



**COTTESMORE
RUTLAND**

**TREE-RING ANALYSIS OF TIMBERS
FROM A NUMBER OF HOUSES**

**GENERIC COVER PIC
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Introduction

Cottesmore, in Rutland, in the East Midlands, stands to the north of the county and, after Oakham and Uppingham, is reckoned to be its third largest settlement (Fig 1). It is believed that there has been a habitation here since at least the mid-eleventh century, its current name originating from 'Cotts Moor' (which should correctly be pronounced Cotts'more), and it appears to have been a flourishing village at the time of the Domesday survey in 1086. At this time it was probably under the name of Goda's Moor since at the time of Edward the Confessor a man called Goda held 3 carucates of land there (the area to be ploughed in a day by a team of 8 oxen). Historically the area around Cottesmore was agricultural, part of the Exton estate, seat of the Earls of Gainsborough. Cottesmore is now a typically English rural society of stone-built house, cottages, and other buildings, some of them thatched, the village grouped around the 800 year old Church of St Nicholas.

Cottesmore Project

On the basis of this history, Cottesmore History and Archaeological Group made a well-received application to the Heritage Lottery Fund, being soon awarded a grant of £13,600 for an exciting new project, *"How old is Cottesmore and how has it Developed"*. This project is being led by volunteers from the Village, with the aim of focusing on the origins of Cottesmore and how it has grown. The project is designed to enable local people to discover the early years of the village and how the community through its farming has grown and prospered.

The project will concentrate its activities on eight buildings throughout the village including, for example, the church and the Sun Inn. As part of this project some attempts will be made to date some of these buildings using dendrochronology, or tree-ring dating as it is more commonly known. It was hoped to find the exact date when the various buildings were built and how they developed to what we see today. This dating work is part of a wider project including an architectural inspection of the buildings plus the story of their inhabitants. The end result will be a number of small books, one for each building plus one for the village.

Sampling

With this brief in mind, an initial pre-sampling survey was made of a number of likely buildings in the village to assess them for their potential for tree-ring dating. From these a 'short-list' of the potentially most suitable was compiled, the available timbers in **six** of these buildings then eventually being sampled:

Honeypot Cottage,

Fir Tree Farmhouse

Holme Farm

The Sun Inn

20 Mill Lane

The Grange
Clatterpot House
Little Cottage
The Granary, 39 Main Street (Map fig 2)

The Nottingham Tree-ring Dating Laboratory would like to take this opportunity to thank the owners of Cottesmore Grange for agreeing to this programme of tree-ring analysis and for being so cooperative and helpful during sampling. The Laboratory would also like to thank Ron Dane and other members of the Cottesmore History and Archaeological Group, for their perseverance with this project, their commissioning of tree-ring dating, and also for their assistance with sampling.

Tree-ring dating

Tree-ring dating relies on a few simple, but quite fundamental, principles. Firstly, as is commonly known, trees (particularly oak trees, the timber most commonly used in building construction until the introduction of pine from the late eighteenth century onwards) grow by adding one, and only one, growth-ring to their circumference each, and every, year. Each new annual growth-ring is added to the outside of the previous year's growth just below the bark. The width of this annual growth-ring is largely, though not exclusively, determined by the weather conditions during the growth period (roughly March–September). In general, good conditions produce wider rings and poor conditions produce narrower rings. Thus, over the lifetime of a tree, the annual growth-rings display a climatically influenced pattern. Furthermore, and importantly, all trees growing in the same area at the same time will be influenced by the same growing conditions and the annual growth-rings of all of them will respond in a similar, though not identical, way (**Fig 3**).

Secondly, because the weather over a certain number of consecutive years is unique, so too is the growth-ring pattern of the tree. The pattern of a shorter period of growth, here taken to be less than 40 consecutive years, might conceivably be repeated two or even three times in the last one thousand years, and is considered less reliable. A short pattern might also be repeated at different time periods in different parts of the country because of differences in regional micro-climates. It is less likely, however, that such problems would occur with the pattern of a longer period of growth, and the longer the period of time under comparison the better.

Tree-ring dating usually relies on obtaining the growth pattern of trees from a number of different timbers in each building, or from each part of a building if it is of different phases. The optimum number of samples per building or phase is usually about 10–12 (depending on the size of the building or its phases), and the samples are usually obtained by coring. The growth pattern of these core samples are then obtained by measuring the width of the annual growth-rings, this being accomplished to a tolerance of 1/100 of a millimeter. The

growth patterns of these samples of unknown date are then compared with a series of reference patterns or chronologies, the date of each ring of which is known.

When the growth-ring sequence of a sample 'cross-matches' repeatedly at the same date span against a series of different reference chronologies the sample can be said to be dated. The degree of cross-matching, that is the measure of similarity between sample and reference, is denoted by a ' t -value'; the higher the value the greater the similarity. The greater the similarity, the greater is the probability that the patterns of samples and references have been produced by growing under the same conditions *at the same time*. The statistically accepted fully reliable minimum t -value is 3.5.

However, rather than attempt to date each sample individually it is usual to first compare all the samples from a single building, or phase of a building, with one another, and attempt to cross-match each one with all the others from the same phase or building. If, as in the case at Cottesmore where several buildings are being dated, fewer than the optimum number of 10–12 samples are obtained from each individual building, the samples can still be analysed collectively in the hope that they will produce results.

When samples from the same building, or from different buildings if they are being analysed together, do cross-match with each other, as at Cottesmore, they are combined at their matching positions to form what is known as a 'site sequence' (see Fig 4). As with any set of data, this has the effect of reducing the anomalies of any one individual (brought about in the case of tree-rings by some non-climatic influence) and enhances the overall climatic signal. As stated above, it is the climate that gives the growth pattern its distinctive pattern. The greater the number of samples in a site sequence the greater is the climatic signal of the group and the weaker is the non-climatic input of any one individual.

Furthermore, combining samples in this way to make a site sequence usually has the effect of increasing the time-span that is under comparison. As also mentioned above, the longer the period of growth under consideration, the greater the certainty of the cross-match. Any site sequence with less than about 40 rings is generally too short for reliable dating.

Having obtained a date for the site sequence as a whole, the date spans of the constituent individual samples can then be found, and from this the felling date of the trees represented may be calculated. Where a sample retains complete sapwood, that is, it has the last or outermost ring produced by the tree before it was cut, the last measured ring date is the felling date of the tree.

Where the sapwood is not complete it is necessary to estimate the likely felling date of the tree. Such an estimate can be made with a high degree of reliability because oak trees generally have between a minimum of 15 sapwood rings and a maximum of 40 sapwood rings. For example, if a sample with, say, 12 sapwood rings has a last sapwood ring date of 1400 (and therefore a heartwood/sapwood boundary ring date of 1388), it is 95% certain

that the tree represented was felled sometime between 1403 ($1400+3$ sapwood rings ($12+3=15$)) and 1428 ($1400+28$ sapwood rings ($12+28=40$)).

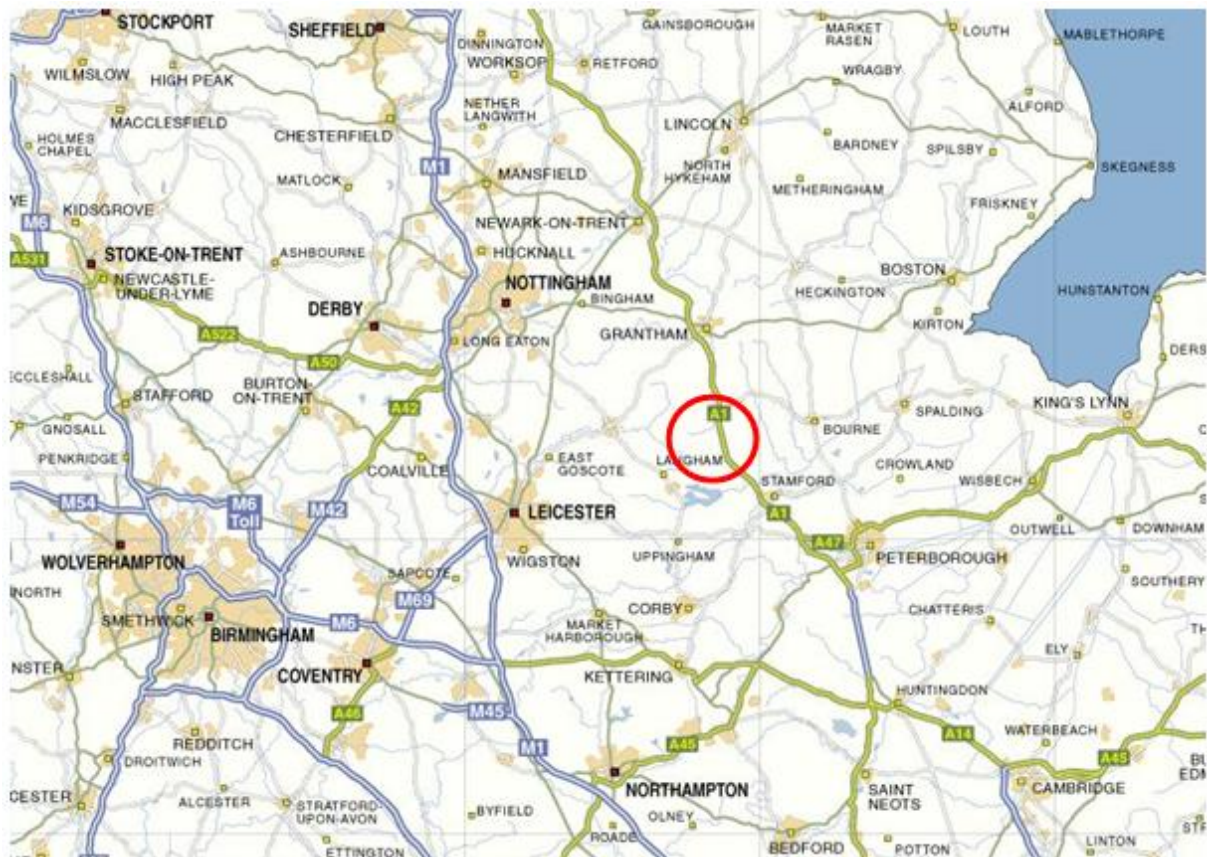


Figure 1: Map to show the location of Cottesmore

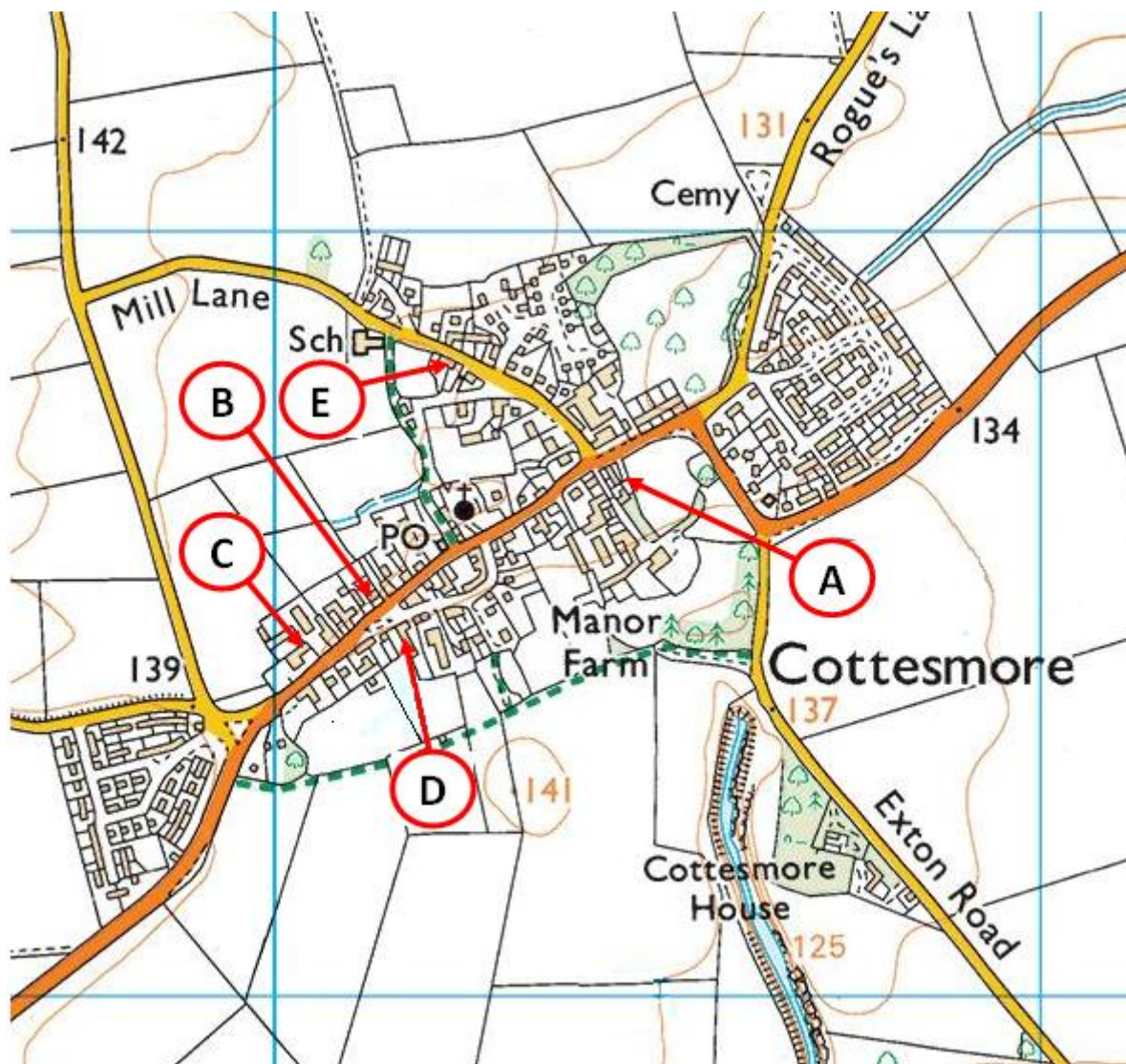


Figure 2: Map to show the approximate location of the five sampled buildings

A = Honeypot Cottage

B = Fir Tree Farm

C = Holme Farm

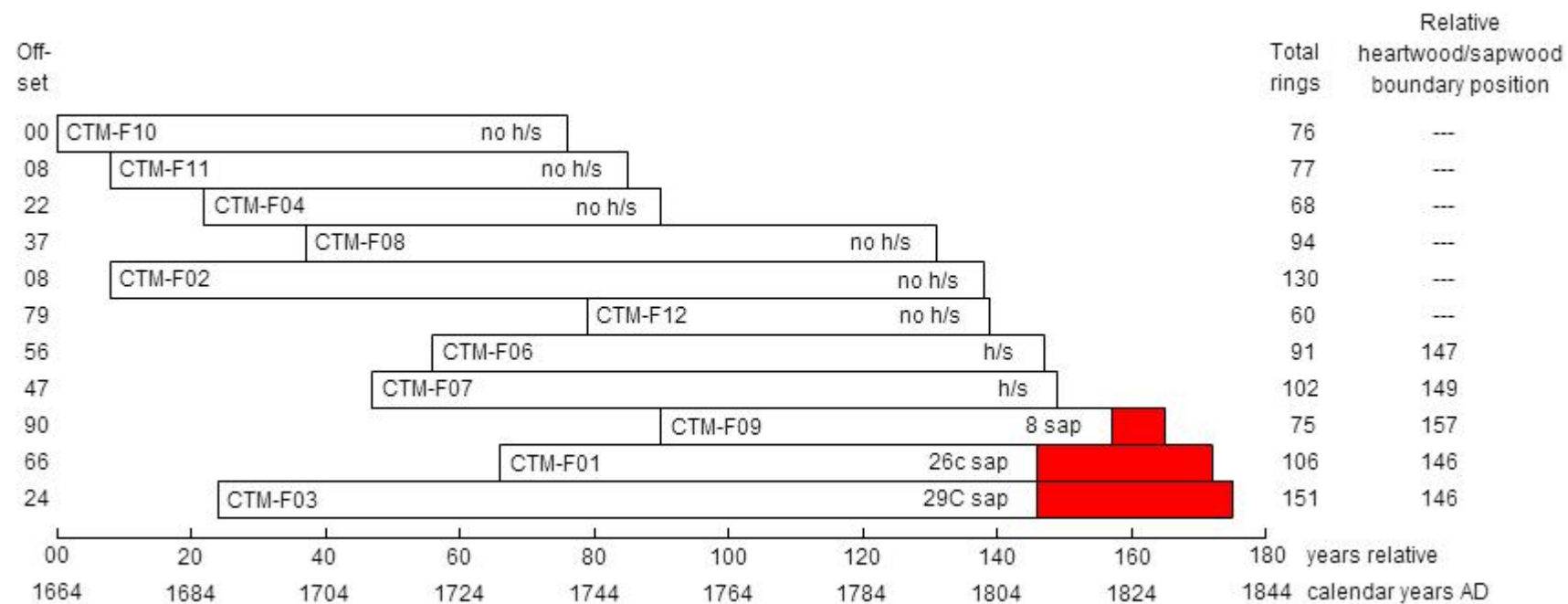
D = Sun Inn

E = 20 Mill Lane + others



Figure 3: Graphic representation of the cross-matching of two samples, COT-F06 and F12

When cross-matched at the correct positions, as here, the variations in the rings of these two samples (where they overlap) correspond with a high degree of similarity. As the ring widths of one sample increase (represented by peaks in the graph), or decrease (represented by troughs), so too do the annual ring widths of the second sample. This similarity in growth pattern is a result of the two trees represented having grown in the *same place* at the *same place*. The growth ring pattern of two samples from trees grown at different times would never correspond so well.



Blank bars = heartwood rings; shaded bars = sapwood rings

C = complete sapwood is retained on the sample; the last measured ring date is the felling date of the tree represented

c = complete sapwood is found on the timber, but a portion of this has been lost from the sample in coring

h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

Figure 4: Bar diagram of the samples in site sequence CTMFSQ01

The samples of site sequence CTMFSQ01 are shown above in the form of bars at positions where the ring width variations cross-match with each other. This similarity is produced by the trees represented growing at the *same time* in the *same place*. The samples are combined to form a 'site sequence' which is then dated by comparison with the 'reference chronologies'.

One sample, COT-F03, retains complete sapwood, this meaning that it has the last growth ring produced by the tree represented before it was felled (this being denoted by upper case 'C'). This last sapwood ring, and thus the felling of the tree, is dated 1838. A further sample, COT-F01, is from a timber which also has complete sapwood on it but from which about 2–3mm was lost coring (this denoted by lower case 'c'). It is estimated that the lost sapwood represents only a few rings which suggests that the tree represented was also felled in, or about, 1838.

The heartwood/sapwood boundary on the five samples that retain it lies within a very narrow range (in some cases being at identical positions). This suggests that these timbers originally had similar numbers of sapwood rings, and thus had similar, if not identical, last growth dates. All the indications are that the roof timbers were cut as part of a single episode of felling undertaken between late 1838 and early 1839.

RESULTS FOR INDIVIDUAL BUILDINGS

Honeypot Cottage

The latest timbers detected in this programme of tree-ring dating are represented by samples CTM-A01–A03 from the ceiling beams at Honeypot Cottage (these samples also dated as part of site sequence CTMSSQ03). One of these samples, CTM-A03, again retains complete sapwood, the last ring produced by the source tree before it was felled. In this case this last ring, and thus the felling of the tree, is dated 1782. Given that the near identical position of the heartwood/sapwood boundary on the other two samples from Honeypot Cottage, it is likely that they too were felled in 1782.



Figure 5: View of the timbers at Honeypot Cottage

Table 1: Details of tree-ring samples from Honeypot Cottage, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-A01	Kitchen, south ceiling beam	47	h/s	1717	1763	1763
CTM-A02	Kitchen, north ceiling beam (partition wall)	53	6	1715	1759	1767
CTM-A03	Living room, ceiling beam	68	16C	1715	1766	1782

*h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

C = complete sapwood is retained on the sample; the last measured ring date is the felling date of the tree represented

Fir Tree Farm

Another sixteenth century timber is represented by sample CTM-B09, from the ceiling beam to the kitchen of Fir Tree Farm (this sample also being dated as part of site sequence CTMSSQ01). This sample has a last measured sapwood ring date of 1564 and includes 11 sapwood rings, though again the sapwood is not complete to the bark. In this case, given that oak trees usually have a minimum number of sapwood rings (15) as well as a maximum (40), this indicates that the timber must have been felled at some point between 1568 at the earliest ($11+4=15$) and 1593 at the latest (allowing that it might at most have had another 29 sapwood rings ($11+29=40$)).

Samples CTM-B04–B08 – Fir Tree Farm

As well as a sixteenth century timber, Fir Tree Farm contains some later timbers as well, these being dated as constituents of site sequence CTMASSQ02. Three of these timbers, the west ceiling beam to the living room, and the ceiling beam and the fireplace bresummer of the dining room, (represented respectively by samples CTM-B06, B07, and B08), are likely to have been felled together at the same time in 1709. Such an interpretation is based on the fact that two of these samples, CTM-B06 and B08, both retain complete sapwood, this meaning that they both have the last growth ring produced by the source trees before they were felled (this being indicated by upper case 'C' in Table 1 and the bar diagrams). These last sapwood rings, and thus the felling of the trees, are both dated to 1709.

The third sample of this group, CTM-B07, is from a timber which has complete sapwood on it, but from which, due to the soft and fragile nature of this part of the wood, a few millimetres of sapwood were lost from the sample in coring (this being indicated by lower case 'c' in Table 1 and the bar diagrams). Given that the last extant sapwood ring on sample CTM-B07 is dated 1707, and the lost millimetres represent only a couple of years growth, the source tree for this timber is also very likely to have been felled in 1709.

A later timber at Fir Tree Farm appears to be represented by sample CTM-B05, from the south lintel to the opening in the living room. This sample also has a last measured ring date of 1709, but in this case the sample is again without the boundary between the heartwood and the sapwood (h/s in Table 1 and the bar diagrams). This again means that not only has the timber lost all its sapwood, but an unknown number of heartwood rings as well (this again probably having been removed by the original carpenters), and it possible that the tree could have gone on growing for many decades after 1709. Again, however, given the size of the timber, and that it represents a half a tree, it is unlikely to have been very much bigger, and therefore unlikely to have gone on growing for a great many more years. It might not be unreasonable, therefore, to suggest that the source tree was felled after the middle of the eighteenth century (possibly at the same time as the other lintel in this door opening – see immediately below).

The final dated timber at Fir Tree Farm is represented by sample CTM-B04, from the north lintel to the opening in the living room. This sample has a last measured sapwood ring date of 1746 and includes 3 sapwood rings (incomplete to the bark). Allowing that it might have had the usual minimum number of sapwood rings (15) as well as the usual maximum (40), this indicates that the timber must have been felled at some point between 1758 at the earliest ($3+12=15$) and 1783 at the latest (allowing that it might at most have had another 37 sapwood rings ($3+37=40$)).



Figure 6: View of timbers at Fir Tree Farm

Table 2: Details of tree-ring samples from Fir Tree Farm, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-B01	Living room, north lintel to opening	104	3	1643	1743	1746
CTM-B02	Living room, south lintel to opening	84	no h/s	1626	-----	1709
CTM-B03	Living room, west ceiling beam	55	17C	1655	1692	1709
CTM-B04	Dining room, ceiling beam	58	19c	1650	1688	1707
CTM-B05	Dining room, fireplace bresummer	88	22C	1622	1687	1709
CTM-B06	Kitchen ceiling beam	53	11	1512	1553	1564

*h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

C = complete sapwood is retained on the sample; the last measured ring date is the felling date of the tree represented

c = complete sapwood is found on the timber, but a portion of this has been lost from the sample in coring

Holme Farm

Potentially the oldest timber is represented by sample CTM-C10, from a beam in the hallway of Holme Farm. This sample has a last measured ring date of 1480. Unfortunately, this sample does not retain the boundary between the heartwood and the sapwood (h/s in Table 1 and the bar diagrams). This means that not only has the timber lost all its sapwood, but an unknown number of heartwood rings as well (this probably having been removed by the original carpenters). This means that it is not possible to determine when it was felled; in theory the tree could have gone on growing for many decades after 1480. However, given the size of the timber, and that it represents a half a tree, it is unlikely to have been very much bigger, and therefore unlikely to have gone on growing for a great many more years. It might not be unreasonable, therefore, to suggest that the source tree was felled at some point during the first half of the sixteenth century.



Figure 7: View of timbers at Holme Farm

Table 3: Details of tree-ring samples from Holme Farm, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-C01	Ceiling beam to hallway	43	no h/s	1438	-----	1480
CTM-C02	Ceiling beam to living room	50	18	-----	-----	-----

*h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

The Sun Inn

The next earliest timber is represented by sample CTM-D12, from the east-most ceiling beam in the public bar of the Sun Inn (this sample dated as part of site sequence CTMSSQ01). This sample has a last measured sapwood ring date of 1547, there being 17 sapwood rings on the sample, though the sapwood is not complete to the bark. Given that oak trees usually have up to a maximum of 40 sap wood rings, this indicates that the timber must have been felled at some point between 1548 at the earliest (as it was still growing in 1547) and 1570 at the latest (allowing that it might at most have had another 23 sapwood rings ($17+23=40$)).

In addition to its sixteenth century timber, the Sun Inn also contains two later timbers. These are represented by sample CTM-D16 and D17, respectively from the ceiling beam and fireplace bresummer in the restaurant (both samples dated as part of site sequence CTMSSQ03). The position of the boundary between the heartwood and the sapwood on both these samples is virtually identical, suggesting that they were felled at the same time as each other, the average date of this boundary being 1753. Allowing for the usual minimum/maximum number of sapwood rings (15/40), this would give the timbers an estimated felling date of some time between 1768 at the earliest and 1793 at the latest.



Figure 8: View of timbers at the Sun Inn

Table 4: Details of tree-ring samples from the Sun Inn, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-D01	Public bar, east ceiling beam	83	17	1465	1530	1547
CTM-D02	Public bar, middle ceiling beam (elm)	nm	---	-----	-----	-----
CTM-D03	Public bar, west ceiling beam (elm)	nm	---	-----	-----	-----
CTM-D04	Public bar, fireplace bresummer (elm)	nm	---	-----	-----	-----
CTM-D05	Restaurant ceiling beam	41	10	1724	1754	1764
CTM-D06	Restaurant, fireplace bresummer	53	8	1708	1752	1760

nm = sample not measured



Figure 9: View of timbers at 20 Mill Lane

Table 5: Details of tree-ring samples from 20 Mill Lane, Cottesmore, Rutland						
Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-E01	North (front) cruck blade	nm	---	-----	-----	-----
CTM-E02	South (rear) cruck blade	nm	---	-----	-----	-----
CTM-E03	Collar, cruck truss (pine)	nm	---	-----	-----	-----

nm = sample not measured

Cottesmore Grange.



The roof of The Grange comprises six king-post type trusses, a truss form common from the early nineteenth century onwards. Each truss is formed of a tiebeam, principal rafters, and king post with shouldered base and expanded head, there being struts which rise from the shoulders of the king-posts to the principal rafters. The trusses support single, backed, purlins to each pitch of the roof, these in turn supporting common rafters (Fig 3a). All such timbers have been finely sawn and heavily worked to produce very even, square cut, timbers, and are held by wooden pegs in morticed and tennoned joints. It may be of interest to note that many of these joints appear to have been carefully marked out in pencil, there also being other scribing to the timbers, possibly numbers or letters (perhaps 'checking' marks) in red pencil or crayon (Fig 3b). This is a feature that has been seen on several other roofs of this type.

From these timbers a total of 12 cores samples was obtained, each sample being given the code CTM-F (for Cottesmore, site 'F'), and numbered 1–12. The sampled timbers are identified on drawings of the trusses, these being given here as [Figure 4a–d](#). Details of the samples are given in Table 1, including the timber sampled and its location, the total number of rings each sample has, and how many of these, if any, are sapwood rings. The individual date span of each dated sample is also given.

In addition to the main timbers of the trusses there are other shorter, outer, struts to each truss, these rising from the tiebeam to the principal rafter where the principal supports the purlin. These timbers appear to be much less well worked than the main timbers, being less well sawn or trimmed, and appearing to be much poorer quality wood. It is possible that these shorter struts are inserted as 'afterthoughts', the beams not being jointed to the

trusses but held by nails. Given that these timbers also appeared to have too few rings for reliable analysis, they were not sampled.

Two other roofs at Cottesmore Grange were also assessed for possible tree-ring analysis, but these proved to be constructed of various types of softwood and pine timbers, probably of twentieth century date. These roofs were not sampled.

Analysis

Each of the 12 samples obtained from the roof of Cottesmore Grange was prepared by sanding and polishing to clearly reveal its annual growth rings. It was seen at this time that one sample, CTM-F04, had distorted rings caused by knotting, and it had to be rejected from this programme of analysis. The widths of the annual growth rings of the remaining 11 samples were, however, measured, the data of these measurements then being compared with each other as described in the notes on tree-ring dating above. This comparative process indicated that all 11 samples cross-matched well with each other at positions as indicated in the bar diagram Figure 6.

These 11 samples were combined at their indicated positions to form site sequence CTMFSQ01, this having an overall length of 175 rings. Site sequence CTMFSQ01 was then satisfactorily dated by repeated and consistent cross-matching with a large number of relevant reference chronologies for oak as spanning the years 1664 to 1838. The evidence for this dating is given in the *t*-values of Table 2.

Interpretation

Interpretation of the sapwood on the dated samples, and the degree of cross-matching between them, would suggest that all the trees used for the roof to this part of Cottesmore Grange were cut as part of a single programme of felling which was undertaken at some point between late 1838 and early 1839.

Such an interpretation is based on the fact that of the 11 dated samples, one, COT-F03 from the east strut of truss 3, retains complete sapwood. This means that it has the last growth ring produced by the tree represented before it was felled (this being denoted by upper case 'C' in Table 1 and the bar diagram). This last, complete, sapwood ring, and thus the felling of the tree is dated 1838. Given that all the spring cell growth and a large amount of summer cell growth for the final year has been laid down, it is likely that the tree was felled between the late summer of that year but before the spring of 1839.

A further sample in site sequence COTFSQ01, COT-F01, is from a timber which also has complete sapwood on it. In this case, due to the soft and fragile nature of this part of the wood, a small amount of sap, about 2–3mm, was lost from the sample in coring (this denoted by lower case 'c' in Table 1 and the bar diagram). It is estimated that the lost

sapwood represents only a few rings which, given that the last extant ring on the sample is dated 1835, would suggest that the tree represented by this core was also felled in, or about, 1838/39.

That all the other timbers were cut at this time as part of a single programme of felling is suggested not only by this being the usual the procedure, followed by builders even into the nineteenth century, but also by the fact that the samples cross-match so well with each other. This means that the source trees were growing close to each other in the same stand of woodland, and that it would be an unusual coincidence (had they been felled at different times) that they should come to be used together in the same roof. Indeed, such is the degree of cross-matching between samples that it is likely that some timbers, those represented by COT-F06, F08, and F12 for example, have in fact been derived from a single tree.

In addition, as may be seen from Table 1 and the bar diagram, the position and date of the heartwood/sapwood boundary on the five samples that retain it varies by only a small amount, in some cases being identical. This suggests that these timbers originally had similar numbers of sapwood rings, and thus had similar, if not identical, last growth ring dates. There is in any case, amongst those sampled, no evidence for the reuse of older timbers in this roof, or for the insertion of later material. All the indications are, therefore, that the sampled roof timbers are part of a single episode of felling undertaken between late 1838 and early 1839.

Woodland sources

It is sometimes possible in tree-ring analysis studies to make some comment on the sourcing of timber and where, approximately, the source woodland might have been located. In this instance, however, because the reference material for the period after about 1750 has fewer datapoints in it than, say, the late-medieval period, it is not possible to determine a distinct geographical trend; as may be seen from Table 2, site sequence COTFSQ01 matches reference chronologies from a widespread area. Indeed, in this respect the material now obtained from Cottesmore Grange will make a welcome addition to the body of eighteenth and early-nineteenth century reference data. Furthermore, having obtained a felling date, it might now be possible to ascertain whether there is any documentary evidence relating to purchase and sourcing of the timber used here.



Figure 10: View of the roof trusses at the Grange (top) and detail of the marking-out lines and other markings in red on a king-post (bottom)

Table 6: Details of tree-ring samples from Cottesmore Grange, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-F01	East strut, truss 2	106	26c	1730	1809	1835
CTM-F02	King post, truss 2	130	no h/s	1672	-----	1801
CTM-F03	East strut, truss 3	151	29C	1688	1809	1838
CTM-F04	West strut, truss 3	68	no h/s	1686	-----	1753
CTM-F05	King post, truss 4	nm	---	-----	-----	-----
CTM-F06	West strut, truss 4	91	h/s	1720	1810	1810
CTM-F07	East strut, truss 4	102	h/s	1711	1812	1812
CTM-F08	West principal rafter, truss 4	94	no h/s	1701	-----	1794
CTM-F09	West purlin truss 4 – 5	75	8	1754	1820	1828
CTM-F10	East strut, truss 5	70	no h/s	1664	-----	1739
CTM-F11	West strut, truss 5	77	no h/s	1672	-----	1748
CTM-F12	East purlin, truss 5 – south gable	79	no h/s	1724	-----	1802

* C = complete sapwood is retained on the sample; the last measured ring date is the felling date of the tree represented

c = complete sapwood is found on the timber, but a portion of this has been lost from the sample in coring

h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

nm = sample not measured

Clatterpot House, Clatterpot Lane



Analysis

Each of the core samples obtained from the six different beams at Clatterpot House was prepared by sanding and polishing to clearly reveal its annual growth rings, the widths of these then being measured. The data of these measurements was then compared with each other as described in the notes on tree-ring dating above. This comparative process showed that three samples, CTM-G04, G05, and G06, all from the first floor ceiling beams, could be cross-matched with each other at positions as shown in the bar diagram Figure 4. The three cross-matching samples were combined at these positions to form CTMGSQ01, a site chronology with an overall length of 73 rings.

Site chronology CTMGSQ01 was then compared with the full corpus of reference chronologies for oak for all time periods from every part of Britain (including samples from other buildings in Cottesmore). Despite this, there was no cross-matching and site chronology CTMGSQ01, and its constituent, timbers must remain undated.

The three remaining ungrouped samples were then compared individually with the full corpus of reference data but again there was no cross-matching, and these samples must also remain undated.

This lack of dating is not an uncommon phenomenon in tree-ring analysis where some samples from almost every site remain undated. This has, however, been a notable feature of the Cottesmore timbers in general where a smaller percentage of timbers than usual have been dated.

Although undated, the fact that the three samples from the first floor ceiling beams cross-match well with each other would suggest that the source trees were growing close to each other in the same patch of woodland. It is thus more likely than not that they were felled at the same time as each other.

Table 7: Details of tree-ring samples from Clatterpot House, Clatterpot Lane, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-G01	Main east bridging beam to kitchen	45	h/s	-----	-----	-----
CTM-G02	East main west bridging beam to utility room	52	h/s	-----	-----	-----
CTM-G03	West main west bridging beam to utility room	50	h/s	-----	-----	-----
CTM-G04	First floor ceiling beam 1	55	h/s	-----	-----	-----
CTM-G05	First floor ceiling beam 2	66	h/s	-----	-----	-----
CTM-G06	First floor ceiling beam 3	70	h/s	-----	-----	-----

*h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing



Figure 11: View of a selection of timbers at Clatterpot House

Little Cottage, Clatterpot Lane



From the timbers available here, three were selected for sampling, the sampled timbers being identified on the annotated photograph, Figure 3, each core being identified by the code CTM-H (for Cottesmore site “H”) and numbered 1–3. Details of the samples are given in Table 1, including the timber sampled and its location, the total number of rings each sample has, and how many of these, if any, are sapwood rings.

Analysis

Each of the core samples obtained from the three different beams at Little Cottage was prepared by sanding and polishing to clearly reveal its annual growth rings. It was seen at this time that one sample, CTM-H01, while being from an oak beam, had too few rings (less than 40) to get a positive match with any of the reference chronologies, and thus it could not be dated.

It was also seen that the two other samples, CTM-H02 and H03, were not only from pine timbers, but also had low numbers of rings. The widths of the annual growth rings of pine trees vary less from year to year according to the weather than do, say, oak trees (which are much more responsive to variations in growing conditions), and thus pine trees carry less climatic information. In order to overcome this problem it is necessary, when trying to date pine, to have even higher numbers of rings than required for oak samples, the usual minimum reliable number for pine being about 80 rings. Thus these two pine samples are also undatable.

Table 8: Details of tree-ring samples from Little Cottage, Clatterpot Lane, Cottesmore, Rutland

Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-H01	Southern main east–west bridging beam (oak)	nm	---	-----	-----	-----
CTM-H02	Northern main east–west bridging beam (pine)	nm	---	-----	-----	-----
CTM-H03	North–south bridging beam (pine)	nm	---	-----	-----	-----

nm = sample not measured

The Granary, 39 Main Street



From the timbers available here, three were selected for sampling, the sampled timbers being identified on annotated photographs as Figure 3a/b, each core being identified by the code CTM-I (for Cottesmore site “I”) and numbered 1–3. Details of the samples are given in Table 1, including the timber sampled and its location, the total number of rings each sample has, and how many of these, if any, are sapwood rings

Analysis

Each of the core samples obtained from the three different beams at The Granary was prepared by sanding and polishing to clearly reveal its annual growth rings. It was seen at this time that two samples, CTM-I01 and I02, both from the bridging beams within the Granary, were derived from elm trees. As indicated in the notes on tree-ring dating, above, such timber is undatable by tree-ring analysis.

The third timber, the outer lintel of the main door to Granary, is, however, of oak, this being sampled as core CTM-I03. This sample was seen to have 62 annual growth rings, the widths of these rings being measured, and the measured data then compared with the full corpus of reference chronologies. This comparative process indicated that the 62 rings of sample CTM-I03 span the years 1662–1723.

Sample CTM-I03 does not retain sapwood complete to the bark, and it is thus not possible to determine exactly when the tree used for this timber was felled. The sample does, however, retain the heartwood/sapwood boundary. This means that although the sample has lost all its sapwood rings, it is *only* the sapwood rings that have been lost. Given that most oak trees usually have minimum and maximum numbers of sapwood rings within known limits, usually

15–40, it is possible to say that the tree utilised for the lintel was most likely felled at some point between 1738 at the very earliest and 1763 at the very latest (Fig 4).

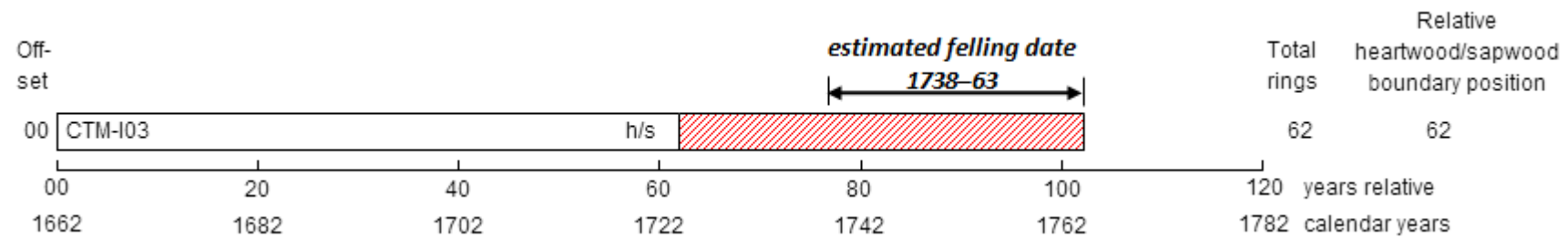


Figure 12: Photographs of the timbers at the Granary

Table 9: Details of tree-ring samples from The Granary, 39 Main Street, Cottesmore, Rutland						
Sample number	Sample location	Total rings	Sapwood rings*	First measured ring date (AD)	Heart/sap boundary (AD)	Last measured ring date (AD)
CTM-I01	Main east bridging beam (elm)	nm	---	-----	-----	-----
CTM-I02	Main west bridging beam (elm)	nm	---	-----	-----	-----
CTM-I03	Outer lintel to main doorway (oak)	62	h/s	1662	1723	1723

*h/s = the sample has the heartwood/sapwood boundary, i.e., only the sapwood rings are missing

nm = sample not measured



h/s = heartwood/sapwood boundary

Missing sapwood rings = 

Figure 13: Bar diagram showing date span of the rings on sample CTM-I03 (1662–1723) and the estimated felling date range of the source tree (1738–63)

Explanatory text to be inserted