The exceptional yew trees of England, Scotland and Wales

by Andy Moir, Toby Hindson, Tim Hills and Richard Haddlesey

SUMMARY: While English yew *Taxus baccata* L. has become extinct or rare in many parts of Europe, Britain contains a large population of very large and old yew. We analysed 2,760 records of live yew trees to document this unique population and categorise by girth: 717 Veteran (5-6.99m), 204 Ancient (7-8.99m) and 55 Exceptional (≥9m) yew trees. Individual trees are mapped, and both areas and habitats of the highest proportions are detailed. The loss of 223 notable trees from churchyards highlights a need for better safeguarding a unique habitat of the world's largest yew trees.

Introduction

English yew (*Taxus baccata* L.) is a slow-growing, long-lived (>1000 years), shade-tolerant species that is able to withstand full sun. In a continental climate it is typically an isolated understorey tree, but in oceanic climates it can form dense stands (Thomas and Polwart, 2003). Over-use in past centuries, combined with unsuccessful regeneration, browsing pressure, illegal cutting and lack of appropriate management strategies (Svenning and Magård, 1999; Dhar et al., 2006), have contributed to English yew being catalogued as a rare and endangered species over Europe (Hageneder, 2007).

In Britain yew is widespread, although yew woodland is restricted to the south and, to a lesser degree, the north of England, occurring on shallow, dry soils, usually on chalk or limestone slopes. Thomas and Polwart (2003) show the distribution of English yew in Britain. The Joint Nature Conservation Committee (http://jncc.defra.gov.uk/) lists thirteen yew woodlands of Special Areas of Conservation (SAC). A large population of individual trees and small stands are more widely spread, growing on more fertile soils.

Yew has been comparatively little studied, probably because it most often occurs as a co-dominant or subordinate species in other types of woodland, or as single trees (Tittensor, 1980). Ecological investigations have been carried out on the yew woodlands on the North and South chalk Downs in south-east England (Williamson, 1979; Tittensor, 1980; Rodwell, 1991), but little has been published about woodlands on the magnesian limestone in Country Durham or on limestone pavements around Morecambe Bay. Age and dendroclimatological studies have been conducted on yew trees in the Privy garden at Hampton Court (Moir, 1999), woodland at Happy Valley (North, 2000) and some churchyard yew in the south-east region (Moir, in preparation).

The natural distribution of yew in Britain is clouded by planting. The only significant stand in Scotland, on Loch Lomond, is considered to have been planted, and whether yew is native to Scotland has been debated (Dickson, 1994). Particularly large yew trees that often occur (presumably planted) near chapels, churches, cemeteries and other prominent areas have long been of interest, and their occurrence, and often girth, documented. The aims of this research were to use records of a unique relic population of large-girth yew trees to quantify and map the population, to identify the most important areas and habitats of survival and to highlight recent losses.

Methods

The earliest locations and descriptions of 'notably' large-girthed English yew come from a variety of documentary sources, some dating back to the late 18th century. Since 2005 historic records, together with more recent identifications and girth measurements of notable yew trees, have been collected by members of the Ancient Yew Group (AYG) and volunteers, and entered onto the AYG database. With most historical records now entered, the focus has turned to locating new notable yew trees and identifying where trees on previously recorded

Figure 1. Ankerwyke, Berkshire, recorded with a girth of 788cm. (Photo: Tim Hills)

sites have been lost.

The AYG database, which may be viewed at www.ancient-yew.org, provides the most comprehensive archive of information on large yew trees in this country. Tree girth has traditionally been recorded at breast height (1.3m). However, the trunks of yew are notoriously irregular (Figure 1), and low branches can make girth measurements extremely difficult, except when taken very close to the ground. The girth measurements of yew trees are therefore typically recorded at the minimum girth between the ground and breast height.

Data

For this study data from the AYG database was made accessible and retrieved in 2011. Seven fields of information: Site name, Area, Country, Site type, Tree Girth, National grid reference (NGR) and Notes, were transferred to a spreadsheet that was then edited, mainly to complete omissions, but also to help identify and correct errors. Girths recorded in inches were multiplied by 2.54 to convert to centimetres. National grid references were generally recorded to six figures, which gives a precision of 100 × 100m. However, where references were not recorded the NGR for the location name (typically the nearest village) was used. In most instances, where a few large yew trees occur in a small discrete group, only a single entry for the largest tree was recorded. To enable the distribution of yew to be plotted with ARCVIEW GIS software, NGR grid references were converted to latitude and longitude in a decimal degrees format. Records in the database for yew in Ireland and France are not in the British NGR format, so these records were not included in this analysis.

Table 1. Frequency distribution for 2,208 yew of known girth.

Girth range (m)	No. of of yew	%	Category
100-299	123	6%	Young yew
300-499	1109	50%	Notable yew
500-699	717	32%	Veteran yew
700-899	204	9%	Ancient yew
900+	55	3%	Exceptional yew

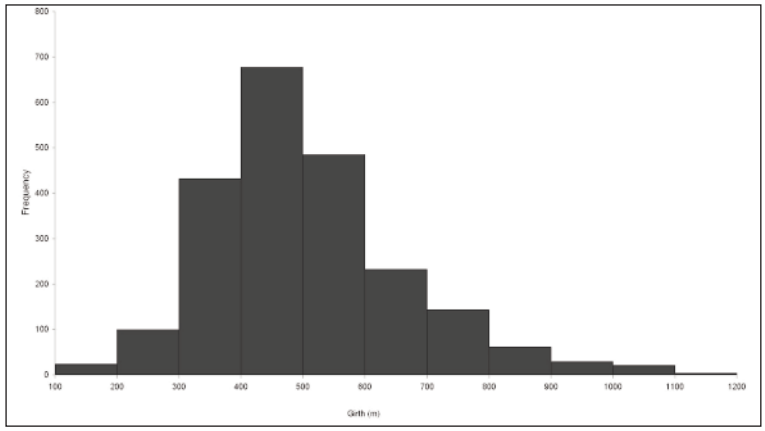

Figure 2. Frequency histogram of the girth of 2,208 live yew trees.

In Britain both the Tree-Register and Ancient-tree-hunt.org.uk categorises trees into 'Notable', 'Veteran' and 'Ancient'. However, to highlight the exceptional rarity and importance of the largest-girthed yew, we have defined a further category 'Exceptional' yew. Here we define five categories based on girth: Young (≤2.99m), Notable (3-4.99m), Veteran (5-6.99m), Ancient (7-8.99m) and Exceptional (≥9m) (Table 1). The 30 counties with the largest populations of yew were listed in rank order. The percentage loss of

trees has been calculated using the following equation: (Lost/Live)*100.

Results

A total of 3,041 records of yew trees were used in this analysis. Of these, 73% were of known girth, 18% of unknown girth, and 9% were lost trees. Distributions of the sizes of the 2,208 live yew of know girths are shown in Figure 2 and Table 1. Veteran, Ancient and Exceptional status yew trees form 32%, 9% and 3% of the records, respectively. Just 35, 19 and one Exceptional yew trees are identified in England, Wales and Scotland, respectively.

The overall geographic distribution of yew is shown in Figure 3 and quantitatively described in Tables 2 and 3. England is shown to contain 71% of the population of recorded yew, with the highest proportion at 17% in Hampshire and Kent. Hampshire and Kent between them contain 19% of the Ancient and 15% of the Exceptional yew trees. Wales contains 25% of the live recorded yew, but half this number (12% of the total population) is located in the County of Powys. Powys contains high proportions of both Ancient and Exceptional yew, accounting for 22% and 15% of these populations, respectively. Two other noteworthy high proportions of yew in England occur in the counties of Somerset and Gloucestershire in the South-west and in Shropshire and Herefordshire of the West Midlands, which contain 19% of the total population divided equally between these two regions.

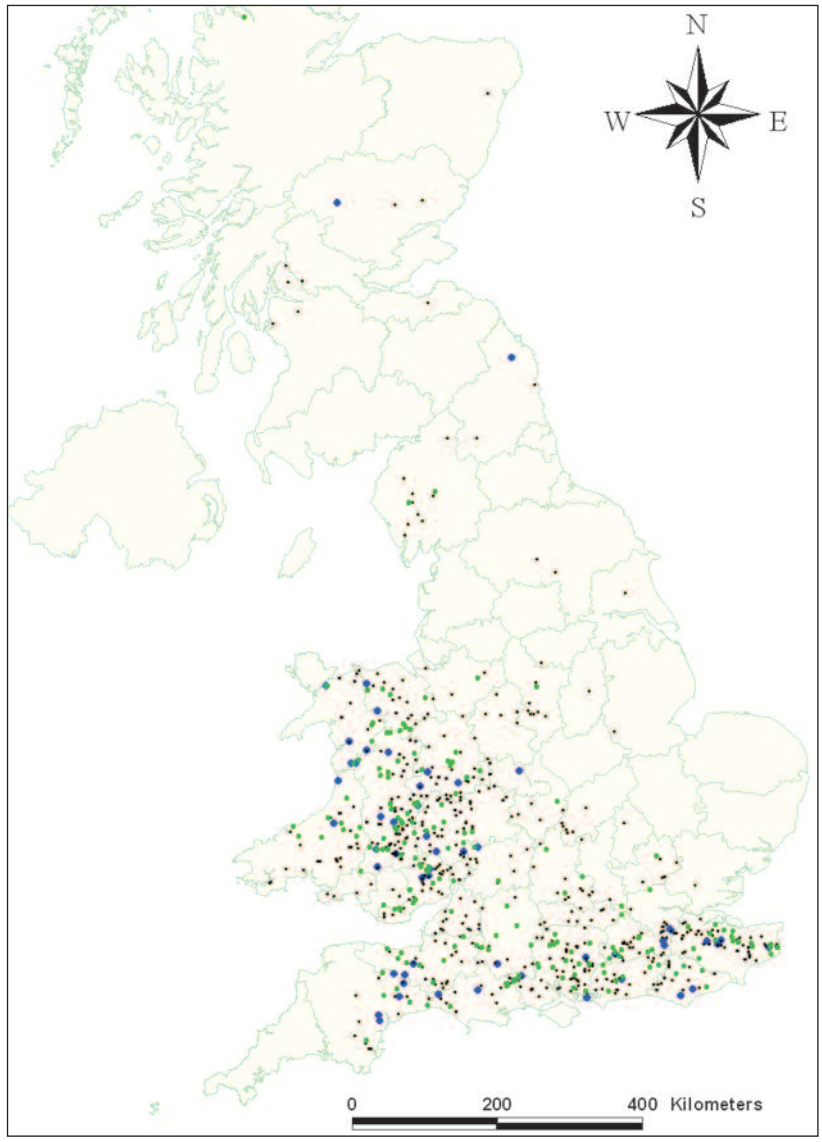

Figure 3. The distribution of 717 recorded yew of Veteran (black/small), Ancient (green/medium) and Exceptional (blue/large) size in England, Scotland and Wales.

Comparison between the numbers of live yew and lost yew in different areas are shown in Table 2. We identify that, overall, 10% of previously recorded yew have now been lost, but these levels are more than double in the worst affected counties: Glamorgan, Yorkshire and Warwickshire. The highest numbers of lost Notable yew trees recorded are 23 in Somerset and 20 in Kent. While Scotland is shown to contain just 4% of the population, it contains the yew with the largest recorded girth at 17.06m (56 ft).

In terms of habitat, a total of 1,855 individual trees (67% of the recorded population) are located in churchyards. Woodland and garden yew account for

just 9% and 6% of the population, respectively. Churchyards also account for the highest number of all recorded lost yew, 223 (79%). In contrast, just three trees are recorded as lost from woodland.

Discussion

Exceptional yew

While it is recognised that our data records only a small part of the total population of yew, it identifies a very high proportion of those trees considered most valuable in terms of conservation. Read (1999) defines veteran trees as those of interest biologically, culturally or aesthetically because of their age, size or condition, and suggests that oak specimens with a girth of more than 4.7m be considered veteran and valuable in terms of conservation. Our defined category of Veteran yew should be considered in similar terms, while those categories of Ancient and Exceptional yew increase exponentially in rarity and value.

A further aspect to the importance of this large-girthed yew is age. Establishing the age of yew is complicated by the general hollowing characteristic of trees over 4.6m in girth (Mitchell, 1972). However, the use of partial increment cores and sections from both hollow trees and solid trunk churchyard yew in the SE region provides reasonable empirical evidence that one metre of girth equates to around one hundred years of age (Moir, in preparation). This helps confirm previous estimates that suggest that yew trees categorised here as Exceptional are likely to be near or over 1,000 years old, which further highlights the importance of these trees.

The distribution of yew

Churchyards contain 717 specimens (73%) of the total 976 recorded yew with girth of 5m or more, highlighting this habitat as the most important for the preservation of large-girth yew. Exactly why yew is associated with churchyards remains unclear, but it has been suggested that the larger yew at such sites

Table 2. Total 2,760 living and lost yew by country and county.

	Country/ County	Live yew	Lost yew	% loss of trees	Number of Ancient yew	Number of Exceptional yew
	England	1964	205	10%	122	35
	Wales	693	71	10%	81	19
	Scotland	103	5	5%	1	1
1	Powys	342	16	5%	44	8
2	Hampshire	236	9	4%	20	3
3	Kent	218	20	9%	19	5
4	Somerset	159	23	14%	11	3
5	Shropshire	142	9	6%	9	3
6	Herefordshire	124	11	9%	10	3
7	Goucestershire	119	7	6%	3	1
8	Sussex	109	15	14%	11	3
9	Dorset	104	15	14%	8	2
10	Surrey	103	9	9%	9	3
11	Devon	78	5	6%	6	4
12	Wiltshire	77	11	14%	5	1
13	Monmouthshire	72	13	18%	9	3
14	Berkshire	61	7	11%	1	
15	Cumbria	52	5	10%	2	
16	Worcestershire	47	8	17%		
17	Denbighshire	40	2	5%	2	
18	Derbyshire	40	7	18%	1	
19	Camarthenshire	37	6	16%	4	
20	Oxfordshire	37	5	14%	3	
21	Staffordshire	35	2	6%		
22	Gwynedd	34	5	15%	5	4
23	Glamorgan	33	9	27%	3	
24	Conwy	31	4	13%	3	2
25	Yorkshire	28	8	29%		
26	Ceredigon	26	4	15%	4	2
27	Greater London	25	5	20%	1	2
28	Warwickshire	22	6	27%	1	
29	Perth & Kinross	17	0	0%		1
30	Buckinghamshire	16	3	19%	1	
	Total in other counties	296	32	11%	9	2
	TOTAL	2760	281	10%	204	55

may be survivors from saint cells from the sixth to seventh centuries AD (Bevan-Jones, 2002). The small (3m x 4m) cells or hermitages of early saints (which may have been little more than a few stones, or wooden constructions) can leave little archaeological evidence or may be incorporated into later churches. Wales has no examples of natural woodland yew (except in a few areas of cliff (Bevan-Jones, 2002)); therefore the abundance of large yew is most likely explained by planting. It is also of interest that, assuming one metre of girth equates to around one hundred years of growth (Moir, in preparation), then the drop after the peak frequency of yew (Figure 2) coincides with the dissolution of the monasteries at the end of the medieval period (c.1539). Similar evidence for a relationship between churches and yew comes from a study using increment cores from the yew at the Dunsfold Parish church in Surrey (Moir, 2004). The study at Dunsfold concluded that the church and the yew were likely to be of the same age. Earlier studies on yew have also suggested a link between the planting dates of yew and their location in relation to a church (Chetan and Brueton, 1994).

Losses of yew

Sixty-seven percent of all recorded yew are located in churchyards. However, 717 of the 976 recorded Ancient yew (≥5 m) (73%), and 50 of the 55 (91%) Exceptional yews (with girth ≥9 m) are located in churchyards. This research highlights the churchyard habitat as a critical habitat for the conservation of large-girthed yew trees. Rather startlingly, 10% of large yew trees previously recorded in churchyards are shown to have disappeared; the majority over the last one hundred years. The loss of yew trees from churchyards is increasingly being recognised (Greenwood, 2013). It is worth noting, however, that yew trees in prominent positions such as churchyards and historic sites are more likely to have been recorded, so the totals may be biased towards churchyard yew loss, while the more easily missed woodland yew losses may be under-represented. However, on balance, the general inclusion of multiple large trees into a single record in this study means that the full extent of large-scale losses at a number of sites is likely to be under-represented. For example, at Sullington (Sussex) only one of six yews now remains, at Blaina (Monmouthshire) eleven substantial trees have all been removed, and at Strata Florida (Scotland) only two of what was once 39 yew remain (Bevan-Jones, 2002). It is possible that these losses are in part a response to the pressure on churchyard space for burials and buildings. While it was considered beyond the scope of this study to quantify the timings and reasons for losses, this information is often available, and analysis of these factors in the future is suggested to help identify simple strategies to help conserve yew. For instance, a total of 28 churchyard yews are recorded as lost due to storms, therefore it is hypothesised that preventing the removal of the lower branches may help mitigate the apparent susceptibility of these trees to wind damage.

Table 3. Total live yew in the main regions of the species.

Region	Number of live yew
South East	702
South West	640
West Midlands	370
Mid-Wales	368
South Wales	142
North Wales	105
East Midlands	40
Yorkshire	28
Mid-Scotland	17

The importance of the churchyard habitat

There are two general conservation strategies for slow-growing long-lived species that are rare and confined to small geographical areas: a) reinstituting the ecological processes important for the recruitment of new individuals (for example, removal of animal browsing pressure on seedlings), and b) protecting established individuals. From our data, hardly any large yews are recorded in Special Areas of Conservation of yew woodland, and just 9% of trees are located in woodland, demonstrating the limited importance of these habitats in the conservation of Britain's largest-girthed yew. It can be argued that the wide regional coverage of large-girthed yew shown here should be viewed as important for the long-term viability of the yew population in this country, due to the critical role they may play in regeneration. Yew seeds are primarily dispersed by birds (Iszkulo and Boratynski, 2004), therefore individual yew allow spontaneous germination under canopies of other tree

species some distance from them. In a study on the South Downs of the Hampshire/Sussex border, Tittensor (1980) found yew woods often along parish boundaries and suggests their likeliest origin is from parental seed trees that marked those boundaries. Large-girthed yew also form a widespread interlinked network that produce abundant pollen that can be borne long distances by the wind, helping to preserve the genetic variation required to maintain population viability. The regeneration of Britain's younger yew woods and future yew wood is therefore likely to be interlinked with the health of the population of large individual yew.

Future research

Interestingly, in studies on the yew woods of the South Downs, Tittensor (1980) found 62% of yew on steep slopes, 90% on chalk and 80% of woods occurring in areas of high rainfall (>1000mm per year). The influence of factors such as rainfall, slope and substrate on the population of individual recorded trees is highlighted for future investigation. Also, despite Scotland's comparatively small population, the few examples of large yew identified there may be critical in helping to establish whether yew is native to Scotland. The relationship between planting yew and churches may be significant and further research to explore the possible correlation between the establishment of churches and the girth of their associated yews is currently under way.

Conclusions

- This study maps all known yew trees of 5m or more girth in England, Scotland and Wales and highlights that just 55 'Exceptional' yew trees (those with a girth of 9m or more) survive.

- Previously known areas with high proportions of large-girthed yew in Hampshire and Kent are shown to contain 17% of the population, while Powys has 12%. Previously unrecognised areas with high proportions are identified in Somerset, Gloucestershire, Shropshire and Herefordshire, which between them contain 19% of the population.

- 67% of large-girthed yew trees are recorded in churchyards, and recent losses suggest a need to better safeguard the exceptional trees that survive in this habitat.

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