

August 2010
Felbrigg Metadata

Groupings

Group 1

Group 1 consisted of 9 trees (fel06-fel11 and fel20-fel30) situated in an open parkland setting of isolated individual trees where competition effects are almost certainly negligible. Soil conditions around fel07 and fel08 were sandier than elsewhere. Trees had an age range from 134 to 293 years, with a mean RBAR of 0.20. This is lowed by cores fel9 and fel10 which exhibited weak to negative correlation with both the other trees in the group, as well as the wider Felbrigg series. Why such poor correlation such poor correlation should be exhibited is not clear. Fel09 did have prominent growth marking on the core which perhaps indicated some change in growth direction. Fel10 was a dead tree, but even accounting for the absence of recent rings, would not correlate significantly over any part of the group or master chronology. As such both fel09 and fel10 were removed from the chronology.

With fel09 fel10

Name	First year	Last	Age Ring	Mean (mm)	S.Dev	Correl. with CRN	RBAR Tree
fel06	1875	2008	134	3.27	1.59	0.42	0.25
fel07	1812	2009	198	1.85	0.87	0.11	0.27
fel08	1857	2009	153	2.15	1.18	0.34	0.21
fel09	1871	2009	139	2.28	2.61	-0.03	0.01
fel10	1843	2006	164	1.92	0.72	0.06	0.06
fel11	1872	2009	138	2.98	1.38	0.44	0.24
fel28	1715	2007	293	1.04	0.71	0.10	0.22
fel29	1841	2009	169	2.66	1.38	0.40	0.28
fel30	1831	2009	179	2.14	1.20	0.26	0.26

Number of trees	9
Mean tree age	174.11
Mean ring width	2.11
Mean correlation	0.23
Mean RBAR	0.20

By removing these cores, the mean RBAR for the remaining 7 trees in the group rises to 0.32, though the mean correlation of this group to the master Felbrigg chronology is still only 0.392, which is substantially lower than the site mean of 0.56. This weaker correlation suggests this group of trees were subjected to different growth forcings than the trees sampled over the rest of the site. Group 1 correlated with group 2 and 3 at 0.61 and 0.69 respectively.

Without fel09 and fel10

Name	First year	Last year	Age	Mean Ring (mm)	S.Dev	Correl. with CRN	RBAR Tree
fel06	1875	2008	134	3.27	1.59	0.41	0.30
fel07	1812	2009	198	1.85	0.87	0.15	0.36
fel08	1857	2009	153	2.15	1.18	0.37	0.27
fel11	1872	2009	138	2.98	1.38	0.48	0.32
fel28	1715	2007	293	1.04	0.71	0.13	0.27
fel29	1841	2009	169	2.66	1.38	0.44	0.35
fel130	1831	2009	179	2.14	1.20	0.31	0.34

Number of trees 7
 Mean tree age 180.57
 Mean ring width 2.12
 Mean correlation 0.33
 Mean RBAR 0.32

Group 2

Group 2 consisted of 8 trees (fel12-fel19), were in a dense mixed woodland setting of oak, chestnut, pine, and beech, where intra and inter-specific species computational effects are almost certainly high. This site lay 1.21 km to the east of group 1 on clay soils. The trees had an age range from 116 to 161 years, with a mean RBAR of 0.41, and an average correlation to the master Felbrigg chronology of 0.516. this suggests a common growth forcing with the other trees on the site, excluding those in group 1. These trees had a larger mean ring-width than those of group 1, reflecting the younger mean age of the group. Fel19 ends in 1969 due to a knot in the wood in subsequent years preventing accurate ring-width measurement. Correlations within this group are substantially higher and more stable between trees than in group 1, suggesting more uniform growth forcing in this group than that witnessed in group 1. Group 2 correlated with group 3 at 0.59.

Name	First year	Last year	Age	Mean Ring (mm)	S.Dev	Correl. with CRN	RBAR Tree
fel12	1862	2009	148	2.75	1.40	0.58	0.42
fel13	1858	2009	152	2.90	0.99	0.57	0.42
fel14	1851	2009	159	1.86	1.07	0.45	0.37
fel15	1849	2009	161	2.10	0.93	0.46	0.43
fel16	1855	2009	155	2.46	1.35	0.56	0.43
fel17	1852	2009	158	2.23	1.15	0.69	0.51
fel18	1894	2009	116	2.63	0.89	0.39	0.30
fel19	1850	1969	120	2.39	1.34	0.40	0.38

Number of trees 8

Mean tree age 146.12
 Mean ring width 2.40
 Mean correlation 0.51
 Mean RBAR 0.41

Group 3

Group 3 consisted of 13 trees (fel01-fel05, fel20-fel27), situated in a less dense woodland setting than site 2, though still denser than site 1. This group had a tree age range of 115-190 years, with a mean RBAR of 0.39. All trees were living and ring-widths were large, indicating rapid growth. This group had a mean correlation to the master chronology of 0.537, thus greater than the site mean.

Name	First year	Last year	Age	Mean Ring (mm)	S.Dev	Correl. with CRN	RBAR Tree
fel01	1852	2009	158	2.67	1.45	0.39	0.45
fel02	1861	2009	149	2.21	1.61	0.59	0.45
fel03	1894	2009	116	3.53	1.05	0.45	0.31
fel04	1840	2009	170	2.42	1.46	0.23	0.39
fel05	1868	2009	142	3.08	1.73	0.67	0.47
fel20	1886	2009	124	3.01	1.84	0.55	0.38
fel21	1881	2009	129	3.32	1.06	0.71	0.48
fel22	1868	2009	142	2.19	1.31	0.45	0.32
fel23	1857	2009	153	2.65	0.82	0.47	0.43
fel24	1880	2009	130	2.87	1.64	0.52	0.36
fel25	1867	2009	143	2.86	1.88	0.63	0.44
fel26	1895	2009	115	1.93	0.76	0.49	0.34
fel27	1820	2009	190	2.30	0.76	0.13	0.28

Number of trees 13
 Mean tree age 143.15
 Mean ring width 2.67
 Mean correlation 0.48
 Mean RBAR 0.39

Causes

Potential causes of such intra-site variations are differences in soil conditions, differences in oak species, or, most likely, due to differences in microclimate and competition status which alter growth response. Given that both groups 2 and 3 were in a woodland setting and both correlated strongly to the master chronology, it would indicate that the change in micro-environmental factors is the underlying cause (i.e. the change from open parkland to dense woodland).

Given these differences, one would expect groups 2 and 3 to exhibit notable differing correlation sign and strength to the climate variables used in this study.

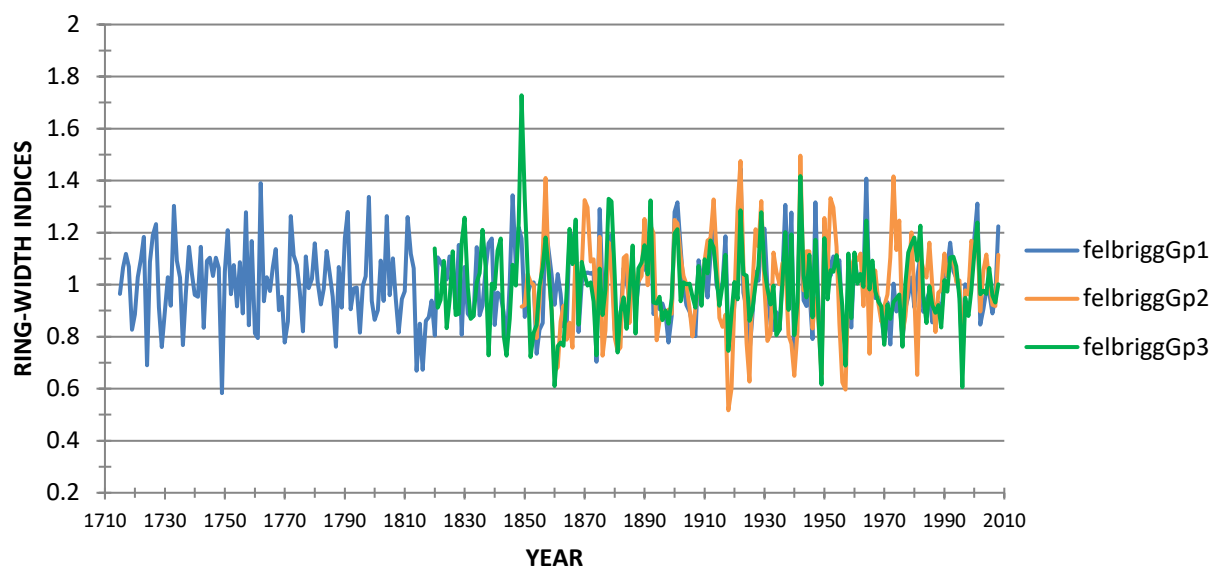
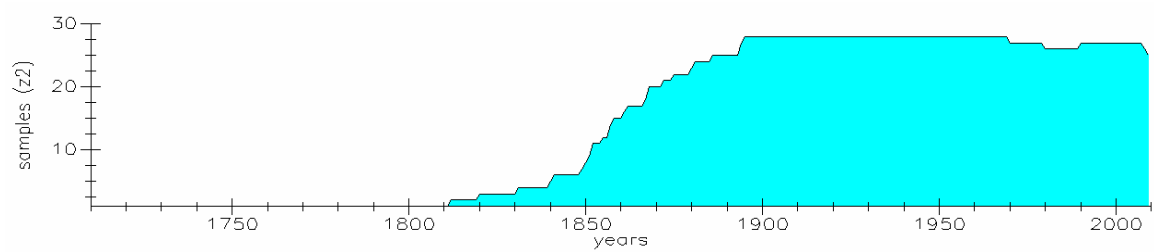
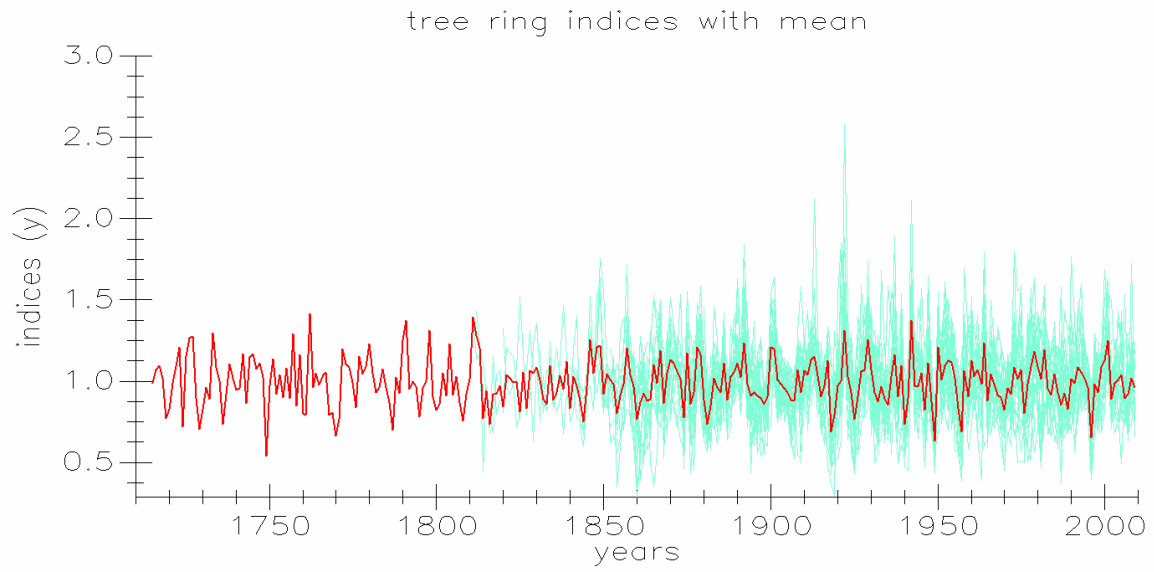


Table 1: Raw chronology stats. Correlations with master chronology.

Year	1800	1825	1850	1875	1900	1925	1950	1975	Mean Core
To	1849	1874	1899	1924	1949	1974	1999	2024	
<i>Fel01</i>			0.66	0.69	0.71	0.68	0.66	0.59	0.66
<i>Fel02</i>			0.56	0.65	0.75	0.67	0.65	0.66	0.66
<i>Fel03</i>				0.50	0.57	0.57	0.39	0.39	0.48
<i>Fel04</i>		0.41	0.47	0.70	0.75	0.70	0.37	0.33	0.53
<i>Fel05</i>			0.72	0.73	0.74	0.70	0.61	0.53	0.67
<i>Fel06</i>				0.68	0.72	0.55	0.44	0.42	0.56
<i>Fel07</i>	0.15	0.43	0.57	0.73	0.81	0.70	0.53	0.43	0.54
<i>Fel08</i>			0.52	0.57	0.51	0.50	0.23	0.27	0.44
<i>Fel11</i>			0.57	0.61	0.65	0.53	0.40	0.43	0.53
<i>Fel12</i>			0.64	0.71	0.52	0.46	0.45	0.36	0.53
<i>Fel13</i>			0.76	0.72	0.67	0.57	0.49	0.46	0.61
<i>Fel14</i>			0.46	0.50	0.58	0.58	0.34	0.32	0.46
<i>Fel15</i>			0.43	0.43	0.48	0.62	0.63	0.56	0.52
<i>Fel16</i>			0.36	0.58	0.54	0.58	0.51	0.47	0.51
<i>Fel17</i>			0.65	0.67	0.62	0.60	0.60	0.54	0.61
<i>Fel18</i>				0.45	0.49	0.54	0.57	0.53	0.52
<i>Fel19</i>			0.57	0.59	0.63	0.53			0.58
<i>Fel20</i>				0.55	0.63	0.74	0.72	0.59	0.65
<i>Fel21</i>				0.68	0.73	0.72	0.66	0.66	0.69
<i>Fel22</i>			0.43	0.44	0.54	0.47	0.39	0.40	0.45
<i>Fel23</i>			0.32	0.50	0.71	0.82	0.75	0.67	0.63
<i>Fel24</i>				0.40	0.46	0.45	0.39	0.36	0.41
<i>Fel25</i>			0.69	0.68	0.72	0.61	0.50	0.45	0.61
<i>Fel26</i>				0.51	0.53	0.47	0.45	0.49	0.49
<i>Fel27</i>	0.21	0.28	0.30	0.36	0.62	0.67	0.55	0.44	0.43
<i>Fel28</i>	0.02	0.17	0.42	0.39	0.38	0.57	0.49	0.36	0.35
<i>Fel29</i>		0.60	0.56	0.70	0.55	0.50	0.50	0.57	0.57
<i>Fel30</i>		0.47	0.52	0.63	0.69	0.55	0.35	0.37	0.51
MEAN	0.13	0.39	0.53	0.58	0.62	0.59	0.51	0.47	0.54
<i>Hethersett</i>		0.41	0.40	0.46	0.51	0.64	0.75	0.74	0.56
<i>Foxley</i>	0.18	0.52	0.61	0.55	0.60	0.75	0.79	0.77	0.60
<i>Sotterly</i>	0.31	0.49	0.55	0.58	0.51	0.49	0.63	0.68	0.53
<i>Blickling</i>	0.67	0.75	0.68	0.51	0.68	0.78	0.74	0.71	0.69
<i>Babingley</i>		0.41	0.46	0.61	0.59	0.66	0.69		0.57
<i>Norfolk</i>	0.61	0.73	0.77	0.73	0.76	0.81	0.86	0.85	0.76

Table 2: Raw pre-EPS adjusted chronology statistics (1715-2009)

Cores	Initial First Year	Last Year	Age (years)	Mean Ring Width (mm)	Standard Deviation	Correlation with Chronology	RBAR
<i>Fel01</i>	1852	2009	158	2.67	1.45	0.63	0.41
<i>Fel02</i>	1861	2009	149	2.21	1.61	0.66	0.41
<i>Fel03</i>	1894	2009	116	3.53	1.05	0.47	0.29
<i>Fel04</i>	1840	2009	170	2.42	1.46	0.44	0.34
<i>Fel05</i>	1868	2009	142	3.08	1.73	0.68	0.41
<i>Fel06</i>	1875	2008	134	3.27	1.59	0.55	0.34
<i>Fel07</i>	1812	2009	198	1.85	0.87	0.24	0.39
<i>Fel08</i>	1857	2009	153	2.15	1.18	0.44	0.28
<i>Fel11</i>	1872	2009	138	2.98	1.38	0.56	0.35
<i>Fel12</i>	1862	2009	148	2.75	1.40	0.52	0.31
<i>Fel13</i>	1858	2009	152	2.90	0.99	0.59	0.35
<i>Fel14</i>	1851	2009	159	1.86	1.07	0.45	0.28
<i>Fel15</i>	1849	2009	161	2.10	0.93	0.49	0.32
<i>Fel16</i>	1855	2009	155	2.46	1.35	0.46	0.30
<i>Fel17</i>	1852	2009	158	2.23	1.15	0.60	0.36
<i>Fel18</i>	1894	2009	116	2.63	0.89	0.52	0.31
<i>Fel19</i>	1850	1969	120	2.39	1.34	0.50	0.34
<i>Fel20</i>	1886	2009	124	3.01	1.84	0.60	0.36
<i>Fel21</i>	1881	2009	129	3.32	1.06	0.68	0.42
<i>Fel22</i>	1868	2009	142	2.19	1.31	0.46	0.29
<i>Fel23</i>	1857	2009	153	2.65	0.82	0.58	0.38
<i>Fel24</i>	1880	2009	130	2.87	1.64	0.45	0.28
<i>Fel25</i>	1867	2009	143	2.86	1.88	0.61	0.37
<i>Fel26</i>	1895	2009	115	1.93	0.76	0.50	0.30
<i>Fel27</i>	1820	2009	190	2.30	0.76	0.23	0.29
<i>Fel28</i>	1715	2007	293	1.04	0.71	0.13	0.25
<i>Fel29</i>	1841	2009	169	2.66	1.38	0.49	0.34
<i>Fel30</i>	1831	2009	179	2.14	1.20	0.34	0.31
MEAN	1855	2009	153	2.44	1.24	0.50	0.34



EPS for Felbrigg is 0.85 at 11 trees. This means shortening the chronology from 1715-2009 to 1860-2009.

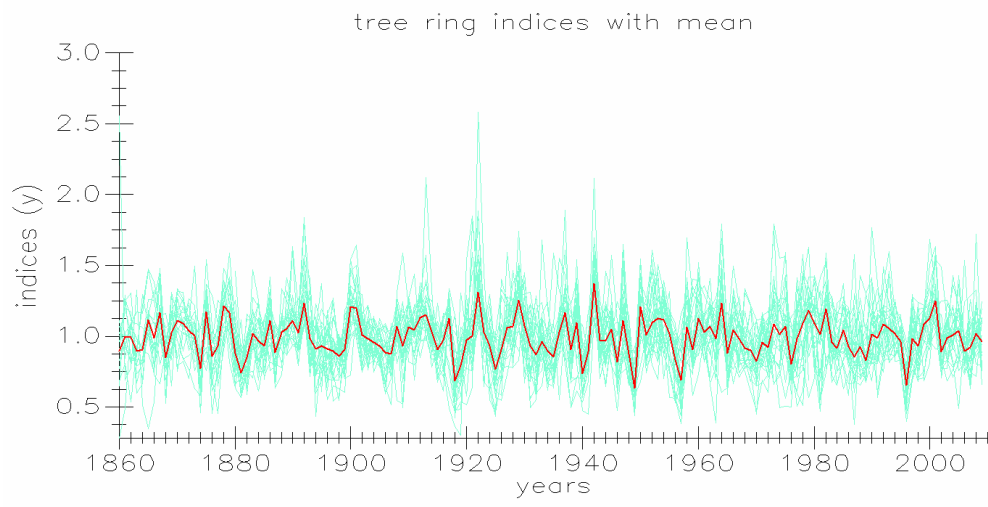
Table 3: EPS adjusted chronology statistics. Correlations with master chronology.

Year	1850	1875	1900	1925	1950	1975	Mean Core
To	1899	1924	1949	1974	1999	2024	
<i>Fel01</i>	0.69	0.69	0.71	0.68	0.66	0.59	0.67
<i>Fel02</i>	0.58	0.64	0.74	0.67	0.65	0.66	0.66
<i>Fel03</i>		0.50	0.57	0.57	0.39	0.40	0.48
<i>Fel04</i>	0.52	0.68	0.73	0.69	0.37	0.34	0.56
<i>Fel05</i>	0.73	0.73	0.74	0.69	0.61	0.52	0.67
<i>Fel06</i>		0.67	0.71	0.54	0.43	0.42	0.56
<i>Fel07</i>	0.62	0.73	0.81	0.71	0.53	0.44	0.64
<i>Fel08</i>	0.54	0.57	0.51	0.51	0.24	0.27	0.44
<i>Fel11</i>	0.57	0.61	0.65	0.53	0.40	0.43	0.53
<i>Fel12</i>	0.63	0.71	0.52	0.47	0.45	0.37	0.52
<i>Fel13</i>	0.76	0.72	0.67	0.57	0.49	0.47	0.61
<i>Fel14</i>	0.37	0.51	0.59	0.58	0.33	0.33	0.45
<i>Fel15</i>	0.41	0.44	0.48	0.62	0.63	0.55	0.52
<i>Fel16</i>	0.18	0.60	0.56	0.61	0.54	0.49	0.49
<i>Fel17</i>	0.65	0.67	0.62	0.61	0.60	0.54	0.61
<i>Fel18</i>		0.46	0.50	0.54	0.57	0.53	0.52
<i>Fel19</i>	0.56	0.60	0.63	0.53			0.58
<i>Fel20</i>		0.55	0.63	0.74	0.72	0.59	0.65
<i>Fel21</i>		0.68	0.73	0.72	0.66	0.66	0.69
<i>Fel22</i>	0.44	0.45	0.54	0.47	0.39	0.40	0.45
<i>Fel23</i>	0.36	0.50	0.71	0.82	0.75	0.67	0.64
<i>Fel24</i>		0.40	0.45	0.44	0.39	0.36	0.41
<i>Fel25</i>	0.70	0.69	0.72	0.61	0.50	0.45	0.61
<i>Fel26</i>		0.50	0.53	0.47	0.45	0.49	0.49
<i>Fel27</i>	0.32	0.41	0.63	0.67	0.55	0.43	0.50
<i>Fel28</i>	0.43	0.40	0.39	0.58	0.50	0.37	0.45
<i>Fel29</i>	0.67	0.70	0.55	0.50	0.50	0.57	0.58
<i>Fel30</i>	0.50	0.62	0.69	0.56	0.36	0.38	0.52
MEAN	0.54	0.59	0.62	0.60	0.51	0.47	0.55
<i>EPS Hethersett</i>	0.52	0.45	0.50	0.63	0.75	0.74	0.60
<i>EPS Foxley</i>	0.68	0.54	0.59	0.74	0.79	0.76	0.68
<i>EPS Sotterly</i>	0.60	0.57	0.50	0.47	0.62	0.68	0.57
<i>EPS Blickling</i>	0.68	0.50	0.68	0.78	0.74	0.71	0.68
<i>EPS Babingley</i>	0.58	0.60	0.58	0.65	0.68		0.62
<i>EPS Norfolk</i>	0.80	0.72	0.75	0.80	0.85	0.85	0.80

Table 4: EPS adjusted chronology statistics (1860-2009)

Cores	Initial First Year	Last Year	Age (years)	Mean Ring Width (mm)	Standard Deviation	Correlation with Chronology	RBAR
<i>Fel01</i>	1860	2009	150	2.50	1.26	0.67	0.41
<i>Fel02</i>	1861	2009	149	2.21	1.61	0.66	0.41
<i>Fel03</i>	1894	2009	116	3.53	1.05	0.47	0.29
<i>Fel04</i>	1860	2009	150	2.48	1.51	0.53	0.34
<i>Fel05</i>	1868	2009	142	3.08	1.73	0.68	0.42
<i>Fel06</i>	1875	2008	134	3.27	1.59	0.54	0.34
<i>Fel07</i>	1860	2009	150	1.61	0.74	0.64	0.39
<i>Fel08</i>	1860	2009	150	2.12	1.17	0.45	0.28
<i>Fel11</i>	1872	2009	138	2.98	1.38	0.56	0.35
<i>Fel12</i>	1862	2009	148	2.75	1.40	0.52	0.31
<i>Fel13</i>	1860	2009	150	2.89	0.99	0.60	0.35
<i>Fel14</i>	1860	2009	150	1.66	0.60	0.45	0.28
<i>Fel15</i>	1860	2009	150	1.98	0.77	0.52	0.32
<i>Fel16</i>	1860	2009	150	2.45	1.37	0.44	0.29
<i>Fel17</i>	1860	2009	150	2.16	1.10	0.61	0.36
<i>Fel18</i>	1894	2009	116	2.63	0.89	0.53	0.32
<i>Fel19</i>	1860	1969	110	2.20	1.18	0.54	0.34
<i>Fel20</i>	1886	2009	124	3.01	1.84	0.60	0.36
<i>Fel21</i>	1881	2009	129	3.32	1.06	0.68	0.42
<i>Fel22</i>	1868	2009	142	2.19	1.31	0.46	0.29
<i>Fel23</i>	1860	2009	150	2.65	0.82	0.60	0.39
<i>Fel24</i>	1880	2009	130	2.87	1.64	0.45	0.28
<i>Fel25</i>	1867	2009	143	2.86	1.88	0.61	0.38
<i>Fel26</i>	1895	2009	115	1.93	0.76	0.50	0.30
<i>Fel27</i>	1860	2009	150	2.28	0.78	0.46	0.29
<i>Fel28</i>	1860	2007	148	0.69	0.24	0.40	0.26
<i>Fel29</i>	1860	2009	150	2.37	1.13	0.56	0.34
<i>Fel30</i>	1860	2009	150	1.74	0.79	0.50	0.32
MEAN	1867	2009	140	2.42	1.16	0.54	0.34

EPS adjusted ring indices for Felbrigg oak

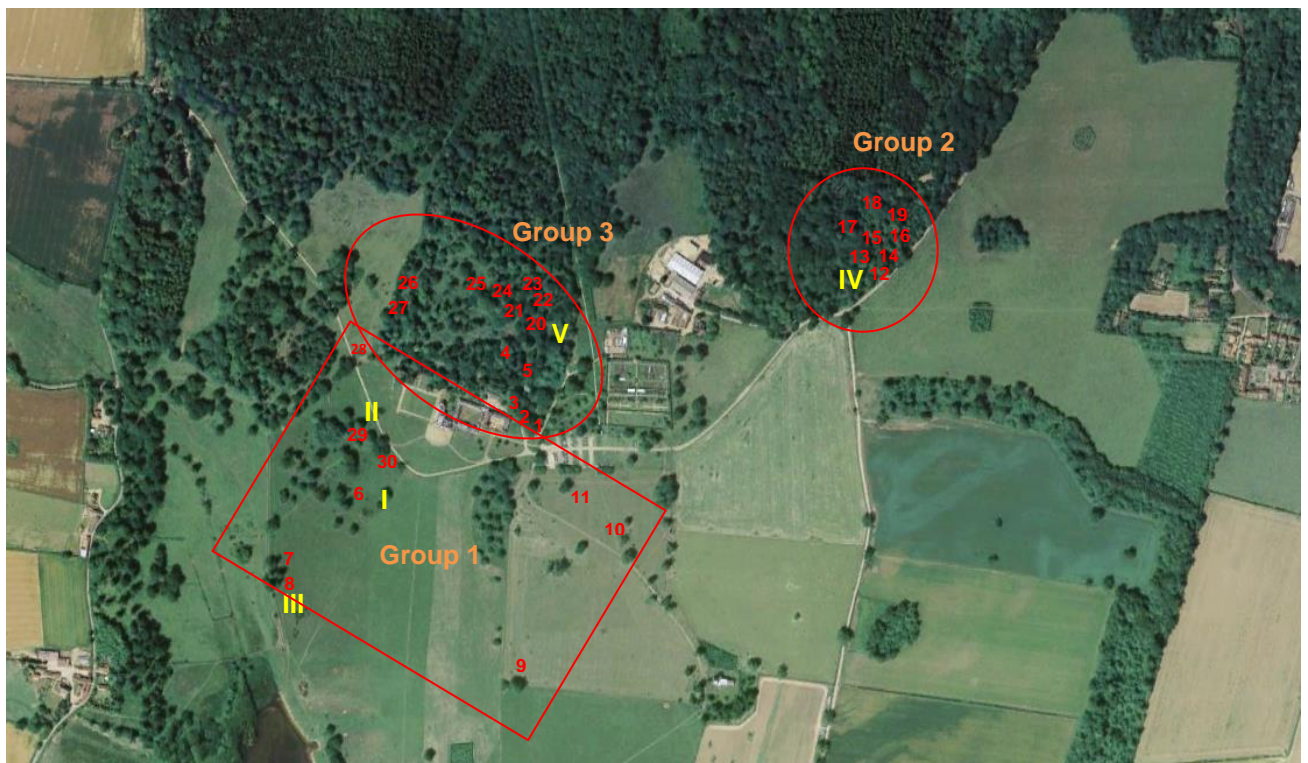


Location of Felbrigg Estate oak

□ = Location

IV = Photograph position

1 = Core number



Photographs of Felbrigg oaks

