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Development of Methods for Investigating Settlement and Land- use using Pollen Data:

**A Case-study from North-east England,
circa 8000 cal. BC - cal. AD 500**

Volume three

**Tables and Figures for Chapter 7:
pollen maps and accompanying tables for north-east
England from the Mesolithic to the end of the
Roman period.**

Part one

Mesolithic period to the later Neolithic period

**Submitted for the higher degree of PhD
by Kathryn Elizabeth Pratt MA (Cantab.), MSc**

**University of Durham,
Departments of Archaeology and Biological Sciences
1996**

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- 4 JUL 1997



Contents

Volume 3

Tables and Figures for Chapter 7: pollen maps and accompanying tables for north-east England from the Mesolithic to the end of the Roman period.

N.B. Tables and figures for Chapter 7 are organised in this volume into ten sections, one for each pollen mapping period. Since there are a very large number of figures in each section (up to 25 figures for each pollen mapping period), only a summary listing of figures is given here. A full listing of the figures for each pollen mapping period is given at the start of each section.

	Page number
Title	1
Contents, Volume 3	2
Preface	10
Guide to the pollen maps for north-east England, circa 8000 cal. BC - cal. AD 500	
Pollen maps for the Mesolithic period circa 8000 - 4000 cal. BC	14
Mesolithic period I: 7800 - 7300 cal. BC	15
Full list of tables and figures for the first Mesolithic period	16
Table 7.1.1	17
Summary of trends in pollen maps for the first Mesolithic period, 7800 - 7300 cal. BC	
Fig. 7.1.1	19
Map showing locations of pollen cores used to create interpolated maps for the period 7800 - 7300 cal. BC	
Figs. 7.1.2 to 7.1.5	21-28
Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 7800 - 7300 cal. BC	

Fig. 7.1.6	Interpolated pollen map of agricultural:arable index scores averaged for the period 7800 - 7300 cal. BC	29
Figs. 7.1.7 to 7.1.17	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 7800 - 7300 cal. BC	31-52
Mesolithic period II: 6800 - 6300 cal. BC		53
Full list of tables and figures for the second Mesolithic period		54
Table 7.1.2	Summary of trends in pollen maps for the second Mesolithic period, 6800 - 6300 cal. BC	55
Fig. 7.1.18	Map showing locations of pollen cores used to create interpolated maps for the period 6800 - 6300 cal. BC	57
Figs. 7.1.19 to 7.1.22	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 6800 - 6300 cal. BC	59-66
Fig. 7.1.23	Interpolated pollen map of agricultural:arable index scores averaged for the period 6800 - 6300 cal. BC	67
Figs. 7.1.24 to 7.1.34	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 6800 - 6300 cal. BC	69-90
Mesolithic period III: 5500 - 5000 cal. BC		91
Full list of tables and figures for the third Mesolithic period		92

Table 7.1.3	Summary of trends in pollen maps for the third Mesolithic period, 5500 - 5000 cal. BC	93
Fig. 7.1.35	Map showing locations of pollen cores used to create interpolated maps for the period 5500 - 5000 cal. BC	95
Figs. 7.1.36 to 7.1.39	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 5500 - 5000 cal. BC	97-104
Fig. 7.1.40	Interpolated pollen map of agricultural:arable index scores averaged for the period 5500 - 5000 cal. BC	105
Figs. 7.1.41 to 7.1.51	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 5500 - 5000 cal. BC	107-128
Pollen maps for the Neolithic period circa 4000 - 2000 cal. BC		129
Earlier Neolithic period: 3800 - 3300 cal. BC		130
Full list of tables and figures for the earlier Neolithic period		131
Table 7.2.1	Summary of trends in pollen maps for the earlier Neolithic period, 3800 - 3300 cal. BC	132
Fig. 7.2.1	Map showing locations of pollen cores used to create interpolated maps for the period 3800 - 3300 cal. BC	134
Figs. 7.2.2 to 7.2.5	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 3800 - 3300 cal. BC	136-143

Fig. 7.2.6	Interpolated pollen map of agricultural:arable index scores averaged for the period 3800 - 3300 cal. BC	144
Figs. 7.2.7 to 7.2.19	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 3800 - 3300 cal. BC	146-171
Later Neolithic period: 2800 - 2300 cal. BC		172
Full list of tables and figures for the later Neolithic period		173
Table 7.2.2	Summary of trends in pollen maps for the later Neolithic period, 2800 - 2300 cal. BC	174
Fig. 7.2.20	Map showing locations of pollen cores used to create interpolated maps for the period 2800 - 2300 cal. BC	176
Figs. 7.2.21 to 7.2.24	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 2800 - 2300 cal. BC	178-185
Fig. 7.2.25	Interpolated pollen map of agricultural:arable index scores averaged for the period 2800 - 2300 cal. BC	186
Figs. 7.2.26 to 7.2.38	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 2800 - 2300 cal. BC	188-213
Pollen maps for the Bronze Age and earliest Iron Age period circa 2000 - 500 cal. BC		214
Early Bronze Age period: 2000 - 1500 cal. BC		215

Full list of tables and figures for the early Bronze Age period	216	
Table 7.3.1	Summary of trends in pollen maps for the early Bronze Age period, 2000 - 1500 cal. BC	217
Fig. 7.3.1	Map showing locations of pollen cores used to create interpolated maps for the period 2000 - 1500 cal. BC	219
Figs. 7.3.2 to 7.3.5	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 2000 - 1500 cal. BC	221-228
Fig. 7.3.6	Interpolated pollen map of agricultural:arable index scores averaged for the period 2000 - 1500 cal. BC	229
Figs. 7.3.7 to 7.2.18	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 2000 - 1500 cal. BC	231-254
Middle Bronze Age period: 1500 - 1000 cal. BC		255
Full list of tables and figures for the middle Bronze Age period	256	
Table 7.3.2	Summary of trends in pollen maps for the middle Bronze Age period, 1500 - 1000 cal. BC	257
Fig. 7.3.19	Map showing locations of pollen cores used to create interpolated maps for the period 1500 - 1000 cal. BC	259
Figs. 7.3.20 to 7.3.23	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 1500 - 1000 cal. BC	261-268

Fig. 7.3.24	Interpolated pollen map of agricultural:arable index scores averaged for the period 1500 - 1000 cal. BC	269
Figs. 7.3.25 to 7.2.37	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 1500 - 1000 cal. BC	271-296
Late Bronze Age and earliest Iron Age period: 1000 - 500 cal. BC		297
Full list of tables and figures for the late Bronze Age and earliest Iron Age period		298
Table 7.3.3	Summary of trends in pollen maps for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC	299
Fig. 7.3.38	Map showing locations of pollen cores used to create interpolated maps for the period 1000 - 500 cal. BC	301
Figs. 7.3.39 to 7.3.42	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 1000 - 500 cal. BC	303-310
Fig. 7.3.43	Interpolated pollen map of agricultural:arable index scores averaged for the period 1000 - 500 cal. BC	311
Figs. 7.3.44 to 7.2.56	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 1000 - 500 cal. BC	313-338
Pollen maps for the Iron Age and Roman period circa 500 cal. BC - cal. AD 500		339
Iron Age period: 500 cal. BC - cal. AD 70		340

Full list of tables and figures for the Iron Age period	341	
Table 7.4.1	Summary of trends in pollen maps for the Iron Age period, 500 cal. BC - cal. AD 70	342
Fig. 7.4.1	Map showing locations of pollen cores used to create interpolated maps for the period 500 cal. BC - cal. AD 70	344
Figs. 7.4.2 to 7.4.5	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period 500 cal. BC - cal. AD 70	346-353
Fig. 7.4.6	Interpolated pollen map of agricultural:arable index scores averaged for the period 500 cal. BC - cal. AD 70	354
Figs. 7.4.7 to 7.4.19	Interpolated pollen maps of selected herb pollen taxa used as anthropogenic indicators averaged for the period 500 cal. BC - cal. AD 70	356-381
Roman period: cal. AD 70 - 500		382
Full list of tables and figures for the Roman period		383
Table 7.4.2	Summary of trends in pollen maps for the Roman period, cal. AD 70 - 500	384
Fig. 7.4.20	Map showing locations of pollen cores used to create interpolated maps for the period cal. AD 70 - 500	386
Figs. 7.4.21 to 7.4.24	Interpolated pollen maps of total tree, shrub, herb and Ericaceae pollen values averaged for the period cal. AD 70 - 500	388-395

Fig. 7.4.25 Interpolated pollen map of agricultural:arable index
scores averaged for the period cal. AD 70 - 500 396

Figs. 7.4.26 to 7.4.38 Interpolated pollen maps of selected herb pollen taxa used
as anthropogenic indicators averaged for the period
cal. AD 70 - 500 398-423

Guide to the pollen maps for north-east England, circa 8000 cal. BC - cal. AD 500

a) Introduction

This section presents the pollen maps produced for north-east England for selected 500 year time periods from approximately 8000 cal. BC to cal. AD 500. This guide explains the organisation of the pollen maps and layout of each pollen map, to aid the reader in locating maps and in finding the most important aspects of each map to concentrate upon. The trends observed in the pollen maps are discussed in Chapter 7, although a table summarising the trends in each pollen mapping period is presented at the start of the period, and each map is provided with a brief commentary for those wishing to look at the maps on their own.

b) Pollen mapping periods

The pollen maps are divided up into ten periods, the ten 500 year time periods selected for pollen mapping in this study. These periods are grouped in four main sections. The first section is the Mesolithic period (*circa* 8000 - 4000 cal. BC), which has three pollen mapping periods; the first Mesolithic period (7800-7300 cal. BC), the second Mesolithic period (6800 - 6300 cal. BC) and the third Mesolithic period (5500 - 5000 cal. BC). The second section, the Neolithic period (*circa* 4000 - 2000 cal. BC) has two pollen mapping periods; the earlier Neolithic (3800 - 3300 cal. BC) and the later Neolithic (2800 - 2300 cal. BC). The third section, the Bronze Age and earliest Iron Age (*circa* 2000 - 500 cal. BC) has three pollen mapping periods; the early Bronze Age (2000 - 1500 cal. BC), the middle Bronze Age (1500 cal. BC) and the late Bronze Age and earliest Iron Age period (1000 - 500 cal. BC). The final section, the Iron Age and Roman period (circa 500 cal. BC - cal. AD 500) has two pollen mapping periods; the Iron Age (500 cal. BC - cal. AD 70) and the Roman period (cal. AD 70 - 500). (Note that the last two pollen mapping periods are not strictly 500 years in duration, since the date of AD 70 was chosen to mark the start of the Roman period, since on the basis of literary sources it is estimated that Roman military forces appeared in northern England in the early AD 70s.)

c) Form of pollen mapping used and how to read the maps

The reasons for choosing the particular 500 year periods for mapping the pollen data and the methods used for mapping the data are described in detail in Chapter 5, and will not be dealt with here. It should be briefly mentioned here, however, that the pollen maps produced here are interpolated pollen maps. These have been produced by interpolating pollen values from each pollen core location in the region using the spline interpolation program ANUSPLIN, to create a continuous surface across the whole region for each pollen taxon. The results from the interpolation were converted, for the purpose of producing pollen maps, into a grid with a 500 metre cell resolution, so that each 500 metre grid cell across the region has an associated pollen value for each taxon. Maps were produced by using Arc/Info to shade grid cells according to their value for a particular pollen taxon, using five shades of grey; the darker the shade the higher the pollen value of that particular taxon. The key in the bottom left hand corner of each map page shows the pollen value ranges corresponding to each grey shade for each taxon. The scale of pollen values also varies from map to map. The maximum pollen value varies considerably in the maps from very small maximum values such as are found for *Centaurea* pollen (with a maximum of 0.1% tdlp), to very large maximum values of 100% (used for the summary tree, shrub, herb and Ericaceae maps). The maximum value in pollen maps also varies from period to period. For example, if Gramineae occurs in very small values in an early pollen mapping period, and if large intervals are used for mapping, these small values might not show up at all, whereas in later periods if Gramineae increases to very high values, a different scale has to be used. Where possible, the same scale of values is used for as many pollen maps for a taxon as is possible, so that it is easier to compare maps from different time periods.

There are a couple of characteristics of interpolated pollen maps which need to be mentioned here, since they affect their interpretation. Firstly, if two pollen core sites close together, at similar elevations have very different pollen values for a particular pollen taxon, the interpolation will average out the values of the two sites, so that a smooth surface is created. As a result, unusually high values occurring at a site surrounded by other sites all with low values will tend not to show up on an interpolated map. The higher the number of sites in an area, and at the same sort of elevation, the more likely an unusual pollen value at one site is to be smoothed out. Conversely, if

there is only one pollen site representing a large area and a wide range of elevations, then an unusually high or low value is likely to show up very markedly on the resultant interpolated map. This effect is termed here the “bullseye effect”, since pollen sites exhibiting this effect tend to stand out as areas with particularly high or low pollen values, appearing rather like a high hill rising out of a plain on a contour elevation map. The fewer the sites there are in a particular area and elevation range, the larger the extent covered by the “bullseye”, and the more unusually high or low the pollen value is compared to other sites in the region, the more pronounced the “bullseye” will be.

d) Arrangement of the pollen maps for each period

For each period, the pollen maps are arranged as follows. At the start of each group of pollen maps for a 500 year period, there is a contents list listing all the tables and figures for that period. This is followed by a table summarising the main trends in all the pollen maps for that period, by dividing the region into four main areas and outlining the trends observed in each for that period. Next a map shows the locations of all the pollen cores used to create the interpolated pollen maps for that period. Since not all pollen cores have pollen data for each period, there is considerable variation from period to period in the pollen cores with available data. This means that in some periods a parts of the region may be well represented with pollen cores, whilst in another period that area may be sparsely represented, since there are few sites with pollen data for that period. The number of pollen sites in each part of the region affects the interpolation and therefore the distribution of sites used in interpolating pollen values from site locations across the whole region must be considered when interpreting the maps.

There then follows four summary maps of total tree pollen, total shrub pollen, total herb pollen and total Ericaceae pollen. The category Ericaceae includes all members of the Ericaceae family such as *Calluna*, *Erica* and *Vaccinium*. These maps summarise the main trends across the region in that period for these four main categories of pollen taxa.

There then follows a map of agricultural: arable index scores. The score is a measure of

the proportion of arable type taxa of total agricultural (i.e. arable plus non-arable agricultural) taxa. The reasons for using this particular index to identify areas with high proportions of arable type taxa, and the methods used to calculate the index scores, are described in Chapter 5.

The final group of pollen maps for each period consists of pollen maps for individual herb pollen taxa which have been used in the pollen literature as indicators of human activity or of arable or pastoral land-use. The value of each taxon as an indicator has been discussed in detail in Appendix B. Maps are presented for the following herb taxa: Gramineae, *Cerealia*-type, *Artemisia*, Caryophyllaceae, *Centaurea*, Chenopodiaceae, Compositae, Cruciferae, Leguminosae, *Plantago*, *Polygonum*, Ranunculaceae and *Rumex*. *Cerealia*-type and *Centaurea* do not occur at any pollen sites until the earlier Neolithic period (3800 - 3300 cal. BC), and as a result, there are no pollen maps for these taxa for the three Mesolithic periods.

On the facing page to each pollen map there is a brief, one paragraph summary of the main points to observe in each map, and a brief description of how that map compares to maps for that taxon in previous periods, and with maps of other taxa in the same period. This brief summary is to aid map reading, and also for those wishing to use the pollen maps independently of the commentary presented in Chapter 7.

Pollen maps for the Mesolithic period

circa 8000 - 4000 cal. BC

Mesolithic period I:

7800 - 7300 cal. BC

List of Figures and Tables for the first Mesolithic period, 7800 - 7300 cal. BC

Tables

Table 7.1.1	Summary of trends in pollen maps for the first Mesolithic period	17
-------------	--	----

Figures

Fig. 7.1.1	Map showing locations of pollen cores used to create interpolated maps for the period 7800 - 7300 cal. BC	19
------------	---	----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.1.2	Interpolated pollen map of averaged total tree pollen values.	21
------------	---	----

Fig. 7.1.3	Interpolated pollen map of total shrub pollen values.	23
------------	---	----

Fig. 7.1.4	Interpolated pollen map of total herb pollen values.	25
------------	--	----

Fig. 7.1.5	Interpolated pollen map of total Ericaceae pollen values.	27
------------	---	----

b) Agricultural: arable index map

Fig. 7.1.6	Interpolated pollen map of agricultural:arable index scores.	29
------------	--	----

c) Maps of selected individual herb taxa

Fig. 7.1.7	Interpolated pollen map of Gramineae pollen values.	31
------------	---	----

Fig. 7.1.8	Interpolated pollen map of <i>Artemisia</i> pollen values.	33
------------	--	----

Fig. 7.1.9	Interpolated pollen map of Caryophyllaceae pollen values.	35
------------	---	----

Fig. 7.1.10	Interpolated pollen map of Chenopodiaceae pollen values.	37
-------------	--	----

Fig. 7.1.11	Interpolated pollen map of Compositae pollen.	39
-------------	---	----

Fig. 7.1.12	Interpolated pollen map of Cruciferae pollen values.	41
-------------	--	----

Fig. 7.1.13	Interpolated pollen map of Leguminosae pollen values.	43
-------------	---	----

Fig. 7.1.14	Interpolated pollen map of <i>Plantago</i> pollen values.	45
-------------	---	----

Fig. 7.1.15	Interpolated pollen map of <i>Polygonum</i> pollen values.	47
-------------	--	----

Fig. 7.1.16	Interpolated pollen map of Ranunculaceae pollen values.	49
-------------	---	----

Fig. 7.1.17	Interpolated pollen map of <i>Rumex</i> pollen values.	51
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Table 7.1.1 Summary of trends in pollen maps for the first Mesolithic period 7800 - 7300 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.2 to 7.1.5</p>	<p>Overall arboreal (tree and shrub) levels are very high in this area, and are dominated by shrub pollen, with far lower tree pollen levels. Shrub levels exceed 69% at Hutton Henry, Neasham Fen and Cranberry Bog. On the coast at Hartlepool tree and shrub levels are about equal (48% and 50%).</p> <p>At Bishop Middleham tree levels exceed shrubs (53% and 12% respectively) and herbs are higher here (33%), whilst elsewhere they do not exceed 3%.</p>	<p>This group of sites has the highest tree pollen levels of the region, up to 71% tdlp at Fortherley Wood, and levels between 50-60% at Low Stublick, Mown Meadows and Muckle Moss. Shrubs lie between 20-30%, so that arboreal pollen makes up almost all pollen at these sites. Herbs are generally low, but reach 25% at Moss Mire North. Ericaceae levels are low, reaching 4% at Moss Mire North.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.6</p>	<p>Cranberry Bog and Bishop Middleham have predominantly arable-type herb taxa in this period, as shown by the high index scores of 99% and 86%, compared to lower scores of 50% at Hutton Henry and Mordon Carr. Neasham Fen and Thorpe Bulmer have neither arable nor pastoral-type herbs in this period.</p>	<p>Neither arable nor pastoral-type herbs are present at any site in this group in this period, except for grasses.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.7 to 7.1.17</p>	<p>At Bishop Middleham Gramineae pollen reaches its highest values for the region (14%) and this is accompanied by Compositae, Cruciferae and small amounts of Ranunculaceae.</p> <p>Much lower levels of Gramineae occur elsewhere (around 1%) and small amounts of Ranunculaceae and Compositae are found at Hutton Henry and Mordon Carr. Only grasses are present at Neasham Fen.</p>	<p>Gramineae pollen dominates the extremely low herb pollen percentages found at these sites.</p>

Table 7.1.1 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.2 to 7.1.5</p>	<p>Most sites in northern Northumberland behave similarly to the Durham lowland sites, with high shrub levels) and lower tree pollen levels. Shrubs lie at 77% at Longlee Moor but are also high at Black Lough and Embleton's Bog. At most sites Ericaceae levels are low, but higher than the Durham lowlands, up to 12% at Embleton's Bog. Herb pollen lies under 1% at most sites.</p> <p>Tree and shrub levels are more equal at Trickley Wood and Lilburn Steads, but together make up almost all pollen at these sites.</p> <p>Akeld Steads is unusual in its low tree and shrub levels (4% and 12%) and high herbs (80%).</p>	<p>Here,as elsewhere in this period, total arboreal pollen dominates the picture. This is mostly made up of shrub pollen, with tree levels rarely exceeding 30%. Herb pollen levels are generally low, under 10%, and Ericaceae values rise to 8% at some sites at the highest elevations.</p> <p>At some sites in Upper Teesdale, and at lower elevations in the uplands, trees and shrubs are a lot lower, and herbs higher, reaching 68% at Dead Crook and 62% at Weelhead Moss. Trees and shrubs rarely exceed 20% each, and Ericaceae do not exceed 2%. At Fox Earth Gill, Crook Burn and Tinkler's Sike shrub levels are higher and herbs slightly lower.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.6</p>	<p>Both arable-type and pastoral-type herbs are present at most north Northumberland sites, with pastoral-types dominating at Akeld Steads, Trickley Wood and Lilburn Steads and equal amounts of both at Black Lough. Arable types dominate at Embleton's Bog, giving an index score of 99%.</p> <p>Further south, at Muckle Moss, neither arable nor pastoral-type pollen is present.</p>	<p>Arable-type pollen is completely absent from the most upland sites, except for some sites in Upper Teesdale and at lower elevations, such as Dufton Moss, Crook Burn, Furness Moss, Tinkler's Sike and Mickleton Moor, where index scores rise as high as 99% indicating an almost entire dominance of arable-types.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.7 to 7.1.17</p>	<p>Gramineae pollen is highest at Akeld Steads (7%) but lies below 1% at other sites. Ranunculaceae, <i>Rumex</i> and Compositae are found at most sites. Chenopodiaceae occurs at its highest values in this area, at Akeld Steads and Embleton's Bog. Caryophyllaceae occur at Akeld Steads and Trickley Wood.</p>	<p>At higher elevation sites Gramineae pollen occurs at high values (up to 9% at Howden Moss) accompanied by high values for Leguminosae (up to 9% at Crook Burn), which is largely absent elsewhere in the region. <i>Artemisia</i>, Caryophyllaceae and <i>Plantago</i> also occur at these sites. In Upper Teesdale and at lower elevations, different herb types occur, with Compositae, <i>Rumex</i>, Cruciferae and <i>Polygonum</i> occurring, and Gramineae pollen rarely exceeding 1%.</p>

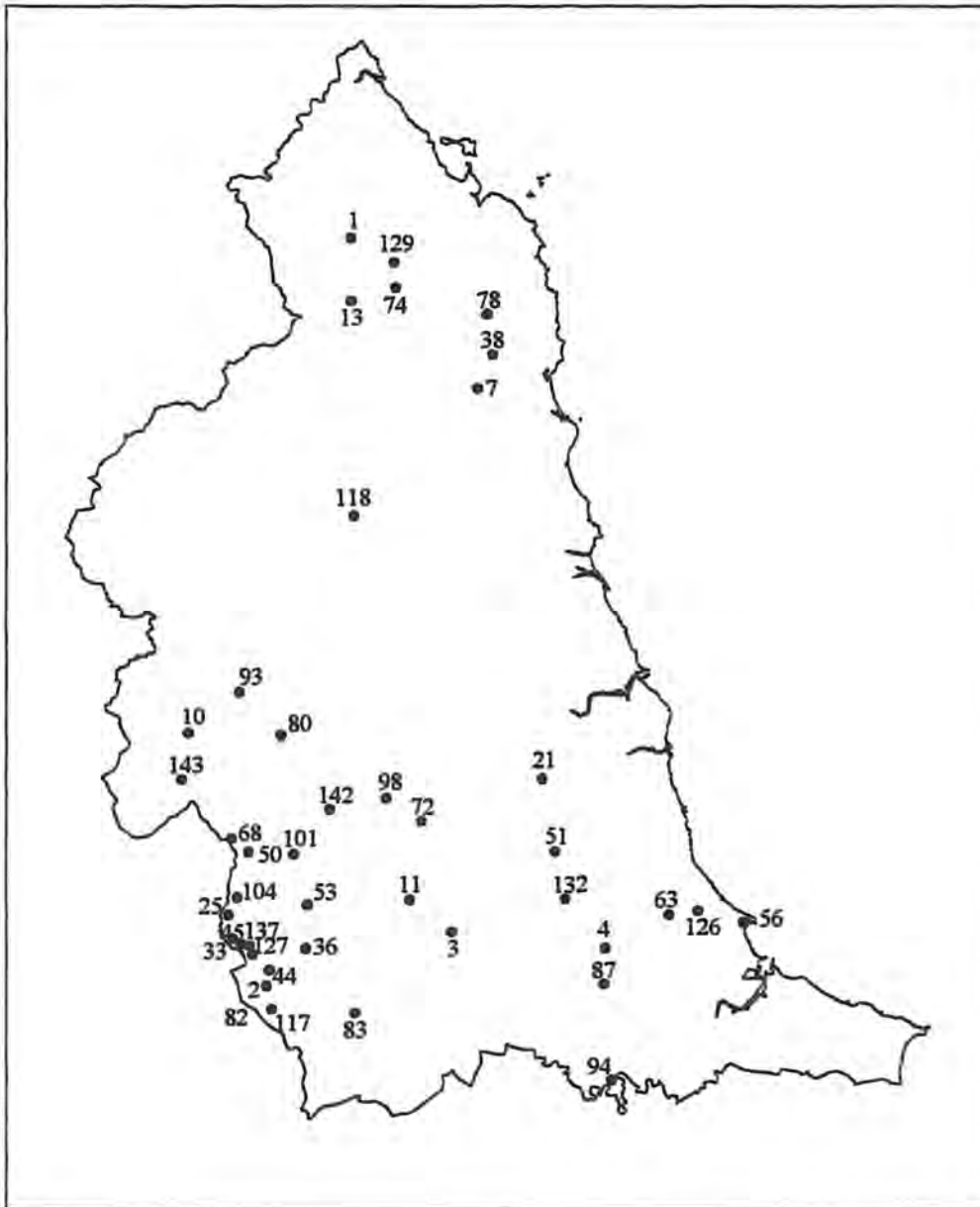


Fig. 7.1.1



Map showing locations of pollen cores used to create interpolated maps for the first Mesolithic period, 7800 - 7300 cal. BC

N.B. Key to site codes on next page.

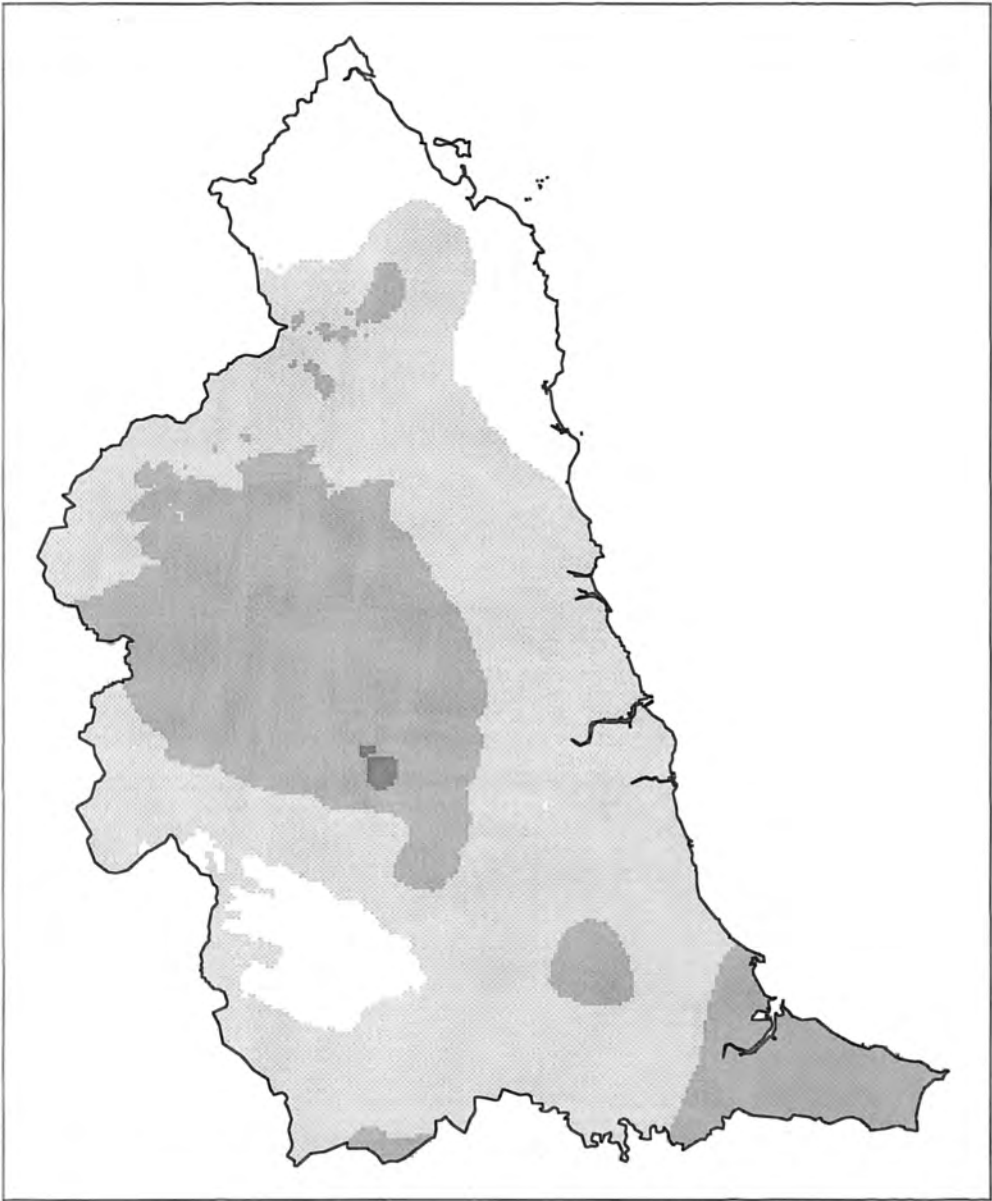
Key to Figure 7.1.1

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	72	Lamb Shield
2	Arngill Head Brocks	74	Lilburn Steads
3	Bellow Moss	78	Longlee Moor
4	Bishop Middleham	80	Low Stublick
7	Black Lough	83	Mickleton Moor
10	Blackshiel Bog	87	Mordon Carr
21	Cranberry Bog	93	Muckle Moss
25	Crook Burn	94	Neasham Fen
33	Dead Crook	98	Pow Hill
36	Dufton Moss	101	Quick Moss
38	Embleton's Bog	104	Sraith Head
44	Fox Earth Gill	17	Staple Moss
45	Furness Moss	126	Thorpe Bulmer
47	Graham's Moss	127	Tinkler's Sike
50	Green Swang	129	Trickley Wood
53	Harthope Moss	132	Waldridge
56	Hartlepool Bay 6	138	Weelhead Moss
62	Howden Moss	142	White House
63	Hutton Henry	143	Whitfield Lough
68	Kilhope Law		

Figure 7.1.2 Interpolated pollen map of tree pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The highest tree pollen percentages occur in the Tyne Corridor (with particularly high values at Muckle Moss) and also to a lesser extent in the area around the Wear and Derwent. Patchy occurrences of high tree values also occur at Bishop Middleham and on the coast at Hartlepool. Tree pollen values are low in the uplands, in northern Northumberland and elsewhere in the Durham lowlands.



Key:

-  0 – 20%
-  20 – 40%
-  40 – 60%
-  60 – 80%
-  80 – 100%



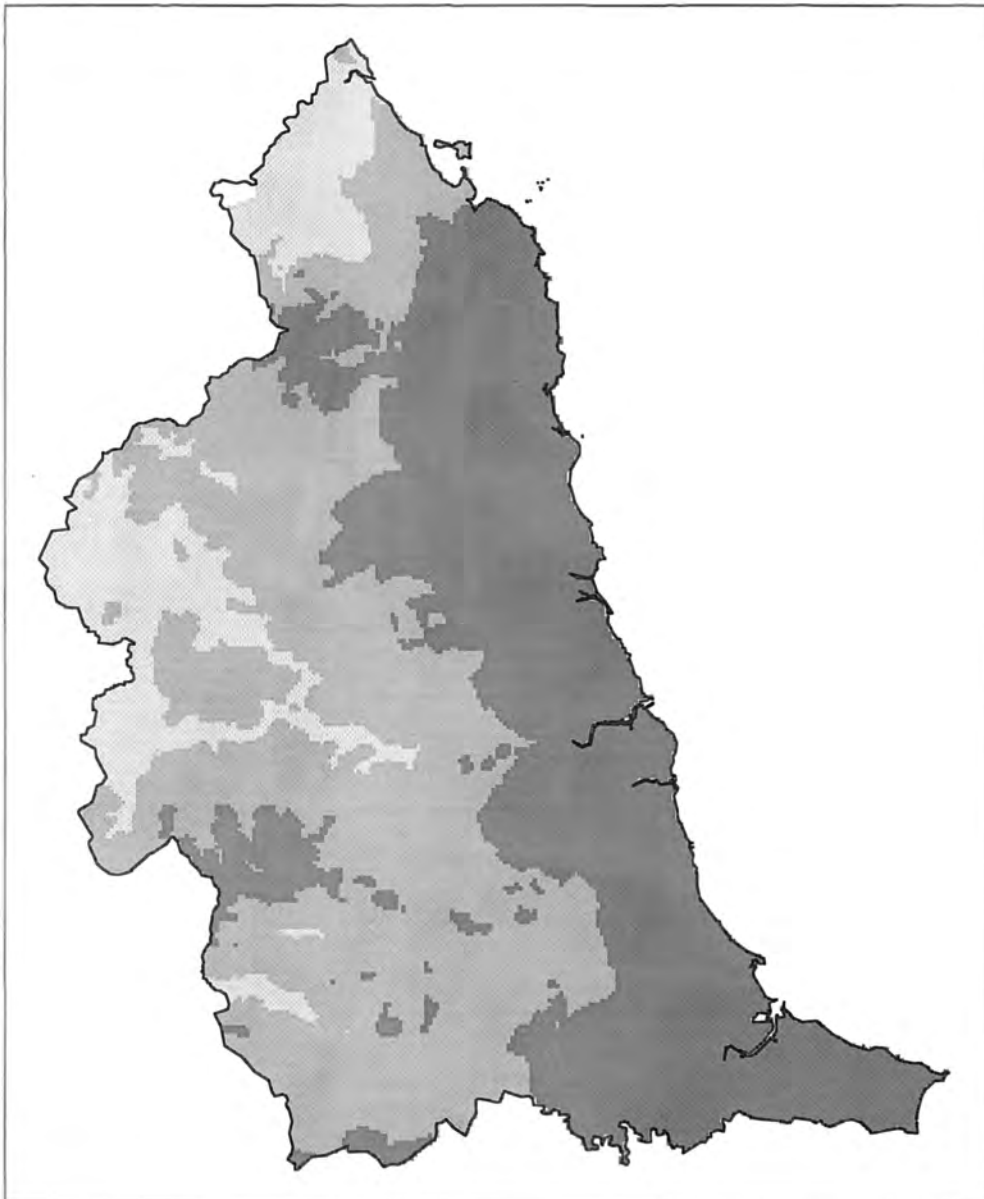
Trees

7800 – 7300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.3 Interpolated pollen map of shrub pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Shrub pollen levels are highest in the lowlands of the region, with lower values occurring at several sites in the uplands of the Northern Pennines. At intermediate elevations, in the foothills, shrub pollen levels are far lower, these areas being dominated by tree pollen.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



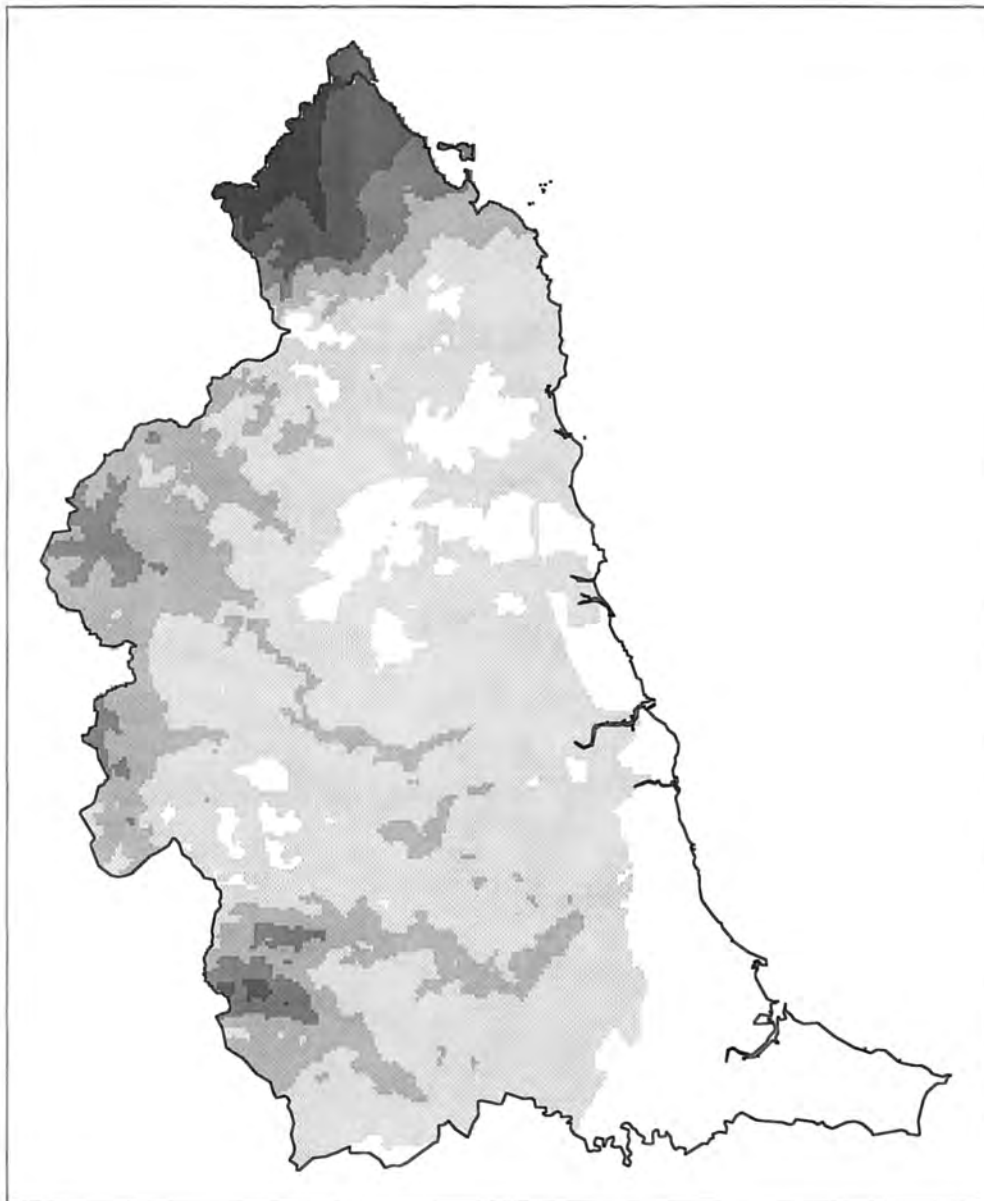
Shrubs

7800 – 7300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.4 Interpolated pollen map of herb pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

High values for herb pollen are found at sites at the highest elevations of the region, which have low tree and shrub values. Very low herb values are found in all other areas of the region. However, the unusually high level of herb pollen (80%) at Akeld Steads in northern Northumberland biases the interpolation towards this area, although at all other sites in the area herb pollen is extremely low.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%



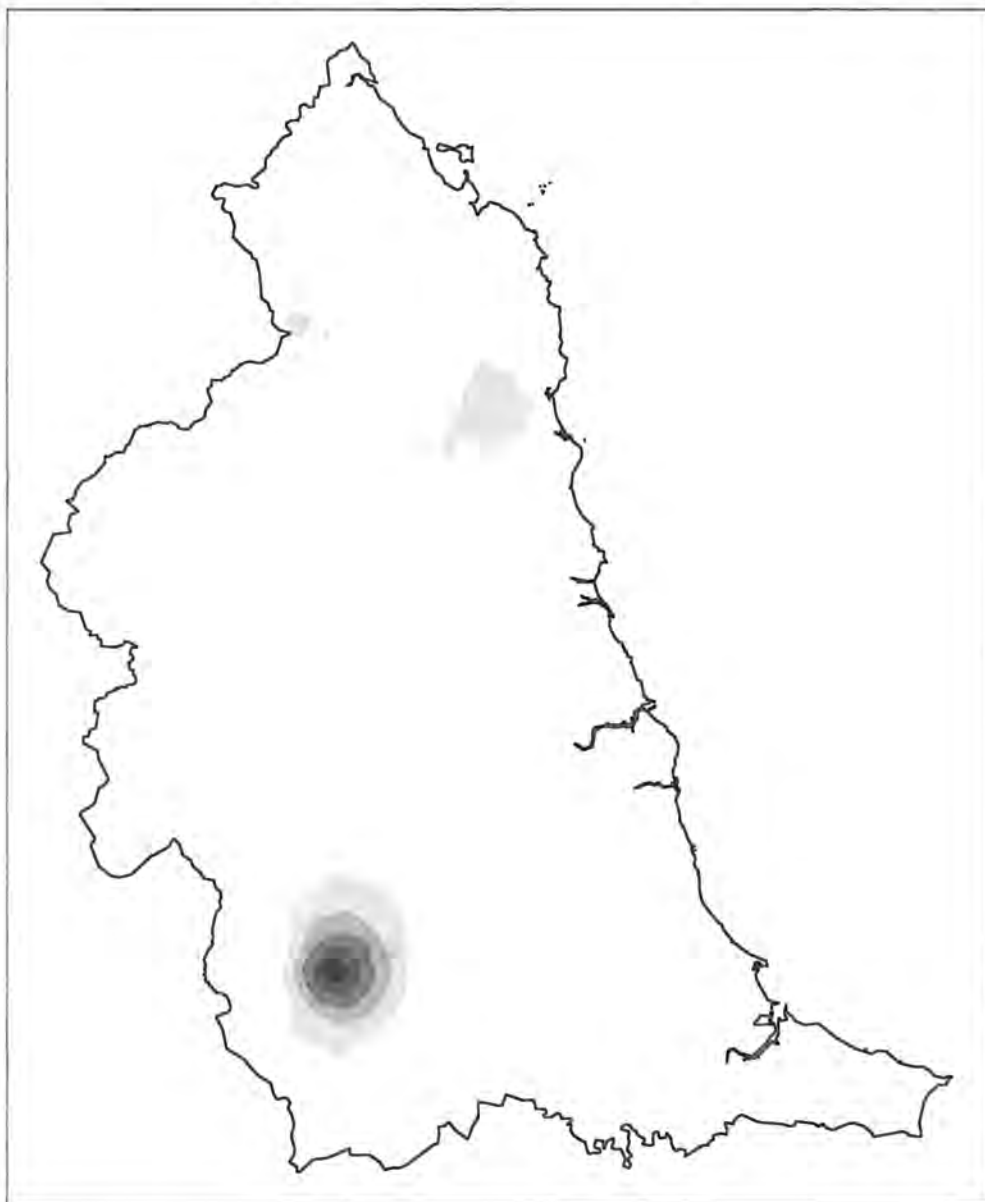
Herbs

7800 – 7300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.5 Interpolated pollen map of Ericaceae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The interpolated map for Ericaceae is biased by the localized occurrence of very high values at one site in upper Weardale and to a lesser extent by a site in northern Northumberland. Apart from this Ericaceae is only recorded in the uplands of the region at sites at the highest elevations, with values up to 8%, although because of the “bullseye” effect of a couple of sites, this does not show up on the map.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



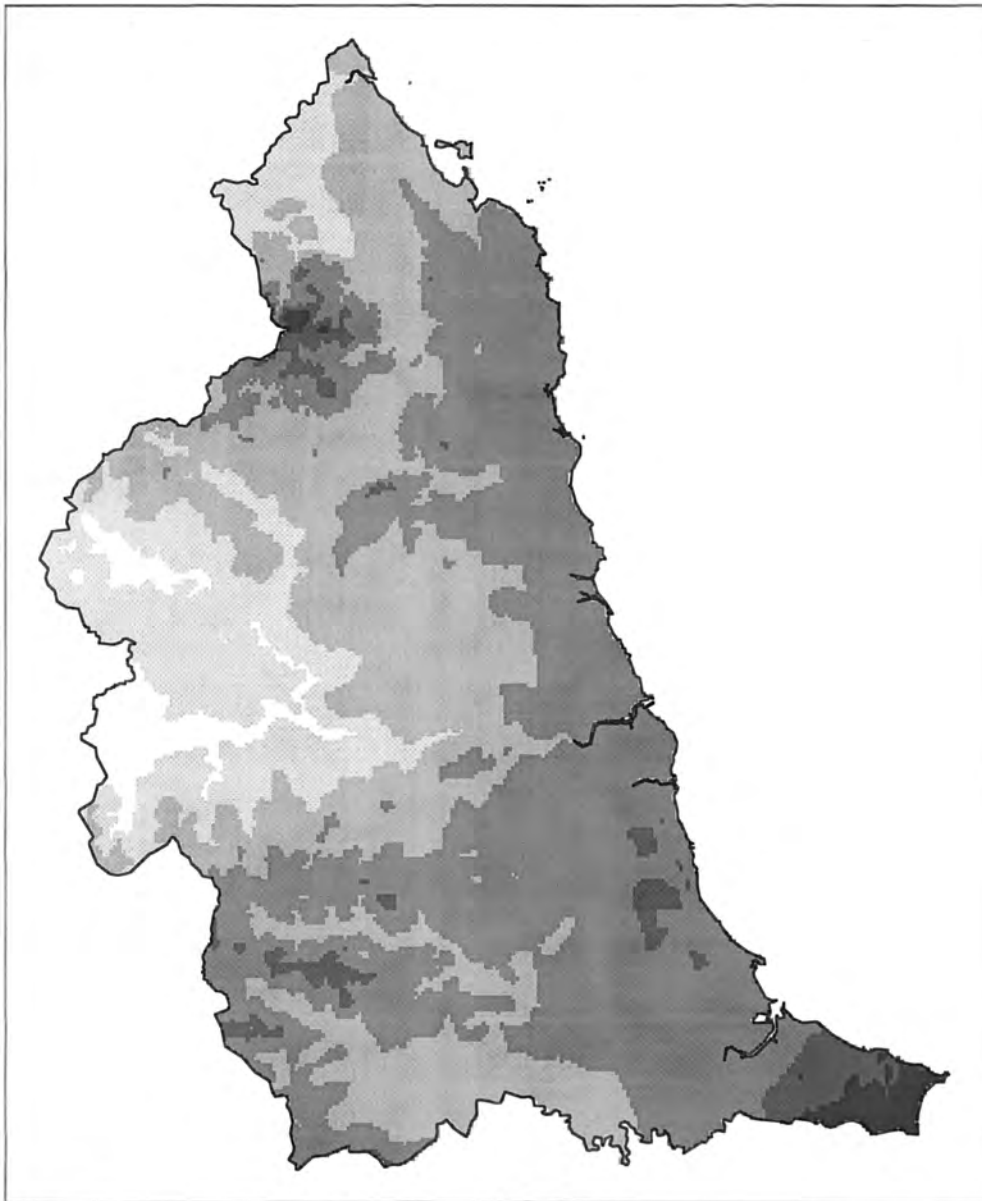
Ericaceae

7800 – 7300 cal. BC



Pollen values expressed as %tdlp.

Figure 7.1.6 Interpolated pollen map of agricultural: arable index scores for the first Mesolithic period, 7800 - 7300 cal. BC

This map shows a dominance of arable type herb taxa in the lowlands of the region and in some areas of the uplands. This is due to the dominance of Compositae and Cruciferae in the East Durham plateau sites and in upper Teesdale, and Caryophyllaceae and *Artemisia* at the highest elevations. In northern Northumberland arable and non arable types are present in equal amounts. At intermediate elevations, where tree pollen almost entirely dominates, both arable and non-arable herb types are totally absent.



Key:

-  0 - 10%
-  10 - 20%
-  20 - 30%
-  30 - 40%
-  40 - 50%
-  > 50%

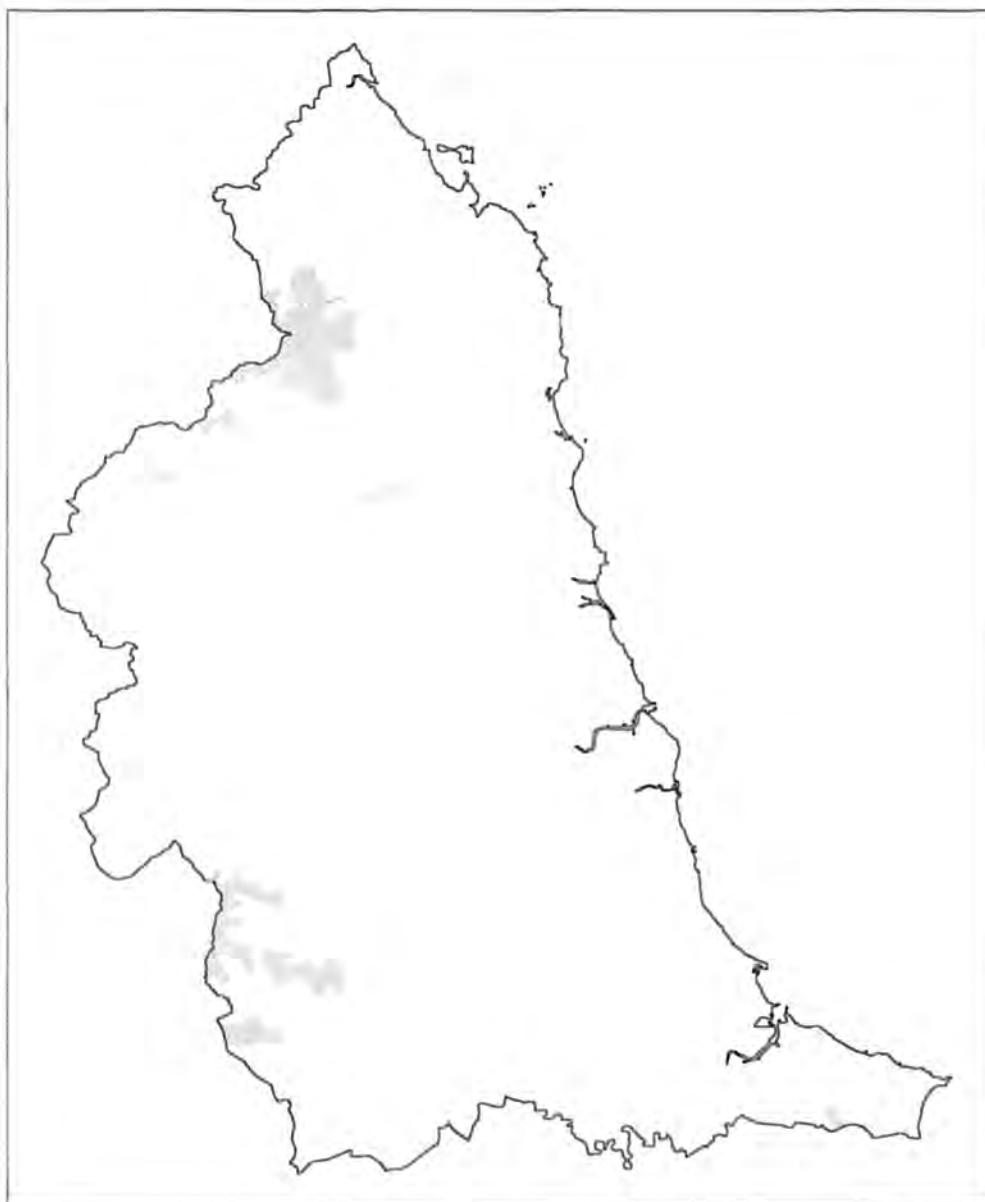


Agricultural:Arable Index







7800 - 7300 cal. BC

Figure 7.1.7 Interpolated pollen map of Gramineae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Interpolated Gramineae pollen values are greatest at the highest elevations in the uplands in the Northern Pennines and Cheviots, rising to 9% tdlp. Bishop Middleham in the lowlands has an isolated value of 14% tdlp, but since all other lowland sites have Gramineae values well below this, it is not shown on the interpolated map.



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



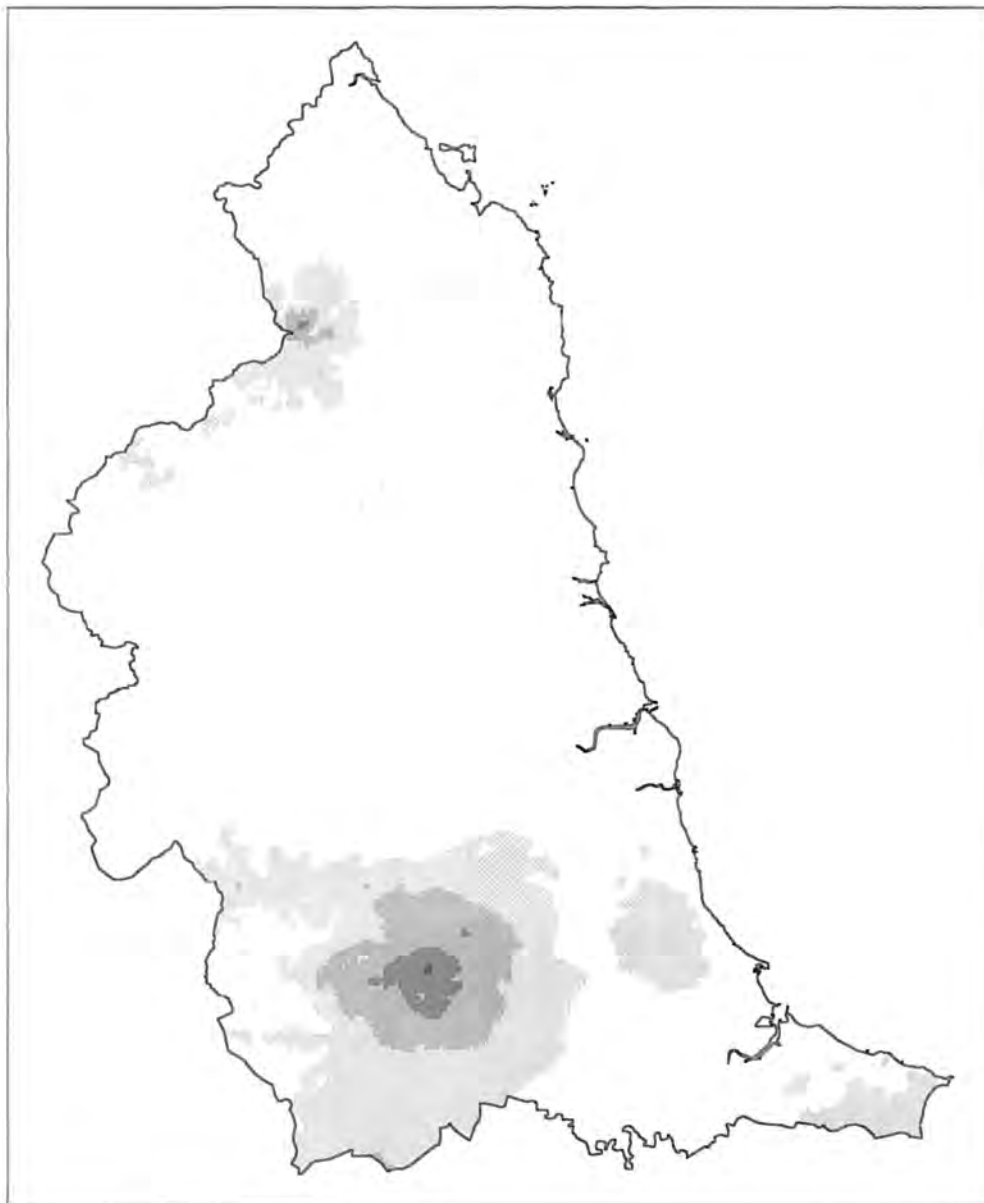
Gramineae

7800 – 7300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.8 Interpolated pollen map of *Artemisia* pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Artemisia in this period occurs in mid-upper Weardale and Teesdale (with unusually high values of 0.4% at Bellow Moss), and also occurs on the East Durham Plateau and in northern Northumberland.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



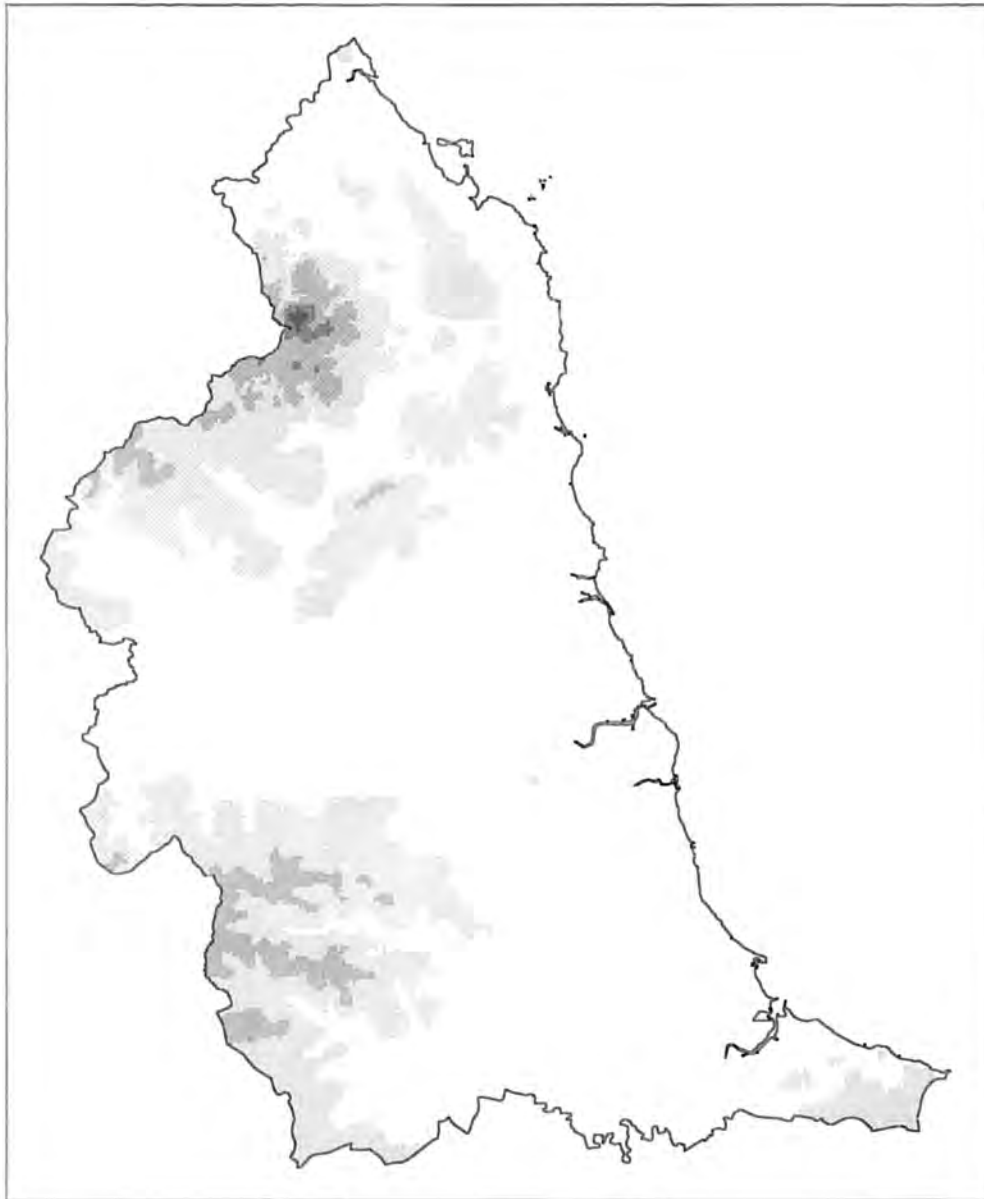
Artemisia

7800 – 7300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.9 Interpolated pollen map of Caryophyllaceae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The highest values for Caryophyllaceae occur at the highest elevations in the region in the uplands of the Northern Pennines and Northumberland. In Northumberland Caryophyllaceae occurs at higher values at lower elevations compared to further south.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



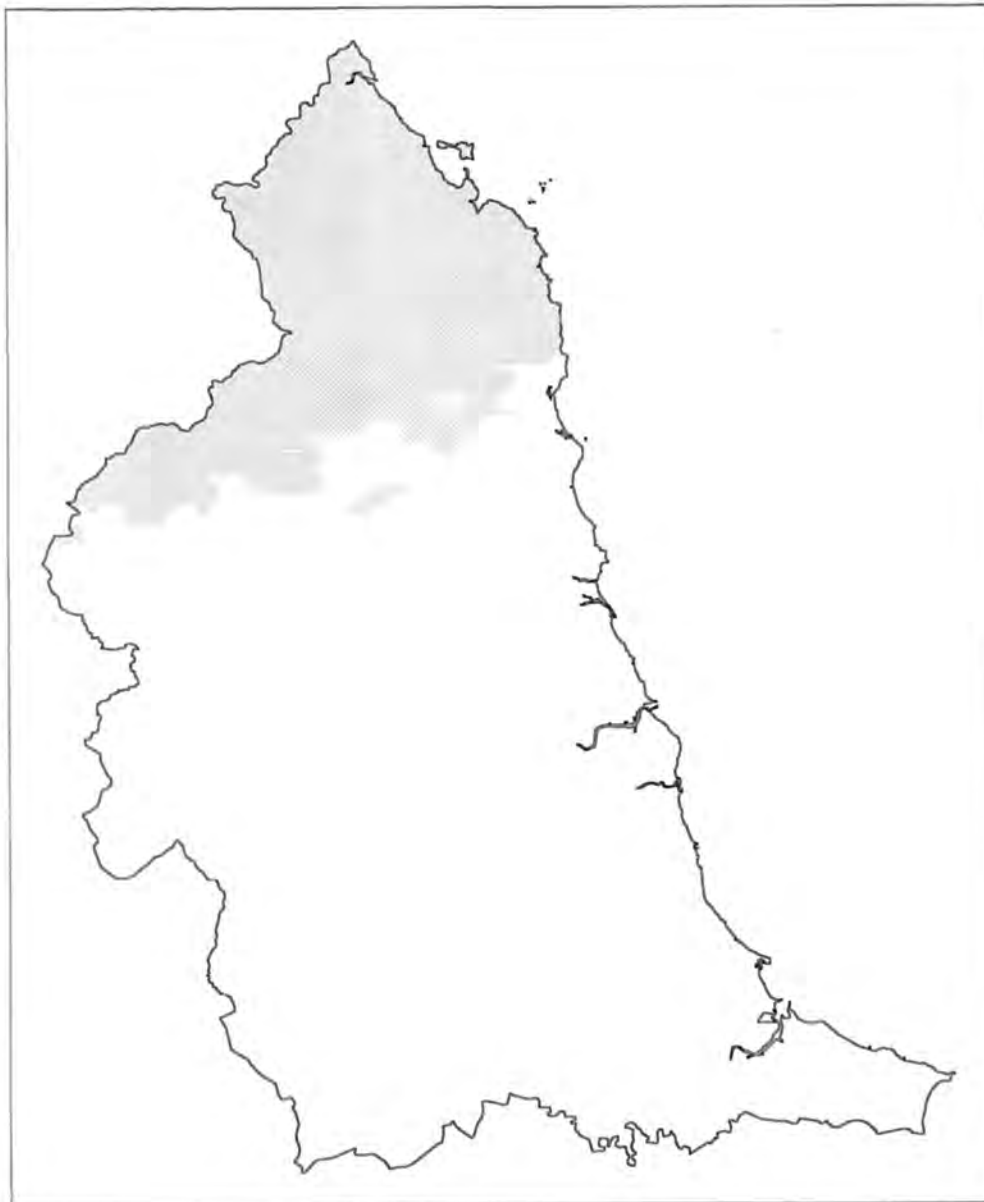
Caryophyllaceae

7800 – 7300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.10 Interpolated pollen map of Chenopodiaceae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Chenopodiaceae values are highest in the north of the region, occurring at Akeld Steads and Embleton's Bog. Very low values do also occur in upper Weardale and Teesdale but only at a small number of sites, otherwise it is absent from these areas.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



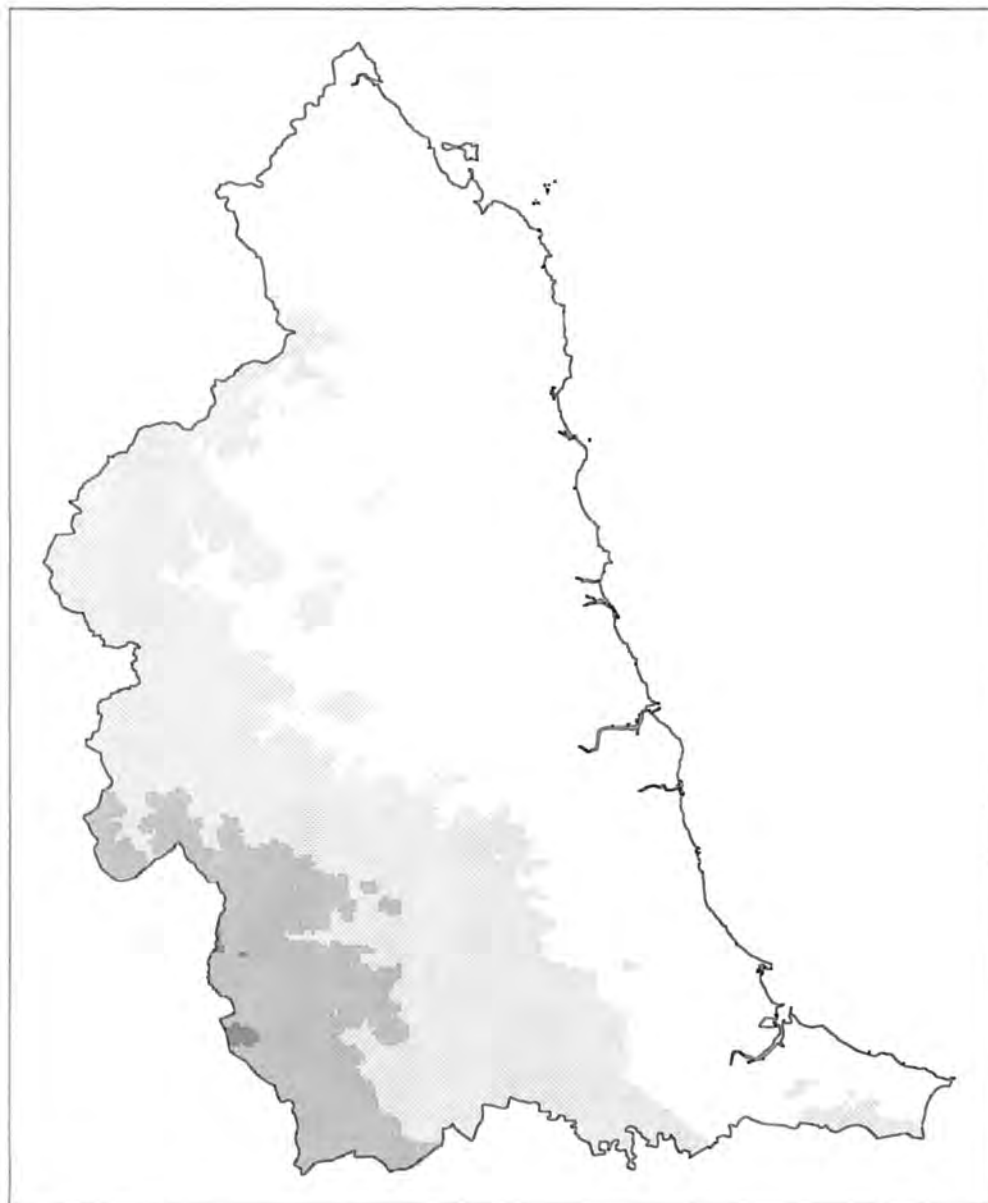
Chenopodiaceae

7800 – 7300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.11 Interpolated pollen map of Compositae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The highest values for Compositae in this period are concentrated in upper Teesdale. Lower values, however, do occur at some sites in northern Northumberland and small values do occur at most sites in the East Durham area.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



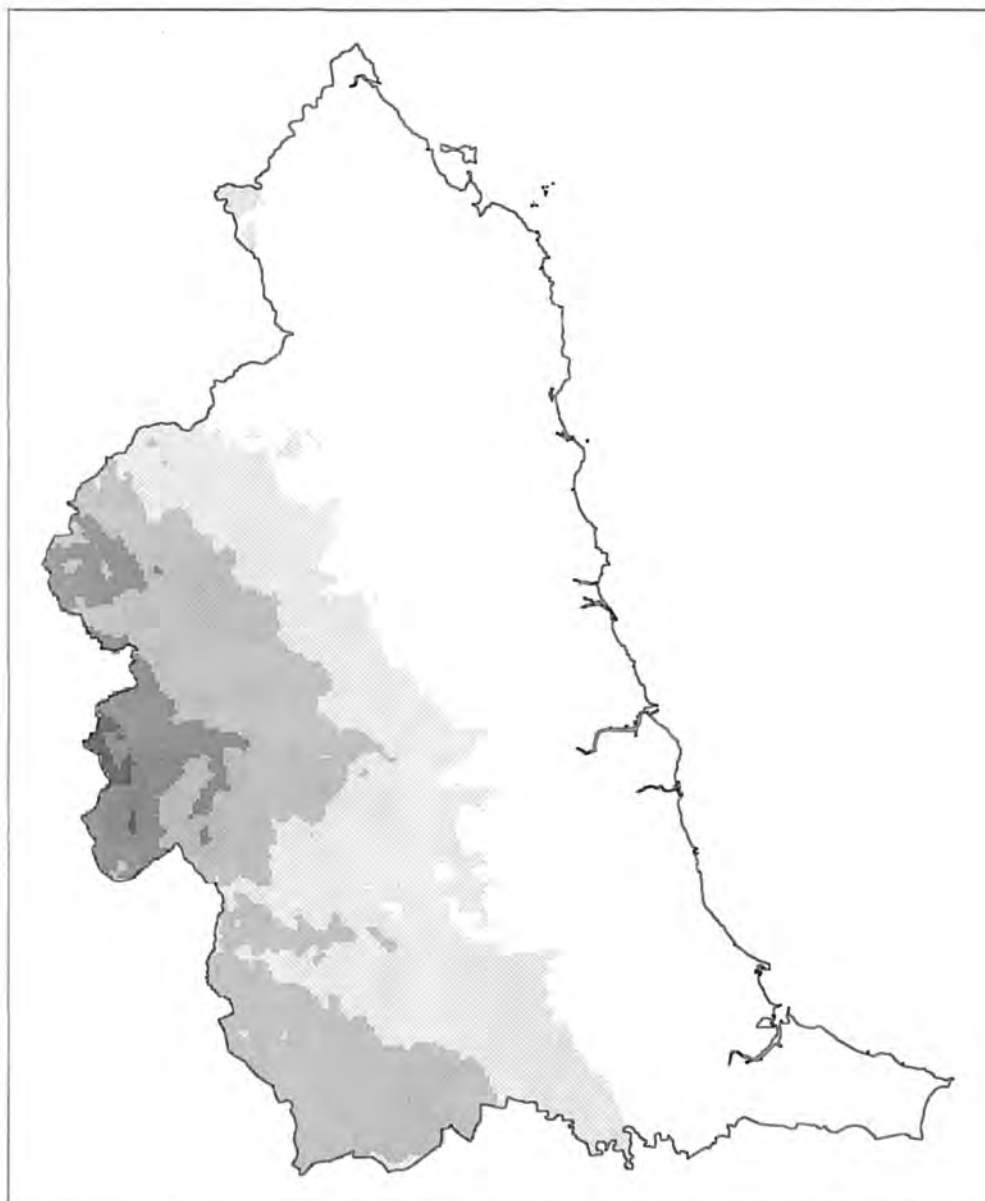
Compositae undiff.

7800 – 7300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.12 Interpolated pollen map of Cruciferae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The distribution of Cruciferae is very similar to that of Compositae, with highest values in upper Teesdale, but also with much smaller percentages at some sites in north Northumberland and East Durham



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



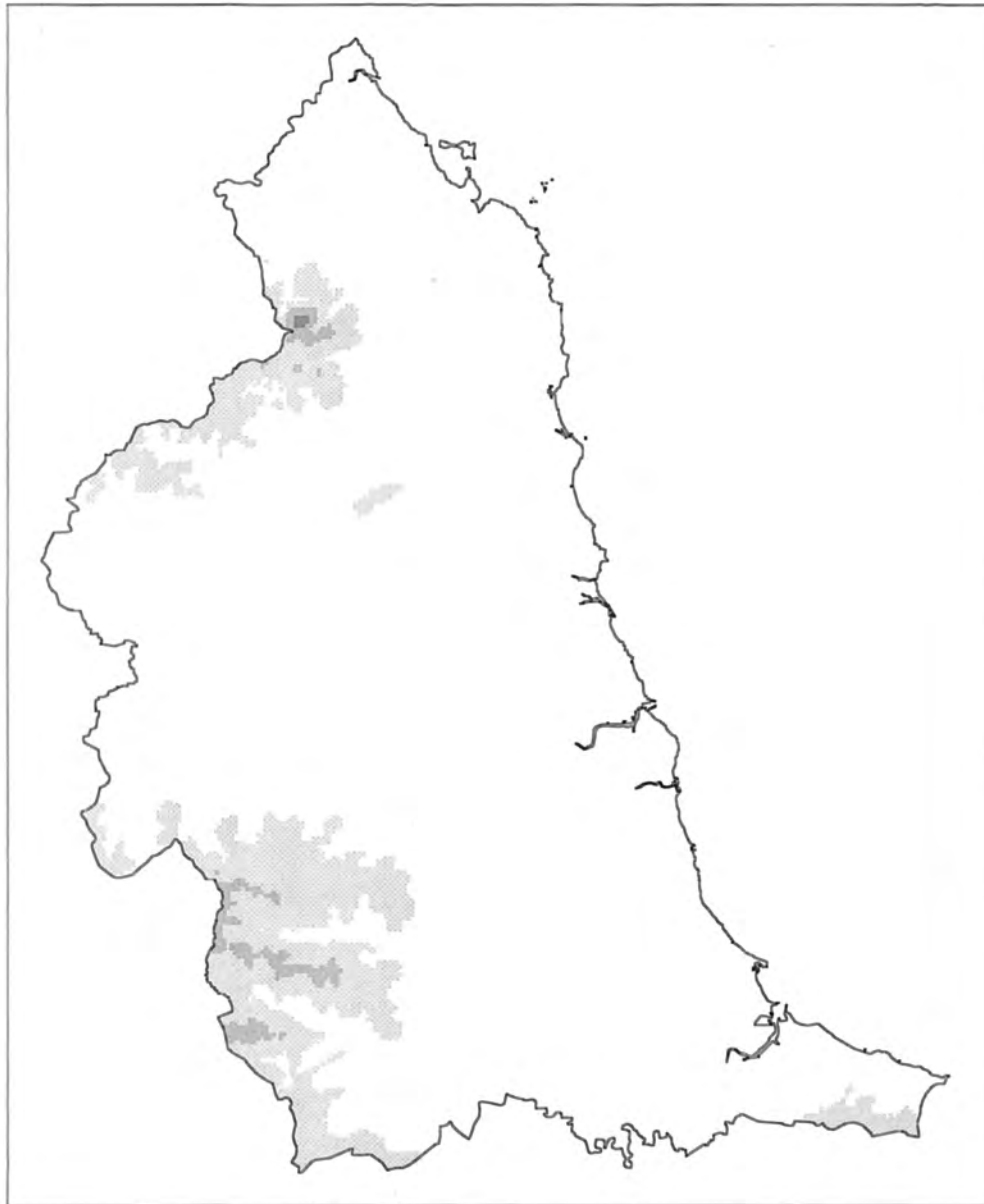
Cruciferae

7800 – 7300 cal. BC

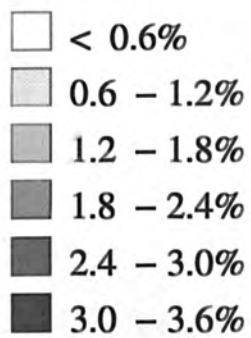
Pollen values expressed as %tdlp.

Figure 7.1.13 Interpolated pollen map of Leguminosae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The distribution of Leguminosae is similar to that of Caryophyllaceae in that the highest values occur at the highest elevations in the region, but is largely absent from the rest of the region.



Key:



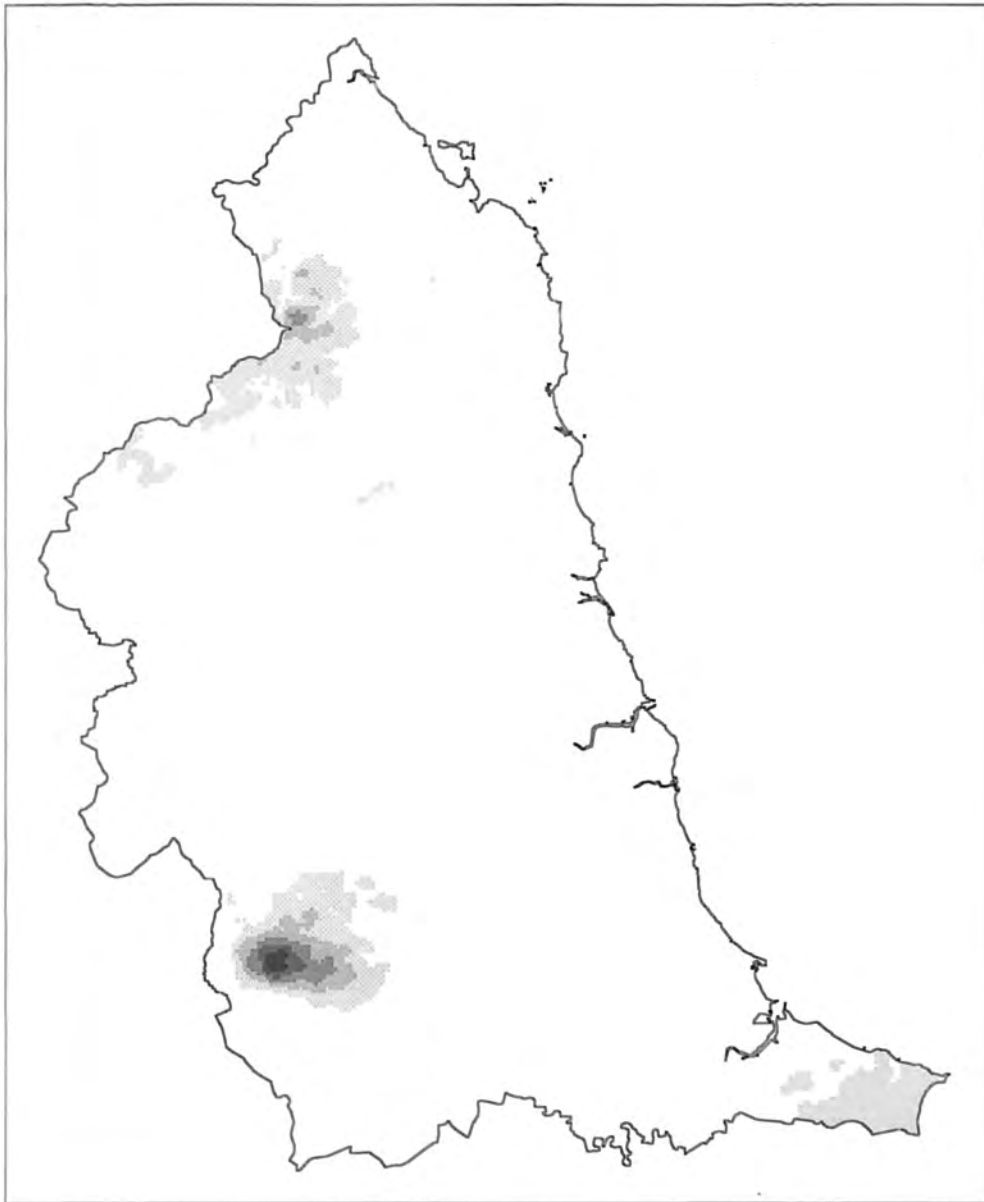
Leguminosae

7800 – 7300 cal. BC

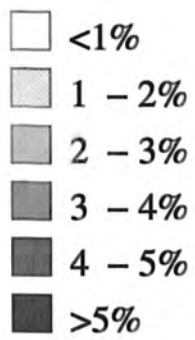
Pollen values expressed as %tdlp.

Figure 7.1.14 Interpolated pollen map of *Plantago* pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Plantago has a patchy distribution, with unusually high values exceeding 6% tdlp occurring at Harthope Moss in upper Teesdale, but elsewhere occurring below 1% tdlp at a small number of other sites in upper Teesdale and in northern Northumberland.



Key:



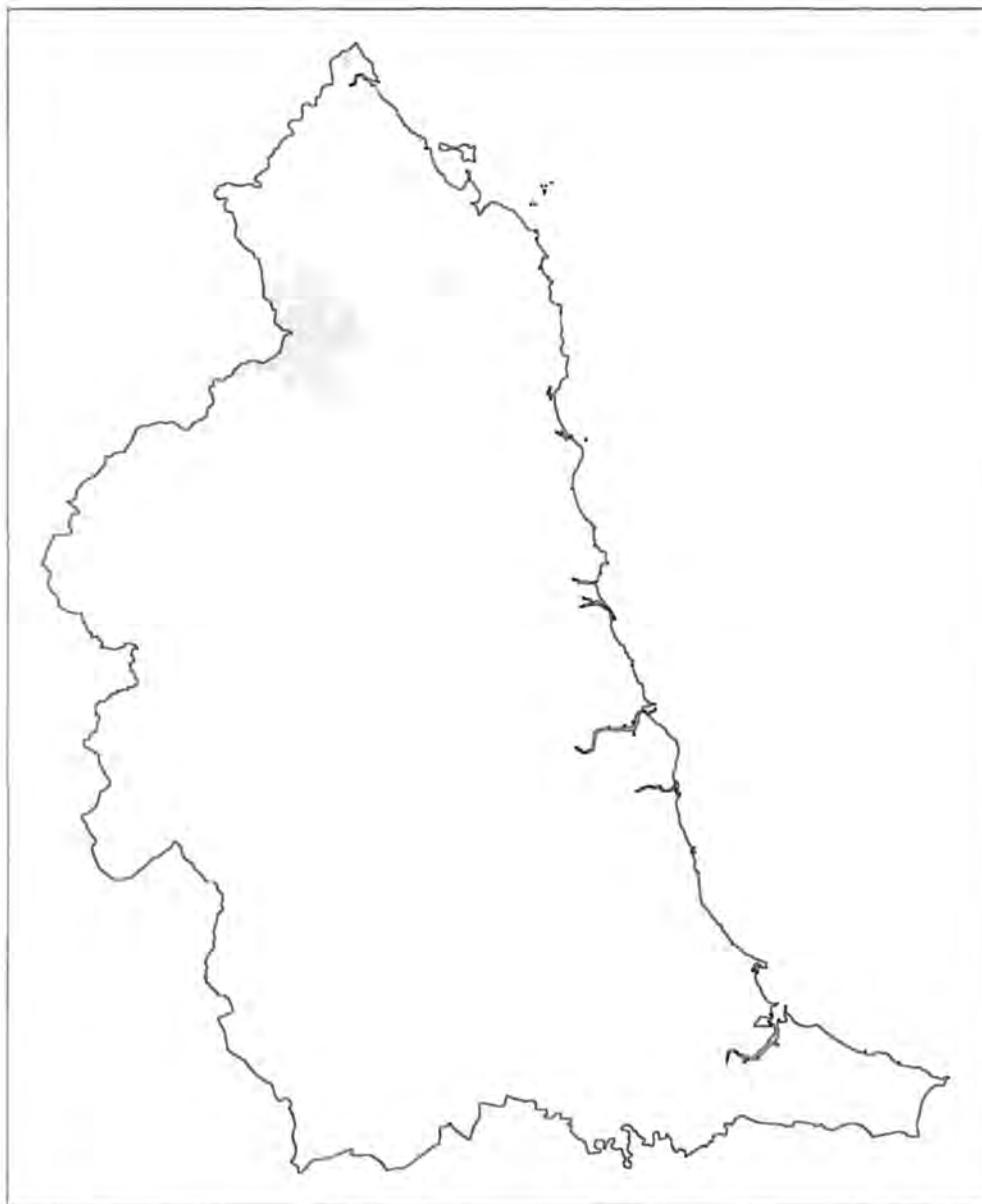
Plantago

7800 - 7300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.15 Interpolated pollen map of *Polygonum* pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Polygonum occurs in small amounts at two pollen sites in northern Northumberland and at a couple of sites in upper Teesdale. Since there are a large number of other sites in upper Teesdale which have no *Polygonum*, and comparatively few sites in Northumberland, this has biased the interpolation in favour of the north of the region.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



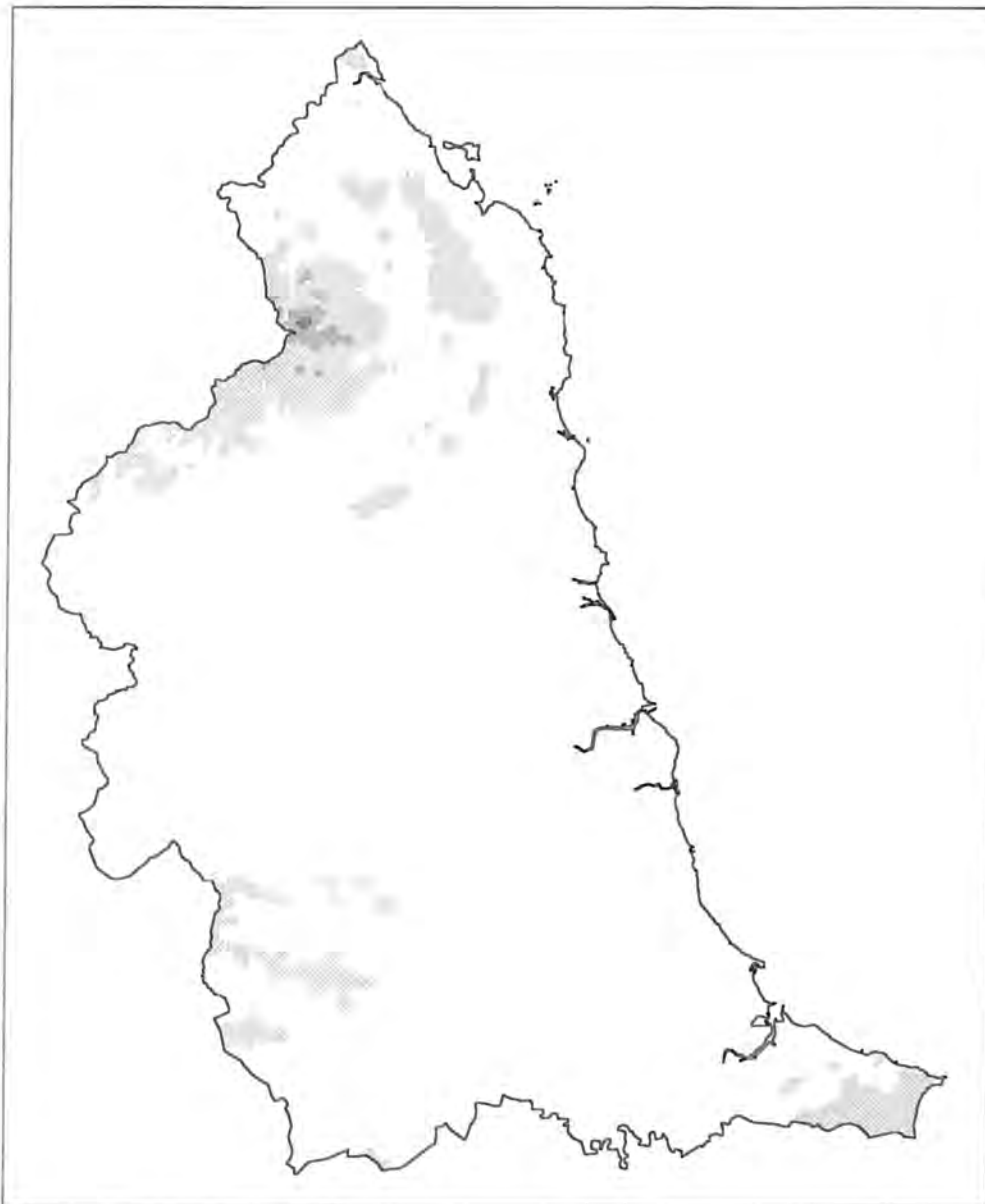
Polygonum

7800 – 7300 cal. BC

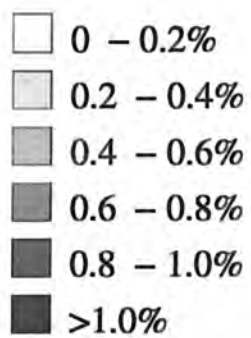
Pollen values expressed as %tdlp.

Figure 7.1.16 Interpolated pollen map of Ranunculaceae pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

Ranunculaceae pollen occurs at virtually all sites in northern Northumberland and hence the interpolation is biased towards this area. Other than this high values occur at some sites at high elevations in the Northern Pennines and very small values are found at several sites in the East Durham area, which do not show up on the map since other low elevation sites have no recorded Ranunculaceae.



Key:



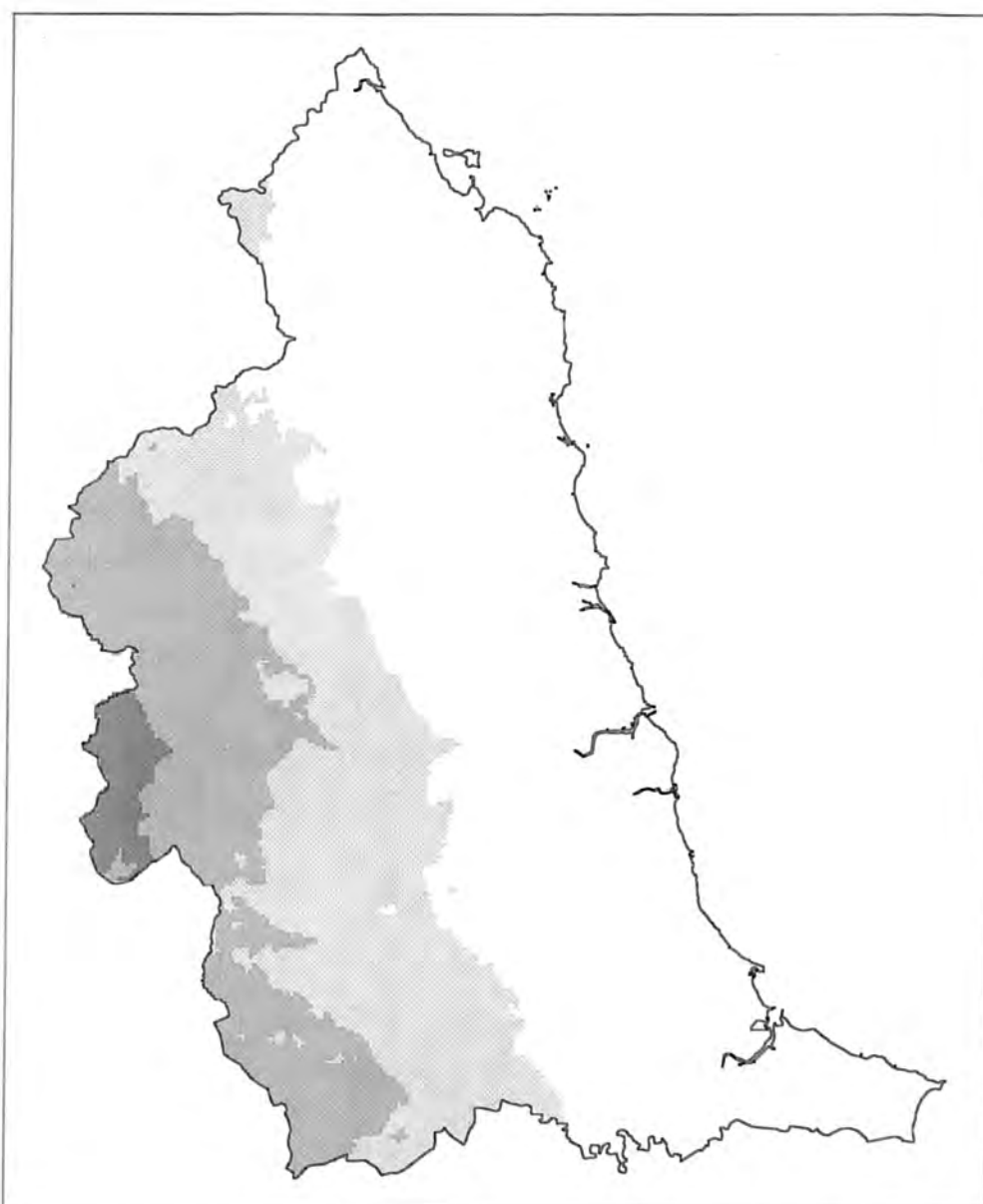
Ranunculaceae

7800 – 7300 cal. BC

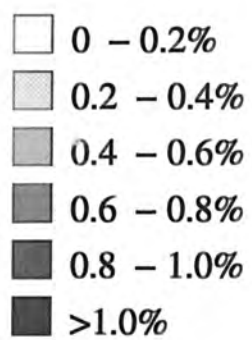
Pollen values expressed as %tdlp.

Figure 7.1.17 Interpolated pollen map of *Rumex* pollen values for the first Mesolithic period, 7800 - 7300 cal. BC

The interpolated map for *Rumex*, like Cruciferae and Compositae, shows a concentration of high values in the western uplands of the region. The highest values occur in upper Teesdale, where it occurs at several sites, and other than this it is not recorded except at one site in the upper Derwent and small values at one site in northern Northumberland.



Key:



Rumex

7800 - 7300 cal. BC

Pollen values expressed as %tdlp.

Mesolithic period II:

6800 - 6300 cal. BC

List of Figures and Tables for the second Mesolithic period, 6800 - 6300 cal. BC

Tables

Table 7.1.2	Summary of trends in pollen maps for the second Mesolithic period.	55
-------------	--	----

Figures

Fig. 7.1.18	Map showing locations of pollen cores used to create interpolated maps for the period 6800 - 6300 cal. BC	57
-------------	---	----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.1.19	Interpolated pollen map of averaged total tree pollen values.	59
-------------	---	----

Fig. 7.1.20	Interpolated pollen map of total shrub pollen values.	61
-------------	---	----

Fig. 7.1.21	Interpolated pollen map of total herb pollen values.	63
-------------	--	----

Fig. 7.1.22	Interpolated pollen map of total Ericaceae pollen values.	65
-------------	---	----

b) Agricultural: arable index map

Fig. 7.1.23	Interpolated pollen map of agricultural:arable index scores.	67
-------------	--	----

c) Maps of selected individual herb taxa:

Fig. 7.1.24	Interpolated pollen map of Gramineae pollen values.	69
-------------	---	----

Fig. 7.1.25	Interpolated pollen map of <i>Artemisia</i> pollen values.	71
-------------	--	----

Fig. 7.1.26	Interpolated pollen map of Caryophyllaceae pollen values.	73
-------------	---	----

Fig. 7.1.27	Interpolated pollen map of Chenopodiaceae pollen values.	75
-------------	--	----

Fig. 7.1.28	Interpolated pollen map of Compositae pollen values.	77
-------------	--	----

Fig. 7.1.29	Interpolated pollen map of Cruciferae pollen values.	79
-------------	--	----

Fig. 7.1.30	Interpolated pollen map of Leguminosae pollen values.	81
-------------	---	----

Fig. 7.1.31	Interpolated pollen map of <i>Plantago</i> pollen values.	83
-------------	---	----

Fig. 7.1.32	Interpolated pollen map of <i>Polygonum</i> pollen values.	85
-------------	--	----

Fig. 7.1.33	Interpolated pollen map of Ranunculaceae pollen values.	87
-------------	---	----

Fig. 7.1.34	Interpolated pollen map of <i>Rumex</i> pollen values.	89
-------------	--	----

Table 7.1.2 Summary of trends in pollen maps for the second Mesolithic period 6800 - 6300 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.19 to 7.1.22</p>	<p>Overall arboreal pollen values remain little changed from before, although trees increase slightly at Hutton Henry to 35%, Neasham Fen to 41% and Mordon Carr to 39%, accompanied by a decline in shrubs. At Hartlepool shrub levels remain high as before. Herb levels remain low except at Bishop Middleham where they remain higher (at 37%). Ericaceae levels remain unchanged from before.</p>	<p>Tree percentages at these sites continue to be high, around 70-75%, with moderate shrub values (20-25%) and low herbs and Ericaceae. White House, a new sites, has high tree values of 83%. Moss Mire North has high tree percentages, although nearby site Moss Mire South has very high herb pollen (72%).</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.23</p>	<p>The proportion of arable to pastoral-types drops in this period at most sites in this area, as arable values fall. Arable-type taxa are no longer present at Mordon Carr and remain absent at Thorpe Bulmer and Neasham Fen. Pastoral-type taxa now appear at the last two sites. At Bishop Middleham and Hutton Henry index scores drop to 25% and 35% respectively as arable-types fall.</p>	<p>Arable-type and pastoral-type herb taxa remain absent from most sites in this group, as in the previous period. At Pow Hill an increase in arable values raises the index score to 51%.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.24 to 7.1.34</p>	<p>Gramineae values remain highest in this area at Bishop Middleham (6%). Ranunculaceae now appears at almost every site and Compositae continues to occur at almost all the sites in this area. <i>Rumex</i> is a new addition at Hutton Henry.</p>	<p>Grass pollen continues to make up virtually all the low herb pollen percentages at these sites, as before, with the exception of Pow Hill, where <i>Artemisia</i> and <i>Chenopodiaceae</i> appear.</p>

Table 7.1.2 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.19 to 7.1.22</p>	<p>Shrub percentages now dominate at many sites in Northumberland. At Lilburn Steads trees decline from 46-18% and shrubs rise to 78%. At Trickle Wood trees decline, with a rise in shrubs to 78%. Both trees and shrubs rise at Akeld Steads with a decline in formerly high herb levels. Herbs and Ericaceae remain low at most sites, although Ericaceae reach 14-15% at Trickle Wood and Embleton's Bog. At Longlee Moor, tree percentages increase from 9-26%, with a decline in shrubs and herbs. In southern Northumberland tree percentages remain high at Fortherley Moss (60%), but at Coom Rigg high herb pollen levels dominate (at 81%).</p>	<p>At most upland sites tree pollen levels increase so that now shrubs and trees are about equal, with the exception of Arngill Head Brocks and Scaith Head, at high elevations, where shrubs remain important. The number of sites with tree levels over 40% increases. Herb pollen remains below 10% at most sites and Ericaceae, although higher than in the lowlands, is still only present in small amounts in the uplands.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.23</p>	<p>At Akeld Steads, Lilburn Steads and Black Lough values for arable-type taxa increase and raise index scores to 46%, 58% and 99% respectively. No arable-type taxa are present at Trickle Wood and Embleton's Bog. Arable-type taxa are also absent at Coom Rigg and Muckle Moss.</p>	<p>Arable-type pollen continues to be absent from most upland sites, except for Staple Moss, where the index score rises from 33% to 81%, Dufton Moss, where there is a rise from 9% to 67%, and at Tinkler's Sike (70%), Kilhope Moor (31%), and Fox Earth Gill (31%). Arable types appear in small amounts at Quick Moss (3%) and make up 4% at Harthope Moss.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.24 to 7.1.34</p>	<p>Gramineae pollen levels are very low at all sites except Akeld Steads, as before. It now reaches 14%. The same types of herbs as before occur at these sites. <i>Rumex</i> and Compositae occur at most sites, and Chenopodiaceae occur at Akeld Steads and Embleton's Bog. <i>Plantago</i> appears at Trickle Wood and Longlee Moor.</p>	<p>At the higher elevation sites grass pollen rises to 8-12% at Kilhope Law, Quick Moss and Staple Moss. It is lower however at those sites with high Ericaceae. Leguminosae occurs up to 7% at Sally Grain, and <i>Artemisia</i> and Caryophyllaceae occur as before. Ranunculaceae occurs more often than <i>Rumex</i> at these sites. <i>Plantago</i> appears up to 5% at Harthope Moss. Ranunculaceae now appear at several sites in Upper Teesdale and lower elevations in the uplands. Cruciferae, Compositae, <i>Polygonum</i> and <i>Rumex</i> continue to be restricted to these sites.</p>

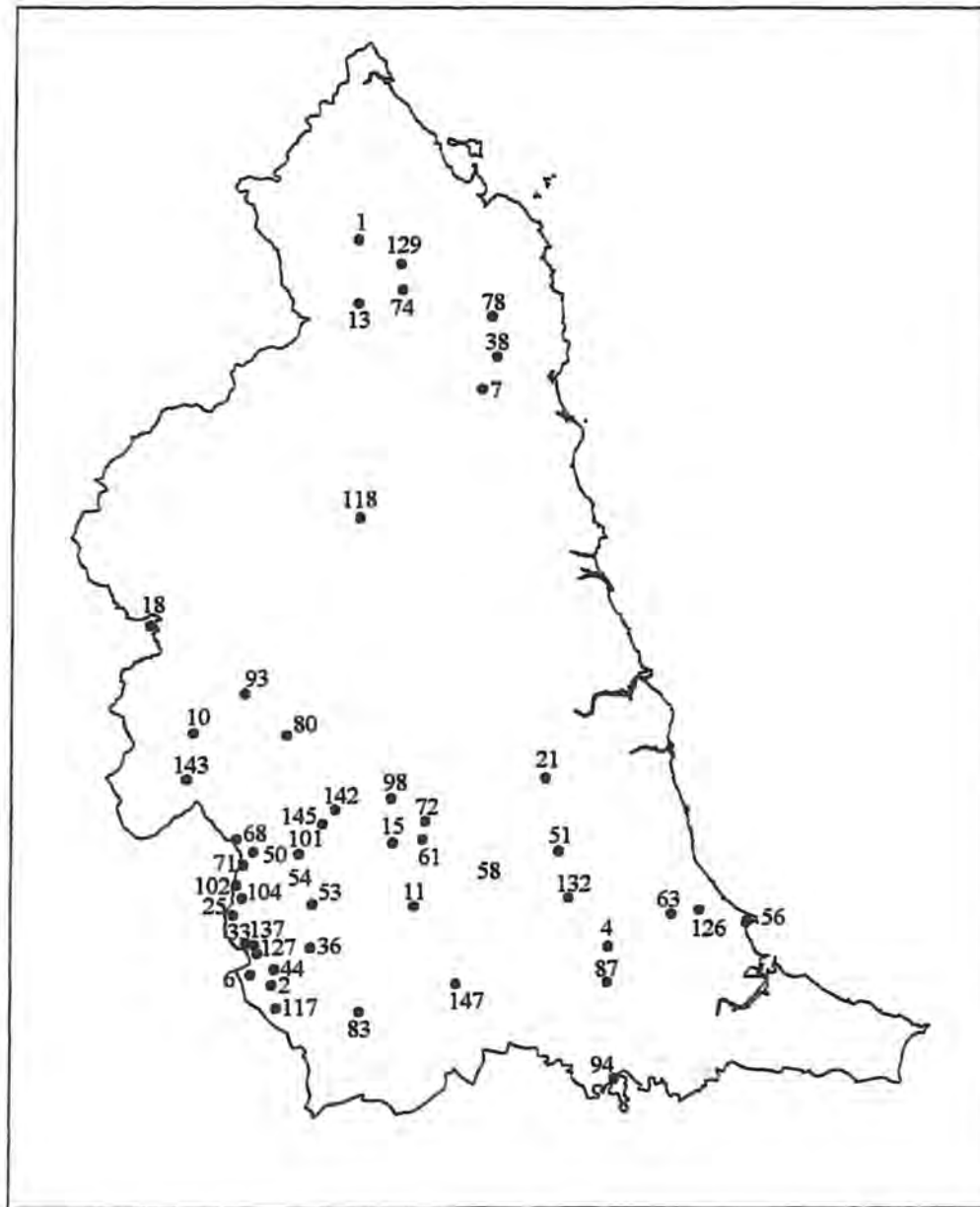


Fig. 7.1.18

Map showing locations of pollen cores used to create interpolated maps for the second Mesolithic period, 6800 - 6300 cal. BC

N.B. Key to site codes on next page.

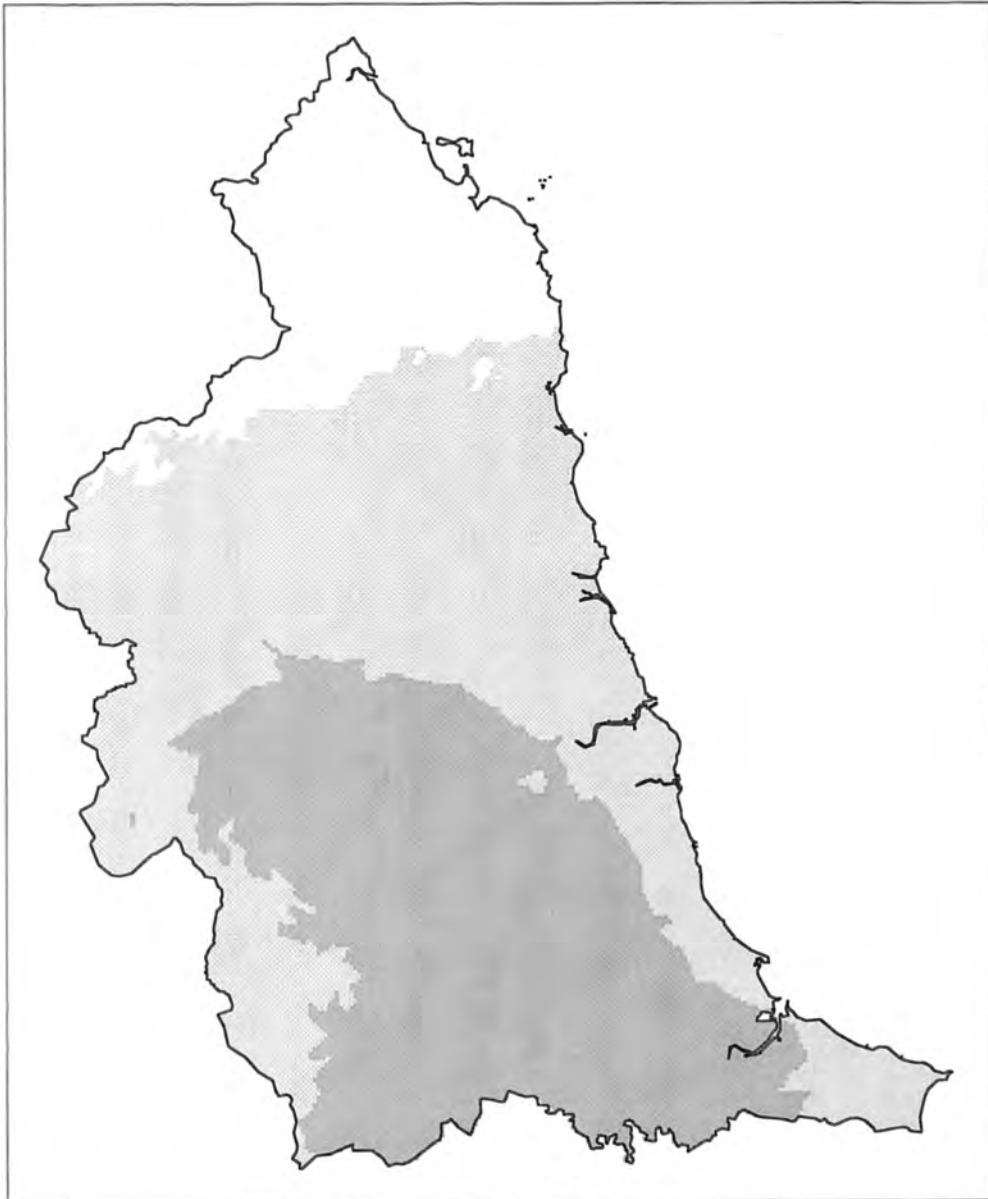
Key to Figure 7.1.18

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	71	Knoutberry
2	Arngill Head Brocks	72	Lamb Shield
3	Bellow Moss	74	Lilburn Steads
4	Bishop Middleham	78	Longlee Moor
6	Black Hill	80	Low Stublick
7	Black Lough	83	Mickleton Moor
10	Blackshiel Bog	87	Mordon Carr
15	Burnhope Dam	93	Muckle Moss
18	Coom Rigg	94	Neasham Fen
21	Cranberry Bog	98	Pow Hill
25	Crook Burn	101	Quick Moss
33	Dead Crook	102	Sally Grain
36	Dufton Moss	104	Scraith Head
38	Embleton's Bog	117	Staple Moss
44	Fox Earth Gill	126	Thorpe Bulmer
47	Graham's Moss	127	Tinkler's Sike
50	Green Swang	129	Trickley Wood
53	Harthope Moss	132	Waldridge
56	Hartlepool Bay 6	138	Weelhead Moss
61	Hisehope Burn	142	White House
62	Howden Moss	143	Whitfield Lough
63	Hutton Henry	145	Wolfscleugh
68	Kilhope Law	147	Woodland

Figure 7.1.20 Interpolated pollen map of tree pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Tree percentages remain similar in many areas of the region compared to the preceding period, declining considerably at several northern Northumberland sites. Tree pollen values increase in the uplands of the region, particularly in the Northern Pennines, except at the highest elevations. Tree percentages are highest in the foothills of the region, from the middle of the Tyne Corridor to mid Teesdale.



Key:

-  0 - 20%
-  20 - 40%
-  40 - 60%
-  60 - 80%
-  80 - 100%



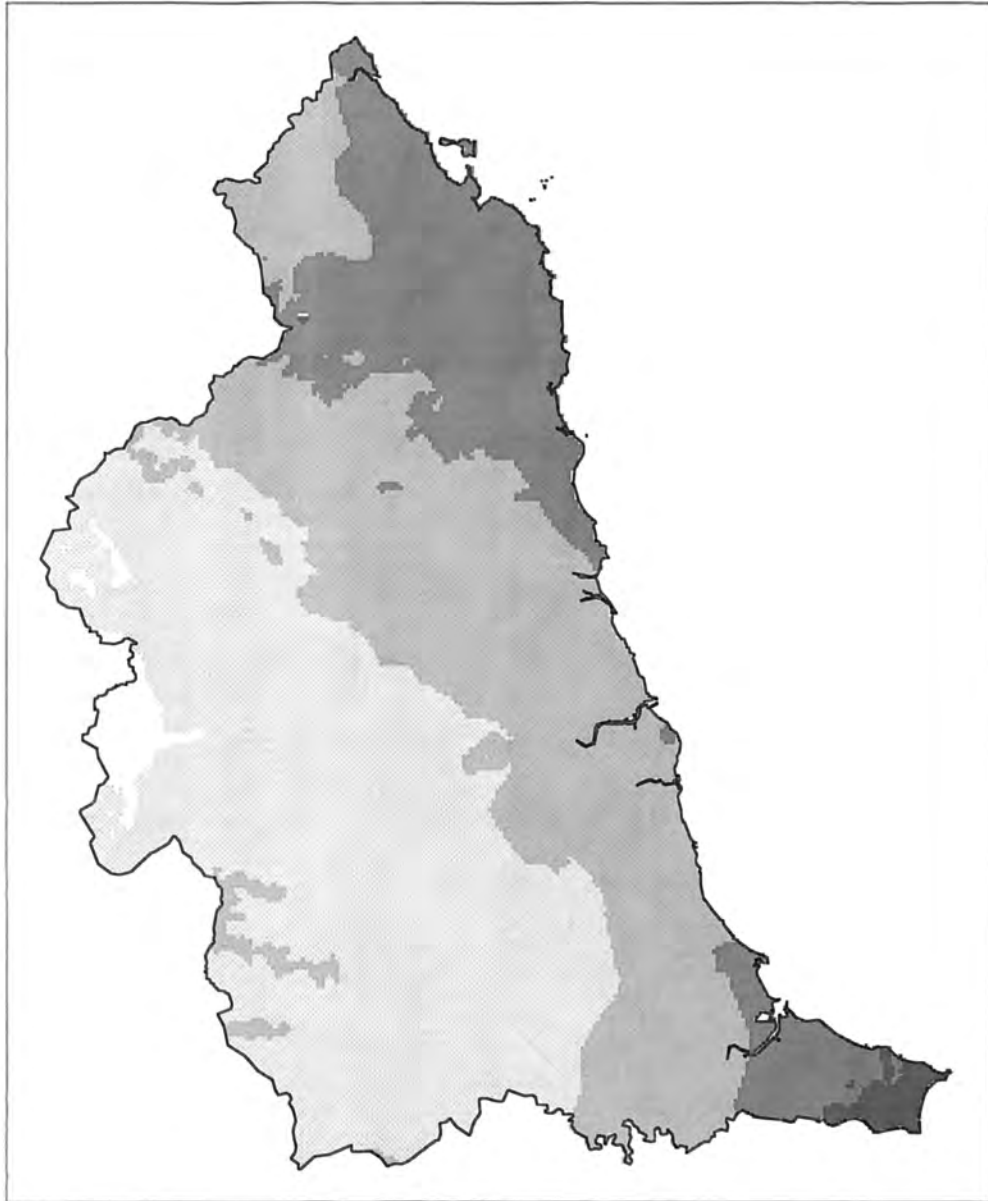
Trees

6800 - 6300 cal. BC






Pollen values expressed as %tdlp.

Figure 7.1.21 Interpolated pollen map of shrub pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Shrub values increase markedly across the region in this period in all areas except in the foothill areas from the mid Tyne Corridor to mid Teesdale, where tree pollen remains dominant (Fig. 7.1.20). Shrub values are highest in the lowlands, as before, but now increase to over 50% tdlp from 30-40% previously (Figure 7.1.3). Shrub values increase in northern Northumberland from low levels to levels equalling those in the lowlands. Values also increase in the Northern Pennines, particularly at the highest elevations where tree pollen does not increase.



Key:

-  0 – 20%
-  20 – 40%
-  40 – 60%
-  60 – 80%
-  80 – 100%



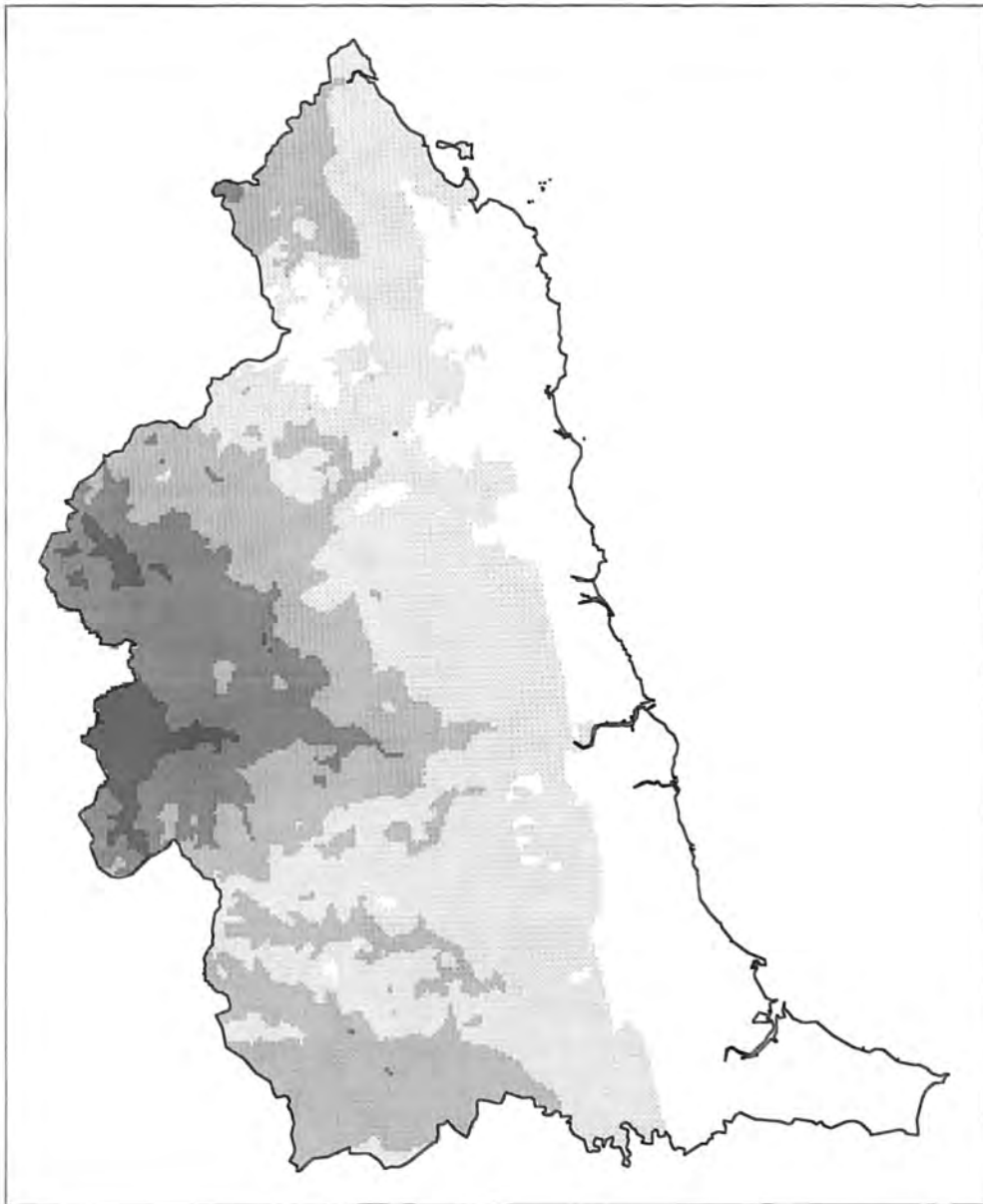
Shrubs

6800 – 6300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.22 Interpolated pollen map of herb pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Herb values remain highest in the uplands of the region at the highest elevations. An unusually high herb percentage of 81% at Coom Rigg Moss in the west of the Tyne Corridor is responsible for the concentration of high values in this area. Formerly high values in northern Northumberland now drop as shrub pollen rises in this area (Figure 7.1.21).



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



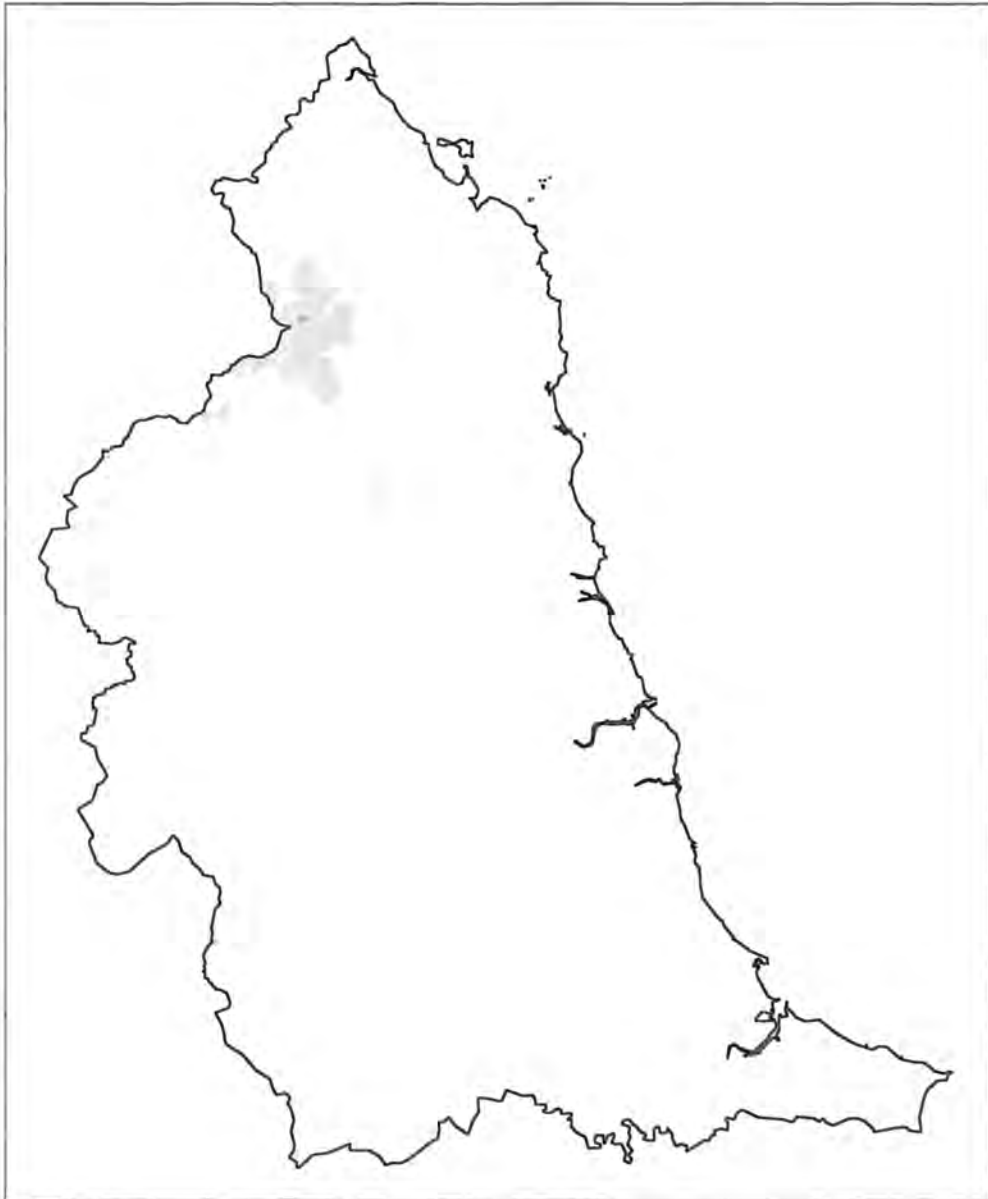
Herbs

6800 – 6300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.23 Interpolated pollen map of Ericaceae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The “bullseye” effect of high values at selected sites found in the previous period has now disappeared. The highest Ericaceae values are found in the uplands of the Northern Pennines and at some sites in northern Northumberland, where it reaches 15% tdlp. Elsewhere Ericaceae pollen is absent or only present in very small amounts.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



Ericaceae

6800 – 6300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.1.24 Interpolated pollen map of agricultural: arable scores for the second Mesolithic period, 6800 - 6300 cal. BC

A rise in the proportion of arable-type taxa at sites in northern Northumberland giving scores consistently over 50% results in the interpolated map being biased towards this area. In the south east of the region, where arable scores were previously high, non-arable types increase, such as Ranunculaceae and *Rumex*. Arable types remain absent from the highest elevations although they continue to be present at a number of sites in upper Teesdale. In the area between the mid Tyne and Tees, where tree pollen dominates, arable and non-arable herb types are virtually absent.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%

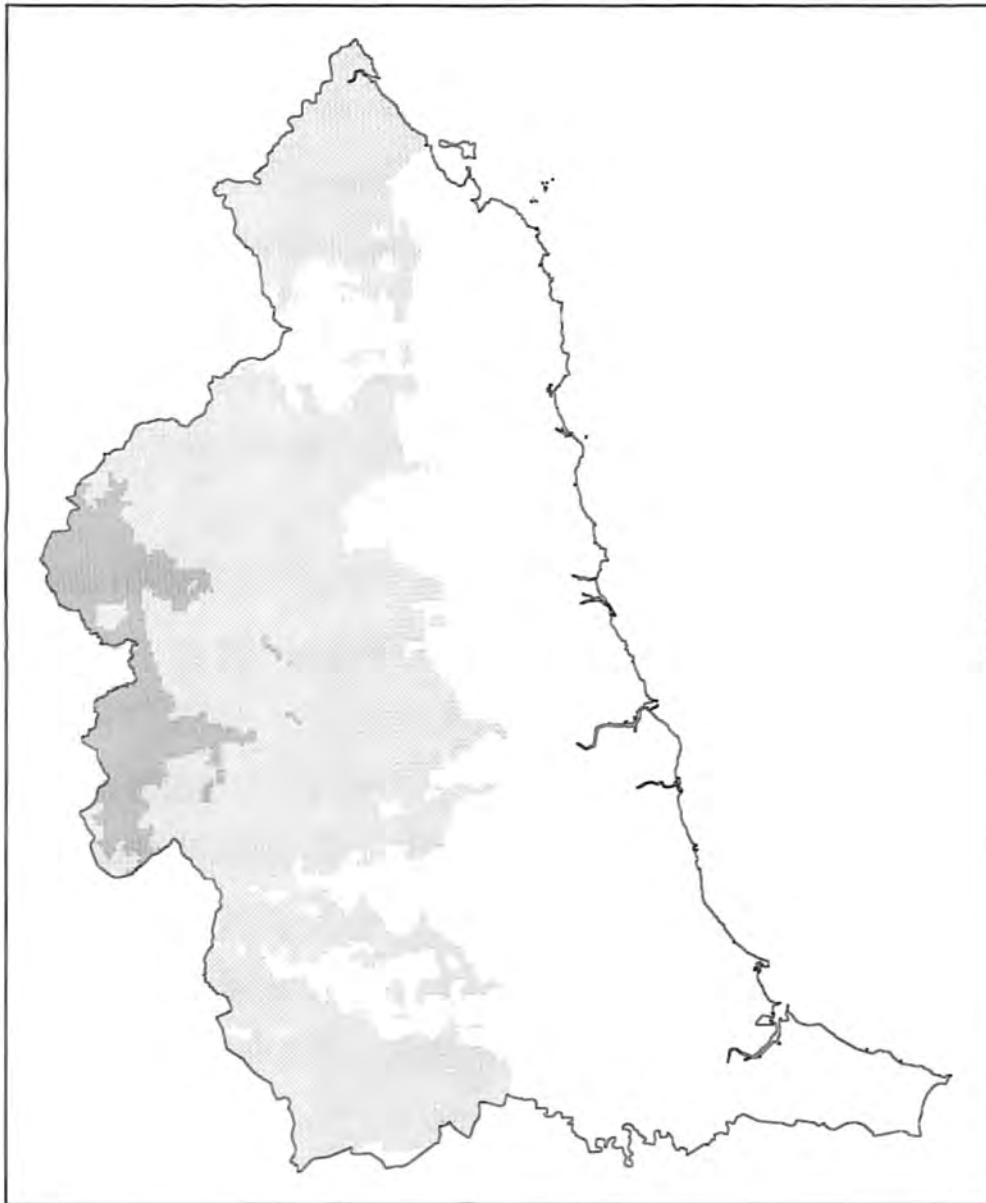


Agricultural:Arable Index







6800 – 6300 cal. BC

Figure 7.1.25 Interpolated pollen map of Gramineae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Grass pollen values over 5% appear during this period at more sites in the uplands, compared to the previous period, when they were restricted just to the upland tops. Values rise to 27% at Coom Rigg in the western Tyne Corridor, and 21% at Dufton Moss in upper Teesdale. Elsewhere grass values are under 5%, with the exception of one site in north Northumberland, Akeld Steads (with 14%), which is responsible for higher interpolated values here.



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



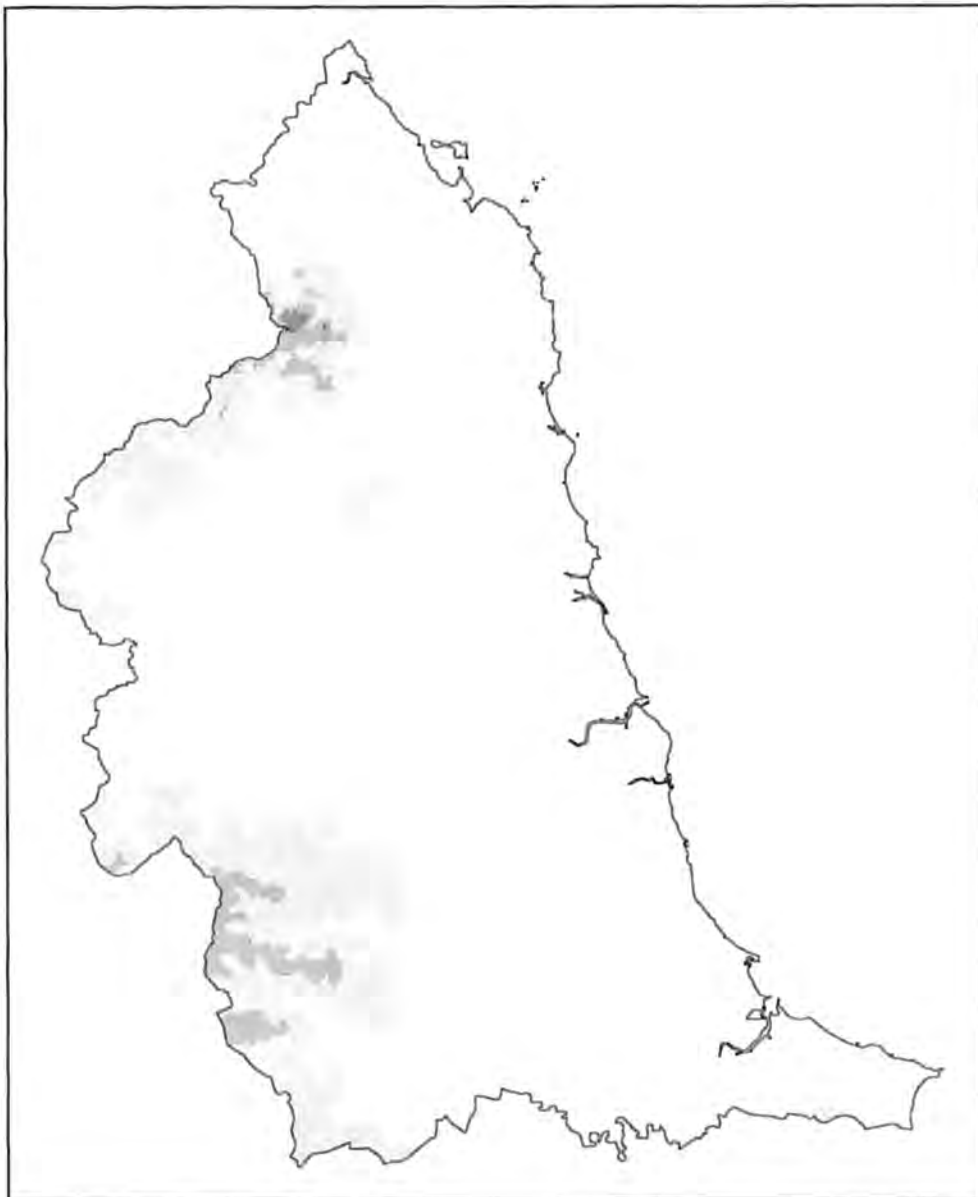
Gramineae

6800 – 6300 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.26 Interpolated pollen map of *Artemisia* pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The “bullseye” effect created by high values at a small number of sites in the previous period now disappears. *Artemisia* occurs only at the highest elevations in the region, being most abundant on the upland tops of the Northern Pennines, where it occurred in the previous period.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



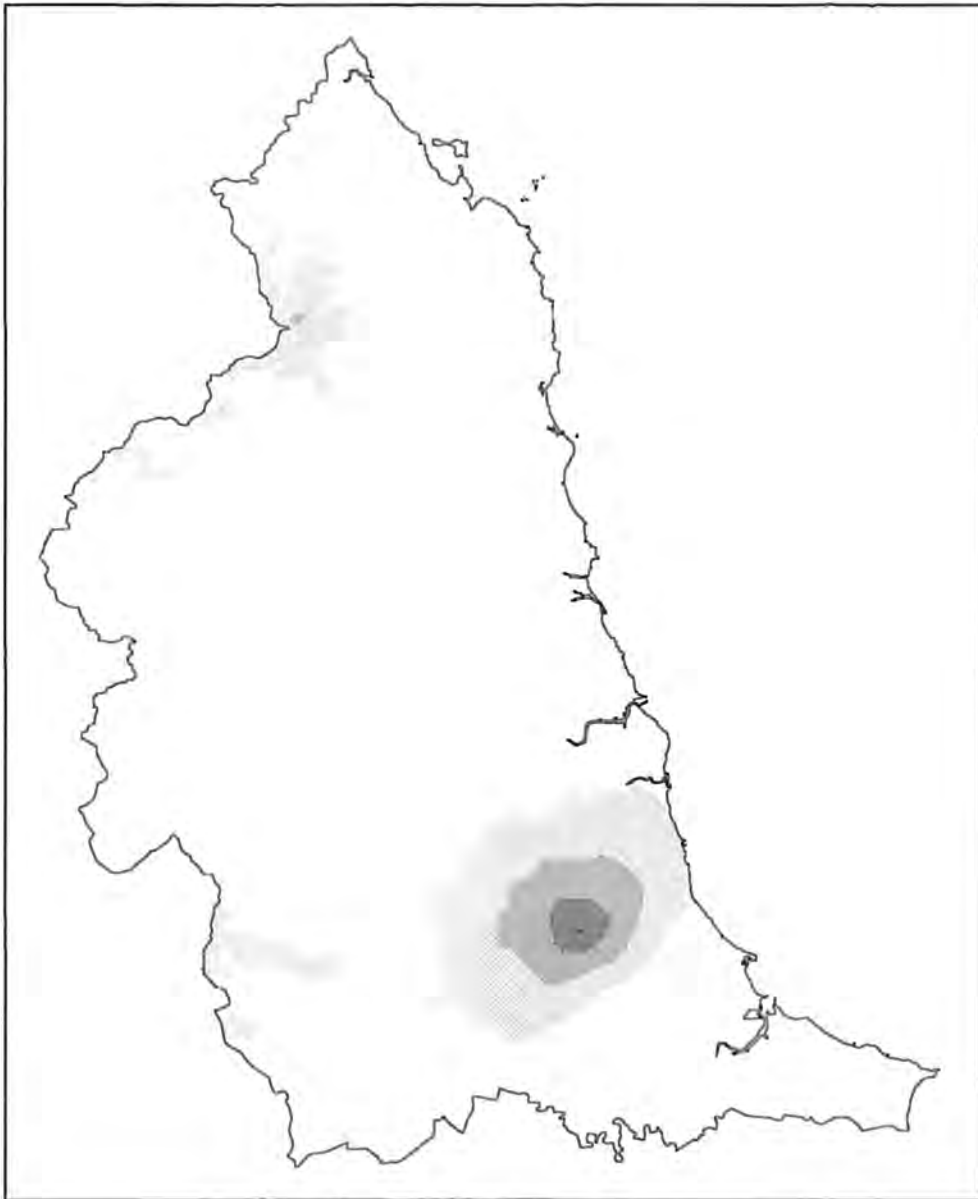
Artemisia

6800 – 6300 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.27 Interpolated pollen map of Caryophyllaceae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The highest values for Caryophyllaceae continue to occur at the highest elevations in the region, as in the preceding period (Fig. 7.1.9). In this period there is also the appearance of unusually high values at one site in the Durham lowlands, creating a “bullseye” effect. Other than this, it is absent from the lowlands. Values in northern Northumberland are not so high as in the previous period.



Key:

- 0–0.1%
- 0.1–0.2%
- 0.2–0.3%
- 0.3–0.4%
- 0.4–0.5%
- > 0.5%



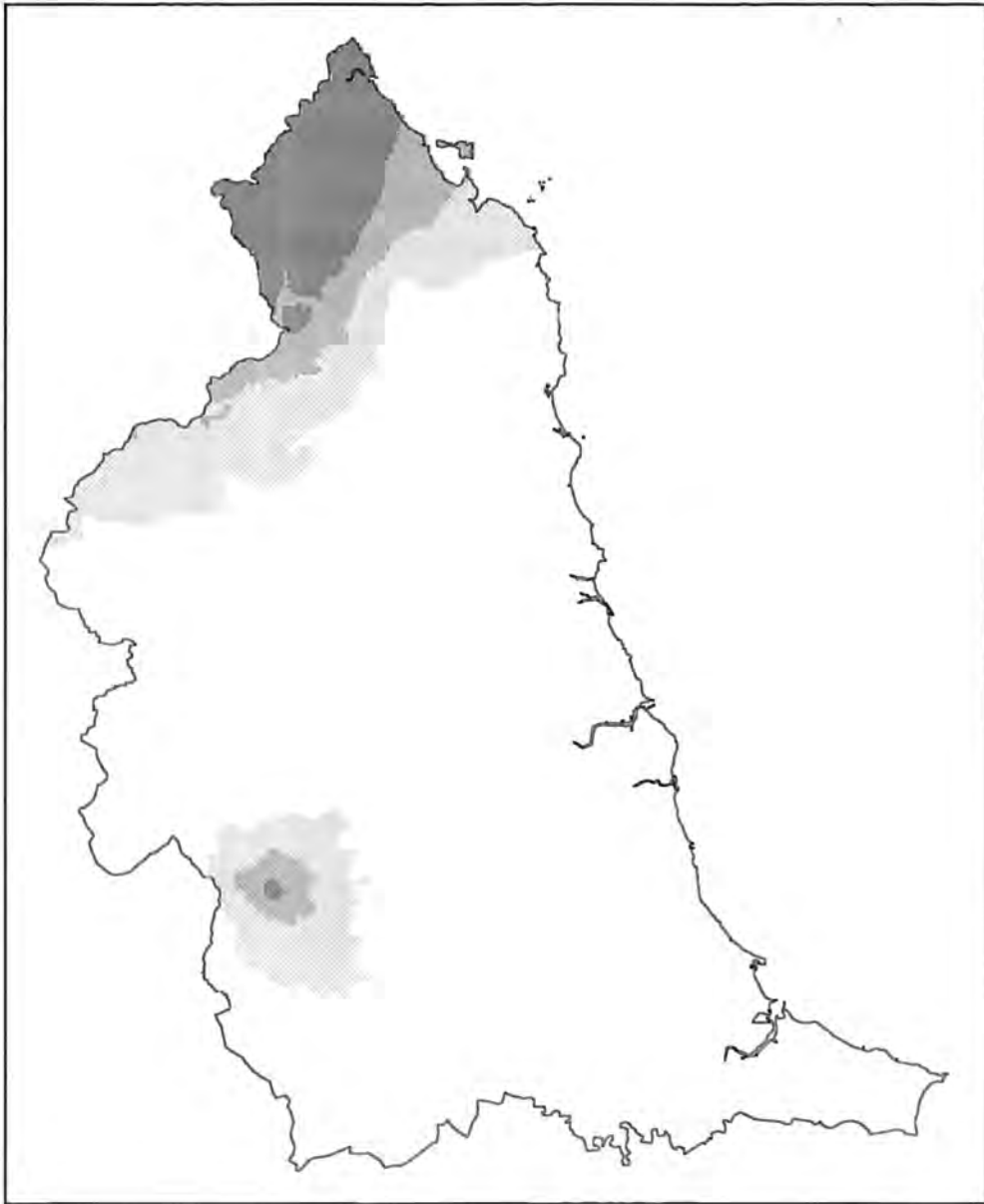
Caryophyllaceae

6800–6300 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.28 Interpolated pollen map of Chenopodiaceae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Chenopodiaceae values continue to be high in the north of the region, and have increased from the preceding period (Fig. 7.1.10), now reaching 0.6% at Akeld Steads. Smaller values (under 0.3%) continue to occur in upper Teesdale and upper Weardale, although not at the higher elevations, as before. A particularly high value at one site in upper Weardale, of 0.8% is responsible for the “bullseye” in this area.



Key:

- 0–0.1%
- 0.1–0.2%
- 0.2–0.3%
- 0.3–0.4%
- 0.4–0.5%
- > 0.5%



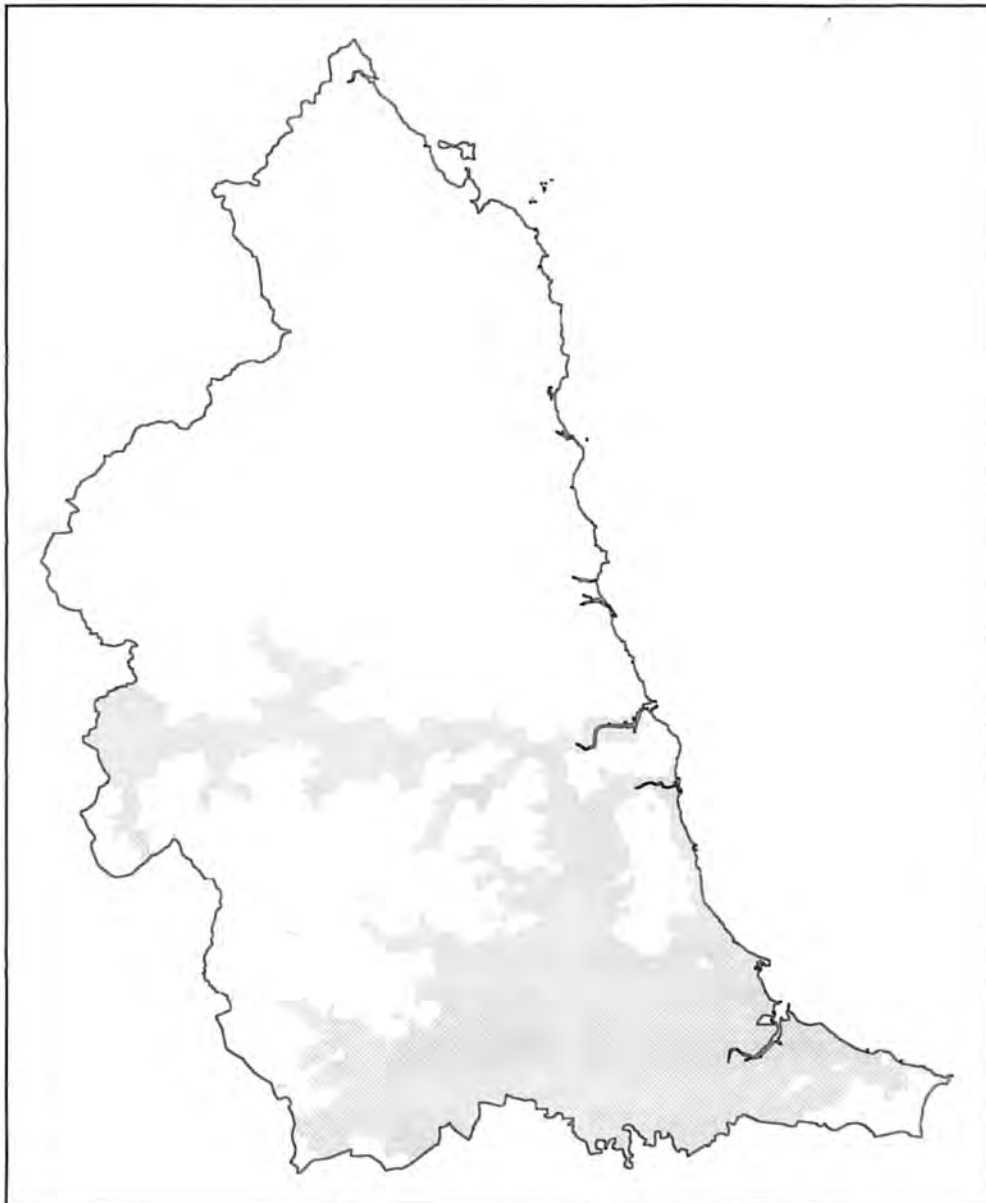
Chenopodiaceae

6800–6300 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.29 Interpolated pollen map of Compositae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The very different appearance of this map compared to the map for Compositae for the preceding period (Fig. 7.1.11) is due to the appearance of Compositae at most sites in the East Durham area at the same values as found in upper Teesdale (i.e. between 0.1-0.2%). The map does not clearly show that Compositae continues to occur at similar levels in upper Teesdale as before.



Key:

- 0–0.1%
- ◻ 0.1–0.2%
- ◻ 0.2–0.3%
- ◻ 0.3–0.4%
- ◻ 0.4–0.5%
- ◼ > 0.5%

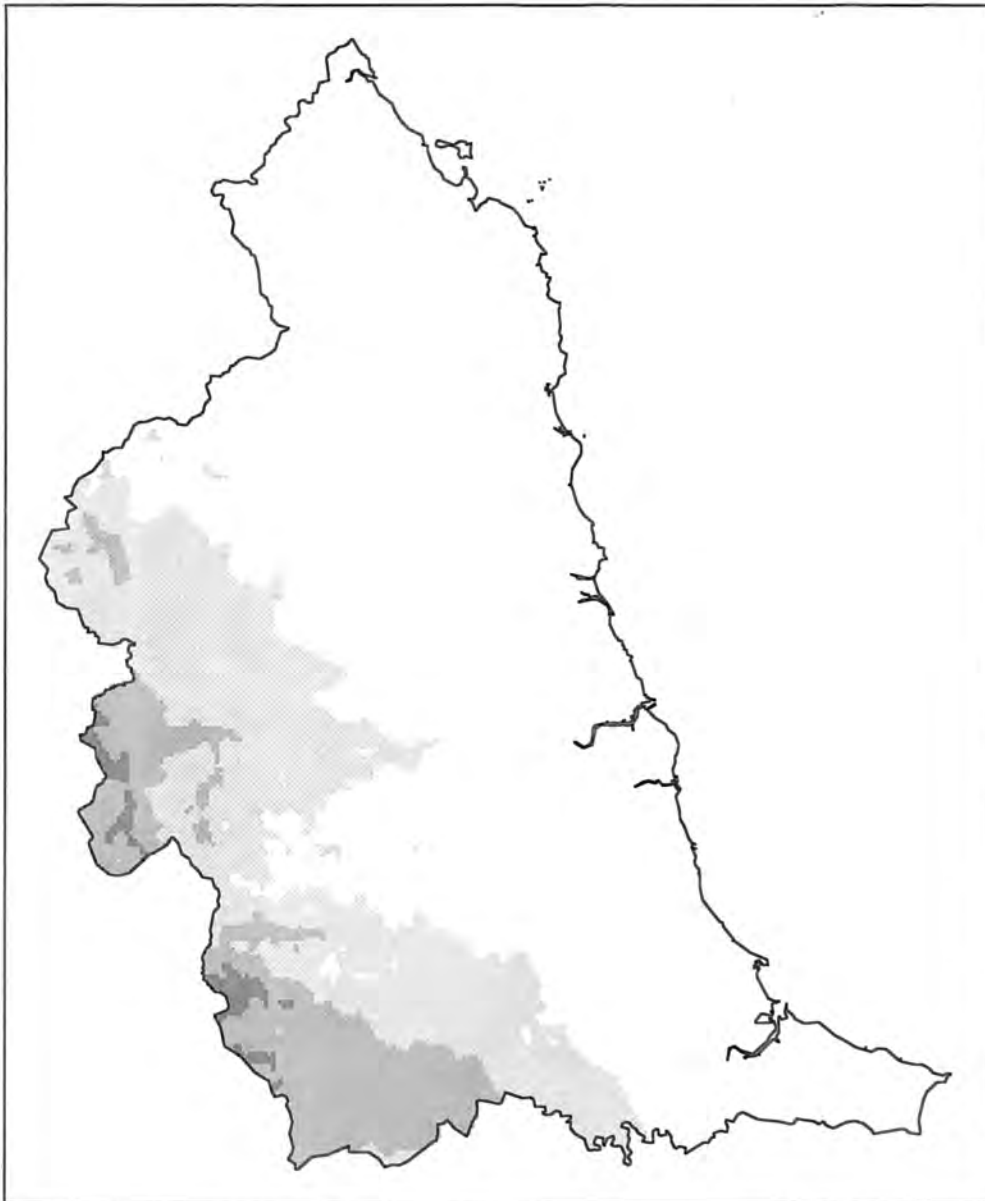
Compositae

6800 –6300 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.30 Interpolated pollen map of Cruciferae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The map for Cruciferae is very similar to the map for the preceding period, with the highest values in upper Teesdale, in the western Tyne Corridor, and much lower values or absence in the rest of the region.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%

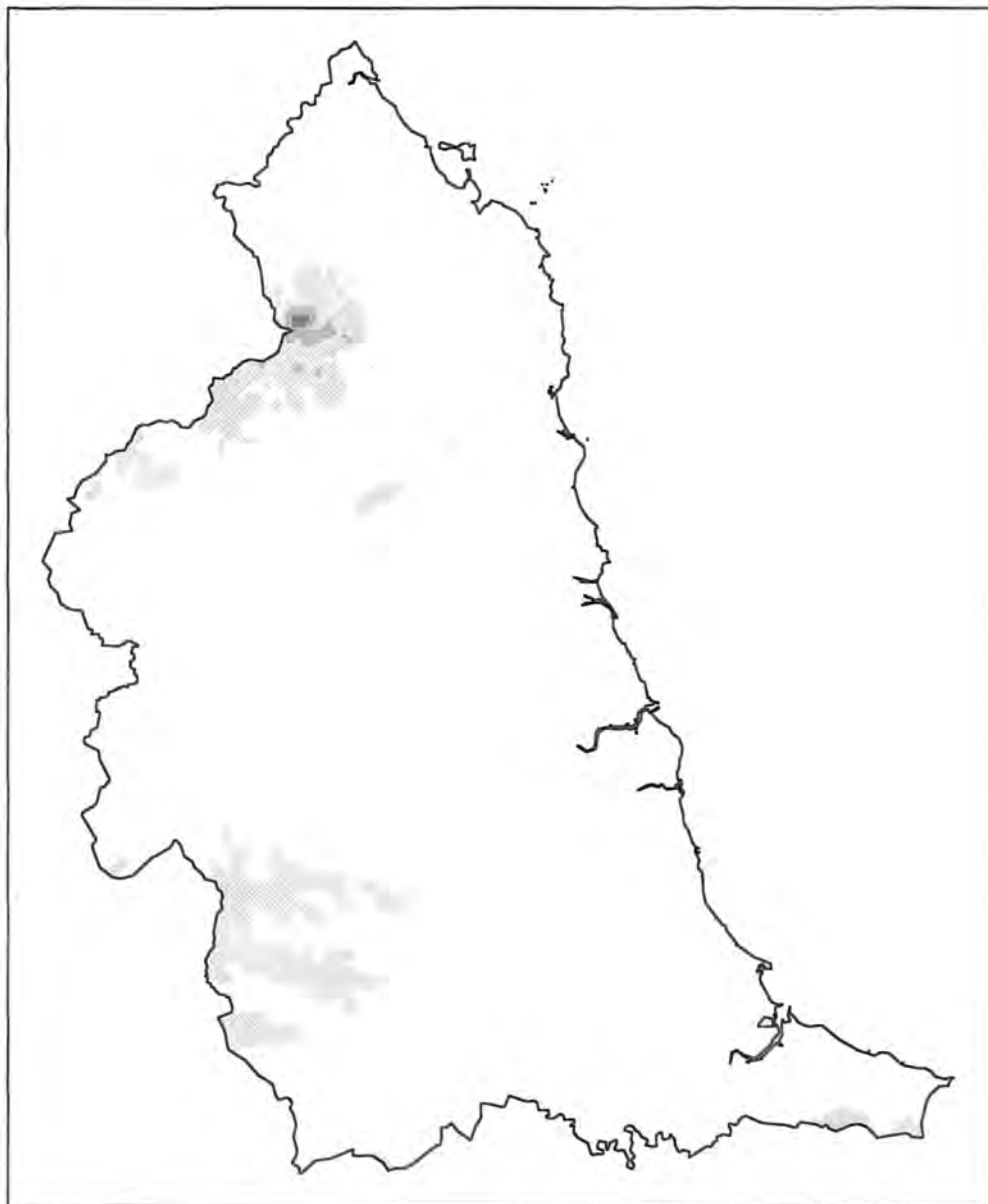
Cruciferae

6800 – 6300 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.31 Interpolated pollen map of Leguminosae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

The map for Leguminosae in this period resembles very closely the map for the previous period (Fig. 7.1.13), with the highest values occurring at the highest elevations in the region, and largely absent from the rest of the region. In this period, values are not so high in the uplands of the Northern Pennines.



Key:

-  < 0.6%
-  0.6 – 1.2%
-  1.2 – 1.8%
-  1.8 – 2.4%
-  2.4 – 3.0%
-  3.0 – 3.6%

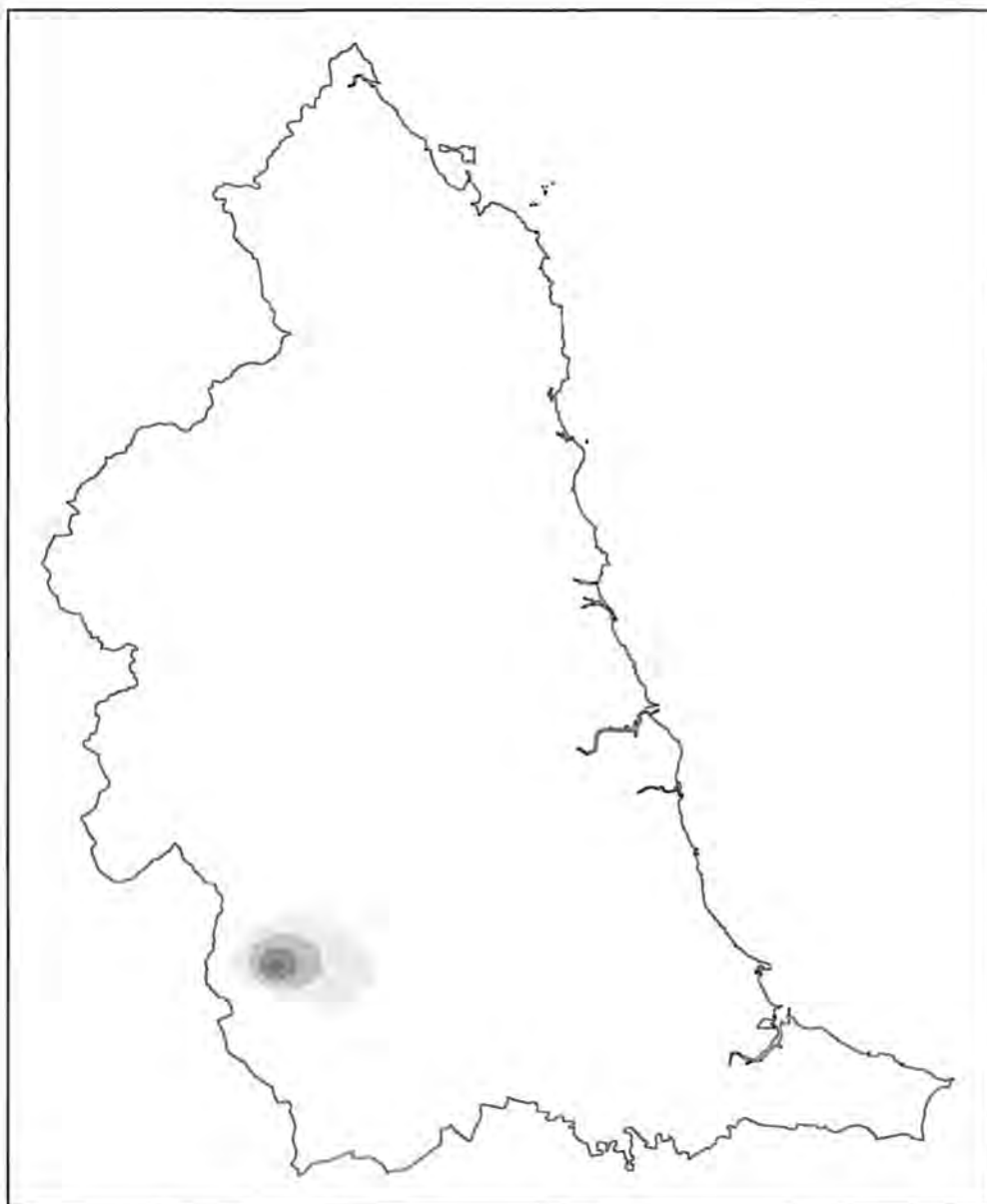
Leguminosae

6800 – 6300 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.32 Interpolated pollen map of *Plantago* pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Plantago continues to occur at unusually high values (4%), although lower than before, at Harthope Moss in upper Teesdale. It also appears in small values at other sites in upper Teesdale as well as occurring at a couple of sites in northern Northumberland.



Key:

-  <1%
-  1 –2%
-  2 –3%
-  3 –4%
-  4 –5%
-  >5%

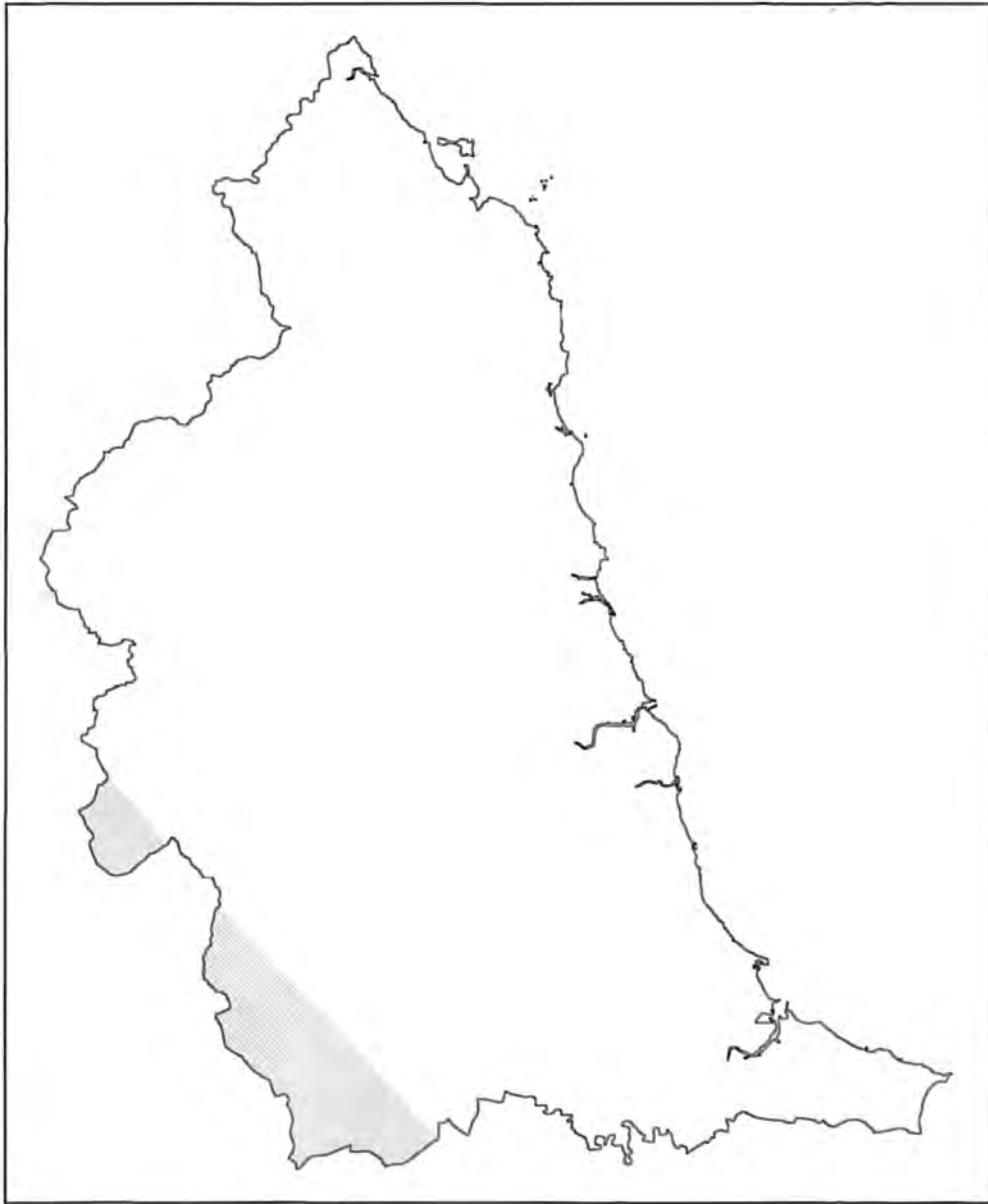
Plantago

6800 –6300 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.33 Interpolated pollen map of *Polygonum* pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

Polygonum only occurs at two sites in upper Teesdale in this period, compared to the preceding period when it occurred in both upper Teesdale and northern Northumberland (Fig. 7.1.15). Values are under 0.3% tdlp.



Key:

- < 0.01%
- 0.01% – 0.02%
- 0.02% – 0.03%
- 0.03% – 0.04%
- 0.05% – 0.06%
- > 0.06%

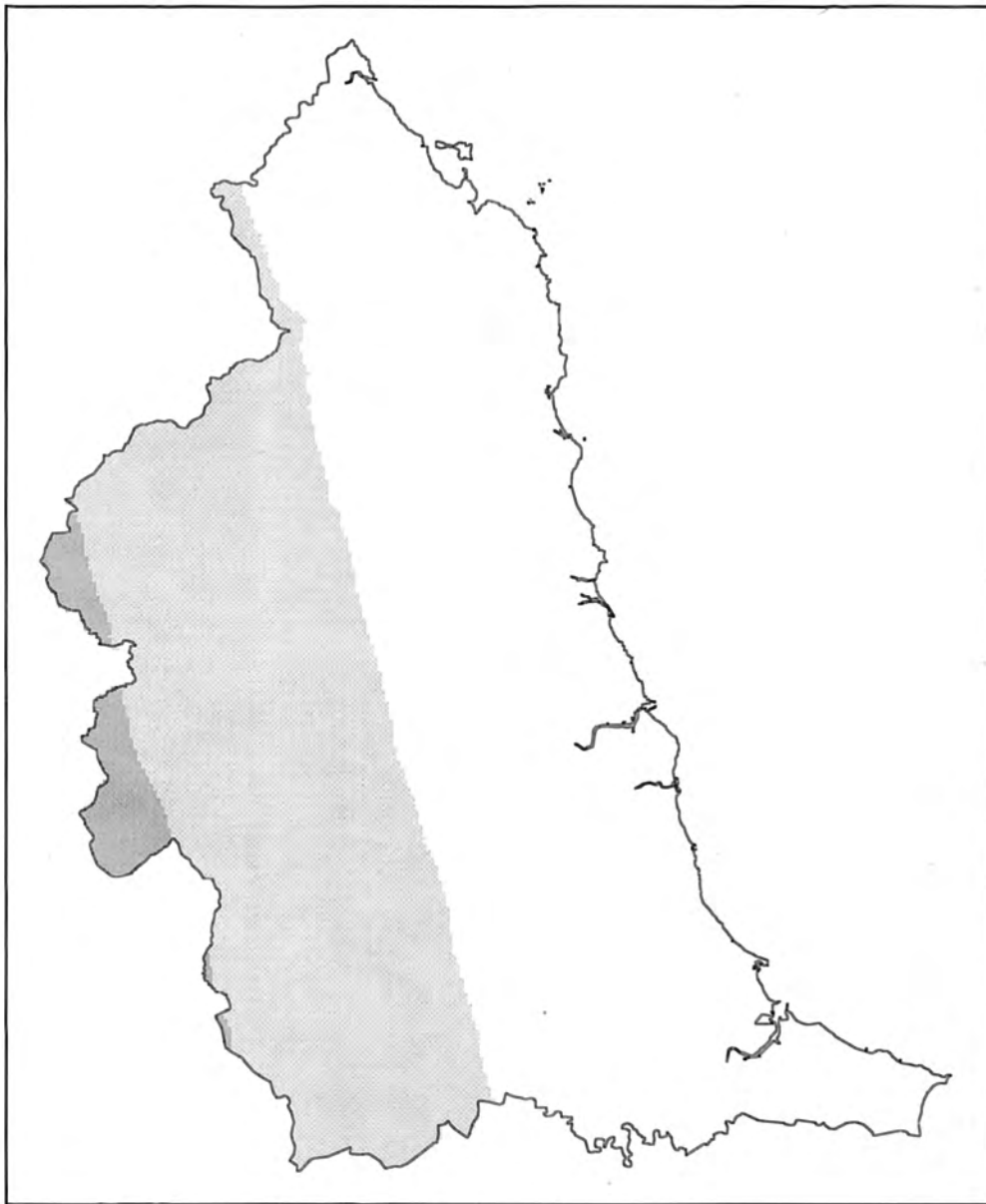
Polygonum

6800 – 6300 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.34 Interpolated pollen map of Ranunculaceae pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

In this period there is an almost perfect west-east trend in Ranunculaceae pollen values, with the highest values occurring in the uplands in the west (both in Northumberland and in the Northern Pennines), and lower values in the lowlands. In the uplands values exceed 2% tdlp whilst in the lowlands values are typically under 0.4%. Ranunculaceae occurs at most of the sites in the region in this period.



Key:

- 0 – 0.2%
- ◻ 0.2 – 0.4%
- ◻ 0.4 – 0.6%
- ◻ 0.6 – 0.8%
- ◻ 0.8 – 1.0%
- ◼ >1.0%

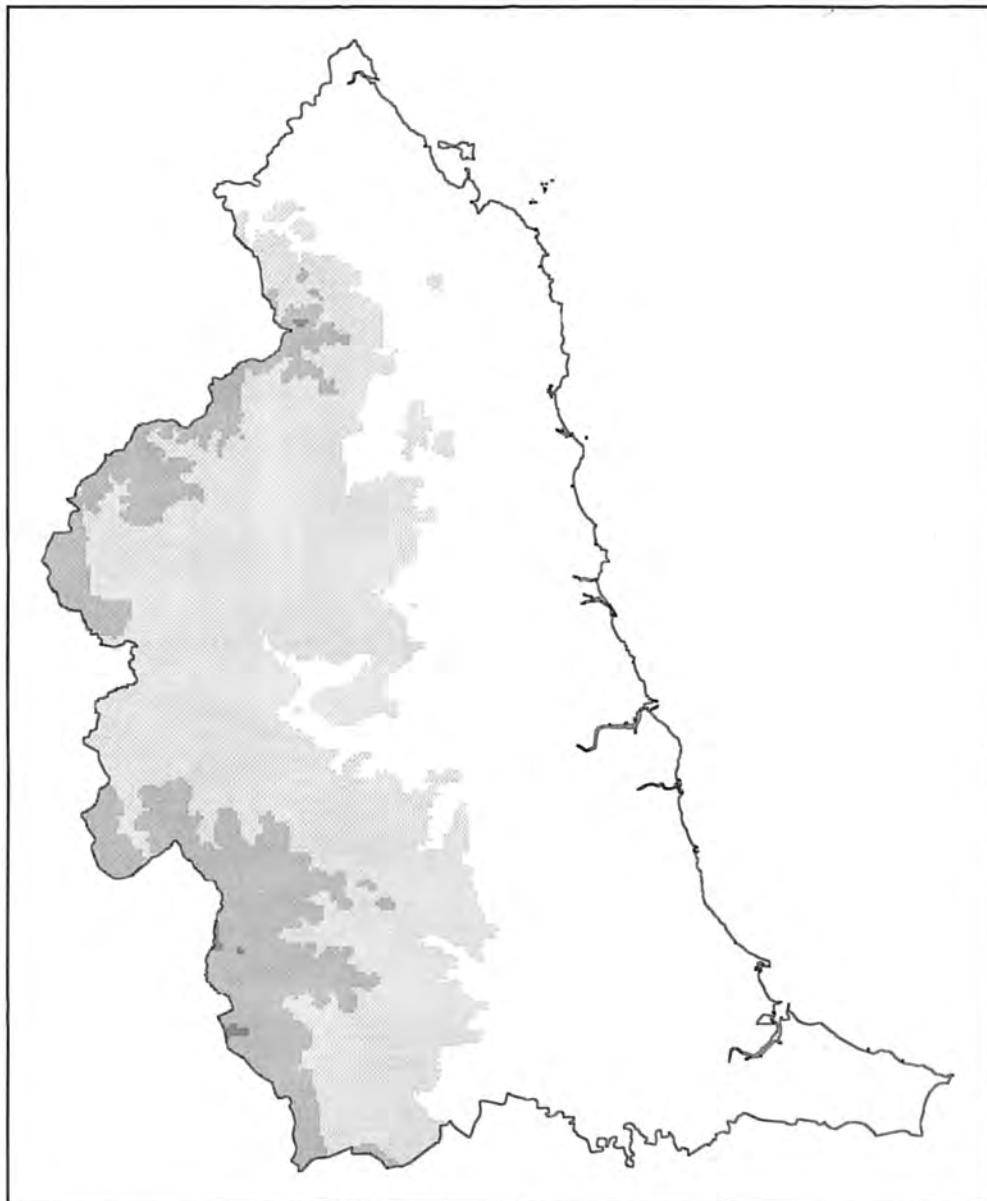
Ranunculaceae

6800 – 6300 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.35 Interpolated pollen map of *Rumex* pollen values for the second Mesolithic period, 6800 - 6300 cal. BC

As before (Fig. 7.1.17) the highest values for *Rumex* occur in the Northern Pennines, exceeding 2% tdlp at two sites in upper Teesdale, but mostly lying between 0.1-0.2% tdlp. Overall, values are slightly lower than the preceding period. *Rumex* continues to be present at one site in the upper Derwent and one site in northern Northumberland and apart from this, is absent from the rest of the region.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%

Rumex

6800 – 6300 cal. BC

Pollen values expressed as %tdlp

Mesolithic period III:

5500 - 5000 cal. BC

List of Figures and Tables for the third Mesolithic period, 5500 - 5000 cal. BC

Tables

Table 7.1.3	Summary of trends in pollen maps for the third Mesolithic period.	93
-------------	---	----

Figures

Fig. 7.1.35	Map showing locations of pollen cores used to create interpolated maps for the period 5500 - 5000 cal. BC	95
-------------	---	----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.1.36	Interpolated pollen map of averaged total tree pollen values.	97
Fig. 7.1.37	Interpolated pollen map of total shrub pollen values.	99
Fig. 7.1.38	Interpolated pollen map of total herb pollen values.	101
Fig. 7.1.39	Interpolated pollen map of total Ericaceae pollen values.	103

b) Agricultural: arable index map

Fig. 7.1.40	Interpolated pollen map of agricultural:arable index scores.	105
-------------	--	-----

c) Maps of selected individual herb taxa:

Fig. 7.1.41	Interpolated pollen map of Gramineae pollen values.	107
Fig. 7.1.42	Interpolated pollen map of <i>Artemisia</i> pollen values.	109
Fig. 7.1.43	Interpolated pollen map of Caryophyllaceae pollen values.	111
Fig. 7.1.44	Interpolated pollen map of Chenopodiaceae pollen values.	113
Fig. 7.1.45	Interpolated pollen map of Compositae pollen values.	115
Fig. 7.1.46	Interpolated pollen map of Cruciferae pollen values.	117
Fig. 7.1.47	Interpolated pollen map of Leguminosae pollen values.	119
Fig. 7.1.48	Interpolated pollen map of <i>Plantago</i> pollen values.	121
Fig. 7.1.49	Interpolated pollen map of <i>Polygonum</i> pollen values.	123
Fig. 7.1.50	Interpolated pollen map of Ranunculaceae pollen values.	125
Fig. 7.1.51	Interpolated pollen map of <i>Rumex</i> pollen values.	127

Table 7.1.3 Summary of trends in pollen maps for the third Mesolithic period, 5500 - 5000 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.36 to 7.1.39</p>	<p>There is a marked increase in tree pollen values in this area in this period. At Hutton Henry trees rise from 35-69%, and at Cranberry Bog from 21-47%. High tree values are also now found on the coast at Hartlepool Bay 4 (84%) and West Hartlepool 19 (75%). Shrub pollen correspondingly declines. Herb pollen remains low at all sites except Bishop Middleham, as do Ericaceae.</p> <p>The rise in trees is less marked at Neasham Fen and Mordon Carr.</p>	<p>Few sites in this area have levels dating to this period. However, it is likely that high tree values continue to exist in this area, since they continue into the next period. The new sites of Smiddy Shaw and Hallowell Moss, in the Wear lowlands, have high tree values (68% and 64% respectively).</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.40</p>	<p>At Bishop Middleham the proportion of arable types increases from 25% to 72%. At Mordon arable types reappear giving a score of 66%. At Hartlepool Bay 4 the score is 45%. Both arable and pastoral types increase at Hutton Henry and the score remains the same as before, at 30%. Arable types remain absent at Neasham Fen, and in this period pastoral types disappear also from this site.</p>	<p>At Pow Hill arable types now disappear. They are absent also from Lamb Shield, Burnhope Dam and from the new sites in this period, Smiddy Shaw and Hallowell Moss.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.41 to 7.1.51</p>	<p>Values for Compositae increase in this area, shifting the emphasis in distribution away from the uplands. Chenopodiaceae appear at Bishop Middleham, <i>Artemisia</i> at Mordon Carr and <i>Plantago</i> at Hutton Henry. Gramineae pollen levels decline at all sites to under 3%.</p>	<p>Gramineae pollen continues to dominate the tiny amounts of herb pollen at these sites in this period.</p>

Table 7.1.3 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.1.36 to 7.1.39</p>	<p>Tree pollen values increase, at Akeld Steads to 39% and at Tricklely Wood to 29%, so that tree and shrub levels are about equal. Herb pollen drops further at Akeld Steads to 13%. Total arboreal pollen continues to be high, as at most sites in this period. Ericaceae values are little changed from before.</p>	<p>Tree values increase across much of the uplands to 40-50%, with a decline in shrubs. Ericaceae increase, with more sites with values over 10%, rising to 37% at Hisehope. At the highest elevations shrub pollen remains dominant and trees low, such as at Arngill Head Brocks, High Banks Moss and Whitfield Lough.</p> <p>Herb levels are higher in Upper Teesdale, up to 54% at Fox Earth Gill and 32% at Weelhead Moss. At some sites these herb values have risen from the previous period, at others they have dropped.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.1.40</p>	<p>Pastoral type herb values increase considerably at Akeld Steads and Tricklely Wood, resulting in a decline in index score at Akeld Steads from 46-21%. At Tricklely Wood, the increase in pastoral-types is accompanied by the appearance of arable-type taxa, raising the score to 14%. Pastoral types still however dominate. Arable types continue to be absent from Black Lough.</p> <p>Arable types continue to be absent from Coom Rigg and Muckle Moss.</p>	<p>Arable types are absent from many upland sites. The proportion of arable-type herbs remains highest at Staple Moss, Tinkler's Sike, Cronkley Fell and Fox Earth Gill, with the highest score being 50%. The score at Dufton Moss declines owing to a large increase in pastoral-type herbs. At Quick Moss the proportion of arable types increases, raising the score from 3% to 34%. Pastoral types therefore dominate at most sites in the uplands.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.1.41 to 7.1.51</p>	<p>In this period high values for Ranunculaceae, <i>Plantago</i> and <i>Polygonum</i> in this area shift emphasis away from the Durham uplands, even though these taxa continue in this area. Ranunculaceae, <i>Artemisia</i>, <i>Plantago</i>, Leguminosae and Compositae appear at sites which formerly had a much smaller range of herb types. Black Lough only has Gramineae pollen at a very small percentage in this period.</p>	<p>In this period herb taxa appear at many upland sites that had only previously occurred in Upper Teesdale (Compositae, Cruciferae and <i>Rumex</i>), and vice-versa (<i>Artemisia</i> and Caryophyllaceae.) Leguminosae still occurs up to 4% in the uplands, but mostly at far lower levels than before.</p> <p>In Upper Teesdale grass pollen increases, reaching 32% at Black Hill. A wider range of herb taxa occurs here in this period, and values increase for Cruciferae and Chenopodiaceae.</p>

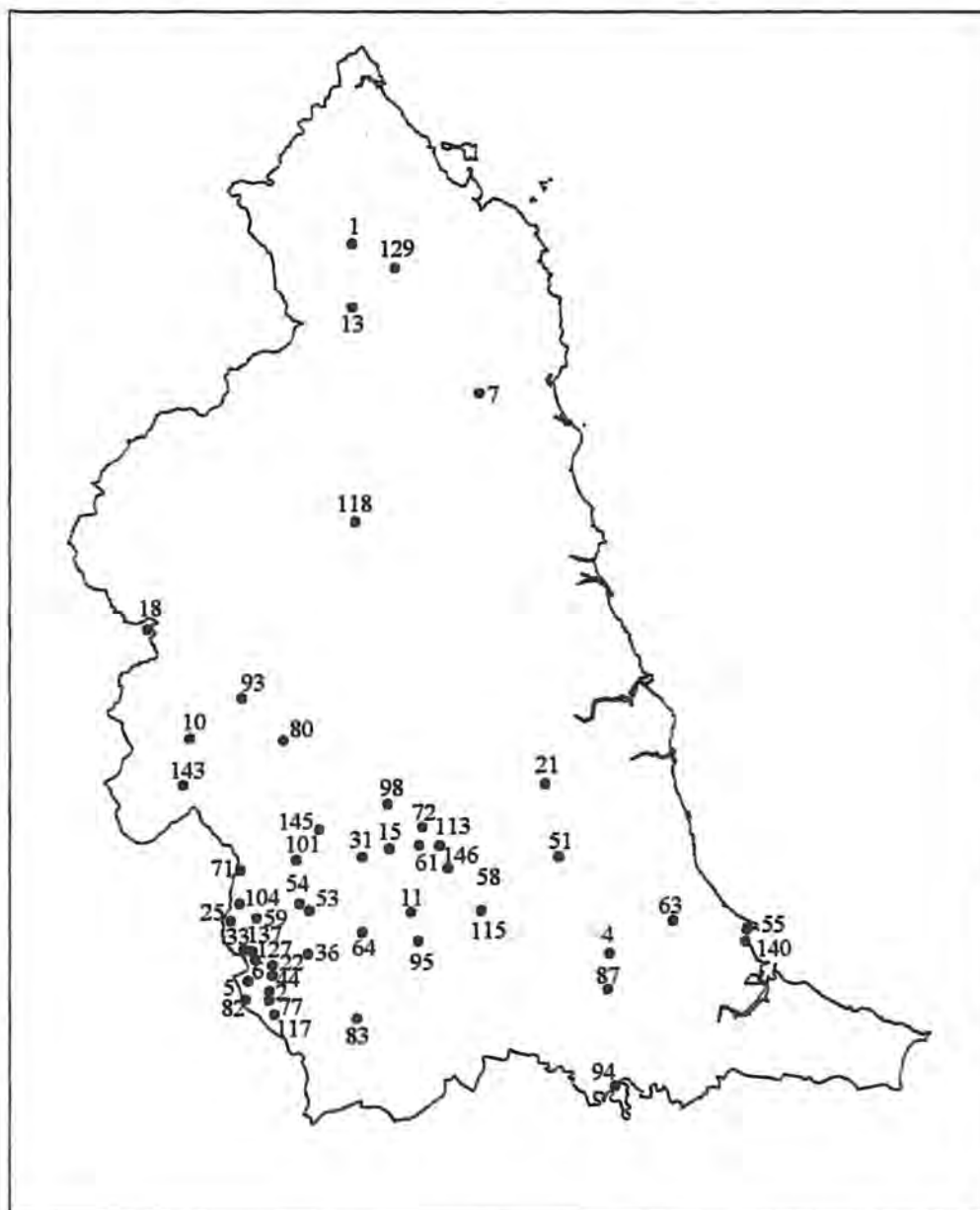


Fig. 7.1.35



Map showing locations of pollen cores used to create interpolated maps for the third Mesolithic period, 5500 - 5000 cal. BC

N.B. Key to site codes on next page.

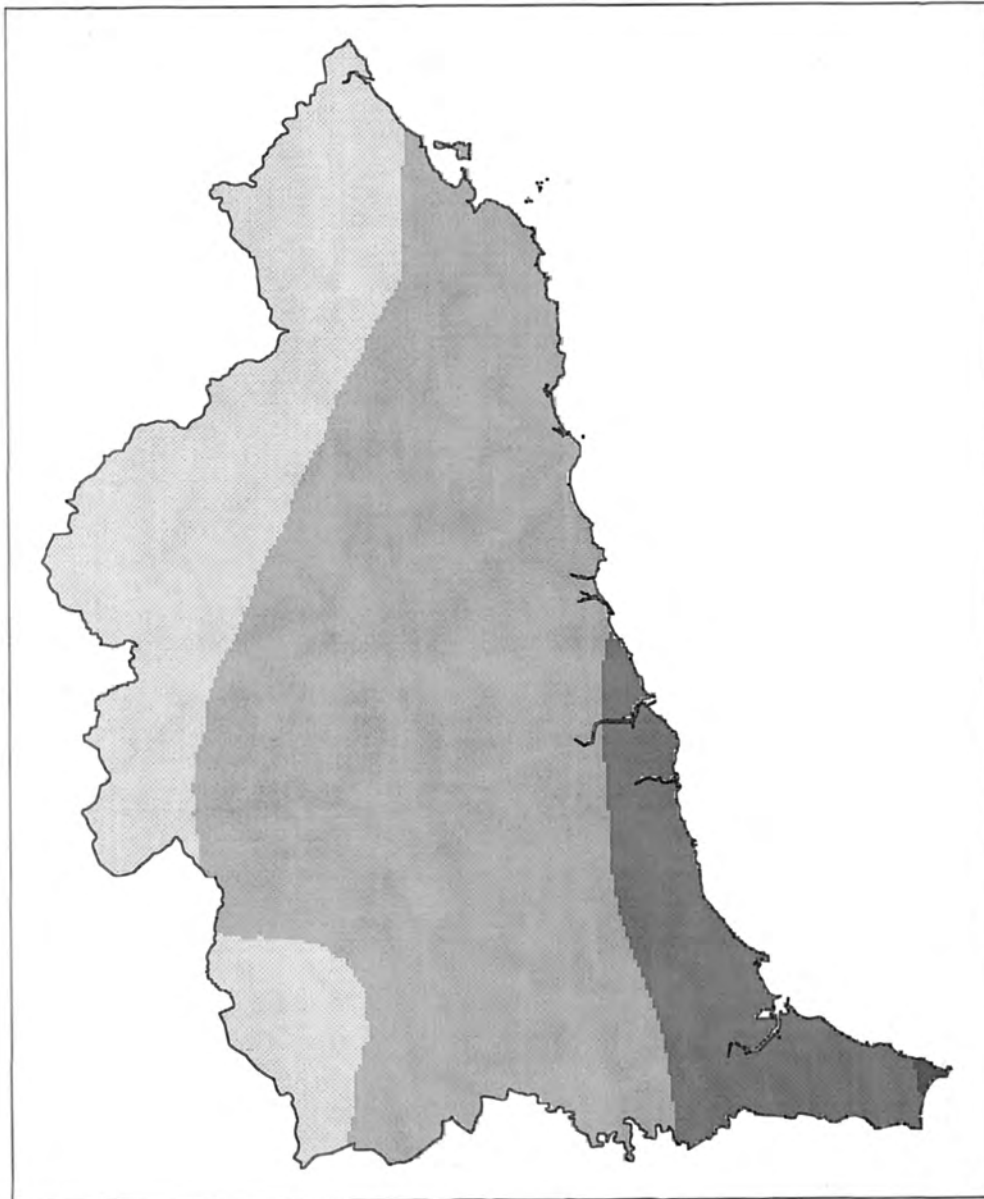
Key to Figure 7.1.35

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.

Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	64	James' Hill
2	Arngill Head Brocks	71	Knoutberry
4	Bishop Middleham	72	Lamb Shield
6	Black Hill	77	Long Crag
7	Black Lough	80	Low Stublick
10	Blackshiel Bog	82	Mickle Fell
15	Burnhope Dam	83	Mickleton Moor
18	Coom Rigg	87	Mordon Carr
21	Cranberry Bog	93	Muckle Moss
22	Cronkley Fell	94	Neasham Fen
31	Cuthbert's Hill	95	Pawlaw Pike
25	Crook Burn	98	Pow Hill
33	Dead Crook	101	Quick Moss
36	Dufton Moss	104	Scaith Head
44	Fox Earth Gill	115	South Cornsay
47	Graham's Moss	117	Staple Moss
51	Hallowell Moss	126	Thorpe Bulmer
53	Harthope Moss	127	Tinkler's Sike
54	Harthope Quarry	129	Trickley Wood
55	Hartlepool Bay 4	138	Weelhead Moss
59	Herdship Fell	140	West Hartlepool 19
61	Hisehope Burn	143	Whitfield Lough
62	Howden Moss	145	Wolfscleugh
63	Hutton Henry	146	WolsinghamParkMoor

Figure 7.1.37 Interpolated pollen map of tree pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Tree percentages recover from the preceding period in Northumberland back to 20-40% tdlp. High tree values (over 75% tdlp) appear in the south east of the region at the coastal sites at Hartlepool and slightly lower values (40-60% tdlp) at sites in East Durham. High tree pollen values over 60% continue to occur between the mid Tyne and mid Tees, focusing upon sites in the upper Derwent-Mid Wear area. Tree percentages increase at many upland sites up to 40%.



Key:

- 0 – 20%
- 20 – 40%
- 40 – 60%
- 60 – 80%
- 80 – 100%



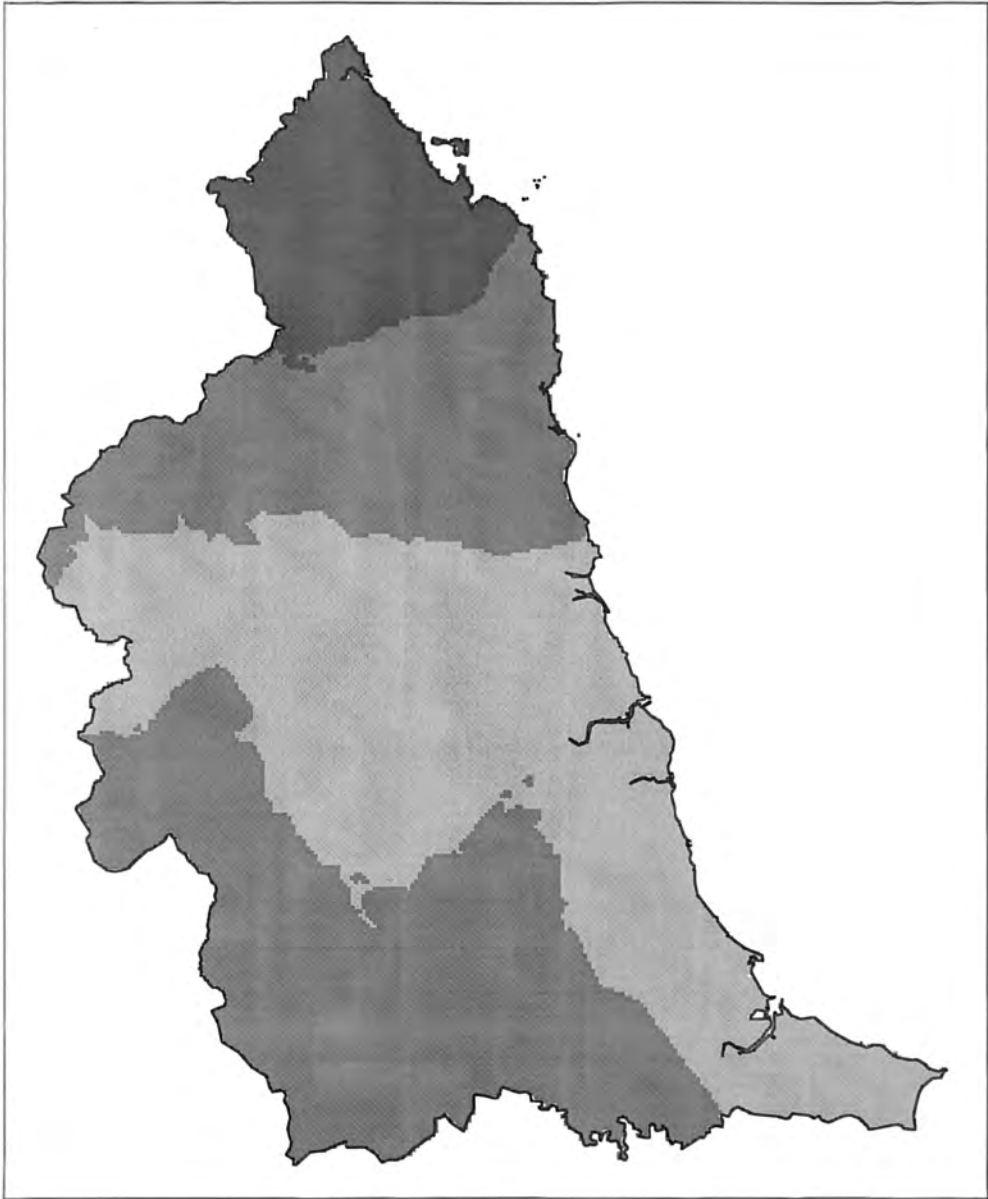
Trees

5500 – 5000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.38 Interpolated pollen map of shrub pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Shrub pollen values decline markedly in the lowlands of the region, compared to the very high values in this area in the previous period (Fig. 7.1.21), as tree pollen increases in these areas. Shrub values remain high, but not as high as the previous period, in the north of the region. Shrubs remain dominant at the highest elevations in the region.



Key:

- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- > 50%



Shrubs

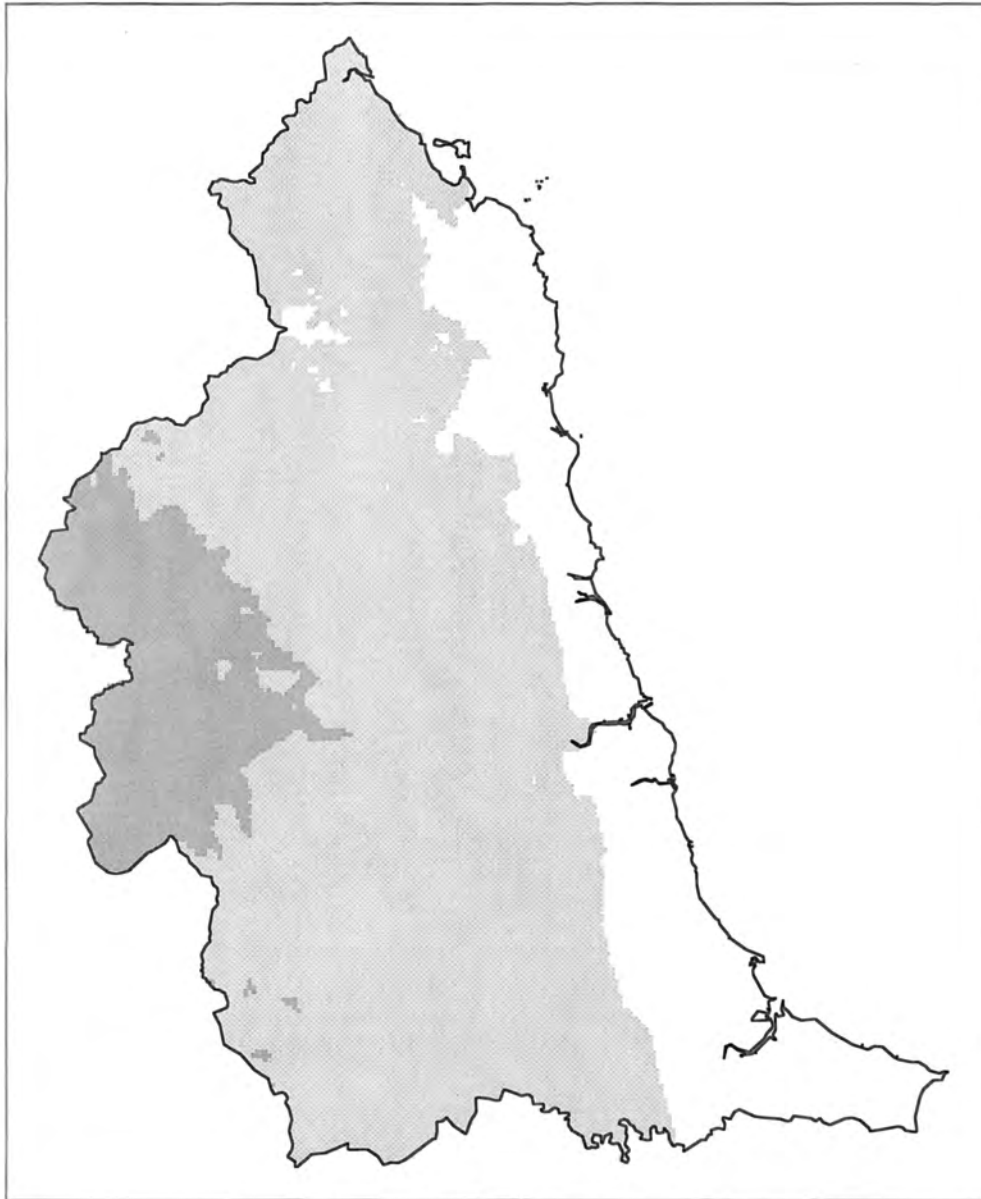
5500 - 5000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.39 Interpolated pollen map of herb pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The highest herb values continue to occur in the uplands, particularly in the west of the Tyne Corridor, as in the previous period, but compared to the previous period values drop to 20-30% from over 40% in the uplands. Herb values remain low in the lowlands and foothills.





Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



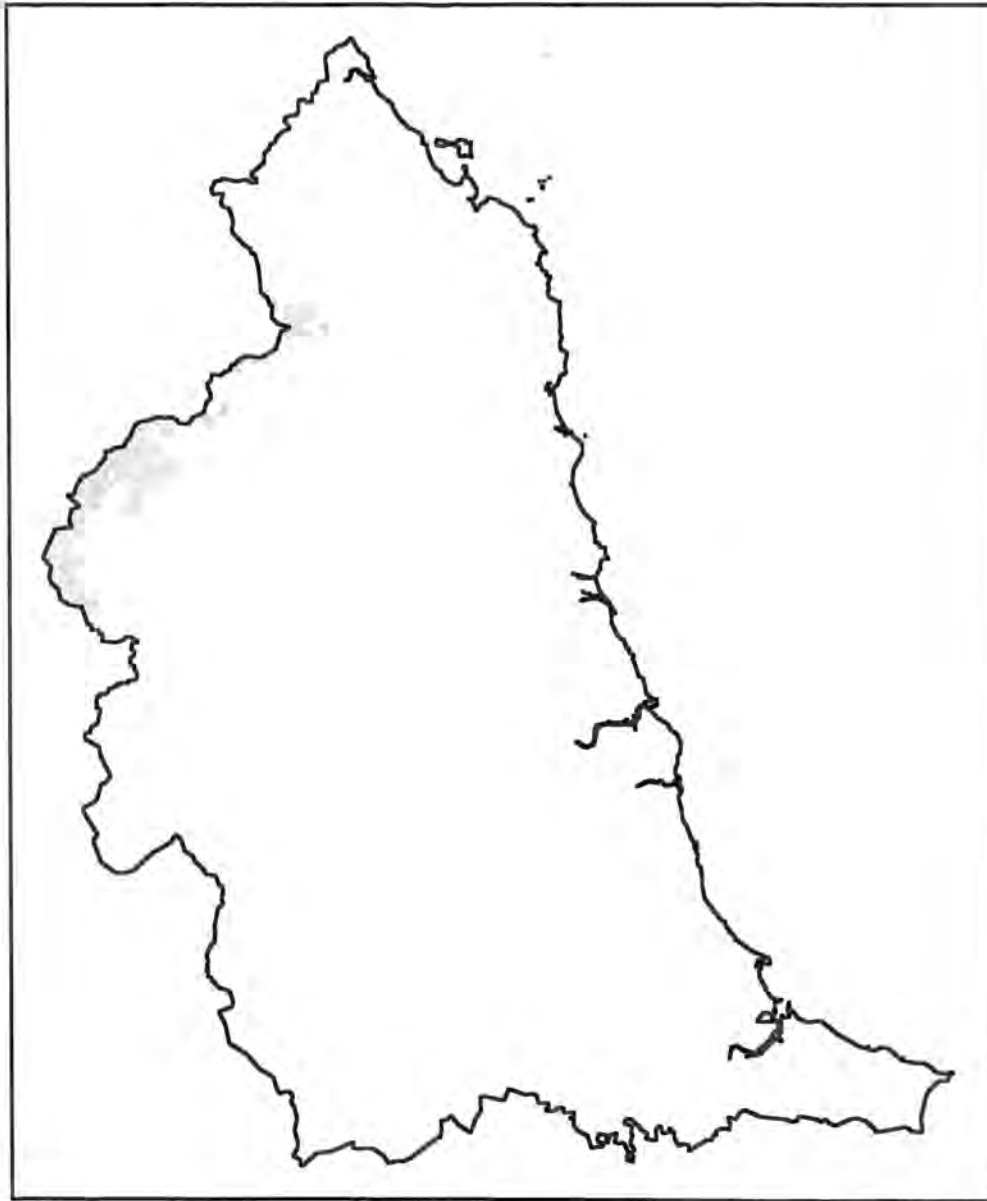
Herbs

5500 – 5000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.1.40 Interpolated pollen map of Ericaceae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Ericaceae values continue to increase from the previous period (Fig. 7.1.22) on the upland tops of the region, rising to over 35% in parts of upper Teesdale. Ericaceae levels above 15% continue to occur at most northern Northumberland sites. Since there are fewer sites in northern Northumberland, and many sites in the uplands of the Northern Pennines which do not have high Ericaceae, the interpolation biases the map in favour of Northumberland.



Key:

- < 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- > 40%



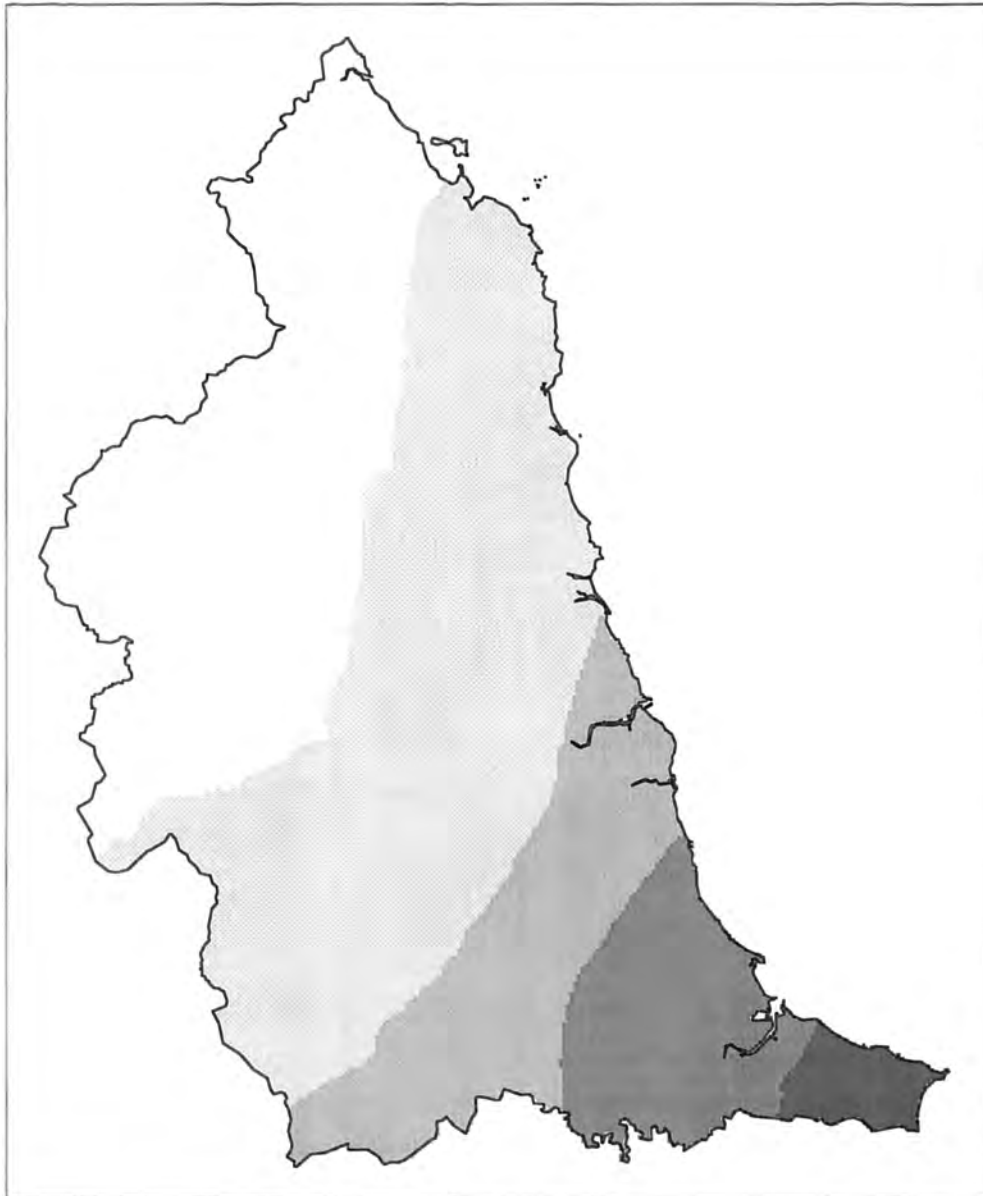
Ericaceae

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.41 Interpolated pollen map of agricultural: arable scores for the third Mesolithic period, 5500 - 5000 cal. BC

The most arable scores in this period occur in the south east of the region, as opposed to the previous period when the most arable scores occurred in northern Northumberland. At sites in East Durham, the former dominance of non-arable types such as Ranunculaceae and Rumex is now replaced by a dominance of arable types such as Compositae and Chenopodiaceae. In northern Northumberland, where arable types dominated in the previous period, non-arable types now increase with high values for Ranunculaceae and Plantago. Non-arable types dominate most sites in the uplands with the exception of some sites in upper Teesdale.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%

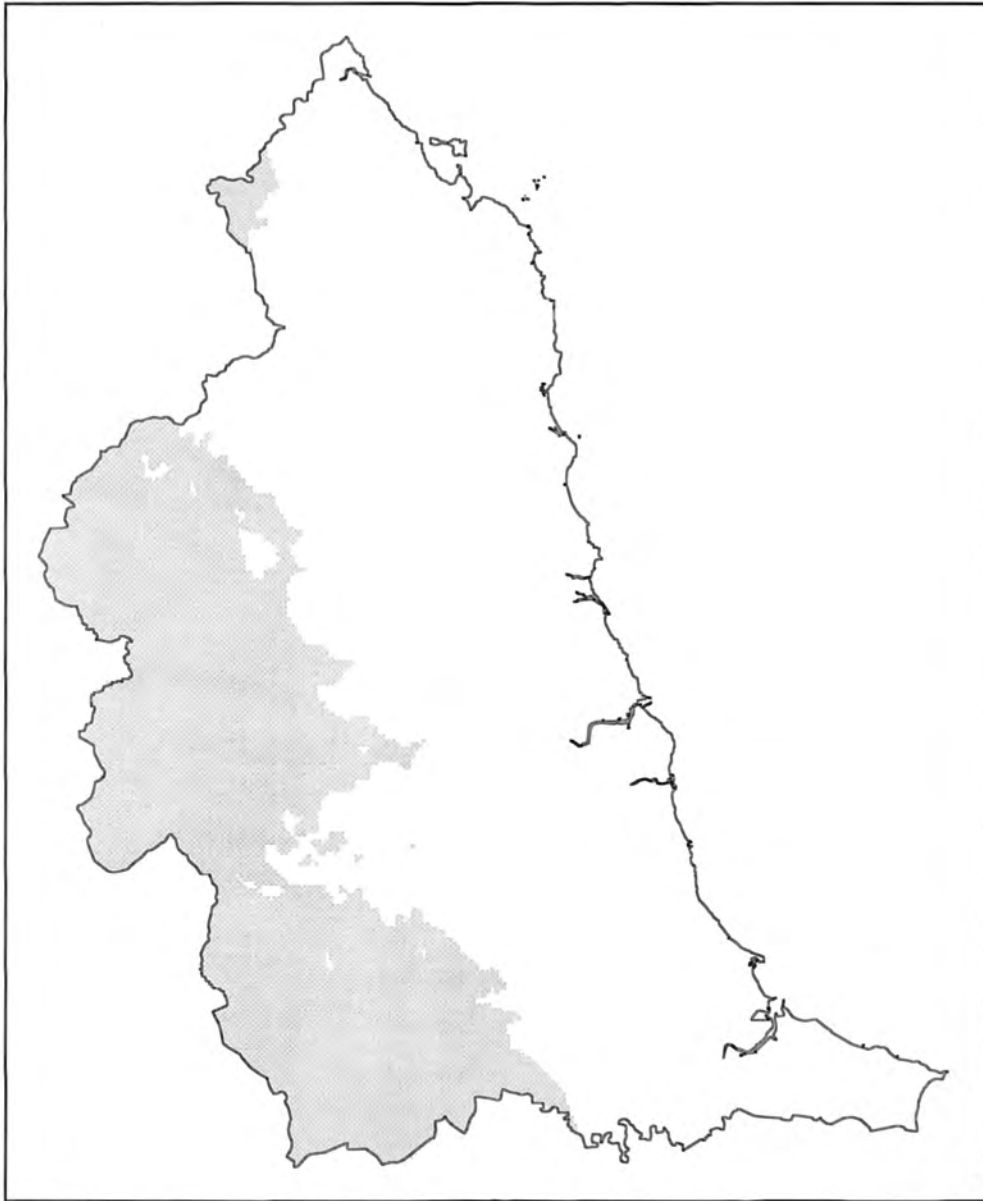


Agricultural:Arable Index

5500 – 5000 cal. BC

Figure 7.1.42 Interpolated pollen map of Gramineae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Gramineae pollen values remain highest in the uplands of the region, reaching 10-15% tdlp at a few sites in upper Teesdale and at one site, Black Hill, reaching 38% tdlp.. At most other sites in the uplands values are below 10%. Elsewhere in the region Gramineae pollen values decline from the previous period (Fig. 7.1.25) to below 3% in the south east of the region and northern Northumberland, and even lower at sites in the upper Derwent-mid Wear area which are almost entirely dominated by tree pollen.



Key:

- 0 –5%
- 5 –10%
- 10 –15%
- 15 –20%
- 20 –25%
- > 30%



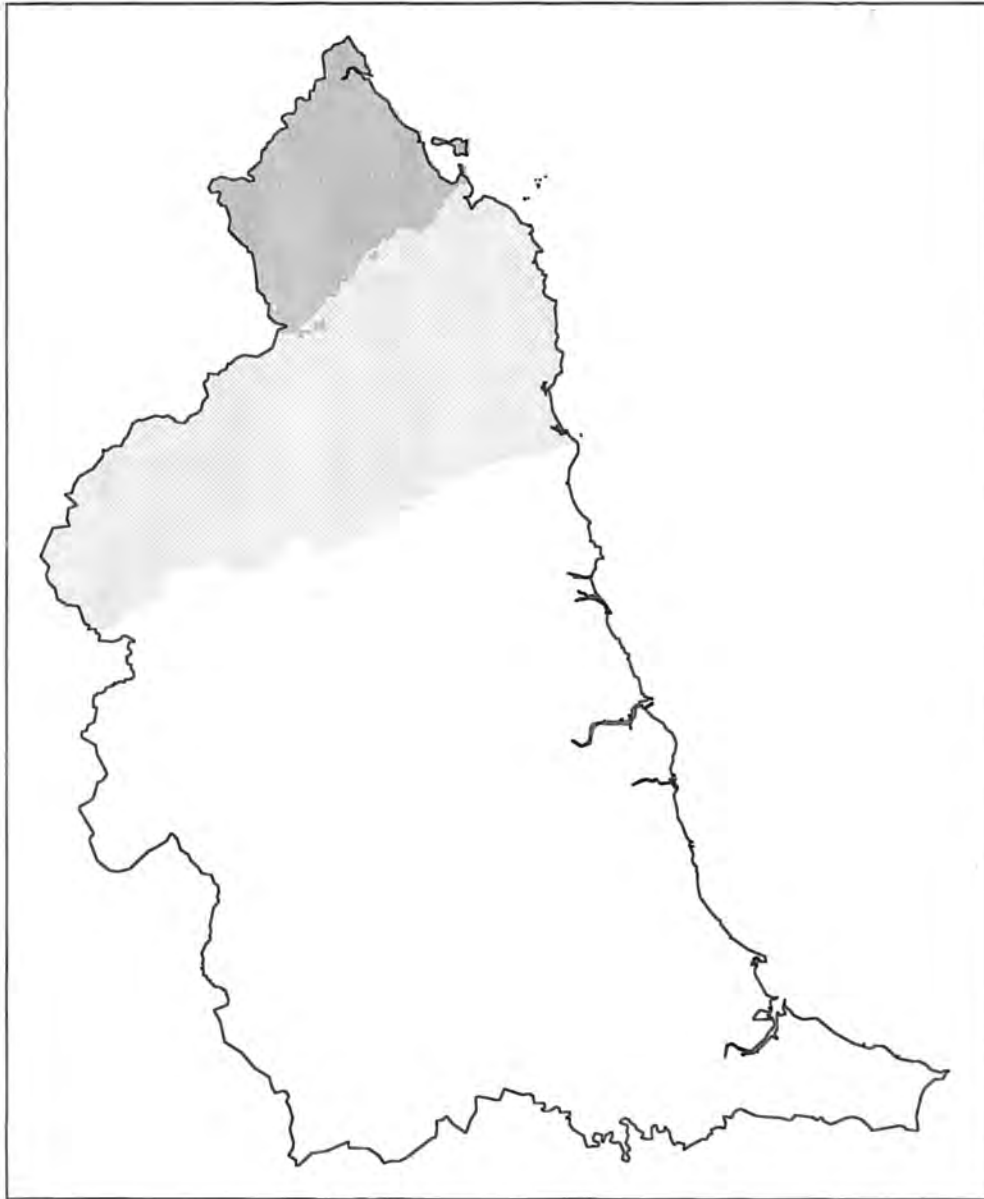
Gramineae

5500 –5000 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.43 Interpolated pollen map of *Artemisia* pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The highest *Artemisia* values in this period occur in northern Northumberland, with values reaching 0.5% tdlp at several sites, whereas before it occurred at much smaller values in this area (Figure 7.1.26). *Artemisia* continues to occur at the highest elevations in the Northern Pennines but at lower values than in Northumberland. It also appears for the first time in small amounts in East Durham and on the coast at Hartlepool.



Key:

-  0–0.1%
-  0.1–0.2%
-  0.2–0.3%
-  0.3–0.4%
-  0.4–0.5%
-  > 0.5%



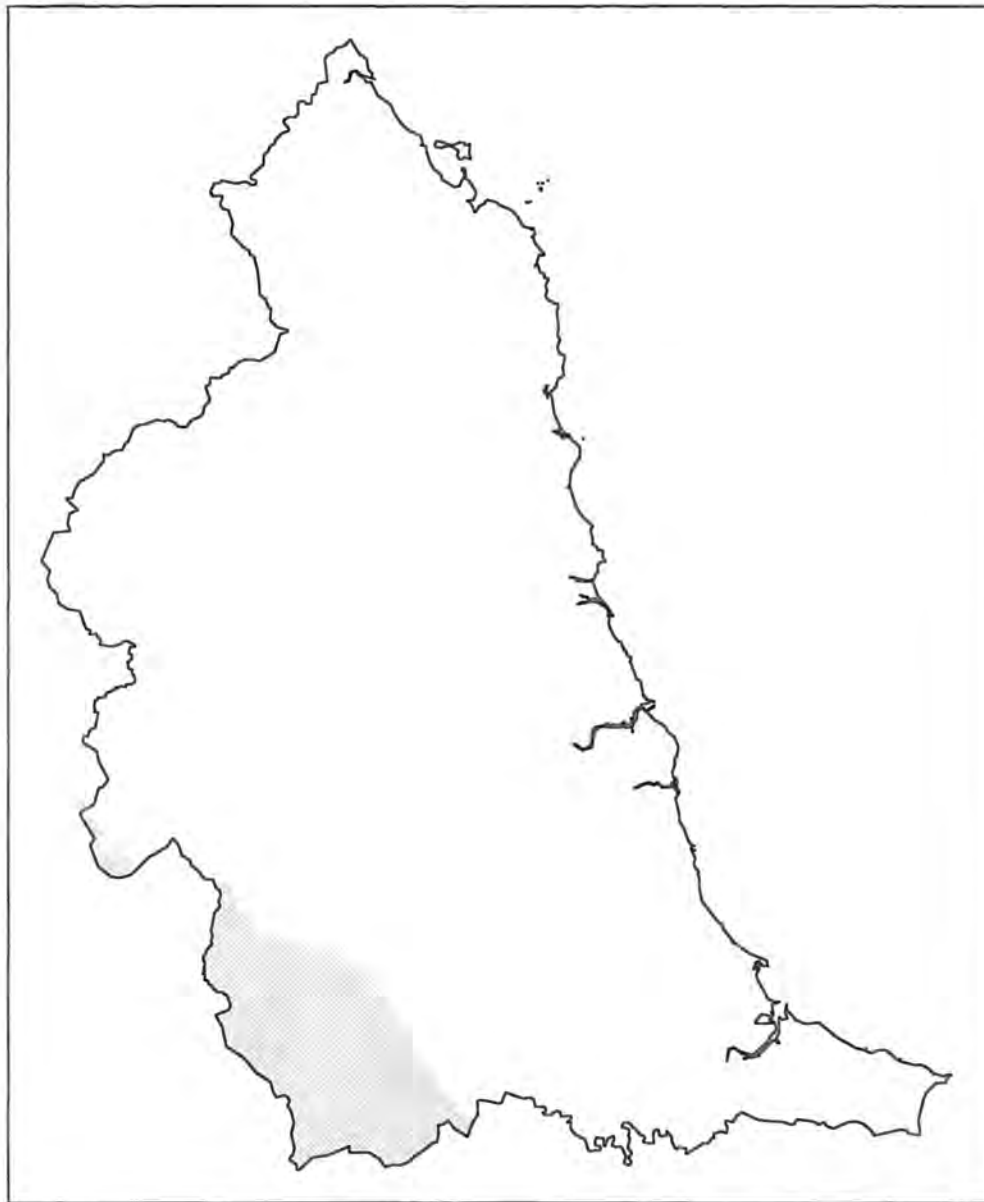
Artemisia

5500 –5000 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.44 Interpolated pollen map of Caryophyllaceae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The “bullseye” effect noted in the Durham lowlands for the previous period has now disappeared (Fig. 7.1.27). High values for Caryophyllaceae continue to occur in the uplands of the Northern Pennines, exceeding 1% at the highest elevations, but also spreading for the first time to sites in upper Teesdale where it was previously absent. It is absent from the rest of the region with the exception of small values on the coast at Hartlepool and at one site in northern Northumberland.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



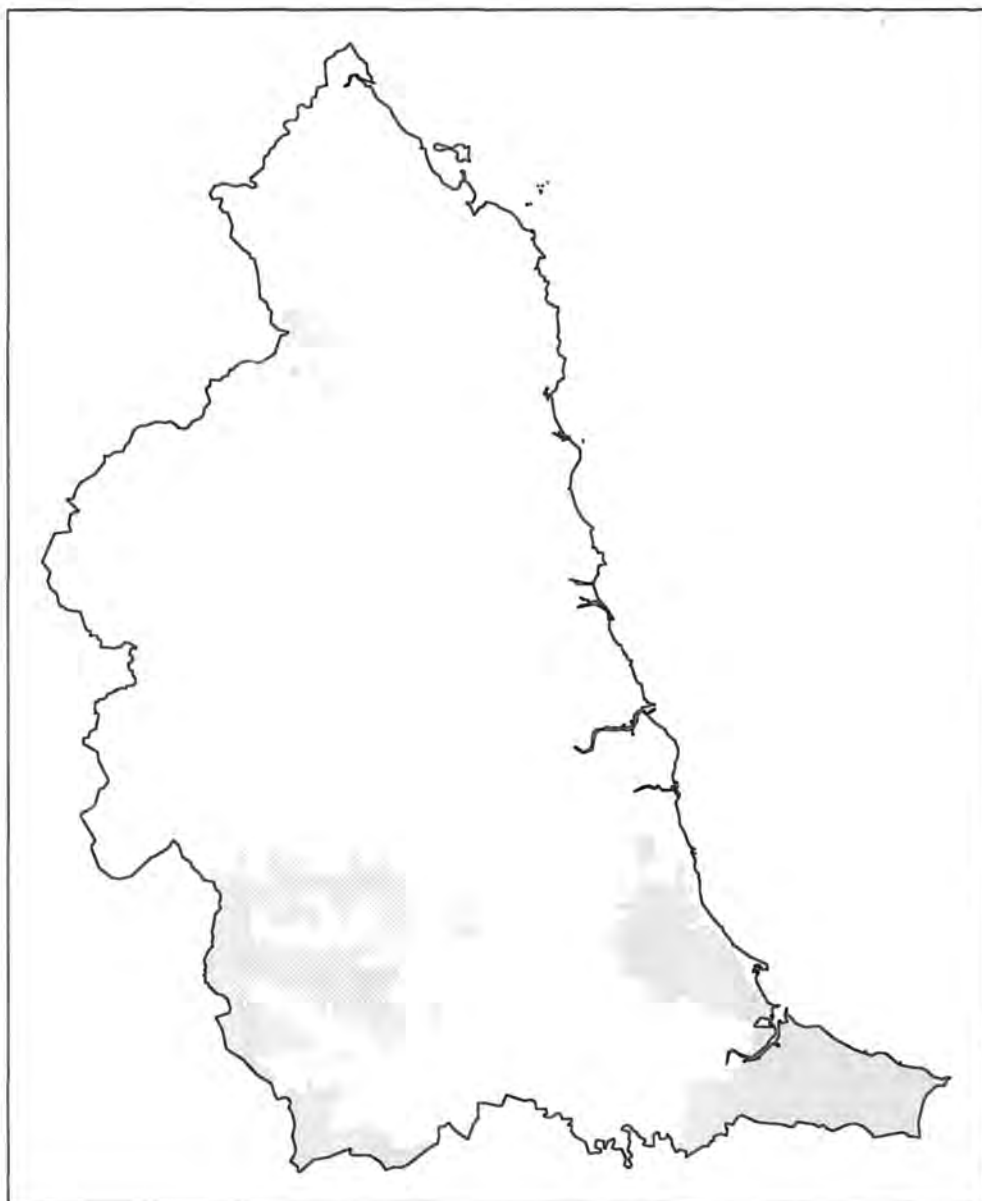
Caryophyllaceae

5500 – 5000 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.45 Interpolated pollen map of Chenopodiaceae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Compared to the previous period (Fig. 7.1.28), the highest values for Chenopodiaceae no longer occur in northern Northumberland. Chenopodiaceae appear for the first time in East Durham. In upper Teesdale Chenopodiaceae continue to occur, with slightly higher values than the previous period, up to 0.5%. Since there are fewer sites in the Durham lowlands and a large number of sites in the Northern Pennines which do not have any recorded Chenopodiaceae, the interpolation is biased in favour of the Durham lowlands.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



Chenopodiaceae

5500 – 5000 cal. BC







Pollen values expressed as %tdlp

Figure 7.1.46 Interpolated pollen map of Compositae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The highest values for Compositae continue to occur in the south east of the region, as in the previous period (Fig. 7.1.29). They increase in this period in this area, occurring between 0.5-0.6% tdlp at several sites in East Durham and on the coast at Hartlepool. Compositae continue to occur in upper Teesdale at lower levels than in the Durham lowlands and for the first time spread to some sites in other areas of the Northern Pennines.



Key:

-  0 –0.1%
-  0.1 –0.2%
-  0.2 –0.3%
-  0.3 –0.4%
-  0.4 –0.5%
-  > 0.5%



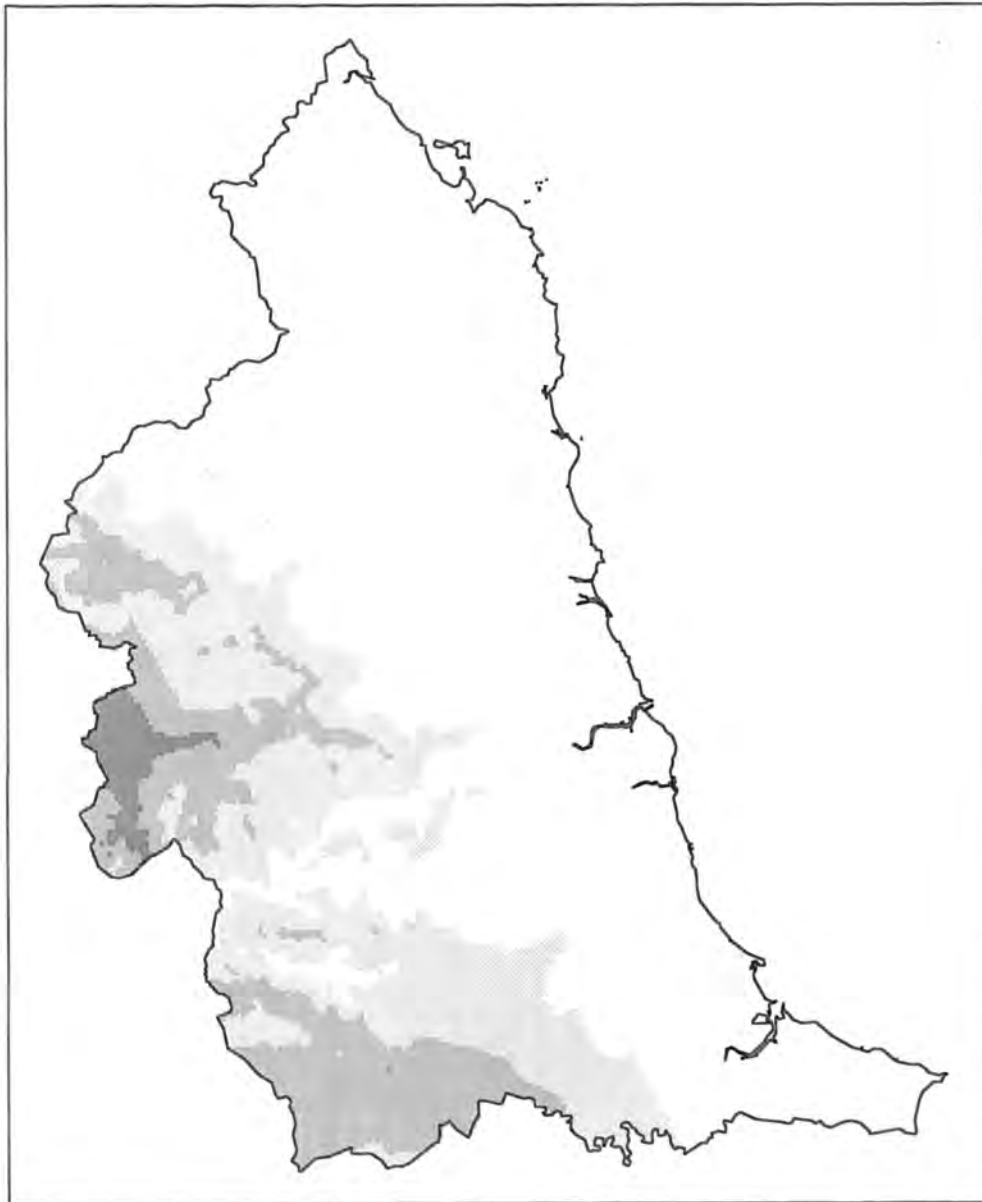
Compositae

5500 –5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.47 Interpolated pollen map of Cruciferae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The map for Cruciferae in this period strongly resembles that of the previous two periods, with the highest values occurring in the western uplands of the region. Cruciferae values increase in upper Teesdale and also spread for the first time into other areas of the Northern Pennine uplands.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



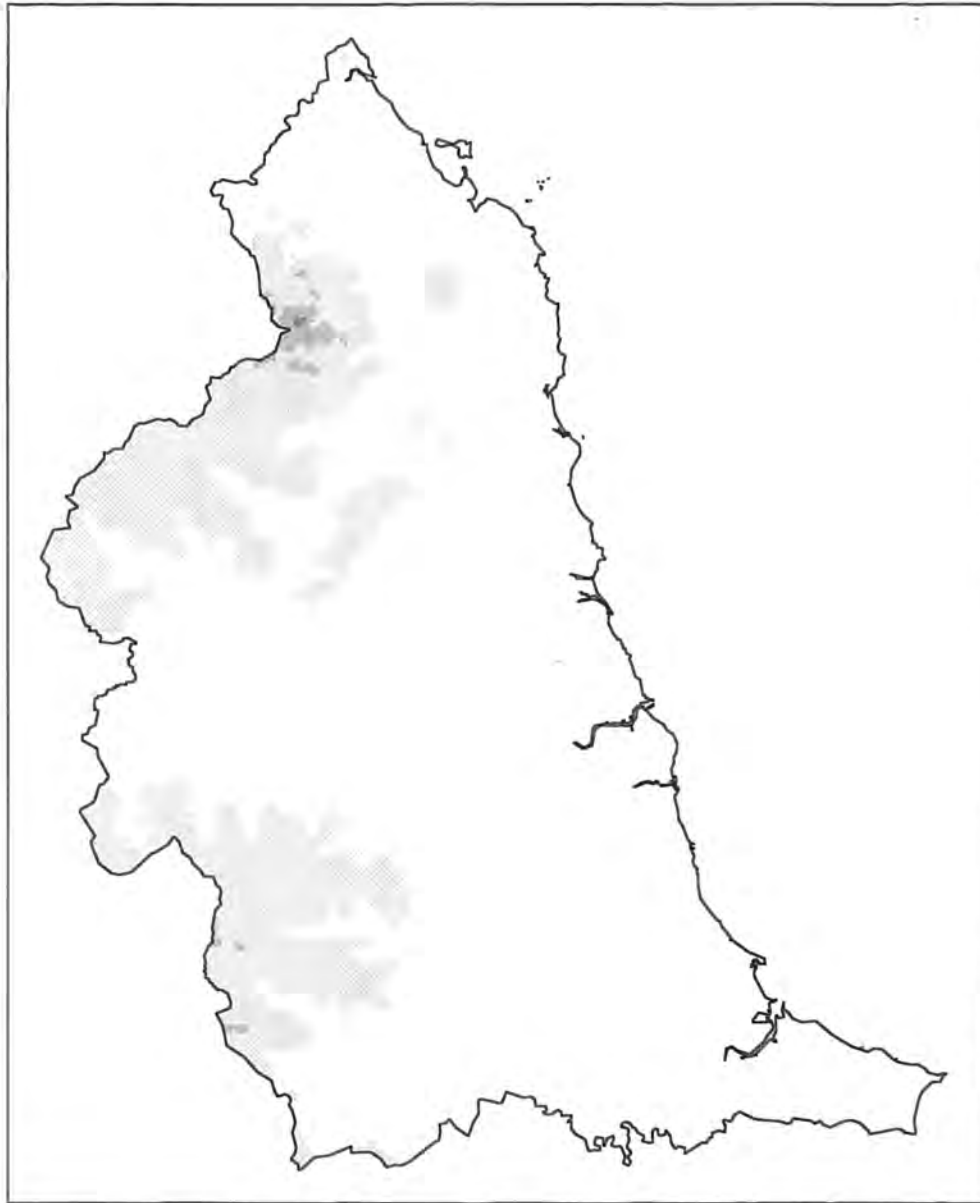
Cruciferae

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.48 Interpolated pollen map of Leguminosae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The map for Leguminosae in this period, like the map for Cruciferae, closely resembles the maps for the previous two periods, with the highest Leguminosae values occurring at the highest elevations of the region. Leguminosae still occur up to 4% tdlp in these areas but mostly are at lower levels than the previous period.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



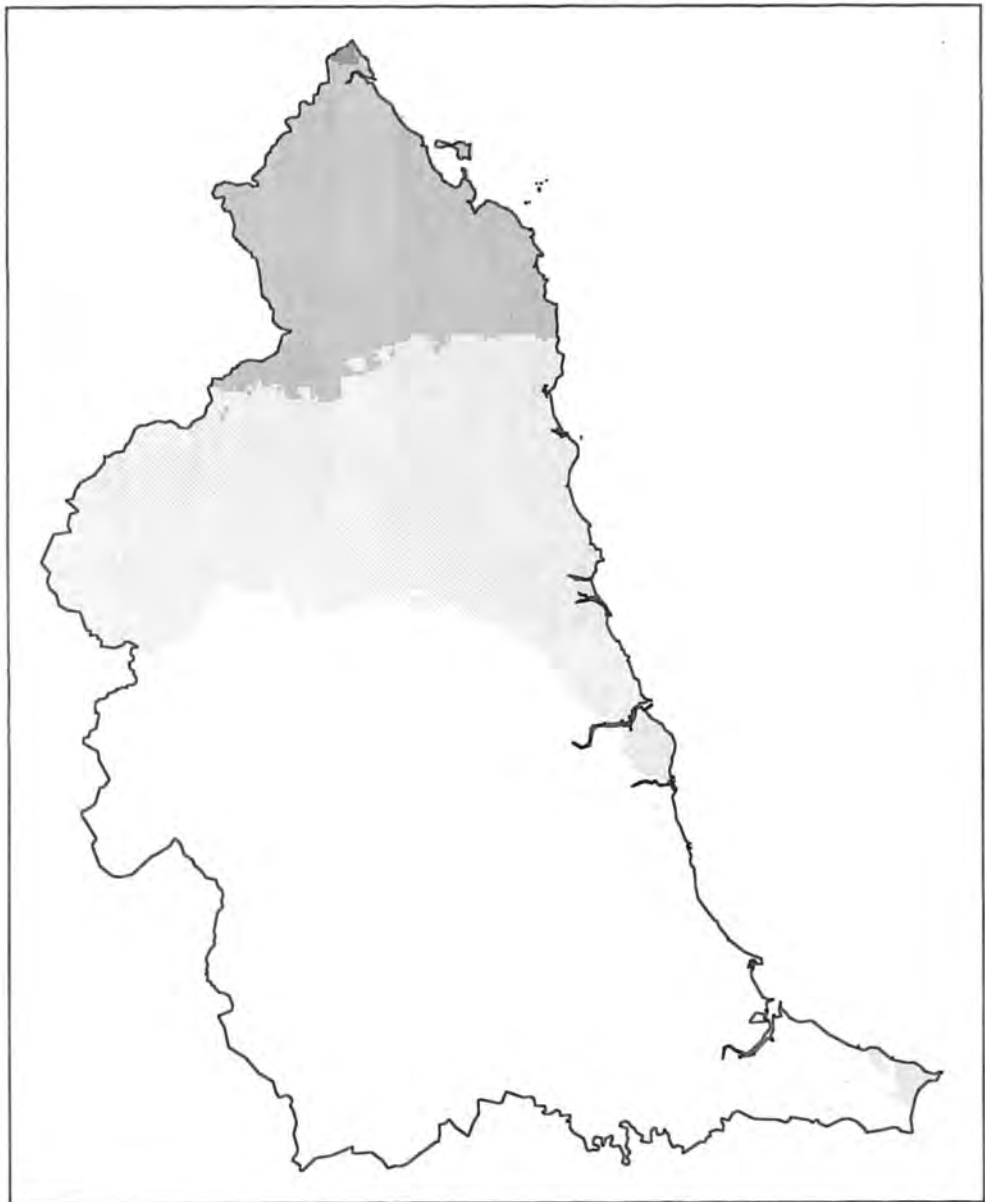
Leguminosae

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.49 Interpolated pollen map of *Plantago* pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The “bullseye” caused by unusually high values at a site in upper Teesdale in the previous period has now disappeared (Fig. 7.1.32). Instead the highest values occur in northern Northumberland, where it occurred before at lower levels. It now occurs up to 0.7% at Trickley Wood and 0.4% at Akeld Steads in northern Northumberland. Lower values below 0.1% occur in upper Teesdale. *Plantago* appears at one site in East Durham and on the coast at Hartlepool in small amounts.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



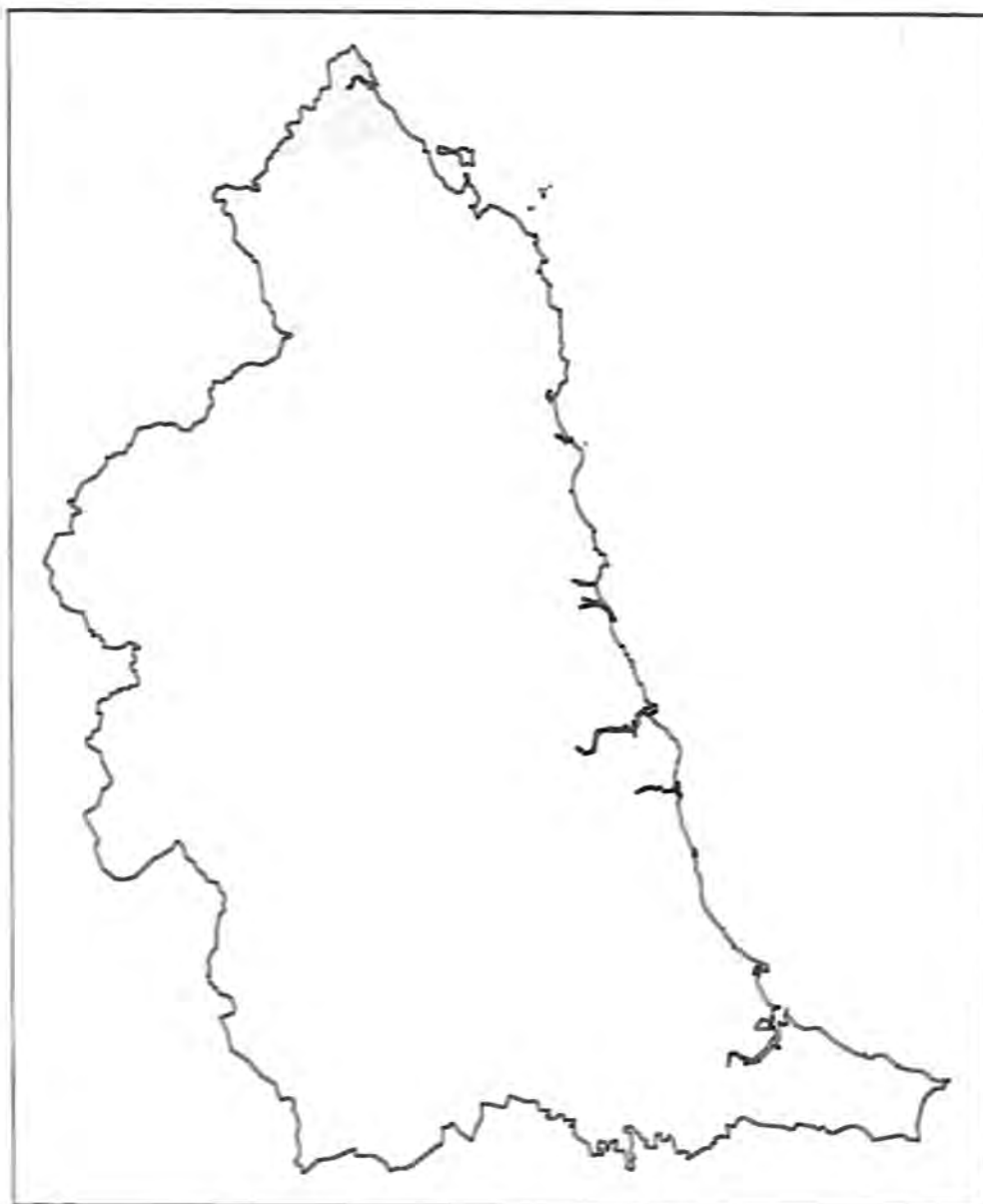
Plantago

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.50 Interpolated pollen map of *Polygonum* pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

Polygonum continues to occur both in northern Northumberland and in upper Teesdale, but although the highest values continue to occur in upper Teesdale, in this period there are more sites with recorded *Polygonum* in northern Northumberland, and although they have lower values, since there are a large number of sites in upper Teesdale with no *Polygonum* pollen, the interpolation is biased in favour of the north of the region. It continues to be absent from the rest of the region.



Key:



Polygonum

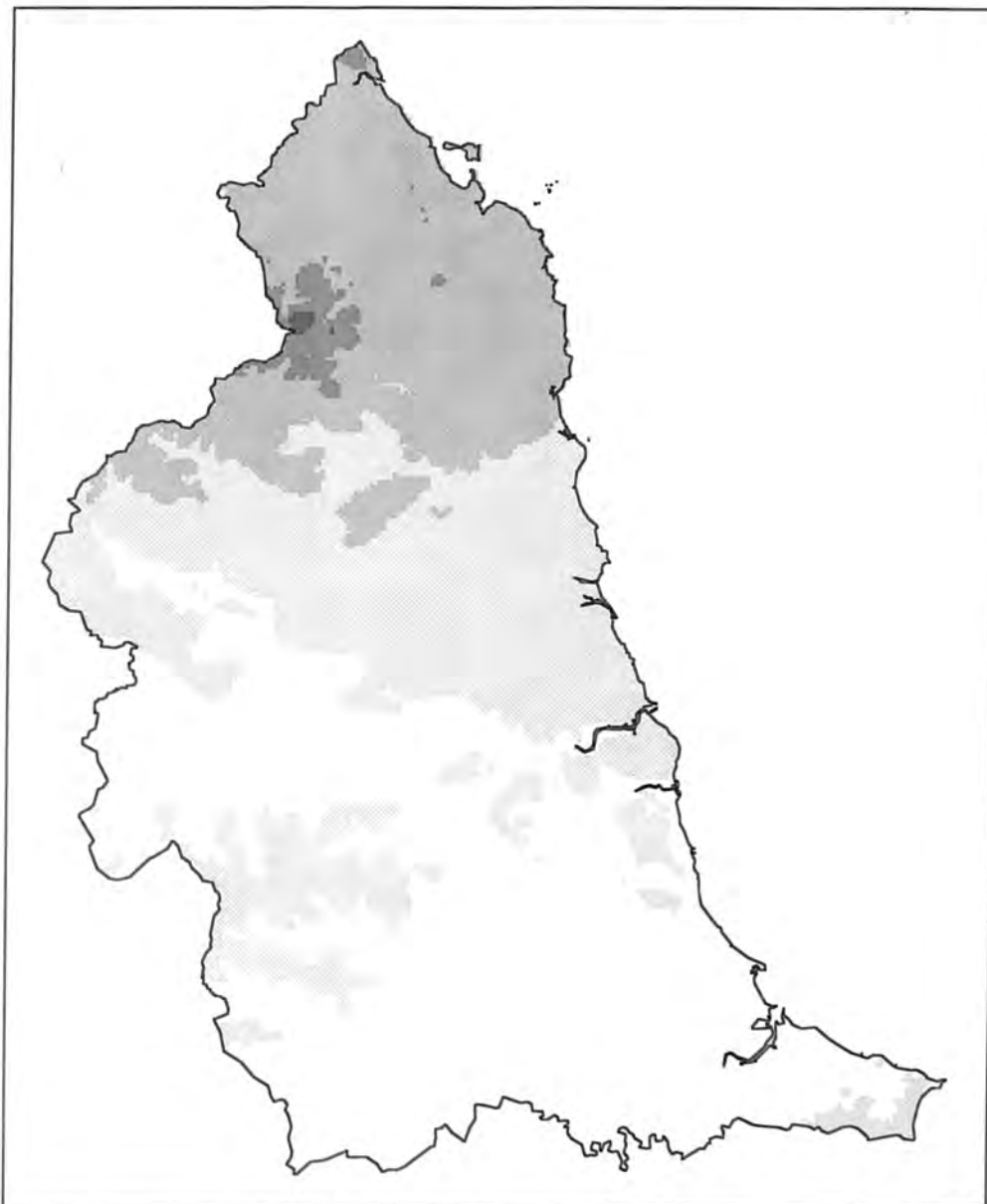
5500 – 5000 cal. BC

Pollen values expressed as %tdlp



Figure 7.1.51 Interpolated pollen map of Ranunculaceae pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

In this period the emphasis shifts from the western uplands to northern Northumberland, where Ranunculaceae values exceeding 1% tdlp occur. Ranunculaceae continue to occur in the Northern Pennines at levels below 0.5% tdlp as in the previous period (Fig. 7.1.34). Ranunculaceae appears for the first time at some sites in the upper Derwent area, up to 0.7%.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



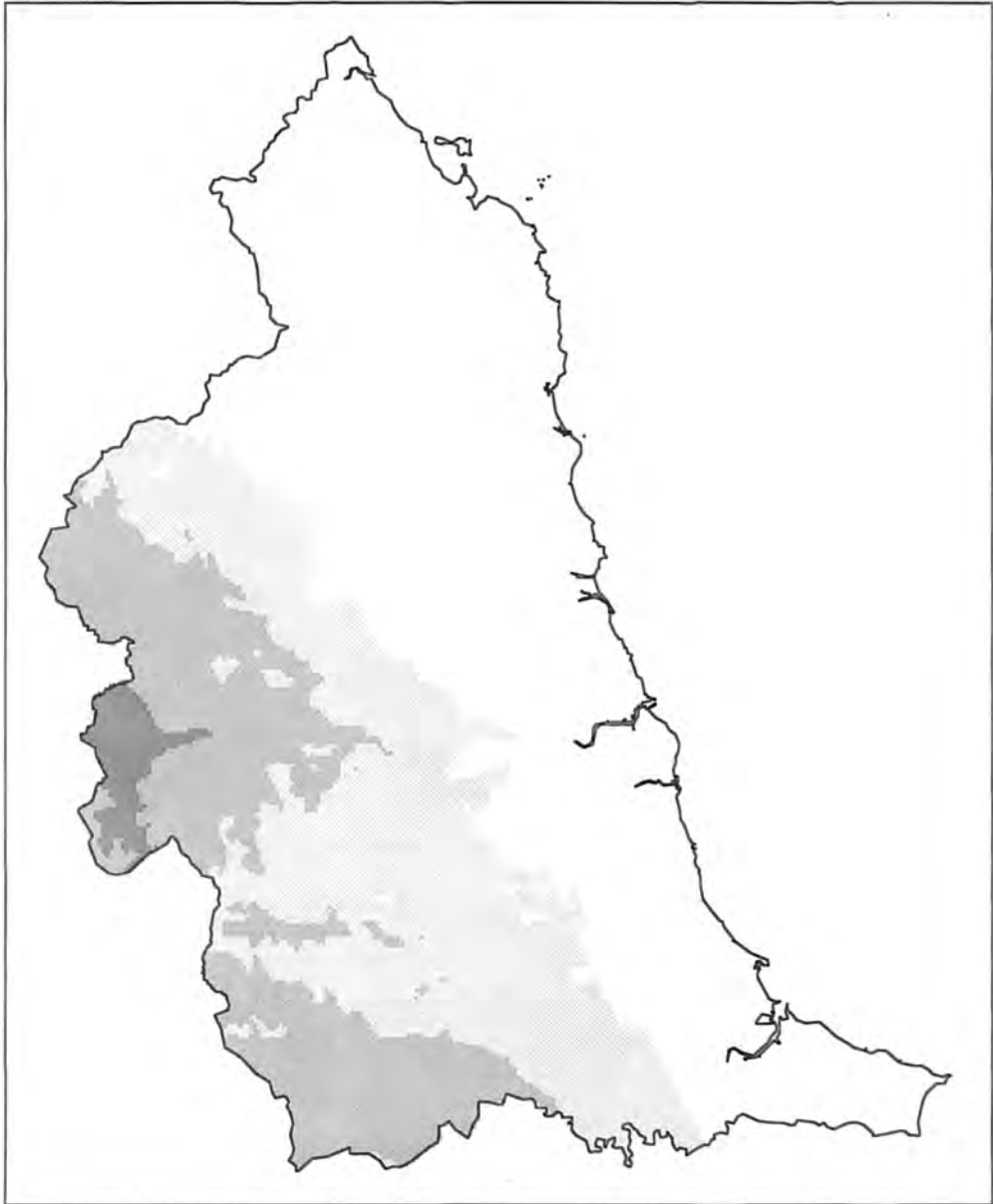
Ranunculaceae

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Figure 7.1.52 Interpolated pollen map of *Rumex* pollen values for the third Mesolithic period, 5500 - 5000 cal. BC

The map for *Rumex* for this period is similar to that for the previous period (Fig. 7.1.36), with the highest values occurring in the Northern Pennine uplands, up to 2% at sites in upper Teesdale. Like Compositae and Cruciferae (Figs. 7.1.46, 7.1.47), *Rumex* was formerly only occurred at sites in upper Teesdale, but now spreads out to other sites in the Northern Pennines including sites at the highest elevations such as Staple Moss and Whitfield Lough.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



Rumex

5500 – 5000 cal. BC

Pollen values expressed as %tdlp

Pollen maps for the Neolithic period

circa 4000 - 2000 cal. BC

Earlier Neolithic period:

3800 - 3300 cal. BC

List of Figures and Tables for the earlier Neolithic period, 3800 - 3300 cal. BC

Tables

Table 7.2.1	Summary of trends in pollen maps for the earlier Neolithic period.	132
-------------	--	-----

Figures

Fig. 7.2.1	Map showing locations of pollen cores used to create interpolated maps for the period 3800 - 3300 cal. BC	134
------------	---	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.2.2	Interpolated pollen map of averaged total tree pollen values.	136
------------	---	-----

Fig. 7.2.3	Interpolated pollen map of total shrub pollen values.	138
------------	---	-----

Fig. 7.2.4	Interpolated pollen map of total herb pollen values.	140
------------	--	-----

Fig. 7.2.5	Interpolated pollen map of total Ericaceae pollen values.	142
------------	---	-----

b) Agricultural: arable index map

Fig. 7.2.6	Interpolated pollen map of agricultural:arable index scores.	144
------------	--	-----

c) Maps of selected individual herb taxa:

Fig. 7.2.7	Interpolated pollen map of Gramineae pollen values.	146
------------	---	-----

Fig. 7.2.8	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	148
------------	---	-----

Fig. 7.2.9	Interpolated pollen map of <i>Artemisia</i> pollen values.	150
------------	--	-----

Fig. 7.2.10	Interpolated pollen map of Caryophyllaceae pollen values.	152
-------------	---	-----

Fig. 7.2.11	Interpolated pollen map of <i>Centaurea</i> pollen values.	154
-------------	--	-----

Fig. 7.2.12	Interpolated pollen map of Chenopodiaceae pollen values.	156
-------------	--	-----

Fig. 7.2.13	Interpolated pollen map of Compositae pollen values.	158
-------------	--	-----

Fig. 7.2.14	Interpolated pollen map of Cruciferae pollen values.	160
-------------	--	-----

Fig. 7.2.15	Interpolated pollen map of Leguminosae pollen values.	162
-------------	---	-----

Fig. 7.2.16	Interpolated pollen map of <i>Plantago</i> pollen values.	164
-------------	---	-----

Fig. 7.2.17	Interpolated pollen map of <i>Polygonum</i> pollen values.	166
-------------	--	-----

Fig. 7.2.18	Interpolated pollen map of Ranunculaceae pollen values.	168
-------------	---	-----

Fig. 7.2.19	Interpolated pollen map of <i>Rumex</i> pollen values.	170
-------------	--	-----

Table 7.2.1 Summary of trends in pollen maps for the earlier Neolithic period, 3800 - 3300 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.2.2 to 7.2.5</p>	<p>Tree values remain high from the preceding period, although not as high as around the Wear and Derwent. There is a slight increase at some sites, to 62-63% at Hutton Henry and Bishop Middleham, whilst Mordon Carr remains at lower levels around 32%. Shrub levels decline to 10-20% at most sites. Herbs increase at Hutton Henry and Mordon Carr to 18 and 42% respectively, and 24% at Bishop Middleham. On the coast there is a decrease in high tree levels to around 50%, with a rise in herbs to 38%. Ericaceae remain low at all sites. Neasham Fen has high overall arboreal cover with only 1% herbs.</p>	<p>The highest tree levels in this period occur in the lower Wear, reaching 89% at Hallowell Moss, and 81% at Wanister Bog, with other high values at Pow Hill (69%) and Lamb Shield (86%) in the upper Derwent area. Graham's Moss has tree values of 65%. At all these sites tree values have increased from the previous period. Shrubs range from 7-18%, whilst herbs mostly lie under 10% and Ericaceae below 1%. However, at Pow Hill herbs reach 22%.</p>
<p>Agricultural: Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.2.6</p>	<p>At Bishop Middleham, the index score drops from 72-27%, with a large increase in pastoral-type taxa. There is also a drop from 66-17% at Mordon Carr, as pastoral types increase. Hutton Henry remains around 27%. Neasham Fen continues to have neither arable nor pastoral types. Pastoral types therefore predominate at all these sites. At Hartlepool Bay 4 only arable types are present in this period.</p>	<p>At Hallowell Moss, the appearance of arable types raises the index score to 15%. Pastoral types also increase in this period. This also occurs at Pow Hill, raising the index score to 20%. At Lamb Shield and Burnhope Burn only pastoral types are present, but these increase in this period.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.2.7 to 7.2.19</p>	<p>At all sites Gramineae pollen does not exceed 4%, except on the coast, where it is 12%. <i>Cereal</i>-type pollen appears at Hartlepool Bay 4, Mordon Carr and West Hartlepool 19. <i>Plantago</i> appears at Bishop Middleham, Mordon Carr and at West Hartlepool 19. A wider range of herb types, including many arable types such as Chenopodiaceae, Cruciferae, Caryophyllaceae and Compositae appear, or increase where they are already present.</p>	<p>Gramineae levels lie below 4% at all sites, being lowest at Hallowell Moss (only 0.3%). This is accompanied by a much smaller range of herbs than in the Durham lowlands. Ranunculaceae is present at all sites, and this is variously accompanied by Compositae, Caryophyllaceae and Chenopodiaceae, all of which are new in this period. <i>Plantago</i> only appears at Burnhope Burn.</p>

Table 7.2.1 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.2.2 to 7.2.5</p>	<p>There is a large decrease in shrub pollen at Black Lough and Tricklely Wood. Shrub levels now lie below 10% at all sites. There is a marked increase in herb pollen at most sites; at Akeld Steads from 13-62%, Black Lough from 5-12% and Tricklely Wood from 7-42%. Ericaceae also increase markedly at Black Lough and Tricklely Wood to 30-35%, although at other sites it is very low. Tree levels vary, from 13% at Tricklely Wood to 56% at Black Lough. Broad Moss has very high tree pollen levels of 78%, with low herbs and Ericaceae.</p>	<p>At most upland sites tree pollen lies between 30-50%, although at higher elevations it lies under 20%. In areas where shrubs were previously high, shrubs now fall from 60% to 30-40%, equal to or below trees. Shrub levels are now higher than in the lowlands. Ericaceae increase to 10-20%, highest at higher elevations. In Upper Teesdale herb pollen levels exceed 20%, with low Ericaceae levels. At Cronkley Pastures, very high herb levels (80%) are accompanied by very low tree values of 6%.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.2.6</p>	<p>The index score at Akeld Steads drops from 21-15%, as pastoral values increase. Pastoral types also increase at Tricklely Wood, but an increase in arable types raises the index from 14-27%. At Black Lough only arable types are present. Steng Moss has neither arable nor pastoral types, whilst Broad Moss has both, with an index score of 21%. Further south, at Fellend Moss, Coom Rigg and Muckle Moss neither arable nor pastoral types are present.</p>	<p>Arable types appear or increase together with a marked rise in pastoral types at Weelhead Moss, Scaith Head, Pawlaw Pike, Mire Holes, Mickle Fell, Greenmines, Cronkley Pastures, Dubby Moss and Arngill Head Brocks. Index scores rise to 43% at Weelhead Moss, 50% at Cronkley Pastures, 61% at Mire Holes and 74% at Dubby Moss. At other sites only pastoral types are present, but this period sees a rise in these values.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.2.7 to 7.2.19</p>	<p>Gramineae values increase at Akeld Steads to 13%, Tricklely Wood to 8%, to 1% at Black Lough, with an increase in range of herb types including arable-type taxa. Chenopodiaceae, Cruciferae and <i>Plantago</i> appear or increase at sites. At Akeld Steads Ranunculaceae increases to 3%, and at Tricklely Wood <i>Plantago</i> increases to 3% with the appearance of <i>Cerealia</i>-type and <i>Centaurea</i>. Further south, Gramineae pollen is very low (under 5%), with few other herb types.</p>	<p><i>Plantago</i> appears at many sites in this period and increases at sites where it already occurred. Gramineae pollen declines at some sites where Ericaceae pollen increases, but increases at others. <i>Cerealia</i>-type pollen appears at Weelhead Moss and Howden Moss. As with other areas, a greater variety of herb types appear at many sites.</p>

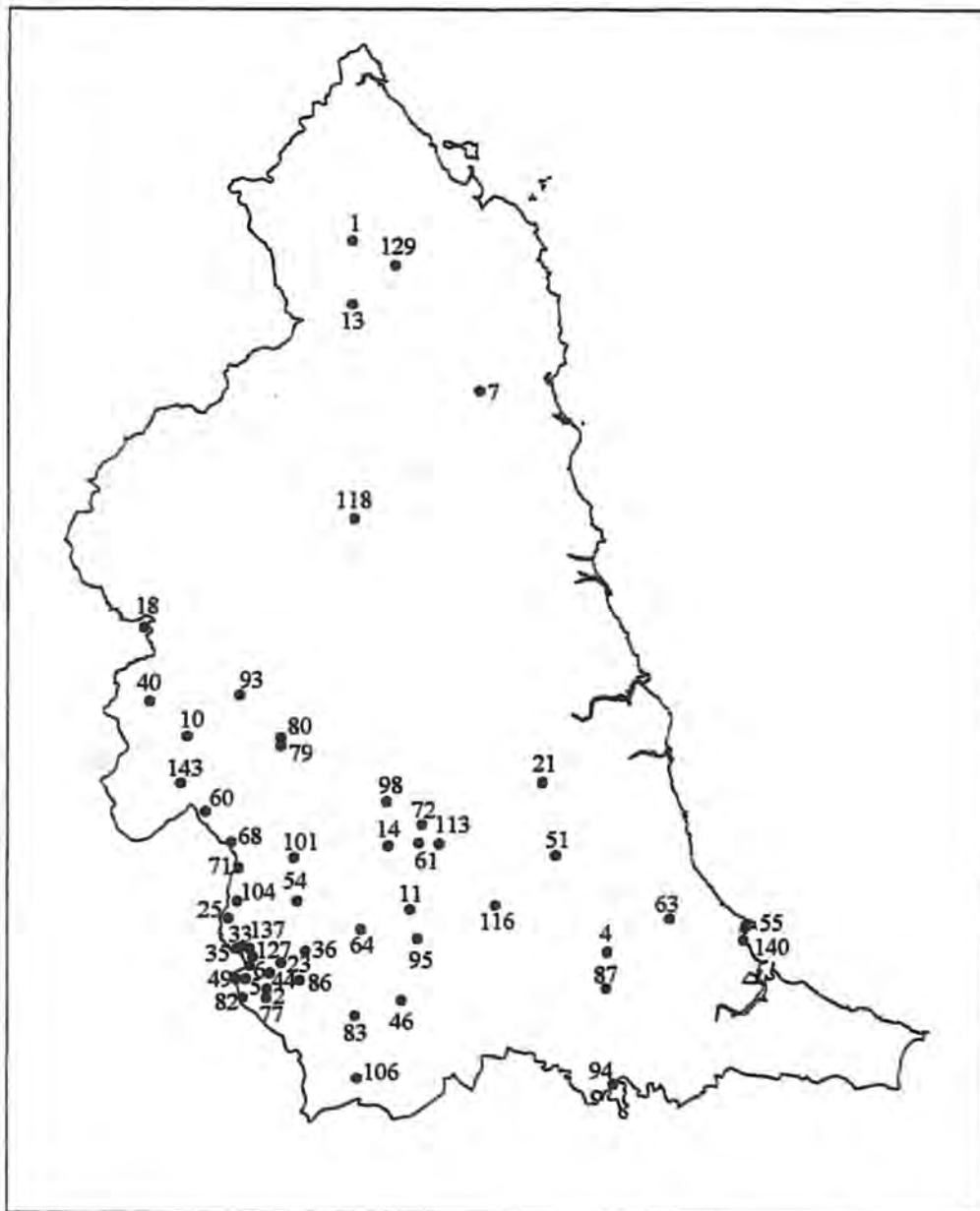


Fig. 7.2.1



Map showing locations of pollen cores used to create interpolated maps for the earlier Neolithic period, 3800 - 3300 cal. BC

N.B. Key to site codes on next page.

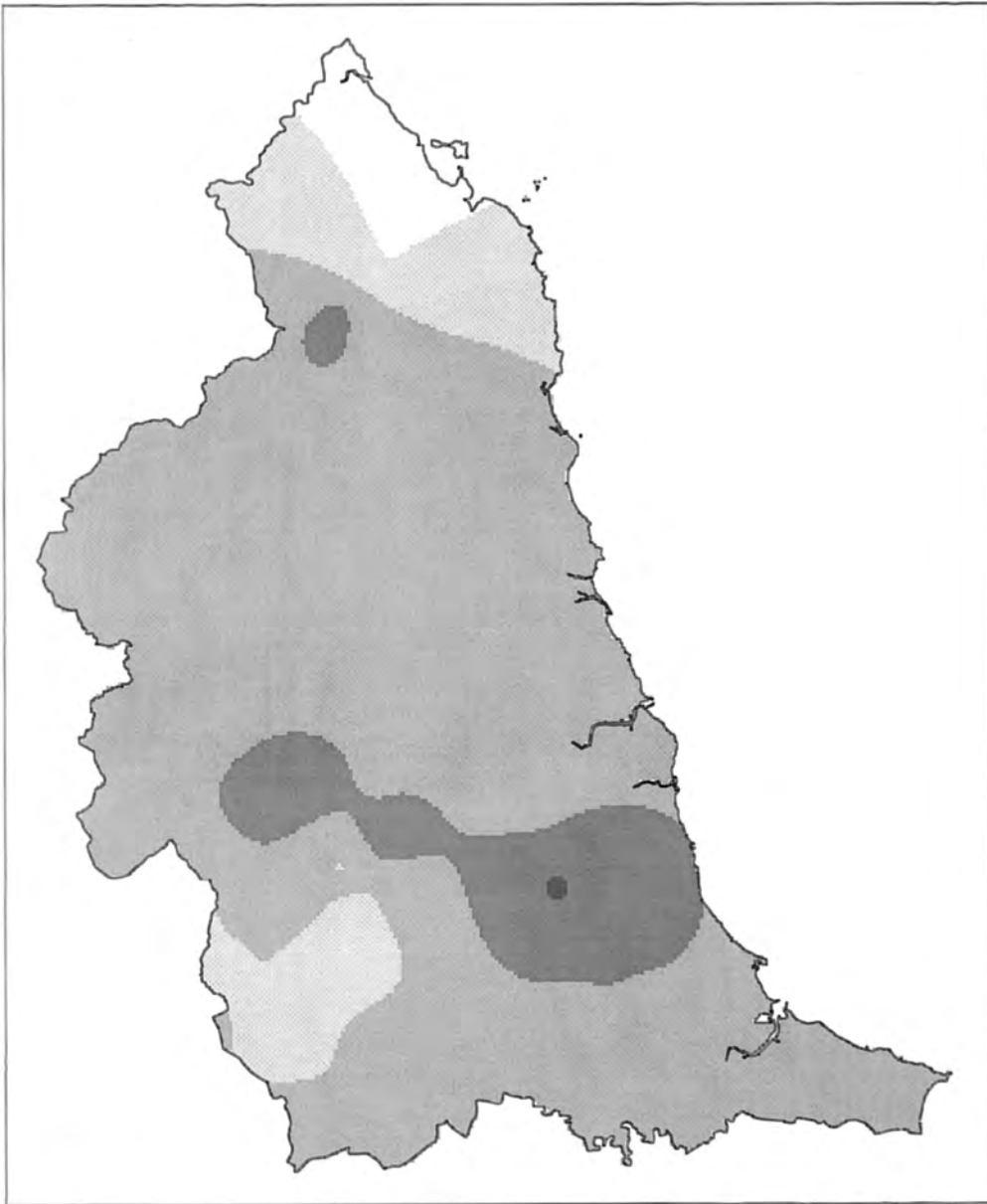
Key to Figure 7.2.1

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	63	Hutton Henry
2	Arngill Head Brocks	64	James' Hill
4	Bishop Middleham	68	Kilhope Law
5	Black Band	71	Knoutberry
6	Black Hill	72	Lamb Shield
7	Black Lough	77	Long Crag
10	Blackshiel Bog	79	Long Moss
14	Burnhope Burn	80	Low Stublick
18	Coom Rigg	82	Mickle Fell
21	Cranberry Bog	83	Mickleton Moor
23	Cronkley Pastures	86	Mire Holes
25	Crook Burn	87	Mordon Carr
33	Dead Crook	93	Muckle Moss
35	Dubby Moss	94	Neasham Fen
36	Dufton Moss	98	Pow Hill
40	Fellend Moss	101	Quick Moss
44	Fox Earth Gill	104	Scaith Head
46	Goosetarn Beck	106	Seven Hills
47	Graham's Moss	113	Smiddy Shaw
49	Greenmines	116	Stanley Moss
51	Hallowell Moss	118	Steng Moss
54	Harthope Quarry	127	Tinkler's Sike
55	Hartlepool Bay 4	129	Trickley Wood
60	High Banks Moss	138	Weelhead Moss
61	Hisehope Burn	140	West Hartlepool 19
62	Howden Moss	143	Whitfield Lough

Figure 7.2.2 Interpolated pollen map of tree pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

The very high tree values on the coast at Hartlepool in the previous period (Fig. 7.1.37) decline during this period to around 50%. The upper Derwent and mid Weardale area which had in previous periods had some of the highest tree pollen values, clearly has the highest tree values in this period. Tree percentages increase further at these sites in this period to over 80% tdlp. Throughout the uplands tree pollen percentages increase to around 30-50%, although at the highest elevations it remains a lot lower. At some sites in northern Northumberland tree pollen levels are very low (13% at Trickle Wood), whilst at others they are high (78% at Broad Moss).



Key:

-  0 – 20%
-  20 – 40%
-  40 – 60%
-  60 – 80%
-  80 – 100%



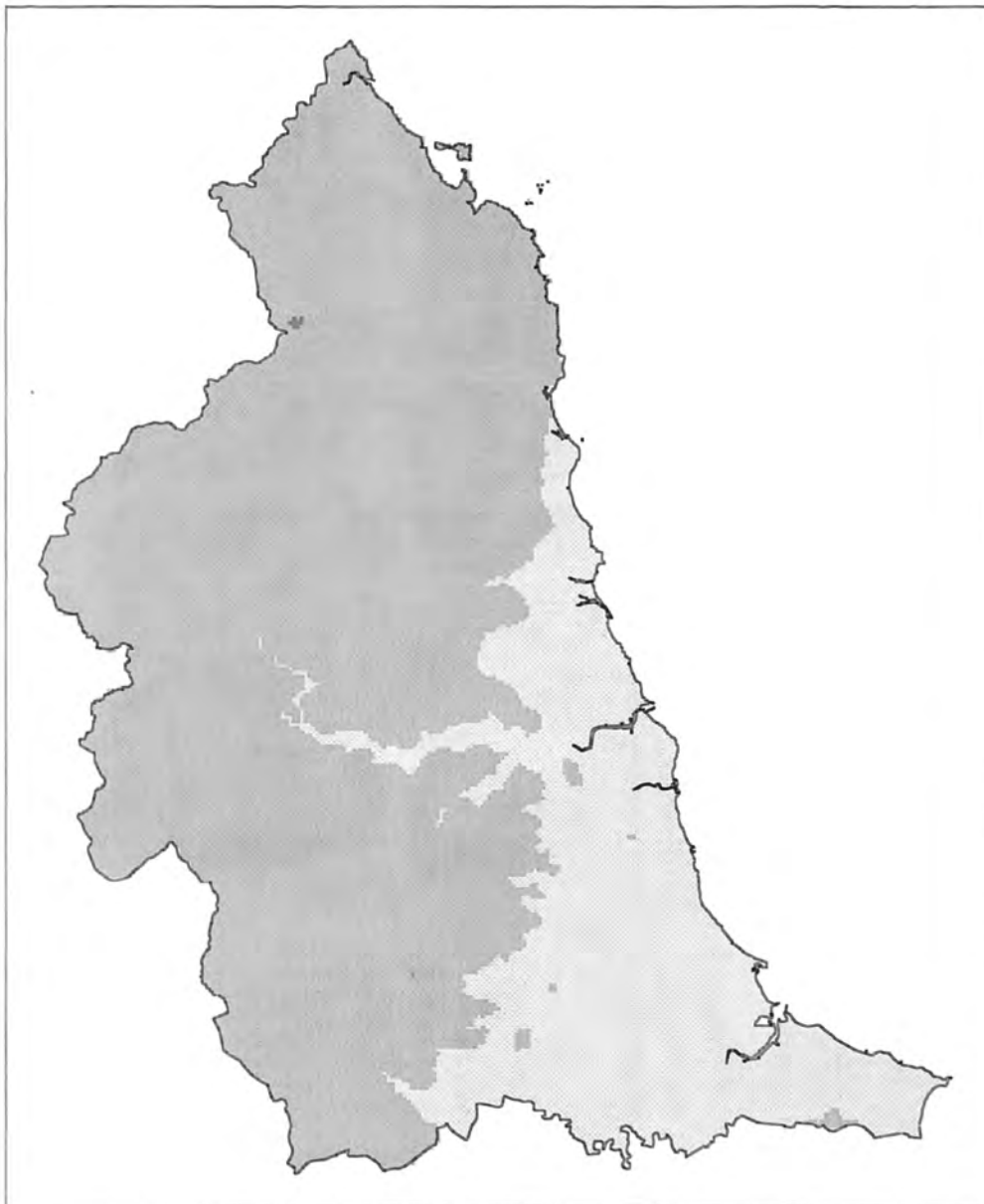
Trees

3800 – 3300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.3 Interpolated pollen map of shrub pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Shrub levels decline further from the previous period (Fig. 7.1.38) so that during this period across the lowlands shrub values lie around 10-20% tdlp. Shrub values continue to be very low in the upper Derwent and mid Weardale area dominated by tree pollen. The highest shrub values in this period now occur in the uplands of the region, but even here shrub values have fallen considerably from the previous period, from around 60% tdlp to between 20-40%. Shrub pollen now equals tree pollen in many upland areas. In Northumberland shrub values lie between 10 -30%.



Key:

- 0 – 10%
- ◻ 10 – 20%
- ◻ 20 – 30%
- ◻ 30 – 40%
- ◻ 40 – 50%
- ◼ > 50%



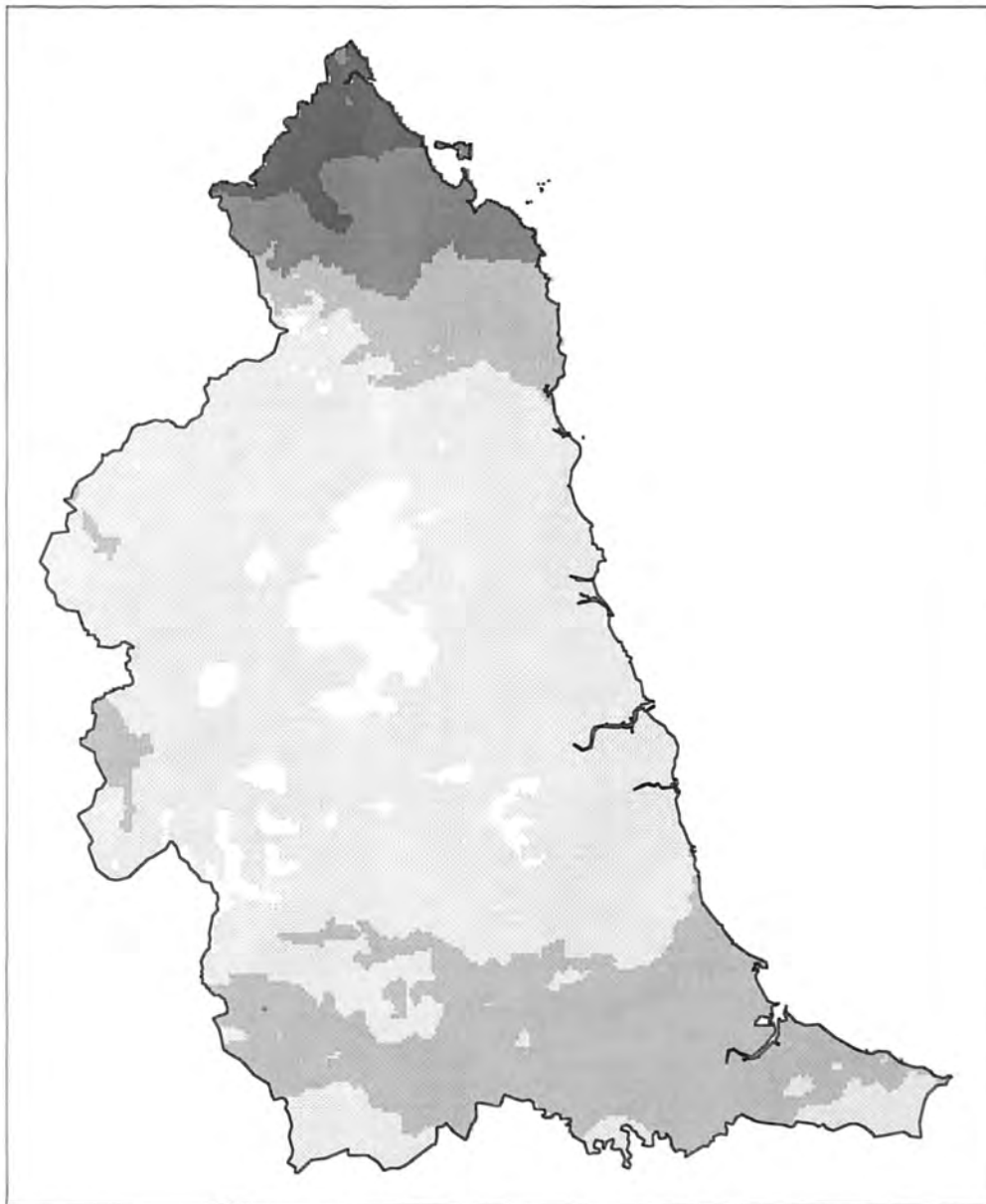
Shrubs

3800 – 3300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.4 Interpolated pollen map of herb pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Herb pollen values increase over much of the region compared to the previous period (Fig. 7.1.39), with a particularly marked increase at most sites in northern Northumberland, which has the highest values in this period from values below 10% to up to 62% tdlp. Herb pollen values also increase in the Durham lowlands at most sites to between 20-40% tdlp and in upper Teesdale many sites now have herb values exceeding 20%. At sites in the Tyne corridor, upper Derwent and mid Weardale, herb pollen values remain very low, since tree pollen dominates in this area.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



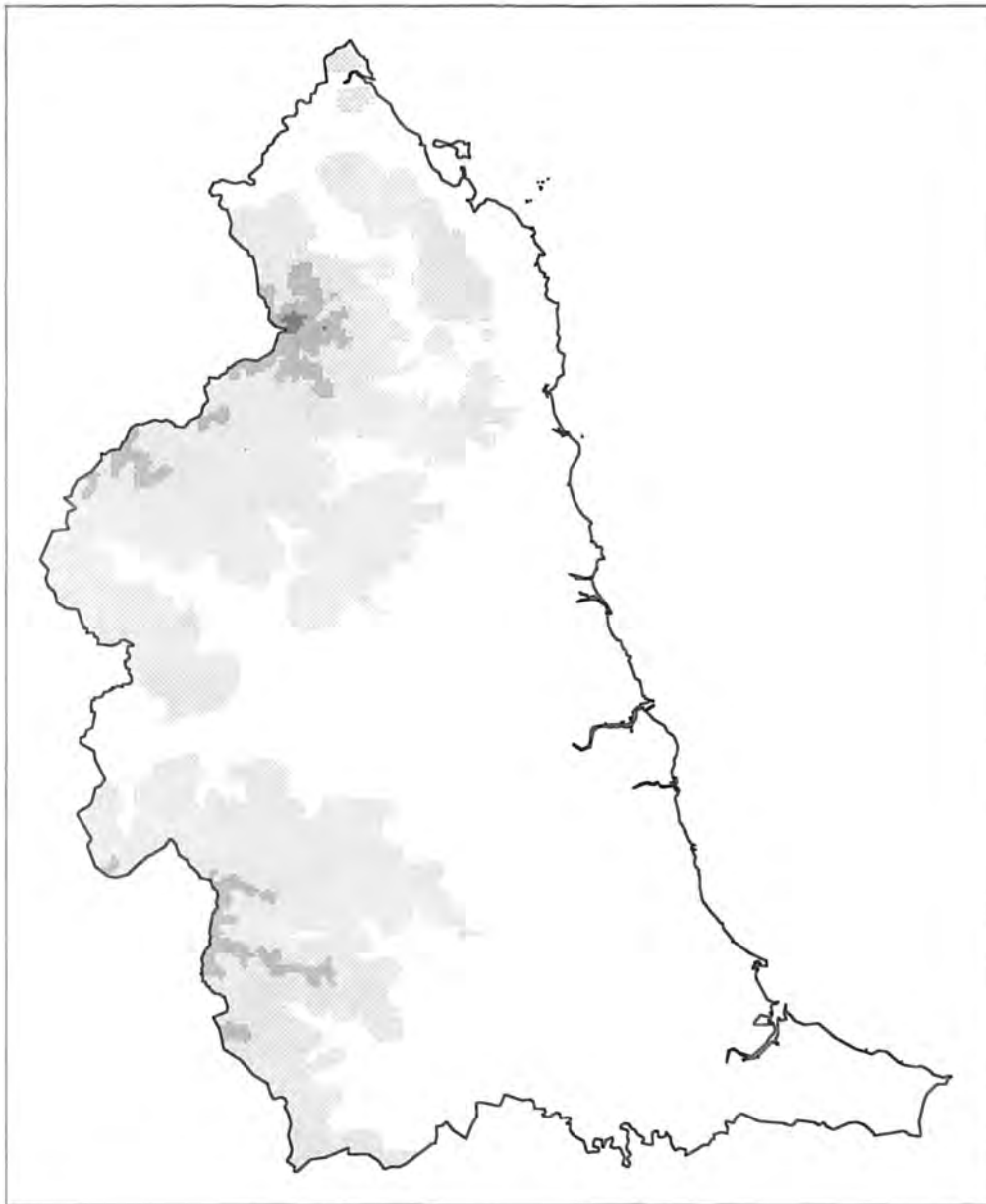
Herbs

3800 – 3300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.5 Interpolated pollen map of Ericaceae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Ericaceae values increase markedly at many sites in the uplands of the region compared to the previous period (Fig. 7.1.40), and values over 10% tdlp spread across the uplands, whereas before they were confined to the upland tops. The highest Ericaceae values still remain at the highest elevations, however, rising to 20% in places. In upper Teesdale itself, however, Ericaceae values are low, compared to the surrounding hilltops. Ericaceae values also rise at two upland sites in northern Northumberland to 35% tdlp. Elsewhere in Northumberland Ericaceae values are very low, and they are absent from the rest of the region.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



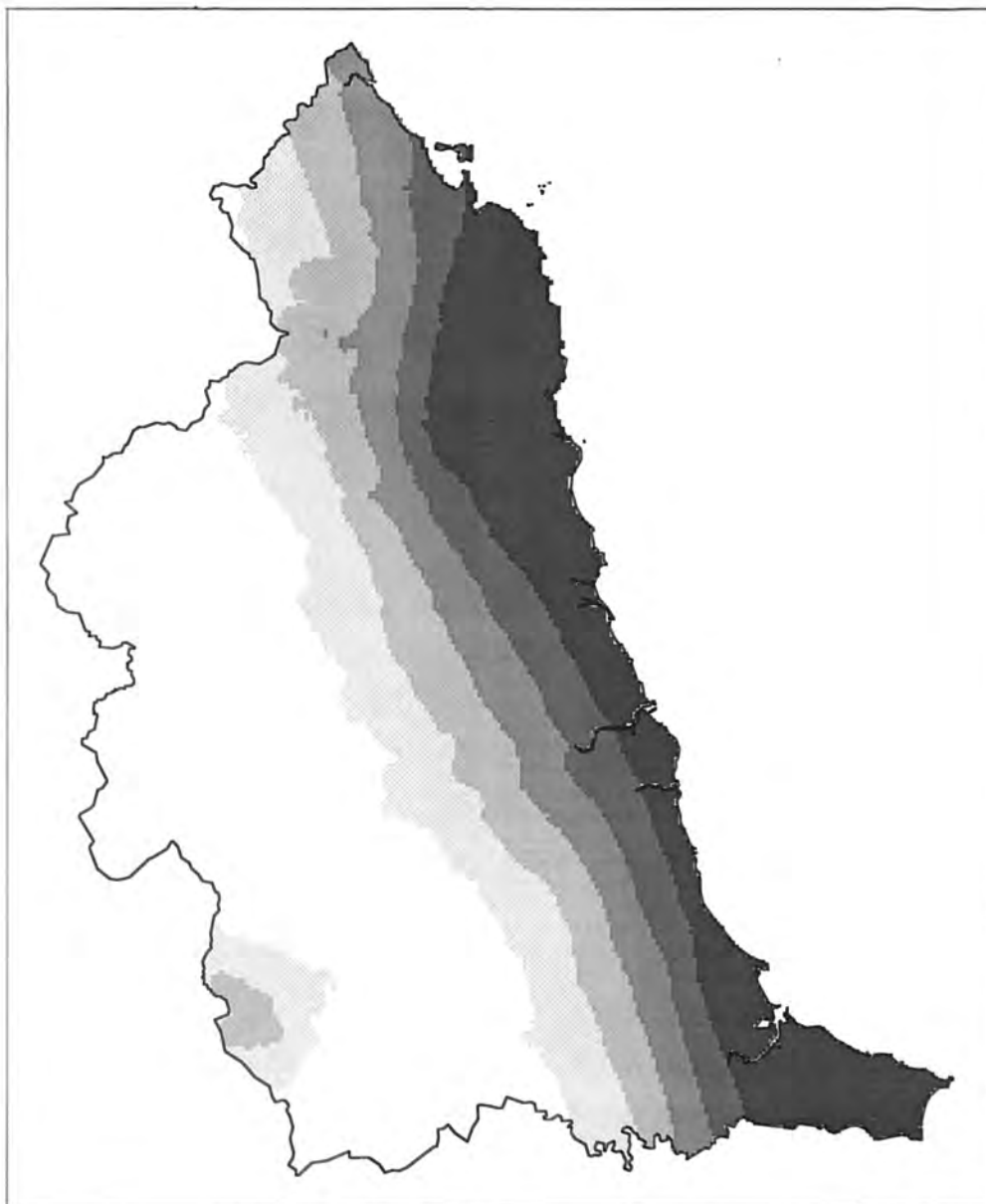
Ericaceae

3800 – 3300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.6 Interpolated pollen map of agricultural: arable index scores for the earlier Neolithic period, 3800 - 3300 cal. BC

The map for this period shows that the highest, most arable scores are concentrated in the eastern lowlands, along the coast, rapidly falling off as one goes further east, with another concentration of arable values in the upper Teesdale area. The concentration of arable values in the coastal area is produced by one score of 100% at Hartlepool Bay 4 (i.e. only arable types are present, mostly Chenopodiaceae, Compositae and Cruciferae and some *Cerealia*-type pollen). Elsewhere in the lowlands non-arable type pollen dominates, due to a large increase in *Plantago* at many sites during this period. The only other area in the region with high arable scores is upper Teesdale, otherwise in all areas non-arable types dominate.



Key:

- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- > 50%



Agricultural:Arable Index





3800 - 3300 cal. BC

Figure 7.2.7 Interpolated pollen map of Gramineae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

As before, Gramineae pollen levels are highest in the uplands of the region, where they increase further in this period so that most sites in the uplands now have Gramineae levels over 10% tdlp, and exceeding 30% at a small number of sites. The number of sites with Gramineae values over 5% also increases across the rest of the region. It increases in northern Northumberland to 13% at Akeld Steads, and on the coast at Hartlepool to over 12% at several sites. Far lower values remain in East Durham and in the upper Derwent and mid Weardale area (under 4%.)



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



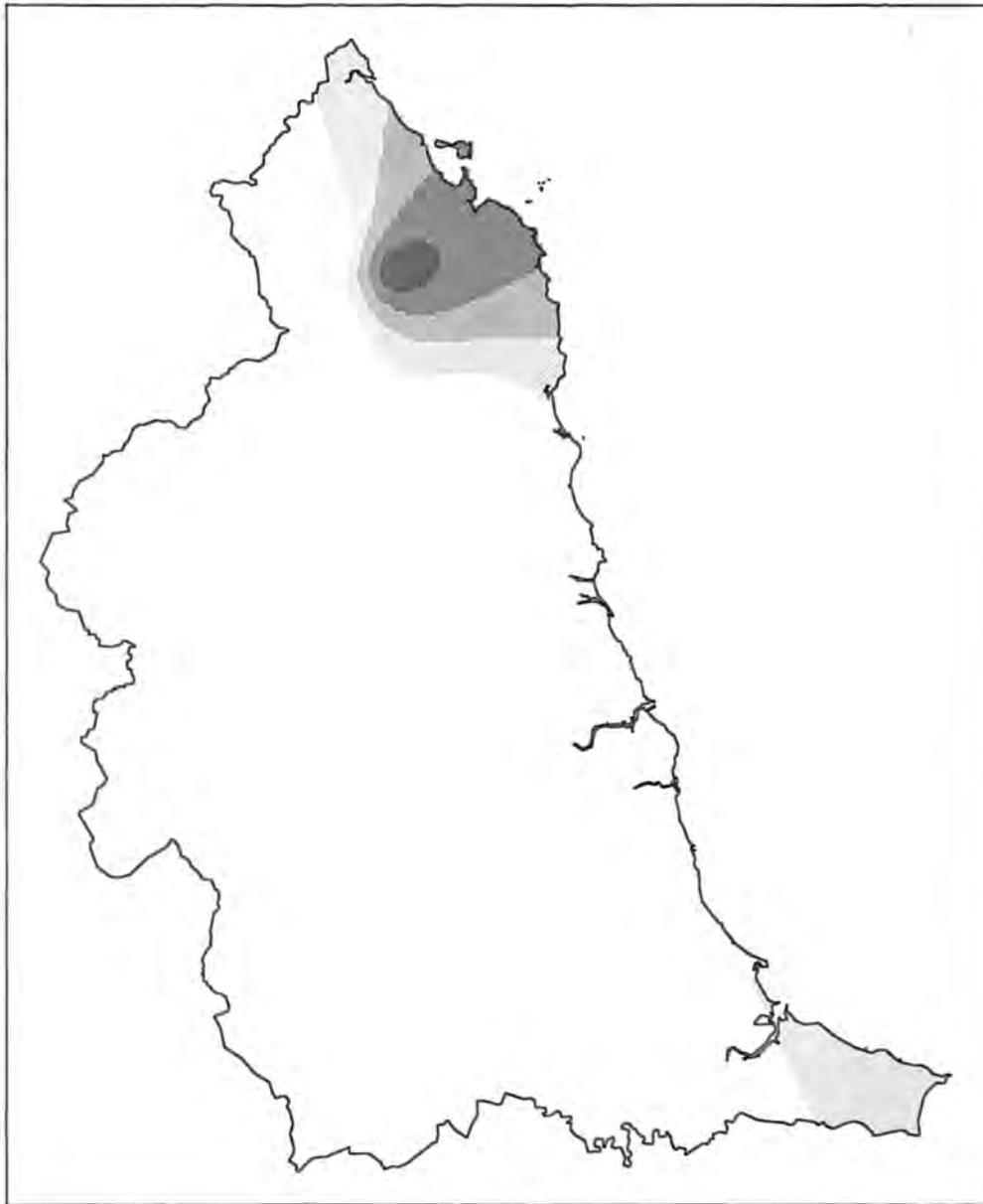
Gramineae

3800 – 3300 cal. BC

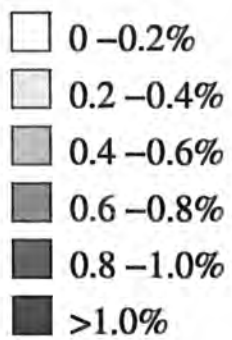
Pollen values expressed as %tdlp

Figure 7.2.8 Interpolated pollen map of *Cerealia*-type pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Cerealia-type pollen appears for the first time at several sites in this period. The interpolated map shows a concentration of high values in north-east Northumberland and this “bullseye” effect is caused by high values exceeding 1% tdlp occurring at Trickle Wood. *Cerealia*-type also occurs on the coast in the south east of the region, reaching 0.2% tdlp, and also at one East Durham site (0.02%). In upper Teesdale it has been recorded at Weelhead Moss (0.04%) and Howden Moss (0.5%), but since there are a large number of sites in upper Teesdale with no recorded *Cerealia*-type pollen, these do not show up on the interpolated map.



Key:



Cerealia-type

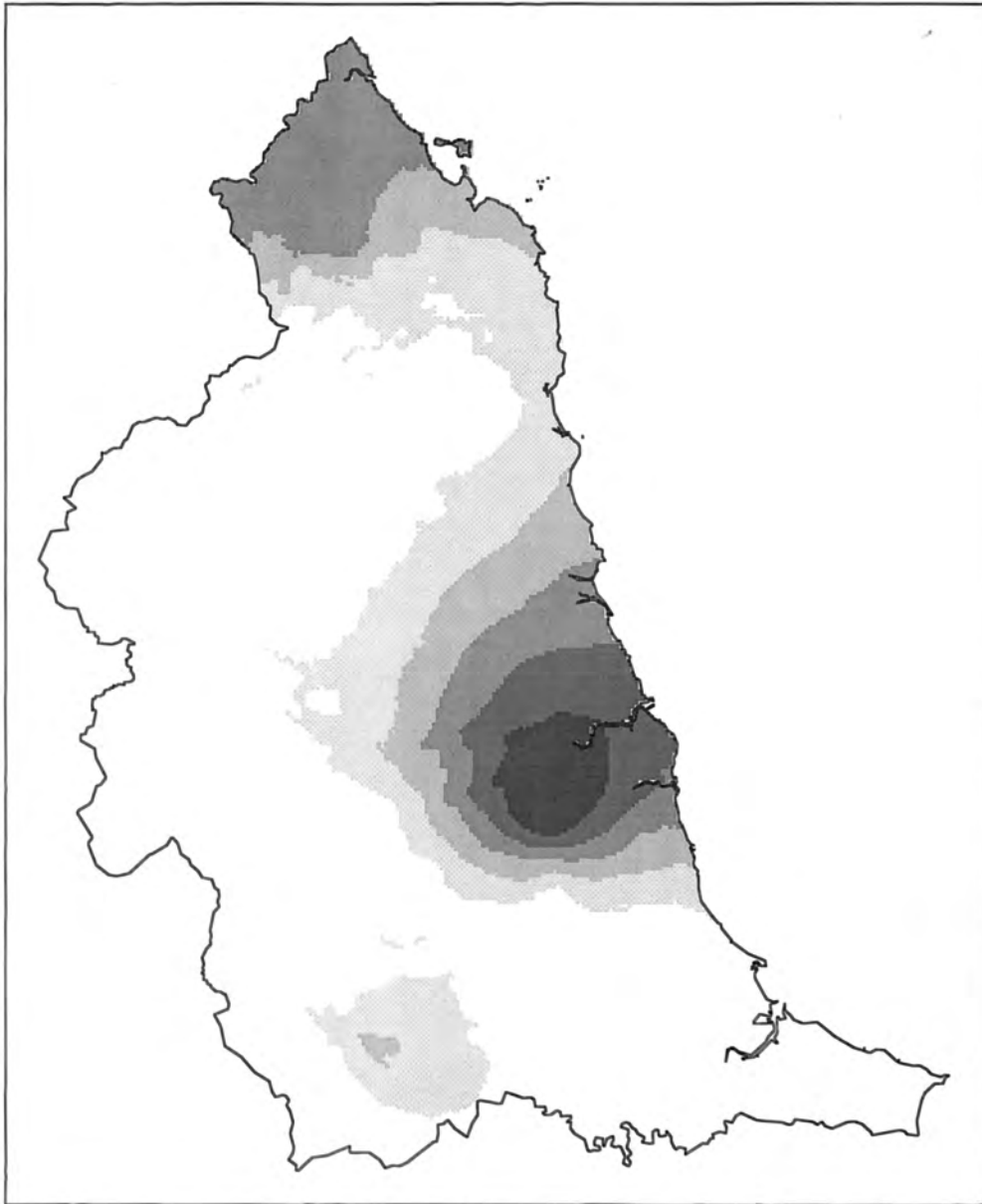
3800 -3300 cal. BC

Pollen values expressed as %tdlp



Figure 7.2.9 Interpolated pollen map of *Artemisia* pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

High values of *Artemisia* continue to occur in the north of Northumberland as in the previous period (Fig. 7.1.43), increasing further to over 0.3% tdlp. However, in this period the occurrence of unusually high values of 0.8% tdlp at Cranberry Bog, whilst *Artemisia* is not found at any other site in the lowlands, has created a “bullseye” around this site. *Artemisia* continues to occur in the uplands of the Northern Pennines, but now spreads from the higher elevations to include sites in upper Teesdale, where it occurs up to 0.9% tdlp at some sites.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



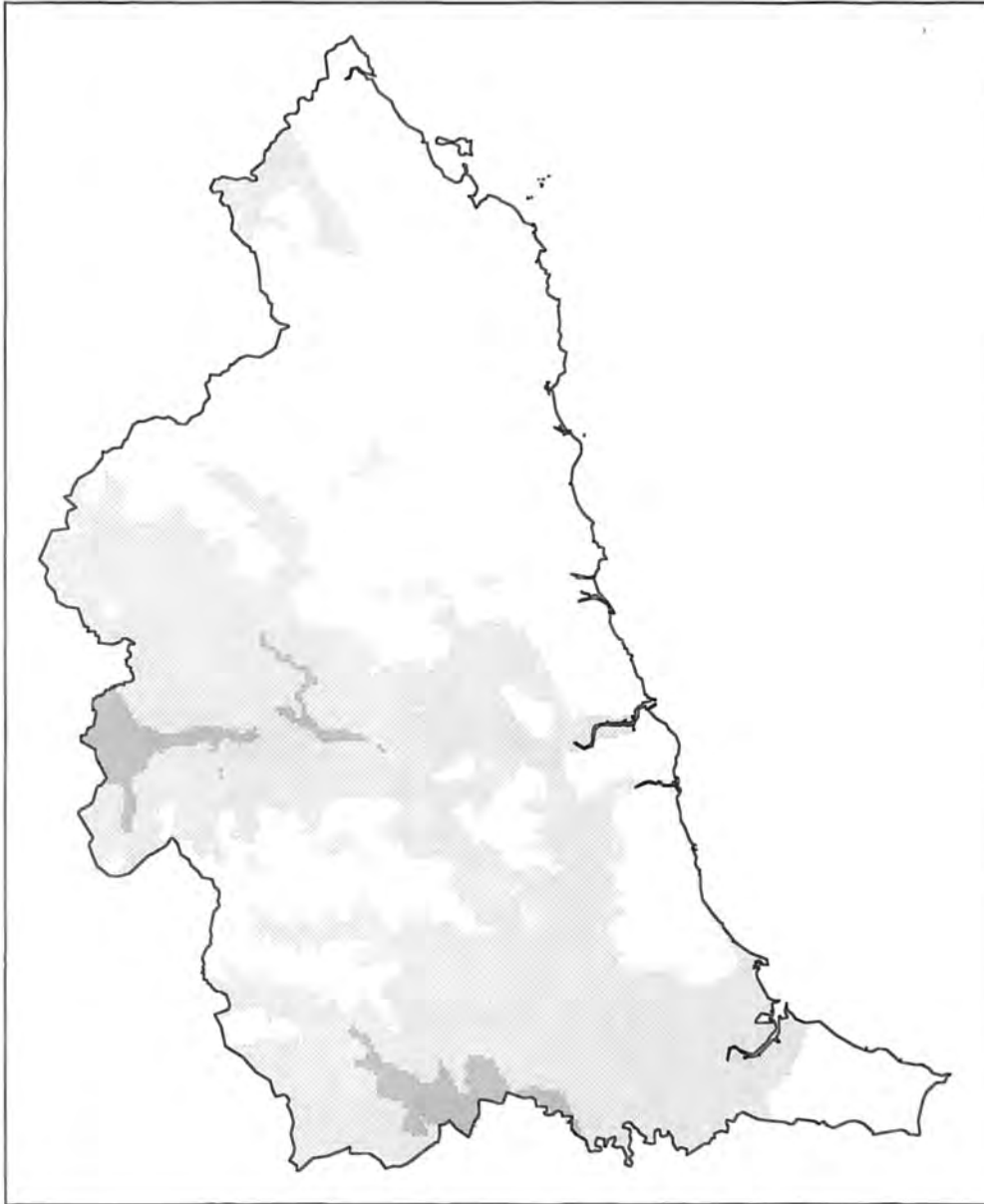
Artemisia

3800 – 3300 cal. BC

Pollen values expressed as %tdlp

Figure 7.2.10 Interpolated pollen map of Caryophyllaceae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Caryophyllaceae appears for the first time in this period outside of the uplands, compared with its previous occurrence only in upland areas (Fig. 7.1.44). It now occurs at several sites in the Durham lowlands and on the coast at Hartlepool at values ranging from 0.1-0.6% tdlp. It also appears at one site in northern Northumberland. The highest values continue to occur in the uplands of the Northern Pennines, exceeding 1% at one site in upper Teesdale but also occurring at smaller values at several other sites in upper and mid Teesdale.



Key:

- 0 –0.1%
- 0.1 –0.2%
- 0.2 –0.3%
- 0.3 –0.4%
- 0.4 –0.5%
- > 0.5%



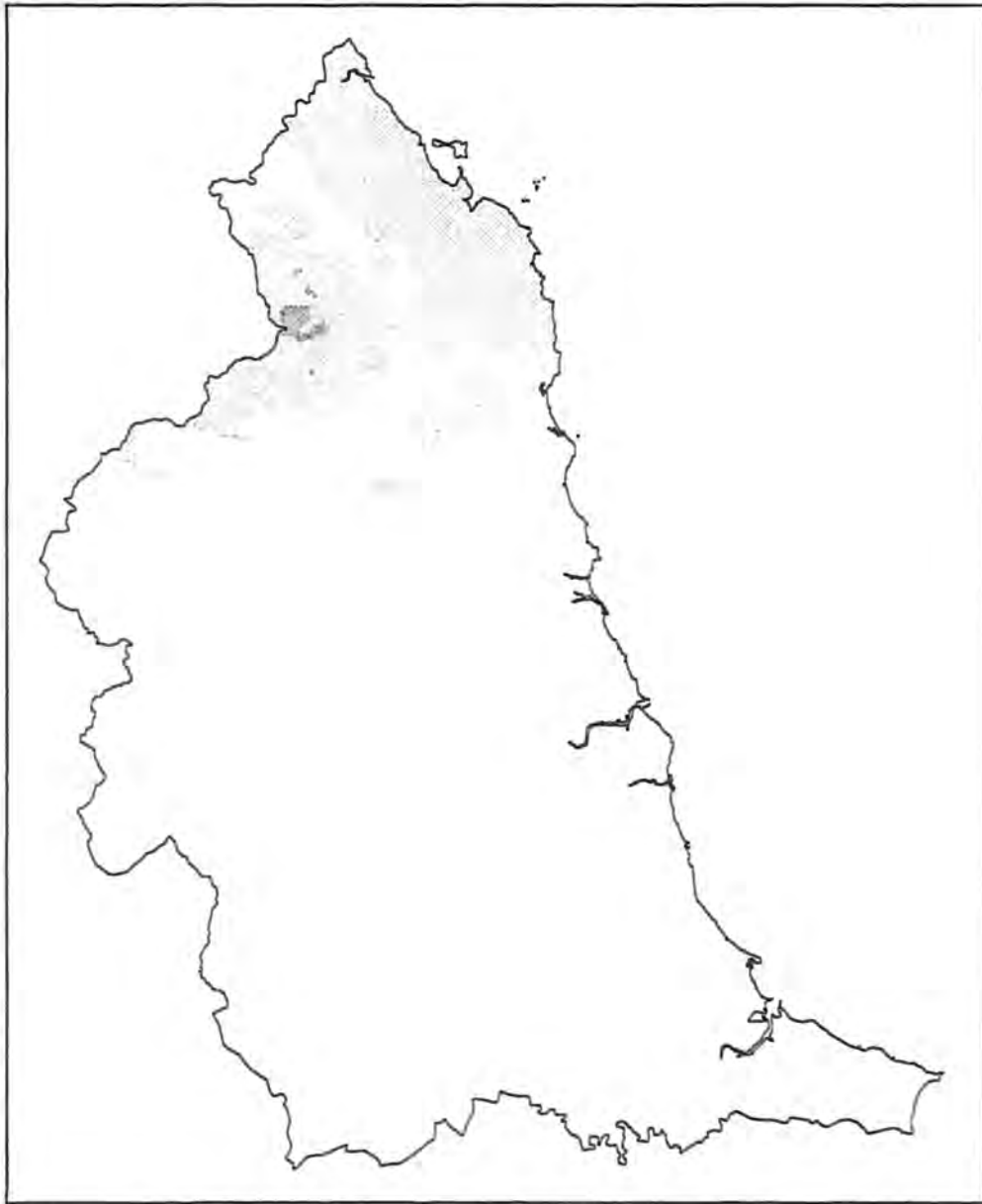
Caryophyllaceae

3800 –3300 cal. BC







Pollen values expressed as %tdlp

Figure 7.2.11 Interpolated pollen map of *Centaurea* pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Centaurea pollen, like *Cerealia*-type pollen, appears for the first time at sites in the region. It is recorded at only two sites, at Scaith Head in the uplands of the Northern Pennines (0.09%) and in northern Northumberland at Trickle Wood (0.08%). Since there are a large number of sites in the Northern Pennines with no recorded *Centaurea* and a smaller number of sites in northern Northumberland, the interpolation biases the map in the favour of the north of the region.



Key:

-  < 0.01%
-  0.01% – 0.02%
-  0.02% – 0.03%
-  0.03% – 0.04%
-  0.05% – 0.06%
-  > 0.06%



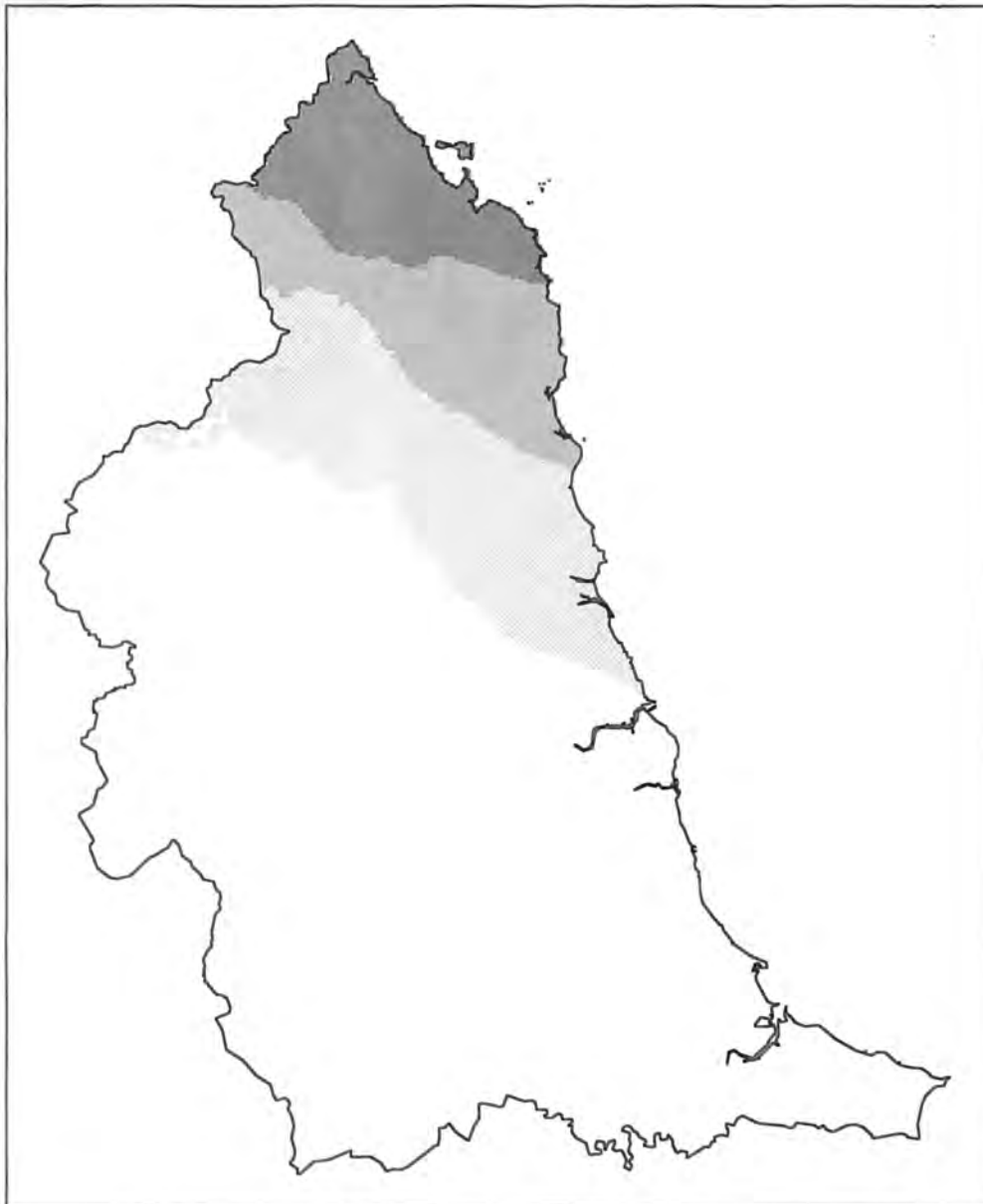
Centaurea

3800 – 3300 cal. BC







Pollen values expressed as %tdlp

Figure 7.2.12 Interpolated pollen map of Chenopodiaceae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Unlike the previous period, which shows the highest Chenopodiaceae values occurring in the Durham lowlands and in the Northern Pennine uplands, in this period, the map shows a concentration of high values in the north of the region. Values under 0.06% tdlp continue to occur at a couple of sites in upper Teesdale and in the Durham lowlands, but in this period there is a reappearance of Chenopodiaceae in northern Northumberland at higher values than seen elsewhere. Values rise to 0.2% at several sites in this area.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



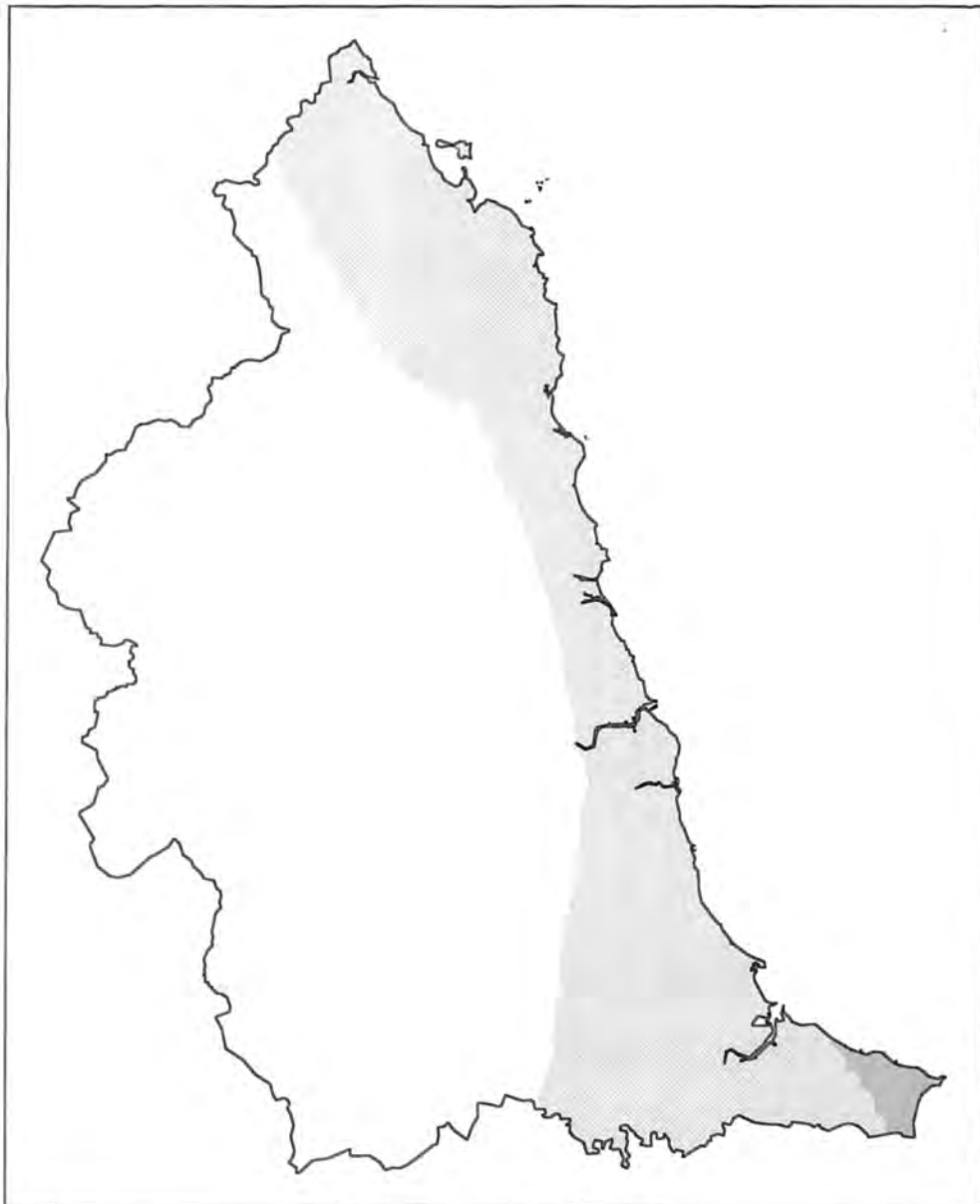
Chenopodiaceae

3800 – 3300 cal. BC

Pollen values expressed as %tdlp

Figure 7.2.13 Interpolated pollen map of Compositae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

The map for Compositae in this period is very similar to that for the preceding two periods (Fig. 7.1.29, 7.1.46), with the highest values occurring in the south east of the region. Values in this area are similar to the previous period (0.6% maximum). In this period the area of over 0.2% Compositae spreads north to cover the appearance of Compositae at one site in northern Northumberland. Compositae continue to occur in the Northern Pennines, with the highest values occurring in upper Teesdale. Since there are a large number of sites in this area with no Compositae, these values do not show up on the map.



Key:

- 0 –0.1%
- ◻ 0.1 –0.2%
- ◻ 0.2 –0.3%
- ◻ 0.3 –0.4%
- ◻ 0.4 –0.5%
- ◼ > 0.5%



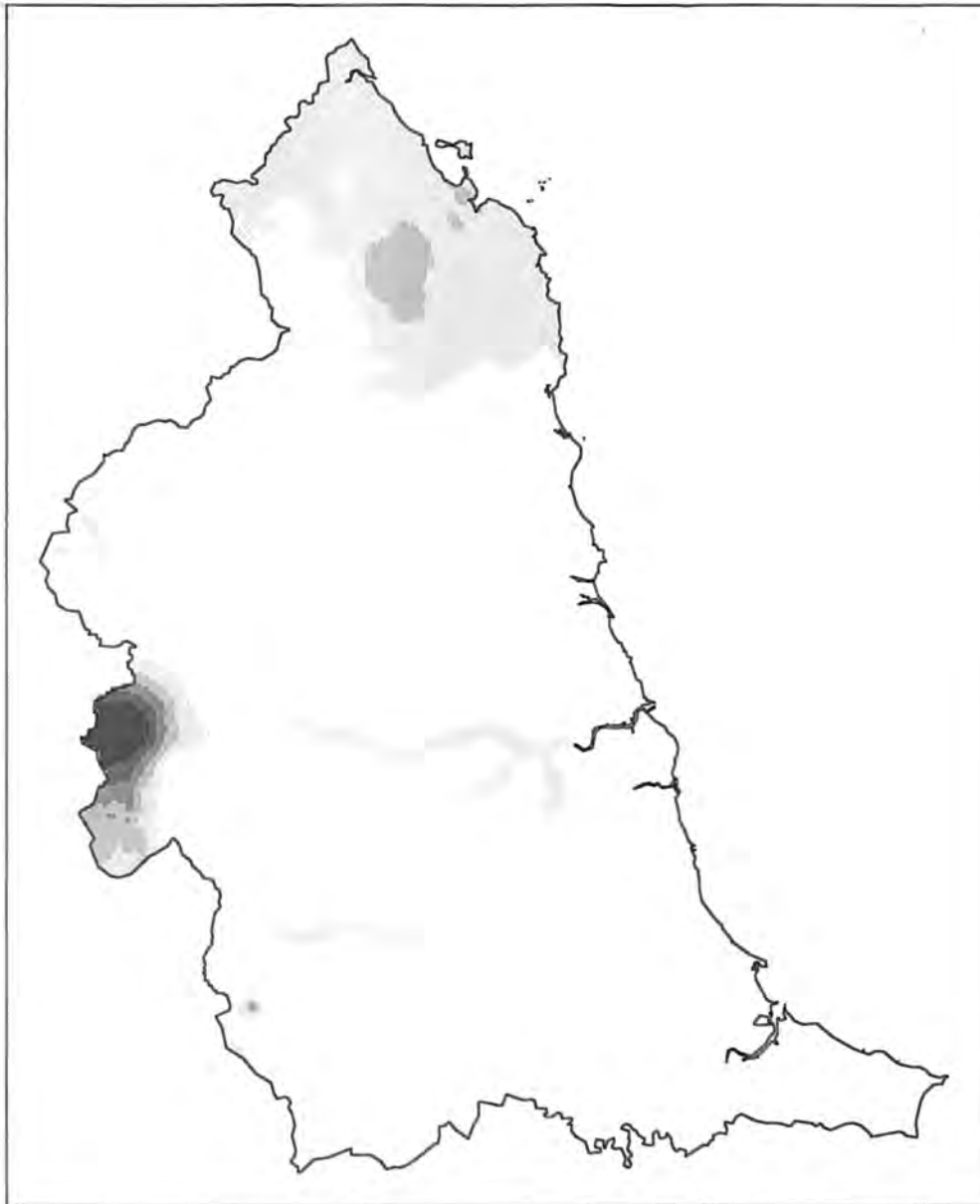
Compositae

3800 –3300 cal. BC

Pollen values expressed as %tdlp

Figure 7.2.14 Interpolated pollen map of Cruciferae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Unlike the maps for previous periods, in this period the highest Cruciferae values occur at one site in the west of the Tyne Corridor, Fellend Moss, where values reach an unusually high level of 1.4% tdlp, creating a “bullseye”. Values between 0.2-0.5 tdlp occur at sites in northern Northumberland. Lower values continue to occur in the Northern Pennine uplands.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



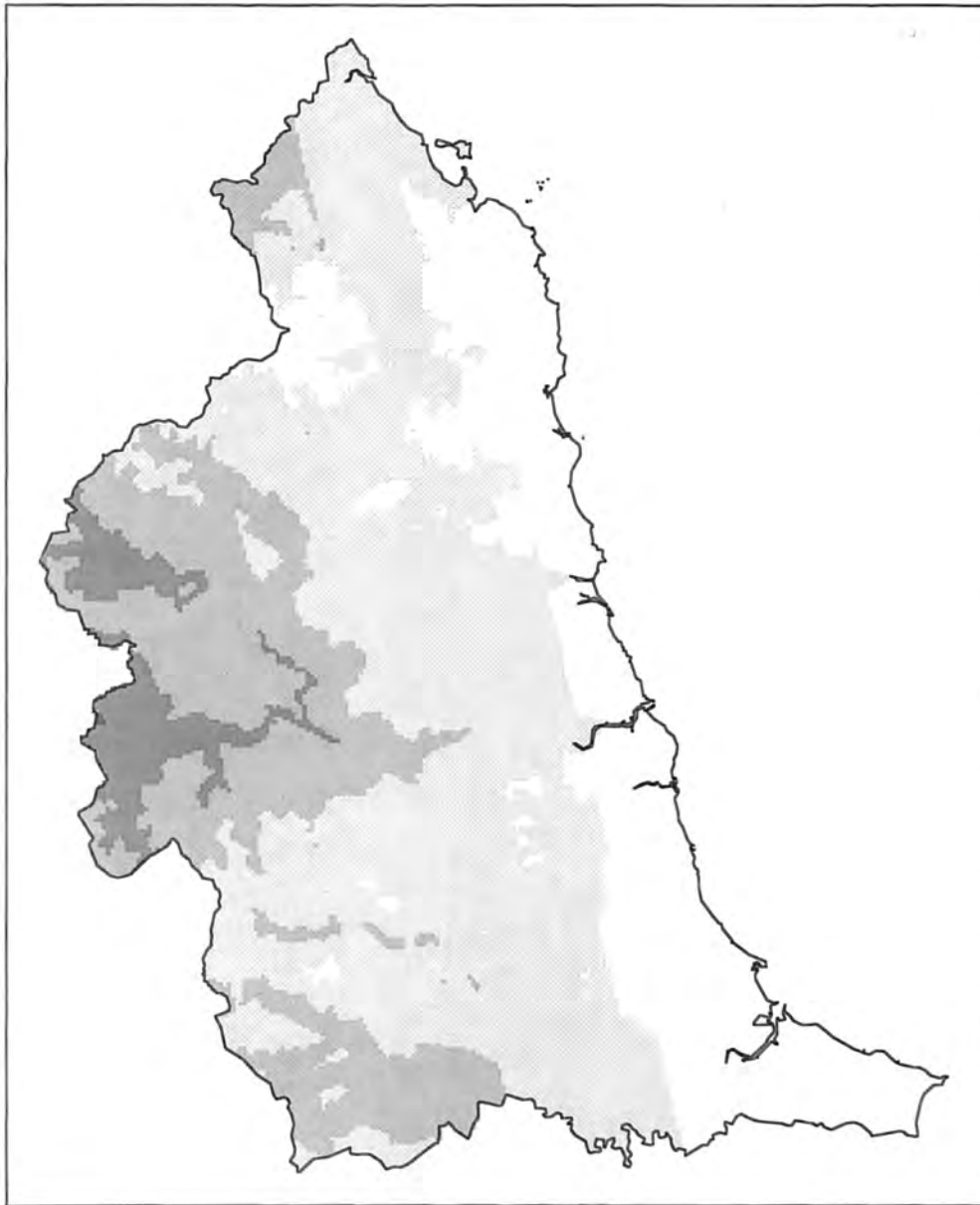
Cruciferae

3800 – 3300 cal. BC

Pollen values expressed as %tdlp

Figure 7.2.15 Interpolated pollen map of Leguminosae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

Compared with previous periods, during this period values for Leguminosae increase markedly at several sites in the uplands, exceeding 2% tdlp at a couple of sites in upper Teesdale. Leguminosae also appear in northern Northumberland and in the Durham lowlands where values rise to 0.2% tdlp.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



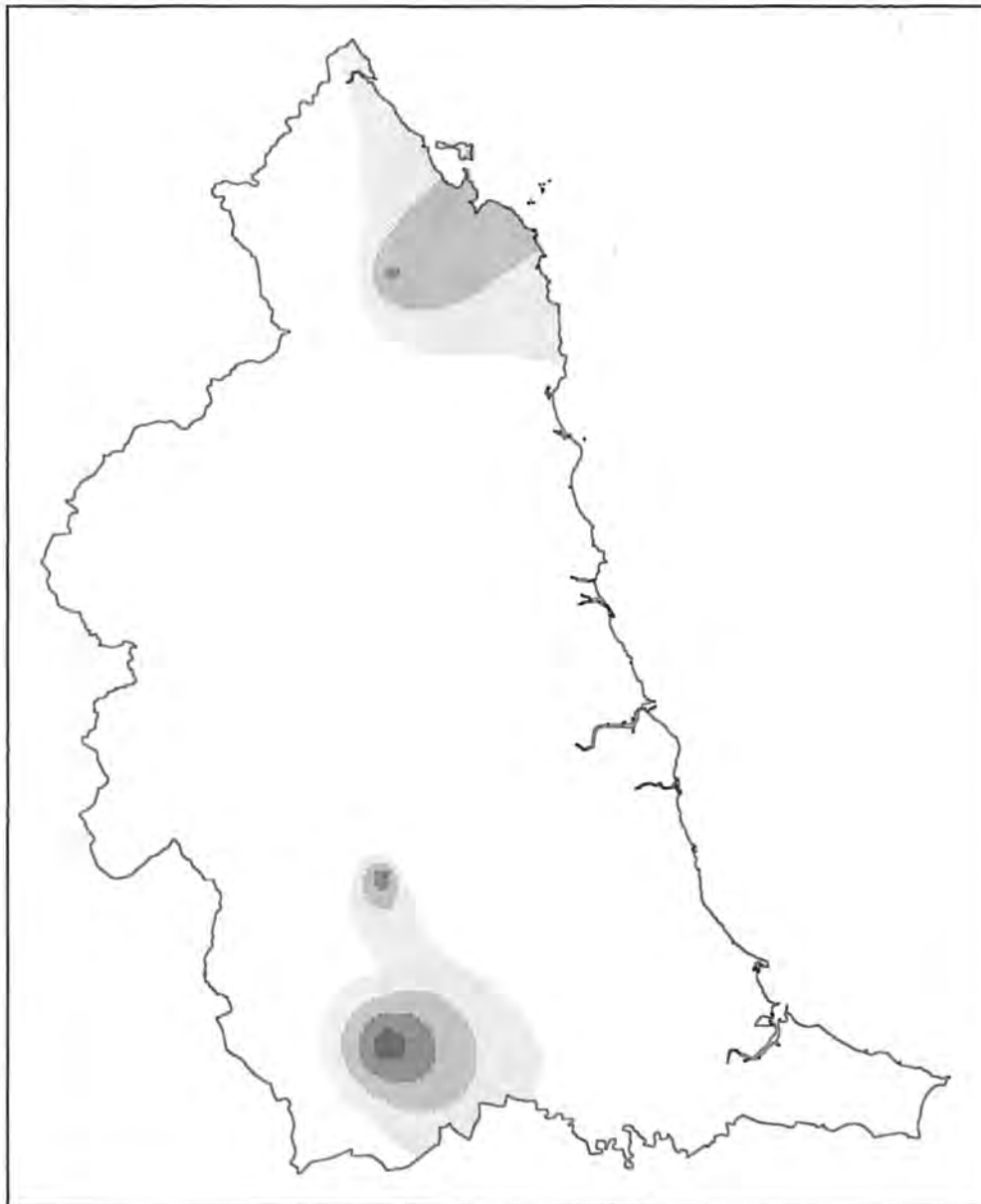
Leguminosae

3800 – 3300 cal. BC







Pollen values expressed as %tdlp

Figure 7.2.16 Interpolated pollen map of *Plantago* pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

The “bullseye” effect created around two sites with unusually high levels of *Plantago* in this period (exceeding 3% at Trickle Wood in northern Northumberland and 4.9% at Goosetarn Beck in mid Teesdale) conceals the fact that *Plantago* appears at a large number of sites across the region in this period. It appears in smaller amounts at several sites in the Durham lowlands and on the coast at Hartlepool (0.2-0.8% tdlp) and also appears at a larger number of sites in the uplands.



Key:

-  <1%
-  1 -2%
-  2 -3%
-  3 -4%
-  4 -5%
-  >5%

Plantago

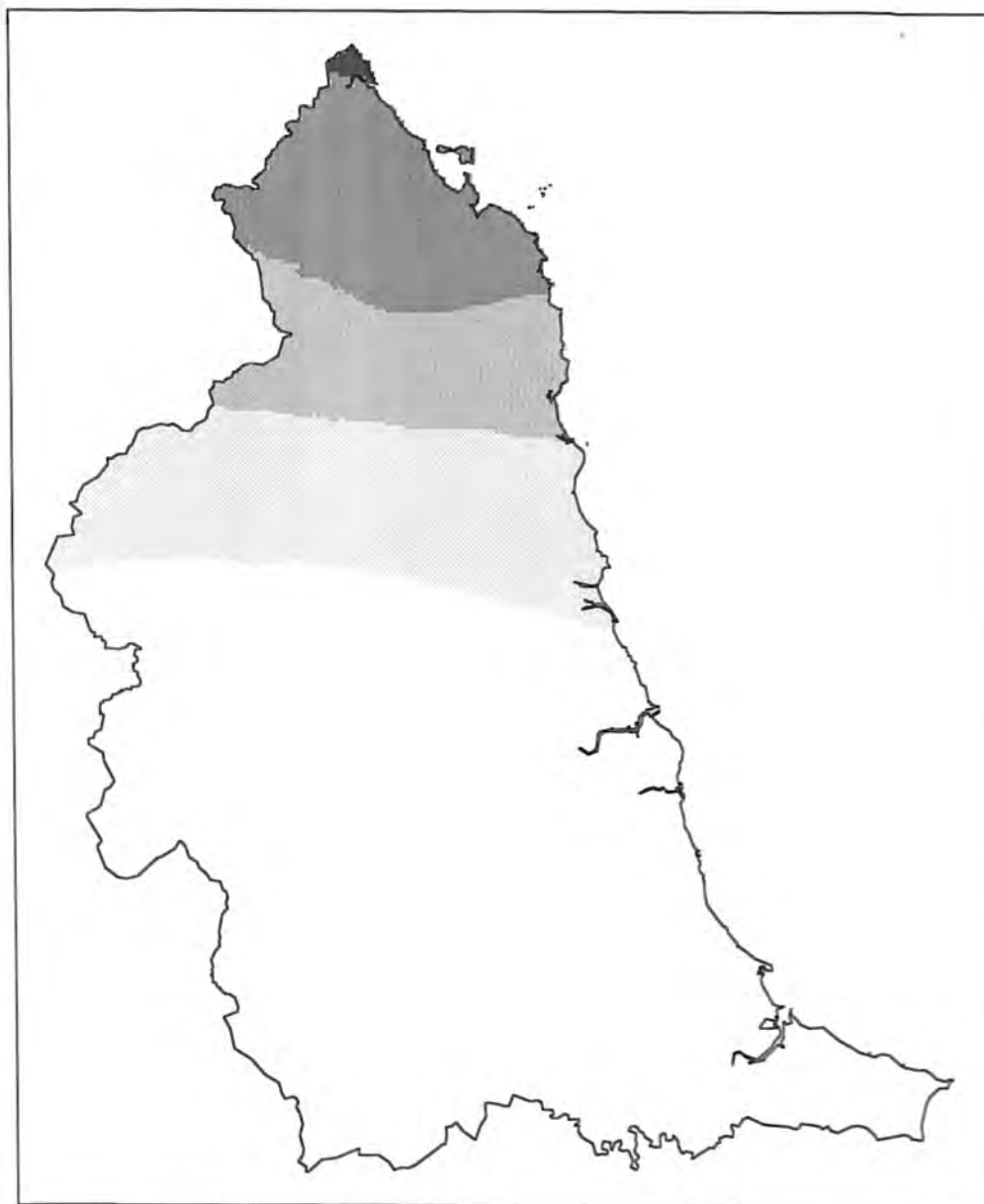
3800 -3300 cal. BC

Pollen values expressed as %tdlp









Figure 7.2.17 Interpolated pollen map of *Polygonum* pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

As in the previous period (Fig. 7.1.50), the highest interpolated values for *Polygonum* occur in the north of the region, but in this period they increase, with a value of 0.17% tdlp recorded at Trickle Wood. *Polygonum* is also recorded at similar levels at two sites in upper Teesdale, but since there are a large number of sites in the area with no *Polygonum*, they do not show up on the interpolated map.



Key:

-  < 0.01%
-  0.01% – 0.02%
-  0.02% – 0.03%
-  0.03% – 0.04%
-  0.05% – 0.06%
-  > 0.06%



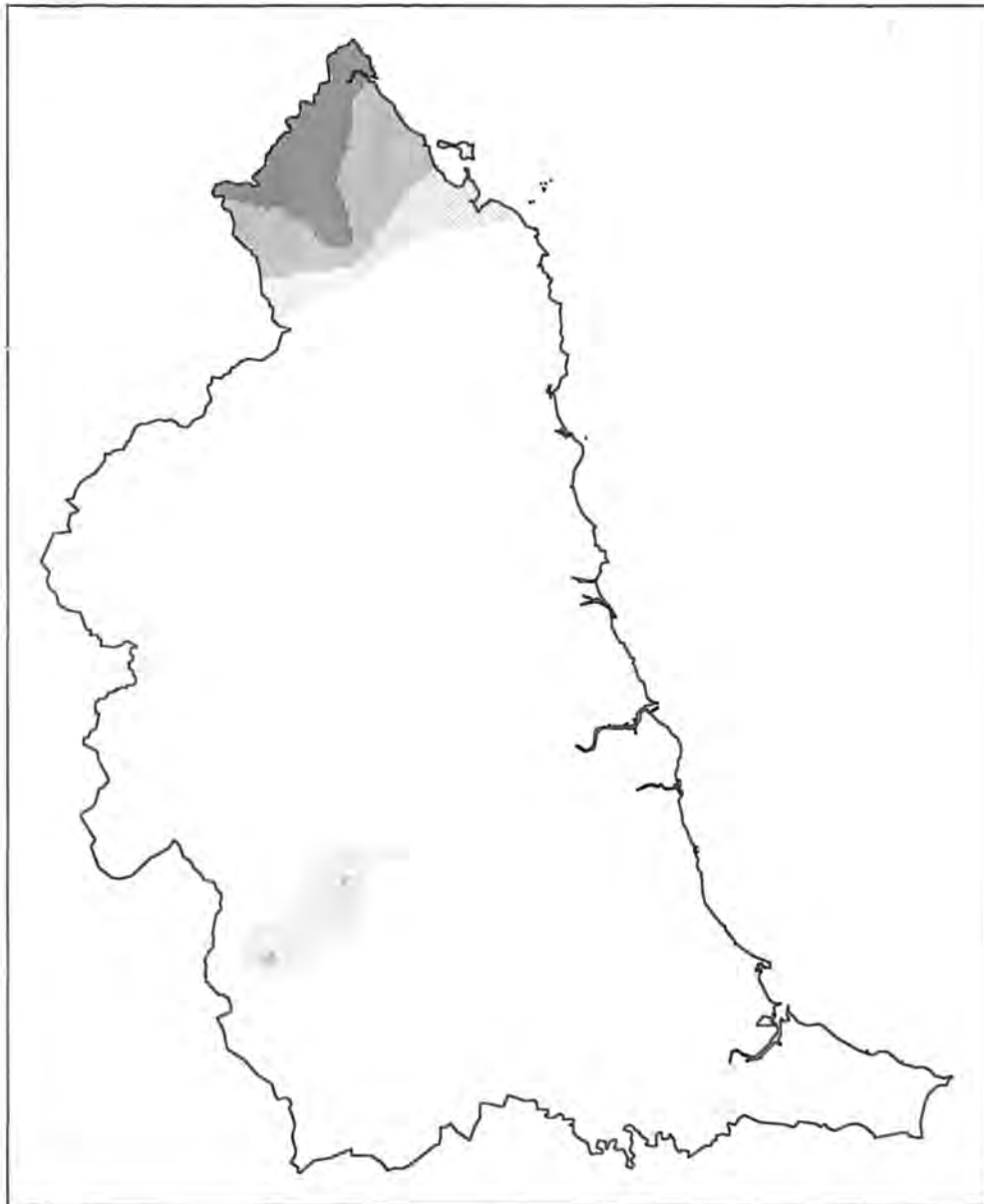
Polygonum

3800 – 3300 cal. BC







Pollen values expressed as %tdlp

Figure 7.2.18 Interpolated pollen map of Ranunculaceae pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

High values for Ranunculaceae continue to occur in the north of Northumberland, but in this period there is a further increase in values to 3.2% at Akeld Steads. Ranunculaceae also continues to occur in the upper Derwent area, and increases in this period to up to 2.1% at Burnhope Burn and 1.4% at Lamb Shield. Ranunculaceae continue to occur at small values in the Northern Pennine uplands, with an unusually high value of 2.3% occurring at Harthope Moss. It also occurs at low levels in the Durham lowlands.



Key:

-  <1%
-  1-2%
-  2-3%
-  3-4%
-  4-5%
-  >5%



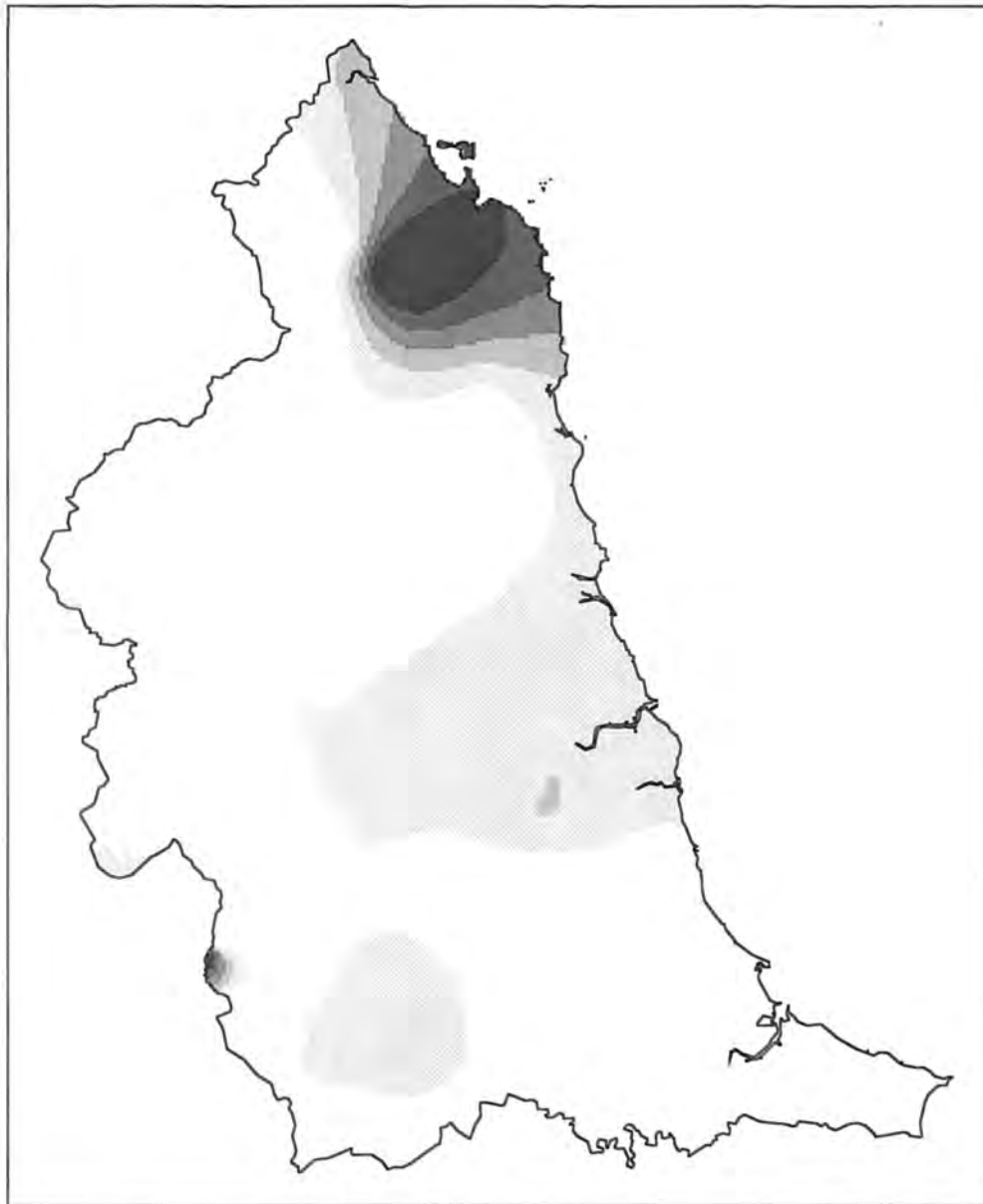
Ranunculaceae

3800 -3300 cal. BC

Pollen values expressed as %tdlp

Figure 7.2.19 Interpolated pollen map of *Rumex* pollen values for the earlier Neolithic period, 3800 - 3300 cal. BC

The map of *Rumex* for this period differs from previous periods in that although high values continue to occur in upper Teesdale (rising to 2% at some sites), as before, the occurrence of unusually high levels of *Rumex* at Trickle Wood in northern Northumberland has resulted in a ‘bullseye’. *Rumex* also occurs at slightly lower values than found in the above areas at Cranberry Bog in the Tyne lowlands.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



Rumex

3800 – 3300 cal. BC

Pollen values expressed as %tdlp

Later Neolithic period:

2800 - 2300 cal. BC

List of Figures and Tables for the later Neolithic period, 2800 - 2300 cal. BC

Tables

Table 7.2.2	Summary of trends in pollen maps for the later Neolithic period.	174
-------------	--	-----

Figures

Fig. 7.1.20	Map showing locations of pollen cores used to create interpolated maps for the period 2800 - 2300 cal. BC	176
-------------	---	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.2.21	Interpolated pollen map of averaged total tree pollen values.	178
-------------	---	-----

Fig. 7.2.22	Interpolated pollen map of total shrub pollen values.	180
-------------	---	-----

Fig. 7.2.23	Interpolated pollen map of total herb pollen values.	182
-------------	--	-----

Fig. 7.2.24	Interpolated pollen map of total Ericaceae pollen values.	184
-------------	---	-----

b) Agricultural: arable index map

Fig. 7.2.25	Interpolated pollen map of agricultural:arable index scores.	186
-------------	--	-----

c) Maps of selected individual herb taxa

Fig. 7.2.26	Interpolated pollen map of Gramineae pollen values.	188
-------------	---	-----

Fig. 7.2.27	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	190
-------------	---	-----

Fig. 7.2.28	Interpolated pollen map of <i>Artemisia</i> pollen values.	192
-------------	--	-----

Fig. 7.2.29	Interpolated pollen map of Caryophyllaceae pollen values.	194
-------------	---	-----

Fig. 7.2.30	Interpolated pollen map of <i>Centaurea</i> pollen values.	196
-------------	--	-----

Fig. 7.2.31	Interpolated pollen map of Chenopodiaceae pollen values.	198
-------------	--	-----

Fig. 7.2.32	Interpolated pollen map of Compositae pollen values.	200
-------------	--	-----

Fig. 7.2.33	Interpolated pollen map of Cruciferae pollen values.	202
-------------	--	-----

Fig. 7.2.34	Interpolated pollen map of Leguminosae pollen values.	204
-------------	---	-----

Fig. 7.2.35	Interpolated pollen map of <i>Plantago</i> pollen values.	206
-------------	---	-----

Fig. 7.2.36	Interpolated pollen map of <i>Polygonum</i> pollen values.	208
-------------	--	-----

Fig. 7.2.37	Interpolated pollen map of Ranunculaceae pollen values.	210
-------------	---	-----

Fig. 7.2.38	Interpolated pollen map of <i>Rumex</i> pollen values.	212
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Table 7.2.2 Summary of trends in pollen maps for the later Neolithic period, 2800 - 2300 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.2.21 to 7.2.24</p>	<p>Tree values decline slightly from the previous period, to 40-60%, with a slight increase in shrubs. Herb values rise at several sites compared to the preceding period. At Bishop Middleham it rises to 36% and Mordon Carr 28%, whilst at Hutton Henry and Cranberry Bog levels lie around 10-15%. On the coast tree pollen declines to 41%, but there is no increase in shrubs. Here herb pollen rises to 49%. Ericaceae levels are low at all sites.</p> <p>At Neasham Fen shrub levels do increase slightly, as at other sites, to 43%, with a slight decline in tree values. However, overall arboreal pollen remains very high, and herb pollen lies at 1%.</p>	<p>Tree pollen values increase at many sites, at Hallowell Moss to 91% and at Pow Hill to 73%, whilst other sites maintain their high levels. The remaining pollen at these sites is made up mostly of shrubs, with only very little herb and almost no Ericaceae pollen.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.2.25</p>	<p>Scores for the index are highest in this area, with 80% at Hartlepool, 71% at Cranberry Bog, 52% at Hutton Henry, 50% at Bishop Middleham and 48% at Mordon Carr. The 99% score at Neasham is because <i>Artemisia</i>, an "arable-type" is the only herb in this period.</p> <p>At most sites both total arable and total pastoral-type herbs see an increase.</p>	<p>Hallowell Moss and Lamb Shield both have low index scores of 0%, indicating an absence of arable-types. Pastoral types are only present in small amounts also, and are dominated by grasses and Ranunculaceae.</p> <p>At Pow Hilland Burnhope Burn index scores are extremely high, indicating that herbs are made up almost entirely of "arable-types", Cruciferae and <i>Artemisia</i>.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.2.26 to 7.2.38</p>	<p>Gramineae levels drop at Bishop Middleham and Hutton Henry to 2%, and remains very low at Neasham. At Mordon Carr it rises to 8%, and to 23% at Hartlepool Bay 4. <i>Cerealia</i>-type pollen continues at Mordon Carr and appears, together with <i>Rumex</i>, and a rise in <i>Plantago</i> at Hutton Henry. <i>Centaurea</i> appears at Cranberry Bog.</p>	<p>At Hallowell Moss Gramineae drop to even lower levels and Compositae disappear. At Pow Hill Ranunculaceae and Chenopodiaceae disappear/ At Burnhope Burn <i>Plantago</i> disappears. Ranunculaceae increases to 1.4% at Lamb Shield, but all other herbs and Gramineae remain unchanged.</p>

Table 7.2.2 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.2.21 to 7.2.24</p>	<p>Trees are high at many sites, up to 83% at Camp Hill Moss and 69% at Akeld Steads. Shrubs remain the same as before, between 10-30%. Herbs decline markedly at all sites, from 62-22% at Akeld Steads and 42-20% at Tricklely Wood. The unusually low trees at Tricklely Wood (9%) are due to extremely high Ericaceae(80%). High Ericaceae is also found at Black Lough, but is very low elsewhere. In southern Northumberland herb values are higher, between 30-40% at Fellend Moss and Coom Rigg.</p>	<p>Tree values remain similar to the previous period, between 20-50%, but overall at lower levels than the lowlands. Shrub levels remain between 20-40%, but drop slightly at several sites. Herbs drop at most sites below 20%, with the exception of Cronkley Pastures (42%) and Dead Crook (28%). At most sites Ericaceae increase with values around 30% being common at upland sites. Levels over 40% are found at Shivery Hill and Black Band.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.2.25</p>	<p>Index scores are very low at most sites in northern Northumberland indicating a predominance of pastoral-type herbs; 6% at Akeld Steads, and 0% at Camp Hill Moss and Broad Moss. However at Tricklely Wood there is a score of 42%, and an increase in arable-types. In southern Northumberland arable-types are absent at Coom Rigg and Muckle Moss, but make up 43% at Fellend Moss.</p>	<p>At many upland sites arable-type taxa are absent, such as Arngill Head Brocks, High Banks Moss, Knoutberry, Quick Moss and Whitfield Lough. In Upper Teesdale also arable-type taxa are absent from Dead Crook, Dufton Moss, Crook Burn, Tinkler's Sike and Cronkley Pastures. At Weelhead Moss, a score of 15% indicates dominance of pastoral-types.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.2.26 to 7.2.38</p>	<p>Gramineae decline at Akeld Steads and Tricklely Wood, but there is a rise in Ranunculaceae at Akeld Steads to 2.1%. At Tricklely Wood <i>Cerealia</i>-type increases to 1.4%, <i>Plantago</i> to 2.7% and <i>Rumex</i> to 1%. These sites still have a wide range of herbs. At other sites, including those in southern Northumberland, Gramineae increases to a maximum of 17% at Coom Rigg, with the appearance of <i>Plantago</i>, Ranunculaceae and <i>Rumex</i> at most sites. Caryophyllaceae and Cruciferae (up to 1.4%) appear at Fellend Moss and Muckle Moss.</p>	<p>At many upland sites only Gramineae, Ranunculaceae, <i>Rumex</i> or <i>Plantago</i> is present. Gramineae only exceeds 1% in Upper Teesdale. At Weelhead Moss Gramineae rises to 4%, with <i>Cerealia</i>-type, the appearance of <i>Centaurea</i>, and a rise in <i>Plantago</i> to 1.1%. At Fox Earth Gill Gramineae rises to 7% with the appearance of <i>Cerealia</i>-type and <i>Artemisia</i> and an increase in <i>Rumex</i>. However, at Dead Crook and Dufton Moss there is a marked decline in the range of herbs.</p>

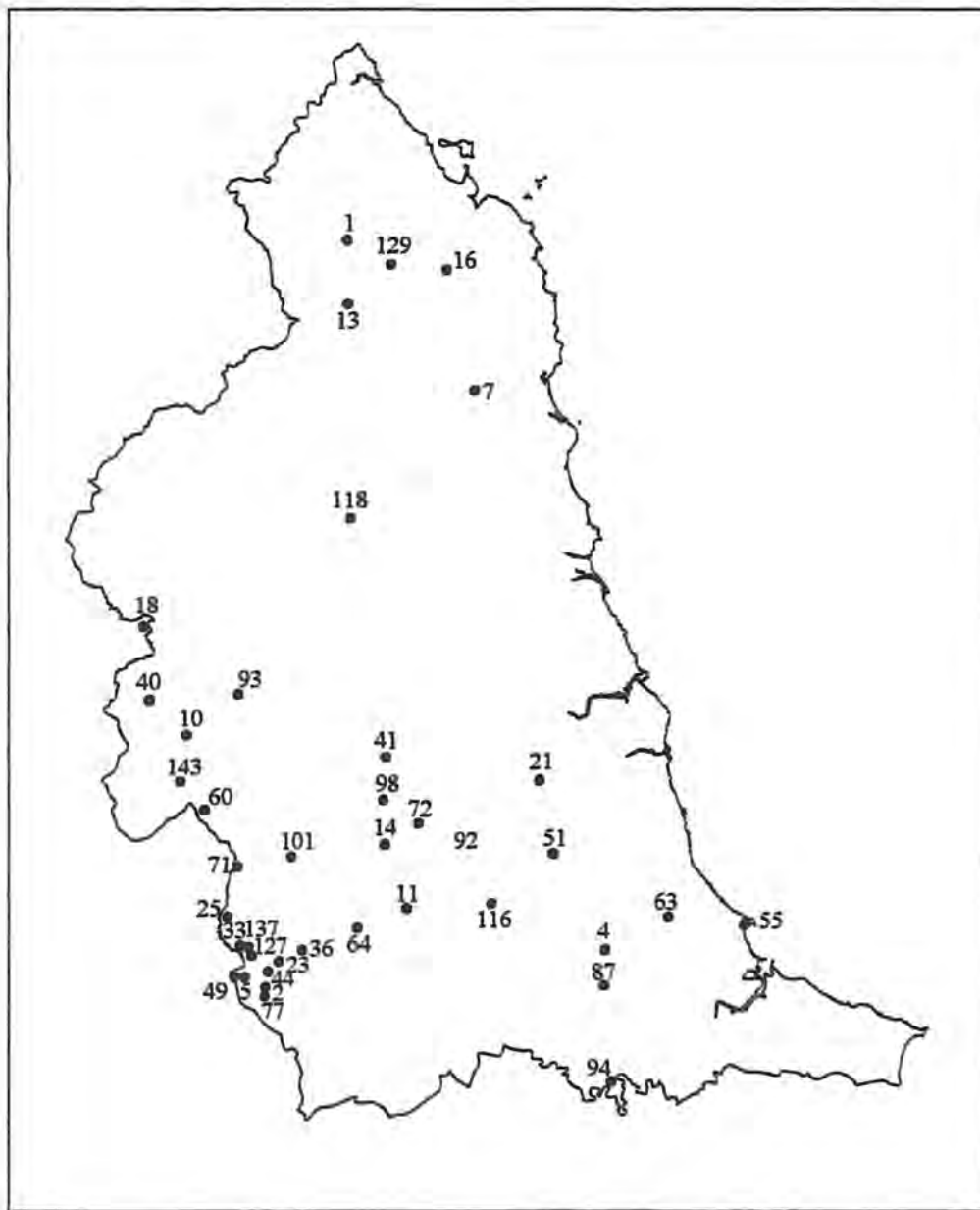


Fig. 7.2.20



Map showing locations of pollen cores used to create interpolated maps for the later Neolithic period, 2800 - 2300 cal. BC

N.B. Key to site codes on next page.

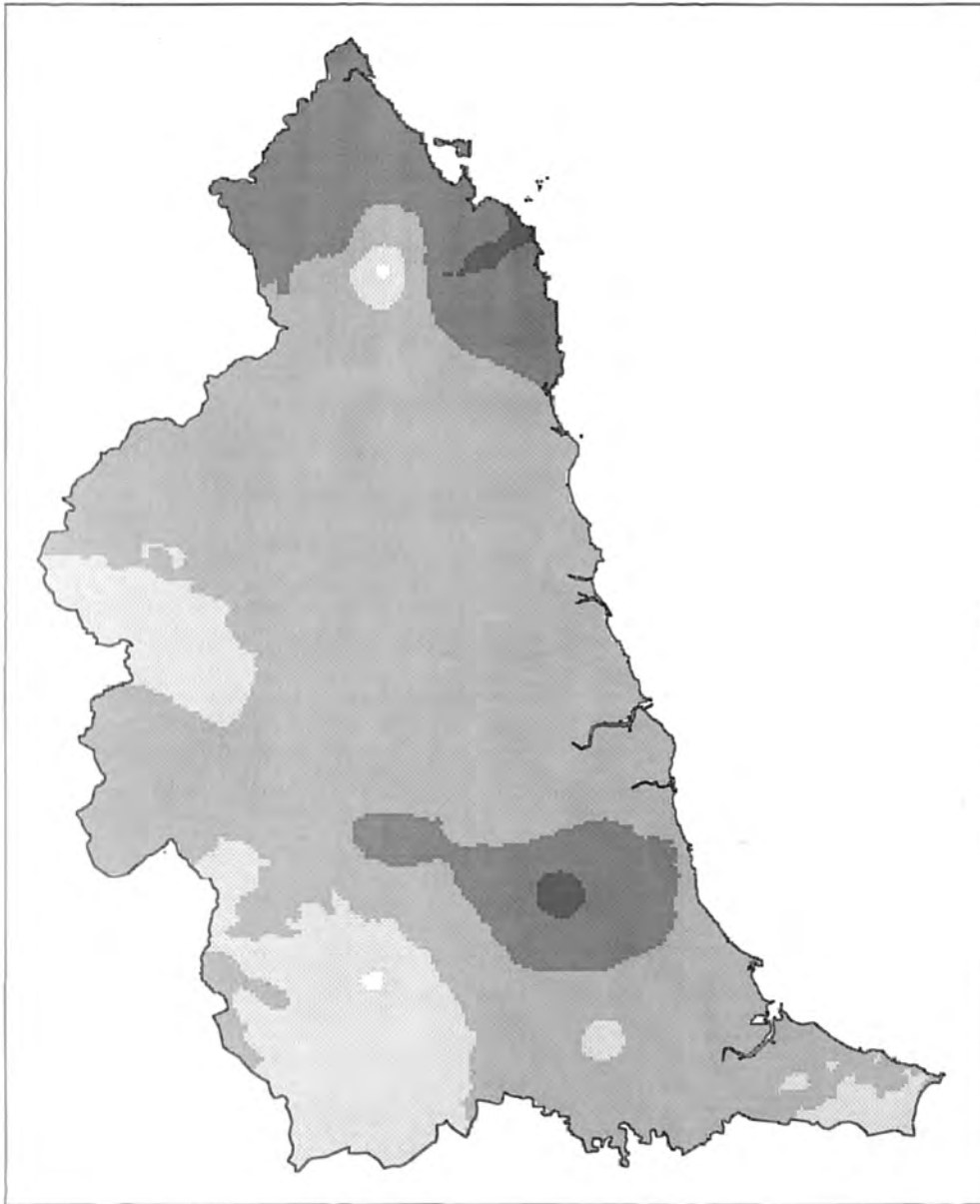
Key to Figure 7.2.20

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	60	High Banks Moss
2	Arngill Head Brocks	62	Howden Moss
4	Bishop Middleham	63	Hutton Henry
5	Black Band	64	James' Hill
7	Black Lough	71	Knoutberry
10	Blackshiel Bog	72	Lamb Shield
13	Broad Moss	77	Long Crag
14	Burnhope Burn	87	Mordon Carr
16	Camp Hill Moss	93	Muckle Moss
18	Coom Rigg	94	Neasham Fen
21	Cranberry Bog	98	Pow Hill
23	Cronkley Pastures	101	Quick Moss
25	Crook Burn	116	Stanley Moss
33	Dead Crook	118	Steng Moss
36	Dufton Moss	127	Tinkler's Sike
40	Fellend Moss	129	Trickley Wood
41	Fortherley Moss	138	Weelhead Moss
44	Fox Earth Gill	143	Whitfield Lough
49	Greenmines		
51	Hallowell Moss		
55	Hartlepool Bay 4		

Figure 7.2.21 Interpolated pollen map of tree pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Tree pollen values remain very similar to the previous period across the region (Fig. 7.2.2), although there is a marked increase in tree values at many sites in northern Northumberland to up to 83% tdlp at Camp Hill Moss (although unusually low levels of 9% occur at Trickle Wood). Apart from this, tree values remain highest in the upper Derwent and mid Weardale area, as before, and increase further at some sites in this area, to 91% at Hallowell Moss. Tree values remain between 20-50% across the rest of the region.



Key:

-  0 – 20%
-  20 – 40%
-  40 – 60%
-  60 – 80%
-  80 – 100%



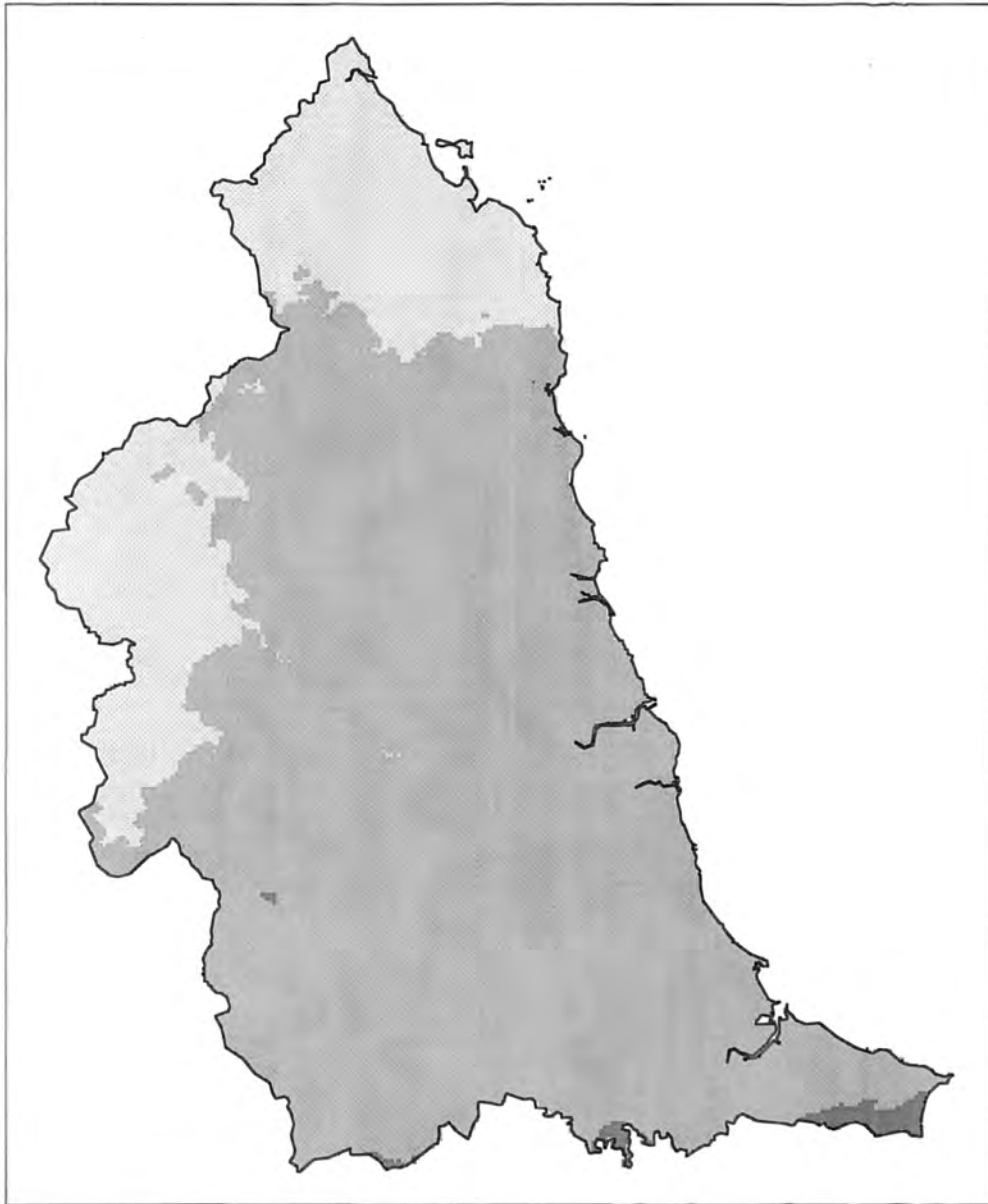
Trees

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.22 Interpolated pollen map of shrub pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Compared to the previous period (Fig. 7.2.3) shrub values decline slightly in the uplands at several sites and increase slightly at sites in the Durham lowlands. Correspondingly, the interpolated map shows a shift in emphasis from the uplands to the Durham lowlands, with values between 20-30% tdlp common in the uplands, and slightly higher, between 30-40% in the lowlands. Shrubs also decline slightly at northern Northumberland sites, with the increase in trees at many of these sites and Ericaceae at others.



Key:

- 0 – 10%
- ◻ 10 – 20%
- ◻ 20 – 30%
- ◻ 30 – 40%
- ◻ 40 – 50%
- ◼ > 50%



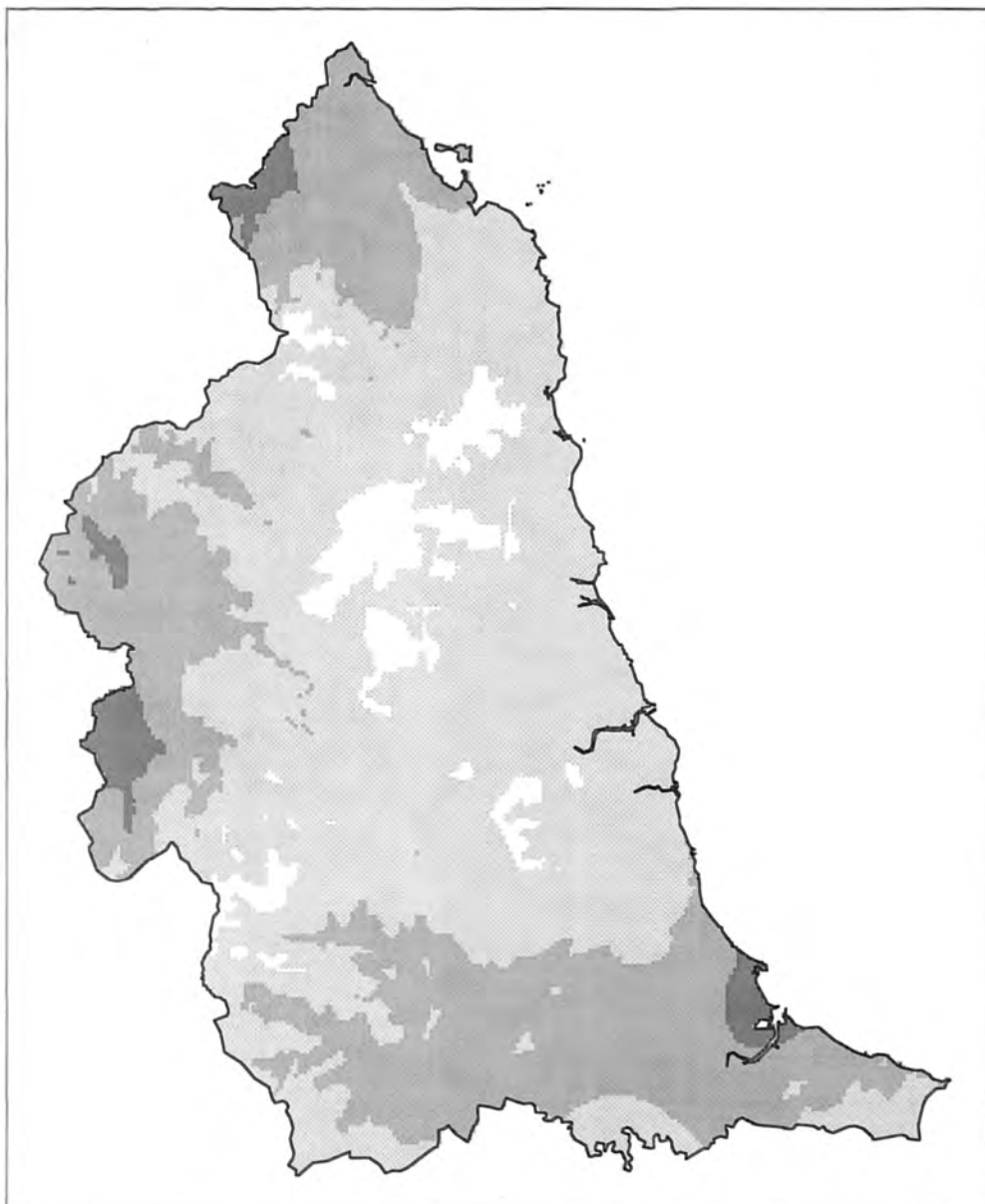
Shrubs

2800 – 2300 cal. BC




Pollen values expressed as %tdlp.

Figure 7.2.23 Interpolated pollen map of herb pollen values for the later Neolithic period, 2800 - 2300 cal. BC

The map for herbs is very similar to the previous period (Fig. 7.2.4) with the highest herb values occurring in the north of the region and in the Durham lowlands and high, but somewhat lower; values occurring in upper Teesdale. Compared to the previous period, however, there is a marked decline in herb values at all sites in northern Northumberland from around 60% tdlp down to 20%, whilst in the Durham lowlands herb values increase at several sites from values under 10% to over 30%. Herb pollen levels drop at many upland sites, with the exception of a few sites in upper Teesdale, to below 20%. Herb pollen remains very low in the upper Derwent and mid Weardale area, as before.



Key:

-  0 - 10%
-  10 - 20%
-  20 - 30%
-  30 - 40%
-  40 - 50%
-  > 50%



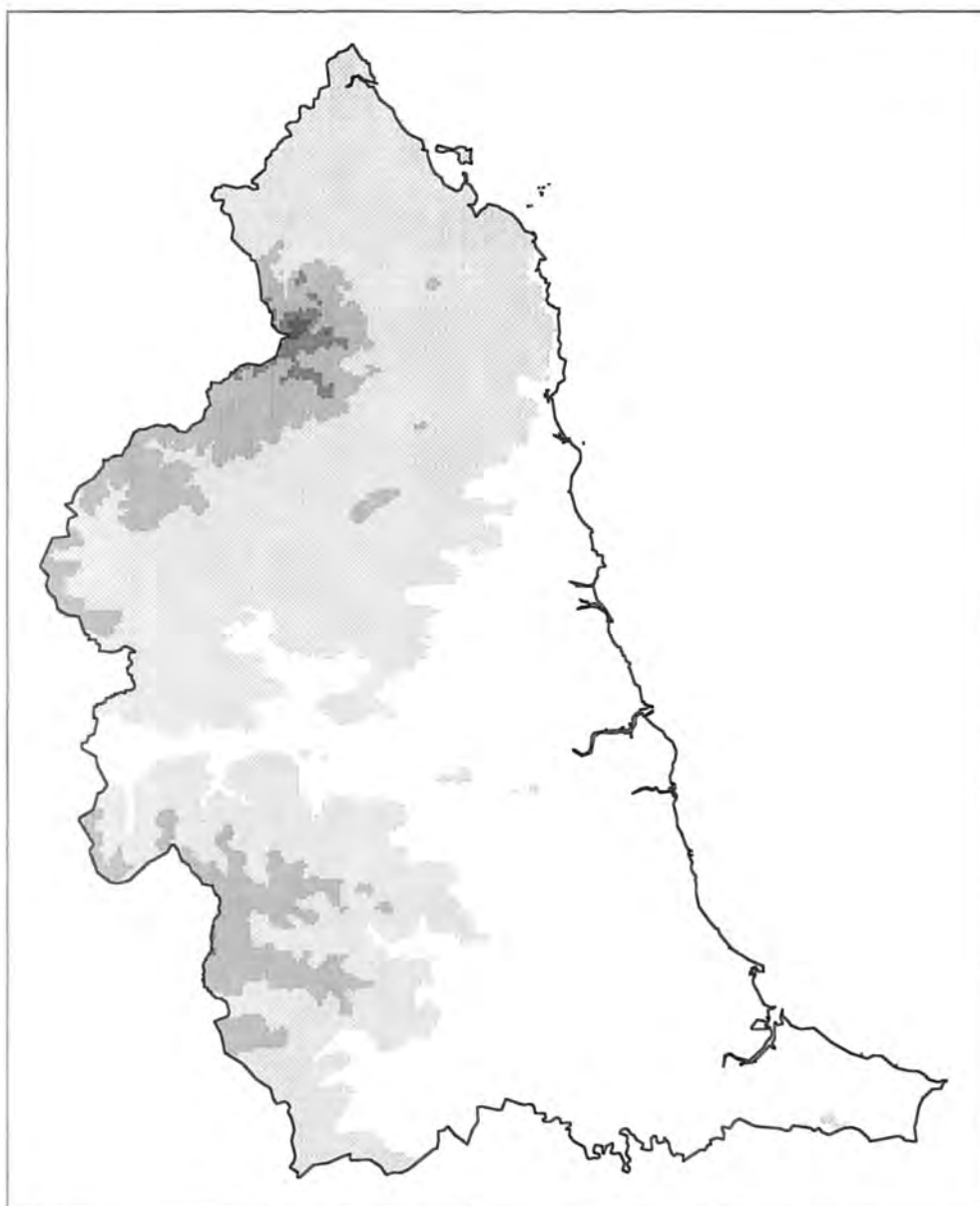
Herbs

2800 - 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.24 Interpolated pollen map of Ericaceae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Ericaceae values increase further at sites in the uplands both in the Northern Pennines and in Northumberland, from the previous period (Fig. 7.2.5) and also Ericaceae values exceeding 10% spread further eastwards across the region from the previous period. Values over 30% are now common in the uplands of the Northern Pennines, with values over 40% occurring at a couple of sites at the highest elevations. Extremely high Ericaceae levels of 80% occur at Trickle Wood in northern Northumberland but they are much lower elsewhere in this area.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



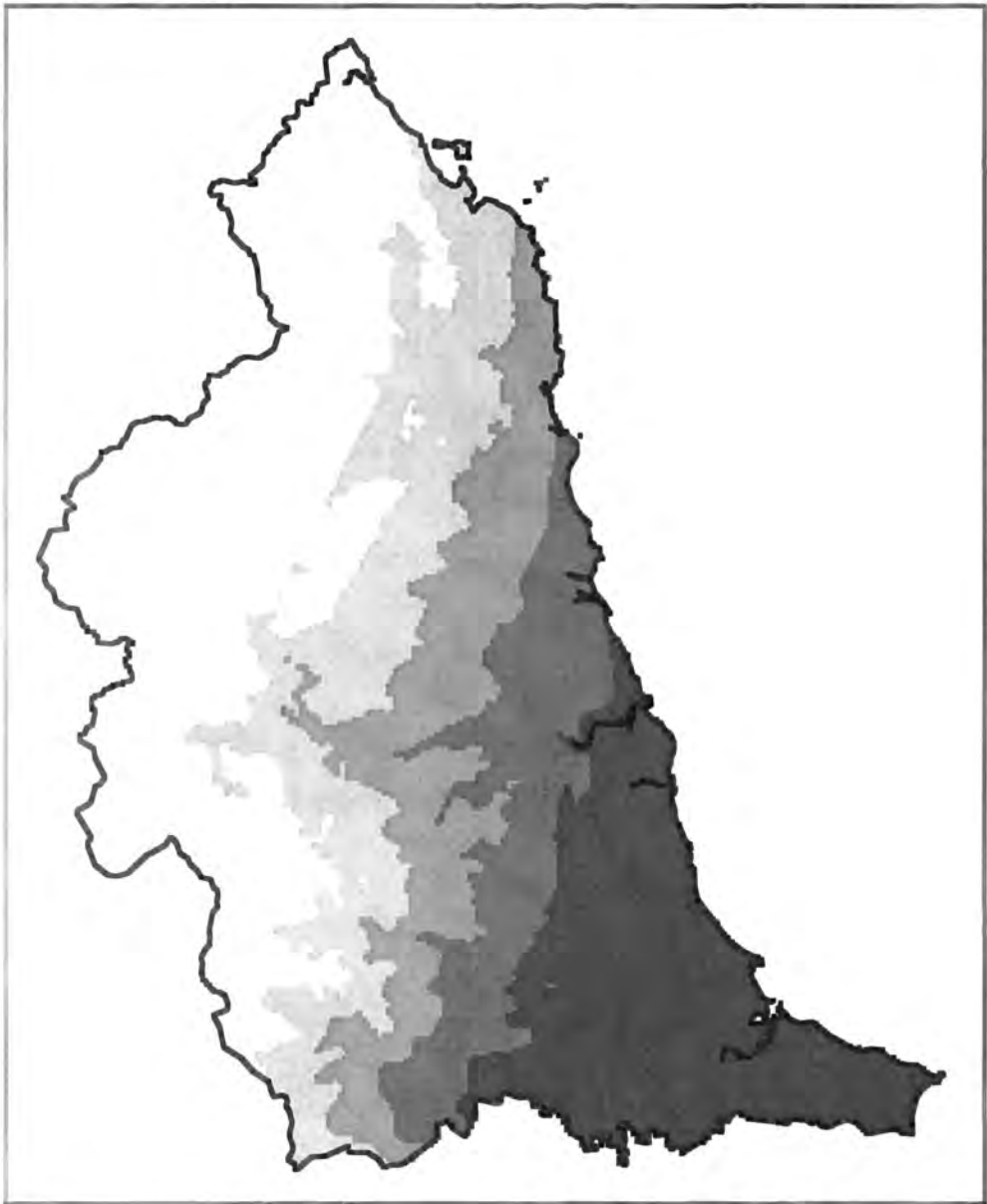
Ericaceae

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.25 Interpolated pollen map of agricultural: arable scores for the later Neolithic period, 2800 - 2300 cal. BC

As in the map for the previous period (Fig. 7.2.6), arable scores are highest in the lowlands of the region, but in this period very high arable scores are found at a higher number of lowland sites than before, when arable scores were only found on the coast. Scores exceeding 70% occur at Neasham Fen, Cranberry Bog and at Hartlepool, and over 50% at other Durham lowland sites. Elsewhere, including in upper Teesdale, where arable scores occurred in the previous period, non-arable types predominate.



Key:

- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- > 50%

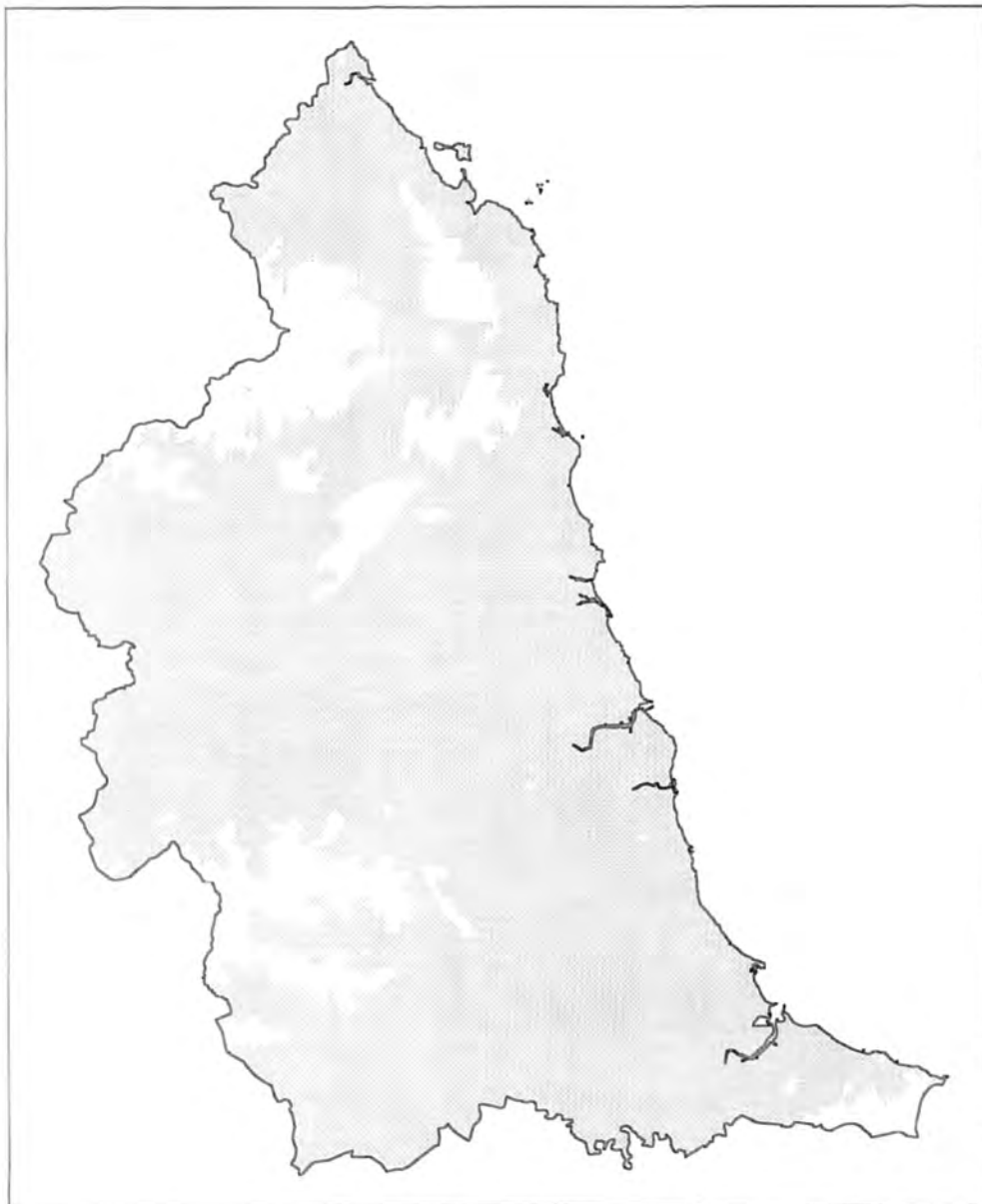


Agricultural:Arable Index







2800 - 2300 cal. BC

Figure 7.2.26 Interpolated pollen map of Gramineae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Whereas in the map for the previous period the highest Gramineae values occurred in the uplands of the region, in this period the picture is more complex, with the highest values occurring in three areas: at one site at Hartlepool (23% tdlp), at one site in the west of the Tyne Corridor (17%) and one site in upper Teesdale (30%). At all other sites in the region Gramineae values lie below 10%.



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



Gramineae

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.27 Interpolated pollen map of *Cerealia*-type pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Cerealia-type pollen occurs at five sites in this period, with the highest values once again occurring at Trickle Wood in northern Northumberland (1.4% tdlp). It also continues to occur in the Durham lowlands, with slightly higher values than before, at Hutton Henry (0.08%) and Mordon Carr (0.08%), and also occurs once more at Weelhead Moss, with higher values of 0.3%.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



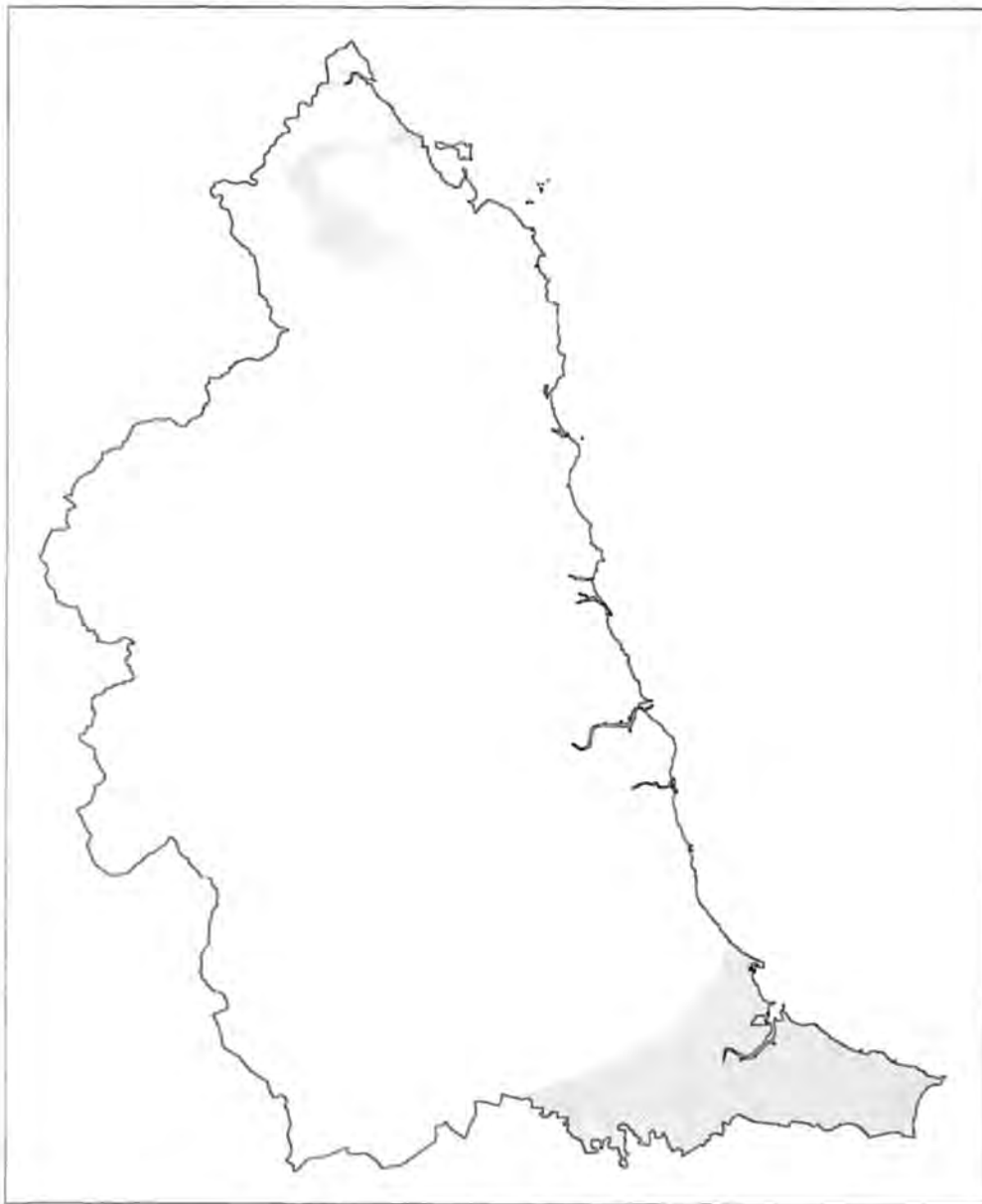
Cerealia-type

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.28 Interpolated pollen map of *Artemisia* pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Artemisia now occurs at much lower levels than found in the previous periods across the region, and the “bullseye” occurring at Cranberry Bog in the previous period (Fig. 7.2.9) now disappears. The highest values for *Artemisia* in this period are 0.2% tdlp on the coast at Hartlepool and 0.1% at Akeld Steads in northern Northumberland, where values for *Artemisia* have declined from the previous period. *Artemisia* appears at sites in the Durham lowlands, including Neasham Fen and Mordon Carr. It continues to occur at sites in the Northern Pennine uplands with values under 0.1%.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



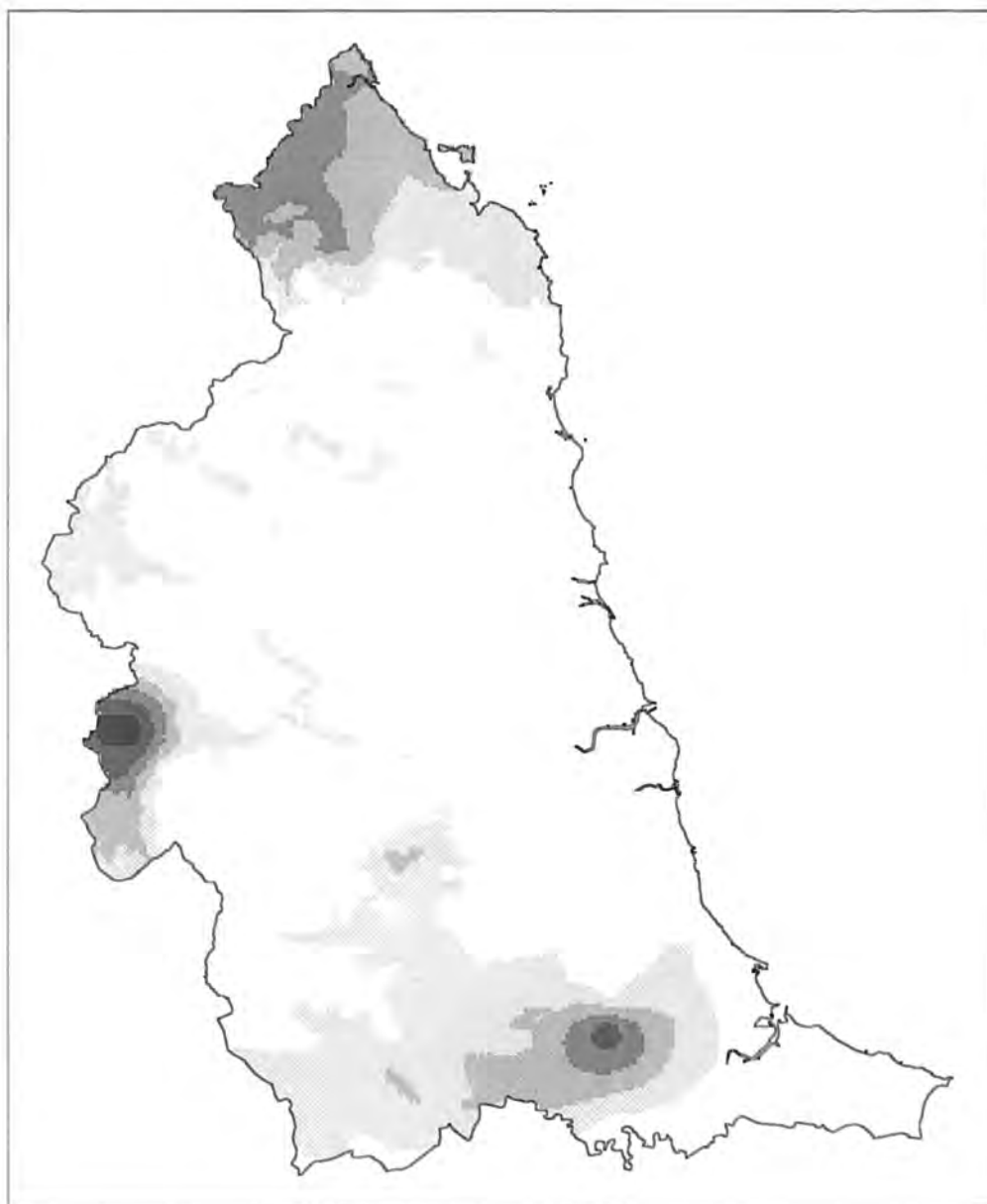
Artemisia

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.29 Interpolated pollen map of Caryophyllaceae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As in the map for the previous period (Fig. 7.2.10), the highest values for Caryophyllaceae occur in the Durham lowlands, the west of the Tyne Corridor and in northern Northumberland. In all three areas Caryophyllaceae values increase in this period. In the Durham lowlands Caryophyllaceae occur at a larger number of sites, consistently with values between 0.1-0.4% tdlp. In the west of the Tyne Corridor, Caryophyllaceae occur at Fellend Moss and Muckle Moss with values up to 0.6%, far higher than before. In northern Northumberland values rise at Akeld Steads to 0.3% and Caryophyllaceae also occur at several other sites in this area for the first time.



Key:

- 0 - 0.1%
- 0.1 - 0.2%
- 0.2 - 0.3%
- 0.3 - 0.4%
- 0.4 - 0.5%
- > 0.5%



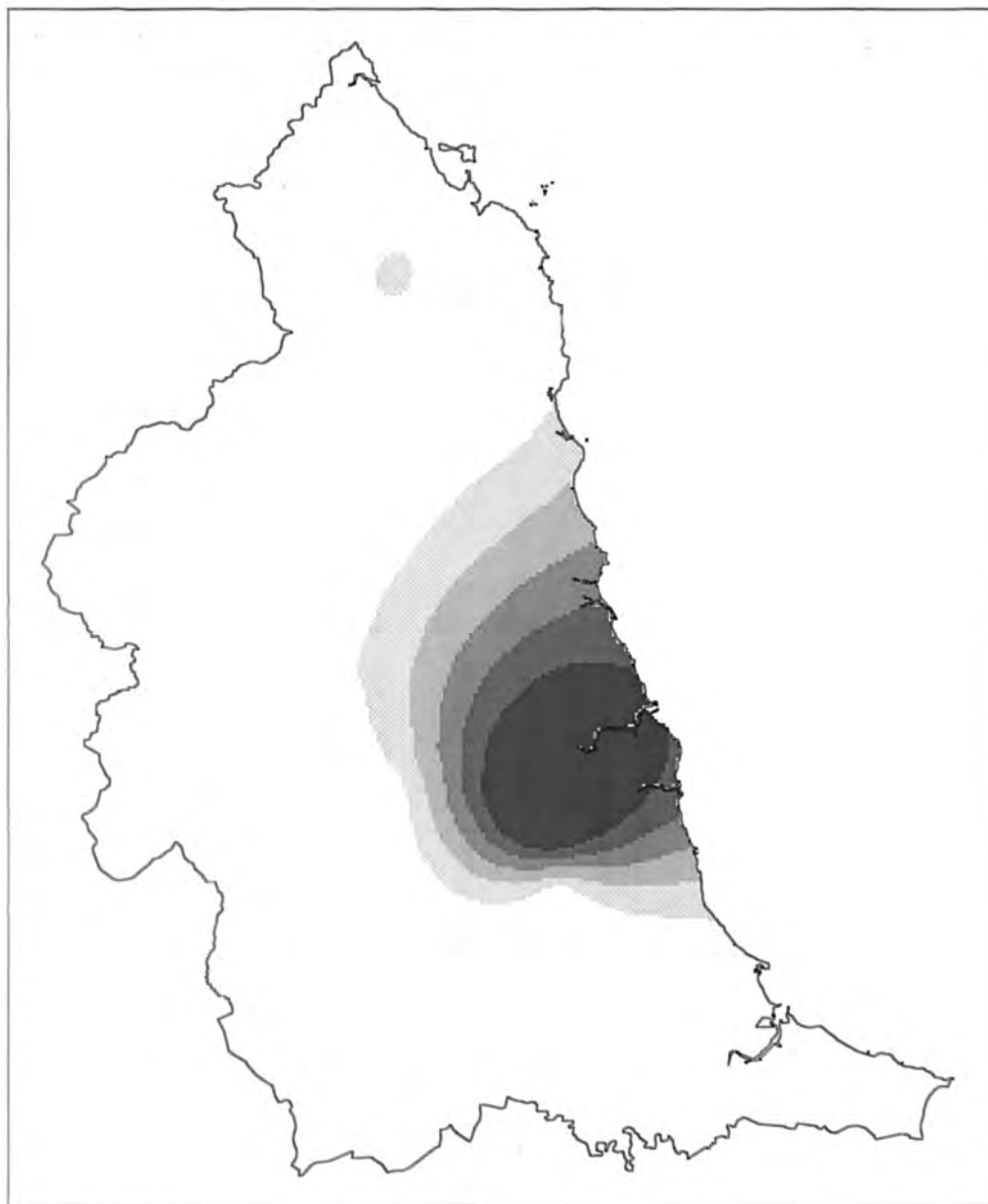
Caryophyllaceae

2800 - 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.30 Interpolated pollen map of *Centaurea* pollen values for the later Neolithic period, 2800 - 2300 cal. BC

The map for *Centaurea* for this period is dominated by unusually high values creating a “bullseye” around Cranberry Bog, which has a *Centaurea* value of 0.93% tdlp. A far lower value of 0.14% occurs at Trickle Wood in northern Northumberland, but although this does not show up on the map, this is an increase from the previous period (Fig. 7.2.11).



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



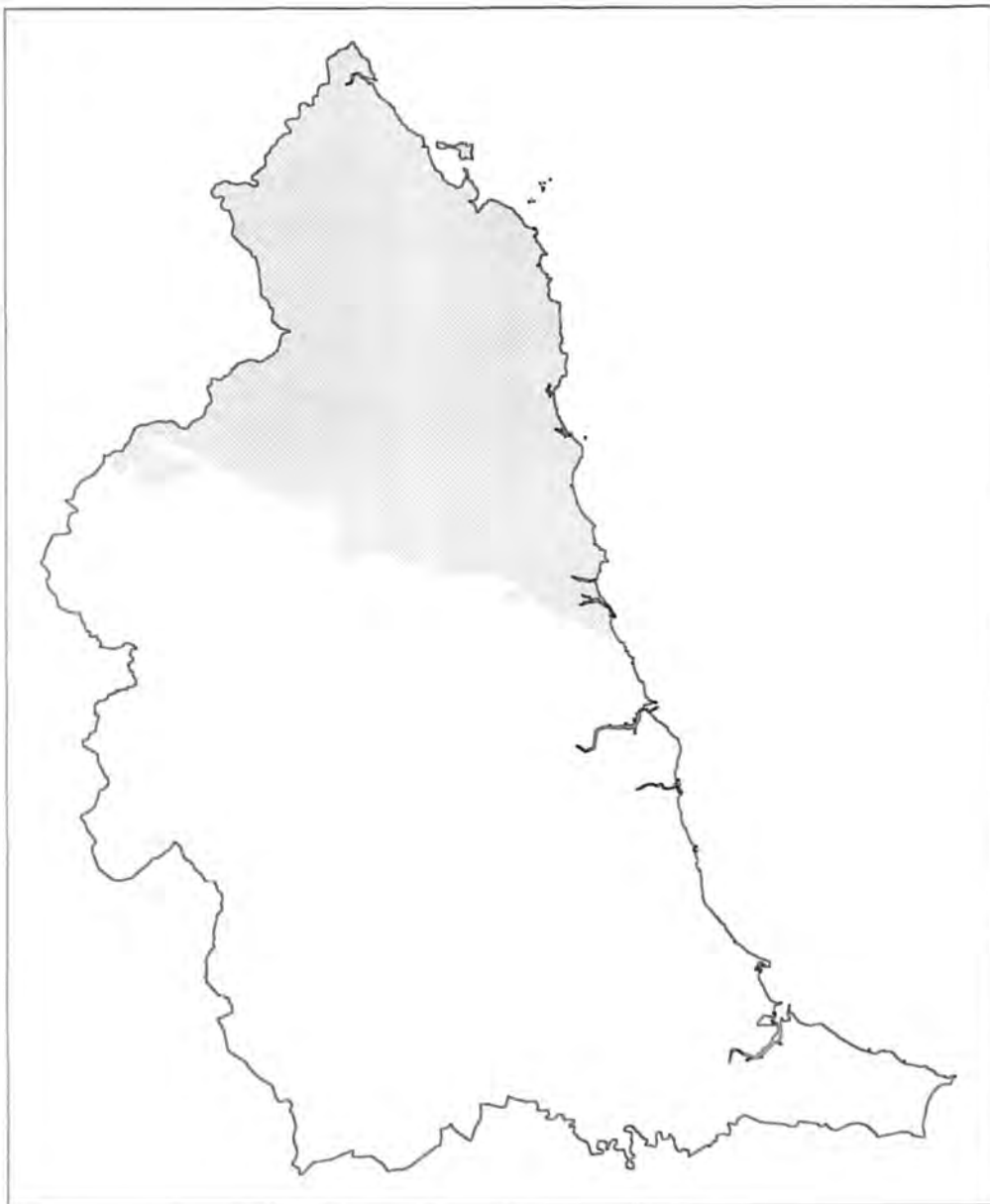
Centaurea

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.31 Interpolated pollen map of Chenopodiaceae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As in the map for Chenopodiaceae for the previous period (Fig. 7.2.12) the highest values occur in northern Northumberland, but in this period values are lower, not exceeding 0.2% tdlp. Chenopodiaceae occurs at fewer sites in this period, occurring at only two sites in upper Teesdale, with values below 0.1%, and also at Hutton Henry in the Durham lowlands, with a value of 0.1%.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



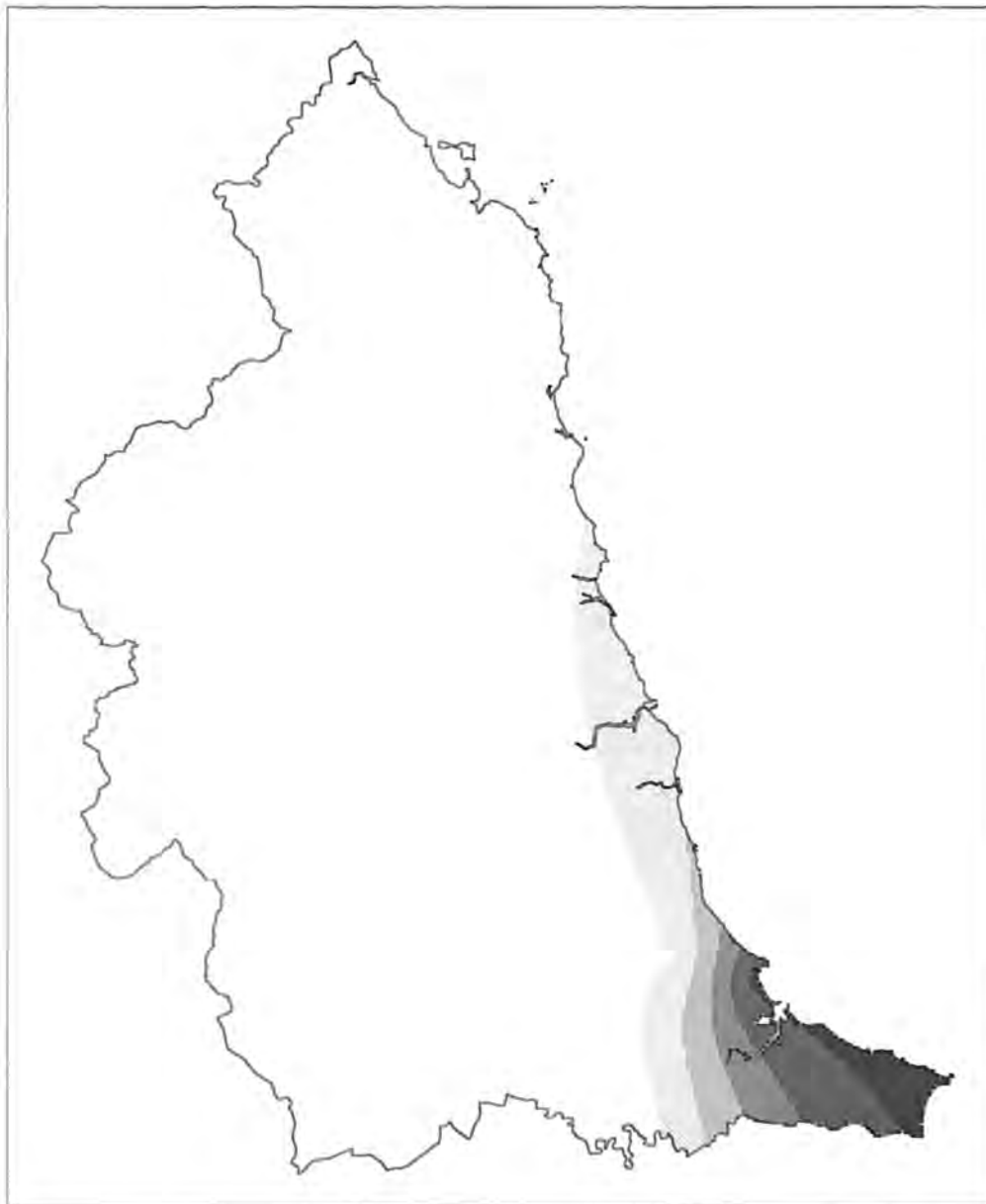
Chenopodiaceae

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.32 Interpolated pollen map of Compositae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As in the maps for previous periods (7.1.29, 7.1.46, 7.2.13), the highest values for Compositae in this period occur in the south east of the region. However, compared to the previous period there is a marked increase in values in this area. Values rise to 3.1% tdlp on the coast at Hartlepool, although at the other sites in the lowlands values range from 0.2-0.5%. Compositae does not occur elsewhere in the region, with the exception of northern Northumberland where it occurs with values below 0.2%.



Key:

-  < 0.6%
-  0.6 – 1.2%
-  1.2 – 1.8%
-  1.8 – 2.4%
-  2.4 – 3.0%
-  3.0 – 3.6%



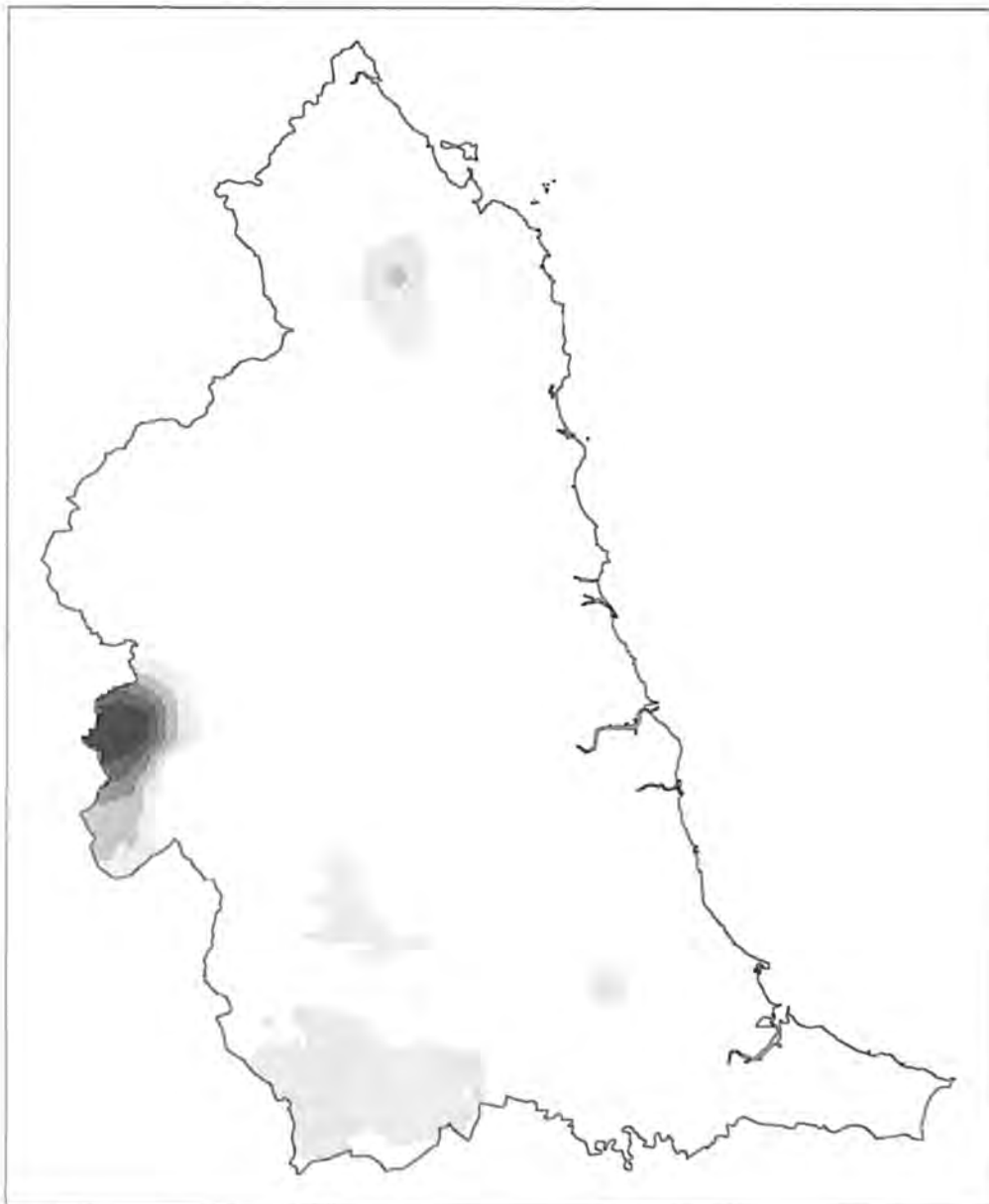
Compositae undiff.

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.33 Interpolated pollen map of Cruciferae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

The “bullseye” occurring at Fellend Moss in the west of the Tyne Corridor in the previous period continues into this period, remaining at 1.4% tdlp. A value of 0.4% occurs at Trickle Wood, but apart from this site, Cruciferae is absent from northern Northumberland. Cruciferae appear in smaller amounts in the Durham lowlands and continue at low levels (under 0.2%) in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



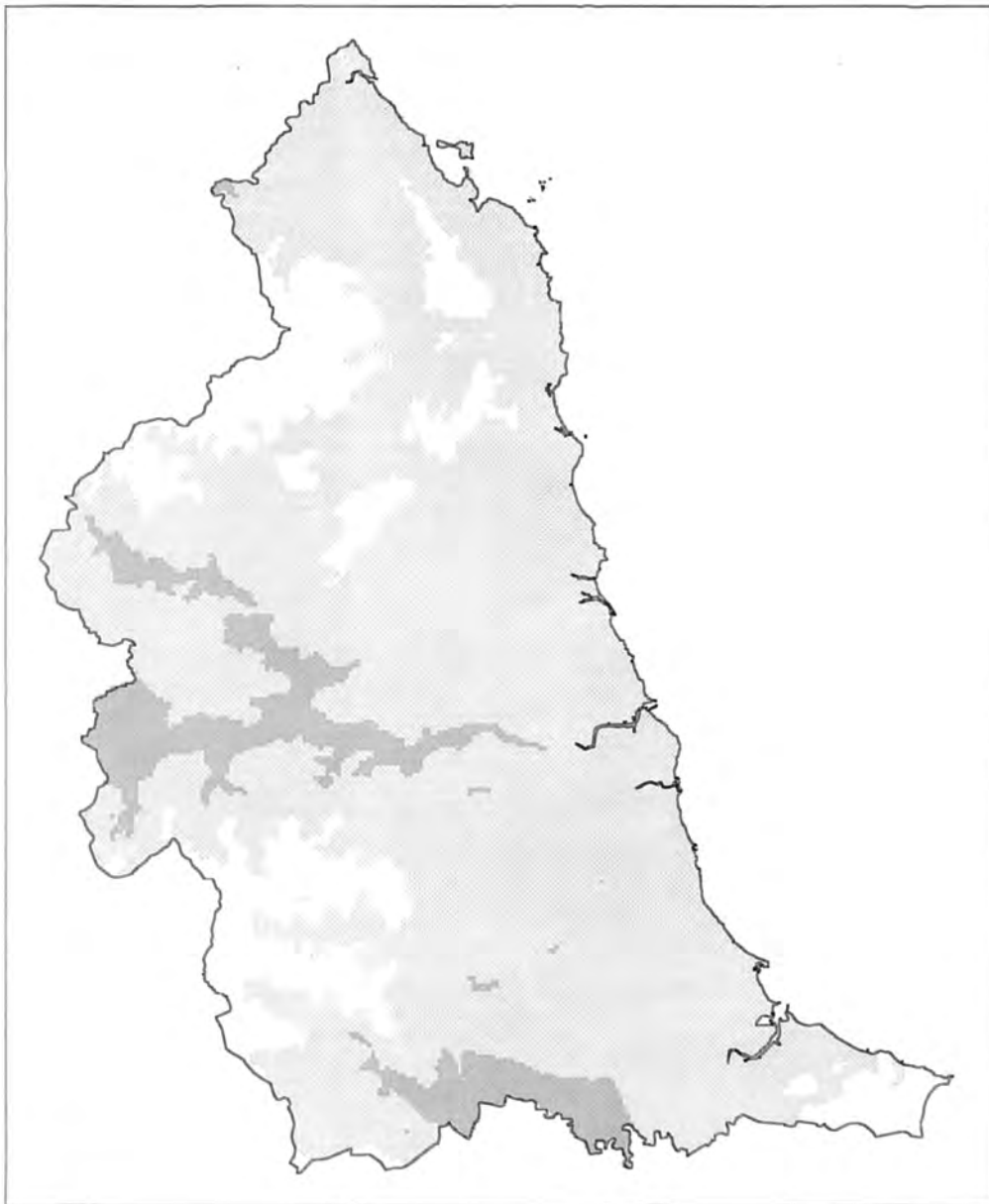
Cruciferae

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.34 Interpolated pollen map of Leguminosae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

The map for Leguminosae is similar to the previous period (Fig. 7.2.15) in that the highest values occur at sites in Teesdale, in the western Tyne Corridor and in northern Northumberland, but in these cases values have declined from the previous period down to below 0.2% at most sites and never exceeding 1.5% (an isolated high value at Cronkley Pastures in upper Teesdale). Values increase in the lowlands with Leguminosae values rising from 0.2% to 0.8%.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



Leguminosae

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.35 Interpolated pollen map of *Plantago* pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As in the previous period, the highest *Plantago* values continue to occur in the north of the region, with a value of 2.7% tdlp at Trickle Wood, slightly lower than the previous period (Fig. 7.2.16). It is present in smaller amounts, further south in Northumberland, at Coom Rigg (1%) and Steng Moss (0.2%), and also in upper Teesdale, reaching 1% at Weelhead Moss. In the Durham lowlands *Plantago* values never range from 0.2-0.7%, similar to the previous period.



Key:

-  < 0.3%
-  0.3 – 0.6%
-  0.6 – 0.9%
-  0.9 – 1.2%
-  1.2 – 1.5%
-  > 1.5%



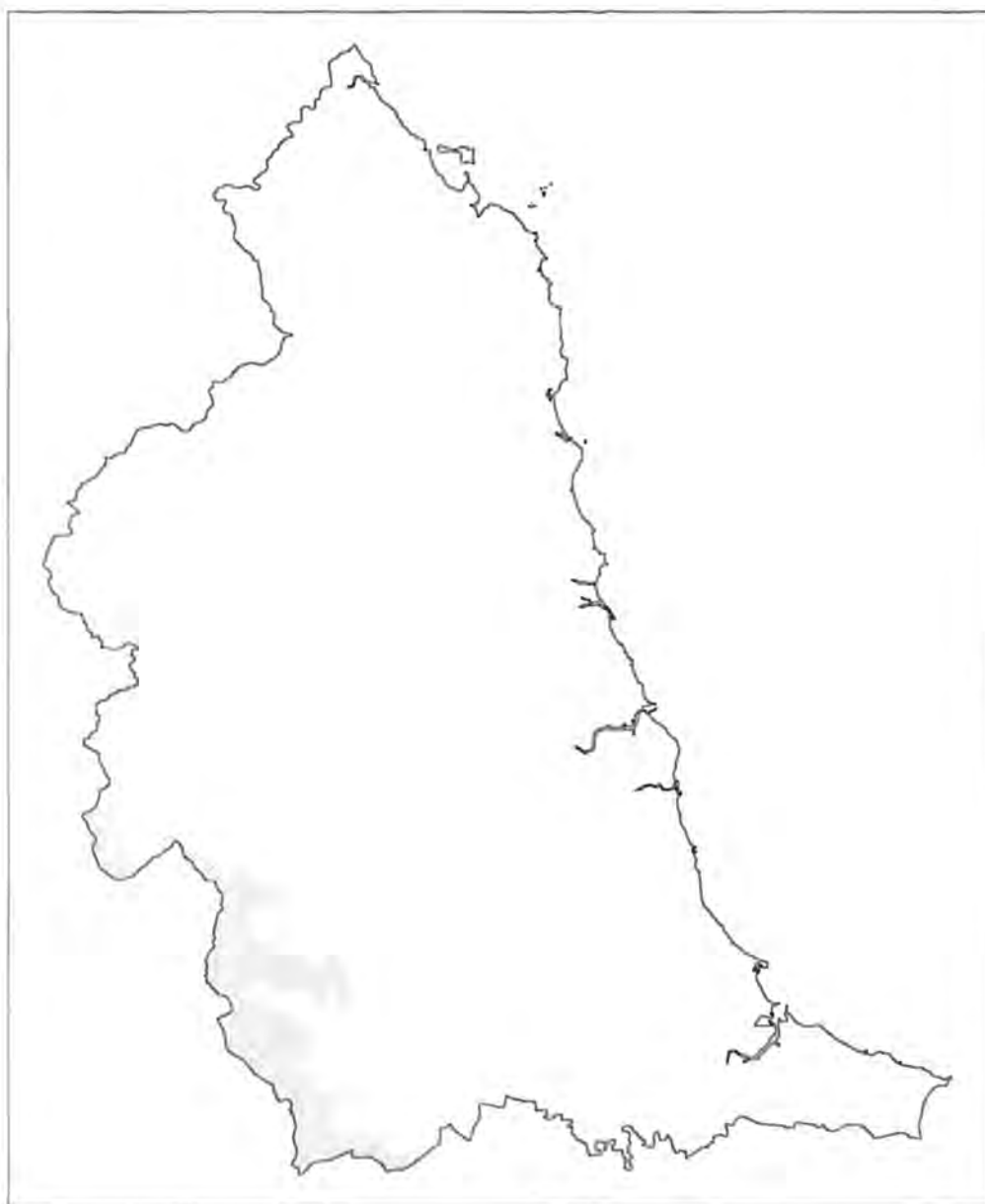
Plantago

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.36 Interpolated pollen map of *Polygonum* pollen values for the later Neolithic period, 2800 - 2300 cal. BC

Once more the interpolated map for *Polygonum* shifts emphasis from northern Northumberland back to upper Teesdale, with the highest value for *Polygonum* in this period occurring at Fox Earth Gill in upper Teesdale, with a value of 0.3% tdlp, compared to the lower value of 0.02% at Black Lough in northern Northumberland.



Key:

-  < 0.01%
-  0.01% – 0.02%
-  0.02% – 0.03%
-  0.03% – 0.04%
-  0.05% – 0.06%
-  > 0.06%



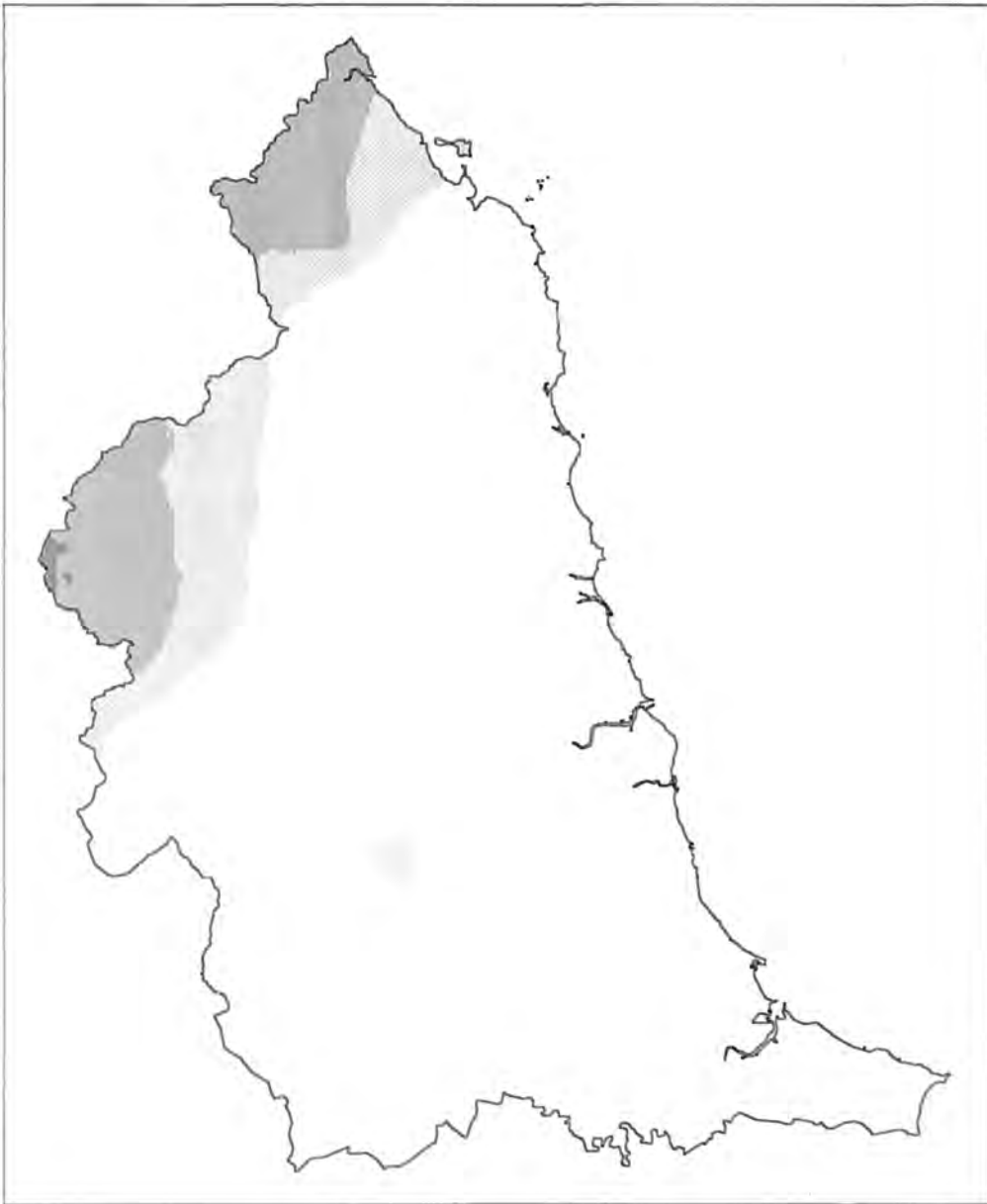
Polygonum

2800 – 2300 cal. BC







Pollen values expressed as %tdlp.

Figure 7.2.37 Interpolated pollen map of Ranunculaceae pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As with the map for the previous period for Ranunculaceae (Fig. 7.2.18), in this period the highest values for Ranunculaceae are in the north of the region, rising to 2.1% tdlp at Akeld Steads in northern Northumberland (a slight decrease from the previous period). Equally high values appear in the west of the Tyne Corridor. A value of 1.4% occurs at one site in the upper Derwent region, but apart from this values over 0.3% do not occur elsewhere in the region.



Key:

-  <1%
-  1 – 2%
-  2 – 3%
-  3 – 4%
-  4 – 5%
-  >5%



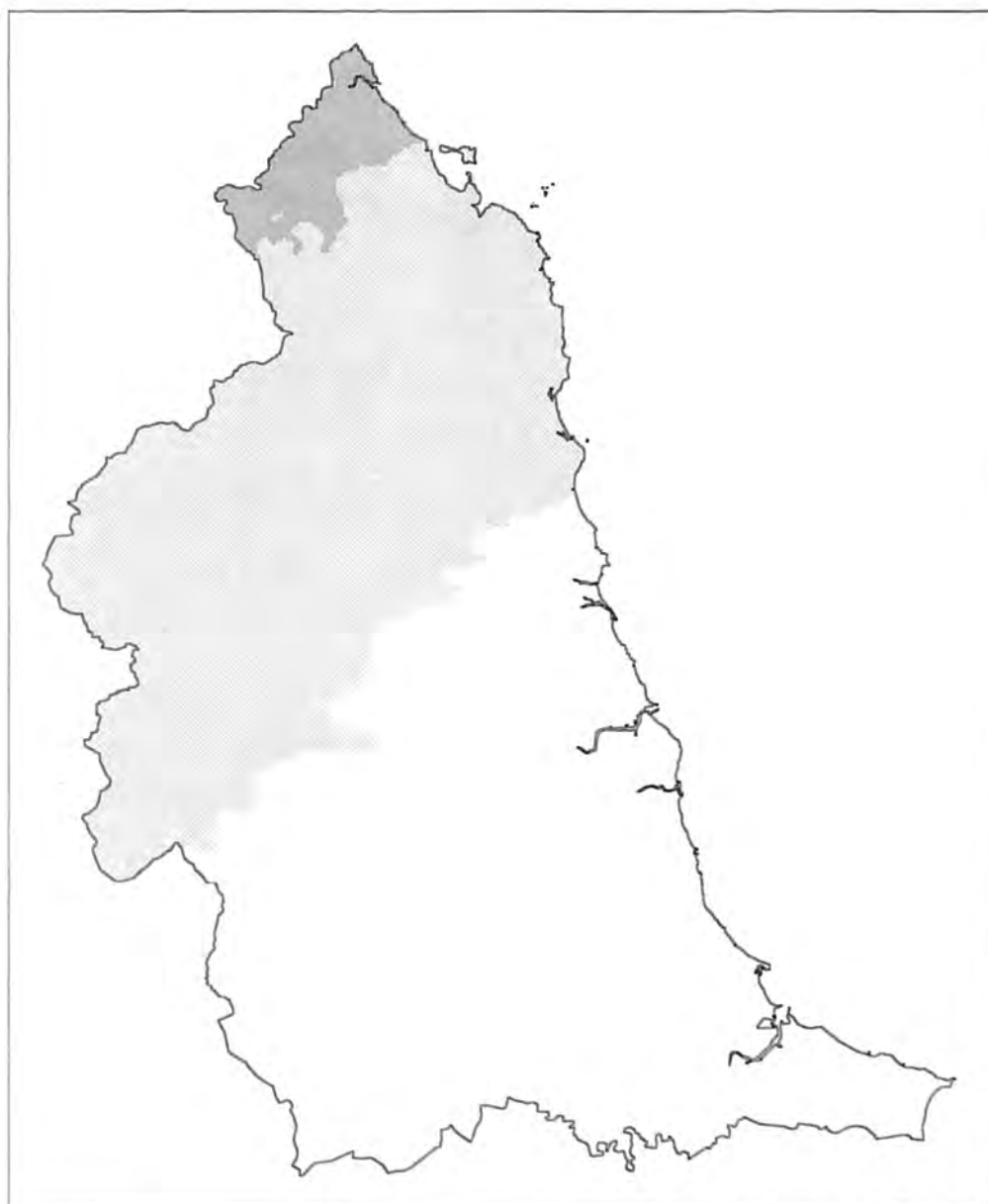
Ranunculaceae

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Figure 7.2.38 Interpolated pollen map of *Rumex* pollen values for the later Neolithic period, 2800 - 2300 cal. BC

As in the previous period (Fig. 7.2.19), but unlike periods before the Neolithic, the highest values for *Rumex* occur in the north of the region, with a value of 1% tdlp occurring at Trickle Wood (lower than the previous period.) Slightly lower values occur elsewhere across Northumberland (0.2-0.8%) and at a small number of sites in upper Teesdale. Far lower values for *Rumex* (0.08-0.09%) occur in the Durham lowlands.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



Rumex

2800 – 2300 cal. BC

Pollen values expressed as %tdlp.

Development of Methods for Investigating Settlement and Land- use using Pollen Data:

**A Case-study from North-east England,
circa 8000 cal. BC - cal. AD 500**

Volume three

**Tables and Figures for Chapter 7:
pollen maps and accompanying tables for north-east
England from the Mesolithic to the end of the
Roman period.**

Part two

Early Bronze Age period to the Roman period

**Submitted for the higher degree of PhD
by Kathryn Elizabeth Pratt MA (Cantab.), MSc**

**University of Durham,
Departments of Archaeology and Biological Sciences
1996**

Pollen maps for the
Bronze Age and earliest
Iron Age period

circa 2000 - 500 cal. BC

Early Bronze Age period:

2000 - 1500 cal. BC

List of Figures and Tables for the early Bronze Age period, 2000 - 1500 cal. BC

Tables

Table 7.3.1	Summary of trends in pollen maps for the early Bronze Age period.	217
-------------	---	-----

Figures

Fig. 7.3.1	Map showing locations of pollen cores used to create interpolated maps for the period 2000 - 1500 cal. BC	219
------------	---	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.3.2	Interpolated pollen map of averaged total tree pollen values.	221
------------	---	-----

Fig. 7.3.3	Interpolated pollen map of total shrub pollen values.	223
------------	---	-----

Fig. 7.3.4	Interpolated pollen map of total herb pollen values.	225
------------	--	-----

Fig. 7.3.5	Interpolated pollen map of total Ericaceae pollen values.	227
------------	---	-----

b) Agricultural: arable index map

Fig. 7.3.6	Interpolated pollen map of agricultural:arable index scores.	229
------------	--	-----

c) Maps of selected individual herb taxa

Fig. 7.3.7	Interpolated pollen map of Gramineae pollen values.	231
------------	---	-----

Fig. 7.3.8	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	233
------------	---	-----

Fig. 7.3.9	Interpolated pollen map of <i>Artemisia</i> pollen values.	235
------------	--	-----

Fig. 7.3.10	Interpolated pollen map of Caryophyllaceae pollen values.	237
-------------	---	-----

Fig. 7.3.11	Interpolated pollen map of Chenopodiaceae pollen values.	239
-------------	--	-----

Fig. 7.3.12	Interpolated pollen map of Compositae pollen values.	241
-------------	--	-----

Fig. 7.3.13	Interpolated pollen map of Cruciferae pollen values.	243
-------------	--	-----

Fig. 7.3.14	Interpolated pollen map of Leguminosae pollen values.	245
-------------	---	-----

Fig. 7.3.15	Interpolated pollen map of <i>Plantago</i> pollen values.	247
-------------	---	-----

Fig. 7.3.16	Interpolated pollen map of <i>Polygonum</i> pollen values.	249
-------------	--	-----

Fig. 7.3.17	Interpolated pollen map of Ranunculaceae pollen values.	251
-------------	---	-----

Fig. 7.3.18	Interpolated pollen map of <i>Rumex</i> pollen values.	253
-------------	--	-----

Table 7.3.1 Summary of trends in pollen maps for the early Bronze Age period, 2000 - 1500 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.2 to 7.3.5</p>	<p>Trees and shrubs drop markedly at Hutton Henry: trees fall from 59-10% and shrubs from 26-9%. At Bishop Middleham trees fall from 53-11% and shrubs from 10-2%. There is also a marked rise in herb pollen from 14-80% at Hutton Henry and from 36-84% at Bishop Middleham. At Mordon Carr tree levels drop slightly to 25%, with a drop in shrubs to 39%. At Neasham Fen tree and shrub levels remain high, although trees drop slightly to 48% with a rise in shrubs to 48%.</p>	<p>At all sites in the Wear lowlands and the upper Derwent tree pollen levels remain very high, with herbs and Ericaceae never exceeding 3% tdlp. At Hallowell Moss there is a slight drop in tree levels to 71%, with a rise in shrub pollen. At Hedleyhope tree pollen levels lie at 66%. In the Upper Derwent, at Pow Hill tree pollen increases to 80%, whilst tree and shrub levels remain constant at Lamb Shield.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.6</p>	<p>During this period agricultural type taxa increase markedly. Index scores, however, drop. Scores fall to 49% at Neasham Fen, 30% at Mordon Carr, 27% at Bishop Middleham and only 9% at Hutton Henry. Pastoral types dominate more at sites on the East Durham Plateau. However, arable types still increase. It is marked increase in pastoral types in this period which has lead to the drop in index scores.</p>	<p>At Pow Hill, Burnhope Burn and Lamb Shield arable type taxa are absent in this period. However, at Hallowell Moss pastoral type taxa increase in this period and arable types appear in small amounts, and so the index increases to 21%. This shows the predominance of pastoral types but the small presence of arable types Cruciferae, Chenopodiaceae and Compositae.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.7 to 7.3.18</p>	<p>There is a very marked rise in Gramineae at Bishop Middleham from 2-17%, Hutton Henry from 2-20%, at Neasham Fen from under 1-2% and Hartlepool Bay 4 from 23-30%. It remains around 5% at Mordon Carr. <i>Cerealia</i>-type pollen appears at Bishop Middleham, with a marked rise in Compositae (to 1.5%), <i>Plantago</i> (to 4.4%) and the appearance of <i>Rumex</i>. <i>Plantago</i> rises to 1.2%, <i>Rumex</i> to 1.4% and <i>Polygonum</i> appears at Hutton Henry. <i>Plantago</i> rises to 1.4% and Chenopodiaceae appear (at 2%) at Hartlepool Bay 4. The rise in Gramineae at Neasham is accompanied by the appearance of Ranunculaceae and Cruciferae.</p>	<p>There is an increase in the variety of herbs at Hallowell Moss, as Chenopodiaceae, Compositae, Cruciferae and <i>Plantago</i> appear together with a very slight increase in grasses to 0.5%. At Burnhope Burn Gramineae rises to 7% with an increase in Ranunculaceae to 1.7%. Lamb Shield and Pow Hill remain little changed.</p>

Table 7.3.1 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.2 to 7.3.5</p>	<p>In the north Northumberland lowlands tree and shrub levels do not decline as much as in the Durham lowlands. Tree levels remain high at Akeld Steads (59%) and at Camp Hill Moss (69%), although there is a slight drop here in this period. Shrub levels remain under 20% and Ericaceae levels are very small. Steng Moss and Fellend Moss, and the Tyne Corridor/Wall area. Ericaceae levels are far higher at Black Lough, Broad Moss and Trickle Wood, reaching 58% at Trickle Wood. Correspondingly, tree and shrub levels are lower, making these sites resemble those in the uplands closely.</p>	<p>At most upland sites tree pollen levels lie between 15-40%, decreasing at most sites, with a drop in shrub pollen to between 20-30%. Herb pollen levels decrease to around 10%, as Ericaceae values over 10% continue to spread. Values exceed 30% at higher elevations. At Dufton Moss and Quick Moss tree and shrub levels remain higher, together making up around 90% tdlp. In Upper Teesdale, herb pollen values are much higher, between 20-30% at Weelhead Moss, Dead Crook and Tinkler's Sike. At Cronkley Pastures unusually high values of 72% continue in this period.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.6</p>	<p>Arable types are absent at Camp Hill Moss, and disappear at Akeld Steads. Arable types appear at Broad Moss, with a greater rise in pastoral types giving a score of 3%. At Black Lough the score drops from 41-24%. Further south, arable types appear in tiny amounts at Coom Rigg raising the score to 1%, and at Fortherley Moss (10%). At Fellend Moss, arable types decline, from 43-10%.</p>	<p>Arable-type taxa continue to be absent at most upland sites. However, they appear at James' Hill, raising the index score to 27% and at Site W(28%). Arable types also appear at Tinkler's Sike, with a score of 33% and increase slightly at Weelhead Moss, where the score rises to 20%. At all these sites pastoral types predominate. At Cronkley Pastures the index score rises from 0-73% in this period as arable types appear.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.7 to 7.3.18</p>	<p>There is an increase in the range of herbs found at Akeld Steads and Trickle Wood, with the appearance of <i>Plantago</i> at Akeld Steads, and rise of Ranunculaceae to 3.2%, and at Trickle Wood the rise in <i>Cerealia</i>-type to 1.8%. Chenopodiaceae and Compositae appear at Broad Moss, and <i>Artemisia</i> and Ranunculaceae at Steng Moss. At Coom Rigg <i>Plantago</i> increases to 1.4% and Ranunculaceae to 2.1% with an increase in the range of herbs. At Fellend Moss Gramineae values decline.</p>	<p>At many upland sites in this period <i>Plantago</i> appears or rises to higher values, if already present. Gramineae values also rise above 1% at many sites. However, no other herb types appear. There is a marked decline in the range of herbs at Weelhead Moss and Fox Earth Gill, so that Ranunculaceae and <i>Rumex</i> are the only types present here. <i>Cerealia</i>-type is the only other herb type that remains at Weelhead Moss.</p>

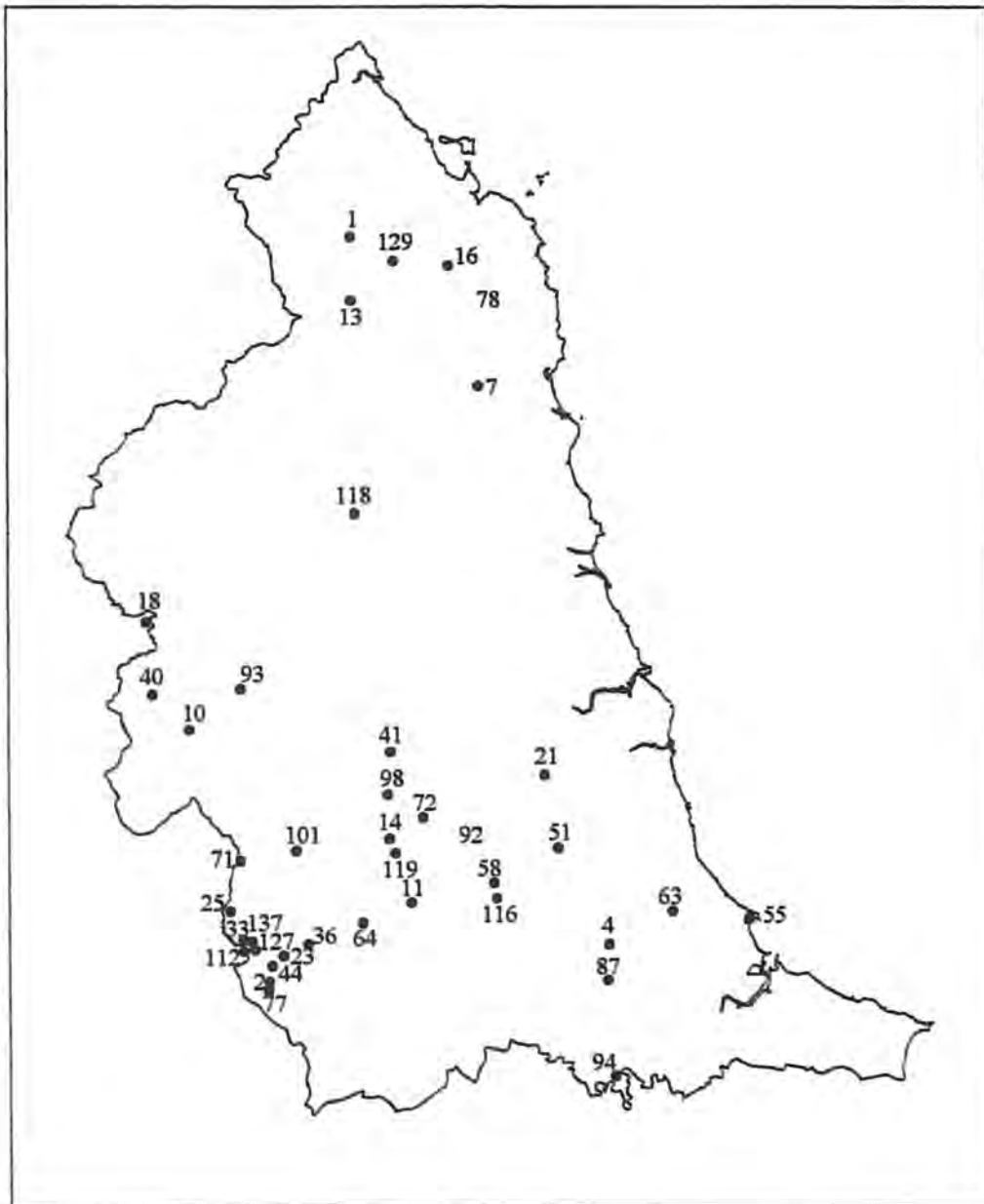


Fig. 7.3.1



Map showing locations of pollen cores used to create interpolated maps for the early Bronze Age, 2000 - 1500 cal. BC

N.B. Key to site codes on next page.

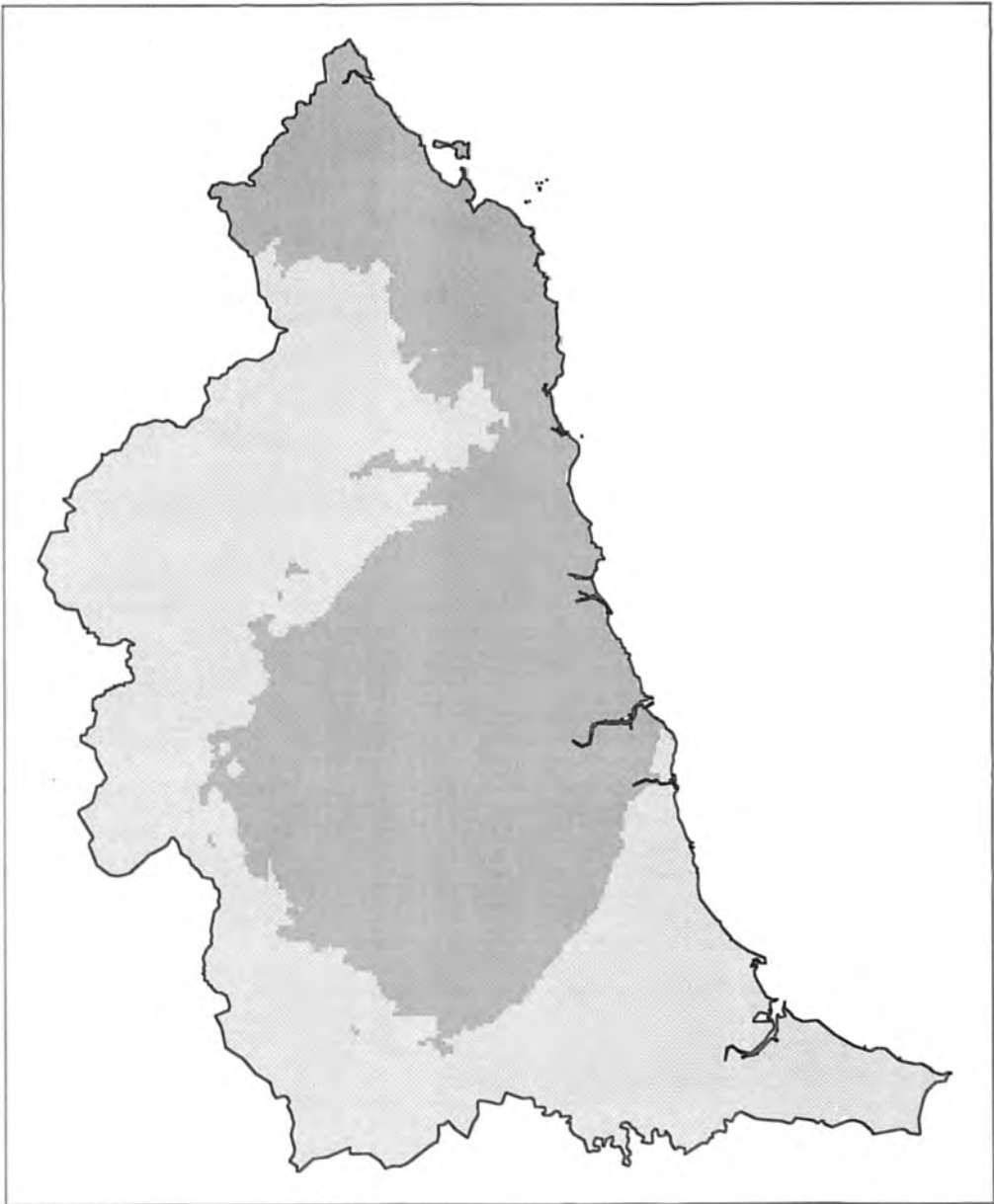
Key to Figure 7.3.1

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.

Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	64	James' Hill
2	Arngill Head Brocks	71	Knoutberry
4	Bishop Middleham	72	Lamb Shield
7	Black Lough	77	Long Crag
10	Blackshiel Bog	87	Mordon Carr
13	Broad Moss	93	Muckle Moss
14	Burnhope Burn	94	Neasham Fen
16	Camp Hill Moss	98	Pow Hill
18	Coom Rigg	101	Quick Moss
21	Cranberry Bog	112	Site W
23	Cronkley Pastures	116	Stanley Moss
25	Crook Burn	118	Steng Moss
33	Dead Crook	127	Tinkler's Sike
36	Dufton Moss	129	Trickley Wood
40	Fellend Moss	138	Weelhead Moss
41	Fortherley Moss		
44	Fox Earth Gill		
51	Hallowell Moss		
55	Hartlepool Bay 4		
58	Hedleyhope		
63	Hutton Henry		

Figure 7.3.2 Interpolated pollen map of tree pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

Tree pollen values drop markedly at many sites across the region during this period. The highest tree values in this period occur in the upper Derwent/ mid Weardale area, as before, and high values remain at a small number of sites, such as Hallowell Moss (71% tdlp). Tree percentages drop considerably in the south east of the region with tree values under 20% at most sites in this area, and also drop slightly in the uplands, falling to between 15-40%. Tree percentages remain high at some sites in northern Northumberland, between 50-70% tdlp, but others dominated by Ericaceae remain low from the previous period.



Key:

- 0 – 20%
- 20 – 40%
- 40 – 60%
- 60 – 80%
- 80 – 100%



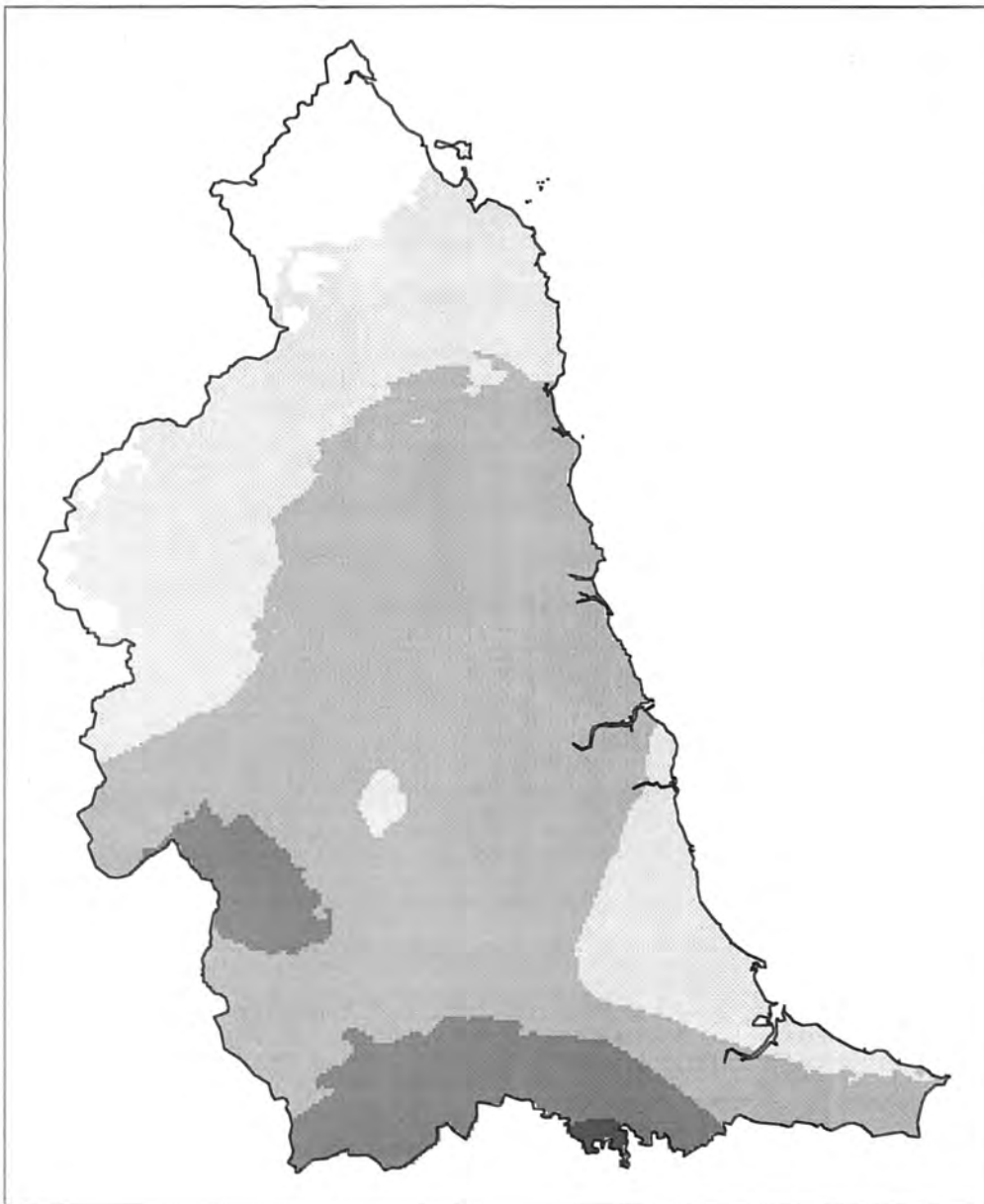
Trees

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.3 Interpolated pollen map of shrub pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

As in the previous period, shrub pollen values remain around 20-30% across most of the region (Fig. 7.2.22), although in this period shrub values decline in the south east of the region to around or below 10% tdlp and in northern Northumberland to under 10%. Selected sites in Teesdale have higher shrub pollen levels exceeding 40%, such as at Dufton Moss and Quick Moss.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



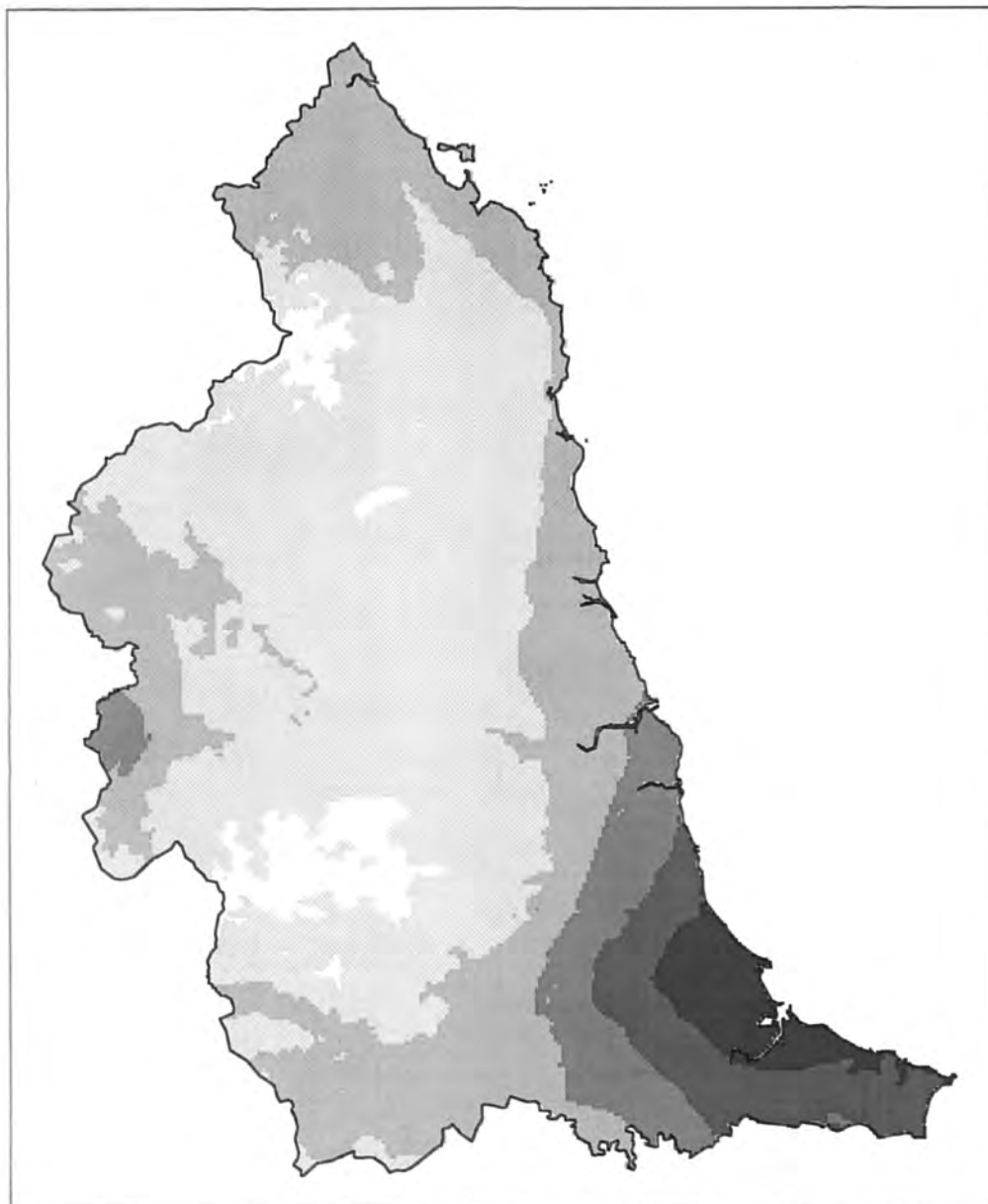
Shrubs

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.4 Interpolated pollen map of herb pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

Herb pollen values increase markedly at sites in the south east of the region, compared to the preceding period (Fig. 7.2.23). This is due to the increase in herb values at Hutton Henry to 80% tdlp and at Bishop Middleham to 84%. Other sites in the area however have lower levels around 20-30%. Herb pollen levels decline at many upland sites in this period, dropping to around 10%. In the upper Derwent/ mid Weardale area dominated by trees, herb pollen values continue to be low.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



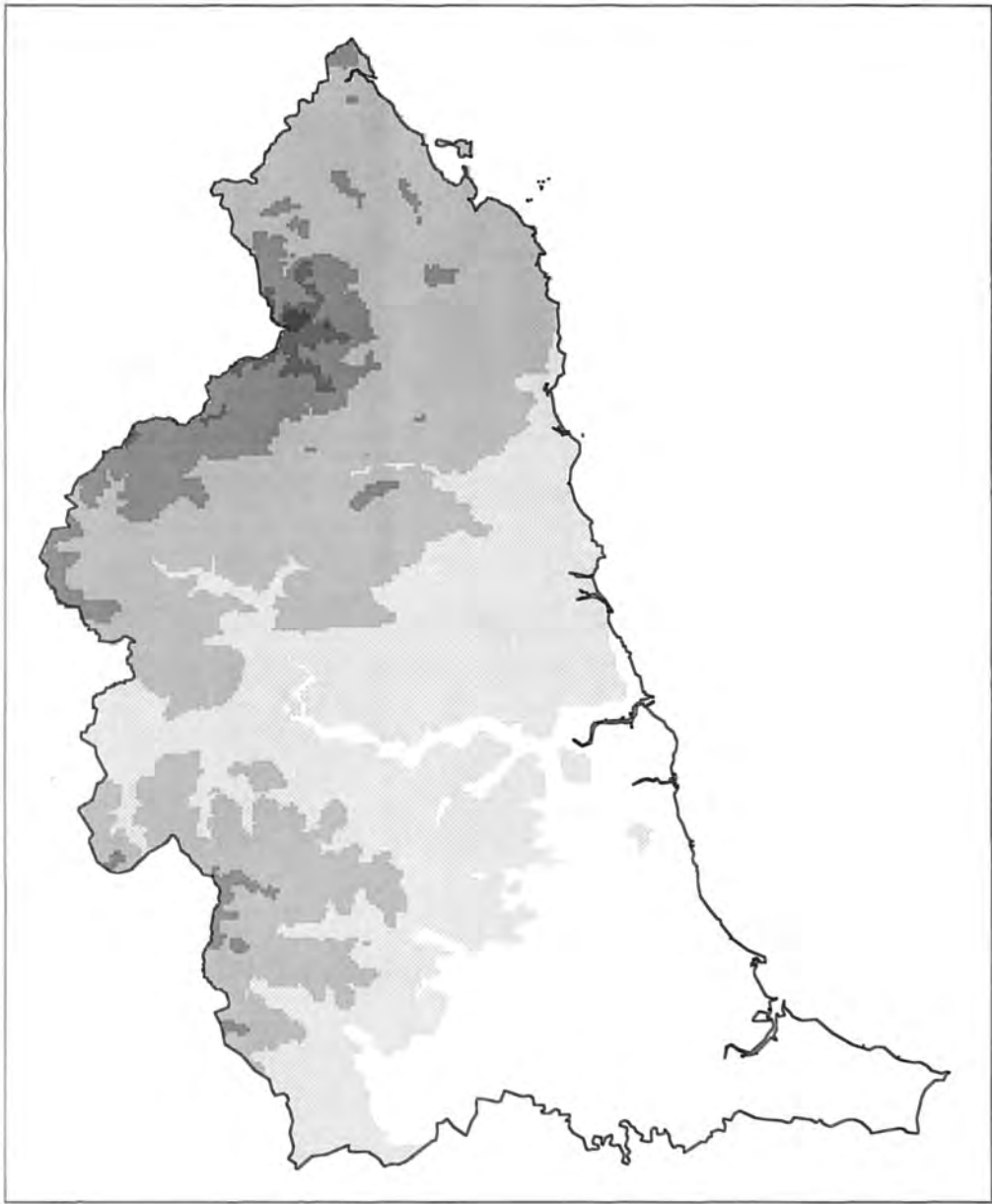
Herbs

2000 – 1500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.5 Interpolated pollen map of Ericaceae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

Ericaceae pollen values continue to increase in this period, continuing the trend observed in previous periods, with a further increase in values in the uplands to over 30% at many sites. The area covered by sites with Ericaceae values over 10% continues to spread across the region.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%



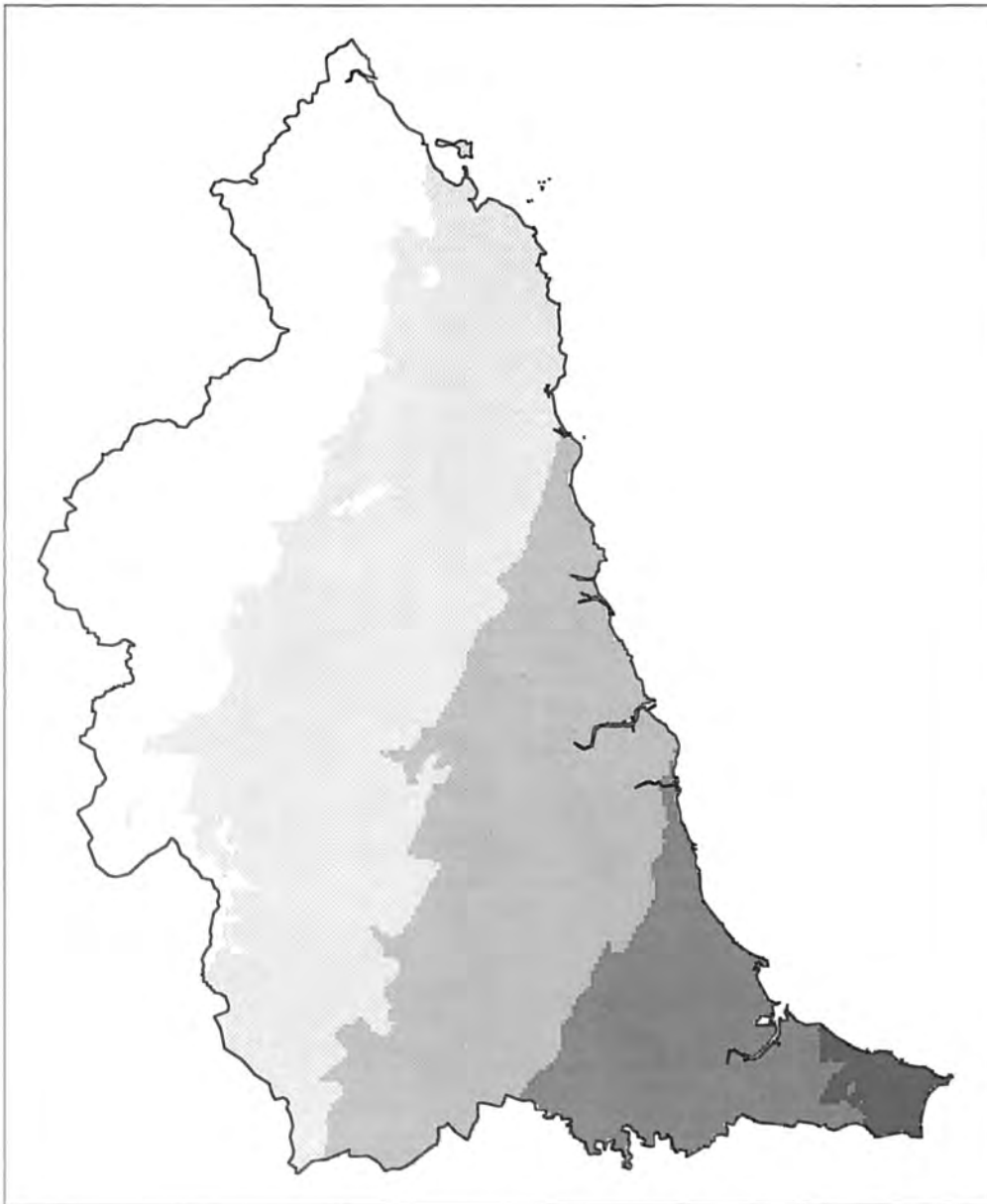
Ericaceae

2000 – 1500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.6 Interpolated pollen map of agricultural: arable scores for the early Bronze Age period, 2000 - 1500 cal. BC

As in the previous period, the highest, most arable scores for this period occur in the south east of the region, although scores have dropped in this area compared to the previous period (Fig. 7.2.25). The proportion of arable types drops markedly at sites in the East Durham area from scores over 50% to scores well below 50% (only 9% at Hutton Henry). This is due to a marked increase in the values for non-arable herb types such as *Plantago*, *Rumex* and Ranunculaceae. Arable types appear in small amounts at certain sites in the Northern Pennine uplands and in the Tyne Corridor in this period.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%

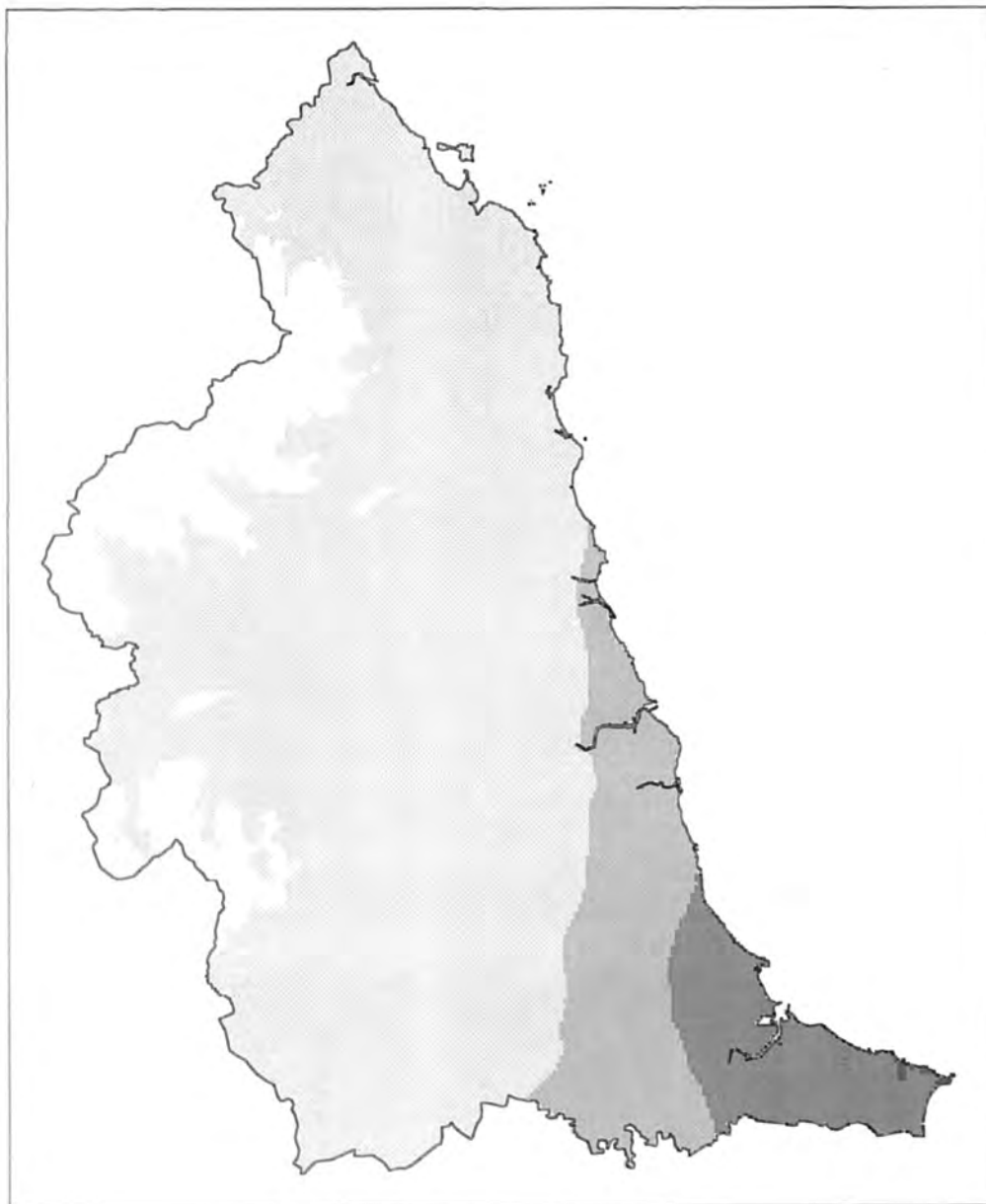


Agricultural:Arable Index




2000 – 1500 cal. BC

Figure 7.3.7 Interpolated pollen map of Gramineae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The map of Gramineae in this period is very different to that of preceding periods, in that the highest values for Gramineae now occur in the south east of the region, rather than in the uplands, as was the case in the Mesolithic and Neolithic. The map for the previous period is transitional between the old pattern and the new. Gramineae values rise above 20% at most sites in the East Durham area. Gramineae values lie below 10% in most other areas of the region, with the exception of a couple of sites in upper Teesdale and the west of the Tyne Corridor.



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



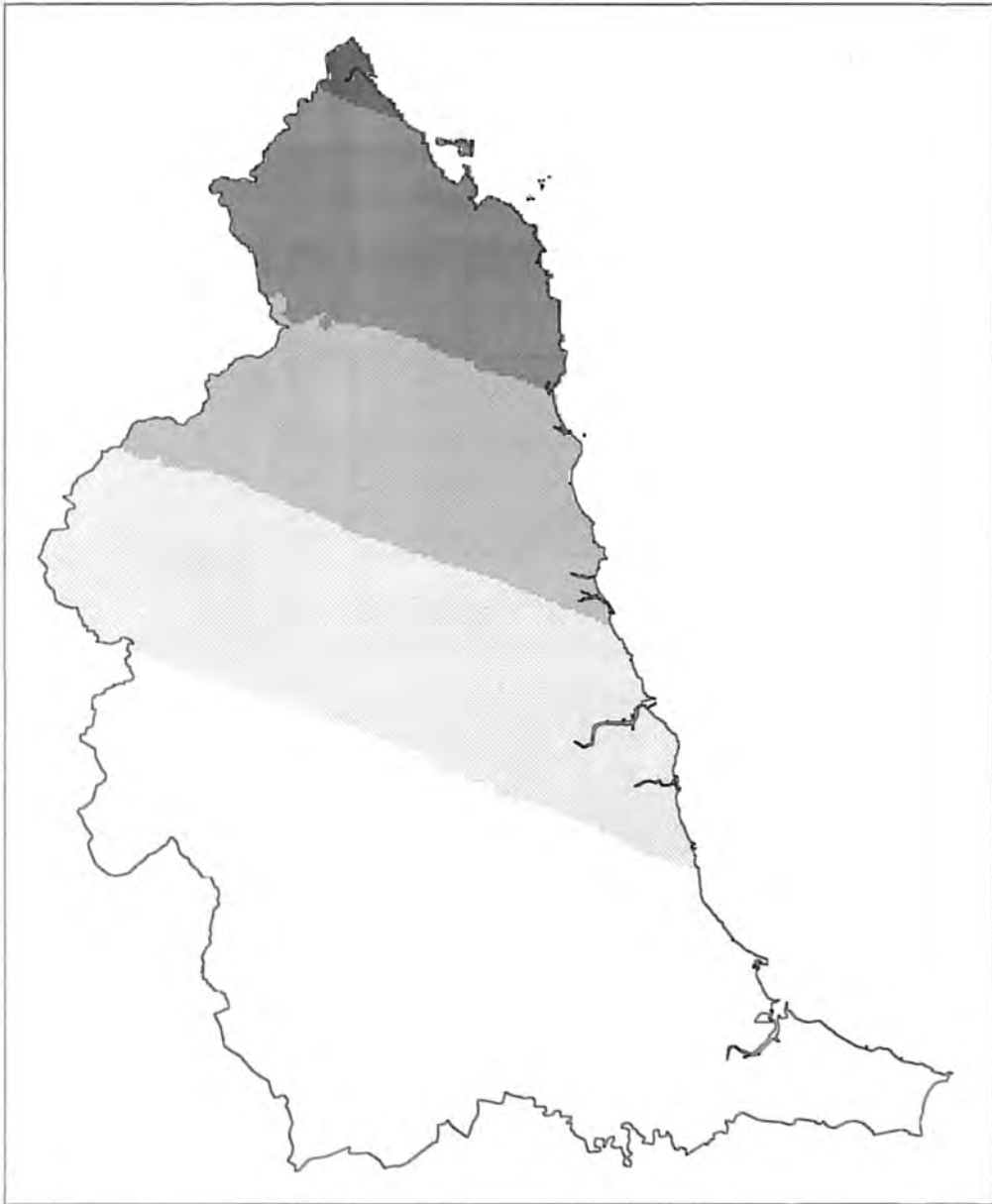
Gramineae

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.8 Interpolated pollen map of *Cerealia*-type pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The map for *Cerealia*-type pollen is very similar to that for the previous period (Fig. 7.2.27), except that the highest *Cerealia*-type pollen value at Trickle Wood is higher than before (1.8% tdlp.) It continues to occur at Weelhead Moss in upper Teesdale and at Mordon Carr in the East Durham area, and also appears at Bishop Middleham.



Key:

- 0 - 0.1%
- 0.1 - 0.2%
- 0.2 - 0.3%
- 0.3 - 0.4%
- 0.4 - 0.5%
- > 0.5%



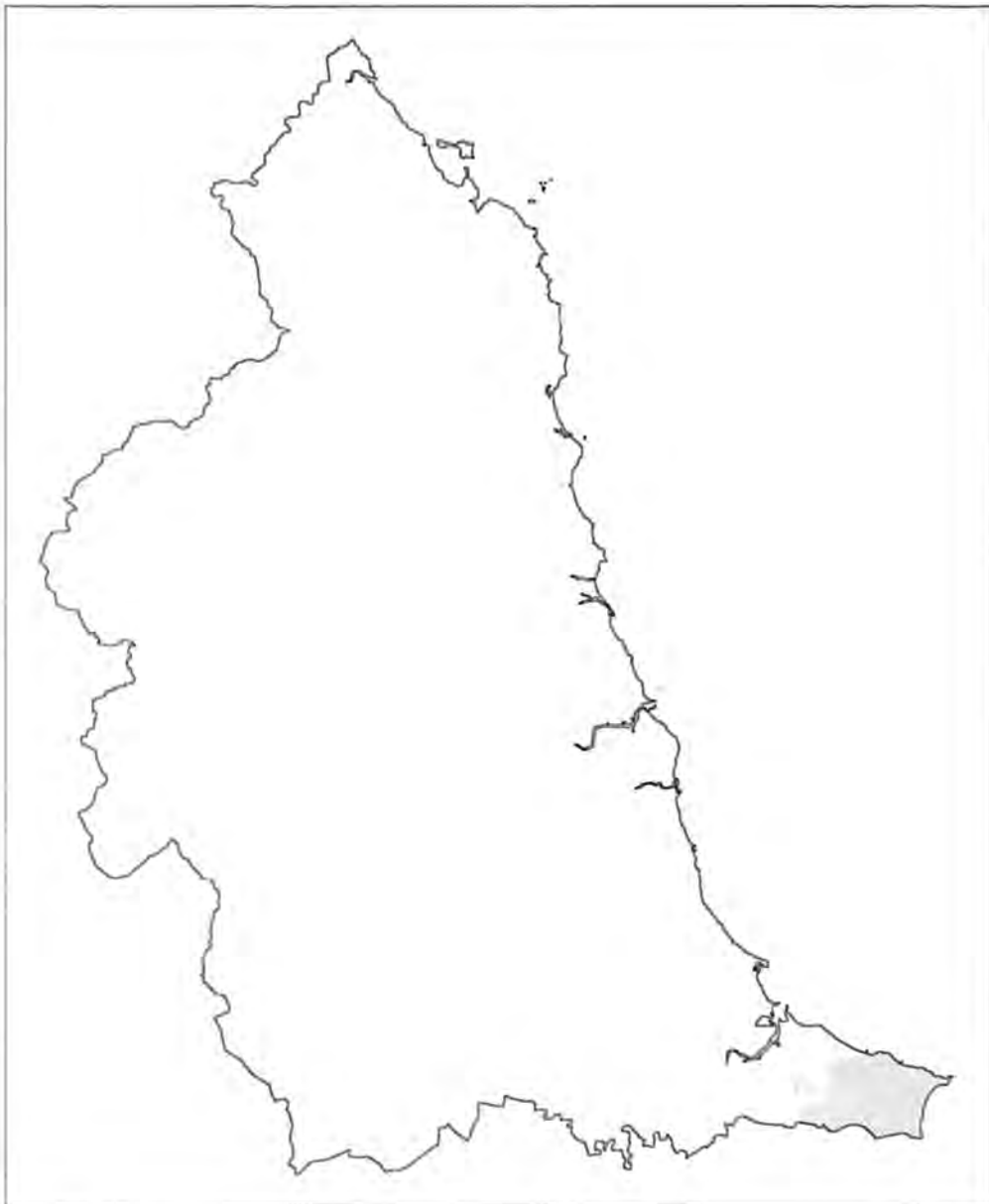
Cerealia-type

2000 - 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.9 Interpolated pollen map of *Artemisia* pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

As in the previous period (Fig. 7.2.28), the highest interpolated values for *Artemisia* occur in the south east of the region, on the coast at Hartlepool (0.4% tdlp). It also continues to occur in northern Northumberland at lower values and at a small number of sites in upper Teesdale. *Artemisia* appears for the first time at Steng Moss and Fellend Moss in Northumberland.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



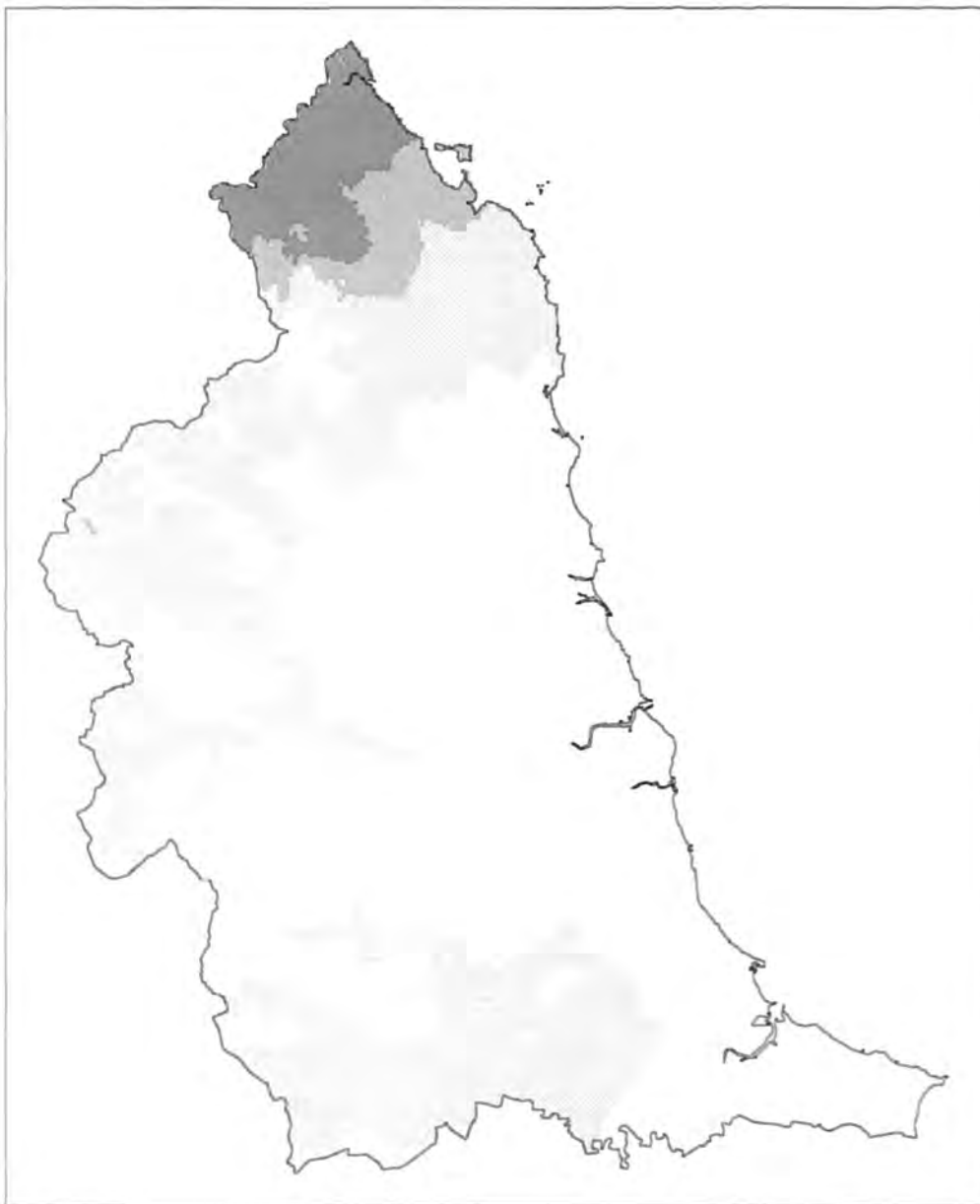
Artemisia

2000 – 1500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.10 Interpolated pollen map of Caryophyllaceae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The map for Caryophyllaceae in this period closely resembles that for the previous period, with high values occurring in northern Northumberland, except that in this period the “bullseyes” at Fellend Moss and in the East Durham area have now disappeared. Values rise in northern Northumberland to 0.8% tdlp and drop in the west of the Tyne Corridor to 0.1%. Caryophyllaceae continue to occur at several sites in East Durham, although at lower values than before and also at a few sites in upper Teesdale.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



Caryophyllaceae

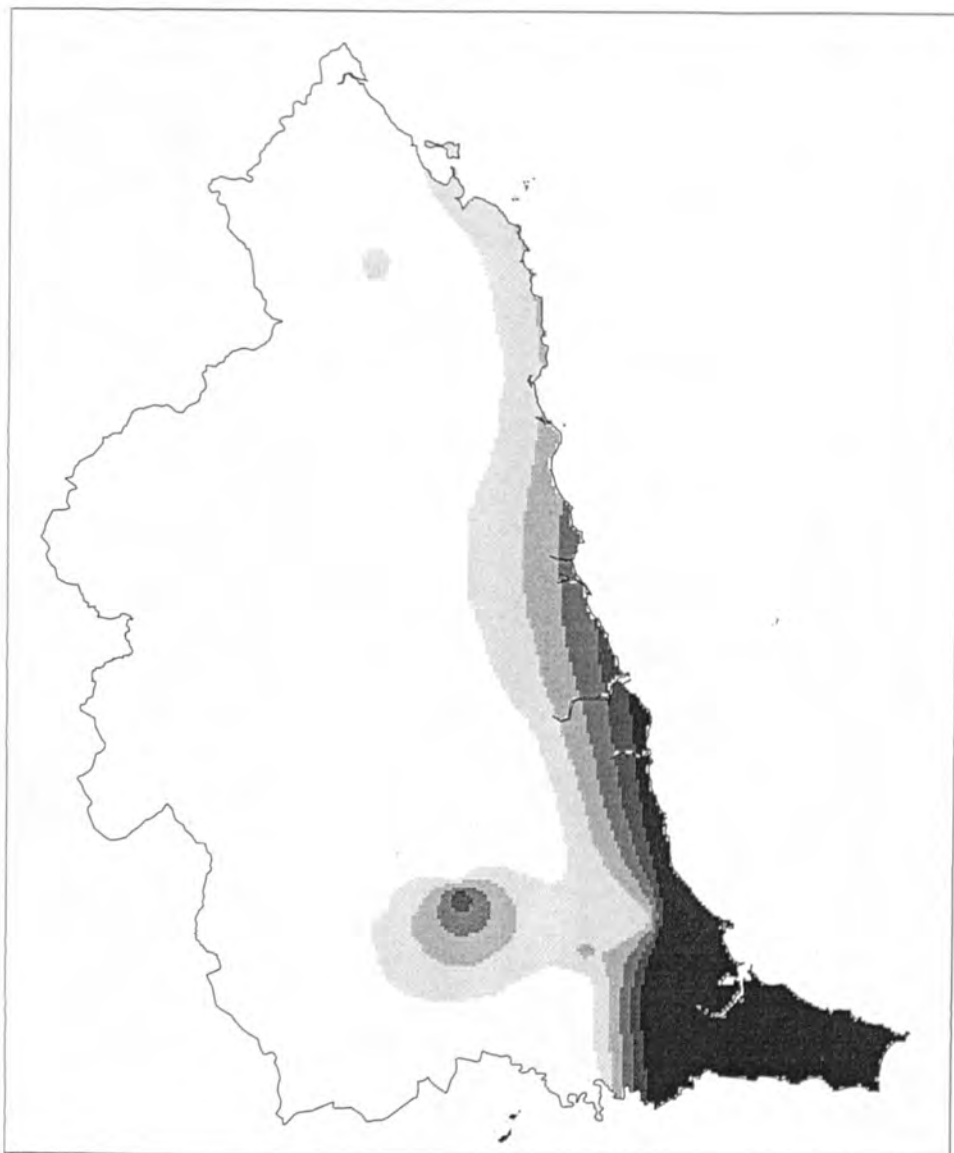
2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.11 Interpolated pollen map of Chenopodiaceae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

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The highest values for Chenopodiaceae in this period are in the south east of the region, as opposed to in the north of the region in previous periods (Fig. 7.2.12, 7.2.31). A high value of 2% tdlp occurs on the coast at Hartlepool, and Chenopodiaceae also occur at lower values at most sites in East Durham. Outside this area, Chenopodiaceae are only recorded in small amounts at two sites in northern Northumberland.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



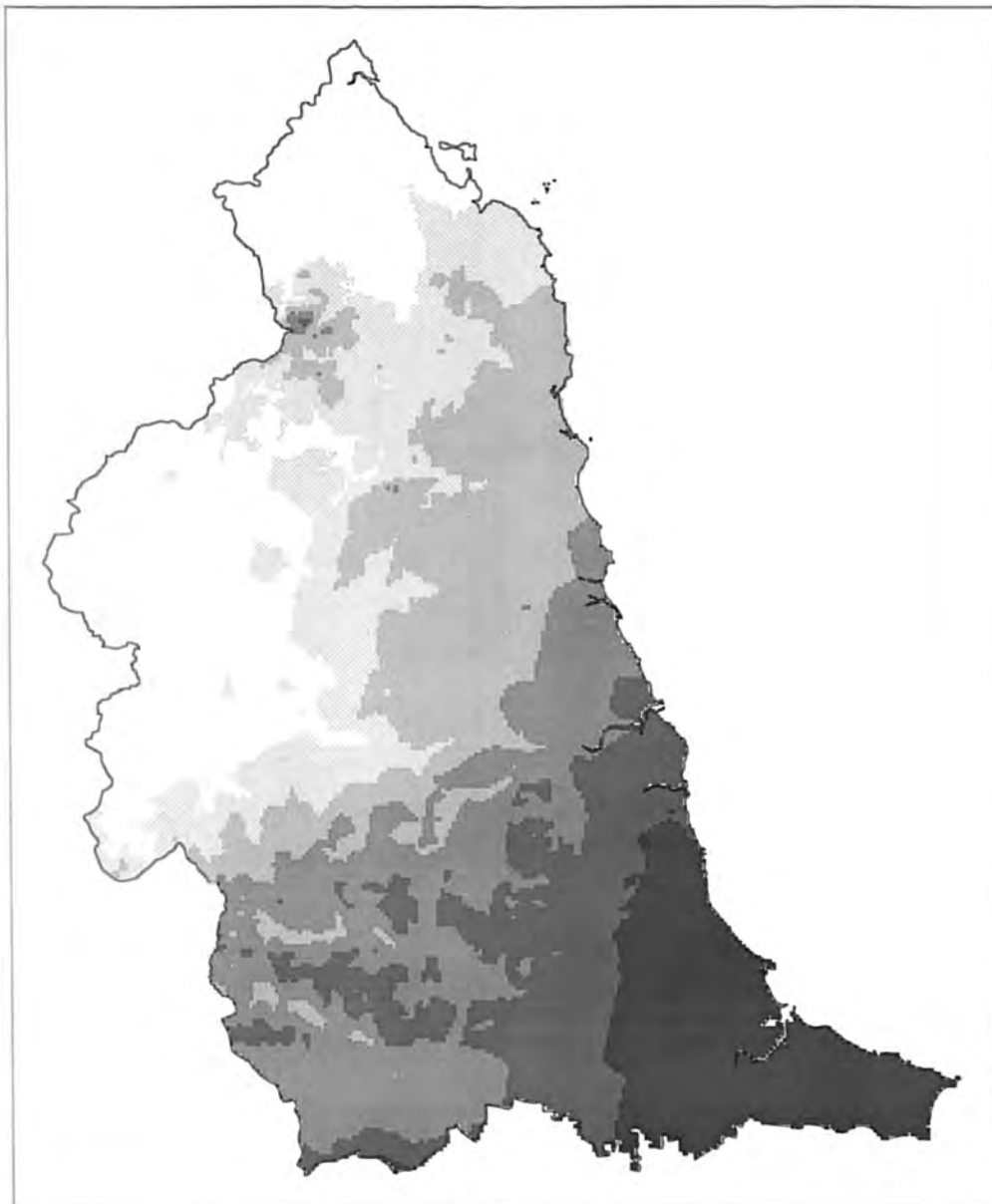
Chenopodiaceae

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.12 Interpolated pollen map of Compositae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

As in previous periods, the highest values for Compositae occur in the south east of the region, with a high value of 1.5% at Bishop Middleham and values ranging from 0.1-0.6% at other sites in this area. In this period, Compositae occurs at other sites across the region in greater amounts, as shown by the greater extent of area covered by values over 0.2% on the map.



Key:

- 0 - 0.1%
- 0.1 - 0.2%
- 0.2 - 0.3%
- 0.3 - 0.4%
- 0.4 - 0.5%
- > 0.5%



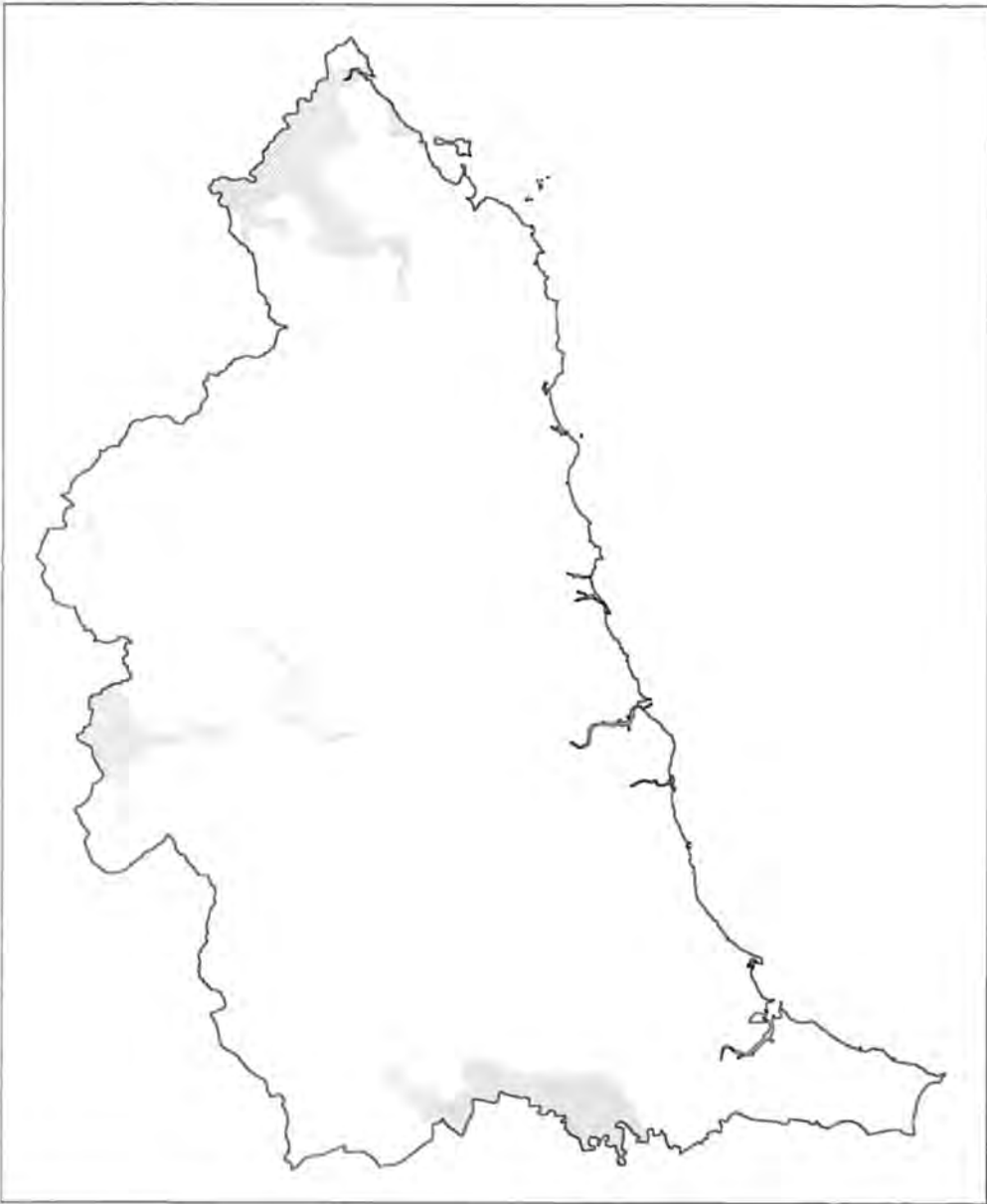
Compositae undiff.

2000 - 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.13 Interpolated pollen map of Cruciferae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The “bullseye” occurring at Fellend Moss in the previous two periods disappears in this period. The highest value (0.4%) occurs at Trickle Wood in northern Northumberland, and far lower values occur at several sites in East Durham and in Teesdale.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



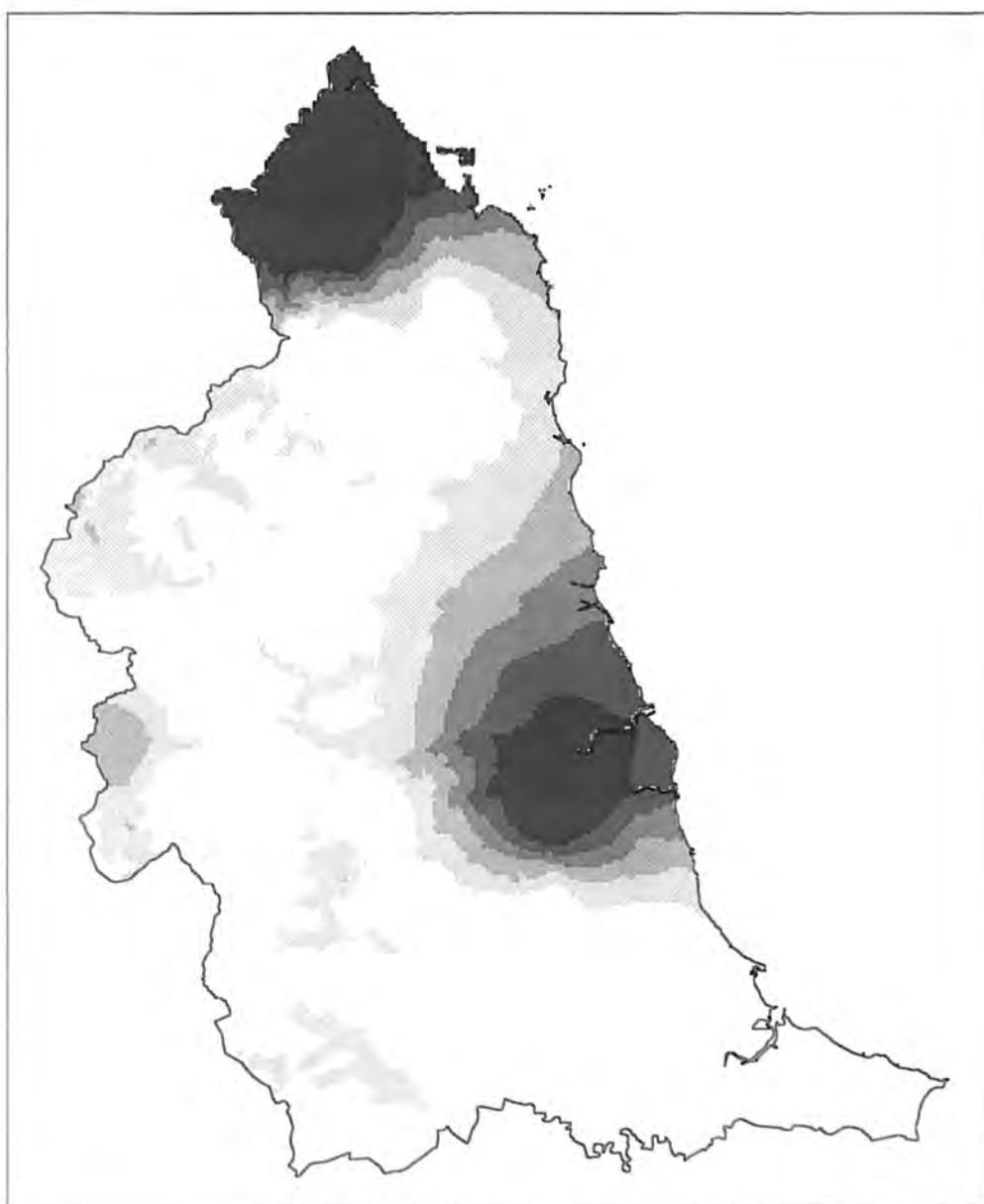
Cruciferae

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.14 Interpolated pollen map of Leguminosae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The map for Leguminosae in this period is dominated by high values (of 0.8% tdlp) occurring at Akeld Steads in northern Northumberland and in the Tyne lowlands at Cranberry Bog. Leguminosae continue to occur in the west of the Tyne Corridor (0.2% as before), and in small values at one site in upper Teesdale and one site in East Durham.



Key:

- 0 - 0.1%
- 0.1 - 0.2%
- 0.2 - 0.3%
- 0.3 - 0.4%
- 0.4 - 0.5%
- > 0.5%



Leguminosae

2000 - 1500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.15 Interpolated pollen map of *Plantago* pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

Unlike in previous periods, the highest values for *Plantago* now occur in the eastern lowlands of the region, rather than the north. High values do still occur in northern Northumberland (1.9% tdlp at Trickle Wood), but also in this period occur in the south east of the region, with values exceeding 1% at almost all the sites in the area, including on the coast, rising to 4.4% at Bishop Middleham. *Plantago* occurs at much lower levels in the west of the region with values around 0.3-0.5% in the west of the Tyne Corridor.



Key:

-  < 0.3%
-  0.3 – 0.6%
-  0.6 – 0.9%
-  0.9 – 1.2%
-  1.2 – 1.5%
-  > 1.5%



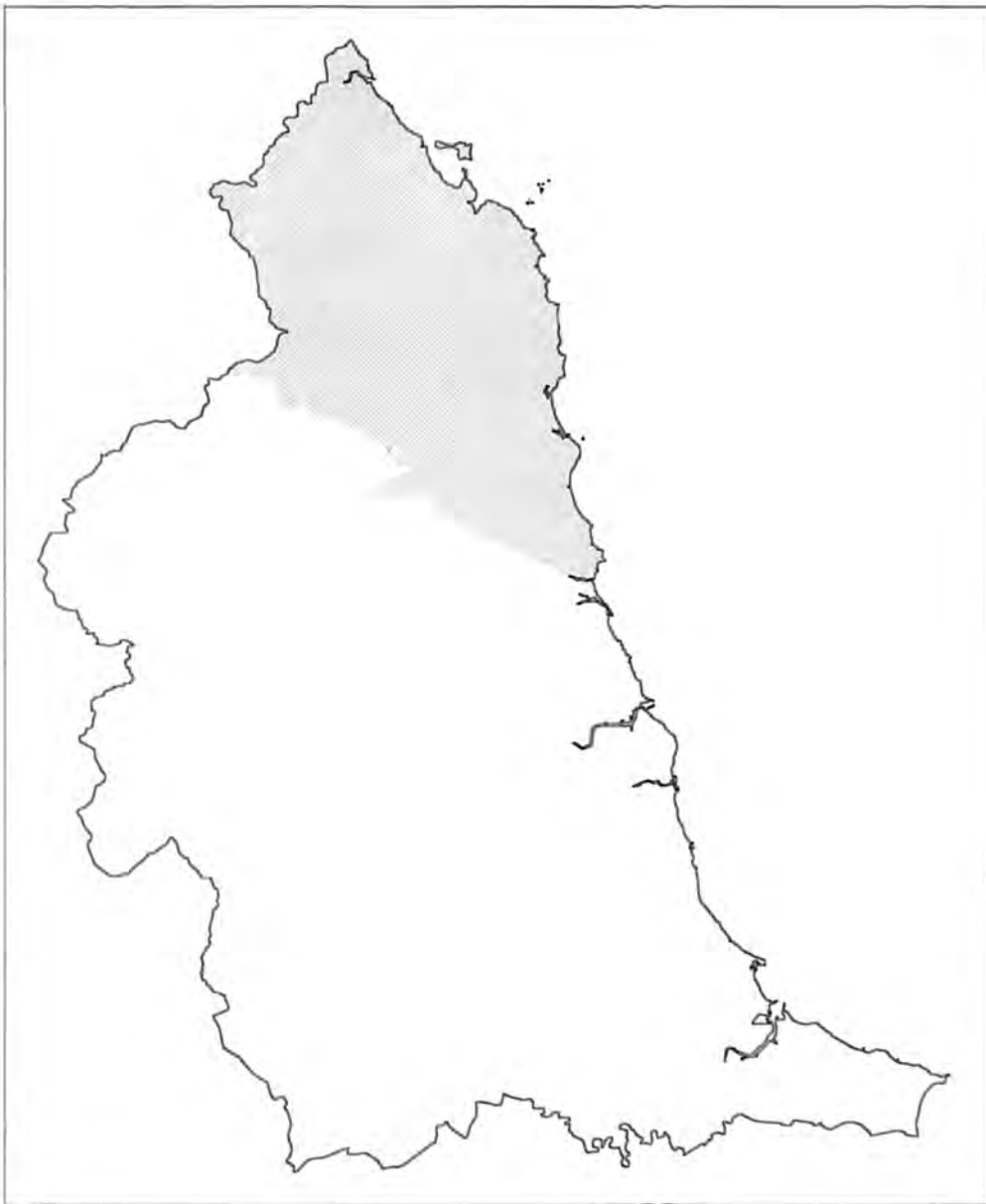
Plantago

2000 – 1500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.16 Interpolated pollen map of *Polygonum* pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The highest values for *Polygonum* once again shift back to the north of Northumberland, rather than the Northern Pennine uplands. Values up to 0.2% occur at Trickle Wood and Black Lough. *Polygonum* continues to occur at Fox Earth Gill (0.2%), and in this period appears for the first time at two sites in East Durham.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



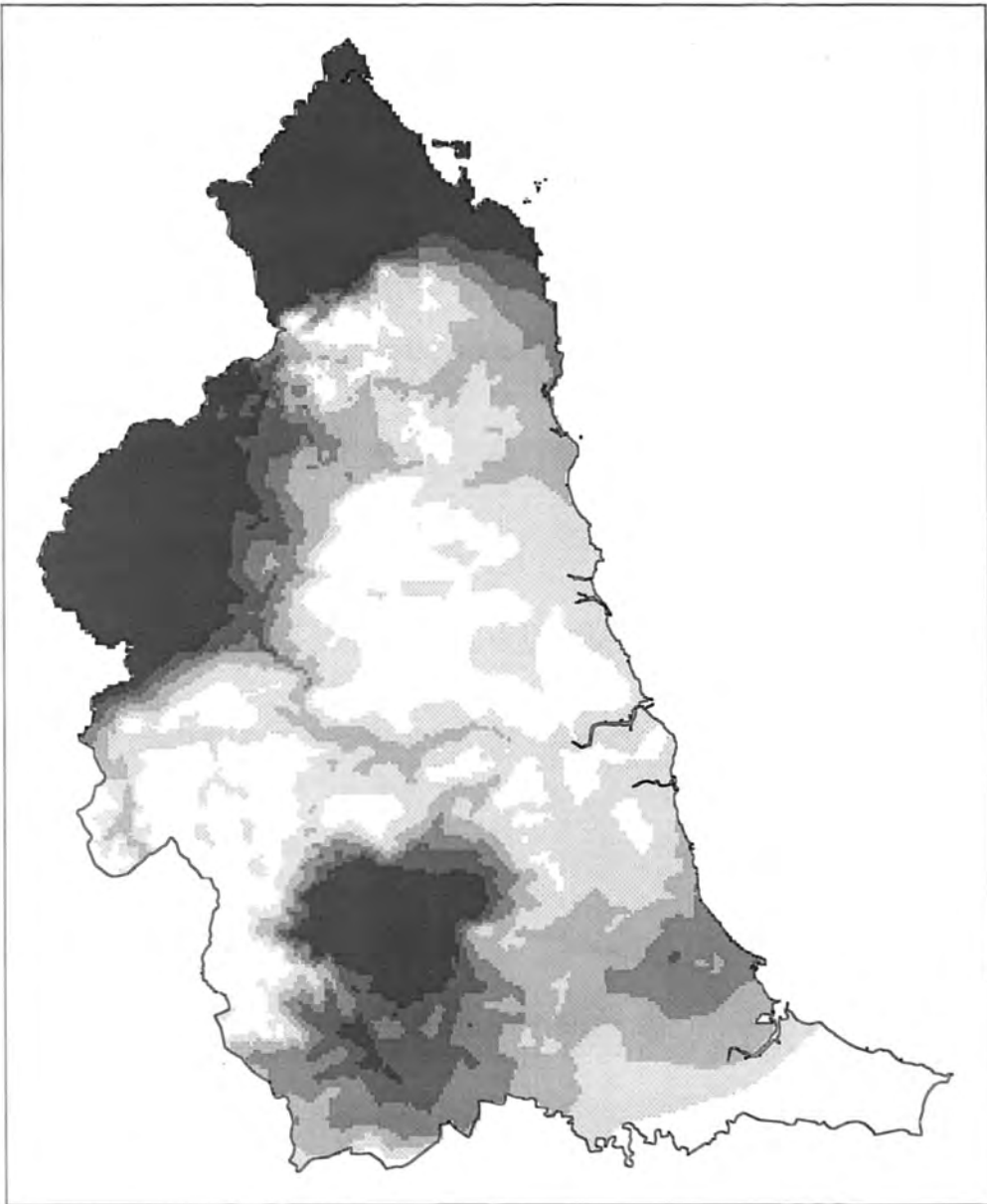
Polygonum

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.17 Interpolated pollen map of Ranunculaceae pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

As in previous periods, the highest values for Ranunculaceae again occur in the north of the region, this time at higher values than before, rising to 3.2% tdlp at Akeld Steads. High values also occur in the west of the Tyne Corridor, exceeding 2%. High values exceeding 1% also occur in the upper Derwent and mid Weardale area. Lower values occur in the East Durham area and even lower values in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



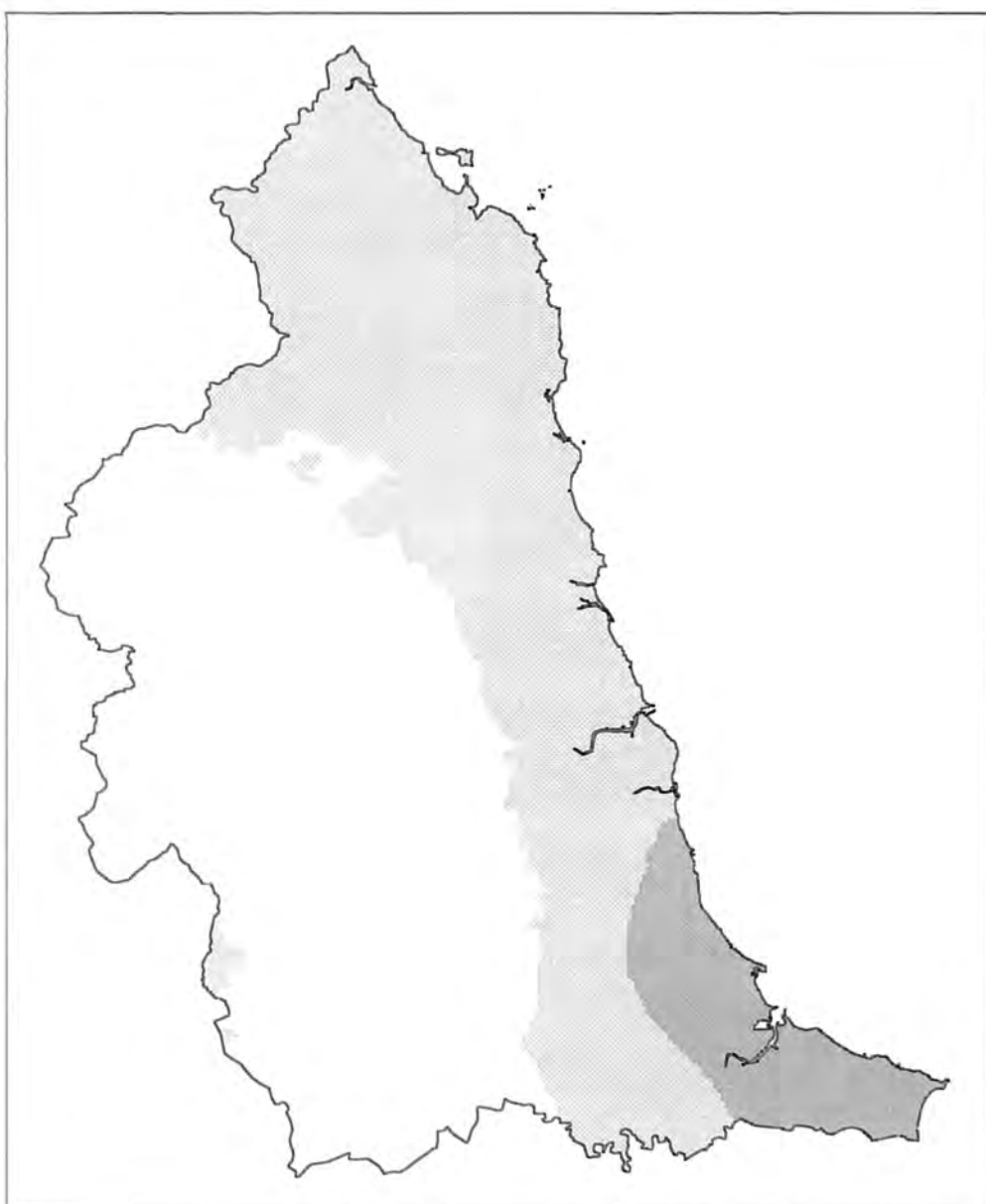
Ranunculaceae

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.18 Interpolated pollen map of *Rumex* pollen values for the early Bronze Age period, 2000 - 1500 cal. BC

The emphasis in this period shifts away from northern Northumberland to the south east of the region, although values up to 0.8% tdlp continue to occur in the north. The highest values occur at the East Durham sites, up to 1.4%. Far lower values occur in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



Rumex

2000 – 1500 cal. BC

Pollen values expressed as %tdlp.

Middle Bronze Age period:

1500 - 1000 cal. BC

List of Figures and Tables for the middle Bronze Age, 1500 - 1000 cal. BC

Tables

Table 7.3.2	Summary of trends in pollen maps for the middle Bronze Age period.	257
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Figures

Fig. 7.3.19	Map showing locations of pollen cores used to create interpolated maps for the period 1500 - 1000 cal. BC	259
a) Summary maps of trees, shrubs, herbs and Ericaceae		
Fig. 7.3.20	Interpolated pollen map of averaged total tree pollen values.	261
Fig. 7.3.21	Interpolated pollen map of total shrub pollen values.	263
Fig. 7.3.22	Interpolated pollen map of total herb pollen values.	265
Fig. 7.3.23	Interpolated pollen map of total Ericaceae pollen values.	267
b) Agricultural: arable index map		
Fig. 7.3.24	Interpolated pollen map of agricultural:arable index scores.	269
c) Maps of selected individual herb taxa		
Fig. 7.3.25	Interpolated pollen map of Gramineae pollen values.	271
Fig. 7.3.26	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	273
Fig. 7.3.27	Interpolated pollen map of <i>Artemisia</i> pollen values.	275
Fig. 7.3.28	Interpolated pollen map of Caryophyllaceae pollen values.	277
Fig. 7.3.29	Interpolated pollen map of <i>Centaurea</i> pollen values.	279
Fig. 7.3.30	Interpolated pollen map of Chenopodiaceae pollen values.	281
Fig. 7.3.31	Interpolated pollen map of Compositae pollen values.	283
Fig. 7.3.32	Interpolated pollen map of Cruciferae pollen values.	285
Fig. 7.3.33	Interpolated pollen map of Leguminosae pollen values.	287
Fig. 7.3.34	Interpolated pollen map of <i>Plantago</i> pollen values.	289
Fig. 7.3.35	Interpolated pollen map of <i>Polygonum</i> pollen values.	291
Fig. 7.3.36	Interpolated pollen map of Ranunculaceae pollen values.	293
Fig. 7.3.37	Interpolated pollen map of <i>Rumex</i> pollen values.	295

Table 7.3.2 Summary of trends in pollen maps for the middle Bronze Age period, 1500 - 1000 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.20 to 7.3.23</p>	<p>At Hutton Henry and Bishop Middleham pollen levels remain very similar to the preceding period, with low trees and shrubs and very high herbs. Shrubs drop further to 6% and 1% respectively. Herbs increase further at Bishop Middleham from 84-89%. On the coast, at Hartlepool, there is a further drop in trees from 25-9%, and shrubs to 4%, and a rise in herbs to 85%. At Mordon Carr trees decline from 21-18% and shrubs from 39-28%, with an increase in both herbs and Ericaceae. Arboreal pollen continues to dominate at Neasham Fen.</p>	<p>At Hallowell Moss there is a marked decrease in tree levels to levels similar to Neasham Fen, from 71% to 49%. This is accompanied by an increase in shrubs to 30%, although herb and Ericaceae levels remain low (under 6%). Total arboreal cover remains high. At Pow Hill tree pollen also declines markedly from 80-48%, but here this is accompanied by an increase in herb pollen to 41%. At Lamb Shield, however, tree pollen increases further to 77%. The new site of Bollihope Bog in this period has high tree (66%) and shrub (17%) cover, similar to other sites in this group.</p>
<p>Agricultural: Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.24</p>	<p>There is an increase in index scores at Hartlepool from 55-78%, Neasham Fen from 49-91%, Mordon Carr from 30-49% and Hutton Henry from 9-12%. This is due to a rise in arable types at all these sites. Pastoral types remain dominant at Hutton Henry and Bishop Middleham; here although arable taxa increase, pastoral types show a more marked increase.</p>	<p>Arable types remain absent at Pow Hill, Lamb Shield and Burnhope Burn.</p> <p>At Hallowell Moss, formerly higher arable type pollen levels decline, resulting in a decline in the index from 21-9%, whilst pastoral types remain about the same.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.25 to 7.3.37</p>	<p>Gramineae values rise markedly at Bishop Middleham from 17-37%, at Neasham Fen from 2-7%, at Hartlepool Bay 4 from 30-70%, and at Mordon Carr from 5-8%. At Hutton Henry it drops from 20-9%. <i>Cereal</i>-type appears at all sites except Hutton Henry. At Bishop Middleham <i>Plantago</i> rises to 8.4% and Ranunculaceae to 1.5%. At Hartlepool Bay 4 Chenopodiaceae rise further to 4% and <i>Plantago</i> to 1.5%. At Neasham Fen and Mordon Carr the appearance of <i>Cereal</i>-type is accompanied by the appearance of many arable types.</p>	<p>Gramineae rise markedly at Pow Hill to 20%, with the appearance of <i>Plantago</i>, although Lamb Shield remains little changed. At Burnhope Burn Gramineae drop from 7-2%. A wider range of herb types remains at Hallowell Moss.</p>

Table 7.3.2 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.20 to 7.3.23</p>	<p>Trees decline slightly at Akeld Steads from 59 to 44%, accompanied by an increase in herbs. However, at Camp Hill Moss, tree levels remain very high (at 75%). At Black Lough and Trickle Wood Ericaceae levels remain very high and trees remain at the same low levels as before (20-30%). However, at Broad Moss, Ericaceae levels drop from 53-26%, accompanied by a rise in herb pollen to 48%.</p>	<p>There is a further slight drop in trees at most sites to 15-30%, with shrub levels remaining between 20-30%. This is accompanied by a further rise in Ericaceae to between 15-50%. Sites with high Ericaceae include Site W (50%) and Dead Crook (50%) and James' Hill (49%). The lowest trees and shrubs occur in Upper Teesdale, which has the highest herbs in the uplands. Herb pollen rises to 57% at Weelhead Moss, and 72% at Cronkley Pastures.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.24</p>	<p>At Broad Moss, Camp Hill Moss and Akeld Steads a rise in arable pollen increases index scores to 11%, 6% and 25% respectively. However at Black Lough arable pollen disappears. Index scores remain low, at 3%, at Steng Moss. At Trickle Wood the index score falls slightly to 35% as arable values drop slightly. At Muckle Moss, Fortherley Moss and Fellend Moss, arable type taxa are absent, having disappeared at the last two sites. At Coom Rigg, however, arable types increase, raising the index from 1-10%.</p>	<p>At several sites arable type taxa remains absent. However at Fox Earth Gill the index rises to 10%, and at Quick Moss to an unusually high level of 83%, as arable types become more important. Pastoral types increase considerably at many sites, resulting in a decline in scores at Weelhead Moss, Tinkler's Sike, Site W and Cronkley Pastures (here from 73-30%).</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.25 to 7.3.37</p>	<p>At Trickle Wood <i>Cerealia</i>-type, <i>Plantago</i>, <i>Polygonum</i> and other herb types continue. Chenopodiaceae and Compositae continue at Broad Moss and Akeld Steads, with an increase in <i>Plantago</i> to 1.2% at both sites. At Black Lough <i>Plantago</i> and <i>Polygonum</i> are present in small amounts. At Steng Moss <i>Plantago</i> appears at 1.7%. At Fellend Moss <i>Plantago</i>, <i>Polygonum</i> and <i>Rumex</i> appear. At Coom Rigg <i>Plantago</i> rises further to 2.1%.</p>	<p><i>Cerealia</i>-type continues to occur at Weelhead Moss, <i>Artemisia</i> and Caryophyllaceae appear and <i>Plantago</i> rises to 2.2%. Gramineae levels rise further at most sites, and increase markedly at Cronkley Pastures to 31%. Chenopodiaceae and <i>Artemisia</i> appear at Quick Moss, and <i>Artemisia</i> at Fox Earth Gill. <i>Cerealia</i>-type appears at Long Crag. <i>Plantago</i> dominates at most sites.</p>

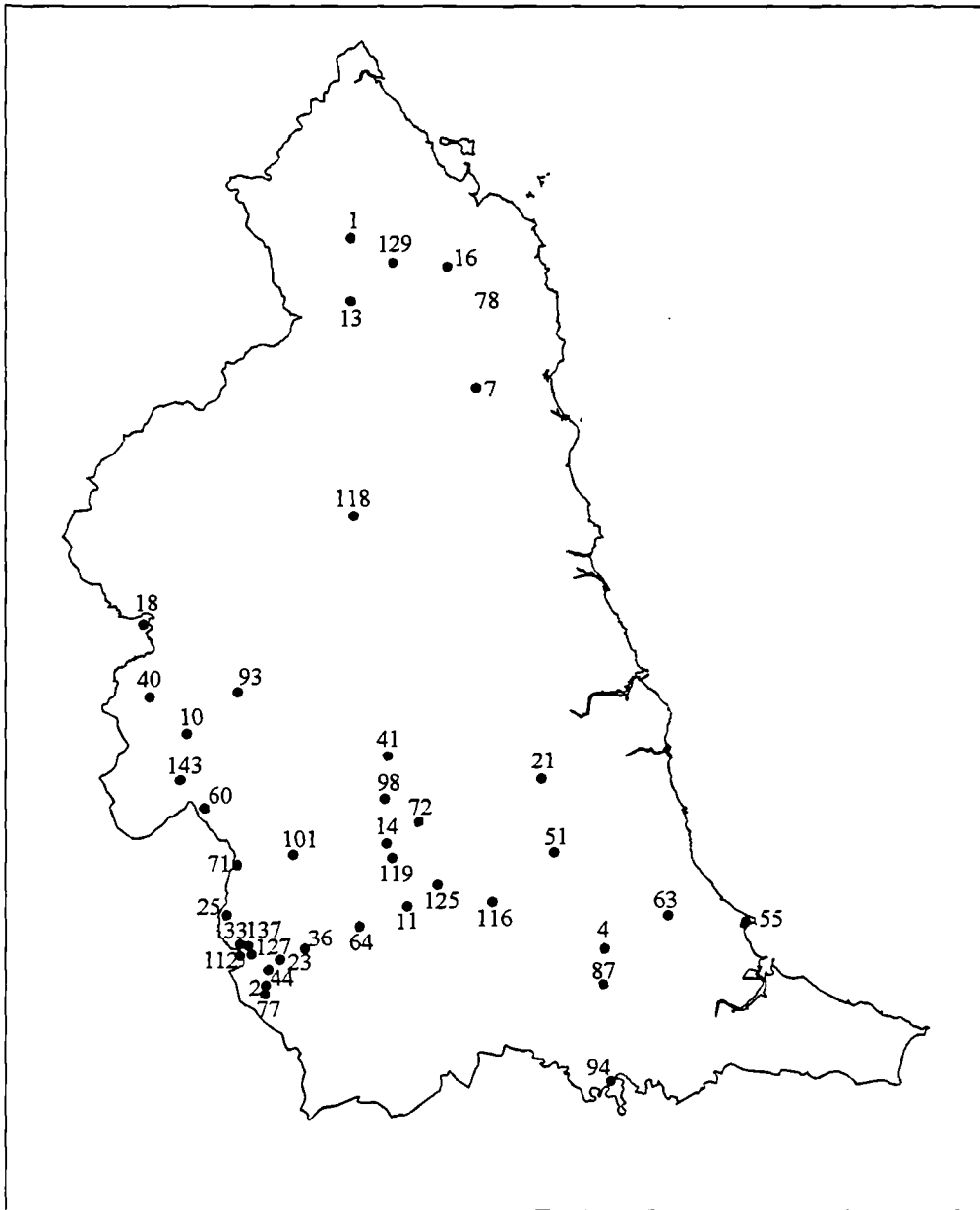


Fig. 7.3.19



Map showing locations of pollen cores used to
create interpolated maps for the middle Bronze
Age, 1500 - 1000 cal. BC

N.B. Key to site codes on next page.

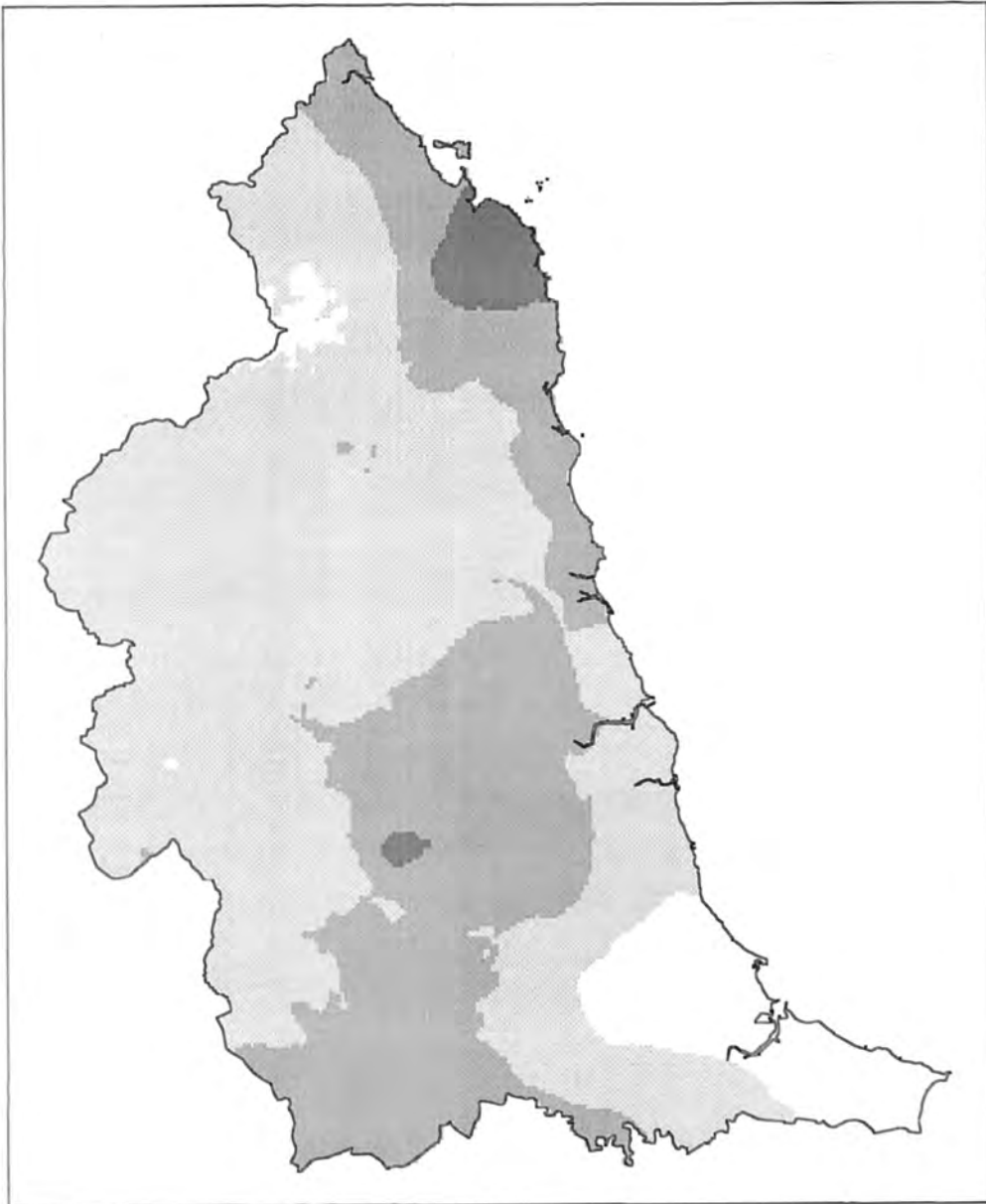
Key to Figure 7.3.19

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	64	James' Hill
2	Arngill Head Brocks	71	Knoutberry
4	Bishop Middleham	72	Lamb Shield
7	Black Lough	77	Long Crag
10	Blackshiel Bog	87	Mordon Carr
13	Broad Moss	93	Muckle Moss
14	Burnhope Burn	94	Neasham Fen
16	Camp Hill Moss	98	Pow Hill
18	Coom Rigg	101	Quick Moss
21	Cranberry Bog	112	Site W
23	Cronkley Pastures	116	Stanley Moss
25	Crook Burn	118	Steng Moss
33	Dead Crook	119	Steward Shield
36	Dufton Moss	125	Thornhope Burn
40	Fellend Moss	127	Tinkler's Sike
41	Fortherley Moss	129	Trickley Wood
44	Fox Earth Gill	138	Weelhead Moss
51	Hallowell Moss	143	Whitfield Lough
55	Hartlepool Bay 4		
60	High Banks Moss		
63	Hutton Henry		

Figure 7.3.20 Interpolated pollen map of tree pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

Tree pollen values now lie below 20% tdlp for all sites in the south east of the region (with the exception of Neasham Fen); sites where tree pollen had not declined in the previous period now decline, such as Mordon Carr and on the coast at Hartlepool. At Hutton Henry and Bishop Middleham tree values remain very low from the previous period. The highest tree values (over 70%) in the region remain in the upper Derwent/mid Weardale area and also at one site in northern Northumberland (Camp Hill Moss). Elsewhere in northern Northumberland, and in the uplands, tree pollen values decline to around 15-30%.



Key:

-  0 - 20%
-  20 - 40%
-  40 - 60%
-  60 - 80%
-  80 - 100%



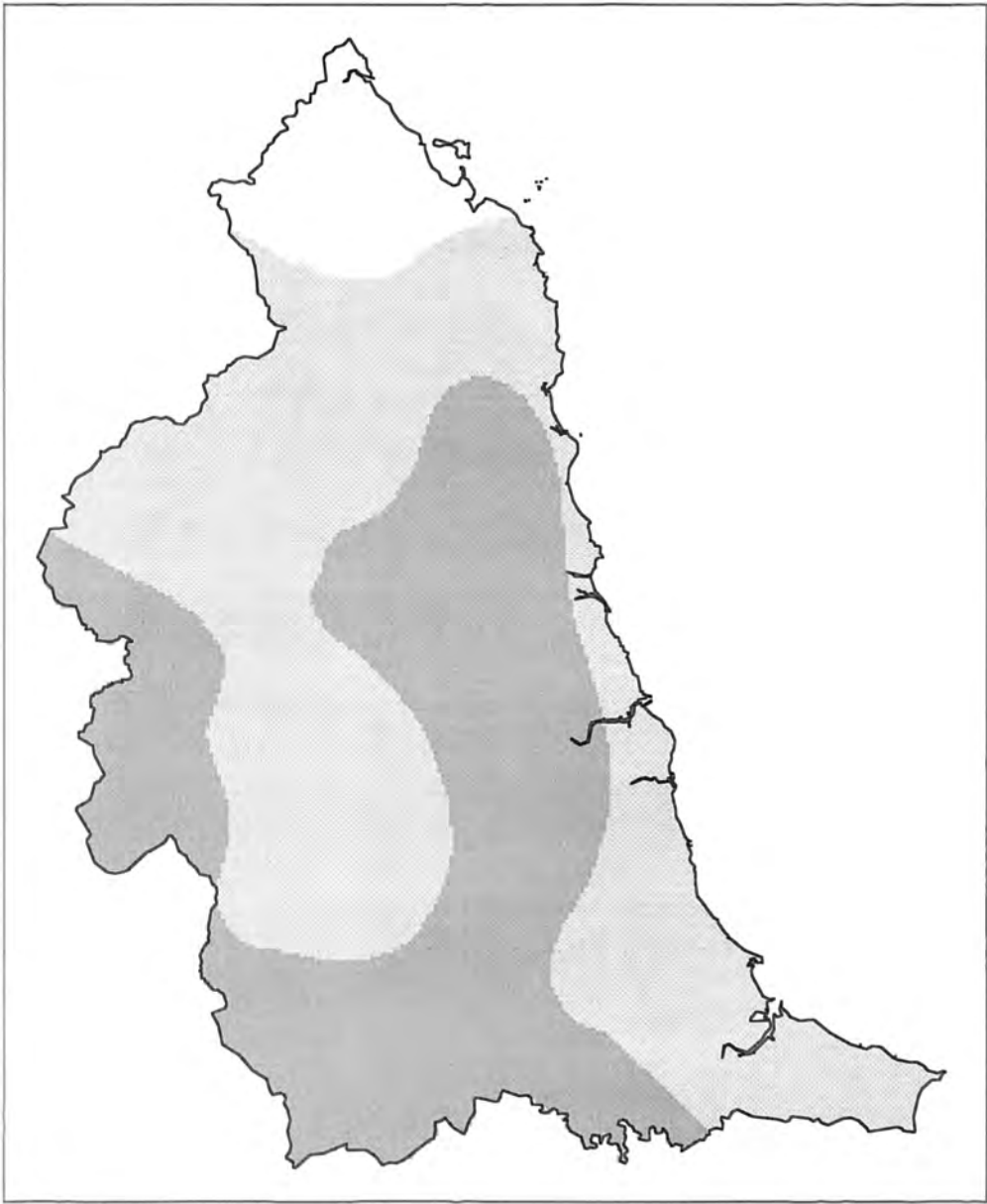
Trees

1500 - 1000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.21 Interpolated pollen map of shrub pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The map for shrubs for this period is similar to that for the preceding period, with values of around 20-30% common in the uplands and lower values in the south east of the region and in Northumberland.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



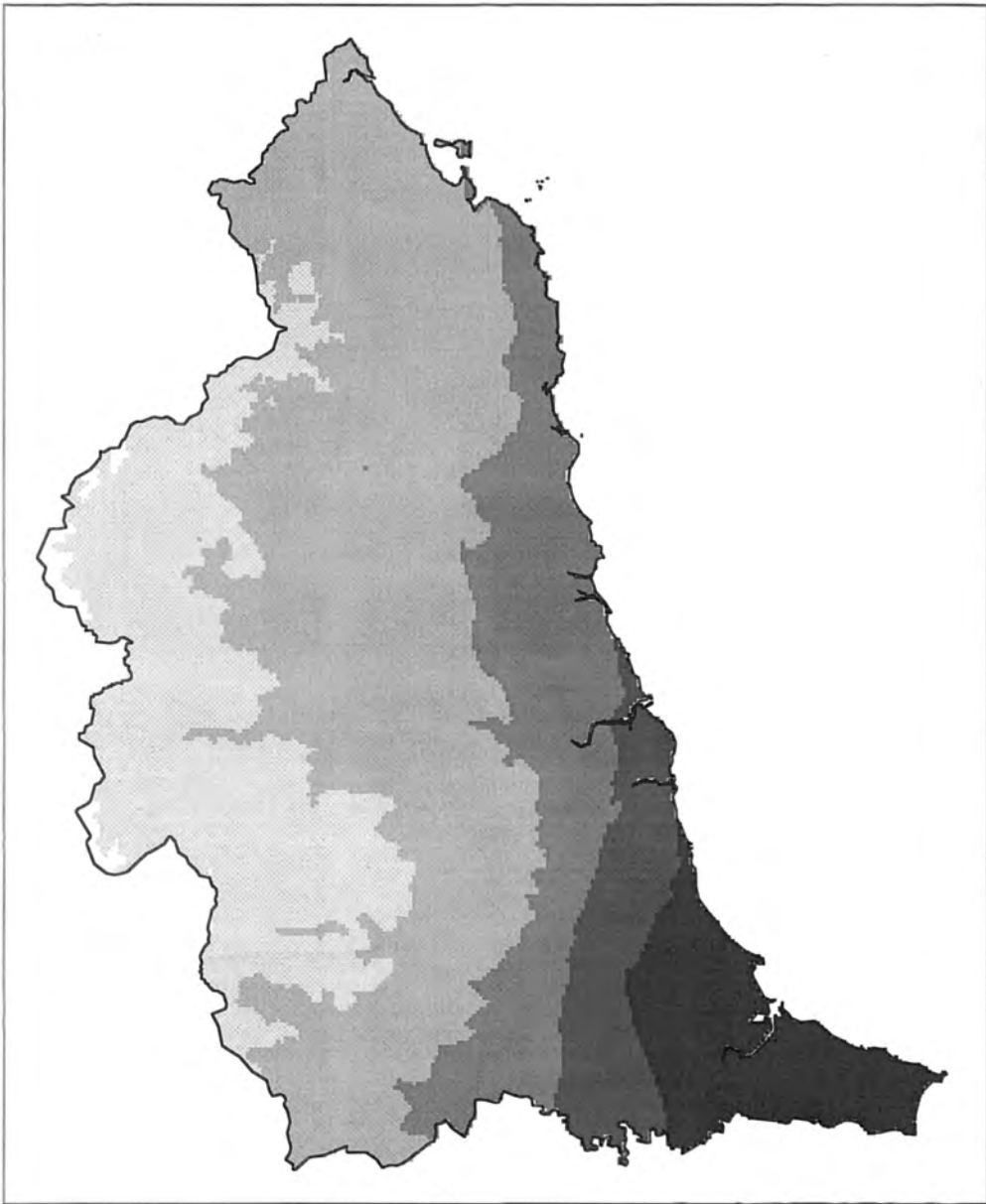
Shrubs

1500 – 1000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.22 Interpolated pollen map of herb pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

As in the previous period (Fig. 7.3.4) herb pollen levels are highest in the south east of the region. In this area herb pollen increases further at several sites up to 89% tdlp at Bishop Middleham and 85% on the coast at Hartlepool. Herb pollen values also increase at some sites in northern Northumberland, such as Akeld Steads, although not at sites where Ericaceae levels or tree levels are high. In the uplands herb pollen rises at a small number of sites in upper Teesdale but otherwise remains around 10%.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



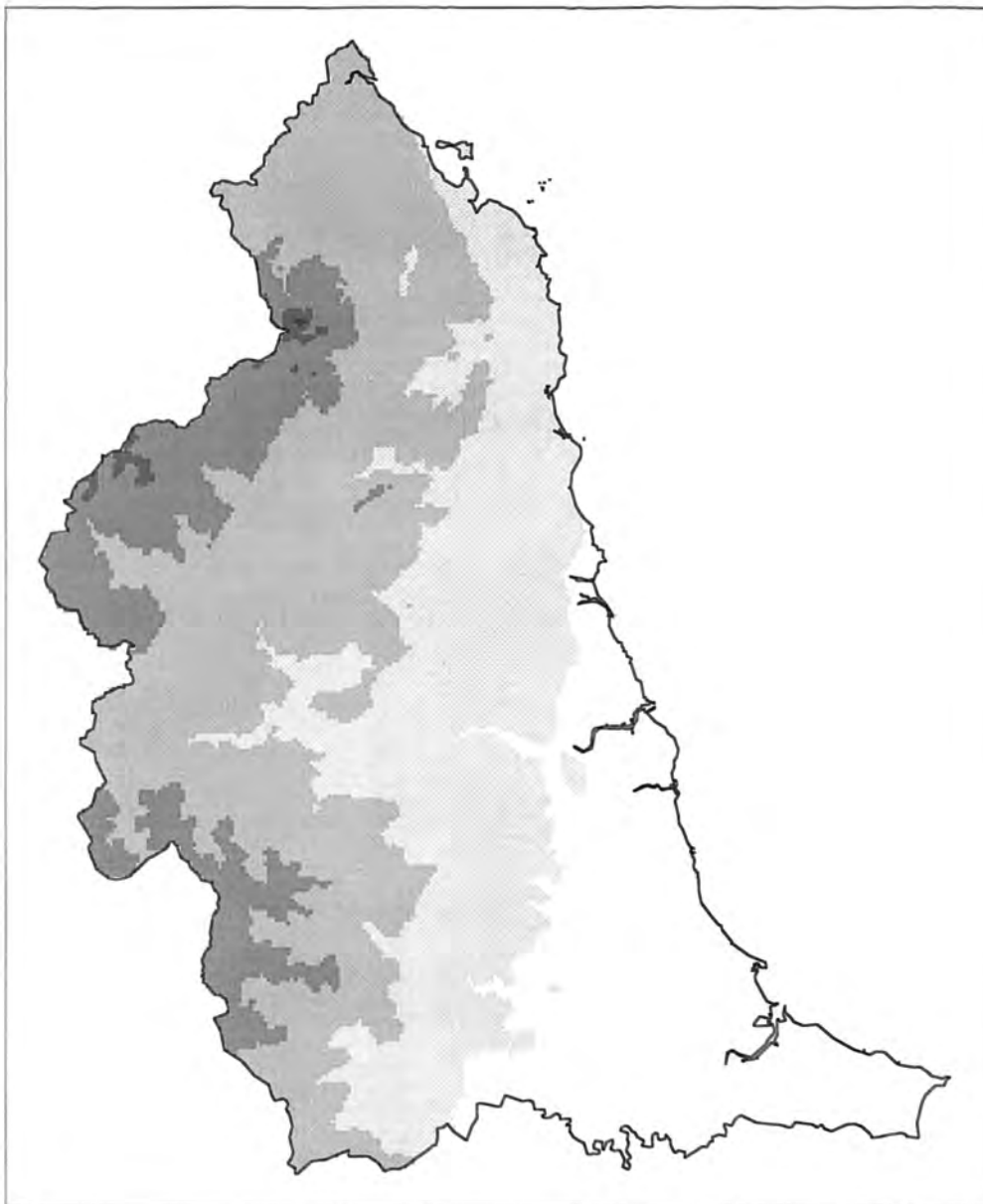
Herbs

1500 – 1000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.23 Interpolated pollen map of Ericaceae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

Ericaceae pollen values continue to rise at upland sites, following the trend observed in all periods preceding this, increasing up to 50% tdlp at many sites. Sites with the highest Ericaceae values occur in the uplands of the Northern Pennines and also in the Cheviots in northern Northumberland. Ericaceae values remain low elsewhere, with the exception of Mordon Carr in the south east of the region, where Ericaceae values rise.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



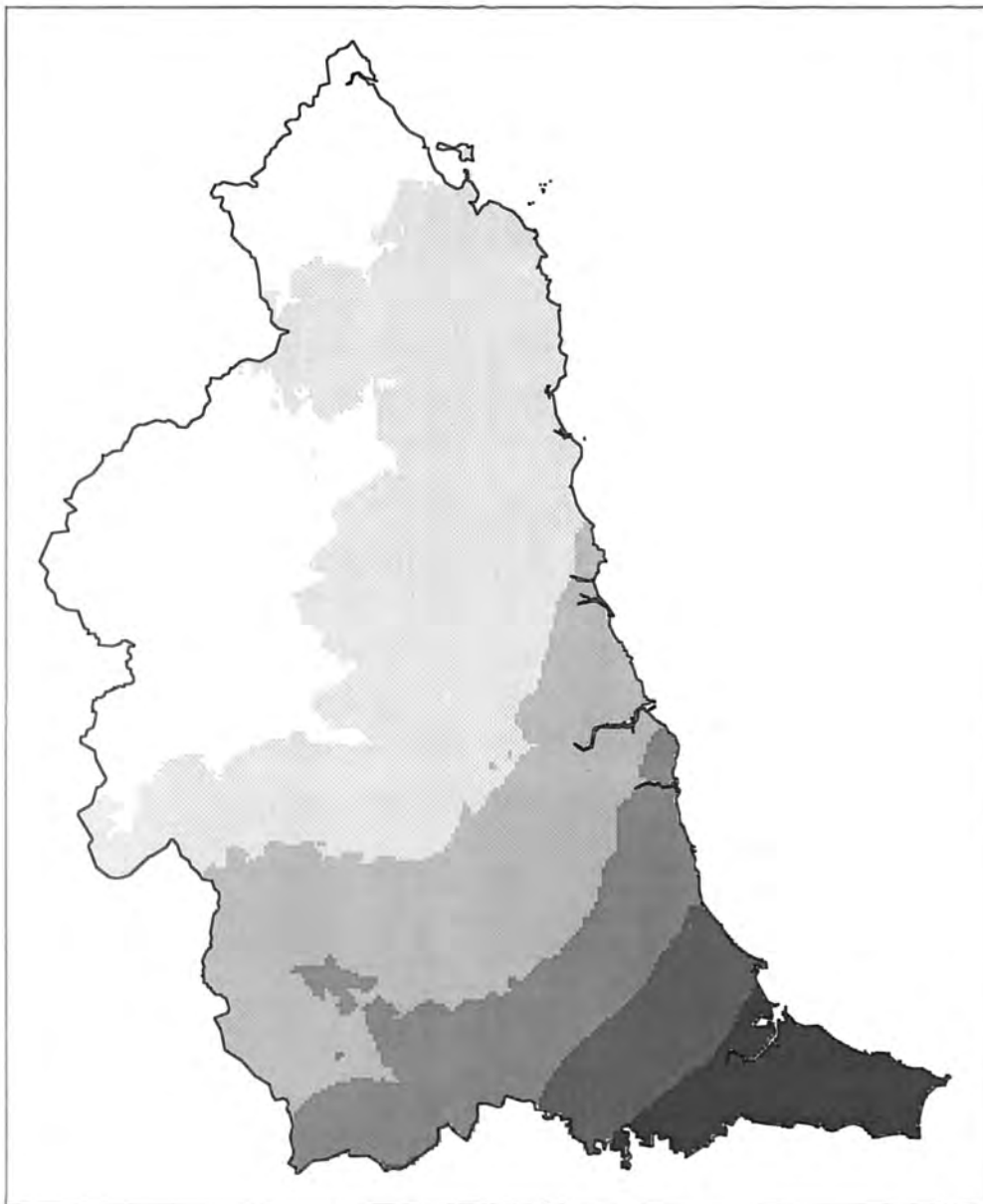
Ericaceae

1500 – 1000 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.24 Interpolated pollen map of agricultural: arable index scores for the middle Bronze Age period, 1500 - 1000 cal. BC

The highest, most arable, scores continue to occur in the south east of the region, with a further increase from the previous period in scores at many sites in this area over 70%. Non-arable types however remain dominant at a couple of sites on the Magnesian Limestone Plateau, Bishop Middleham and Hutton Henry. At a small number of sites in the uplands of the Northern Pennines arable scores increase, such as at Quick Moss, although overall in the uplands non-arable types increase, for example in Upper Teesdale. Scores remain low at most sites in Northumberland, with the exception of Akeld Steads where there is a rise in arable types.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%

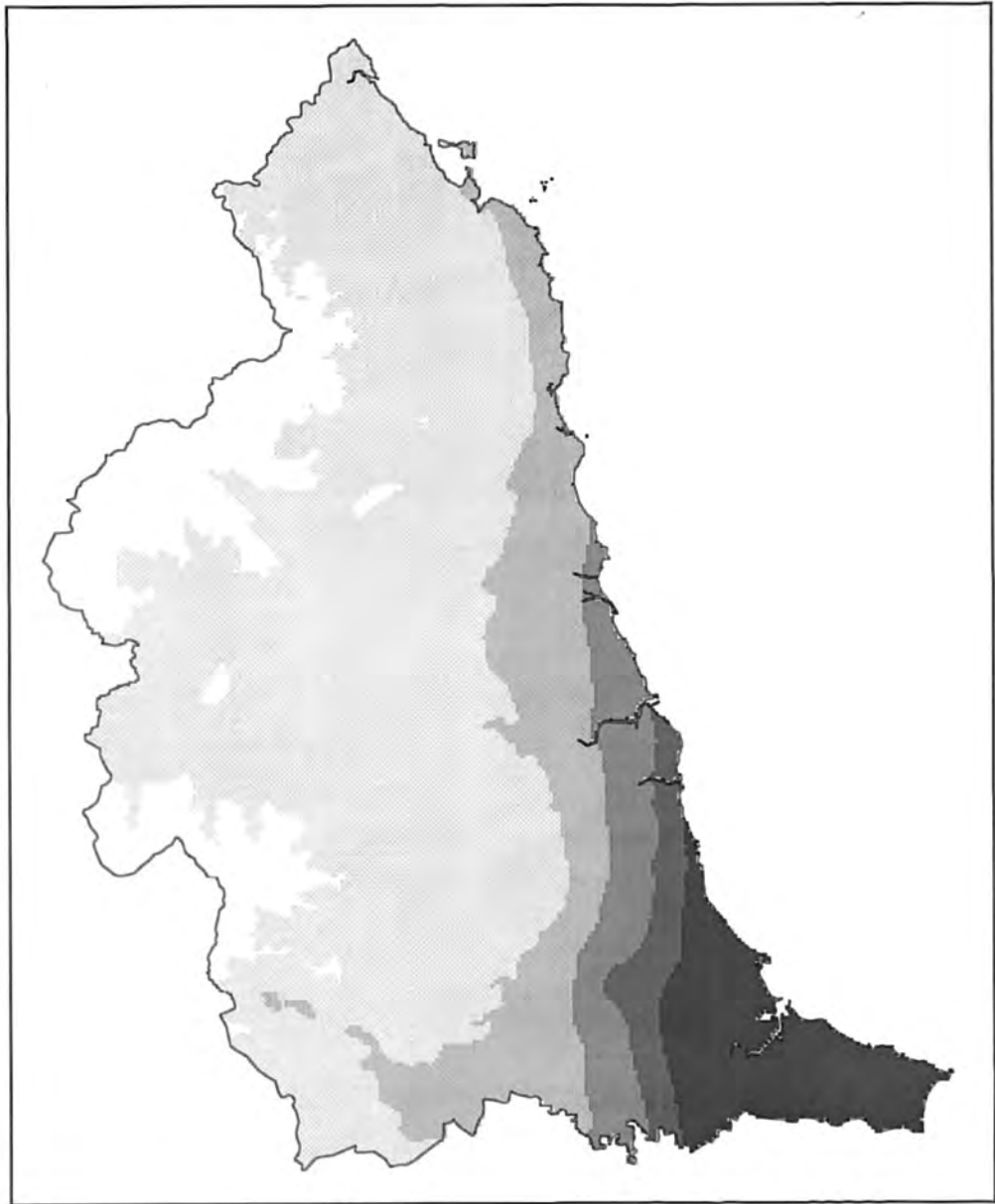


Agricultural:Arable Index






1500 – 1000 cal. BC

Figure 7.3.25 Interpolated pollen map of Gramineae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

As in the previous period, the highest values for Gramineae occur in the south east of the region, with a very high value of 70% tdlp on the coast at Hartlepool, and a high value of 37% at Bishop Middleham on the East Durham plateau. Elsewhere in the south east Gramineae values are much lower (under 10%.) Other high values occur at Cronkley Pastures in upper Teesdale (31%) and in the upper Derwent at Pow Hill (20%), but apart from this values lie under 10% across most of the region, and under 5% at many upland sites.



Key:

-  0 – 5%
-  5 – 10%
-  10 – 15%
-  15 – 20%
-  20 – 25%
-  > 30%



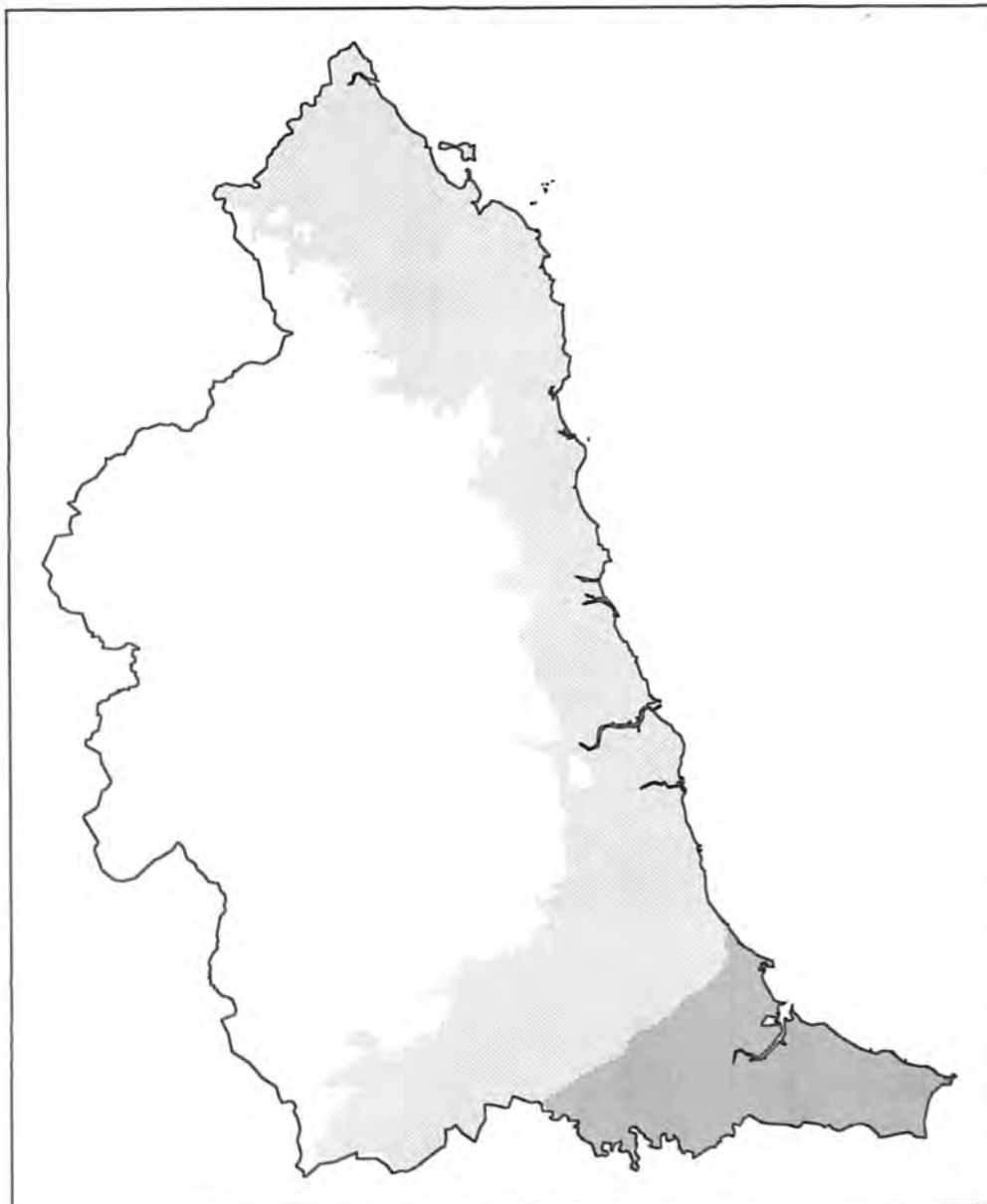
Gramineae

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.26 Interpolated pollen map of *Cerealia*-type pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

Compared to the previous period, the map for *Cerealia*-type pollen shifts emphasis away from northern Northumberland to the south east of the region, as values at Trickle Wood fall, and values at sites in the south east increase. *Cerealia*-type pollen now occurs at almost all sites in the south east of the region, ranging from 0.1-0.5%. *Cerealia*-type pollen continues to occur at Weelhead Moss in upper Teesdale.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



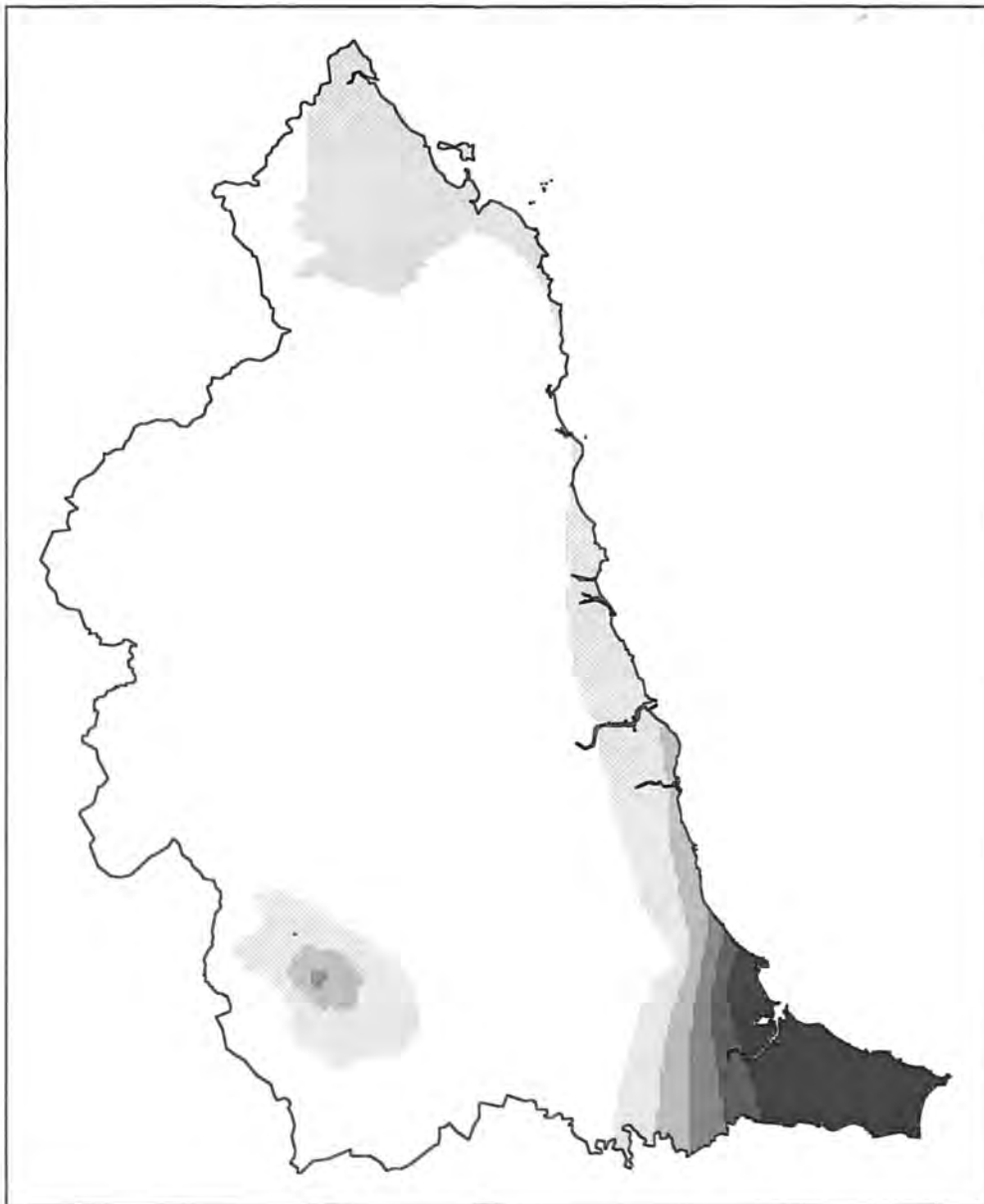
Cerealia-type

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.27 Interpolated pollen map of *Artemisia* pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The highest values for *Artemisia* continue to occur in the south east of the region, but increase markedly on the coast at Hartlepool to 1.6% tdlp. It also occurs at lower values at other sites in the south east. Values in northern Northumberland increase to 0.4% at a couple of sites. It continues to occur in upper Teesdale in small amounts.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%

Artemisia

1500 – 1000 cal. BC

Pollen values expressed as %tdlp



Figure 7.3.28 Interpolated pollen map of Caryophyllaceae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The map for Caryophyllaceae for this period differs from previous periods in that the highest values no longer occur in northern Northumberland, but in the south east of the region. Values around 0.1-0.2% tdlp occur at most sites in the south east, whilst Caryophyllaceae has now disappeared from northern Northumberland. It continues to occur in upper Teesdale in small amounts.



Key:

- 0–0.1%
- 0.1–0.2%
- 0.2–0.3%
- 0.3–0.4%
- 0.4–0.5%
- > 0.5%



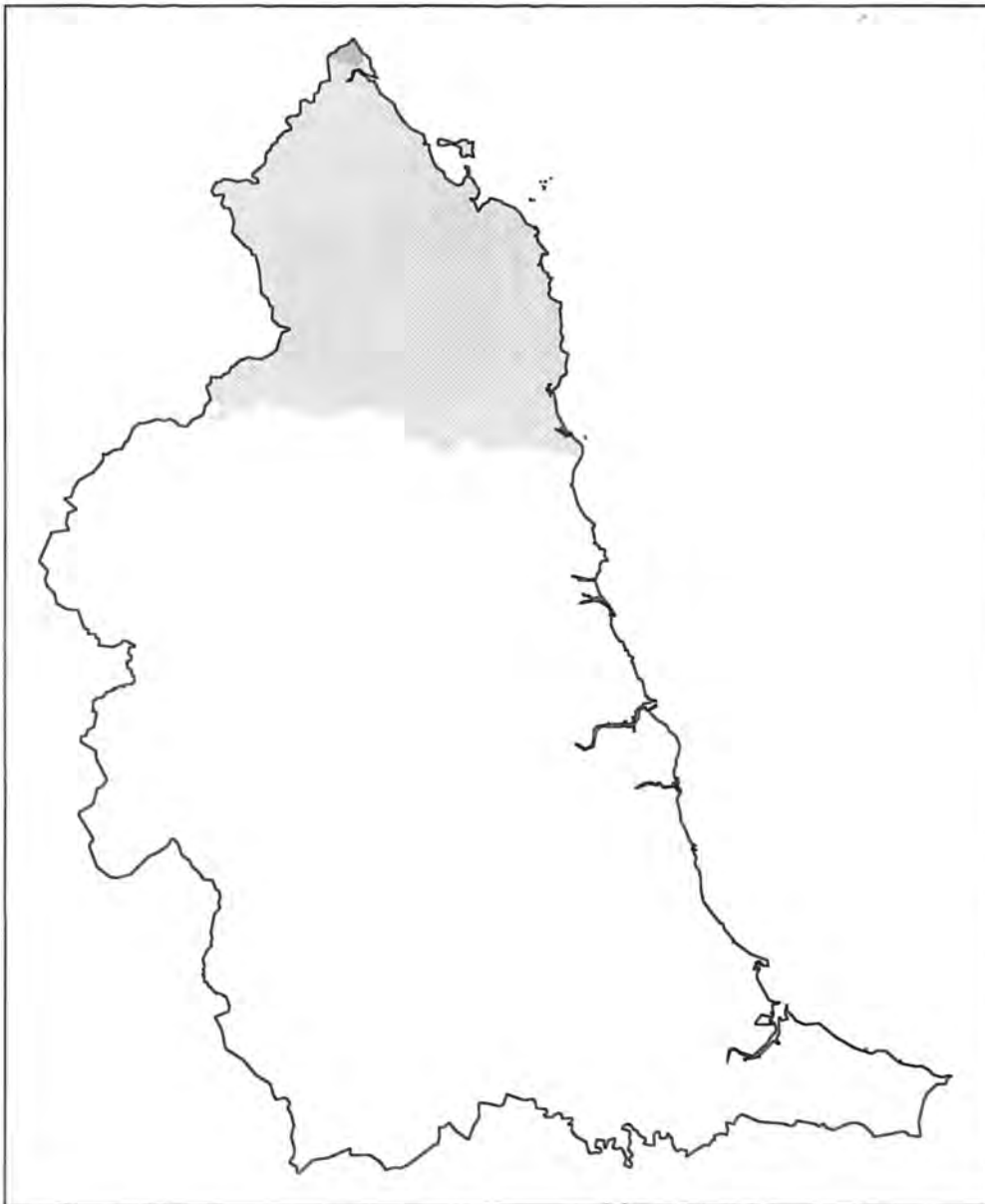
Caryophyllaceae

1500 –1000 cal. BC







Pollen values expressed as %tdlp

Figure 7.3.29 Interpolated pollen map of *Centaurea* pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

Centaurea pollen now reappears in the region, with the highest values occurring in the north of Northumberland. It only occurs at Trickle Wood, with a value of 0.1% tdlp.



Key:

-  < 0.01%
-  0.01% – 0.02%
-  0.02% – 0.03%
-  0.03% – 0.04%
-  0.05% – 0.06%
-  > 0.06%



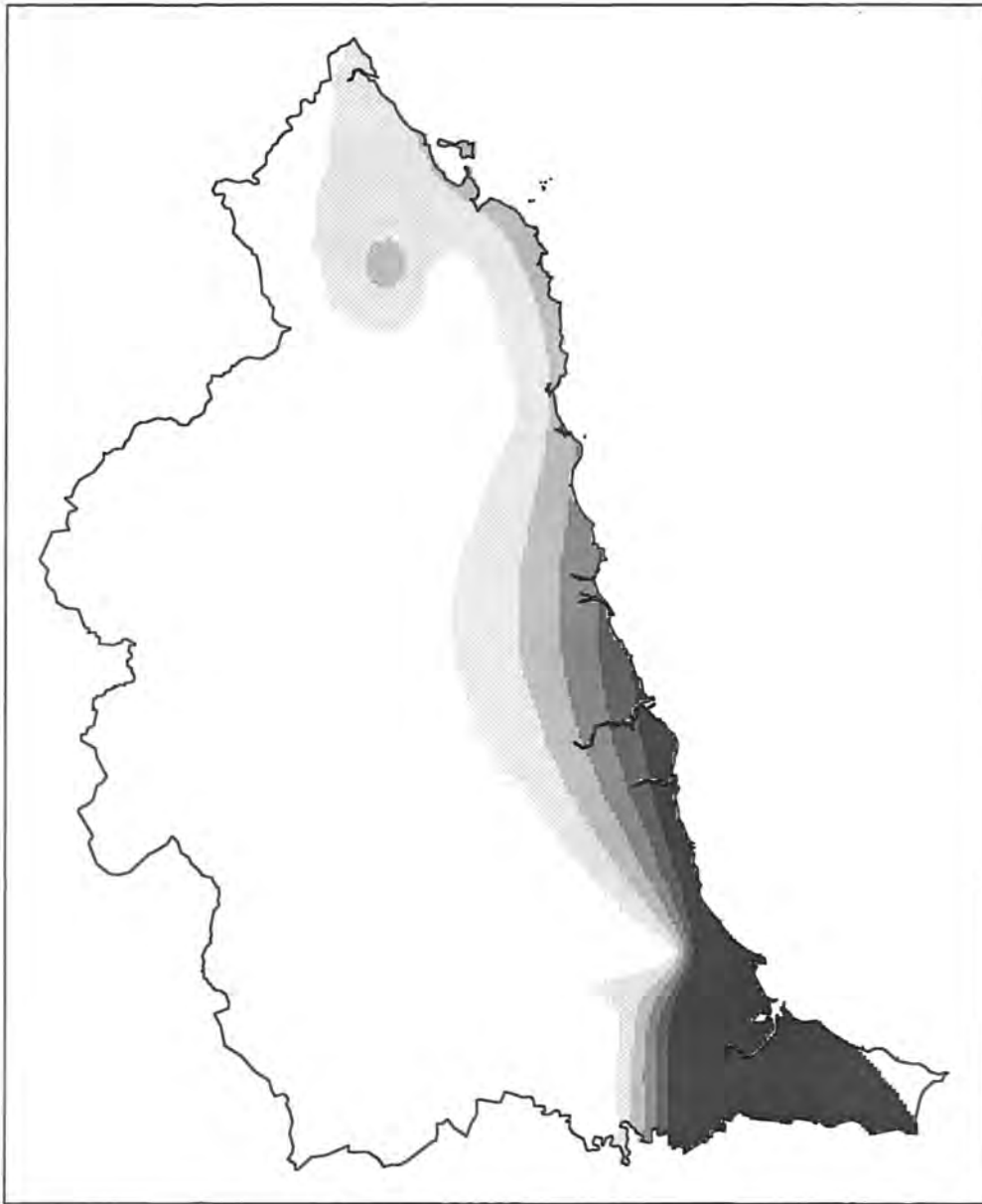
Centaurea

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.30 Interpolated pollen map of Chenopodiaceae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The map for Chenopodiaceae for this period is very similar to that for the previous period (Fig. 7.3.11), with the highest values occurring on the coast at Hartlepool in the south of the region (4% tdlp.) Far lower values occur elsewhere, at several sites in the south east with values around 0.1-0.2%, and at several sites in Northumberland, rising to 0.4% at Trickle Wood.



Key:

- 0–0.2%
- 0.2–0.4%
- 0.4–0.6%
- 0.6–0.8%
- 0.8–1.0%
- >1.0%



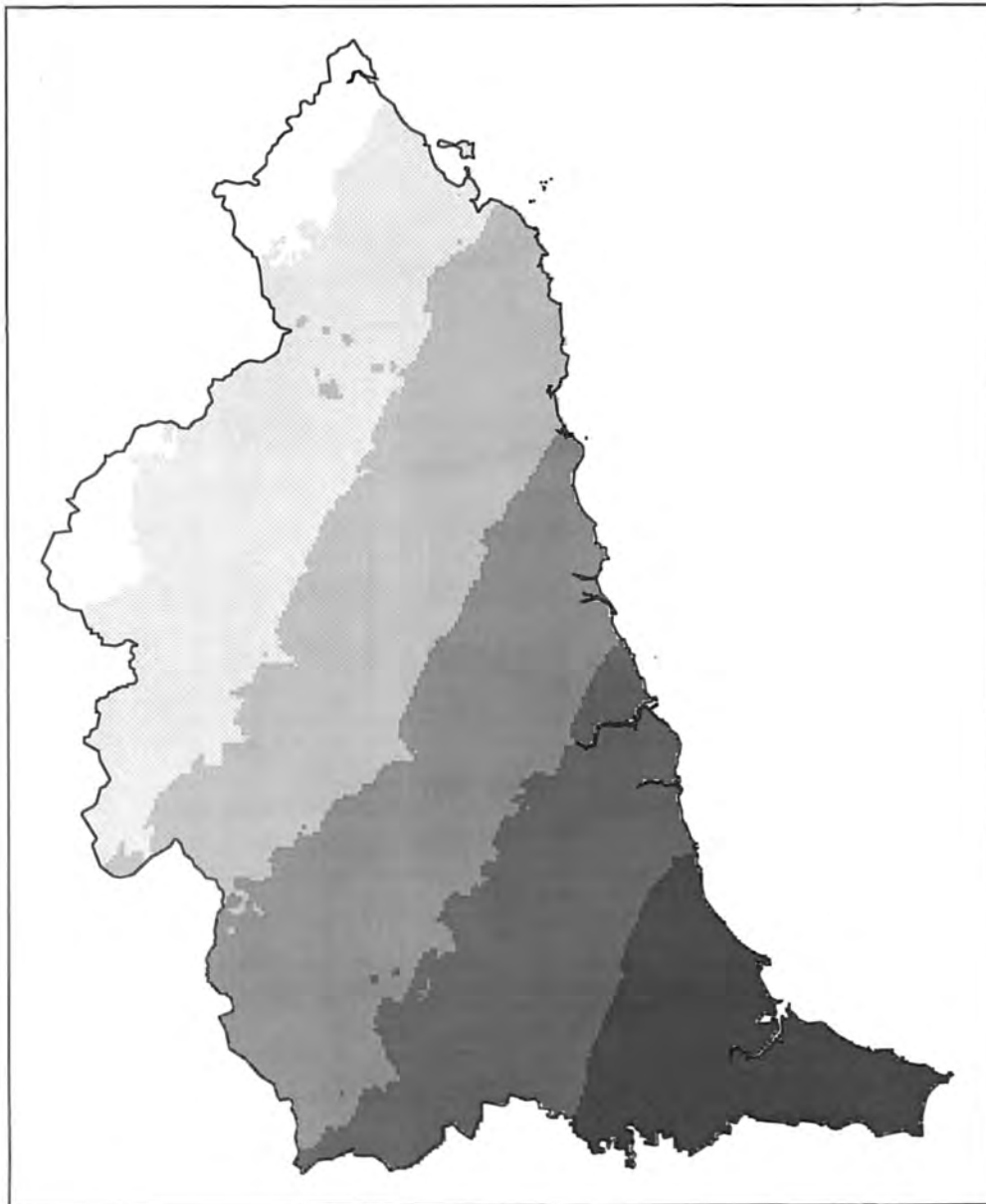
Chenopodiaceae

1500 –1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.31 Interpolated pollen map of Compositae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The map for Compositae for this period closely resembles that for the previous period (Fig. 7.3.12), with the highest values occurring in the south east of the region. A high value exceeding 1% tdlp occurs at Bishop Middleham and values between 0.1-0.4% at other sites in the area. Values up to 0.1% occur at several sites in Northumberland, including Steng Moss, Broad Moss and Trickle Wood, and a value of 0.4% occurs in the west of the Tyne Corridor.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



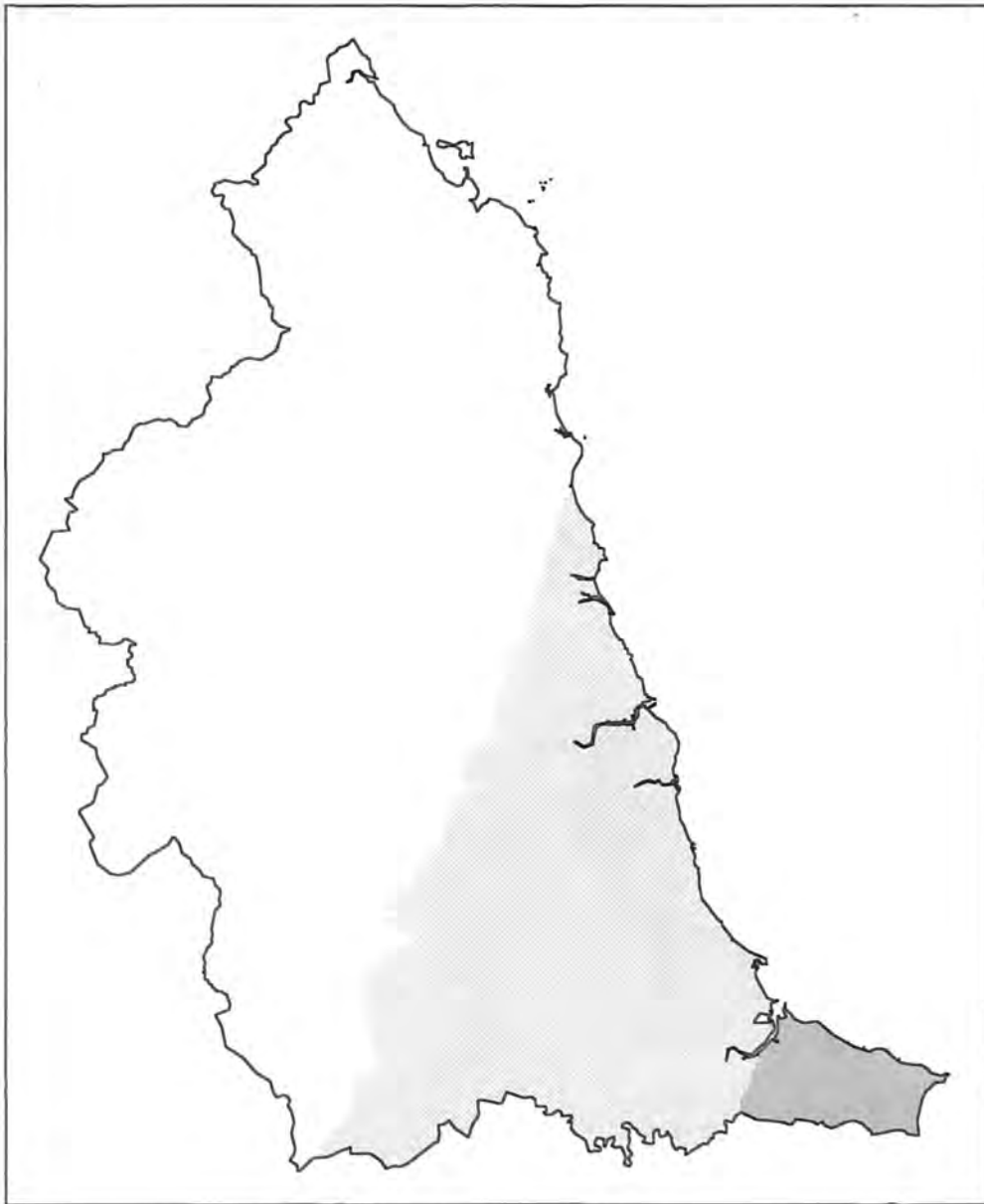
Compositae

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.32 Interpolated pollen map of Cruciferae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The emphasis shifts in this period from the north of Northumberland to the south east of the region, compared to the previous period (Fig. 7.3.13). A value of 0.6% tdlp occurs at Akeld Steads in northern Northumberland, but values increase in the south east of the region, to between 0.1-0.7% at several sites in this area.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



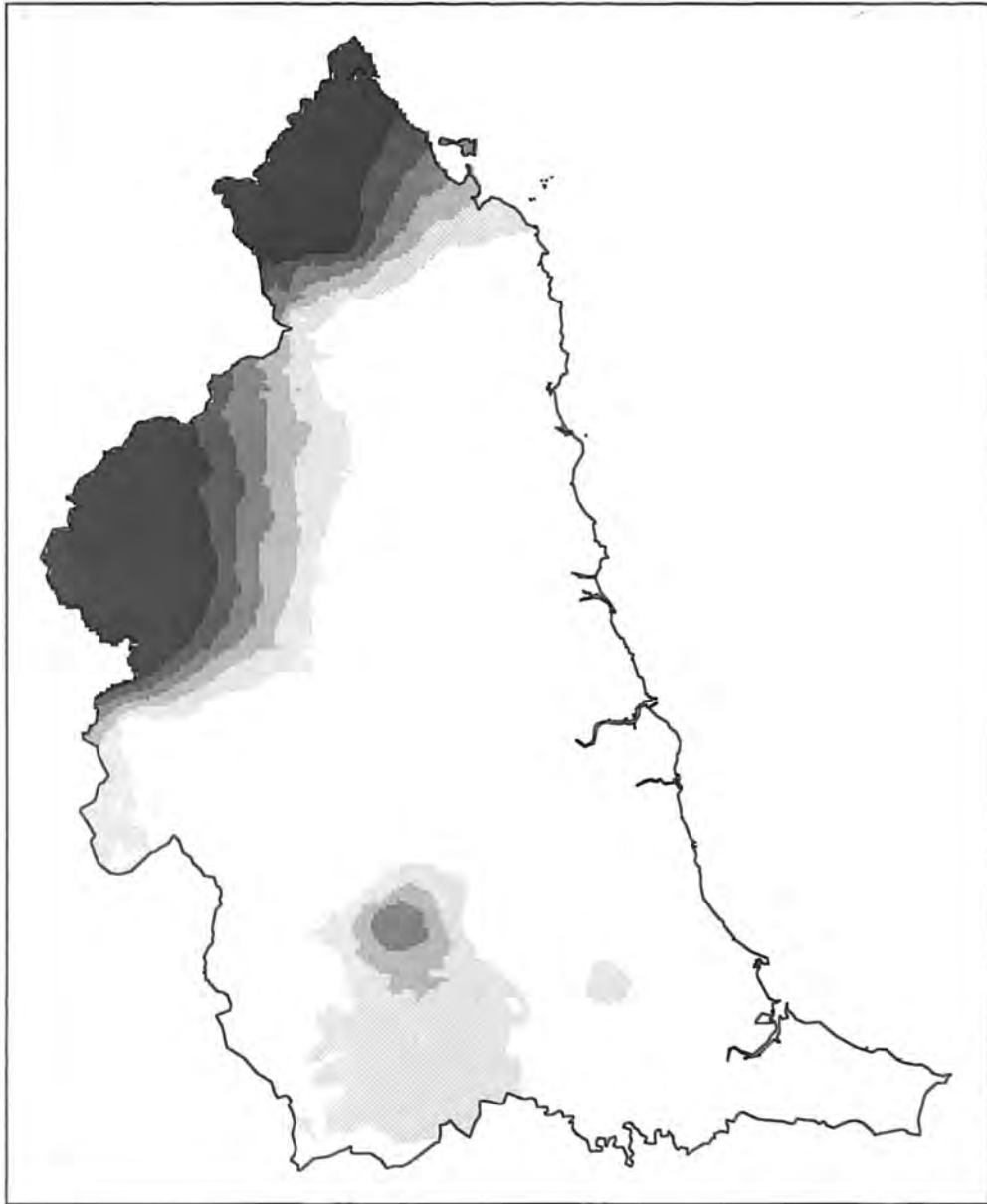
Cruciferae

1500 – 1000 cal. BC







Pollen values expressed as %tdlp

Figure 7.3.33 Interpolated pollen map of Leguminosae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The high values formerly found at Cranberry Bog (Fig. 7.3.14) now disappear, but the highest Leguminosae values continue to occur in the north of the region, with values of 0.1-0.6% tdlp occurring at several sites in northern Northumberland, and a high value of 1% occurring in the western uplands of Northumberland at Coom Rigg. It occurs in small values under 0.1% at a couple of sites in the south east of the region.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



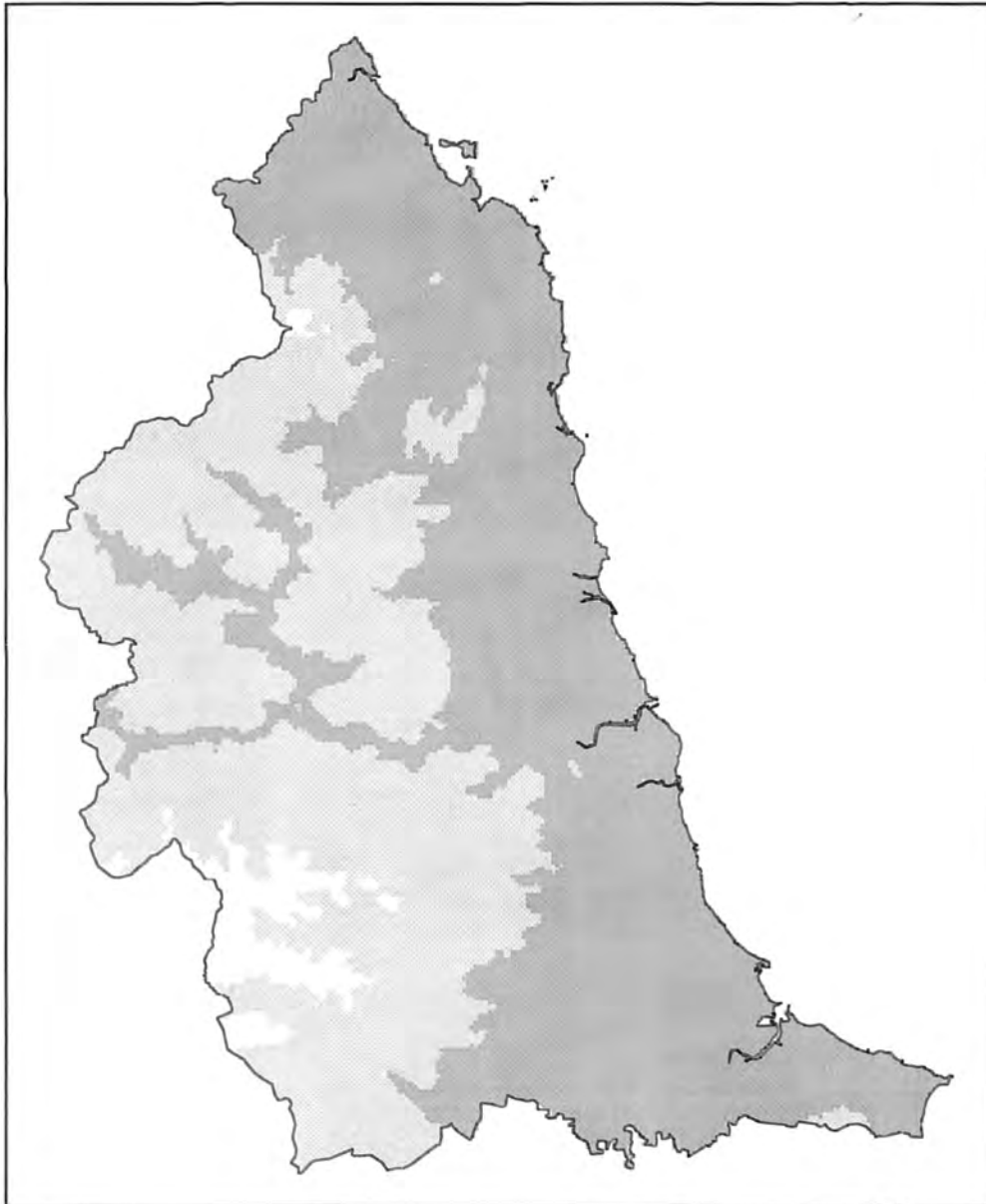
Leguminosae

1500 – 1000 cal. BC







Pollen values expressed as %tdlp

Figure 7.3.34 Interpolated pollen map of *Plantago* pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

High values continue to occur in the south east of the region, increasing further at some sites, up to 8.4% tdlp at Bishop Middleham and 1.5% on the coast, and lying between 0.2-0.4% at other sites in the area. High values now also occur in northern Northumberland over 1% at most sites and also further south in Northumberland at Steng Moss (1.7%) and Coom Rigg (2.1%) and in the Tyne Corridor. In the Northern Pennines values generally lie under 0.5% with the exception of Weelhead Moss (2%).



Key:

-  < 0.6%
-  0.6 – 1.2%
-  1.2 – 1.8%
-  1.8 – 2.4%
-  2.4 – 3.0%
-  3.0 – 3.6%



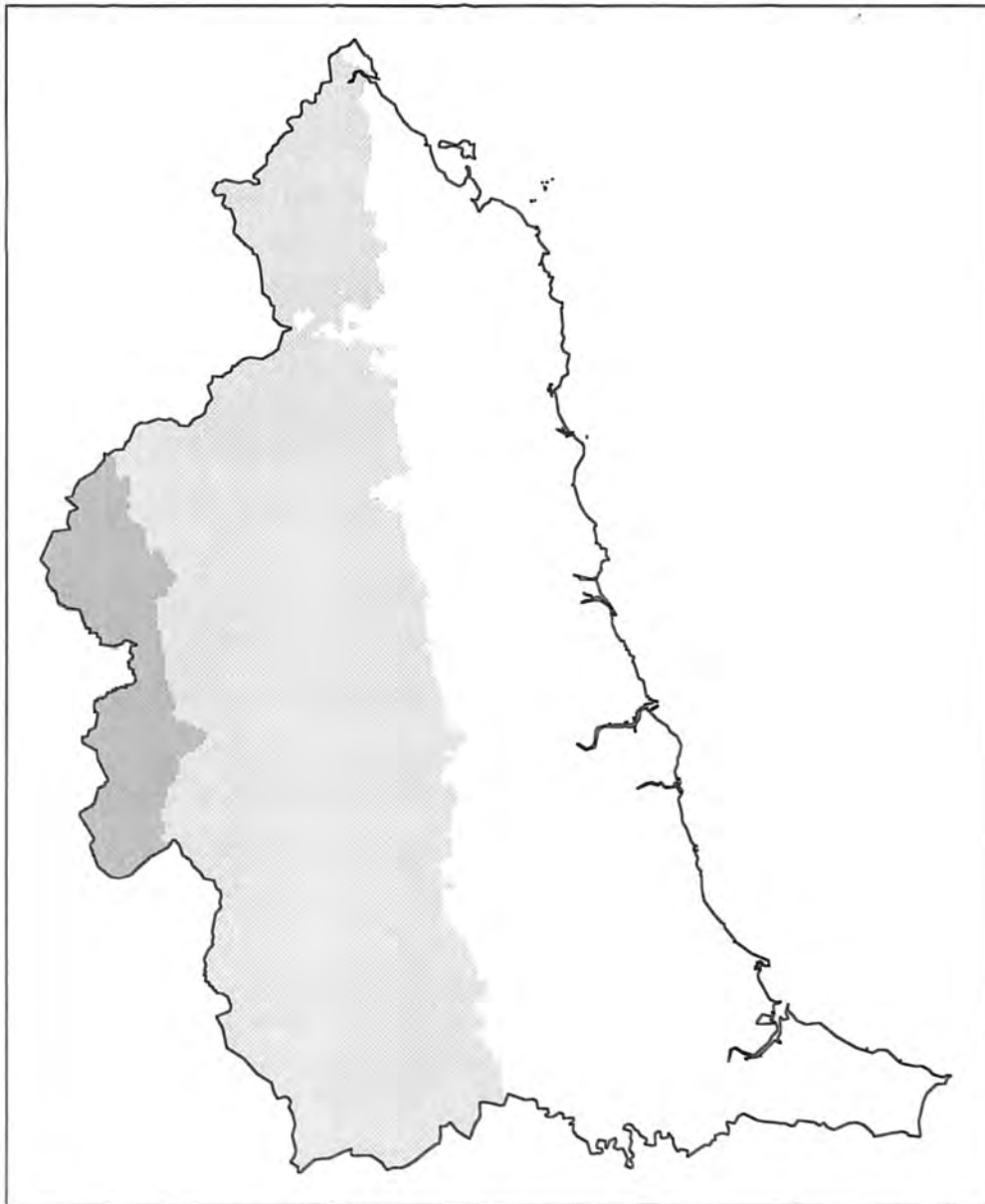
Plantago

1500 – 1000 cal. BC







Pollen values expressed as %tdlp

Figure 7.3.35 Interpolated pollen map of *Polygonum* pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The highest *Polygonum* value in this period occurs at Fox Earth Gill in upper Teesdale, with a high value of 1.6% tdlp. Apart from this, most other occurrences of *Polygonum* occur in Northumberland, rising to 0.4% at Trickle Wood.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



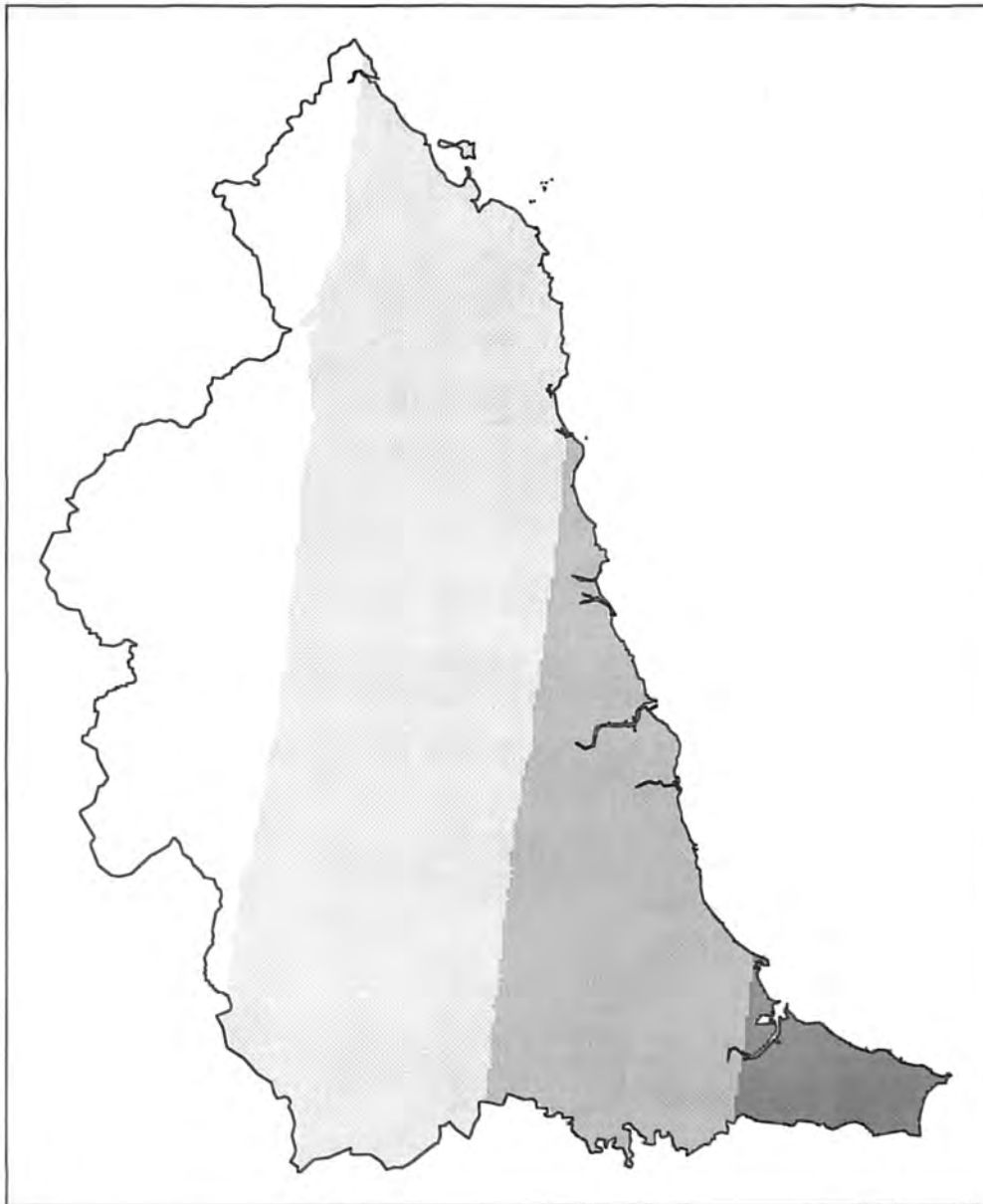
Polygonum

1500 – 1000 cal. BC







Pollen values expressed as %tdlp

Figure 7.3.36 Interpolated pollen map of Ranunculaceae pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

The highest values for Ranunculaceae in this period occur in the south east of the region, with a high value of 1.5% tdlp occurring at Bishop Middleham. Values between 0.3-0.5% occur at other sites in this area. Values between 0.2-0.6% occur at sites across Northumberland, with the highest value occurring in northern Northumberland.



Key:

-  0 – 0.2%
-  0.2 – 0.4%
-  0.4 – 0.6%
-  0.6 – 0.8%
-  0.8 – 1.0%
-  > 1.0%



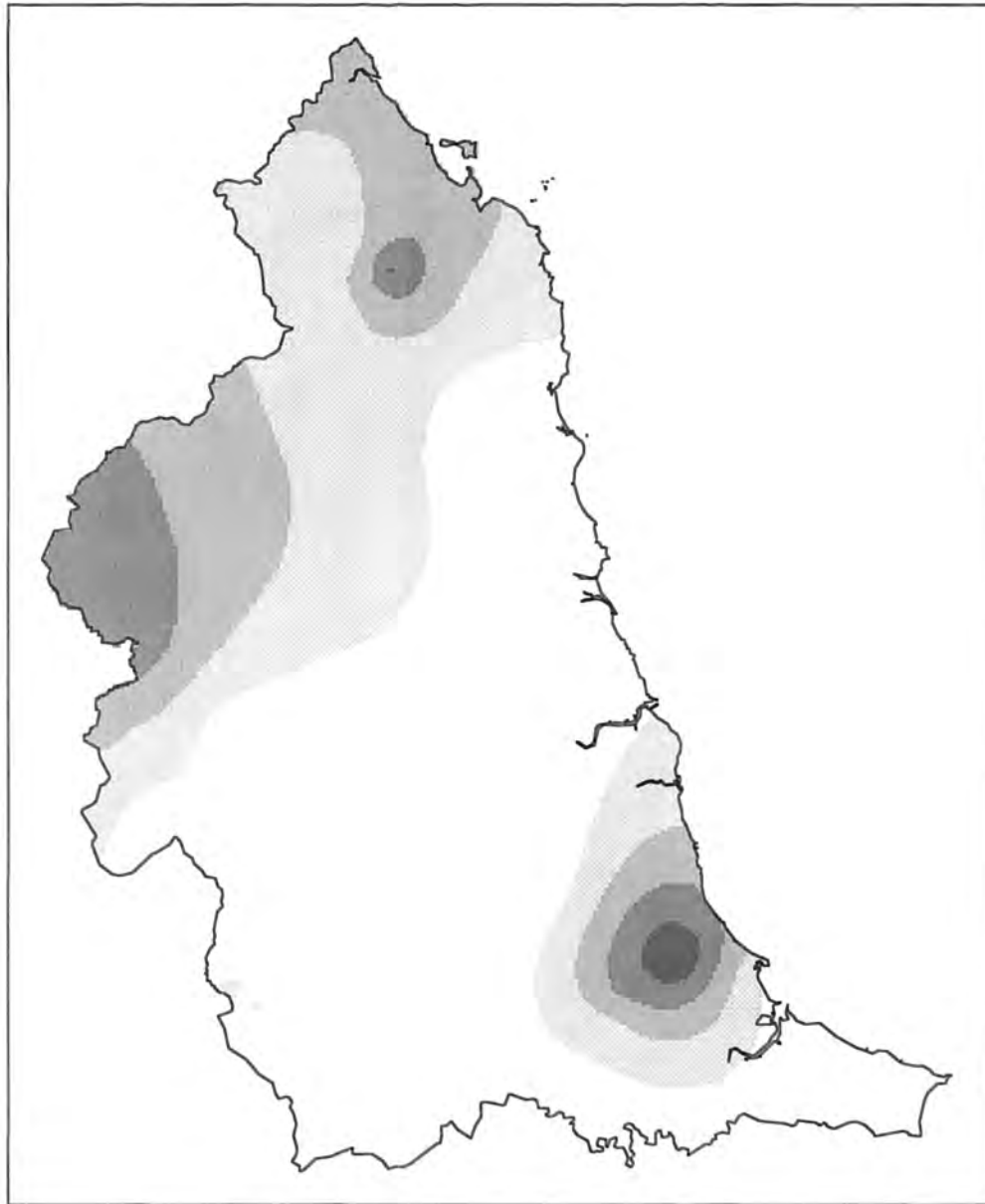
Ranunculaceae

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Figure 7.3.37 Interpolated pollen map of *Rumex* pollen values for the middle Bronze Age period, 1500 - 1000 cal. BC

As in the previous period, the highest values for *Rumex* in this period occur in the south east of the region, rising to 1.4% tdlp at Hutton Henry and occurring between 0.1-0.7% at other sites in the area. A high value of 1.3% also occurs in northern Northumberland at Trickle Wood and occurs at other sites across Northumberland between 0.2-0.4%, and in south west Northumberland at Coom Rigg Moss at 0.9%. Lower values continue to occur in the Northern Pennine uplands.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



Rumex

1500 – 1000 cal. BC

Pollen values expressed as %tdlp

Later Bronze Age and
earliest Iron Age period:

1000 - 500 cal. BC

List of Figures and Tables for the late Bronze Age and earliest Iron Age

Tables

Table 7.3.3	Summary of trends in pollen maps for the late Bronze Age and earliest Iron Age period.	299
-------------	--	-----

Figures

Fig. 7.3.38	Map showing locations of pollen cores used to create interpolated maps for the period 1000 - 500 cal. BC	301
-------------	--	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.3.39	Interpolated pollen map of averaged total tree pollen values.	303
-------------	---	-----

Fig. 7.3.40	Interpolated pollen map of total shrub pollen values.	305
-------------	---	-----

Fig. 7.3.41	Interpolated pollen map of total herb pollen values.	307
-------------	--	-----

Fig. 7.3.42	Interpolated pollen map of total Ericaceae pollen values.	309
-------------	---	-----

b) Agricultural: arable index map

Fig. 7.3.43	Interpolated pollen map of agricultural:arable index scores.	311
-------------	--	-----

c) Maps of selected individual herb taxa:

Fig. 7.3.44	Interpolated pollen map of Gramineae pollen values.	313
-------------	---	-----

Fig. 7.3.45	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	315
-------------	---	-----

Fig. 7.3.46	Interpolated pollen map of <i>Artemisia</i> pollen values.	317
-------------	--	-----

Fig. 7.3.47	Interpolated pollen map of Caryophyllaceae pollen values.	319
-------------	---	-----

Fig. 7.3.48	Interpolated pollen map of <i>Centaurea</i> pollen values.	321
-------------	--	-----

Fig. 7.3.49	Interpolated pollen map of Chenopodiaceae pollen values.	323
-------------	--	-----

Fig. 7.3.50	Interpolated pollen map of Compositae pollen values.	325
-------------	--	-----

Fig. 7.3.51	Interpolated pollen map of Cruciferae pollen values.	327
-------------	--	-----

Fig. 7.3.52	Interpolated pollen map of Leguminosae pollen values.	329
-------------	---	-----

Fig. 7.3.53	Interpolated pollen map of <i>Plantago</i> pollen values.	331
-------------	---	-----

Fig. 7.3.54	Interpolated pollen map of <i>Polygonum</i> pollen values.	333
-------------	--	-----

Fig. 7.3.55	Interpolated pollen map of Ranunculaceae pollen values.	335
-------------	---	-----

Fig. 7.3.56	Interpolated pollen map of <i>Rumex</i> pollen values.	337
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Table 7.3.3 Summary of trends in pollen maps for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.39 to 7.3.42</p>	<p>At Hutton Henry and Bishop Middleham the very low tree and shrub levels and very high herb levels remain almost unchanged . At Hartlepool, tree and shrub levels remain very low with herb pollen at 81%. Ericaceae is virtually absent. At Mordon Carr tree and shrub levels are higher than elsewhere, as Ericaceae levels lie at 28%. At Neasham Fen tree levels fall slightly, from 47-36%, making tree and shrub levels almost equal. Herb pollen increases slightly to 27%.</p>	<p>Tree values remain at high levels, increasing at Hallowell Moss, from 49-60%, with slight increases at Pow Hill from 48-50% and at Bollihope Bog from 68-70%. Shrub values remain constant, and herb pollen decreases. At Lamb Shield tree pollen decreases from 77 to 64%. The new site of Steward Shield Meadow trees and shrubs lie around 20-30%, and herb values at 43%. Ericaceae are very low. This site resembles sites in the Durham lowlands.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.43</p>	<p>In this period there is a massive increase in arable pollen at Hutton Henry, raising the index score further from 12%-67%. Pastoral types also increase here but not to such a great extent. At Bishop Middleham pastoral types continue to dominate, with a score of 18%. At Mordon Carr, Neasham Fen and Hartlepool both arable and pastoral types increase, but pastoral types increase proportionally more, resulting in a decrease in score to 46%,43% and 37% respectively.</p>	<p>At Lamb Shield arable types remain absent, but there is an increase in both arable and pastoral types at Pow Hill and Burnhope Burn, giving index scores of 29% and 6% respectively. At Hallowell Moss a decline in both arable and pastoral types is accompanied by a drop in index score from 9-4%. Index scores are far higher at Bollihope Bog, with a score of 32%, and at Steward Shield Meadow, with a score of 65%, on a level found in the lowlands.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.44 to 7.3.56</p>	<p>Gramineae pollen increases at Bishop Middleham to 40%, Neasham Fen to 15% and Hartlepool Bay 4 to 44%, but remains around 9% at Mordon Carr and 19% at Hutton Henry. <i>Cerealia</i>-type is present at Bishop Middleham, Mordon Carr, Hutton Henry and Neasham Fen. <i>Plantago</i> (to 8.8% at Bishop Middleham), Compositae, <i>Rumex</i> and Ranunculaceae increase further at most sites. A wide range of herb types appear in this period at Neasham, including <i>Cerealia</i>-type, Compositae, <i>Plantago</i>, <i>Polygonum</i>, <i>Rumex</i> and Chenopodiaceae.</p>	<p>At Pow Hill Gramineae increase to 9%, with the appearance of <i>Cerealia</i>-type, <i>Centaurea</i>, <i>Artemisia</i> and <i>Plantago</i> rises to 1.7%. At Burnhope Burn <i>Plantago</i> rises to 1.6% and Gramineae to 18%, with a wide range of other herb types. A wide range of herb types remain at Hallowell Moss, with the appearance also of <i>Rumex</i>, although Gramineae remains very low, at 0.3%. Lamb Shield remains little changed.</p>

Table 7.3.3 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.3.39 to 7.3.42</p>	<p>The new site of Edlingham has tree and shrub pollen levels around 30%, 44% herbs and very little Ericaceae, and behaves similarly to the Durham lowland sites. Akeld Steads has no levels dating to this period. Broad Moss and Trickle Wood continue to resemble sites in the Durham uplands. Trees decrease at Trickle Wood to 12%, with an increase in herbs to 26%. Camp Hill Moss continues to have high tree levels (68%) and resembles sites in the Wear and Derwent areas.</p>	<p>Tree levels remain the same whilst shrub levels fall at many sites to 10-20%. Herb pollen levels remain the same at most sites, and Ericaceae continue to increase. Values over 40% are common, such as at High banks Moss (50%) and Dead Crook (49%). At Dufton Moss and Quick Moss trees and shrubs remain high. Trees and shrubs are lowest in Upper Teesdale, with trees falling to 12% and shrubs to 9% at Weelhead Moss. Herb pollen levels are higher here.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.3.43</p>	<p>Index scores rise at Trickle Wood (35-51%) and Camp Hill Moss (6-15%) as arable types proportionally show a greater increase. At Broad Moss pastoral types decline and the index score rises (11-14%). At Black Lough arable types are still absent. At Steng Moss arable types are low, at 2%. Arable types are absent at Fellend Moss and Fortherley Moss, but there is a further increase in arable types, and index score, at Coom Rigg to 21%.</p>	<p>Several sites in the uplands continue to have no arable-type pollen. However, at some sites both arable and pastoral pollen types increase, with rises in index scores, at Dufton Moss (to 7%), Cronkley Pastures (to 40%), Tinkler's Sike (to 10%) and Whitfield Lough (to 20%). At Weelhead Moss and Site W index scores fall (to 4% and 14%) as the proportion of pastoral types increases.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.3.44 to 7.3.56</p>	<p>At Trickle Wood Gramineae increases to 8% with a rise in <i>Cerealia</i>-type to 2.2%, <i>Plantago</i> to 2.9% and <i>Polygonum</i> to 1.1%. <i>Plantago</i> appears at Black Lough, and at Broad Moss <i>Artemisia</i> appears with a slight rise in Gramineae to 4%. At Steng Moss levels remain the same as before. Further south, at Fellend Moss Gramineae increases to 7%, although no other herbs are present. At Coom Rigg Compositae, Cruciferae and Caryophyllaceae increase.</p>	<p>Gramineae rises at Weelhead Moss to 10%, with <i>Cerealia</i>-type, and an increase in <i>Plantago</i> to 4.1%. At Dufton Moss, Gramineae rises to 4%, with the appearance of <i>Cerealia</i>-type and <i>Plantago</i>. At Quick Moss there is an increase in the range of herbs, with the appearance of Chenopodiaceae, <i>Plantago</i> and <i>Artemisia</i>. At Cronkley Pastures unusually high levels of Gramineae (29%) occur, with <i>Cerealia</i>-type and Caryophyllaceae, Compositae and Cruciferae, rarely found elsewhere now in the uplands.</p>

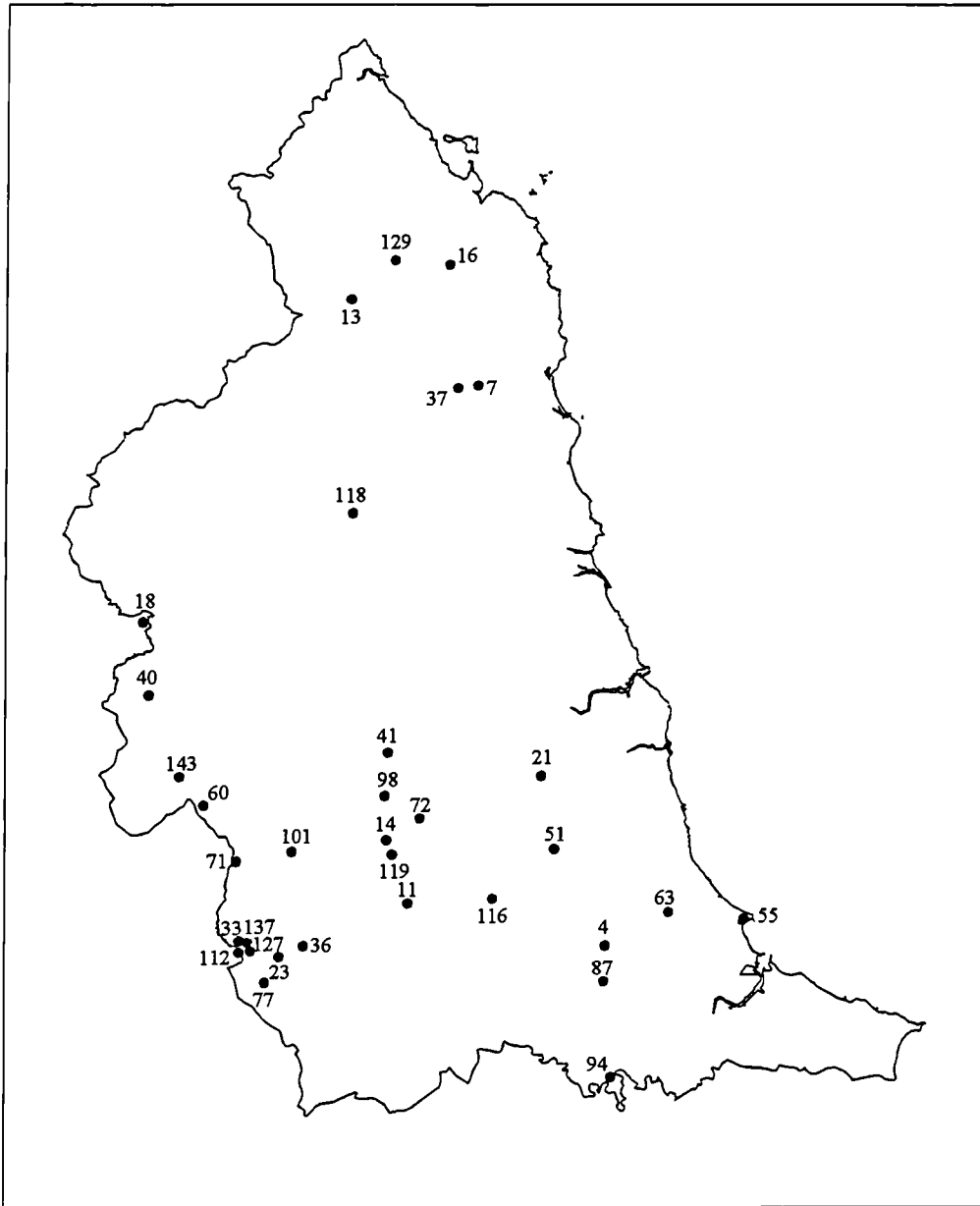


Fig. 7.3.38



Map showing locations of pollen cores used to create interpolated maps for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

N.B. Key to site codes on next page.

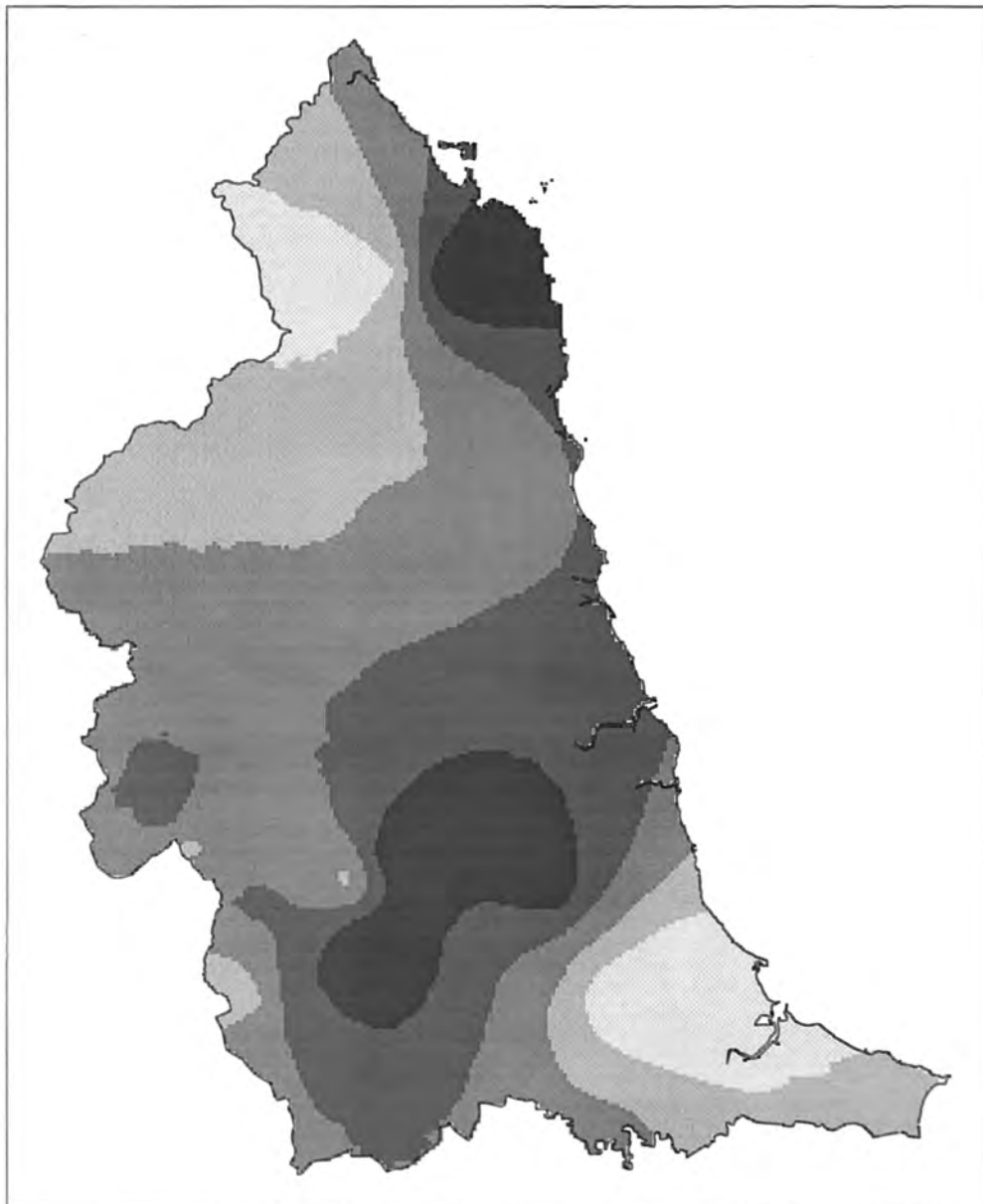
Key to Figure 7.3.38

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.







Code	Pollen core name	Code	Pollen core name
4	Bishop Middleham	71	Knoutberry
7	Black Lough	72	Lamb Shield
11	Bollihope Bog	77	Long Crag
13	Broad Moss	87	Mordon Carr
14	Burnhope Burn	94	Neasham Fen
16	Camp Hill Moss	98	Pow Hill
18	Coom Rigg	101	Quick Moss
23	Cronkley Pastures	112	Site W
33	Dead Crook	116	Stanley Moss
36	Duften Moss	118	Steng Moss
37	Edlingham	119	Steward Shield
40	Fellend Moss	127	Tinkler's Sike
41	Fortherley Moss	129	Trickley Wood
51	Hallowell Moss	138	Weelhead Moss
55	Hartlepool Bay 4	143	Whitfield Lough
60	High Banks Moss		
63	Hutton Henry		

Figure 7.3.39 Interpolated pollen map of tree pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The map of tree pollen values for this period is very similar to that for the previous period (Fig. 7.3.20), in that low tree pollen values occur in the south east of the region and in parts of northern Northumberland, and the highest tree pollen values continue to occur in the upper Derwent/ mid Weardale area, and also at one site in northern Northumberland. The low values in the south east of the region remain almost unchanged from the previous period and tree levels in the uplands remain at the same levels as the previous period.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%



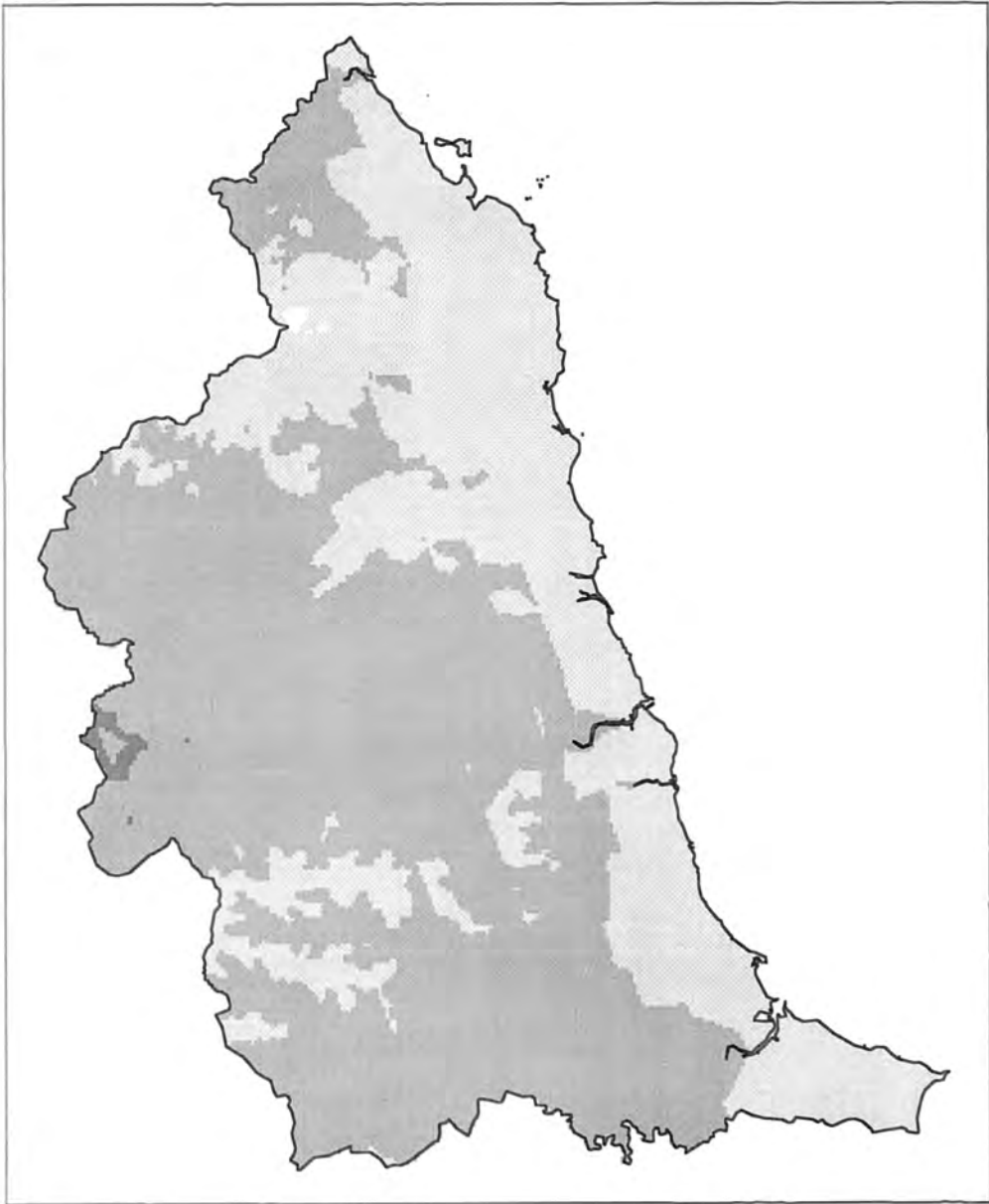
Trees

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.40 Interpolated pollen map of shrub pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Shrub values remain very similar across the region as in the previous period (Fig. 7.3 .31) with the highest values occurring in the uplands and at some sites in northern Northumberland, with values around 20-30% tdlp. At many sites in the uplands shrub levels fall in this period to 10-20%. Shrub values remain low in the south east of the region and in the tree dominated upper Derwent/ mid Weardale area.



Key:

- 0 – 10%
- ◻ 10 – 20%
- ◻ 20 – 30%
- ◻ 30 – 40%
- ◻ 40 – 50%
- ◼ > 50%



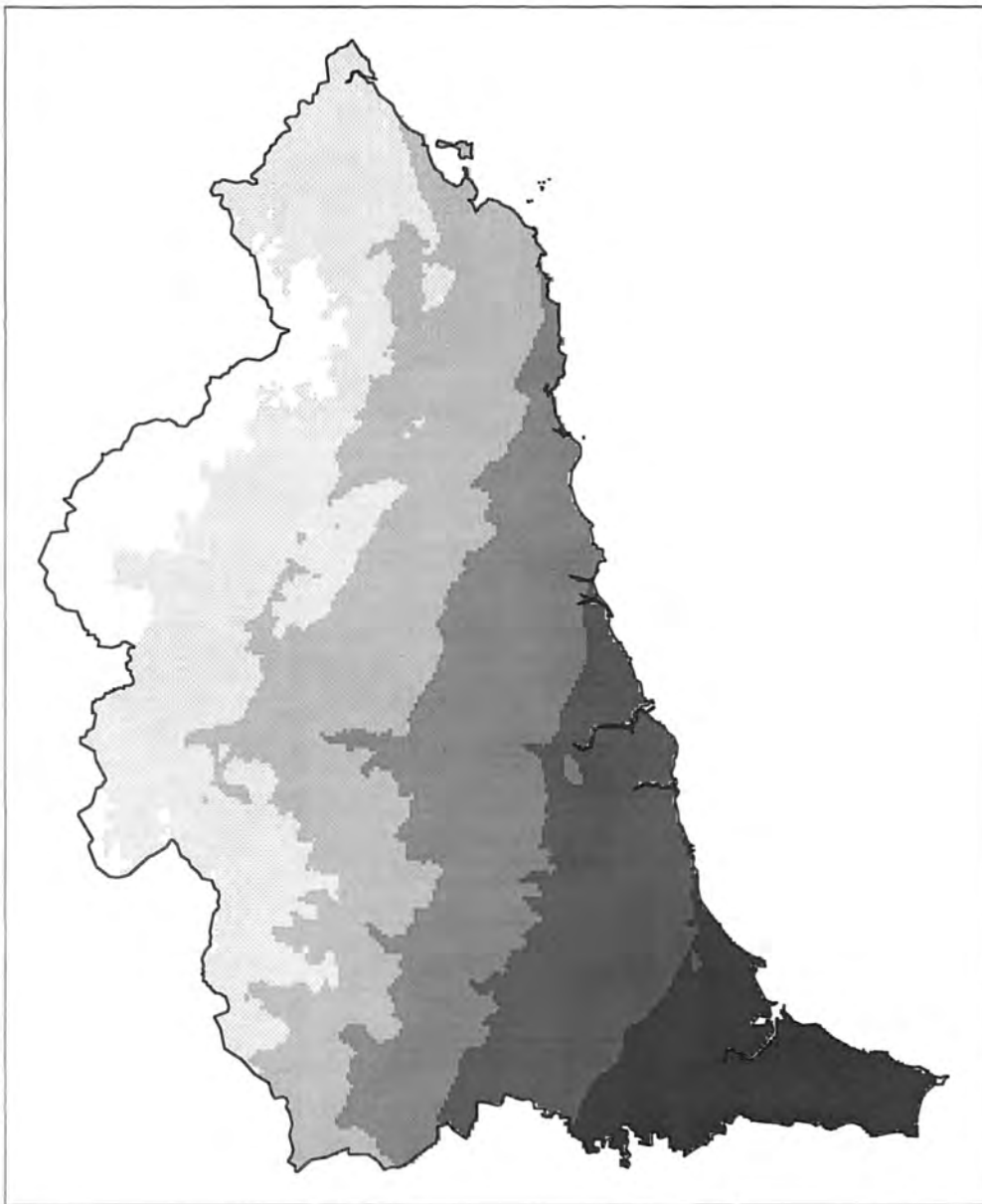
Shrubs

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.41 Interpolated pollen map of herb pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The map for herb pollen in this period closely resembles that for the previous period (Fig. 7.3.22), with the highest values continuing to occur in the south east of the region, rising to 81% tdlp in this area. At the new site of Steward Shield Meadow in Weardale, moderately high values of 43% occur. This has resulted in the interpolation spreading high values further west across the region. In the uplands values continue to lie around or below 10%, lower in those areas with high Ericaceae cover.



Key:

- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- > 50%



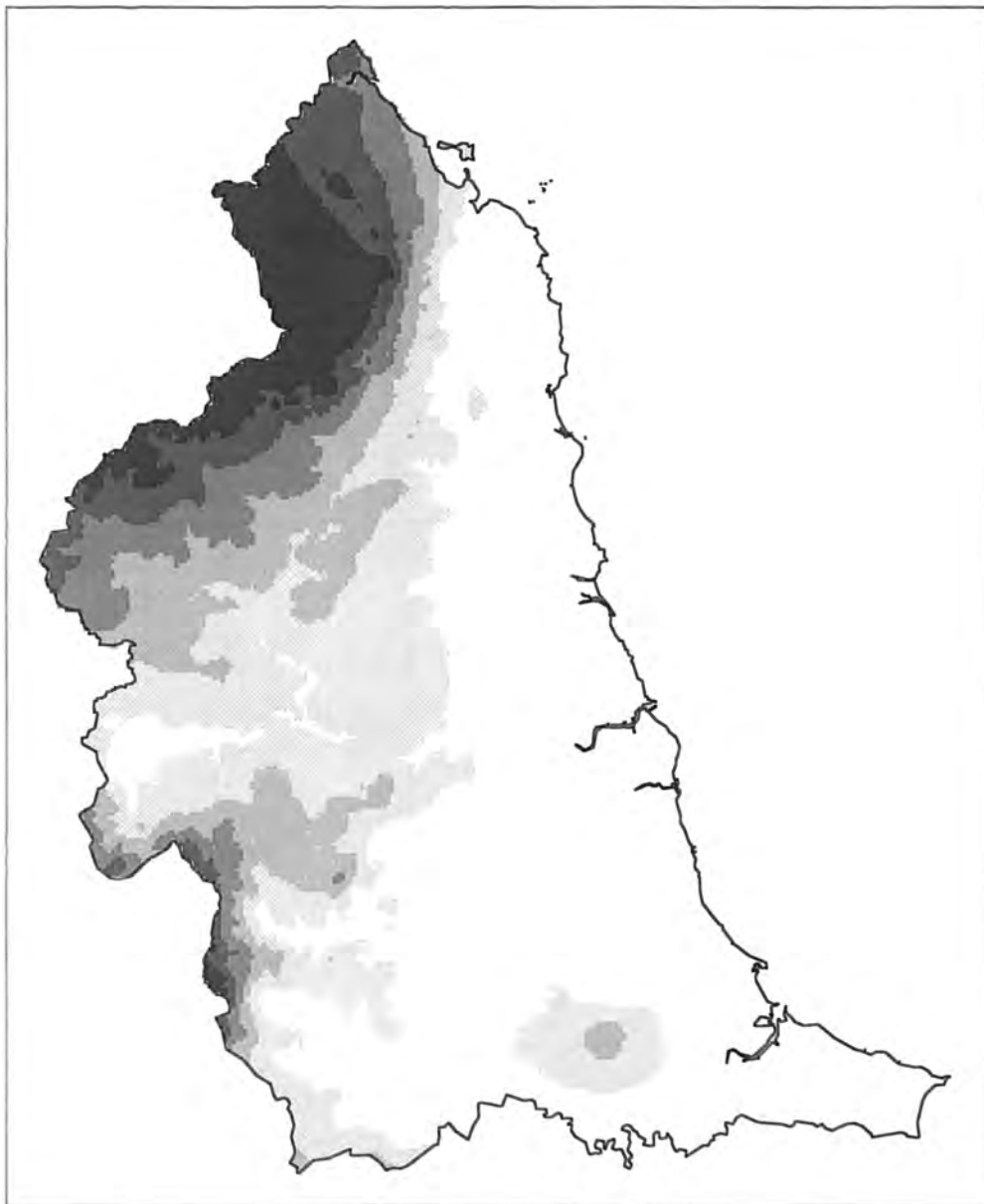
Herbs

1000 - 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.42 Interpolated pollen map of Ericaceae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Ericaceae values continue to increase in the uplands as in previous periods, and in this period increase particularly markedly at many upland sites, with more sites having Ericaceae values between 30-50% tdlp. With the exception of Mordon Carr in the south east of the region, Ericaceae is absent from all other areas of the region.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



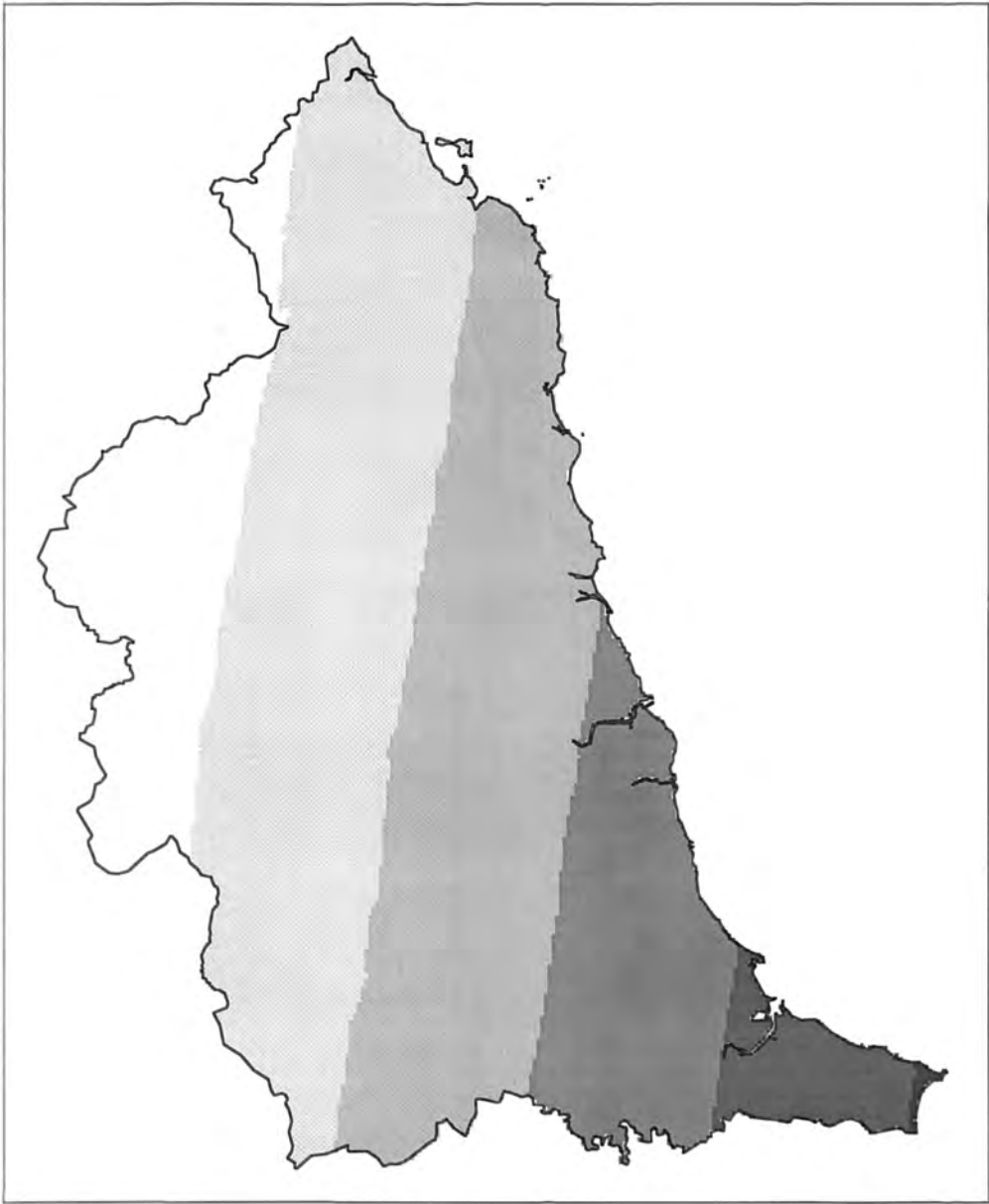
Ericaceae

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.43 Interpolated pollen map of agricultural: arable index scores for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As before, the highest, most arable, scores for the agricultural: arable index occur in the south east of the region, although at slightly lower levels than the previous period. A high arable score of 67% now occurs at Hutton Henry, whilst at other sites non-arable types increase resulting in slightly lower scores between 35-50% at other sites in the area. Scores, as before, are much lower across the rest of the region, with the exception of a couple of sites in northern Northumberland where the score reaches 50%.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%

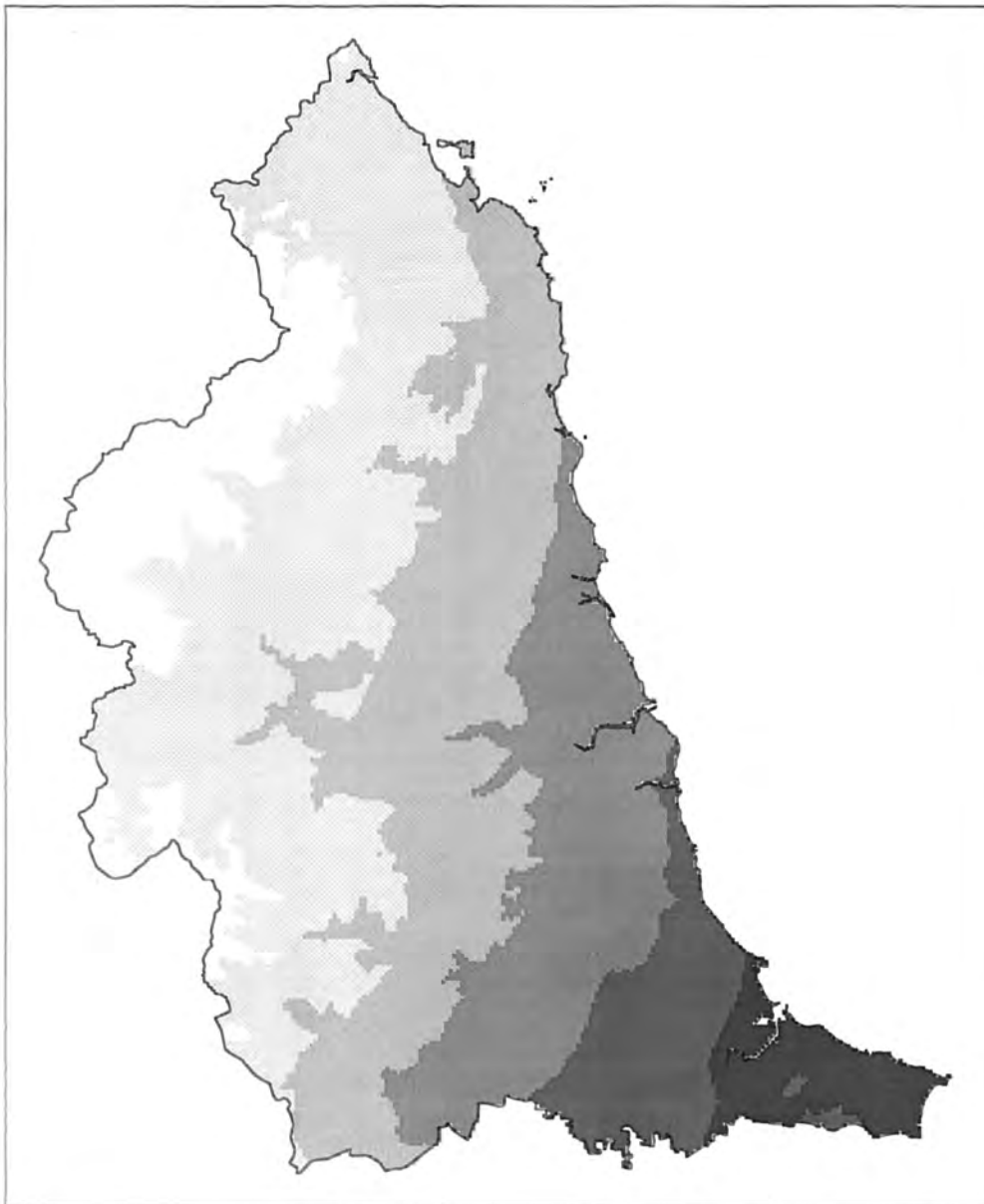


Agricultural:Arable Index

1000 – 500 cal. BC

Figure 7.3.44 Interpolated pollen map of Gramineae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As in the previous period (Fig. 7.3.25), the highest values for Gramineae occur in the south east of the region, rising to 44% tdlp on the coast at Hartlepool, 40% at Bishop Middleham and 19% and 15% at Hutton Henry and Neasham Fen. Outside this area high values occur at the new site in northern Northumberland, Edlingham (20%) and at Cronkley Pastures in upper Teesdale (29%). Other than these sites, Gramineae pollen values lie below 10% at most sites across the region, with the lowest values occurring in the tree dominated upper Derwent/ mid Weardale sites and also in the uplands where Ericaceae dominate.



Key:

- 0 – 5%
- ▒ 5 – 10%
- ▓ 10 – 15%
- 15 – 20%
- 20 – 25%
- > 30%



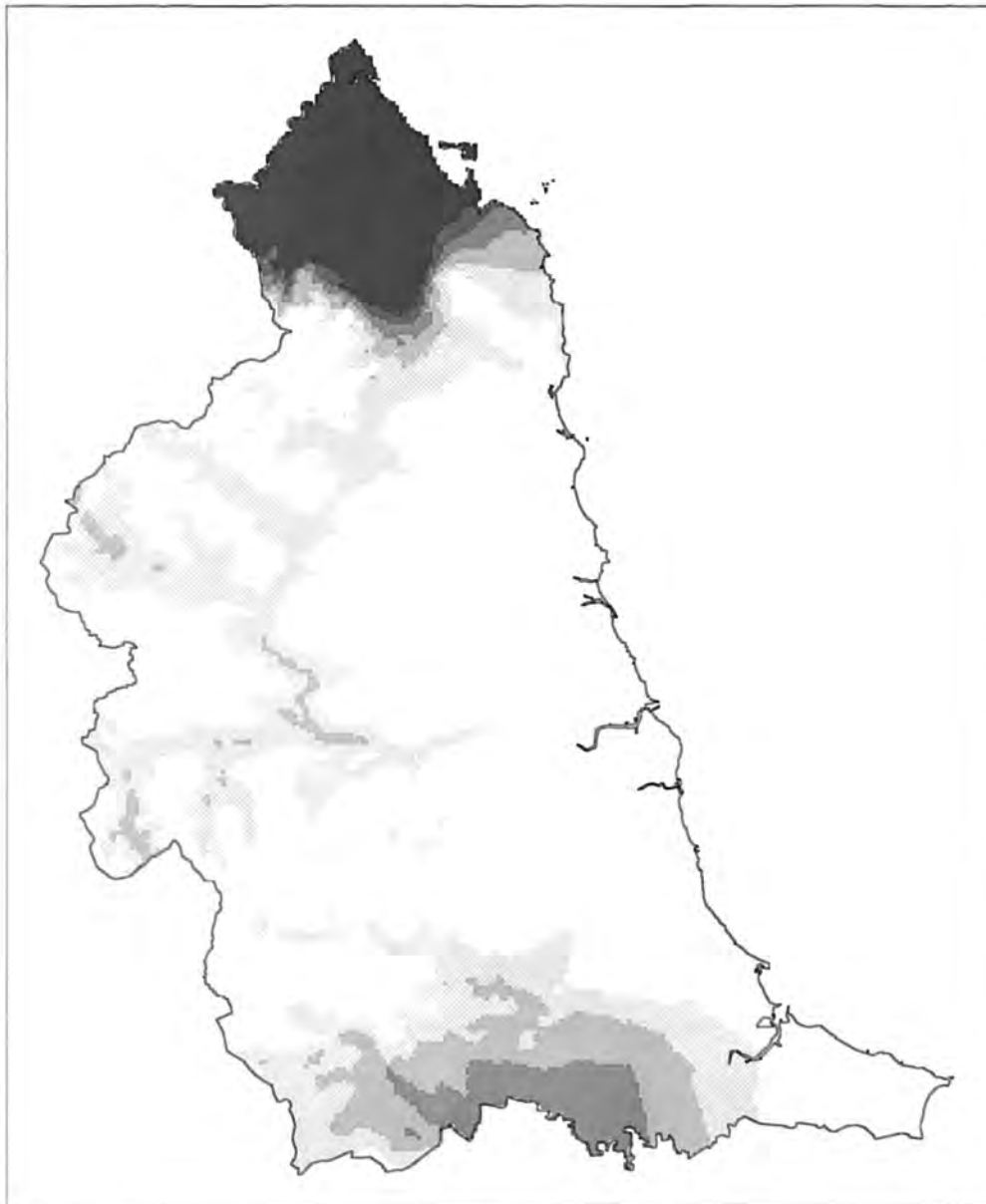
Gramineae

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.45 Interpolated pollen map of *Cerealia*-type pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Unlike the map for the previous period (Fig. 7.3.26) the highest values for *Cerealia*-type pollen in this period occur in the north of the region, rather than in the south east. A high value of 2.2% tdlp occurs at Trickley Wood and values between 0.05-0.15% occur at other sites in this area. *Cerealia*-type pollen still occurs at most sites in the south east of the region at values around 0.1-0.2%, rising to 0.7% on the coast. It also continues to occur at Weelhead Moss in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



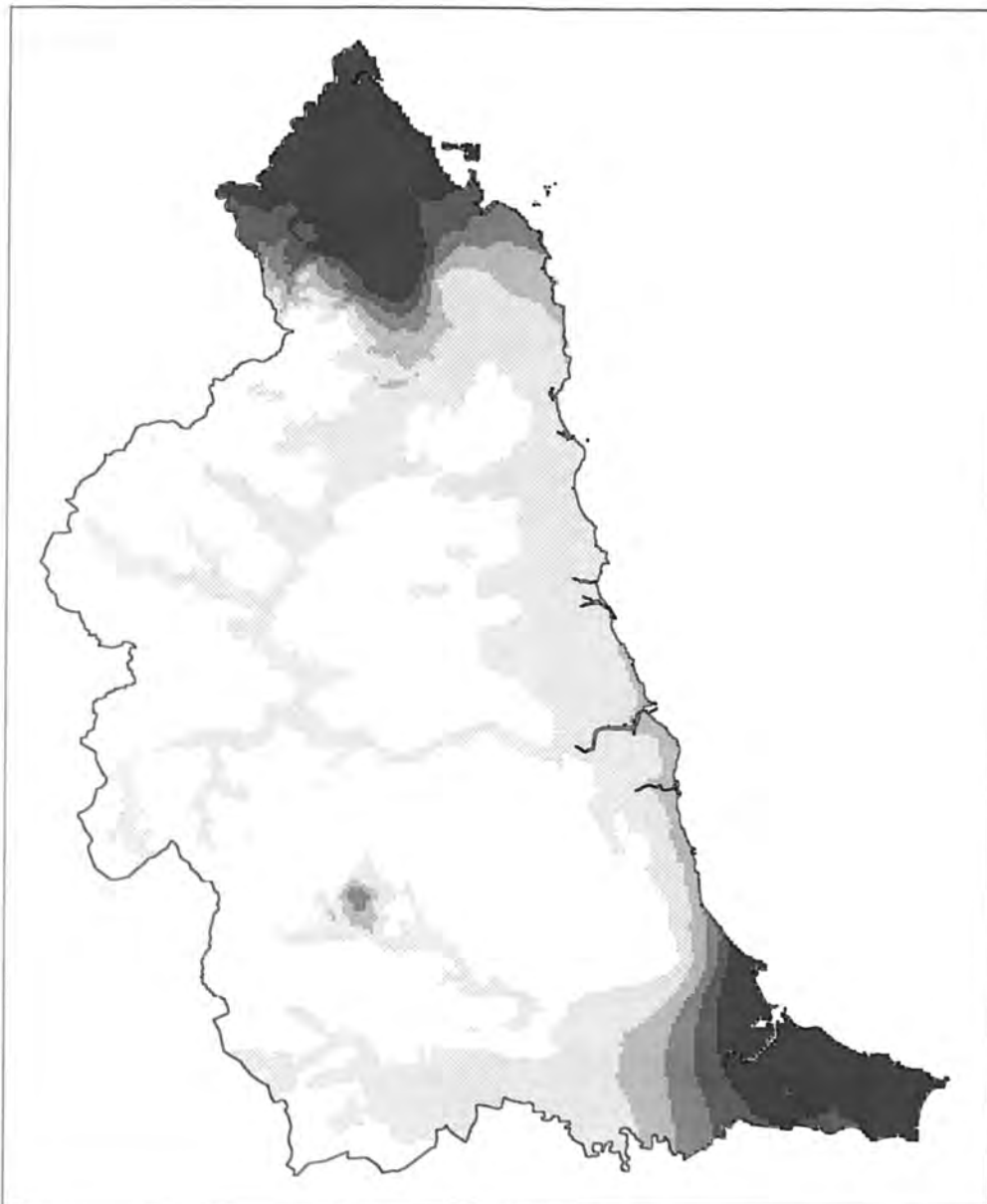
Cerealia-type

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.46 Interpolated pollen map of *Artemisia* pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The map for *Artemisia* for this period is very similar to the previous period (Fig. 7.3.27), with high values in the south east of the region, but in this period values increase in the north of the region also, up to 0.7% at Trickley Wood and occurring between 0.1-0.2% at other sites in this area. In south east Durham *Artemisia* values continue to be high on the coast at Hartlepool (0.8%) and lie between 0.05-0.15% at other sites in the south east.



Key:

- 0 - 0.1%
- 0.1 - 0.2%
- 0.2 - 0.3%
- 0.3 - 0.4%
- 0.4 - 0.5%
- > 0.5%



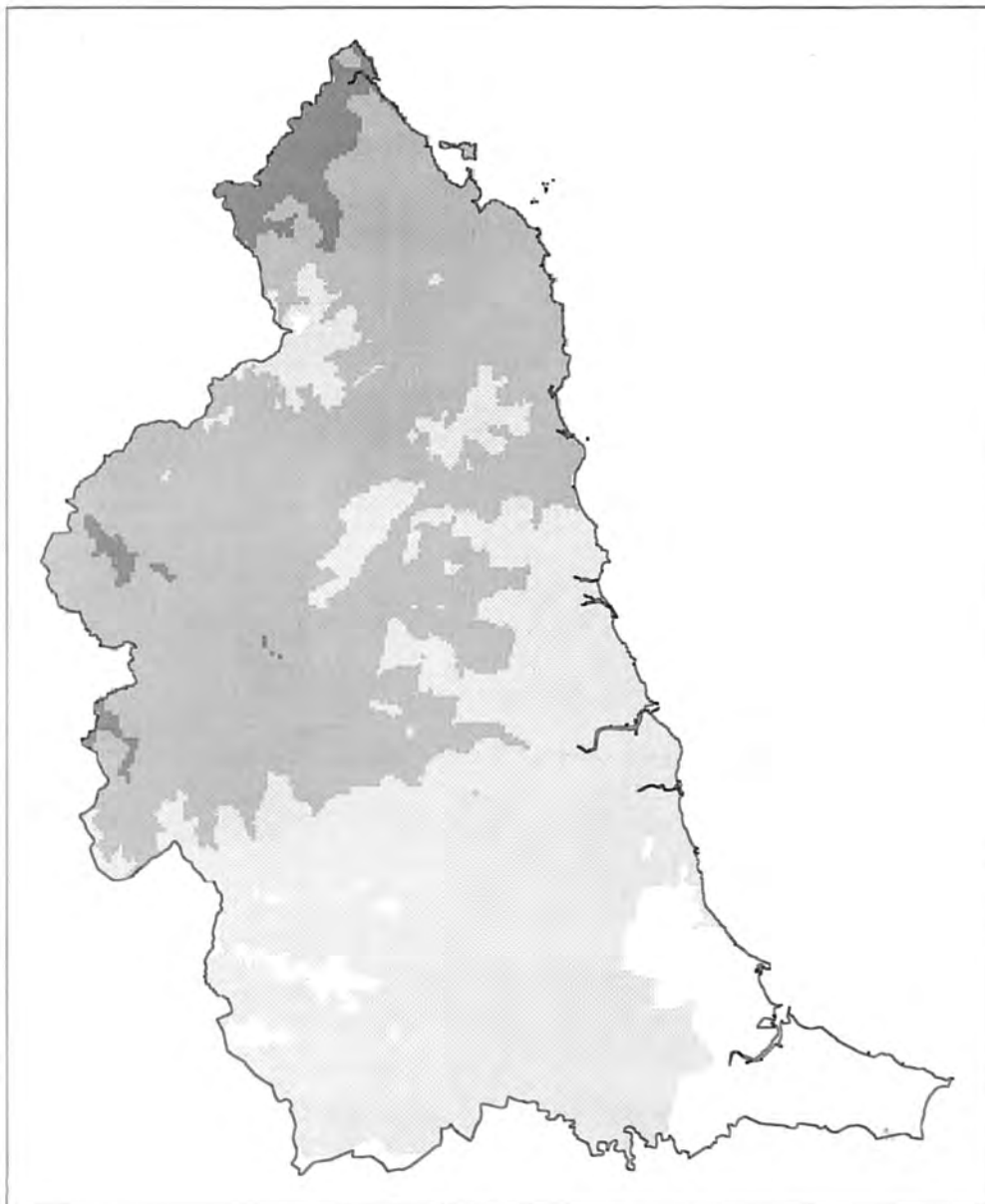
Artemisia

1000 - 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.47 Interpolated pollen map of Caryophyllaceae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The map for Caryophyllaceae differs from the previous period (Fig. 7.3.28) in that in this period the highest values occur in the north and north west of the region, rather than the south east. The highest value occurs at Coom Rigg Moss in south west Northumberland, followed by a value of 0.7% tdlp to the north at Edlingham. Values between 0.1-0.2% occur at other sites in Northumberland. Values between 0.05-0.1% occur in the south east of the region and also in the upper Derwent area.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



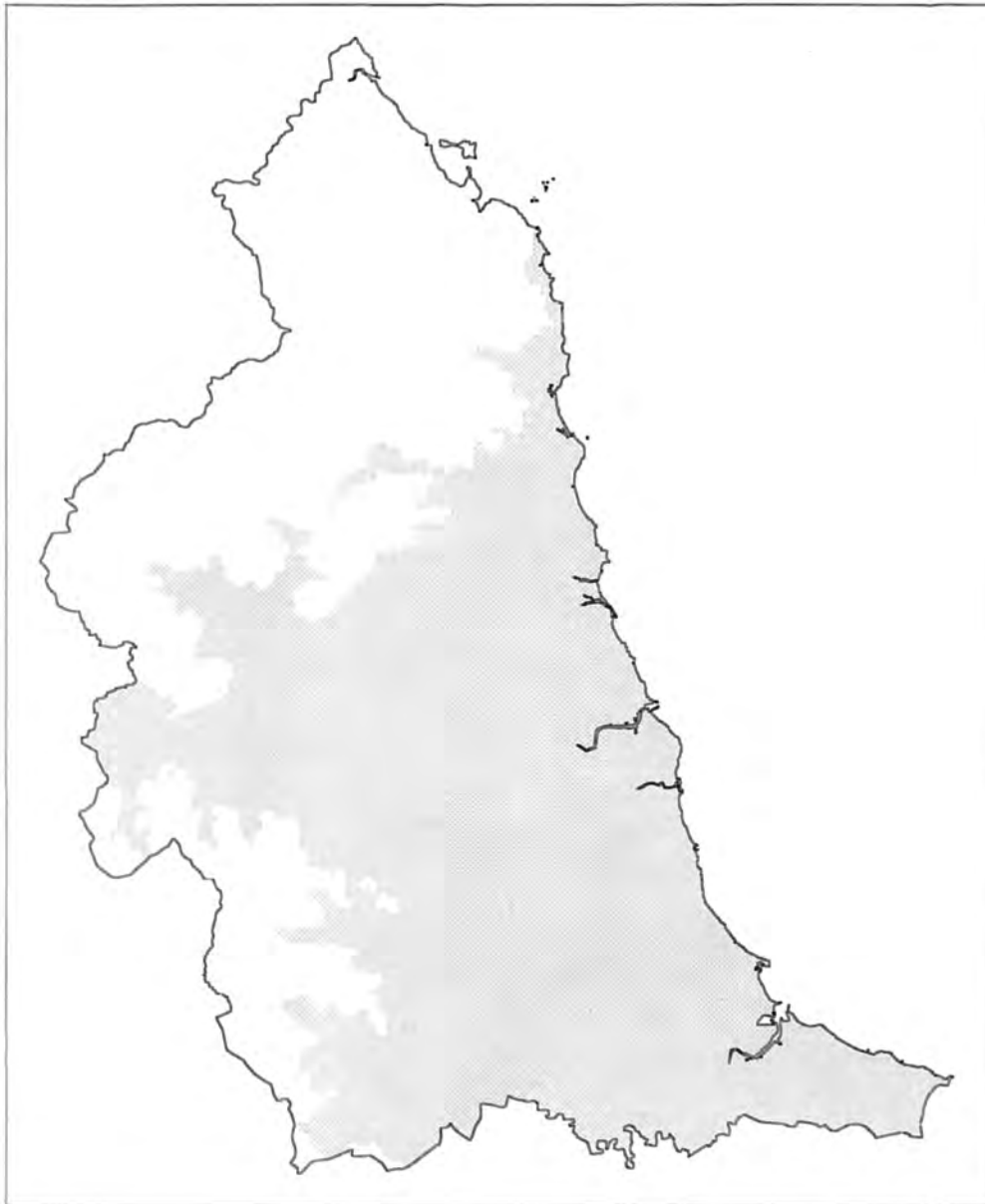
Caryophyllaceae

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.48 Interpolated pollen map of *Centaurea* pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The map for *Centaurea* in this period shifts emphasis away from northern Northumberland (where it was the only area to occur in the previous period, Fig. 7.3.29) to the south east of the region. It occurs in small values (0.03% tdlp) at Bishop Middleham and at Pow Hill in the upper Derwent area (0.1%). Apart from this it is absent from the region.



Key:

-  0 – 0.005%
-  0.005 – 0.01%
-  0.01 – 0.015%
-  0.015 – 0.02%
-  0.02 – 0.025%
-  >0.025



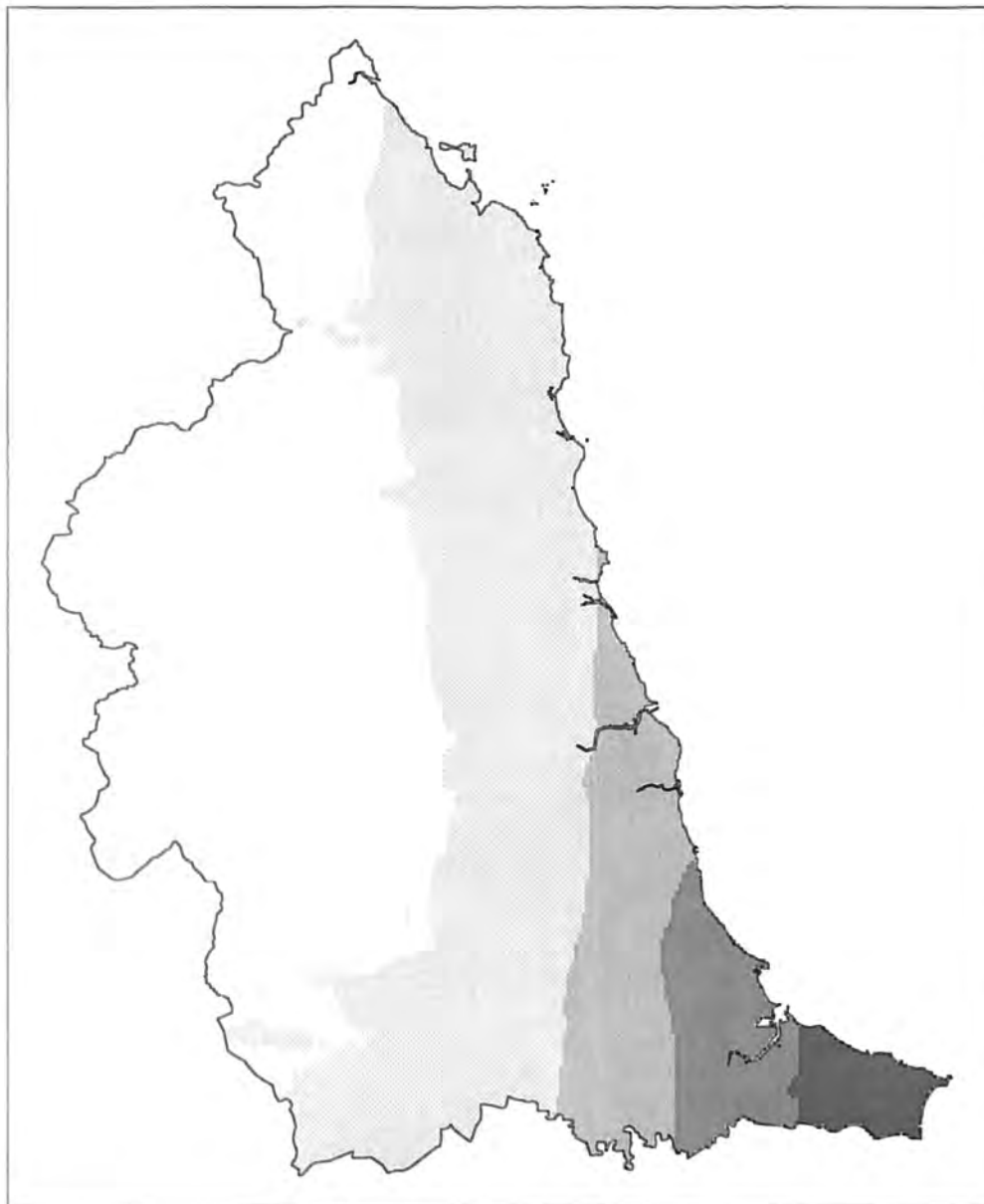
Centaurea

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.49 Interpolated pollen map of Chenopodiaceae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As in the map for Chenopodiaceae for the previous period (Fig. 7.3.30), the highest values for Chenopodiaceae occur in the south east of the region, with values around 0.5% tdlp at Hutton Henry and on the coast and around 0.2% at other sites. Values between 0.1-0.3% occur at sites in northern Northumberland. An isolated high value of 0.6% occurs at one site in upper Teesdale, apart from which Chenopodiaceae only occurs at a couple of upland sites around 0.1%.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



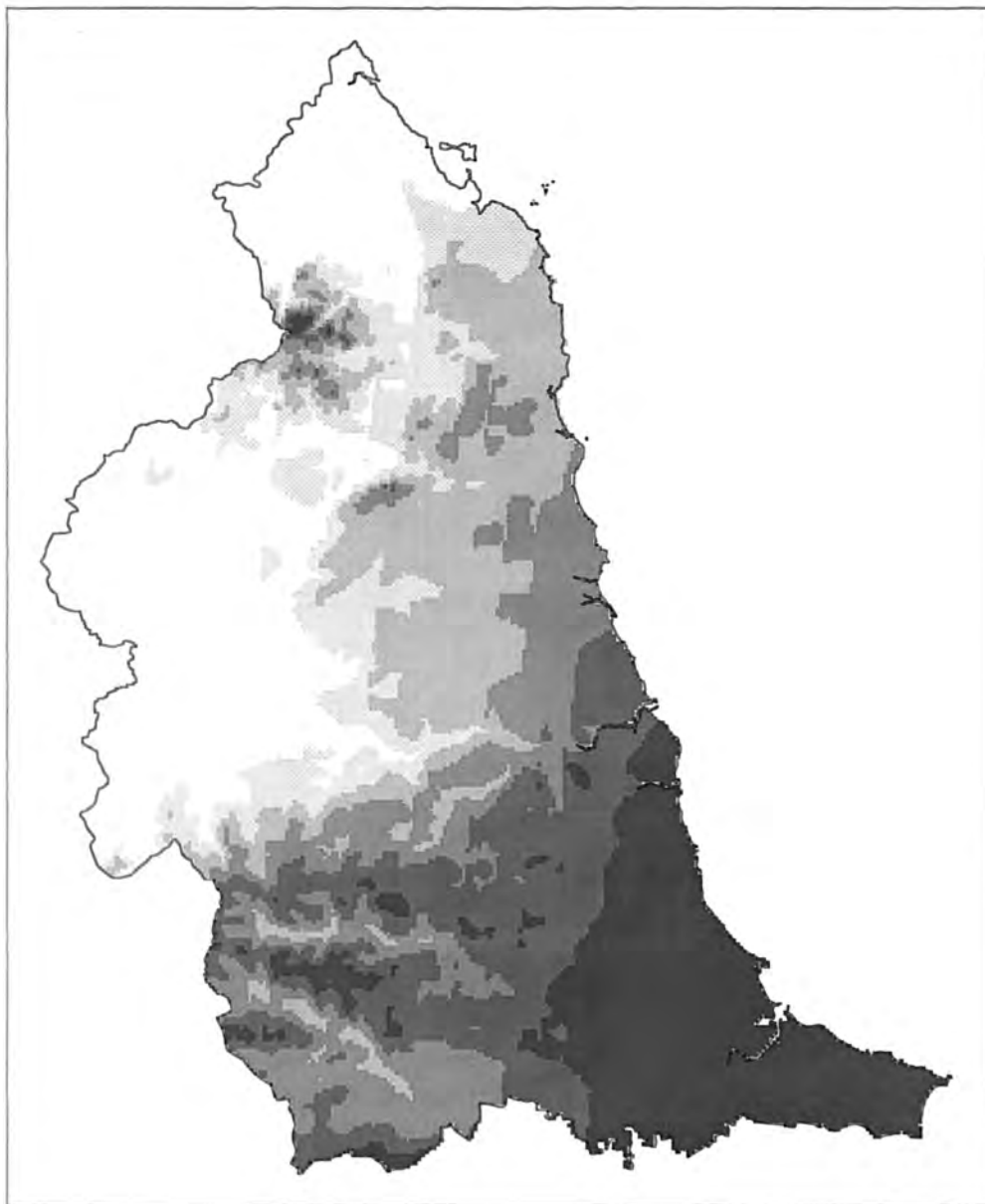
Chenopodiaceae

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.50 Interpolated pollen map of Compositae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Values for Compositae increase markedly in this period in the south east of the region (where the highest values also occurred in the previous period, Fig. 7.3.31) and also at some sites in upper Teesdale. Compositae values rise to between 1-2% tdlp at several sites in the south east, but the highest values for Compositae in this period occur in Weardale at Steward Shield Meadow (exceeding 10%) and Bollihope Bog (1.4%). Compositae reach 0.5% at some sites in northern Northumberland.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



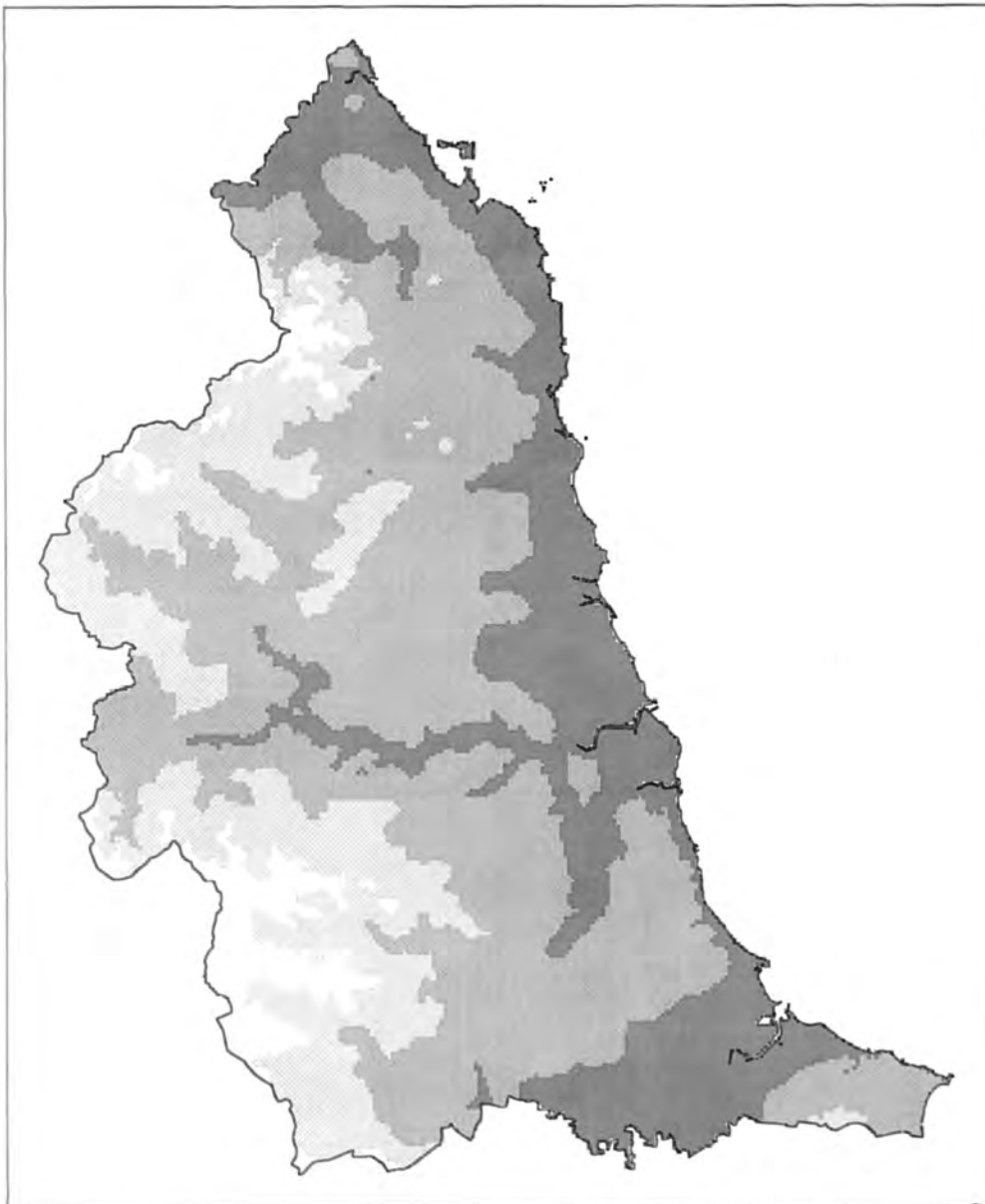
Compositae

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.51 Interpolated pollen map of Cruciferae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

Cruciferae pollen values in this period are highest in northern Northumberland and in the south east of the region, whereas in the previous period the highest values were confined to the south east (Fig. 7.3.32). The highest value of 0.5% occurs at Trickle Wood in northern Northumberland, but a similar value of 0.4% occurs at Bishop Middleham and Hutton Henry in the south east. Lower values around 0.1-0.3% occur at some sites in the uplands of the Northern Pennines.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



Cruciferae

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.52 Interpolated pollen map of Leguminosae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As in the previous period (Fig. 7.3.33) the highest values for Leguminosae in this period occur in the north of the region, although values are considerably lower than before. The highest value (0.6%) occurs at Trickle Wood and a value of 0.1% occurs at Fortherley Moss in the Tyne Corridor. A high value of 0.6% also occurs at one site in upper Teesdale. Lower values occur at one site in the south east of the region.



Key:

-  < 0.05%
-  0.05 – 0.1%
-  0.1 – 0.15%
-  0.15 – 0.2%
-  0.2 – 0.25%
-  > 0.25%



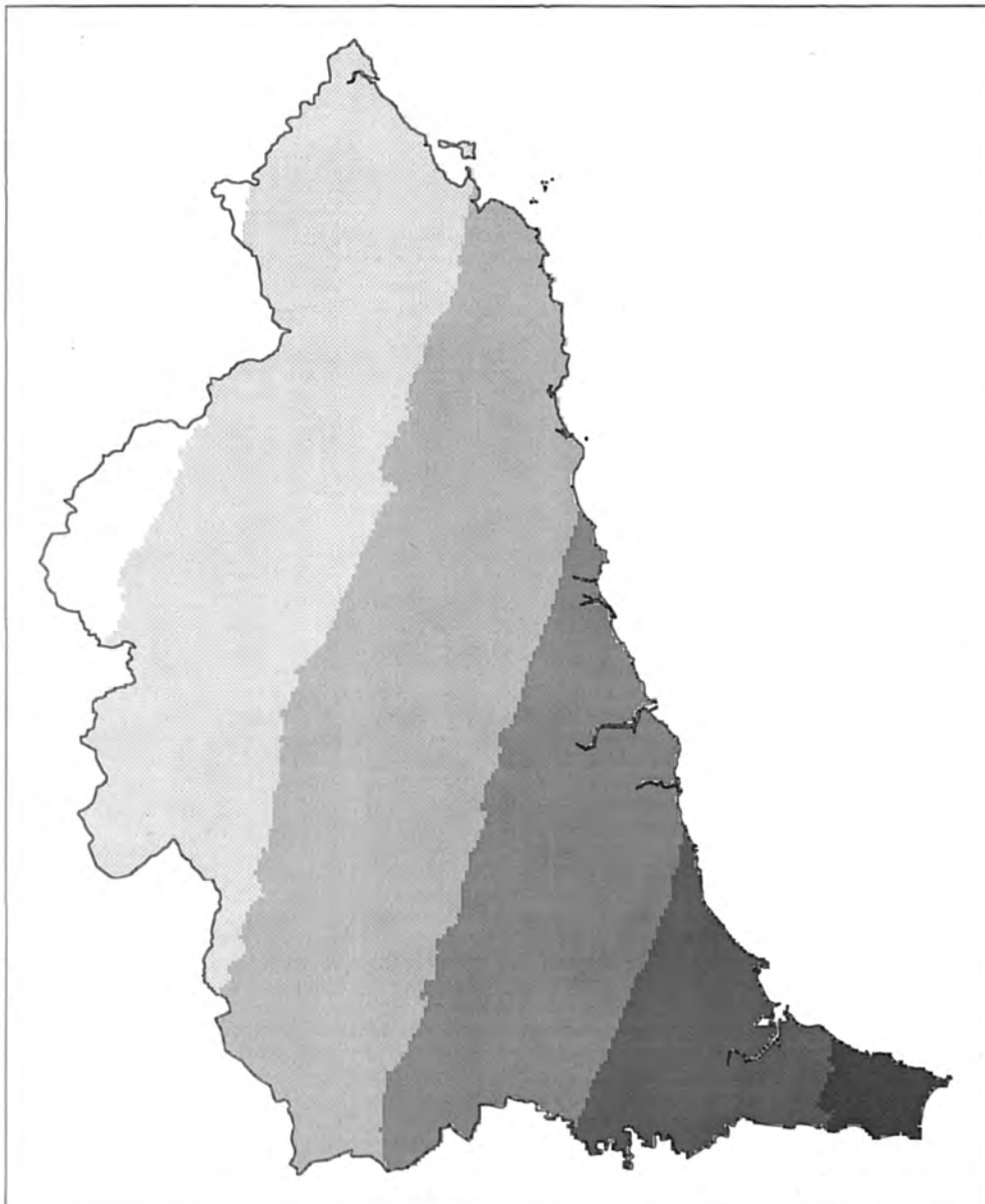
Leguminosae

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.53 Interpolated pollen map of *Plantago* pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As in the previous period (Fig. 7.3.34), high values continue to occur in the south east of the region, reaching 8.8% tdlp at Bishop Middleham and 3.3% on the coast at Hartlepool, but occurring at values around 0.6-0.7% at other sites in this area. High values also occur in Weardale at Steward Shield Meadow (4%) and at a couple of sites in upper Teesdale (4%). At sites in the upper Derwent, *Plantago* values reach 1%. Elsewhere *Plantago* values lie below 0.5%, with the exception of sites in northern Northumberland, where values exceed 2% at a couple of sites.



Key:

-  < 0.6%
-  0.6 – 1.2%
-  1.2 – 1.8%
-  1.8 – 2.4%
-  2.4 – 3.0%
-  3.0 – 3.6%



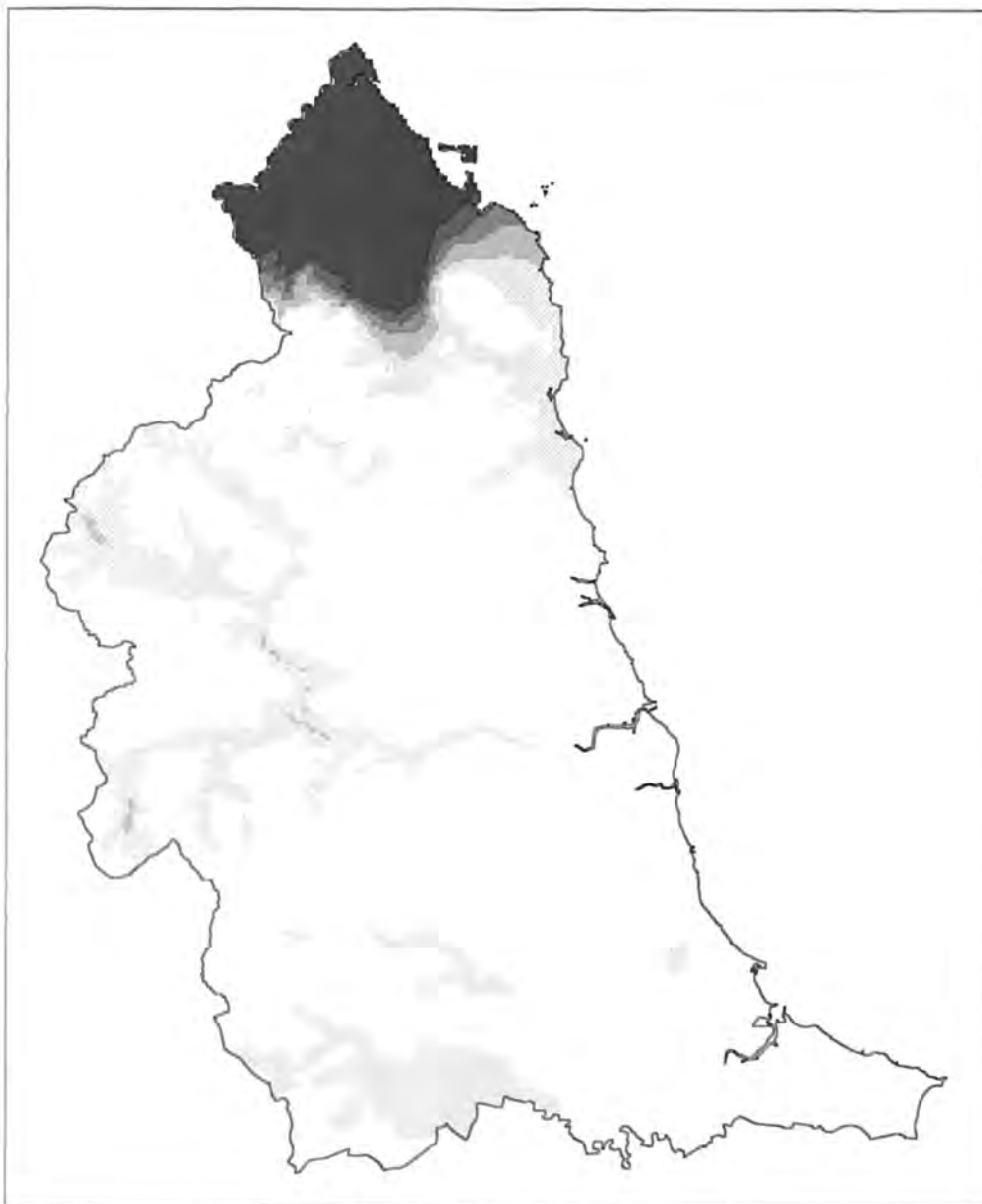
Plantago

1000 – 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.54 Interpolated pollen map of *Polygonum* pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

In this period, as before, the highest *Polygonum* values occur in the north of Northumberland, at Trikley Wood (1.1% tdlp). It also occurs at another northern Northumberland site, Black Lough (0.05%). *Polygonum* no longer occurs in upper Teesdale. Lower values occur in the south east of the region at a few sites (0.05-0.1%).



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



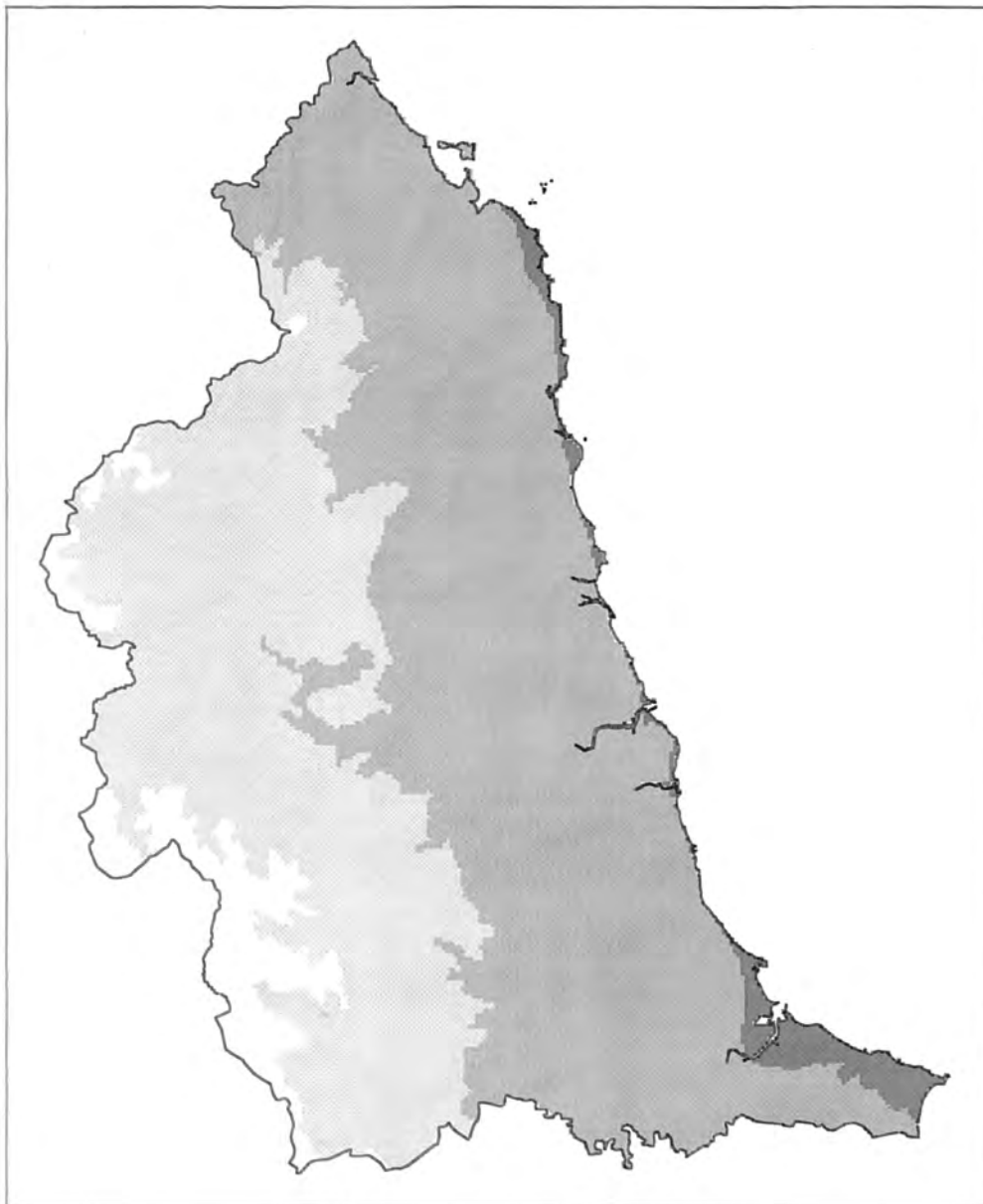
Polygonum

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Figure 7.3.55 Interpolated pollen map of Ranunculaceae pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

The highest values in this period for Ranunculaceae occur in the south east of the region and also in northern Northumberland. High values occur at Edlingham in northern Northumberland, with a value of 3.3% tdlp , but similarly high values occur at Steward Shield Meadow in Weardale (3.2%) and at Bollihope Bog (2.5%). A value of 1.5% occurs on the coast at Hartlepool and lower values of 0.1-0.9% occur at other sites in the south east of the region. Ranunculaceae occur in the uplands of the Northern Pennines at lower values (under 0.3%).



Key:

- 0 - 0.2%
- 0.2 - 0.4%
- 0.4 - 0.6%
- 0.6 - 0.8%
- 0.8 - 1.0%
- >1.0%



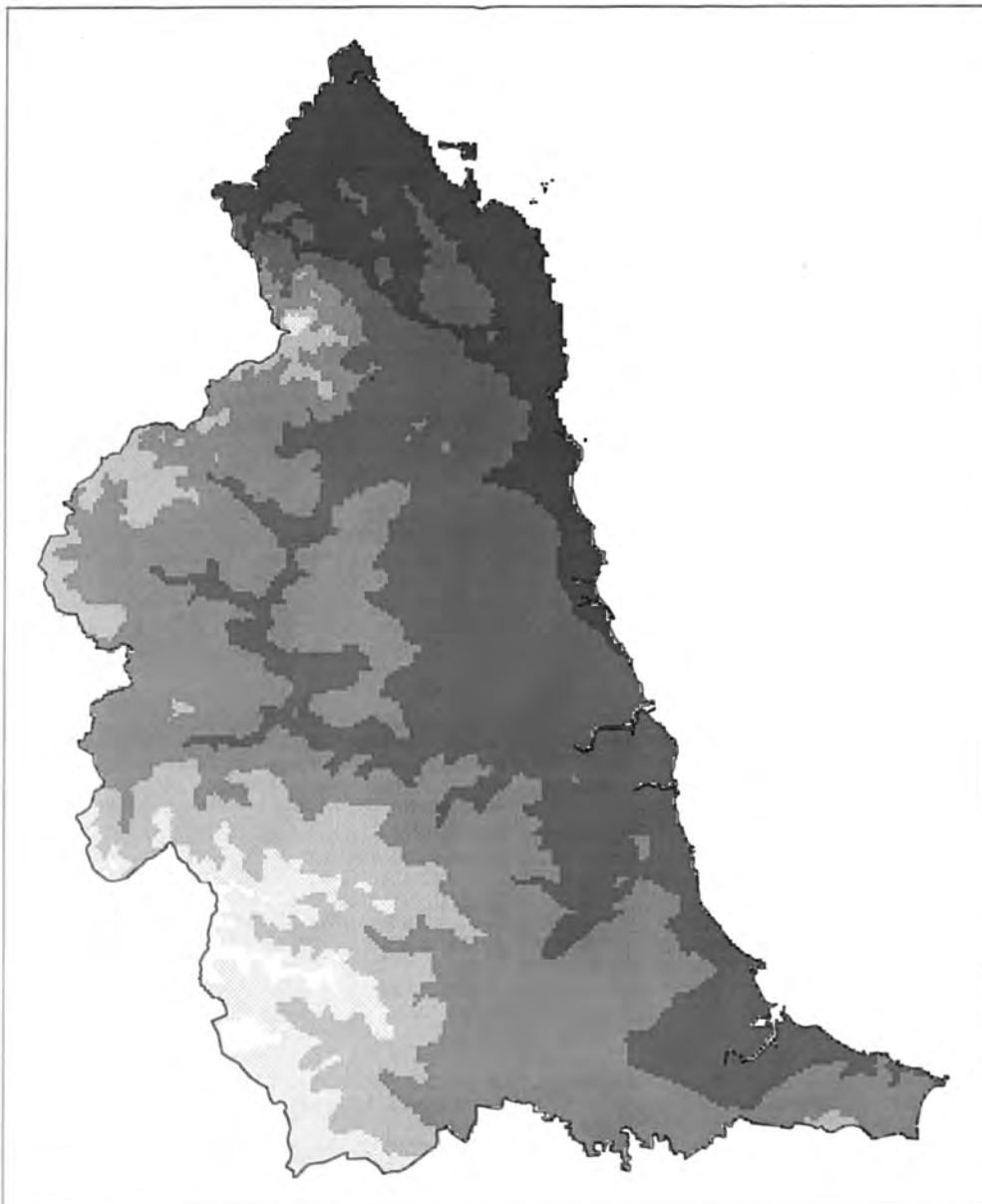
Ranunculaceae

1000 - 500 cal. BC







Pollen values expressed as %tdlp.

Figure 7.3.56 Interpolated pollen map of *Rumex* pollen values for the late Bronze Age and earliest Iron Age period, 1000 - 500 cal. BC

As in the previous period, high values occur in the south east of the region and also in the north of the region for *Rumex* (Fig. 7.3.37), but in this period the highest values on the whole occur in northern Northumberland rather than the south east. One high value of 1.2% tdlp occurs at Bishop Middleham in the south east, although at other sites in this area the values are far lower ranging from 0.1-0.7%. In northern Northumberland there are several sites with high values, including Trickle Wood (0.9%), Camp Hill Moss (0.6%) and Edlingham (0.7%). Values up to 0.5% also occur in south west Northumberland.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



Rumex

1000 – 500 cal. BC

Pollen values expressed as %tdlp.

Pollen maps for the Iron Age and Roman period

circa 500 cal. BC -
cal. AD 500

Iron Age period:

500 cal. BC -
cal. AD 70..

List of Figures and Tables for the Iron Age period, 500 cal. BC - cal. AD 70

Tables

Table 7.4.1	Summary of trends in pollen maps for the Iron Age period.	342
-------------	---	-----

Figures

Fig. 7.4.1	Map showing locations of pollen cores used to create interpolated maps for the period 500 cal. BC - cal. AD 70	344
------------	--	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.4.2	Interpolated pollen map of averaged total tree pollen values.	346
------------	---	-----

Fig. 7.4.3	Interpolated pollen map of total shrub pollen values.	348
------------	---	-----

Fig. 7.4.4	Interpolated pollen map of total herb pollen values.	350
------------	--	-----

Fig. 7.4.5	Interpolated pollen map of total Ericaceae pollen values.	352
------------	---	-----

b) Agricultural: arable index map

Fig. 7.4.6	Interpolated pollen map of agricultural:arable index scores.	354
------------	--	-----

c) Maps of selected individual herb taxa

Fig. 7.4.7	Interpolated pollen map of Gramineae pollen values.	356
------------	---	-----

Fig. 7.4.8	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	358
------------	---	-----

Fig. 7.4.9	Interpolated pollen map of <i>Artemisia</i> pollen values.	360
------------	--	-----

Fig. 7.4.10	Interpolated pollen map of Caryophyllaceae pollen values.	362
-------------	---	-----

Fig. 7.4.11	Interpolated pollen map of <i>Centaurea</i> pollen values.	364
-------------	--	-----

Fig. 7.4.12	Interpolated pollen map of Chenopodiaceae pollen values.	366
-------------	--	-----

Fig. 7.4.13	Interpolated pollen map of Compositae pollen values.	368
-------------	--	-----

Fig. 7.4.14	Interpolated pollen map of Cruciferae pollen values.	370
-------------	--	-----

Fig. 7.4.15	Interpolated pollen map of Leguminosae pollen values.	372
-------------	---	-----

Fig. 7.4.16	Interpolated pollen map of <i>Plantago</i> pollen values.	374
-------------	---	-----

Fig. 7.4.17	Interpolated pollen map of <i>Polygonum</i> pollen values.	376
-------------	--	-----

Fig. 7.4.18	Interpolated pollen map of Ranunculaceae pollen values.	378
-------------	---	-----

Fig. 7.4.19	Interpolated pollen map of <i>Rumex</i> pollen values.	380
-------------	--	-----

Table 7.4.1 Summary of trends in pollen maps for the Iron Age period,
500 cal. BC - cal. AD 70

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.4.2 to 7.4.5</p>	<p>At Bishop Middleham and on the coast low trees and shrubs and high herbs continue. At Hutton Henry tree pollen rises to 27%, with a drop in herbs. At Mordon Carr, herbs increase from 21-34%, with a drop in shrubs from 33-23%. At Thorpe Bulmer, trees lie at 37%, shrubs at 23%, and herbs at 37%. Ericaceae are very low. Tree pollen recovers at Neasham Fen, increasing from 36-51%, whilst shrub and herb levels drop to 25 and 22% respectively.</p>	<p>At Hallowell Moss and Bollihope Bog tree pollen remains at the same high levels as before. However, at Pow Hill, formerly high tree levels drop to 16% as Ericaceae values climb to 61%, making this site resemble those in the uplands. At Steward Shield Meadow, trees and shrubs decline to 22% and 14% respectively, accompanied by a rise in herb values to 53%. This site resembles those in the Durham lowlands more than other sites in the area.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.4.6</p>	<p>There is a marked decline in previous high index scores at Hutton Henry from 67-27%, as both arable and pastoral values drop. The index at Bishop Middleham rises to 28%, as arable pollen values rise. At Neasham Fen the index drops from 43-18% as both arable and pastoral values decline. At Mordon Carr the index score rises to 56%.</p>	<p>The index score at Burnhope Burn rises from 6-10% as arable values increase. At Hallowell Moss the score remains low, at 3%. At Pow Hill values remain the same, and the index remains at 29%. At both Steward Shield and Bollihope Bog, index scores drop to 55% and 16% as both arable and pastoral types decline, but the proportion of pastoral types remains higher.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.4.7 to 7.4.19</p>	<p>Gramineae drop at Bishop Middleham from 40-29%, but remain at 17% at Hutton Henry, 42% at Hartlepool Bay 4 and 16% at Neasham Fen. Values rise to 16% at Mordon Carr. <i>Cerealialia</i>-type is present at all sites. <i>Centaurea</i> is present at Bishop Middleham and Cranberry Bog. At Hartlepool Bay 4 Chenopodiaceae increase to 2.8%, Compositae to 1.2% and Plantago to 4.6%. At Bishop Middleham Compositae rises to 1.9% and Plantago drops to 6.9%. At Neasham many herb types disappear. At Hutton Henry Compositae values drop to 0.3%.</p>	<p>Gramineae reaches its highest values yet, although still very small, at Hallowell Moss (0.75%), with a wide range of herb types continuing. Pow Hill continues to have <i>Cerealialia</i>-type and <i>Centaurea</i>, and <i>Plantago</i> increases to 1.7% and Ranunculaceae to 0.9%. At Burnhope Burn Gramineae remains at 17%, and <i>Plantago</i> increases to 2.1%. A wide range of herb types continues here.</p>

Table 7.4.1 continued.

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.4.2 to 7.4.5</p>	<p>At Akeld Steads herbs are high (52%). At Edlingham herbs increase to 66%, with a drop in trees and shrubs to 21 and 11% respectively. Trees at Camp Hill Moss now drop to 48%, as herbs rise to 27%. Trickle Wood and Broad Moss continue to have high Ericaceae values. In southern Northumberland, tree pollen levels are high at Fellend Moss and Fortherley Moss (45% and 51% respectively), with Ericaceae levels above 13%.</p>	<p>Trees drop further at many sites, whilst shrub pollen is little changed. Herbs fall below 10% at most sites, whilst Ericaceae rise even further, reaching 76% at Dead Crook, 68% at Site W and 50% at Long Crag. All other upland sites have Ericaceae above 20%, except for Cronkley Pastures. Trees remain at 29% at Quick Moss and 36% at Dufton Moss. Herb values remain highest at Upper Teesdale sites, reaching 57% at Weelhead Moss and 67% at Cronkley Pastures.</p>
<p>Agricultural:Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.4.6</p>	<p>Index scores rise to 23% at Camp Hill Moss and arable types reappear at Black Lough (5%). At Steng Moss the index rises to 7%. At Trickle Wood and Broad Moss index scores drop to 45% and 13% as pastoral types increase. Arable types remain absent at Fellend Moss, Muckle Moss and Fortherley Moss, although at all sites pastoral values increase. At Coom Rigg the score is higher, at 20%.</p>	<p>Index scores decline at many sites in this period. At most sites both arable and pastoral values drop, but pastoral percentages remain proportionally higher. The highest score is at Cronkley Pasture (25%) which has declined from 40% in the previous period.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.4.7 to 7.4.19</p>	<p>Gramineae pollen rises at most sites with an increase in the range of herb types, to 9% at Akeld Steads, to 13% at Trickle Wood (with a rise in <i>Cerealia</i>-type to 1.5%, Compositae to 1.1% and <i>Plantago</i> to 4.6%), to 5% at Black Lough (with the appearance of <i>Artemisia</i> and Caryophyllaceae and a rise in <i>Plantago</i> to 1.5%), to 6% at Broad Moss (with the appearance of many arable type herbs including <i>Cerealia</i>-type and a rise in <i>Plantago</i> to 2.5%), and at Steng Moss to 11%, with an increase in all herb types including <i>Plantago</i> to 2.3%. Further south, <i>Plantago</i> and Ranunculaceae appear at Fellend Moss and at Coom Rigg Gramineae rises to 13% with the appearance of <i>Centaurea</i> and rise in <i>Plantago</i> to 2%.</p>	<p>Gramineae levels increase at most upland sites in this period. This is accompanied by the appearance of many arable-types, particularly Caryophyllaceae, Chenopodiaceae, Compositae and <i>Artemisia</i>. <i>Plantago</i>, Ranunculaceae and <i>Rumex</i> are found at almost every site in the uplands, tending to dominate. <i>Cerealia</i>-type is present at Weelhead Moss, Dufton Moss and Quick Moss.</p>

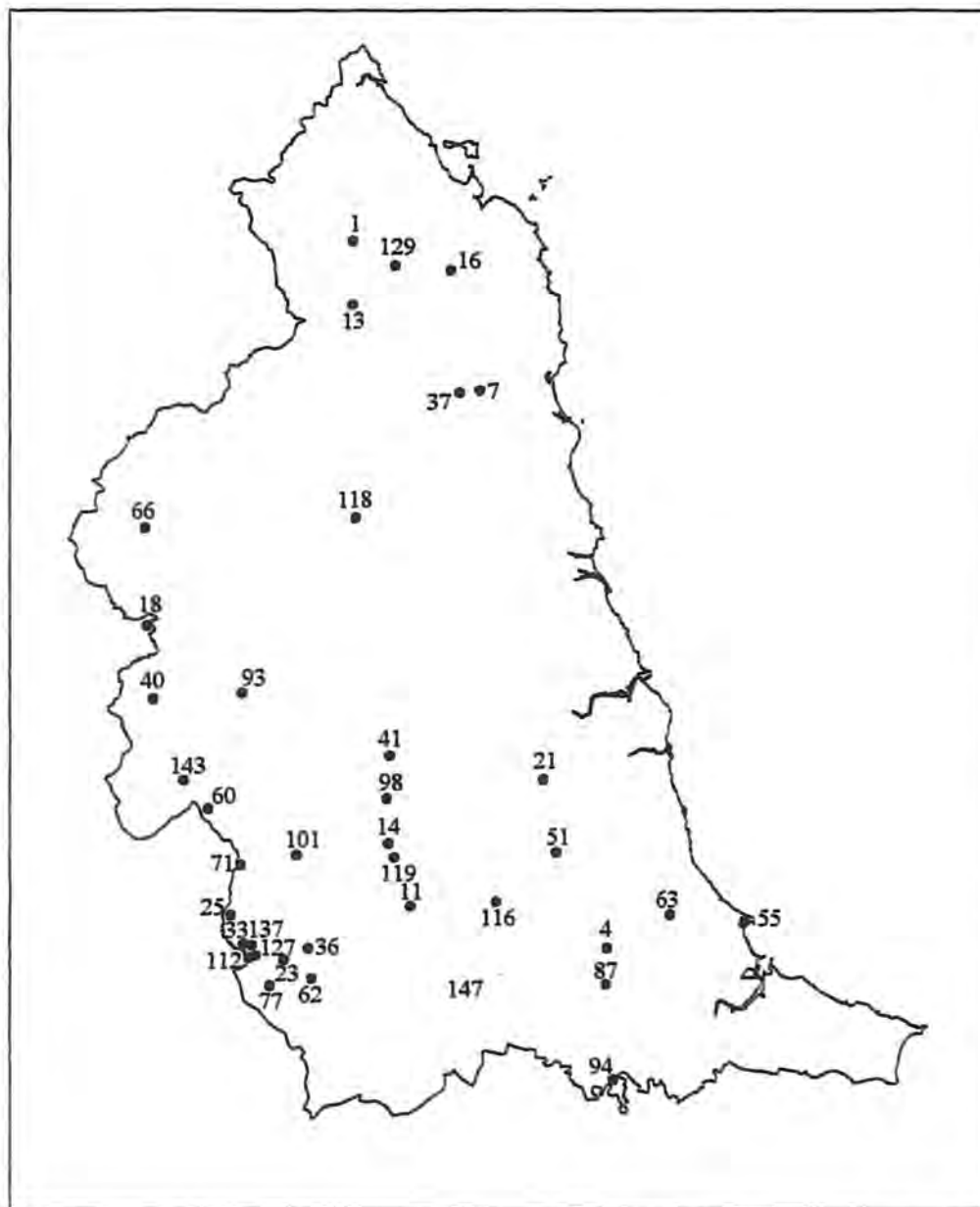


Fig. 7.4.1



Map showing locations of pollen cores used to
create interpolated maps for the Iron Age period,
500 cal. BC - cal. AD 70

N.B. Key to site codes on next page.

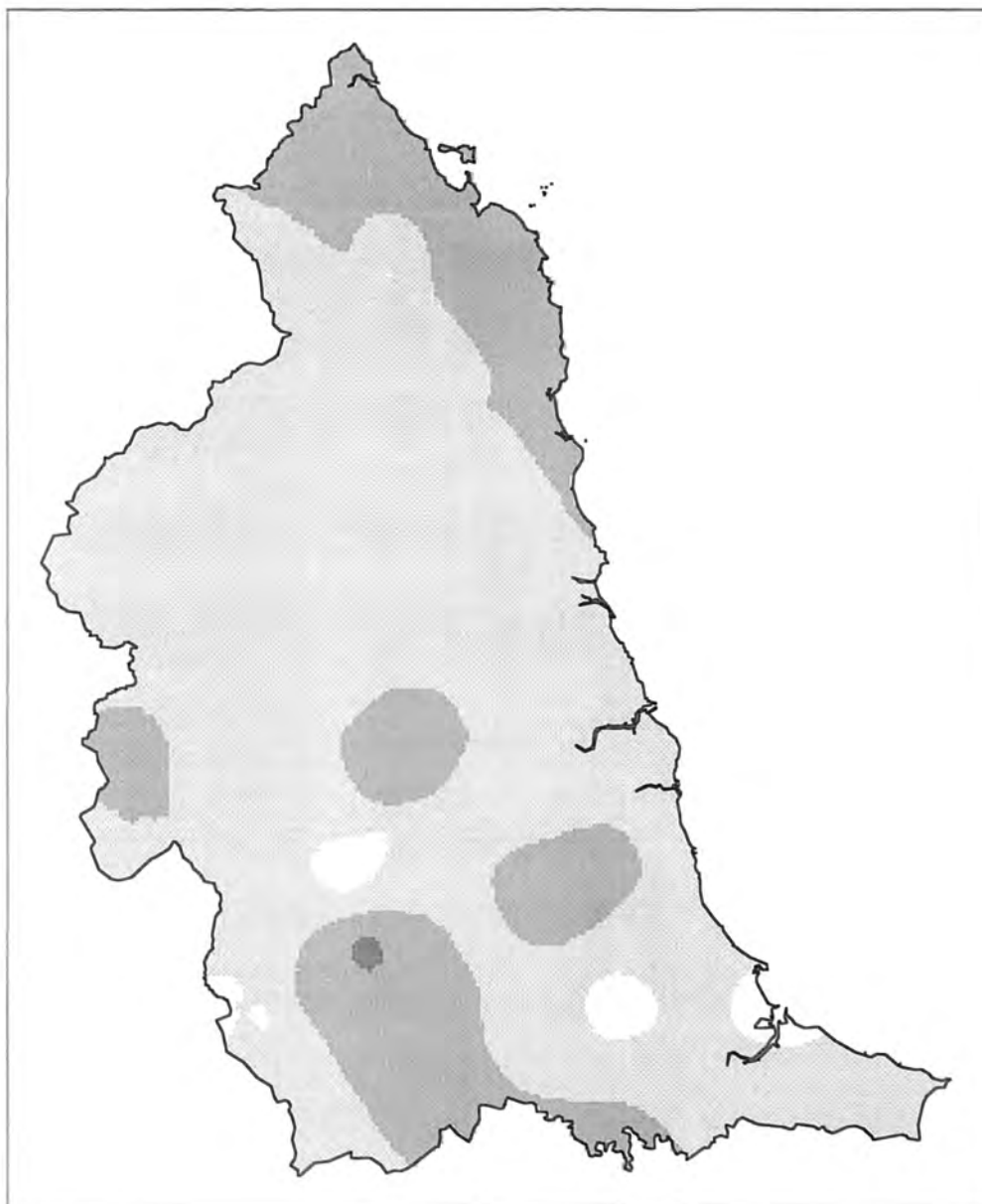
Key to Figure 7.4.1.

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	66	Kennel Hall Knowe
4	Bishop Middleham	71	Knoutberry
7	Black Lough	77	Long Crag
11	Bollihope Bog	87	Mordon Carr
13	Broad Moss	93	Muckle Moss
14	Burnhope Burn	94	Neasham Fen
16	Camp Hill Moss	98	Pow Hill
18	Coom Rigg	101	Quick Moss
21	Cranberry Bog	112	Site W
23	Cronkley Pastures	116	Stanley Moss
25	Crook Burn	118	Steng Moss
33	Dead Crook	119	Steward Shield
36	Dufton Moss	126	Thorpe Bulmer
37	Edlingham	127	Tinkler's Sike
40	Fellend Moss	129	Trickley Wood
41	Fortherley Moss	138	Weelhead Moss
51	Hallowell Moss	143	Whitfield Lough
55	Hartlepool Bay 4		
60	High Banks Moss		
62	Howden Moss		
63	Hutton Henry		

Figure 7.4.2 Interpolated pollen map of tree pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

The map of tree pollen values for this period is very similar to that of the previous period, with low values in the south east of the region and high values at sites between the mid Tyne and mid Tees and also in northern Northumberland. Tree values increase at a couple of sites in the south east of the region, following a temporary decline in the previous period. Tree values drop further at most upland sites in the Northern Pennines from the previous period and also in the upper Derwent at Pow Hill and in Weardale at Steward Shield Meadow there is a marked drop in tree values, although elsewhere in this area tree values remain high.



Key:

-  0 - 20%
-  20 - 40%
-  40 - 60%
-  60 - 80%
-  80 - 100%



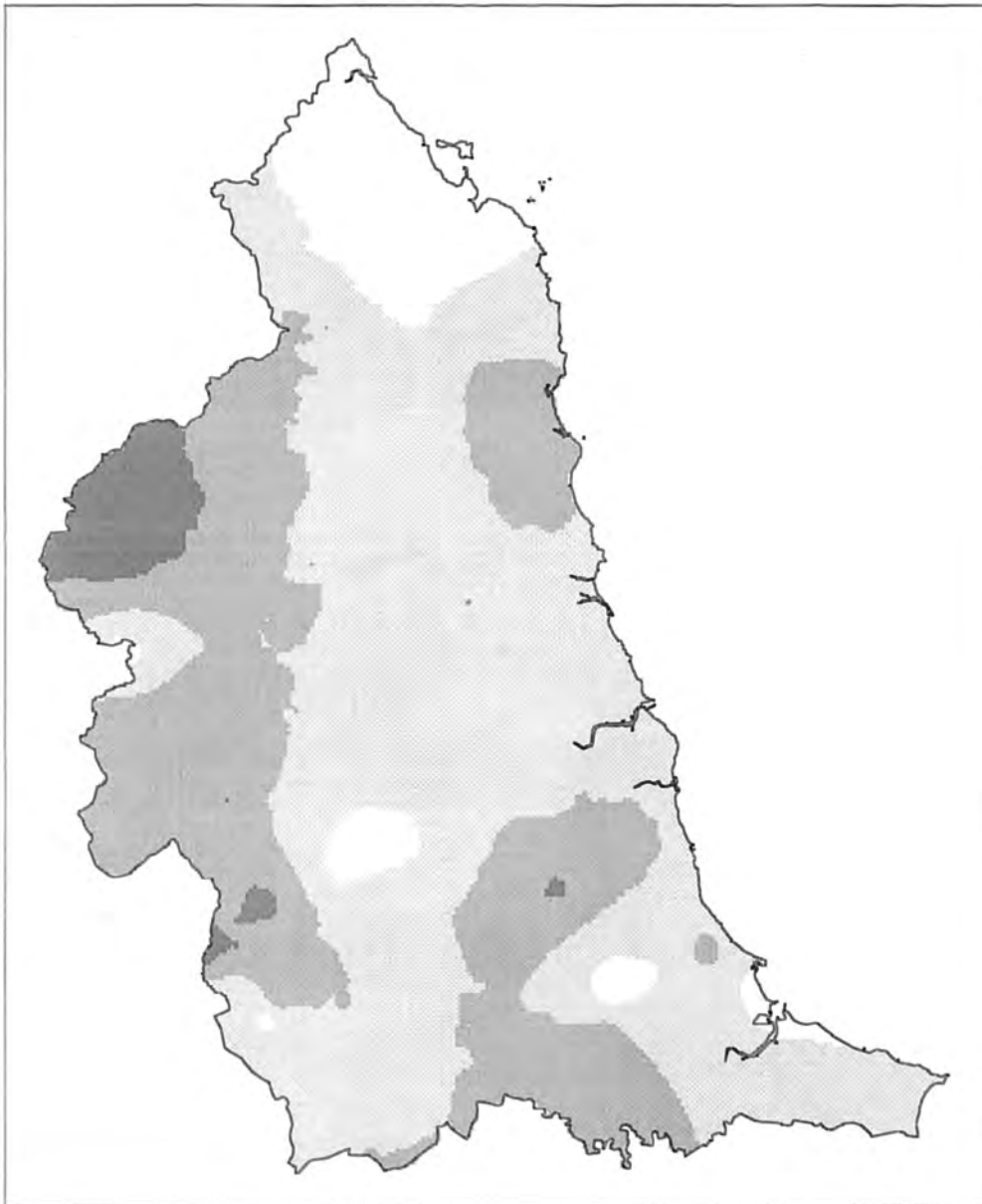
Trees

**500 cal. BC -
cal. AD 70**







Pollen values expressed as %tdlp.

Figure 7.4.3 Interpolated pollen map of shrub pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Shrub pollen declines at many sites in this period, with values of 10-20% covering most of the region, and higher values remaining only at some sites in the uplands. Shrub values decline at several sites in northern Northumberland and at sites in the south east of the region such as Neasham Fen and Mordon Carr where in the previous period a decline in trees had occurred. In this period at these sites tree pollen levels recover.



Key:

-  0 - 10%
-  10 - 20%
-  20 - 30%
-  30 - 40%
-  40 - 50%
-  > 50%



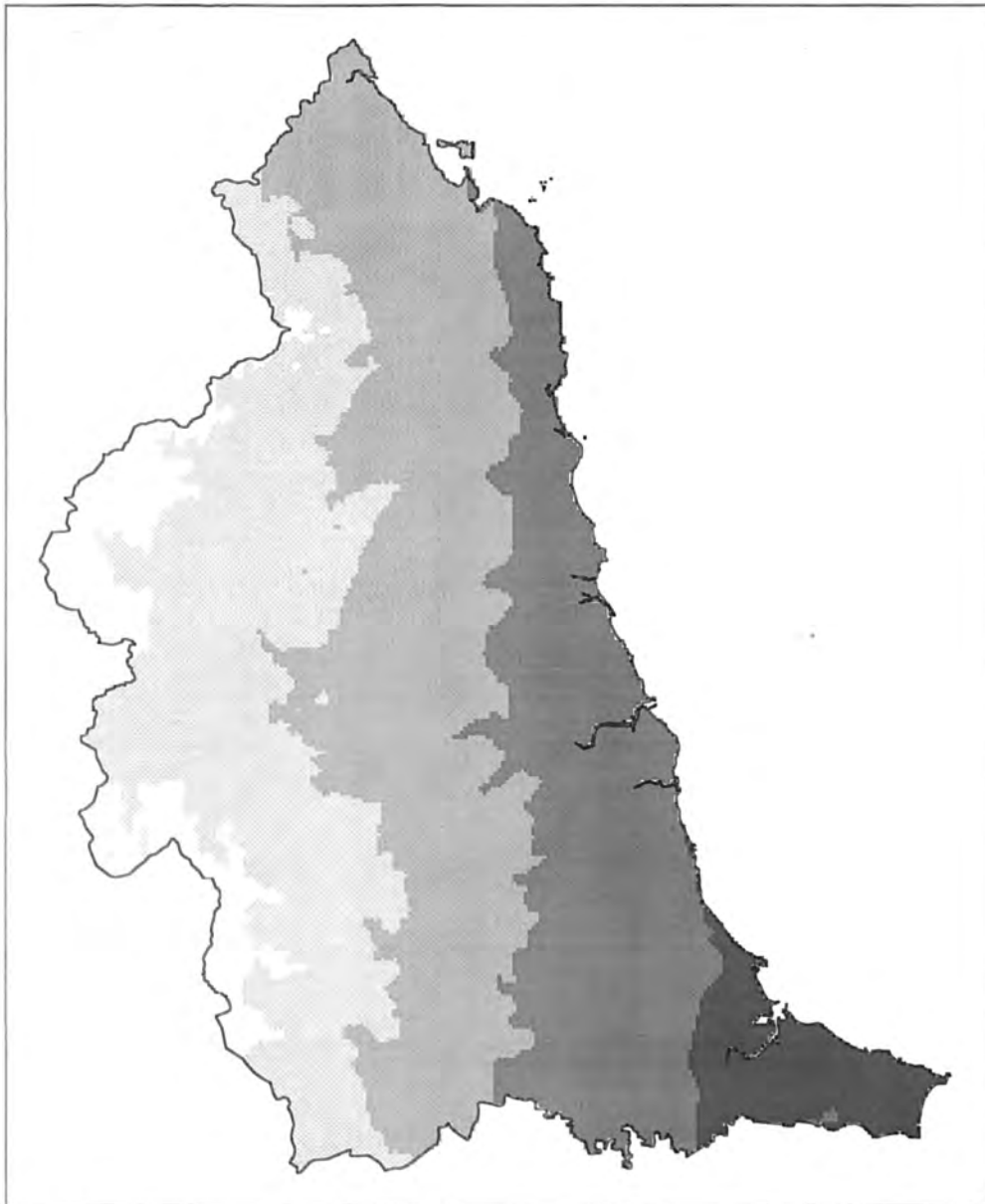
Shrubs

**500 cal. BC -
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.4 Interpolated pollen map of herb pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

The map for herb pollen in this period is very similar to the preceding period (Fig. 7.3.41) with the highest herb values occurring in the south east of the region. Herb levels are on the whole lower at these sites than before, as in this period tree levels recover and herb levels drop with the exception of Bishop Middleham. In northern Northumberland herb pollen values increase at several sites, most notably at Edlingham to 66% tdlp, but also herb values rise at Akeld Steads and Camp Hill Moss. At the other northern Northumberland sites Ericaceae levels are high instead. Herb pollen levels drop further at many sites in the uplands as Ericaceae values rise even further. In Weardale at Steward Shield Meadow there is a marked rise in herbs to 53%.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



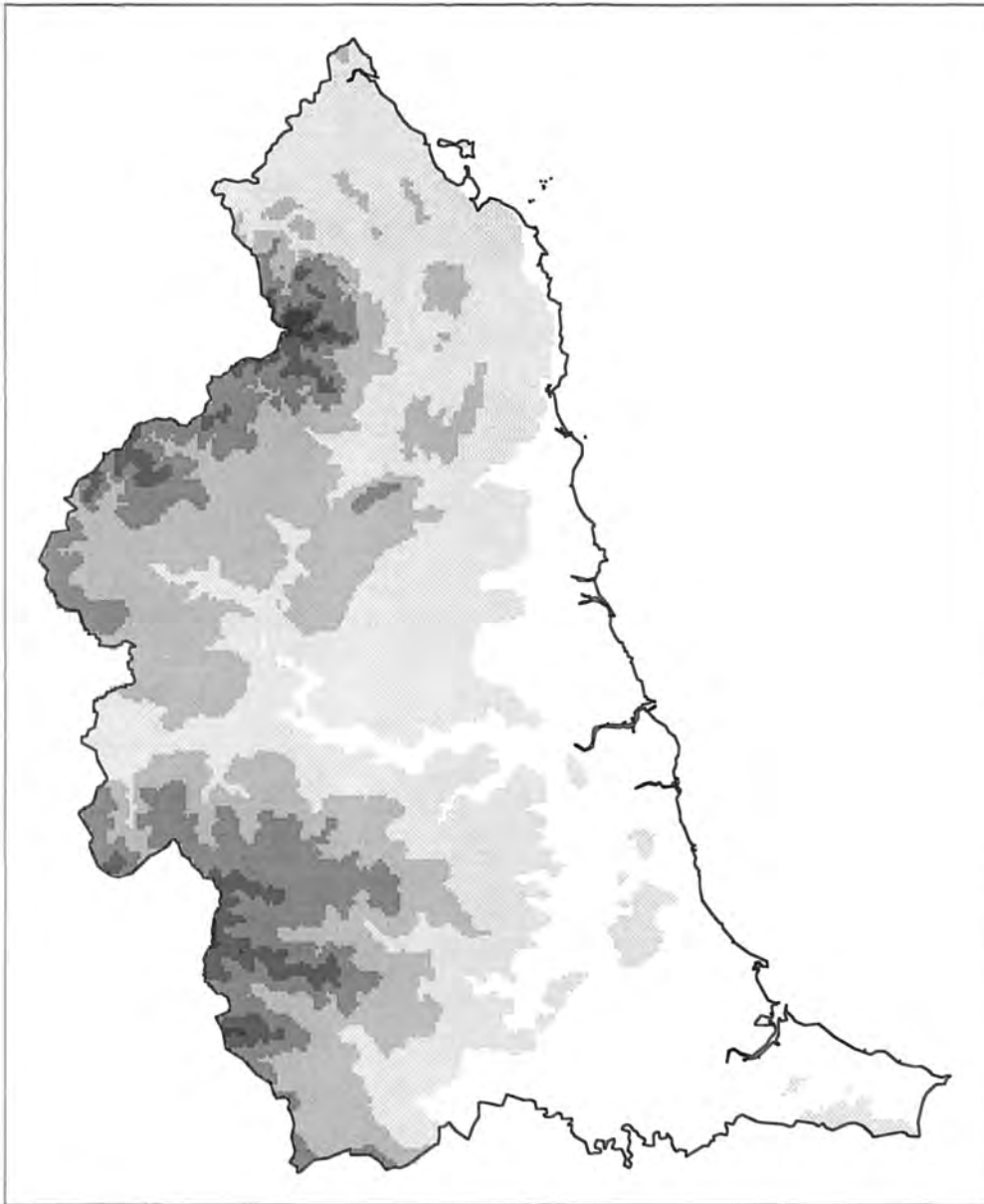
Herbs

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.5 Interpolated pollen map of Ericaceae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Whereas in the previous period the highest Ericaceae values occurred in the uplands of northern Northumberland, in this period there is a further increase in Ericaceae values at many sites in the uplands of the Northern Pennines, reaching 60-70% tdlp at some sites. Virtually all other sites in this area have Ericaceae values above 20%. Ericaceae values also rise for the first time at sites in the upper Derwent area, such as at Pow Hill, where values rise to 61%. Ericaceae values also increase at sites in the west of the Tyne Corridor.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%



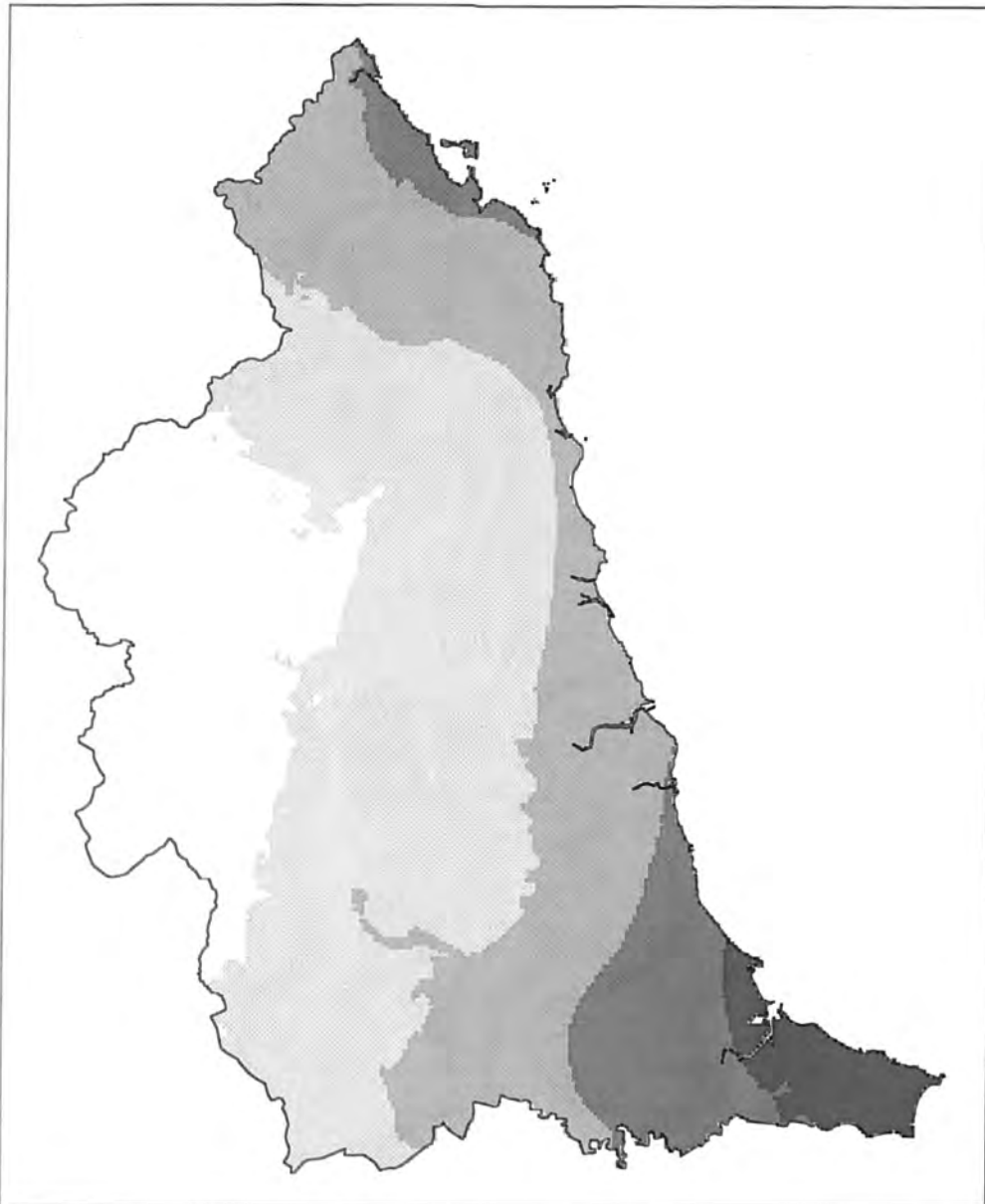
Ericaceae

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.6 Interpolated pollen map of agricultural: arable index scores for the Iron Age period, 500 cal. BC - cal. AD 70.

Although the map for this period shows that the highest scores occur in the south east of the region, there is a marked decline in scores at several sites, including at Hutton Henry, where scores drop from 67% to 27% and Neasham Fen from 43% to 18%. Similarly in Weardale, at Steward Shield Meadow and Bollihope Bog, scores drop as the proportion of non-arable types increases. Scores remain non-arable in the uplands. In contrast, arable types increase proportionally at several sites in northern Northumberland, particularly at Edlingham and Camp Hill Moss, so that levels are now similar to those found in the south east of the region.



Key:

- 0 – 10%
- 10 – 20%
- 20 – 30%
- 30 – 40%
- 40 – 50%
- > 50%

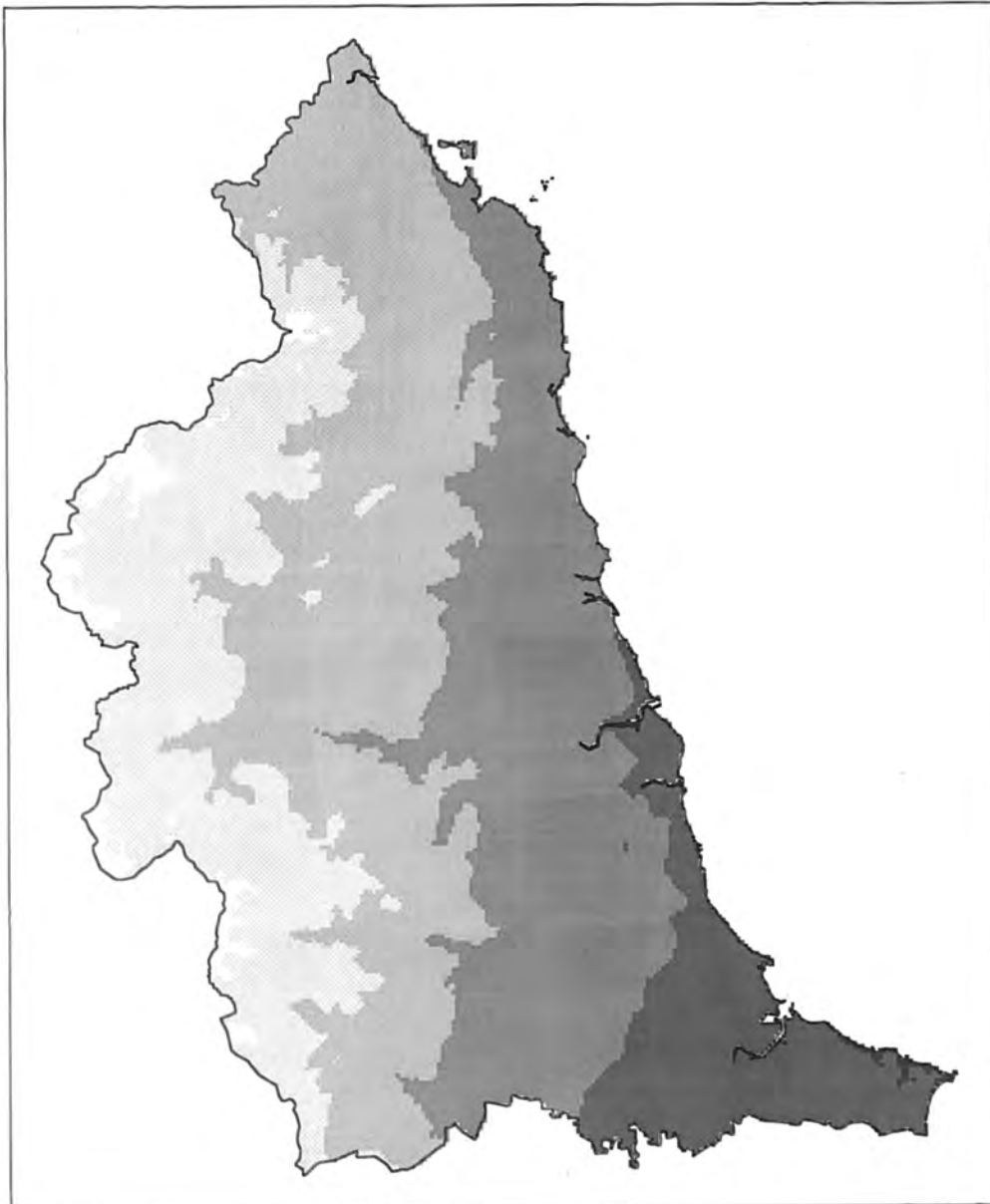


Agricultural:Arable Index

**500 cal. BC –
cal. AD 70**

Figure 7.4.7 Interpolated pollen map of Gramineae values for the Iron Age period, 500 cal. BC - cal. AD 70.

The map for Gramineae is similar to that for the previous period, with the highest values occurring in the south east of the region, but at several sites in the area Gramineae values (although still higher than found elsewhere) decline slightly. At Bishop Middleham, for example, values drop from 40% tdlp to 29%, although on the coast at Hartlepool values remain very high (42%). Gramineae values increase at sites in northern Northumberland; at Edlingham they rise from 20-30% and at Trickle Wood to 13%. They also rise in Weardale at Steward Shield Meadow to 15%. Elsewhere, as before, Gramineae values remain below 10% with the exception of a couple of sites in upper Teesdale.



Key:

- 0 – 5%
- 5 – 10%
- 10 – 15%
- 15 – 20%
- 20 – 25%
- > 30%



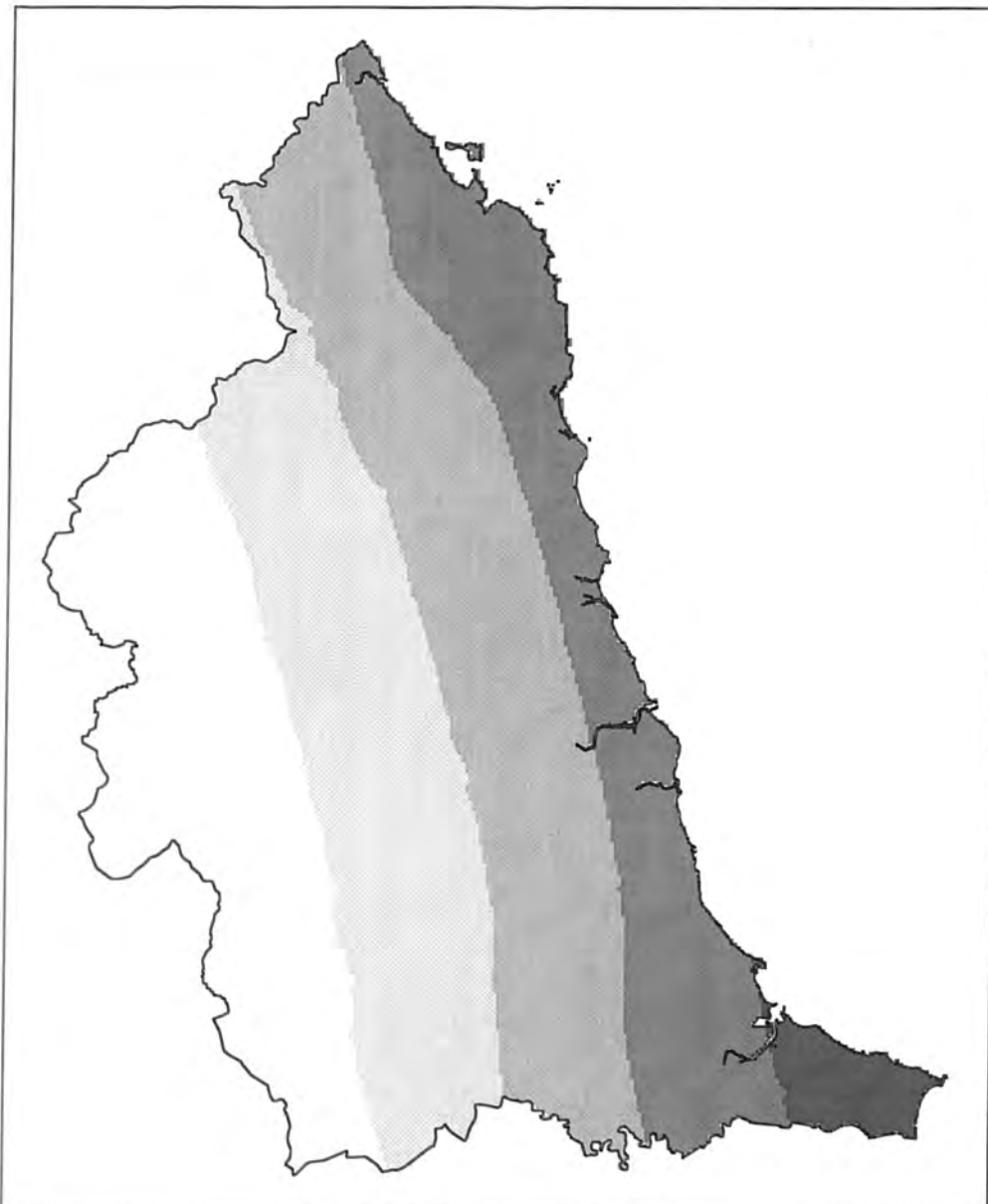
Gramineae

**500 cal. BC –
cal. AD 70**







Pollen values expressed as %tdlp.

Figure 7.4.8 Interpolated pollen map of *Cerealia*-type pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Cerealia-type pollen continues to occur in high values at Trickle Wood in northern Northumberland (1.5% tdlp). In this period *Cerealia*-type pollen occurs at a larger number of sites than before. Values from 0.2-0.6% occur at most sites in the south east of the region. It appears at Steward Shield, other sites in the upper Derwent and Weardale area and at sites in the Tyne Corridor in this period.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



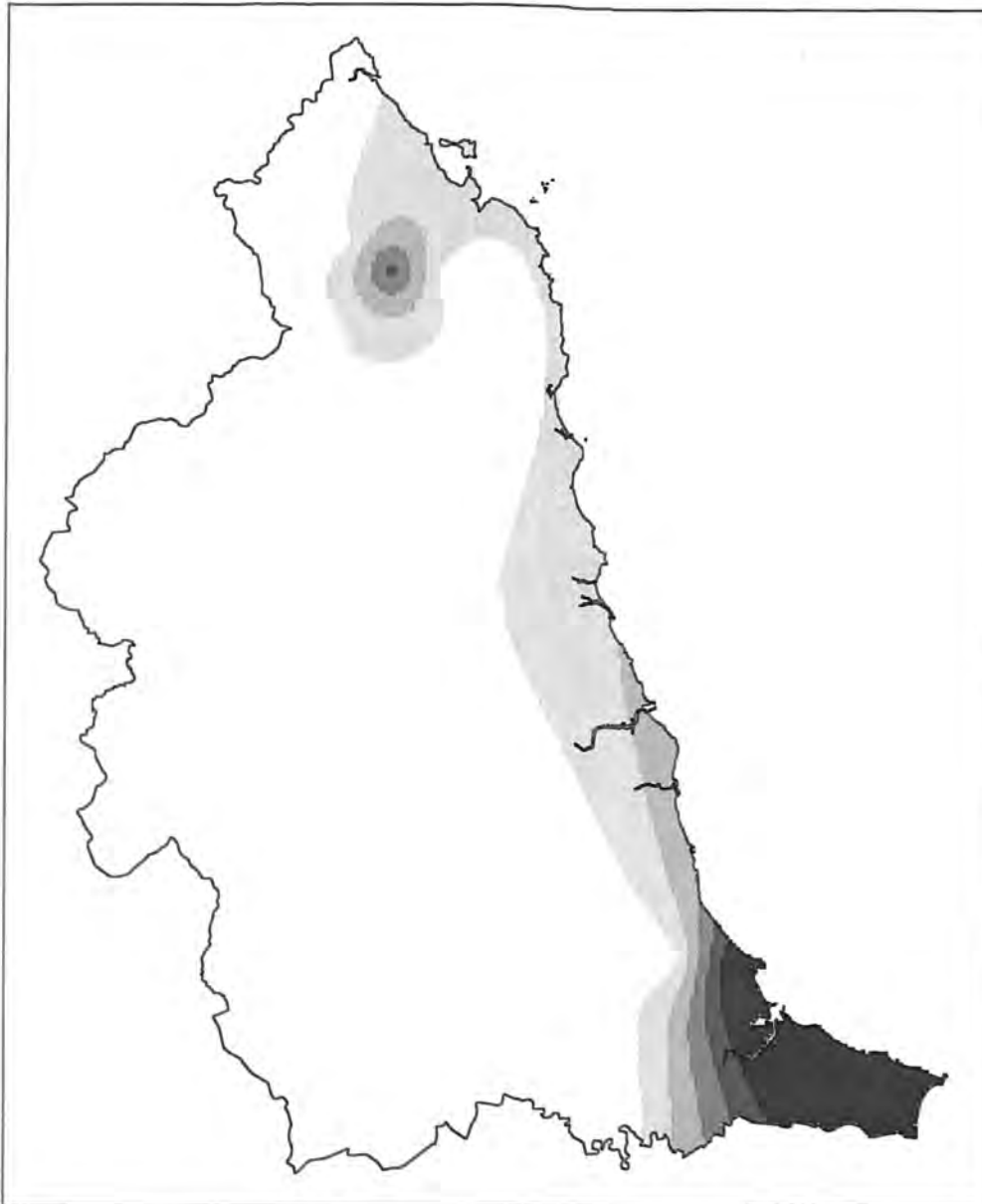
Cerealia-type

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.9 Interpolated pollen map of *Artemisia* pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

As in the previous period, areas with high *Artemisia* occur in the south east of the region and also in northern Northumberland. The highest values in this period occur in the south east, rising to 1.6% tdlp on the coast at Hartlepool and also occurring at 0.7% at Thorpe Bulmer. Values are much lower (under 0.2%) elsewhere in the south of the region and in northern Northumberland. Outside these areas, *Artemisia* occurs at low values in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



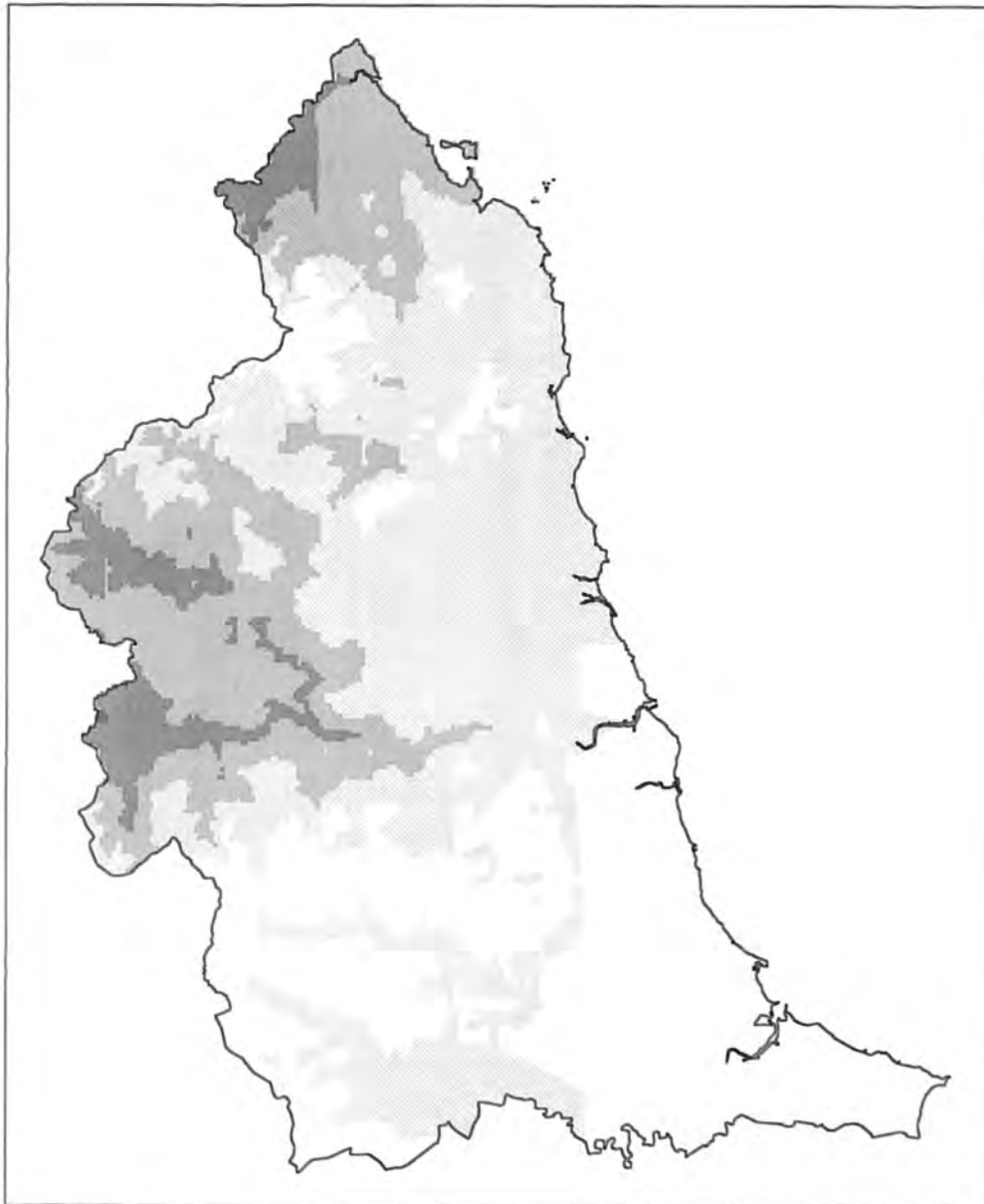
Artemisia

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.10 Interpolated pollen map of Caryophyllaceae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

The highest values for Caryophyllaceae continue to occur in the north and north west of the region, as before (Fig. 7.3.47). Values increase at many sites in this period, with the highest value at Muckle Moss in the west of the Tyne Corridor (1.8% tdlp) and at Kennel Hall Knowe (0.8%) and Coom Rigg just to the north (0.7%). High values still remain at sites in northern Northumberland, with a value of 0.9% at Edlingham. It appears at high values of 1.1% at Steward Shield Meadow in Weardale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



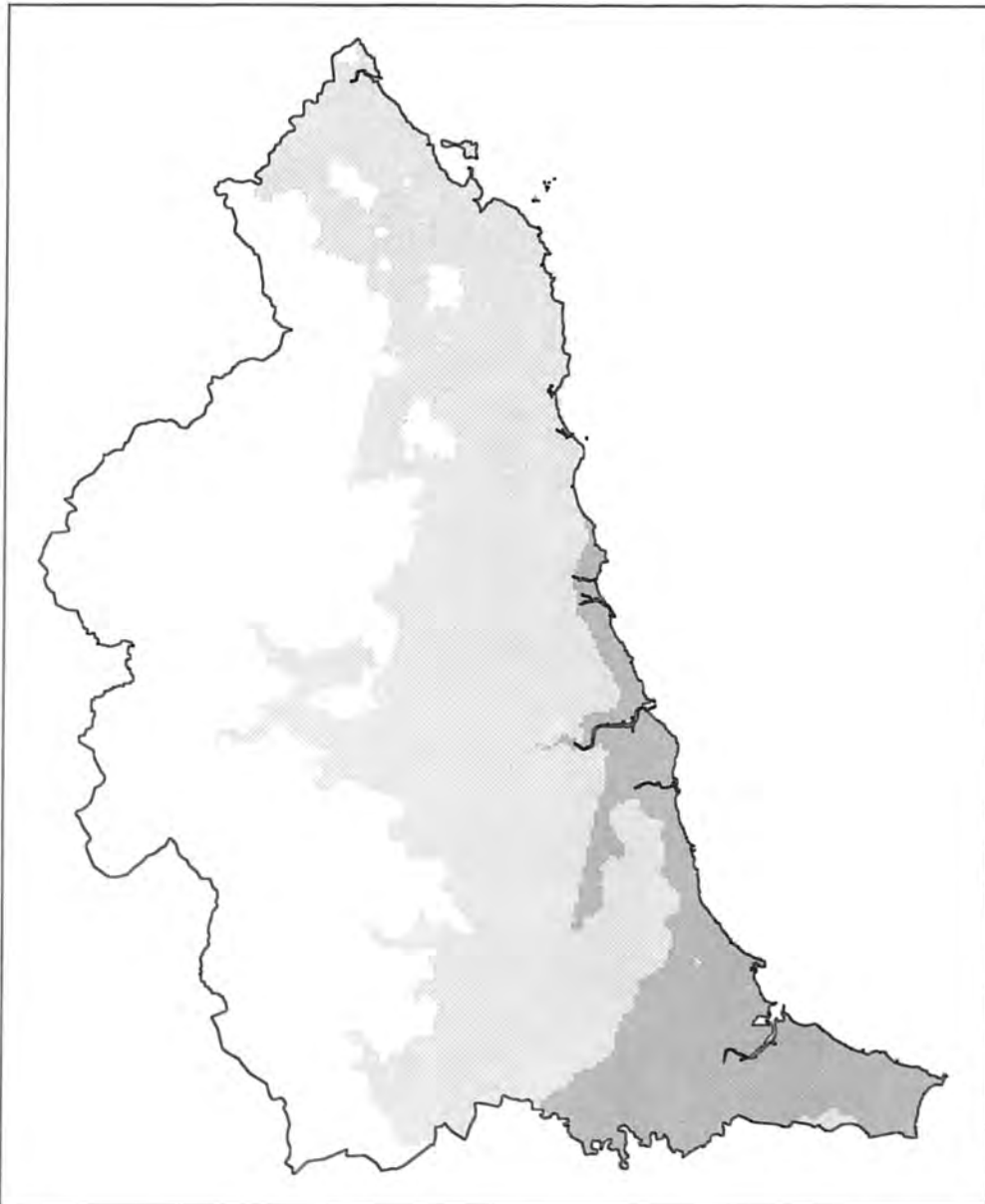
Caryophyllaceae

**500 cal. BC –
cal. AD 70**







Pollen values expressed as %tdlp.

Figure 7.4.11 Interpolated pollen map of *Centaurea* pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

As in the previous period, but unlike in periods before that, the highest values for *Centaurea* occur in the south east of the region, increasing at Bishop Middleham to 0.1% tdlp. Apart from this, it continues to occur at Pow Hill in the upper Derwent area, at Coom Rigg Moss in south west Northumberland and Camp Hill Moss in northern Northumberland.



Key:

-  < 0.01%
-  0.01% – 0.02%
-  0.02% – 0.03%
-  0.03% – 0.04%
-  0.05% – 0.06%
-  > 0.06%



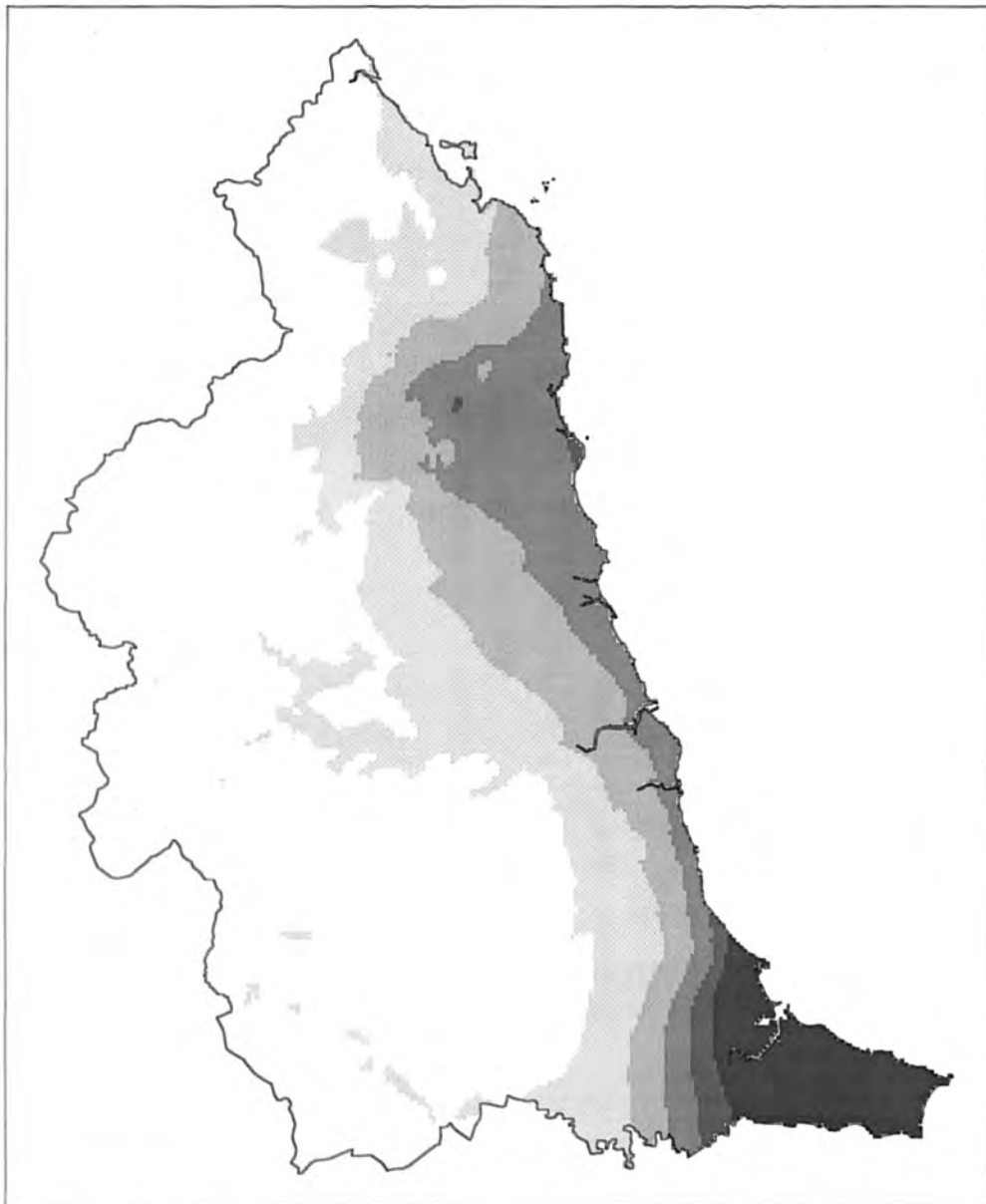
Centaurea

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.12 Interpolated pollen map of Chenopodiaceae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

As in the previous period, the highest values for Chenopodiaceae occur in the south east of the region, reaching 2.8% tdlp on the coast at Hartlepool, and values around 0.2% are common at other sites in this area. A high value of 1.8% appears at Edlingham in northern Northumberland and it occurs at Akeld Steads at 0.2%. Smaller values from 0.07-0.3% continue to occur in upper Teesdale.



Key:

- 0 - 0.2%
- 0.2 - 0.4%
- 0.4 - 0.6%
- 0.6 - 0.8%
- 0.8 - 1.0%
- >1.0%



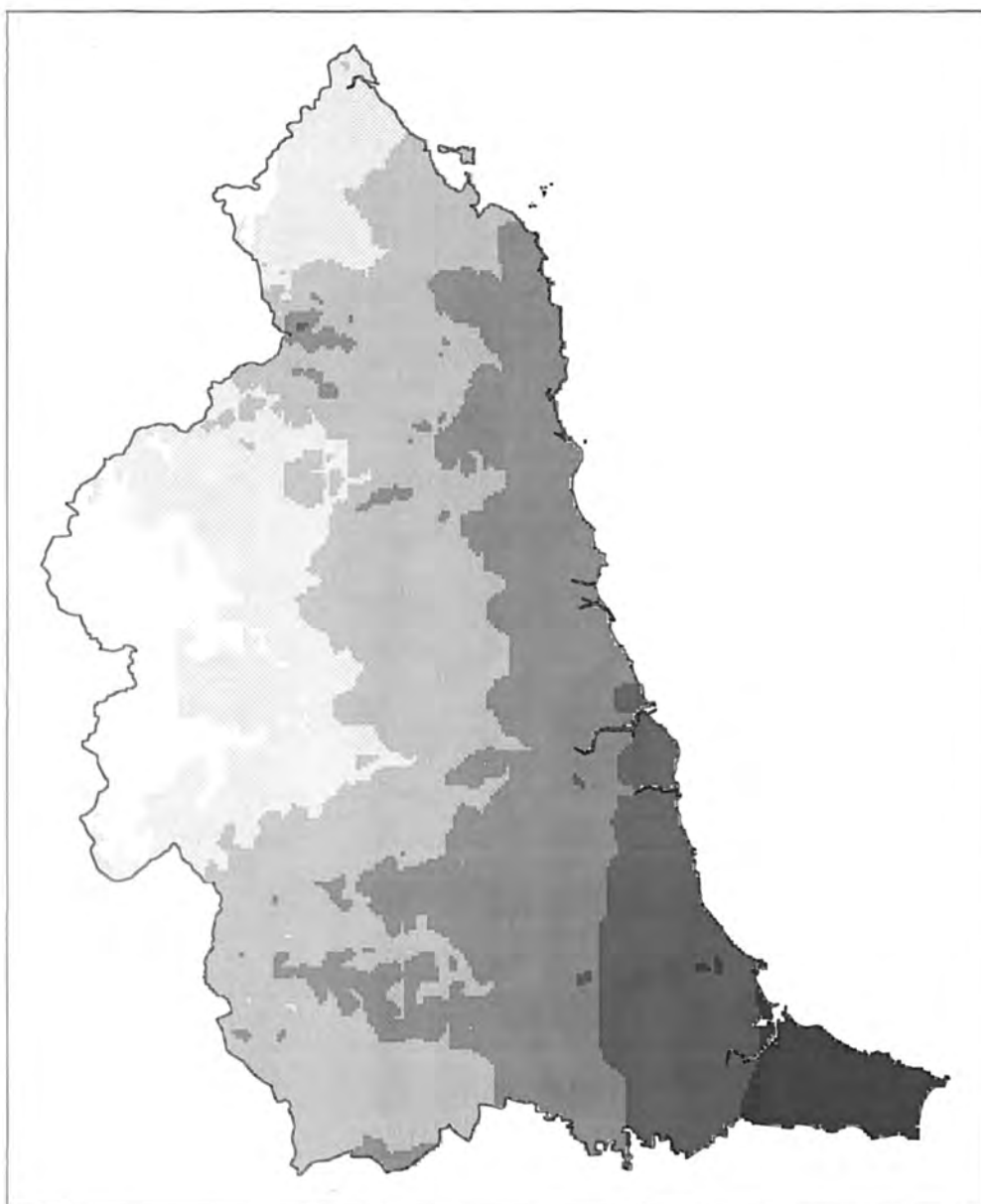
Chenopodiaceae

**500 cal. BC -
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.13 Interpolated pollen map of Compositae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

As in the previous period, high Compositae values continue to occur in the south east of the region, rising to 1.9% tdlp at Bishop Middleham, 1% at Thorpe Bulmer and 1.2% on the coast, at similar levels to the previous period. Very high values around 10% continue to occur at Steward Shield in Weardale, but are much lower at nearby Bollihope Bog, unlike in the previous period. Values for Compositae increase at several sites in northern Northumberland from around 0.5% to 1.1% at Trickle Wood and 0.7% at Akeld Steads. It continues to occur in smaller values (0.1-0.3%) in upper Teesdale.



Key:

- 0 – 0.2%
- 0.2 – 0.4%
- 0.4 – 0.6%
- 0.6 – 0.8%
- 0.8 – 1.0%
- >1.0%



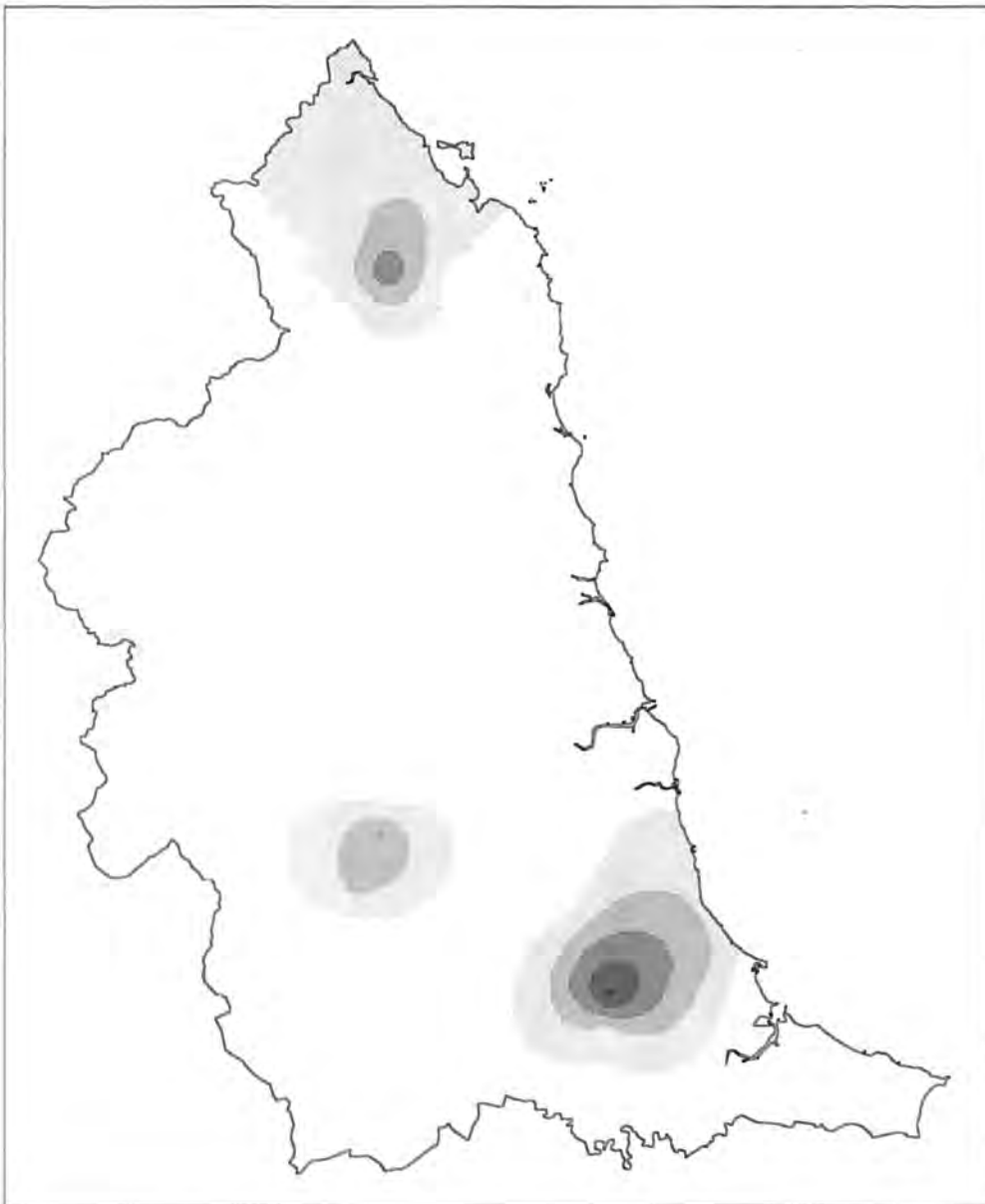
Compositae undiff.

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.14 Interpolated pollen map of Cruciferae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Cruciferae pollen continues to occur at its highest values in northern Northumberland and in the south east of the region, but in this period much higher values than found previously appear at a few sites. At Bishop Middleham a value of 0.5% occurs, with lower values of 0.1-0.2% at other sites in the area. Values around 0.4-0.5% occur at a couple of sites in northern Northumberland.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



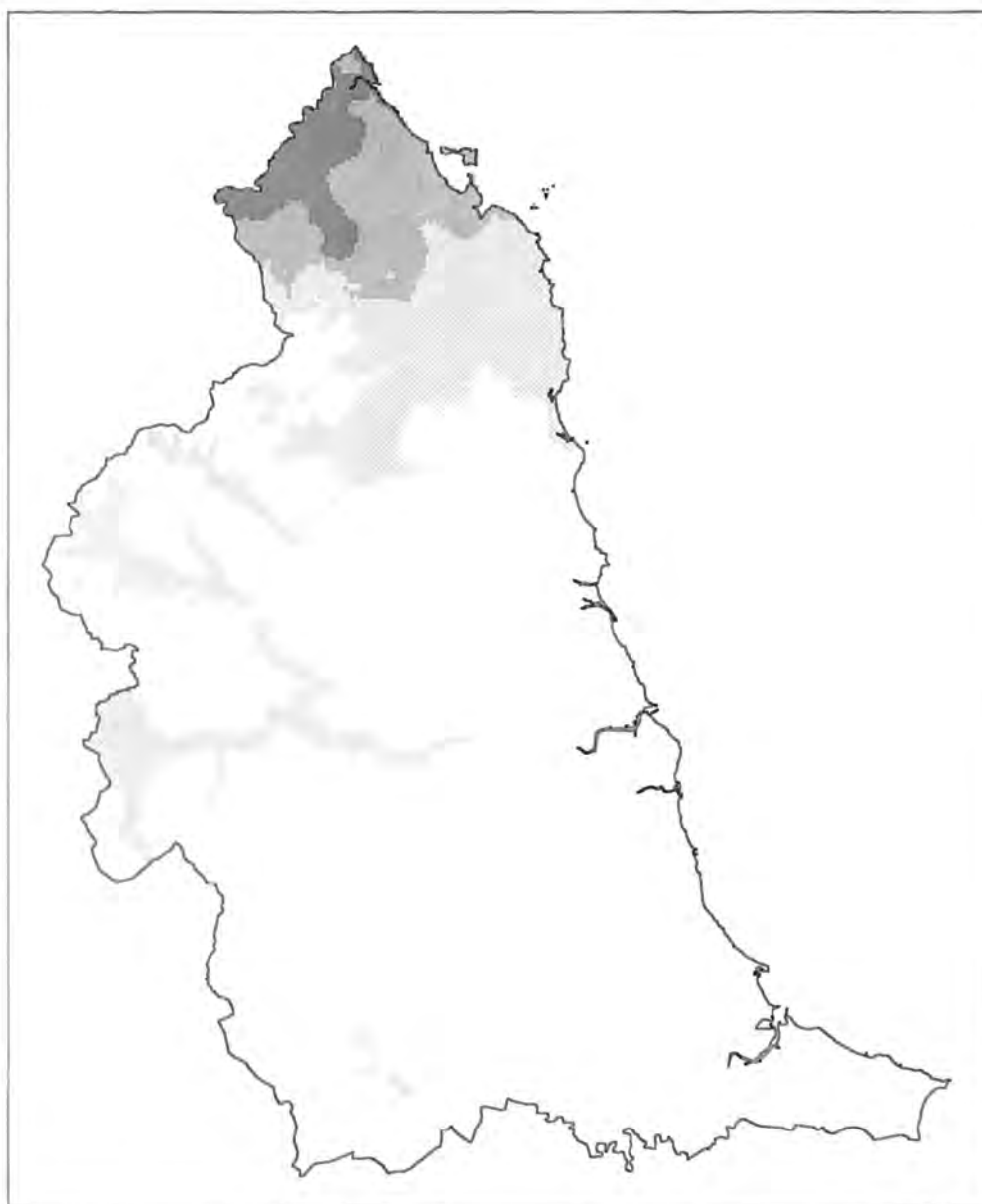
Cruciferae

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.15 Interpolated pollen map of Leguminosae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

The highest values for Leguminosae, as in the previous period, occur in the north of the region with a value of 0.9% tdlp at Akeld Steads in the north of Northumberland. A value of 0.6% continues to occur at Tinkler's Sike in upper Teesdale. Much lower values occur in the south east of the region, as before, around 0.03-0.05%.



Key:

- 0 – 0.1%
- 0.1 – 0.2%
- 0.2 – 0.3%
- 0.3 – 0.4%
- 0.4 – 0.5%
- > 0.5%



Leguminosae

**500 cal. BC –
cal. AD 70**







Pollen values expressed as %tdlp.

Figure 7.4.16 Interpolated pollen map of *Plantago* pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Plantago values continue to remain high in the south east of the region, as in the Neolithic, with values reaching 6.3% tdlp at Bishop Middleham, 4.6% on the coast and at slightly higher values than before (0.6-1.5%) at other sites in the area. Higher values than before appear at some sites in northern Northumberland, with 4.6% at Trickle Wood and 2.5% at Broad Moss. High *Plantago* values also occur at Steward Shield Meadow in Weardale (4.5%) and at sites in the northern Pennines, such as 4.6% at Tinkler's Sike and 2.1% at Quick Moss. In the Tyne Corridor values up to 2.3% occur at Fortherley Moss, and to the north at Coom Rigg Moss, Kennel Hall Knowe and Steng Moss.



Key:

-  < 0.6%
-  0.6 – 1.2%
-  1.2 – 1.8%
-  1.8 – 2.4%
-  2.4 – 3.0%
-  3.0 – 3.6%

Plantago

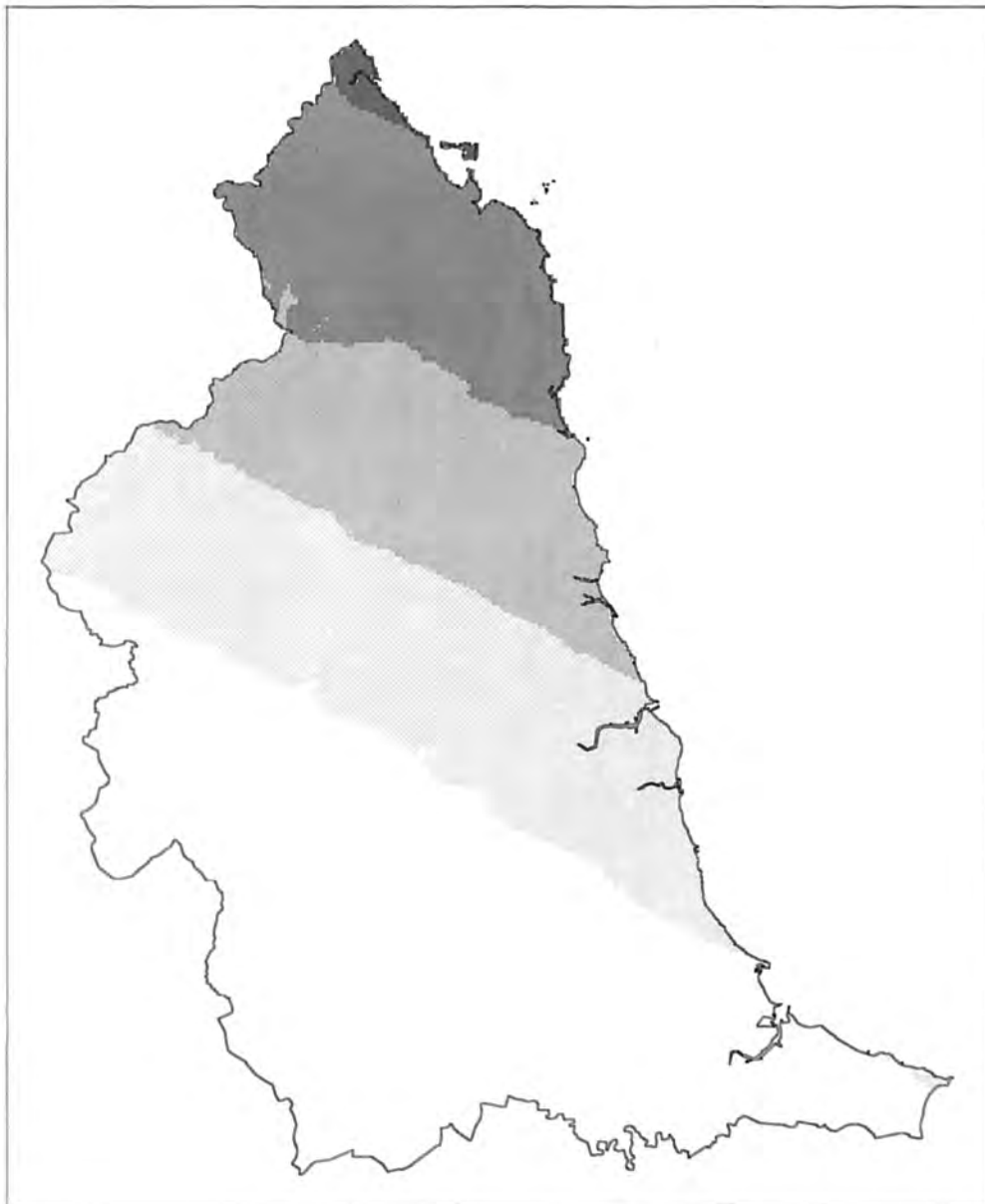
**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.









Figure 7.4.17 Interpolated pollen map of *Polygonum* pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

The highest *Polygonum* values continue to occur, as in the previous periods, in the north of the region, with values reaching 1.8% tdlp at Edlingham and a slightly lower value than before of 0.5% at Trickle Wood. No occurrences of *Polygonum* are recorded in upper Teesdale, unlike in previous periods, although it does occur in small amounts at Steward Shield Meadow in Weardale and continues to occur at Hutton Henry in the south east of the region.



Key:

-  0 – 0.1%
-  0.1 – 0.2%
-  0.2 – 0.3%
-  0.3 – 0.4%
-  0.4 – 0.5%
-  > 0.5%



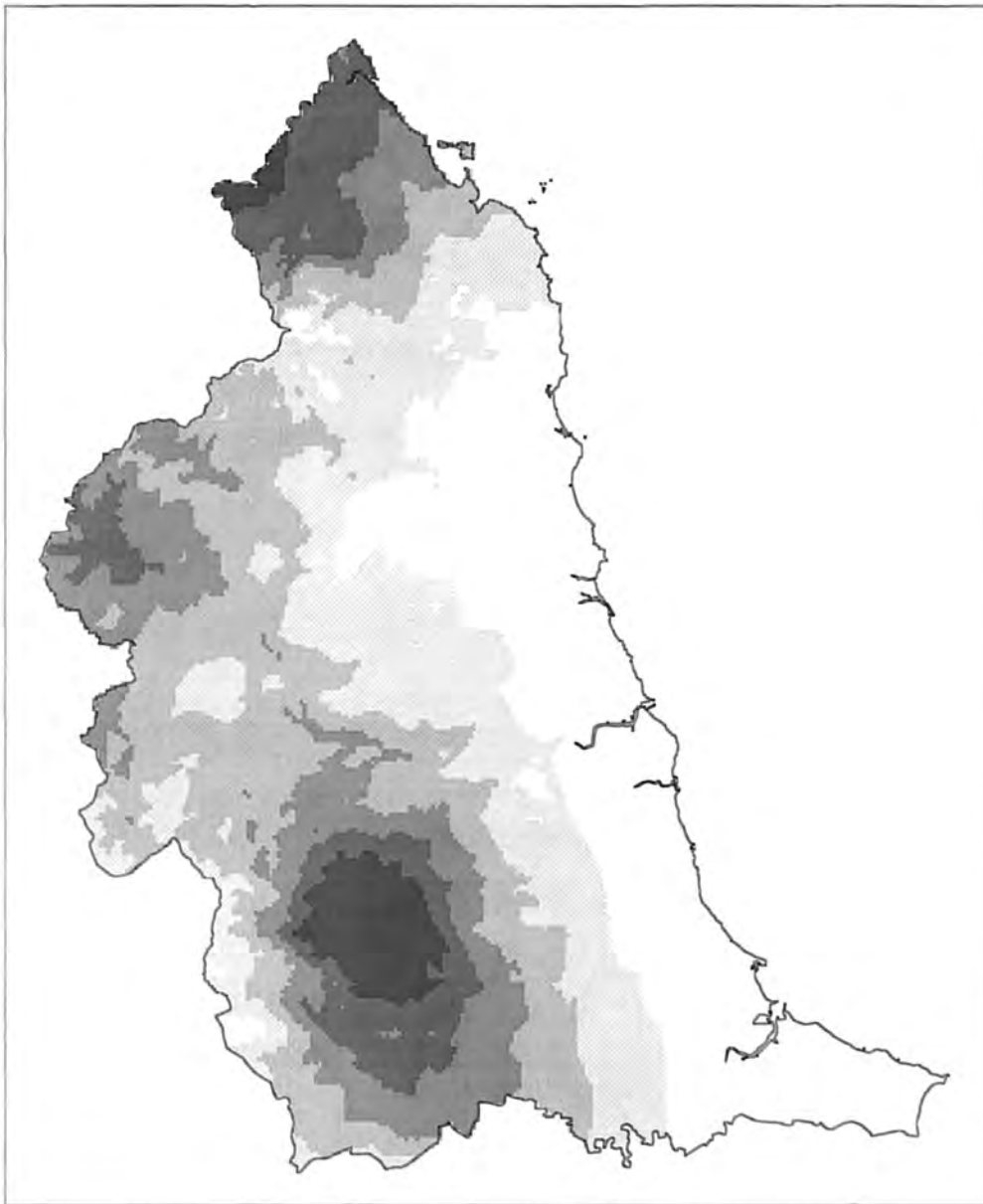
Polygonum

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Figure 7.4.18 Interpolated pollen map of Ranunculaceae pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

Unlike in the previous period, when the highest Ranunculaceae values occurred in the south east of the region and in northern Northumberland, in this period the highest values occur in Weardale at Steward Shield Meadow (4.2% tdlp) and Bollihope Bog (2.9%). High values occurred here in the previous period, but increase further in this period. It continues to occur in northern Northumberland at high values at one site, Akeld Steads, but no longer appears at Edlingham. A high value of 1.1% occurs at Kennel Hall Knowe in western Northumberland. Values around 0.1-0.5% continue to occur in the south east of the region, but the formerly high values on the coast now disappear.



Key:

- 0 - 0.2%
- 0.2 - 0.4%
- 0.4 - 0.6%
- 0.6 - 0.8%
- 0.8 - 1.0%
- >1.0%



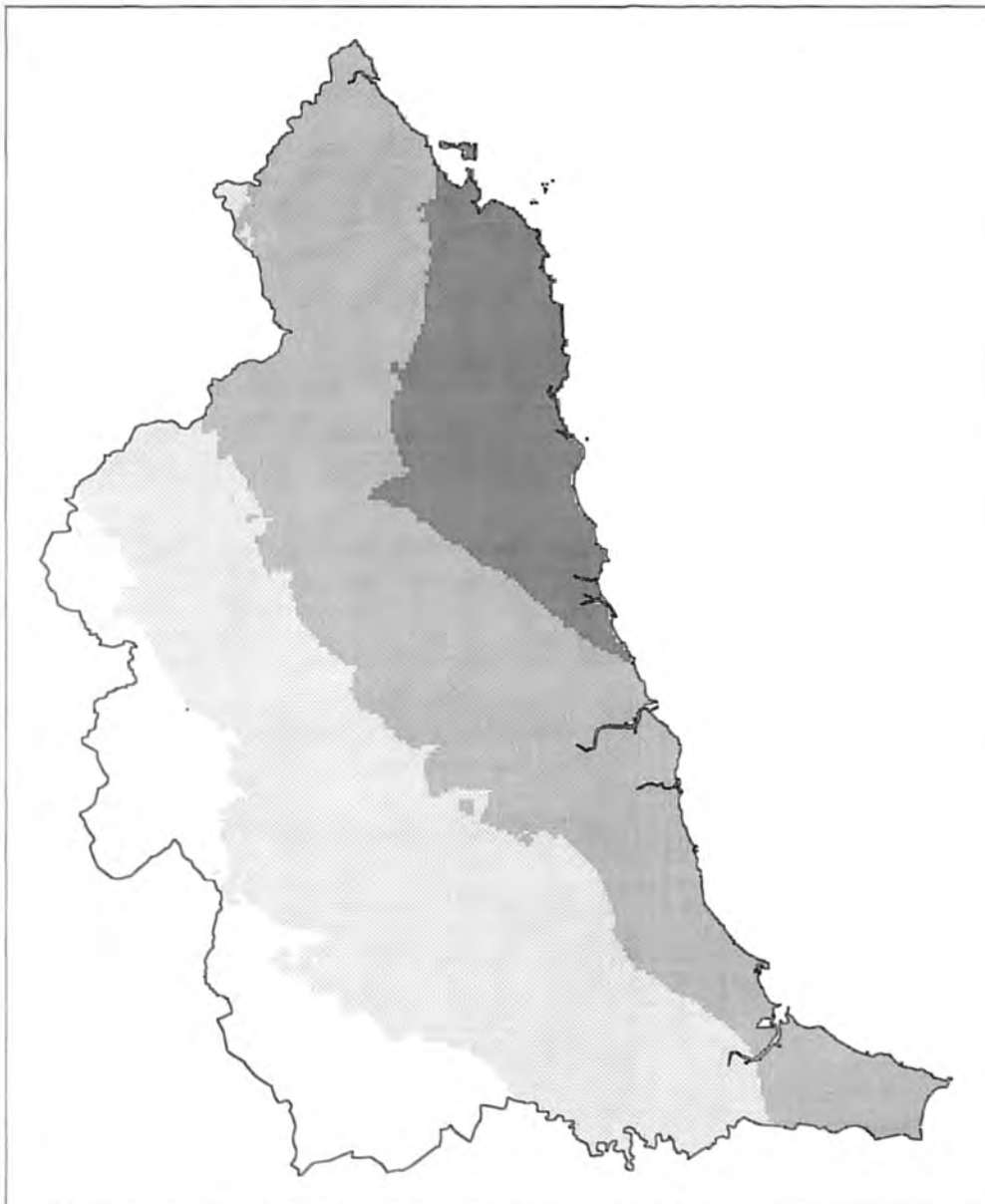
Ranunculaceae

**500 cal. BC -
cal. AD 70**







Pollen values expressed as %tdlp.

Figure 7.4.19 Interpolated pollen map of *Rumex* pollen values for the Iron Age period, 500 cal. BC - cal. AD 70.

As in the previous period, the highest values for *Rumex* occur in northern Northumberland, at Edlingham where *Rumex* values reach 2.8% tdlp. However, *Rumex* values decline at Bishop Middleham in the south east from over 1% to 0.7%, although values remain the same (0.1-0.7% at other sites in the area).



Key:

-  0 – 0.2%
-  0.2 – 0.4%
-  0.4 – 0.6%
-  0.6 – 0.8%
-  0.8 – 1.0%
-  >1.0%



Rumex

**500 cal. BC –
cal. AD 70**

Pollen values expressed as %tdlp.

Roman period:

cal. AD 70 - 500

List of Figures and Tables for the Roman period, cal. AD 70 - 500

Tables

Table 7.4.2	Summary of trends in pollen maps for the Roman period.	384
-------------	--	-----

Figures

Fig. 7.4.20	Map showing locations of pollen cores used to create interpolated maps for the period cal. AD 70 - 500.	386
-------------	---	-----

a) Summary maps of trees, shrubs, herbs and Ericaceae

Fig. 7.4.21	Interpolated pollen map of averaged total tree pollen values.	388
-------------	---	-----

Fig. 7.4.22	Interpolated pollen map of total shrub pollen values.	390
-------------	---	-----

Fig. 7.4.23	Interpolated pollen map of total herb pollen values.	392
-------------	--	-----

Fig. 7.4.24	Interpolated pollen map of total Ericaceae pollen values.	394
-------------	---	-----

b) Agricultural: arable index map

Fig. 7.4.25	Interpolated pollen map of agricultural:arable index scores.	396
-------------	--	-----

c) Maps of selected individual herb taxa

Fig. 7.4.26	Interpolated pollen map of Gramineae pollen values.	398
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Fig. 7.4.27	Interpolated pollen map of <i>Cerealia</i> -type pollen values.	400
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Fig. 7.4.28	Interpolated pollen map of <i>Artemisia</i> pollen values.	402
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Fig. 7.4.29	Interpolated pollen map of Caryophyllaceae pollen values.	404
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Fig. 7.4.30	Interpolated pollen map of <i>Centaurea</i> pollen values.	406
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Fig. 7.4.31	Interpolated pollen map of Chenopodiaceae pollen values.	408
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Fig. 7.4.32	Interpolated pollen map of Compositae pollen values.	410
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Fig. 7.4.33	Interpolated pollen map of Cruciferae pollen values.	412
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Fig. 7.4.34	Interpolated pollen map of Leguminosae pollen values.	414
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Fig. 7.4.35	Interpolated pollen map of <i>Plantago</i> pollen values.	416
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Fig. 7.4.36	Interpolated pollen map of <i>Polygonum</i> pollen values.	418
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Fig. 7.4.37	Interpolated pollen map of Ranunculaceae pollen values.	420
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Fig. 7.4.38	Interpolated pollen map of <i>Rumex</i> pollen values.	422
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Table 7.4.2 Summary of trends in pollen maps for the Roman period, cal. AD 70 - 500

Figures:	Durham and Cleveland lowlands	Foothills and lower valleys
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.4.21 to 7.4.24</p>	<p>Herb pollen rises markedly to 91% at Hutton Henry, 82% at Bishop Middleham and 65% at Hartlepool. At Mordon Carr and Thorpe Bulmer, trees and shrubs are slightly higher, and herbs reach 60% and 57% respectively. Ericaceae is absent everywhere except Mordon Carr (8%). Neasham Fen is the only site where herbs do not increase. Here tree and shrub levels remain high (at 51% and 32% respectively.)</p>	<p>During this period trees drop markedly from 60% at Bollihope Bog and Hallowell Moss down to 14% and 18% respectively. At Pow Hill trees drop from 50% to 5% and at Lamb Shield to 26%. Herbs rise at most sites to above 35%, but Ericaceae also rise, from 2-27% at Hallowell Moss and 12-37% at Bollihope Bog. In contrast, Steward Shield has very low levels of trees and shrubs (both under 5%), and very high herb levels (75%).</p>
<p>Agricultural: Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.4.25</p>	<p>Both arable and pastoral type herbs rise markedly at most sites in this period, although the proportions vary between sites. The index score rises at Mordon Carr from 53-82%, and at Bishop Middleham from 28-50%. However, at Hutton Henry the index declines from 27-24% as the proportion of pastoral types increases. At Neasham Fen arable types disappear completely, although pastoral types increase.</p>	<p>At Hallowell Moss the index score rises to 6%, and both arable and pastoral values rise. At Lamb Shield arable pollen types appear, increasing the index to 14%, whilst at Pow Hill a proportionally greater rise in pastoral types results in a decline in score to 18%. At Bollihope Bog and Steward Shield index scores rise to 45% and 59%, accompanied by a rise in both arable and pastoral values.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.4.26 to 7.4.38</p>	<p>At Bishop Middleham Gramineae pollen drops slightly to 24%, but rises markedly at Hutton Henry to 34% at Mordon Carr to 25%. At Neasham Fen it drops from 16-8%. <i>Cerealia</i>-type pollen is present at Bishop Middleham, Hartlepool Bay 4 and at 3% at Mordon Carr. At Neasham Fen only <i>Plantago</i>, Ranunculaceae and <i>Rumex</i> remain. At Hutton Henry <i>Plantago</i> dominates, at 3.7%. At Bishop Middleham Compositae increase to 3.9%, <i>Cannabis</i> appears, and <i>Plantago</i> falls to 4.2%. At Mordon Carr arable types increase. On the coast Chenopodiaceae rise to 3.4% and Compositae to 1.4%.</p>	<p>This period sees a marked rise in many herb types at these sites. At Hallowell Moss Gramineae pollen rises from under 1% to 17%, and <i>Plantago</i> rises to 7%. <i>Cerealia</i>-type pollen, Compositae, Cruciferae and <i>Polygonum</i> all appear now. At Lamb Shield Gramineae rises to 8%, with the appearance of <i>Cerealia</i>-type, Compositae and Cruciferae and <i>Plantago</i> increases to 1.6%. However, at Pow Hill, <i>Cerealia</i>-type and <i>Centaurea</i> now disappear. At Steward Shield Gramineae rises to 25%, with Compositae at 12% and <i>Plantago</i> and Ranunculaceae both at 4%. At Bollihope Bog Gramineae rises to 20%, with Compositae at 2.3% and <i>Plantago</i> and Ranunculaceae at 1%.</p>

Table 7.4.2 continued

Figures:	Northumberland	Uplands
<p>Summary maps: Trees, Shrubs, Herbs and Ericaceae</p> <p>Figs. 7.4.21 to 7.4.24</p>	<p>Herbs rise at Akeld Steads, Wooler Water and Edlingham to 73%, 90% and 82% respectively, with low trees, shrubs and Ericaceae. In contrast, Broad Moss, Trickle Wood and Camp Hill Moss have high Ericaceae, with herbs under 25%, and low trees and shrubs. Further south, trees fall markedly at Fellend Moss and Fortherley Moss, from 47-13% and 39-11% respectively. Ericaceae values rise to 40%. However, Vindolanda has very high herbs (86%).</p>	<p>Trees lie below 30%, shrubs below 20% and herbs rarely exceed 30% at most upland sites in this period. However trees and shrubs are never as low as those in the lowlands. Ericaceae values rise to 69% in places, with the exception of Cronkley Pastures, which resembles lowland sites with its 86% herb pollen. Dufton Moss and Quick Moss have the highest trees (42% and 27% respectively) and shrubs (24% and 36%) in the uplands, as before.</p>
<p>Agricultural: Arable Index, and total arable and total pastoral maps.</p> <p>Fig. 7.4.25</p>	<p>There is a marked rise in arable values at Edlingham, raising the index from 0-89%. Pastoral types also increase. The index rises at Camp Hill Moss to 29%. Pastoral values rise at Akeld Steads, Black Lough and Steng Moss lowering index scores to 33%, 5% and 3% respectively. The score at Trickle Wood remains at 44% and Broad Moss at 12%. Arable types are absent at Fortherley Moss and Muckle Moss, but appear at Fellend Moss.</p>	<p>At several sites the index score drops in this period owing to a decline in arable values and a marked rise in pastoral types, such as at Weelhead Moss and Dufton Moss. However, the index rises at Site W, Tinkler's Sike, High Banks Moss and Cronkley Pastures, as arable types increase. At other sites arable types remain absent, and pastoral values increase in this period, such as at Whitfield Lough, Dead Crook and Knoutberry.</p>
<p>Maps of individual herb taxa:</p> <p>Figs. 7.4.26 to 7.4.38</p>	<p>Gramineae rise markedly at all sites, to 15% at Akeld Steads with a marked increase in all herb types, to 23% at Black Lough (where <i>Plantago</i> reaches 4%), to 17% at Steng Moss (where <i>Plantago</i> rises to 3.9% and <i>Rumex</i> to 1%) and at Fellend Moss to 14% (where <i>Plantago</i> increases to 3.6%, with the appearance of <i>Centaurea</i>). <i>Cerealia</i>-type appears at Coom Rigg with a rise in <i>Plantago</i> to 1.7% and Ranunculaceae to 1.6%. A wide range of arable types is also present at all sites.</p>	<p>There is a decline in the range of herbs found at many sites from the previous period, and at some sites Gramineae pollen also declines (such as Cronkley Pastures, Dufton Moss and Dead Crook). Chenopodiaceae and <i>Cerealia</i>-type in particular disappear. However, <i>Plantago</i> values continue to increase at many sites, to 2.2% at Quick Moss and Knoutberry and 1.3% at Weelhead Moss. Ranunculaceae and <i>Rumex</i> remain at virtually all sites. At Cronkley Pastures, Tinkler's Sike, High Banks Moss and Site W arable types (particularly Compositae and Cruciferae) remain proportionally higher.</p>

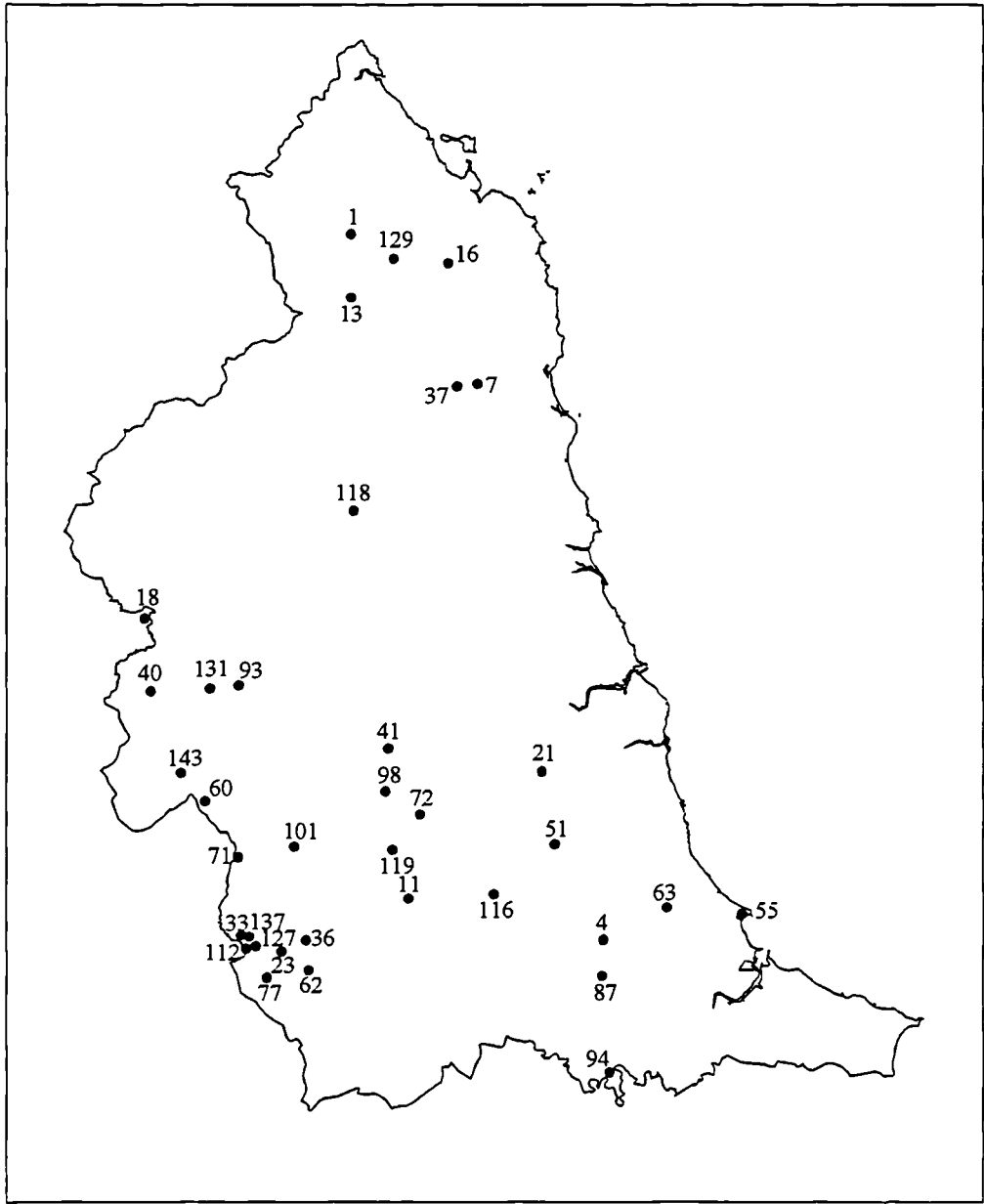


Fig. 7.4.19



Map showing locations of pollen cores used to create interpolated maps for the Roman period, cal. AD 70 - 500

N.B. Key to site codes on next page

Key to Figure 7.4.20.

N.B. The site codes used in Figure 3.1.1 refer to the site codes for each pollen core site listed in Table 3.1.






Code	Pollen core name	Code	Pollen core name
1	Akeld Steads	71	Knoutberry
4	Bishop Middleham	72	Lamb Shield
7	Black Lough	77	Long Crag
11	Bollihope Bog	87	Mordon Carr
13	Broad Moss	93	Muckle Moss
16	Camp Hill Moss	94	Neasham Fen
18	Coom Rigg	98	Pow Hill
21	Cranberry Bog	101	Quick Moss
23	Cronkley Pastures	112	Site W
33	Dead Crook	116	Stanley Moss
36	Dufton Moss	118	Steng Moss
37	Edlingham	119	Steward Shield
40	Fellend Moss	126	Thorpe Bulmer
41	Fortherley Moss	127	Tinkler's Sike
51	Hallowell Moss	129	Trickley Wood
55	Hartlepool Bay 4	131	Vindolanda
60	High Banks Moss	138	Weelhead Moss
62	Howden Moss	143	Whitfield Lough
63	Hutton Henry		

Figure 7.4.21 Interpolated pollen map of tree pollen values for the Roman period, cal. AD 70 - 500.

The map for this period shows that interpolated tree pollen values across most of the region lie between 20-30% tdlp, with lower values in northern Northumberland and in the uplands of the Northern Pennines, and the highest values in the south of the region, along the Tees, and in the west of the Tyne Corridor. This map does not clearly show the marked decline in tree values that occurs at many sites in the upper Derwent/Weardale area that were previously almost totally dominated by tree pollen. This is probably because tree pollen levels remain high at Neasham Fen on the Tees in the south of the region (at 51% tdlp). In the upper Derwent/Weardale area, trees decline markedly from around 50 - 60% to below 20% at all sites in this area and to as low as 5% at Pow Hill. At all sites in south east Durham apart from Neasham Fen tree values remain low from previous periods. At all sites in northern Northumberland tree pollen levels decline to under 20%, if they were not already low at some sites. Further south in Northumberland, in the Tyne Corridor, at Fellend Moss and Fortherley Moss, tree values fall markedly from 30-50% to under 15%. In the uplands tree values remain below 30%, remaining higher at a couple of sites.



Key:

-  0 – 20%
-  20 – 40%
-  40 – 60%
-  60 – 80%
-  80 – 100%



Trees

cal. AD 70 – 500







Pollen values expressed as %tdlp.

Figure 7.4.22 Interpolated pollen map of shrub pollen values for the Roman period, cal. AD 70 - 500.

In this period, shrub pollen values are highest in the south of the region, rather than in the western uplands, as in the previous period (Fig. 7.4.3). Shrub values, like tree values, remain high at one site in the Tees lowlands, Neasham Fen (32% tdlp), whereas values are far lower at other sites in the south east of the region and are also low in the upper Derwent/ Weardale area which experienced a marked drop in tree pollen in this period. At these sites shrub pollen was always low. In the north of the region shrub values remain low from the previous period, under 10%. In the uplands shrub pollen values remain below 20%.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%



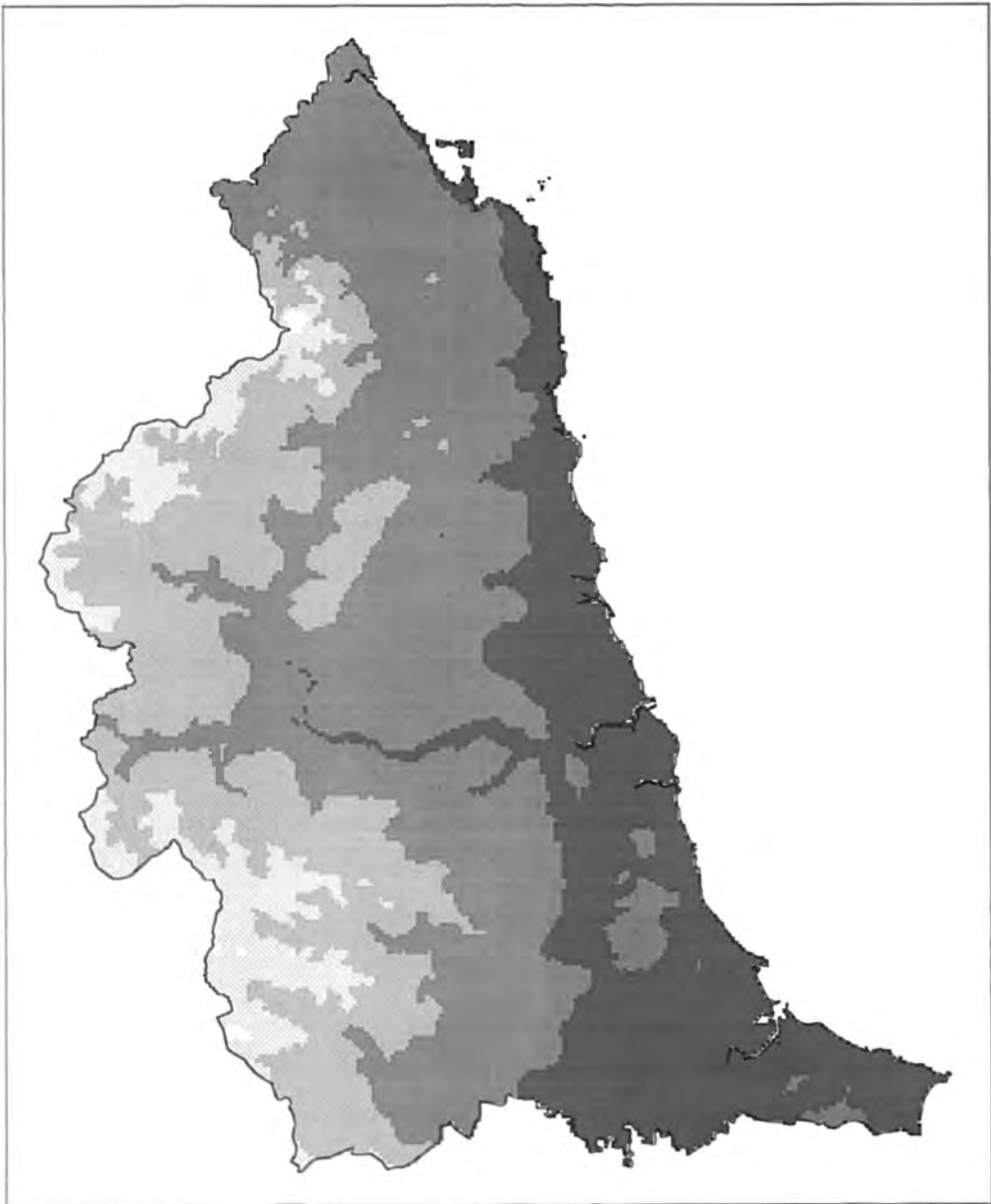
Shrubs

cal. AD 70 – 500







Pollen values expressed as %tdlp.

Figure 7.4.23 Interpolated pollen map of herb pollen values for the Roman period, cal. AD 70 - 500.

Compared to the averaged values for the whole of the Iron Age, by or during this period, herb values rise markedly at sites in the lowlands, particularly at sites in the south east of the region and in northern Northumberland. In the south east of the region herb values rise to 91% tdlp at Hutton Henry and 82% at Bishop Middleham. Herb levels are slightly lower (55-60%) at Mordon Carr and Thorpe Bulmer. However, herb levels remain low at the tree and shrub dominated Neasham Fen. In the north of Northumberland herb values rise to similarly high levels, up to 90% at Wooler Water, 82% at Edlingham and 73% at Akeld Steads. At some sites in the Tyne Corridor, for example at Vindolanda, high herb pollen values (86%) are also found. At Steward Shield Meadow herb pollen levels rise to 75% and at one site in upper Teesdale, Cronkley Pastures, to 86%. In other areas of the region, at sites in the uplands of the Northern Pennines, in the uplands of southern Northumberland, in the upland sites in northern Northumberland and in the upper Derwent area, the marked decline in tree pollen is not accompanied by a marked rise in herbs, but a marked rise in Ericaceae.



Key:

-  0 – 10%
-  10 – 20%
-  20 – 30%
-  30 – 40%
-  40 – 50%
-  > 50%



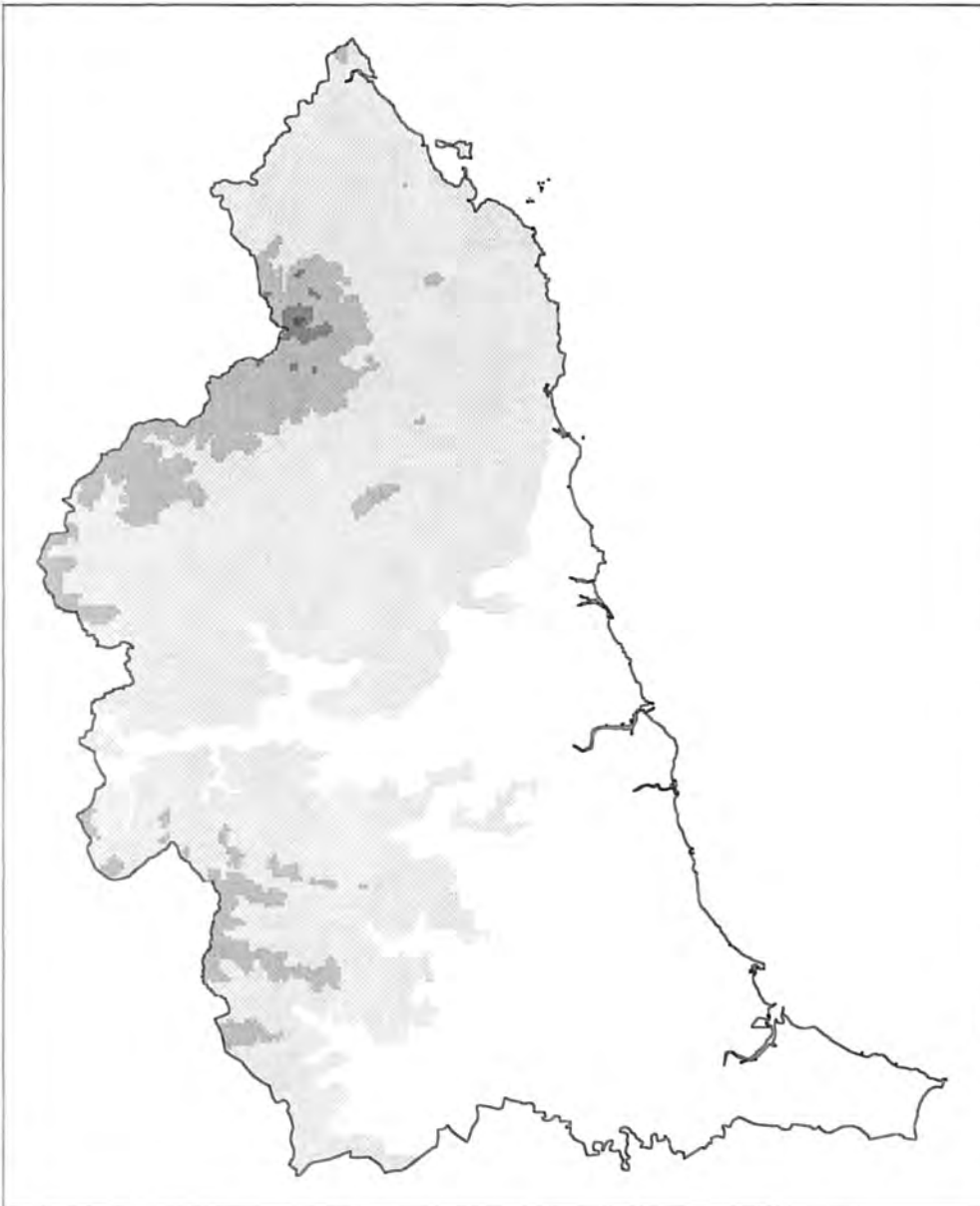
Herbs

cal. AD 70 – 500

Pollen values expressed as %tdlp.

Figure 7.4.24 Interpolated pollen map of Ericaceae pollen values for the Roman period, cal. AD 70 - 500.

High Ericaceae values appear in other parts of the region in this period other than the Northern Pennines and uplands of Northumberland, and increase at many sites in these areas. The marked decline in trees at sites in the upper Derwent area is accompanied by a marked rise in Ericaceae pollen to over 30% tdlp at several sites. Similarly, the decline in trees at some sites in the Tyne Corridor (Fellend Moss and Fortherley Moss) is accompanied by a rise in Ericaceae values to 40%. Ericaceae values also rise at several upland sites in northern Northumberland as tree and shrub levels decline, and herb pollen levels are low at these sites, in contrast to other more lowland sites in northern Northumberland where herb pollen values rise to very high levels. These sites include Broad Moss, Black Lough, Camp Hill Moss and Trickle Wood. In the uplands of the Northern Pennines Ericaceae values rise further in this period up to 69% in places.



Key:

- 0 - 20%
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100%



Ericaceae

cal. AD 70 - 500






Pollen values expressed as %tdlp.

Figure 7.4.25 Interpolated pollen map of agricultural: arable index scores for the Roman period, cal. AD 70 - 500.

As in the previous period, the highest, most arable, scores occur in the eastern lowlands of the region. Values for both arable and pastoral herb taxa increase at many sites in the region in this period, and the proportions vary between sites, so that at some sites in the lowlands of the south east of the region pastoral types remain predominant (on the East Durham Plateau at Hutton Henry) whilst at others, such as Mordon Carr, between the plateau and the Tees, the proportion of arable types increases markedly to give an index score of 82%. In Weardale at Steward Shield Meadow and Bollihope Bog, the proportion of arable types rises, although pastoral types also rise in value. In northern Northumberland a high arable score appears at Edlingham (89%) due to a marked rise in arable type taxa at this site. However, at other sites in this area pastoral types increase in this period resulting in very low index scores. Arable types are absent from most sites in the Tyne Corridor with the exception of Fellend Moss and Vindolanda. In the uplands pastoral types predominate, although at some sites in upper Teesdale the index rises as arable types increase.



Key:

-  0 - 10%
-  10 - 20%
-  20 - 30%
-  30 - 40%
-  40 - 50%
-  > 50%

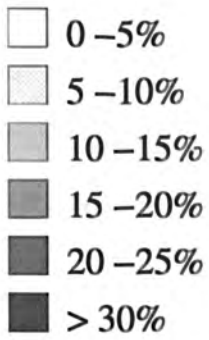
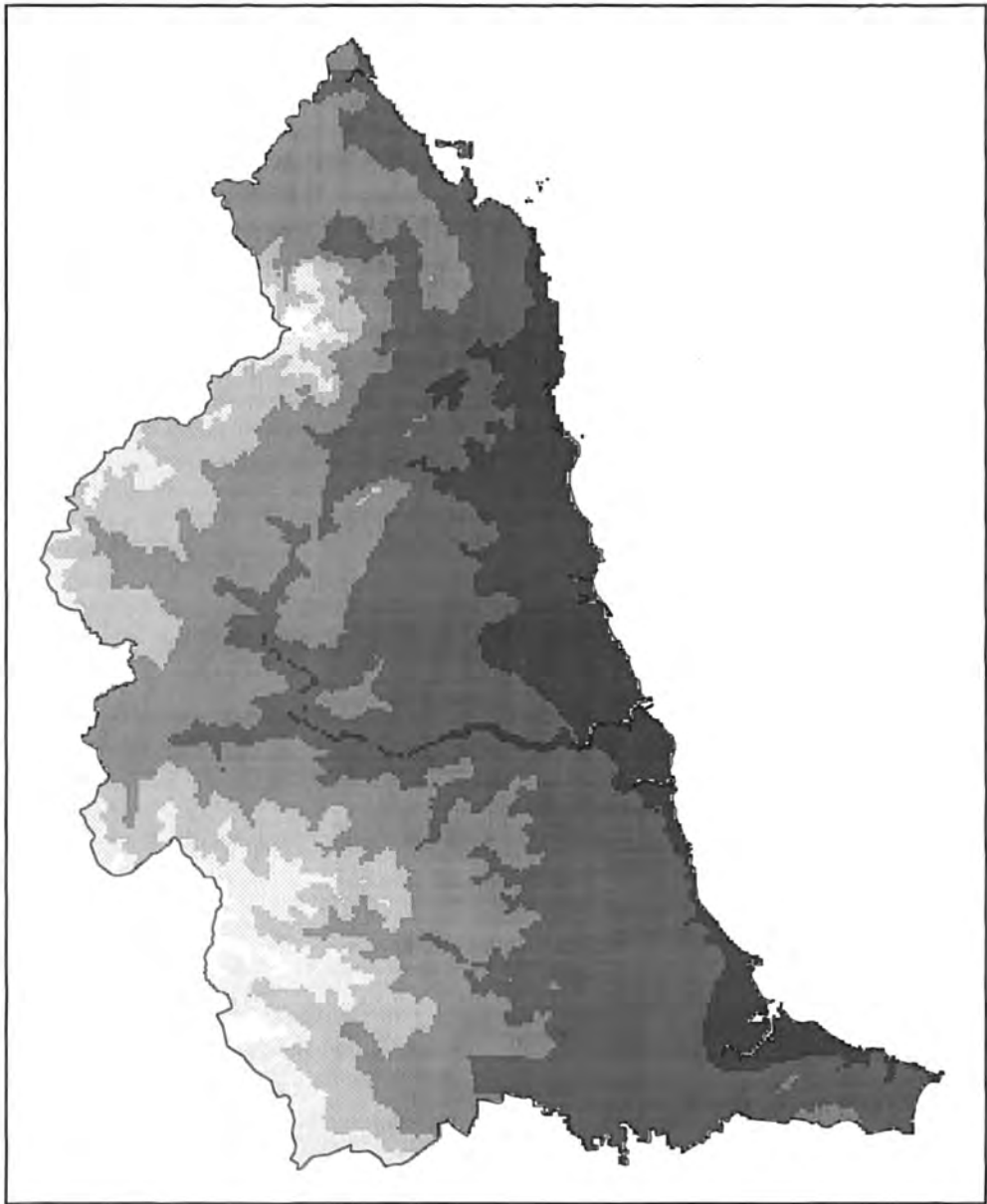


Agricultural:Arable Index

cal. AD 70 - 500

Figure 7.4.26 Interpolated pollen map of Gramineae pollen values for the Roman period, cal. AD 70 - 500.

Values for Gramineae increase markedly at many sites in the south east of the region and in the lowlands of northern Northumberland compared to the previous period (Fig. 7.4.5) and high values also appear at sites in the Tyne Corridor and in Weardale. In this period, values rise to 49% tdlp at Edlingham in northern Northumberland, with values over 10% at other sites, but low values at upland sites in the area that are dominated by Ericaceae. Further south, grass values increase at Steng Moss to 17% and occur at very high values of 43% at Vindolanda, and at other sites in the Tyne Corridor grass pollen levels exceed 14% (at Fellend Moss and Fortherley Moss). In Weardale, at Steward Shield Meadow and Bollihope Bog, high grass values of 25% and 20% respectively occur and a value of 17% occurs at the formerly tree dominated Weardale site of Hallowell Moss. In the south east of the region grass values rise to 24% at Bishop Middleham, 34% at Hutton Henry, 25% at Mordon Carr and 30% on the coast. In the uplands, grass pollen levels generally remain under 10%.



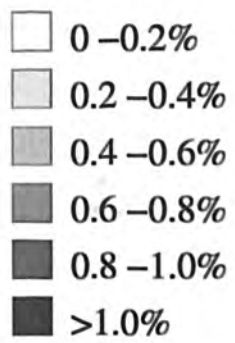
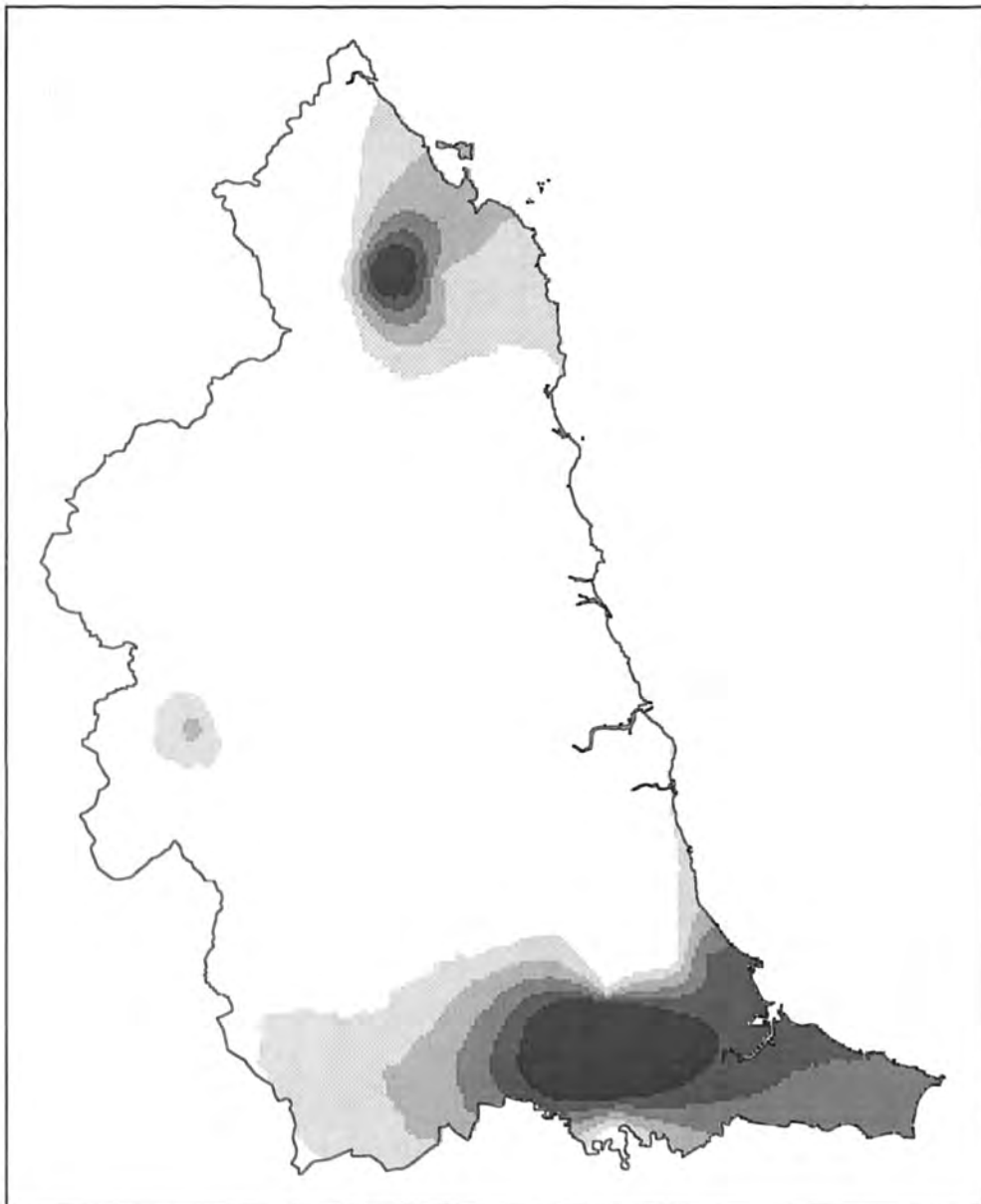
Gramineae

cal. AD 70 – 500

Pollen values expressed as %tdlp

Figure 7.4.27 Interpolated pollen map of *Cerealia*-type pollen values for the Roman period, cal. AD 70 - 500.

Very high values of *Cerealia*-type pollen appear in this period at Mordon Carr in the south east of the region (3% tdlp) and high values over 0.7% occur at Thorpe Bulmer and on the coast, but not at Hutton Henry, where it is absent. A high value of 1.6% occurs at Trickle Wood in northern Northumberland and a value of 0.3% at Camp Hill Moss. *Cerealia*-type also occurs at Vindolanda (0.4%) in the Tyne Corridor and appears at Hallowell Moss in Weardale for the first time.



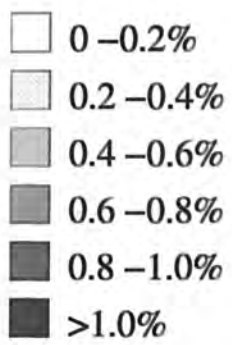
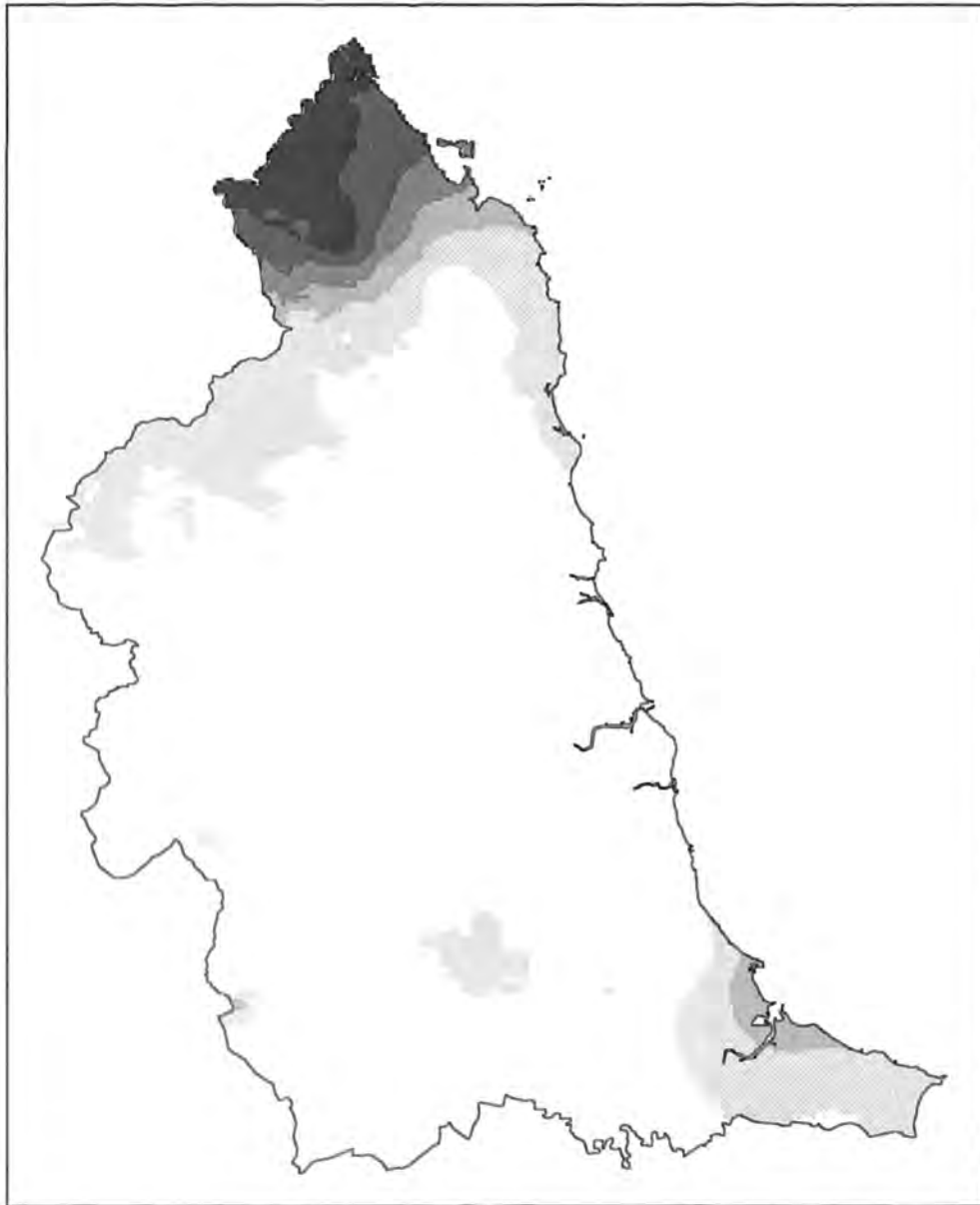
Cerealia-type

cal. AD 70 -500

Pollen values expressed as %tdlp

Figure 7.4.28 Interpolated pollen map of *Artemisia* pollen values for the Roman period, cal. AD 70 - 500.

The highest values of *Artemisia* occur in this period not in the south east of the region, as before, but in northern Northumberland, rising to 1.1% tdlp at Akeld Steads and occurring between 0.1-0.4 at other sites in this area. Values up to 0.5% continue to occur in the south east of the region, with lower values in the uplands and in the Tyne Corridor.



Artemisia

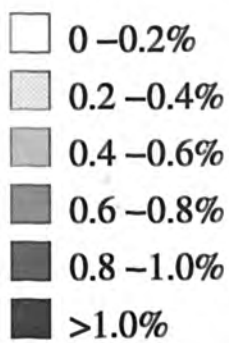
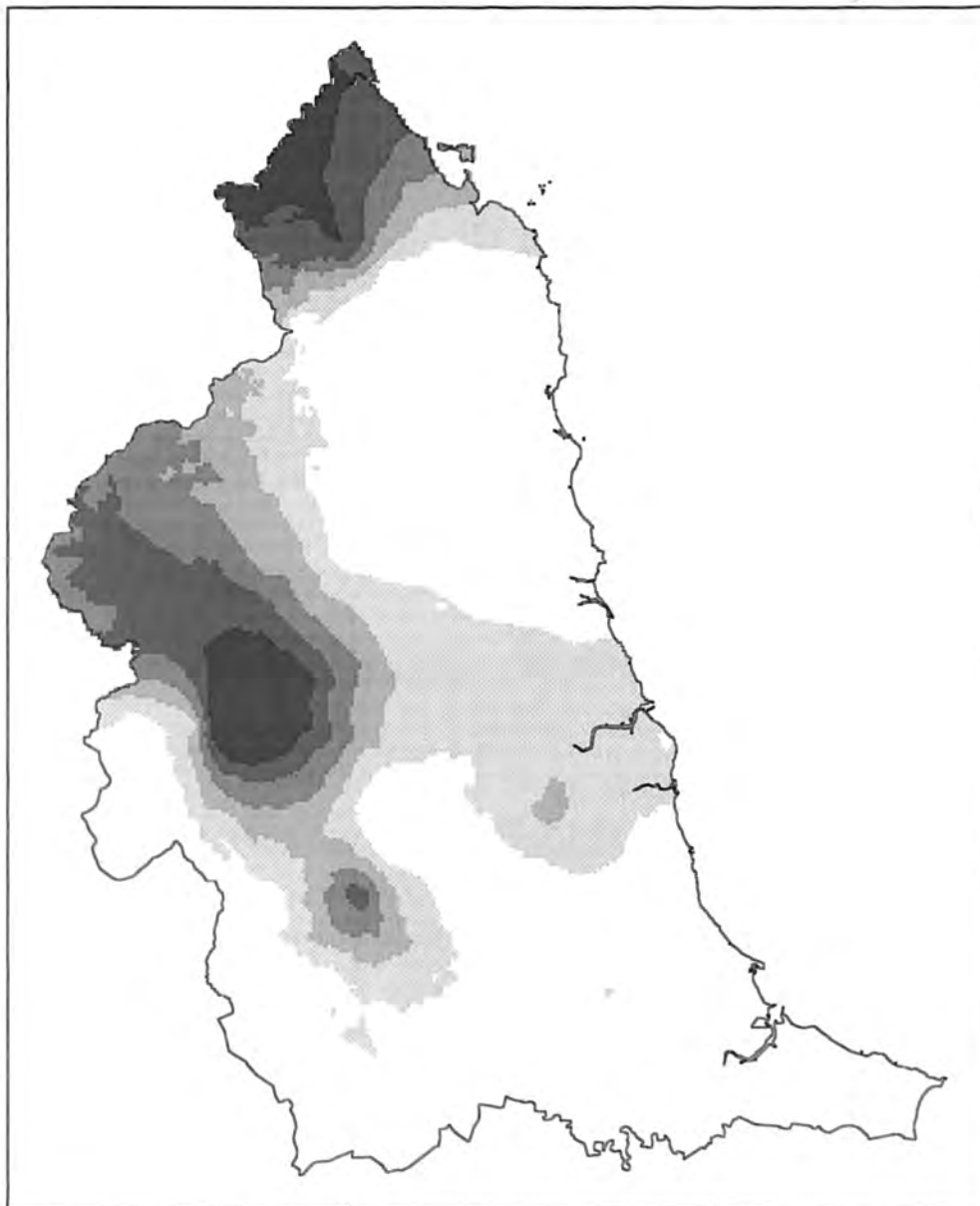
cal. AD 70 – 500

Pollen values expressed as %tdlp



Figure 7.4.29 Interpolated pollen map of Caryophyllaceae pollen values for the Roman period, cal. AD 70 - 500.

As in the previous period, the highest values for Caryophyllaceae occur in the north and west of Northumberland, but in this period values increase markedly at several sites in these areas, rising to 1% at Akeld Steads, 1.8% at Muckle Moss in the west of the Tyne Corridor and 0.8% at Coom Rigg to the north. It also occurs at lower values at other sites in the Tyne Corridor area. A high value of 0.9% also occurs at Steward Shield Meadow in Weardale. In the south east of the region, it only occurs in small values at Bishop Middleham and is largely absent from the rest of the region.



Caryophyllaceae

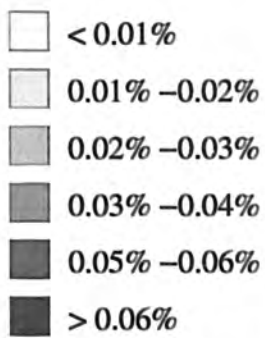
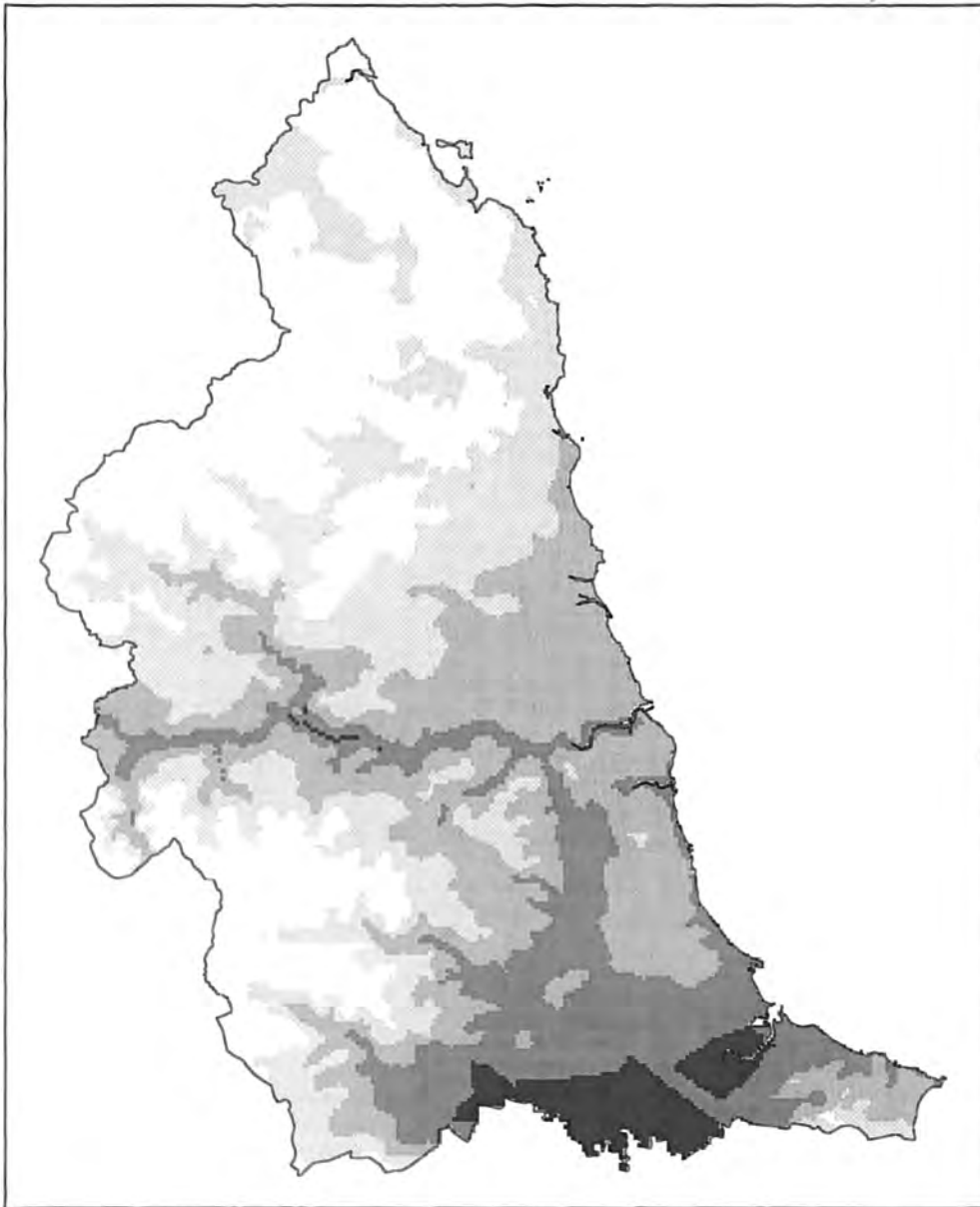
cal. AD 70 -500

Pollen values expressed as %tdlp



Figure 7.4.30 Interpolated pollen map of *Centaurea* pollen values for the Roman period, cal. AD 70 - 500.

As before, the highest values for *Centaurea* occur in this period in the south east of the region, but with the appearance of high values at a couple of sites, rising to 0.2% at Bishop Middleham and 0.1% at Stanley Moss to the west, and at smaller values at Thorpe Bulmer. Apart from this it occurs at Bollihope Bog in Weardale and appears at a couple of sites in the Tyne Corridor: Vindolanda and Fellend Moss.



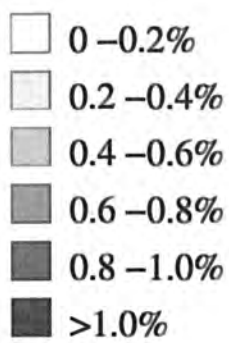
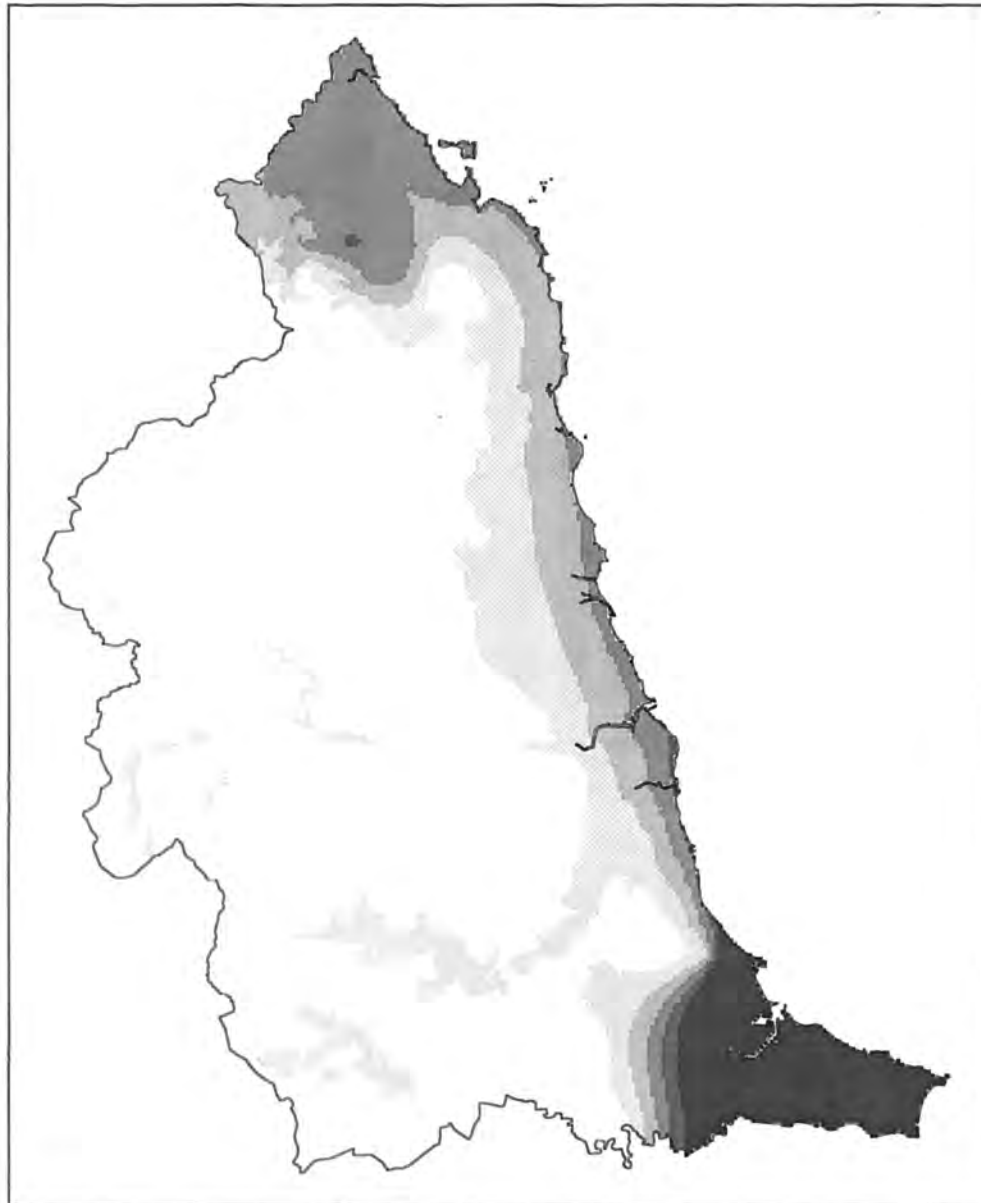
Centaurea

cal. AD 70 - 500

Pollen values expressed as %tdlp

Figure 7.4.31 Interpolated pollen map of Chenopodiaceae pollen values for the Roman period, cal. AD 70 - 500.

Chenopodiaceae continues to occur, as in the previous period, in high values in the south east of the region and also at sites in northern Northumberland, but in this period values increase considerably at one site in the south east of the region, rising to 3.4% tdlp on the coast at Hartlepool. Lower values of 0.1-0.3% continue to occur at sites in this area. High values up to 0.6% occur at Trickle Wood and 0.8% at Akeld Steads in northern Northumberland and smaller values of 0.1-0.3% occur in the Tyne Corridor area.



Chenopodiaceae

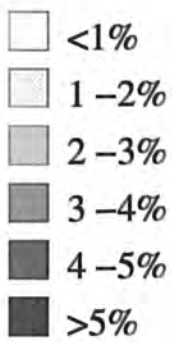
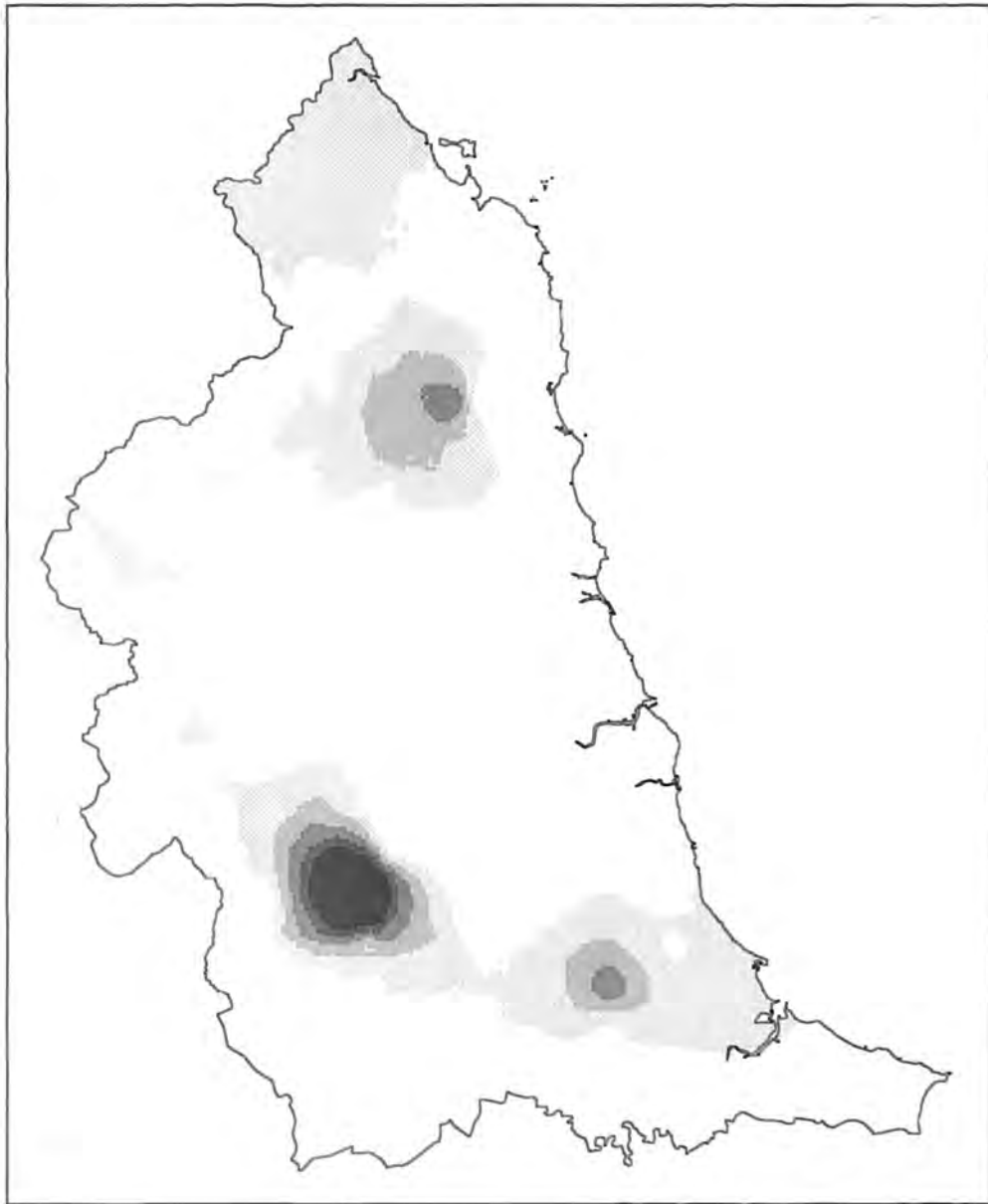
cal. AD 70 -500

Pollen values expressed as %tdlp



Figure 7.4.32 Interpolated pollen map of Compositae pollen values for the Roman period, cal. AD 70 - 500.

High values of Compositae continue to occur, from the previous period, in the south east of the region (with values of 1-3% tdlp being common at most sites in this area) and in northern Northumberland (1.8% at Akeld Steads and up to 4% at Edlingham), with lower values up to 0.7% appearing at sites in the Tyne Corridor. The highest value for this period by far appears at Steward Shield Meadow (12%) with a high value also occurring at the nearby Bollihope Bog (2.3%).



Compositae

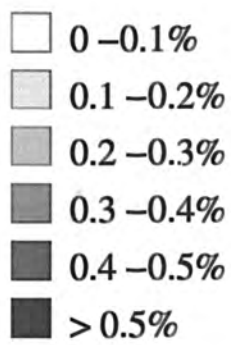
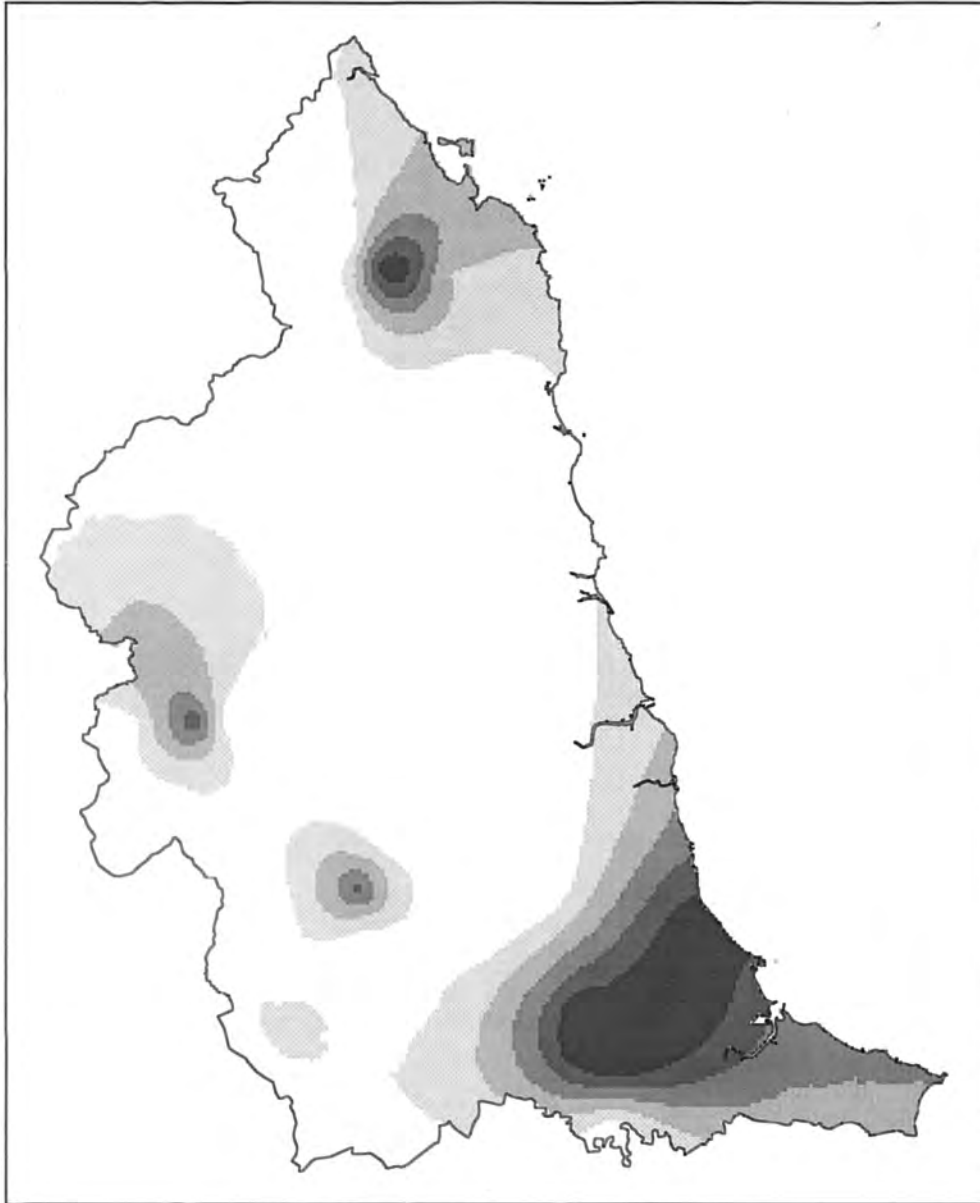
cal. AD 70 -500

Pollen values expressed as %tdlp



Figure 7.4.33 Interpolated pollen map of Cruciferae pollen values for the Roman period, cal. AD 70 - 500.

High values for Cruciferae continue to occur at the same sites as in the previous period (Fig. 7.1.14), with a further increase in this period, up to 0.9% tdlp at Mordon Carr, 0.7% at Thorpe Bulmer and 0.5% at Bishop Middleham and Hutton Henry in the south east of the region. In the north of Northumberland values rise at Trickle Wood to 0.4%. A value of 0.4% occurs at Steward Shield Meadow and in the Tyne Corridor a value of 0.4% occurs at Vindolanda and to the north a value of 0.2% occurs at Coom Rigg Moss.



Cruciferae

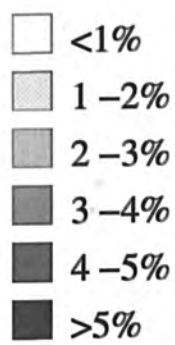
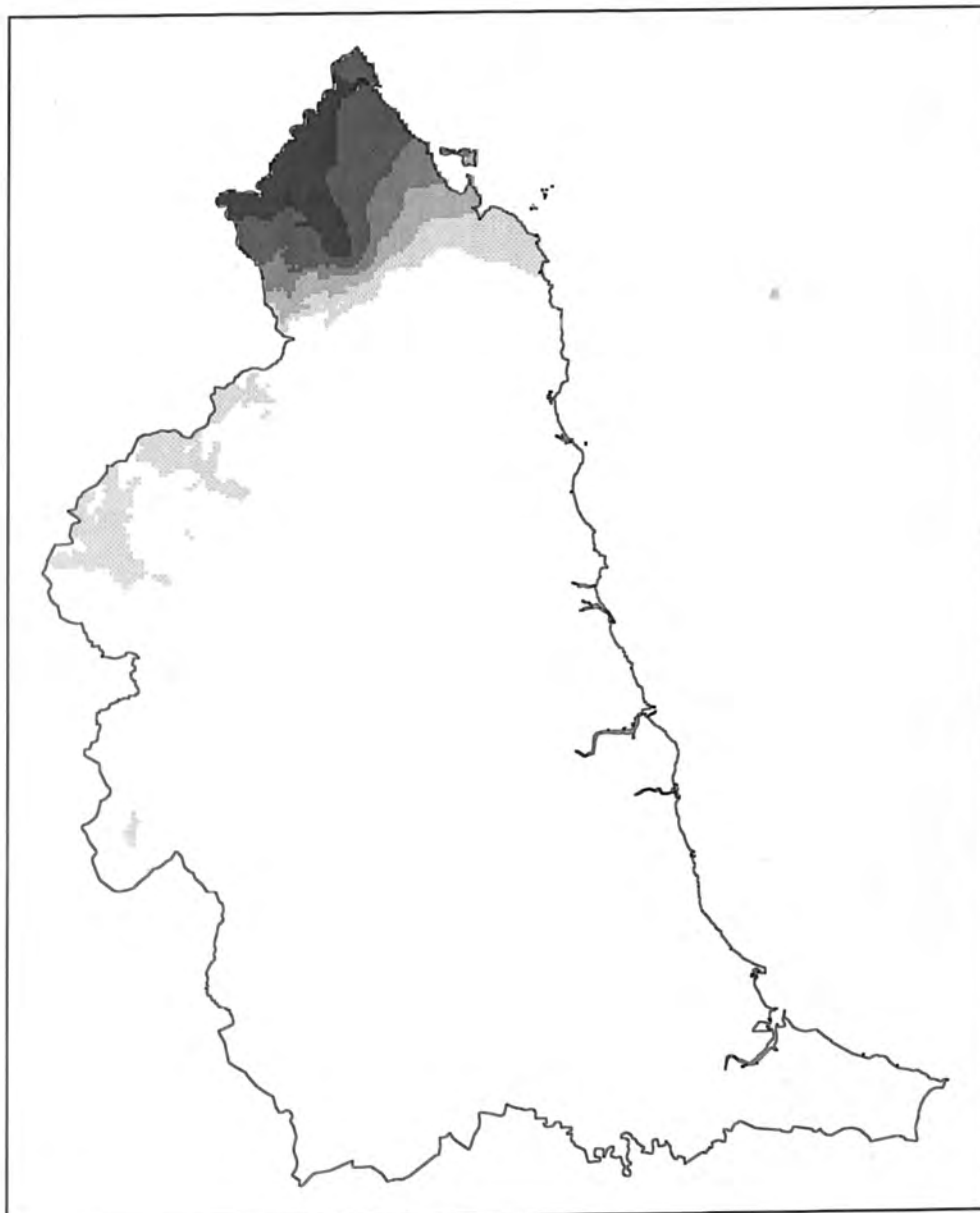
cal. AD 70 - 500

Pollen values expressed as %tdlp



Figure 7.4.34 Interpolated pollen map of Leguminosae pollen values for the Roman period, cal. AD 70 - 500.

As in the previous period, the highest Leguminosae pollen values occur in the north of the region, at Akeld Steads, in this period increasing further to 5.4% tdlp. Lower values around 0.2-0.5% occur in the Tyne Corridor and surrounding areas and one value of 0.3% occurs at Bishop Middleham in the south east of the region.



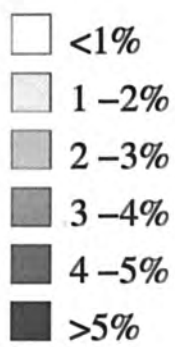
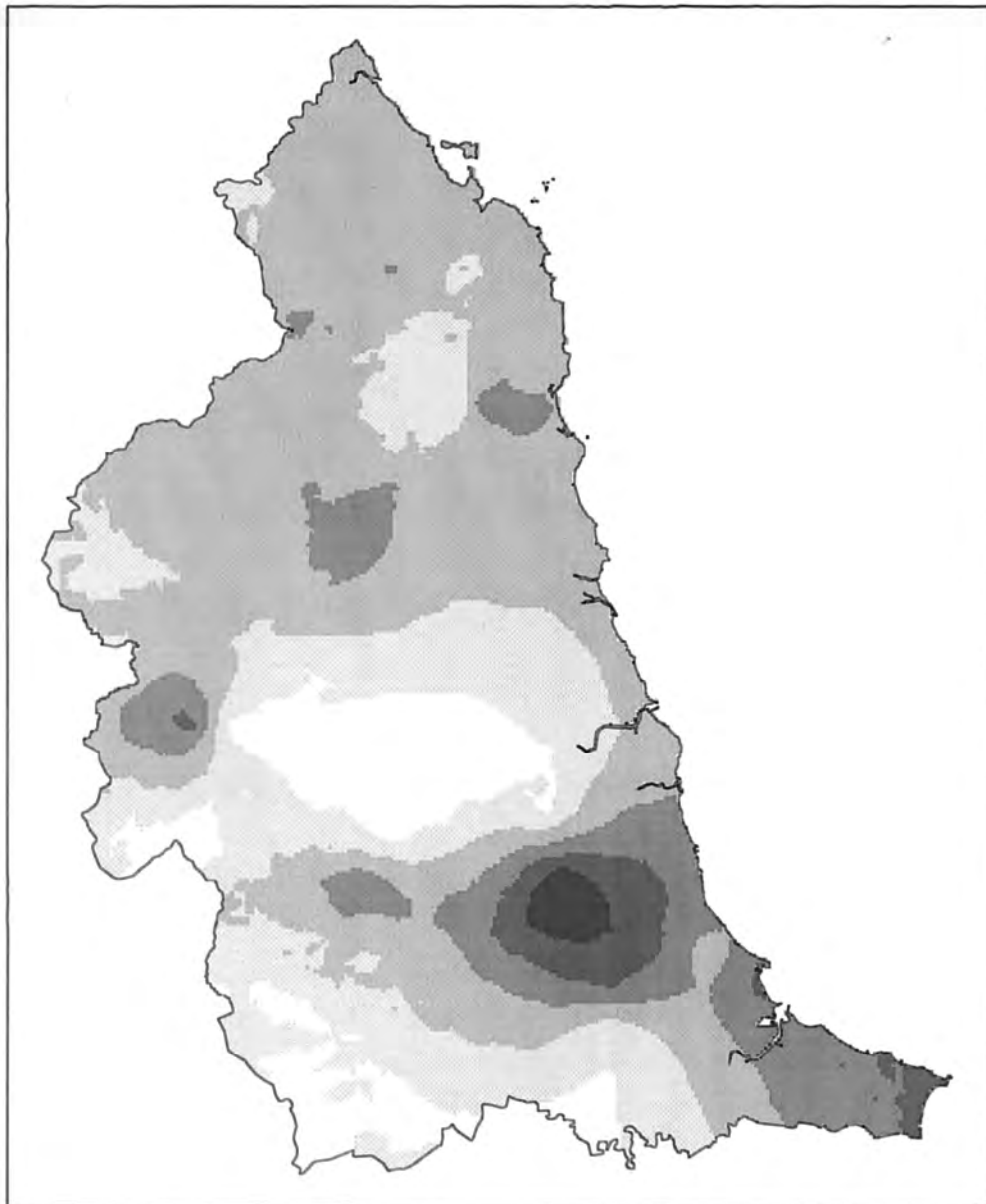
Leguminosae

cal. AD 70 -500

Pollen values expressed as %tdlp

Figure 7.4.35 Interpolated pollen map of *Plantago* pollen values for the Roman period, cal. AD 70 - 500.

Some of the highest *Plantago* values in this period, as in the previous period, occur in the south east of the region, but in this period particularly high values of *Plantago* occur at Hallowell Moss, where tree pollen levels have declined markedly (*Plantago* here lies at 7% tdlp). Other high values up to 5% occur in northern Northumberland at Akeld Steads and Trickle Wood and at a couple of sites in the Tyne Corridor at Vindolanda and Fellend Moss, with slightly lower values at Coom Rigg. Values up to 4% also occur in the south east of the region at Bishop Middleham and Hutton Henry, but are far lower at Mordon Carr and Thorpe Bulmer.



Plantago

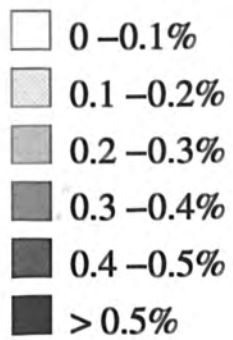
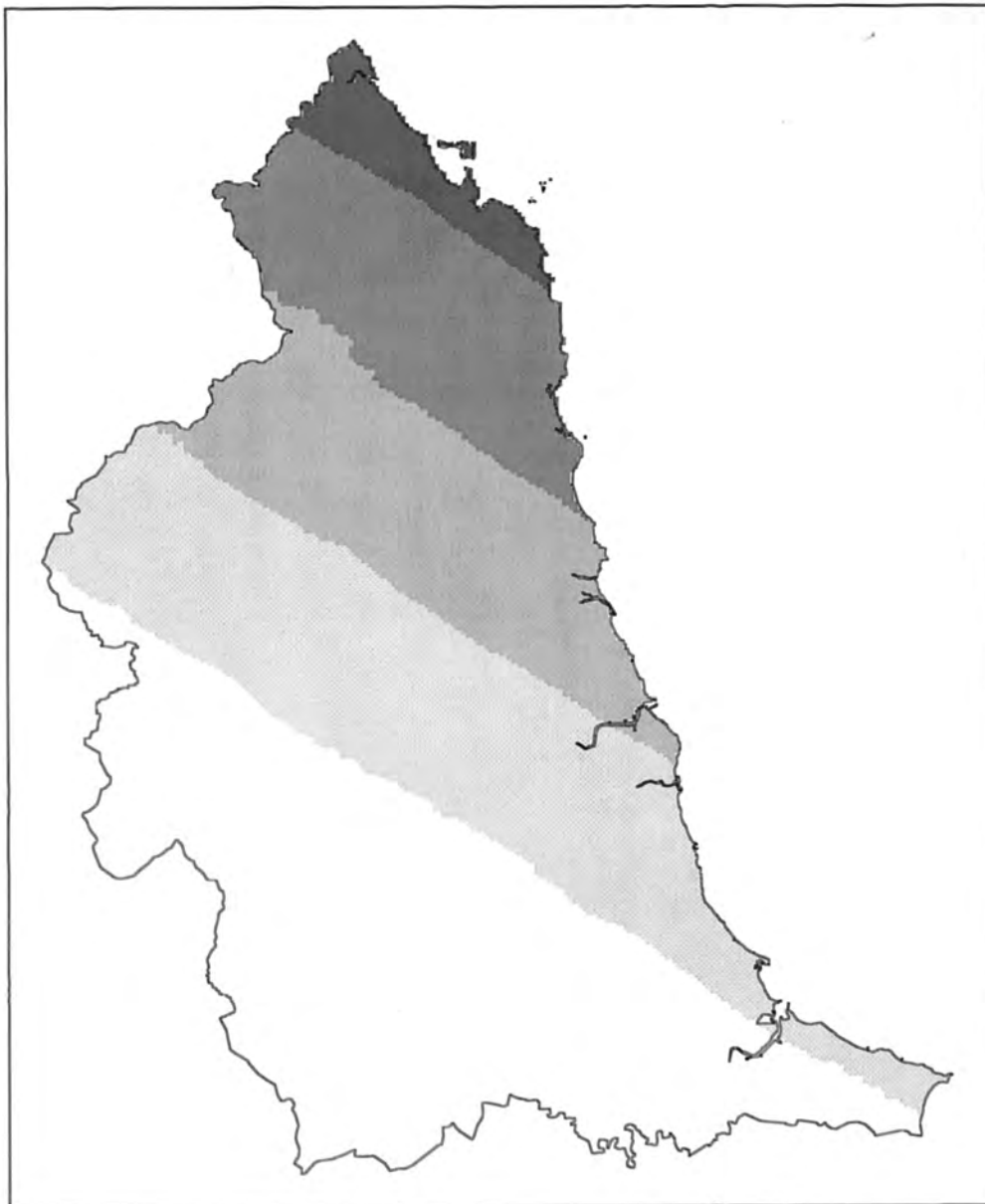
cal. AD 70 -500

Pollen values expressed as %tdlp



Figure 7.4.36 Interpolated pollen map of *Polygonum* pollen values for the Roman period, cal. AD 70 - 500.

As in the previous period, the highest values for *Polygonum* again occur in the north of the region, rising in this period to 1.2% at Edlingham and 0.8% at Trickle Wood and occurring at lower levels around 0.2% at Akeld Steads and Black Lough. Smaller values under 0.1% occur in the south east of the region at Thorpe Bulmer.



Polygonum

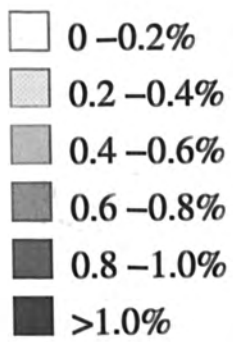
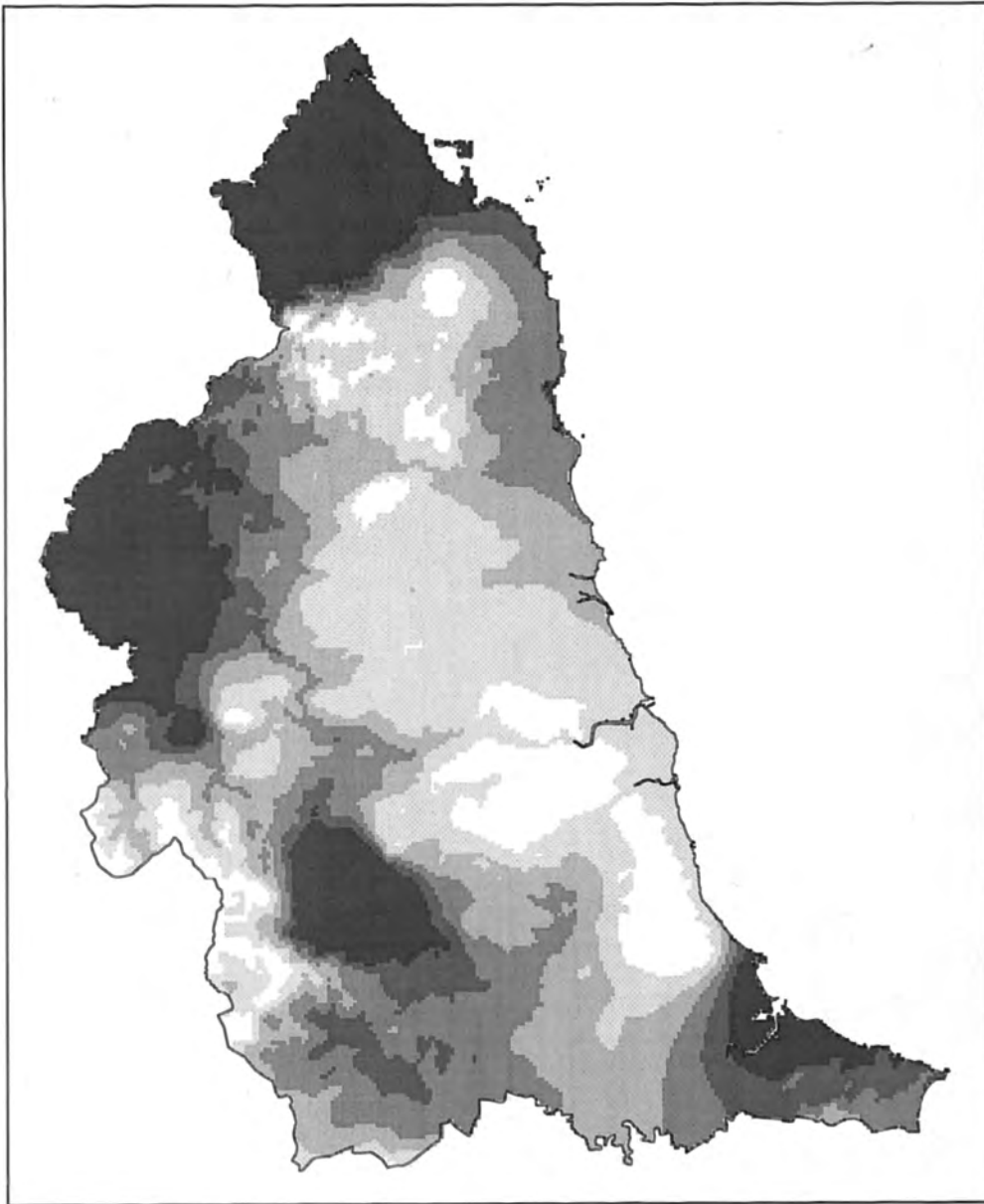
cal. AD 70 – 500

Pollen values expressed as %tdlp



Figure 7.4.37 Interpolated pollen map of Ranunculaceae pollen values for the Roman period, cal. AD 70 - 500.

High values in this period continue to occur in the north of Northumberland, in the west of Northumberland and at Steward Shield Meadow in Weardale, as well as occurring in the south east of the region in this period at higher values. Values increase at many sites in this period, with the highest values occurring at Steward Shield Meadow (4% tdlp), Akeld Steads (2.5%), Coom Rigg (1.6%) and Vindolanda (1.5%). A value of 1.5% also occurs on the coast at Hartlepool, although lower values occur at other sites in the south east of the region, ranging from 0.3-0.4%. Values up to 0.6% occur at sites in upper Teesdale. Ranunculaceae occur at virtually all sites in the region in this period.



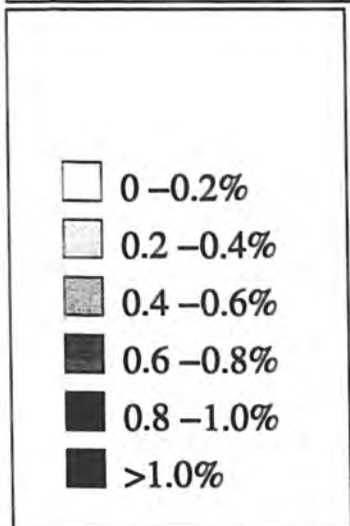
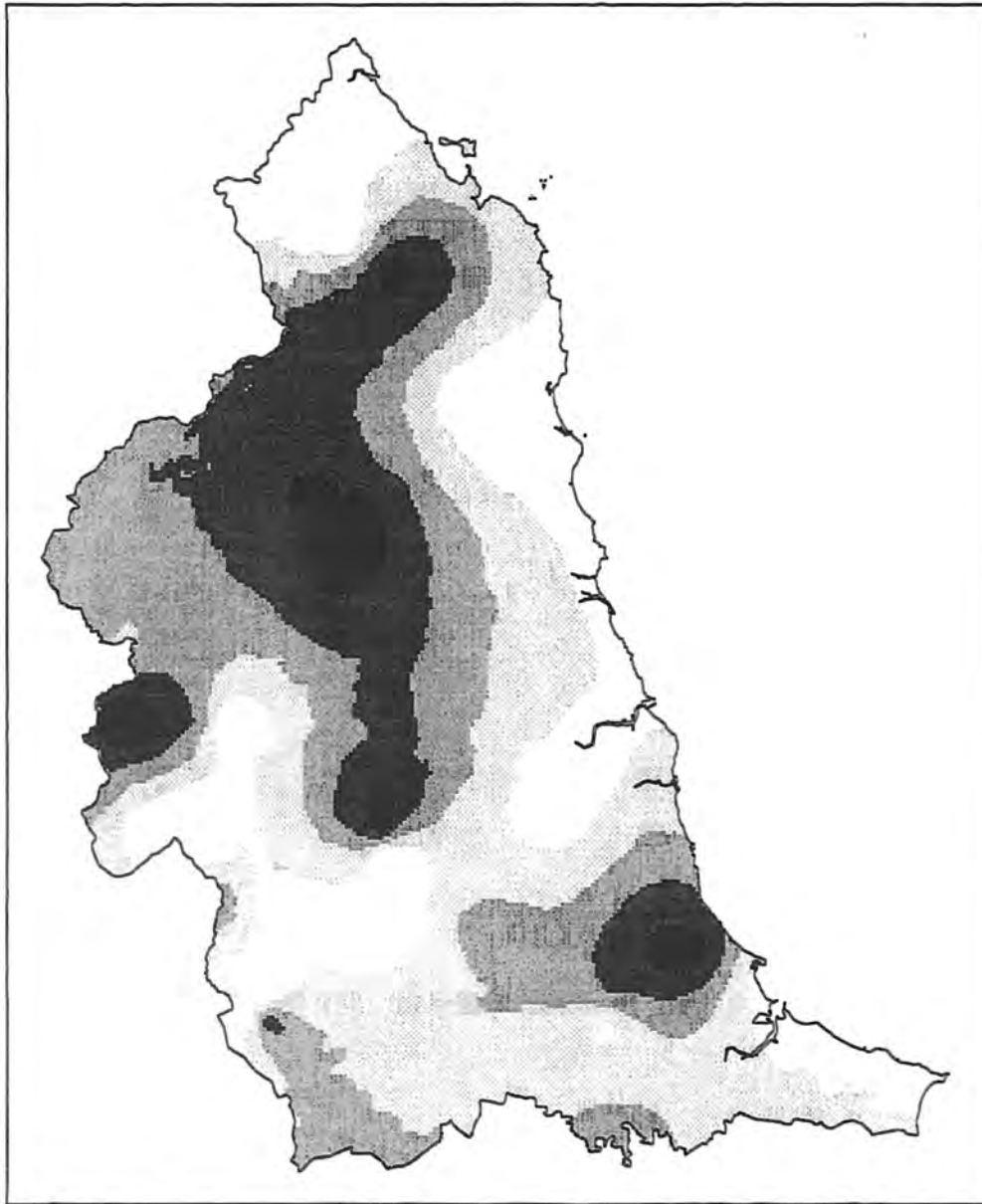
Ranunculaceae

cal. AD 70 - 500

Pollen values expressed as %tdlp

Figure 7.4.38 Interpolated pollen map of *Rumex* pollen values for the Roman period, cal. AD 70 - 500.

There is a marked increase in *Rumex* values at several sites across the region, including sites across Northumberland and in the south east of the region. The highest values occur at Fellend Moss in the Tyne Corridor (with slightly lower values of 0.6% tdlp at Vindolanda and 0.8% at Fortherley Wood) and at Steng Moss to the north, both of which have *Rumex* values over 1% tdlp. High values also occur at several sites in the north of Northumberland; at Trickle Wood (0.9%), Broad Moss (0.7%) and Camp Hill Moss (0.6%). In the south east of the region, *Rumex* values between 0.6-0.9% occur at Bishop Middleham, Hutton Henry and Thorpe Bulmer, but not at Mordon Carr. Lower values occur in the uplands of the Northern Pennines.



Rumex

cal. AD 70 - 500

Pollen values expressed as %tdlp

