

Hedges 2020 An Interim Report, June 2020

In 2014 Sidmouth Arboretum undertook a survey of the valley's trees, now they are following up that work with a study of the agricultural hedges.

The 2014 Survey* revealed that, apart from nearly half a million trees, there are over 500Km (300 miles) of hedges currently enclosing farmers' fields in the Sid Valley, and they play an important role in the valley's appearance and ecosystems.

Using a computerised geographical information system, Arboretum chairman Jon Ball made a random selection of 100 fields across the valley, and then selected one side of each field to be surveyed.



The Sid Valley has a rich network of hedgerows

Thank you to the volunteers who have been out estimating the dimensions of the hedges, their state of maintenance, the presence of standard trees and the maximum size of those trees, the variety of woody species in the hedge, and the range of herbaceous plants associated with the hedges. In Devon, the term hedge often refers to a bank planted with shrubs and trees and many of the hedges in our survey fit that description, but some do not include the bank. If there is a bank, the height of the hedge is recorded as the height of the growth, that is what is above the bank.

Summary of Aims

The Hedge Survey has four main aims:

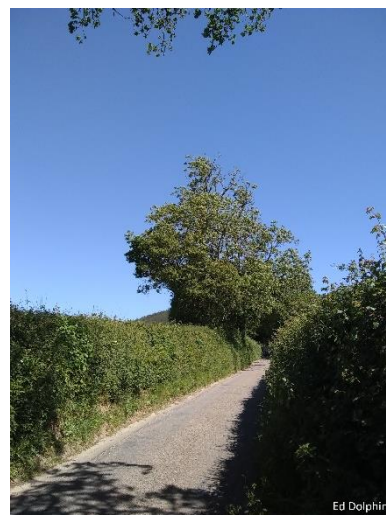
- 1) Establish the hedgerow species diversity
- 2) Establish the scale of standard trees in our hedgerows
- 3) Estimate the age of hedges
- 4) Establish the floral diversity in our hedgerows.

With more than half the sample now surveyed, this is an interim report on the findings. This report, being interim, concludes with a brief look ahead and a summary of the data. The final report will include a list of action points that need to be addressed if future generations are going to enjoy the same level of amenity provided by our wonderful hedgerows.

Woody Species Diversity

It is clear that, although this is a small, self-contained valley, the diversity of form, structure and quality of our hedges is wide, possibly more so than in areas of intensive farming such as parts of North West Norfolk.

Some of our hedges are clearly very old, some have been planted more recently, there will be a separate report, Hedges 2020 Historical Changes to follow this report. The differing geology, topography, and history across the valley support a wide variety of species profiles in the hedges. Many areas have a mix of Hawthorn and Blackthorn and a good variety of other woody species. Two thirds of the hedges have more than five woody species. Some of the hedges in the larger fields are in distinct sections, perhaps a stretch of Field Maple and then a stretch of Hawthorn or Blackthorn. In some cases, this is linked to previous field patterns where the different stretches used to be in separate fields that are now amalgamated. In other cases, a farmer might have revitalised a neglected hedge with a new planting where the old hedge had failed, but they have used a different species.



A hedge maintained by tractor mounted flail.

In some of the upland areas, particularly the areas on Greensand, Beech predominates in hedges that were planted as the open heath was enclosed in Victorian times. The fields to the north of Sid Road from Fortescue to Sidford, although known to be at least two hundred years old, appear to have been planted more recently and are made up of Elm mainly. Two thirds of the hedges surveyed so far are traditional Devon Hedges in that they are planted on a bank, sometimes just earth, others supported by stone cladding. This includes some of the hedges that have clearly been replanted comparatively recently.



A grown out Beech hedge

Many of the hedges are maintained regularly, others have been neglected for decades and have grown into lines of trees rather than a hedge, these are known as relict hedges. Some of the relict hedges were once maintained by the traditional practice of hedge laying where upright growth is half cut through, laid down, and branches are woven together to form a stock proof barrier. A small number of the well-maintained hedges show evidence of having been laid comparatively recently, but the majority are maintained by tractor mounted flail.

There is a negative correlation between a hedge being left untended and relict and having a wide range of woody species. There is some correlation between being sited next to a road and the hedge having multiple species of woody plant. Whether or not a hedge is banked does not appear to influence the number of woody species.

Standards

One of the main aims of the study was to establish the condition of standard trees, trees allowed to grow to maturity spreading their canopies above the hedge. Standard trees are very important in the appearance of the valley and to wildlife. Our standards are part of a group known as Trees Out Of Woods (TOWS). TOWS have ecologic impacts far beyond the proportion of land they occupy, by increasing the permeability and habitat value of the whole landscape. **

Of the valley's estimated tree population of nearly half a million trees, the survey suggests there are about 38,000 standard trees in our hedgerows. Often, these standards are pollards, trees cut off at the height reached by a man with an axe to keep the new growth out of reach of browsing livestock. This used to be common practice because the wide spreading crowns provided shelter for livestock and repeated pollarding, like coppicing, provided valuable timber for craft and woodfuel.



357N Oak, Ash and Field Maple Standards

Modern maintenance by tractor mounted flail means that maintaining standard trees happens less often now, and the majority of the standards are the mature trees left by previous generations in the old hedges and they are coming to the end of their lives, particularly the Ashes, but more on that later.

Our valley's hedges still have a good stock of mature standards, but the tidy, maintained hedges, which make up half the survey sample so far, have fewer standards per 100m than other hedges.

The difference is even more marked when it comes to young trees that could grow into mature standards in the future, tidy flailed hedges have far fewer young trees per unit length. One possible action point is to work with farmers to promote the idea of leaving more of the young trees in the regularly maintained hedges to grow as standards. This will involve the farmers in extra work and a good cost benefit analysis would have to be made.

Dating Hedges

It is true generally that older hedges have a wider range of woody species in their length. In the 1960s, ecologist and historian Max Hooper used a wealth of observations and archive evidence to propose a method of dating hedges which became known as Hooper's Rule. Dating a hedge is not a precise science and, with modern farming trends, it is becoming less reliable, but Hooper's Rule is still a useful guide. The rule states that the number of woody species in a 30 yards length of hedge



Max Hooper

multiplied by 110 gives you the age of the hedge site in centuries. The explanation is that, although hedges are usually planted as a single species, a Hawthorn or a Field Maple hedge for example, other species are introduced by natural processes of seed dispersal as time passes. Saying that a hedge is 500 years old does not mean that is the age of the trees and shrubs currently making up the hedge, although this might be true for the occasional ancient Oak standard. It means there has been a field boundary on this site for that length of time with a succession of trees and shrubs. Hedge 611N in our survey has 13 woody species in its length. If you took any 30 yard section, it contains at least 9 of these and so, x110, the rule suggests there has been a hedge on that site for about 1,000 years, but the oldest tree in the hedge is an oak that is about 200 years old.

Modern hedge planting often includes multiple species as a deliberate choice. Sidmouth Arboretum has planted three hedges in the last year each of which were a mixture of five species. If a researcher surveyed the hedge five years from now without knowing the history, and simply applied Hooper's Rule, they would conclude the hedge had been in place for 550 years. In the case of 611N, there is other evidence that backs up the conclusion about the age of the hedge, but that will be covered in the separate Historical Changes report.

Hooper's Rule may have some problems, but it is certainly true that ancient hedge sites, as with ancient forests, tend to have more woody species than younger hedge sites and this diversity is considered a good thing from an environmental point of view.

Herbaceous Diversity

There is a strong correlation between the hedges in the valley with many woody species and a diverse herbaceous storey underneath.

Where hedges are associated with a rich variety of herbaceous species this provides a good base for a food chain that will support many types of invertebrates, and small vertebrates, particularly birds and small mammals. See below for a list of herbaceous plants recorded so far. Some names are generic and cover a number of species, for example more than one type of Buttercup was found, but the list was a secondary purpose of the survey and received less attention during recording. Also, the visible species change during the year, some of the sites were surveyed before summer plants emerged and others were surveyed after early spring plants had died back. It is beyond the scope of this study to record the myriad species of invertebrates that live in the hedges.



Black Bryony is poisonous to humans, but a rich food source for others.

Nineteen of the 59 hedges surveyed so far were rated as having a good range of herbaceous species, 24 were medium, and 16 were poor. The distribution of good and poor diversity was not even across all hedge conformations.

Possibly contrary to some expectations, the hedges kept under control with the flail had slightly better diversity in their herbaceous storey overall, 50% of the hedges surveyed are flailed but they represent 64% of the hedges rated as good for herbaceous diversity and only 25% of the poor hedges.



Some hedges have a rich herbaceous layer.

However, this is not a straightforward picture because there is an interaction between management method, structure, and location. Half of the flailed hedges are on a roadside where they have to be kept under control for road safety reasons, and more than half are banked. Roadside hedges and banked hedges are more likely to have a very long history and, as might be expected, they do have a disproportionate share of the good herbaceous diversity. The widest diversity is found with the banked hedges on old, quiet lanes such as Harcombe Lane and Milltown Lane, one of which is flailed and one not.

If you move away from the roadside to the hedges between fields, 18% of the flailed hedges have good herbaceous diversity compared to 25% of the unflailed hedges. However, 18% of the flailed hedges have poor diversity compared to 40% of the unflailed hedges. These results are skewed by the relict banks on the high ground which have grown out as lines of Beech, the canopy of Beech trees is dense and shades out the herbaceous layer almost completely. Other flailed hedges are in arable fields where cultivation, including some spraying, is taken right up to the hedge. The numbers are too small to draw firm conclusions, but the overall impression is that flailed hedges can support a rich and diverse herbaceous storey. The effect on animal diversity is beyond the scope of this study. Of the two laid hedges, one was rated with good diversity, the other poor.

The Future

There are clouds on the future horizon that threaten our trees and hedges. The long-term threat to the hedges themselves from climate change is unquantified, but there are serious concerns about the impact of climate change on our standard trees. Standard trees are a key part of the visual and wildlife value of the hedges. Away from the upland areas, Ash and Oak standards are the two main species. Many of the standards are succumbing to age and there is a potential threat to the Oaks from a disease called Sudden Oak Death, but that threat to our valley's appearance and biodiversity is much lower than Ash Die Back.

The 2014 Tree Survey revealed that Ash is the dominant deciduous tree in the valley. Ash trees are 10.7% of the tree population and provide 18% of the total leaf area. Their importance is even more significant because they support much more of our local biodiversity than the larch and Douglas Fir which are the most numerous trees. To lose our Ash trees will be as devastating to the landscape and ecology of the valley as Dutch Elm Disease was several decades ago across southern England.

Ash Die Back is a fungal disease that spread from Asia where the native Ash species have evolved resistance to its effects, our trees do not enjoy that resistance. The fungus invades and



Ash Die Back

blocks the water transport xylem of the tree and eventually the tree dies. As was said, Ash is the dominant broadleaf tree in the valley and, as a native tree, it supports a wide range of other species. The loss of most of our mature Ash trees and the loss of young trees to succeed the old trees will not only affect the landscape, but the valley's invertebrate biodiversity with a knock-on effect on vertebrates, particularly birds.

The stark numbers are that of the 59 sites surveyed, 50 have Ash present either as a tree or shrub or both. Of the sites with Ash present, 30 have signs of Ash Die Back, 14 of them have evidence of significant infection. It is not possible to stop Ash Die Back; you cannot inoculate nearly eight thousand trees, forty thousand if you include the trees in woodland, even if there was a tree antibiotic. It is possible that some trees will show resistance and survive to breed new stock, but that will be a long-term process that I will not see. The outlook for the next few years is not promising.

To conclude, the overall picture is that our hedges are in a fairly good state, with the exception of the younger but now relict ones on the high ground. There is good diversity in hedge type and the natural biodiversity they support. Things could be improved further with the help of farmers committed to our aims. Action needs to be taken to allow standard trees to be replaced if we want the appearance of the valley to be maintained, but the replacements will have to take account of climate change and tree pathogens.

We await the data from the remaining hedges to be surveyed which may or may not cause major changes to these observations. The data present a springboard into other investigations to explore particular aspects of our wonderful network of hedges. A full report will be published when we have all the data.

Ed Dolphin, with thanks to all the volunteer surveyors, and to Jon Ball and Diana East for their help with editing this report.

*2014 Survey http://sidmoutharboretum.org.uk/documents/tree_survey_report_v6.pdf

** Trees Outside Woods <https://www.woodlandtrust.org.uk/media/1821/trees-outside-woods-ecological-value.pdf>

Further reading about Hedges and Hedges

Hedgeline UK <http://www.hedgeline.org.uk/index.php?page=16>

Devon Hedge Group http://www.devon.gov.uk/devon_hedges

Blackdown Hills Hedge Association <http://bhha.info/>

Natural England <http://www.cfeonline.org.uk/hedge-trees/>

<i>Herbaceous species</i>			
ALEXANDERS	DOCK BROAD LEAVED	NAVELWORT	VALERIAN
ALKANET	DOCK HYBRID	NETTLE SMALL	VETCH BUSH
ANGELICA	DOCK CURLED	NETTLE STINGING	VETCH COMMON
ARUM	DOG'S MERCURY	NIPPLEWORT	VIOLET
BINDWEED FIELD	DROPWORT	OX-EYE DAISY	WHITE DEADNETTLE
BINDWEED HEDGE	FAT HEN	PIGNUT	WILD GARLIC
BIRD'S FOOT TREFOIL LARGE	FLEABANE	PLANTAIN RIBWORT	WILD ONION
BITTERSWEET	FOXGLOVE	PRICKLY LETTUCE	WILLOWHERB BROAD LEAF
BLACK BRYONY	GARLIC MUSTARD	PRIMROSE	WILLOWHERB GREATER
BLACK NIGHTSHADE	GROUND ELDER	PULMONARIA	WILLOWHERB MARSH
BLUEBELL	GROUND IVY	RAGWORT COMMON	WILLOWHERB SQUARE STEM
BUGLE	HAWKBIT	RED CAMPION	WOODSAGE
BURDOCK	HEDGE BEDSTRAW	RED DEADNETTLE	YARROW
BUTTERBUR	HEDGE MUSTARD	SANICLE	YELLOW ARCHANGEL
BUTTERCUP CREEPING	HEDGE PARSLEY	SCARLET PIMPERNEL	ST JOHN'S WORT
BUTTERCUP MEADOW	HERB BENNETT	SCENTLESS MAYWEED	<i>Grasses</i>
CATS EAR	HERB ROBERT	SILVERWEED	BARREN BROME
CELANDINE	HIMALAYAN BALSAM	SORREL	COCKSFOOT

CHICKWEED	HOGWEED (not Giant)	SOW-THISTLE ROUGH	CRESTED DOGSTAIL
CINQUEFOIL	HONESTY	SOW-THISTLE SMOOTH	ITALIAN RYEGRASS
CLEAVERS	IRIS STINKING	SPEEDWELL	PENDULOUS SEDGE
CLOVER RED	IRIS YELLOW	SPOTTED LOOSETRIFE	SOFT RUSH
CLOVER WHITE	IVY LEAVED TOADFLAX	STITCHWORT	WALL BARLEY
COMFREY	KNAPWEED	ST JOHN'S WORT	WOOD MELICK
COW PARSLEY	KNOTGRASS	TANSY	<i>Non-flowering</i>
CRANESBILL CUT-LEAVED	LONG-STALKED CRANESBILL	TEASLE	BRACKEN
CRANESBILL LONG-STALKED	LUCERNE	THISTLE CREEPING	HARD FERN
CRANESBILL WOOD	MEADOW-RUE	THISTLE SOW	HART'S TONGUE FERN
CUCKOO FLOWER	MEADOWSWEET	THISTLE SPEAR	HORSETAIL
DANDELION	MUGWORT	TORMENTIL	MALE FERN

Summary Data

1. 59 of the 100 selected hedges have been surveyed to date.
2. Total length surveyed 8.41km, which is 1.7% of the valley's total of approximately 500km.
3. Field sizes vary enormously across the valley and the selected hedges range from 30-325m.
4. The shrub layer of hedges ranged in height from absent to 5m tall with a mean average of 1.8m and a modal average of 2m.
5. The shrub layer ranged in depth from absent to some untended hedges spreading to 15m, the mean average is just under 2m and the modal average is 2m.
6. 28 of the 59 hedges were considered tidy which is 47% of the sample surveyed so far, the total length of tidy hedges is 4.41km which is 52% of the sample surveyed so far, this is approximated to 50% for analysis below.
7. 26 of the tidy hedges are maintained by tractor mounted flail, 2 maintained by recent laying.
8. 32% of the hedges are roadside, 16% are beside a track or unmade road, 52% are solely field boundaries.
9. 67% of the hedges are planted on a bank.
10. A total of 523 standard trees (5m or taller) was recorded, this extrapolates to almost 35,000 standard trees in the hedges of the valley.
 - a. The mean average is 7 standards per 100m of hedge, but that reduces to 4 per 100m if you remove the relict hedges that have grown as lines of mainly Beech trees.
 - b. 22 hedges have fewer than 2 standards per 100m.
 - c. 12 hedges have no standard trees.
11. The most frequent standards are
 - a. Ash 117 specimens (extrapolating to 7,800 across the valley), the tallest 25m, one specimen with a girth of 600cm, a registered ancient tree in Byes Lane estimated to be 450 years old
 - b. English Oak 82 specimens, the tallest 21m, maximum girth of 470cm equating to an age of 270-300 years, also in Byes Lane
 - c. Beech 74 specimens, the tallest 15m, maximum girth 200cm equating to an age of 80 years
 - d. Sycamore 61 specimens, the tallest 18m, maximum girth 100cm equating to an age of only 30 years.

12. A total of 266 possible future standard trees (small trees up to 5m that could be left to grow into a standard) was recorded, this extrapolates to a potential 18,000 future standard trees in the hedges of the valley.
 - a. Of the species capable of growing to a large tree, the breakdown is: Ash 24, Beech 24, English Oak 15, Field Maple 28, Sycamore 20.
 - b. The remainder were mainly Hazel and Willow coppice that had been left to grow out.
13. The standard and potential standard trees were not distributed proportionately across different hedge formats.
 - a. The 50% of hedges rated as tidy, almost exclusively flailed, held just 16% of the standard trees and 29% of the potential standards.
 - b. The 31% of hedges beside a road held only 12% of the standards and 23% of the potential standards.
 - c. The 17% of hedges beside a track held 30% and 27% respectively.
 - d. The 53% of hedges neither beside a road nor a track held 59% of the standards and 47% of the potential standards.
 - e. The 66% of hedges planted on a bank held 74% of the standards and 76% of the potential standards.
14. The median number of woody species is 8 per hedge but the range varies greatly, 611N had 13 different species while 207N is a relict hedge with only 2 species, Ash and Oak trees, but no shrub storey.
 - a. Of the 26 hedges above the median, 15 are rated good for herbaceous diversity, 10 medium and only 1 poor.
 - b. Of the 25 hedges below the median, only 2 are rated as good for herbaceous diversity, 9 medium and 14 poor.
 - c. Banked hedges are equally likely to have their number of woody species above or below the median.
 - d. Of the tidy flailed hedges, 16 are above the median, 7 are below.
 - e. Of the untidy and relict hedges, 10 are above the median, 18 are below.
 - f. Of the roadside hedges, 12 are above the median, 3 are below.
 - g. Of the trackside hedges, 3 are above the median, 6 are below.
 - h. Of the hedges neither beside a road nor a track, 9 are above the median, 13 are below.
15. The assessment of the herbaceous diversity was qualitative but equates approximately to hedges associated with more than 10 herbaceous species being good, 5-10 species being medium, and those holding fewer than 5 species being poor.
 - a. 19 of the 59 hedges were rated as good, 24 medium, and 16 poor.
 - b. Of the 28 hedges rated tidy, almost exclusively flailed, 42% had good diversity and 14% poor. These hedges are 50% of the total and represented 63% of those rated as good for diversity, 50% of those rated medium, but only 25% of the those rated as poor.

- c. Of the 18 hedges beside a road, 50% had good diversity and 33% poor. These hedges are 31% of the total but represented 47% of the good hedges and only 6% of the hedges with poor diversity.
- d. Of the 10 hedges beside a track, 33% were had good diversity and 50% were poor. These hedges are 17% of the total, they represented 16% of the good hedges but 31% of the hedges with poor diversity.
- e. Of the 31 hedges neither beside a road nor a track, only 23% had good diversity and 32% were poor. These hedges are 53% of the total but they represented only 37% of the good hedges and 63% of the hedges with poor diversity.
- f. Of the 39 hedges planted on a bank, 41% had good diversity and 28% were poor. These hedges are 66% of the total but represented 84% of the good hedges and 69% of the hedges with poor diversity.