with a Feno marker. These are square yellow blocks approximately 10cm x 10cm x 10cm attached to the ground by a long metal expanding pin. The permanent quadrats are located using stratified random sampling (the habitat areas of major interest are selected then within these areas the plot is randomly placed).

Each quadrat is a 2m by 2m square and is further subdivided into twenty five, 40cm by 40cm, cells. A set of abiotic factors are recorded for the whole quadrat including Altitude, Slope, Aspect, Land use and Broad habitat. Evidence of grazing, presence of animal dung and/or human disturbance is also recorded. For each cell, the height of the vegetation was measured using a drop disk (a circular disk of known weight and area, 'dropped' down a metric calibrated pole). Within each cell a list of species present (vascular plants, bryophytes and lichens) was recorded along with their percentage cover; also recorded was any litter, open water or bare earth/rock. Where woodland occurs, additional measurements are taken within a 10m by 10m quadrat (Natural England 2020).

We (Arvensis Ecology) have been fortunate in being involved with the Long Term Monitoring Network since 2014 when we surveyed the Stiperstones (Shropshire), Motte Meadows (Staffordshire) and Lullington Heath (East Sussex). Since then, we have had the good fortune to work on a variety of other NNRs including the Cambridgeshire Fens, Cumbrian Bogs and Mosses and the diverse habitats within New Forest.

In 2020 we were asked to survey Wyre Forest NNR for NE: initially this was cancelled due to COVID but fortunately the rules allowed us to continue the work in June. This would be the second time that LTMN surveying has taken place in the Wyre, the first survey being in 2014.

Re-location, re-location, re-location or losing the plot?

The first challenge as always with permanent quadrats is to relocate them. Fortunately, each plot has a grid reference recording its location, and hopefully also a sketch map(s) of prominent landmarks and photograph(s) from when it was installed. All useful if you have an open site, with clear landmarks, less useful in dense woodland. In theory all sites are also marked with a prominent yellow Feno marker, but time and vegetation do their best to obscure these (in bogs they often settle several centimetres below the surface!).

A common experience was that the grid references previously recorded did not always match the actual locations accurately, and in some previous surveys were over 10m out in two directions. Possible reasons

for this are the difference between GPS devices (older and handheld units are generally less accurate especially in some terrains and habitats), surveyors' error when writing down the reference in the field and potential corruption of the co-ordinates in mapping software. Whilst we were re-finding the plots, we had also been asked to use a High Accuracy GPS system (accurate to less than 1m) to record the location of each plot accurately and precisely for future surveyors. This aroused some interesting conversations with walkers on site, who were curious about the tall staff with a 'lollipop' receiver dish on top and recording device.

Even with all these aids, it can still be time consuming to relocate the original marker, in one section of woodland, all the markers seemed to be under piles of brash left from forestry work, elsewhere they seemed buried in bramble scrub. Other times they were prominent and easily seen from 10s of metres away. If we failed to relocate a marker then we had to re-install a new Feno marker along with all the other associated marks, the new location being determined from the previous surveyor's description (to allow some consistency with data) and the grid reference.

All of this must be done without damaging the vegetation in such a way that it cannot be surveyed and recorded accurately later, sometimes a challenge in high grassy swards, especially on other sites we have surveyed such as Motte Meadows or Chippenham Fen (where Common Reed often reached 2m in height).

Over the years we have adopted a procedure for marking the site to speed up location of the plots by future surveyors. As a minimum, a cane is left standing by the Feno marker and sprayed with a contrasting colour (although even so they do tend to go astray either by wildlife, or human activity, sometimes the management of the site precludes their use e.g. meadows being cut). In woodland as in the Wyre, we spray-painted a band of bright blue paint around the trunk of the nearest or most prominent tree, with a downward stripe indicating the direction to search for the marker. A metal disk with LTMN embossed into it also faces the marker, to allow for any weathering of the painted band. Notes on the distance and aspect of the marker from the tree are also recorded, along with photographs. Occasionally two trees would be marked to form a 'transect' along which to search.

Hopefully all this additional work will enable any future surveyors to use a low power handheld GPS to quickly find the general area of the plot and then a short search should reveal the tagged trees and Feno marker.

Seeing the wood for the trees: down to business.

All quadrats at Wyre Forest were located within mixed

deciduous woodland, usually deep within the woods, although occasionally on the margins of woodland rides vegetation (Fig. 2), and in a few cases where recent felling (since 2014) had removed the majority of the woody vegetation.



Figure 2: Quadrat on the woodland floor with a marked tree nearby.

Mark Duffell

Having already re-located all the plots previously, we could quickly get to work. A system soon developed within the surveying team, one surveyor placing the quadrat accurately, with the marker in the southwest corner of the plot, then double-checking alignment with a compass. The other surveyor/scribe starts to record the abiotic features, altitude (from a GPS device positioned by the marker), aspect, slope in degrees using a clinometer, land use (in the case of Wyre, always *Deciduous woodland*), slope code (either *convex*, *straight* or *concave*) and the broad habitat (mostly *Broadleaved*, *Mixed* and *Yew Woodland*). Evidence of any animal activity within the plot was noted, the commonest feature in Wyre being deer signs: droppings, stripping of trees, and other browsing damage. We were fortunate enough to have regular sightings of Roe Deer whilst we stood within the plot. Other animals' signs recorded were rabbits (from their droppings and diggings) and perhaps the most interesting find, found when doing the botanical survey whilst on hands and knees was a couple of vole larders, with their neat stashes of food. Human activity was also recorded, which was usually limited to forestry work (with active management such as felling or brash piles being prominent, in a few cases vehicle tracks crossed the plot). One plot had a children's den nearby, which may also have explained the absence of the cane markers in this area. In an adjacent plot the Feno marker had been dug up (quite a task) and abandoned

on the surface nearby. Photos were taken from each compass point, to allow comparison of any change over the years.

The 2m by 2m quadrats are further subdivided into twenty five, 40cm by 40cm, cells. For each cell, the vegetation height is recorded using a drop disk, the disk being dropped over the pole and coming to a stop on top of the vegetation: the height then being read off the drop disk pole.

Once this had been completed the botanical survey could start, for each cell a list of species (vascular plants, bryophytes and lichens) was recorded. Fortunately for us being relatively local we were familiar with the vegetation so it gave us no major challenges, although we still did take away specimens for confirming under microscopes (particularly bryophytes). Regular use was made of keys from our usual field pack containing (Atherton *et al.* 2010; Jermy *et al.* 2008; Hubbard 1992, Poland and Clement 2009; Stace 1999), with further texts available when back in the office. In each cell any litter, bare ground, bare rock, dead wood or open water was also noted. Once all the cells had been surveyed the overall percentage cover was recorded for all species and litter etc.

As well as the standard 2m x 2m quadrat, woodland work for the LTMN requires an additional set of measurements being made in a 10m by 10m quadrat. Due to the previous survey not having tagged or marked the trees sufficiently (occasionally some were numbered but they were faded or absent in most plots) we needed to re-set out all of the 10m x 10m quadrats. Within the 10m quadrat the 2m quadrat is nested in the centre, so the lower corner is 4m south and west. Tent pegs held the tape in place to allow accurate alignment with a compass.

All tree and shrub species were recorded within this larger quadrat, placed into crown and dominance classes (*tree, sapling, seedling, shrub; dominant, subdominant, intermediate and suppressed*). Often the same tree species could feature in all categories.

Within the larger quadrat, it is broken down further into smaller cells (again 40cm x 40cm, 25 along one axis and 25 along the other axis, totaling 625 cells), ten random cells are chosen (after the initial setting out and marking of the trees; the same random cell is then re-used next survey). All tree and shrubs seedlings present are recorded, along with the total number of individuals. From each random cell the tree nearest the centre of that cell and over 5cm at diameter breast height (DBH) is tagged and measured. No tree is allowed to be measured twice, so occasionally you might need to go well outside the 10m quadrat to find the next suitable tree. Each tree was fitted with a tree

tag bearing a number 1-10, placed at a standard height above ground, and facing towards the Feno marker. The species was recorded, along with the bearing and distance of the stem to the centre of the random cell. Measurements of the tree's height and DBH, and number of stems were noted.

Results

It was not possible to locate several quadrats due to the problems stated above, and it may even be that in one area Feno markers were not installed. Therefore, direct comparisons of the vegetative composition of plots and quadrats can only be made between re-found plots, although occasionally general habitat details may in some cases suggest that there are anomalies with some of the species recorded previously in 2014.

A total of 91 vascular plants, 18 bryophytes and two lichens were recorded to species and/or subspecies level in 2020. This compares favourably to the 2014 survey which recorded 89 vascular plants, seven bryophytes and no lichens.

Species richness within the quadrats varied from just four species (bracken and brambles dominating under a canopy of holly and hybrid oak) up to 45 species in a plot which had variable habitats present from dense dry bracken and associated species to an open ride and trackside with seasonally wet vegetation diverse in *Carex* sedges (Common Yellow *Carex demissa*, Glaucous *C. flacca*, Pale *C. pallescens*, and Wood *C. sylvatica*) and grasses (Wood False-brome *Brachypodium sylvaticum*, Hairy Brome *Bromopsis ramosus*, Heath Grass *Danthonia decumbens*), alongside Wild Basil *Clinopodium vulgare*, Eyebrights *Euphrasia officinalis* agg. and Slender St. John's Wort *Hypericum pulchrum*.

Perhaps not surprisingly in this habitat the most commonly recorded species within the 2m square quadrats was Bramble *Rubus fruticosus* agg., followed by a bryophyte Cypress-leaved Moss *Hypnum cupressiforme* sens. lat. Table 1 shows a full list of the top twenty most commonly recorded species.

A few species were only recorded in either the current or previous survey. In many cases (e.g. Creeping Buttercup *Ranunculus repens* or Common Mouse-ear *Cerastium fontanum*) this is likely due to not being able to repeat exactly the same quadrat location if the Feno marker was not located. Changes in vegetation will occur over any given period, so change in a particular species presence or abundance within a quadrat is highly likely.

A number of species were only recorded in the 2014 survey (Table 2) and 2020 survey (Table 3), those in bold are discussed below.

Table 1: Top twenty most commonly recorded species within the quadrats.

Scientific and common names	Number of quadrats in which recorded
Bramble <i>Rubus fruticosus</i> agg.	58
Cypress-leaved Plait Moss <i>Hypnum cupressiforme</i> sens. lat.	41
Hybrid Oak <i>Quercus petraea</i> x <i>robur</i>	38
Holly <i>Ilex aquifolium</i>	30
Common Feather-moss <i>Kindbergia praelonga</i>	29
Bracken <i>Pteridium aquilinum</i>	29
Creeping Soft-grass <i>Holcus mollis</i>	26
Honeysuckle <i>Lonicera periclymenum</i>	22
Bilberry <i>Vaccinium myrtillus</i>	18
Bluebell <i>Hyacinthoides non-scripta</i>	16
Beech <i>Fagus sylvatica</i>	15
Bank Haircap <i>Polytrichastrum formosum</i>	13
Wavy Hair-grass <i>Avenella (Deschampsia) flexuosa</i>	11
Pill Sedge <i>Carex pilulifera</i>	10
Swan's-neck Thyme-moss <i>Mnium hornum</i>	10
Common Tamarisk-moss <i>Thuidium tamariscinum</i>	10
Silver Birch <i>Betula pendula</i>	8
Ling <i>Calluna vulgaris</i>	8
Wood Sage <i>Teucrium scorodonia</i>	8
Common Bent <i>Agrostis capillaris</i>	7

Changing Species: Herbs.

Lady Fern *Athyrium filix-femina* was not recorded in the 2014 survey but was recorded in plot 30 in 2020. Previously two other Dryopterid ferns were recorded in this plot, Common Male-Fern *Dryopteris filix-mas* (with no frequency recorded) and Broad-buckler Fern *D. dilatata* (recorded in many of the same cells as the *Athyrium* currently). All three species are readily identifiable even when immature (with no reproductive structures present), with *D. dilatata* being easily separated with its tri-pinnate fronds. Use of vascular bundles characters was made to check material found and ALL material had two ribbon like vascular bundles as found in *Athyrium* (compared to multiple mixed size round vascular bundles as per *Dryopteris* and *Polystichum*) (Poland and Clement 1999).

Table 2: Species only recorded during 2014 survey (24 taxa).

Velvet Bent	<i>Agrostis canina</i>
Lesser Pond-sedge	<i>Carex acutiformis</i>
White Sedge	<i>Carex canescens</i>
Bog Sedge	<i>Carex limosa</i>
Hard Rush	<i>Juncus inflexus</i>
Field Woodrush	<i>Luzula campestris</i>
Wood Anemone	<i>Anemone nemorosa</i>
Wild Angelica	<i>Angelica sylvestris</i>
Rosebay Willowherb	<i>Chamerion angustifolium</i>
Pignut	<i>Conopodium majus</i>
Sheep's Fescue	<i>Festuca ovina</i>
Sheep's and Red Fescue	<i>Festuca ovina</i> or <i>F. rubra</i>
Bitter Vetch	<i>Lathyrus linifolius</i>
Greater Bird's-foot Trefoil	<i>Lotus pedunculatus</i>
Heath Milkwort	<i>Polygala serpyllifolia</i>
Common Milkwort	<i>Polygala vulgaris</i>
Creeping Buttercup	<i>Ranunculus repens</i>
Hazel	<i>Corylus avellana</i>
European Larch	<i>Larix decidua</i>
Turkey Oak	<i>Quercus cerris</i>
Pedunculate Oak	<i>Quercus robur</i>
Eared Willow	<i>Salix aurita</i>
A Dandelion	<i>Taraxacum fulvum</i>
Heath Violet	<i>Viola canina</i>

Lesser Pond Sedge *Carex acutiformis*, previously this species was recorded from Plot 33, but unfortunately it was not possible to relocate the Feno marker for this site. The grid reference given was now in an area that had been recently clear felled, and the ground stripped and covered with brash and chippings, with absolutely no sign of plant growth in the immediate area. In attempting to relocate the Feno marker a search was made of any areas that might support *C. acutiformis*, but the habitats found in this area seemed entirely unsuitable.

The plot was located on the upper sides of an east facing slope, with nearby dense patches of Silver Birch *Betula pendula*, and occasional Downy Birch *B. pubescens*, in amongst dense plantings and/or regrowth of Noble Fir *Abies grandis*, Norway Spruce *Picea abies* and Western Hemlock *Tsuga heterophylla* as well as others. In openings in this area stood patches of Bracken *Pteridium aquilinum* with understoreys of Ling *Calluna vulgaris* and Bilberry *Vaccinium myrtillus*. The soil and flora suggested an acid location, but with only limited water. A comparison of the previous records show that

Table 3: Species only recorded during 2020 survey (31 taxa).

Grand Fir	<i>Abies grandis</i>
Sycamore	<i>Acer pseudoplatanus</i>
Lady Fern	<i>Athyrium filix-femina</i>
Hairy Brome	<i>Bromopsis ramosa</i>
A Bittercress	<i>Cardamine</i> sp.*
Common Yellow-sedge	<i>Carex demissa</i>
Pale Sedge	<i>Carex pallescens</i>
Common Mouse-ear	<i>Cerastium fontanum</i>
Wild Basil	<i>Clinopodium vulgare</i>
Crested Dog's-tail	<i>Cynosurus cristatus</i>
Cock's-foot	<i>Dactylis glomerata</i>
Heath Grass	<i>Danthonia decumbens</i>
An Eyebright	<i>Euphrasia nemorosa</i> agg.*
Perforate St John's-wort	<i>Hypericum perforatum</i>
Japanese Larch	<i>Larix kaempferi</i>
Bird's-foot Trefoil	<i>Lotus corniculatus</i> var. <i>corniculatus</i>
Heath Woodrush	<i>Luzula multiflora</i> ssp. <i>congesta</i>
Heath Woodrush	<i>Luzula multiflora</i> ssp. <i>multiflora</i>
Purple Moor-grass	<i>Molinia caerulea</i> ssp. <i>caerulea</i>
Corsican Pine	<i>Pinus nigra</i> ssp. <i>laricio</i>
Aspen	<i>Populus tremula</i>
Selfheal	<i>Prunella vulgaris</i>
Hybrid Oak	<i>Quercus x rosacea</i>
Lesser Spearwort	<i>Ranunculus flammula</i> ssp. <i>flammula</i>
Grey Willow	<i>Salix cinerea</i>
Wild Service-tree	<i>Sorbus torminalis</i>
Snowberry	<i>Symphoricarpos albus</i>
Lesser Trefoil	<i>Trifolium micranthum</i>
Red Clover	<i>Trifolium pratense</i>
Western Hemlock	<i>Tsuga heterophylla</i>
European Gorse	<i>Ulex europeus</i>

* vegetative and/or small specimens so further identification not possible

the majority of species are similar to the habitat and species record during this survey (Table 4).

Carex acutiformis can be found by sides of rivers, streams, canals, pools and lakes, as well as forming sedge-swamps in wet woodland and carrs (Jermy et al. 2007). It has been recorded from the Wyre Forest previously (Wyre Forest Study Group 2020), but no

Table 4: Previously recorded species for Plot 33.

Common Bent <i>Agrostis capillaris</i>
Velvet Bent <i>Agrostis vinealis</i>
Silver Birch <i>Betula pendula</i>
Downy Birch <i>Betula pubescens</i>
Lesser Pond Sedge <i>Carex acutiformis</i>
Pill Sedge <i>Carex pilulifera</i>
Rosebay Willowherb <i>Chamerion angustifolium</i>
Foxglove <i>Digitalis purpurea</i>
Common Male Fern <i>Dryopteris filix-mas</i>
Heath Bedstraw <i>Galium saxatile</i>
Bluebell <i>Hyacinthoides non-scripta</i>
a St. John's-wort <i>Hypericum</i> sp.
Soft Rush <i>Juncus effusus</i>
Field Woodrush <i>Luzula campestris</i>
Heath Woodrush <i>Luzula multiflora</i>
Yellow Pimpernel <i>Lysimachia nemorum</i>
Wood Melick <i>Melica uniflora</i>
a Spruce <i>Picea</i> sp.
Douglas Fir <i>Pseudotsuga menziesii</i>
Bramble <i>Rubus fruticosus</i> agg.
Eared Willow <i>Salix aurita</i>
Groundsel <i>Senecio vulgaris</i>
Green Field-speedwell <i>Veronica agrestis</i>
Heath Violet <i>Viola canina</i>

mention is made in Westwood et al. 2015.

It is felt unlikely that the habitat around Plot 33 could support *Carex acutiformis*, but it is not clear what it could have been mis-identified for. Lower down the slopes and elsewhere on site were patches of Wood Club-rush *Scirpus sylvaticus*, but this again requires a damper location not found near this plot. Consideration was also given to typos or inputting errors but no species has come to mind.

White Sedge *Carex canescens* (as *C. curta* in 2014 survey) was previously recorded from Plot 28, for which the Feno marker was not re-located. The following sedges were also previously recorded there; Hairy Sedge *C. hirta*, Pill Sedge *C. pilulifera*, Wood Sedge *C. sylvatica*. Whilst the original marker could not be relocated, the grid reference for the new plot was close to the old site. Within this site Pale Sedge *Carex pallescens* was found: nearby were plants of *C. pilulifera* and *C. sylvatica*. The site was gently sloping to the southeast under a dense canopy of Oak and other trees, with a rich ground flora including Bluebells and Bilberry typical of a dry W10 community (the *Quercus robur*-*Pteridium aquilinum*-*Rubus fruticosus* woodland community as defined by

the National Vegetation Classification (NVC).

Carex canescens is a plant of mires with species such as Cotton grass *Eriophorum* sp. and Sphagnum as associates (M2, M4, M5, M6 and M7 – all NVC Mire communities) (Jermy *et al.* 2007). All the areas visited during this survey seem unsuitable for this species. It is unclear if this plant was mis-identified for another species, the closest species that was near to the plot and could conceivably be confused is Remote Sedge *C. remota* but the elongated bract should have identified that species. *C. canescens* has been recorded from the Wyre Forest previously (Wyre Forest Study Group 2020), but the only mention in Westwood *et al.* 2015 is "One small willow-swamp woodland near Button Oak, has a particularly interesting flora. Water Horsetail *Equisetum fluviatile* and bog-moss *Sphagnum* spp. dominate the vegetation, but amongst these can be found Tubular Water-dropwort *Oenanthe fistulosa*, White Sedge *Carex canescens* and Bogbean *Menyanthes trifoliata* at their only native site in Wyre." It can be concluded that this plant was previously mis-identified.

Bog Sedge *Carex limosa*. This distinctive species had been previously recorded from Plot 38, for which the Feno marker was not re-located: also recorded in the same plot were species such as Wood Spurge *Euphorbia amygdaloides* and Wood Sage *Teucrium scorodonia*.

Plot 38 was on a steep south east facing slope, with at the time dry soil (although it is apparent that this is seasonally moist, from the presence of species such as Lesser Spearwort *Ranunculus flammula*, Common-yellow Sedge *Carex demissa* and Bugle *Ajuga reptans*.

Carex limosa, as inferred by its common name of Bog Sedge, is a plant of 'very wet blanket and valley mires' (Jermy *et al.* 2007), NVC communities M1, M4 and M9 with associates including Sphagnum, Cotton-grass *Eriophorum* sp., Bladderworts *Utricularia* sp.

The plot when re-surveyed (or as close as possible to old site) had numerous Sedges *C. demissa*, *C. flacca*, *C. pallescens* and *C. sylvatica*. Of these the only species superficially similar to *C. limosa* is Glaucous Sedge *C. flacca* which has pendent spikes and a dark colouration to the glumes. In our experience of teaching Sedge Identification courses, we have had students in the past mistakenly identify *C. flacca* as *C. limosa*, either when 'picture matching' or not reading the habitat descriptions in keys. The key in Jermy *et al.* 2007 places *C. flacca* close to *C. limosa*, separating them on the utricles being nerveless/nerved and minutely papillose/smooth. These can be occasionally be difficult to distinguish in the field, but the habitat descriptions for both species should quickly rule out *C. limosa*. Another possibility is confusion with Pale Sedge *C. pallescens*

which is occasionally prominent in the ground flora.

Carex limosa has only ever been recorded once from the Wyre Forest previously, by Jordan in 1864, and is currently considered extinct in Worcestershire (and in neighbouring counties).

Sheep's Fescue *Festuca ovina* agg. and **Red Fescue** *Festuca rubra* agg. Comparison of the two surveys shows a disparity between recording of Fescues and Wavy Hair Grass *Avenella (Deschampsia) flexuosa*. The current survey made no records of any *Festuca* sp. within the plots, with all fine-leaved grass species being recorded as *A. flexuosa*. The previous survey recorded both Fescues and Wavy Hair-grass in a number of plots. This survey used the presence of an 'obvious' ligule to separate *Avenella* from *Festuca*, along with intravaginal growth and open sheaths to separate Sheep and Red Fescues (Poland and Clement 1999; Stace 2019).

Bird's-foot Trefoil *Lotus corniculatus* and **Greater Bird's-foot Trefoil** *Lotus pedunculatus*. Plot 30 was damp with patches of Tufted Hair-grass *Deschampsia cespitosa*, Purple Moor-grass *Molinia caerulea*, and Marsh Bedstraw *Galium palustre*, all indicators of a site with damper soils. During the survey, a *Lotus* species was found in eleven cells, this was checked during the survey and felt to be *L. corniculatus*, even with the dampness of the habitats. On checking the previous data, it is found that only Greater Bird's-foot Trefoil *Lotus pedunculatus* had been recorded here previously (in nine cells). It was decided to re-visit the plot to determine the correct identification. The plant had no flowers open but there were immature flower buds with the characteristic erect calyx teeth (recurved in *L. pedunculatus*), vegetatively, it had solid stems and veins not apparent (Poland and Clement 1999; Stace 2019).

Heath Violet *Viola canina*. This species had been previously recorded in three plots, so a careful search was made of all the material in this area (as in other plots), but only good *V. riviniana* was found (identification based on the presence of a basal rosette – absent in *V. canina*, leaf shape and other features mentioned in Rich and Jermy (1998). Heath Violet is present in the Wyre Forest (Westwood *et al.* 2015), but the habitat at this plot was felt to be wrong for this species (under dense Beech, Oak and Pine trees).

Changing Species: Trees.

Hybrid Birch *Betula x aurata* (*B. pendula* x *pubescens*). Silver Birch *Betula pendula* was widespread in the Wyre Forest, with only occasional patches or solitary trees of Downy Birch *Betula pubescens*. Care was taken to check any unusual Birches and Hybrid Birch was recorded once within the plots (Plot 15). Identification was based

on vegetative material collected and compared against Rich and Jermy 1998.

Japanese Larch *Larix kaempferi*. A single plant was found within Plot 31. Identification was based on cones (on the ground), the presence of strongly reflexed scales and long bracts as well as vegetative features (Rich and Jermy 1998; Poland and Clement 1999; Stace 2019). This plot had a previous record for European Larch *Larix decidua* but due to lack of tree tags and numbers it is unclear if this was the same tree.

Aspen *Populus tremula*. Plot 30 had several mature Aspen present, as well as widespread suckers within the quadrat and elsewhere. The suckers seem unlikely to have been absent previously so perhaps they are one of the 'Unidentified' species in the previous plot list?

Turkey Oak *Quercus cerris* was widely recorded in the previous survey, but during the current survey no specimens were found (within the quadrats or larger quadrats). Previously Turkey Oak was recorded from the majority of plots in the ground flora (as seedlings), with Pedunculate Oak and Sessile Oak only being recorded twice and once respectively. In the canopy Turkey Oak was only recorded in one plot, whilst Pedunculate and Sessile Oak were recorded in 42 and 3 plots respectively; there appears to have been an anomaly between recording of seedlings and mature trees previously.

Turkey Oak is readily separated from any of our native oaks and their hybrid, by the presence of long persistent stipules at the leaf base and, buds surrounded by persistent stipules. Likewise, the distinctive cupules of the acorns should remove any confusion. Whilst we did find that some seedling oaks did sometimes exhibit the occasional persistent stipule(s) at the base of the leaf, they lacked the dense stipules within the buds, and were just typical examples of Sessile Oak *Q. petraea*, Pedunculate Oak *Q. robur* or their hybrid. Leaf shape with seedling oaks is highly variable and some of the leaf outlines did come close to resembling *Q. cerris*, but the other characters ruled this out as an identification (Rich and Jermy 1998; Poland and Clement 1999; Stace 2019).

Quercus cerris has been recorded from the Wyre Forest previously (Wyre Forest Study Group 2020), though it is not common and only a 'small number of Turkey Oaks (are) present' Westwood et al. 2015. Maskew (2014), mentions Turkey Oak being 'only been reported from two places in the Wyre Forest...'. It is felt that *Q. cerris* was highly over-recorded during the previous survey, with no records made for this species in 2020.

Hybrid Oak *Quercus x rosacea* (*Q. petraea* x *Q. robur*) is widespread in the Midlands region and knowing the likelihood for Hybrid oak being present within the

Wyre Forest the surveyors made regular observations of any oaks found during walking the site during the Feno marker relocating period and continuing into the botanical survey. From this, they were able to get a 'feel' for what Oak species were present. Identifications were made using a range of characters based on Rich and Jermy (1998) and Stace (2019) including: Overall leaf shape, lobing, number of pairs of lobes, intercalary veins, auricles, stellate hairs (presence/absence), petiole length.

In only a few cases could trees be assigned to either parent (*Q. petraea* or *Q. robur*), with the majority of species investigated exhibiting characters from both parents, although they often showed more characters with *Q. petraea*, suggesting some backcrossing with that parent. Usually, it was not possible to reach vegetative or floral material from the canopy, so the less satisfactory choice of using leaf litter had to be resorted to. By having assessed the overall picture of Oaks within Wyre it is felt that this data is representative of those species present.

Post survey on consulting Westwood et al. (2015), it was comforting to see that they regard *Q. x rosacea* to be the commoner plant "Whilst Wyre oak seems to be generally Sessile, most are hybrids..." Maskew (2014) in the Flora of Worcestershire in reference to the Wyre Forest states 'the coppice chiefly consist of *Q. petraea* and *Q. x rosacea*...', elsewhere regarding *Q. petraea* 'it is difficult to assess the true distribution in the county as it has almost certainly been over-recorded for *Q. x rosacea*, which invariably is present in the same woodlands'.

It wasn't all plants!

With hard work and long days, the chance to be in such a beautiful patch of the country was further rewarded by many sightings of interesting flora and fauna. These included finding patches of Columbine *Aquilegia vulgaris* growing wild amongst a carpet of Hairy Woodrush *Luzula pilosa*. Seeing so many mature and maturing Wild Service-trees *Sorbus torminalis* was heartening as was spotting Lily of the Valley *Convallaria majalis*, a species that we have only seen wild on the continent before but never in the British Isles (outside of gardens). It was refreshing to visit healthy woodland with generally lots of signs of regeneration, from seedlings and saplings to tall mature trees, even with the presence of deer.

The slow pace of surveying, as well as transiting through relatively undisturbed areas meant we often came across Fallow Deer, including a mother gently drawing us away from her young fawn which we discovered and had to detour to avoid. A memory that will remain is being near Lord's Yard Coppice where an adult leucistic

Fallow Deer stood and watched us, before we slowly followed it towards one of our final quadrats. As it scampered off into the woods, it was hard to not read some symbolism into the experience. At the end of a long day as we headed home it was not unusual to flush a Muntjac deer from amongst the valley floors.

The nests of Wood Ants impressed, and we frequently stood and watched their activity. Whilst measuring tree diameters and tagging them, we often had to get intimate with the trees, wrapping our hands round to pass a tape measure. On several occasions enraged wood ants attempted to assault us, the first time I had sudden illusions of 'fish and chips', it took me a while to realise that I was being sprayed with 'vinegar' by a bevy of ants incensed that I was on their tree. This happened a few times afterwards, even covering glasses with a fine mist of formic acid and could be tasted in the air and on my lips.

One morning whilst walking towards Unclys we spent a pleasant twenty minutes watching an adult fox working its way around an orchard, seeking out and then pouncing on unsuspecting small mammals. Even when we moved on and encircled it from another path it remained oblivious to us, but its ears soon pricked up when it heard nearby dogs and dog walkers.

The peace would be shattered by the drumming of a woodpecker, perhaps searching for the larvae of Lesser Stag Beetle which we had observed wandering along the woodland paths. Or the screech of a group of Jays living up to their garrulous scientific name.

Within the challenges of 2020, Wyre stands out both as a professional and personal highlight of our year.

Acknowledgements.

Thanks to Jenni Duffell and Tim Handley for acting as field assistants and scribes for parts of the survey. To John Handley for working on the initial contract and for his knowledge and guidance on Wyre Forest habitats. To Tom Simpson, Reserve Manager for the Wyre Forest for his help and advice on accessing the site. To Sarah Grinsted, Lead Adviser for Natural England and the rest of the LTMN team for contracting this work.

References:

- Atherton, I.D.M., Bosanquet, S.D.S. and Lawley, M. 2010. *Mosses and Liverworts of Britain and Ireland: A field guide*. British Bryological Society.
- Hubbard, C.E. 1992. *Grasses: A guide to their structure, identification, uses and distribution in the British Isles*. 3rd edition. Penguin Books.
- Jerry, C.A., Simpson, D.A., Foley, M.J.Y., and Porter, M.S. 2007. *Handbook No1: Sedges of the British Isles*. 3rd Edition. Botanical Society of the British Isles, London.
- Maskew, R. 2014. *The Flora of Worcestershire*. Maskew, Tenbury Wells.
- Natural England. 2020. *Natural England's Long Term Monitoring Network* (RP00316) <http://publications.naturalengland.org.uk/publication/4654364897050624> Accessed 5th May 2020.
- Nisbet, A., Smith, S.J., & Holdsworth, J., (Eds) 2017. *Taking the long view: An introduction to Natural England's Long Term Monitoring Network 2009 – 2016*. Natural England Report NERR070.
- Poland, J. and Clement, E. 1999. *The Vegetative Key to the British Flora*. Poland, Southampton.
- Rich, T.C.G. and Jerry, A.C. 1998. *Plant Crib*. Botanical Society of the British Isles, London.
- Stace, C.A. 1999. *Field Flora of the British Isles*. Cambridge University Press, Cambridge.
- Stace, C.A. 2019. *New Flora of the British Isles*. 4th Edition. C&M Floristics, Suffolk.
- Westwood, B., Shirley, P., Winnall, R. and Green, H. 2015. *The Nature of Wyre, a wildlife-rich forest in the heart of Britain*. Pisces Publications, Newbury.
- Wyre Forest Study Group. 2020. *Vascular Plants of the Wyre*. <https://wyreforest.net/vascular-plants-of-wyre/> Accessed 2nd July 2020.



Fig. 3. Tall stands of Hybrid Oak *Quercus x rosacea* dominate near Town Coppice. Mark Duffell