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Tree-Ring Analysis of Timbers from the Tower, St Andrew's Church, Wissett, Suffolk

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Summary

The timbers of a floor in the tower were assessed for their suitability for dendrochronological study. Most timbers were found to have too few rings to be suitable for further study. Samples were taken from three beams and a floorboard. Two of the series from beams matched each other well and were combined into a 77-year sequence. None of the ring sequences yielded consistent dates when compared with the extensive database of reference material, and the floor remains undated.

Keywords

Dendrochronology
Standing Building

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Introduction

The parish church of Wissett (NGR TM 366792; Fig 1) is of twelfth-century origin and has a round tower at the west end. Recent plans to replace the existing bellframe have raised the possibility of removing the second floor, which has led to a reassessment of its historical importance, and the thought that it could be an original twelfth-century floor. Dendrochronological study of the timbers in this floor was requested by the local English Heritage historic buildings inspector (Paul Edwards) to inform the renovation project and plans for alterations to the tower.

Methodology

The site was visited in March AD 2004. Oak timbers with more than 50 rings, traces of sapwood, and accessibility were the main considerations in the initial assessment. Those timbers judged to be potentially useful were cored using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis.

The cores were prepared for measuring by sanding using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. Suitable samples had their tree-ring sequences measured to an accuracy of 0.01 mm using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC. The software used in measuring and subsequent analysis was written by Ian Tyers (1999).

Ring sequences were plotted to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements when the samples crossmatch. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973). Those *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches, and give consistent matching positions.

When crossmatching between samples is found, their ring-width sequences are meaned to form an internal 'working' site mean sequence. Other samples may then be incorporated after comparison with this 'working' master until a final site sequence is established, which is then compared with a number of reference chronologies (multi-site chronologies from a region) and dated individual site masters in an attempt to date it. Individual long series which are not included in the site mean(s) are also compared with the database to see if they can be dated.

The dates thus obtained represent the time of formation of the rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed for this area by Miles (1997), in

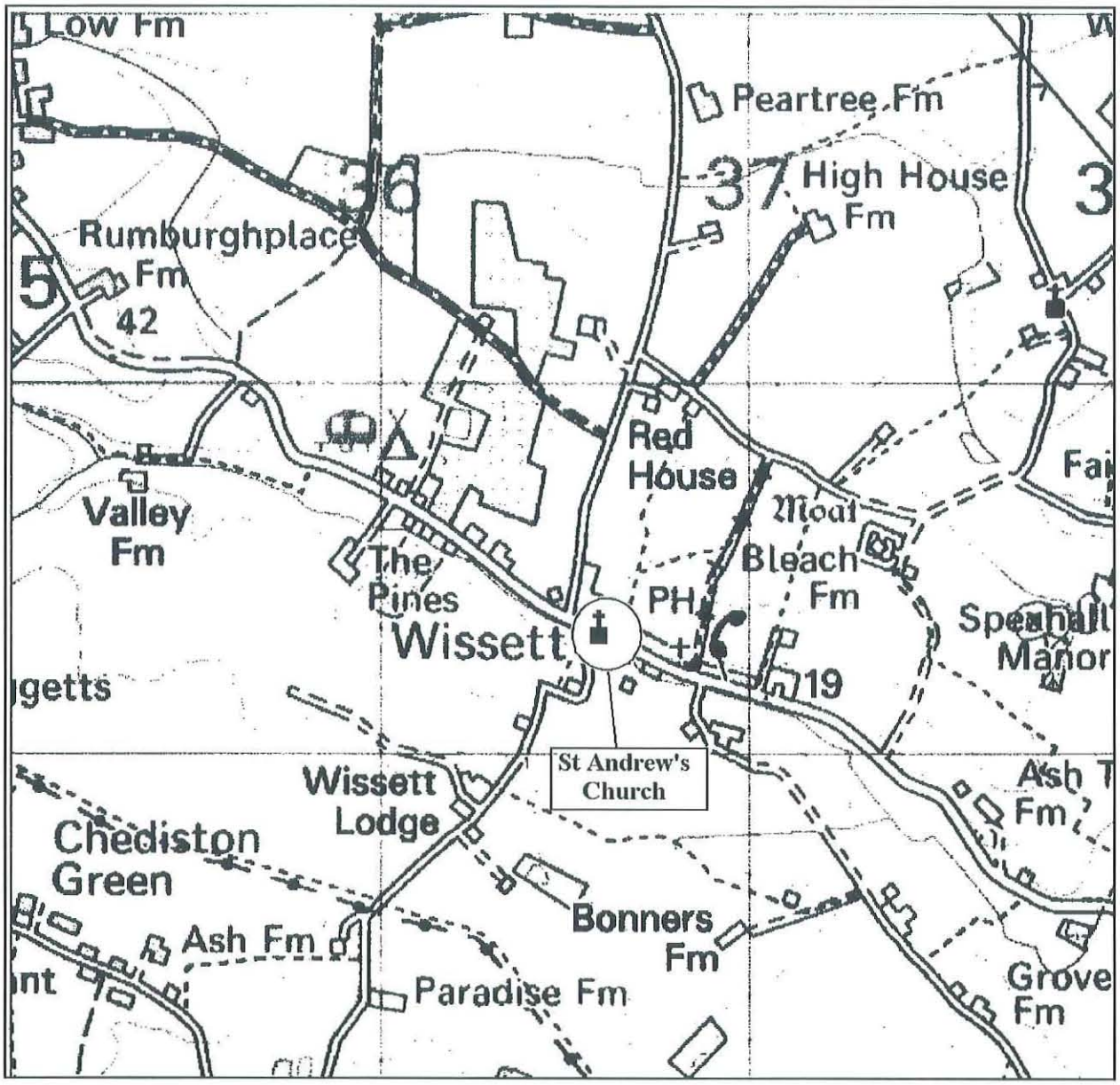

Figure 1: Map showing the location of St Andrew's Church, Wissett

which 95% of samples are likely to have from 9 to 41 sapwood rings. Where bark is present on the sample the exact date of felling of the tree used may be determined.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the building. However, evidence suggests that, except in the re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

All the timbers investigated were of oak (*Quercus* spp.). Many of the timbers were found to contain too few rings, but the more promising timbers and those for which there was ready access were sampled. Details of these timbers are given in Table 1 and their locations are shown in Figure 2. Some timbers could not be readily cored because of their proximity to the walls, making it impossible to core from the required angle to get the maximum number of rings in the timber. One floorboard was loose and could be lifted to enable sampling. The others were fixed and not readily available for sampling without potentially unacceptable intervention.

Sample saw02 was rejected as it had too few rings. Samples saw01 and saw03 crossmatched with each other (t = 9.5 with 58 years of overlap) and were combined to make a new 77-year long sequence *saw0103m.*

Neither this, nor the other sequence, gave consistent matching with the dated reference material available. The tree-ring data are presented in Table 2.

Interpretation and Discussion

The ring sequences could not be dated and the date of the floor therefore remains uncertain. Some of the boards seen may contain sufficient rings to be dated, but were not accessible for sampling. Also, the most favourable parts of the beams were not always accessible in the confined space of the tower, and may yield longer sequences if removed. The purpose of this investigation was to inform a decision about the historical significance of this floor, and whether or not it could be removed. The dendrochronological evidence that it was possible to gather with the floor *in situ* has not been able to assist in this decision-making process. From the dendrochronological point of view however, if the floor is subsequently removed, it would be of great interest to be able to further sample the timbers in the hope of deriving a potentially early chronology for this county, which is generally under-represented in the dendrochronological record.

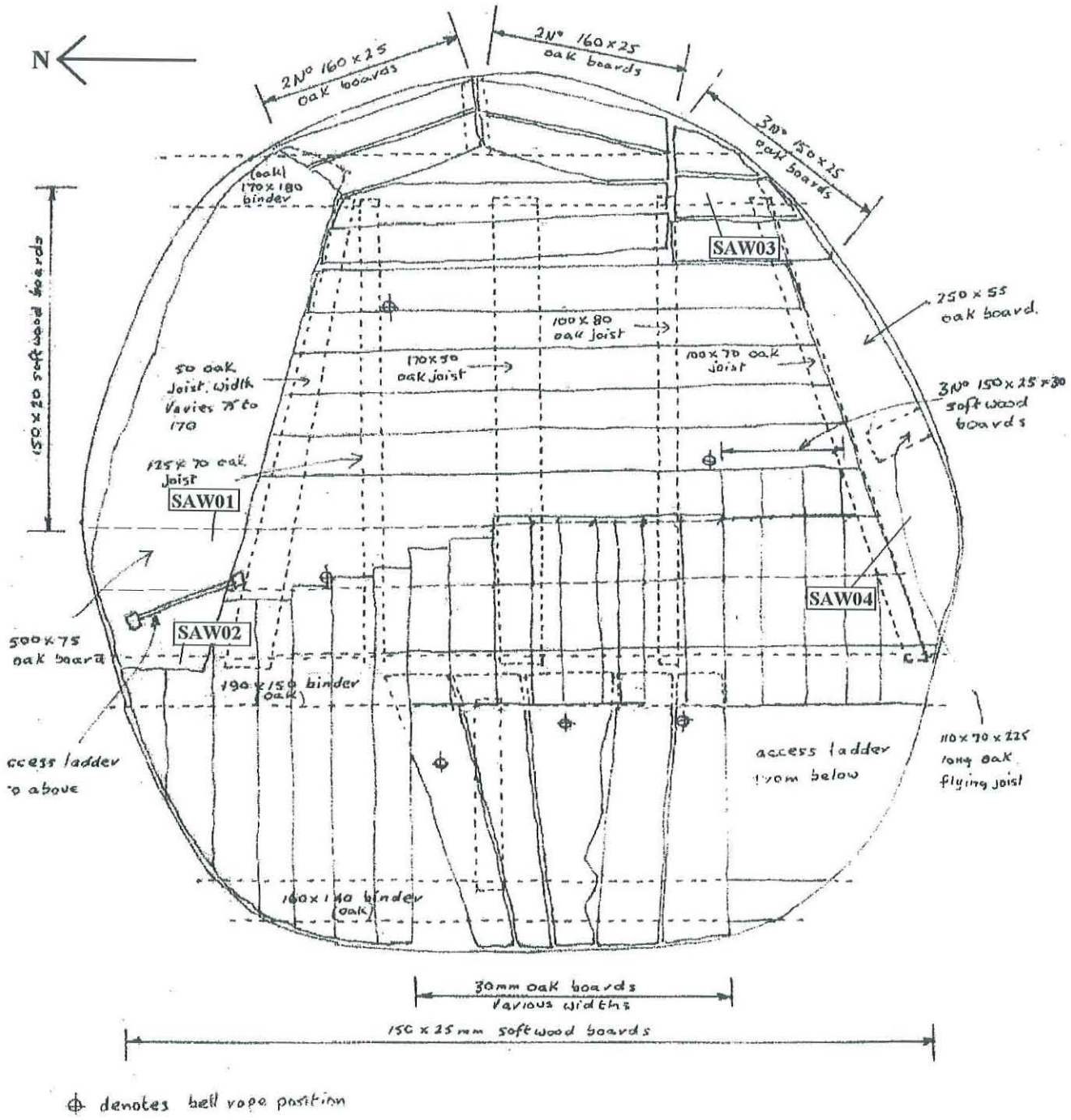

Figure 2: Drawing of the tower timbers showing those sampled for dendrochronology, adapted from an original by R. Stoddard

Table 1: Details of the timbers sampled from the tower of St Andrew's Church, Wissett, Suffolk

Sample number	Timber and position	Dates AD spanning	H/S bdry	Sapwood complement	No of rings	Mean width mm	Std devn mm	Mean sens mm
saw01	Inner western floorbeam	unknown	77	none	77	2.79	0.85	0.19
saw02	Western floorbeam	not measured	-	-	<40	-	-	-
saw03	Eastern floorbeam	unknown	58	none	58	2.44	0.84	0.26
saw04	Plank on south side of tower	unknown	59	none	59	1.91	0.54	0.23
saw0103m	saw01 + saw03	unknown	-	-	77	2.61	0.79	0.21

Acknowledgements

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Table 2: Ring width data for the undated sequences from the tower of St Andrew's Church, Wissett

ring widths (0.01mm)									
saw01									
259	187	170	191	218	237	277	310	274	356
243	449	363	382	369	372	295	481	568	314
431	393	380	303	345	392	495	304	273	368
291	324	320	299	282	349	267	355	292	278
274	281	269	209	196	311	228	314	281	209
223	282	240	220	249	313	273	257	251	218
200	161	327	243	181	196	199	268	154	147
211	140	131	171	162	216	228			
saw03									
341	336	306	233	423	435	267	419	376	425
213	361	305	352	226	206	392	258	269	308
170	217	147	172	197	134	189	180	162	164
117	98	189	133	202	241	216	199	293	279
176	236	267	215	216	227	199	187	164	284
180	195	230	220	290	148	198	374		
saw04									
237	115	128	134	120	175	228	234	250	133
172	249	307	168	196	389	245	212	172	132
188	167	240	240	187	153	199	197	240	198
143	125	185	222	198	207	209	252	147	191
124	123	133	156	159	133	118	131	271	286
233	206	137	222	256	169	172	151	213	
saw0103M									
259	187	170	191	218	237	277	310	274	356
243	449	363	361	352	339	264	452	501	290
425	384	402	258	353	348	423	265	239	380
274	296	314	234	249	248	219	276	213	233
227	221	216	163	147	250	180	258	261	212
211	287	259	198	242	290	244	236	239	208
193	162	305	211	188	213	209	279	151	172
292	140	131	171	162	216	228			