

Sedum Roof Expedition 2016

ANN HILL AND ROSEMARY WINNALL



Smaller roof facing SSW, 31 July 2016 Rosemary Winnall



Larger roof facing NNE, 31 July 2016 Rosemary Winnall

Background

In the summer of 2016, the Wyre Forest Study Group was given permission to access and survey the wildlife interest of the extensive living roof system installed over the Wyre Forest Community Discovery Centre. The aim of the survey was to collect baseline data on the flora and to check for other wildlife on the roof.



Installing the matting 28 October 2009 Rosemary Winnall

Site

The Discovery Centre, at Callow Hill in north-west Worcestershire, is on the southern edge of the Wyre Forest. The building was erected in 2009 as part of Grow With Wyre, a Landscape Partnership Scheme funded by the Heritage Lottery and other sponsors. It is thought that Greenfix installed the roof, although documentation did not survive their amalgamation to become Greenfix Sky-Garden, so technical background information was limited.

Sedum mats were fixed on the roofs of two new education rooms as part of the water management system (photos 2 and 3 taken on 28th October 2009). Sky Gardens helpfully provided a list of species that they were including in their mats at that time: *Sedum acre*, *album*, *floriferum*, *hybridum*, *kamtschaticum*, *lydium* 'Glaucum', *reflexum*, *sexangulare*, *spurium*, *album* 'Coral Carpet', and *hispanicum*.

Both sides of the roofs were pitched: the small roof faced south-south-west and the large roof faced north-north-east. The large NNE roof overhung the lower small SSW roof. The adjacent oak and larch canopy overhung the south-east corner of the roof and created partial shade. Roof aspect, slope, shade and area were measured and recorded, see Table 1.

Wyre Forest Discovery Centre	Large NNE Roof	Small SSW Roof
Aspect degrees	16	208
Slope angle	15	20
Area (m ²) approximate	~246	~121.5
Shade %	5%	<5%
Substrate depth	2-3cms	
Vegetation height	average 5-6cms (up to 95cms)	

Table 1

The substrate appeared to have multiple layers: a freely draining gravelly soil within an eco-grid over a wire mesh and waterproof membrane. No substrate samples were taken.

It is thought that no vegetation management has been undertaken on the roofs since the installation.



Sedum matting ready for installing Rosemary Winnall



Edge of the matting, 25 November 2016 Ann Hill



The Sedum roofs, 4 August 2016 Rosemary Winnall



Ann Hill surveying, h25 November 2016 Rosemary Winnall

Method

Two survey expeditions on to the roof were made. Prior to each survey a Risk Assessment was undertaken by Rosemary Winnall. The first expedition was undertaken in dry, warm weather on the evening of 4th August 2016. Extendable ladders were used for roof access. There was a team of four recorders: Mike Averill, Ann Hill and Rosemary Winnall surveyed and recorded on the roof whilst Harry Green surveyed the roof and gutters from the top of the ladder. Graham Hill was present on the ground to ensure that safe working practices were followed. A second expedition to update species lists and make seasonal observations was made by Ann and Rosemary on the morning of 25 November 2016. On this occasion the weather was sunny and bitterly cold following an overnight frost.



Ann Hill and Mike Averill, 4 August 2016 Rosemary Winnall

The approach to data collection was simple and pragmatic. A walk-over of the roof habitat was undertaken and a plant list was compiled (no quadrats or transects were undertaken). All vascular plants, bryophytes, lichens and fungi rooted or attached within the habitat were accurately identified and recorded. Numerous photographs were taken of the plants and vegetation assemblages. Small samples of some species were taken for microscopic analysis to

confirm identification. The lichens were confirmed by Trevor Duke. Fungi were confirmed by John Bingham. *Sedum* plants were photographed.

No attempt was made to systematically survey the roofs for invertebrates, but during the August visit flowering plants were checked for visiting insects, and the substrate was examined at a number of sites on each roof. Species found were recorded or taken away for subsequent identification.



Roof apex, 4 August 2016 Rosemary Winnall

Results - Vegetation

Both roofs had an open sedum-moss-herbaceous vegetation assemblage with no clear dominant species. Vegetation cover over the large NNE roof was approximately 95%. Vegetation cover over the small SSW roof was approximately 90% cover with bare substrate under the overhang from the upper roof and on the upper exposed northern ridge. Both swards comprised a base layer of *Sedum* and mosses with low growing ephemeral and short perennial plants and a scattering of taller forbs, woody seedlings and grasses and occasional lichens. The main difference between the two swards was the presence of grasses and increased cover of herbaceous species on the large NNE roof. Herbaceous vegetation increased towards

the south-eastern ends of both roofs. The majority of vegetation was low-growing and less than 7cm tall but a few species such as *Senecio jacobaea* Common Ragwort and *Epilobium* species and the woody seedlings grew up to 95cm. Overall, the vegetation assemblage was estimated to comprise 47% *Sedum*, 35% moss, 15% herbaceous plants and 3% lichens.

A very similar range of plant species was present in both swards. No plant was particularly prominent, see Table 2.

Sedum plants were a major component of both swards. All the *Sedums* found to be present in 2016 were assumed to have been planted. Six varieties were identified but more varieties may be present. In addition to the *Sedum*, herbaceous vegetation in both swards included scattered ruderal plants such as *Lapsana communis* Nipplewort, *Stellaria media* Common Chickweed and *Taraxacum* agg. dandelions and the grasses *Agrostis capillaris* Common Bent, *Poa annua* Annual Meadow-grass and the diminutive ephemeral grass *Aira praecox* Early Hair-grass. The pinnate fronds of *Polypodium vulgare* Polypody was found on the large NNE roof. Occasional *Larix decidua* European Larch, *Quercus* oak and *Acer pseudoplatanus* Sycamore seedlings were scattered through both swards. In addition, *Lonicera periclymenum* Honeysuckle was present on the large NNE roof.

Both swards supported a variety of mosses: a total of five pleurocarpous mosses and eight acrocarpous mosses were recorded. No liverworts were recorded. Yellowish green patches of the pleurocarpous moss *Brachythecium rutabulum* Rough-stalked Feather-moss and tufts of the acrocarpous moss *Bryum capillare* Capillary Thread-moss were patchily abundant on both roofs. Olive green patches of the pioneer moss species *Campylopus introflexus* Heath Star Moss were recorded on both roofs: this introduced species was first recorded in Britain in 1941 and now occurs all over the British Isles. In addition, scattered shoots and patches of the calcifuge moss *Polytrichum juniperinum* Juniper Haircap, with its distinctive red-brown leaf tip, were locally frequent on both roofs. The roof gutters were being colonised by mosses including *Brachythecium rutabulum*, *Bryum capillare* Capillary Thread-moss and *Ceratodon purpureus* ssp. *purpureus* Redshank.

Cultivated *Sedums* are notoriously difficult to identify, and easily hybridise, so it was not possible to put names to all those on the roof, although Greenfix Sky-Garden identified a few species for us.

In August 2016 the colours and flora in the sward were spectacular. However, by November 2016 the *Sedum*



Polytrichum juniperinum amongst the *Sedum* R. Winnall



Larch sapling Rosemary Winnall



Peltigera hymenina Rosemary Winnall



Sedums Rosemary Winnall



Lycoperdon nigrescens

Rosemary Winnall



Conocybe pulchella

Rosemary Winnall



Melanoleuca brevipes

Rosemary Winnall



Galerina marginata

Rosemary Winnall



Lycoperdon excipuliforme

Rosemary Winnall

and herbaceous flowers had died down and the mosses and basal rosettes of herbaceous plants were visually prominent in the sward. Rosette type plants were especially noticeable at the south-east end of the small SSW roof when viewed from the upper roof. The small SSW roof also had a good cover of wind-blown leaf litter and a few acorns. A *Pseudotsuga menziesii* Douglas Fir seedling and *Veronica hederifolia* Ivy-leaved Speedwell were added to the species list.

In November, the lichens were also conspicuous and included locally frequent patches of *Peltigera didactyla*, *P. hymenina* and *P. membranacea* and less commonly *Cladonia chlorophaea* s. str. that grew amongst the short vegetation. *Hypogymnia physodes* and *Parmelia sulcata* were colonising the waterproof membrane along the roof line of the large NNE roof and *Evernia prunastri* was scattered in and over the sward, the latter presumably blow down from nearby trees.

The fungal community of the roofs was revealed in November: none had been recorded on the first expedition. The fruiting bodies of eight fungi plus one unknown species of fungi were found.

Overall, a total of 70 plant species were recorded during the two expeditions (thirty-five herbaceous plants, thirteen mosses, seven lichens, nine fungi and six varieties of *Sedum*), see Figure 1. No rare herbaceous species or bryophytes were found.

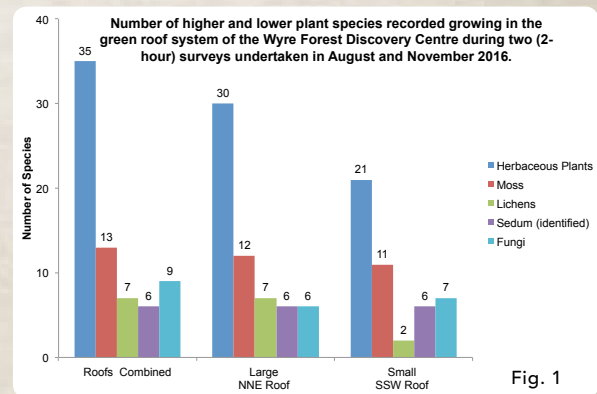


Fig. 1

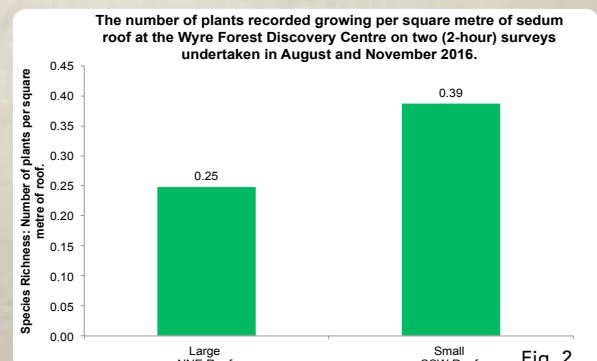


Fig. 2

Species richness for each roof, defined as the number of plants recorded per square metre of roof, showed that the large NNE roof supported a greater number of plant species. However, the small SSW roof had a greater number of plant species per square metre of roof than the large NNE roof, see Figure 2.

We did not plan our survey to include invertebrates, but we identified those we came across during our August visit. We did not expect to find many insects on the wing so late in the day (18.00-20.00), so we were surprised to see three species of bumblebee nectaring on the flowering *Sedums*: *Bombus lapidarius*, *B. lucorum/terrestris* and *B. hypnorum*. We found several tunnel spiders *Agelena labyrinthica* which had made their retreats amongst the ground vegetation, and two species of harvestmen were identified, *Dicranopalpus ramosus* and *Paraligolophus agrestis*. Delving down between the plants we unearthed one small earthworm, a few *Myrmica scabrinodis* ants, and the shell of the snail *Zonitoides excavatus*.

Discussion

This was an exciting and unusual project to be involved with and with the additional benefit of the study site being situated so close to the Wyre Forest Study Group records room.

Trying to fit the existing assemblage to a recognised vegetation community was difficult. The plant community was at its best a match to acid heath, where *Sedum* replaced heather and bilberry (species usually found in heath) as the constant species over numerous mosses and lichens and a low cover of herbaceous plants. Colonisation of the *Sedum* blanket will have taken place in gaps in the exposed substrate although the precise location will be in part determined by chance but also by aspect, angle and shelter. Slope, substrate, aspect and shade will continue to be a major influence on floristics and structure. The woody seedlings present in the swards are thought unlikely to persist because they will be either killed off by drought, extreme temperatures, or shallow depths: although they may persist if the conditions permit. The small SSW roof supported higher plant species diversity than the larger NNE roof most likely because with a south-south-west facing aspect it had slightly more favourable micro-habitat i.e. warmer, increased light levels. The adjacent tree canopy has affected the shading levels on the roofs and created visually obvious environmental gradients in the habitat.

Plant species numbers (richness) will be partly attributed to the habitat being located within the Wyre woodland which will be a source of the propagules of

colonizing species. Some species will have colonised the habitat naturally either by wind and/or animal dispersal and/or migration, whilst some may have been present within the original sedum carpets and transported to the Wyre in the pre-cultivated mats. It would be interesting to know more about the pre-grown sedum mats and the conditions in which they are grown.

Even though we found only a few invertebrates on this survey, a hot summer's day would undoubtedly provide more records. This glorious array of flowering plants, largely unseen from below, provides rich nectaring opportunities for insects, and the vegetation and soil provide refuge and food for others. It must be considered that some invertebrates might have been present in the matting when it was delivered, and that could explain the presence of some of the non-flying species found in this survey.

The visual observations made in August and in November were remarkably different and highlighted how much the plant communities changed between summer and autumn seasons. It would be interesting to try to classify the vegetation community with the passage of time and to increase our understanding of the complex relationship between vegetation, fauna and habitat in the Discovery Centre's living roof system.

Acknowledgements

We are grateful to the Forestry Commission who gave us access permissions to explore the roofs, and to John Bingham (fungi), Geoff Trevis (hymenoptera), Trevor Duke (lichens) who all helped with the identification of some species. We are also indebted to Greenfix Sky-Garden for their assistance with information and *Sedum* identification.



Small Roof, 4 August 2016

Ann Hill

Table 2. List of species recorded growing in the Wyre Forest Discovery Centre Sedum roof on two (2-hour) surveys, Aug. and Nov. 2016.

Latin Name	Vernacular Name	Large Roof	Small Roof	Gutter
<i>Acer pseudoplatanus</i> seedling	Sycamore seedling	●	●	
<i>Agrostis capillaris</i>	Common bent	●	●	
<i>Aira praecox</i>	Early hair-grass	●	●	
<i>Cerastium fontanum</i>	Common mouse-ear	●	●	
<i>Crepis biennis</i>	Rough hawk's-beard	●	●	
<i>Crepis capillaris</i>	Smooth hawk's-beard	●	●	
<i>Epilobium hirsutum</i>	Great willowherb	●	●	
<i>Epilobium montanum</i>	Broad-leaved willowherb	●	●	
<i>Fragaria vesca</i>	Wild strawberry	●		
<i>Geranium robertianum</i>	Herb-Robert		●	
<i>Geranium X magnificum</i>	Purple cranesbill		●	
<i>Holcus lanatus</i>	Yorkshire-fog	●		
<i>Hypericum pulchrum</i>	Slender St John's-wort		●	
<i>Hypochaeris radicata</i>	Cat's-ear		●	
<i>Lapsana communis</i>	Nippelwort	●	●	
<i>Larix decidua</i> seedling	European larch seedling	●	●	
<i>Lolium perenne</i>	Perennial rye-grass	●		
<i>Lonicera periclymenum</i>	Honeysuckle	●		
<i>Medicago lupulina</i>	Black medick	●	●	
<i>Plantago lanceolata</i>	Ribwort plantain	●	●	
<i>Poa annua</i>	Annual meadow-grass	●		
<i>Polypodium vulgare</i>	Polypody	●		
<i>Prunella vulgaris</i>	Selfheal	●		
<i>Pseudotsuga menziesii</i> seedling	Douglas Fir seedling	●		
<i>Quercus</i> sp.	Oak sp. seedling	●	●	
<i>Ranunculus repens</i>	Creeping buttercup		●	
<i>Senecio jacobaea</i>	Common ragwort	●		
<i>Senecio squalidus</i>	Oxford ragwort	●		
<i>Sonchus asper</i>	Prickly sow-thistle	●	●	
<i>Stellaria media</i>	Common chickweed	●	●	
<i>Taraxacum</i> agg.	Dandelions	●	●	
<i>Trifolium dubium</i>	Lesser trefoil	●		
<i>Trifolium repens</i>	White clover	●		
<i>Triticum aestivum</i>	Bread wheat	●		
<i>Veronica hederifolia</i>	Ivy-leaved speedwell	●		
<i>Brachythecium albicans</i>	Whitish feather-moss	●		
<i>Brachythecium rutabulum</i>	Rough-stalked feather-moss	●	●	●
<i>Bryum argenteum</i>	Silver-moss	●	●	●
<i>Bryum capillare</i>	Capillary thread-moss	●	●	●
<i>Campylopus introflexus</i>	Heath star moss	●	●	
<i>Ceratodon purpureus</i> ssp. <i>purpureus</i>	Redshank	●	●	●
<i>Didymodon insulanus</i>	Cylindric beard-moss	●	●	●
<i>Hypnum cupressiforme</i> var. <i>cupressiforme</i>	Cypress-leaved plait-moss	●	●	●
<i>Kindbergia praelonga</i>	Common feather-moss	●	●	
<i>Polytrichum commune</i> var. <i>commune</i>	Common haircap	●		
<i>Polytrichum juniperinum</i>	Juniper haircap	●	●	
<i>Rhytidiadelphus squarrosus</i>	Springy turf-moss	●	●	
<i>Tortula muralis</i>	Wall screw-moss		●	
<i>Sedum acre</i>	Biting stonecrop	●	●	
<i>Sedum album</i>	White stonecrop	●	●	
<i>Sedum album</i> , Coral carpet	White stonecrop, Coral carpet	●	●	
<i>Sedum floriferum</i>	Weihenstephaner Gold' stonecrop	●	●	
<i>Sedum lydium</i>	Mossy stonecrop	●	●	
<i>Sedum spurium</i>	Caucasian-stonecrop	●	●	
<i>Cladonia chlorophaea</i> s. str.	Lichen	●		
<i>Evernia prunastri</i>	Lichen	●		
<i>Hypogymnia physodes</i>	Lichen	●		
<i>Parmelia sulcata</i>	Lichen	●		
<i>Peltigera didactyla</i>	Lichen	●		
<i>Peltigera hymenina</i>	Lichen	●	●	
<i>Peltigera membranacea</i>	Lichen	●	●	
<i>Bovista nigrescens</i>		●	●	
<i>Conocybe pulchella</i>			●	
<i>Conocybe tenera</i>		●		
<i>Galerina autumnalis</i> = <i>Galerina marginata</i>		●	●	
<i>Galerina pumila</i> ?			●	
<i>Lycoperdon excipuliforme</i>		●	●	
<i>Lycoperdon nigrescens</i>			●	
<i>Melanoleuca brevipes</i>		●	●	
Unknown		●		