UNSTRUCTURED DATA AND ARCHAEOLOGY: THE USE OF LARGE DATASETS IN ARCHAEOLOGICAL RESEARCH

by

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ABSTRACT

This thesis demonstrates the utility of unstructured data for archaeological research using the example of the Portable Antiquities Scheme (PAS). The aim was achieved using a two-part methodology. Firstly, the *longue durée* was assessed using the whole dataset and key periods of difference from overall trends identified.

Secondly, the data were reduced to a case study period, building pn previous work by going beyond distribution maps and analysis of settlement patterns. The greater statistical power of such a large dataset was exploited using analysis of categories of finds to determine whether there were statistically significant differences in the make-up of finds assemblages.

Overall, the research demonstrated the utility of PAS data and its usefulness in terms of the *long durée* and nationwide trends. It also demonstrated that the data can provide coarse-grained analysis of a period and a broad overview of regionality. Limitations were identified, namely that a lack of secure dating, specific artifact type identification and association with other archaeological material hinder the ability to conduct detailed analysis. As the data is used on more micro-levels, the limitations on the data become more prevalent.

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1 INTRODUCTION

1.1 Unstructured data and archaeology

All archaeology comprises the analysis of various kinds of data, predominantly material culture data of some kind. One of the main features of large, unstructured databases is their sheer size and the number of entries within them. Study of artefact types and their distributions in order to tell us something about peoples in the past requires a multidisciplinary approach. This includes drawing from anthropology, art history and, in the case of large, unstructured datasets, mathematics. The increase in archaeological data, both from excavations and finds recovered by members of the public, can present a problem of how best to study and use the data but also an opportunity to make use of vast volumes of data.

The greater the number of rows in any given dataset, the greater the statistical power (Breur 2016: 61). This means that statistics become a key tool in the analysis of such databases, particularly on a nationwide scale. Neumaier (2001: vii) discussed the importance of statistics, stating that since the advent of computing, numerical analysis has become an increasingly important link between mathematics and its application in science or technology. This means that the use of computer technology is a key component of dealing with large quantities of data and applying the use of mathematics and statistics to, in this case, archaeology. Cohen (2005: 17) also emphasises the importance of data, stating that 'we live in a world of numbers'.

The use of statistics has also become important in archaeology, particularly with the increasing size of computer-based datasets such as the Portable Antiquities Scheme (PAS), Historic Environment

Records (HERs) and museum records. Such databases could be deemed to be 'big data', a term popularised by John Mashey in the 1990s when he presented a paper entitled 'Big Data and the Next Wave of Infrastress' at a USENIX meeting (Press 2013).

Big data is associated with three main concepts: volume, variety and velocity (Laney 2001). Volume refers to the data size, which for computer-based archaeology datasets is large and getting larger all the time. Variety refers to the different kinds of data sources. For instance, PAS finds come from a wide geographic area and are 'found while carrying out a wide range of activities including metal-detecting' (Portable Antiquities Scheme 2018d). Velocity refers to the speed of change of the data. The PAS database is being updated all the time. An archive of daily records is kept by the PAS and shows that, for instance, on Thursday 04 January 2018, 154 records were created (Portable Antiquities Scheme 2018e).

Prior to the existence of the PAS, finds discovered by members of the public went largely unrecorded and were lost to archaeologists. In 1996 the Treasure Act was passed and, as part of the discussions, the then Department of National Heritage (DNH) discussed the issue of non-treasure finds. The DNH sought opinions from archaeologists and metal detectorists and it was deemed that recording all archaeological material was important (Portable Antiquities Scheme 2018a). Thus, the PAS began with the initial issue of protecting treasure finds and grew from a programme of six pilot schemes to the current national database (Bland 2010). The PAS records archaeological finds made and reported by members of the public in England and Wales. This is a vast and growing body of data with immense potential for use by archaeologists. Its value as a source of data was hugely increased when the national database was established in 2003.

Vast amounts of material culture are recovered by members of the public, particularly metal detectorists. High profile recent finds such as the Staffordshire Hoard (PAS ref: WMID-399670) and the Leekfrith Torcs (PAS ref: WMID-FD08D9) have raised the profile of metal detecting and in 2016 a record number of new Treasure finds were made by members of the public (Lewis 2017). Leslie Webster (2012: 123) described even the preliminary research of the Staffordshire Hoard as 'beginning to question some of our conventional views of art and society in the seventh century'. At the most fundamental level, without the work of the PAS such finds simply would not be available for study by archaeologists. These finds do, however, generally lack context. It is important to note here that by context archaeologists generally mean a reliable stratigraphic context, its associations and provenance and the circumstances surrounding the deposition of the artefact. This is the sense in which the term is used here unless indicated otherwise. The issue of context with regard to PAS data will be discussed in more detail in Chapter Two.

1.2 Aim and objectives

The overarching aim of this thesis is to assess the utility of large unstructured datasets such as the PAS in archaeological research. The aim is important because the data are being recorded and kept by schemes which are publicly funded. For example, the PAS is funded by the Department for Digital, Culture, Media and Sport (DCMS) and run by the British Museum. The name of the DCMS was changed to include Digital in 2017 in a move intended to reflect the growing importance of digital data including telecommunications, data protection and media (Bradley 2017). The scheme relies on being perceived as an important and useful resource in order to secure funding, particularly in times of cuts across the board. The Portable Antiquities Scheme (2018c) reported that 'The considerable goodwill towards PAS from across the partnership has clearly been critical in ensuring that the Scheme has survived to date in the context of ongoing flat core funding and partner financial

constraints. Without this regard and goodwill, PAS would not have survived into 2018 in its current format, if at all.' The PAS engaged DC Research to review the PAS Partnership model in 2017 and many respondents at the PAS believed that 'centralised core funding' was a requirement in securing the future of the scheme. Given that the 'goodwill' and view of the PAS as succeeding in its aims is seen as key to ongoing funding of the scheme, it seems reasonable to conclude that the PAS needs to demonstrate its usefulness in securing future funding from the government and other sources such as the Heritage Lottery Fund (HLF).

If the data are not useful, as has been stated by archaeologists such as Webb (2011) and Barford (2016), then why continue to record finds made by members of the public? The PAS represents the single largest source of material culture data in England and Wales but it has different requirements for use than traditional excavated data. Therefore, it is important to demonstrate both the utility of the data and how it can best be used in order to secure future funding for such schemes. It can also demonstrate new ways of studying material culture data in a manner that uses archaeological material on a nationwide level with easily accessible sources of information.

This research aimed to show how and in what ways unstructured material culture data which has been recovered by members of the public can be useful for archaeological study. This is in contrast to perceptions among some archaeologists (see Webb 2011 and Barford 2016) who exclude such data.

The research was divided into two main objectives which formed the steps taken to achieve the aim of assessing the utility of unstructured data. The two objectives assessed the data across macro- and micro-levels of study to determine what can and cannot be achieved with unstructured archaeological data. Archaeological data can be used to view different resolutions in time and space. Nationwide, long-term trends use the *longue durée* approach, concentrating on slowly evolving social

structures on a macro-level. This provided a baseline for the micro-level study. The data were narrowed down by period and specific cultural questions designed to determine if unstructured data could be used in this way.

1.2.1 Objective One – What can unstructured data be used for? How can it be used on a macro-level or nationwide scale?

Unstructured data require their own methodology for use. The thesis sets out a methodological framework for using large unstructured datasets of material culture. This will necessarily incorporate methodologies from several previous studies.

There are several research projects which utilise large databases of archaeological material. Often these are focused on investigating landscape or settlement changes across a given area. For example, the Viking and Anglo-Saxon Landscape and Economy (VASLE) project (Naylor and Richards 2005; Naylor 2006; Richards *et al* 2009) and the English Landscapes and Identities projects (Gosden and ten Harkel 2011; Gosden *et al* 2012, 2015; Donelly *et al* 2014), both of which use databases such as the PAS, HERs and the National Record of the Historic Environment (NRHE) to study landscape change in England.

Other studies such as those by Katherine Robbins (2013a, 2013b, 2014) and Tom Brindle (2013), asses the data on a variety of scales but suggest ways that the data in the PAS is best suited to micro-level study. Both of these used regional case studies in their initial investigation and looked more closely at micro-level trends. Brindle (2013) states that, although macro- and micro-level distributions can be studied, micro are more useful and Robbins (2014) sets out a methodology best

suited to micro-level research involving investigation into land use and re-walking of fields by metal detectorists.

1.2.2 Objective Two – What are the strengths and limitations of unstructured data? Can unstructured data be used to answer specific, cultural questions?

Many studies using PAS data map findspots in order to compare distributions. Much of this centres on studies of landscape use, for example the VASLE project, which studied the relationship between PAS finds and Viking and Anglo-Saxon settlement (Richards *et al* 2009). Many of the research projects listed on the PAS website use the data in this way. For example, of the sixteen large-scale research projects recorded to be using PAS data, nine are specifically studies of environs, landscape or settlement patterns (Portable Antiquities Scheme 2018b).

In order to determine how else unstructured databases can or cannot be used, the data were used to try and answer specific cultural questions about a particular period. This revealed the uses and shortcomings of the data by attempting to go beyond artefact distribution maps and study unstructured data on a more micro- or cultural level.

The idea of artefacts as indicators of identity and culture has been touched on above. A key question here is whether large, unstructured datasets can answer any meaningful questions on a cultural level. Can analysis of such datasets go beyond finds distributions in order to answer questions about past culture and society?

Differences in the type of material culture in a given society still exist today. Division can be along the lines of indigenous peoples and relative newcomers to a country. For instance, Australian Indigenous

art has a distinct style, reflecting the difference in identity between Indigenous Australians and the rest of the population. This enduring nature of Australian indigenous art was explored in a British Museum exhibition in 2015 (British Museum 2015; Sculthorpe *et al* 2015). These separate art styles that reflect separate identities continue through to the modern day. Contemporary indigenous artists provide a contrast with artists that create a more Western style of art (Figure 1.1). Can divisions along similar lines be seen in the material culture found in unstructured databases?

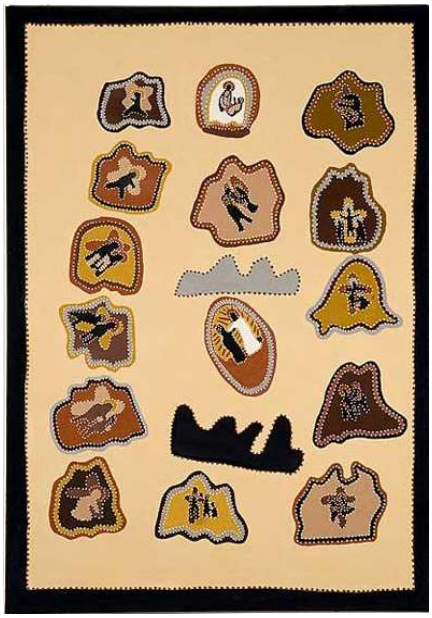
a)  b) 

Figure 1.1 a) Stations of the Cross by indigenous Australian artist, Shirley Purdey, Blake Prize Winner 2007 Copyright © Shirley Purdie 2007 b) Untitled Landscape With Figure by Euan Macleod, Blake Prize Winner 2006 Copyright © Euan Macleod 2006. Source: Blake Prize (2013).

The aim and objectives generated three main research questions to be answered:

1. To what extent are large, unstructured databases of finds a valuable tool for archaeological research?

2. If large, unstructured databases are a valuable tool then how are the data best used?

3. What are the limitations on the data?

1.3 Structure of the thesis

The research used a multi-layered approach to achieving the aim of assessing the utility of large unstructured datasets. The two objectives formed a study of PAS data on two levels. First, a macro- or nationwide level and, second, on a more micro- or cultural level. This Introduction has provided a brief overview of the research aims and how this will be achieved. Following this, Chapter Two will review the current literature in the field of data and archaeology. It will discuss the use of data in archaeology particularly with reference to large, unstructured datasets such as the PAS. Chapter Three will outline the methodology of the research and how the data have been used to address the aims and objectives of the thesis. Chapter Four will address the first objective of the thesis, that is how can unstructured data be used on a nationwide scale and what is it useful for? Chapter Five will introduce the case study period that will be used in order to address the second objective. In order to determine whether or not the data can be used to answer specific, cultural questions it is necessary to reduce the data to a particular period. Chapter Six will outline the results of the second aspect of the research on a micro-level, using statistical analysis of unstructured data to try and answer questions about a given period and specific cultures. Chapter Seven will discuss the results and their implications on the use of unstructured data on a variety of scales. It will also use the data to try and answer the cultural questions set out in Chapter Five. This will determine how useful the data are for this type of approach. Finally, Chapter Eight will draw conclusions and answer the research questions posed above before addressing the overarching aim of the thesis; how useful large unstructured datasets such as the PAS are to archaeologists.

2 LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the aims and objectives of the research in studying the use of big or unstructured data in archaeology. In order to assess the use of large amounts of unstructured data for archaeological research, it is necessary to have an understanding of current literature in the field. This chapter discusses the role of data in archaeological studies. This will comprise assessment of the role of finds data in archaeology and the importance of context when using large amounts of material culture data. It is important to understand current literature in the field in order to construct a methodology to achieve the aim of assessing the utility of large unstructured datasets such as the PAS.

2.2 Data and archaeology

The use of data is a fundamental aspect of archaeology, even at the most basic level. All archaeology produces data which is then compiled and analysed to produce conclusions. This is particularly true since the advent of processual archaeology in the 1960s which sought to use scientific methods, the testing of hypotheses and a quantitative approach to data (Trigger 1996: 295). Processual archaeologists subscribe to Leslie White's (1959: 8) theory of exosomatic culture. That is, the study of cultural change as taking place outside the body in response to environmental change. In 1968, two of the most influential processual archaeology works were published. Sally and Lewis Binford's *New Perspectives in Archaeology* comprises sixteen articles by Binford and his colleagues arguing for a scientific approach with conclusions based on a framework and logical argument (Binford and Binford 1968). In Britain, the work of David Clarke typified the processual approach. His work, *Analytical Archaeology* (1968) both demonstrated the importance of sophisticated quantitative

analysis using new computer technology and rejected the link between archaeology and history. Clarke stated that 'archaeology is archaeology, is archaeology' (1968: 13). In other words, archaeology is a discipline in its own right, divorced from history, which utilises data to achieve its aims.

Post-processualism emerged as the main criticism of processual archaeological approaches. Hodder (1982a, 1982b, 1984, 1985, 1987, 1991, 2001), who is the most prominent proponent of post-processual archaeology (alongside others such as Miller 1984; Miller and Tilley 1984; Leone 1986; Shanks and Tilley 1987) criticised processual archaeology for asserting that scientific methods could lead to objective conclusions. Post-processualist archaeology seeks to be contextual and subjective. Other criticisms are political in nature, for instance Miller (1984: 38) states that a positivist approach seeks to control what knowledge is deemed to be. Hodder (1984) asserted that archaeologists should not interpret the histories of other ethnicities, rather they should provide those groups with the ability to determine their own views of their past.

Despite objections, the key relevant contribution of processual archaeology is the quantitative and scientific analysis of archaeological data. Criticism of post-processual archaeology includes Earle and Pruecel's (1987) statement that post-processualism, whilst having some worth, was ultimately flawed as it did not construct a clear methodology. Watson and Fotiadis (1990: 615) also noted that much of the published work of post-processual archaeologists relied on historical and ethnographic information (for example Leone and Potter's 1988 study of *Historical Archaeology in the Eastern United States*).

Despite being the key proponent of post-processual archaeology and its criticisms of the positivist approach taken by processual archaeologists, Hodder (1991) recognised the importance of grounded data.

A quantitative approach to archaeological data allows easier visualisation of data and their relationships, rigorous testing of hypotheses and statistical significance tests. Cool and Baxter (2002: 365-6) described the importance of quantifying archaeological data. They argued that a distrust of statistical methods (for example see Shanks and Tilley 1992: 58; Wacher 1995: 14) prevents this type of approach. This point of view appears to be beginning to change in recent years especially in research using the PAS and other online sources (see Naylor and Richards 2005; Naylor 2006; Gosden and ten Harkel 2011; Gosden *et al* 2012; Donelly *et al* 2014; Robbins 2013a, 2013b, 2013c, 2014).

The development of computer technology has only made a quantitative approach quicker and more accessible to archaeologists. Julian Richards (2009:28) describes how standardised computer hardware and software has simplified the use of data in archaeology. In the 1980s, surveys of the use of computers in archaeological research highlighted that a variety of different software was in use (Richards 1986; Booth *et al* 1989). The dominance of Microsoft Office now means that almost all data and analysis is available for download and use by others. Stephen Shennan's textbook on *Quantifying Archaeology* (1997) attempts to explain statistics in a simple, easy to understand way for archaeologists. The existence of this and several other textbooks on the use of statistics specific to archaeology shows the growing importance to the field (Orton 1980, 2000; Baxter 2003; Drennan 2009; VanPool and Leonard 2010). These ideas could be found in a maths textbook but are considered important enough to the field that specialist textbooks for archaeologists are required.

Chapter 1.2.2 introduced some of the existing studies that use large, unstructured datasets. These often utilise a quantitative approach to archaeological data on a broad scale. The Viking and Anglo-Saxon Landscape and Economy (VASLE) project uses finds from the databases of the PAS and the Corpus of Early Medieval Coin Finds (EMC) to study English settlements in the period AD 700 - 1100 (Naylor and Richards 2005; Naylor 2006; Richards *et al* 2009). It was described by the researchers as 'the first systematic attempt' to use PAS finds to study the landscape of early Medieval England. Naylor and Richards (2005: 83) identified the growing importance of third-party data in archaeology. This is due to the growing view of fieldwork as a limited practice, time and resource pressure on doctoral research and development in techniques for data analysis.

Chapter 1.2.1 discussed the varying scales at which Katherine Robbins (2013a, 2013b, 2014) and Tom Brindle (2013, 2014) use PAS data. In particular, Robbins (2013a, 2013b, 2014) has studied the biases inherent in PAS data and ways in which these biases can be overcome. This is an example of a very recent and seminal work in the field of quantitative analysis of PAS finds for archaeological research. Robbins's (2014) thesis utilised three key case study areas rather than the entire PAS dataset. Her research is currently being expanded to a nationwide scale by a Leverhulme Trust funded research project (British Museum 2013; Robbins 2013c).

A similar study to the VASLE project is still in progress at the time of writing. The English Landscapes and Identities project (Gosden and ten Harkel 2011; Gosden *et al* 2012, 2015; Donnelly *et al* 2014), again only looks at England rather than the full extent of the PAS across England and Wales. However, in contrast to the VASLE project, it uses a much broader timescale of 1500 BC to AD 1086 (Gosden *et al* 2015) rather than studying a specific period. Much like the VASLE project's aim to provide a framework for future study and to identify site types and landscape use (Naylor 2006; Richards *et al* 2009), the English Landscapes and Identities project seeks to create a framework for

the analysis of landscape change in England over time (Gosden *et al* 2012, 2015). The project uses finds from the following sources rather than only those found by members of the public:

- The English Heritage National Record of the Historic Environment (NRHE)
- The National Mapping Programme (NMP)
- Around eighty Historic Environment Records (HERs)
- Archaeological Investigations Programmes (AIPs)
- The PAS
- The Corpus of Early Medieval Coin Finds (EMC)

The project focuses on HER and NRHE data (although it began with a focus on data from the NMP) with the PAS database only 'complementing' the other datasets with further relevant information on find types (Donelly *et* al 2014: 44-5). The methodology has been in development since 2011 (Donnelly *et al* 2014: 43) and references the work of Katherine Robbins, specifically her (2013) paper on bias in PAS finds in the methodology but not the VASLE project.

Initial conclusions about the utility of such data in archaeology suggested that objective and quantified study of the past was not possible (Donnelly *et al* 2014: 54) as has been argued by archaeologists such as Shanks (2008: 137) and Watson (2008: 33). The researchers also identified that the initial proposal of studying landscape use via the production of distribution maps was not viable. It was deemed to be too simplistic on the basis that distribution patterns more often reflect modern recovery than anything else (Donelly *et al* 2014: 54). At the point of publication of this article on the initial methodology of the English Landscapes and Identities project in 2014, some suggestions as to overcoming this factor with respect to PAS finds had already been put forward by the VASLE project (Naylor 2006; Richards *et al* 2009) and Katherine Robbins (2013a, 2013b) and similar methodologies could be implemented in the overcoming of biases inherent in HER and NRHE data.

Chris Gosden has also previously been part of a similar study which aimed to create a comprehensive database of Celtic art in the UK. The Technologies of Enchantment project used data from museum records, books, papers and the PAS (Garrow 2008: 16; Hill *et al* 2008). This then allowed the data to be quantified and studied using distribution maps and graphs to answer questions regarding stylistic diversity in Iron Age coinage (Leins 2008), the presence of distribution of Celtic art in Roman Britain (Hunter 2008) and settlements (Garrow and Gosden 2012: 60-86).

Gosden pointed out that a project of this scale was only possible due to new digital information and mapping. The 'Technologies of Enchantment' project used data from the PAS, museum records, books and papers to compile a digitally available resource for those wishing to study Celtic art in Britain (Garrow 2008: 15-16,2010). Although the project drew from key publications by Jope (2000a, 2000b), MacGregor (1976a, 1976b) and Spratling (1972), the PAS was a key resource since many examples of late pre-Roman Iron Age (LPRIA) and Roman decorated finds are found as single scattered finds or in hoards (Megaw and Megaw 2001: 90). The project sought to produce a comprehensive database for study and understood that it was critical for PAS finds to be included in order to achieve this.

One of the main identified problems with the data used by the Technologies of Enchantment project was dating. Accurate dates for each artefact were not always possible to establish and any dates that were ascribed to artefacts were often incorrectly deemed to more closely reflect the date of deposition than that of manufacture (Arrow 2008: 16). For any finds without context, such as those found in the PAS database, the dates given are necessarily those of manufacture rather than deposition. Without a secure stratigraphic context, all dating must be based on typology which makes it impossible to determine the date of deposition. This is an issue shared with all such studies

using large databases of finds, many of which lack context. This issue will be discussed in more detail below.

2.2.1 Finds data in archaeology

There are several potential types of data available for use in archaeology including material culture, settlements, biological data and funerary evidence. Most examples of big data in archaeology are concerned with cataloguing either sites and monuments or archaeological finds. In terms of sites and monuments, HERs are a good example of big data. The national network of over eighty-five HERs are a key record of the historical built environment and are described as an 'important starting point for anyone interested in the archaeology, built heritage, and history of an area' (Historic England 2018).

For finds, there is an abundance of both structured and unstructured data in the PAS, museum records and excavation reports. These types of databases are used in archaeological research either in combination, such as the Technologies of Enchantment project (Garrow 2008: 16; Hill *et al* 2008; British Museum 2012b) or isolation, for example Katherine Robbins's (2013a, 2013b) research into the biases inherent in PAS data.

This thesis is ultimately concerned with finds research, albeit on a large scale. Following on from the above discussion of data in general, the role of material culture and small finds in archaeological research will now be discussed. Finds research is often seen as being of lesser importance than other types of archaeological research. Kenneth Aitchison's *Survey of Archaeological Specialists* (2011: 42) surveyed 235 archaeological specialists for The Higher Education Academy Subject Centre for History, Classics and Archaeology, and English Heritage. He found that, on average, finds specialists charged less for their services than the average for all specialisms. Other responses to the survey included

feedback that there is 'very little competition as most people do not think this is a valuable area for study'.

Cumberpatch and Blinkhorn (1997: 5) have noted that finds work is often seen as only useful as a descriptive tool, or to determine provenance and chronology whilst Chitty (1999) identified the possibility of a shortage of finds specialists when assessing archaeological training needs. Ellen Swift (2007) conducted research to determine the perceptions of finds research amongst the academic Roman archaeology community. The study concluded that 'finds specialists are an aging population' and that a majority (around two thirds) of finds specialists felt their work was viewed negatively in the academic and archaeological communities. Swift (2007: 25) also notes that finds research contributed a significant number of total theses in British universities in the 1980s and early 1990s, before a decline in the mid 1990s. This is suggested to be linked to the rejection of positivism by post-processual archaeologists (Hilary Cool pers. comm in Swift 2007: 25).

The seemingly unfashionable nature of artefact studies in academic archaeology may be partially a reaction to the backlash against the culture history paradigm prominent in the late nineteenth and early twentieth centuries. The attribution of particular aspects of the material culture record to particular societies or cultures has long been a part of the study of archaeology. The late nineteenth and early twentieth centuries saw a concern with culture and society being distinct from racial classifications (Jones 1997: 45). The culture-history approach developed in the late nineteenth century, whereby material culture assemblages were seen to represent discrete social cultures in the past (Daniel 1975: 38, 41; Jones 1997: 51). The 'pots equal people' model was popularised in Britain by Gordon Childe. For instance, in his article on 'Races, People and Cultures in Prehistoric Europe' (1933), Childe outlined how different material culture provinces represented different ethnicities and identities.

It was within this framework that Gustaf Kossinna developed his 'settlement archaeology', a culture-history approach that he used to determine the geographic spread of Germanic peoples in the past (Jones 1997: 2). Kossinna's work and its use by the Nazis during the Second World War demonstrate the importance of identity and ethnicity in archaeology, including the ways in which it can be misused. Archaeology was important to German nationalism and the sense of a German identity and this was taken to its extreme by the Third Reich. This is demonstrated by Himmler's SS organisation, the *Deutches Ahnenerbe* who, along with archaeologists such as Kossinna, attempted to use archaeology to demonstrate Germanic ownership of territory in modern-day Poland in prehistory (Figure 2.1) and, thus, justify 'reclaiming' that territory' (Arnold 1990: 467; Jones 1997: 2-3).

Figure 2.1 A map produced in 1945 by the German archaeologist Hans Reinerth who worked for the Nazis. The map shows supposed Germanic expansion during the Bronze Age. Source: Jones (1997: 4) redrawn from Arnold (1990: 446).

Despite this, artefacts have long been a central part of archaeology and yield valuable information about past peoples and societies. Lucas (2001: 3) described fieldwork and the collection of material remains as 'the bread and butter of all archaeologists'. The use of everyday material and the total recording of everything found on site are invaluable parts of archaeology (Braidwood 1960, CIFA 2014). This demonstrates the importance of finds work to analysis of excavations. All finds must be recorded in order to be able to draw accurate conclusions. Johns (2007: 29) stated that, in order to advance studies in archaeology in a sound and unbiased manner, finds research needed to be fully re-integrated into the subject. This kind of re-integration is supported by Cooper (2007) who suggested methodologies for promoting finds research including university teaching, community archaeology and differing approaches to various types of Roman finds. In terms of those finds reported by members of the public, detailed methodologies have been put forward by the VASLE project (Naylor 2006; Richards *et al* 2009) and Katherine Robbins (2013a, 2013b, 2014) (see Chapter 2.1).

It has been noted by Swift (2007: 27) that finds research is less common in Roman studies but more prevalent in other research periods, particularly Anglo-Saxon archaeology. It is suggested that this is due to grave goods being the main source of evidence for the period. Many key pieces of research into the Anglo-Saxon period in Britain are based on studies of either certain find types (for example, Evison (1977) on Supporting- and Equal-arm brooches; Bruns (2003) on equal-arm brooches; Leahy (2003) on Anglo-Saxon crafts; Hinton (2005) on possessions in Medieval Britain) or decoration styles (Haseloff 1974; Leigh 1984; Shepherd 1998 on Style I; Shepherd 1993 on Style I; Høilund Nielsen 1999; 2010 on Style II; Suzuki 2000 on the Quoit Brooch Style; Inker 2006 on the Saxon Relief Style).

Conferences such as the 2012 Roman Pottery in the Fifth Century conference at Newcastle University and the 2002 Roman Finds conference at Durham University demonstrate a resurgence of interest in

Roman finds research. A number of key studies of Roman finds have been published in recent years (for example, Evans 1988, 1995a, 1995b, 2001 largely on pottery distribution; Snape 1993 on Roman Brooches; Cool *et al (*1995a, 1995b) on finds from York fortress; Dungworth 1998 on Roman nails; Price and Cottom 1998 and Cool and Baxter 1999 on glass vessels; Swift 2000b, 2003, 2009, 2012 on Roman dress accessories and decoration; Allason-Jones 2001; 2011 on Roman small finds and artefact use; Fulford 2001 on ritual artefacts; Brickstock *et al* 2002 on finds from Catterick; Collins and Allason-Jones 2010 on finds from the Hadrian's Wall frontier; Webb 2011 on finds from the Roman north, Eckardt 2014 on material culture in Roman Britain and the north-western provinces; Eckardt 2017, 2018 on material culture of literacy in the Roman World).

Lavan *et al* (2007) pushed for greater use of artefact distributions in archaeological studies. They drew on studies of early Roman artefacts from Colchester (Crummy: 1983) and York (Cool *et al* 1995a, 1995b) as well as more general synthesis of approaches to Roman finds assemblages (Cool and Baxter 2002). These focus largely on micro-level studies which analyse a particular space using the distribution of artefacts. This thesis conducts a similar type of study but on a larger scale, assessing types of finds found across England and Wales rather than specific examples found on one site. A good example of large scale finds research is Swift's (2000) study on *Regionality in Dress Accessories in the late Roman West*. This study looked at types of Roman artefacts of personal adornment and used their spatial distributions to identify key differences both between and within provinces.

Along with Swift's (2007) assertion that material culture studies may be more common in Anglo-Saxon research due to the importance of cemeteries as an evidence source, it may also be linked to the culture-history paradigm discussed above that has fallen out of favour in many other areas. Whilst culture-history was the main paradigm in twentieth century archaeology (Jones 1997: 5), the

development of processual archaeology was largely responsible for the end of culture-history as a model for socio-cultural and ethnic diversity. Rather than simply use material culture to infer the presence of particular ethnic groups, processual archaeology conceptualised culture as a system and sought to understand how and why cultural evolution took place (Binford 1962, 1965; Clarke 1968). Jones (1997: 27) argued that the major exception to this general trend of abandonment of the culture-history approach has been in historical archaeology where written evidence of the existence of ethnic groups has led to the continuation of clearly defined cultural provinces being thought to correspond to specific groups of peoples. This approach is still ingrained in much post-Roman archaeology (Lucy 2002: 72-3).

In conclusion, although finds research is often seen as unfashionable, recent work is bringing it to the fore again. Work on material culture is particularly prevalent in post-Roman archaeology although possibly still rooted in the culture history approach even relatively recently.

2.3 Issues of resolution

2.3.1 Macro-level issues

The first objective of the research was to assess what unstructured data can be used for on a macro-level or nationwide scale. This section will assess current literature and the issues of using unstructured data on a macro-level. This includes the broader issues of stratigraphic context and whether large databases such as the PAS are deemed to be worthwhile.

Chapter 1.1 introduced the issue of context with regard to large databases of finds and this is a critical issue when considering if such databases are of any use in archaeological research. Many of

the finds in these large catalogues whether found by members of the public or recorded in museum databases, do not have a secure context. Context is considered key in archaeological interpretation of materials and crucial to the value of an artefact and what it can reveal about past societies (Shanks and Hodder 1995: 14). The importance of context and stratigraphy to archaeology is also demonstrated by the regard in which so called pioneers of archaeology are held. For example, Pitt Rivers for his contributions to archaeological recording (Pitt Rivers 1897; Daniel 1975: 170; Levine 1986: 34; Bowden 1991: 57; Lucas 2001: 19) and Flinders Petrie for his insistence on scientific archaeology, development of seriation and refining of stratigraphic techniques (Petrie 1904: 171; Heizer 1959: 376-83; Levine 1986: 100; Drower 1985: 252; Murray 1961: 8; Trigger 1996: 291; Lucas 2001: 26). Willis and Hingley (2007: 13) highlight the importance of finds research (see above) but also state that 'in our investigation of the past through its artefacts it is vital to consider context and site formation processes'.

The importance of context and stratigraphy in archaeology has clear implications for the perceived usefulness of big data in archaeology. For example, regarding the PAS, the reporting of 'exciting, fragile or complex' finds to their local Finds Liaison Officer (FLO) to allow archaeologists to record the context in which the find was made is encouraged. Despite this, most PAS data are without stratigraphic context (Portable Antiquities Scheme 2015c).

Private collectors are often vilified by archaeologists on the basis of their removing finds from the archaeological context, thus making them worthless (Renfrew 1993; Gibson and Sanders 1993). Wayne Sayles (2013) defended the private collecting of antiquities. He discussed the issues amongst the archaeological community, stating that they considered no object to be of value without its archaeological context. Sayles disagreed with this on the basis that it is illogical to historians and art

historians. Bland (2013) pointed out that Sayles's conclusions are largely self-serving, as a collector himself and reiterates the importance of the information available from finds which have a context.

Research using small finds may exclude PAS finds on the basis of their lack of context. In his study of *Personal Ornament in the Roman North*, Timothy Webb (2011) excluded PAS finds for this reason. Webb was comparing artefacts between various types of site and so needed to assign artefacts to one of seven site types – military, *vicus*, town, villa, rural, cave or cemetery. He did, however, compare the PAS assemblage to the rural assemblage from Cumbria and determined that it showed a greater quantity of metal artefacts (which is to be expected) but proportionally similar artefact types. He nevertheless omitted the material as it may introduce 'unnecessary variables' and that his study lacked the resources to determine which finds were relevant (Webb 2011: 20). Webb's approach seems to be one of attempting to gain the best of both worlds, ignoring the PAS finds whilst attempting to demonstrate that this has not affected his conclusions. He omitted PAS data despite determining that it seems to be part of the rural assemblage. Research into PAS finds suggests that the vast majority of finds come from rural areas (Richards *et al* 2009; Robbins 2013a, 2013b, 2014). Webb also only compares the PAS data from one area. This makes it difficult to trust the conclusion that the PAS assemblage does not significantly differ from the rural assemblage. Studies such as the VASLE project (Richards *et al* 2009), which would have been available to Webb, and later studies by Katherine Robbins (2013a, 2013b, 2014) show the extraordinary geographic variability in recovery of finds reported to the PAS.

Despite this key point that PAS finds lack context, the PAS database is an invaluable resource. A 2001 review of the PAS (Cool 2001: 6) stated that 'currently the entries are of variable value, and it is imperative to improve the quality of the poorer ones.' The scheme took action to improve the issues,

establishing the post of ICT advisor and using Heritage Lottery Fund money to improve the database (Pett 2010b: 1).

In his assessment of the PAS and the Treasure Act, David Gill (2010b: 2-3) questioned whether there is a significant under-reporting of finds to the PAS. He states that the figures for reported finds (44,268 metal detected finds in 2008) and metal detectorists (around 9,000 active) suggest that few finds are reported to the PAS. He cited the example of the Icklingham Bronzes which went on display at the Harvard University Art Museums in 1996 which had been found in Suffolk and found their way on to the New York market (Mattusch 1996: 262-3; Gill 2010a; 2010b: 3-4). However, the bronzes were discovered in the early 1990s, prior to the Treasure Act 1996 or the setting up of the PAS (Chechi *et al* 2012; Portable Antiquities Scheme 2016, 2019a). With regard to the question of whether the PAS has helped to prevent looting of archaeological sites, Peter Wilson (2009) of English Heritage and David Gill (2010b, 2010c) have both suggested that high profile cases of finds given large monetary value has actually encouraged people to search for more artefacts.

In a response to Gill's (2010b) concerns about the PAS and looting of archaeological sites, Trevor Austin (2010) stated that, although looting was clearly still an issue, Gill is overstating the case. Austin pointed out that Gill's use of statistics is actually simply speculation as to whether the number of active metal detectorists correlates well with the number of reported finds and that any accusation of under-reporting needs to be considered in the context of a PAS with limited resources at its disposal. Responses by Austin (2010), Renfrew (2010) and Moshenska (2010) largely agreed that there is not a serious threat to British archaeological heritage by looting but that there is scope for revision of the Treasure Act.

The number of finds uncovered by metal detectorists is an important consideration in the usefulness and importance of the PAS (Barford 2006a, 2006b; Bland 2006a; 2006b; Barford and Swift in press). Manuals produced for metal detectorists demonstrate the link suggested by Gill (2010) between known sites and detectorist activity by highlighting how to find a 'productive site' by identifying areas where finds have already been reported (see Villanueva 2006, 2007; Grove 2010). Nevertheless, it is important to consider that to ignore the PAS as a resource is to ignore an enormous body of potential information and that, without the PAS, none of the finds found by members of the public would be available for study. Finds such as the Crosby Garrett helmet and its sale (discussed further below) would still attract much media attention and, therefore, the notice of metal detectorists, looters and treasure hunters. In her discussion of the reintegration of finds research into archaeology, Catherine Johns (2007: 31) stated that one of the issues with this is the mutual suspicion between metal detectorists and professional archaeologists and the fact that detecting is often seen as a 'borderline criminal activity' with small finds 'beneath the notice' of 'real' archaeologists.

Good relations between archaeologists and metal detectorists are vital in order to maximise the utility of finds discovered by members of the public. Raimund (2011) looked at heritage protection laws in Austria where metal detecting licences are only granted to archaeology graduates. He concluded that these laws had the opposite effect to the intended desired protection of archaeological heritage. Criminalisation of amateur archaeology in Austria led to a reduction in the number of finds reported and the National Heritage Agency Bundesdenkmalamt (BDA) not being made aware of many unknown archaeological sites.

Information from finds made by members of the public is not reported everywhere. For example, in France metal detecting is widespread but there is no record of these finds (Gransard-Desmond 2013;

Bland 2013) and the information they could provide is lost. Were this the case in England and Wales, a vast potential source of archaeological data would be lost. A study of Roman gold coins carried out by Bland and Loriot (2012) looked at a corpus of data of finds made by members of the public and revealed that the PAS was recording seventy percent of all current finds. A recording system for finds made by members of the public is also seen as a solution to looting in other countries (Portable Antiquities Scheme 2007: 21; Fincham 2008: 363-5; Gill 2010: 9). Thus, the PAS is a significant body of data of a type that is frequently lost to research in other countries. It would seem remiss to exclude this resource from study on the basis of the lack of context. This is particularly the case when methodologies to manage the biases in the data have been put forward (see Naylor 2006; Richards *et al* 2009; Robbins 2013a, 2013b, 2014) and it has been pointed out that the context of PAS finds is in their location (Pett 2010b). The recording of finds recovered by members of the public is becoming more widespread and commonplace. For example, in 2016 the Netherlands set up the Portable Antiquities of the Netherlands (PAN) scheme along with enacting new heritage laws which legalised metal detecting in the top thirty centimetres of soil (Faculty of Humanities, *Vrije Universiteit, Amsterdam* 2019). PAN is part of the North Sea Area Finds Recording Group which additionally comprises Denmark, England and Flanders. These areas are considered to be some of the most progressive regions in Europe for recording archaeological finds made by members of the public (Lewis 2017). The expansion of schemes to record finds made by members of the public into countries such as the Netherlands, where metal detecting was previously illegal, demonstrates the importance of such finds to the archaeology and heritage of a country.

The PAS is also of great importance in community archaeology. Cooper (2007: 37) stated that this is demonstrated by the expansion of the scheme along with high profile TV series such as the BBC's 2003 series *Hidden Treasure*. This public engagement with the PAS has continued since the publication of Cooper's research with the 2012 ITV series *Britain's Secret Treasures* produced in

conjunction with the PAS highlighting the importance of objects found by members of the public to our knowledge of British history (British Museum 2012a; Ochota 2013).

Daniel Pett was previously the IT advisor to the PAS and has been one of the main champions of the PAS as an important archaeological resource. In response to the claims that PAS finds have no provenance, Pett (2010: 3-4) stated that this argument is losing ground. He asserted that PAS finds do have a context, albeit different to the stratigraphic context provided by excavation. The context of the finds is in their location, particularly when many metal detected finds come from disturbed plough soil meaning that their stratigraphic context is already lost before the finds are discovered. Pett (2010: 2) pointed out that when the scheme reached half a million objects recorded it would be critical for archaeological research using the PAS. At such a large number of finds trends within the data would be statistically significant, something that would not be true of a relatively small number of finds. This point was reached on 21 March 2010 and, as of 08 May 2015, the scheme's database included 1,090,931 objects within 679,893 records (Portable Antiquities Scheme 2015a).

It may be argued that, as IT advisor to the PAS, Daniel Pett was inherently biased towards the PAS as a useful source of information, however, his views are shared by others in the field. For instance, in her paper arguing that finds research needed to be reintegrated into archaeology, Catherine Johns (2007: 31) highlighted the importance of the Treasure Act (1996) and the PAS. The aforementioned studies by the VASLE project (Naylor 2006; Richards *et al* 2009; Naylor and Richards 2005) and Katherine Robbins (2013a, 2013b, 2014) also demonstrate how the biases inherent in PAS data can be overcome by comparing any trends identified to the trends over the whole PAS dataset. At the time the VASLE project was carried out, there was little information available to researchers in how to conduct data collection from vast databases of finds and monuments such as the PAS, HER, NMR and museum records. This is in contrast to the number of works available on best practice in data

collection from fieldwork such as excavation, landscape analysis or finds and building recording (for example Haselgrove *et* al 1985; Joukowsky 1980; Rippon 2012; Roskams 2001; Swallow *et al* 1993). The VASLE project was a seminal piece of research in using databases such as the PAS to conduct archaeological research.

In 2007 a conference was held to mark the tenth anniversary of the PAS. This demonstrated the variety of uses to which PAS data could be put and, as Bland (2010: v) stated in the foreword to the publication of the conference's proceedings, showed the potential of the recording of finds made by members of the public for research. The types of research carried out with PAS data included studies of specific artefact types such as lithics (Bond 2010), Iron Age sword strap fasteners (Andrews-Wilson 2010) and Anglo-Saxon brooches (McLean 2010; Dickinson 2010) and those of particular geographic areas, for example the Berkshire downs (Sumnall 2010). The influence of the PAS was also identified by Esmonde Cleary (2014: 7-8) in his work on the Romano-British to Anglo-Saxon transition period. He observed that in the last forty years one of the most obvious changes for understanding of the period is the volume and range of evidence available. He credited this largely to the Planning Policy Guidance 16 (PPG16) and the PAS which have transformed understanding of Roman Britain.
As of 18 September 2019, there were 147 doctoral level, eighteen Arts and Humanities Research Council (AHRC), twenty three major publications, five journal and nine Leverhulme funded projects registered with the PAS (Portable Antiquities Scheme 2015b). These include the previously discussed VASLE, English Landscapes and Identities and technologies of Enchantment projects and research by Katherine Robbins into a methodology for study of PAS finds (see Chapter 2.2). Much of the research comprises study of the landscape and environs of various sites and locations in England and Wales. Examples include work at Silchester (Barnett 2015), Caerau Hill (Davis 2014), Stonehenge and Avebury (Davis and Cripps 2011) and South Oxfordshire (Mileson 2011). The PAS is important to all of these research projects due to its accurate recording of findspots which can be plotted and used for

geographical information system (GIS) analysis. This was specifically mentioned as a key point of the PAS data by Davis (2014) with respect to his attempts to identify Bronze Age and Iron Age sites in the area surrounding Caerau Hillfort.

Another key example of a recent, large-scale research project which understood the importance of PAS finds was the 'Fields of Britannia' project, which studied the links between the Romano-British and Medieval landscapes (Rippon *et al* 2010). As part of this, Stephen Rippon supervised a doctoral research project into settlement relationships in the Roman and early Medieval period using PAS, HER and grey literature records (Fleming 2010). For this research, Fleming used data from rural Norfolk, Kent and Somerset to carry out a quantitative analysis of settlement patterns in the fifth to eleventh centuries. She determined that river valleys were areas of high status Roman settlement and saw greater continuity whereas lower status Roman settlements were located on heavier soils in interfluvial landscapes and had more discontinuous use during the period studied (Fleming 2013).

The importance of PAS finds to archaeology is particularly well highlighted by the Staffordshire Hoard. Discovered in Hammerwich, Staffordshire in 2009 it has attracted significant attention from both members of the public and archaeologists. It has been pointed out by Leahy (2010) that the Staffordshire Hoard will re-ignite interest in Anglo-Saxon material culture and allow it to be studied using a much larger set of available data. The discovery of the Staffordshire Hoard demonstrated the importance of Anglo-Saxon or English identity even today. There was immense public interest in the hoard with over 40,000 people queuing to see it on the first day it went on public display (Leahy and Bland 2009: 9). There was a public campaign to keep the Staffordshire Hoard in the Midlands where it was seen to belong (Pembrey 2010) and the 'Mercian Trail Partnership' developed the 'Mercian Trail' which sought to tell the story of the find and the history of the region (The Staffordshire Hoard

2013). These things demonstrate the interest in the perceived Anglo-Saxon identity of the Midlands and the role the Staffordshire Hoard played in affirming this.

Few archaeologists have claimed that the Staffordshire Hoard is not a useful resource because it was found by a metal detectorist. Catherine Hills (2011) did state that the circumstances of the discovery of the hoard mean it will never be determined whether it was part of a site such as Nydam and Illerup in Jutland, where weapons were deposited into lakes. Hills believed that both Terry Herbert, the metal detectorist, and the excavation team from Birmingham Archaeology were mainly concerned with the recovery of precious metal finds rather than careful, *in situ*, recording of the finds. She concluded that, whilst the hoard may provide useful information regarding the technological and stylistic development of weapons fittings, it will not, 'rewrite the Dark Ages' (Hills 2011: 228). This is in contrast to scholars such as Webster (2011, 2012: 121-5), Leahy (Leahy 2010; Leahy and Bland 2009; Leahy *et al* 2011), Høilund Nielsen (2010), Brooks (2010), Fischer and Soulat (2010) and Pollington (2010: 513-4) who consider the Staffordshire Hoard to be useful and use it in research into the Anglo-Saxon period. The Staffordshire Hoard changed the evidence available for Anglo-Saxon treasure which had previously mainly come from high-status burials and individual finds (Webster 2011). Despite Catherine Hill's criticism of the excavation, the initial emergency fieldwork undertaken concluded that the remaining artefacts were contained within the topsoil and that the distribution suggests objects had been redistributed by ploughing (Dean *et al* 2010; Jones 2010, 2011). This suggests that the context for the Staffordshire Hoard had been lost prior to any excavation taking place.

A further example of a key archaeological find made by a metal detectorist is the Crosby Garrett helmet. The helmet was restored and sold at auction in 2010, with no conservation able to be carried out prior to this (Worrell 2010: 30). Even the find location was not known with any accuracy and it

was over three months from the date of discovery until FLOs were shown the hole from which the fragments of the helmet were apparently removed (Gill 2010: 6). Despite this lack of context, it was described by the Senior Curator of Romano-British collections at the British Museum as an 'outstandingly important find...it is as an ensemble that the helmet is so exceptional and, in its specifics, unparalleled' (Jackson 2010: 2). It has been described by Worrell *et al* (2011) as internationally significant and led to calls for a reassessment of what was defined as treasure. In December 2010, the most common topic of questions to the Minister for Culture, Media and Sport, Ed Vaizey, was the Crosby Garrett Helmet (Department for Culture Media and Sport 2010).
More recently, four Iron Age torcs were recovered by metal detectorists in December 2017 in Leekfrith, Staffordshire. The torcs were described by Julia Farley (2017), curator of British and European Iron Age Collections at the British Museum, as 'of international importance'. She stated that the torcs, which are the earliest example of Iron Age gold found in Britain, would shed 'new light on the relationship between Britain and Europe over 2000 years ago'. Theresa Gilmore (2018: 32), the FLO for Staffordshire has described the find as changing archaeological understanding of the Iron Age in Britain.

It seems that, where a find is almost unique, many archaeologists are able to overlook its lack of stratigraphic context and even, in some cases, a lack of certainty about where exactly the find spot was located in order to make use of an important or unprecedented example of material culture.

2.3.2 Distribution maps

Pett (2013) stated that the context of PAS finds is in their location, particularly when the large number of finds in the database are used together. This makes distribution maps an important tool in the analysis of big data as well as more widely within archaeology.

For example, in a study of brooches on the northern frontier in fourth to fifth century Roman Britain, Rob Collins (2010) used distribution maps of various kinds of brooches to conclude that 'the frontier is distinct from the rest of Britain and even more different from the Continent' (Collins 2010: 73). Webb (2011) used distribution maps of a wider variety of finds as part of his similar study into the nature of the Roman frontier in Britain.

Distribution maps are used on a wide variety of scales. On a micro-level, excavation reports often use distribution maps of find types across a site to aid in interpretation. Data from excavations is more structured and finds generally have a stratigraphic context. Both excavated material and that found by members of the public use distribution maps but, as the latter is less structured and lacks certain information such as stratigraphic context, the usefulness beyond finds distributions is more challenging for PAS data.

At Spong Hill Anglo-Saxon cemetery in Norfolk, distributions of various classes of finds were mapped across the cemetery. These were used to assess chronology of different classifications of find and if distributions varied across the cemetery. For example, Figure 2.2 shows the distribution map of triangular comb types in the cemetery. This is used as part of the discussion of combs in the cemetery, concluding that triangular types continued into the sixth century and had a wide distribution across the cemetery (Hills and Lucy 2018: 118). This example comes from a site with excellent dating of artefacts, producing an extensive chronology. For unstructured datasets this information no longer exists and it is, therefore, not possible to provide such specific information on such a small scale. The next section will discuss the possible issues when using big data for small-scale issues and how this data might (or might not) be used to investigate specific cultural issues.

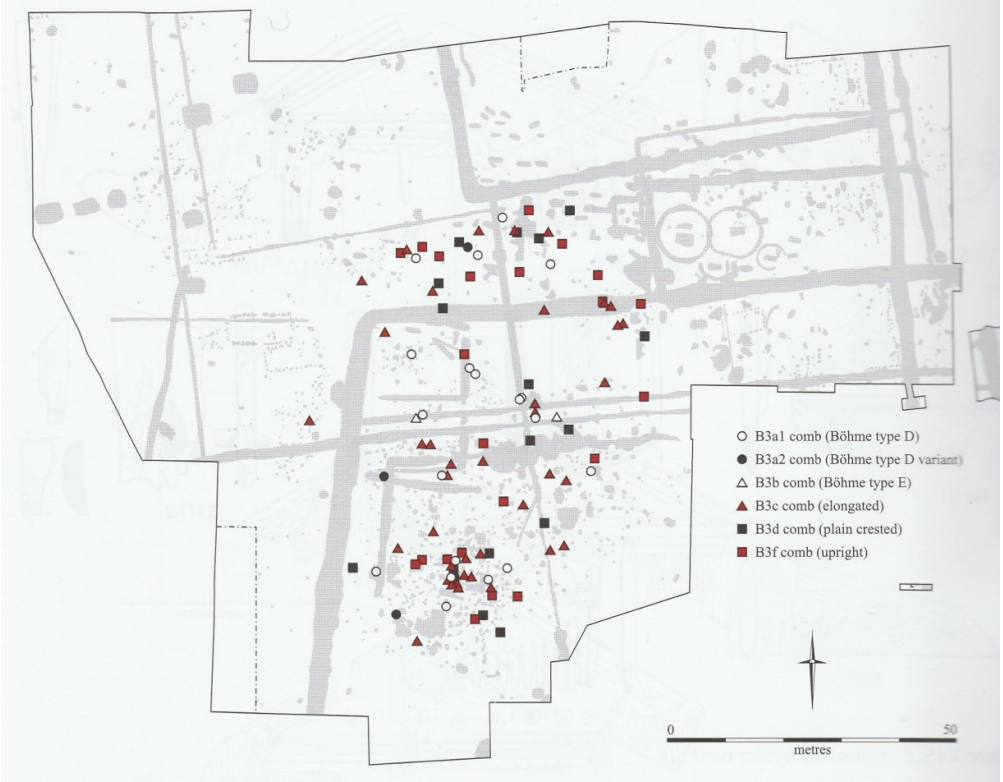


Figure 2.2 Site distribution plot of triangular comb types at Spong Hill. Source: Hills and Lucy (2013: 118).

Distribution maps are also used on a nationwide, or even broader, scale. For example, Ellen Swift (2000) used distribution maps as part of a study into surveying four classes of artefact (crossbow brooches, glass beads, bracelets and belt fittings) across an area covering the region from *Britannia* to *Pannonia.* The research revealed that the late Roman west was not homogenous and identifies key differences between provinces. For example, Swift (2000: 181) identified that bracelet styles were spatially divergent and suggested that certain types, such as type 105, cluster together (Figure 2.3). She also identified the issue with the small number of this type of bracelet, identifying the importance of large amounts of data for statistical significance and accurate results.

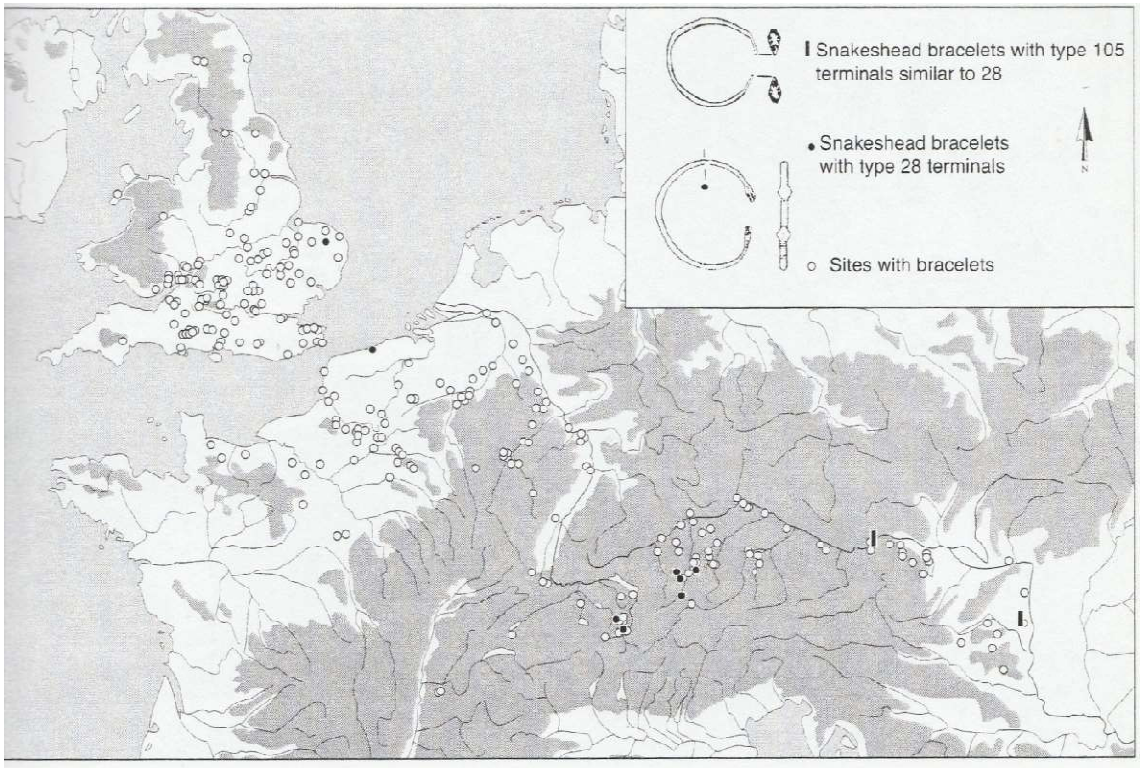


Figure 2.3 Distribution map of snakeshead bracelets with type 28 and type 105 terminals. Source: Swift (2010: 171).

2.3.3 Micro-level issues

Distribution maps are only able to reveal so much about historical peoples and cultures. Can large unstructured datasets be used to answer more specific questions about historical cultures? The second objective of the research was to determine whether unstructured data can be used to answer specific cultural questions. What are its strengths and limitations? This section will review literature on using material culture to answer questions on past societies regarding culture and identity.

The objects used by a society can reflect social beliefs and identity. The objects we use today tell others about our lives and our identity. Wickham (2009: 16) points out that material culture 'projects

meaning'. For example, the type of jewellery worn can vary with status, wealth, belief/religion and culture. Modern anthropology sees artefacts as part of systems of belief and economy, displays of wealth and social ranking (Ember and Ember 1996). Similarly, archaeological material can be interpreted to tell us about the lives of people in past societies.

In anthropology, different styles are used as a type of cultural marker and are considered to relate to cultural difference between peoples (Hatcher 1999: 22). Until recently, few archaeologists have been directly influenced by modern anthropological and sociological ideas regarding ethnicity and social identity (Jones 1997: 113). Nevertheless, it can be seen in past studies of material culture that these ideas are important when studying the products of past societies. For example, in the latter half of the twentieth century, ideas about the style and decoration of artefacts changed from simply seeing them as a passive product of that particular society to their being viewed as a form of communication and social indicator (Conkey 1991: 10). In this respect types of artefact are seen to reflect aspects of social identification, religious identification and status, particularly in times of social and environmental stress (Jones 1997: 113). It is, however, important not to fall back on the culture-history paradigm which over simplistically assigns certain types of material culture to groups of peoples.

Archaeological studies of material culture have often centred on technical and aesthetic evaluation and recognising characteristic regional styles, whereas anthropology has a history of researching the relationship between art or material culture and society (Scott 2000: 14-15). In terms of anthropology, therefore, material culture describes the society that produced it, its structure and ideology (Pollington 2010: 39; Woodward 2013). Whilst chronological successions of material culture styles are often drawn up across many periods of history, how and why styles change needs to be

considered. Shepherd (1998: 82) put forward the view that the choice of style is a statement of belonging and adherence to a particular set of values.

Archaeological investigation of material culture as social indicators also has much in common with the discipline of art history (Caple 2006: 44). Renfrew (2003: 7) stated that there are two main approaches to understanding the modern material world: archaeology and the visual arts. In addition, the art historian Jules Prown studied artefacts as primary data to determine the values and attitudes of past cultures. He used features such as decoration and material to reveal something about the society which created them (Prown 1982). These two approaches demonstrate the similarities and overlap between the two disciplines. Wicker (1999) saw archaeology and art history as closely related disciplines, especially in medieval studies. She points out that both are concerned with material culture. Classicists such as Smith (1994) have distinguished between archaeology and art history as the difference between artefacts and art work and believe that aesthetics are irrelevant to archaeologists. Nevertheless, it can be observed that there is overlap between art history and the archaeological study of decoration or art. For instance, Freedberg (1994: 394) has stated that many art objects have functions beyond simply aesthetics and many objects we would not usually class as being art can be aesthetically pleasing. This means that the study of art history has, to some extent, expanded beyond pure aesthetics whereas archaeology can take some of the techniques of art history and apply them to artefacts and material culture.

In the 1980s, the archaeologist Brunhilde Ridgeway was asked to contribute an essay on the study of ancient art to the art historical journal *The Art Bulletin*. This shows the degree of overlap between approaches to material culture by art historians and archaeologists. Ridgeway states that, despite her misgivings on an archaeologist contributing to an art journal that rarely included ancient art,

iconography, chronology and the sociological aspects of material culture are a common ground between the disciplines of art history and archaeology (Ridgeway 1986).

Lack of secure dating of PAS finds makes it difficult to study micro-level chronologies. Constructing typological sequences of artefact and decoration types is a long-established means for archaeologists to understand relative chronologies of finds. By using this approach, archaeologists run the risk of over-simplifying chronologies of material culture and there is the danger of circularity too. Assumptions have to be made about decorative styles and sequences of development which are often based on modern views of how things develop – from simple to complex (Lucy 2000:17). For instance, in the early twentieth century, Leeds (1912: 28) viewed objects as starting as simple in form and decoration and becoming more complex over time.

Although typological studies have somewhat fallen out of favour in archaeological research within the last ten to twenty years, they are still an important tool when attempting to understand the history of a particular period. Inker (2006: 2) argued that typologies still form the basis of most chronological frameworks. There is an issue here that dating is much better for some periods than others. For example, in the Roman period typological chronologies can be compared to coin dated finds. (Lockyear 2012) . This allows more secure chronological dating than is possible for coinless periods.

Statistical methods could be used to interrogate the data and try and answer more micro-level issues. Statistics are important when dealing with such a large volume of data. Shennan (1997: 1-4) and Orton (1980) discuss the importance of quantitative methods and the way that archaeologists interpret the past based on patterns in the archaeological record and thus quantitative research and statistical methods are imperative.

A key component of the quantitative methods required for studying patterns in the archaeological record is significance testing. In other words, whether distributions are 'real' or are likely to be caused by chance. The Chi-squared test is a good option here due to a lack of restrictions on its use meaning it can be widely used. It is important to note that the results do not reveal the strength of any relationships, only whether a relationship exists (Shennan 1997: 65-74).

Another option for statistical analysis of the data is Correspondence Analysis. This was used by Høilund Nielsen (1999, 2010) to produce parabolas of seriation of Anglo-Saxon decoration and by Cool and Baxter (2002) to analysis Roman finds assemblages from several different sites. Chi-squared tests and Correspondence Analysis are the two main options for interpreting cross-tabulated data. Bendixen (1996: 1-2) explained that the Chi-squared test determines independence. For large, unstructured databases such as the PAS this establishes whether find type is influenced by region. Correspondence Analysis is a multivariate statistical technique. Cool and Baxter (2002) use the technique to assess assemblages across multiple sites in other to determine which are similar or different.

2.4 The problems with unstructured data

Any data used in research has limitations. Nevertheless, unstructured big data comes with its own unique set of issues which must be understood before any research can produce valid conclusions. In order to achieve the second research objective, the limitations of such data must be understood. The key problems are listed and discussed below. The issue of context has already been discussed above (see Chapter 2.3.1).

2.4.1 Inconsistencies in the data

When combining multiple databases from different sources there are likely to be inconsistencies within them. This is an issue highlighted by the Technologies of Enchantment project. When combining databases from museum records, the PAS and excavation reports they found that not all of the records contained accurate dates (Garrow 2008: 16). Further research was carried out in order to try and establish a date but this was not always possible, creating problems when assigning artefacts to one of the five phases between 300 BC and AD 150. In order to attempt to overcome this issue the researchers divided artefacts with a wide date range equally amongst the phases. For instance, if there had been ten artefacts dated to phases four to five, five would have been assigned to phase four and five to phase five (Hill *et al* 2008). This method would not have always been ideal as in many cases the number of artefacts does not equally divide into the number of phases. Furthermore, in some phases over seventy percent of the total number of artefacts were assigned in this manner (data from Hill *et al* 2008). This means that the vast majority of artefacts in any one phase are actually much more broadly dated and may not be from this phase at all.

Even within one database there can often be many inconsistencies or errors. For example, the PAS is put together from regional finds records over a long period of time and, therefore, has some inconsistencies that need to be addressed before the data can be analysed. The non-standardised approach to PAS recording was highlighted by Naylor and Richards (2005: 87). They discussed that inconsistencies in how finds are recorded and described meant that they could not simply search the database for those finds from the period that they wanted to study. A more detailed methodology, particularly regarding cleaning and enhancement of the data, was required in order to maximise the number of finds records available for study. This will be further discussed in the following chapter.

2.4.2 Biases in the data

All archaeological data has bias and, to some extent, many of the same biases are inherent in PAS data as excavated material. For instance, all archaeological material is subject to the biasing factors of deposition, preservation, survival, recovery and recording.

Preservation can skew the results of a study of material culture. Many artefacts made of materials which are not often preserved in the archaeological record would have been in use in past societies. Finds such as rim bands from wooden bowls (see Boyle *et al.* 1998: 252 for an example from Butler's Field) show that biodegradable materials were used but these do not often survive for study. As Hawkes (1997: 311) stated, we can only study the material that is the most durable. This is not necessarily the material that is most representative of the time. On sites with exceptional preservation conditions we can catch glimpses of the material that is largely missing from the archaeological record. At Vindolanda, south of Hadrian's Wall, exceptional environmental conditions mean that a large quantity of material that does not usually survive in the archaeological record is found here. This includes the famous Vindolanda writing tablets (Bowman *et al* 2010) as well as wooden, leather and over 1,000 textile objects (Birley 2009: 31).

Nevertheless, unstructured data such as that in the PAS has a unique set of biases compared to excavated data. Recovery bias exists in both excavated and metal detected data but it is important to identify how these biases may differ. Rather than issues such as research interest, sampling methods and site availability, PAS data are biased by where metal detectorists can and will operate. Known locations of productive sites and certain types of land use such as recently ploughed land attract metal detectorists to an area. Other areas impede detectorists and metal detecting is either difficult

or restricted by law. The nature of the PAS also means that the majority of finds are reported by metal detectorists, and are thus overwhelmingly biased to a particular type – metal artefacts.

Recording differences are affected by relationships between metal detectorists and Finds Liaison Officers (FLOs). For example, at Weekend Wanderers rallies in the Wessex Downs, more finds are recorded when a FLO is in attendance at a rally (Robbins 2014). Recording is also not consistent across England and Wales. Robbins (2014: 74-75) noted that recording rates are not consistent with the Isle of Wight having a much higher monthly rate of recording than Northamptonshire and Hampshire. This may be a result of the length of time the PAS has been in operation here, with recording rates increasing over time and the reporting/recording structure becoming more efficient.

Previous studies using the PAS began to establish a framework for data analysis which went some way to overcoming the biases in the data. The VASLE project (Richards *et al* 2009), Katherine Robbins (2013a, 2013b, 2014) and Tom Brindle (2013, 2014) all advocated the use of some form of 'constraints map' when exploring biases in PAS data.

Robbins (2013a, 2013b) studied the effects of collection bias on distributions of PAS finds and assessed at which scales the effects were most pervasive. She found that distributions of PAS finds represented both modern collection bias and historical patterns of use and put forward three questions to consider when using PAS data (Robbins 2013b: 69-70):

1. **'What is the survey area?'** In order to define the search area, Robbins suggested using constraints maps (which identify areas where finds tend not to be recovered) and the mapping of fields with findspot records to determine which areas have been searched.

2. **'How do patterns of recovery influence data?'** Finds recovery patterns vary greatly, especially within individual fields. With reference to macro-level studies, Robbins stated that density of metal detecting activity must be understood.

3. **'What are the reporting and recording issues associated with the dataset?'** This includes the relationships between metal detectorists and archaeologists in a given area which may impact the reporting of finds.

For her pilot study into the distributions of PAS finds, Robbins (2013a, 2013b) chose to use three case study areas (Northamptonshire, Hampshire and the Isle of Wight) to demonstrate the effects of recovery bias in PAS data. As a result, several of her suggestions focus on research across a smaller area. This includes assessing land use (Figure 2.4 and Figure 2.5), the degree of re-walking of fields and patterns of field walking. Detailed analysis of land use such as that seen in Figure 2.4 and Figure 2.5 is difficult to carry out on a national scale.

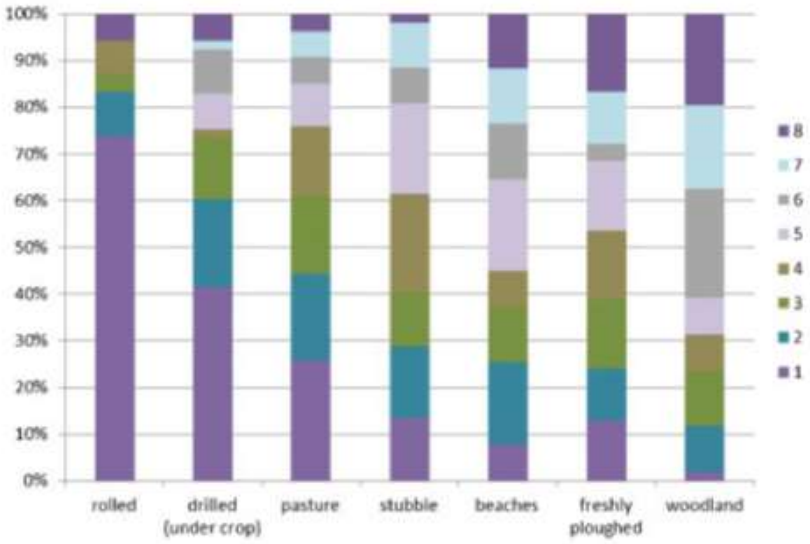


Figure 2.4 A chart showing detectorists preferences by land type with rolled, rural land the most popular. Source: Robbins (2013b: 58).

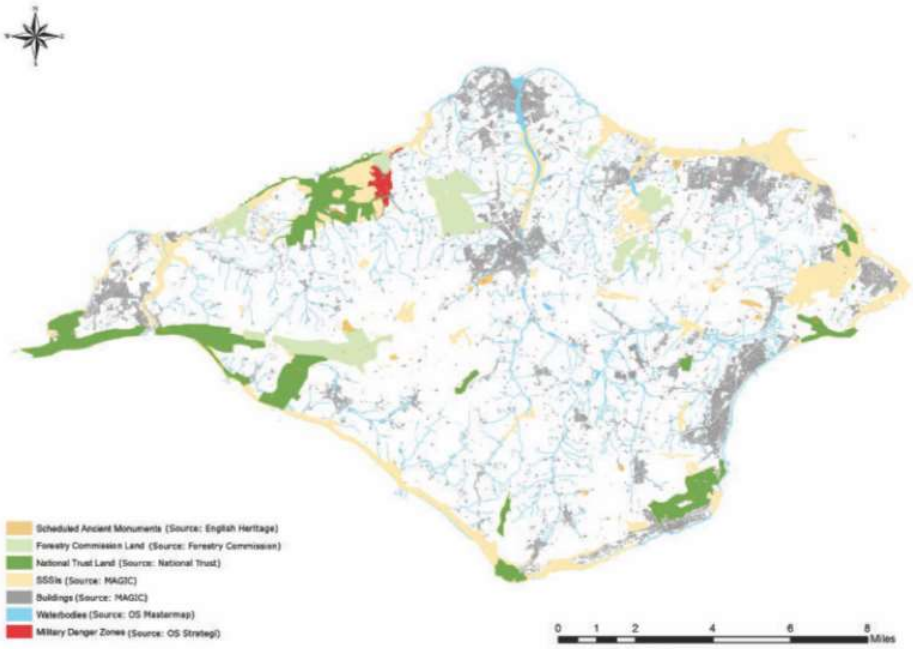


Figure 2.5 A map showing constraints on detecting on the Isle of Wight. Source: Robbins (2013b: 62).

In a later work, Robbins (2014: 48) stated that, in a nationwide analysis, including every constraint on the data would unnecessarily complicate the constraints map and also make processing the data incredibly time consuming. Here, she deemed it more appropriate to use more extensive constraints through mapping, different methods of displaying densities and distributions, landscape analysis and comparisons to other datasets.

This type of framework is extremely similar to that used by the earlier VASLE project which utilised PAS data. The three objectives of the VASLE project were:

- 'To map national distributions of metal artefacts and coinage circa AD 700 - 1000 and to compare these distributions with landscape factors, in order to understand the visibility, recovery and archaeological distribution of early medieval 'productive sites.'

- 'To characterise the finds assemblages of individual known sites, graphic percentages of coins and other object types in order to examine change through time and to derive 'fingerprints' that will help define a hierarchy of settlement types.'

- To use targeted and controlled metal detecting of specific sites in the north of England to study their development and morphology from finds distributions.'
  (Naylor 2006).

As with other studies using similar datasets, one of the key elements of the framework for using PAS data in archaeological study was the need to use control datasets for quantitative and geographical analysis (Richards *et al* 2009). The whole PAS dataset needs to be used to determine the influences

on the data. The constraints on the dataset as a whole can be seen and modern patterns of recovery and reporting can be differentiated from historical patterns of use.

The VASLE project advocated the use of period-specific datasets which they produced from the Iron Age to the Late Medieval period. The project also used constraints base maps to distinguish between historical distribution and modern recovery. This allowed the cleaned early Medieval records used by the VASLE project to be compared with background patterns. Their research identified areas with large numbers of metal detected artefacts but few finds from the study period. They suggested possible reasons for this in different areas such as the Weald being heavily forested, north-east Norfolk and the fens being flooded and the population of Lancashire and Somerset not using recognised Anglo-Saxon or Anglo-Scandinavian artefacts (Richards *et al* 2009).

Richards *et al* (2009) stated that differences which can be seen through time are likely to represent actual change rather than variations in recovery. Their example is that, in the Iron Age to Early Medieval period, the finds distribution in the area of Fenland around the Wash suggests that there was little occupation in the Iron Age, more in the Roman period and continued occupation in the Early Medieval period. They interpret the finds distribution through time as representing Roman Fenland management.

The VASLE project produced two base maps with which to compare PAS distributions. The first was a topographic map (Figure 2.6a) in order to reveal differential recovery or deposition of artefacts between lowland and highland areas. The second was referred to as a 'constraints map' (Figure 2.6b). This plotted other factors which may bias artefact recovery. Together these two maps represent the same constraints as those identified as existing on a nationwide scale by both Robbins (2013a, 2013b, 2014) and Brindle (2013, 2014):

- Topography
- Urban areas
- Woodland
- Non-agricultural land
- Other areas which cannot be surveyed by detectorists such as Sites of Special Scientific Interest (SSSI), military land etc.

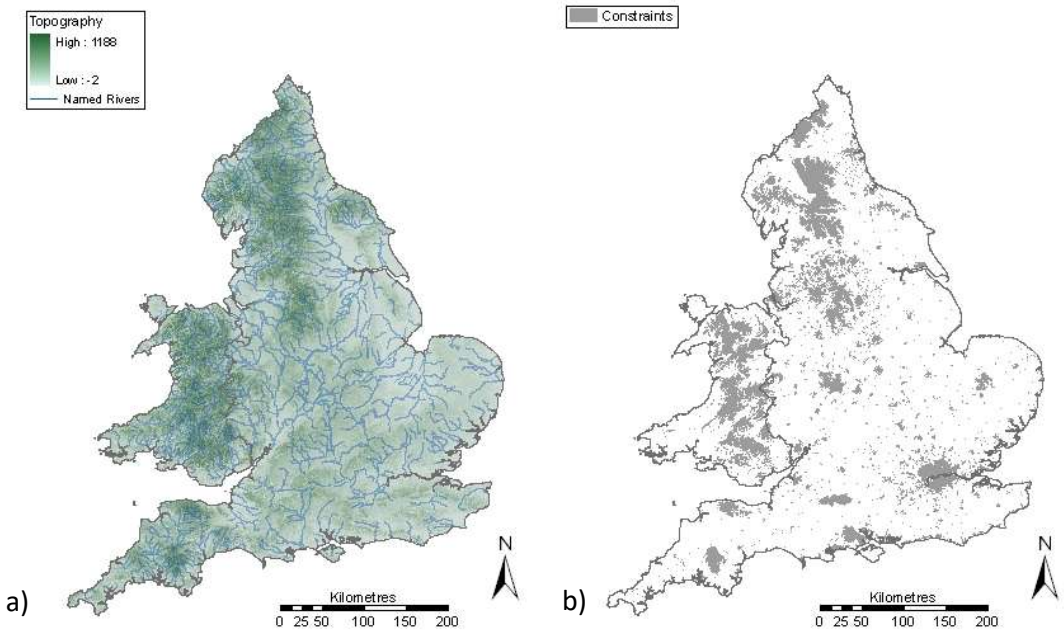


Figure 2.6 VASLE project base maps used to show bias in PAS data. a) Topographic base map showing relief and major rivers b) Constraints base map, showing urban areas, forests, lakes and danger zones (maps derived from Bartholomew GB2003 and Ordnance Survey LANDMAP datasets). Source: Richards et al (2009).

Comparing the spread of data with such a map means that areas of sparse finds can be assessed to determine whether the distribution is 'real'. That is, whether they are a product of deposition in the

period studied or whether they merely reflect areas where metal detecting does not or cannot take place. The so-called areas identified by Richards *et al* (2009) as being detrimental to find recovery were:

- Urban areas
- Forests
- Lakes
- Danger zones – military practice areas and firing ranges

Richards *et al* (2009) pointed out that their base maps do not include all factors which may potentially affect data recovery. There are other biases that are difficult to quantify. These factors may include the number of metal detectorists active in an area or the amount of land available for them to use. These factors are those that are identified by Robbins (2013b, 2014) as being particularly relevant for micro-level research and which needlessly overcomplicate maps of nationwide trends.

The key point of Richards *et al*'s (2009) framework is the idea of recovery versus reality when using PAS data. Only studies which take into account these possible biasing factors and interpret finds distribution with reference to them can provide accurate and reliable results. For this reason, it is important to be able to map the finds accurately.

2.5 Conclusions

All archaeology is data, however, large unstructured databases like the PAS have their own limitations and biases. This chapter has described the current literature in the field of big data in

archaeology. It has shown how such databases are used in archaeological research along with their limitations. It has also discussed the reasons why big data is often excluded from archaeological research due to a lack of secure stratigraphic context. The literature review has also discussed existing work in the field and how this fits in with the two research objectives identified in Chapter One. First, what can unstructured data be used for? How can it be used on a macro-level or nationwide scale? Many examples of existing research assessed PAS data on this level. For example, the VASLE project and the English Landscapes and Identities Project. Second, what are the strengths and limitations of the data? Can unstructured data be used to answer specific cultural questions? This chapter has demonstrated that much micro-level research using PAS data is in distributions across small geographic areas. Projects include assessments of site environs and multiple landscape projects. There are clear differences between excavated and PAS data. Both can be used in similar ways to an extent, such as using distribution maps of finds, but the lack of structure and stratigraphic context in PAS data makes its use beyond this more challenging. What else can unstructured data be used for and how can it best go beyond artefact distributions?

This research aims to understand the utility of unstructured big data for archaeology. The main value in large databases is the sheer volume of artefacts they contain and the way this vast amount of data can be mapped and studied together as a whole. One of the principal limitations of big data is that it may be more useful for large-scale research over a relatively wide area rather than a detailed analysis of a particular culture. This is down to the dating and context limitations of databases such as the PAS. The value of big data for addressing specific cultural questions will be assessed further in Chapter Six.

In conclusion, as long as the limitations and biases of the data are understood they can be used for research. The specific methodology of the research, acknowledging the limitations of the data and

overcoming the biases as much as possible, will be outlined in the next chapter. This will be partly based on the work of previous research projects summarised above but also take into account the objectives of the research in looking at the large- and small-scale use of the data. For instance, the large-scale mapping of finds and also what methods can be employed to try and answer specific cultural questions based on material in large databases such as the PAS.

3 METHODOLOGY

3.1 Introduction

This chapter will discuss the methodological framework of the thesis and introduce the statistical and spatial analysis that will be carried out on the data. It will also detail the harvesting, cleaning and data analysis techniques used. The methodology was constructed to take into account the two objectives of the research which took place on two levels: a macro- or nationwide, long-term level and a micro- or shorter term, cultural level. The PAS database covers England and Wales. Any mention of these countries as well as Britain or any counties should be understood to be referring to the modern countries/counties.

3.2 Choice of dataset

The choice of data is important in any research. In terms of big data and archaeology, the Portable Antiquities Scheme provides one of the largest unstructured archaeological databases in England and Wales. It is also an easily accessible body of data which can be utilised by both professional and amateur archaeologists. This aspect of the PAS makes it a particularly important tool for public engagement with archaeology.

The initial research outline utilised the PAS as a new, and relatively untapped, research resource that could add substantially to the database of archaeological material in Britain. Upon downloading the PAS database to incorporate these finds into a larger body of data, it quickly became apparent that the PAS database represented a research project in itself. Firstly, the data required cleaning and enhancement before they were available for use. The nature of the PAS database means that it is compiled by multiple different people across many different areas. This makes absolute consistency

difficult to achieve. Secondly, and most importantly, was the sheer volume of finds available for study and the accurate mapping which could be carried out with the location data available in the research database. These suggested a modified avenue of research would be profitable, assessing how useful the PAS is in archaeological research, determining the scope of its use and creating the best methodology for study.

The PAS is an important body of data, as discussed in Chapter 1.1. These finds often prove to be of great importance to archaeology. Although the PAS database mainly contains individual finds, when taken in aggregate these make up a vast body of data which should not be ignored. The database passed the half a million objects mark on 21 March 2010. Half a million objects is the point at which Pett (2010b) stated that the data would become statistically significant. It has subsequently reached over a million objects recorded (Portable Antiquities Scheme 2016). Recent work on PAS finds and third-party data (Naylor and Richards 2005, Richards *et al* 2009, Robbins 2013a, 2013b, 2014) makes a reassessment of the value of such data worthwhile.

The choice of dataset for the study also included whether to supplement PAS data with other datasets such as HERs, NMRs or online numismatic databases such as the Corpus of Early Medieval Coin Finds (EMC). It was decided that the PAS data would be used in isolation. Several other studies introduced in the previous chapter use big data from a variety of sources in their methodologies. These often used the PAS in conjunction with other datasets. For example, as part of a study into 'The Viking and Anglo-Saxon Landscape and Economy' (VASLE), Richards *et al* (2009) utilised both the PAS and the EMC. The EMC is a corpus of coins from AD 410-1180 in the British Isles and is based at the Fitzwilliam Museum, Cambridge (Early Medieval Corpus 2013). The VASLE project supplemented the PAS database with data from the EMC as, at the time the VASLE project was initiated, there were very few Early Medieval coins recorded by the PAS (Richards *et al* 2009).

Since the VASLE project began, the PAS database has incorporated two significant corpora of numismatic data, the Oxford University Celtic Coin Index (CCI) and the Iron Age and Roman coins of Wales project (IARCW) from Cardiff University (Portable Antiquities Scheme 2016). Writing in 2009, Richards *et al* also stated that the PAS was probably, at that point, the main source of records of early Medieval (circa fifth to the eleventh century) coinage. The EMC also only contains coins from AD 410-1180. Using this data would, therefore, bias numismatic data towards post AD 410 finds. For these reasons, it was deemed appropriate to make use of the numismatic data in the PAS database rather than incorporate data from other sources. Using only PAS data also helped to ensure that, as much as is possible, the data are consistent and collected under similar conditions.

Other studies of large databases have also omitted certain material either for research reasons or time and resource constraints on the researchers. One of the main issues with the Technologies of Enchantment Project (See Chapter 2.2) as a database for further study in this field is the omission of coins and particularly brooches (Garrow 2008: 19). This is explained as being down to time and resource constraints but it is also argued that coins and brooches are often not classified as art (the primary concern of the database rather than simply artefacts) (Gosden and Hill 2008: 1). Brooches are a key artefact on which decoration is found both in the Iron Age and the Anglo-Saxon period. The PAS brooch category is vast and contains many types and sub-types which are useful for dating and analysis (Geake 2019).

For this research it was decided that omitting coins would be detrimental. There are several reasons for this. First, omitting a category of artefacts for time and resource constraints does not necessarily produce the best methodology and most accurate results. The Technologies of Enchantment project's reason of time constraints for the omission of coins (the project also omitted brooches for the same reason) does not apply to this research. While J.D. Hill's project required the time and

resources to compile a research database from PAS, museum and published records, this research is focused solely on PAS data. This streamlines the data harvesting process and allows all artefact categories to be included in the database more easily.

Second, there are also issues with the reasons used by the Technologies of Enchantment project to back up their decisions. Coins are a valuable resource that it is important not to overlook. In terms of the aims of the Technologies of Enchantment project, they are usually decorated in some way and it is difficult to agree with Gosden and Hill's (2008) argument that their decoration should be dismissed as being any less artistic than other finds. For instance, images of the Emperor on Roman coins may reflect general trends in Imperial Portraiture. Julio-Claudian portraits were often concerned with demonstrating the dynastic continuity of the Emperors whereas the third century Emperors sought to emphasise their military origins and toughness with close cropped hair and beards (Zanker 2008: 82, 187). This can be seen in the coins minted during these periods (Figure 3.1 – Figure 3.3).

Figure 3.1 Silver denarius of Augustus, 2 BC - AD 9. The head of Augustus on the obverse demonstrates the Hellenistic influenced idealised portraiture of the period. Source: Basford (2013).

Figure 3.2 Silver denarius of Tiberius, AD 36 - 37. In order to consolidate his status, the portrait of the Emperor strongly resembles that of Augustan and Julio-Claudian portraits despite Tiberius being genetically unrelated to Augustus. Source: Collins (2013).

Figure 3.3 A silver denarius of Maximinus I, AD 235 - 236. The depiction of the Emperor is typical of third century soldier-Emperors, many of whom emphasised their military origins. Source: Griffiths (2013).

John Creighton (2000: 80-125) discussed the imagery in Iron Age coins and described the different Classical imagery with which coins were decorated. He also stated that the local people would have understood what the images on the coins represented and meant and discussed the chronology and development of coins, for example, the development of imagery on Gallo-Belgic gold (Figure 3.4). Coins, therefore, do seem to have some merit in terms of iconography and are also excellent indicators of chronology and dating. This makes the Technologies of Enchantment's decision not to include them debateable.

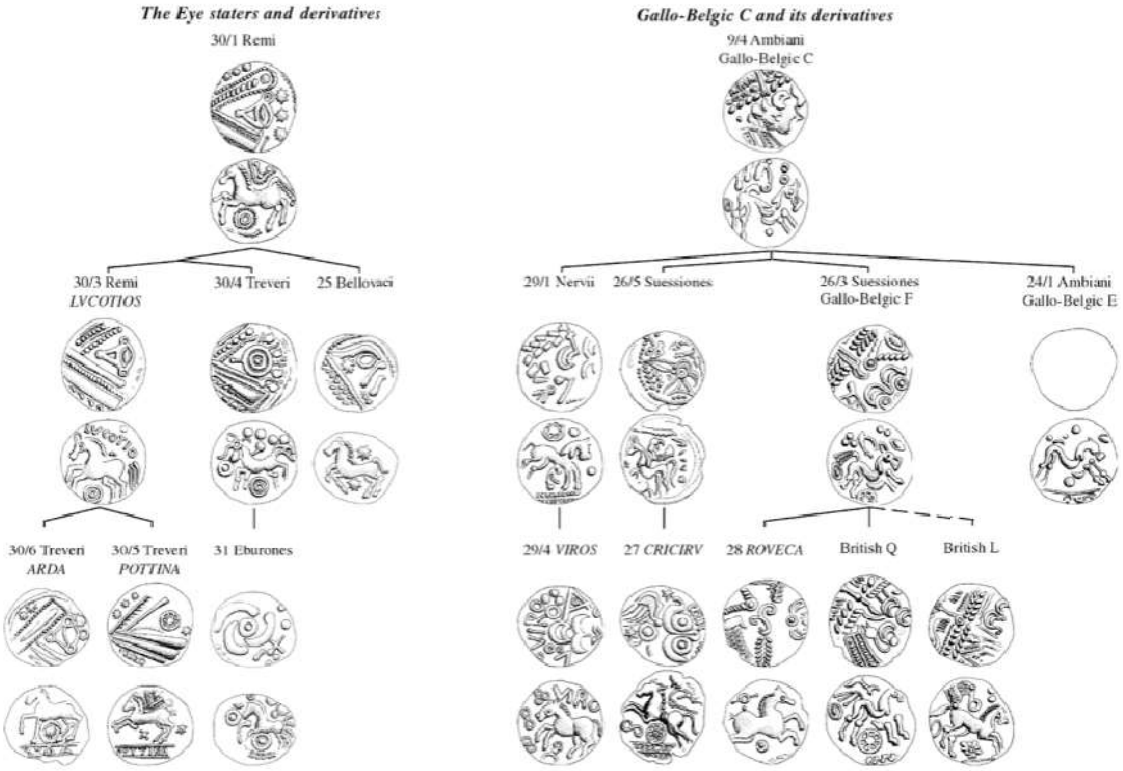


Figure 3.4 The development of imagery on Gallo-Belgic gold. Source: Creighton (2000: 71).

Coins are also reused by past societies, taking on another function beyond currency. Roman coins are often found in Anglo-Saxon contexts. For instance, White (1988: 62-101) catalogues 455 Roman coins from 102 different sites. King (1988: 225) noted that in most areas the majority of coins (around 60%) were perforated. This suggests that the reuse of Roman coins was intended for display, pushing them into the category of art studied by the Technologies of Enchantment project. This is linked to the wider practice of the reuse of, particularly late, Roman material culture in the post-Roman period.

Swift (2012) identifies the wide extent of the reuse of Roman bracelets and the difference in meaning for these artefacts pre- and post-transition. This was not the simple reuse of objects with continuity from the Roman to post-Roman period. Objects were reused in different ways and with different meanings attached to them.

The latter point is, however, less relevant to studies using the PAS where the date being used as an identifier is, necessarily, the date of manufacture rather than that of deposition. Therefore, when comparing distributions and types of artefacts in the database, the date of the artefact type in question is that of its first iteration. For instance, in the example of Figure 3.5, the date given is that of a coin of Constantine I circa AD 330-335 and not its second use in the Anglo-Saxon period or later when it was drilled and reused as a pendant.

Figure 3.5 A copper alloy Roman nummus of Constantine I, circa AD 330-335. The coin has two drilled holes for suspension, probably from reuse as a pendant in the Anglo-Saxon period. Source: Burr (2007).

Dating is also central to a further reason to argue against the choices of the Technologies of Enchantment to omit coins from a database which was heavily populated by finds from museums and the PAS. Coins are one of the few artefact types in the PAS that are accurately datable.

3.3 The Research Framework

In the previous chapter (see especially Chapter 2.4) it was established that unstructured PAS data require a specific methodology in order to use them effectively because the data differ in significant ways, such as lack of stratigraphic context, from excavated data. Although the database is easily accessible to members of the public and researchers, it cannot simply be downloaded and used without further work. Prior to any mapping or statistical work, the data must be cleaned and enhanced.

The data harvesting and cleaning steps are explained in more detail in Chapter 3.4. The research methodology was designed to tackle the specific requirements of PAS data and best address the aims and objectives set out in Chapter One. A two-part methodology was chosen (see Figure 3.6), analysing the data on both macro- and micro- levels according to the two objectives set out in Chapter One. This best allowed the questions of how PAS data can be useful and to what extent it can be used not only for nationwide distributions but also micro-level cultural questions to be answered. An initial assessment of the overall PAS database determined the parameters of the study and the overall utility of the PAS as a nationwide resource to be outlined. This also acted as a control dataset for the micro-level analysis of a specific case study which was used in order to try and answer cultural questions regarding a particular period. This two-part approach was chosen in order to best assess what is the most useful aspect of PAS data (and other examples of large, unstructured datasets in archaeology) and what the limitations of it are in archaeological study.

The framework for the research is shown in Figure 3.6.

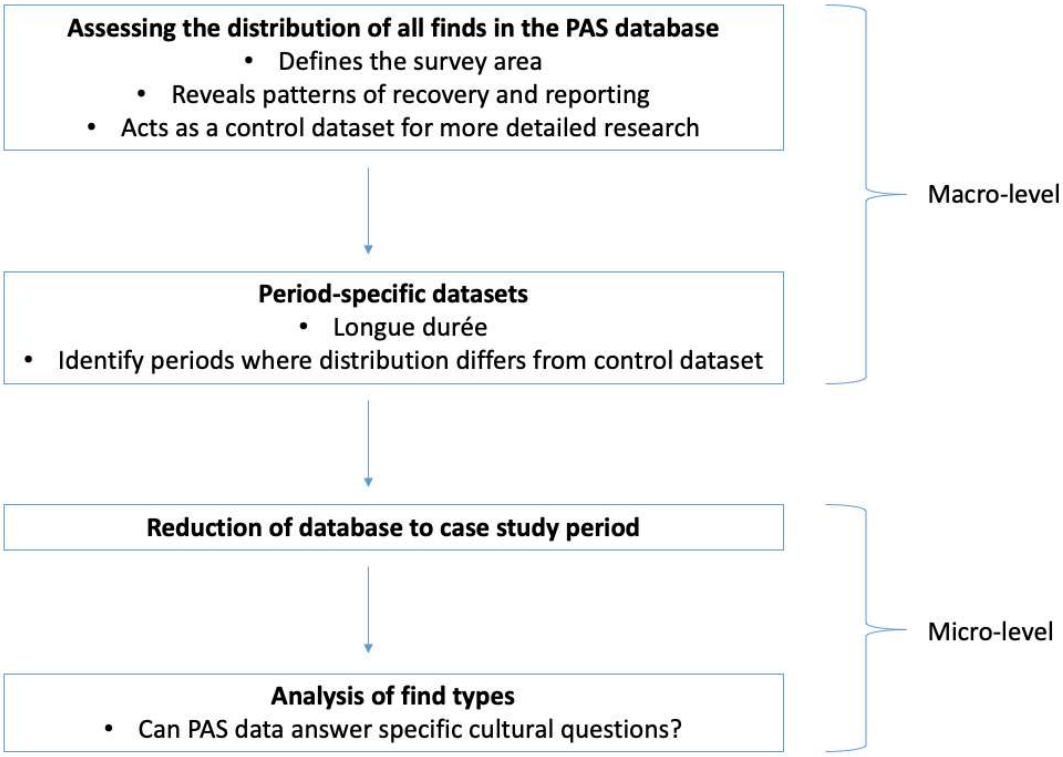


Figure 3.6 The research framework.

In order to ensure accuracy, the study of the entire PAS dataset as carried out by those involved in the VASLE project was repeated. Richards *et al* (2009) downloaded data for the entire PAS database on 18 July 2006 for quantitative analysis. A search of the PAS database (PAS 2013) revealed a total quantity of 207,550 records created on or before 18 July 2006 and 699,649 created between 18 July 2006 and 21 October 2013. As new artefacts are added to the PAS database all the time it was necessary to reanalyse the entire dataset.

3.3.1 Macro-level issues

This section of the framework was developed to carry out objective one. How can unstructured data be used on a macro-level? What can it tell us about long-term and broad-scale trends? Chapter 2.3.1 discussed the idea that large, unstructured datasets are an excellent tool for large scale issues in archaeology and that this is particularly done using distribution maps.

As identified in the previous chapter, one of the prime uses of PAS data is the construction of maps of finds distributions. These were produced for the study area of England and Wales in order to address objective one which was to assess how PAS data could be used on a nationwide scale. These were used to assess the distribution of PAS finds across the entirety of the PAS database. This is the type of approach used by the VASLE project (Richards *et al* 2009), using big data on a nationwide scale. In contrast, Robbins (2013a, 2013b, 2014) and Brindle (2013) favoured a micro-level approach, looking at degrees of field walking and land use of small areas in order to study PAS finds distribution. A methodology similar to that of the VASLE project was chosen for the initial macro-level analysis of the data. This was to allow assessment of nationwide trends in the data and how these compare to other archaeological studies. For instance, whether the trends in the PAS data have changed over time and how distribution of PAS artefacts compares to other aspects of British archaeology.

The macro-level issues will also consider the periodisation of PAS data and how the data change across historical periods. This will provide a baseline for further micro-level study within the dataset. Studying the data on a more micro-level could be done by narrowing down the area or period of study. As Robbins (2013a, 2013b, 2013c, 2014) has already effectively assessed PAS data across smaller areas and developed a research methodology, this research looked into PAS data on a more

micro-level in terms of a case study period, addressing specific cultural questions. The nationwide analysis also provided an overview of what PAS data can contribute to British archaeology in terms of the *longue durée*. This allowed the data to be used in an approach prioritising the long-term historical changes. This approach to history was championed by the *Annales* school who emphasised long-term processes caused largely by cultural and natural forces (Praetzellis 2015: 182). One of the pioneers of this approach, Fernand Braudel, used it in his studies of *The Mediterranean World* (1966) and *Civilization and Capitalism* (1992). In her work on *The Mediterranean World in Late Antiquity*, Averil Cameron (1993: 197) states that 'consideration of the *longue durée* is more helpful than the appeal to immediate causal factors'.

The central feature of PAS data is the record of its location data. This means the finds can be mapped accurately on a nationwide scale in order to facilitate broad-scale research projects using a vast amount of archaeological data. Mapping of finds is also the aspect of the PAS most championed by the scheme's ICT advisor, Daniel Pett (2013). Pett worked in IT prior to his work with the PAS and became responsible for all of the scheme's IT following the collapse of Oxford ArchDigital. His work involves research into linked data methodologies (PAS 2018). This makes Pett well qualified to comment on the links between archaeology and large, IT based, unstructured datasets. Chapter 2.3.2 discussed the limitations of what distribution maps can reveal and examined the meanings attributed to certain kinds of artefact.

Assessing the distribution of all finds in the PAS database helped to reveal the survey area and patterns of recovery and recording influencing the data. It also acted as a control dataset revealing areas of high and low finds density and allowed comparison of the overall finds distribution to areas where metal detecting is unlikely to take place. Going beyond distribution maps, the density of finds per square kilometre was used to assess the distribution of finds along the PAS's modern divisions

into various counties. Results were compared to known areas of relationships between detectorists and archaeologists which predate the PAS.

Macro-level trends in the data were identified using distribution maps of the entire PAS dataset. Along the lines of the Richards *et al*'s (2009) study, the entire PAS database and period-specific datasets allowed changes in distribution over time and geography to be assessed. This revealed long-term trends in the data such as those caused by topography and land use. The period-specific datasets showed how distributions change over time and if there are any differences visible in certain periods. Differences from the control dataset identified in a particular period may be considered to be more likely to reflect genuine historical deposition.

3.3.2 Micro-level issues

With regard to the second research objective, 'can unstructured data be used to answer specific cultural questions?', a methodology for research was also constructed. For this the data were reduced to a case study period to allow more detailed analysis of find types. This allows micro-level cultural questions to be asked of the data. Archaeology can borrow concepts from anthropology and art history in order to approach the study of material culture. This type of analysis of find types will determine whether PAS data have the required level of detail to tackle these kinds of questions.

Therefore, a significant further question regarding the utility of the PAS database is whether it can reveal any answers to smaller-scale questions about the kinds of artefacts used by people in past societies and the temporal trends. The latter is difficult to achieve with PAS data due to the lack of accurate dating of finds and whether the former is possible is one of the objectives of this thesis.

Objective two goes beyond distribution maps of artefacts. It also sought to overcome some of the biases which affect PAS data, particularly topography and modern-day land use which determine areas where metal detecting is carried out. Finds assemblages were analysed and statistical methods employed to determine what types of material culture are recovered from different areas. If objects can be cultural markers, then can differences and similarities in finds assemblages across different areas of England and Wales reveal anything about culture and society in a specific time period?

Once the data were cleaned according to the methodology outlined above, the spread of different types of artefact could be analysed using statistical methods. This was used to address questions such as whether differences in finds densities in different areas are statistically significant. In addition, analysis of find types as a percentage of the total assemblage was carried out. The location of findspots is biased according to variations in detectorist activity. This bias was somewhat overcome by looking at find types as a proportion of the overall assemblage in a particular area. This, however, introduced new biases that affect the type of artefacts present such as the presence or absence of ploughed out cemeteries in certain areas.

Statistical methods were used to determine whether distributions of finds and differences between proportions of different find types were statistically significant. As explained in Chapter 2.3.3, statistics are an excellent tool for analysis of large amounts of unstructured data. The previous chapter discussed methods such as significance testing to determine independence and Correspondence Analysis, to assess multivariate data.

The data analysed here have a single variable – whether there are more finds of a particular type in one area or another. For this reason, Chi-squared tests were chosen to determine whether the number of finds recovered is influenced by region. The data here require the use of a one-sample

Chi-squared test whereby the sample is compared to a theoretical distribution. In other words, how did the distributions of finds in various areas compare to a theoretical random distribution? Unlike cross-classified data, relationships between two variables are not being analysed, only whether there is a statistically significant difference between two assemblages with a single variable, in this case region.

3.3.3 Inconsistencies in the data

Chapter 2.4.1 discussed the inconsistencies inherent in PAS data. The database contains both inaccuracies and inconsistencies. These needed to be removed as much as possible in order to reach the most accurate conclusions.

The data needed to be cleaned in order to ensure as much accuracy and consistency as possible. The cleaning followed the methodology set out by Richards *et al* (2009) in the VASLE project. They checked for accuracy and consistency in the object description, location data and broad period categorisation of PAS artefacts. The VASLE project set out the best methodology for cleaning and enhancing large volumes of unstructured data. Whereas Garrow *et al* (2009) used only decorated examples of Late Pre-Roman Iron Age art as part of the Technologies of Enchantment Project, the VASLE project tackled the PAS database download in its entirety.

3.3.4 Biases in the data

The issue of bias in PAS data and how to overcome it has been discussed in Chapter 2.4.2. The chosen methodology combined Robbins's approach with that of the nationwide VASLE project (see Chapter 2.4.2 for a full discussion of each). It used Robbins's (2013a, 2013b, 2014) questions

regarding the nature of the PAS data (What is the survey area? How do patterns of recovery influence data? What are the reporting issues associated with the dataset?) along with the VASLE project's use of nationwide constraints maps, use of the entire PAS database as a control and period-specific datasets. This allowed easier analysis of limitations on the data than Robbins's (2013a, 2013b, 2014) more specific, small-area assessment of constraints. The use of period-specific datasets also allowed the *longue durée* approach to British archaeology to be used.

3.4 Data harvesting

The entire PAS research database up until 21 October 2013 (see Appendix One) was downloaded for study from the PAS website (Portable Antiquities Scheme 2013a). The site contains daily data dumps of the entire database and includes finds in the published and validated workflow stages. The daily research data dumps include location information not included in other database downloads. The following fields are provided:

- Knownas
- Gridref
- gridSource
- fourFig
- easting
- northing
- latitude
- longitude
- geohash,
- coordinates

- fourFigLat
- fourFigLon

Of particular importance to the research was the accurate mapping that the daily research data dump allowed. It contained data on find location such as latitude and longitude which could be used for mapping and statistical analysis. A CSV file of the PAS research database as of 21 October 2013 was downloaded for study. An excerpt from this database is shown in Table 3.1. The full database download can be found in Appendix One.

id	objecttype	broadperiod	periodFromName	periodToName	fromdate	todate	description	notes
485567	SEAL MATRIX	MEDIEVAL	MEDIEVAL		1200	1500	seal matrix with a pointed oval-shaped die and pierced lug to the reverse, measuring 32.04x19.78x(max)7.51mm and weighing 9.2g.	
288381	ABACUS						Copper alloy	

workflow	materialTerm	secondaryMaterialTerm	subsequentActionTerm	discoveryMethod	datefound1	datefound2	TID	rallyName
4	Copper alloy		Returned to finder	Metal detector	2000-01-01T00:00:00Z	2000-12-31T00:00:00Z		
4	Copper alloy			Metal detector	2009-12-01T00:00:00Z			

weight	height	diameter	thickness	length	quantity	finder	identifier	recorder
9.2			7.51	32.04	1	Mick Ashton	Katie Hinds	Katie Hinds
1.4			1.76	27.05	1	Joe Rainsbury	Andrew Richardson	Andrew Richardson

denomination	rulerName	mintName	obverseDescription	obverseLegend	reverseDescription	reverseLegend	tribeName	reeceID

cciNumber	mintmark	abcType	categoryTerm	typeTerm	moneyerName	reverseType	regionName	county
								Oxfordshire

district	parish	knownas	gridref	gridSource	fourFigure	easting	northing	latitude
	Broughton	Broughton	SU30133297		SU3032	430130	132970	51.095252

longitude	geohash	coordinates	fourFigureLat	fourFigureLon
-1.571119	gcnfsjxgqm2	51.095252\,-1.571119	51.086536	-1.573056
			0	0

Table 3.1 Excerpt from the full PAS database download. Data from the PAS.

The data for this research was harvested from the PAS research database prior to cleaning and enhancement. Finds in the PAS database can be exported as Keyhole Markup Language (KML), Comma-separated values (CSV), Historic Environment Record (HER) or Portable Document Format (PDF) files.

The uses of each of these file formats is as follows:

- KML – Keyhole Markup Language allows geographic data to be displayed in an Earth browser such as Google Earth or Google Maps (Google Developers 2012).

- CSV – Comma-separated Values are a tabulated data saved as plain text, separated by commas. The file can be opened and edited in a variety of spreadsheet programmes including Microsoft Excel (Fry 2008 299-303).

- HER – data can be exported for import into the Historic Environment Record (HER).

- PDF – exports tabulated data into a Portable Document Format (PDF).

Users are limited as to the number of objects which can be exported from a search at any one time. It is, therefore, best to download the full dataset for analysis (Pett 2013). For this study, the PAS data were downloaded as a CSV file. This can be edited using Microsoft Excel, allowing ease of statistical analysis through the spreadsheet's functions. This includes sorting the data, creating graphs and charts and using mathematical analyses. Further use of the data by other researchers is also possible. As identified by Donnelly *et al* (2014) in their study of the English landscape, simple maps of finds are not always helpful due to the biases inherent in the data. The use of CSV files also allowed other methods of visualising the data to be used, for example, pie charts and scatter graphs as well as other statistical techniques.

The PAS database is updated on a regular basis with new finds. For instance, a search of finds recorded on 30 July 2013 showed that 157 records were added to the database on this date. The total quantity of finds added was 503 (the maximum quantity of finds for one record on 30 July 2013 is 309). This means that it was necessary to set a date limit on the harvesting of data. Since the

VASLE project was completed, a new PAS website was soft launched on 24 March 2010 and added to and adapted over the next six months (Pett 2010a). This had new features not available to the researchers involved with the VASLE project. The new website integrates a number of new features: the Ordnance Survey (OS) 1:50K dataset, the English Heritage Scheduled Monuments dataset, Yahoo! GeoPlanet's data (this provides a system for geo-referencing data on the internet) and old OS maps from the National Library of Scotland (Pett 2010a). Detailed searches are possible and results exported in a variety of file formats as explained above. Artefact record pages include high-resolution photographs of the artefacts where available. These new features all allowed easier analysis of finds distribution. Such features impact on the methodology used for data harvesting and study. They also affect the framework set out by the VASLE project and which has been adapted for use here.

3.5 Data cleaning

Although the data harvesting of PAS finds was a simple step, the nature of the PAS database meant that cleaning of the data was vital to ensure accurate results. This is partly because the data are unstructured. The data cleaning represents the answer to part of objective one. How can the data be best used? The PAS database has been put together from regional finds records by many different individuals and over a long period time. This is bound to create inconsistencies in the data that needed to be addressed before the data could be analysed. The non-standardised nature of the PAS has been discussed in Chapter 2.4.1. Many of the artefacts in the PAS database are listed only by broad period such as Early Medieval rather than subdivided by specific dates or early or middle subgroups. Having been compiled by many different FLOs, the PAS entries do not always follow best practice codes. Some artefacts were classified differently to other, almost identical, ones. Others were classified differently according to 'type' and 'class'. Naylor and Richards cite the example of late Anglo-Saxon stirrups. In some cases, these are classed as stirrups for type and according to Williams's

(1997) typology under class. In others they were described as horse trappings under type and stirrup strap mounts under class. Naylor and Richards (2005: 88) describe the need to clean the data, deleting all non-appropriate data, and enhance it, ensuring it is as accurate and standardised as possible.

The initial 21 October 2013 research database downloaded from the PAS website consisted of 525,105 rows of data. In order to ensure accurate counting of finds records, the database was first edited to ensure that each row of the database represented one finds record. Several of the records for hoards were spread over multiple rows in the CSV file. Removal of 1,077 excess rows revealed the total number of finds records in the uncleaned database to be 524,028.

Cleaning of the database consisted of a number of steps. First, the database was studied for records which needed to be deleted from the database. All finds from outside England and Wales were removed and one duplicate record was also deleted. The PAS only covers England and Wales and so any finds reported from outside this area will not represent as accurate an account of the finds made by members of the public in these locations. Finds from outside England and Wales included a total of 131 finds from:

- France
- Scotland
- Belgium
- Germany
- India
- Jersey
- The Netherlands

- The Isle of Man

Second, the records in the database were studied for those which needed to be expanded from one to several independent records. Some of the records in the PAS database contain more than one artefact. The VASLE project chose to separate these records into single entries (Naylor and Richards 2005: 89). For this research, entries with more than one item were assessed to determine whether they required separation into multiple records. Many were left as single entries as the finds appeared to be fragments from the same item. Large hoards were also left as a single entry in order to prevent biasing the data. When carrying out statistical analysis on the data a single large hoard which has been separated into multiple finds records could artificially inflate the number of finds relative to other areas. The above cleaning process resulted in a database (Appendix One) which could be used for research with a total of 523,896 finds from England and Wales.

3.5.1 Location data

It has been established in the previous chapter that one of the main strengths of PAS data is the number of finds which can be mapped to study distributions patterns throughout history. It has also been put forward by Pett (2010b) that the context of PAS finds is in their spatial location as opposed to the chronological context of traditionally excavated finds. For this reason, it is vital that detailed location data are available for as many finds as possible.

Of the 523,896 records in the database, 489,879 (93.51%) have the latitude and longitude data used by geographic information system programmes such as ArcGIS to map the find spots. For comparison, the PAS dataset used by the VASLE project contained 137,090 records, 122,067 (89.0%) of which could be mapped.

In order to further assess the distribution of the entire PAS dataset, the number of finds per county was calculated. This allowed easier visualisation of finds density in each area covered by the PAS. It was also useful in allowing the inclusion of finds with no latitude and longitude data in a distribution map of finds density and so maximised the number of finds available for study. Out of a total of 523,896 finds records, 500,994 (95.63%) have a county, unitary authority or metropolitan borough recorded. This left 22,904 finds records in the original database of finds from the United Kingdom with no county recorded.

The number of finds per county in this initial, uncleaned database were counted in Microsoft Excel using the formula '=COUNTIF(range, criteria)' to count the number of entries for each county, unitary area or metropolitan borough and counting any blanks using the formula '=COUNTBLANK(range)'. The results of this can be seen in Table 3.2.

Unitary authorities such as Stoke-on-Trent have their finds recorded separately from the parent county (in this case Staffordshire) whereas other large cities such as Nottingham do not. The full list of counties, unitary authorities and metropolitan boroughs from which finds are recorded in the PAS database can be seen in Appendix Three. For the sake of simplicity, this work took the example of the PAS data dump download (Appendix One) and refers to these areas as counties regardless of whether they are true counties, unitary authorities or metropolitan boroughs. Therefore, any following use of the term county (such as number of finds per county) refers to one of the administrative regions listed in Appendix Three unless stated otherwise.

The next step in cleaning the data was to address the records with missing location data at the county level. Out of 523,896 records, 22,902 (2.37%) have no county recorded. However, a number of these records do have other location information recorded such as parish, grid references or

latitude and longitude data. This allows the missing data to be reconstructed from that which is available.

Where possible, the county has been added to the finds record. The UK Grid Reference Finder (2008) was used to find the county from the grid reference or latitude and longitude data. The number of blank cells in the county column in this new database is 16,689 (3.19%). County data was able to be added for a total of 6,213 finds (a 27.13% decrease).

It was necessary to leave some records blank as there was either no or insufficient location data to determine the county. For example, finds recorded as being from 'Llanfair' could be from any number of locations in Wales with that name (there is a Llanfair in Ceredigion, Gwynedd, Powys and the Isle of Anglesey). Other finds were recorded no more specifically than 'Wales' or 'Yorkshire'. With no other location information such as a grid reference or latitude and longitude data these cannot be placed in a specific county.

There were a number of finds for which this was the case. For such finds it was necessary to leave them with no county data as the records lacked sufficient information to narrow it further. These were the finds from the following locations:

- Fosse Way (1)
- MAT.F.1 (2)
- South East England (1)
- Wales (1)
- Yorkshire (55)
- Sussex (1)

- Norton (1)
- Llanfair (1)

A number of counties had finds added to their total via this process (Table 3.2). The new numbers of finds per county after cleaning had been done were then used for all future analysis. This demonstrates the importance of cleaning and standardising the PAS database before it can be effectively used for research. There were six counties for which over 100 finds were added by this cleaning process:

- Cheshire East (1367)
- Cheshire West and Chester (1321)
- County of Herefordshire (1254)
- Central Bedfordshire (1130)
- North Somerset (643)
- The Vale of Glamorgan (112)

Six counties also have a percentage increase of over 100%:

- City of Wolverhampton (2400.00%)
- North Somerset (1339.58%)
- Birmingham (1333.33%)
- Cheshire East (198.98%)
- Cheshire West and Chester (178.76%)
- County of Herefordshire (156.55%)

It is worth noting that the percentage increase for the Isles of Scilly is not possible to calculate as the original value is zero.

County	No. of finds - cleaned	No. of finds added by cleaning	County	No. of finds - cleaned	No. of finds added by cleaning
Cheshire East	2054	1367	**East Sussex**	9036	1
Cheshire West and Chester	2060	1321	**Isle of Anglesey**	926	1
County of Herefordshire	2055	1254	**Kent**	17580	1
Central Bedfordshire	2619	1130	**Lancashire**	2229	1
North Somerset	691	643	**Lincolnshire**	37878	1
The Vale of Glamorgan	2319	112	**Manchester**	4	1
Cardiff	1417	44	**Newport**	4924	1
Birmingham	43	40	**Oldham**	8	1
Stockton-on-Tees	110	38	**Reading**	166	1
Dudley	149	33	**Rotherham**	595	1
Wiltshire	11879	31	**Salford**	7	1
City of Wolverhampton	25	24	**Staffordshire**	5484	1
County Durham	1141	19	**Warrington**	86	1
Leicestershire	11430	19	**West Sussex**	9589	1
East Riding of Yorkshire	17155	17	**Wigan**	12	1
St. Helens	57	14			
North Tyneside	85	12			
Northumberland	1616	12			
Bedford	3003	10			
Isles of Scilly	9	9			
North Yorkshire	16837	6			
Powys	6762	6			
Rhondda Cynon Taff	41	6			
Monmouthshire	19717	4			
West Berkshire	2596	4			
Leeds	855	3			
Bridgend	2041	2			
Calderdale	147	2			
Hampshire	20737	2			
Middlesbrough	5	2			
Somerset	9487	2			
South Gloucestershire	2302	2			
Wakefield	1045	2			
Worcestershire	4755	2			
Blaenau Gwent	13	1			
Bracknell Forest	213	1			
Bradford	118	1			
Doncaster	2306	1			

Table 3.2 The counties for which the total number of finds has increased in the cleaned database and the number of finds added by the data cleaning/enhancement process. Data from the PAS.

The cleaned data for the number of finds per county was used to calculate the density of finds per square kilometre. The OS OpenData contains information on the area of each county. The dataset 'Data: Boundary-Line – GB' has been used (Ordnance Survey 2013). It was necessary to manipulate some of the data to allow it to be plotted on the map provided by the OS (Ordnance Survey 2013b) which can be seen in Figure 3.7 and Figure 3.8.

The OS records areas for the districts which make up each county. These were added together to calculate the area of each county. Any unitary authorities in which finds are recorded separately in the PAS database were excluded and counted separately. For instance, the OS database records areas for the districts which make up the county of Devon:

- Exeter district
- East Devon district
- Mid Devon district
- North Devon district
- Torridge district
- West Devon district
- South Hams district
- Teignbridge district
- Plymouth unitary authority
- Torbay unitary authority

Torbay Unitary Authority is recorded separately from the remaining areas.

The cleaned data in Appendix Two, along with data from the OS, were used to calculate the number of records per square kilometre (Appendix Three). These densities could then be graphically depicted on a map of the UK (Figure 3.7 and Figure 3.8).

It must be remembered that a county is an arbitrary choice of area in which to study the finds since these administrative areas did not exist for the periods from which the PAS finds date. Nevertheless, it is a useful way to assess the relative density of finds across Britain. Furthermore, the PAS operates on a regional basis, with a FLO for each county (or multiple counties depending on workload). This means that variation in finds distribution is visible at county level and that modern limitations, such as how long the PAS has been in operation in each area, could be assessed.

Comparison of the maps of finds per square kilometre before and after cleaning (Figure 3.7 and Figure 3.8 respectively) showed that the overall distribution of finds was largely unchanged. After cleaning the highest density of finds is still in the south and east and the majority of counties remained in the same category as before data cleaning. This is likely to be due to the sheer number of finds in the database. Even cleaning a high volume of data amounts to a relatively small proportion of the total finds and so has little effect on the overall pattern. This suggests that data cleaning becomes more important on a micro-level where the number of finds would be lower.

The only changes are as follows:

- Central Bedfordshire: from green (2.08 finds per sq km) to yellow (3.66 finds per sq km)
- Cheshire East: from blue (0.59 finds per sq km) to green (1.76 finds per sq km)
- Cheshire West and Chester: from blue (0.79 finds per sq km) to green (2.19 finds per sq km)
- Dudley: from blue (1.18 finds per sq km) to green (1.52 finds per sq km)

- Isle of Anglesey: from blue (1.23 finds per sq km) to green (1.24 finds per sq km)

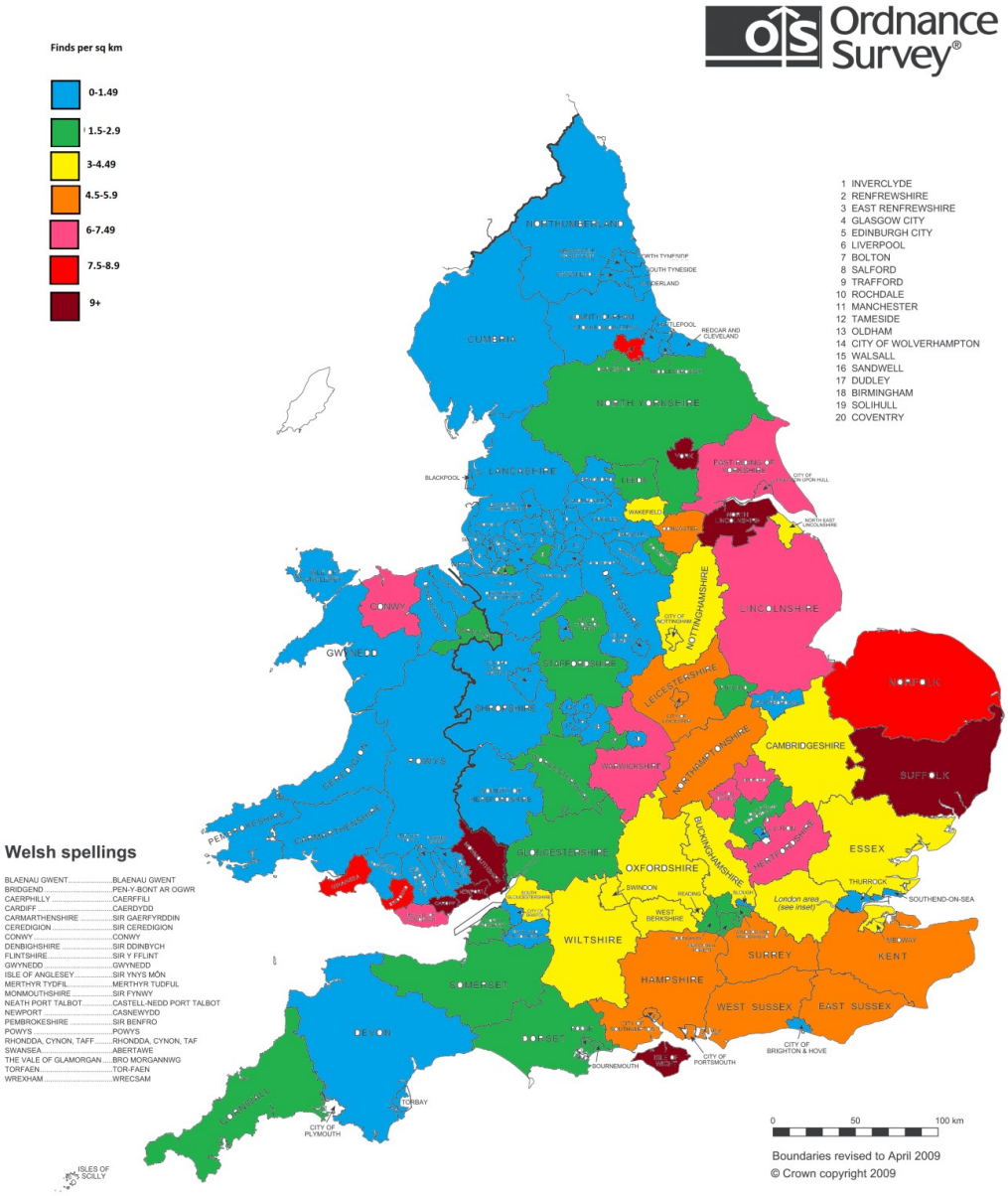


Figure 3.7 The number of finds per county before cleaning. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

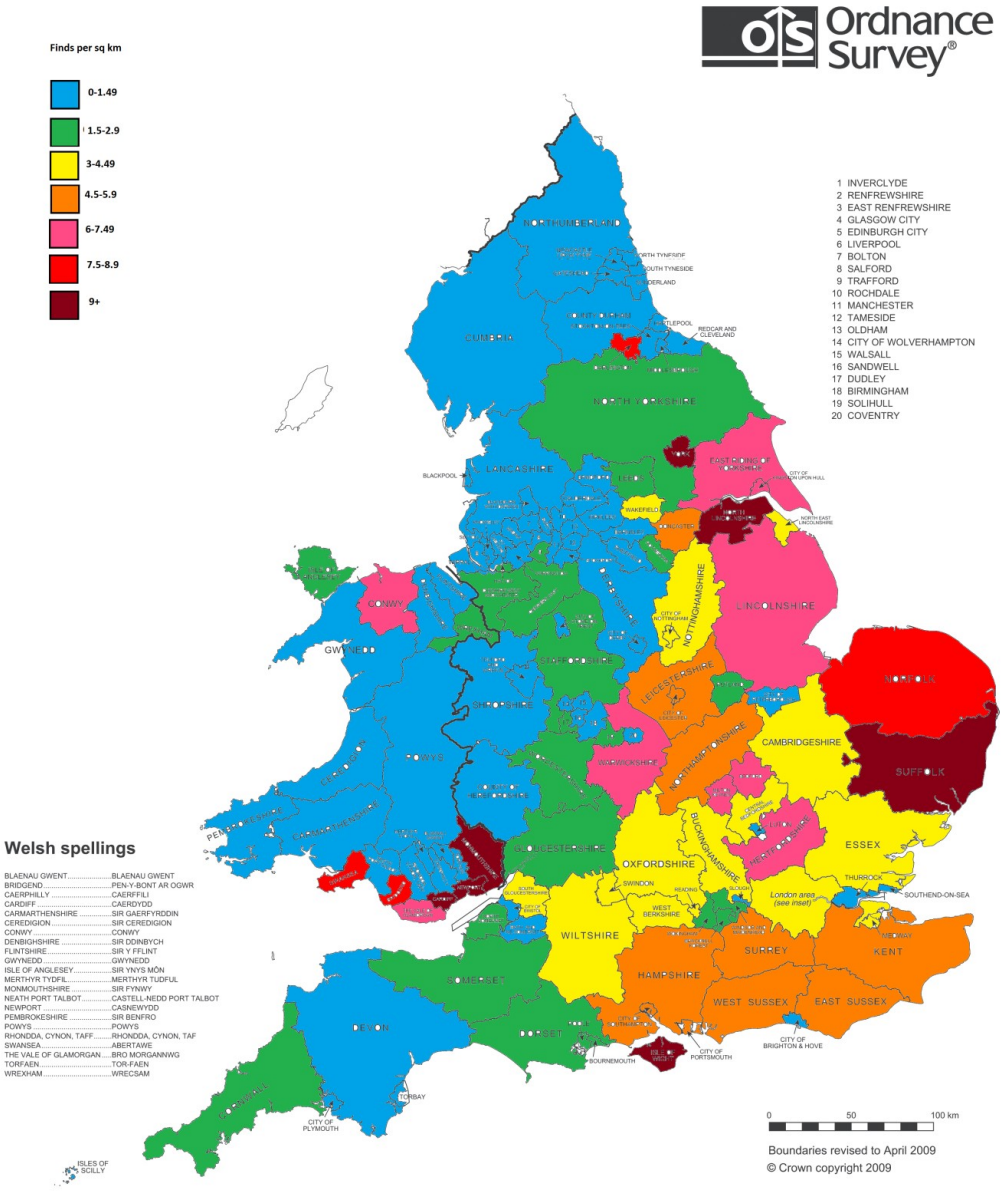


Figure 3.8 The number of finds per county after cleaning. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

3.5.2 Data cleaning: object type

As with the find location, it was important to clean the data in terms of object type. There were no finds in the database which did not have an object type recorded, however, the data still needed cleaning to ensure that all terminology was consistent.

The data were cleaned to ensure that object terminology was consistent across the database. The nature of the PAS database means that it comprises data from a number of different areas and FLOs. This means that terminology may not always be used in a consistent fashion. Data were also checked for accuracy. In order to achieve accuracy and consistency the PAS (2013e) 'Preferred Terminologies' were used as a guide. The terms used by the PAS are derived from the British Museum Object Names Thesaurus (British Museum 1999). This was set up by the Collection Data Management Section (CDMS) Working Party with curatorial advice. The CDMS Working Party also contributed to the Museum Documentation Association (MDA) Archaeological Objects Thesaurus which was used by the PAS alongside the British Museum Object Name Thesaurus to derive the preferred object terms.

Many of the terms found in the database download are what the PAS (2013e) refer to as 'narrow terms'. For example, belt fitting, plate, mount, slide and chape are all deemed narrow terms, with simply 'belt' being the PAS preferred term. (Portable Antiquities Scheme 2013a). Narrow terms in the database have been changed to the preferred term as necessary. Table 3.3 shows object terms found in the PAS database download and the PAS preferred terms to which they were changed. In some cases, the narrow term has been retained in a new column in the database. For example, the PAS (2013e) state the preferred term as being 'brooch' for brooch types such as small-long brooch. For more detailed analysis, it is helpful to have a narrower definition of object type.

It was also necessary to alter a number of other object terms in the database. There were ten finds recorded as being a 'Blade'. The 'Controlled Terminologies' (Portable Antiquities Scheme 2013b) defines a blade as 'A struck piece of flint or other stone where the length is at least twice the width'. The Roman and Early Medieval 'blades' were made of either copper-alloy or iron and have been changed to 'Cutting Equipment', accordingly. There were also eighteen Brooch Pins in the database. These are defined as being 'A specific type of early medieval pin' with the instruction not to use if the object is simply a pin that has become detached from a brooch (Portable Antiquities Scheme 2013b). All but one of these brooch pins were recorded as being Roman, dating from AD 1 - 410, and all were described as being the detached pin of a brooch such as in Figure 3.9

Figure 3.9 A copper alloy brooch pin probably from a bow brooch, circa AD 43 – 175. Source: Scott (2008).

Incorrect object labelling has important implications for analysis and conclusions drawn from PAS data. Without correcting the identification of the objects, incorrect assumptions would be made about items both in terms of their usage and probable date range. For instance, without cleaning, all of the pins detached from brooches which have been mislabelled as 'brooch pins' could be thought to be Early Medieval (AD 410-1066) and an entirely different class of artefact. This is particularly relevant in micro-level studies where the smaller number of finds means that errors may not be averaged out across a vast dataset. This means it is possible to use the entire PAS dataset to gain a broad picture but for micro-level studies in either time or space cleaning becomes more important as the data size reduces.

Other finds were not recorded with specific enough object terms. Eleven finds were recorded as 'Chape' rather than the preferred terms of 'Scabbard Chape' or 'Belt Chape'. These were amended where possible based on the item description (Table 3.3).

Term Found in PAS database	Preferred Term	Term Found in PAS database	Preferred Term
Architectural	Architectural Element	Ring Bezel	Finger Ring
Bell clapper	Bell	Scabbard Fitting	Scabbard
Belt fitting	Belt	Scabbard Chape	
Belt plate		Scabbard Slide	
Belt mount		Seal Box Lid	Seal Box
Belt slide		Shaft	Unknown
Chape		Spearhead	Spear
Bird Mount	Mount	Spoon Bowl	Spoon
Bolthead	Projectile Weapon	Stand	Unassigned
Bow Strengthener	Bow	Decorative Panel	
Box Fitting	Box	Drop Handle	
Brockage	Coin	Terminal	Strap Fitting
Brooch Fragment	Brooch	Strap Union	
Brooch Spring		Strap Mount	
Small Long Brooch		Strap slider	
Building Material	Architectural Element	Tablet	Writing/Tablet
Casket Mount	Casket	Toilet Implement	Toilet Article
Cosmetic Implement	Cosmetic Article	Trade weight	Weight
Fixture and Fitting	Fixtures and Fittings	Lead Weight	
Fitting		Uncertain	Unidentified object
Connector		Unidentified	
Harness Link	Harness Fitting	Unknown	
Hone	Whetstone	Unidentified Fitting	
Horse Harness	Harness	Vessel Fragment	Vessel
Human Bone	Human remains	Vessel Lid	
Jeweller's Test Piece	Jewellery	Vessel Mount	
Key	Key (locking)	Vessel Pot Sherd	
Knife Handle	Knife	Weaving Implement	Textile Equipment
Lock Bar	Lock	Workbox	Box
Lock Bolt	Lock	Wrist Clasp	Wrist Band
Loom Weight	Loomweight	Terret	Harness Ring
Mortar	Architecture	Terret Ring	
Needle/Pin	Needle	Building Material	Architecture
Needle Case		Daub	
Needle Case	Needle	Daub	
Pin Beater	Weaving Implement	Pin Head	Pin
Plough Coulter	Plough	Buckle frame	Buckle
Pommel Cap	Sword	Buckle plate	Buckle
Sword Pommel			
Sword Chape			
Pot Sherd	Pot		
Pot Mend/Repair			
Pot Sherds			
Pottery			
Sherd			
Ceramic			

Table 3.3 The object terms found in the PAS database and the preferred terms to which they have been changed.

3.6 Choice of case study

Although the macro-level issues necessarily involved the entire PAS database, the question of whether the PAS, and thus other large unstructured data, can be utilised to study small-scale questions of artefact use and meaning required the trimming down of the dataset to a more manageable number of finds. Objective two required study on a more micro-level with fewer finds and specific cultural questions. This case study will then be used for a more detailed analysis of find types in the PAS database in order to determine whether unstructured data can add to current archaeological thought on a particular time period. The case study period was required to be one of change across both time and space. This allowed the change from one period to another to be studied and the material culture assemblages in different areas to be assessed to determine whether they act as any kind of cultural marker.

The period of the fourth to the sixth century AD was chosen as a case study for this research. Due to the time period covered, all dates mentioned can be assumed to be AD unless otherwise stated. This period was chosen as a case study as the period is a time of complex change in the archaeology of what is now England and Wales. The same could be said of other times of transition in British archaeology, for example, the so called 'Neolithic Revolution' when humans transitioned from hunter gatherer societies to agricultural ones (Barker 2009). Stone Age transitionary periods were not considered since the majority of PAS finds are recovered by metal detectorists (Robbins 2014: 11). This meant that there are insufficient numbers of finds from the Mesolithic or the Neolithic to conduct an overall analysis.

The period of change from the Iron Age to the Roman period could also have been studied. Whereas some archaeologists view the Roman conquest as the end of Iron Age British society with no

amalgamation between the two cultures possible (Collingwood and Myres 1998: 261; Chadwick 2001), others see the continuation of Iron Age society into the Roman period (Haverfield 1923: 14; Laing 1997; Davis and Gwilt 2008: 146). Iron Age societies may have been particularly fragmented on a very local level (Hill 2011: 244-46) which makes study on a nationwide scale difficult. Anglo-Saxon and Roman societies were, of course, regionalised but on a larger scale (White 2007: 60). Manley *et al* (2018: 41) discuss the highly fragmented nature of Iron Age society, identifying that an area as small as the Fishbourne and Chichester area has a distinctive archaeological record and that 'there may well be a particular character to the Early and Middle Iron Age occupation of this area'. In his assessment of the regionalisation of Anglo-Saxon settlement in England and Wales, Blair (2014) described a much broader pattern with what he calls the 'Anglo-Saxon building culture province' across eastern England and parts of east Yorkshire. This zone (Figure 3.10) has produced buildings, associated finds and boundary-ditch systems that delineate the areas of Anglo-Saxon settlement. This same area is also rich in metal detected finds (Richards *et al* 2009; Robbins 2013a, 2013b).

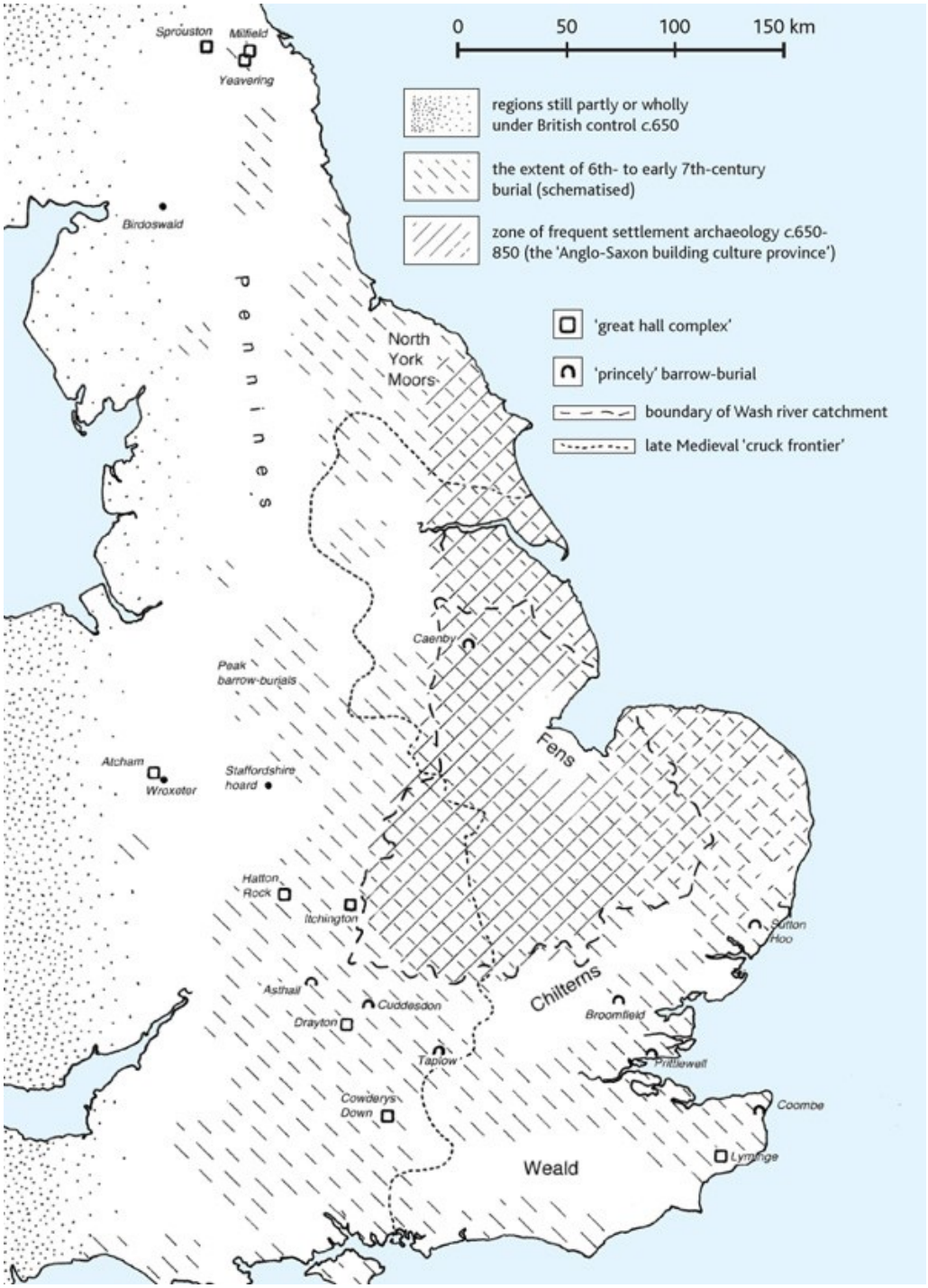


Figure 3.10 A map showing regional diversity in mid-Saxon England. Based on archaeological data and shows the area to the east with greatest evidence of Anglo-Saxon settlement. Source: Blair 2014: 23.

During the fourth to the sixth centuries AD, the provinces that made up Britain left direct Roman control, creating debate amongst archaeologists as to the degree of 'continuity or collapse'. The period also saw the influx of a new and distinctive Anglo-Saxon material culture in the eastern and southern half of England. The *Adventus Saxonum* is part of the English national mythology. It is the origin story of the English people and can be traced back to the writings of Gildas probably in the sixth century AD (Gildas, *De Excidio Britanniae*) and Bede who, writing in the eighth century, described the coming of the Saxons *en masse* to Britain in the mid fifth century (Bede, *The Ecclesiastical History of the English People*).

Despite being overwhelmingly influential in accounts of the Romano-British to Anglo-Saxon transition, these non-contemporary literary sources are increasingly thought to be unreliable (Moreland 2000: 38; Halsall 2013). This time period still causes debate amongst archaeologists as to the extent of any possible migration of Germanic peoples and the identity of those people living in western Britain and eastern England from the fall of the Western Roman Empire to the influx of Germanic-style material culture in the fifth and sixth centuries.

In particular, the material culture of the late Roman and early Anglo-Saxon period is worthy of study since, as explained above, this was a time of profound change within Britain. The changes in material culture are vital to understanding the Romano-British to Anglo-Saxon transition. Higham (1992: 208-36) stated that we know relatively little regarding the social, political and religious structure of sub-Roman Britain and so the best we can do is to construct hypotheses. His hypothesis for this period discusses the material evidence and the rise of 'Englishness' as it is mirrored in the archaeological record as communities took on aspects of the material culture of the dominant cultural group. Higham (1992, 2005) also discusses the change in material culture in lowland Britain associated with the end of the Roman period. He deems differences in the adoption of new types of material culture

to represent areas which underwent social change and upheaval versus those that remained largely Roman in nature. In her study of *Early Anglo-Saxon cemeteries of East Yorkshire,* Sam Lucy also highlighted the importance of material culture as an active component of identity and ideology. Williams (2005: 545) stated that recent, post-processual approaches have led to new ways of thinking about material culture, particularly in the context of the early Anglo-Saxon burial rite. Mortuary practice, including use of grave goods, is seen as being used to construct memories and identities during a period of economic, political and social transformation. Henig (2004: 15) also supported the use of material culture in studying the period. He stated that we should approach the period of late antiquity (the transition period between Classical Antiquity and the Medieval period) from artefacts such as jewellery and dress items. He states that, apart from language, the way people dressed and the accessories they wore were 'the surest way to represent identity' (2004: 13). He saw these as suggesting that there was a degree of continuity of Roman culture due to reuse of Roman objects and influence of Roman art on Anglo-Saxon styles (see Chapter 5.4.2). Therefore, the material culture of the Roman to Anglo-Saxon transition in England and Wales is worthy of study.

In his study of late Roman military identity, Gardner (2007: 17) highlights that Roman culture is evidently different to modern culture and, therefore, that material culture needs to be re-examined in detail 'with a full appreciation of its context'. He suggests, therefore, that analysis should focus on patterns evident in material culture and what these can reveal about the lives of the people who use it. Henig (1995: chapter 7; 2004: 15) also points out the importance of placing material culture within its context. The style of Roman material culture was not constant from the beginning to end of the Roman period. The change in material culture into the late Roman period included greater use of ostentatious jewellery and gold openwork, typified by the Thetford and Hoxne hoards. The methodology developed for this study, as outlined above, allows the placing of the case study period in context with regard to longer-term trends (see Chapter 3.6). The above suggest that an analysis of

the vast amount of material culture data held in the PAS database for this period would be worthwhile in order to determine how useful the data are for answering specific cultural questions about a given period and placing the material within its context (see Chapter 1.2.2).

There was a considerable change in fourth to sixth century Britain associated with the end of Roman occupation and the influx of Anglo-Saxon culture. There is a clear difference between the archaeological evidence for the two cultures. As Lucy (1998: 2) describes, Roman Britain is characterised by 'settlement evidence, monumental architecture, distinctive building styles, imported pottery and metalwork'. The evidence is very much centred on the world of the living. On the other hand, the archaeological evidence for Anglo-Saxon England comprises mainly cemeteries distinguished by their grave goods (Lucy 2000: 1). Traditionally, a cultural divide between Anglo-Saxons to the east and Britons/sub-Romans to the west has been assumed. Some archaeologists dispute this idea and have suggested that this distinction is not as clear as once thought (Moreland 2000: 33). Further detail on the debate about this topic will be discussed in Chapter Five.

The period of transition in Britain in the fourth to sixth centuries is 'invisible' in many respects both to the people living at the time and modern archaeologists and historians. This makes it an important period worthy of study. As White (2007: 15) pointed out, one of the important things to remember when studying history is that, for the people at the time, 'history' the way we study it today did not exist. Unlike modern archaeologists and historians, the people living at the time had no foreknowledge of what was to come and often only a limited understanding of the past due to folk memory, oral tradition and often unreliable written sources for those who were literate. This can mean that archaeologists who typically view late Roman Britain in terms of the first century Empire and its politics are not looking at the period the way the people living at the time would have done. When the Roman armies withdrew, the people living in Britain would not have immediately

understood that they were never returning. Neither would they suddenly have self-identified differently. After over three centuries of Roman rule in Britain, life before Rome would have been long out of living memory. People who viewed themselves and their families as, to some degree, Romano-British are unlikely to have fundamentally changed in terms of ethnicity and cultural identity following the withdrawal of Roman troops. This view is summed up in a satirical cartoon published by Punch (Figure 3.11).

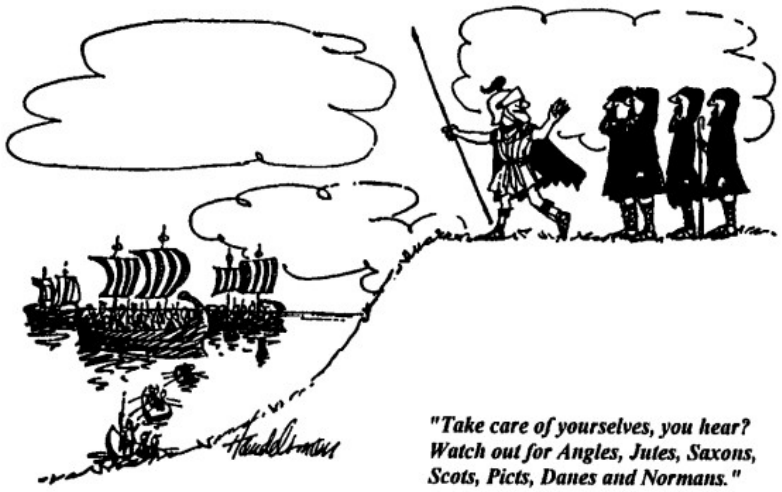


Figure 3.11 A cartoon published by Punch showing the Romans waving goodbye to the native Britons. Source: Arnold (1997: 19).

In terms of archaeological and historical research, the period is often also 'invisible', particularly in the case of artefact research. Many modern works on Anglo-Saxon material culture have focussed on manufacturing techniques and processes (for example Coatsworth and Pinder 2002; Leahy 2003) or art and decoration (for example Suzuki 2000; Inker 2006) rather than discussing the broader object types and their distributions. Thus, the high degree of visibility in this period and the distinctiveness of the respective cultures, made it an ideal test case for the micro-research objective.

3.7 Conclusions

This chapter has set out the methodology of the research as summarised in Figure 3.12

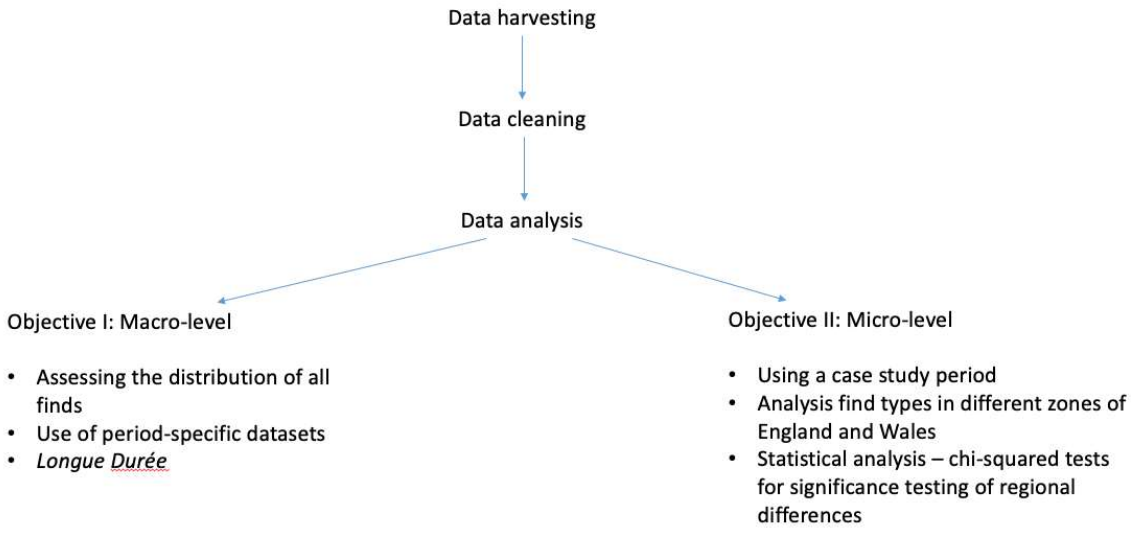


Figure 3.12 The research methodology.

The methodology has been developed to best achieve the overall aim of assessing the utility of unstructured datasets such as the PAS for archaeological research. The methodology of macro-level issues is largely based on the VASLE project's (Richards *et al* 2009) framework with the micro-level analysis developed from discussion of statistical methods. The key component of debate about the case study period, the cultural divide between Anglo-Saxon and sub-Roman, can be analysed with statistical analysis of the PAS data. This used chi-squared tests to determine whether there are any statistically significant differences between regions in terms of find types reported to the PAS. The makeup of different assemblages from different periods was also compared. As stated above,

differences between period-specific datasets and the full database can be considered more likely to represent changes in historical deposition.

This micro-level analysis will determine whether the PAS database can be used to study specific cultural questions about past societies and if it can add anything to the picture we currently have of the case study period.

The following chapter will assess the utility of PAS data in studying large-scale issues in England and Wales. The full PAS database was used to look at nationwide trends in the data and divide the database into period-specific databases. These allowed broad trends and changes over time to be studied and also revealed any significant periods in which the finds distribution differs from the overall PAS distribution. Analysis was also carried out into any regional differences in the number of finds recovered and reported to the PAS and key zones of high- and low-density finds are identified. This overall study of the full PAS database also acted as a control for the later, micro-level study. As with the period-specific databases the material from the fourth to the sixth centuries was compared to the full PAS database. Richards *et al* (2009) described these differences as being most likely to be down to actual historical use and deposition rather than modern trends in recovery and reporting.

4 RESULTS I: MACRO-LEVEL

4.1 Introduction

Having set out the methodology of the research in the previous chapter, this chapter will present the results of the first part of the research framework as part of objective one. It studies the PAS database at a macro-level, assessing how unstructured data can be used on a nationwide level across all periods. The nationwide trends of the entire PAS database were mapped in order to define the survey area, reveal patterns of recovery and reporting and act as a control dataset for later, micro-level research. Period-specific datasets were also created according to the defined periods recorded by the PAS to study the data using the *longue durée* approach of the *Annales* School. These period-specific datasets have also been used to demonstrate areas where distribution differs from the control dataset, determined by Richards *et al* (2009) to be more likely to represent historical deposition and usage rather than merely modern recovery and reporting.

4.2 The overall PAS database

Mapping all of the finds in the dataset allowed the distribution of the data to be compared to known constraints such as areas where metal detecting cannot take place. The cleaned data were plotted onto a topographic map of the UK using ArcMap, the main mapping component of ArcGIS (Figure 4.1). This allowed comparison with known constraints on nationwide PAS data (Figure 2.6) such as topography and large areas of forest.

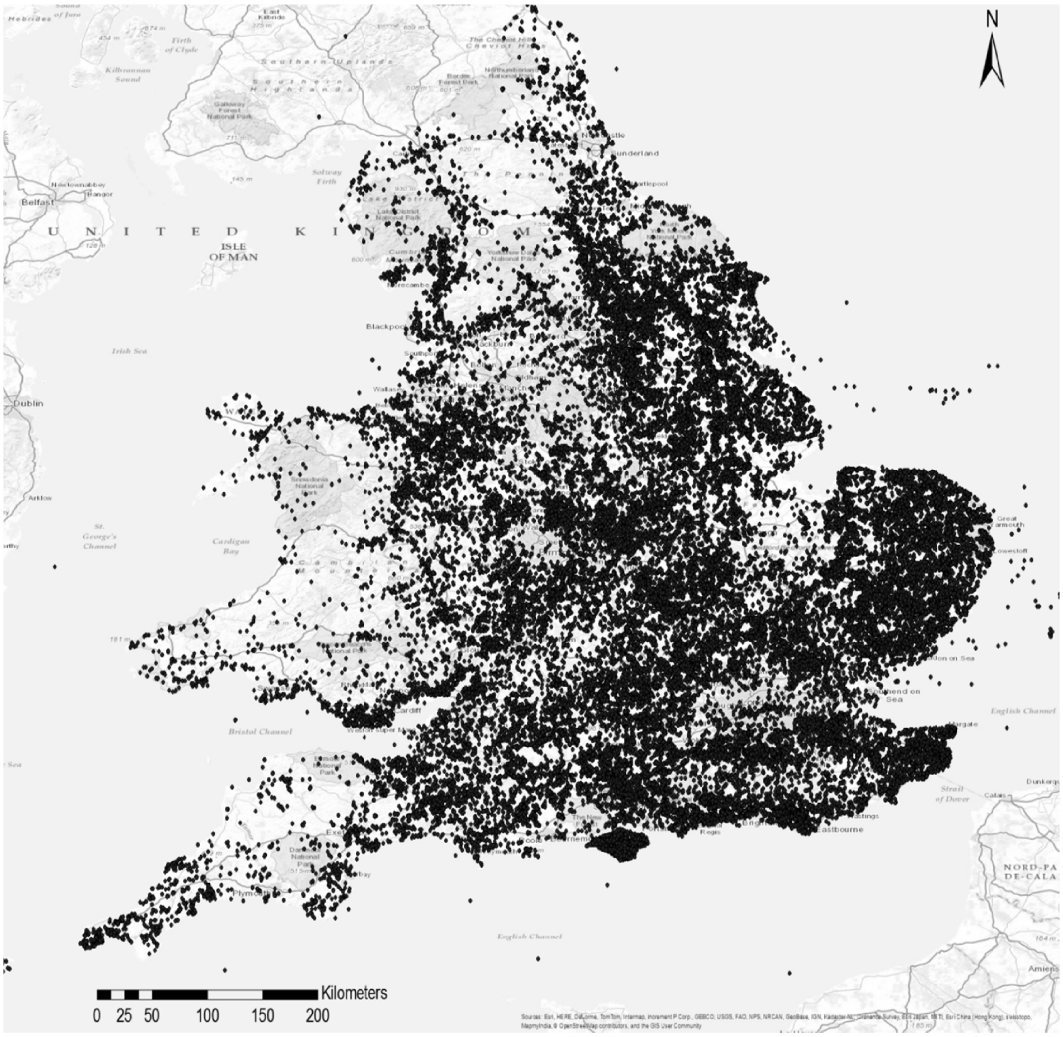


Figure 4.1 All finds mapped onto a topographic map of Great Britain. Map produced using ArcMap with data from the PAS.

The cleaned data for the number of finds per county was used to calculate the density of finds per square kilometre. The areas for the districts making up each county were added together according to the methodology laid out in Chapter Three. The OS OpenData contains information on the area of each county. The dataset 'Data: Boundary-Line – GB' has been used (Ordnance Survey 2013). It was necessary to manipulate some of the data to allow it to be plotted on the map provided by the OS (Ordnance Survey 2013b) which can be seen in Figure 4.2.

The cleaned data in Appendix Two, along with data from the OS, were used to calculate the density of finds in each county (Appendix Three). This could then be graphically depicted on a map of the UK (Figure 4.2). The finds density ranges from 0.01 per square kilometre in The City of Derby to 30.35 per square kilometre in the Isle of Wight. The mean number of finds per square kilometre is 2.78 per square kilometre.

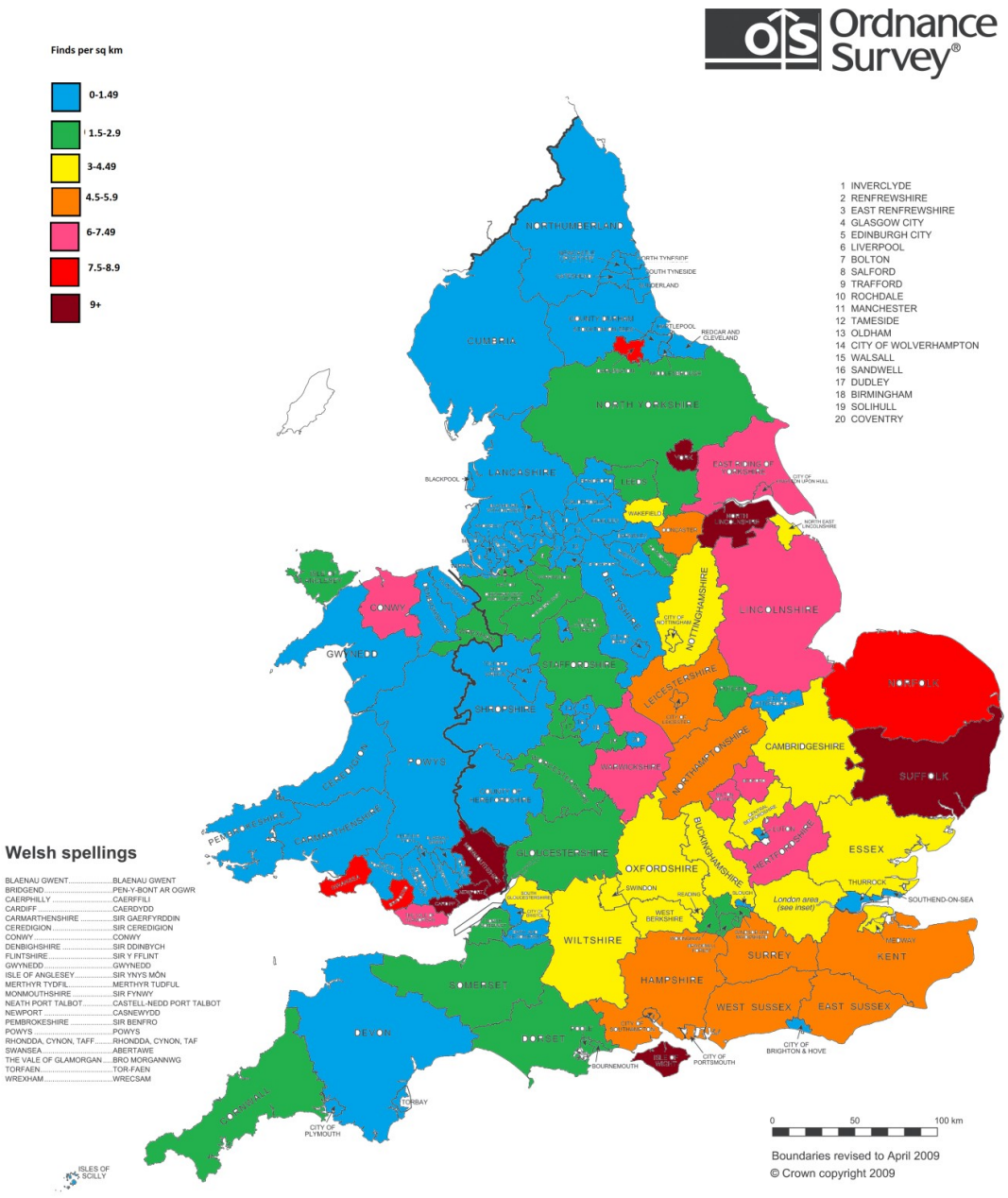


Figure 4.2 The density of finds in each county after cleaning. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

Overall distribution trends are of higher finds recovery and reporting in the east than the west (Taylor 2014: 58-9). The greatest concentration of finds is in the south and east, with sparser areas in the north-west, much of Wales, and mid Devon and Cornwall. There is a degree of coastal scatter (Figure 4.1) and also more dense areas of finds in north and south Wales (Figure 4.1 and Figure 4.2). This corresponds with the findings of the VASLE project in 2005-2006 (Richards *et al* 2009). The fact that the overall spread of PAS finds has remained relatively constant between 2005 and 2013 strongly suggests that this is a long-term pattern of finds distribution.

The areas marked on Richards *et al*'s constraints maps (Figure 2.6) are, in general, the areas with the fewest finds. The effect of the types of land identified by Richards *et al* (2009), Robbins (2013a, 2013b, 2014) and Brindle (2013, 2014) can be seen on the control dataset of all PAS finds (Figure 4.1).

In addition to the overall east-west division of finds density, the effect of topography, urbanisation and land use can be identified. Even within eastern areas which otherwise have high finds density, high topography regions such as The Pennines, large urban conurbations and heavily forested areas such as The Weald have relatively few finds (Figure 4.1). Figure 4.2 also shows that many urban areas have a low density of finds compared to surrounding counties. For instance, the City of Peterborough has a relatively low finds density (0.43 finds per square kilometre) despite bordering the higher density counties of Lincolnshire (6.21), Cambridgeshire (3.55) and Northamptonshire (5.09). The same pattern can be seen in other cities which are unitary authorities recorded separately from the rest of the county. For example, The City of Brighton and Hove (0.32 compared to 5.24 in East Sussex), Southend-on-Sea (0.03 compared to 3.67 in Essex) and, to a lesser degree, the City of Stoke-on-Trent (0.14 compared to 2.15 in Staffordshire). Other areas of low density finds in urban areas in the south and east can be found in the Thames Valley. A similar pattern can be seen in the

Birmingham area although on a smaller scale owing to the smaller number of finds in the west of Britain.

There are exceptions to this general rule. There are a number of finds reported from within the centre of London itself, demonstrating that urban centres are not always devoid of PAS finds. Figure 4.2 shows London in the same category as the surrounding counties of Essex and Buckinghamshire for density of finds. This is in contrast to nearby urban areas such as Slough or Wokingham which have fewer finds per square kilometre than might be expected from their location in the south and east of Britain. Focusing in on finds from the London area shows that many of these find spots follow the route of the river Thames (Figure 4.3). These finds likely represent the work of mudlarks in London.

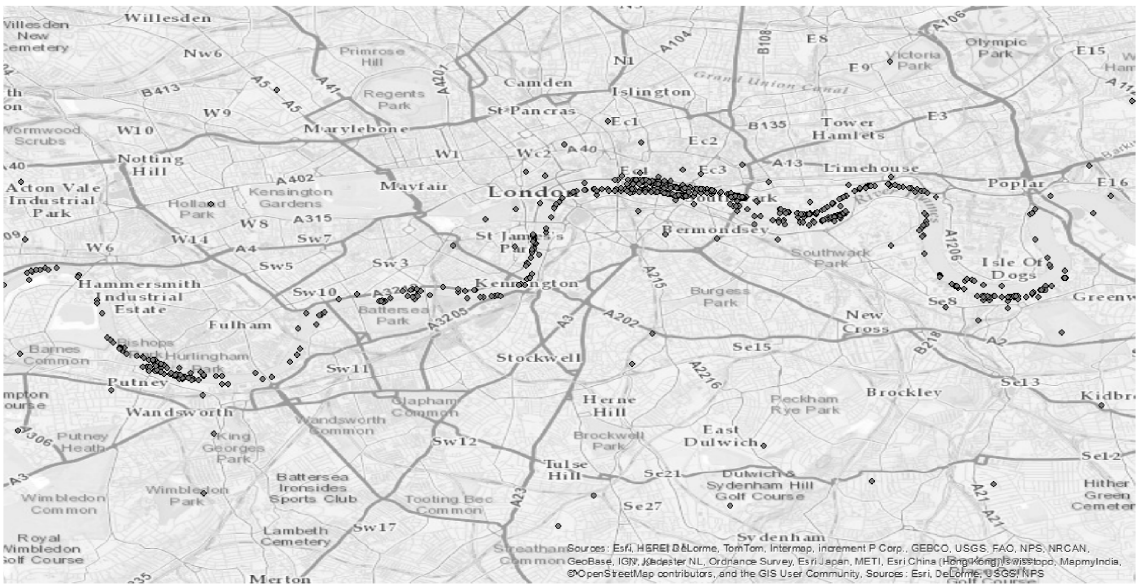


Figure 4.3 All finds from the London area mapped onto a topographical map. Map produced using ArcMap with data from the PAS. Scale: 1:100,000.

The mapping of all finds revealed the areas in which few finds are located and defined the search area. This type of map was used by the VASLE project as a control dataset with which to compare the period-specific datasets. It revealed how recovery and reporting patterns influence the dataset as a whole. Areas with a dearth of PAS finds are potentially simply those where detectorist activity is not taking place – they are outside the search area – rather than those in which historical use patterns led to a lack of material culture.

The east-west patterning of data itself may be heavily influenced by topography. Much of central Wales/The Marches is high topography (Snowdonia, Shropshire Hills, Brecon Beacons) which would hamper the use of metal detectors. Cornwall and Devon are also heavily comprised of land which is not necessarily available to detectorists (Exmoor and Dartmoor National Parks, Tamar Valley, Quantock Hills, Blackdown Hills and East Devon Areas of Outstanding Natural Beauty (AONB)). For instance, in Exmoor National Park, metal detecting is not permitted except where permission has been granted by the Land Agent and the detecting is part of a programme of archaeological research (Exmoor National Park Authority 2011: 2-3). Areas of high topography and large nature reserves and AONBs appear to have the greatest effect on the overall distribution of finds. Although urban areas have few finds compared to rural ones, the locations of the largest cities in England and Wales (Figure 4.4) has little effect on the distribution, with most being located within the area of highest finds density.

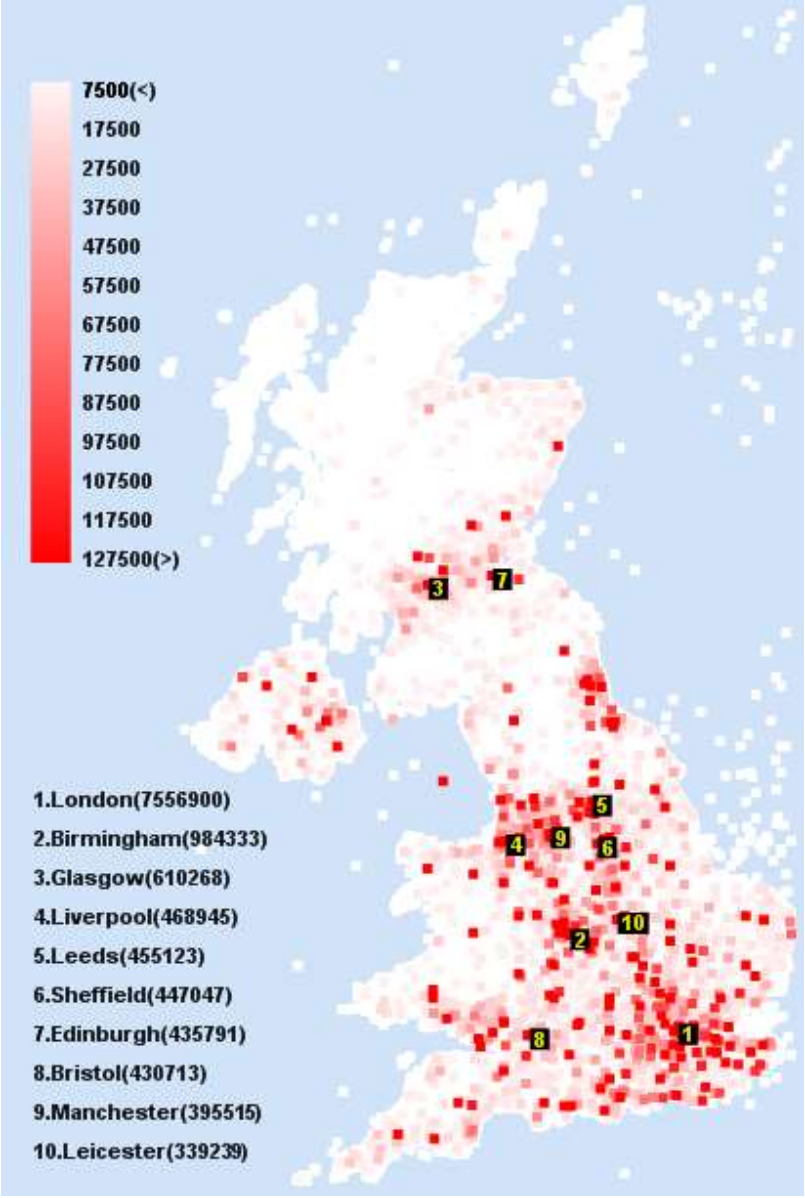


Figure 4.4 A map of city locations in the United Kingdom showing the density of population. Source: Population Labs (2011).

Finds distribution may also be affected by variations in the relationships between archaeologists and metal detectorists across England and Wales. There is a high density of finds in Norfolk (Figure 4.2), possibly owing to its history of working with metal detectorists (Chitty and Edwards 2004: 33). Richards *et al* (2009) pointed out that Norfolk may actually be expected to have an even higher

number of finds than it does, particularly when compared to the number found in neighbouring Suffolk. Suffolk has a finds density of 11.58 per square kilometre compared to Norfolk's 8.00. Norfolk's recording system for finds predating the PAS meant that many of the county's finds were recorded in the local HER where they remained following the development of the PAS database (Chitty and Edwards 2004: 33).

A good relationship with metal detectorists possibly led to greater use of metal detectors and higher levels of reporting. This would lead to more finds in this area. When the PAS first began as a two-year programme in 1997, six pilot schemes were set up based in Kent, Norfolk, the West Midlands, North Lincolnshire, the North West and Yorkshire with FLOs appointed in each area. In 1999, five more FLOs were appointed in Dorset and Somerset, Hampshire, Northamptonshire, Suffolk and Wales (Richards *et al* 2009). Many, but not all, of these areas have a high density of finds. The high numbers of finds in Kent, Norfolk and North Lincolnshire may more accurately reflect early relationships with metal detectorists than historical deposition of portable antiquities.

The areas in which early PAS schemes were set up but that lack a high density of finds are an important consideration. The West Midlands, the North West and Wales are conspicuous by their relative dearth of finds despite early finds recording schemes being in operation. Despite greater opportunity for a higher reported number of finds in these areas there is still a relative dearth of finds. These areas are all in the west, outside the area of highest finds density. Richards *et al* (2009) put forward the view that this may suggest a genuine lack of portable antiquities in this area, perhaps due to a disparity in access to or use of metals or lower populations. It is important to note that other biasing factors such as topography and urbanisation (Figure 4.1) are likely to play a role in the lack of finds in the west regardless of the impact of early PAS pilot schemes. Brindle (2013: 74) considers the uneven distribution of PAS finds to be largely due to topography and land use with the

varying relationships between archaeologists and metal detectorists prior to the creation of the PAS having a smaller contribution. Nevertheless, the lack of positive effect of early recording schemes in the West Midlands, the North West and slightly later schemes in Wales on finds densities compared to surrounding western areas suggests that there may be a genuine dearth of material culture in these areas. Overall, an understanding of the history of the PAS and pre-PAS recording schemes helps to reveal reporting and recording issues.

Richards *et al*'s ideas regarding the reasons for the relative lack of PAS finds in areas of western Britain may be called into question by comparison with areas of Britain in which large deposits of metals are found. The main orefields in Britain are in Wales, Northumberland/Northumbria, Cornwall and the Midlands (Figure 4.5). This means that much of the area in which there are fewer PAS finds is the same as the area from which metals could be mined. It seems implausible that there would not be as much, if not greater, use of metals in these areas if they are the areas in which raw materials were most abundant.

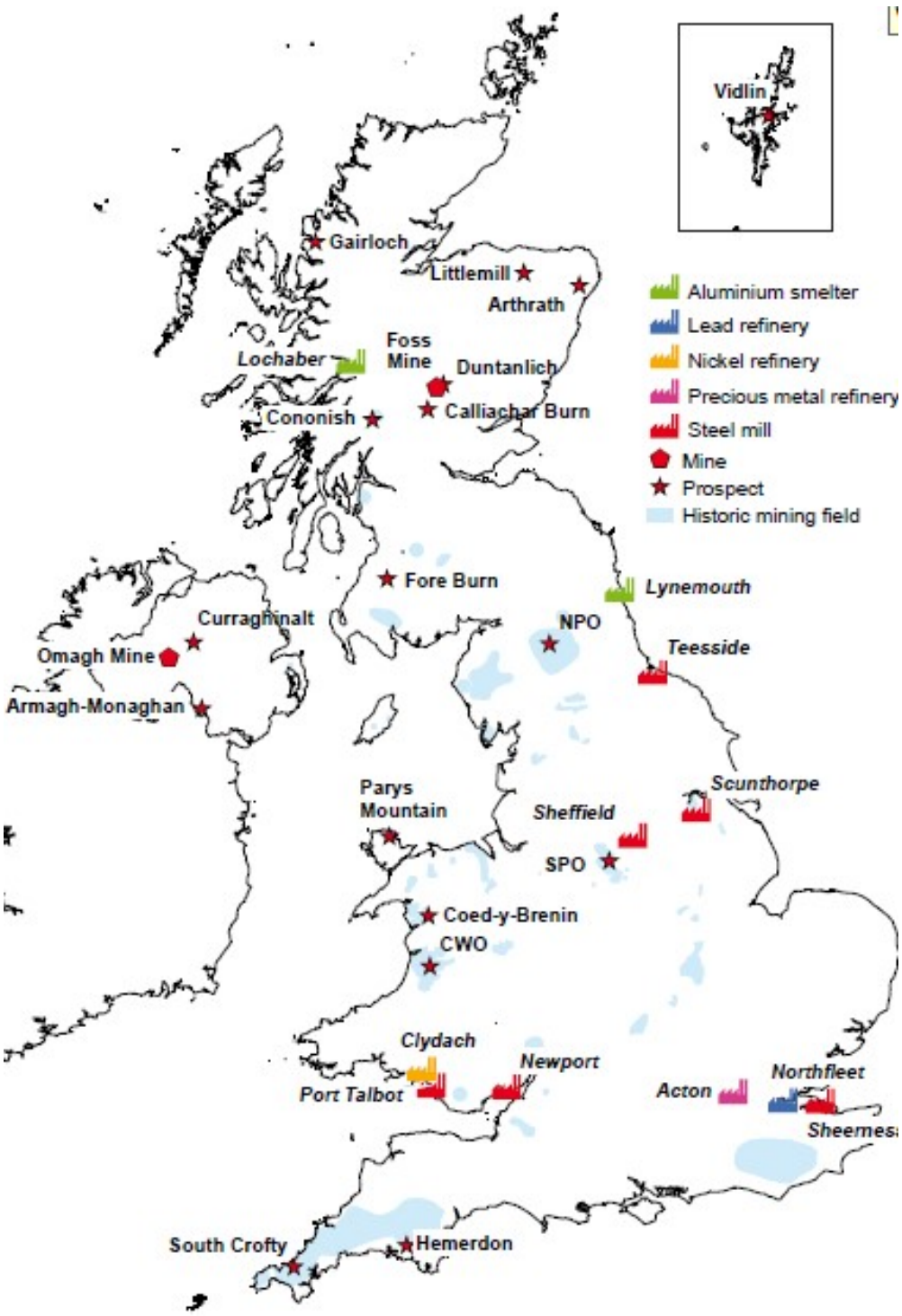


Figure 4.5 A map of orefields, prospects, metal smelters, steel mills and historical mining fields. The main orefields are the North Penine and South Pennine Orefields, Central Wales Orefield and the Cornubian Orefield. Source: British Geological Survey (2010: 9).

There are exceptions to the general pattern of high densities of finds in counties in the east and south of England. Most notably, there are high densities of finds in several counties in south east Wales (Figure 4.2). There are also some more isolated examples of finds in a coastal scatter down the western coast, including a number found near the south western tip of Cornwall (Figure 4.1). Darlington and York both contain more finds per square kilometre than may be expected based on their location and the finds densities in surrounding counties. York's high finds density compared to North Yorkshire may be explained by its location in the east of Britain, whereas North Yorkshire extends into the west. The finds density can only display an average across the whole county. Comparison with the distribution map in Figure 4.1 reveals that the majority of the finds in North Yorkshire are from the east of the county.

The distribution of the entire PAS dataset is important to keep in mind when assessing the distribution of specific types of artefacts or decoration. Without comparison to the overall pattern of reported finds it is impossible to reach any meaningful conclusions when comparing the eastern and western artefacts from circa AD 300-600 and their decoration. A relative lack of a certain kind of artefact from western Britain (or a high topography/urban area elsewhere) may be a result of finds recovery being low overall rather than a lack of use in the period in question.

The entire PAS database acts as a control, as in the VASLE project's methodology (Naylor and Richards 2005; Naylor 2006; Richards *et al* 2009). The distribution of all PAS data is used to represent the limitations of the data, with fewer finds in constraints areas such as urban, heavily forested, protected or highland areas. Overall, this means that the distribution of PAS finds is heavily skewed to the south and east. The VASLE project viewed any changes to this distribution over time as representing real historical variation rather than the modern patterns of recovery largely reflected in the overall distribution.

The dataset also helps to answer some of the methodological questions posed by Robbins 2013b: 69-70) with some adaptations necessary for use over such a large area. The distribution map of all PAS data (Figure 4.1) reveals the study area. It shows that finds have been reported across England and Wales albeit in much higher densities in the south and east than the north and west. This also reflects density of metal detecting activity in these areas.

4.2.1 Regional distribution

It has been established above that, in general, it is the south and east that contain the bulk of the PAS finds in Britain. Constraints of finds recovery, namely topography and urbanisation, have a great effect on the number of finds recorded in a given area. Highland and urban areas have fewer finds than lowland plough zone.

In order to study the regional variations in portable antiquities distribution, the numbers of finds per county (Appendix Three) were used to calculate the number and density of finds in various regions of the country. England and Wales have been broken down into ten broad regions for analysis:

- North East
- Yorkshire and the Humber
- East Midlands
- East
- London
- South East
- North West
- West Midlands

- Wales
- South West

These regions are based on the regions of England which were formerly known as Government Office Regions (Department for Communities and Local Government 2012: 141) and Wales is included as its own region. Those finds that could not be allocated to a specific country but do have some location information have been incorporated into the data where possible. The data confirm that there is not an even spread of finds across England and Wales, with certain regions having a much higher number of finds and greater finds densities (Table 4.1).

The areas with the greatest number of finds are the East (130431 finds, 6.66 finds per square kilometre) and the South East (101926 finds, 5.25 finds per square kilometre) (Table 4.1, Figure 4.6 and Figure 4.7). This confirms the south and east bias in the recovery and recording of PAS finds. As discussed above this is largely down to topography, with most highland areas being located in the north and west (Figure 4.1).

Region	Number of finds	Km^2	Density of finds (finds per $km^{2)}$
North East	4922.00	8676.30	0.57
Yorkshire and the Humber	51621.00	15480.62	3.33
South West	45400.00	24388.87	1.86
East	130431.00	19585.91	6.66
West Midlands	28646.00	12698.08	2.26
North West	10159.00	15097.76	0.67
Wales	56262.00	21222.48	2.65
South East	102026	19409.89	5.26
East Midlands	72211.00	15810.94	2.57
Greater London Authority	5686.00	1592.70	3.57

Table 4.1 Density of finds in each region of the United Kingdom. Data from the PAS.

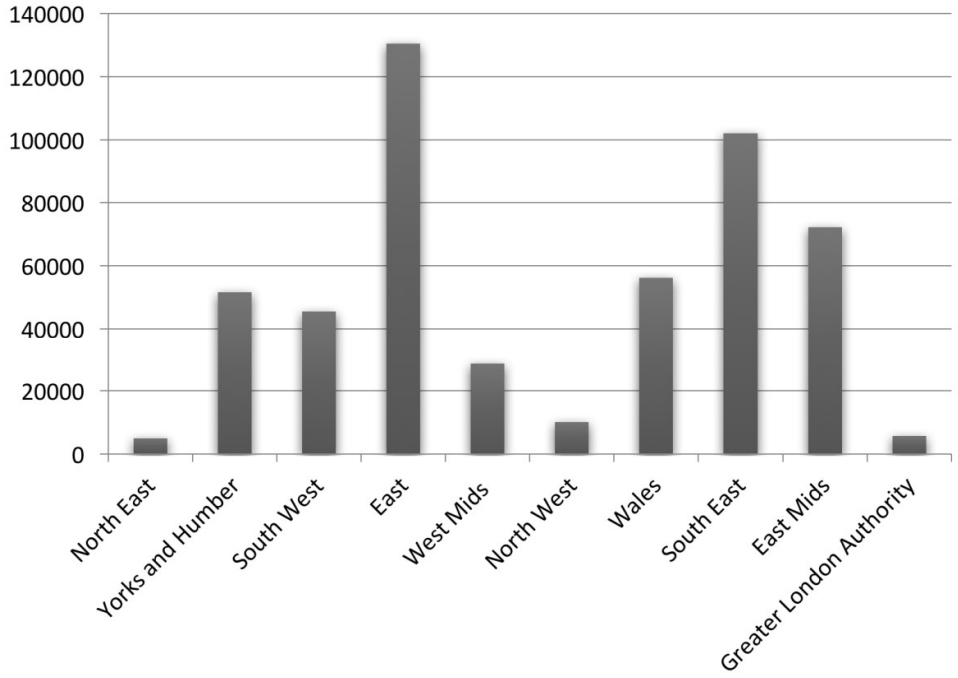


Figure 4.6 The number of finds in each area of Britain. Graph created with data from the PAS.

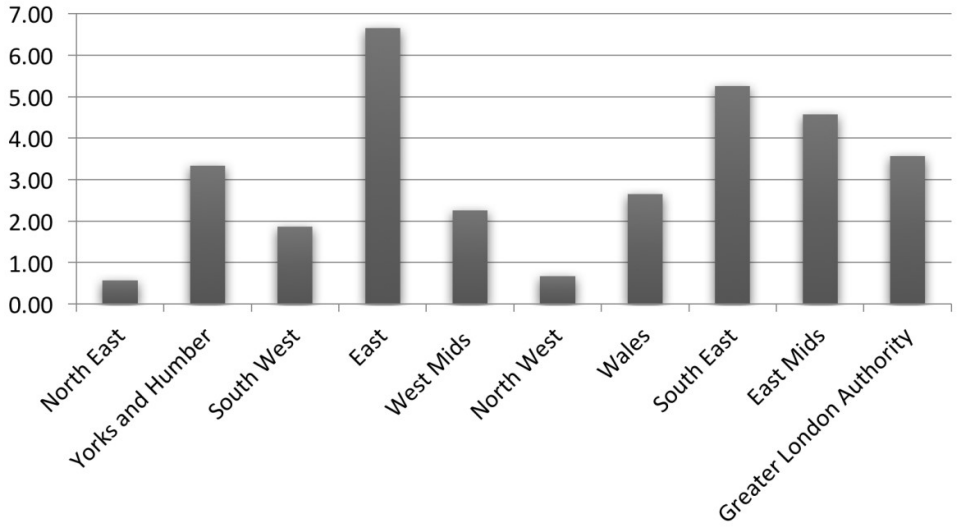


Figure 4.7 The density of finds in each area of Britain. Graph created with data from the PAS.

The fact that, in general, the east of the county contains the majority of the finds reported to the PAS is demonstrated by Figure 4.8. Nearly three quarters (72%) of the PAS finds with known locations are in the east.

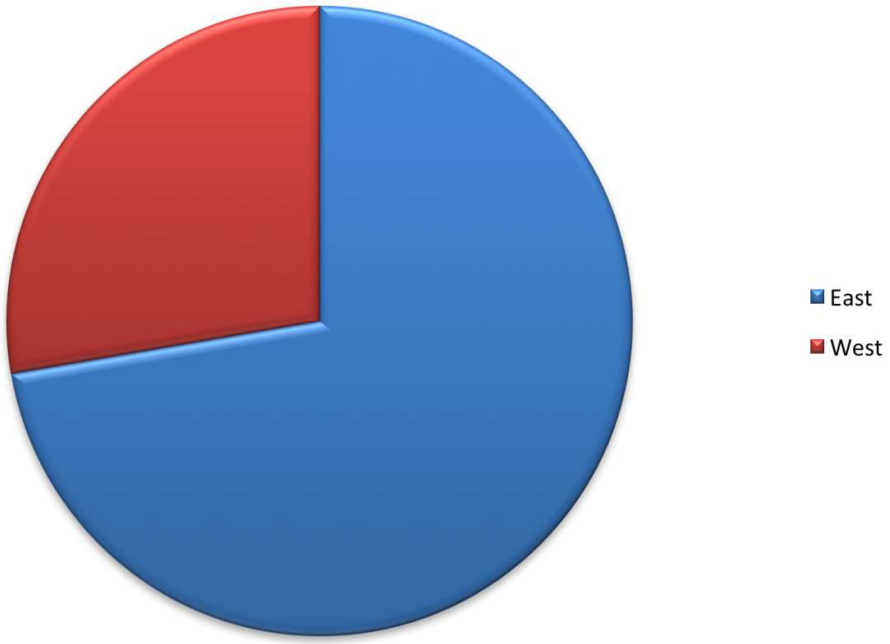


Figure 4.8 A pie chart of the percentage of PAS finds of known location recorded as being in the east and west. Graph created with data from the PAS.

It is important to calculate whether these differences in percentages are statistically significant. The use of statistical significance testing, in this case the Chi-squared test, has been outlined in Chapter Three. It will be used to determine whether the distribution is significantly different from that produced at random. The null hypothesis is that there is no significant difference in the number of finds in the east and west.

The Chi-squared test was carried out using the CHISQ.TEST function in Microsoft Excel. This works using the following arguments:

- Actual range: 'The range of data that contains observations to test against expected values'
- Expected range: 'The range of data that contains the ratio of the product of row totals and column totals to the grand total.' The range of data expected if the distribution were random.

The Chi-squared function calculates using the following formula:

$$\chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{\left(A_{ij} - E_{ij}\right)^2}{E_{ij}}$$

Where:

- A_{ij} = actual frequency in the i-th row, j-th column
- E_{ij} = expected frequency in the i-th row, j-th column
- r = number or rows
- c = number of columns

(Microsoft 2014)

A low Chi-squared value indicates that the distribution is not random. Excel uses the Chi-squared distribution with the appropriate number of degrees of freedom (df):

- Where r and c are greater than 1, the df = (r-1)(c-1)
- Where r=1 and c is greater than 1, df = c-1
- Where r is greater than 1 and c=1, df = r-1

(Microsoft 2014)

Table 4.2 shows the Chi-squared test for the finds from the east and west. The 'Actual' column shows the actual distribution of Roman and Early Medieval finds. The 'Expected column' shows the number of finds that would be expected if the distribution was completely random. In this case this is the distribution of finds across the two zones according to surface area. For example, the east makes up

52.32% of the total area and, with random distribution, would be expected to have 52.32% of the total number of finds. The p-value represents the probability that the difference is random. A p-value under 0.05 is usually considered statistically significant and one over 0.05 is considered to suggest random distribution (Burton 2002).

The p-value is 0 and, therefore, the null hypothesis can be rejected. The distribution of finds is not random and there is a significant difference in the number of finds in the east and west of the area studied.

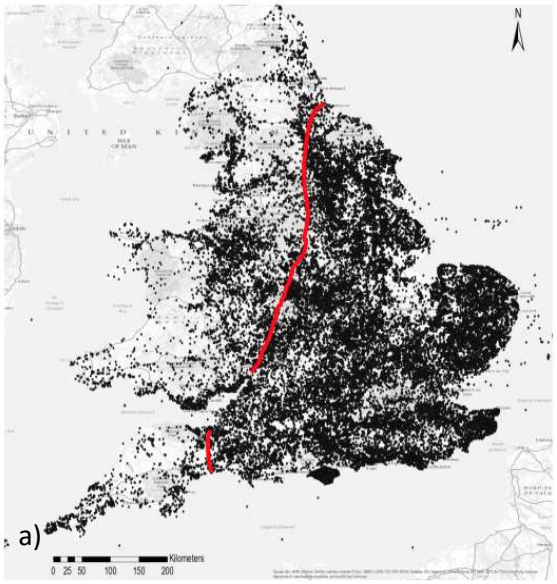
	Number of finds	**Km^2**	**% of total area**	**Actual Distribution**	**Expected Distribution**
East	366950	80558.35	52.32	366950.00	80558.35
West	140467	73409.19	47.68	140467.00	73409.19
P-value					0.00

Table 4.2 Chi-squared test for finds in the east and west. Data from the PAS.

The areas in the east of the country with the least finds are the North East (4,924 finds) and London (5686 finds). However, London has more finds per square kilometre (3.57) than the North East (0.57). This is to be expected. It can be seen in Figure 4.1 that the North East has generally higher topography and more constraints areas that the rest of the east of Britain. London, being an urban area is also a large constraints area and would be expected to have fewer finds that the surrounding areas. The incidence of finds within the City of London itself has been discussed above (Chapter 3.5).

In the west, it is also the north in which the fewest finds are located. This is likely to be predominantly down to the high topography in this region (Figure 4.1).

If the PAS finds distribution is divided into two based on finds density, it can be seen that the line drawn between the area with the highest number of finds and that with the fewest is roughly analogous to the location of the suggested boundary between 'Anglo-Saxon England' to the east and 'native Britain' to the west (Figure 4.9).



a)

b)

c)

Figure 4.9 a) map of the entire PAS dataset with a line drawn dividing the large number of finds in the east and fewer finds in the west. Map produced using ArcMap with data from the PAS, b) map of the number of finds per square kilometre in each county with a line drawn dividing the generally high-density east and low-density west. Map reproduced from Ordnance Survey map data by permission of Ordnance Survey © Crown copyright 2013, c) The perceived east-west divide in Britain circa AD 500. Source: Haywood (2001: 91).

It may be that a relative lack of finds in the west of Britain affects interpretations of the cultural and ethnic identities of the people living there during the post-Roman period. It is important to consider the results and conclusions of this study in the light of these findings. Is the distribution of certain diagnostically British or Anglo-Saxon artefacts 'real' or product of modern limitations on finds recovery? Figure 4.10 shows the distribution of Anglo-Saxon burials from Härke's (2011) study

overlain on Richards *et al*'s (2009) base maps for assessing potential biasing factors in data recovery. It can be seen that the main distribution of Anglo-Saxon burials is outside the area of highest topography and most danger zones.

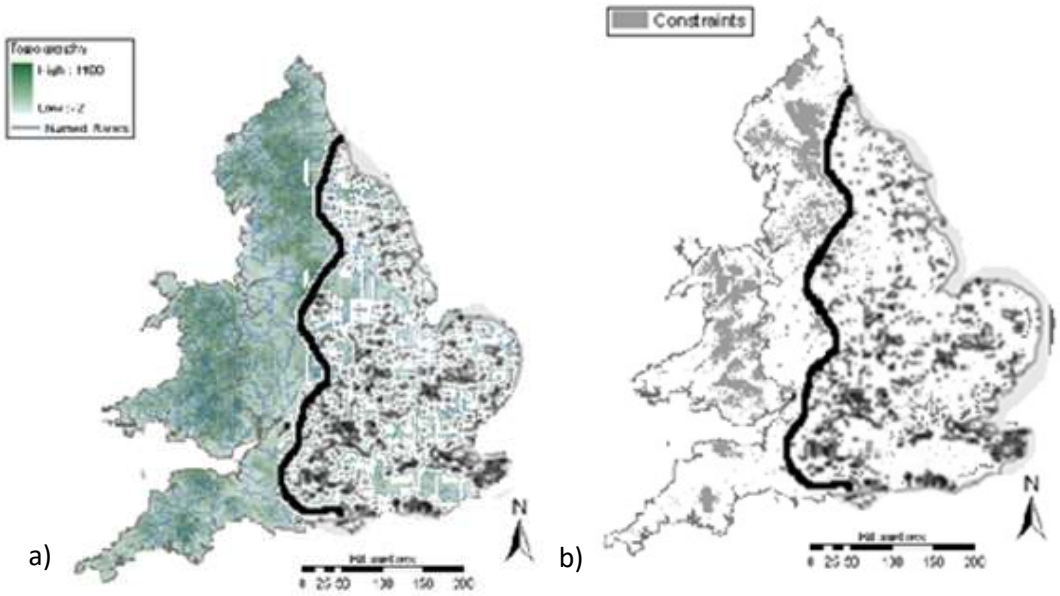


Figure 4.10 Distribution of Anglo-Saxon burials overlain onto the VASLE projects a) map of terrain and b) potential biasing factors influencing data recovery. Maps from Richards et al (2009), data from Härke (2011: 3).

Härke (2011: 1) suggested a model for change in post-Roman Britain which focuses on the native Britons and their interactions with immigrant Germanic peoples. His model has two broad phases. First, an ethnically divided society in the fifth to the sixth centuries where incoming Germanic groups and their descendants kept themselves segregated from natives in order to keep their dominance. Second, the increasing assimilation of native society and way of life in the seventh to the eighth centuries which was the start of a common English society.

Part of Härke's evidence for a divided society in the early post-Roman period is based on the distribution of diagnostically Anglo-Saxon material culture. Härke did not suggest that the presence of certain types of artefacts must demonstrate the existence of genetically Germanic peoples (he does not necessarily subscribe to the culture history paradigm) but he did come to the conclusion that these types of artefacts suggest the existence of at least a culture that self identifies as Anglo-Saxon or Germanic (Härke 1990, 2011). For instance, when studying Anglo-Saxon burials, material culture plays a large role in determining whether a burial is Anglo-Saxon.

The distribution of Anglo-Saxon burials from the fifth-seventh/eight centuries can be seen in Figure 4.11. By comparing this distribution to the distribution of the entire PAS dataset it can be seen that, as well as corresponding well to the suggested east-west divide in Britain at this time (Figure 4.9c), there is also great similarity to the distribution of all reported PAS finds (Figure 4.9a). Furthermore, the distribution of artefacts considered diagnostically native or sub-Roman such as hanging bowls and escutcheons and, with a notable absence in some areas of the south east, penannular brooches (Figure 4.11c) corresponds well with this east-west divide as defined by Haywood (2001:91)

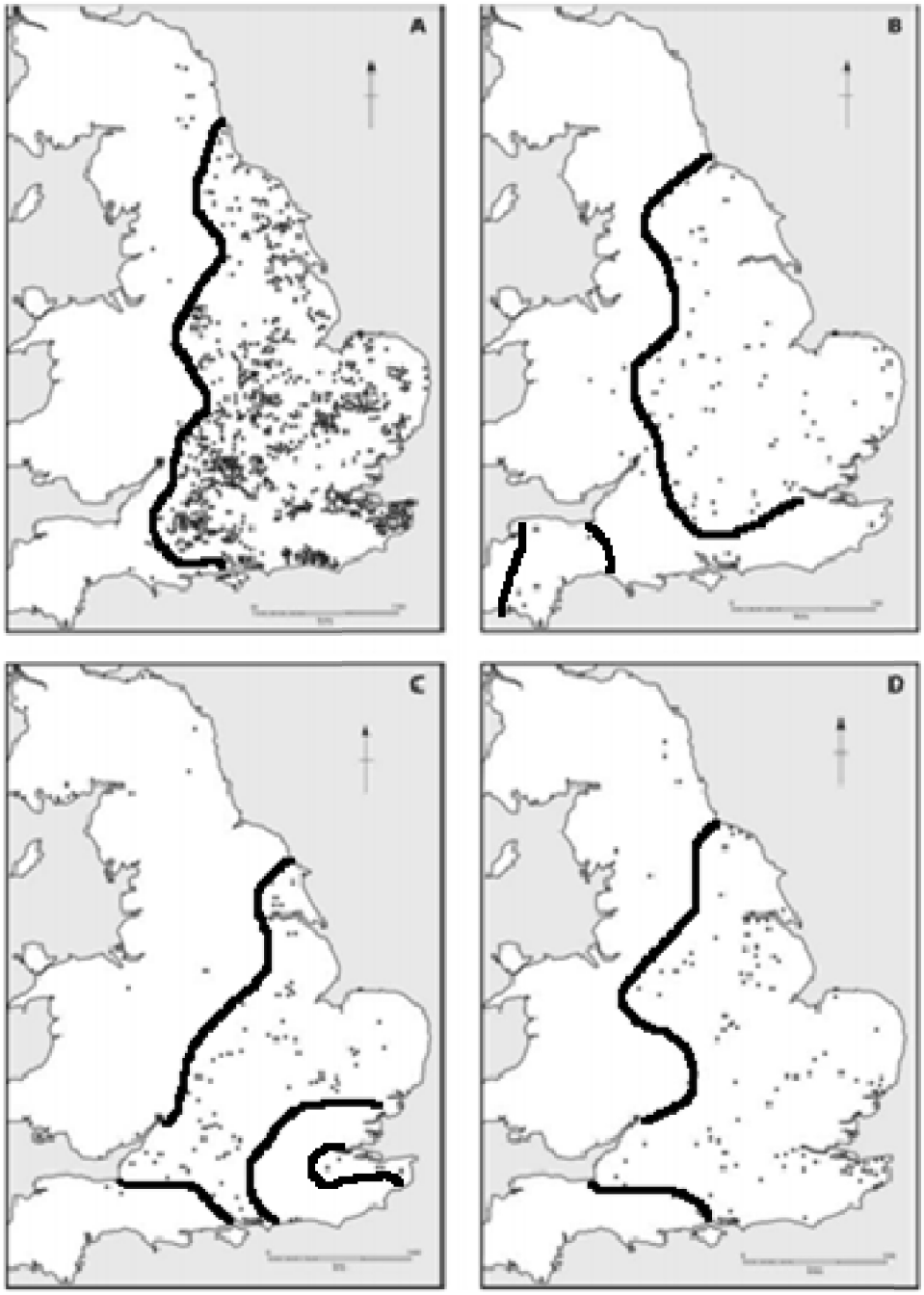


Figure 4.11 Distribution map of fifth to seventh/eight century evidence types which are considered to be diagnostically British or Anglo-Saxon. a). Anglo-Saxon burials, b) Place names ending in walh-, c) Penannular brooches, d) Hanging bowls and escutcheons. The general limits of distribution have been demarcated with black lines. After Härke (2011: 3).

Härke (2011) adopted an interdisciplinary approach but used data from excavations with DNA and skeletal evidence to back up his findings from the archaeological material. For instance, his study of distributions of penannular brooches (Figure 4.11c) is drawn from excavated data compiled by White (1988), Longley (1975) and Fowler (1963). The fact that the distribution of all PAS data appears to roughly correspond to that of excavated material from the case study period suggests that possibly the east-west divide seen in post-Roman archaeology is, in fact, more an artefact of long-term trends and divisions along geographical/topographic lines than a divide solely relating to change from Roman Britain to Anglo-Saxon England.

If only the distribution of finds is taken into consideration, then it may be assumed that this apparent east-west divide in Britain in Anglo-Saxon times is simply an artefact of the known archaeological record. Few finds exist in the west of Britain and it is, therefore, difficult to produce a picture of what was happening in this area after the Roman conquest. From Figure 4.11d it can be seen that finds of penannular brooches follow this same distribution pattern. This is unusual as penannular brooches were in use from Iron Age Europe (circa 400 BC) to the Viking period (White 2007: 21). As they are not diagnostic of one particular culture, it would be expected that the distribution of penannular brooches would include western Britain rather than being largely limited to the eastern and southern region. Figure 4.11b shows that the incidence of place names ending in *walh* also follows a similar pattern. This cannot be explained as the result of differential finds recovery and suggests that there may be additional reasons for the Anglo-Saxon east-west divide.

Topography and availability of suitable land for metal detectorists has a vast influence on the distribution of PAS finds. With regard to PAS finds distribution, lowland areas have much higher finds densities than highland areas (Figure 4.12 and Figure 4.13). This shows the impact of topography on British archaeology, here affecting probable finds recovery patterns. Figure 4.12 and Figure 4.13

show the apparent boundary between areas of high and low finds density. Statistical analysis was carried out on this finds distribution to see if there is a statistically significant difference between the area to the north and west of this boundary (Highland Zone) and the south and east (Lowland Zone). This can help to determine the degree of impact topography has on PAS finds.

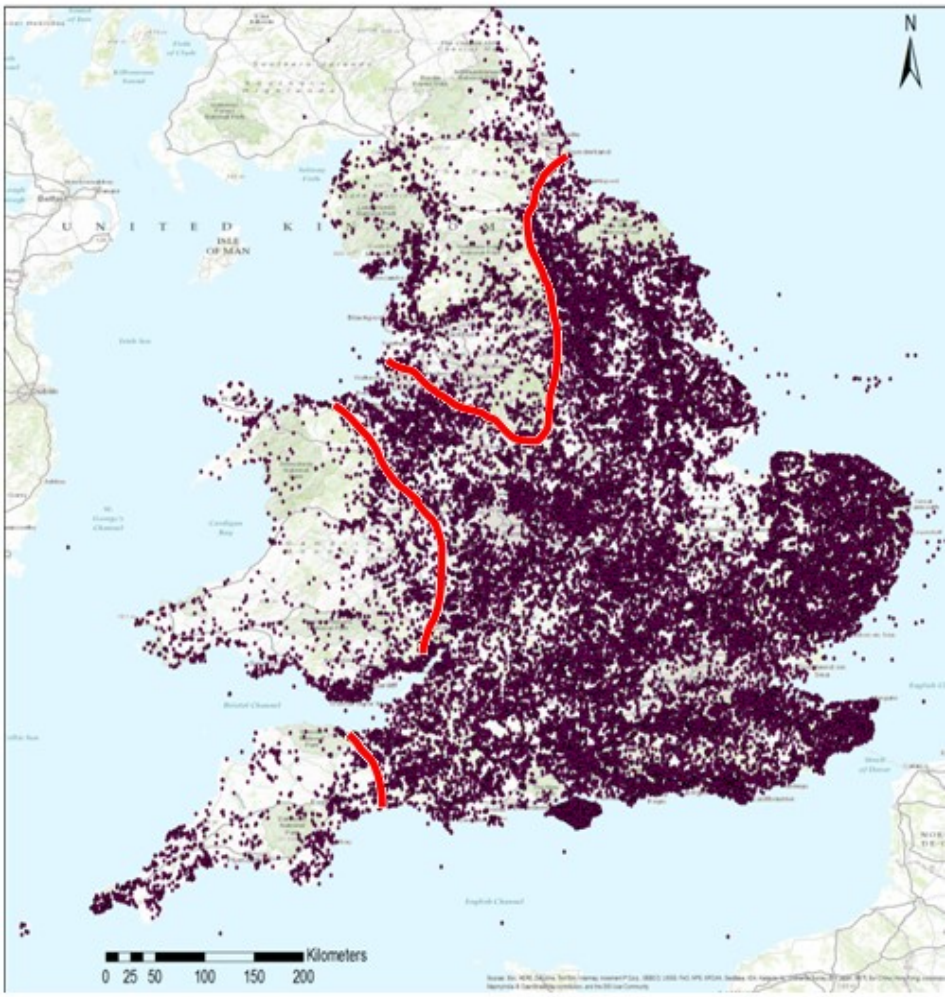


Figure 4.12 The distribution of the entire dataset plotted onto a topographic base map. Red lines show the boundary between areas of high and low finds densities.

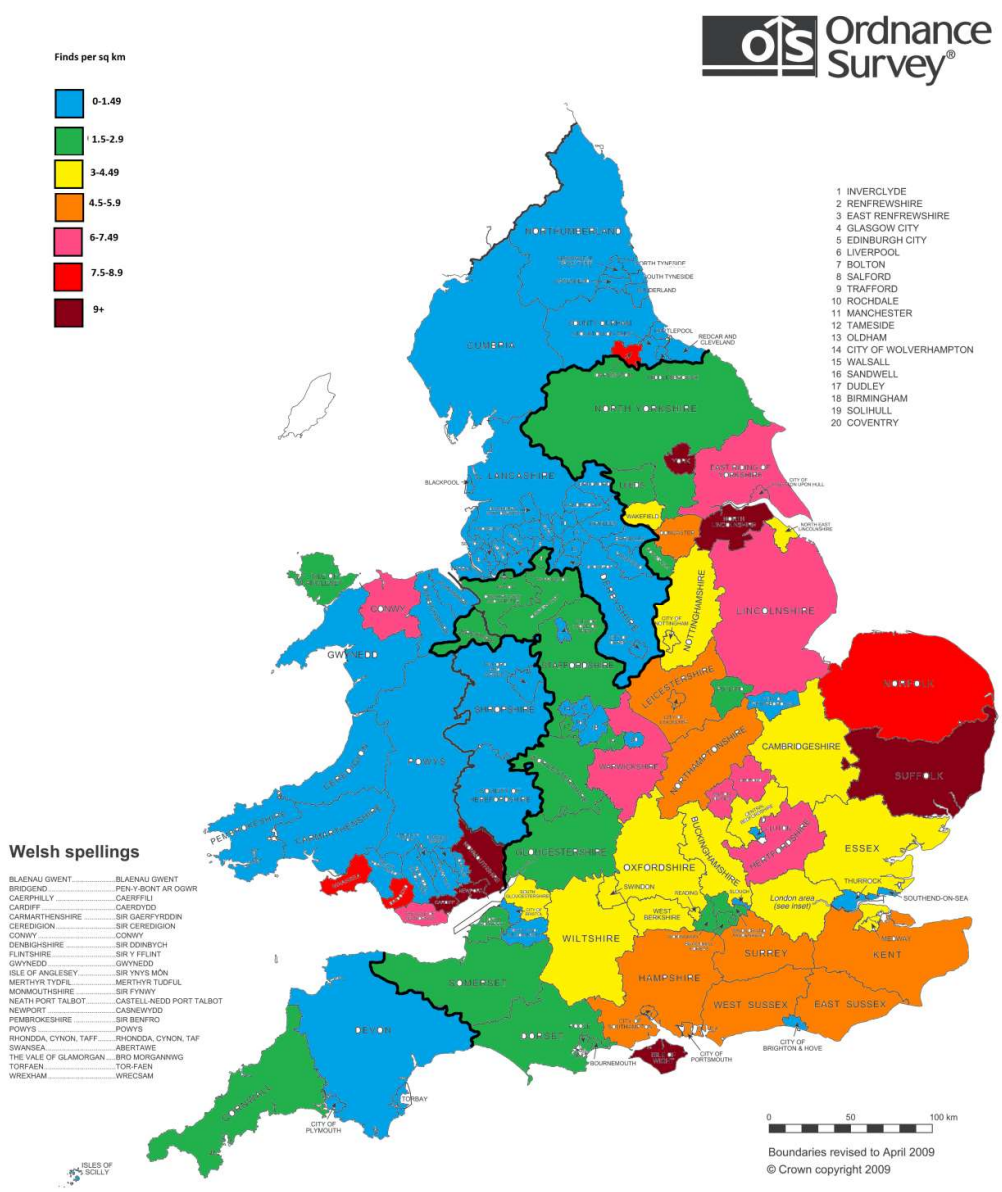


Figure 4.13 The density of finds in each county after cleaning. The black line shows the boundary between areas of relatively high and low finds densities. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

There is a total of 80,244 finds in the Highland Zone to the north and west of the boundary line (an average of 1.29 finds per square kilometre and 15.82% of the total finds) and 426,936 in the Lowland

Zone to the south and east (an average of 2.66 finds per square kilometre and 82.18% of the total finds). For the Chi-squared tests on finds in high and low topography areas (Table 4.3) the null hypothesis is that there is no significant difference between the numbers of finds. The p-value is zero and therefore the null hypothesis can be rejected. The numbers of finds in the two zones are significantly different from those expected by random distribution. If the distribution were random, the number of finds in each zone would be expected to be proportional to the percentage of the total area represented by that zone. There is a statistically significant higher number of finds in low topography areas.

Zone	**No. Finds (Actual distribution)**	**Area km^2**	**% total area**	**Expected Distribution**
Highland Zone	80244.00	62423.35	40.54	205637.90
Lowland Zone	427014.00	91544.19	59.46	301569.10
Total	507258.00	153967.50		
P-value	0.00			

Table 4.3 Chi-squared test for finds in high and low topography areas. The p-value is 0 and so the null hypothesis can be rejected. Data from the PAS.

Large areas of high topography in the north and east of England and Wales, such as the Brecon Beacons, and the Pennines, are not conducive to successful metal detecting activity. As identified by Robbins (2014), detectorists tend to prefer agricultural land. In Wales, 80% of agricultural land is Less Favoured Area meaning it produces a lower yield and is usually upland (RSPB 2011a). English agricultural land is more diverse. The east is largely arable whilst the west has more upland areas grazed by sheep and cattle (RSPB 2011b). The arable land of eastern England, which is ploughed and/or rolled for growing crops, is more attractive to metal detectorists and more likely to result in

finds. It is difficult to assess the degree of impact that land use and areas of highest metal detectorist activity have because the PAS has no system of negative recording.

4.3 Period-specific datasets

Having outlined the constraints on finds reported to the PAS and begun to discuss the degree to which the east-west divide in Britain is an artefact of different finds recovery, the data were studied by period. For the macro-level study the finds were divided by PAS defined period (Portable Antiquities Scheme 2013b). The fourteen broad periods to which PAS finds are assigned are as follows:

- Unknown: 10000000 BC-AD 2050
- Prehistoric: 500000 BC-AD 42
- Palaeolithic: 500000-10001 BC
- Mesolithic: 10000-4001 BC
- Neolithic: 4000-2351 BC
- Bronze Age: 2350-801 BC
- Iron Age: 800 BC-AD 42
- Greek and Roman Provincial: 700 BC-AD 297
- Roman: AD 43-410
- Early Medieval: AD 410-1066
- Byzantine: AD 491-1453
- Medieval: AD 1066-1539
- Post Medieval: AD 1500-1900
- Modern: AD 1901-2050

The first step was to clean the data and ensure that all finds had a period recorded where possible. Before cleaning the database contained 14,124 records with no broad period recorded. The cleaned database contained 1,290 blank entries in the 'broad period' column. There are also 5,898 finds recorded as being of 'unknown' period in both the cleaned and uncleaned databases.

The number of finds from each period in the cleaned database was counted (Table 4.4 and Figure 4.14) in order to determine the temporal spread of finds which are recorded in the PAS database. The majority of the finds are Roman (42.67%), followed by Medieval (21.65%) and Post Medieval (16.26%).

Prehistoric	417
Palaeolithic	608
Mesolithic	5578
Neolithic	12158
Bronze Age	6157
Iron Age	48054
Roman	221950
Greek and Roman Provincial	204
Byzantine	72
Early Medieval	20143
Medieval	113384
Post Medieval	85184
Modern	2850

Table 4.4 The number of finds per broad period. Data from the PAS.

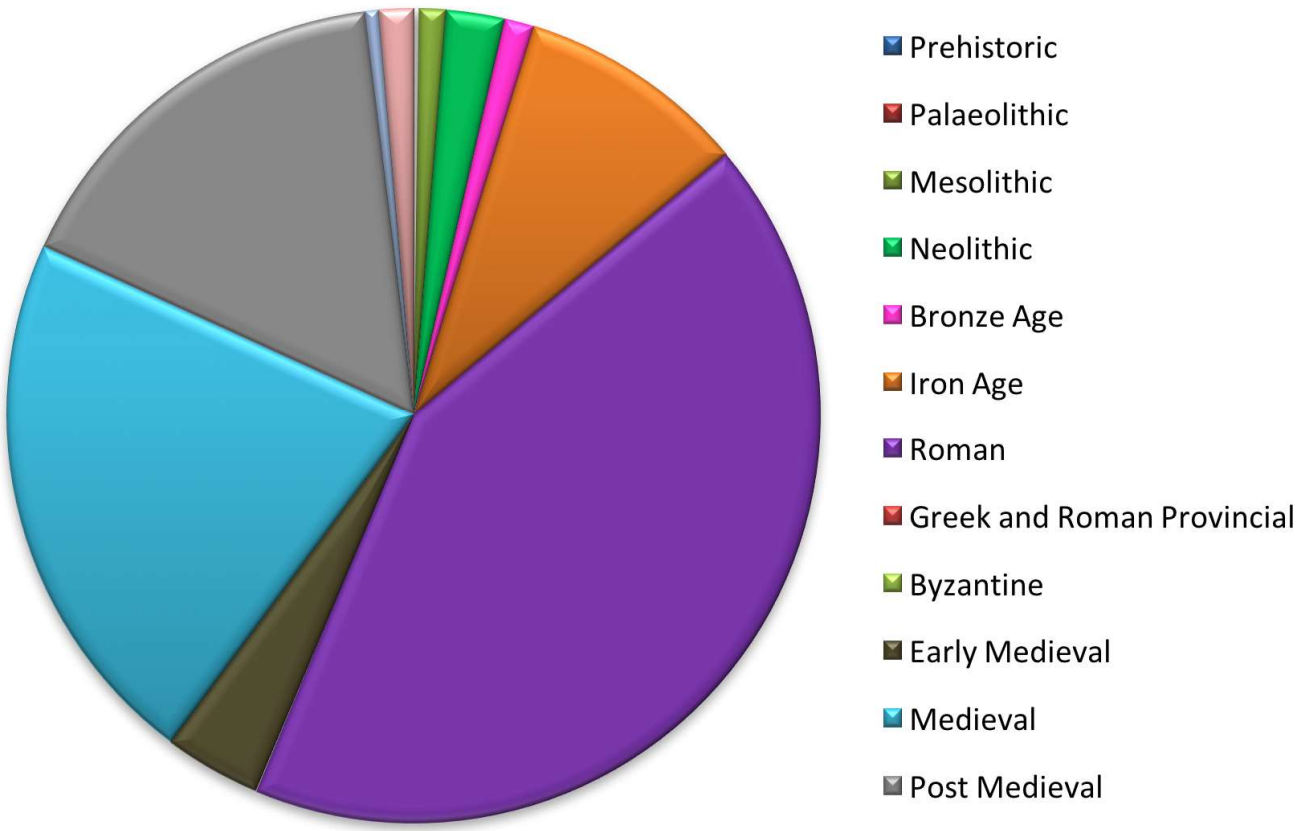


Figure 4.14 The percentage contribution of finds of each period to the total number of finds. Graph produced using data from the PAS.

The data were then split into period-specific datasets along the lines of the PAS period division listed above. Modern constraints such as urban areas, topography and how long the PAS has been in operation in a given area clearly have a great influence over the number of finds recovered. Chapter 4.4 will discuss the idea of Highland and Lowland Zones in Britain that are inherently different with different cultural affiliations going back as far as the Mesolithic. This suggests that finds distribution cannot be entirely explained as being the result of the above constraints on data collection.

Plotting the distribution of finds from various period-specific datasets allowed patterns in the data to be observed across the broad periods assigned to artefacts in the PAS. From this it can be seen whether the finds distribution in each period largely follows or deviates from the trend for the entire PAS database. The period-specific datasets (Figure 4.15 to Figure 4.27) show the distribution of finds for each period in the database. On each of these maps the division between the areas of high and low finds density for the whole database has been shown with a line. The boundary represents the division between the Highland Zone (high topography, low finds density) and the Lowland Zone (low topography, high finds density). This allows comparison with the entire PAS dataset as set out in the methodology.

As well as maps displaying the finds distribution plotted onto street maps with terrain, the period data has also been displayed as a percentage of the regional assemblage. This allows more detailed visualisation of the data and, to some extent, overcomes the topography/land bias of modern recovery. It is known that relatively few finds will have been recovered of any period in Wales or Cornwall but the maps show percentages of total finds rather than raw numbers of finds. This means that, in those areas where relatively few finds are recorded, it can be seen how many of those that are recorded are from a particular period.

The number of finds per period from each county (Appendix Three) were used to calculate the proportion that each period contributes to the county's assemblage and plotted onto the maps in Figure 4.15b to Figure 4.27b. These two different ways of visualising the data can be combined to give an overall view of how the distribution of PAS finds changes through time.

The period-specific datasets produced demonstrate that the relative spread of finds is fairly consistent across all periods, with generally fewer finds in the north and west than the south and east. This is a similar distribution to that shown by the entire dataset and is to be expected. There is also a similar coastal scatter shown in the western areas as with the full dataset. However, there are exceptions to this. For instance, the map produced for Greek and Roman provincial (700 BC - AD 297) (Figure 4.22) shows a more even spread across the country and the Byzantine period (AD 495- 1453) (Figure 4.23) displays a concentration of finds in the south east with some in the south west but very few in the north at all. Both of these periods as defined by the PAS overlap with others and have fewer objects ascribed to them than the rest. When the sample size is low, as in this case, any change in number of finds between two areas will appear magnified.

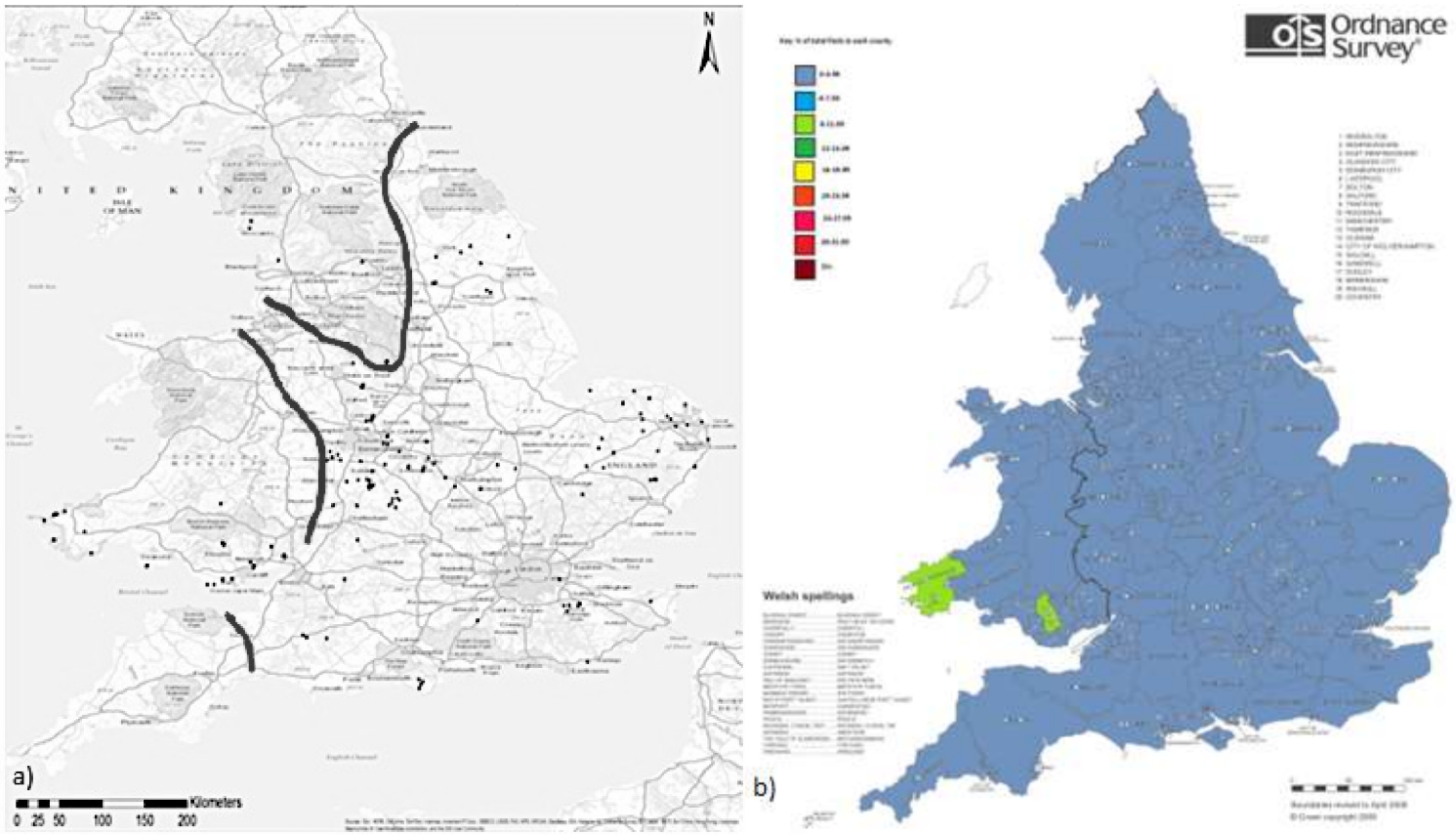


Figure 4.15 a) Prehistoric (500000 BC-AD 42) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Prehistoric. Map produced using data from the PAS and a base map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

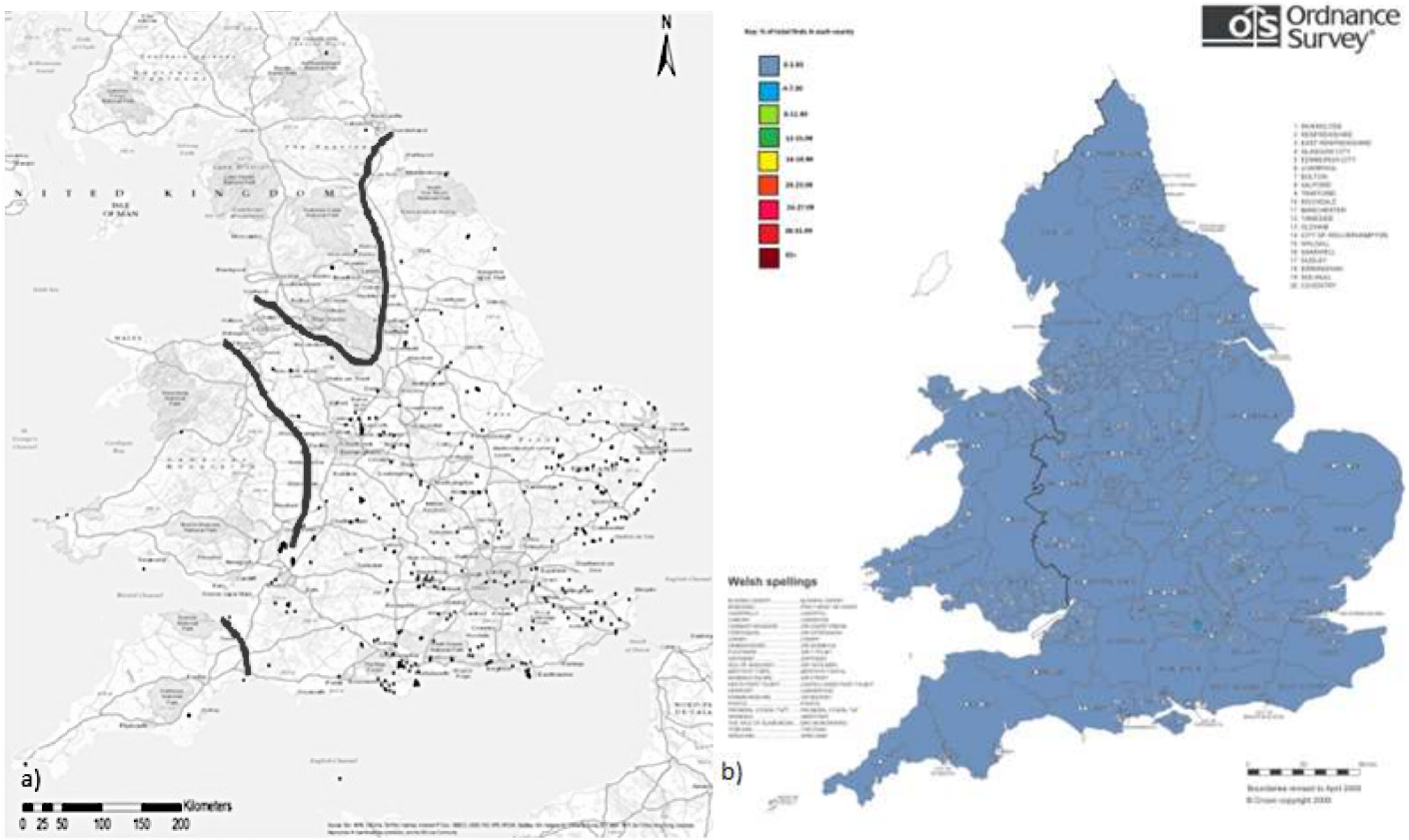


Figure 4.16 a) Palaeolithic(500000-10001 BC) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Palaeolithic. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

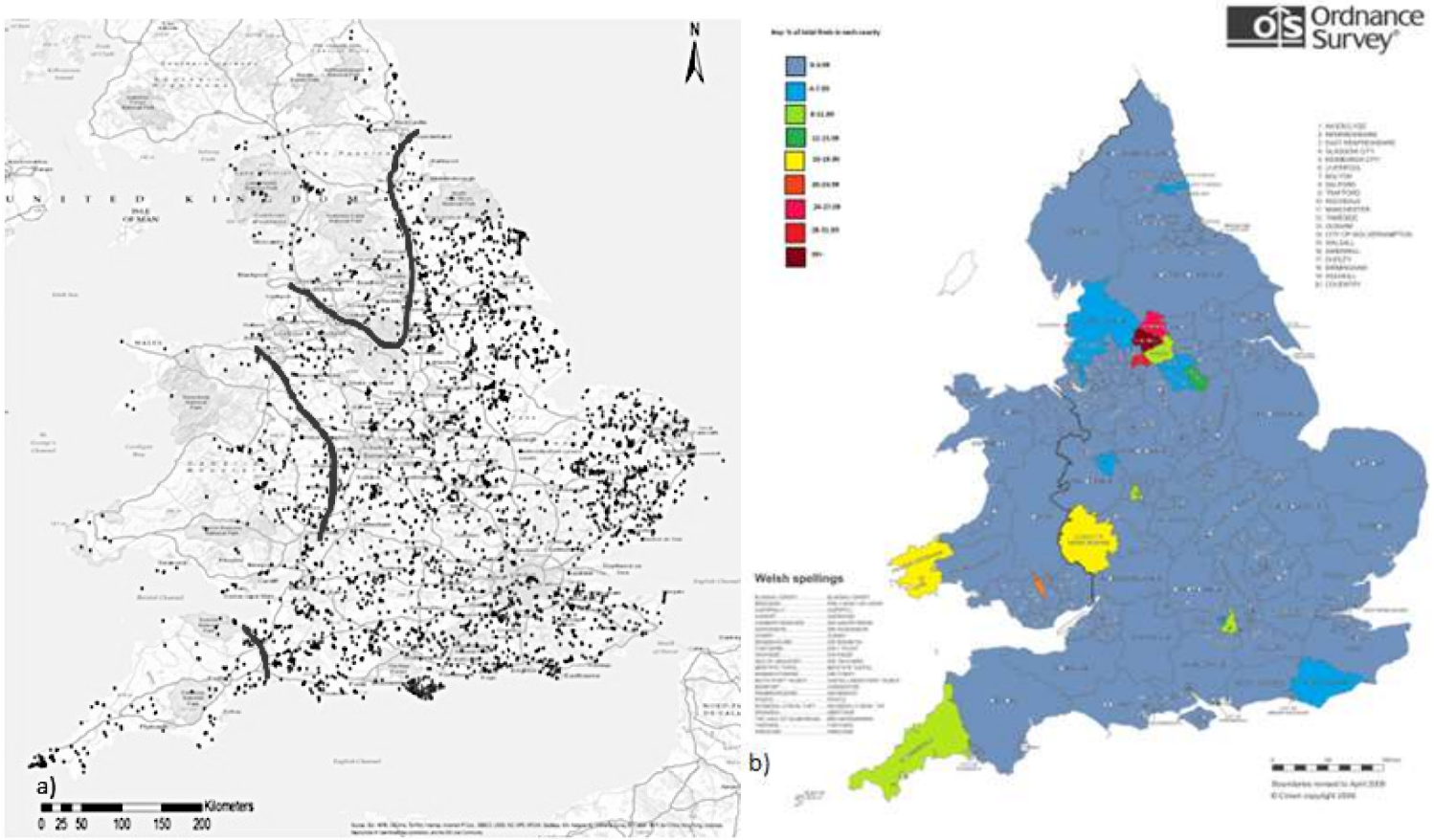


Figure 4.17 a) Mesolithic (10000-4001 BC) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Mesolithic. Map produced using data from the PAS database, base map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

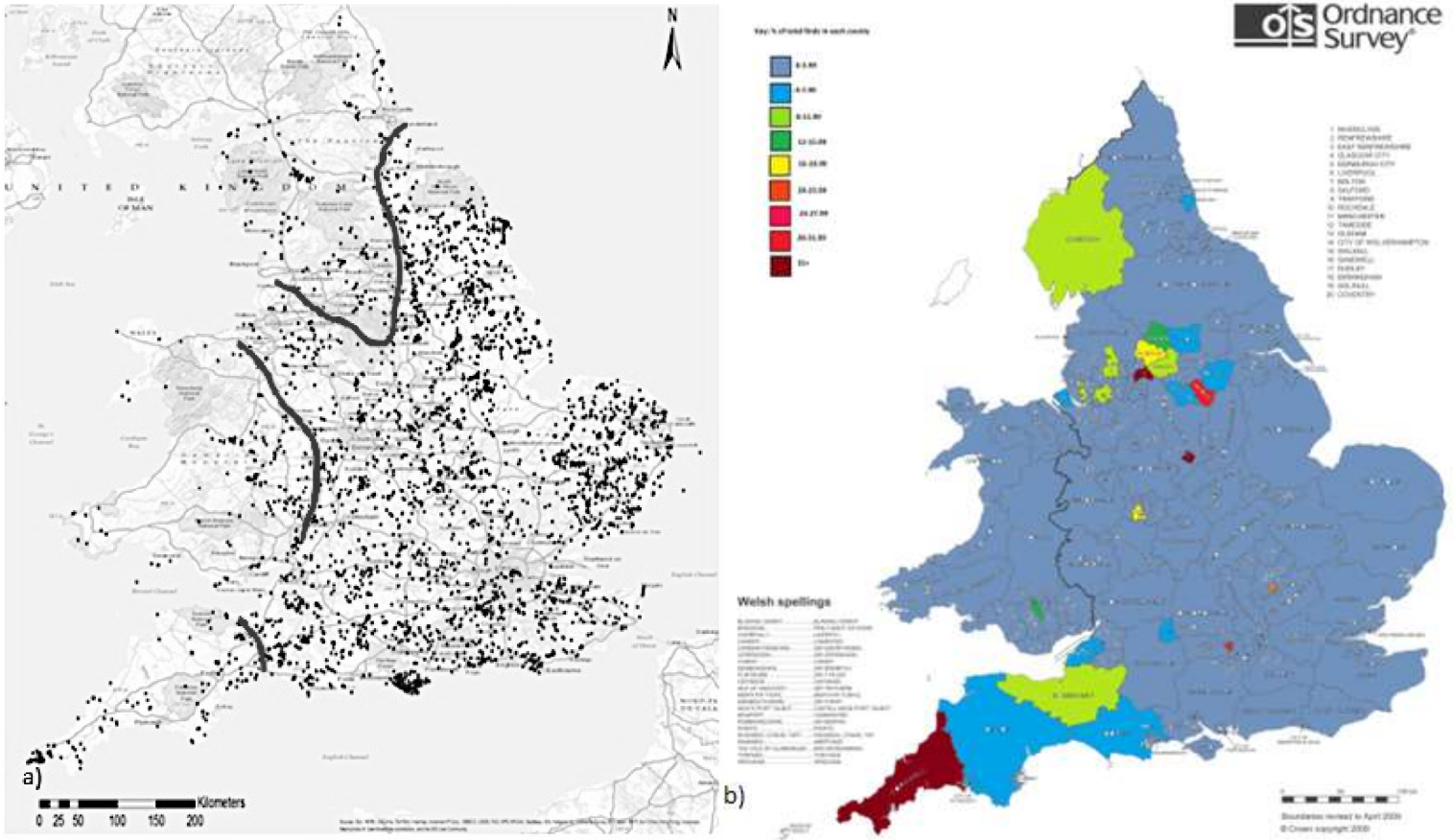


Figure 4.18 a) Neolithic (4000-2351 BC) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Neolithic. Map produced using data from the PAS database, base map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

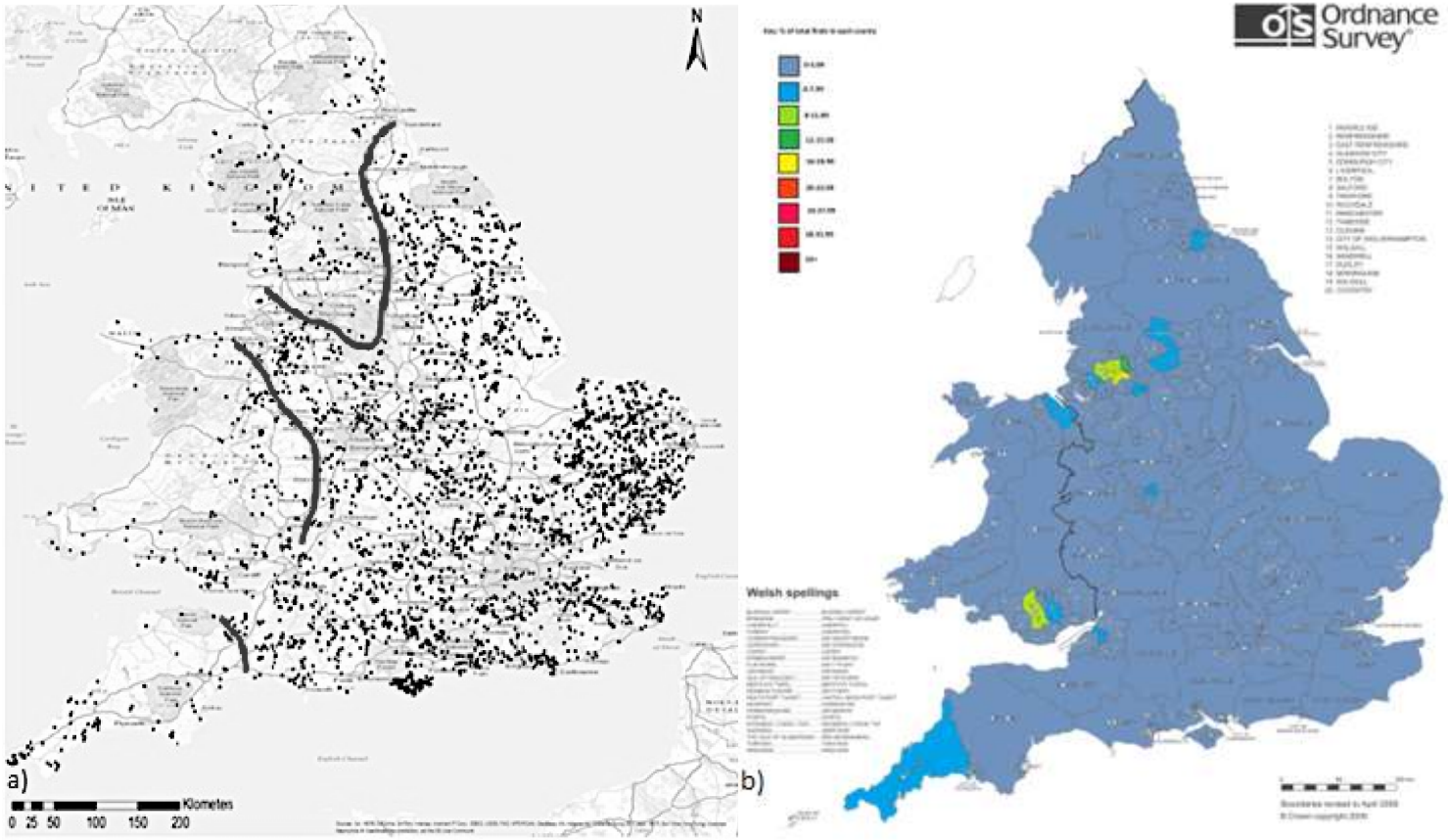


Figure 4.19 a) Bronze Age (2350-801 BC) finds distribution. Map produced using ArcGIS with data from the PAS. b) The percentage of finds per county that are Bronze Age. Map produced using data from the PAS database, base map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

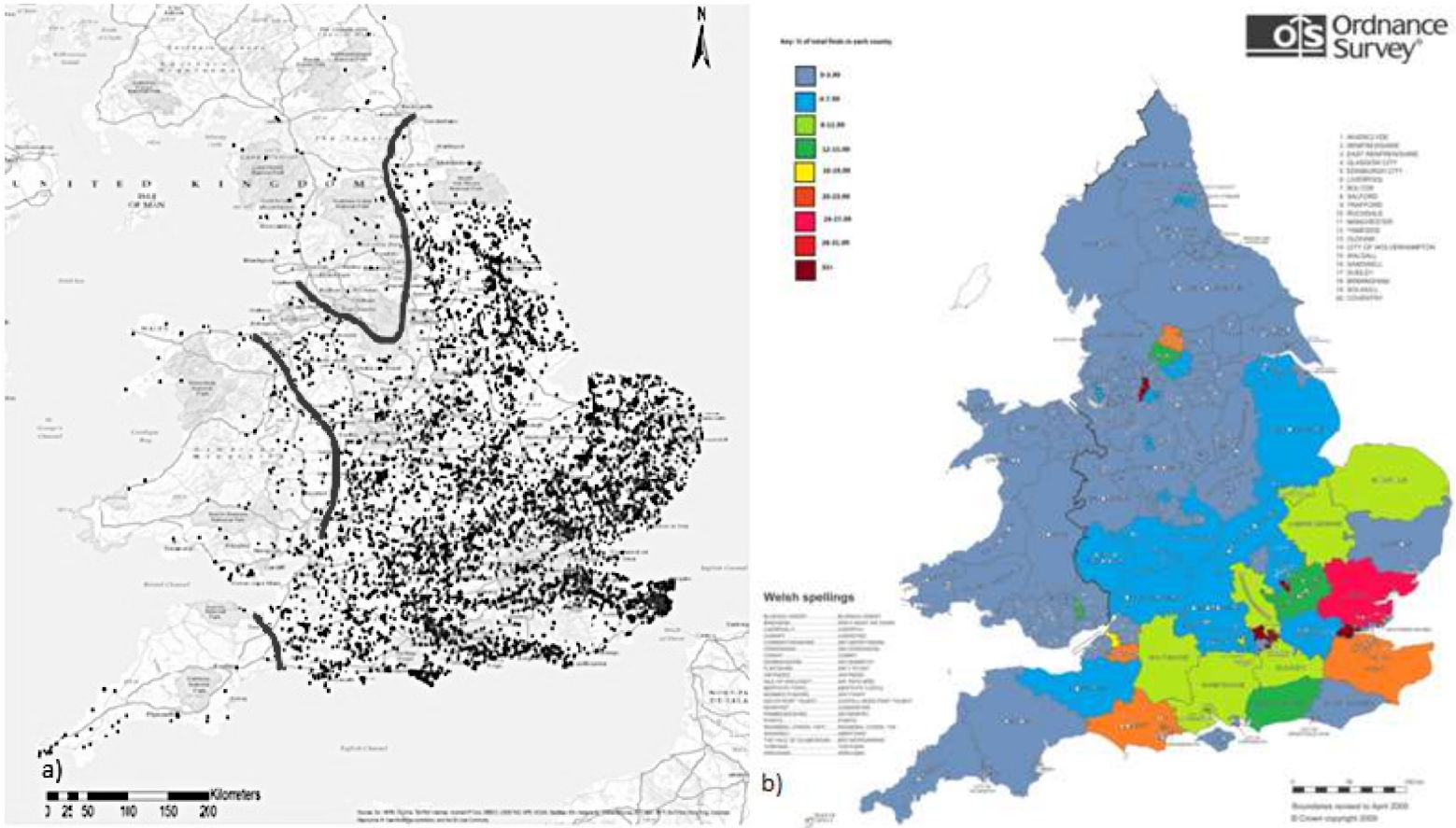


Figure 4.20 a) Iron Age (800 BC-AD 42) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Iron Age. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

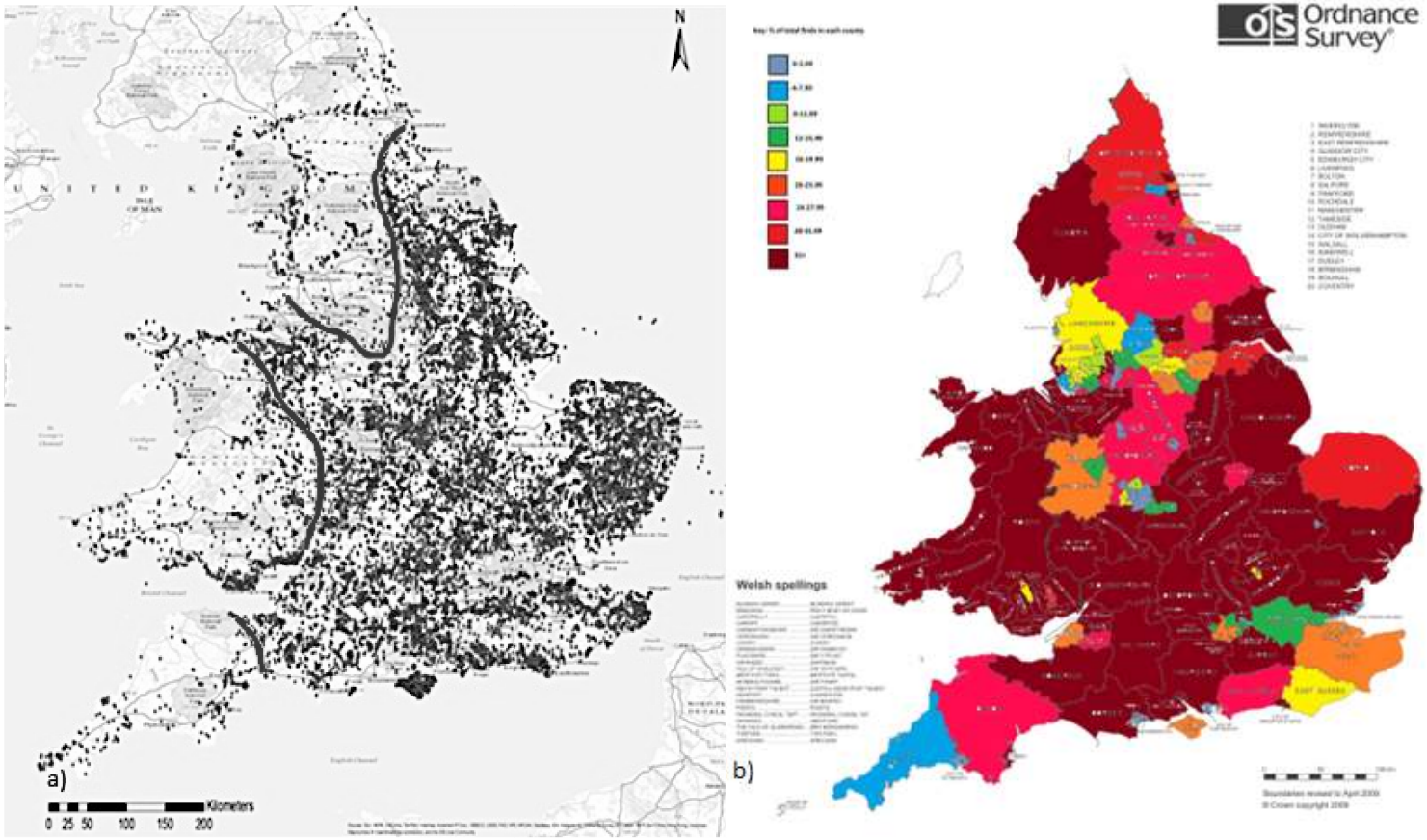


Figure 4.21 a) Roman (AD 43-410) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds in each county that are Roman. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

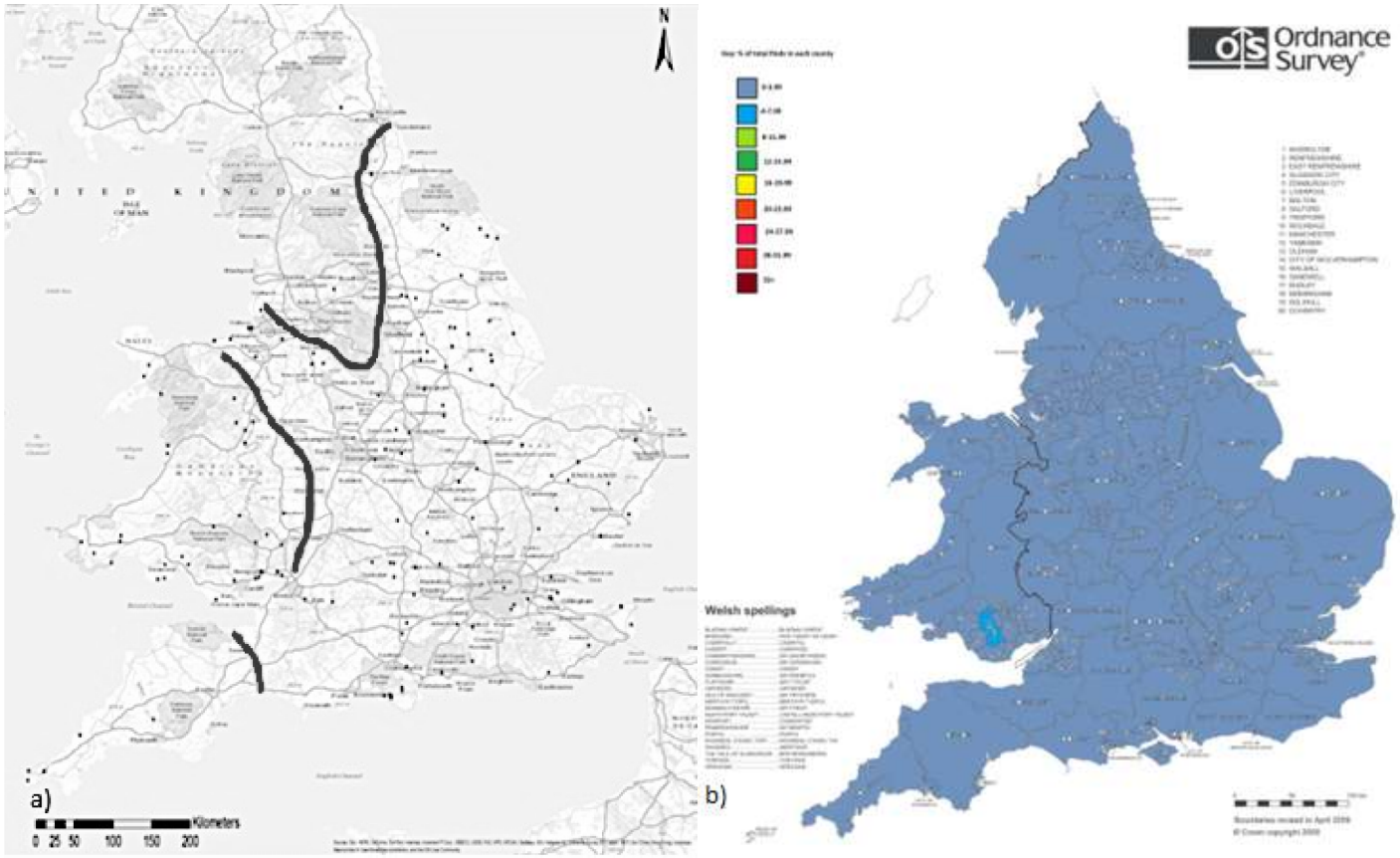


Figure 4.22 a) Greek and Roman Provincial (700 BC-AD 297) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds in each county that are Greek and Roman Provincial. Map produced using data from the PAS database and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

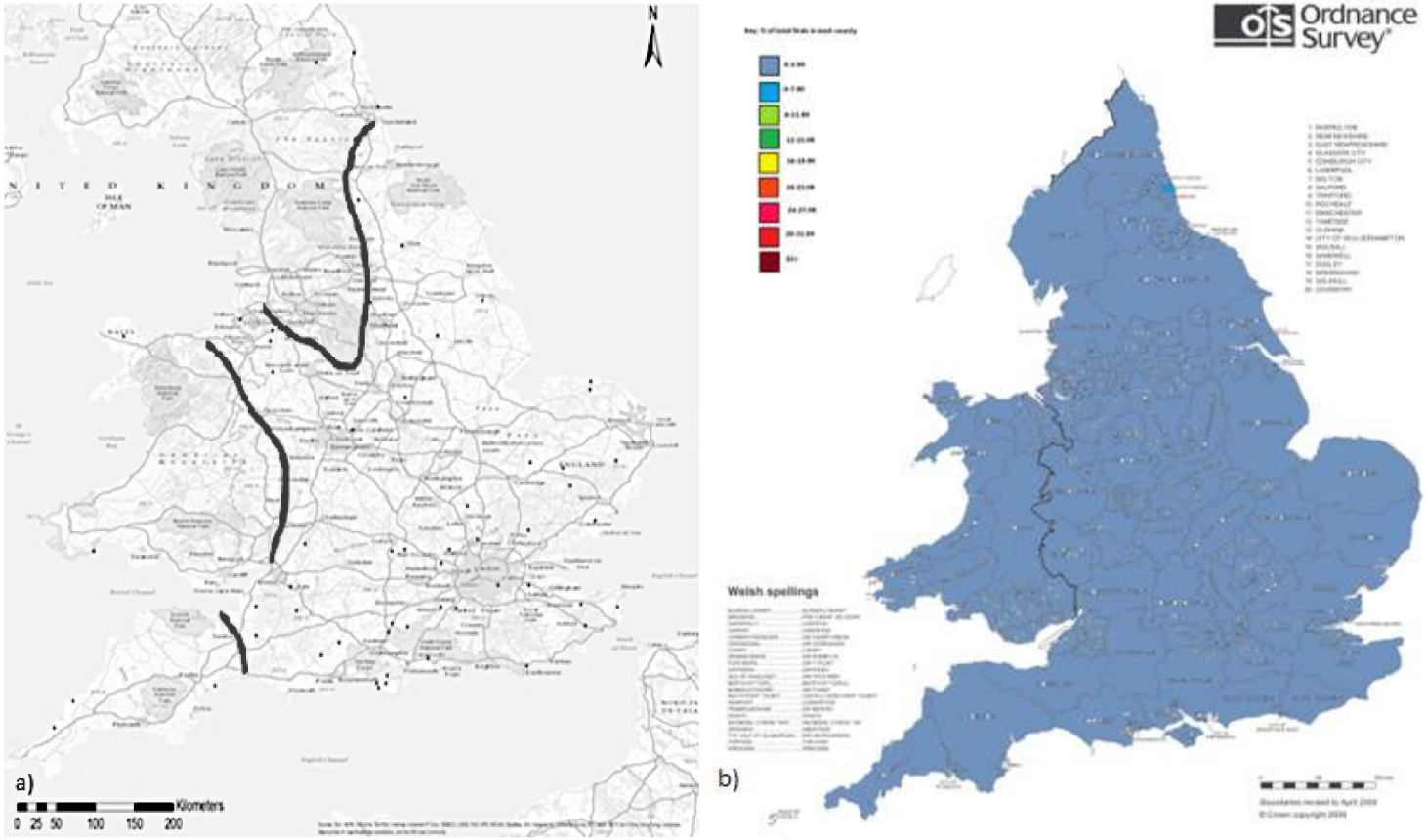


Figure 4.23 a) Byzantine (AD 491-1453) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Byzantine. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

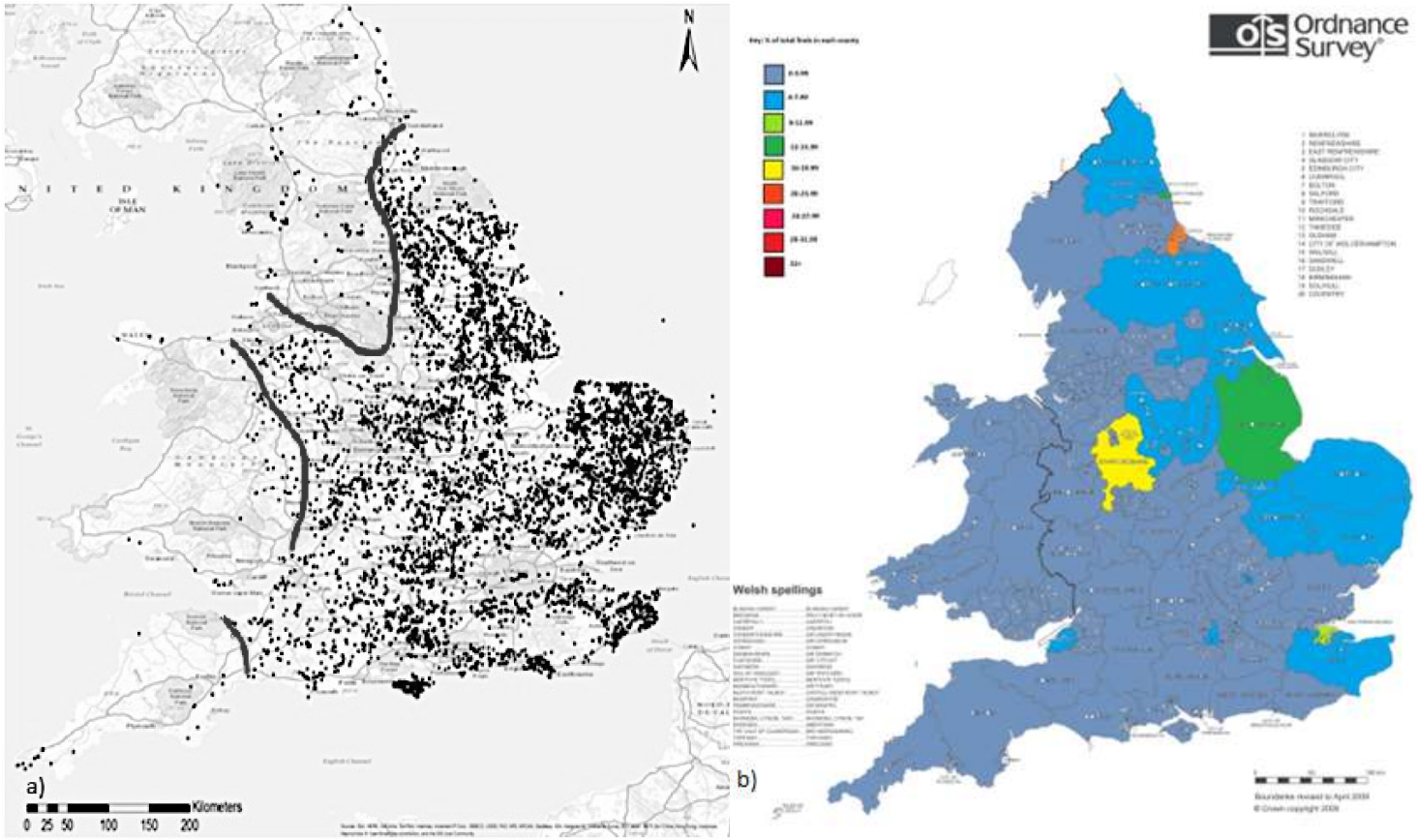


Figure 4.24 a) Early Medieval (AD 410-1066) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Early Medieval. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

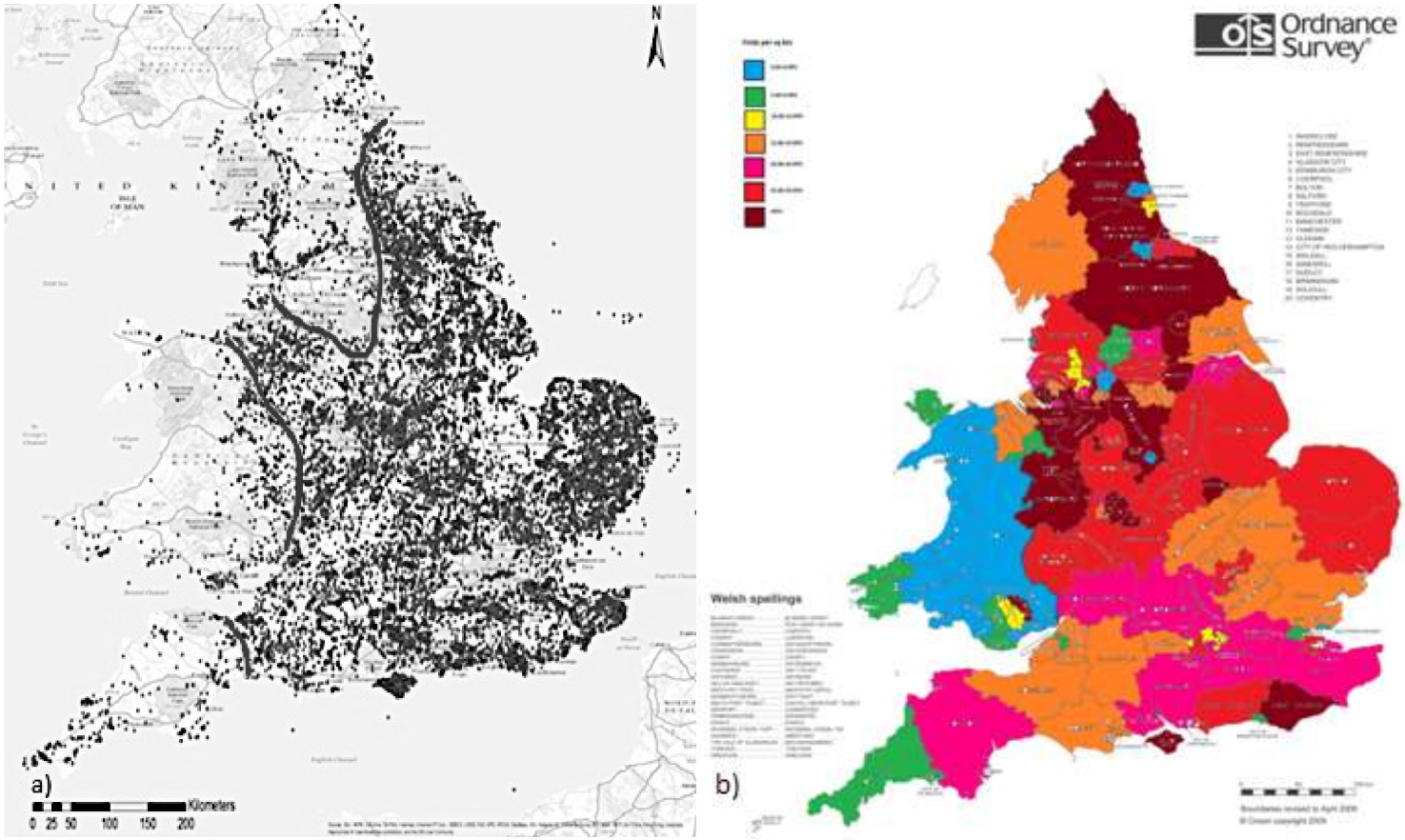


Figure 4.25 a) Medieval (AD 1066-1539) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Medieval. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

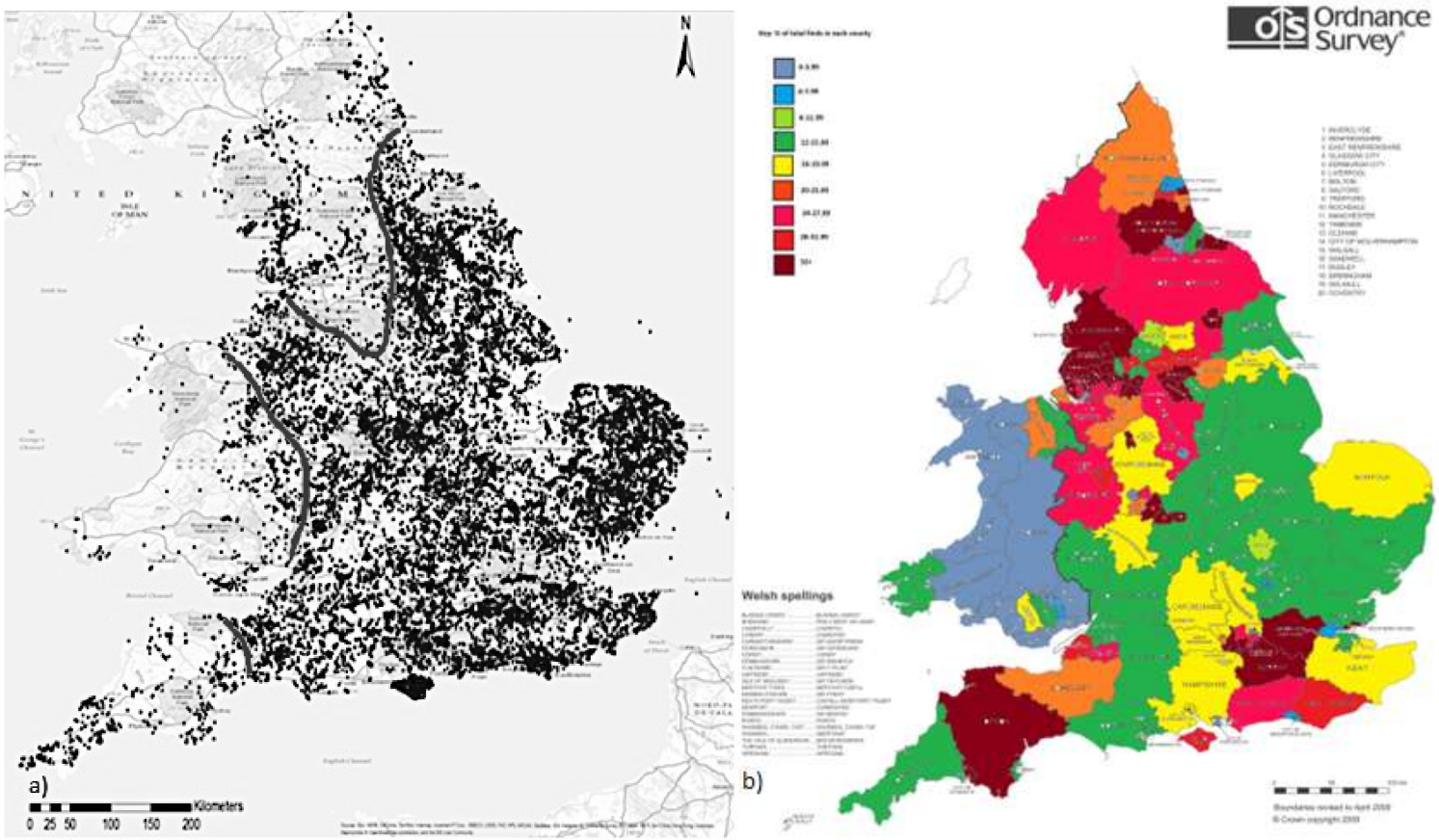


Figure 4.26 a) Post-Medieval (AD 1500-1900) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds per county that are Post-Medieval. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

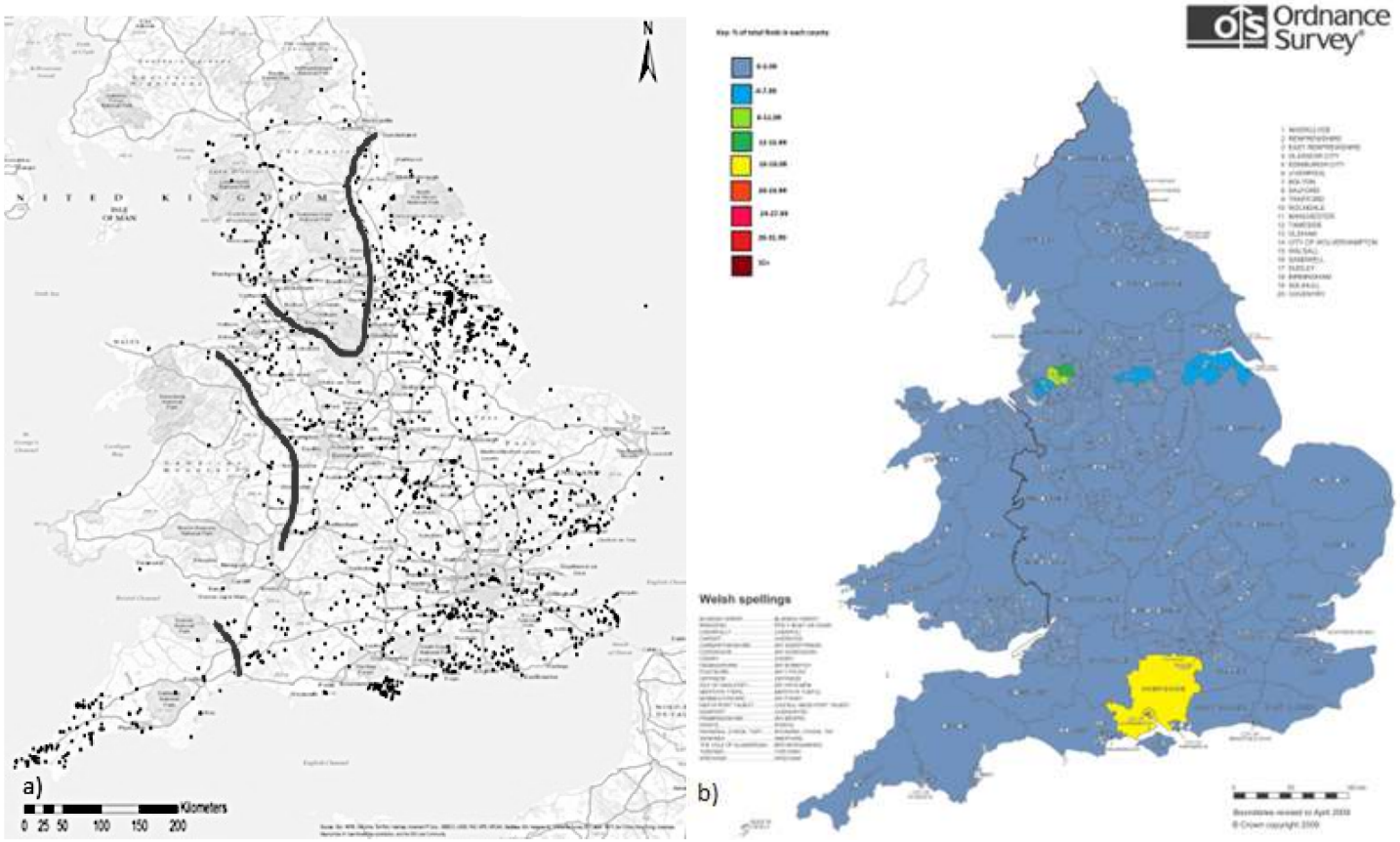


Figure 4.27 a) Modern(AD 1901-2050) finds distribution. Map produced using ArcMap with data from the PAS. b) The percentage of finds in each county that are Modern. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

The results of the Chi-squared tests for the period-specific datasets are shown in Table 4.5. The actual number of finds in each period is compared to that expected if the finds were distributed randomly across the two zones. For each of these tests the null hypothesis is that there is no significant difference between the density of finds in the Highland Zone and the Lowland Zone.

The P-values for the period-specific datasets (Table 4.5) show that the null hypothesis (that there is no significant difference between the finds density in the Highland Zone and the Lowland Zone) can be rejected for all periods except Greek and Roman Provincial. The remaining periods do have a statistically significant difference between the finds in the Highland Zone and the Lowland Zone. In all cases (except Greek and Roman Provincial) there appears to be a lower density of finds in the Highland Zone and this is supported by the Chi-squared test.

Broad Period	**P-value**
Prehistoric	0
Palaeolithic	1.12306×10^{-58}
Mesolithic	6.71831×10^{-80}
Neolithic	2.31254×10^{-34}
Bronze Age	0
Iron Age	0
Roman	0
Greek and Roman Provincial	0.860264807
Byzantine	0.000240579
Early Medieval	0
Medieval	0
Post-Medieval	0
Modern	3.3771×10^{-157}
Unknown	0

Table 4.5 P-values calculated by Chi-squared test for the number of finds in the Highland and Lowland Zones in each broad period. Data from the PAS.

The Iron Age (800 BC-AD 42) data (Figure 4.20) shows a slightly different distribution to that of the whole PAS dataset. The divide along the line of the boundary between the Highland and Lowland Zones is still visible to some extent. The boundary between higher and lower densities of finds runs from The Wash in East Anglia to the Bristol Channel. There are few finds from north of the South West region. A similar distribution of Iron Age portable antiquities was identified by the VASLE project (Richards *et al* 2009). Despite this, in the Iron Age finds distribution still broadly follows the same trends as the entire dataset.

The Roman (AD 43-410) finds (Figure 4.21) largely follow the patterns established above for the national data (Figure 4.12). The map of relative density of Roman finds per county (Figure 4.21b) also shows that many counties have a large proportion (greater than 32%) of Roman finds. Norfolk, Kent and East and West Sussex have lower percentage of Roman finds than might be expected compared to surrounding areas. As discussed above, many finds from Norfolk may not yet be recorded in the PAS and this may influence the apparent distribution of PAS finds in the county. However, in other periods, Norfolk has a similar or greater percentage of finds than the surrounding counties. In Kent and East and West Sussex, the finds distribution is focused mainly around the coast with the interior of the counties being relatively sparse in terms of finds recovery. Richards *et al* (2009) suggest that the distribution of Roman finds is linked to what they refer to as 'the centre of gravity of Roman Britain', towns and villas. The villa economy and urbanisation in lowland Britain were key factors of the Roman way of life in *Britannia* (Faulker 1997: 40-42, de la Bédoyère 2006: 130-133, 182-183). Figure 4.28 depicts the distribution of Roman towns and villas in Britain and does show similarities to the distribution of portable antiquities.

In the south and east (in the Lowland Zone) there is, in general, a high density of Colonies, *Civitas* capitals and small towns (Figure 4.28a). The north, Wales and Cornwall are generally devoid of

principal towns. The West Midlands also has few towns. The small towns of the West Midlands and North West which can be seen in Figure 4.28a are are part of the Lowland Zone where there is a high finds density (Figure 4.12). East and West Sussex have few principal towns, with a non-urbanised area (The Weald) between Silchester and Canterbury (Figure 4.28a).

A similar distribution can be seen in the villas (Figure 4.28b). These occur predominantly in the south and east of Britain in what are known as the Central and Eastern Zones by de la Bédoyère. Villas are found mainly in the Central Zone. Villa distribution in Norfolk is relatively sparse and inland areas of East and West Sussex are devoid of villas. However, the interior of Kent and East and West Sussex has few finds in any period. This pattern is more evident where there are sufficient finds to display a clear distribution pattern but not so many that it is impossible to show each findspot clearly on a relatively small scale map such as that in Figure 4.12. The area of The Weald has been identified above as a sparse area in the otherwise finds-rich south and east. There are also areas with high numbers of PAS finds where villas are relatively sparse. In particular, the north and east of Wales and north east England have a number of Roman finds but very few villas. Brindle (2013: 74) agrees with the assessment of the Roman distribution made by the VASLE project (Richards *et al* 2009). He states that the distribution of Roman data is along the lines of what would be expected based on the traditional indicators of Roman culture such as towns and villas.

Richards *et al* (2009) may be correct in identifying a link between the distribution of PAS finds and Roman towns and villas but the latter is not necessarily the cause of the former. The lack of both villas and finds in The Weald may have both been down to the area originally being heavily forested.

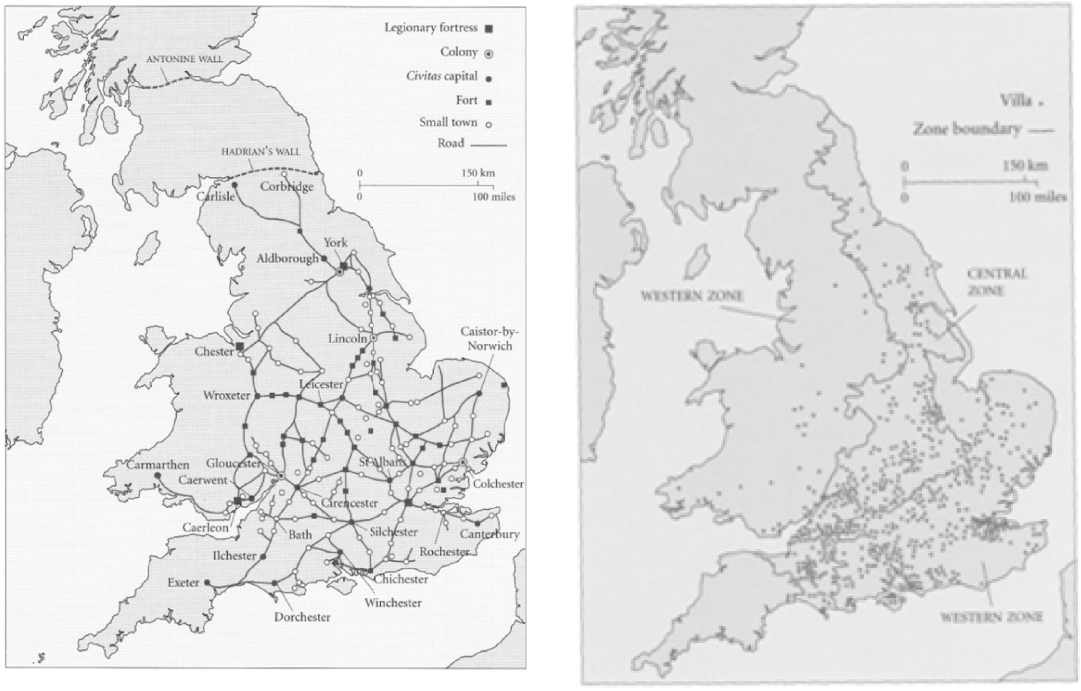


Figure 4.28 a) Map of the principal towns of Roman Britain. Source: de la Bédoyère (2006: 131). b) Map of villa distribution in Roman Britain. Source: de la Bédoyère (2006: 183) after Hingley and Miles and Jones and Mattingly.

Along with the Roman finds, the portable antiquities from the PAS Early Medieval period (AD 410-1066) are of the greatest importance to this study. Again, the period-specific database follows broadly the same trends as for the entire PAS database. However, a divergence from this pattern has been identified (Taylor 2014: 60). In the case of the Early Medieval data, there appears to be a concentration of finds along the east coast of Britain (Figure 4.24). Naylor (2004: 51) identified that in the period AD 650-900 the sites with the largest coin assemblages were mainly located less than fifteen kilometres from the coast, demonstrating the importance of seaborne trade routes.

This trend is also reflected in the fact that it is predominantly the counties along the North Sea coast which have the greatest percentage of Early Medieval finds. Richards *et al* (2009) note that the lack

of finds from the Midlands compared to earlier and later periods must demonstrate that there were differences in the use of material culture in the east and west. They state that Early Medieval communities in the West Midlands area became increasingly isolated when the North Sea economic system became dominant in the seventh century. Much of Wales and the West Midlands have low densities of finds in all periods but the areas around Liverpool and the Wirral are particularly sparse in the Early Medieval period compared to the periods either side. Despite being in the west of the country, this area is part of the Lowland Zone with a higher density of finds (Figure 4.12). The fact that finds distribution in this area differs from the national trends supports the hypothesis that this is down to differential use and deposition of portable antiquities in the period in question rather than an artefact of finds reporting and recording.

Loveluck and Tys (2006) suggest that there was far greater exploitation of marginal coastal landscapes in the Early Medieval period than previously thought. They identified the importance of the Channel and North Coast regions in the Early Medieval period. An importance of eastern coastal communities at this time may explain the distribution of the PAS finds seen in Figure 4.24a.

Richards *et al* (2009) also assert that the difference in use of material culture between east and west and the lack of material in the Midlands compared with other periods is particularly evident in fifth to eighth century burial. They cite the assessment of post-Roman cemeteries by Holbrook and Thomas (2005: 87) where they state the majority of such sites have few grave goods. The lack of grave goods in western cemetery sites is well attested (Lucy and Reynolds 2002: 1-8) and is most likely to reflect differences in culture and identity rather than use of material culture in non-funerary contexts. Joyce (2001: 12) stated that approaches to funerary archaeology are united in the sense that funerary contexts are extremely meaningful with regard to identity because 'they were formed under the pressure of one of the most significant transformations in the human life course'.

Archaeology has long used analysis of funerary settings as an indicator of identity and/or social status. For example, the work of Saxe (1970) and Binford (1971) into social indicators in mortuary practice (c.f. Brown, J. A. 1995). Reimers (1999: 147) looked at graves as a form of social communication, drawing on studies of ethnicity to determine that death rituals in contemporary Sweden were used to 'enhance, subsume, or to fuse social boundaries'.

Lucy's (2000:140-9) assessment of the furnished burial rite in Anglo-Saxon England led her to conclude that there was a decline in furnished burials in the East Midlands and East Anglia in the seventh and eight centuries. However, the Peak District (along with Wiltshire, Kent and Sussex) had a strong barrow-building tradition in the seventh century (Lucy 2000: 146). This concentration of Anglo-Saxon burials can be seen in Härke's (2011: 3) map of Anglo-Saxon burials from the fifth to the seventh/eight century (Figure 4.11a) and also corresponds to a similar concentration of Early Medieval and Medieval finds in the Peak District (Figure 4.24). There are also known Anglo-Saxon graves in cemeteries in Warwickshire in the West Midlands at Wasperton (Carver *et al*: 2009) and Stretton-on-Fosse (Ford 2003). These will be discussed further in Chapter Five as demonstrating a culturally diverse community and the blending of Anglo-Saxon and native British identity.

The trends observed by the VASLE project are somewhat altered in the more up to date assessment of the PAS database. The biggest exception to the general trend of concentration of finds down the east coast is Staffordshire, in the West Midlands, which has one of the highest percentages of Early Medieval finds in England and Wales. The discovery of the Staffordshire Hoard in Ogley Hay, Staffordshire in July 2009 (Leahy *et al* 2011) may be part of the reason for this anomaly. However, its influence can be exaggerated given that there is no location data recorded for the Staffordshire Hoard in the PAS database and so it does not appear on the distribution map.

Nevertheless, the discovery of the Staffordshire Hoard and the high percentage of Early Medieval finds in Staffordshire show that portable antiquities were in use in the West Midlands in this period. Furthermore, the apparent lack of finds in certain areas may be at least partially down to the small number of Early Medieval finds in general.

There is, however, a clear difference between the distributions of Early Medieval finds and finds from other periods. Figure 4.29 shows the density of Early Medieval finds in each county. In the Highland Zone, the lowest number of finds per square kilometre is zero (thirty two different counties) and the highest is 0.11 (Hartlepool). In the Lowland Zone the lowest number of finds per square kilometre is zero (eight counties) and the highest is 1.29 (Isle of Wight). Figure 4.30 shows the distribution map of Early Medieval PAS finds with both the boundary between the Highland and Lowland Zones (with high and low densities of finds respectively in the overall dataset) shown in red and the boundary between high and low densities of Early Medieval finds shown in green. These two zones can be referred to as Eastern England and Western Britain as they represent the traditionally perceived divide between the area occupied by peoples who were culturally Anglo-Saxon and native Britons. It must be noted that these names are based on the perceived cultural affiliations of each area, which will be further tested as part of this research, and are not an attempt to clearly define areas of Anglo-Saxon and Roman or sub-Roman culture based solely on the distribution of Early Medieval finds. There is an area which is part of the Lowland Zone, with high densities of overall finds, but in Western Britain, with low densities of Early Medieval finds. This has been referred to as the Boundary Zone.

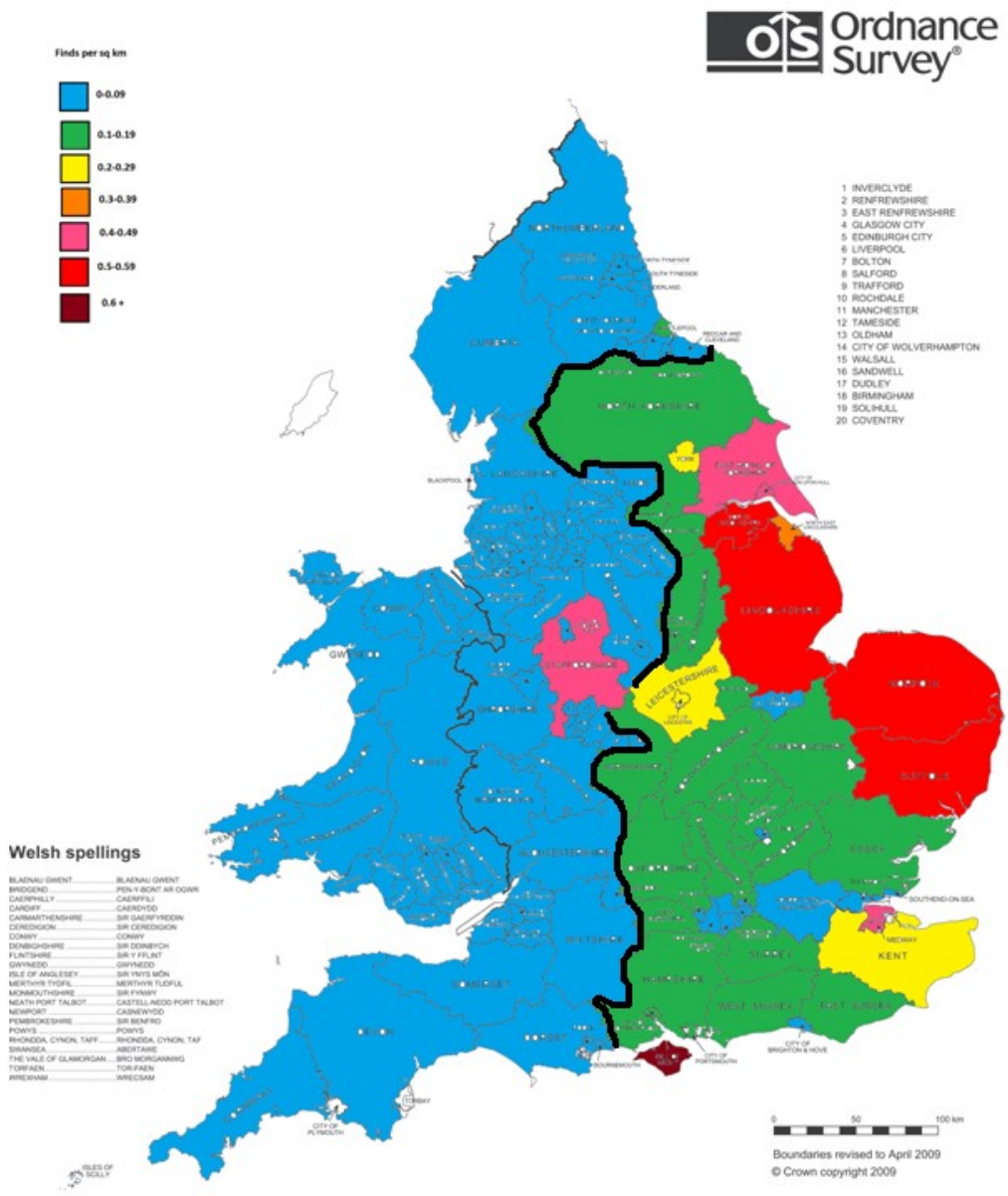


Figure 4.29 Early Medieval finds density in each county. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

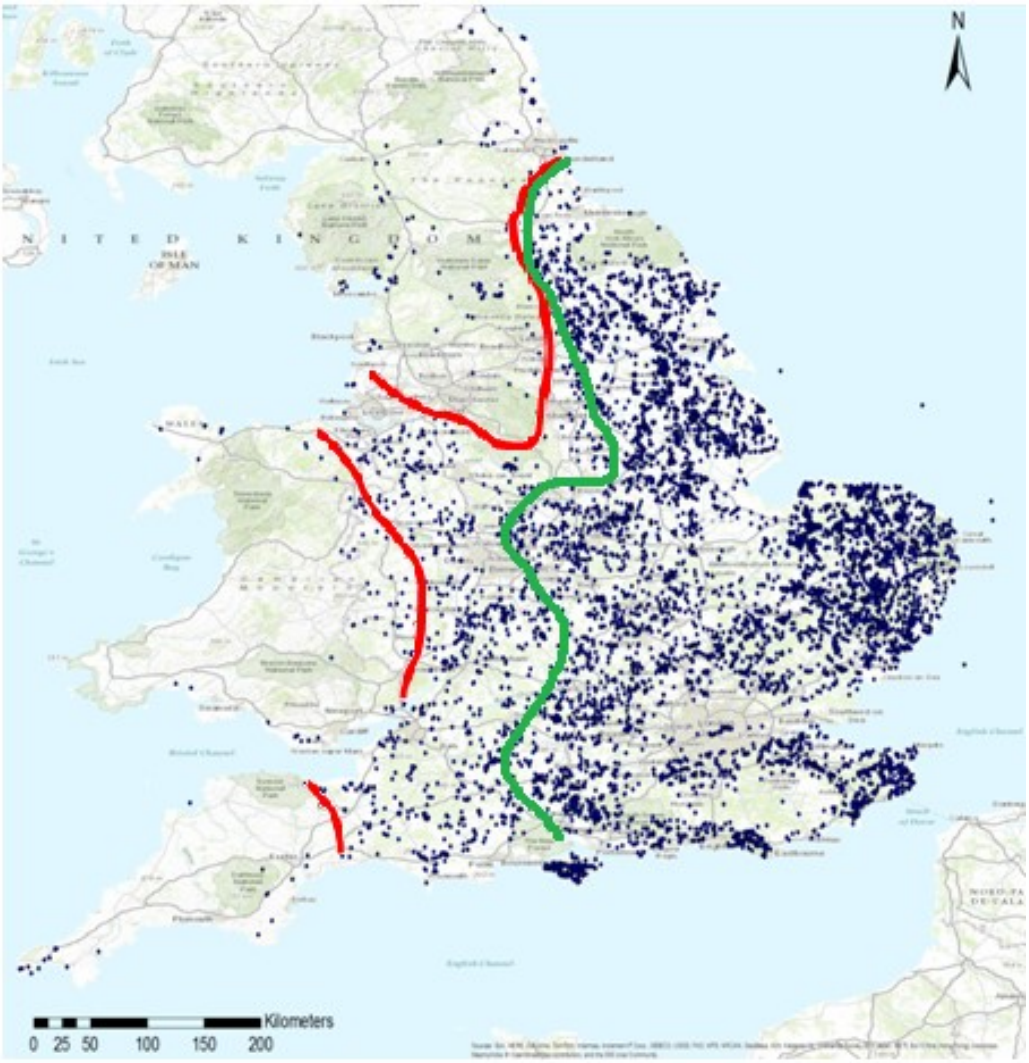


Figure 4.30 Distribution map of Early Medieval PAS finds showing the boundary between the Highland and Lowland Zones (red) and the boundary between high and low densities of Early Medieval finds (green).

In conclusion, several zones have been identified based on finds distribution. These are shown in

Figure 4.31.

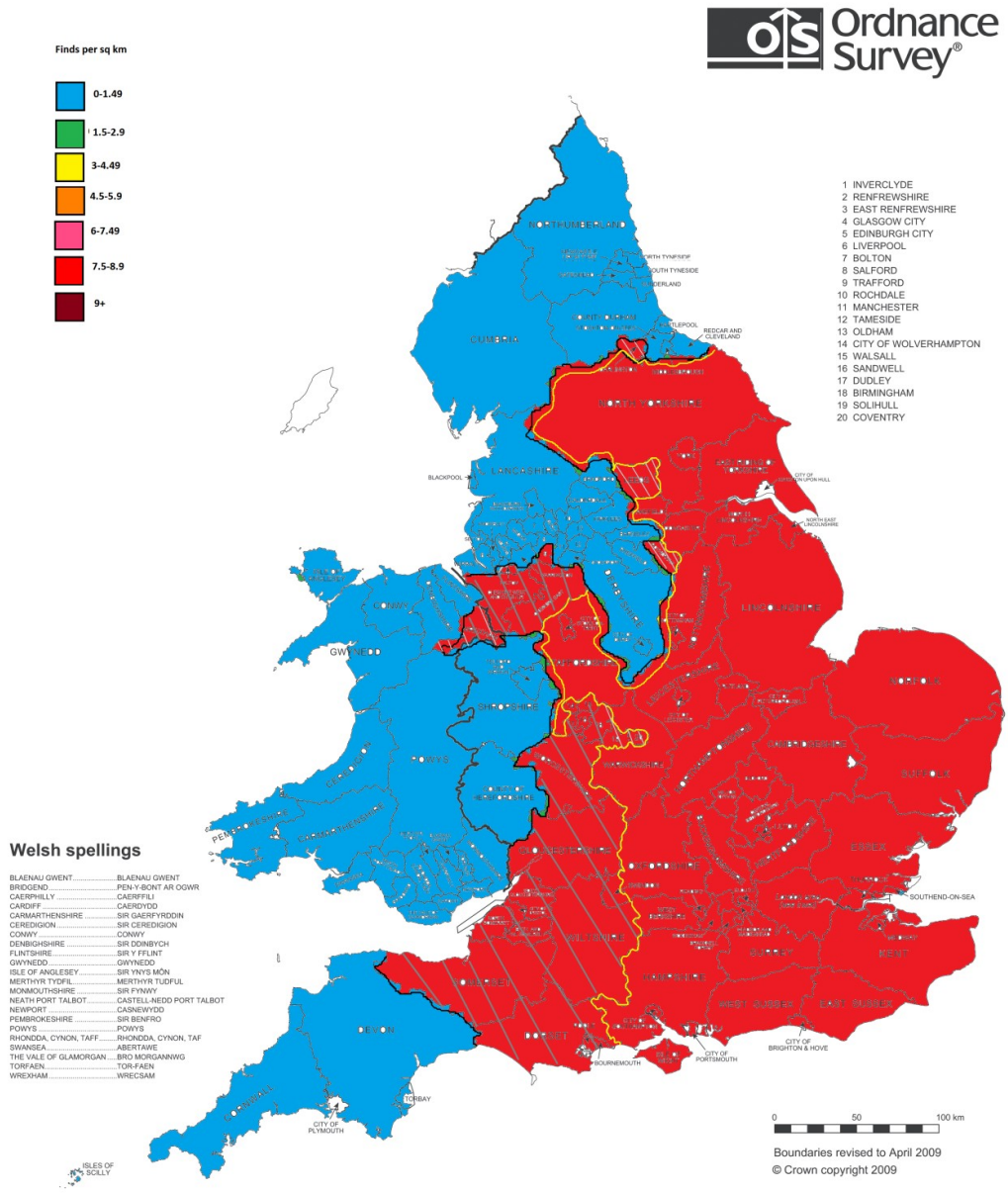


Figure 4.31 Distributions of PAS finds. Blue: Highland Zone, red: Lowland Zone, black line: boundary between the Highland Zone and Lowland Zone, yellow line: boundary between Western Britain and Eastern England, hashed area: Boundary Zone - the area which is part of the Lowland Zone but Western Britain. Map produced using data from the PAS database, base map by permission of Ordnance Survey (2013) © Crown copyright 2013.

Based on the Early Medieval finds distribution, the following counties make up the Boundary Zone:

- Rotherham
- Cheshire East
- Cheshire West and Chester
- Halton
- Trafford
- Wrexham
- City of Wolverhampton
- Walsall
- Dudley
- Birmingham
- Solihull
- Coventry
- Worcestershire
- Gloucestershire
- Swindon
- Wiltshire
- South Gloucestershire
- City of Bristol
- Bath and North East Somerset
- North Somerset
- Somerset
- Dorset
- Darlington

- Leeds

Chi-squared tests were carried out to determine whether there is any statistically significant difference in finds densities between those zones that have been identified. The results of the Chi-squared tests (Table 4.6) show that in Eastern England and Western Britain there is a statistically significant difference in the number of finds across all periods excluding the Neolithic and Greek and Roman Provincial. In the majority of broad periods, there is a higher finds density in Eastern England than Western Britain. Only in the Prehistoric and Greek and Roman Provincial periods is the finds density higher in Western Britain. The fact that it is not only for the Early Medieval period that there is a statistically significant difference in the number of finds in Eastern England and Western Britain does not mean that the differences in finds distributions identified above (Figure 4.29 and Figure 4.30) are not important. The large number of finds in the east in general across all periods may skew the results and mean that there is still a significant difference in finds density between Eastern England and Western Britain, even in periods where the distribution seems to suggest a division more along the lines of high and low topography. This is due to the overlap between zones (see Figure 4.31).

Chi-tests for the finds across the Boundary Zone and Eastern England or the Highland Zone demonstrate that there is a significant difference in finds densities between these areas in the majority of periods (Table 4.6), This is to be expected. The Boundary Zone has, in general, fewer finds that the rest of the Lowland Zone and, therefore, the results of the Chi-squared tests are not surprising.

The distribution of finds in the PAS periods of research for this study are summarised in Table 4.7 and Figure 4.32.

Broad Period	P-value (Eastern England and Western Britain)	P-value (Eastern England and Boundary Zone)	P-value (Highland Zone and Boundary Zone)
All Finds	0	0	0
Prehistoric	0.01	0	0.01
Palaeolithic	0	0.82	0
Mesolithic	0	0	0
Neolithic	0.11	0	0
Bronze Age	0	0	0
Iron Age	0	0	0
Roman	0	0	0
Greek and Roman Provincial	3.64	0.78	0.50
Byzantine	0	0.80	0.16
Early Medieval	0	0	0
Medieval	0	0	0
Post-Medieval	0	0	0
Modern	0	0	0.16
Unknown	0	0	0

Table 4.6 Chi-squared test for finds in Eastern England and the Boundary Zone and the Highland Zone and the Boundary Zone. Data from the PAS.

	Finds per square kilometre		Chi^2	Finds per square kilometre		Chi^2	Finds per square kilometre		Chi^2	Finds per square kilometre		Chi^2
Broad Period	**Highland Zone**	**Lowland Zone**		**Western Britain**	**Eastern England**		**Eastern England**	**Boundary Zone**		**Highland Zone**	**Boundary Zone**	
All finds	1.29	4.66	✓	1.61	5.28	✓	5.28	2.49	✓	1.29	2.49	✓
Prehistoric												✓
Palaeolithic	0.00	0.00	✓	0.00	0.00	✓	0.00	0.00	✓	0.00	0.00	✓
Mesolithic	0.00	0.01	✓	0.00	0.01	✓	0.01	0.01	X	0.00	0.01	✓
Neolithic	0.03	0.04	✓	0.03	0.05	✓	0.47	0.03	✓	0.03	0.03	✓
Bronze Age	0.07	0.09	✓	0.08	0.08	X	0.08	0.11	✓	0.07	0.11	✓
Iron Age	0.02	0.06	✓	0.02	0.06	✓	0.06	0.04	✓	0.02	0.04	✓
Roman	0.01	0.36	✓	0.05	0.41	✓	0.41	0.18	✓	0.01	0.18	✓
Greek and Roman Provincial	0.93	1.78	✓	0.97	1.98	✓	1.98	1.09	✓	0.93	1.09	X
Byzantine	0.00	0.00	X	0.00	0.00	X	0.00	0.00	X	0.00	0.00	X
Early Medieval	0.00	0.00	✓	0.00	0.00	✓	0.00	0.00	X	0.00	0.00	✓
Medieval	0.01	0.21	✓	0.02	0.26	✓	0.26	0.05	✓	0.01	0.05	✓
Post-Medieval												✓
Modern	0.10	1.16	✓	0.21	1.35	✓	1.35	0.51	✓	0.10	0.51	X

Table 4.7 Summary of finds per square kilometre and whether the results of the chi-test show that the distribution of finds is significantly different to random distribution. Shaded cells show the higher of the two values for finds per square kilometre. Data from the PAS.

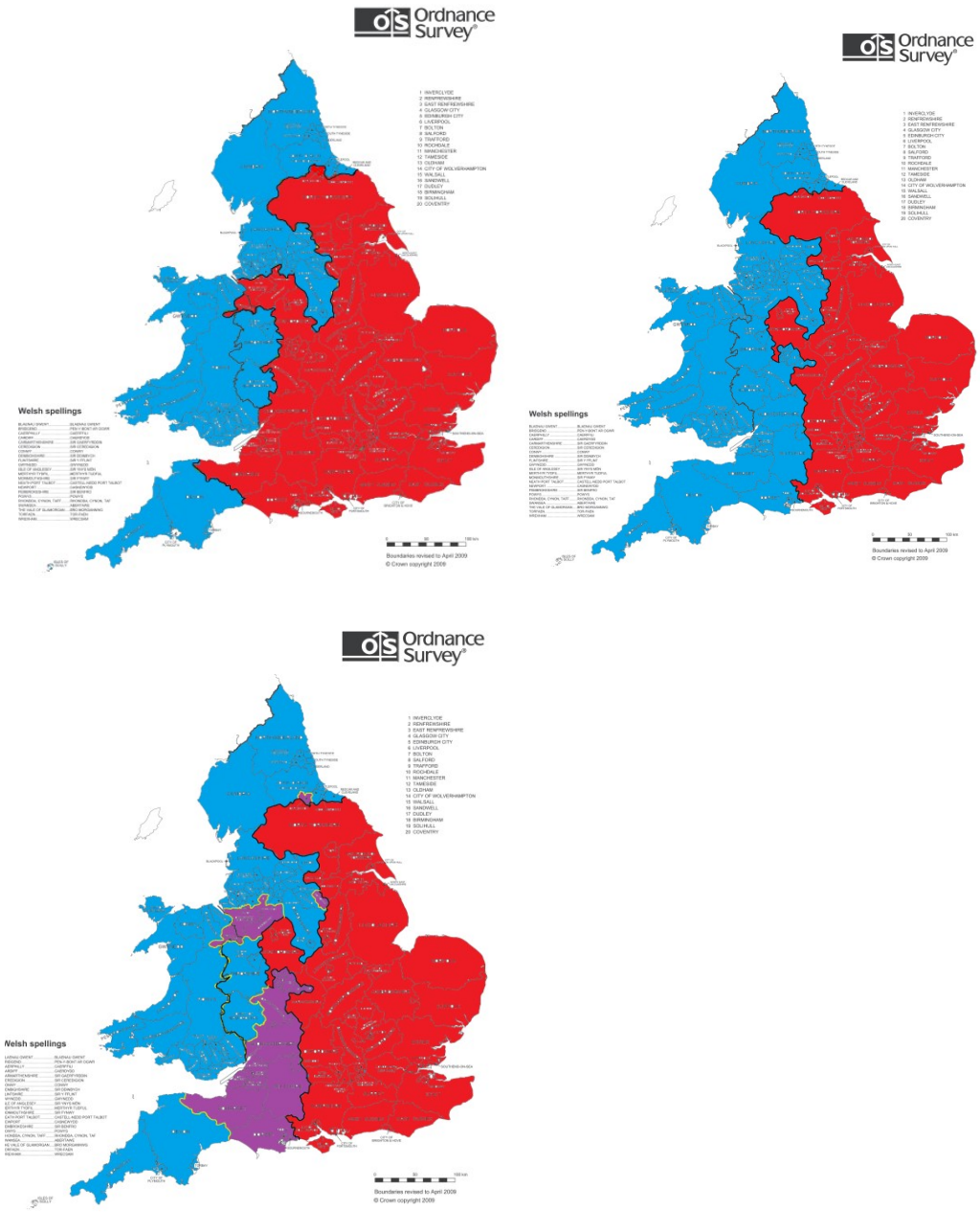


Figure 4.32 Distribution of finds across the various areas identified above. a) Greater density of finds in the Lowland Zone (red) than the Highland Zone (blue), b) Greater density of finds in Eastern England (red) than Western Britain (blue), c) Greater density of finds in the Boundary Zone than the Highland Zone (blue). Maps produced using data from the PAS database, base maps by permission of Ordnance Survey (2013) © Crown copyright 2013.

The distribution seen in Figure 4.32 is the same for the majority of periods. For the Highland and Lowland Zones (Figure 4.32a), in the Prehistoric period the picture is reversed and there is a higher finds density in the Highland Zone. For the Greek and Roman Provincial period there is no statistically significant difference between the two zones. For Eastern England and Western Britain (Figure 4.32b), again the situation is reversed for the Prehistoric period and there is a greater density of finds in Western Britain. In the Neolithic and Greek and Roman Provincial periods there is no statistically significant difference between the two zones. Finally, for Eastern England, the Boundary Zone and the Highland Zone, there is no statistically significant difference between Eastern England and the Boundary Zone in the Palaeolithic, Greek and Roman Provincial and Byzantine periods. In the Neolithic, there is a higher density of finds in the Boundary Zone than Eastern England. There is a higher density of finds in the Highland Zone than the Boundary Zone in the Prehistoric and Palaeolithic periods. For the Greek and Roman Provincial, Byzantine and Modern periods there is no statistically significant difference between the density of finds in the Highland and Boundary Zones.

This means that, for the main PAS periods in question for this research, the picture of relative finds densities across the different areas of Britain are those shown in Figure 4.32. This is to be expected as it can be seen in the distribution maps of all finds (Figure 4.12 and Figure 4.13) that the Boundary Zone does have fewer finds than the area to the east. However, it is also necessary to use common sense and comparison of the distribution maps produced in ArcMap. Unusually high or low densities of finds in certain locations may skew results of the Chi-squared test. As previously noted, the otherwise finds-rich Eastern England has several areas of low finds including The Wash, London and The Weald. In the Roman period, a relatively high number of finds are found along Hadrian's Wall in the Highland Zone/Western Britain. These distribution maps suggest a slightly different distribution for the Early Medieval finds as explained above (Figure 4.29, Figure 4.30).

The percentage that finds from each broad period contribute to the overall assemblage in each area (Table 4.8 and Figure 4.33) allows the differences between eastern and western Britain to be easily seen. The proportions of finds of different periods are fairly consistent across England and Wales. The main exceptions are the very high proportion of Roman finds in Wales (95.26%) and high proportion of Post Medieval finds in London (48.43%).

	Prehistoric	Palaeolithic	Mesolithic	Neolithic	Bronze Age	Iron Age	Roman	Greek & Roman Provincial	Byzantine	Early Medieval	Medieval	Post Medieval	Modern	Unknown
North East	0.00	0.04	0.41	2.31	1.09	0.39	51.21	0.10	0.06	2.73	22.06	18.20	0.52	0.87
Yorkshire & Humber	0.02	0.03	2.00	3.09	0.90	3.01	34.64	0.02	0.01	5.36	27.06	19.64	1.57	2.66
East Midlands	0.01	0.05	0.45	1.90	0.77	4.13	44.80	0.03	0.01	6.05	25.32	14.30	0.94	1.23
East	0.04	0.10	0.40	1.02	1.37	9.89	39.44	0.01	0.01	5.08	25.09	15.83	0.16	1.57
London	0.02	0.23	0.95	2.18	0.69	5.89	16.32	0.04	0.02	1.57	21.98	48.43	0.91	0.77
South East	0.02	0.21	1.55	1.22	1.32	10.52	31.41	0.04	0.02	3.51	25.40	22.59	0.45	1.75
North West	0.04	0.18	2.14	4.93	3.24	1.36	29.41	0.08	0.04	1.49	24.71	28.11	2.78	1.48
West Midlands	0.36	0.15	1.39	2.37	1.75	4.84	37.10	0.01	0.00	5.34	27.59	17.33	0.28	1.50
South West	0.03	0.27	2.71	11.24	2.06	7.96	37.91	0.02	0.02	1.58	17.69	17.10	0.61	0.81
Wales	0.34	0.02	0.42	0.36	0.28	0.19	95.26	0.15	0.01	0.09	1.37	1.33	0.04	0.14

Table 4.8 The percentage of finds of each period in each region of England and Wales. Data from the PAS.

The percentages of finds from different periods which make up the assemblages from the different areas (Figure 4.33 and Figure 4.34) were calculated. This demonstrates the variability in distribution across England and Wales.

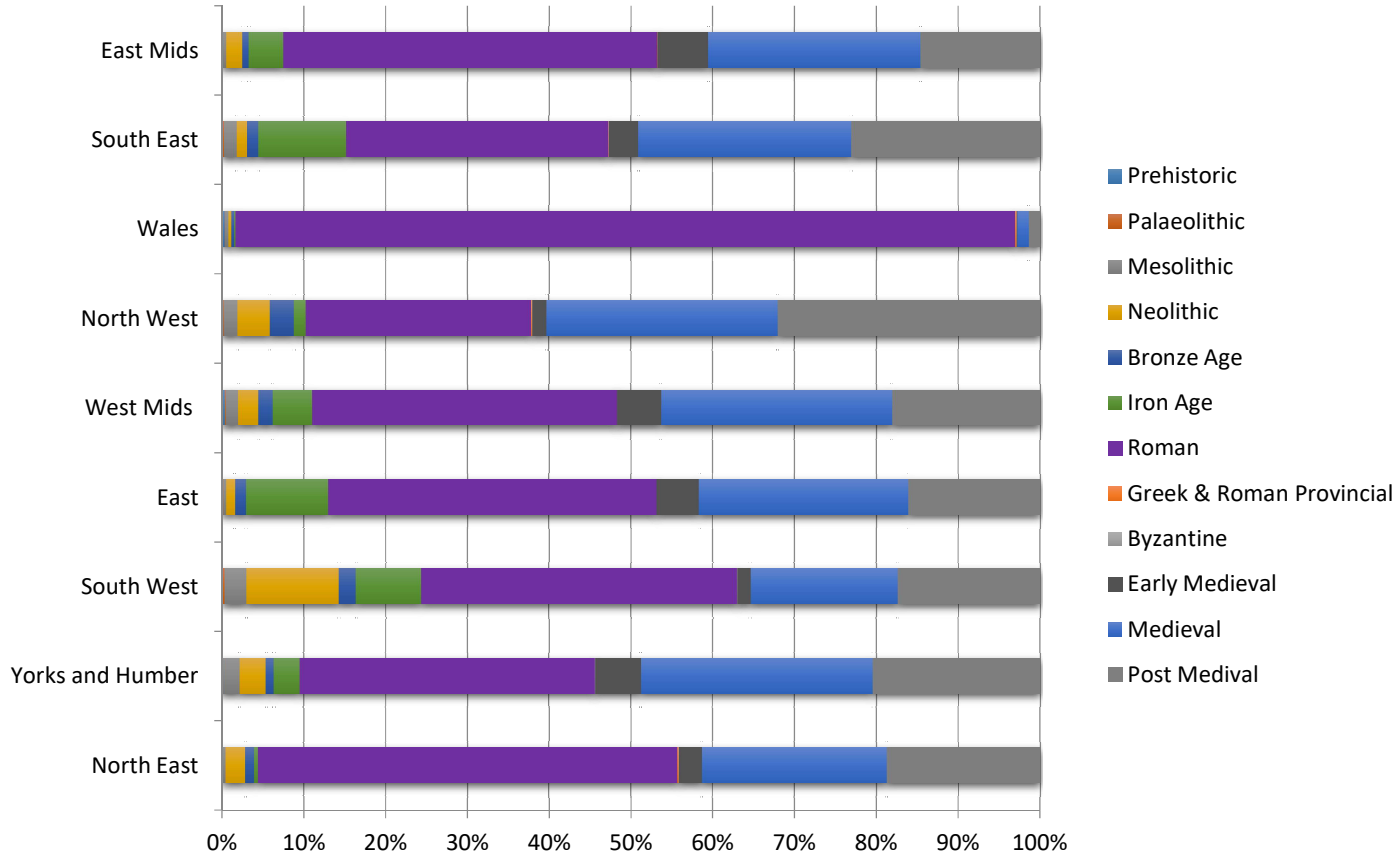


Figure 4.33 The makeup of the assemblage in each region of England and Wales in terms of period. Graph produced using data from the PAS.

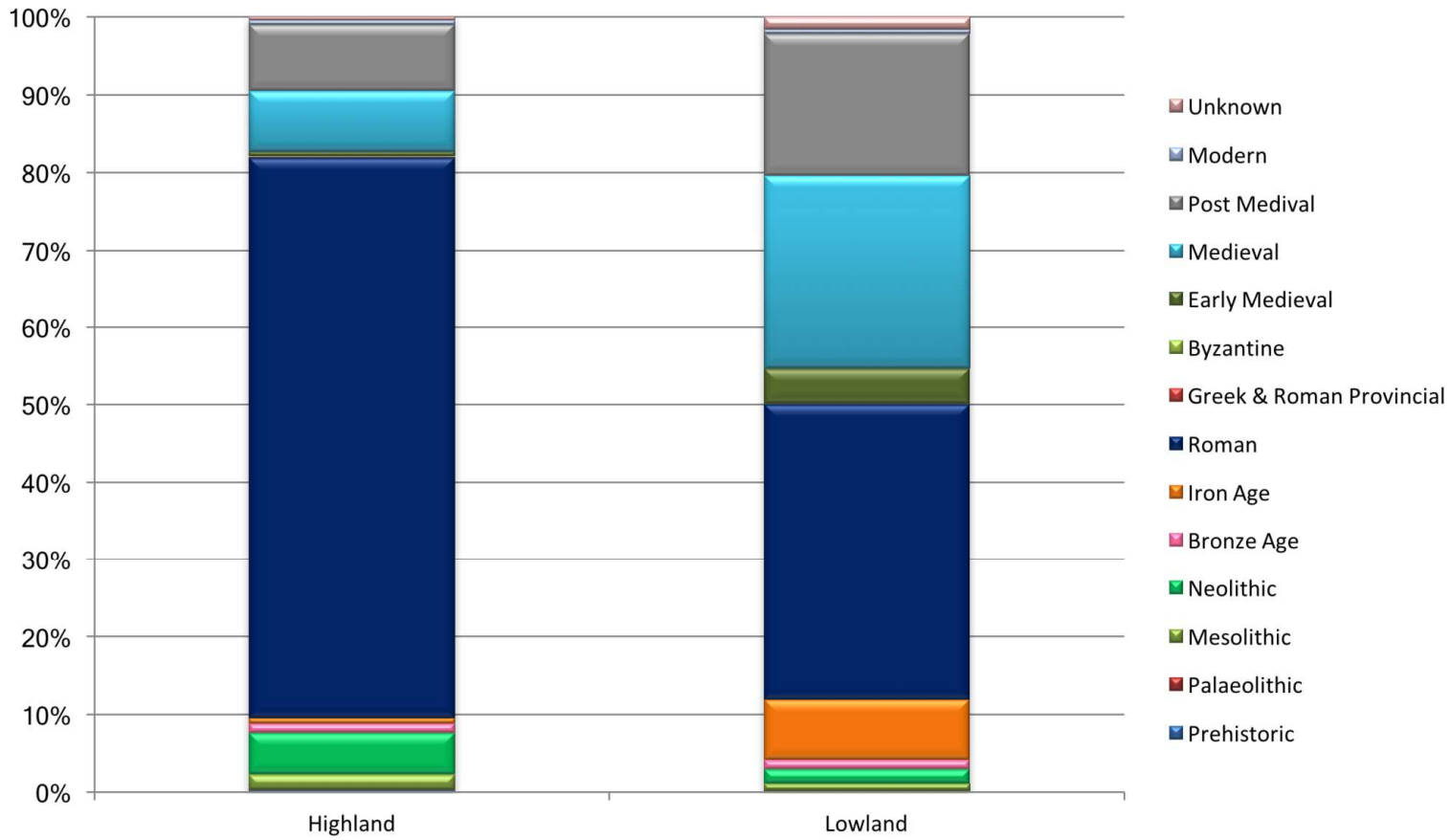


Figure 4.34 Proportions of finds from each broad period making up the overall assemblage for the Highland Zone and Lowland Zone. Graph produced using data from the PAS.

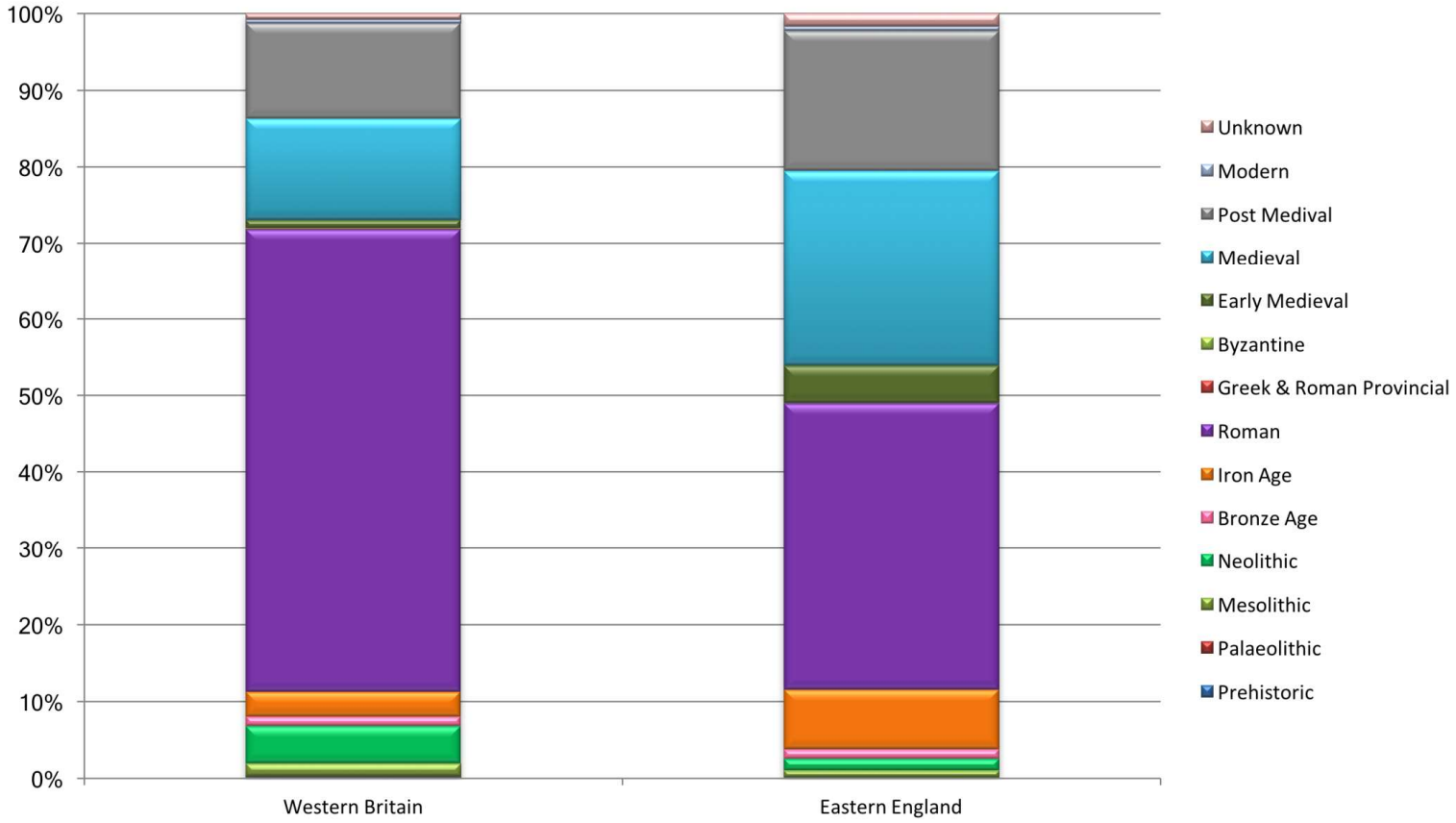


Figure 4.35 Proportions of finds from each broad period making up the overall assemblage for Western Britain and Eastern England. Graph produced using data from the PAS.

Although, as with most broad PAS periods, there is a higher density of Roman finds in the Lowland Zone and Eastern England than in the Highland Zone and Western Britain respectively (Table 4.7), the Roman finds actually make up a higher percentage of the total assemblage in the Highland Zone and Western Britain. There are 58,151 Roman finds in the Highland Zone out of a total 80,244 (72.47%) and 162,998 out of a total of 426,963 finds in the Lowland Zone (38.18%). This may be due to the high proportion of Roman finds in Wales noted above.

The distributions of the PAS period-specific datasets also demonstrate that Roman (Figure 4.21b) finds appear to be mainly in more rural areas whereas Medieval (Figure 4.25b) and Post-Medieval (Figure 4.26b) finds are found in more urban areas. The impact of geography on the age of find most commonly reported to the PAS can be seen in Figure 4.33. In urban areas such as the South East, Midlands and North East, Medieval and Post-Medieval finds dominate the record.

There are exceptions to the rule that in more rural areas the finds are largely Roman. For instance, Devon and Somerset are predominantly Post-Medieval despite being largely rural and low-lying. The City of Derby being dominated by Neolithic finds also appears to be an anomaly. As an urban area, the City of Derby would be expected to be dominated by Medieval or Post Medieval finds. Indeed, Derbyshire has mainly Medieval finds recorded. However, examination of the raw data reveals only one find recorded for the City of Derby, this being Neolithic.

4.4 Longue Durée

A division in British archaeology between the east and west that is enduring throughout all periods has been recognised since 1907 when the geographer Halford Mackinder originally published his proposal that Britain is divided into a Lowland and a Highland Zone along a line from Teesmouth to Exmouth (Mackinder 1910). Cyril Fox applied a similar idea of a divided Britain along these lines to

the archaeology. His main thesis was that the Highland Zone was an area of cultural continuity whereas cultural differences and replacement were evident in the Lowland Zone (Fox 1933). To the north and west of the line from the mouth of the Tees to the mouth of the Exe is largely Palaeozoic rocks (Figure 4.36) with mountainous regions in Scotland and much of Wales formed by the Caledonian orogeny and in Cornwall and south Wales by the Variscan orogeny. To the south and east of this line Britain was largely unaffected by mountain building episodes and is formed of younger Mesozoic and Cenozoic rocks (Figure 4.36). To what extent can the east-west divide seen in British archaeology be explained by long-term cultural trends influenced by topography?

The line marking the boundary between the Highland and Lowland Zones is shown in Figure 4.37. The division into the Highland and Lowland Zones deviates from Mackinder's (1910) divide. Rather than a simple division along a line from the Tees to the Exe, what Fox calls the 'Midland Gap' (1933: 25) can be seen between the Pennines and the highland regions of Wales and Cornwall. This corresponds with an area of younger, Triassic bedrock shown Figure 4.36b. The Midland Gap is also evident in a higher PAS finds density in an area that would otherwise be expected to have a small number of finds due to its location in the west (Figure 4.12).

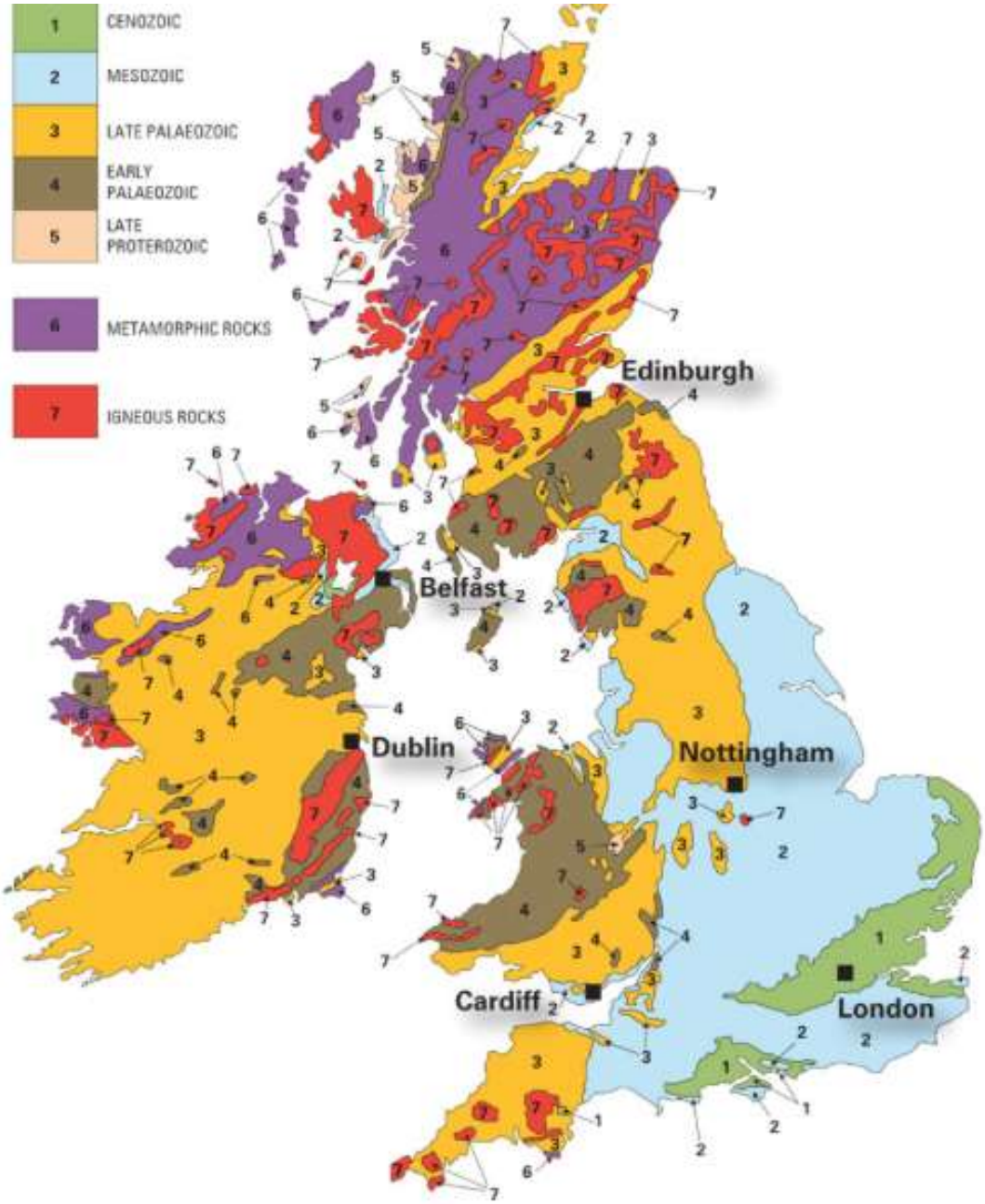


Figure 4.36 Geological maps showing the Palaeozoic rocks of the north and west and the Mesozoic and Cenozoic rocks of the south and east. © NERC 2014. Source: British Geological Society (2014).

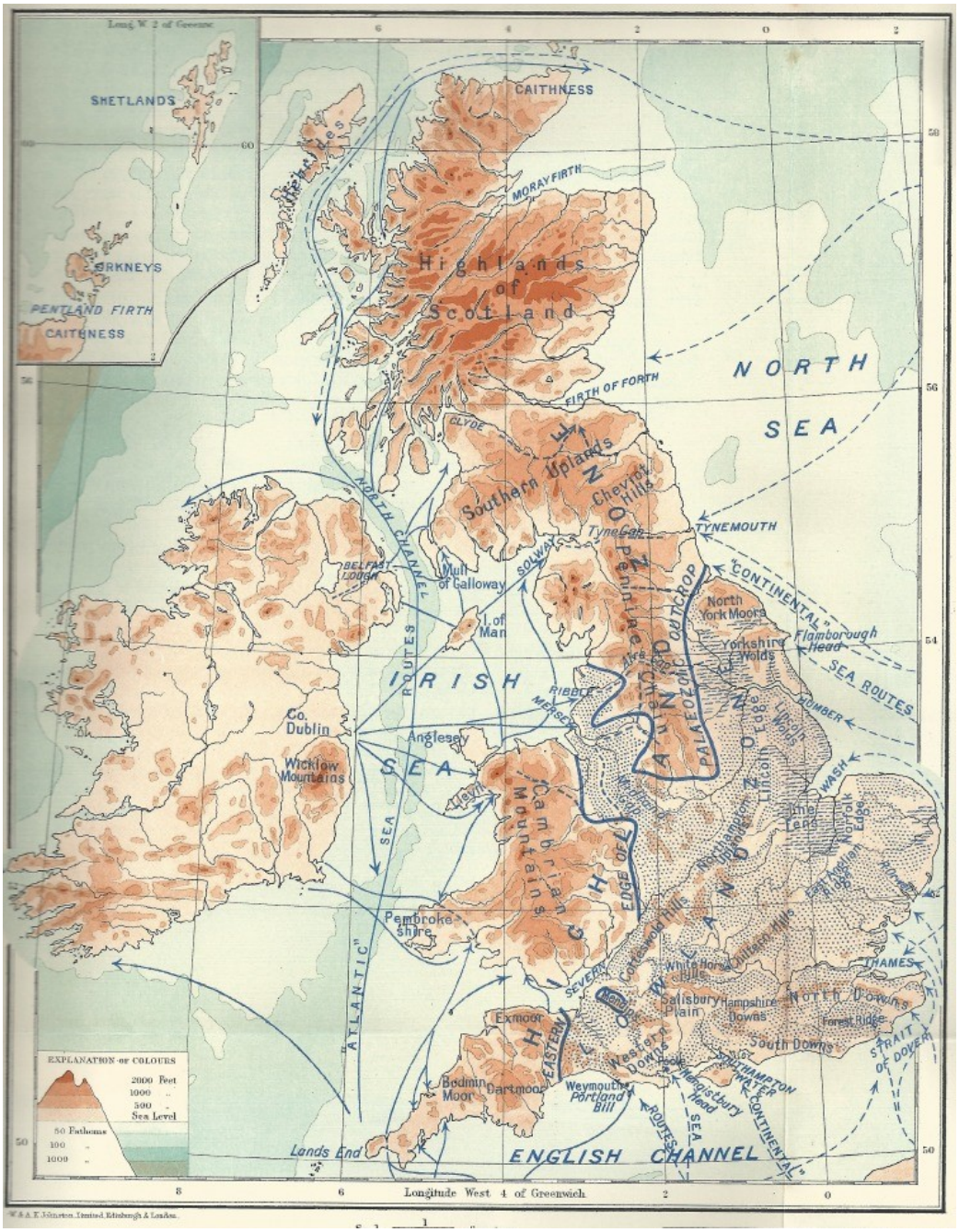


Figure 4.37 A physical map of the British Isles showing the natural boundary between Fox's Highland and Lowland Zones. Source: Fox (1933: 27).

This apparent east-west divide in England and Wales links in with Stephen Oppenheimer (2006) and Barry Cunliffe's (2001) theories. A division between upland and lowland Britain (Figure 4.37) matches the division identified by Oppenheimer and the shared Atlantic culture theory put forward by Cunliffe. In his discussion of cultures in what he terms the 'Atlantic zone', Barry Cunliffe states that by circa 3000 BC a shared Atlantic identity had begun to develop. The main characteristic of this identity was the building of megalithic monuments. Cunliffe demonstrated that, as early as the Neolithic, there was a shared culture in the north-west Atlantic zone which may have begun with simple chambered tombs in Western Iberia and spread to Armorica and western France to Ireland and western Britain and the Shetland Isles (Cunliffe 2001). At this time, Cunliffe states that east and south Britain did not share this Atlantic culture. In fact, many of the elements of this area such as causewayed camps, cursus monuments and long barrows are found in continental Europe in a region from west-central France to Poland (Cunliffe 2001: 187-90). The distributions of various types of megaliths in Britain (Figure 4.38) show this east-west divide.

Oppenheimer built on these ideas, using genetics to suggest that the difference between the English and the Welsh, Irish and Scottish was much older than the Anglo-Saxon period. He argues that, as far back as Mesolithic colonisation after the end of the Younger Dryas stadial (the last glacial period), there was a real, genetic difference between east and west Britain (Oppenheimer 2006). In essence, his theory is that recolonisation of Britain in the Mesolithic was from two different origins in the east and west (Figure 4.39).

Fox (1933: 27) believed that the differences between the two zones were due to invasion, the Lowland Zone being easier to invade and settle than the Highland Zone. Even if the movement of ideas is favoured over the large scale migrations of people as the catalyst for cultural change, Fox's basic ideas regarding the essential differences between east and west Britain may still be relevant.

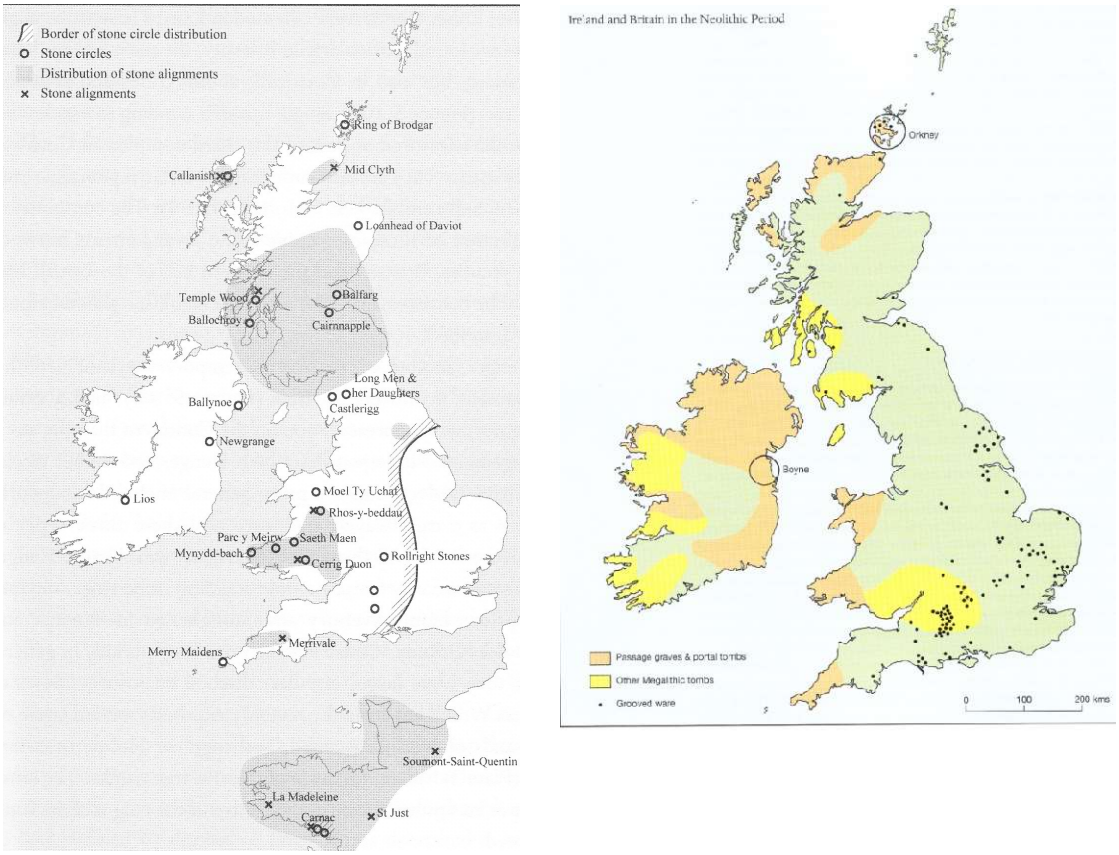


Figure 4.38 a) Distribution of menhirs, stone circles and alignments in Britain and Britanny. Source: Oppenheimer (2006: 257). b) The 'passage grave zone' of Neolithic Britain and Ireland. Source: Cunliffe (2001: 188).

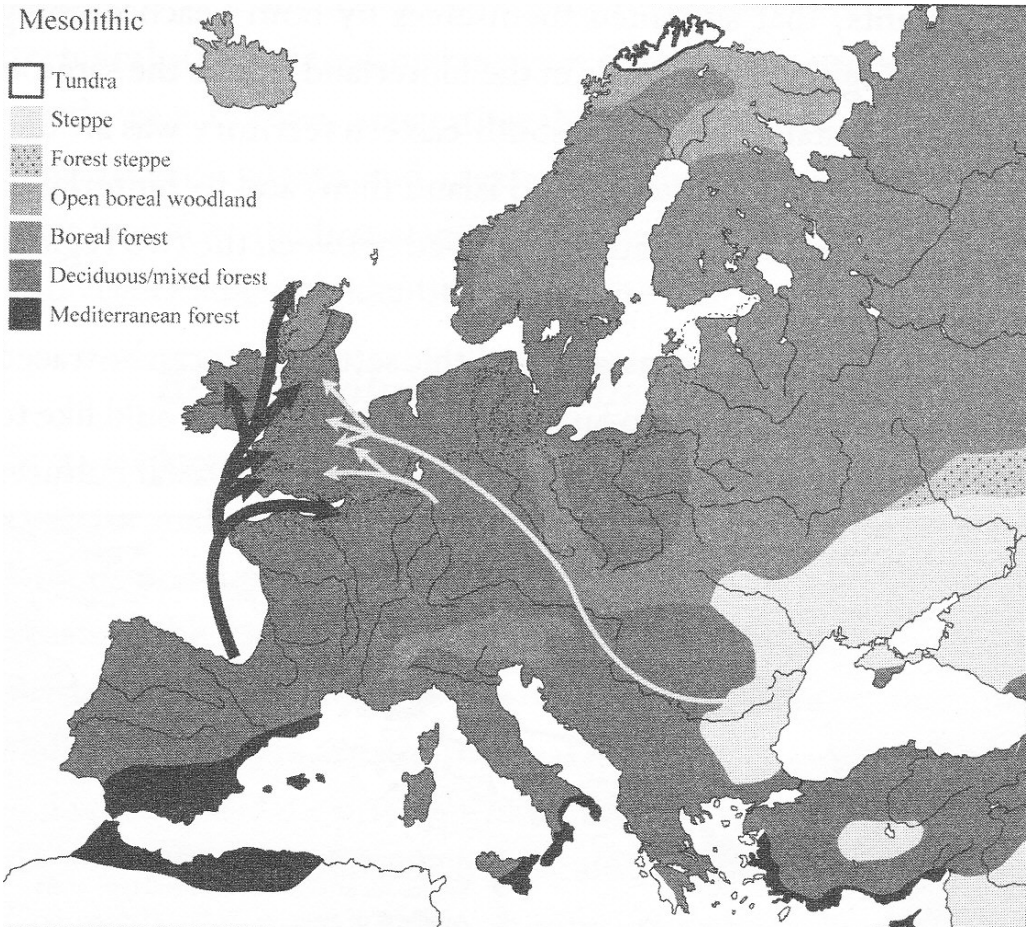


Figure 4.39 Colonisation of north-west Europe in the Mesolithic showing two different sources of gene flow to Britain. Source: Oppenheimer (2006: 159).

As identified above, one of the key strengths of PAS data is the large body of artefacts complete with detailed location data. This means that the significant factor in identity in Roman and post-Roman Britain demonstrated by these finds is in their location. In other words, does the PAS data exhibit differences in identity by location whether rooted in ethnicity, gender and status or otherwise? The simplistic, culture-history approach needs to be avoided but clear differences in the spread of material culture have been identified in post-Roman archaeology and these represent some degree of difference in the way of life of the people using and disposing of these objects. The above

discussion demonstrates the continuing importance of debate surrounding the transition between Roman and Anglo-Saxon in modern Roman and Anglo-Saxon archaeology. The distribution of PAS data can display trends in the material culture of England and Wales which, in some sense, reflect the identity of the individuals and populations who made and used the artefacts.

The use of artefacts to construct identity can vary according to context. This has been demonstrated by Webb (2011) when he assigned different Roman artefacts to a particular context in order to study cultural diversity. The only context PAS data have is their location which is not sufficient to indicate context of use. This makes it difficult to study identity via distribution maps of artefacts. The biases in the PAS data also mean that there is an east-west divide between areas of high and low topography which can be largely determined to be due to modern recovery and recording of metal detected finds. Nevertheless, the long-term east-west divide in British archaeology is often interpreted in terms of identity. The accurate location data of PAS finds can be used to determine whether the distributions of artefacts matches these perceived divisions or whether differences in Roman to Anglo-Saxon artefacts differ from long-term trends. As explained in the previous chapter, rather than simply mapping different artefacts and trying to link these distributions to some kind of cultural identity in various areas, the differing regional assemblages will be studied statistically. Analysis of find types as a proportion of the overall assemblage will attempt to go beyond studying finds densities which may be more reflective of modern recovery and reporting trends. Furthermore, one of the key objectives of the research is to determine to what extent large unstructured datasets such as the PAS are useful for not only macro-level issues but also micro-level cultural questions. This approach will help to determine what, if anything, the PAS data can tell us about the Roman to Anglo-Saxon transition and whether the data are useful for this kind of question.

4.5 Conclusions

The entire PAS dataset clearly shows a divide between a Highland Zone and a Lowland Zone with the Highland Zone displaying a much lower density of finds reported by members of the public. This division demonstrates the fact that, in terms of macro-scale trends in the data, the distribution of PAS finds is affected by topography. This is likely to be a combination of both modern reporting and recovery trends and differences in way of life between areas of high and low land. For example, a division between Highland and Lowland Zones fits in with ideas about a *longue durée* in British archaeology and the existence of an Atlantic Zone (Cunliffe 2001). Different types of land and land use will have affected ways of life in past societies through differing modes of farming and access to raw materials (Figure 4.5).

The identified division between Highland and Lowland areas of low and high finds reporting respectively matches the general division of British archaeology across all periods along topographic lines. This raises the question of to what extent this long-term trend of differences between high and lowland areas is related to historical cultural differences or modern biases in data recovery. It is not only PAS data which is biased by topography. All archaeological data has bias and areas in which archaeologists choose to work will be one of the biases inherent in excavated material.

The mapping of all PAS finds acted as a control for the period-specific datasets. It could be argued that these maps are an artefact of the way the objects are categorised into periods. However, it can be seen from the distributions (Figure 4.15 to Figure 4.27) that the majority of periods match the overall distribution. This suggests that this is not the case and what can mainly be seen are long-term trends in PAS artefact distributions across England and Wales. If the distribution maps were largely an artefact of the categorisation into periods, then it would be expected that this would have more

of an effect on distribution in each period. In actual fact, for most periods, the periodisation of the dataset has little to no effect on artefact distribution.

The Early Medieval (AD 410-1066) data deviates from the previously established trends by being largely concentrated down the east coast. This led to the identification of two zones, referred to as Eastern England and Western Britain, which are in evidence in the Early Medieval data. According to the VASLE projects methodology (Richards *et al* 2009), this divergence from the overall distribution makes it more likely to represent genuine historical deposition rather than being merely an artefact of modern recovery and reporting by metal detectorists. Despite this, other possible reasons for this distribution need to be considered. For example, the correlation between the east coast concentration of Early Medieval finds and the distribution of Anglo-Saxon graves (Figure 4.11a) is a possible explanation. The nature of PAS finds as being without secure stratigraphic context means that dating relies on typological methods. Accordingly, those finds which are more obviously 'Anglo-Saxon' in nature are the most likely to be accurately dated to the Early Medieval period. Therefore, the distribution here is, to some extent, an artefact of the way PAS finds are divided into periods. The fact that most burials in the west were unfurnished in the post-Roman period (Philpott 1991; Lucy and Reynolds 2002: 1-8), along with most archaeological evidence for Anglo-Saxon England coming from cemeteries (Lucy 2000: 1), suggests that much of this material placed in the Early Medieval category could represent metal detected finds from ploughed out cemeteries.

The next chapter will set out the background to the chosen case study period of the fourth to the sixth centuries. This is necessary in order to give context to the PAS data from the period and also to set out current archaeological thinking on this time of great change in archaeology. Once the debate surrounding the transition from Roman to Anglo-Saxon has been set out, the results from the study of the PAS data can be compared. This determines to what extent PAS data can add to the debate on

the topic and, more generally, how useful PAS data are in answering specific cultural questions about a particular period.

5 CASE STUDY: THE FOURTH TO THE SIXTH CENTURIES IN ENGLAND AND WALES

5.1 Introduction

The previous chapter studied the PAS database on a macro-level, discussing the nationwide trends and period-specific datasets. Much research using the PAS uses distribution maps to visualise the data and discusses the period in question in terms of artefact distributions, with research often focussing on a particular time period or type of artefact. The methodology outlined for this research included macro-level analysis of the PAS database but also a more in depth look at the type of finds recorded in the database in order to achieve objective two. For this it is helpful to narrow the total number of finds to a particular time period. This allows data from the PAS to be compared to current archaeological thought on a specific period of change in the archaeological record.

The second objective of whether the PAS can be used to investigate micro-level issues regarding specific cultural questions was achieved by using a case study of artefacts from the fourth to the sixth centuries. The choice of case study was introduced in Chapter 3.6, which outlined the reasons for choosing it.

This chapter sets out the background to the case study period, discussing the key issues in archaeology of the case study period. This includes the issue of the influx of a new material culture in post-Roman Britain with the creation of a divide commonly seen to exist between Anglo-Saxons to the east and sub-Romans to the west. It will set out the debates on the period which will allow the results of the analysis of PAS data to be compared to current archaeological thought.

5.2 Background to the case study period

The impetus for the change in the culture of Britain (and the formation of England) in the fourth to the sixth centuries was ultimately the fall of the Western Roman Empire and the end of Roman rule in Britain. It is, therefore, important to include a basic outline of the debates surrounding this event (or series of events) in order to study the material culture and its implications for late and post-Roman archaeology in context.

In the period used as a case study, Britain changed from being a part of the Western Roman Empire (Figure 5.1) to being outside Roman control by the time the Western Roman Empire collapsed circa AD 476 - 480, the exact date varying throughout Europe (Swift 2000: 15). The traditional date for the end of the western Roman Empire is AD 476 when the last emperor, Romulus Augustulus was deposed and Odoacer, a 'barbarian' (non-Roman) general took control of Italy (Jotischky and Hull 2005: 20; Wickham 2009: 86).

Over the course of the fifth century, the Western Roman Empire underwent a significant amount of stress from the so-called barbarian peoples outside its frontiers. The Visigothic sacking of Rome in AD 410 was followed later in the fifth century by the Hun's raids on Gaul and Italy and another sack of Rome, this time by the Vandals, in AD 455 (Moorhead and Stuttard 2010: 149-150).

Figure 5.1 Map of the Western and Eastern Roman Empires circa the fourth century. Source: Damen (2011).

During the late fifth century the Western Roman Empire fragmented into multiple non-Roman, or 'barbarian', kingdoms and by AD 500 many Roman monuments were either in disrepair or were no longer standing (Harris 2003: 7). There was increasing localisation of society and culture, with each region having distinct social, economic, political and cultural development after the late fifth century (Wickham 2009: 75).

The Eastern Roman Empire endured periods of both expansion and contraction but it endured until AD 1453 when Constantinople fell to the Turks (Scarre 1995: 231; Swift 2000: 15). After the fall of the Western Empire, the Eastern Empire is often referred to as the 'Byzantine Empire' or 'Byzantium'

(Harris 2003: 8). The Byzantines referred to themselves as Romans or *Romanioi*, as did other eastern peoples. Those in the west called them 'Greeks' (Wickham 2009: 256).

The period of collapse of the Western Roman Empire and the spread of Germanic, barbarian culture across Europe in the fifth century is traditionally known as the Migration Period (Jotischky and Hull 2005: 20-21). Defence of the Roman Empire was threatened by the incursions of barbarian tribes described above (see also Figure 5.2) but there was no unified 'Germanic' nation. The Germanic tribal or ethnic groups shared some traditions but probably had distinct cultures (Goffart 2009).

Figure 5.2 The supposed migration routes of the fourth-fifth century Germanic tribes. Source: Jotischky and Hull 2005: 20).

Goffart (2009: 14) put forward three different definitions of how the term 'Migration Period' is used by modern scholars. Its primary meaning is essentially synonymous with 'Barbarian invasions'. The different tribes moved across Europe in a process of conquest and settlement and the Western Roman Empire fell. A looser definition extends the period both in time and space and is split into two main categories. Firstly, the Asian model which extends the invasions/migrations across Eurasia and, secondly, the Germanic model which reaches back in time to attempt to explain the pre-fourth century history of the various tribes.

5.2.1 The end of Roman Britain

With regard to Britain, the collapse of the Western Roman Empire and the Migration Period are seen as having created a dichotomy between east and west. In the fifth century we see the influx of Germanic or Anglo-Saxon material culture in the east whereas the west is viewed as remaining 'native' or 'sub-Roman' (Figure 5.3).

As far as Britain is concerned, the date for the collapse of Roman rule is usually placed at AD 410. This is based on the writings of the sixth century scholar Zosimus. In his *Historia Nova* (10.2) he recounts how, in 410 AD the Emperor Honorius instructed the Britons to take care of their own defences. However, some scholars of the period such as Philip Bartholomew (1982) argued that, since this information is located in the middle of a discussion on Italy, Zosimus is actually referring to Bruttium in Italy. AD 410 was also the year of the 'Sack of Rome' by the Visigoths, led by Alaric I (Moorhead and Stuttard 2010: 124), a key event in the eventual decline of the Western Roman Empire.

a)

b)

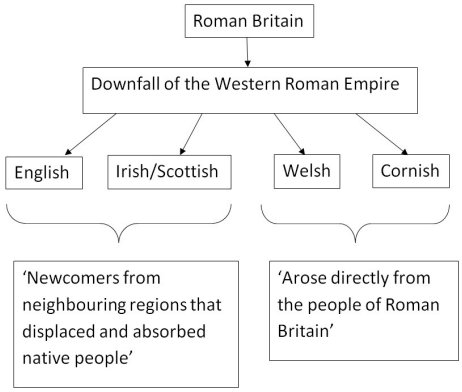


Figure 5.3 The perceived east-west divide in Britain circa AD 500. Source: Haywood (2001: 91). b) The end of Roman Britain and the formation of an east-west divide in Britain. Drawn from information from White (2007: 7).

The debate about the end of Roman Britain stems from a lack of evidence, particularly well-dated evidence, but also from issues about what we define as 'Roman' (Gardner 2007: 59). The reforms of Diocletian can be seen as a tipping point in the Roman Empire, with the Crisis of the Third Century bringing about great changes which ultimately led to a period of Late Antiquity between the second and eighth centuries. This period of the Roman Empire was very different to the preceding Classical Roman Empire with political and social transformations taking place (Brown 1971). In AD 212 the *Constitutio Antoniniana* meant that all free men were Roman citizens and all free women had the same rights as Roman women (Lim 2010: 114). Under Theodosius I, Christianity became the state religion in contrast to the multiple deities of the Classical Roman World (Brown, P 1995: 4). Material culture, particularly state art also changed. There was a transition from classical realism to a more stylised art (Kitzinger 1977: 2-21).

With regard to Britain, by the late Roman period, *Britannia* was no longer a monolithic province, having been divided into four (Figure 5.4) by Diocletian in AD 269 (White 2007: 60).

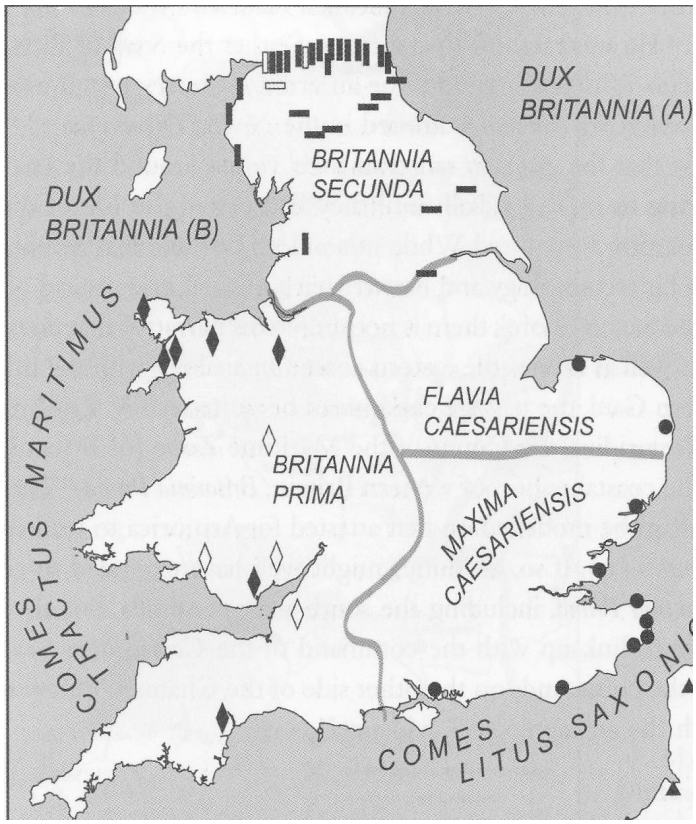


Figure 5.4 The province of Britannia in the late Roman period. Source: (White 2007: 60).

Furthermore, the Roman Empire was not a homogenous system. Provinces took on aspects of Roman culture through a filter of their own native identity. One example of this is the concept of *Interpretatio Romana* whereby 'native' deities are interpreted in terms of Roman ones (Tacitus *Germania* 43). The people of the various Roman provinces did not take on a Roman way of life wholesale. The Romans drew parallels between the Roman pantheon of deities and native ones, which were still worshipped by people living under Roman occupation.

Models of cultural change during the Roman period have been debated. The traditional model of Romanisation by which provinces were 'given a civilization' (Haverfield 1923: 11) has been superseded by nativist models of emulation (Millett 1990). Romanisation or acculturation models have been questioned, for instance Woolf (2000) rejects the Romanisation model in his assessment of cultural change in Roman Gaul. Webster (2001) suggests that creolisation is a more accurate way of describing the changes that took place from the bottom up rather than from the perspective of elites. Mattingly (2011) uses discrepant identities as a model for change and reasons that different people and communities use and display identity differently.

The heterogeneous nature of the Roman Empire is the reason for terms such as 'Romano-British' or 'Gallo-Roman' to describe the culture in the Roman provinces. Studies such as that of Roman Gaul by Greg Woolf (2000) show how a Roman way of life was adopted in a way unique to the peoples of each province. Differences are also visible within provinces. In *Britannia*, Cunliffe (1991: 202-204, 1997: 259-260) views the communities to the south and east of the Fosse Way to have been the most 'civilised' and most Romanised, as by AD 47 they had been subdued by the Romans. To the north and west of the Fosse Way, he sees the peoples to have been more difficult to conquer and resisted Romanisation to a greater degree.

When combined with the temporal changes throughout the history of the Roman Empire, this makes it difficult to define what is 'Roman' in general rather than Classical Roman, as opposed to Late Antique or Romano-British, Gallo-Roman or the Roman culture apparent in any of the other Roman provinces.

5.3 Debate surrounding the nature of the Roman to Anglo-Saxon transition

One of the core reasons for the choice of case study was the existence of continuing debate about the period (see Chapter 3.6). Several historiographies of works on the end of Roman Britain and early Anglo-Saxon archaeology have already been published (for example, Hines 1998; Higham 1992: 1-16; Lucy 1998, 2000: 1-15, 155-73; Gerrard 2013: 1-25; Esmonde Cleary 2014) and these will not be repeated here. However, it is important to ground any new study of the Roman to Anglo-Saxon period in an understanding of the current state of archaeological thought.

As late as 1973, literary sources were being claimed by scholars such as Morris (1973) to be the basis for an accurate history of the period, although his work was criticised by archaeologists (see Dumville 1977; Kirby and Williams 1975-6; Campbell 1975 and Myres 1975). An excellent reassessment of the veracity of the literary sources can be found in Halsall (2013: 51-86). Over the last forty years there has been somewhat of a paradigm shift in studies of the end of Roman Britain from largely historical (for example, Blair 1963, 1970, 1976; Kirby 1966, 1991; John 1966; Levison 1966; Morris 1973; Dumville 1977; Wallace-Hadrill 1991) to largely archaeological (Esmonde Cleary 2014: 1-2). Along with this change in approach came a rejection of migrationist ideas (Renfrew 1987; Esmonde-Cleary 1989: 162; Higham 1992, 2007; Lucy 1998: 20, 2000: 185; Noble 2006; White 2007: 17).

Since the beginning of the twenty-first century, biological evidence has had a large influence on debates about the late Roman to Anglo-Saxon transition. Skeletal data (Härke 1990, 1998, 2002, 2011), DNA analysis (Weale *et al* 2002; Capelli *et al* 2003; Leslie *et al* 2010) and isotope analysis (Budd *et al* 2004: 127; Carver *et al* 2009) have all been used to attempt to identify Germanic migrants. These estimate migrations anywhere between ten to one hundred percent. It is important to note that genetic studies also show significant pre-Roman but post-Mesolithic movement from

Europe into southeast England (Leslie *et al* 2015: 311-3, see also Oppenheimer 2006: 159 and Chapter 4.4). There are issues with the technique of DNA analysis and many archaeologists view it as problematic. For example, Allentoft *et al* (2015) and Haak *et al* (2015) concluded that new populations migrated to the Eurasian Steppe circa 4,500 to 5,000 years ago coinciding with the emergence of Corded Ware. Several archaeologists such as Calloway (2018) and Heyd (2017) have rejected the conclusions of these studies, stating they are too similar to the culture history paradigm (see Chapter 2.2.1).

Objective two of this research questions whether unstructured data can be used to answer specific cultural questions (see Chapter 1.2.2). Although the issue of ethnicity and identity in post-Roman Britain is largely outside the remit of this research, it is important to define what is meant by these terms. The idea of ethnicity is more complex than it may first appear. Few works even define what is meant when they use the term 'ethnicity' or 'ethnic group'. In a survey of sixty-five studies of ethnicity in the field of sociology and anthropology, Isajiw (1974: 111) found that only thirteen defined ethnicity in any way.

The theoretical perspective on identity uses material culture in order to understand individuals and groups of people in the past. This involves recognising aspects of identity and the relationships between cultures which existed contemporaneously and how these social groups differed (Darvill 2002: 205). Jones (1997: 49) states that it has been clear for some time that, in reality, cultural groupings are more heterogeneous than culture-history as a concept acknowledges. Modern views of ethnicity are grounded in the work of the sociologist Fredrik Barth (1969) who recognised ethnicity as being a social construct rather than a biological one. There is now generally a more subjective approach to ethnicity whereby the perceptions of the members of a social group as being different from others are considered the deciding factor (Fenton 2010: 2; Regmi 2003: 3).

Regarding the fourth to the fifth centuries in Britain/England, this flexible definition of ethnicity can be seen in more recent interpretations of early post-Roman material culture and burial rites. For instance, in their assessment of the fourth to seventh century cemetery at Wasperton, Warwickshire, Martin Carver *et al* (2009: 3-4) interpret the burials and finds as local expressions of identity. That is, they do not insist on any continuation of race or ethnicity but rather describe the people living at the time as having an 'original voice, never heard before'.

This study will follow the definition of ethnicity ascribed to by Jones (1997: xiii). That is, when used in this work, ethnicity can be taken to mean the 'social and psychological phenomena associated with a culturally constructed group identity', encompassing a fluid concept of belonging. The implications of these definitions of ethnicity for the Roman-Britain to Anglo-Saxon transition are twofold. Firstly, the idea of ethnogenesis as a fluid social process means that the divide between identities may not be as strict as traditionally thought. Secondly, the idea of Angles, Saxons and Jutes settling in Britain and remaining as discrete cultural groups is, perhaps, not a viable model.

It is also important to clarify several other examples of terminology related to ethnicity and identity and define how they are used in this thesis. Germanic, despite objections by Goffart (2009) that it should not be used in Late Antique studies as Germany did not exist at least until the Carolingian dynasty, is used in the sense it is usually used in studies of this period, to mean those European tribes outside the boundaries of the Roman Empire. The term 'Early Medieval' is used to refer to the PAS period dating from AD 410-AD 1066 (Portable Antiquities Scheme 2013b). Anglo-Saxon is used to define the period from the fifth to the sixth centuries in England and Wales in order to distinguish this from the PAS defined Early Medieval period.

5.4 Understanding the 'Dark Ages'

Current archaeological opinion regarding the nature of Anglo-Saxon migration into Britain in the post-Roman period tends to take into account the need to take a more nuanced approach to DNA evidence and changes in material culture. Some degree of migration is considered to have taken place, having more effect on the population than in any other period, but the native population were by no means wiped out (Härke 2011). Despite this, the origins of the people in Britain in the immediate post-Roman period do not necessarily reveal anything about ethnicity and identity which are distinct from racial origins.

There is still much debate about the cultural affiliations of the peoples of post-Roman and early Anglo-Saxon Britain, particularly in the west. There are two conflicting theories amongst current late Roman and early Anglo-Saxon archaeologists concerning the potential continuation of a Romano-British culture into the post-Roman period. The first asserts that Roman culture survived in some form into the post-Roman period (Dark: 1994, 2000, 2014; Henig: 2002, 2004; Harris: 2003), whilst the second states that the Roman way of life ended and that there had already been a decline in Roman Britain (a 'Dark Ages') prior to the arrival of the Anglo-Saxons (Reece: 1988; Esmonde Cleary: 1989, 2013; Loyn: 1991; Ward-Perkins: 1996, 2000; Faulkner 2000, 2004; Faulkner and Reece 2002; Guest 2014: 126; Wickham: 2005, 2009).

This dichotomy in archaeological thought regarding the end of Roman Britain is well illustrated by two articles by Neil Faulkner and Martin Henig in the British Archaeology Reports (BAR) publication from a conference held in 2003 on *Debating Late Antiquity in Britain* (Collins and Gerrard: 2004). Faulkner's (2004) *The Case for the Dark* Ages argues for the decline of Roman culture in Britain

whereas Henig's (2004) *Remaining Roman in Britain* uses portable art to persuasively argue for the continuity of Roman and Byzantine influence and culture in post-Roman Britain.

The Faulkner and Reece school of thought represents the most extreme assessment of the decline of Roman Britain, with a more traditional view of the fall of the Western Roman Empire leading to Dark Age Britain. Reece's (1980) work on Romano-British towns suggested that they had disappeared by AD 350 and been replaced by 'administrative villages'. Faulkner (2014: 37) describes how this view was unpopular at the time but is now regarded as seminal and that all available evidence indicated that Reece was right.

Faulkner (2004) rejects the idea of a Late Antique period in British archaeology as denying reality. Since Peter Brown's (1971) seminal work, many accept a period from circa the end of the second to the eight century as 'Late Antiquity'. This idea has been applied to the archaeology of Roman Britain by scholars such as Dark (1994, 2000) and Harris (2003). Faulkner (2004: 5) states that the idea of a Late Antiquity period is unsupported by evidence and that it 'deconstructs' the idea of the transition and fall of the Western Roman Empire. He objects to the theory on four main grounds (Faulkner 2004: 6-7):

1. Late Antiquity scholars provide no definition of the Roman Empire as a social formation and so it has no proper definition of its subject of study.

2. It does not define what is 'Roman' and selectively uses evidence such as late fifth century Mediterranean pottery found on some sites in western Britain as evidence for a Late Antique period. For example, he states that towns were the most important part of Romanisation, citing Liebeschuetz's study *The Decline and Fall of the Roman City* (2003) to

conclude that 'on no site can a level of activity be demonstrated – whether by buildings under construction or buildings still occupied – sufficient to justify the description 'urban''.

3. The evidence that exists for the period is not studied properly. For instance, finds are not studied in context but select pieces of evidence are singled out and studied in isolation. Faulkner argues that this forms an over simplistic view of the post-Roman period as there is no study discussing how material culture alters to suit changes in circumstance and how old symbols are rejected.

4. That the idea of the British remaining culturally Roman suggests that classical civilisation was inherently superior and turns the Roman Empire into 'a bizarre cross between the United Nations and the National Trust'.

Faulkner appears to be guilty of what he criticises proponents of a Late Antique period for doing, that is, selectively using evidence by prioritising towns as an indicator of *Romanitas* and dismissing language, continued use of artefacts and Christianity as unimportant. Why should these aspects be any more superficial indicators of continuity of culture than towns? Faulkner appears to be ignoring some important aspects of continuity and reducing those examples he acknowledges to be merely 'residual Roman material' (Faulkner 2004: 9). As Henig (2004: 15) puts it later in the same volume, the culture of the post-Roman period in no way needs to be considered as any less Roman 'unless one defines culture in terms of the economy and drains'. Determining culture in this way appears to be what Faulkner (and the wider Faulkner and Reece school of archaeologists) is doing when prioritising the evidence of continued use of towns.

Furthermore, Faulkner's thoughts on the ideological implications of Late Antiquity seem questionable. Is it necessarily true that if the population remained 'Roman' then this is implying that Roman Imperial policy was a good thing? The Roman Empire does not need to be seen as culturally superior for aspects of its culture to survive. After all, following a period of around 400 years, many generations will have passed since any individual was alive who could remember the pre-Roman Iron Age. This means that the idea of society reverting to a pre-Roman socio-cultural identity and way of life seems impossible. Four centuries of Roman Imperialism will have left its mark on Britain in the form of a Romano-British hybrid or creolised culture.

Faulkner (2004) also argued that without a strict definition of 'Roman' then any attempt to show that Britain remained Roman after circa AD 410 is meaningless. To test his assessment of a Late Antique period as a flawed concept, Faulkner tries to define particular aspects of material culture as diagnostically Roman (see also Faulkner and Reece 2002). He does stress that his list is only a suggestion.

His criteria which are relevant to material culture are:

- A cultural assemblage which is 'broadly uniform from Britain to Syria' from the first to the fourth century AD.

- Archaeological evidence for mass production and wide distribution of a range of artefacts. For example, Roman coinage, fast wheel-thrown and high fired pottery, oil and wine distributed in amphorae.

- Luxury crafts which reflect Graeco-Roman Mediterranean taste.

- Art and architecture in Graeco-Roman Mediterranean styles

  (Faulkner 2004: 8-9).

He states that if these aspects of material culture are compared to the material culture of post-Roman Britain, a large contrast can be seen between the end of Romanised assemblages in AD 375/425, and the appearance of distinctively Early Dark Age ones circa AD 540/75 (Faulkner 2004: 10).

There are immediately obvious problems with Faulkner's 'evidence' for the end of *Romanitas*. He points out a contrast between Roman and early Anglo-Saxon (or Dark Age as he refers to it) material culture but he does little to account for what the identity of the people living in Britain in the hundred or so years between the end of his Roman assemblages and the beginning of his 'Early Dark Age' ones may have been.

Perhaps a more glaring omission is the neglect of the fact that the Roman Empire and its culture changed drastically between Claudius' conquest of Britain in AD 43 and the pulling out of Roman troops in (possibly) AD 410. The crisis and military revolution of the third century and the reforms of Diocletian completely changed the nature of the Roman Empire and set the tone for the fourth-century revival (Gardner 2007: 53). The empire that emerged with the reforms of Diocletian from the beginning of his reign in AD 284 was very different to that of Classical Antiquity. This Late Antique world, defined by Brown (1971), differed from 'classical' civilisation. It would be a mistake to view the Western Roman Empire as a static, homogenous culture that endured until its catastrophic end in the fifth century.

Other proponents of the idea that there was a fundamental break with the Roman past are less excessive. In his 2009 work on *The Inheritance of Rome*, Wickham does describe some degree of continuity in terms of religion and culture, however, he states that this should not take precedence over the important political and economic breakdown. Works such as those by Reece (1980), Johnson (1980), Arnold (1984) and Esmonde Cleary (1989) sought to focus on the archaeological evidence and characterised the Roman to Anglo-Saxon transition as being one of the rapid collapse of a Roman way of life prior to the arrival of an Anglo-Saxon one. Esmonde Cleary (1989: 159) uses archaeological evidence to conclude that the ending of Roman Britain can be understood through the collapse of Roman power and culture elsewhere in the Western Roman Empire. Roman culture ended in Britain because the fall of the Roman Empire removed the economic and political systems necessary for it to continue. Esmonde Cleary's views describe the general decline of towns and Roman ways of life in the late fourth century. The continuity of population is, however, supported in Esmonde Cleary's conclusions and also the ending of a Roman way of life prior to the arrival of the Anglo-Saxons. Gerrard's (2013: 11) work on *The Ruin of Roman Britain,* using the archaeological evidence, described this view as having achieved 'something approaching academic consensus'. In a later work, Esmonde Cleary (2014: 6) notes that what he terms the 'short chronology' or 'rupture model' needs to be considered in context as a reaction to the continuity model that was influential in the 70s and 80s.

Ken Dark is one of the key supporters of the idea that Romano-British culture survived the fall of the Western Roman Empire. He believes that the descendants of the Romano-British people lived under their own rule with a Romano-Christian culture and political units recognisable as late Roman into the sixth century (1994, 2000: 230). Dark proposes the most complete model of Romano-British continuity. His assessment, *Britain and the End of the Roman Empire* (2000), looks at both the east and west. He states that cultural change in the east was a process of acculturation and gradual

mixing of two cultures rather than the catastrophic events described in the literature. Dark views the west as having been well integrated into the wide Romano-Byzantine world and culture and that urban life continued largely unaltered. Dark (2014) uses pottery and epigraphic evidence to argue for a connection between the post-Roman south-west and the Late Antique west. In particular, the ceramic evidence at Tintagel is put forward as demonstrating links with Constantinople.

The view of collapse put forward by Esmonde Cleary and others has been criticised, most notably by Cool (2000, 2006, 2014). She states that the analysis depends too much on the end of the supply of coinage (2006: Chapter 19) and discusses the identification of Roman style artefacts in the post-Roman period (2000). This is also considered by White (2007: 20-5, 2014). The picture gained of changes in decoration over time will be, to some extent, influenced by assumptions about the period to which certain decorative styles belonged.

Cool's (2014) analysis of the 'end' of Roman Britain was part of a Roman Society conference about the end of Roman Britain. In this she disputes the traditional view of a rapid end to Roman Britain circa AD 410 using the material culture evidence. She particularly notes the continuity of forms of glassware and pottery into the fifth century and identifies that it is important to compare the fifth century to the fourth rather than earlier Roman Britain. In this sense the work is a follow on to a similar assessment of finds on the northern frontier of Roman Britain (Cool 2010). Dark (2014: 29) also identifies a distinctive package of finds for sites in western Britain which includes Roman objects, organic artefacts, stone objects, post-Roman metalwork (penannular brooches and knives) as well as imported pottery and glass.

Harris (2003) also argues that in the fifth to the sixth centuries people in Britain remained fundamentally Roman. She sees Britain at this time as being part of a Late Antique Byzantine

Commonwealth. People are seen to have been Romano-Christian with a continued sense of *Romanitas*. This is in agreement with Dark's (2014) view of western Britain as having continued links with Constantinople and a Late Antique culture.

5.4.1 The urban evidence

In their work on *The City in the Roman West*, Laurence *et al* (2011: 2) state that urban areas have long been considered to be a vital component of the Roman Empire. Key to the idea that western Britain remained essentially Roman in character and was part of a Late Antique society is the fact that settlement patterns appears to remain consistent in the post-Roman period and into the early Medieval period (Pearce 2004; Quinnell 2004). Henig (2002), states that the survival of many Roman towns to the present day makes the view of complete collapse of town life improbable.

Rogers's (2011) work on *Late Roman Towns in Britain* argues against the view of decline and abandonment in Romano-British towns but takes a less extreme view than Dark, suggesting that alterations to late Roman buildings imply attempts to keep a Roman way of living going. He also suggests that Roman small towns had a key role to play in late Roman urban life (Rogers 2011: 179). This is a view shared by Fitzpatrick-Matthews (2014). Small towns became more important in the late Roman period, perhaps representing a more local type of Roman urbanism (Millett 1990: 143-56, 2001; Hingley 1997; Rogers 2011: 179; Fitzpatrick-Matthews 2014). Similarly, Wacher's (1995: 408-21) ideas suggest that there was more limited use of former Roman urban centres rather than a Roman-style town life.

Several sites such as St Albans, Canterbury and York have been mooted as producing evidence that urban life continued into the post-Roman period (Lane 2014: 502). In his work on the excavation of

Winchester, Biddle (1974) identifies continuity as being probable but in terms of urban centres remaining as centres of influence and power rather than significant population.

The key site for the debate around the survival of cities is Wroxeter. Cool (2007: 231) states that the Wroxeter material is a key resource in understanding the fifth and sixth centuries in Britain. Wroxeter is often put forward as an important site when attempting to demonstrate Roman culture in the post-Roman period (Dark 1994; Ward-Perkins 1996: 9-10; Barker *et al* 1997; White and Barker 1998: 118-36; Wood 2003: 429; White 2007; Rogers 2010; 2011; Speed 2010). At Wroxeter the baths basilica remained in use into the fifth century with the site then redeveloped with timber buildings built to Roman models (White 2007: 177-86, 2014: 160).

These views, and Ken Dark's ideas regarding the continuation of Roman culture and town life, have been criticised. For instance, Faulkner and Reece (2002) state that Wroxeter is an anomaly and has no bearing on urban continuity elsewhere. Halsall (2007: 359) disagrees with the assertion that the evidence found at Wroxeter represents urbanism, stating that it was merely the seat of a local bishop or magnate. This is in line with Biddle's (1976) views of the role of post-Roman towns. Fulford (2002) questioned the evidence put forward for the continuation of urban life at Wroxeter in the post-Roman period. He stated that the rubble of the penultimate phase of the site was not a Roman-style timber framed building (Barker *et al* 1997; White and Barker 1998) but late Saxon stone robbing. Lane (2014) questions the claim that the town survived into the seventh century on the basis of the lack of material culture found from the period AD 400 - 700 and rejects the dating evidence from archaeomagnetic and radiocarbon dates as potentially unreliable. Further, he states that the evidence for fifth and sixth century imported wares in the area surrounding Wroxeter, but not at Wroxeter itself, suggests it was not an important urban centre in this period. Late Roman material from the Mediterranean region was imported into Britain circa AD 475 - 550 and material from

France imported in the late sixth to late seventh centuries (Campbell 2007). It is noted by Lane (2014: 509) that none of these finds (Figure 5.5) are found in towns despite there being two sites with finds in the immediate vicinity of Wroxeter. These are New Pieces, just over thirty kilometres away where excavations revealed industrial activity, Roman and early Medieval material (Edwards and Lane 1988: 97-8; Arnold and Huggett 2000) and Wenlock Priory, eleven kilometres away from Wroxeter, where early Medieval glass was recovered from medieval contexts (Campbell 2007: 54-73, 117). Lane (2014) concludes that the evidence from Wroxeter, central to Dark's (1994, 2000) thesis that a Late Antique society with an essentially Roman way of life existed in the fifth and sixth centuries, is insufficient.

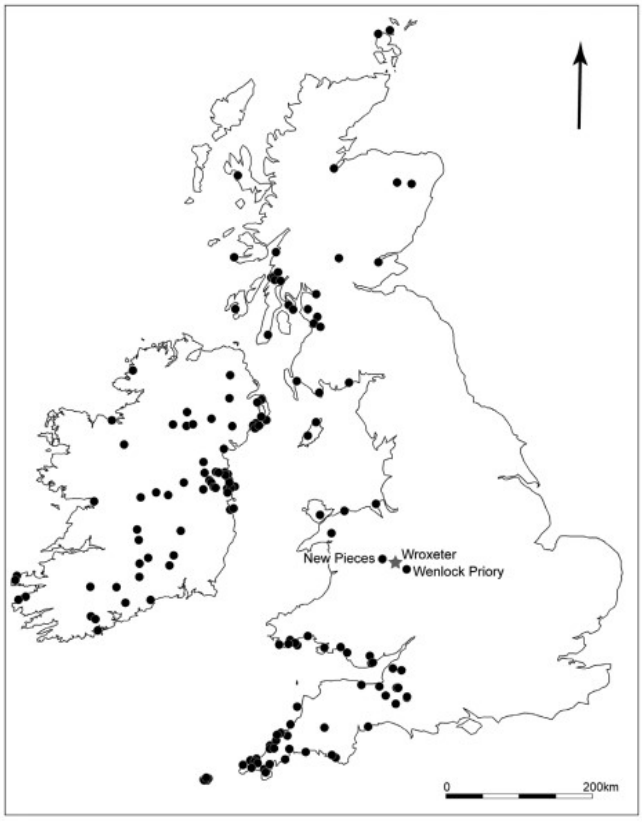


Figure 5.5 Fifth-sixth century imported glass and pottery finds in western Britain. Source: Evans Campbell (pers. Comm. In Lane 2014: 510).

Lane's (2014) assertions that there is no evidence of a post-Roman date for urban life at Wroxeter do not necessarily mean that this was not the case. Dating finds from the fifth century is difficult and material culture may have remained essentially the same in the post-Roman period or have been fourth century artefacts reused (White 1988:45, 2007: 14; Rahtz *et al* 1992: 228). Analysis of the pottery suggests that it was conserved and carefully used to allow continued use after the collapse of large-scale production (Cool 2006: 323-5; White 2007: 183). Also, at the Baths Basilica at Wroxeter there is little fifth century material in the post-fourth century sequence and artefacts may have been reused in the fifth and sixth centuries (Barker *et al* 1997: 203, 240).

Furthermore, the artefacts from Wroxeter suggest that there is evidence of occupation at Wroxeter in the post-Roman period. Excavations of the Baths Basilica suggested that Wroxeter was part of the trade in international glass up to the end of the fourth century and that fourth century glass was in use into the fifth, and possibly sixth, century (Pretty 1997: 323). There is also evidence of late and post-Roman window glass at the Baths and Macellum site. At these excavations there were four main periods identified. The latter two date to the late Roman and Early Medieval period with period three being dated to the third to fourth centuries and early post-Roman and period four dated as Medieval and modern (Ellis 2000: 48-77). Analysis of the window glass revealed 176 fragments from period three and eighty five from period four (Cool 2000: 187). One of these fragments was from the Portico and had purple streaks. Similar examples have been found in other excavations from late Saxon contexts (Price 1993: 189), however, Cool (2000: 188) cautions that the fragments being Late or post-Roman is only a possibility.

There are three main monographs published on the Wroxeter data by Barker *et al* (1997), Ellis (2000) and Webster (2002). Whilst Lane (2014) has stated that the material culture evidence of an urban environment at Wroxeter in the fifth/sixth centuries is almost non-existent, Hilary Cool (2007: 231)

has argued that the sequence of material culture is difficult to establish. This is because the late Roman to sub-Roman material was largely recovered from makeup layers and, therefore, was presumed to have little to do with the settlement of the site. This meant that the data was originally only published in summary form and was, as Cool (2007:231) described, 'in dire need of a major research project to rescue it'. An archive project was carried out in 2010 and the data, excluding the pottery archives, published online in 2011 (amended 2014) as 'The Webster Excavation Archive Project (Cool 2011). White and Wigley (2018: 130) stated that this archive will be a useful research tool in the future.

A further argument against the view of Wroxeter put forward by Lane (2014) and Faulkner and Reece (2002) is that Wroxeter is not necessarily anomalous in its existence but its discovery and excavation. White (2007: 180) points out that Faulkner's (1996) analysis of St Albans (where he argues for the decline of the town) does not take into consideration plough damage to late and post-Roman levels or the fact that late fifth and sixth century structures tended to be constructed from organic materials and leave less trace in the archaeological record. Tellingly, when Niblett (2008: 100-8) assessed the same data she produced a different picture, taking note of the ephemeral structures found in open-area excavation. Evidence from other towns such as Silchester, Insula IX, also demonstrates it was not abandoned after the fourth century (Fulford *et al* 2006). At Canterbury the amphitheatre remained standing into the medieval period (Frere 1970), while in Cirencester alterations to a temple and the amphitheatre entrance and its interior appear to date to the fifth century (Holbrook 1998: 142-5, 134-5). Evidence in other towns is more ambiguous. For instance, at Chester the structures of the Roman fortress influenced the topography of the Medieval town (Strickland 1994) and the Roman walls were reused for structures in the fifth and sixth centuries (Ward 1994) but settlement in this period is not widely accepted yet. Mason (2001: 213) states that buildings previously thought to be fourth or fifth century are now believed to be from the tenth and

eleventh centuries during the Anglo-Scandinavian settlement of the town. He concludes that there is no evidence of the type of sub-Roman timber buildings found at Wroxeter, at least not in the centre of the fortress where large-scale excavations have taken place. Due to the nature of the excavations at Wroxeter, evidence from other urbanisations is bound to be less conclusive. Esmonde Cleary (2014: 3) puts the extent of the excavations at Wroxeter in context. He notes that the development away from 'Wheeler boxes' and towards open area excavation had been taking place and that only this type of excavation would reveal the traces of ephemeral timber structures which were constructed in the period. White and Barker (1998: 129) conclude that it is not only Wroxeter which survived into the post-Roman period.

Finally, Lane's (2014) argument regarding the find locations of imported glass and pottery does not seem to stand up to close scrutiny. Analysis of the map in Figure 5.5 shows that the vast majority of locations where imported pottery has been found are on the coast. The main grouping of inland finds is around Bristol, near to the Bristol Channel and the River Avon. The fact that there are two locations near to Wroxeter with such finds whereas Wroxeter itself has none does not seem statistically significant. There are a large number of other towns and locations in the west that also lack such finds and an absence of these at Wroxeter does not definitively demonstrate that town life did not continue here into the fifth century.

The debate surrounding the continuity or collapse of a Roman way of life in urban areas after the end of Roman Britain ultimately involves two arguments. First, the degree of continuity of urban life and, second, the importance of towns and cities as an indicator of continued *Romanitas*. Town life is generally seen as a key part of Romanisation (Esmonde Cleary 1989, 2013; Millett 1990; Faulkner 2004), although other scholars such as Harris (2003) and Henig (2004) regard Roman culture as being

more than just public buildings and cities, considering it to be represented in post-Roman Britain by Christianity and portable art respectively.

Archaeologists such as Esmonde Cleary (1989, 2013) and particularly Faulkner and Reece (Reece 1988; Faulkner 1996, 2004; Faulkner and Reece 2002) view urban centres as key indicators of Romanisation and that a decline in use of towns and cities in the fourth century represented a fundamental break from Roman culture. Laurence *et al* (2011: 318-9) describe urbanisation as a process which, in many places, could only be sustained for around 200 years. Some degree of continuity is described but the 'set of cultural meanings' which brought urbanism about in the first place had been lost. This raises the question of what degree of continuity is required in order for the survival of a Roman way of life to be considered. It is not necessarily the case that the original motivation for cities needed to still be in place at the end of the Roman period in order for us to view it as continuity of *Romanitas*. Over the course of almost four centuries of Roman rule these motivations will have been forgotten by the ordinary people living in cities.

Amongst those archaeologists who consider that there was a continued sense of *Romanitas* in Britain, Ken Dark (1994, 2000, 2014) seems to overstate the case for the survival of town life in a way that was almost completely Roman or Romano-British. Faulkner and Reece argue the opposite, that what survived into the post-Roman period was not urban. The debate ultimately rests on what we consider to constitute ‘urban’. It is clear from the evidence discussed above from Wroxeter and other towns such as Silchester, Cirencester, St Albans and Chester, that any survival of town life into the fifth century and beyond was not unchanged. This makes it difficult to go so far as Dark’s statement urban life was largely unaltered. However, the Faulkner and Reece school of thought seems to go too far the other way. This perhaps reflects the authors’ own biases about the Roman Empire as reflected in Faulkner’s (2004) ideas that remaining Roman in Britain implies that classical civilisation

was superior. As White (2007: 177) points out, when assessing the survival of towns, it is imperative that the features of towns in the fifth century are focused on, not those of the first or second. In his assessment of the survival of small towns into the fifth century, Fitzpatrick-Matthews (2014:57-8) describes research as often reflecting 'the archaeology of expectation'. Since it is well 'known' that Roman towns did not survive the end of Roman Britain, evidence of fifth century activity on these sites is not looked for or goes unrecognised. An example of this is at Chester where commercial pressures on the excavation meant that archaeological evidence for occupation into the fifth century went unrecognised (White 2007: 188; Fitzpatrick-Matthews 2014: 54).

In parallel with the view of urban life coming to an end with the end of Roman Britain, the villa system is described as not surviving either (Loyn 1991: 16). Villas are seen as characteristic of a Roman way of life in rural areas and villas were still being developed and construction taking place in the fourth century (Percival 1976; Smith 1997; Terrenato 2001: Lewit 2003). Lewit (2003) argues that, rather than abandonment, the changes that took place to villas in the West in the fifth and sixth centuries represent transformation and changing occupation styles. In parallel with developments in towns where new buildings were built in wood, Lewit sees villas as being replaced by more functional buildings in ephemeral materials.

5.4.2 Cemetery and material culture evidence

There is an Anglo-Saxon bias in post-Roman archaeology, owing mainly to the abundant cemetery and grave goods evidence (Ford 1996: 70; Henig 2004; Swift 2007). In the west 'native' burials are largely unfurnished (Philpott 1991; Lucy and Reynolds 2002: 1-8) and in the east an Anglo-Saxon burial rite was adopted with Christian cemeteries disappearing (Lucy 2000; Taylor 2001: 135). This was a major division recognised between the two 'cultures' (Chadwick 1907; Leeds 1936; Myres

1942). Gerrard (2013:566-7) points out that the cemetery evidence for the Roman to Anglo-Saxon transition appears particularly unambiguous but that this may be misleading as many sites have continuity with late Roman burial. At Poundbury in Dorchester there are graves identified as dating from the post-Roman use of the site as a settlement (Sparey-Green 1987: 106-7) and graves at Poundbury sites N and E have a significant number of grave goods (Farwell 1993: 62). In the east, barrows were an important part of the Anglo-Saxon burial rite (Williams 1998) including both Anglo-Saxon barrows, as at Finglesham in Kent (Parfitt 2006: 28-30), and the reuse of Bronze Age barrows as at Mucking, Essex (Hirst and Clarke 2009: 452-6). Roman artefacts are also frequently found in Anglo-Saxon graves (White 1988). For example, at Mucking twelve rings and seven bracelets of a type common in female late Roman graves were found as well as 102 late Roman style belt fittings (Hirst and Clarke 2009: 495-7, 529). These are identified by Archibald *et al* (1997: 233) as the transference of a Roman signifier of male rank. The earliest weapons burials at Mucking were originally interpreted as late Roman burials (Jones *et al* 1968: 226) and then as fifth century *foederati* (Evison 1981). They are now believed to belong to a mixed culture that Hirst and Clarke (2009: 766-7) believe can be seen across Britain. Both the use of earlier Bronze Age burial mounds and Roman type grave goods also demonstrates an attempt to evoke the past on the part of the people conducting this 'Anglo-Saxon' burial rite and suggests that the division between the two graves rites is not as simple as previously thought.

This mixed culture is perhaps best displayed in the cemetery at Wasperton, Warwickshire. This site is found on what may be deemed to be the 'interface' between sub-Roman Britain and Anglo-Saxon England. The development of the cemetery has been traced by Carver *et al* (2009: 135-136):

- In the fourth century, the Romano-British population made use of the whole area of the cemetery and the grave alignment varied, suggesting a diverse community with eclectic beliefs.

- The fifth century saw unfurnished inhumations which stable isotopes suggest were local people. This implies the emulation of late Roman burial rites by natives.

- In the fifth to the sixth century, the cremation rite began. This possibly represents incoming families but the British rites are respected and continued.

- By the end of the sixth century, new rituals dominate with predominantly furnished inhumations with Anglo-Saxon assemblages. This suggests the fusion of native and incoming culture.

A similar story is suggested by another Warwickshire cemetery at Stretton-on-Fosse. Excavations have revealed an Anglo-Saxon and a Romano-British cemetery as well as a small Anglo-Saxon settlement (Ford 2003). Ford concluded that cultural influences were predominantly Anglo-Saxon but also identified distinctly Romano-British burial rites.

Works on Roman Britain tend to stop at around AD 410, the typical date given for the withdrawal of Roman troops, however, much of the research into Anglo-Saxon finds and their styles begin at the seventh century. For example, in her *The Art of Anglo-Saxon England* (2011), Karkov (2011) surveys the art produced in the Anglo-Saxon period in England or by English craftsmen. It begins at circa AD 600 and does not cover the early transitional period from Roman Britain to Anglo-Saxon England in the fifth and sixth centuries. Even considering the works which do not ignore the fifth century, many

focus on very specific and distinct Roman and Anglo-Saxon identities. Works tend to discuss Roman material culture up to the fourth century or Anglo-Saxon from the fifth century onwards with only a relatively small part of the work dedicated to the earlier or later types. Even those more recent works which consider earlier examples such as Pollington's *Wayland's Work* (2010) and Webster's *Anglo-Saxon Art: a new history* (2012) give them relatively few pages. Henig's key work on *The Art of Roman Britain* (1995) gives some attention to later styles, specifically those Roman styles which are found in Anglo-Saxon contexts in the fifth century. However, this is covered in four pages and focuses solely on 'reclaiming' these styles as Roman rather than Germanic (2004: 170-3).

This lacuna is largely because archaeologists (and art historians) tend to be either Romanists or Anglo-Saxon experts. Leslie Webster curated the Anglo-Saxon, Viking and Celtic and Continental early medieval collections at the British Museum (National Heritage Memorial Fund 2013). Martin Henig worked in the faculty of Classics at the University of Oxford, researching Roman and particularly Romano-British art (Henig 2011). Faulkner argues for a complete lack of continuity in the post-Roman period but stresses that he is a Romanist not a 'Dark Age specialist' (Faulkner 2004: 11). Esmonde Cleary (2014: 4) highlights the division in archaeology firstly between 'Romanists' and 'Saxonists' but also between studies of so-called 'Celtic' and Saxon regions in the post-Roman period.

Recently, there has been work towards a more integrated approach. For example, Ellen Swift (2012) looks at object reuse in the post-Roman transition period and calls for further study that brings together material usually divided into Roman and Anglo-Saxon archaeology. Swift's research is largely in late Roman and late antique art and her research projects focus mainly on use of Roman material culture and art in the Roman and post-Roman/late antique period (University of Kent 2012). This research will bridge the gap between the art and material culture of the east and west during the fourth to the sixth centuries. Henig (2004: 21) asks whether distinctions between Germanic and

Roman would have been recognised by the wearers and users of fourth-sixth century portable art. This is an important consideration. For instance, would examples of continued Romano-British style decoration be evidence of a conscious effort to remain Roman or people simply carrying on using the items they had used before? Martin Henig (1995, 2004, 2007) is one of the major champions of the use of material culture, particularly art, to determine cultural affiliations in post-Roman Britain. See Chapter 5.4 for discussion of Henig versus Faulkner in interpretation of post-Roman material culture and the idea of a Late Antique period in Britain.

Studies of material culture of the immediate post-Roman period often identify an apparent desire of Anglo-Saxon people to appear Roman. For instance, Henig (2004), Filmer-Sankey (1996) and Wood (1997: 119) identified similarities between Anglo-Saxon artefacts and those that were previously used to display *Romanitas*. Henig (2004: 14-22) stated that by the third century, Roman jewellery became showier, with large plain stones, gold openwork, bracelets and neck chains. He saw Anglo-Saxon graves with their decorative grave goods as being the 'heirs' of pagan peoples who used material culture such as the Thetford Treasure. He saw exotic garnets and amethyst bead necklaces such as the Desborough necklace (Webster and Backhouse 1991: 28-29) as demonstrating links with the Byzantine east. The use of large buckles and chip-carved decoration are also seen by Henig to reflect a desire to be Roman in appearance. For example, the assemblage of artefacts at Sutton Hoo has been interpreted as portraying the owner as Roman (Filmer-Sankey 1996; Wood 1997: 119; Henig 2004: 20). Wood (1997: 119) stated that the helmet originated from Roman parade helmets and the whetstone is similar to the objects depicted in the *Notitia Dignitatum*, relating to the late Roman Imperial officials and their insignia.

Pollington (2010: 82) goes further, suggesting that the use of garnets and love of colour in Anglo-Saxon art and decoration demonstrated a desire to appear Roman. A love of colour is not a unique

aspect of art and decoration and garnets are not common in Roman jewellery. Webster (2012: 58-59) states that the use of garnet inlay in Germanic jewellery follows a Roman, and ultimately Greek, practice of lapidary work and that their colour denoted status and wealth (see also Hamerow 2017b). This does not mean that the use of garnets represents Germanic people trying to imitate Roman culture, rather that the use of precious gemstone inlay more generally followed in previous Graeco-Roman engraving, cutting or polishing of gemstones. Where garnets are used in Roman jewellery, the use and settings are very different. Rather than the Anglo-Saxon garnet cloisonné, Roman use of garnets (and other gemstones) was frequently in the form of intaglios from the late fourth and early fifth centuries onwards (Adams 2011: 10).

Nevertheless, several Germanic art styles found on material culture are derived ultimately from late Roman Military styles. For example, the Sösdala style (Suzuki 2000: 59), Nydam Style (Haseloff 1974, 1981: 8; Roth 1979: 58-64; Ager 1990; Suzuki 2000: 59; Lucy 2000; Bruns 2003: 40; Hupfauf 2003; Francesci *et al* 2005: 20-1), Saxon Relief Style (Behrens 1930; Bakka 1958; Haseloff 1974; Evison 1977; Böhme 1986; Inker 2006: 1) and the Quoit Brooch Style (Leeds 1936; Bakka 1958; Ager 1985; White 1988; Henig 1995; Suzuki 2000).

There are differing opinions amongst scholars as to the origins of Germanic zoomorphic art and material culture. Some believe its origins to lie in the Eurasian Steppe (Salin 1904 *Die altgermanische Thierornamentik*; Lindqvist 1926 *Vendelkulturens Alder och Ursprung*; Åberg 1924 *Den Nordiska Folkvandringstidens Chronologi* referenced in Haseloff 1974: 2) (see also Holmqvist 1955 *Germanic Art during the First Millenium A.D*). Bakka (1958: 5) describes the style's ultimate origins as being Late Roman, albeit 'so far developed that its ultimate source of inspiration, late-Roman decorative animals, are definitely left behind'. He uses this to suggest that it should generally be thought of as the first purely Germanic style. More recently, many view Style I as having developed from the

Nydam Style (Haseloff 1974: 2; Hicks 1993; Muhl 1994; Shepherd 1998; Lucy 2000: 18; Hupfauf 2003; Franceschi, Jorn and Magnus 2005a: 21) and, therefore, having its ultimate origins in late Roman styles.

On the other hand, as has been explained, a Roman identity is not always as cut and dried as one might expect it to be. Although the Romans themselves seem to have thought in terms of Romans and barbarians (non-Romans), the reality is more complex. As the Romans came into contact with other peoples as part of their expansion of the Empire, they declared these peoples Roman citizens by the beginning of the third century. Roman influence thus led to a blending of Roman and native cultures which differed between the provinces. This contact was not a one-way process but a mutual exchange of ideas and a blending of the two cultures. Bishop and Coulston (2006: 270-1) emphasise this as a two-way process in respect of the military. They explain that, contrary to the often emphasised impact of the Roman army on the peoples they occupied, interaction with the native peoples of the provinces affected the equipment used by the Roman military. With particular relevance to Roman and Germanic identities, contact with Germanic tribes seems to have influenced the army from the late third century. For example, the adoption of round shields (Bishop and Coulston 2006: 271). In terms of art styles, these varied across the Empire and throughout the provinces. Chip-carving was most prevalent in northern Gaul and the Elbe-Weser region (Suzuki 2000: 58; Bruns 2003). There was a large amount of trade between this area and the province of *Britannia* (and later the provinces that made up *Britannia*) (Pollington 2010: 80).

Does this suggest that the Anglo-Saxons were, in terms in culture and identity, not that dissimilar to the Romans and Romano-British? They were, at least, using similar art styles and seemed willing to adopt the motifs of the Roman world.

That Germanic peoples used and made Roman style artefacts for their own use does not mean that they were necessarily trying to display a Roman identity. In their work on *The Vandals*, Merrills and Miles (2010: 93) argue that the fact that the symbols that the Vandals used to define themselves are similar to those of the late Romans does not mean that they wanted to be Romans. They adopted African Roman élite material culture because they wanted to be elites.

Härke (1990: 38-40) used material culture in conjunction with skeletal data. He studied data from forty-seven Anglo-Saxon burial sites from the fifth to the seventh centuries and found that 47% of the burials had weapons. The weapons burials correspond to those burials of taller individuals. He interprets the weapon burials as a marker of families descended from migrants. This suggests that, if Härke's ideas regarding the weapons burial rite are correct, almost half of the fifth to seventh century population may have been descended from Germanic migrants. However, this is a generalised picture. The proportion of burials containing weapons varied by region from 29.5% to 82.4%. This suggests that Anglo-Saxon acculturation of native/Romano-British was not consistent.

Material culture evidence was also used by White (2013b: 590-1) to back up his arguments about the continuing importance of the late Roman provinces that made up *Britannia* into the fifth century (White 2007). He noted that by plotting the locations of specific find types it becomes apparent that each of the provinces has links with the nearest part of the continent (Figure 5.6). White based his boundaries of the provinces on contemporary writings, inscriptions (such as on the Jupiter column at Cirencester) and Iron Age tribal boundaries which formed the basis of the *civitates* (White 2007: 36-37).

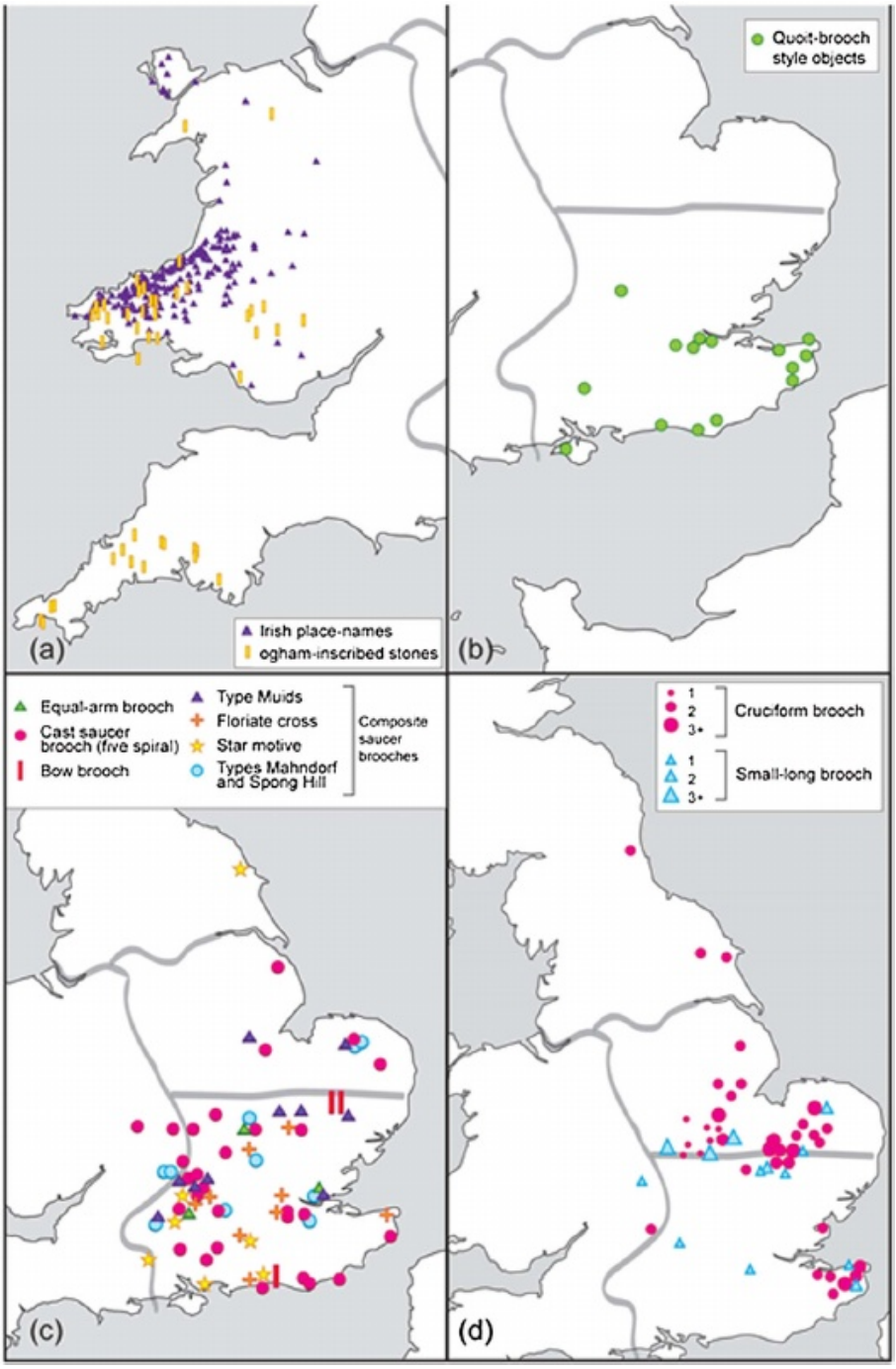


Figure 5.6 Plots of specific evidence types showing links with different areas of the continent in various Roman provinces. a) Irish settlement evidence in Britannia Prima, b) Quoit brooch style, high status military metalwork in Maxima Caesarensis, c) Saxon type objects in Maxima Caesarensis, d) Anglian type objects in Flavia Caesarensis. Source: White (2013b: 590).

The concentration of Quoit Brooch Style artefacts in Kent is often interpreted as meaning that the wearers and manufacturers were using them to make a statement about their identity (Ager 1985; Suzuki 2000: 7). This concentration of finds is linked by Pollington (2010: 90) to Jutish immigrants to the region. The issues with linking specific types of finds to incoming people and also the problems inherent with viewing Germanic settlers as having come over and settled in discrete social groups have been discussed in Chapter 5.3. In fact, archaeologists such as Dickinson (1979) have long viewed the disc brooch and its decoration as the continuation of a Romano-British fashion from the Thames-Valley rather than any display of Jutish identity or ethnicity. Other scholars see the Quoit Brooch Style as being representative of the varied and complex character of early Anglo-Saxon society in the fifth century (Inker 2000: 25) or as being particularly difficult to define and interpret. For instance, Hinton (2005: 13-5) states that it could be used as evidence of continuity from Roman Britain, of continued contact with late Roman Gaul or of new contacts with Scandinavia or the Franks.

Høilund Nielsen (1992) also identified a difference in Style II art between Anglian objects from Suffolk, which may have a Danish link, and Kentish and Saxon objects from Kent, which may result from Frankish influence. This fits with White's (2013) ideas about each province of *Britannia* 'turning to' the closest part of the continent. It is important to note that this is only an assessment of élite material culture and thus of the identity or affiliations of the élites in these areas. It may be the case that populations in each province turned to the closest area of the continent and used the trappings of these cultures in order to show status. Høilund Nielsen (1992: 187) had to remove a number of artefacts from her analysis as they did not share sufficient stylistic elements with the remaining Style II finds. This demonstrates that links with the continent are only one component of the identity displayed by people in these areas in the period.

The discovery of the Staffordshire Hoard added eighty to ninety Style II artefacts to the 124 used by Høilund Nielsen in 1992. For this reason, at the Staffordshire Hoard Symposium, Høilund Nielsen (2010) attempted to fit the Style II objects from the hoard into the seriation she developed previously. The Staffordshire Hoard contains a number of Anglian style finds which mainly fit into the later development of the style. The Kentish style artefacts suggest a development which continues later than previously identified. Høilund Nielsen notes that the finds have close links to those from Sutton Hoo and that the new finds call into question the idea that one group of animal interlace weapons fittings is 'essentially Kentish'. The Staffordshire Hoard demonstrates that 'Kentish' and 'Anglian' styles were at least in use outside the usual concentration of artefacts in the mid seventh century.

5.4.3 Models of continuity

Not all works on the period fit into the simplistic division into ideas of continuity or collapse outlined above. The issue of continuity is a complex one. Many studies which argue for or against the continuation of Romano-British culture run the risk of taking a view which puts Roman and Anglo-Saxon cultures as two polar opposites. For instance, Faulkner's (2004) view of Roman culture as ending completely in Britain because there is little evidence of continuity in terms of towns and economy. Henig (2004: 13) points out that he is not arguing that there was continuity 'in a broad sense' because the fourth to the eight centuries were full of changes. This demonstrates the importance of recognising the difference between suggesting that the Britons retained their Romano-British sense of identity and stating that everything in this period stayed the same. This point of view, of gradual change with a remaining sense of *Romanitas* for some time after Roman political and economic systems ended is evidenced in recent studies which talk of the 'transformation of the Roman world' rather than the 'fall of Rome'. For example, Noble's (2006)

introduction to a work on this period of transition which discusses 'Romans, barbarians, and the transformation of the Roman Empire' and Mathisen, Shanzer and contributors' (2011) work on *Romans, Barbarians, and the Transformation of the Roman World*.

In his work on 'Romano-British Interaction', Reece (1979) concluded that the archaeological evidence does not support the idea that native British customs and way of life were replaced by those of the Romans. Furthermore, when revisiting his 1980 work on Roman towns, he discussed the idea of a Romanised south and west in the first to the fourth centuries AD as 'a skin deep veneer' (Reece 1983: 150). He describes the trappings of *Romanitas* as belonging only to a relatively small élite who lived on in the countryside into the third century. By the fifth century, even those élite markers which lasted into the fifth century disappear.

Recently, Miles Russell and Stuart Laycock built on Reece's idea. They put forward the view that Britain was never fully Romanised in the first place; it didn't have a sufficient degree of Roman culture to lose (Russell and Laycock: 2010; Laycock: 2012). This argument relies upon the idea that the native Britons never accepted Roman culture and, therefore, there was no Romano-British identity to continue into the post-Roman period. It plays into the Faulkner and Reece school of thought that any class of evidence that is deemed to matter in terms of being 'Romanised' ceased to exist after the Romans withdrew.

Another view of the period states that the break between the two opposing schools of thought can be bridged. A key proponent of the view is Roger White, whose work on *Britannia Prima* (2007, 2013, 2014) puts forward the view that late Roman province of *Britannia Prima* survived as essentially Roman into the fifth century. White states that, in particular, the western side of *Britannia Prima* was

more ‘Britto-Roman’ than ‘Romano-British’ whereas the east of the province was more Romanised and remained ‘defiantly Roman’ (White 2007: 151).

This is also essentially the view of Nicholas Higham (1992:86-7) who states that the north and west (‘the old military parts of the province’) remained largely Roman until they fell under Anglo-Saxon control into the fifth century, with Wales holding on to its native culture, language and ruling elite into the Late Medieval period. White brings up the question of the continued use of Latin and echoes Henig’s sentiments quoted above when he states that ‘no one told the Romans of the fifth to seventh centuries that they ceased to be Roman merely because their bureaucrats had vanished’ (2007: 150). White states that the origin of the change in archaeology in the fifth century was the Germanic invasion of Gaul in AD 406. This affected trade connections, switching the main trade routes to the west coast and essentially isolating the more Romanised elites in the east of the province. Few prestige goods from the Mediterranean and western Gaul are found in eastern *Britannia Prima* after this point (Reynolds 2006: 140). This thesis fits in with the lack of evidence of imported glass and pottery from the Mediterranean (Figure 5.5). Whereas Lane (2014) uses this to suggest that Wroxeter did not remain in use after the Romans withdrew, White (2007: 151) suggests that after the Germanic invasion of Gaul, trade switched to the west coast, isolating Roman elites in the east. White uses evidence such as the refortification of hillforts and continued use of towns to argue for the survival of *Britannia Prima* throughout the fifth century. The richest evidence in the south west peninsula is used to suggest that, in the west, a Roman way of life could not be maintained and was replaced with more simple exchange of goods and services. In the east, the degree of change was greater in the fifth century as the culture here was more Roman. The archaeology of rural areas is similar to that in the west but it became more difficult to display wealth through buildings and, therefore, dress and accessories became an important indicator of status (White 2007: 162-4, 169). Tensions within the province led to its breakup and subsequent formation

of Britonnic kingdoms which were ultimately conquered by the Anglo-Saxons between the seventh and thirteenth centuries.

White's (2007, 2014) view of a *Britannia Prima* which turned its back on the rest of Britain with the shifting of power and trade connections to the western sea routes, shares much in common with the more general idea of an east-west divide in Britain that stretches beyond the immediate post/sub-Roman period (Mackinder 1910; Fox 1933; Cunliffe 2001; Oppenheimer 2006. See Chapter 4.4). White's (2007, 2013) assessment of division in Britain in the post-Roman period (see Figure 5.6) tie in to Cunliffe's theory that the Atlantic Zone shared culture is based largely on imported Atlantic trading routes.

Esmonde Cleary (2014: 3) identifies two ways in which continuity has been seen to exist into the post-Roman period. One approach, the ways in which a Roman way of life was extended into the post-Roman period, has been discussed above. The other is the idea that there were Germanic people in Britain during the Roman period.

Oppenheimer (2006) argues that there was a Germanic presence in Britain before the end of the Roman period. This view has also been put forward on the basis of the archaeological evidence. Examples of apparently Germanic influenced finds in Britain before the end of the Roman period have been identified by Hawkes and Dunning (1961) and Myres (1956, 1969). It needs to be noted that these publications are old and thus, opinions may have changed. More recent reaction to the ideas of an early Germanic presence in Britain will be discussed below. Some artefact types such as horse-head buckles (Hawkes and Dunning type 1B) are specifically British types dating to the late Roman period (Hawkes and Dunning 1961: 46-47; Laycock and Marshall 2005; Swift 2011: 201). For example, the buckle in Figure 5.7, which was found in Buckinghamshire.

Figure 5.7 Late Roman to early Medieval (late fourth to early fifth century) horse-head buckle of Hawkes and Dunning type 1B. The decoration comprises two back-to-back horse heads with incised lines and ring-and-dot decoration for the eyes. Source: Battye (2005).

Myres (1956, 1969) in particular was a strong proponent of the *foederati* theory, whereby large numbers of Anglo-Saxons came to Britain in the fourth and fifth centuries as mercenaries. Saxons were involved in the late Roman army, as evidenced by a unit, the *ala prima saxonum*, which was commanded by a Dux (a military position from the third century) and stationed in Verofablia in Foenicia in the fourth and fifth century according to the *Notitia Dignitatum* (Seeck 1962: XXXII). An association with Britain is attested by the Roman historian Ammianus Marcellinus who mentions the Saxons in relation to an attack on Britain in AD 364 saying '*Picti Saxonesque et Scotti et Attacotti Brittanos aerumnis'* translated by Pollington (2010: 82) as 'The Picts and Saxons, also Scots and Attacotti constantly harried the Britons'.

Roman military belt buckles are found amongst the Roman style artefacts buried in fifth to early eight century graves in Cemetery II at Mucking. As well as twelve rings and seven bracelets, common artefacts in female late Roman graves, 102 Roman-style 'wide' buckles were also recovered (Hirst and Clarke 2009: 495-7). Such burials were originally interpreted as late Roman burials (Jones *et al* 1968: 226), then as early fifth century *foederati* (Evison 1981), Germanic troops enlisted for the defence of Britain after the Romans withdrew. Hirst and Clarke (2009: 766-7) now see them as belonging to a 'mixed culture', a blend of Germanic and late/sub-Roman seen across Britain, while Archibald *et al* (1997: 233) interpret this as the transference of a male signifier of rank. The main Roman influence on Germanic personal adornment seems to be military accoutrements and typically male items of dress. However, the earliest Roman military belt buckles found in England are interred in what appear to be female graves, perhaps as part of their use as a symbol of status (Pollington 2010: 76; Lucy 2016) This also demonstrates an apparent eagerness to suggest a Roman identity as a sign of prestige.

Therefore, more recent works reject the *foederati* explanation and see artefacts such as late Roman military belt buckles as a late Romano-British feature of material culture. As at Mucking, finds such as late Roman military belt fittings cannot be simplistically assigned to the late Roman period or Germanic *foederati*. Continental style late Roman belt fittings continued to be produced in the fifth century (Hirst and Clark 2009: 766-7; Lucy 2016) and so any finds of them in Britain cannot necessarily be dated to the period of Roman occupation of Britain. In particular, many of the fittings such as belt buckles used by Hawkes and Dunning (1969) were standard issue.

Many of the motifs found on the Late Roman Military Style buckles are also found in classical styles, demonstrating the Roman rather than Germanic associations of this type of find. For instance, the decoration on late Roman chip-carved belt fittings include scrolls similar to those used on the capital

of Hellenistic Ionic columns (Figure 5.8) and vine/scroll decoration (Figure 5.9) in the Classical style (Bishop and Coulston 2006: 218-221). This suggests that this artefact style is very much a late Roman one, displaying a Roman military identity rather than evidence for a Germanic presence in Britain prior to the end of the Roman period.

a) b)

Figure 5.8 a) Copper alloy strap end with chip-carved scroll decoration. Circa fourth century. Source: McIntosh (2008). b) Hellenistic marble column from the Temple of Artemis, Sardis. Circa 300 BC. Source: Metropolitan Museum of Art (2015).

Figure 5.9 Roman (AD 43 - 410) oval, copper alloy belt plate decorated with scrollwork and moulded floral motifs. The space between the floral motifs is filled with enamel which is now dark green but may have been yellow. Source: Boughton (2010).

Pollington (2010: 75) asks whether the military buckles were made by Romans for 'barbarian' tastes or were a Roman product in their own right. This demonstrates a practice that is relatively widespread within studies of Roman and Germanic art, whereby types of artefact that are assumed to be diagnostically Roman but with apparently Germanic elements are often thought to have been made for Germanic peoples. This culture history approach is generally rejected and Inker (2006) argues that they were not produced by 'captive Roman metalworkers' for Germanic peoples.

5.5 Dating

The arguments by Cool (2000, 2006, 2014) t

hat there was a continuity of forms of material culture into the fifth century have already been outlined. Dating of finds is particularly important in identifying post-Roman material culture. This means that any problems with dating techniques can skew results. The accuracy of a given date is dependent upon the method of dating, for instance, whether the artefact has been dated itself or by

the context in which it was found and whether the date is absolute or relative. This makes direct comparison between results from traditional archaeological methods and those from the study of big data difficult. Excavated data may have a secure stratigraphic context and dating is of the date of the context the artefact is found in, therefore that of deposition rather than manufacture. Assemblages of artefacts found together, for instance in burials, also allows more accurate dating. For example, at Mucking (Hirst and Clark 2008; Lucy 2016) and Spong Hill (Hills and Lucy 2013) where temporal phasing and associative patterning of artefacts were used to produce a chronology.

Finds in the PAS are, by virtue of how they are recovered and reported, dated stylistically. This means that the date given is usually that of presumed production rather than deposition. PAS finds are, by their very nature, no longer in context. This means that finds are generally dated through typology with decoration often a major factor in deciding on a date range (Caple 2006: 210). As a result, rather than arriving at the date of deposition of the artefact, the date given will be of manufacture. This problem is compounded if we consider the possibility that, following the withdrawal of Roman troops, life did not change all that much for native Britons/sub-Romans. The artefacts they used may have continued to be in the same styles and forms. The collapse of the monetary economy by the fifth century (Esmonde Cleary 1990: 144; Reece 1991: 33) and/or difficulties in obtaining goods, would have led to people using their existing goods for longer. With regard to a possible continuity in the types and styles of objects used into the post-Roman period, there are two categories of objects to which this could apply. Firstly, curated objects which were manufactured in the Roman period and reused and repaired. Secondly, the possibility that some artefacts were produced in the post-Roman period that used the same or similar styles as before and are thus not easily distinguished from Roman material. It is possible that there is material that could be identified as post-Roman using subtle differences in style and manufacture but that these have not been identified. This could be due to the small quantities of material that this possibly applies to, dating issues with post-Roman

material (see above and Chapter 2.3.3) or the evidence being buried in site reports or PAS data (for example, the Wroxeter archives discussed in Chapter 5.4.1). Both continuity in material culture styles and curation may lead to potentially incorrect dating of out of context artefacts. White (2007: 20-5) highlighted this issue in his study of *Britannia Prima*, pointing out that it leads to late Roman material culture being 'invisible'. Any find in a late Roman style is deemed to be fourth century rather than possibly being fifth century. The PAS is an important dataset but it is vital that dating issues are taken into consideration when assessing to what extent the PAS data can tell us what was happening in the fifth century in western Britain.

Gerrard (2014: 91, 94) discusses this issue in relation to post-Roman pottery in Britain. He argues that there is evidence for both the use and production of pottery during the early fifth century but that the only way to conclusively prove this would be the excavation of a kiln securely stratified above fifth century dating evidence. Alternatively, a kiln site could potentially be securely dated using scientific methods such as radiocarbon (for associated organic material), thermo-remnant magnetism or rehydroxylation dating (Wilson *et al* 2009).

Sometime during the fifth century, Romano-British pottery production ceased. However, Romano-British pottery is still found in post-Roman contexts. This is deemed to be due to one of four possibilities:

- Curation of vessels (i.e. those retained for future use)

- Roman vessels which have been recovered (as opposed to retained) and reused from abandoned Roman sites

- Fragments of Roman vessels recovered by post-Roman peoples, possibly as an indicator of *Romanitas*

- Anglo-Saxon vessels made with a Romano-British influence

The first two of these theories fit with White's (1988, 2007, 2013, 2014) ideas on reuse and curation of late Roman objects in the post-Roman period being the reason for a lack of securely dated fifth century Roman artefacts. In the same volume as Gerrard's analysis of pottery, Swift (2014) discusses the 'Reuse of Glass, Pottery and Copper-Alloy Objects' in the transition from Late to post-Roman in Britain. This is supplementary to her 2012 article demonstrating the evidence for the reuse of Roman bracelets (Swift 2012). These include penannular brooches with replacement iron pins which are found mainly in Anglo-Saxon cemeteries in the south-east (Swift 2014: 132-134), reworked glass sherds which have a more widespread distribution with many finds in the north-east (Cool 2000; Swift 2014: 138-142) and Samian sherd spindle whorls, found largely on northern military sites.

Gerrard (2004: 66) concludes that 'All works on the end of Roman Britain acknowledge that there is a serious difficulty in dating the early fifth century'. This issue has been discussed above (see Chapter 5.4.1) with reference to the possible evidence for fifth century Roman activity at Wroxeter and other Roman towns. One of the main issues with dating fifth century finds is the lack of coinage. Whyman (1993: 64) stated that the fifth century is often compressed due to the last coin-dated assemblages.

5.6 Conclusions

The fourth to the fifth centuries were a time of great change in the archaeology of England and Wales. The collapse of the Western Roman Empire and the introduction of new 'Anglo-Saxon'

material culture and burial customs leads to debate amongst archaeologists as to the nature of the change.

There are two main schools of thought regarding the end of Roman Britain:

1) That there was a decline in Roman culture and way of life (Esmonde Cleary 1989, 2012; Faulkner 2000, 2004, 2014; Faulkner and Reece 2002; Guest 2014; Reece 1988; Wickham 2005; 2009).

2) That there was continuity of Roman culture and way of life into the post-Roman period (Dark 2000, 2014; Gerrard 2004, 2013, 2014; Harris 2003; Henig 2004; Rogers 2011).

Other positions attempt to balance the two contrasting views. For example, White (2007, 2013, 2014) who proposed that continuity of Roman culture and identity varied geographically. He suggested that the province of *Britannia Prima* remained more culturally Roman into the post-Roman period. Even within *Britannia Prima* there is variation, with the east of the province being more Romanised and, thus, remained more Roman into the fifth century.

These ideas of significant differences within the province of *Britannia* play into theories regarding the more long-term divisions in existence within British archaeology (Cunliffe 2001; Fox 1933; Oppenheimer 2006; Mackinder 1910). The existence of an 'Atlantic Zone' which remained distinct from the rest of Britain across much of prehistory ties into ideas about *Britannia Prima* remaining culturally separate from the rest of Britain into the post-Roman period. Cunliffe's (2001) Atlantic Zone exists in opposition to the rest of Britain, where the east- and south-facing aspects form a North Sea Zone in which many of its elements are found in Continental Europe. This is similar to

White's (2013) view of the old provinces of Roman Britain linking to the nearest part of the continent.

The following chapter will use PAS data on a more micro-level than previously. The PAS database has been reduced to the finds of the fourth to the sixth century in order to assess whether the PAS can answer specific cultural questions. The results of this study will be compared to the current archaeological debate on the period laid out here. The key questions regarding this period of change in the archaeological record are:

1. What do the PAS data reveal about England and Wales in the fourth to the sixth centuries?

2. In particular, what do the PAS finds reveal about the west in the immediate post-Roman period?

3. How do findings compare to current understanding?

The overarching objective of the micro-level research is to determine whether and how PAS data can be used to answer this type of question about a specific period in archaeology.

6 RESULTS II: MICRO-LEVEL

6.1 Introduction

The previous chapter set out the debate on the case study period of the fourth to the sixth centuries and suggested some key questions for the PAS data to answer in relation to objective two – can unstructured data be used to answer specific, cultural questions? This built on Chapter Four which analysed the geographical and temporal distribution of the entire dataset in order to determine the patterns of recovery and recording affecting the data. This allowed the identification of areas of high and low densities of finds, demonstrating that topography has a clear effect on the density of finds recorded in any given area. Comparison of the PAS defined period-specific datasets with this control dataset showed different zoning patterns in terms of finds density in the Early Medieval (AD 410-600) assemblage compared to other periods.

This chapter presents the results from applying statistical analysis to the data and conducts a more detailed analysis than can be done with distribution maps. It takes into account the types of artefacts found in the case study period and if/how these differ across the study area. The need to go further than distribution maps in the study of PAS data was identified by the English Landscapes and Identities project (Donelly *et al* 2014: 54). In terms of looking more specifically at find types, simply mapping the data is not always beneficial. Figure 6.1 shows that mapping the Roman Personal Adornment finds cannot show anything further than the broad trends identified in the previous chapter. The large number of finds in the Lowland Zone obscures any differences that may be apparent in the Personal Adornment category. In order to attempt to overcome this, other methods of analysis and visual display are presented in this chapter.

The zones identified based on the distribution of finds represent areas of differing topography in England and Wales. Whilst topography certainly has an effect on metal detecting and, therefore, PAS finds recording, it has also long been considered to have more broad reaching effects on the archaeology of Britain (see Chapter 4.4). Analysis of finds types across these zones will allow exploration of whether these topographic areas also have differing finds assemblages.

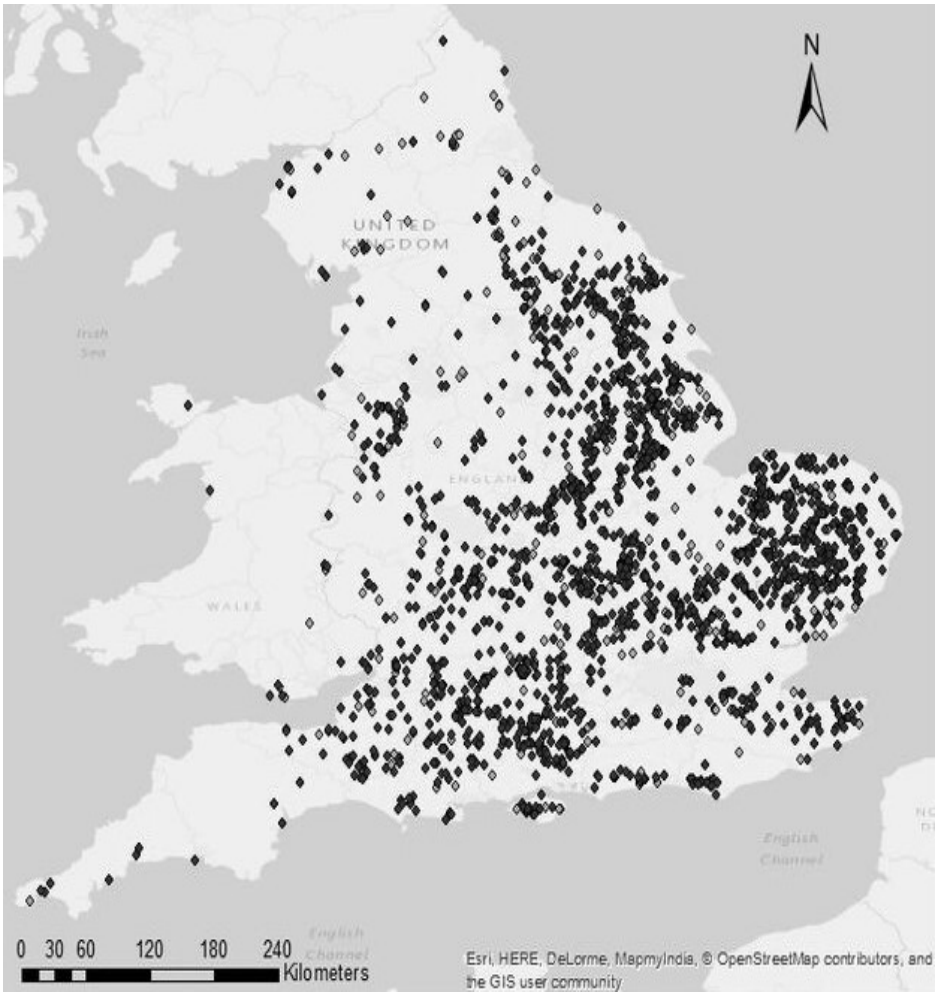


Figure 6.1 Distribution map of Roman Personal Adornment finds. Map produced using ArcMap with data from the PAS.

The data were analysed from both the PAS defined Roman and Early Medieval periods as a whole and, more specifically, the case study period of the fourth to the sixth centuries. This is for two main reasons. Firstly, it maximised the number of artefacts used in the study. Only 34% of the Early Medieval data is from the period of the fourth to the sixth centuries. Secondly, it allowed analysis of deviation from overall trends for the broader period. This is a technique used in the previous chapter and by the VASLE project in order to compare overall trends with period-specific data. Deviations from overall trends are deemed more likely to represent historical deposition as opposed to modern recovery and reporting trends. The same applies here with fourth to sixth century deviation from the trends of the broader period. To some extent analysis of the broader range of Roman and Early Medieval finds helps to eliminate the gap between this research and that of the VASLE project. By looking at the bigger picture, this research can assess the possible contribution of PAS data to research across the Roman and Early Medieval periods. In this way, the research complements recent studies into how the PAS should be approached (Robbins 2013a, 2013b, 2014) and portable antiquities in Roman Britain (Brindle 2013, 2014). Thus, rather than producing a framework for studying the distribution of PAS finds, this section of the study aims to assess periodisation of the PAS database and the implications of the dating of the finds on research into the area. It will also look more closely at the specific object types found in the Roman and Early Medieval periods, how these data may reflect cultural identity and especially comparisons of the PAS assemblage from the east and west.

The finds from the PAS periods Roman (AD 43-410) and Early Medieval (AD 410-1066) will be analysed separately in order to determine if there is any significant change at the proposed end of the Roman period. By reducing the number of finds in the dataset, it was possible to further clean the data by type of find. The total number of finds (523,896) would be too great to clean the data in this way for every find with the time and resources available to this research. These finds still

represent a broad period of time, from AD 43-1066. The finds were then filtered further to finds from the fourth to the sixth century.

The Roman data have 211,446 finds with both a 'from' and 'to' date recorded and the Early Medieval have 18,614. These represent 95.27% and 92.64% of the total number of finds for each period respectively. This may seem like a high proportion of finds are more specifically dateable but it must be taken into account that many finds have a large date range. For example, an Early Medieval vessel (ID 392244) is recorded as having a broad and incorrect date of 700 BC-AD 200 and a Roman Architectural Element (ID 214978) with a date of AD 100 - 410. Others narrow the date down no more than the broad period. In the Roman finds, 12,080 (5.44%) have a date range of AD 43-410. Of the Early Medieval finds, 4377 (1.88%) have a date range of AD 410-1066.

As with the find location, it is important to clean the data in terms of object type, particularly when studying what artefact types are found across the Roman to Early Medieval periods. The data were cleaned to ensure that object terminology was consistent across the database. The nature of the PAS database means that it comprises data from a number of different areas and FLOs. This means that terminology may not always be used in a consistent fashion. Data were also checked for accuracy. In order to achieve accuracy and consistency the PAS (2013e) 'Preferred Terminologies' were used as a guide. There were no finds in the database which did not have an object type recorded. However, the data still required cleaning to ensure that all terminology was consistent. This was carried out according to the methodology outlined in Chapter Three. Figures 6.2 and 6.3 show the density of finds in each county in the Roman and Early Medieval periods. The concentration of Roman finds is mainly in the south and east (Figure 6.2) as identified by Richards *et al* (2009). Despite this, the GIS plot of all Roman finds (Figure 4.21) shows that there are a number of finds in the Midland Gap, with overall distribution closely matching that of the entire dataset. The reason for this disparity between

the two visualisations of the data may be the smaller number of finds overall but with a high number of finds in certain categories. This can skew the plotting of the data by county on to a map where, instead of a continuum, finds can only be shown according to which division they belong. Furthermore, many of the counties in the area of the Midland Gap are largely urban. Finds are clearly being reported here and these are likely to be from outside the main urban centres. However, when averaged out over the county, other areas of low numbers of finds make it appear as if there are very few finds overall. Perhaps more useful are the maps of the proportion of Roman and Early Medieval (PAS periods) finds in each county as a percentage of the whole assemblage (Figure 6.4 and Figure 6.5). These depict the data in a way that can, to an extent, overcome the biases in finds distribution by showing which areas have the highest proportion of Roman or Early Medieval finds.

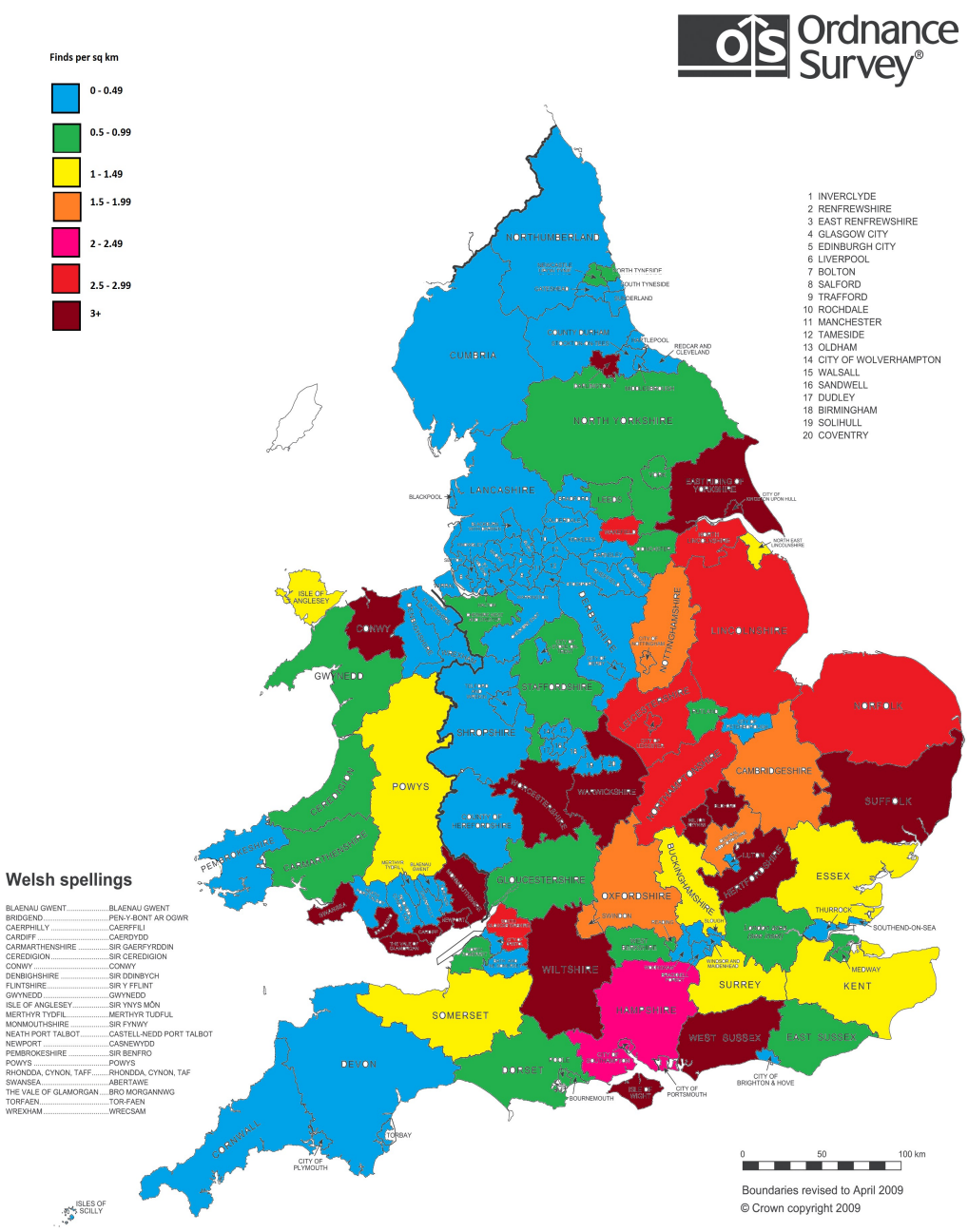


Figure 6.2 The density of Roman (AD 43-410) finds in each county. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

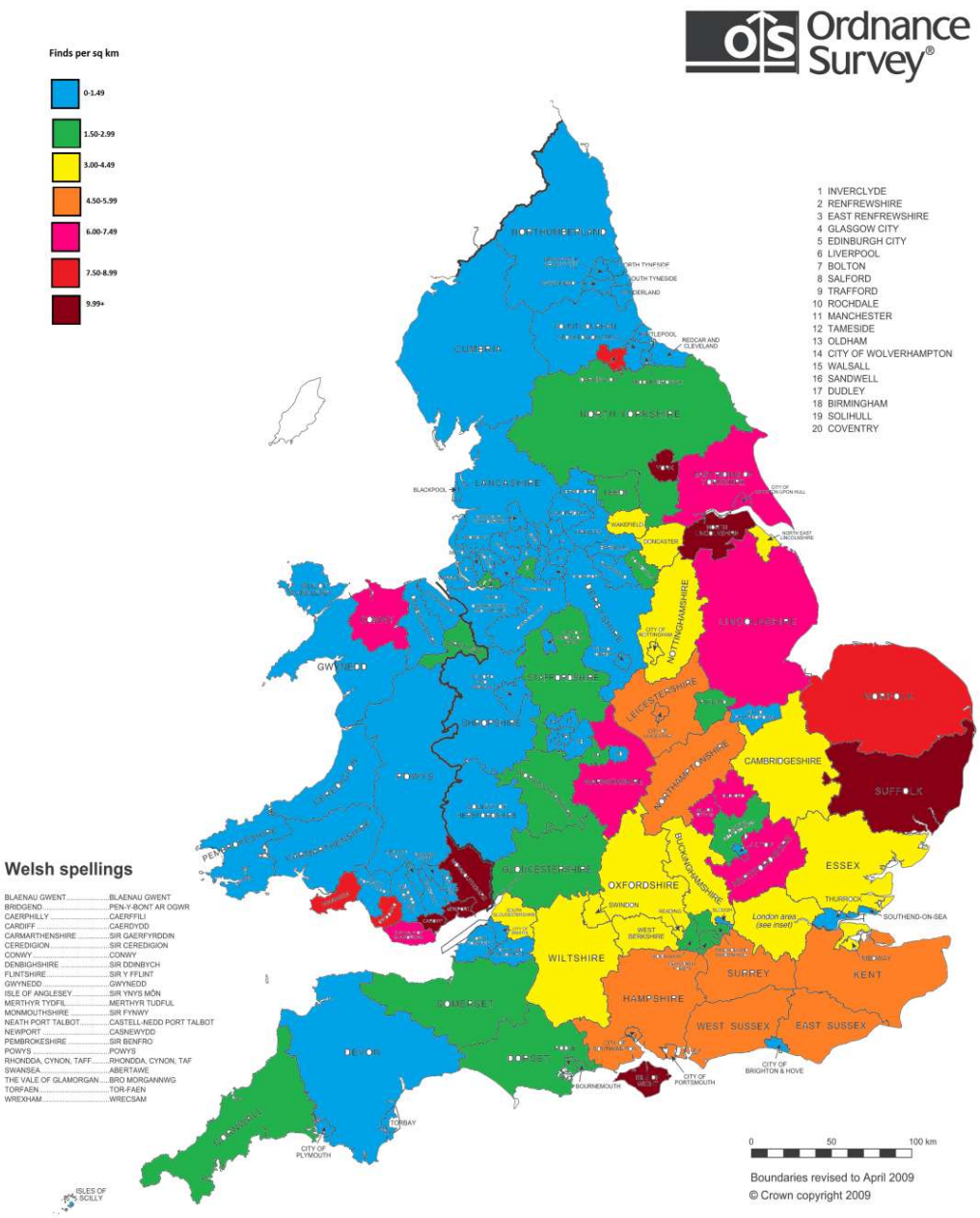


Figure 6.3 The density of Early Medieval (AD 410-1066) finds in each county. Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

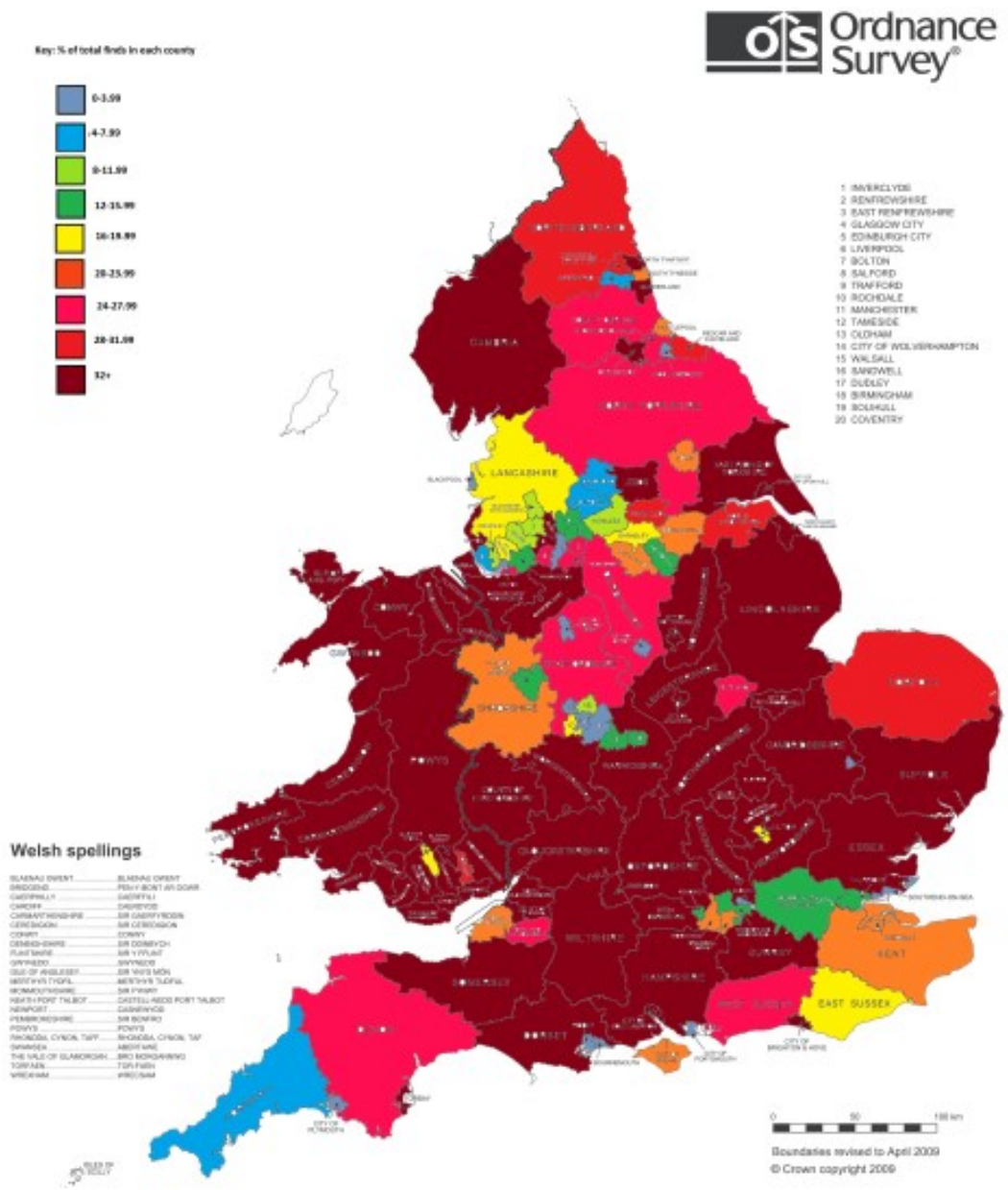


Figure 6.4 The percentage of finds in each county which are Roman (AD 43-410). Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

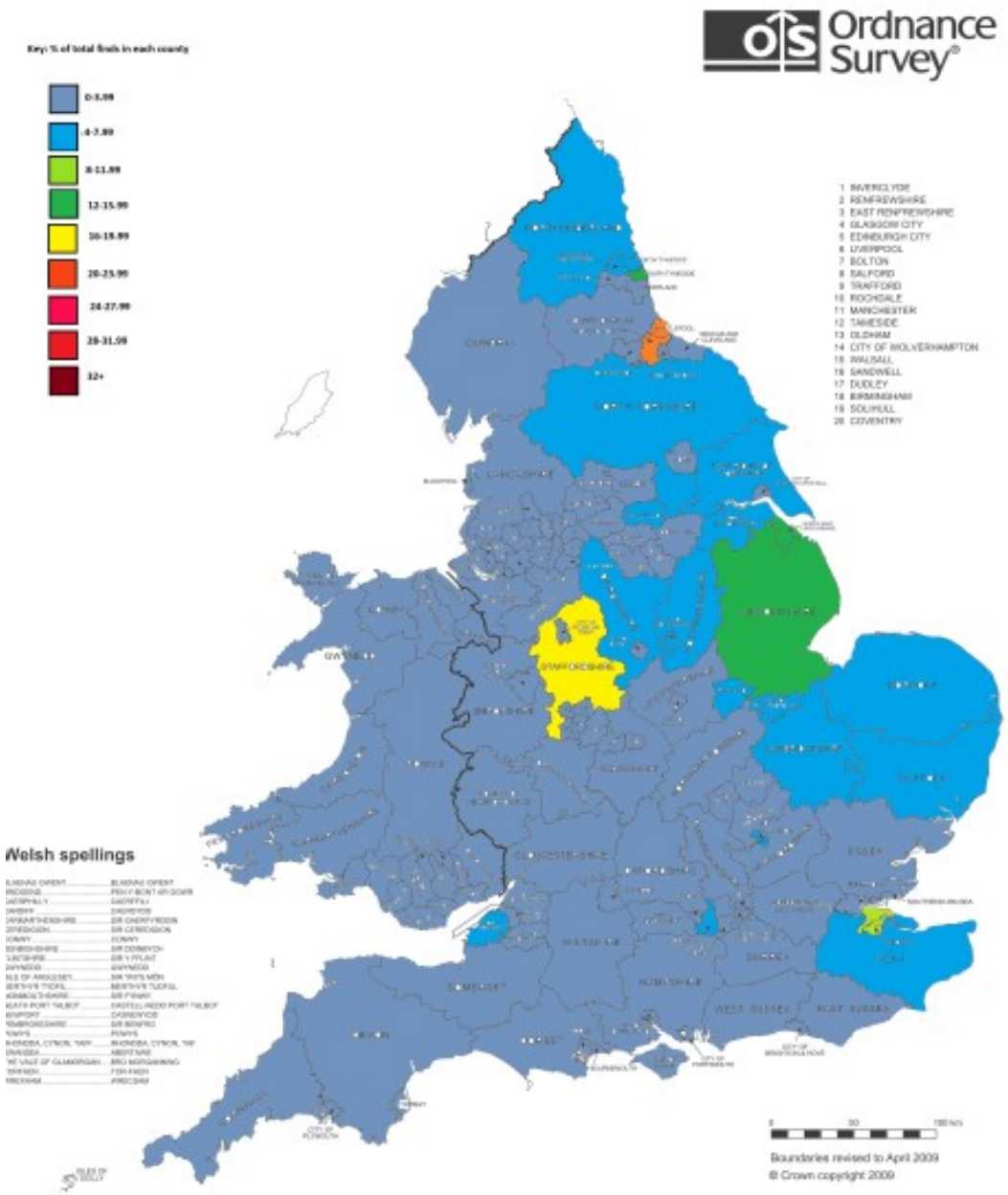


Figure 6.5 The percentage of finds in each county which are Early Medieval (AD 410-1066). Map produced using data from the PAS and a base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

6.2 Roman (AD 43-410) and Early Medieval (AD 410-1066)

Once the data had been cleaned it could be divided by both PAS period and object type. This made it possible to determine which classes of finds contribute the most to the overall finds assemblage and also what types of PAS finds appear to be diagnostically Roman or Early Medieval.

The object types were grouped together into categories. These categories largely follow the division of small finds made by Allason-Jones in *Artefacts in Roman Britain: Their Purpose and Use* (2011). These are:

- Commerce or coins
- Weaponry and military equipment
- Writing and communication
- Domestic
- Heating and lighting
- Personal ornament
- Recreation
- Medicine and hygiene
- Religion
- Funerary contexts

However, it was decided to keep brooches and personal ornament separate. This is for two main reasons. Firstly, brooches, while also having aesthetic value, have a functional use whereas other items of personal adornment, such as bracelets and finger rings, were used for purely aesthetic reasons. Also, as explained in Chapter Four, brooches are an important resource when looking at

personal adornment and potential implications for identity and ethnicity. For this reason, it is helpful for analysis to have them in a separate category.

Additional categories have also been added to those used by Allason-Jones. These are:

- Dress and Accessories: This is to separate functional dress items, such as clothing fasteners, from purely decorative items of personal adornment. There are artefacts which can cross over categories. For instance, buckles, whilst being functional items, are also often decorated and used as personal adornment. For this analysis the buckles were included in Dress and Accessories as not all buckles are highly decorative. It may be possible to look beyond the PAS's preferred terms for artefacts into narrower categories of finds.

- Horse equipment: Horse equipment is discussed by contributors to Allason-Jones's (2011) work under both military and transport categories. It is impossible to distinguish between the two on the basis of artefact type alone and so a new category has been created for this.

- Building material: In order to distinguish structural material from that used in a domestic setting such as vessels and food preparation equipment.

- Locks: This is another type of find which can cross over multiple categories. Locks may be for small, portable objects used in a domestic setting or part of the building structure itself. In the case of the latter, these may not always be domestic and so a new category has been created.

- Unknown/miscellaneous.

Button-and-loop fasteners were included in the Horse Equipment category on the basis of Wild's (1970) assessment of their function. Seal boxes have been included in Unknown/Miscellaneous rather than Writing and Communication based on the assessment by Andrews (2012). The fact that dating of PAS finds is largely based on typology means that dating artefacts necessarily involves discussion of date of manufacture rather than deposition. This affects the classification of objects which have had a change in use. Pierced coins are usually classed as coins and dated to the Roman period. For example, the coin in Figure 6.6 is classified by the PAS as a Roman coin despite being pierced, possibly in the Anglo-Saxon period (Minter 2007). The full list of PAS preferred terms and their definitions can be found on the PAS website (Portable Antiquities Scheme 2013b).

Figure 6.6 Pierced copper-alloy Roman nummus or radiate coin. Source: Minter (2007).

6.2.1 Makeup of the assemblages

The PAS periods which include artefacts from the date range of AD 43-1066 are:

- Greek and Roman Provincial: 700 BC-AD 297
- Roman: AD 43-410
- Byzantine: AD 491-297
- Early Medieval: AD 410-1066

The PAS controlled terminologies (2013) have separate categories for periods and ascribed cultures. However, the division between Roman and Greek and Roman Provincial, and Early Medieval and Byzantine must be cultural to some extent as the dates overlap.

The Greek and Roman Provincial coins are Roman coins struck outside *Britannia*. These may be finds from outside the Romano-British period. The remaining artefact types defined as being Greek and Roman Provincial are a coin weight, finger ring, metal working debris and an intaglio. Similarly, the Byzantine coins are also those which were manufactured outside *Britannia*, those coins minted in the Byzantine Empire after its formation in the fifth century.

The Greek and Roman Provincial and Byzantine periods have the fewest number of finds, with 204 and seventy two respectively. The Byzantine finds are all coins and the Greek and Roman Provincial are predominantly (99%) from this category. The fact that such a large number of the Greek and Roman Provincial and all the Byzantine finds are coins makes them of limited to no use to the research. It is not possible to analyse differences in artefact assemblages as they are almost entirely made up of finds from one category. For this reason, the Greek and Roman Provincial and Byzantine

data have been removed from the analysis. For example, statistical analysis was not possible to determine whether distributions were random as there were either no non-coin finds (Byzantine) or so few as to be meaningless (Greek and Roman Provincial). The graphs produced for these categories were not useful in the analysis of find types.

There are a range of object types found from the Roman (AD 43-410) and Early Medieval (AD 410-1066) periods (Table 6.1) in the cleaned database (Appendix Two).

Broad Category	**Roman**	**Early Medieval**
Coins	176581	2783
Travel and Transport	28	0
Industry and Tools	1159	320
Agriculture	112	4
Weaponry and Military Equipment	135	647
Horse Equipment	764	1891
Writing and Communication	159	47
Locks	550	75
Domestic	11181	877
Building Materials	739	4
Heating and Lighting	21	1
Personal Adornment	3788	559
Dress and Accessories	1440	4794
Brooches	18551	4294
Recreation	107	89
Cosmetic, Hygiene and Medical	1096	188
Religion or Ritual	85	30
Funerary Contexts	13	34
Unknown/Misc	5441	3455

Table 6.1 The number of Roman (AD 43-410) and Early Medieval (AD 410-1066) finds in each broad category of object types. Data from the PAS.

The Early Medieval period has fewer finds overall than the Roman period and also fewer different types of find (Table 6.1). Most notably, there are no Early Medieval Travel and Transport finds and only one Heating and Lighting find and only four finds in both the Agriculture and Building Materials categories.

In order to allow for better evaluation of the finds assemblages from each period, the percentage contribution of each broad object category was calculated (Figure 6.7 to Figure 6.8). Using the percentage contribution of each category to the overall assemblage allows comparison between the periods without the biasing factor of the much smaller Early Medieval assemblage compared to that of the Roman period. The graphs show that the Roman finds are dominated by coins (80%) (Figure 6.13), whereas the Early Medieval assemblage has a more even spread across the categories, with coins making up only 14% (Figure 6.15).

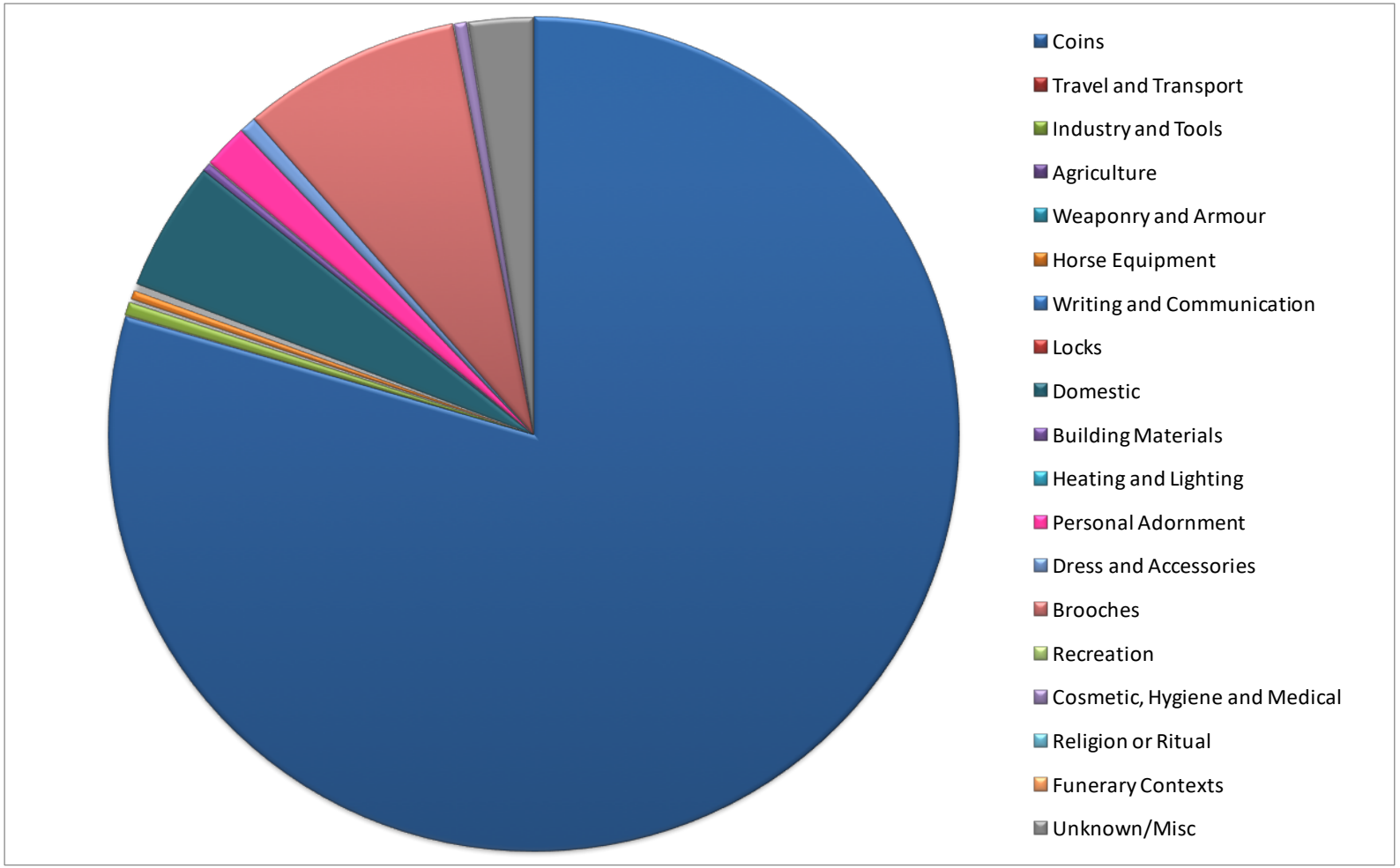


Figure 6.7 The Roman (AD 43-410) assemblage. Graph produced using data from the PAS.

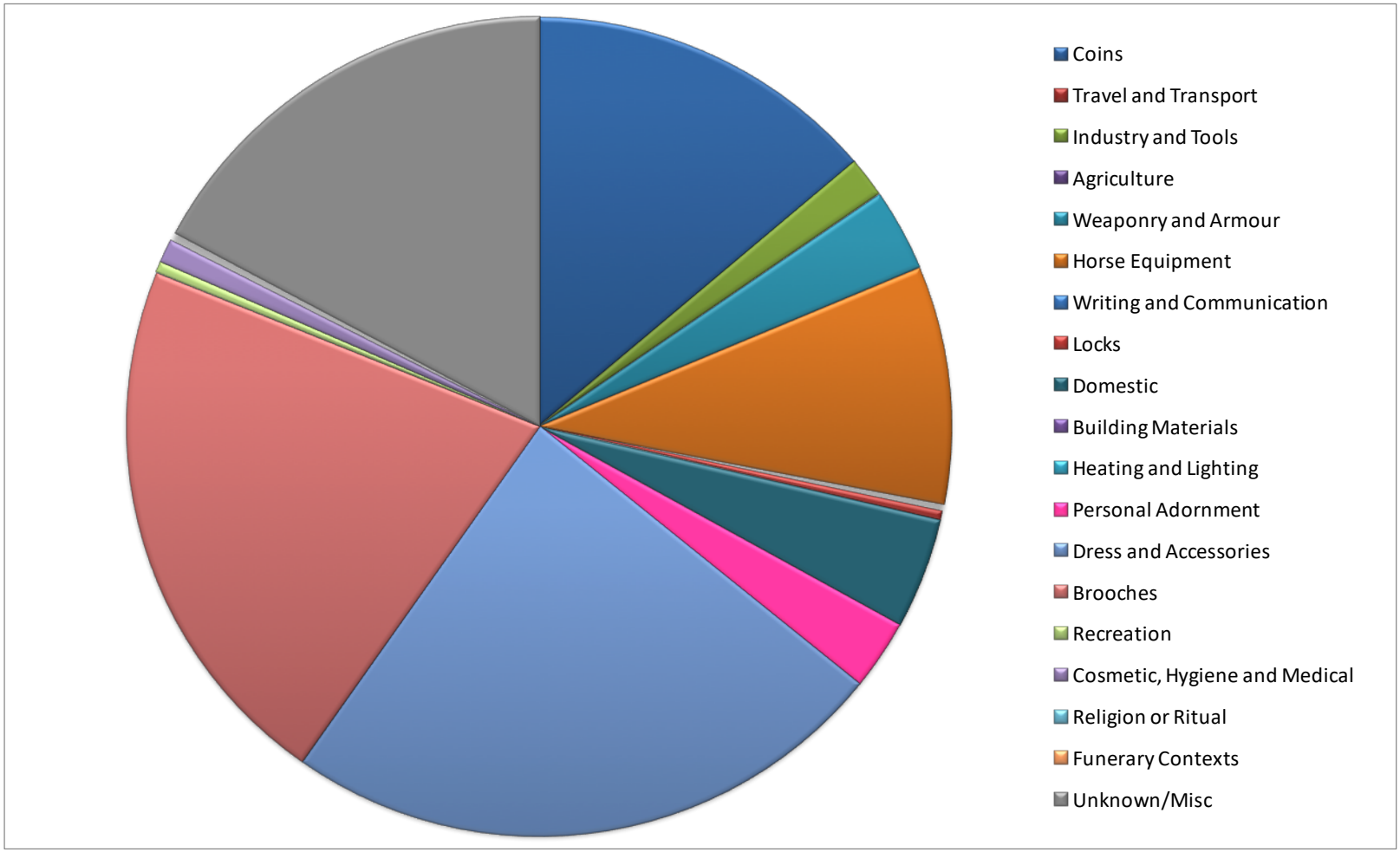


Figure 6.8 The Early Medieval (AD 410-1066) assemblage. Graph produced using data from the PAS.

The fact that such a large number of the Roman finds are coins makes it difficult for the graphs to show the proportions of other categories in a way that is visible and clear. In order to attempt to visualise the data in such a way that the relative contributions of each category are discernible, Figure 6.9 to Figure 6.10 show the data with the Coins finds removed. Unknown/Miscellaneous finds have also been removed as these are less useful in determining what the characteristic makeup of the Roman and Early Medieval PAS finds might be and which object types are diagnostically Roman or Early Medieval.

The Roman finds are dominated by Brooches (46%), followed by Domestic (28%) with a relatively small proportion of Dress and Accessories (4%) (Figure 6.16). The Early Medieval finds still have a large number of Brooches (31%) but also Dress and Accessories make up a much higher proportion of the total finds (35%). Domestic finds are reduced to only 6% of the assemblage (Figure 6.10). More generally, excavated evidence for Roman Britain tends to be settlement evidence (Lucy 1998: 2), whereas for the Early Medieval period it is funerary contexts (Lucy 2000: 1). This means that in the south and east, considered to be culturally Anglo-Saxon areas, an abundance of productive grave sites and dispersed cemeteries leads to greater volume of dress accessories originally deposited as grave goods. Conversely, in the late Roman period, burials were mainly unfurnished (Lucy and Reynolds 2002: 1-8). The data, therefore, demonstrate the differences in display of identity through material culture. The importance of funerary display in the formation and display of identity has been discussed in Chapter 4.3. In the Early Medieval period, the predominant finds are those of personal adornment that may have been used to express an Anglo-Saxon identity through mortuary practice. This did not occur in the Roman period or in areas of England and Wales that appeared to remain largely Roman in terms of culture and identity into the immediate post-Roman period.

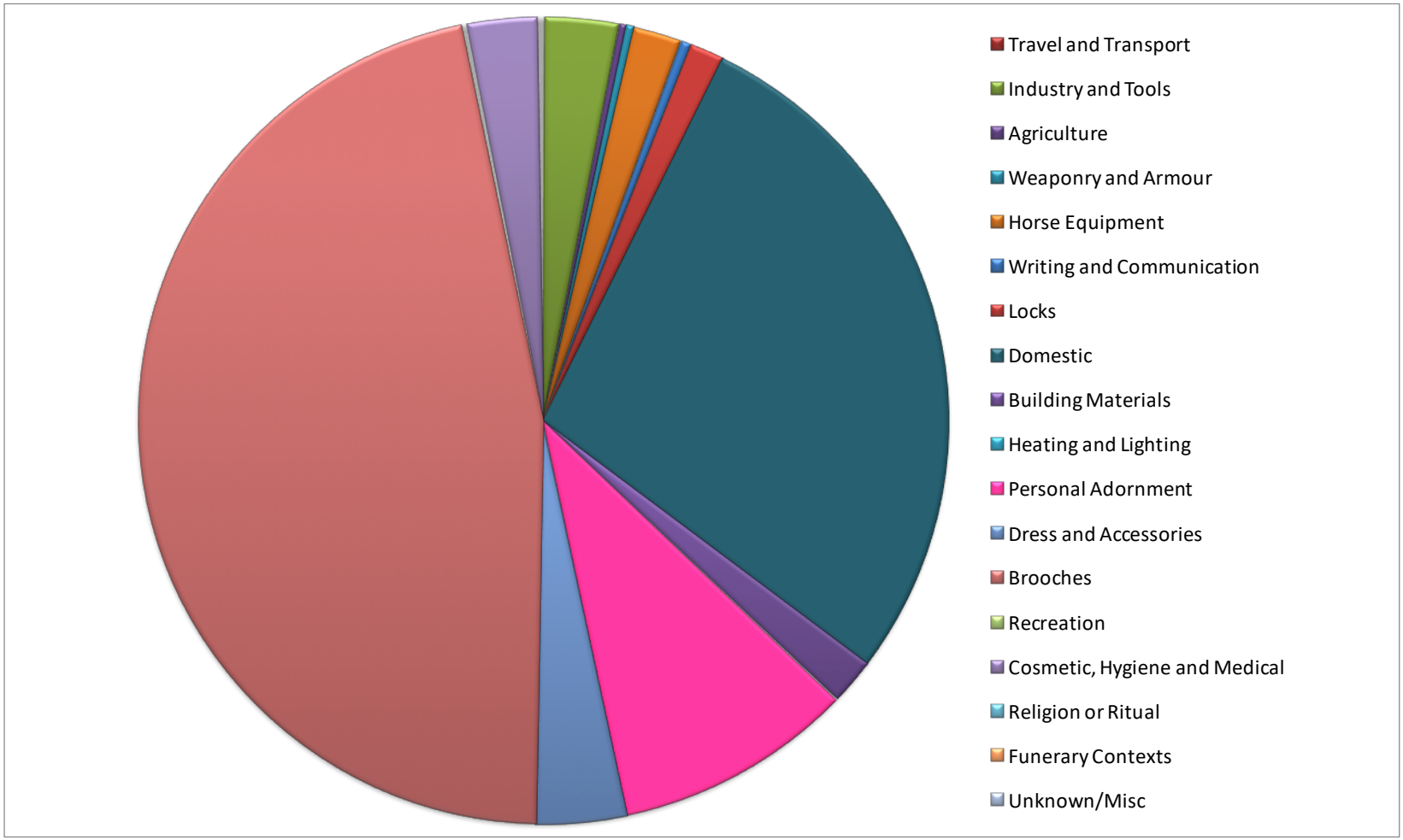


Figure 6.9 The Roman (AD 43-410) assemblage with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

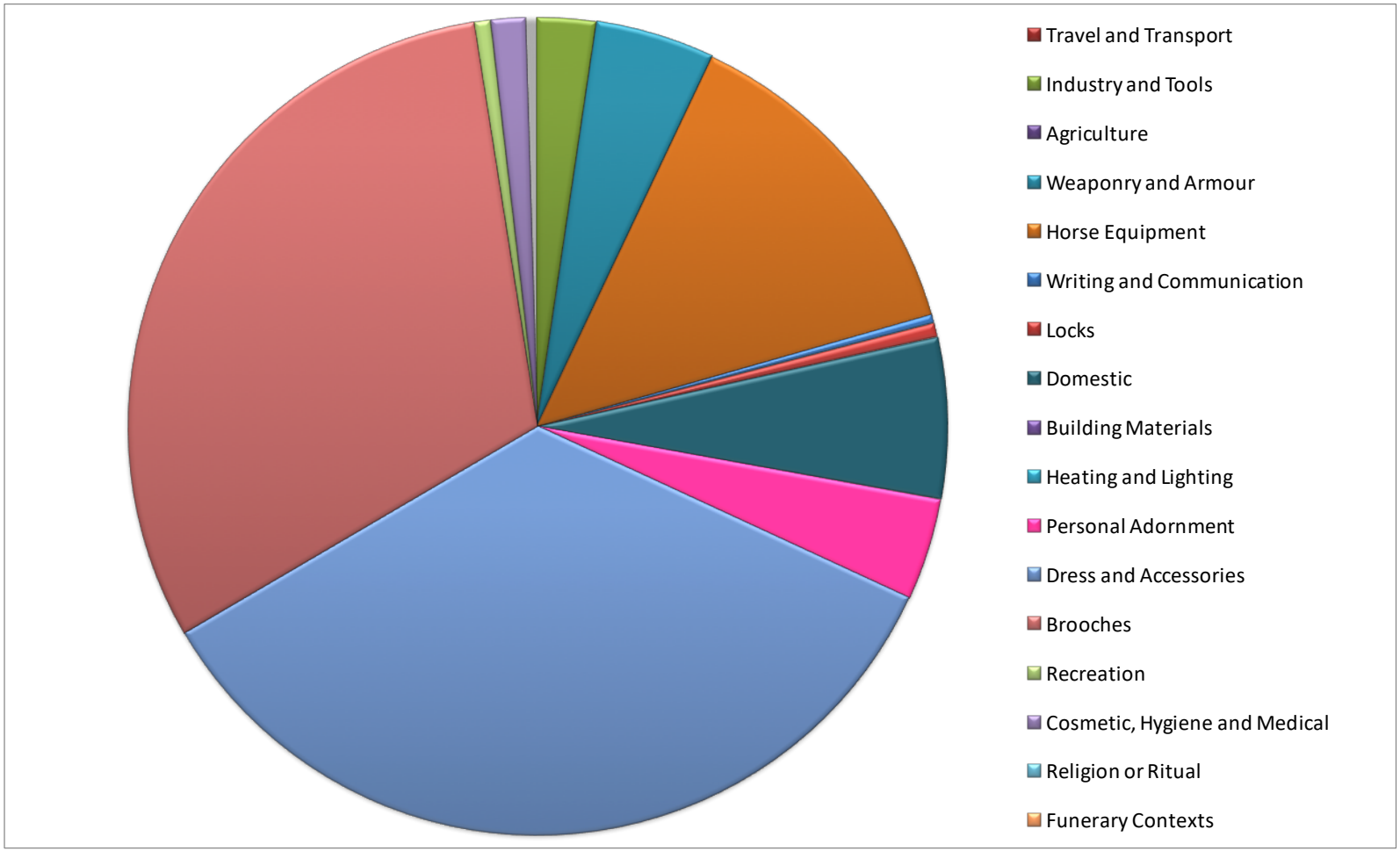


Figure 6.10 The Early Medieval (AD 410-1066) assemblage with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Chi-squared tests were carried out on the data to determine whether the distribution of finds categories across the four periods was statistically significant (Table 6.2 and Table 6.3). In each case, the null hypothesis is that there is no significant difference in the numbers of finds across the broad object categories. For all finds, P-values are all approximately zero and so the null hypothesis can be rejected. The distribution is significantly different from random distribution. For the data which have the coins deleted, the P-values for the Roman and Early Medieval assemblages are zero and so the null hypothesis can be rejected.

Period	P-value – all finds	P-value – excluding Coins and Unknown/Miscellaneous
Roman	0.00	0.00
Early Medieval	0.00	0.00

Table 6.2 Chi-squared tests for data across the broad object categories both with and without Coins and Unknown/Miscellaneous finds. Data from the PAS.

Table 6.3 shows the Chi-squared test results for each broad object category between the Roman and Early Medieval finds. These tests were carried out using the actual number of finds in each period as the actual distribution and the average number of finds as the expected distribution (random distribution would result in an equal number of finds in each of the two periods). The percentages represent the percentage of all finds in the broad object category which belong to each period. There is a statistically significant difference in all categories except for Recreation and Religion or Ritual. The majority of categories have a higher percentage of finds in the Roman period. However, the following categories stand out as having a statistically significant higher percentage of Early Medieval finds:

- Weaponry and Military Equipment
- Horse Equipment
- Dress and Accessories

- Funerary Contexts

Broad Object Category	% Roman	% Early Medieval	P-value
Coins	98.44	1.55	0.00
Travel and Transport	100	0.00	1.213E-07
Industry and Tools	78.36	21.64	0.00
Agriculture	96.55	3.45	1.153E-23
Weaponry and Military Equipment	17.26	82.74	0.00
Horse Equipment	28.78	71.22	0.00
Writing and Communication	77.18	22.82	0.00
Locks	88.00	12.00	0.00
Domestic	92.73	7.27	0.00
Building Materials	99.46	0.54	3.85E-160
Heating and Lighting	95.45	4.55	0.00
Personal Adornment	87.14	12.86	0.00
Dress and Accessories	23.10	76.90	0.00
Brooches	81.20	18.80	0.00
Recreation	54.59	45.41	0.1985429
Cosmetic, Hygiene and Medical	85.36	14.64	0.00
Religion or Ritual	73.91	26.09	0.06
Funerary Contexts	27.66	72.34	0.02
Unknown/Misc	61.16	38.84	0.00

Table 6.3 Chi-squared test for finds in each broad object category in the Roman and Early Medieval period. Calculated according to the proportion of Roman and Early Medieval finds in each broad object category. Categories with a statistically significant higher percentage of Roman finds are shaded in purple and categories with a statistically significant higher percentage of Early Medieval finds are shaded in green. Data from the PAS.

6.2.2 Highland and Lowland zones

The number of finds per category in the Highland and Lowland Zones in each period is shown in

Table 6.4. This is then visualised in the pie charts in Figure 6.11 to Figure 6.12.

Broad Category	Roman Highland	Roman Lowland	Early Medieval Highland	Early Medieval Lowland
Coins	55164	120836	81	2687
Travel and Transport	1	27	0	0
Industry and Tools	217	937	9	309
Agriculture	20	92	0	4
Weaponry and Military Equipment	27	108	19	622
Horse Equipment	71	688	50	1834
Writing and Communication	23	134	2	44
Locks	19	528	3	72
Domestic	990	10133	28	847
Building Materials	59	679	0	4
Heating and Lighting	3	18	0	1
Personal Adornment	153	3610	22	528
Dress and Accessories	59	1371	108	4653
Brooches	907	17552	67	4210
Recreation	12	93	6	83
Cosmetic, Hygiene and Medical	31	1061	0	187
Religion or Ritual	7	78	1	29
Funerary	9	5	0	34
Unknown/Misc	378	5048	89	3351

Table 6.4 The number of finds per broad category in the Highland and Lowland Zones in the Roman, Greek and Roman Provincial, Early Medieval and Byzantine periods. Data from the PAS.

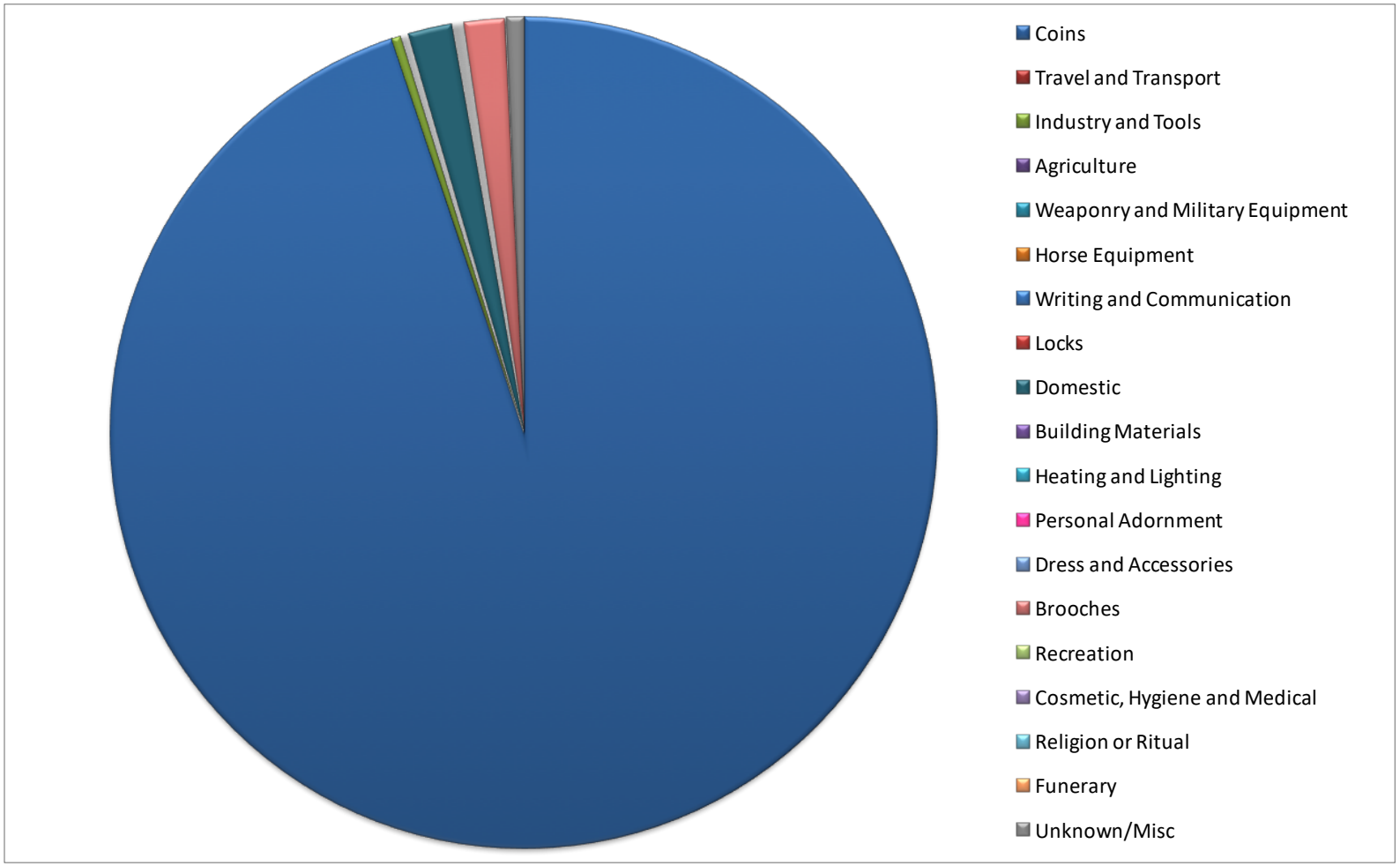


Figure 6.11 The Roman (AD 43-410) assemblage in the Highland Zone. Graph produced using data from the PAS.

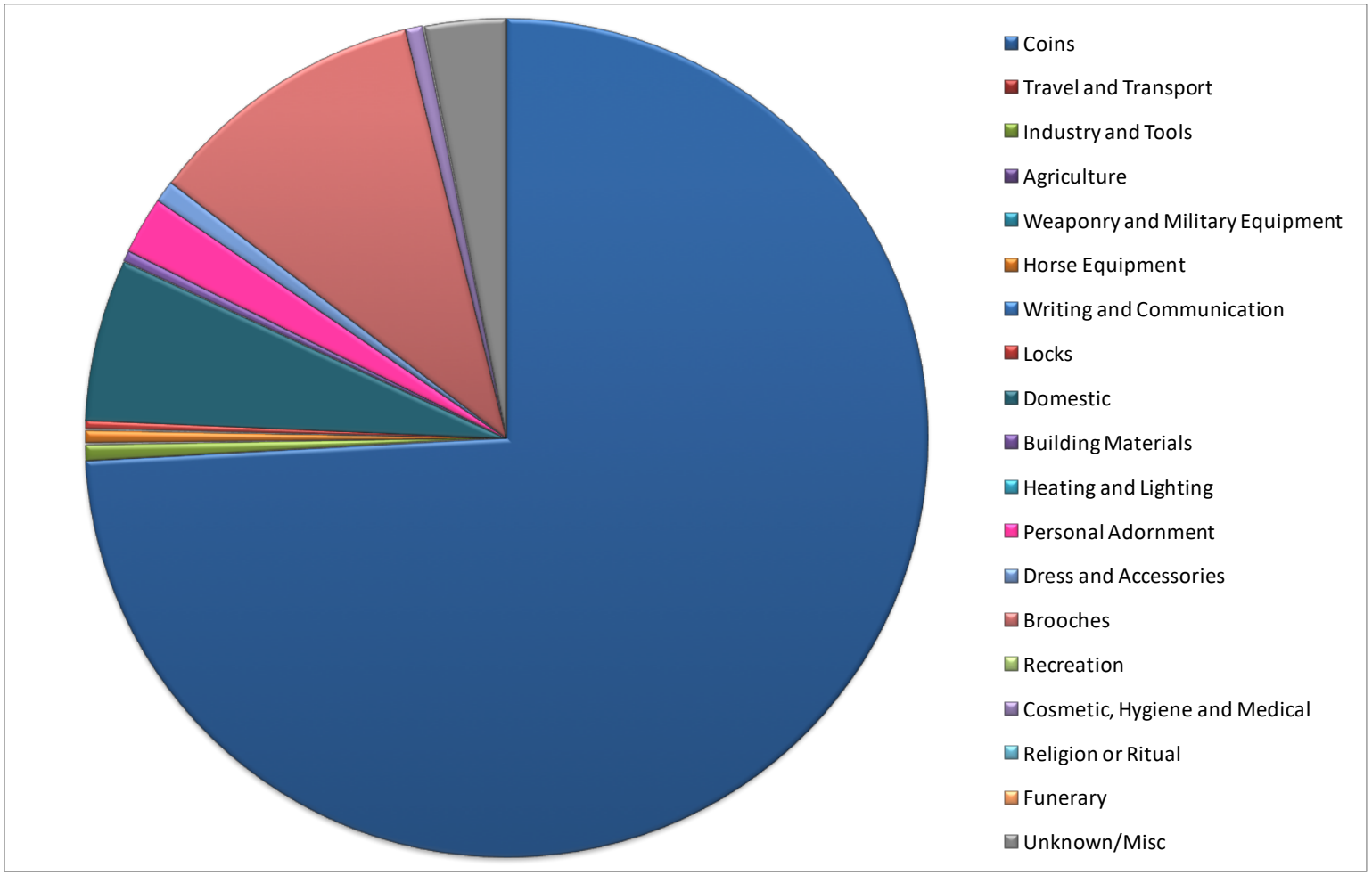


Figure 6.12 The Roman (AD 43-410) assemblage in the Lowland Zone. Graph produced using data from the PAS.

Of the two assemblages, the Lowland Zone (Figure 6.12) most closely resembles the overall assemblage (Figure 6.7). The Highland Zone (Figure 6.11) differs, having a higher proportion of Coins finds and lesser contributions from other broad object categories. Chi-squared tests have been carried out on the nineteen broad object categories to determine whether any differences in the makeup of the Highland and Lowland Zones assemblages is random or statistically significant. The example of Coins finds has been used to demonstrate how the Chi-squared tests were carried out. There are 55,164 Roman Coins finds out of a total of 58,150 Roman finds in the Highland Zone and 120,836 out of a total 162,998 in the Lowland zone. In order to calculate the expected distribution of Coins finds, these two assemblages have been combined to give a total of 176,000 Coins finds out of 221,148 (79.58%). Therefore, if there were no difference between the two zones, we would expect 79.58% of the total Roman finds in each zone to be Coins.

1. Expected distribution: Highland Zone

   = (58150/100)x79.58

   =46278.51

2. Expected distribution: Lowland Zone

   =(162998/100)x79.58

   =129721.49

It is important to note that, whilst the percentage contributions shown in Table 6.5 are low, the actual expected value is greater than five. This is the value usually stated to be that above which a Chi-squared test will be accurate (Bendixen 1996: 2; Shennan 1997: 69). The P-value produced using the Chi-squared test uses the number of finds expected in each zone. This demonstrates whether there is a statistically significant difference between the two areas. Percentages have been used rather than total finds numbers to determine in which zone each object category has the greatest contribution. For example, the Industry and Tools finds have very low percentage contributions in

both the Highland Zone and the Lowland Zone. Using the above method, the number of finds in each zone if the percentage contributions were equal was calculated. Therefore, the values used for the Chi-squared test were an actual distribution of 217 finds in the Highland Zone and 937 in the Lowland Zone and an expected distribution of 303.44 in the Highland Zone and 850.56 in the Lowland Zone.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Coins	94.8650	74.1334	0.00
Travel and Transport	0.0017	0.0166	0.01
Industry and Tools	0.3732	0.5749	0.00
Agriculture	0.0344	0.0564	0.09
Weaponry and Military Equipment	0.0464	0.079663	0.19
Horse Equipment	0.1221	0.4221	0.00
Writing and Communication	0.0396	0.0822	0.00
Locks	0.0327	0.3239	0.00
Domestic	1.7025	6.2166	0.00
Building Materials	0.1015	0.4166	0.00
Heating and Lighting	0.0052	0.0110	0.42
Personal Adornment	0.2631	2.2148	0.00
Dress and Accessories	0.1015	0.8411	0.00
Brooches	1.5598	10.7682	0.00
Recreation	0.0206	0.0571	0.00
Cosmetic, Hygiene and Medical	0.0533	0.6509	0.00
Religion or Ritual	0.0120	0.0479	0.00
Funerary	0.0155	0.0031	0.00
Unknown/Misc	0.6500	3.0970	0.00

Table 6.5 Chi-squared tests for percentage contribution of each broad category to the overall Roman (AD 43-410) assemblage in the Highland and Lowland Zones. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

There is a higher percentage of Coins finds in the Highland Zone (94.87%) than the Lowland Zone (74.10%) (Table 6.5). The Chi-squared test provides a P-value of zero, meaning that the null hypothesis can be rejected and the alternative hypothesis, that there is a significant difference in the

proportion of Coins finds between the two zones, can be accepted. It is important to be wary when using percentages and to not necessarily take them at face value. The a higher percentage of Coins finds in the Highland Zone does not necessarily mean that there are more Coins finds here than in the Lowland Zone. The data in Table 6.4 suggest that the reason for the higher contribution of Coins finds to the Roman Highland Zone assemblage is due to fewer finds in other broad categories rather than relatively more Coins finds.

Table 6.6 assesses the data in terms of density of finds in order to try and clarify this issue. The Chi-squared tests are carried out in the same way as those above, with the expected distribution calculated by dividing the finds amongst the two zones according to the percentage of the total surface area.

Looking at the Coins data, Table 6.6 demonstrates that, despite the lower percentage, there are more finds per square kilometre in the Lowland Zone (1.32) than the Highland Zone (0.88). The P-value is zero and, therefore, we can reject the null hypothesis and state that this difference in finds distribution is statistically significant.

Domestic is the only broad object category which had a higher density in the Highland Zone than the Lowland Zone. The majority of categories have both a higher percentage and a higher density of finds in the Lowland Zone. These results confirm that the higher percentage of Coins finds in the Highland Zone is largely down to fewer finds in other categories rather than more coins.

Broad Category	Finds per km^2 Highland Zone	Finds per km^2 Lowland Zone	P-value
Coins	0.8837	1.32	0
Travel and Transport	0	0.0003	0.0001
Industry and Tools	0.0035	0.0102	0
Agriculture	0.0003	0.001	0
Weaponry and Military Equipment	0.0004	0.0012	0
Horse Equipment	0.0011	0.0075	0
Writing and Communication	0.0004	0.0015	0
Locks	0.0003	0.0058	0
Domestic	0.1623	0.0058	0
Building Materials	0.0009	0.0076	0
Heating and Lighting	0	0.0002	0.0143
Personal Adornment	0.0025	0.0025	0.0394
Dress and Accessories	0.0009	0.015	0
Brooches	0.0145	0.1917	0
Recreation	0.0002	0.001	0
Cosmetic, Hygiene and Medical	0.0005	0.0116	0
Religion or Ritual	0.0001	0.0009	0
Funerary	0.0001	0.0001	0.0704
Unknown/Misc	0.0061	0.0551	0

Table 6.6 Chi-squared tests for Roman (AD 43-410) finds density in the Highland and Lowland Zones. Broad object categories with a statistically significant higher number of finds per square kilometre in the Lowland Zone are shaded in red and those with a statistically significant higher number of finds per square kilometre in the Highland Zone are shaded in blue. Data from the PAS.

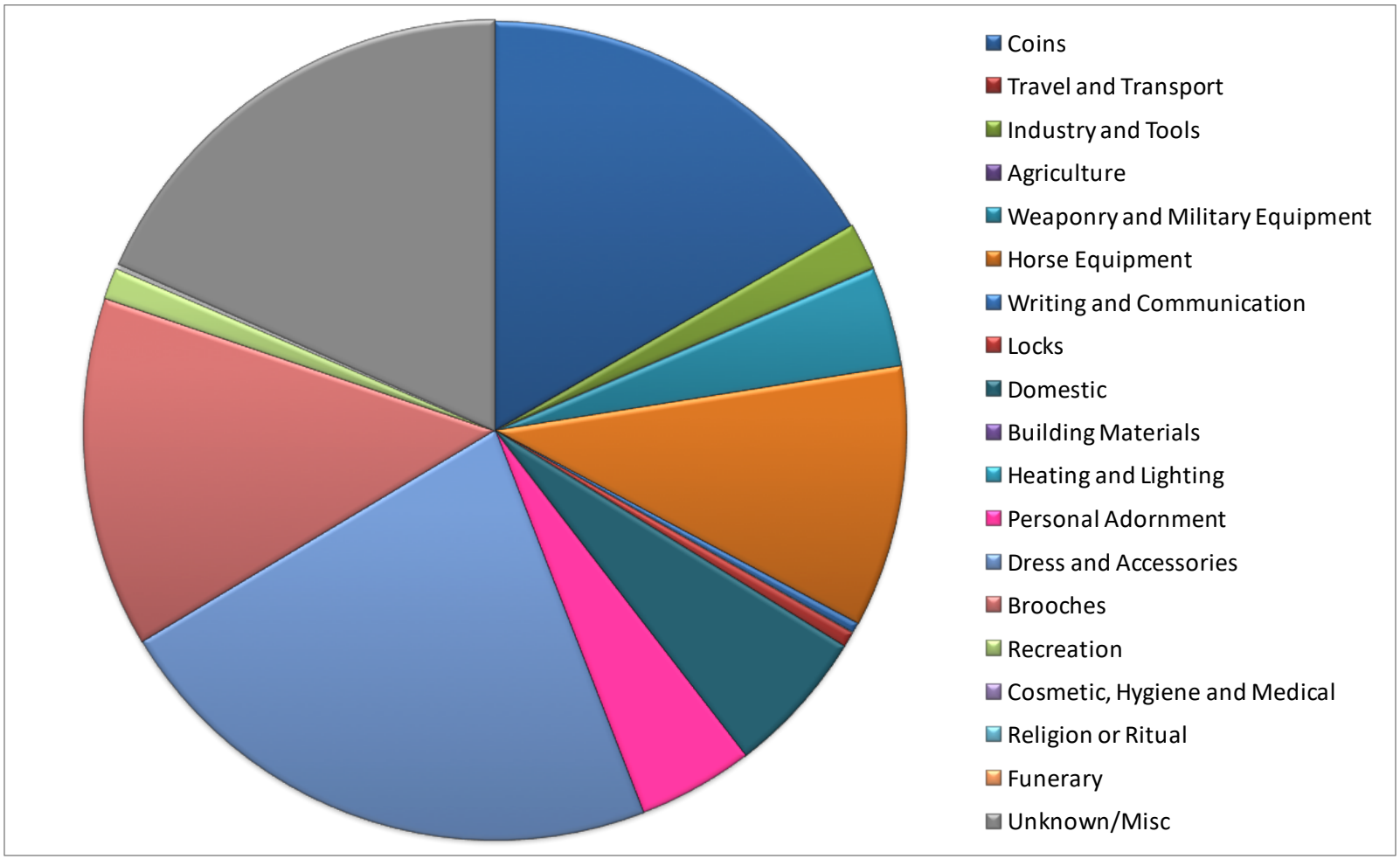


Figure 6.13 The Early Medieval (AD 410-1066) assemblage in the Highland Zone. Graph produced using data from the PAS.

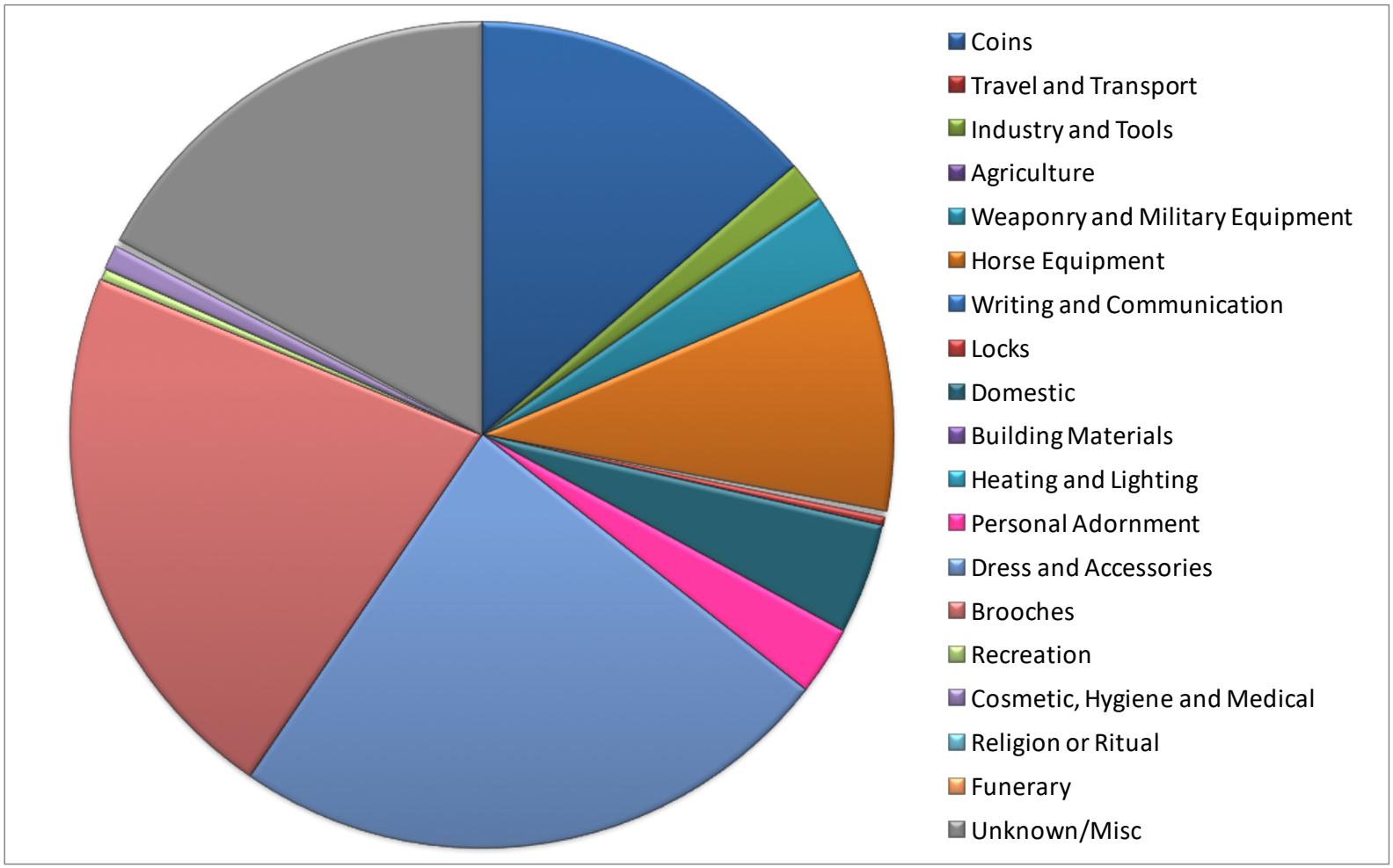


Figure 6.14 The Early Medieval (AD 410-1066) assemblage in the Lowland Zone. Graph produced using data from the PAS.

In contrast to the Roman finds, the Early Medieval finds show a much more similar distribution in both zones (Figure 6.13 and Figure 6.14). Both have the largest proportions of finds in the following object types:

- Coins (Highland 17%, Lowland 14%)
- Unknown/misc (Highland 18%, Lowland 17%)
- Dress and Accessories (Highland 22%, Lowland 24%)
- Brooches (Highland 14%, Lowland 22%)

Of these broad object types, that with the largest difference between the Highland and Lowland Zones is Brooches, which contribute a higher percentage to the Lowland Zone assemblage. Chi-squared tests were carried out (Table 6.7) in the same way as for the Roman finds above, with the same null hypothesis.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Coins	16.7010	13.7802	0.09
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	1.8557	1.5847	0.64
Agriculture	0.0000	0.0205	0.75
Weaponry and Military Equipment	3.9175	3.2155	0.75
Horse Equipment	10.3093	9.4056	1.04
Writing and Communication	0.4124	0.2257	0.79
Locks	0.6186	0.3692	0.75
Domestic	5.7732	4.3541	0.27
Building Materials	0.0000	0.0205	1.50
Heating and Lighting	0.0000	0.0051	1.75
Personal Adornment	4.5361	2.7078	0.03
Dress and Accessories	22.2680	24.0012	0.95
Brooches	13.8144	21.6473	0.00
Recreation	1.2371	0.4257	0.02
Cosmetic, Hygiene and Medical	0.0000	0.9642	0.06
Religion or Ritual	0.2062	0.1487	1.49
Funerary	0.0000	0.1744	0.72
Unknown/Misc	18.3505	17.2214	1.08

Table 6.7 Chi-squared tests for percentage contribution of each broad category to the overall Early Medieval (AD 410-1066) assemblage in the Highland and Lowland Zones. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

The results in Table 6.7 support the statement made above, that there is a similar distribution of broad object types between the Highland Zone and Lowland Zone. The difference in the percentages of Brooches is statistically significant, with a higher percentage of Brooches in the Lowland Zone.

Table 6.8 shows the results of Chi-squared tests on each broad object category according to the density of finds in each zone. Unsurprisingly, there are more finds per square kilometre in the Lowland Zone in almost all cases.

Broad Category	Finds per km^2 Highland Zone	Finds per km^2 Lowland Zone	P-value
Coins	0.0013	0.0294	0.0000
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	0.0001	0.0034	0.0000
Agriculture	0.0000	0.0000	0.0986
Weaponry and Military Equipment	0.0003	0.0068	0.0000
Horse Equipment	0.0008	0.0200	0.0000
Writing and Communication	0.0000	0.0005	0.0000
Locks	0.0000	0.0008	0.0000
Domestic	0.0004	0.0093	0.0000
Building Materials	0.0000	0.0000	0.0986
Heating and Lighting	0.0000	0.0000	0.4089
Personal Adornment	0.0004	0.0058	0.0000
Dress and Accessories	0.0017	0.0508	0.0000
Brooches	0.0011	0.0460	0.0000
Recreation	0.0001	0.0009	0.0000
Cosmetic, Hygiene and Medical	0.0000	0.0020	0.0000
Religion or Ritual	0.0000	0.0003	0.0000
Funerary	0.0000	0.0004	0.0000
Unknown/Misc	0.0014	0.0366	0.0000

Table 6.8 Chi-squared tests for Early Medieval (AD 410-1066) finds per square kilometre in the Highland and Lowland Zones. Broad object categories with a statistically significant higher number of finds per square kilometre in the Lowland Zone are shaded in red and those with a statistically significant higher number of finds per square kilometre in the Highland Zone are shaded in blue. Data from the PAS.

The graphs have also been produced with the Coins and Unknown/Miscellaneous finds excluded (Figure 6.15-Figure 6.18).

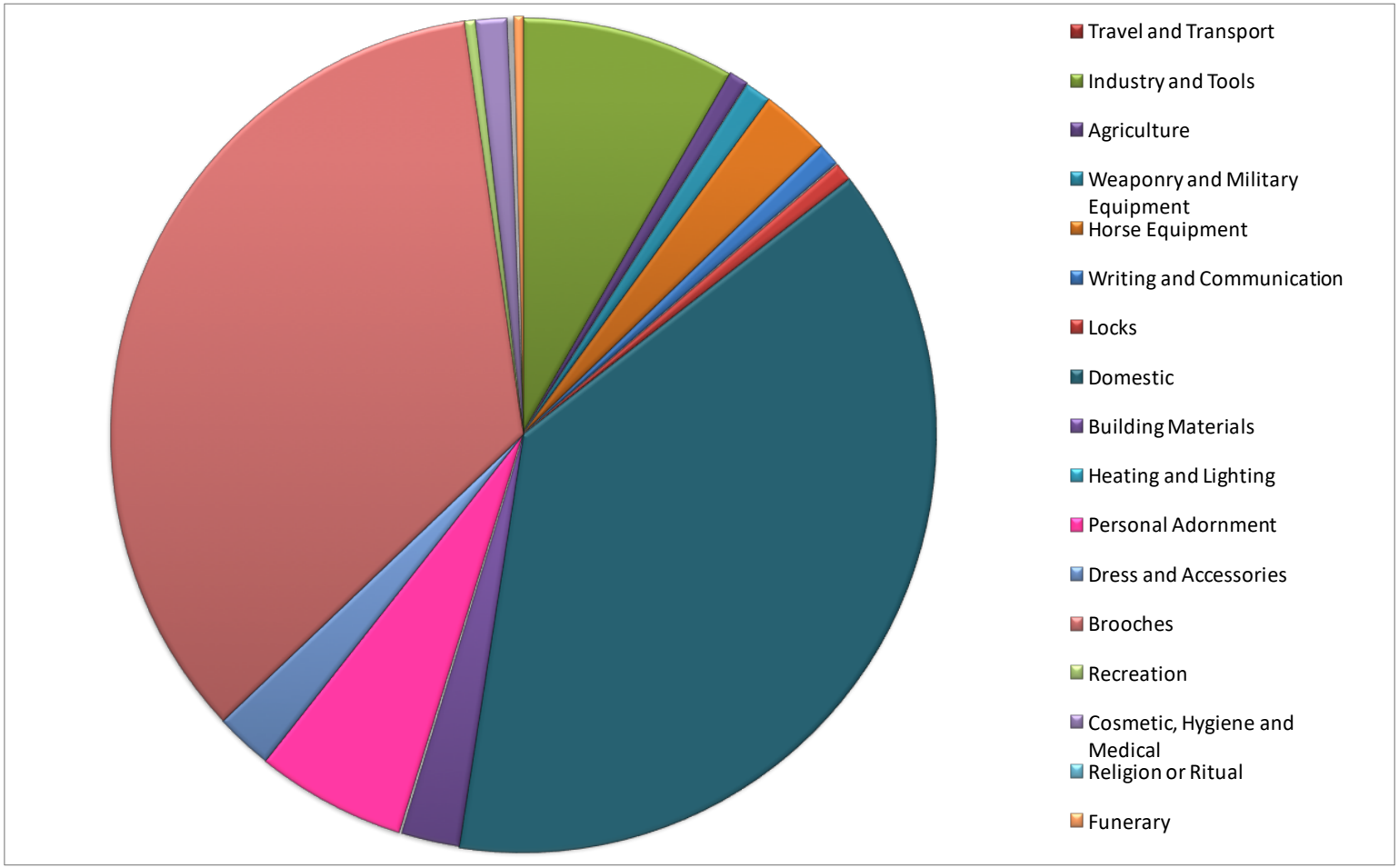


Figure 6.15 The Roman (AD 43-410) assemblage in the Highland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

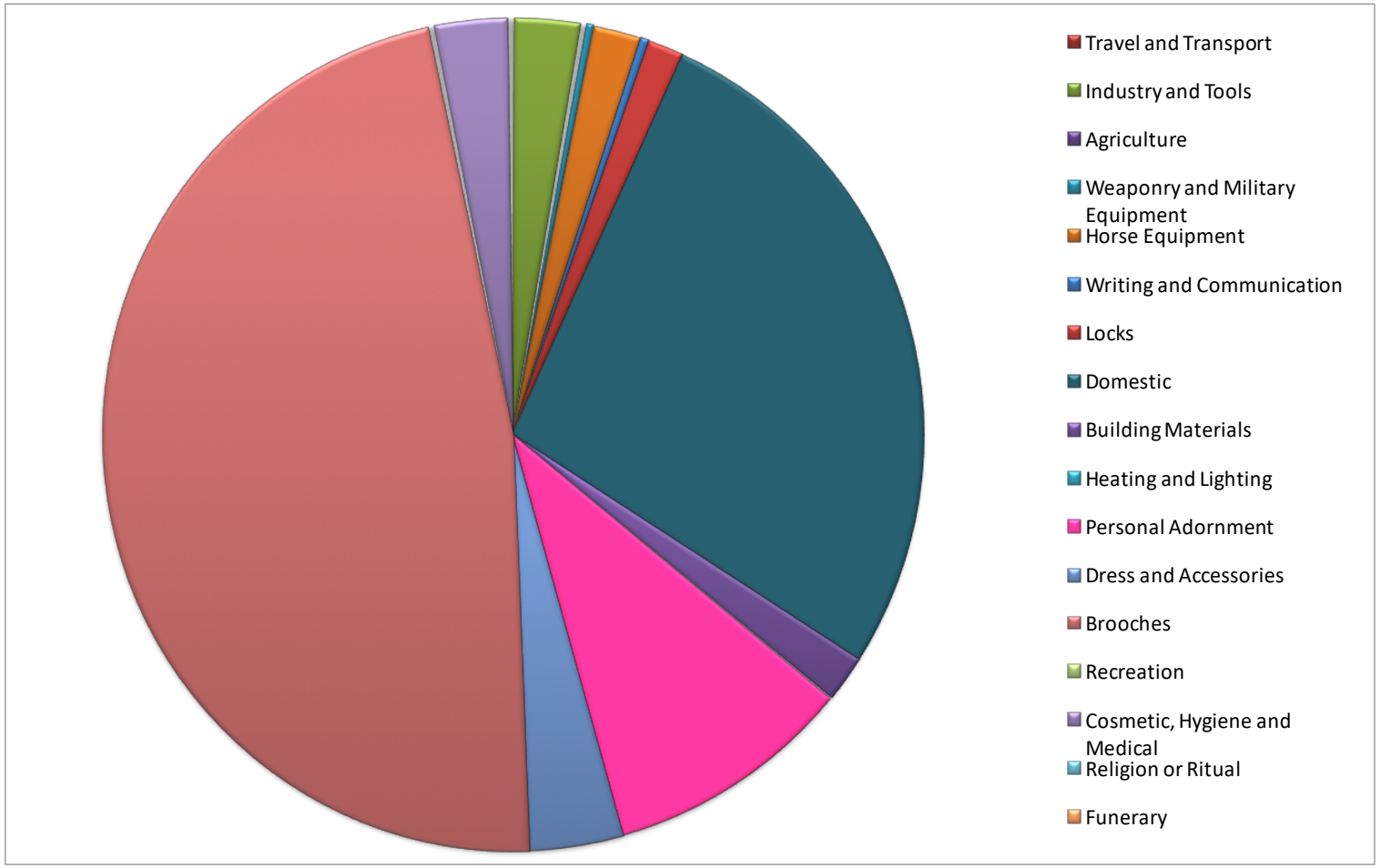


Figure 6.16 The Roman (AD 43-410) assemblage in the Lowland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Figure 6.15 and Figure 6.16 show a broadly similar makeup of the Highland and Lowland assemblages in terms of object type in the Roman period. Both are dominated by Brooches (Highland 35%, Lowland 47%) and Domestic (Highland 38%, Lowland 27%). This supports the assertion made above that the difference in the zones was largely down to the number of Coins finds. However, there are also clear differences in these proportions. Another major difference appears to be the higher percentage of Industry and Tools finds in the Highland Zone.

Chi-squared tests were again carried out for these categories to determine whether differences in percentage contribution were statistically significant (Table 6.9). The finds per square kilometre are the same as in Table 6.6.

The differences from percentages including Coins and Unknown/Miscellaneous finds are as follows:

- Broad object categories with a higher percentage of finds in the Lowland Zone when including Coins and Unknown/Miscellaneous but no statistically significant difference when these categories are excluded:
    - Travel and Transport
    - Building Materials
    - Recreation
    - Religion or Ritual

- Broad object categories with a higher percentage of finds in the Lowland Zone when including Coins and Unknown/Miscellaneous but a higher percentage in the Highland Zone when these categories are excluded:
    - Industry and Tools

- Horse Equipment
- Writing and Communication,
- Domestic

- Broad object categories with no statistically significant difference when including Coins and Unknown/Miscellaneous but a higher percentage of finds in the Highland Zone when these categories are excluded:
  - Agriculture
  - Weaponry and Military Equipment

Broad Category	% Highland Zone	% Lowland Zone	P-value
Travel and Transport	0.0383	0.0727	0.52
Industry and Tools	8.3206	2.5247	6.21E-63
Agriculture	0.7669	0.2479	2.8E-06
Weaponry and Military Equipment	1.0353	0.2910	5.87E-10
Horse Equipment	2.7224	1.8537	0.00
Writing and Communication	0.8819	0.3610	8.64E-05
Locks	0.7285	1.4226	0.01
Domestic	37.9601	27.3024	0.00
Building Materials	2.2623	1.8295	0.34
Heating and Lighting	0.1150	0.0485	0.31
Personal Adornment	5.8666	9.7268	0.00
Dress and Accessories	2.2623	3.6940	0.00
Brooches	34.7776	47.2921	0.00
Recreation	0.4601	0.2506	0.09
Cosmetic, Hygiene and Medical	1.1887	2.8588	0.00
Religion or Ritual	0.2684	0.2102	1.07
Funerary	0.3451	0.0135	0.00

Table 6.9 Chi-squared tests for percentage contribution of each broad category to the Roman (AD 43-410) assemblage in the Highland and Lowland Zones excluding Coins and Unknown/Miscellaneous finds. Broad object categories with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

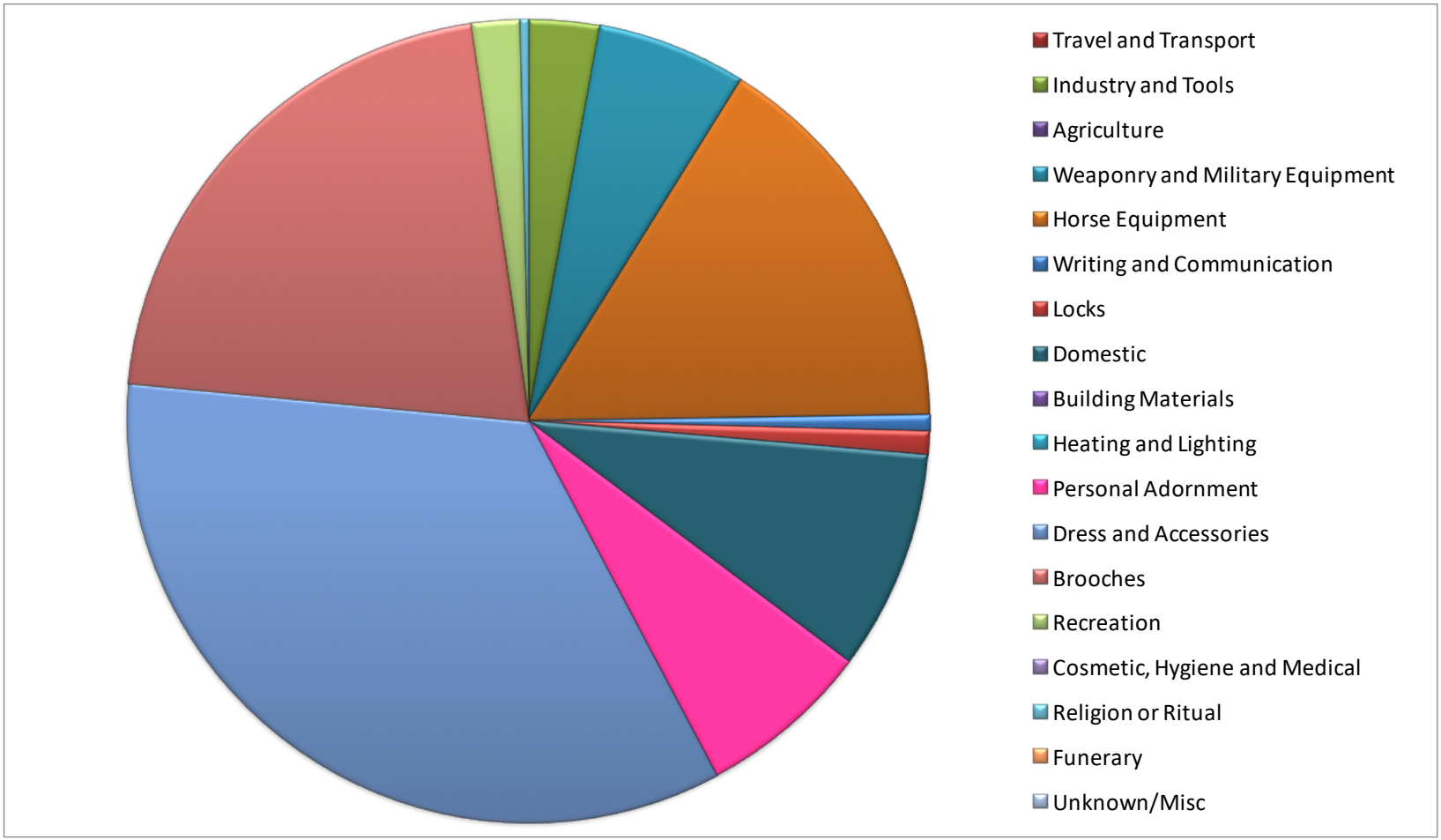


Figure 6.17 The Early Medieval (AD 410-1066) assemblage in the Highland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

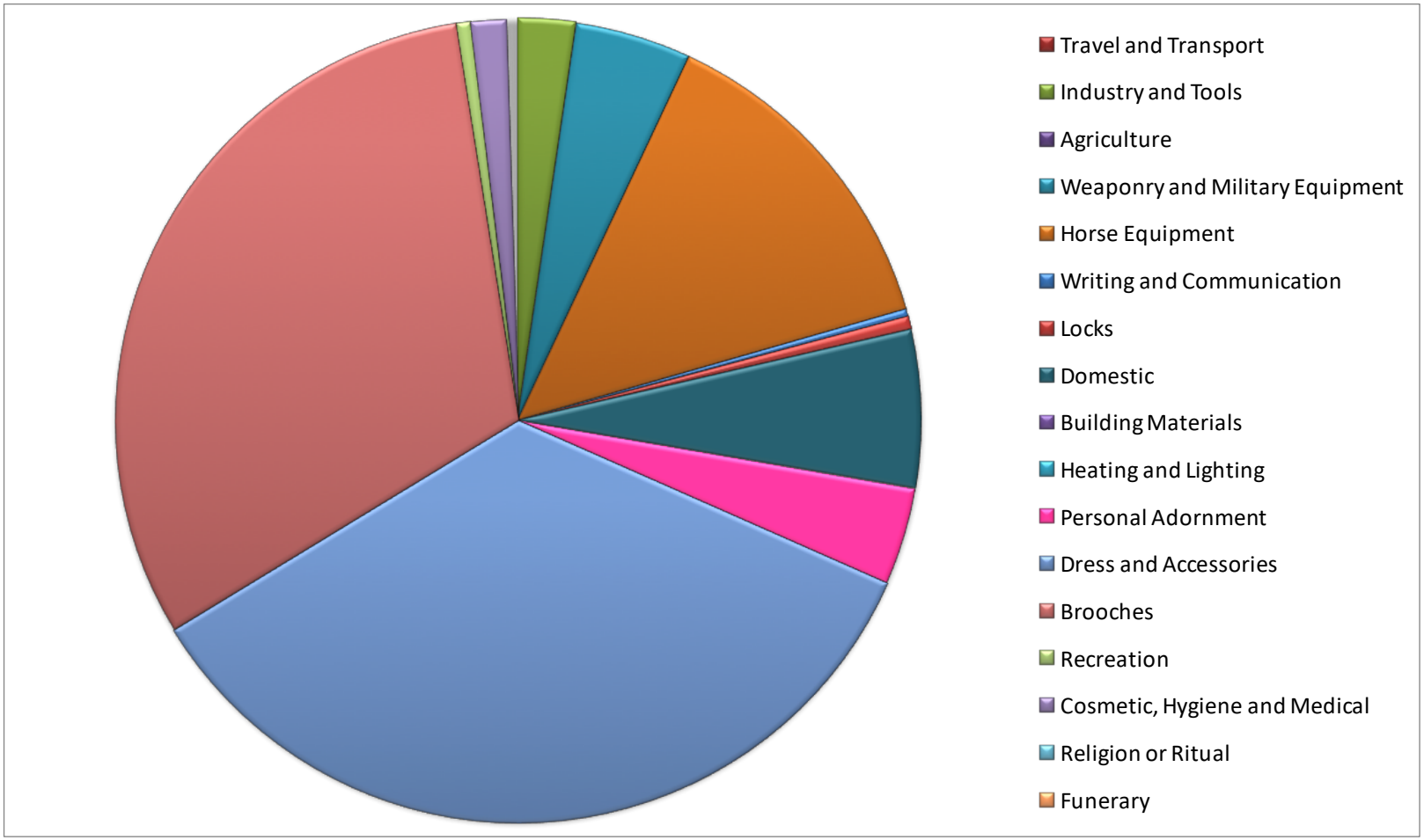


Figure 6.18 The Early Medieval (AD 410-1066) assemblage in the Lowland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Figure 6.17 and Figure 6.18 demonstrate further that the broad makeup of the (PAS defined) Early Medieval assemblages in both the Highland and Lowland Zones are similar. The predominant categories of finds are as follows:

- Dress and Accessories (Highland 34%, Lowland 35%)
- Brooches (Highland 21%, Lowland 31%)
- Horse Equipment (Highland 16%, Lowland 14%)

Once again Brooches break the pattern of similarities. The contribution of the Brooches category to each of the assemblages has been discussed above.

The Chi-squared tests for these categories in terms of percentage differ from percentages including Coins and Unknown/Miscellaneous finds in the following ways:

- Broad object categories with no statistically significant difference when including Coins and Unknown/Miscellaneous but a higher percentage of finds in the Lowland Zone when these categories are excluded:
    - Cosmetic, Hygiene and Medical

The removal of Coins and Unknown/Miscellaneous finds from the database is less revealing for the Early Medieval PAS period finds than for the Roman. This is due to the more even spread of Early Medieval finds across the nineteen broad categories. There are far fewer differences created in the percentages by the removal of Coins and Unknown/Miscellaneous finds from the data in the Early Medieval than in the Roman finds. This is to be expected due to the greater number of Roman Coins

finds. The data in Table 6.10 continue to demonstrate a much more even makeup of the assemblages in the Highland Zone and Lowland Zone in the Early Medieval period than in the Roman period.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	2.8571	2.2955	0.52
Agriculture	0.0000	0.0297	0.76
Weaponry and Military Equipment	6.0317	4.6579	0.50
Horse Equipment	15.8730	13.6245	0.57
Writing and Communication	0.6349	0.3269	0.70
Locks	0.9524	0.5349	0.64
Domestic	8.8889	6.3071	0.14
Building Materials	0.0000	0.0297	1.52
Heating and Lighting	0.0000	0.0074	1.76
Personal Adornment	6.9841	3.9224	0.01
Dress and Accessories	34.2857	34.7671	1.87
Brooches	21.2698	31.3573	0.00
Recreation	1.9048	0.6166	0.01
Cosmetic, Hygiene and Medical	0.0000	1.3966	0.07
Religion or Ritual	0.3175	0.2154	1.40
Funerary	0.0000	0.2526	0.74

Table 6.10 Chi-squared tests for percentage contribution of each broad category to the Early Medieval (AD 410-1066) assemblage in the Highland and Lowland Zones excluding Coins and Unknown/Miscellaneous finds. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

6.2.3 Eastern England and Western Britain

This analysis uses the same broad object categories as above. It looks at the makeup of the assemblages of PAS finds in the zones of Western Britain and Eastern England.

Table 6.11 shows the number of finds in each broad category in Western Britain and Eastern England. Figure 6.19 to Figure 6.26 show these as pie charts with and without Coins and Unknown/Miscellaneous/Unknown.

Broad Category	Roman Western Britain	Roman Eastern England	Early Medieval Western Britain	Early Medieval Eastern England
Coins	70841	105159	214	2554
Travel and Transport	2	26	0	0
Industry and Tools	368	786	11	307
Agriculture	30	82	0	4
Weaponry and Military Equipment	44	91	38	603
Horse Equipment	134	625	236	1648
Writing and Communication	35	122	6	40
Locks	56	491	7	68
Domestic	2980	8143	64	811
Building Materials	218	520	0	4
Heating and Lighting	4	17	0	1
Personal Adornment	601	3162	47	503
Dress and Accessories	203	1227	432	4329
Brooches	3800	14659	159	4118
Recreation	32	73	12	77
Cosmetic, Hygiene and Medical	136	956	2	185
Religion or Ritual	19	66	1	29
Funerary	9	5	0	34
Unknown/Misc	818	4608	220	3220

Table 6.11 The number of finds per broad category in Western Britain and Eastern England in the Roman (AD 43-410) and Early Medieval (AD 410-1066) periods. Data from the PAS.

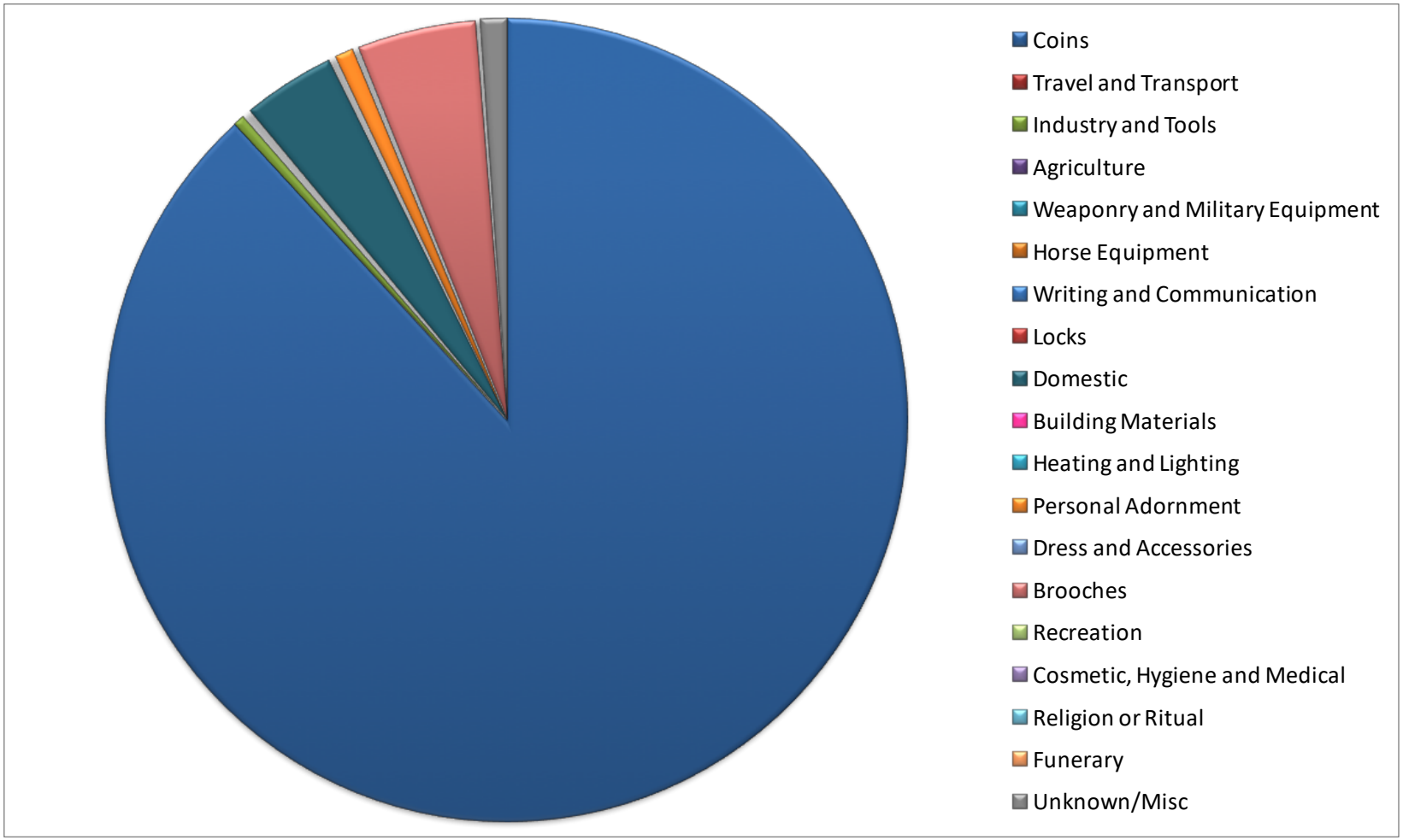


Figure 6.19 The Roman (AD 43-410) assemblage in Western Britain. Graph produced using data from the PAS.

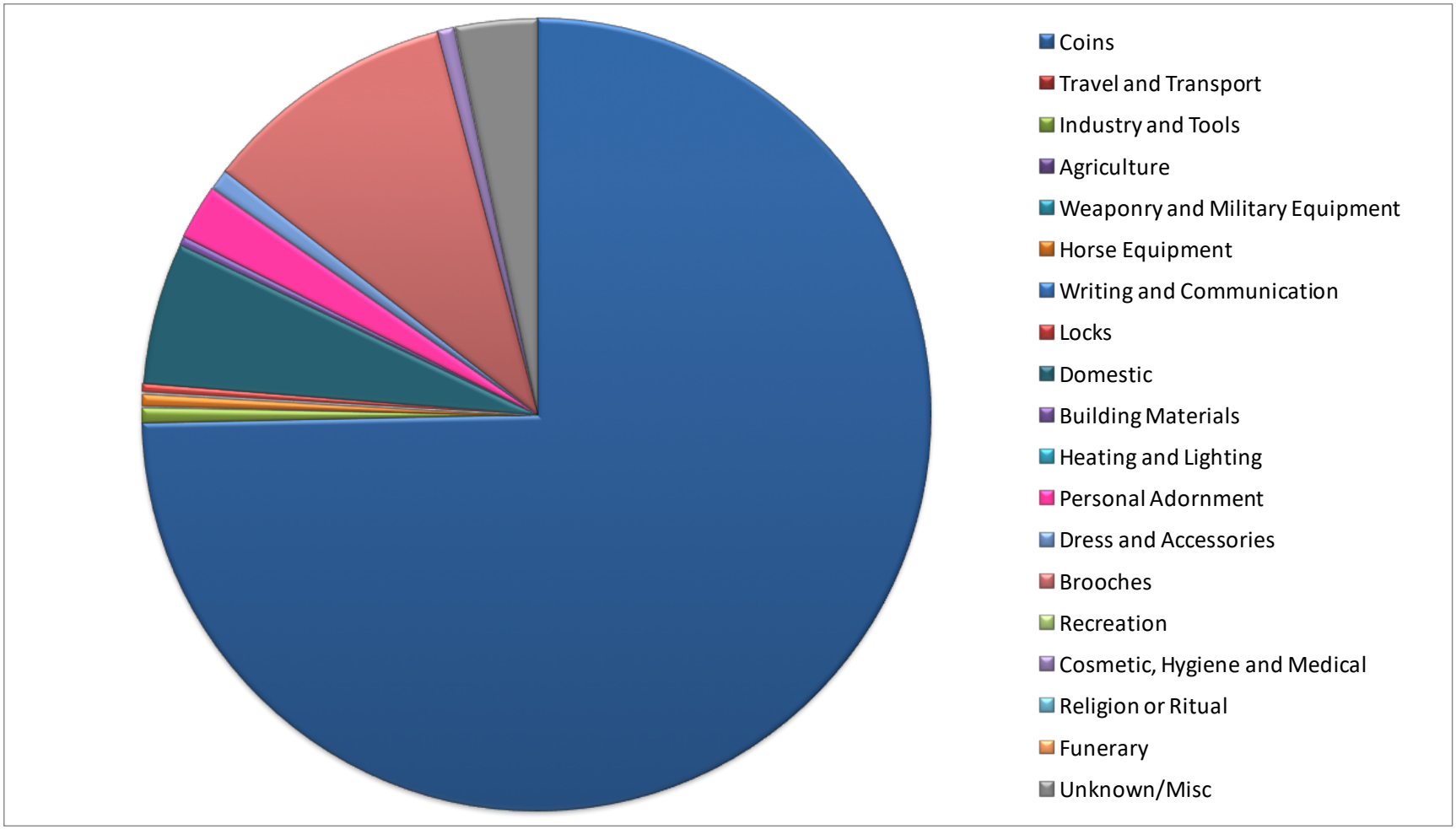


Figure 6.20 The Roman (AD 43-410) assemblage in Eastern England. Graph produced using data from the PAS.

The pattern for Roman finds in Western Britain and Eastern England (Figure 6.19 and Figure 6.20) is almost identical to that seen in the finds from the Highland and Lowland Zones (Figure 6.11 and Figure 6.12). Finds in each zone are again dominated by Coins finds, with a higher percentage of this category in Western Britain (88% in Western Britain and 75% in Eastern England).

Chi-squared tests (Table 6.12) were carried out with the same null hypothesis, that there is no significant difference between the numbers of finds in each zone. Here the findings are also similar to those for the Highland and Lowland Zones (Table 6.5). Many of the broad object categories have the same results. The only variations are that there is no statistically significant difference in percentage of Recreation and Funerary finds. These categories had a higher percentage of finds in the Lowland and Highland Zone respectively (Table 6.5). There is a higher percentage of Coins finds in Western Britain, again due to fewer finds in other object categories.

Broad Category	% Western Britain	% Eastern England	P-value
Commerce	88.1875	74.6772	4.2E-257
Travel and Transport	0.0025	0.0185	0.00
Industry and Tools	0.4581	0.5582	0.00
Agriculture	0.0373	0.0582	0.07
Weaponry and Military Equipment	0.0548	0.0646	0.73
Horse Equipment	0.1668	0.4438	2.16E-26
Writing and Communication	0.0436	0.0866	0.00
Locks	0.0697	0.3487	1.41E-36
Domestic	3.7097	5.7826	9.7E-97
Building Materials	0.2714	0.3693	0.00
Heating and Lighting	0.0050	0.0121	0.20
Personal Adornment	0.7482	2.2455	2.8E-148
Dress and Accessories	0.2527	0.8713	1.67E-67
Brooches	4.7305	10.4099	0.00
Recreation	0.0398	0.0518	0.43
Cosmetic, Hygiene and Medical	0.1693	0.6789	3.75E-60
Religion or Ritual	0.0237	0.0469	0.01
Funerary	0.0112	0.0036	0.06
Unknown/Misc	1.0183	3.2723	4.9E-232

Table 6.12 Chi-squared tests for percentage contribution of each broad category to the Roman (AD 43-410) assemblage in the Western Britain and Eastern England. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

Table 6.13 shows the results of Chi-squared tests on each broad object category according to the number of finds per square kilometre in each zone. Unsurprisingly, there are more finds per square kilometre in the Lowland Zone in almost all cases.

Broad Category	Finds per sq km Western Britain	Finds per sq km Eastern England	P-value
Coins	0.8559	1.4769	0.0000
Travel and Transport	0.0000	0.0004	0.0000
Industry and Tools	0.0044	0.0110	0.0000
Agriculture	0.0004	0.0012	0.0000
Weaponry and Military Equipment	0.0005	0.0013	0.0000
Horse Equipment	0.0016	0.0088	0.0000
Writing and Communication	0.0004	0.0017	0.0000
Locks	0.0007	0.0069	0.0000
Domestic	0.0360	0.1144	0.0000
Building Materials	0.0026	0.0073	0.0000
Heating and Lighting	0.0000	0.0002	0.0014
Personal Adornment	0.0073	0.0444	0.0000
Dress and Accessories	0.0025	0.0172	0.0000
Brooches	0.0459	0.2059	0.0000
Recreation	0.0004	0.0010	0.0000
Cosmetic, Hygiene and Medical	0.0016	0.0134	0.0000
Religion or Ritual	0.0002	0.0009	0.0000
Funerary	0.0001	0.0001	0.4294
Unknown/Misc	0.0099	0.0647	0.0000

Table 6.13 Chi-squared tests for Roman (AD 43-410) finds density in Western Britain and Eastern England. Broad object categories with a statistically significant higher number of finds per square kilometre in Eastern England are shaded in red and those with a statistically significant higher number of finds per square kilometre in Western Britain are shaded in blue. Data from the PAS.

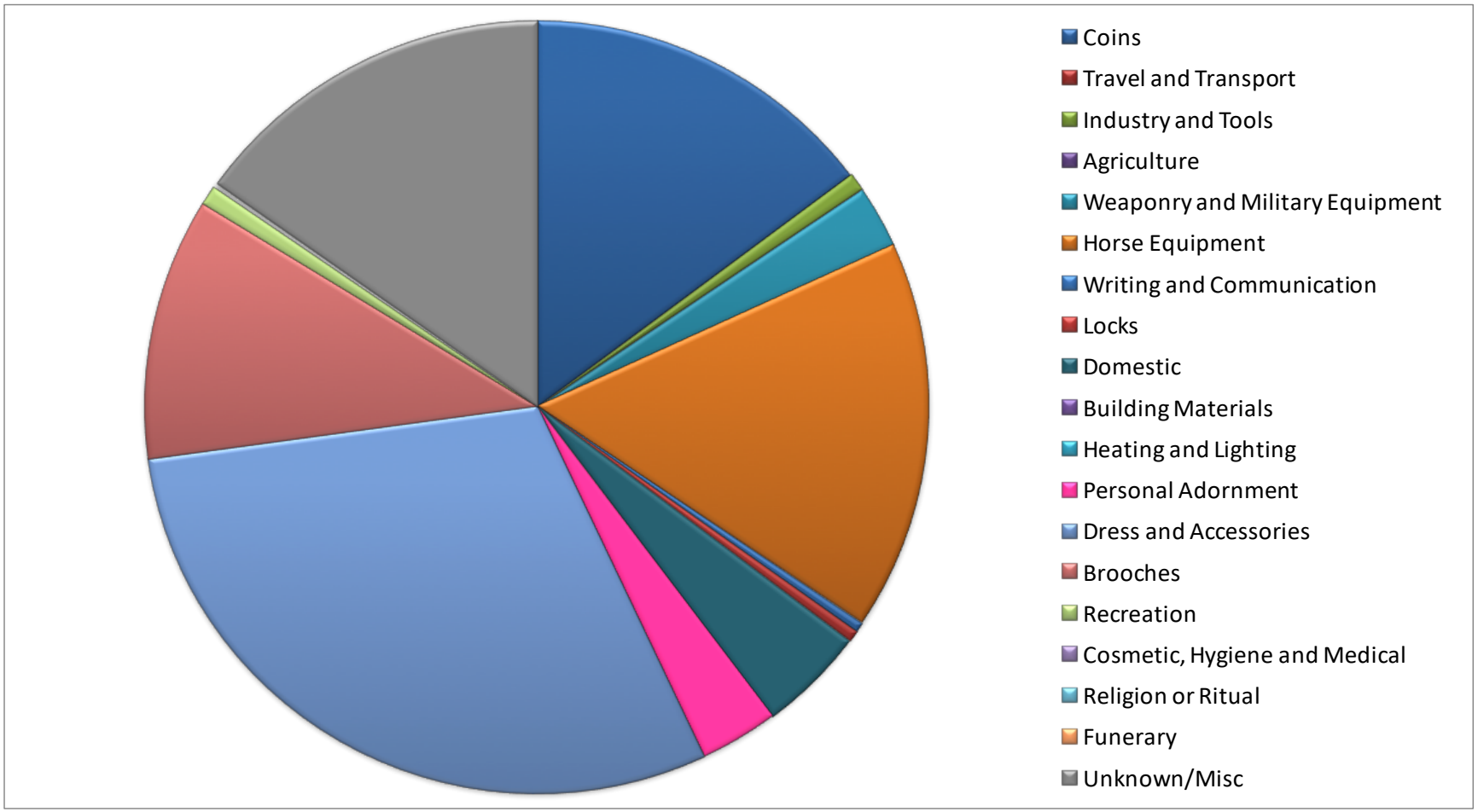


Figure 6.21 The Early Medieval (AD 410-1066) assemblage in Western Britain. Graph produced using data from the PAS.

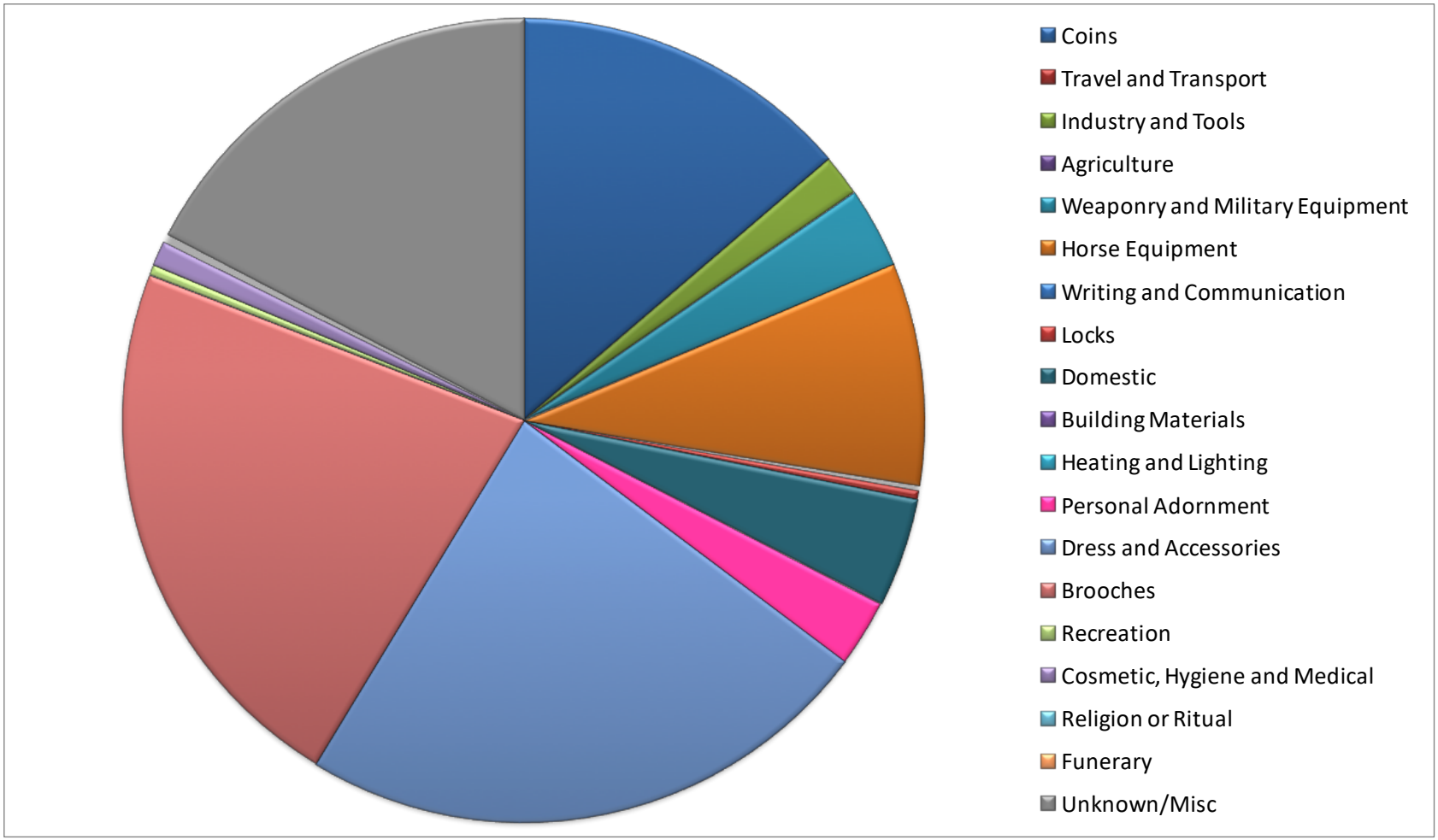


Figure 6.22 The Early Medieval (AD 410-1066) assemblage in Eastern England. Graph produced using data from the PAS.

The Early Medieval assemblages (Figure 6.21 and Figure 6.22) also, to some extent, show a similar distribution to that seen in the Highland and Lowland Zones (Figure 6.13 and Figure 6.14) with finds in both zones again dominated by finds in the following object types:

- Coins (Western Britain 15%, Eastern England 14%)
- Unknown/misc (Western Britain 15%, Eastern England 17%)
- Dress and Accessories (Western Britain 30%, Eastern England 23%)
- Brooches (Western Britain 11%, Eastern England 22%)

Comparing the assemblage for Western Britain (Figure 6.21) with that for the Highland Zone (Figure 6.13) shows that Horse Equipment appears to contribute a higher proportion of finds to the Western Britain zone (Western Britain 16%, Highland Zone 10%). There is also apparently a greater difference in the contribution of Horse Equipment to the finds in Western Britain (16%) compared to Eastern England (9%) than between the Highland Zone (10%) and Lowland Zone (9%).

Chi-squared tests (Table 6.14) demonstrate that, as with the Highland and Lowland Zones, there is much less difference in the composition of the assemblage between the two zones for the Early Medieval finds than for Roman. The main differences are the higher percentage of finds in Western Britain in the Horse Equipment and Dress and Accessories categories and the higher percentage of Industry and Tools finds in Eastern England.

Table 6.15 shows the results of Chi-squared tests on each broad object category according to the number of finds per square kilometre in each zone. Unsurprisingly, there is a higher density finds per square kilometre in the Lowland Zone in almost all cases.

Broad Category	% Western Britain	% Eastern England	P-value
Coins	14.7688	13.7793	0.33
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	0.7591	1.6563	0.02
Agriculture	0.0000	0.0216	1.15
Weaponry and Military Equipment	2.6225	3.2803	0.39
Horse Equipment	16.2871	8.8913	2.09E-18
Writing and Communication	0.4141	0.2158	0.26
Locks	0.4831	0.3669	0.97
Domestic	4.4168	4.3863	1.88
Building Materials	0.0000	0.0216	1.15
Heating and Lighting	0.0000	0.0054	1.56
Personal Adornment	3.2436	2.7138	0.48
Dress and Accessories	29.8137	23.5015	2.47E-06
Brooches	10.9731	22.2768	1.02E-18
Recreation	0.8282	0.4154	0.05
Cosmetic, Hygiene and Medical	0.1380	1.0035	0.00
Religion or Ritual	0.0690	0.1565	0.82
Funerary	0.0000	0.1834	0.21
Unknown/Misc	15.1829	17.4103	0.11

Table 6.14 Chi-squared tests for percentage contribution of each broad category to the Early Medieval (AD 410-1066) assemblage in Western Britain and Eastern England. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

Broad Category	Finds per km^2 Western Britain	Finds per km^2 Eastern England	P-value
Coins	0.0026	0.0359	0.0000
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	0.0001	0.0043	0.0000
Agriculture	0.0000	0.0001	0.0311
Weaponry and Military Equipment	0.0005	0.0085	0.0000
Horse Equipment	0.0029	0.0231	0.0000
Writing and Communication	0.0001	0.0006	0.0000
Locks	0.0001	0.0010	0.0000
Domestic	0.0008	0.0114	0.0000
Building Materials	0.0000	0.0001	0.0311
Heating and Lighting	0.0000	0.0000	0.2810
Personal Adornment	0.0006	0.0071	0.0000
Dress and Accessories	0.0052	0.0608	0.0000
Brooches	0.0019	0.0578	0.0000
Recreation	0.0001	0.0011	0.0000
Cosmetic, Hygiene and Medical	0.0000	0.0026	0.0000
Religion or Ritual	0.0000	0.0004	0.0000
Funerary	0.0000	0.0005	0.0000
Unknown/Misc	0.0027	0.0452	0.0000

Table 6.15 Chi-squared tests for Early Medieval (AD 410-1066) finds density in Western Britain and Eastern England. Broad object categories with a statistically significant higher number of finds per square kilometre in Eastern England are shaded in red and those with a statistically significant higher number of finds per square kilometre in Western Britain are shaded in blue. Data from the PAS.

The Roman data for Western Britain and Eastern England with the Coins and Unknown/Miscellaneous material removed (Figure 6.23 and Figure 6.24), again show a similar pattern to finds from the Highland and Lowland Zones (Figure 6.15 and Figure 6.16).

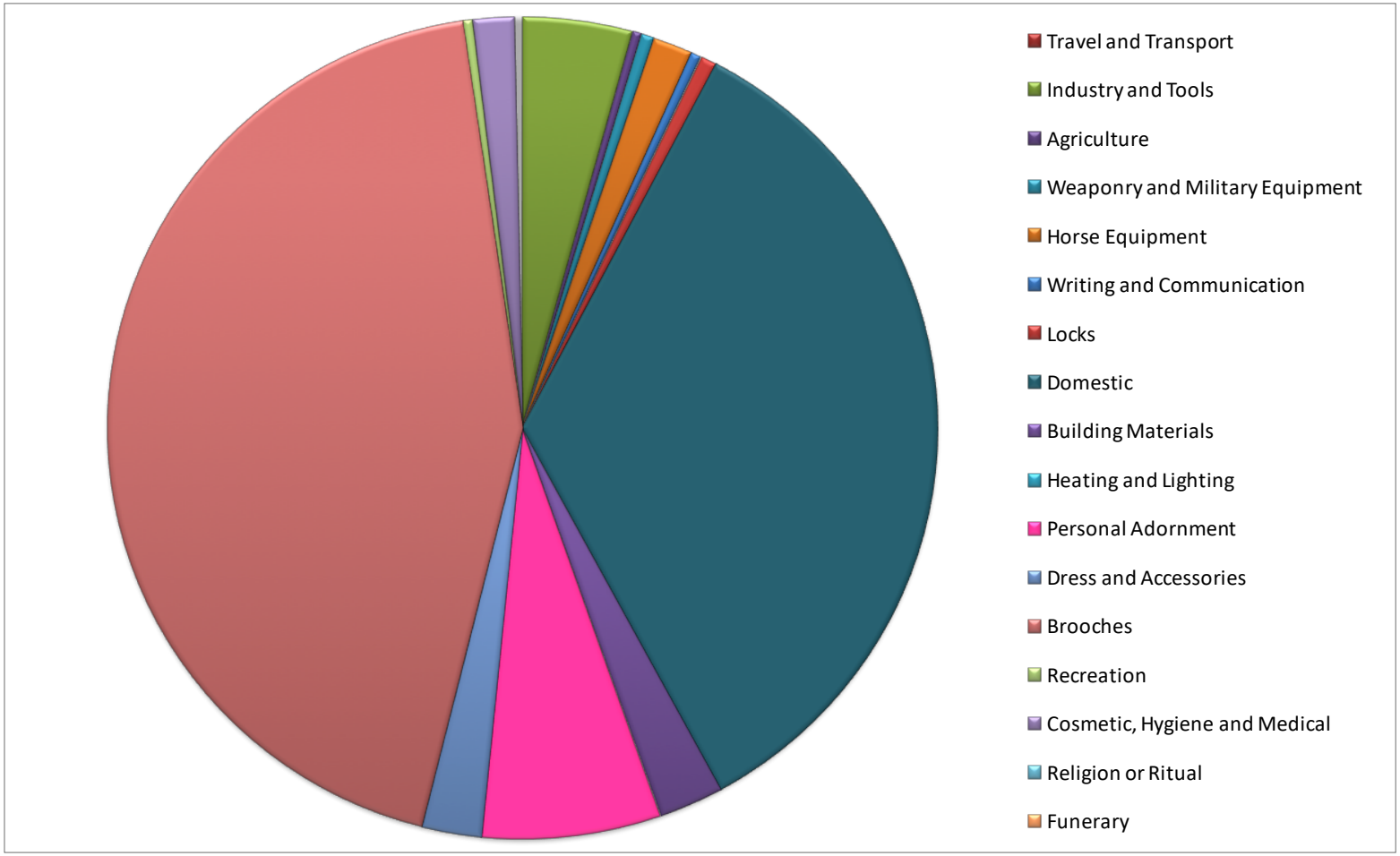


Figure 6.23 The Roman (AD 43-410) assemblage in Western Britain with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

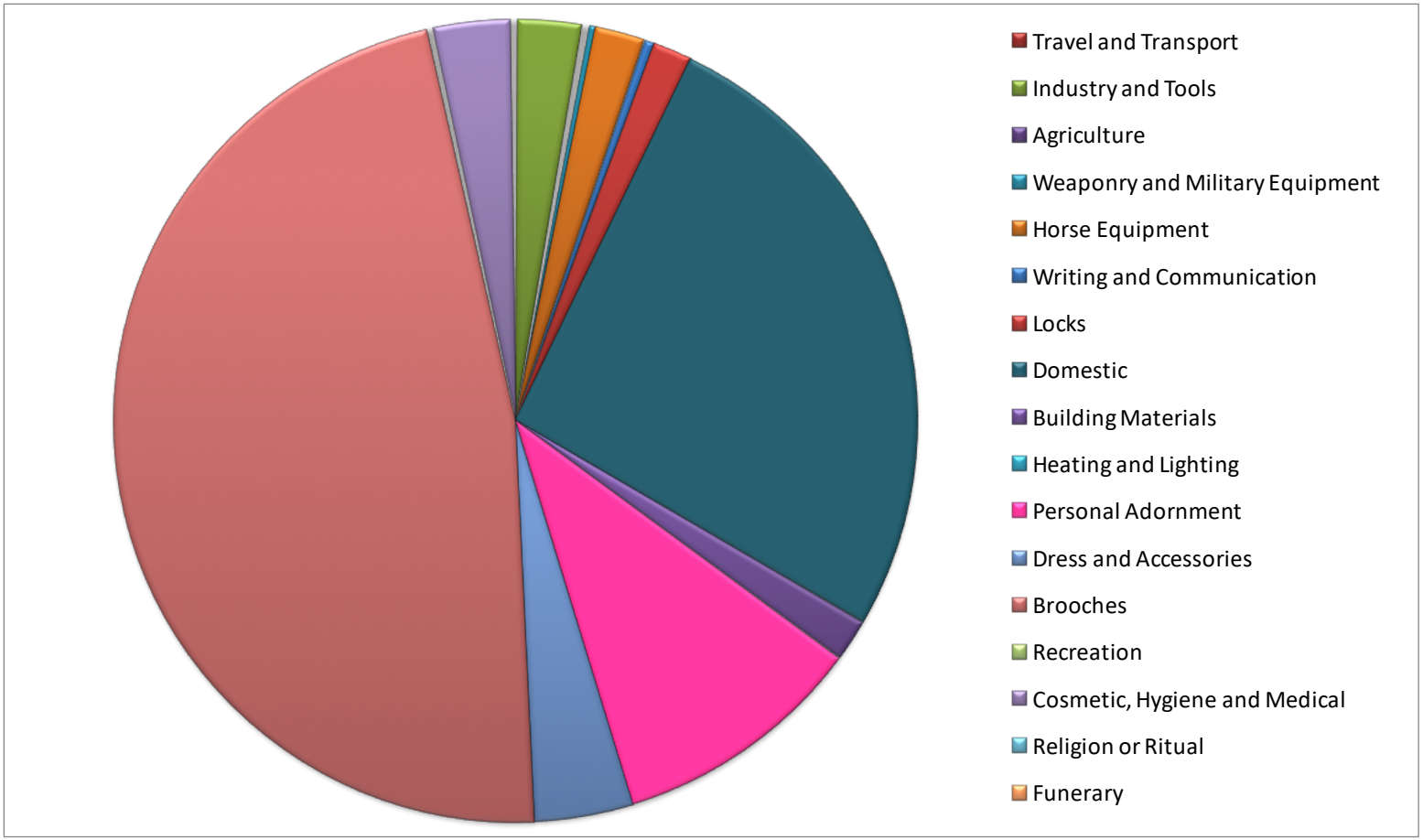


Figure 6.24 The Roman (AD 43-410) assemblage in Eastern England with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Broad Category	% Western Britain	% Eastern England	P-value
Travel and Transport	0.0231	0.0837	0.06
Industry and Tools	4.2440	2.5313	2.62E-12
Agriculture	0.3460	0.2641	0.41
Weaponry and Military Equipment	0.5074	0.2931	0.00
Horse Equipment	1.5454	2.0128	0.01
Writing and Communication	0.4036	0.3929	1.78
Locks	0.6458	1.5813	1.06E-10
Domestic	34.3674	26.2246	1.76E-36
Building Materials	2.5141	1.6747	7.94E-07
Heating and Lighting	0.0461	0.0547	1.52
Personal Adornment	6.9311	10.1832	6.7E-18
Dress and Accessories	2.3411	3.9516	5.58E-12
Brooches	43.8242	47.2094	8.69E-05
Recreation	0.3690	0.2351	0.06
Cosmetic, Hygiene and Medical	1.5684	3.0788	1.28E-13
Religion or Ritual	0.2191	0.2126	1.81
Funerary	0.1038	0.0161	0.00

Table 6.16 Chi-squared tests for percentage contribution of each broad category to the Roman (AD 43-410) assemblage in Western Britain and Eastern England with Coins and Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of finds in Eastern England are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

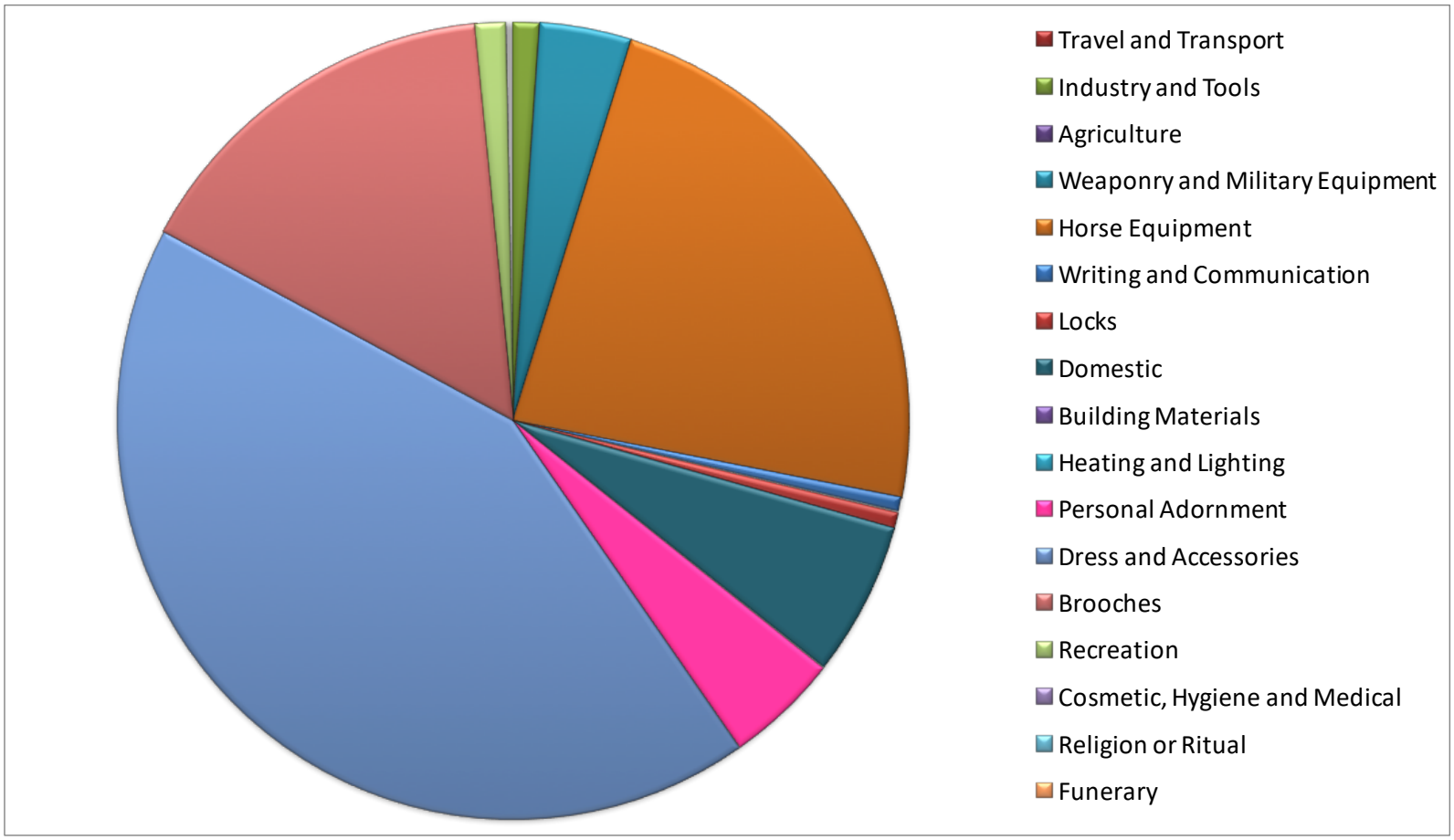


Figure 6.25 The Early Medieval (AD 410-1066) assemblage in Western Britain with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

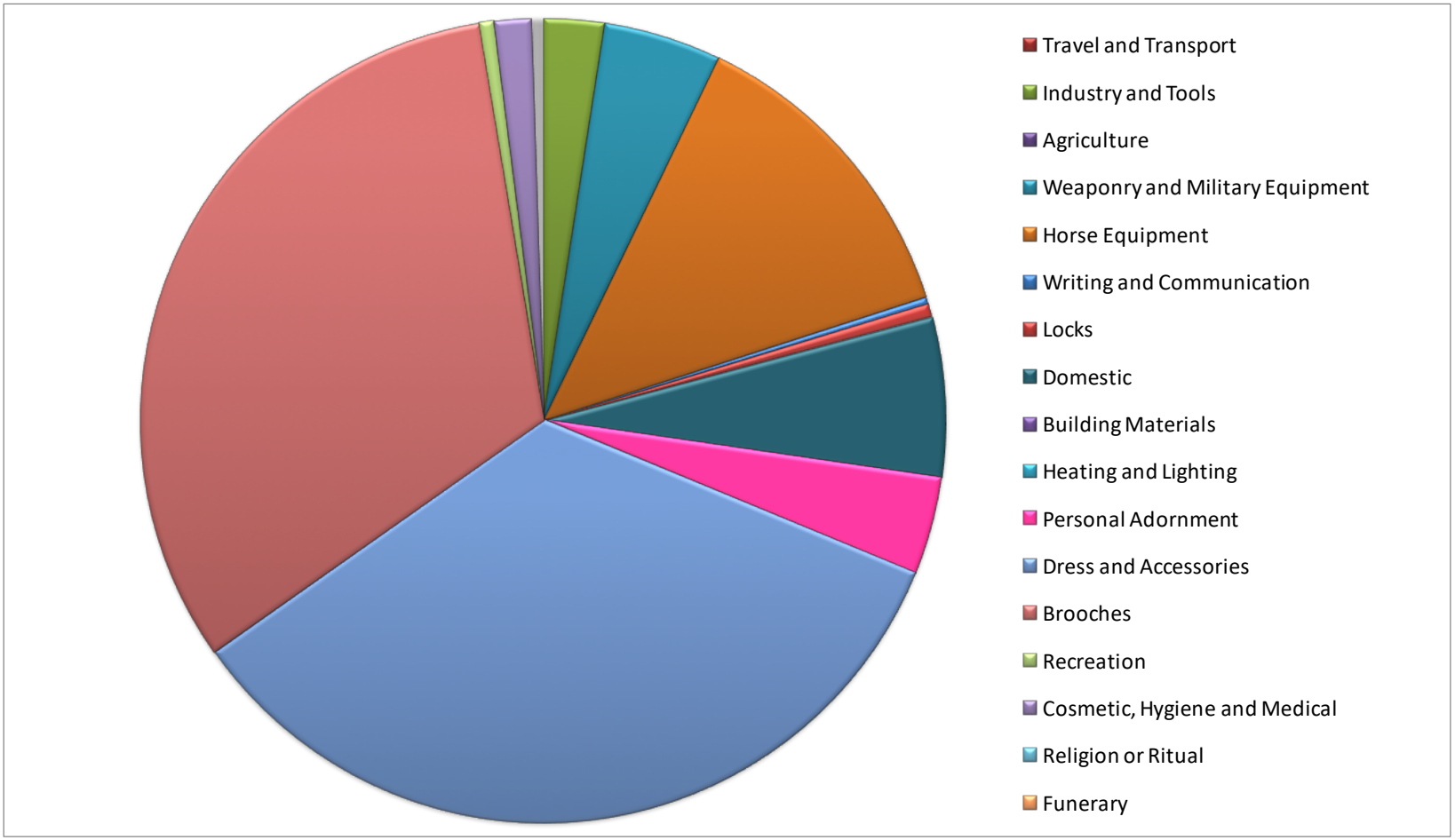


Figure 6.26 The Early Medieval (AD 410-1066) assemblage in Eastern England with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Comparison of the data for the Early Medieval Period in Eastern England and Western Britain with Coins/Miscellaneous removed (Figure 6.25 and Figure 6.26) with the data for the Highland and Lowland Zones in Figure 6.17 and Figure 6.18 supports the idea discussed above that there is a difference in the makeup of the Early Medieval Western Britain and Eastern England assemblages which is not apparent in either the Roman assemblages or the Early Medieval Highland and Lowland assemblages. Whilst the proportions of each of the categories of finds are broadly similar across the Highland and Lowland Zones, there are some clear differences between Western Britain and Eastern England. It has been noted above that this difference is less apparent when including Coins and Unknown/Miscellaneous finds.

The graph produced for Eastern England (Figure 6.26) resembles those for the Highland and Lowland Zones (Figure 6.17 and Figure 6.18) but Western Britain (Figure 6.25) diverges from this pattern. Chi-squared tests for the Early Medieval assemblages with Coins and Unknown/Miscellaneous finds removed (Table 6.17) show that, in general, there is no significant difference in the makeup of the assemblage in Western Britain and Eastern England. There are, however, key differences from the results for the Highland and Lowland Zones. Western Britain has a higher percentage of finds in the following categories:

- Horse Equipment (23.25% in Western Britain, 12.92% in Eastern England)
- Dress and Accessories (42.56% in Western Britain, 33.92% in Eastern England)
- Recreation (1.18% in Western Britain, 0.60% in Eastern England)

and a lower percentage of finds in the following categories:

- Industry and Tools (1.08% in Western Britain, 2.41% in Eastern England)
- Brooches (15.67% in Western Britain and 32.27% in Eastern England)

- Cosmetic, Hygiene and Medical (0.20% in Western Britain, 1.44% in Eastern England)

The differences in Industry and Tools, Horse Equipment and Dress and Accessories, where there are no statistically significant differences between the Highland and Lowland Zones, suggest that, in the Early Medieval period, there are some differences between Western Britain and Eastern England that are not evident in the Roman period or between the Highland and Lowland Zones.

Broad Category	% Western Britain	% Eastern England	P-value
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	1.0837	2.4058	0.02
Agriculture	0.0000	0.0313	1.15
Weaponry and Military Equipment	3.7438	4.7645	0.33
Horse Equipment	23.2512	12.9143	2.05E-17
Writing and Communication	0.5911	0.3135	0.28
Locks	0.6897	0.5329	1.03
Domestic	6.3054	6.3710	1.90
Building Materials	0.0000	0.0313	1.15
Heating and Lighting	0.0000	0.0078	1.56
Personal Adornment	4.6305	3.9417	0.58
Dress and Accessories	42.5616	34.1353	1.32E-05
Brooches	15.6650	32.3564	1.27E-19
Recreation	1.1823	0.6034	0.05
Cosmetic, Hygiene and Medical	0.1970	1.4576	0.00
Religion or Ritual	0.0985	0.2273	0.80
Funerary	0.0000	0.2664	0.20

Table 6.17 Chi-squared tests for percentage contribution of each broad category to the Early Medieval (AD 410-1066) assemblage in Western Britain and Eastern England with Coins and Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue.

If PAS finds distributions from the Early Medieval (AD 410-1066) (Figure 4.24) and Medieval (AD 1066-1539) (Figure 4.25) periods are compared, it can be seen that the distribution for the Medieval

period much more closely matches the overall distribution (Figure 4.1). It is only the Early Medieval period which deviates from the long-term trends. This suggests that, whilst there were genuine differences in artefact types and distributions in the Early Medieval period (as discussed above, grave goods from dispersed cemeteries in the east representing demonstration of identity through funerary practice in contrast to sub-Roman areas in the west), finds return to the overall pattern of the *longue durée* by circa AD 1066.

In England and Wales, Anglo-Saxon territory had expanded to the borders of modern-day Wales and Cornwall by circa 800 AD (Figure 6.27). As Anglo-Saxon territory expanded in the late Saxon period (circa AD 899-1066), PAS finds distributions return to the long-term pattern by AD 1066.

Figure 6.27 Early Medieval Britain and Ireland. Source: Jotischky and Hull (2005).

6.2.4 Summary and conclusions – Roman (AD 43-410) and Early Medieval (AD 410-1066)

The Chi-squared tests show which categories have statistically significant differences between the various zones identified (Table 6.18 and Table 6.19).

Broad Category	Roman Highland/Lowland	Roman Western Britain/Eastern England		Early Medieval Highland/Lowland	Early Medieval Western Britain/Eastern England
Coins					
Travel and Transport					
Industry and Tools					
Agriculture					
Weaponry and Military Equipment					
Horse Equipment					
Writing and Communication					
Locks					
Domestic					
Building Materials					
Heating and Lighting					
Personal Adornment					
Dress and Accessories					
Brooches					
Recreation					
Cosmetic, Hygiene and Medical					
Religion or Ritual					
Funerary					
Unknown/Misc					

Table 6.18 Summary of Chi-squared test results for percentage contribution of each broad object category in the Roman (AD 43-410) and Early Medieval (AD 410-1066) periods. Red shaded cells represent categories with a higher percentage in the Lowland Zone/Eastern England, blue shaded cells those with a higher percentage in the Highland Zone/Western Britain and unshaded cells those with no statistically significant difference.

Broad Category	Roman Highland/Lowland	Roman Western Britain/Eastern England		Early Medieval Highland/Lowland	Early Medieval Western Britain/Eastern England
Travel and Transport					
Industry and Tools					
Agriculture					
Weaponry and Military Equipment					
Horse Equipment					
Writing and Communication					
Locks					
Domestic					
Building Materials					
Heating and Lighting					
Personal Adornment					
Dress and Accessories					
Brooches					
Recreation					
Cosmetic, Hygiene and Medical					
Religion or Ritual					
Funerary					

Table 6.19 Summary of Chi-squared test results for percentage contribution of each broad object category in the Roman (AD 43-410) and Early Medieval (AD 410-1066) periods with Coins and Unknown/Miscellaneous finds removed. Red shaded cells represent categories with a higher percentage in the Lowland Zone/Eastern England, blue shaded cells those with a higher percentage in the Highland Zone/Western Britain and unshaded cells those with no statistically significant difference.

6.2.4.1 Roman (AD 43-410)

In the Roman period, there are proportionally more Coins finds (and fewer finds of other categories) in the Highland Zone than the Lowland Zone. Of the two zones, the Lowland Zone most closely resembles the overall pattern of Roman finds. This means that geographical differences in the types of finds from the Roman period divides England and Wales into Highland and Lowland Zones. The entire Roman assemblage here acts as a control dataset with which to compare the Highland and Lowland Zones. The results suggest that a division exists not only in terms of modern day finds recovery (many more finds are recorded from areas of low topography) but also in the types of artefacts deposited.

As speculated in Chapter Four, this difference may be due to areas which had more interaction with Rome and took on more aspects of Roman culture. This fits with the conclusions drawn by Richards *et al* (2009) in their assessment of the period-specific datasets of PAS data (see Chapter 4.3). Timothy Webb's research into *Personal Ornamentation as an Indicator of Cultural Diversity in the Roman North* concludes that, despite being part of the larger Roman culture, there is a distinct cultural assemblage in the north of Britain. As with the research carried out here, Webb identified this as being most apparent when studying the proportions of different object categories. For instance, types of brooches differed in the north and south during the Roman period (2011: 133). Webb also points out a difference within the northern cultural assemblage between the east and west, with the east appearing more unified (Webb 2011: 123).

It must also be considered that this is merely an artefact of the general recovery patterns of PAS data. It was established in Chapter 4.4 that there is a boundary between areas of high finds density and low finds density approximately analogous with Cyril Fox's (1933) division into Highland and

Lowland Zones. On the other hand, the use of percentage contribution to the overall finds assemblage allows a comparison of the types of finds recovered in each area without the biasing factor of the much higher numbers of finds, in general, in the south and east of the country.

The above analysis appears to show that, to an extent, there is a difference in the makeup of the assemblages in the east and west of the country. Table 6.18 and Table 6.19 summarise the Chi-squared test results for the percentage contribution of each broad object category to the overall assemblage in each zone.

Between the Highland and Lowland Zones there are statistically significant differences in sixteen out of nineteen categories (fourteen out of sixteen when Coins and Unknown/Miscellaneous finds are excluded). For Eastern England and Western Britain, the pattern is broadly similar but with only fourteen categories with statistically significant differences (twelve with Coins and Unknown/Miscellaneous excluded). The makeup of each assemblage is broadly similar across the Highland and Lowland Zones. Therefore, in this case, it appears that it is the Highland and Lowland Zone divide that is important in the period.

For most categories, there is a higher percentage of finds in the Lowland Zone which fits well with general expectation of the area of Britain which was the most 'Romanised'. However, there is a higher percentage of finds in the Highland Zone in Coins and Funerary. The high percentage of Coins finds in the Highland Zone has been discussed above, with the conclusion that it is largely down to fewer finds in other categories rather than more Roman coinage reported. With the Coins and Unknown/Miscellaneous finds excluded from the data, the relative proportions of the remaining find types become clearer as they are no longer being swamped by the Coins data. There is then a higher percentage in the Highland Zone in more categories (ten out of sixteen as opposed to two out of

eighteen). This is to be expected, as the fact that such a high percentage of finds in the Highland Zone are coins means that removing them makes a greater difference.

Artefacts typically viewed as markers of identity and status have a higher percentage in the Lowland Zone, for example, Dress and Accessories, Personal Adornment and Brooches. Swift (2007: 387) identified dress as one of the three main areas of Roman social display. The Highland Zone is, conversely, dominated by Industry, Agriculture, Weapons and Building finds with fewer of those finds which are generally seen as the markers of *Romanitas*.

6.2.4.2 Early Medieval (AD 410-1066)

The Early Medieval data are more similar in terms of find types between the Highland and Lowland Zones. There are only differences in four out of nineteen categories (three out of seventeen with Coins and Unknown/Miscellaneous removed). When the finds are divided between Western Britain and Eastern England, the number of categories with differences increases to six (five with Coins and Unknown/Miscellaneous removed). The fact that the Early Medieval data are much more similar across the Highland-Lowland divide than the Roman data, suggests that this boundary was much less important in this time period. The higher number of differences between Western Britain and Eastern England may suggest that it is this boundary which was important in the Early Medieval period. However, it is not a great difference making firm conclusions incredibly difficult. This result matches that from the mapping of the period-specific datasets in Chapter Four. The data confirm that brooches are a key artefact type for identifying Early Medieval identity along with Cosmetic, Hygiene and Medical and Industry and Tools. A more robust conclusion will be drawn from assessment of the data from the case study period of AD 300-600 AD. This is the period which will

best display the degree of continuity and change across the late Roman to early Anglo-Saxon transition without the biasing factor of early Roman and post Anglo-Saxon finds.

The above identified differences between the assemblages are statistically significant but this does not place a value on the degree of difference. Some categories here have a greater difference than others. The aims of this research are to draw broad conclusions about the distribution of finds rather than assess the specific types of finds from each period. Therefore, the conclusions drawn are that there appears to be a statistically significant difference between the Highland Zone and the Lowland Zone during the Roman period that does not exist in the Early Medieval period. Further research into the find types would be necessary in order to analyse the specific find types causing this effect.

6.3 Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-1066)

Following an assessment of the PAS period datasets for the Roman and Early Medieval finds, the database was narrowed further to those finds from the period circa AD 300 - 600. This was done by separately cutting down the previous cleaned databases of Roman (AD 43 - 410) and Early Medieval (AD 410 - 1066) finds. As stated above (Chapter 6.2.1), the Greek and Roman Provincial and Byzantine finds were excluded from the data. This reduced the number of finds available for study but allowed a more detailed look at the period in question based on the distribution of PAS finds. The period-specific datasets for the PAS periods of Roman (AD 43-410) and Early Medieval (AD 410-1066) act as a control, much like the control dataset of all PAS finds do for the period-specific datasets.

The finds were cut down to the required date range first by removing all finds with a 'fromdate' value of greater than 600 and then removing all finds with a 'todate' value of less than 300. This removed those finds from the database that had been definitively dated by the FLOs to later than or prior to

the period in question. This did, however, leave a number of finds with a very broad date range. The dates for some finds had obviously been entered in error and this was able to be corrected based on the information given in the description. For example, find 489,265 (Figure 6.28) is a horse harness with a date given of AD 100 - 1100. The find is described as 'An incomplete Early Medieval (Anglo-Scandinavian) to Medieval cast copper alloy harness link' (Basford 2012) and Williams (2007: 5-6) suggests that these harness fittings date to the eleventh century. When looked up on the PAS website, this find is dated as AD 1000-1100.

Some Roman finds had more obviously incorrect values entered for 'fromdate' and/or 'todate'. For instance, find 251,415 had a 'fromdate' of 260364. These were edited to something more reasonable based on the description. In this example the description reads, 'probably dating from 260-275 AD' (Downes 2009). The 'todate' is likely supposed to read 364 and the 'fromdate' 260. The second example is a contemporary copy of a nummus of the House of Constantine which had been mistakenly dated to the Roman period. Others, such as 447,541, had date ranges that did not match the period given. 447,541 (Figure 6.29) is listed as Roman but with a 'fromdate' of 1940 and 'todate' of 1980. In this case the description states it has been adapted in the modern period or possibly a modern reproduction (Webley 2011). This example was deleted. This type of error did occur in the Early Medieval finds but not to the same degree.

Many finds are of a type that was used across a broad date range and are therefore difficult to date accurately. Find 460,171 (Figure 6.30) is a glass bead with the description stating that such 'blue glass beads were commonly used in the Iron Age, Roman and Saxon periods and again in the modern/Victorian era' (Cassidy 2011).

Figure 6.28 Early Medieval harness fitting, AD 1000-1100, Isle of Wight. Source: Basford (2012).

Figure 6.29 Copper-alloy zoomorphic brooch, possibly Roman or a modern reproduction, Winchester, Hampshire. Source: (Webley 2011).

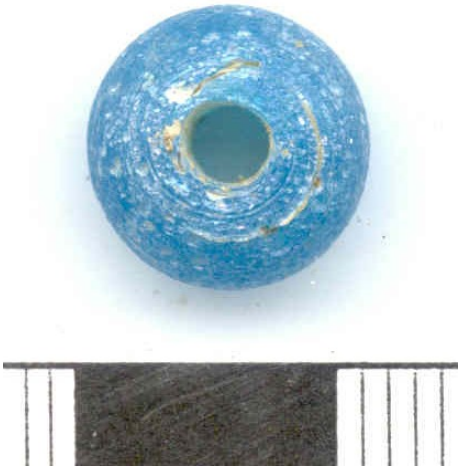


Figure 6.30 Translucent glass bead, 100 BC – AD 1500, Bedford. Source: Cassidy (2011).

Following this, finds with a 'fromdate' of less than 300 as well as a 'todate' of greater than 600 were studied in more detail. Where possible more specific date ranges were input. Finally, finds with no value recorded for 'fromdate' or 'todate' were cleaned in the same way. In order to add in dates for finds the descriptions and finds types were used. In many cases the date range or century is mentioned. In particular for coins, the Emperor or Dynasty could often date the coin where no dates had been entered into the database.

Where the description was unhelpful in determining the date, the find type can often assist. This is dependent on typology and is often difficult but is particularly useful in types of finds such as brooches which changed according to fashion over time. The date ranges of the PAS defined periods, Roman (AD 43-410) and Early Medieval (AD 410-1066) brooch types entered into the database can be found in Table 6.20 and Table 6.21. For brooch types with broad date ranges, for example penannular brooches which were in use outside the Roman and Anglo-Saxon periods, dating was attempted based on other information in the database. Other find types were dated based on information from the PAS database. Finds with no dates entered and where the description and

artefact type were of no use in determining the date range were deleted. This narrowing of the range of data produced finds from two new date categories which have been referred to for this thesis as: Late Roman (AD 300 -410) and Early Anglo-Saxon (AD 410 - 600). It is noted that these categories vary slightly from those date ranges usually categorised as late Roman or early Anglo-Saxon but they are necessarily constrained by the case study period of the fourth to the sixth centuries AD.

Figure 6.31 to Figure 6.34 show the density of Late Roman and Early Anglo-Saxon finds in each county. It can be seen that the distributions generally match those for the PAS periods Roman (AD 43-410) and Early Medieval (AD 410-1066). The Late Roman (Figure 6.31 and 6.32) distribution is broadly similar to the distribution for the entire dataset (Figure 4.1), whereas the Early Anglo-Saxon finds (Figure 6.33 and 6.34) are concentrated down the east coast of England.

Brooch type	Date range	Source
Colchester	1 - 75	Hattatt (1982: 60-63; 1989: 296-299), Mackreth (2011: 36-45).
Dolphin/Colchester Derivative	50 - 125	Hattatt (1982: 65-67; 1989: 299), Mackreth (2011: 50-102).
Polden Hill	50 - 125	Hattatt (1982: 69 1989: 300), Mackreth (69-81; 100-102).
T shaped/Colchester Derivative with Trumpet-style Knops	50 - 150	Hattatt (1982: 71-73; 1989: 302-305), Mackreth (2011: 112-113).
Headstud	43 - 200	Hattatt (1982: 39, 77; 1989: 332-333), Mackreth (2011: 103-109).
Langton Down	25 -75	Hattatt (1982: 80-82; 1989: 306), Mackreth (2011: 26-35).
Lion Bow/*Léontomorphe*	1 - 100	Hattatt (1982: 99; 1989: 307), Mackreth (2011: 29-30).
Aucissa	43 - 80	Hattatt (1982: 83-87; 317-318), Mackreth (2011: 130).
Hod Hill	43 - 70	Hattatt (1982: 88-93; 1989: 320-323), Mackreth (2011: 133-145).
Bagendon	1 - 50	Hattatt (1982: 96-97; 1989: 319), Mackreth (2011: 133-145).
Bow and Fantail	50 - 150	Hattatt (1982: 102-103; 1989: 315), Mackreth (2011: 50-99).
Trumpet	75 - 175	Hattatt (1982: 109; 1989: 326-327), Mackreth (2011: 114-125).
Knee	50 - 250	Hattatt (1982: 114-115; 1989: 334-336), Mackreth (2011: 189-195).
Crossbow	200 - 400	Hattatt (1982: 122-124; 1989: 368), Mackreth (2011: 196-205), Swift (2011: 194).
Dragonesque	100 - 200	Hattatt (1989: 351), Mackreth (2011: 186-188).
Disc (Roman)	100 - 200	Hattatt (1989: 344-347), Mackreth (2011: 154-178).
Skeuomorphic	100 - 200	Hattatt (1989: 358), Mackreth (2011: 154-178).
Zoomorphic	100 - 200	Hattatt (1989: 359), Mackreth (2011: 179-185).
Pennanular	Broad date range – requires further dating information	Mackreth (2011: 206-233), Swift (2011: 194).

Table 6.20 Date ranges of Roman (AD 43-410) brooch types entered into the database.

Brooch Type	Date Range	Source
Annular	450 - 850	Hammond (2009: 25); Pollington (2010: 227)
Ansate	725 - 850	Portable Antiquities Scheme (2003)
Bird	400-600	Lucy (2000: 2000); Hammond (2009: 24); Pollington (2010: 226)
Bow	Broad date range – requires further dating information	Hammond (2009: 29); Pollington (2010: 230)
Button	400 - 550	Avent and Evison (1982: 96); Hammond (2009: 47); Pollington (2010: 246)
Cruciform	400 - 800	Åberg (1926: 28-56); Leeds and Pocock (1971); ; Hammond (2009: 29-35); Pollington (2010); Martin (2015)
Disc	Broad date range – requires further dating information	Dickinson (1979); MacGregor and Bolick (1993: 57); Lucy (2000: 34; Owen Crocker 2004: 40); Hammond (2009: 46); Pollington (2010: 244)
Equal-arm	340 - 525	MacGregor and Bolick 1993: 150-51); Hammond (2009: 36); Pollington (2010: 236); Inker (2006: 6, 10-12,16-19, 32, 41-44); Suzuki (2006: 39)
Great square-headed	500 - 700	Hines 1997b: 14); Shepherd 1998: 18-24); Hammond (2009: 41-45); Pollington (2010: 241);
Keystone	500 - 699	Hammond (2009: 49); Pollington (2010: 247)
Penannular	Broad date range – requires further dating information	Jessup: 1974: 36-8; MacGregor and Bolick 1993: 93); Geake 1997: 52-4): Lucy (2000: 37); Alcock (2003: 30-4); Owen Crocker (2004: 40); Hinton (2005: 17); Hammond (2009: 27); Pollington (2010: 230)
Plate	Broad date range – requires further dating information	
Quoit	400 - 600	Ager (1985: 5); White (1990: 133); Walton-Rogers (2007: 116-7); Suzuki (2000); Hammond (2009: 26); Pollington (2010: 228)
Saucer brooch	400 - 599	Hammond (2009: 52-55); Pollington (2010)
Small-long	400 - 750	Hammond (2009: 38-9); Pollington (2010)
Ring	Broad date range – requires further dating information	

Table 6.21 Date ranges of Early Medieval (AD 410-1066) brooch types entered into the database.

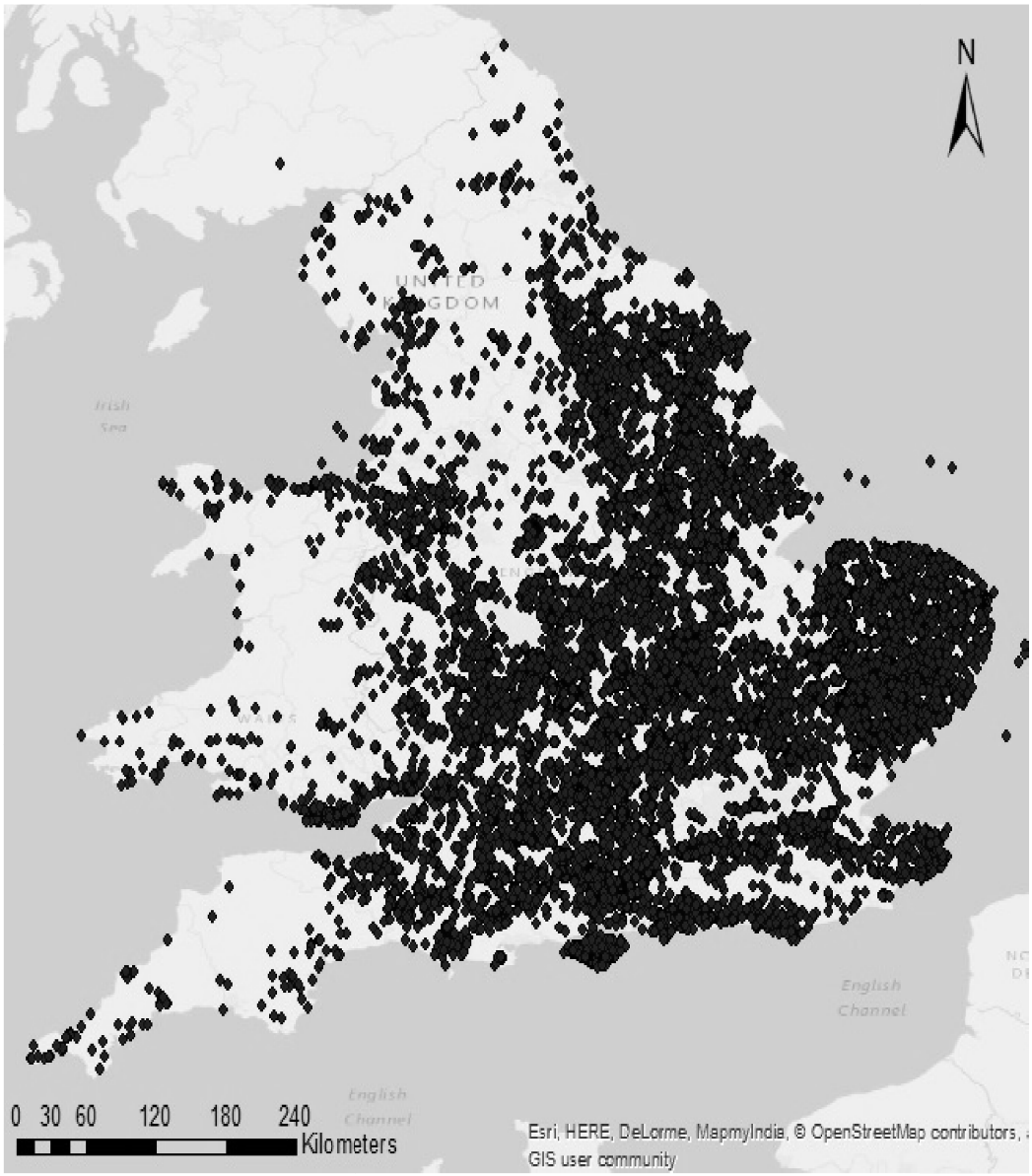


Figure 6.31 Late Roman (AD 300-410) finds distribution. Map produced using ArcGIS with data from the PAS.

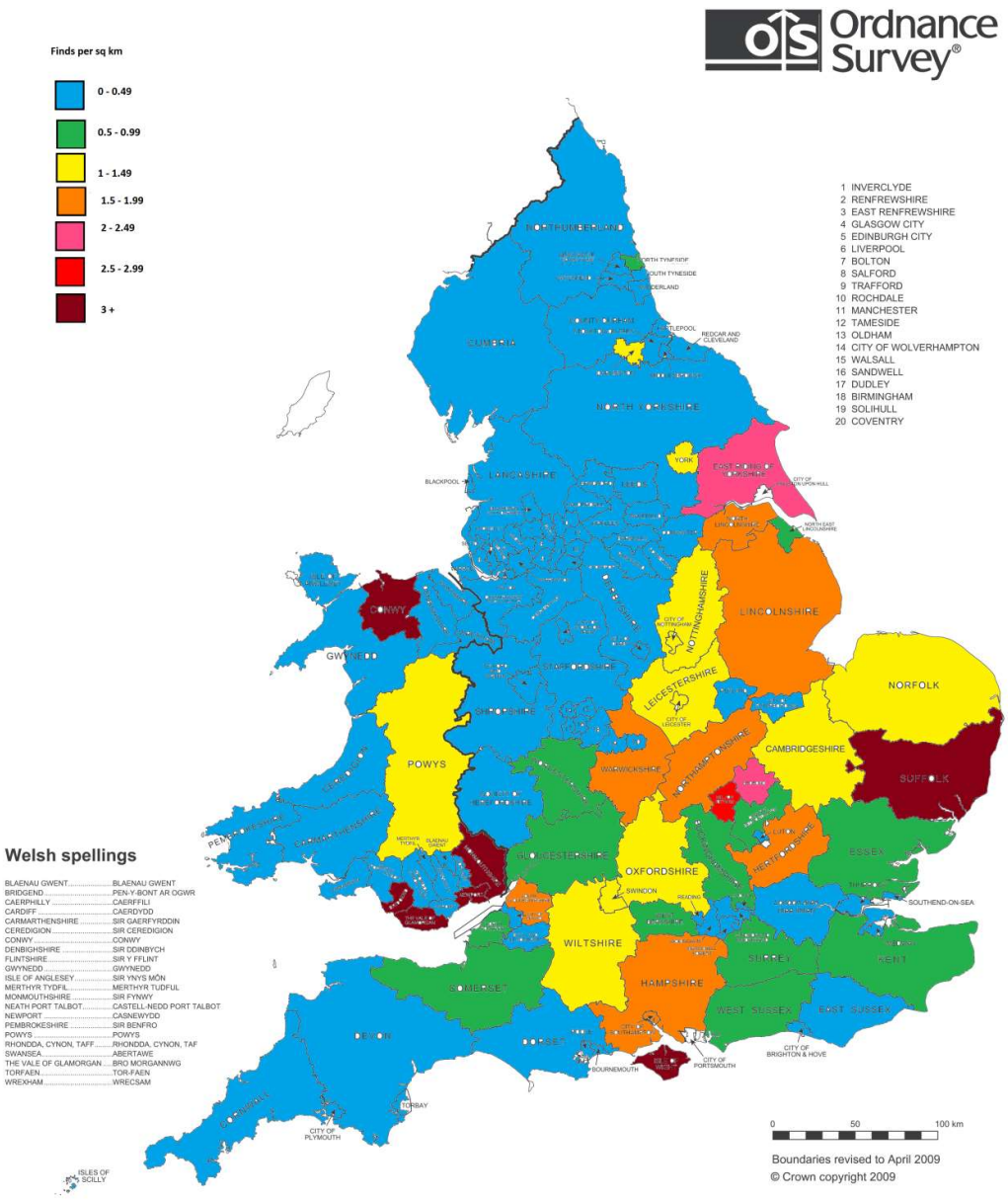


Figure 6.32 The density of Late Roman (AD 300-410) finds in each county. Map produced using data from the PAS database, base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

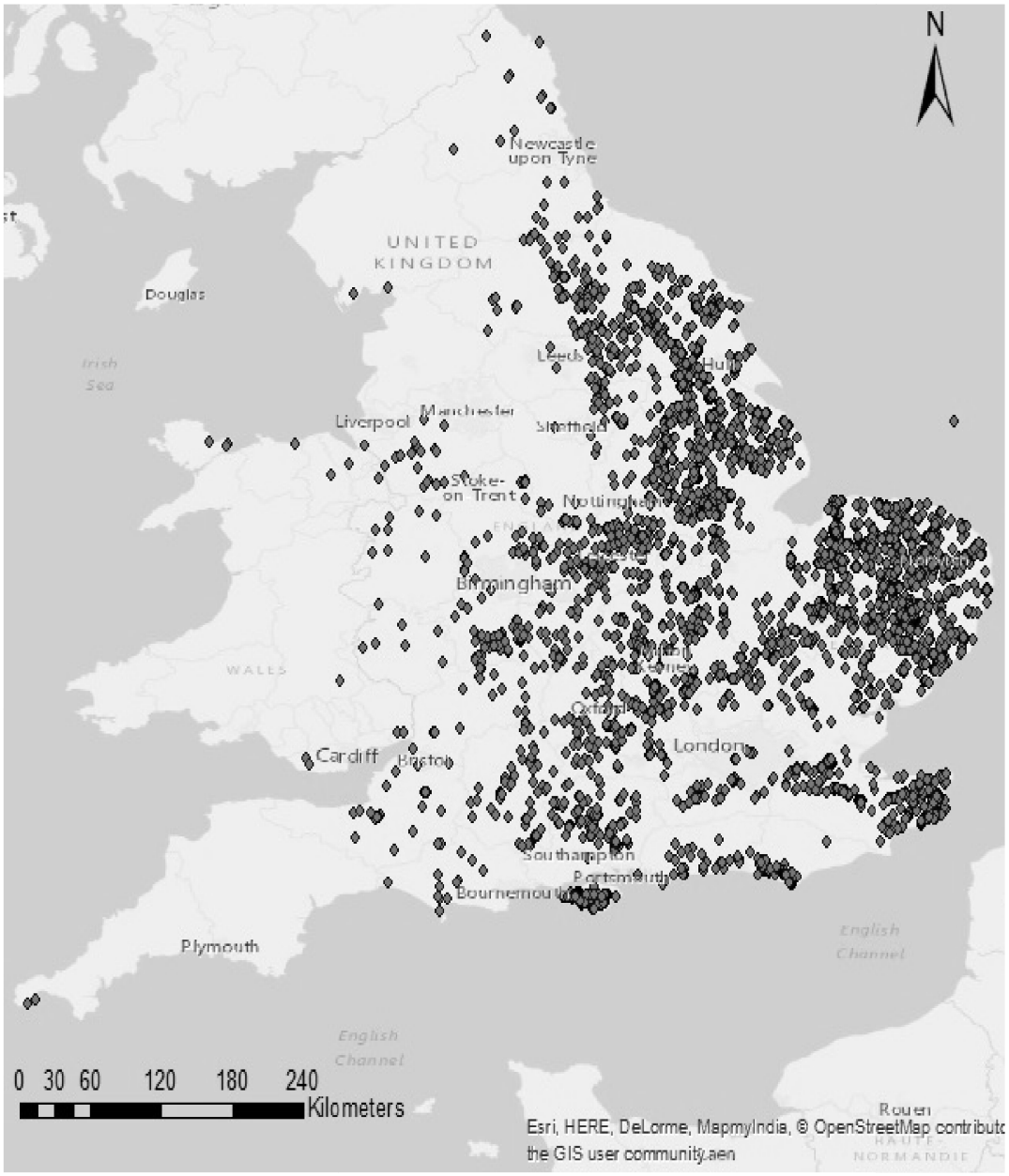


Figure 6.33 Early Anglo-Saxon (AD 410-600) finds distribution. Map produced using ArcGIS with data from the PAS.

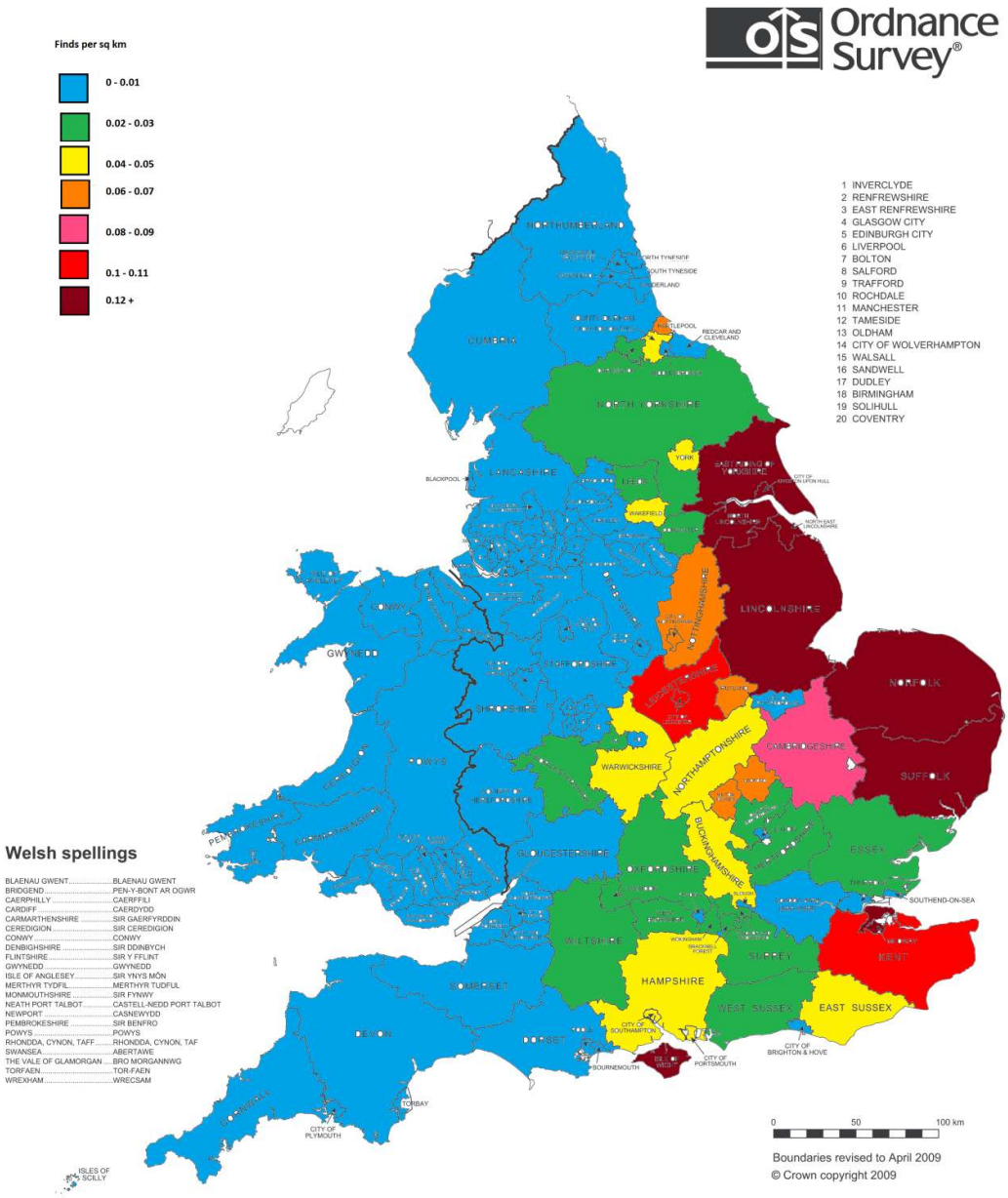


Figure 6.34 The density of Early Anglo-Saxon (AD 410-600) finds in each county. Map produced using data from the PAS database, base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

6.3.1 Makeup of assemblages

As expected based on the data for the entire Roman (AD 43-410) and Early Medieval (AD 410-1066) periods (as defined by the PAS), there are fewer finds in the case study period of Early Anglo-Saxon (AD 410-600) than Late Roman (AD 300-410) (Table 6.22). There are finds in all of the broad categories in the Late Roman period but no Travel and Transport, Building Materials or Heating and Lighting finds in the Early Anglo-Saxon period.

Broad Category	**Late Roman**	**Early Anglo-Saxon**
Coins	107178	121
Travel and Transport	8	0
Industry and Tools	840	126
Agriculture	74	1
Weaponry and Military Equipment	70	185
Horse Equipment	324	49
Writing and Communication	112	8
Locks	445	15
Domestic	8357	373
Building Materials	666	0
Heating and Lighting	13	0
Personal Adornment	2884	283
Dress and Accessories	1110	1319
Brooches	1943	3496
Recreation	81	22
Cosmetic, Hygiene and Medical	753	117
Religion or Ritual	70	10
Funerary	2	32
Unknown/Misc	4022	773
Total	128952	6930

Table 6.22 The number of finds per broad object category in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Data from the PAS.

Figure 6.35 to Figure 6.38 visualise the finds assemblage in each period. The Late Roman finds are dominated by Coins finds (83%) (Figure 6.35). Figure 6.8 shows that the entire Early Medieval (AD 410-1066) assemblage had a broadly equal spread of find numbers across the broad categories. However, the Early Anglo-Saxon (AD 410-600) material (Figure 6.36) is dominated by brooches (50%). This is partly due to the methodology used when cutting down the finds. Brooches are the easiest find type to assign a date to where no other information is given. Material in other categories is more difficult to date. The Personal Adornment and Dress and Accessories categories were often also more difficult to assign a date to where none was previously given in the database. In the Early Medieval cleaned database there were 559 Personal Adornment finds. Of these, 139 (24.87%) were beads with a broad date range given and not possible to date more accurately on the information provided. The Early Medieval Personal Adornment finds were also often already relatively closely dated by the PAS. In fact, only 39 (6.98%) were broadly dated to the PAS Early Medieval period of AD 410-1066. The finds for all of the categories were also assigned dates based on the description, not only find types mentioned above (Table 6.20 and Table 6.21), and the same methodology was followed for the Roman and Early Medieval finds. It is important to keep in mind any possible biasing factors in the data. This means it is not always possible to accurately compare data across the different periods (the PAS defined categories of Roman and Early Medieval and the Late Roman and Early Anglo-Saxon categories defined by this research), only across the various geographical zones within these periods (Highland and Lowland or Western Britain and Eastern England).

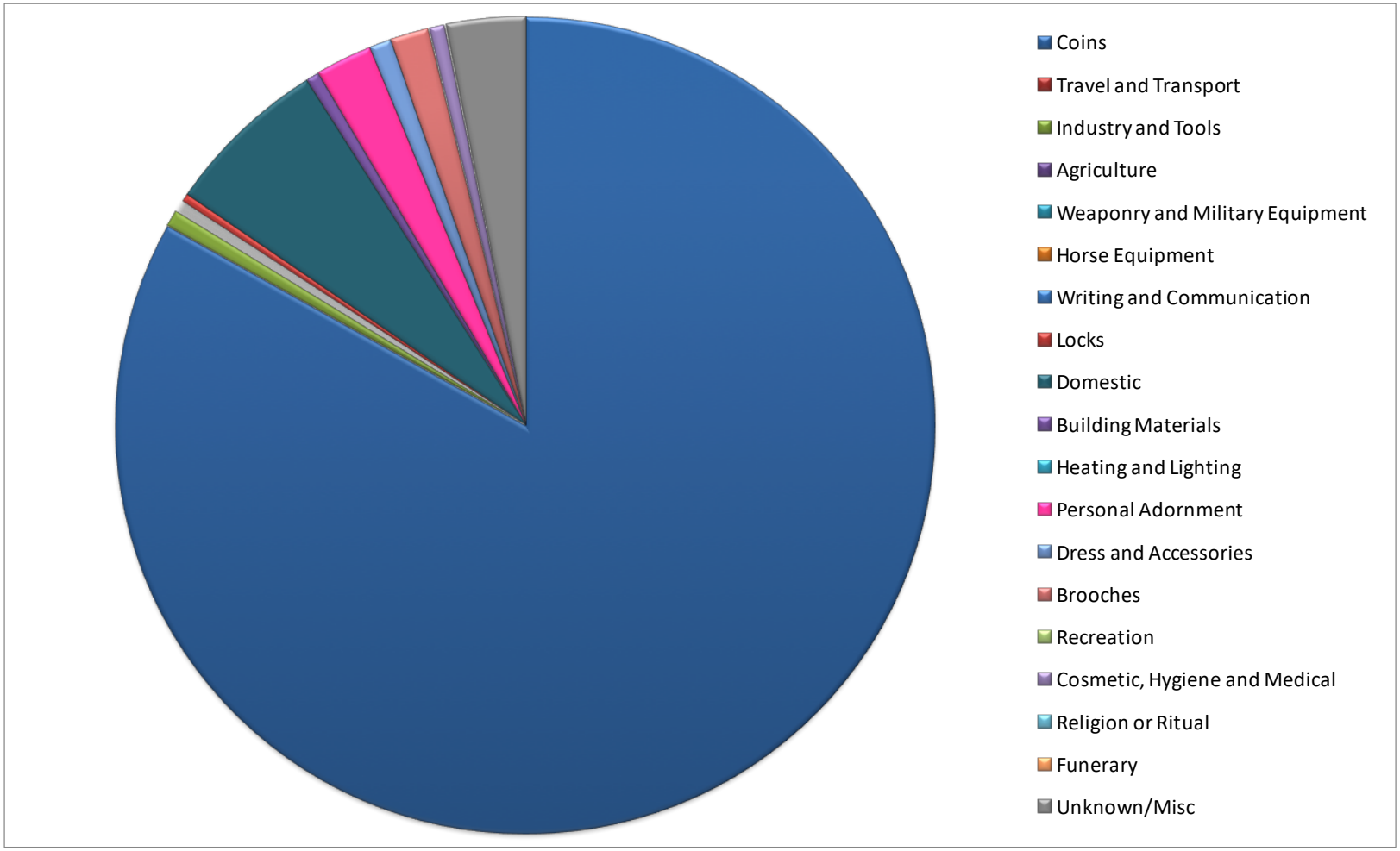


Figure 6.35 The Late Roman (AD300-410) assemblage. Graph produced using data from the PAS.

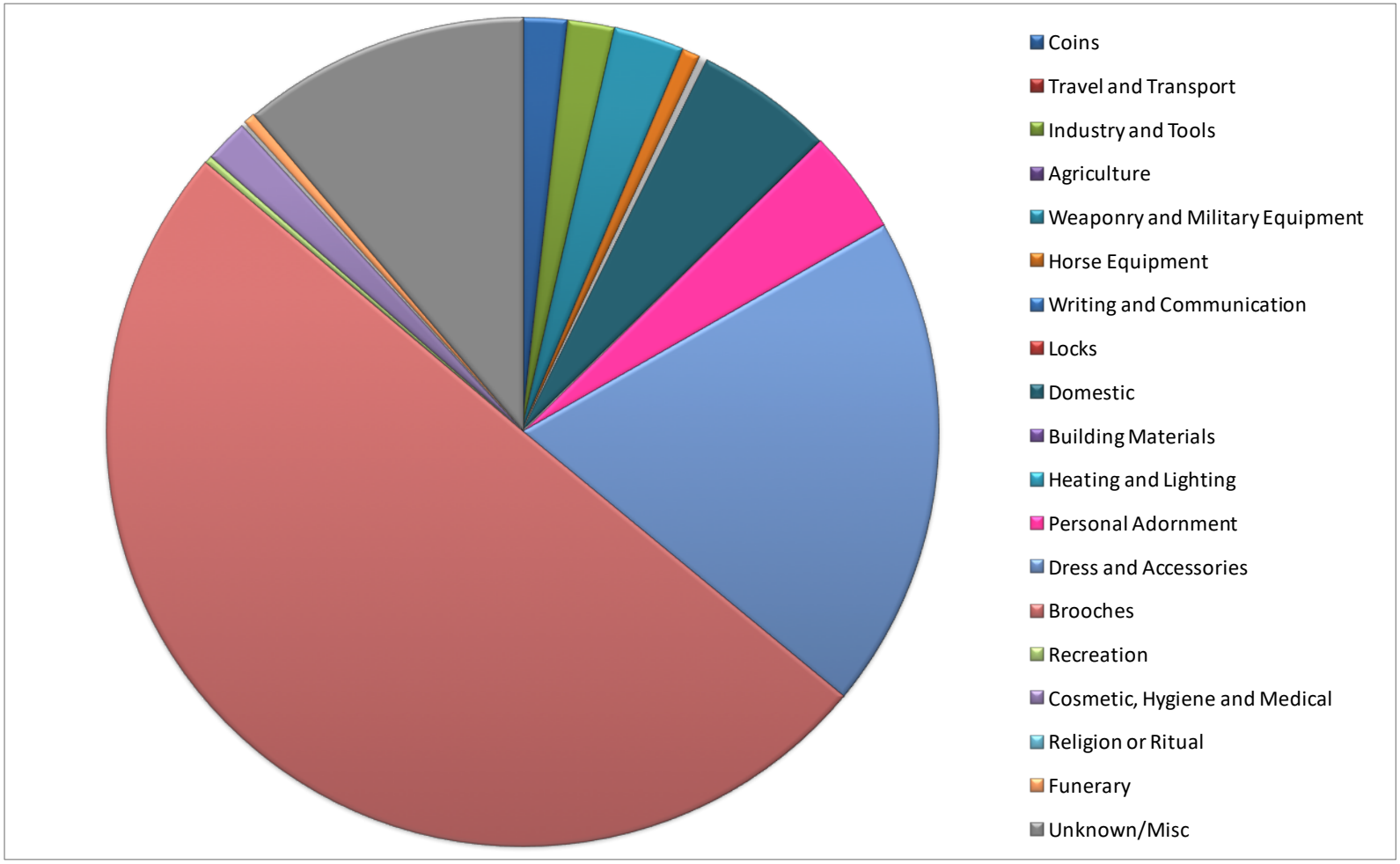


Figure 6.36 The Early Anglo-Saxon (AD 410-600) assemblage. Graph produced using data from the PAS.

In order to attempt to remove the biasing factor of the large number of Coins finds in the Late Roman material, the graphs were again reproduced with the Coins and Unknown/Miscellaneous finds removed from the data. These graphs can be seen in Figures 6.37 to 6.38.

The Late Roman (AD 300-410) assemblage now looks very different to the, PAS defined, Roman (AD 43-410) one. Whereas the Roman assemblage was dominated by Brooches (46%) followed by Domestic (28%) (Figure 6.9), the Late Roman assemblage has a majority of Domestic (47%) finds, with Brooches only making up 11% (Figure 6.37). The Anglo-Saxon (AD 410-600) finds have a large number of Brooches (58%) with Dress and Accessories (22%) and Domestic (6%) making up the most important categories. The dramatic drop in the contribution of Brooches to the late Roman assemblage tallies with excavated material which also suggests a Late Roman decline in brooch use (Cool 2010: 279; Collins 2010; Gerrard 2013: 105).

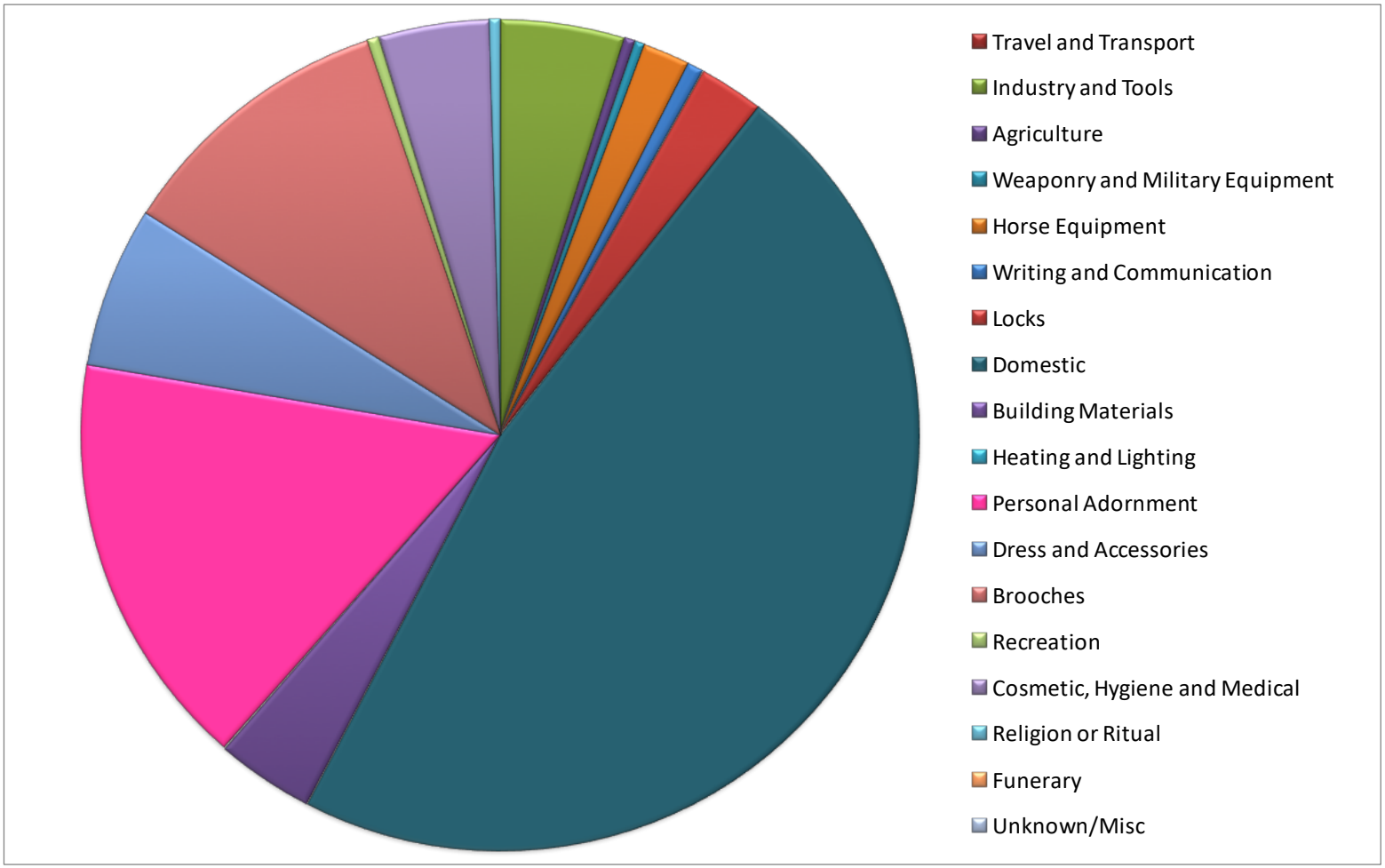


Figure 6.37 The Late Roman (AD 300-600) assemblage with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

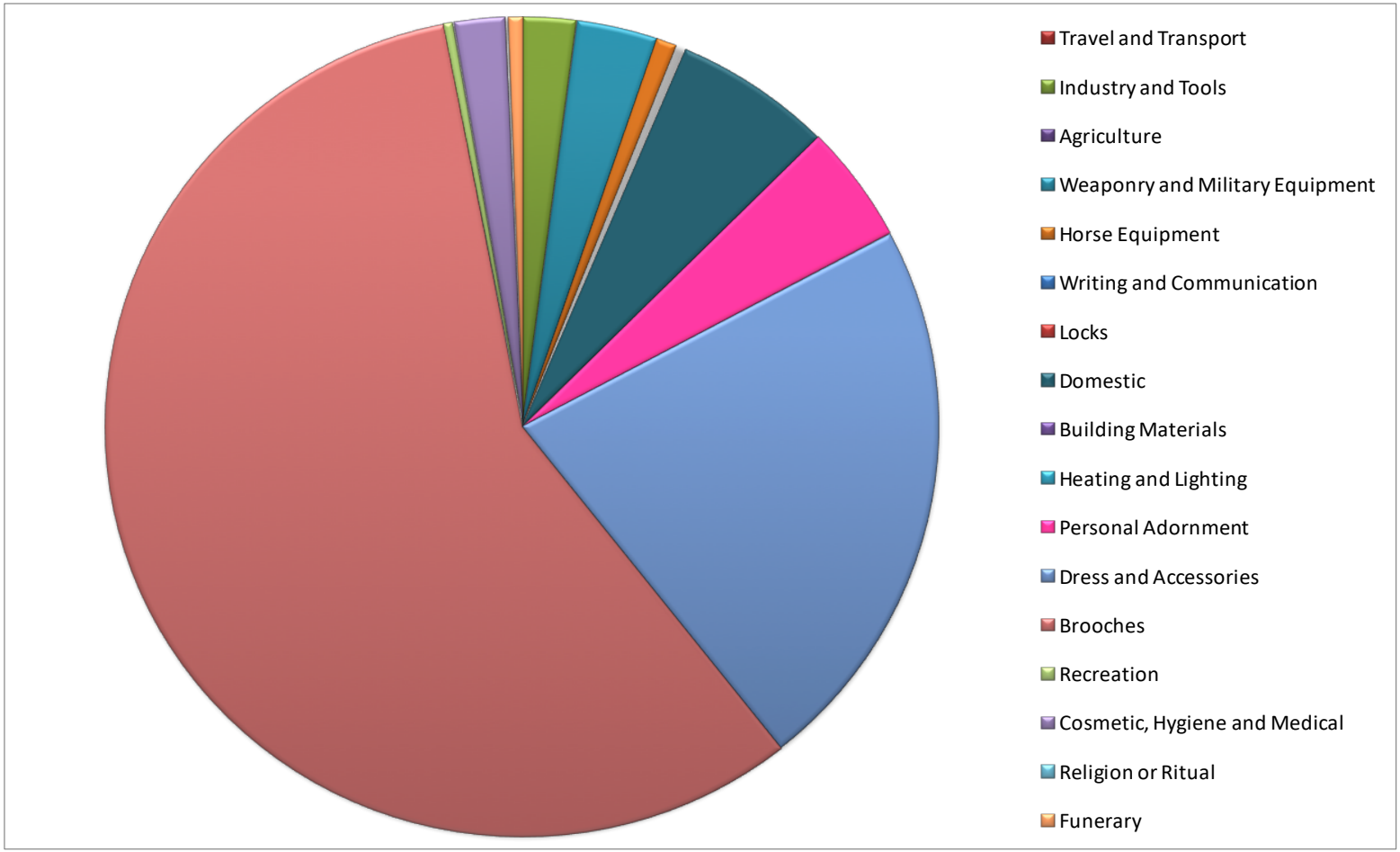


Figure 6.38 The Early Anglo-Saxon (AD 410-600) assemblage with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

The Chi-squared tests show whether the distribution of finds is even across the broad categories. Table 6.23 demonstrates that in the majority of cases there is a statistically significant difference in the number of finds in each broad category. The null hypothesis in all cases is that there is no significant difference in the number of finds across the broad object categories. In all cases with Coins and Unknown/Miscellaneous finds removed, the P-value is approximately zero.

Period	P-value – all finds	P-value – with Coins an Unknown/Miscellaneous finds removed
Late Roman	0.00	0.00
Early Anglo-Saxon	0.00	0.00

Table 6.23 Chi-squared tests for data across the broad categories both with and without Coins and Unknown/Miscellaneous finds. Data from the PAS.

Table 6.24 shows the Chi-squared tests between the Late Roman (AD 43-410) and Early Anglo-Saxon (AD 410-600) finds. These tests were carried out in exactly the same way as those for the Roman and Early Medieval finds. There is a statistically significant difference in all categories. Comparing Table 6.24 with Table 6.3 shows an intriguing number of object categories with a statistically significant higher proportion of Early Anglo-Saxon finds. Only four object categories had a significantly higher percentage of Early Medieval finds:

- Weaponry and Military Equipment
- Horse Equipment
- Dress and Accessories
- Funerary Contexts

In contrast there are twelve categories with a higher percentage of Early Anglo-Saxon finds:

- Industry and Tools
- Weaponry and Military Equipment
- Horse Equipment
- Writing and Communication
- Personal Adornment
- Dress and Accessories
- Brooches
- Recreation
- Cosmetic, Hygiene and Medical
- Religion or Ritual
- Funerary Contexts
- Unknown/Miscellaneous

Broad Object Category	% Late Roman	% Early Anglo-Saxon	P-value
Coins	83.11	1.75	0.00
Travel and Transport	0.01	0.00	0.005
Industry and Tools	0.65	1.82	0.00
Agriculture	0.06	0.01	2.123E-17
Weaponry and Military Equipment	0.05	2.67	0.00
Horse Equipment	0.25	0.71	0.00
Writing and Communication	0.09	0.12	0.00
Locks	0.35	0.22	0.00
Domestic	6.48	5.38	0.00
Building Materials	0.52	0.00	7.4E-1.47
Building Materials	0.52	0.00	7.4E-147
Heating and Lighting	0.01	0.00	0.00
Personal Adornment	2.24	4.08	0.00
Dress and Accessories	0.86	19.03	0.00
Brooches	1.51	50.45	0.00
Recreation	0.06	0.32	6.12E-09
Cosmetic. Hygiene and Medical	0.58	1.69	0.00
Religion or Ritual	0.05	0.14	0.00
Funerary Contexts	0.00	0.46	0.00
Unknown/Misc	3.12	11.15	0.00

Table 6.24 Chi-squared tests for finds in each broad object category in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Calculated according to the proportion of Late Roman and Early Anglo-Saxon finds in each broach object category. Categories with a statistically significant higher percentage of Late Roman finds are shaded in purple and categories with a statistically significant higher percentage of Early Anglo-Saxon finds are shaded in green. Data from the PAS.

Possible reasons for the higher proportion of Early Anglo-Saxon Brooches have been discussed above, although it was also stated that the same methodology was used for the Roman finds and, therefore, this did not necessarily cause this difference. Furthermore, there is no such reason for the higher percentages of finds in other categories. However, the impact of the much greater number of Coins finds in the Late Roman period must be considered. As discussed in the previous chapter, such

a large number of finds in one category makes the remaining categories appear proportionally smaller.

Table 6.25 shows the same data but with the Coins and Unknown/Miscellaneous finds removed. This demonstrates that excluding the Coins finds from the data means that a much higher number of categories have a higher percentage of finds in the Late Roman period. Using this analysis, only Weaponry and Military Equipment, Dress and Accessories, Brooches and Funerary Contexts have a higher proportion of finds in the Early Anglo-Saxon periods. It may be that these categories of find are those most likely to be identified as post-Roman and/or least likely to be recognised as Late Roman. These are all categories of artefact which are likely to be used in order to display identity. This makes it much more likely that Anglo-Saxon examples of these finds will be identified, as there is a clear difference between Anglo-Saxon and Roman material culture. As explained above, many Anglo-Saxon finds in the PAS database are likely to be from dispersed cemeteries. The distribution of finds from the PAS Early Medieval period (Figure 4.24) matches that of fifth to seventh/eighth century burials (Figure 4.11a). The examples of material culture from such contexts are likely to be weaponry, dress accessories and brooches. This is in line with the excavated evidence for the Anglo-Saxon period, much of which is represented by funerary contexts in contrast to the domestic and settlement evidence for later and post-Roman Britain (Lucy 1998: 2, 2000: 1).

The difference in funerary practice between the Late Romano-British and pre-Christian Anglo-Saxon cultures may explain the difference in the proportion of the above categories of finds. In the Late Roman period burials were generally largely unfurnished (Lucy and Reynolds 2002: 1-8) whereas in Anglo-Saxon areas in the post-Roman period Christian cemeteries disappear (Taylor 2001: 135) and grave goods are abundant. This makes it more likely for an Anglo-Saxon grave to be found by a metal detectorist than a late Roman one.

Even with the Coins finds removed from the data it is necessary to keep in mind that the number of finds in other categories can affect the percentage contribution of any one category as much as the number of finds in the category itself.

Broad Object Category	% Late Roman	% Early Anglo-Saxon	P-value
Travel and Transport	0.05	0.00	0.005
Industry and Tools	4.73	2.09	0.00
Agriculture	0.42	0.02	2.123E-17
Weaponry and Military Equipment	0.39	3.06	0.00
Horse Equipment	1.83	0.81	0.00
Writing and Communication	0.63	0.13	0.00
Locks	2.51	0.25	0.00
Domestic	47.08	6.18	0.00
Building Materials	3.75	0.00	7.4E-147
Heating and Lighting	0.07	0.00	0.00
Personal Adornment	16.25	4.69	0.00
Dress and Accessories	6.25	21.85	0.00
Brooches	10.95	57.92	0.00
Recreation	0.46	0.36	6.12E-09
Cosmetic. Hygiene and Medical	4.24	1.94	0.00
Religion or Ritual	0.39	0.17	0.00
Funerary Contexts	0.01	0.53	0.00

Table 6.25 Chi-squared tests for finds in each broad object category in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods with Coins and Unknown/Miscellaneous finds removed. Calculated according to the proportion of Late Roman and Early Anglo-Saxon finds in each broad object category. Categories with a statistically significant higher percentage of Early Anglo-Saxon finds are shaded in green. Data from the PAS.

6.3.2 Highland and Lowland Zones

The data for the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods so far show that, despite a greater number of Late Roman finds (128,952 Late Roman finds versus 6,930 Early Anglo-Saxon finds), there are in fact proportionally more Early Anglo-Saxon finds in many categories.

The data suggest that geographical location may have a significant bearing on the proportions of Late Roman and Early Anglo-Saxon finds. By comparing the numbers and proportions of finds in each broad category across the Highland and Lowland Zones, the effect of geographical location on find numbers and types can be assessed. Table 6.26 shows the number of finds per category in each of the two zones for the Late Roman and Early Anglo-Saxon periods. The data for the Late Roman and Early Anglo-Saxon periods in each zone is then shown in the pie charts in Figure 6.39 to Figure 6.42.

Broad Category	Late Roman Highland	Late Roman Lowland	Early Anglo-Saxon Highland	Early Anglo-Saxon Lowland
Coins	29208	77603	2	118
Travel and Transport		8		
Industry and Tools	106	730	4	122
Agriculture	13	61		1
Weaponry and Military Equipment	14	56	7	175
Horse Equipment	18	304	1	47
Writing and Communication	15	96		8
Locks	10	432		15
Domestic	563	7752	11	361
Building Materials	46	619		
Heating and Lighting	1	12		
Personal Adornment	93	2776	8	272
Dress and Accessories	28	1074	17	1298
Brooches	65	1867	57	3425
Recreation	10	70	1	21
Cosmetic, Hygiene and Medical	13	737		116
Religion or Ritual	6	64		10
Funerary	2			32
Unknown/Misc	229	3782	34	734

Table 6.26 The number of finds per broad category in the Highland and Lowland Zones in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Data from the PAS.

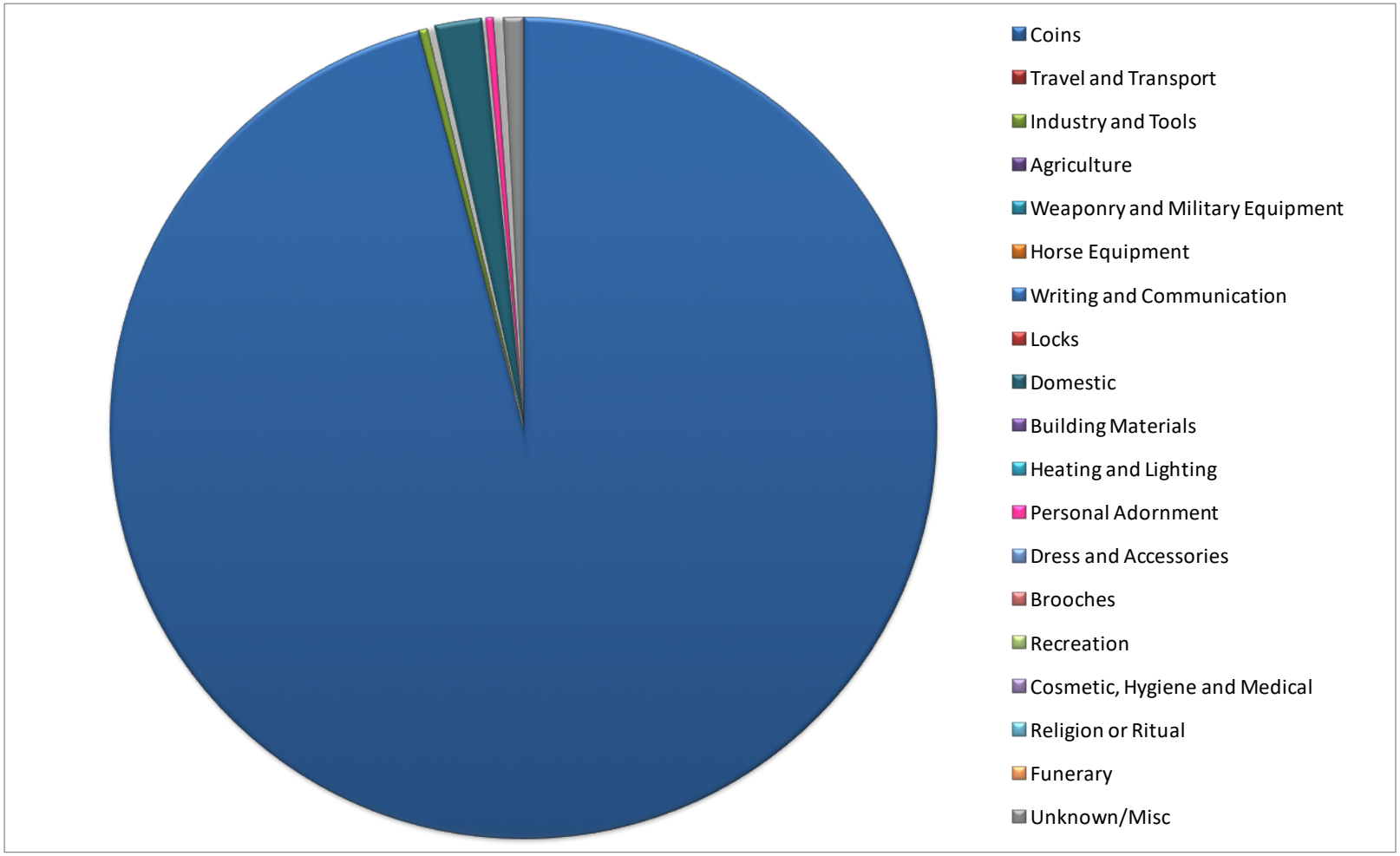


Figure 6.39 The Late Roman (AD 300-410) assemblage in the Highland Zone. Graph produced using data from the PAS.

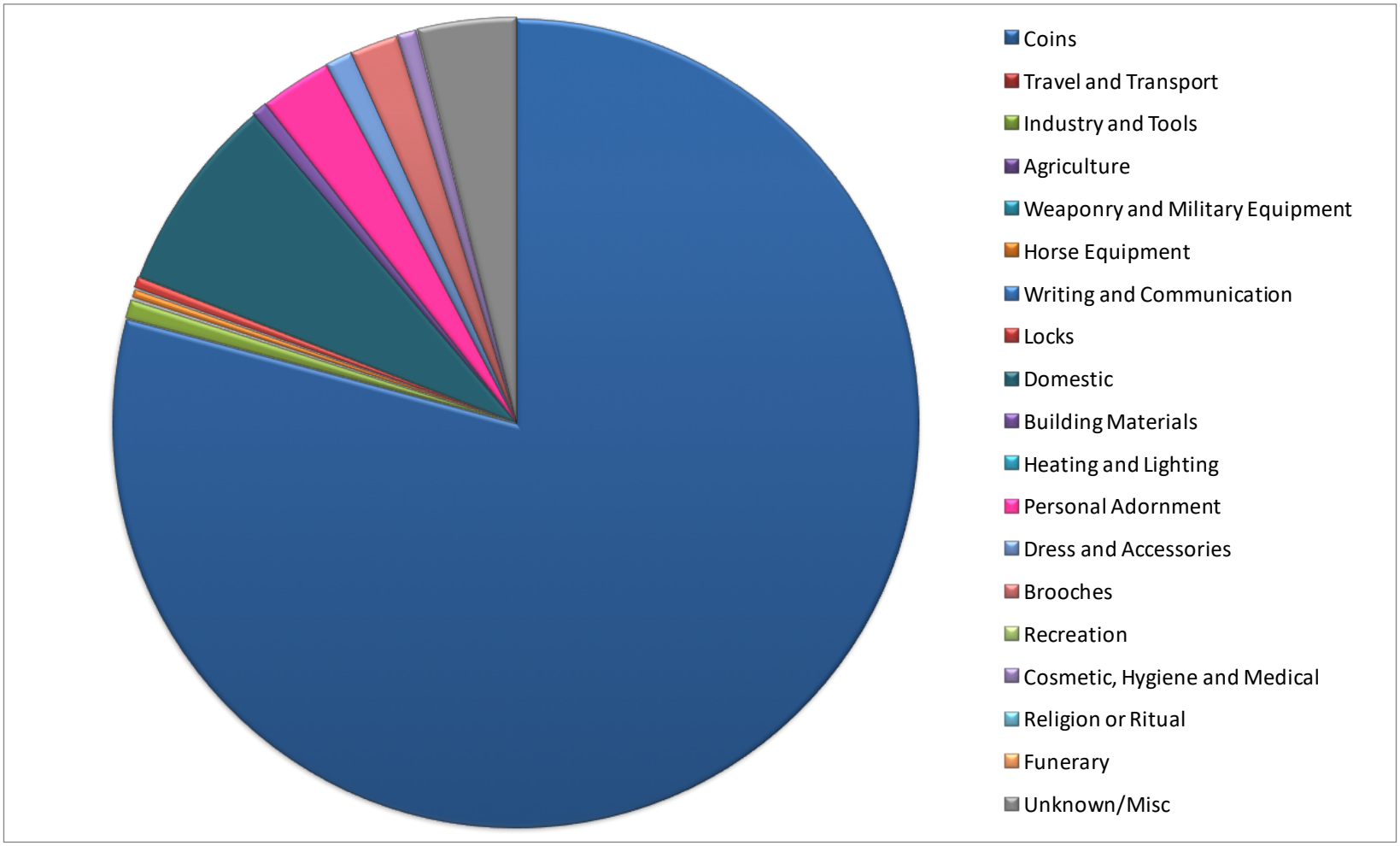


Figure 6.40 The Late Roman (AD 300-410) assemblage in the Lowland Zone. Graph produced using data from the PAS.

As was the case with the PAS defined categories, Roman (AD 43-410) and Early Medieval (AD 410-1066), it is the Late Roman (AD 300-410) case study period assemblage in the Lowland Zone (Figure 6.40) which most closely resembles the country-wide assemblage (Figure 6.35). The Highland Zone again has a higher proportion of Coins finds (96% in the Highland Zone, 79% in the Lowland Zone).

The Chi-squared tests in Table 6.27 were carried out in the same way as those above.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Coins	95.9527	79.152	1.60E-173
Travel and Transport	0	0.0082	0.01
Industry and Tools	0.3482	0.7446	0
Agriculture	0.0427	0.0622	0.29
Weaponry and Military Equipment	0.046	0.0571	0.63
Horse Equipment	0.0591	0.3101	3.09E-20
Writing and Communication	0.0493	0.0979	0.02
Locks	0.0329	0.4406	1.98E-28
Domestic	1.8495	7.9067	0
Building Materials	0.1511	0.6314	1.85E-24
Heating and Lighting	0.0033	0.0122	0.62
Personal Adornment	0.3055	2.8314	4.60E-176
Dress and Accessories	0.092	1.0954	1.61E-67
Brooches	0.2135	1.9043	0
Recreation	0.0329	0.0714	0.01
Cosmetic, Hygiene and Medical	0.0427	0.7517	9.04E-59
Religion or Ritual	0.0197	0.0653	0
Funerary	0.0066	0	0
Unknown/Misc	0.7523	3.8575	2.70E-184

Table 6.27 Chi-squared tests for percentage contribution of each broad object category to the overall Late Roman (AD 300-410) assemblage in the Highland and Lowland Zones. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

The results are extremely similar to those of the Chi-squared tests for the Roman assemblage (Table 6.5). The majority of object types (sixteen out of nineteen) have a statistically significant difference between the two zones. There is a higher percentage of finds in the Lowland Zone in the majority of categories with a higher percentage of Highland Zone finds in the Coins and Funerary categories.

As stated above, it is important to fully understand percentages when assessing the finds in this way. The higher percentage of finds in a certain category does not always mean a higher number of finds. In both the Roman (Table 6.5) and Late Roman (Table 6.27) assemblages, the higher percentage of Coins finds in the Highland Zone is due to fewer finds in other categories rather than more Coins finds.

Chi-squared tests have not been carried out for the density of finds for the Late Roman and Early Anglo-Saxon finds as this merely demonstrates that there are more finds per square kilometre in the Lowland Zone than in the Highland Zone. This has already been thoroughly demonstrated and is the same across all periods.

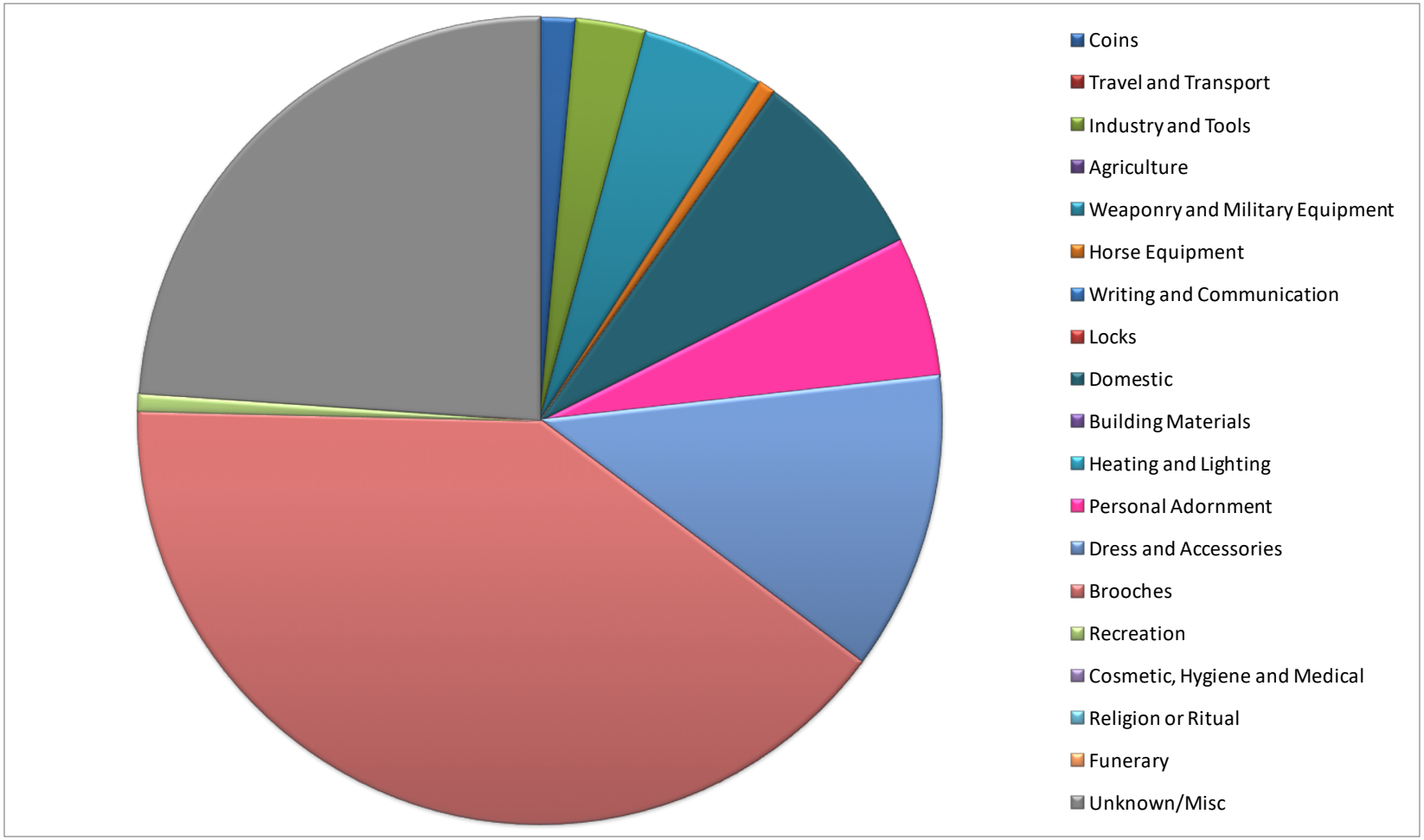


Figure 6.41 The Early Anglo-Saxon (AD 410-600) assemblage in the Highland Zone. Graph produced using data from the PAS.

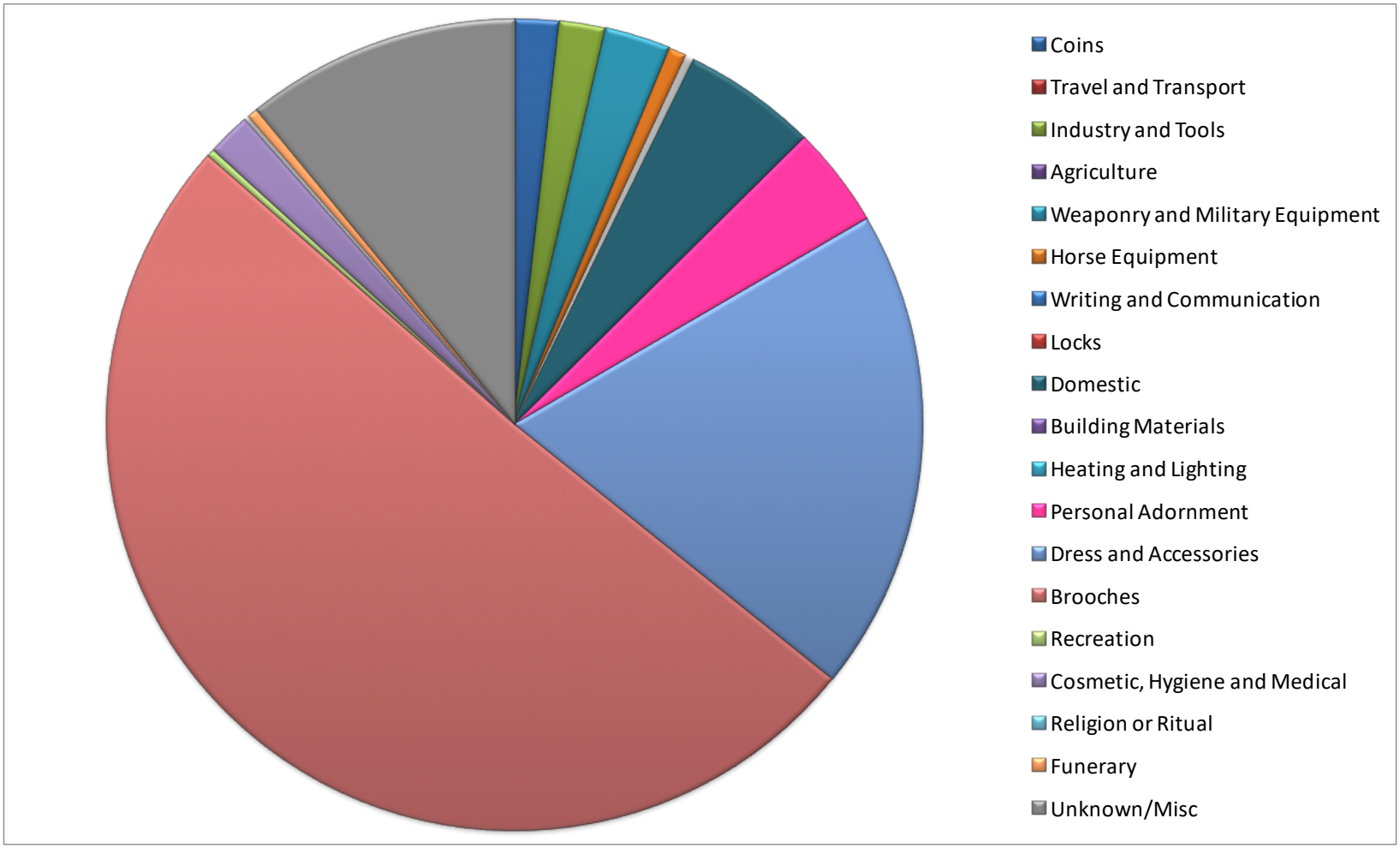


Figure 6.42 The Early Anglo-Saxon (AD 410-600) assemblage in the Lowland Zone. Graph produced using data from the PAS.

Unlike the Early Medieval (AD 410-1066) finds in Figure 6.17 and Figure 6.18 there appears at first sight to be more of a difference in assemblages apparent between the Highland and Lowland Zones in the Early Anglo-Saxon (AD 410-600) period. The Lowland Zone assemblage (Figure 6.42) mostly closely resembles that of the whole dataset (Figure 6.36) with a higher proportion of Brooches (51% in the Lowland Zone and 40% in the Highland Zone) and Dress and Accessories (19% in the Lowland Zone and 12% in the Highland Zone) and a lower proportion of Unknown/Miscellaneous (11% in the Lowland Zone and 24% in the Highland Zone).

However, comparison with the data for the Early Medieval period in the Highland and Lowland Zones does show that the largest difference, that between the percentages of Brooches in each zone, is mirrored in the Early Medieval assemblage. The Chi-squared results (Table 6.28) demonstrate that this apparent difference is not statistically significant. There is only a statistically significant difference in the percentage of finds in each zone in the Unknown/Miscellaneous category. This supports the assertion made in Chapter 6.2 that, whilst there is a clear difference in number and type of finds across the Highland and Lowland Zones in the Roman (AD 43-410) period, there is much less of a difference in the Early Medieval (AD 410-1066) finds. In fact, in the Early Anglo-Saxon (AD 410-600) finds, there is almost no difference in the type of finds found across the Highland and Lowland Zones. From Chapter Four, it is known that there are more finds in all periods in the Lowland Zone. Any discussion of finds distribution must be compared to this baseline before any accurate conclusions can be made. Therefore, the fact that there are more Early Anglo-Saxon and Early Medieval finds in the Lowland Zone may be a factor of modern recovery as this is seen in all periods. The distribution of certain types of finds, however, is something that is different in the Late Roman and Early Anglo-Saxon periods. In the Late Roman (AD 300-410) period, most categories have a higher percentage of finds in the Lowland Zone. In contrast, the Early Anglo-Saxon (AD 410-600) period shows no such distinction. There is no statistically significant difference in the majority of

categories and only a significantly higher percentage in the Highland Zone for Unknown/Miscellaneous finds. The two zones appear much more similar in the immediate post-Roman period (AD 410-600) than prior.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Commerce	1.4085	1.7469	0.76
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	2.8169	1.8061	0.38
Agriculture	0.0000	0.0148	0.88
Weaponry and Military Equipment	4.9296	2.5907	0.18
Horse Equipment	0.7042	0.6958	1.98
Writing and Communication	0.0000	0.1184	1.36
Locks	0.0000	0.2221	1.15
Domestic	7.7465	5.3442	0.45
Building Materials	0.0000	0.0000	N/A
Heating and Lighting	0.0000	0.0000	N/A
Personal Adornment	5.6338	4.0266	0.69
Dress and Accessories	11.9718	19.2154	0.10
Brooches	40.1408	50.7032	0.24
Recreation	0.7042	0.3109	0.82
Cosmetic, Hygiene and Medical	0.0000	1.7172	0.24
Religion or Ritual	0.0000	0.1480	1.29
Funerary	0.0000	0.4737	0.82
Unknown/Misc	23.9437	10.8660	0.00

Table 6.28 Chi-squared tests for percentage contribution of each broad category to the overall Early Anglo-Saxon (AD 410-600) assemblage in the Highland and Lowland Zones. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

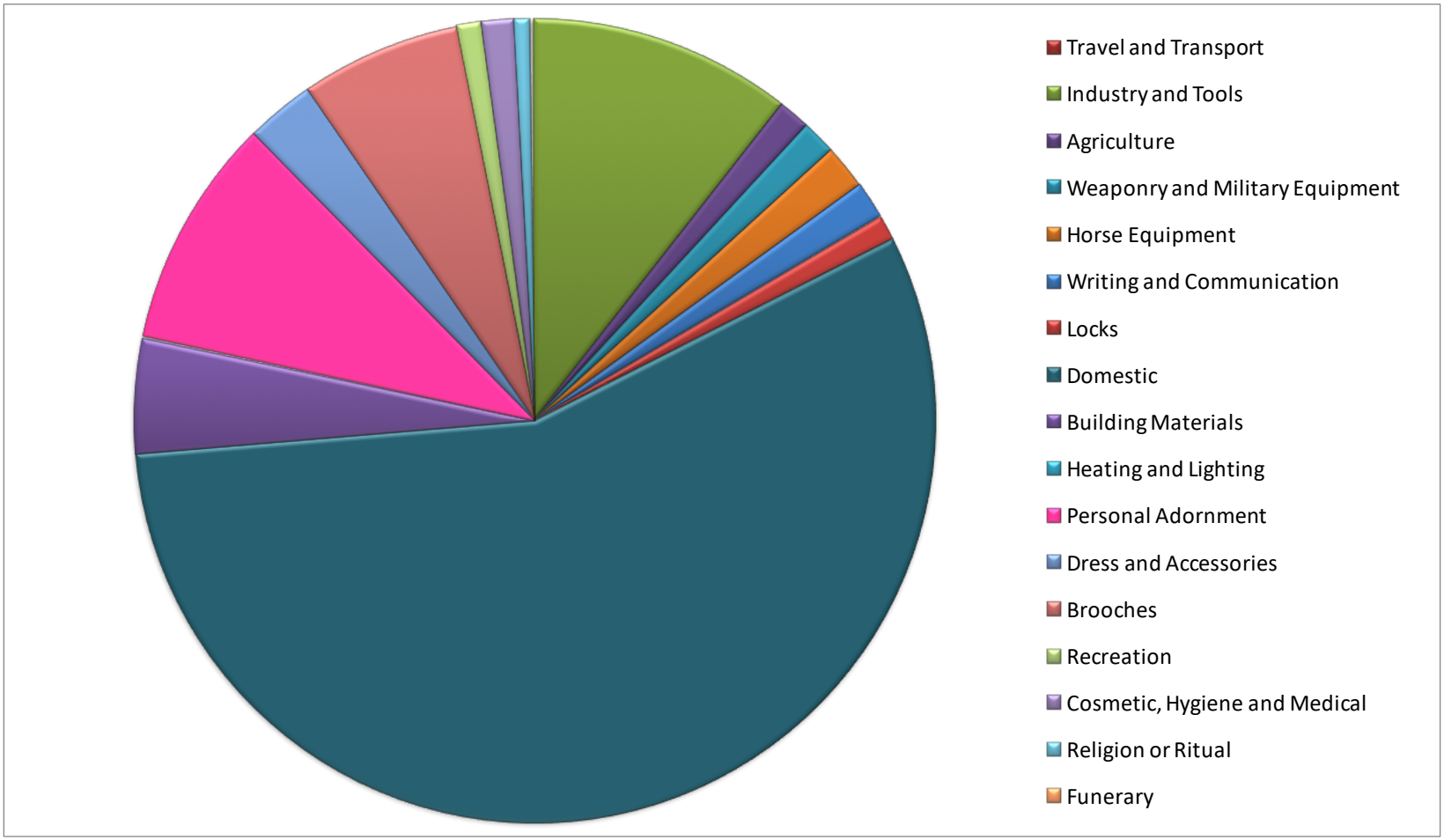


Figure 6.43 The Late Roman (AD 300-410) assemblage in the Highland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

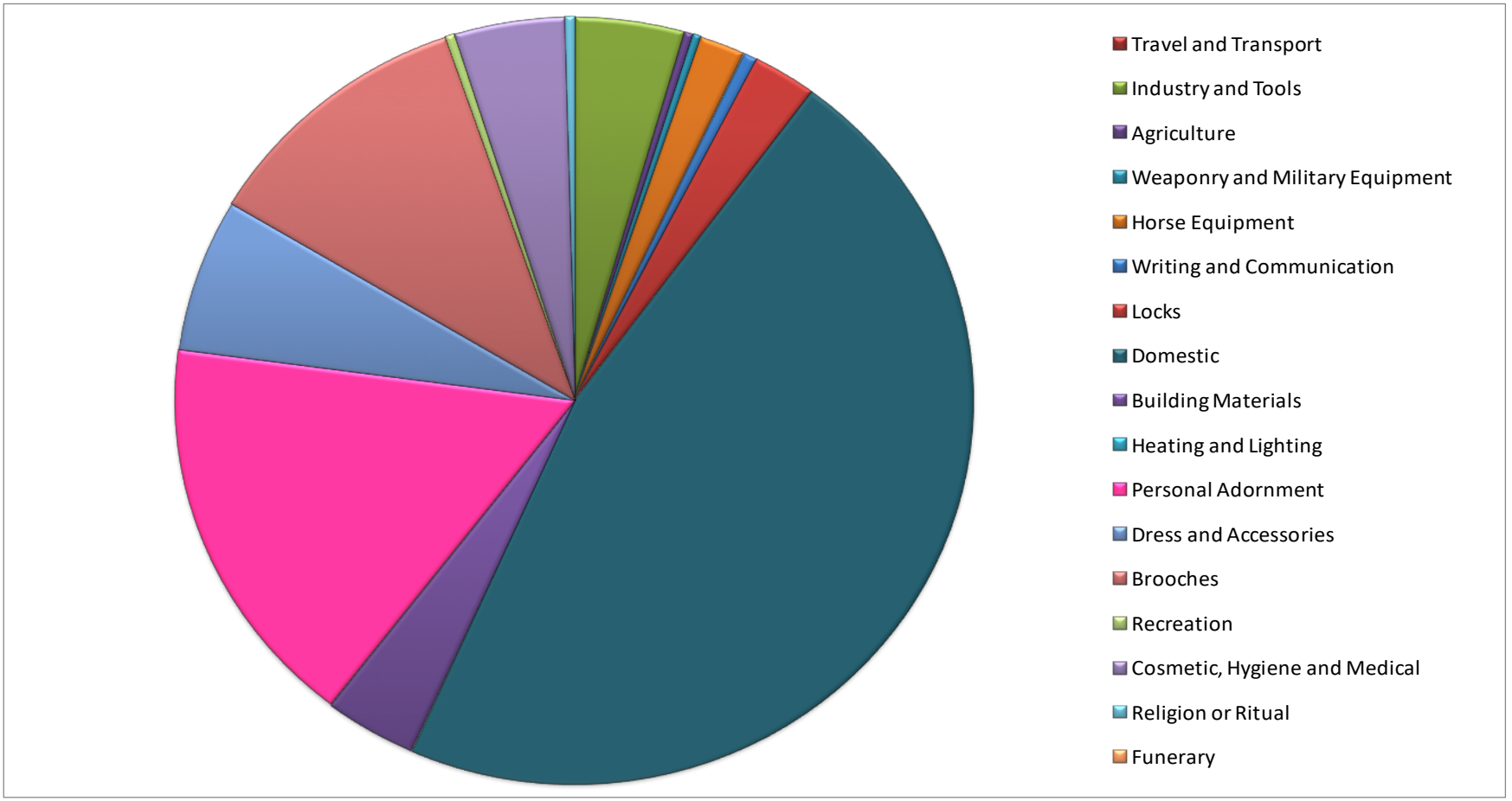


Figure 6.44 The Late Roman (AD 300-410) assemblage in the Lowland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS

Figure 6.43 and Figure 6.44 appear to show a difference in the makeup of the Late Roman assemblage in each zone when Coins and Unknown/Miscellaneous finds are removed. Although both are dominated by Domestic (47% in the Lowland Zone and 56% in the Highland Zone) the distribution of finds across the remaining categories shows clear differences. For example, there is a higher proportion of Industry and Tools (11%) in the Highland Zone than in the Lowland Zone (4%). This was also observed in the Roman finds (Figure 6.15 and Figure 6.16).

Table 6.29 shows these differences in many categories when Chi-squared tests were carried out. The differences from percentages including Coins and Unknown/Miscellaneous finds are as follows:

- Broad object categories with a higher percentage of finds in the Lowland Zone when including Coins and Unknown/Miscellaneous but a higher percentage in the Highland Zone when excluding them:
    - Industry and Tools
    - Writing and communication
    - Domestic
    - Building Materials
    - Heating and Lighting
    - Recreation
    - Religion or Ritual

Broad Category	% Highland Zone	% Lowland Zone	P-value
Travel and Transport	0.0000	0.0480	0.01
Industry and Tools	10.5683	4.3823	0.00
Agriculture	1.2961	0.3662	0.29
Weaponry and Military Equipment	1.3958	0.3362	0.63
Horse Equipment	1.7946	1.8249	3.09E-20
Writing and Communication	1.4955	0.5763	0.02
Locks	0.9970	2.5933	1.98E-28
Domestic	56.1316	46.5362	0.00
Building Materials	4.5862	3.7159	1.85E-24
Heating and Lighting	0.0997	0.0720	0.62
Personal Adornment	9.2722	16.6647	4.6E-176
Dress and Accessories	2.7916	6.4474	1.61E-67
Brooches	6.4806	11.2078	0.00
Recreation	0.9970	0.4202	0.01
Cosmetic, Hygiene and Medical	1.2961	4.4243	9.04E-59
Religion or Ritual	0.5982	0.3842	0.00
Funerary	0.1994	0.0000	0.00

Table 6.29 Chi-squared tests for percentage contribution of each broad category to the Late Roman (AD 300-410) assemblage in the Highland and Lowland zones with Coins an Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS

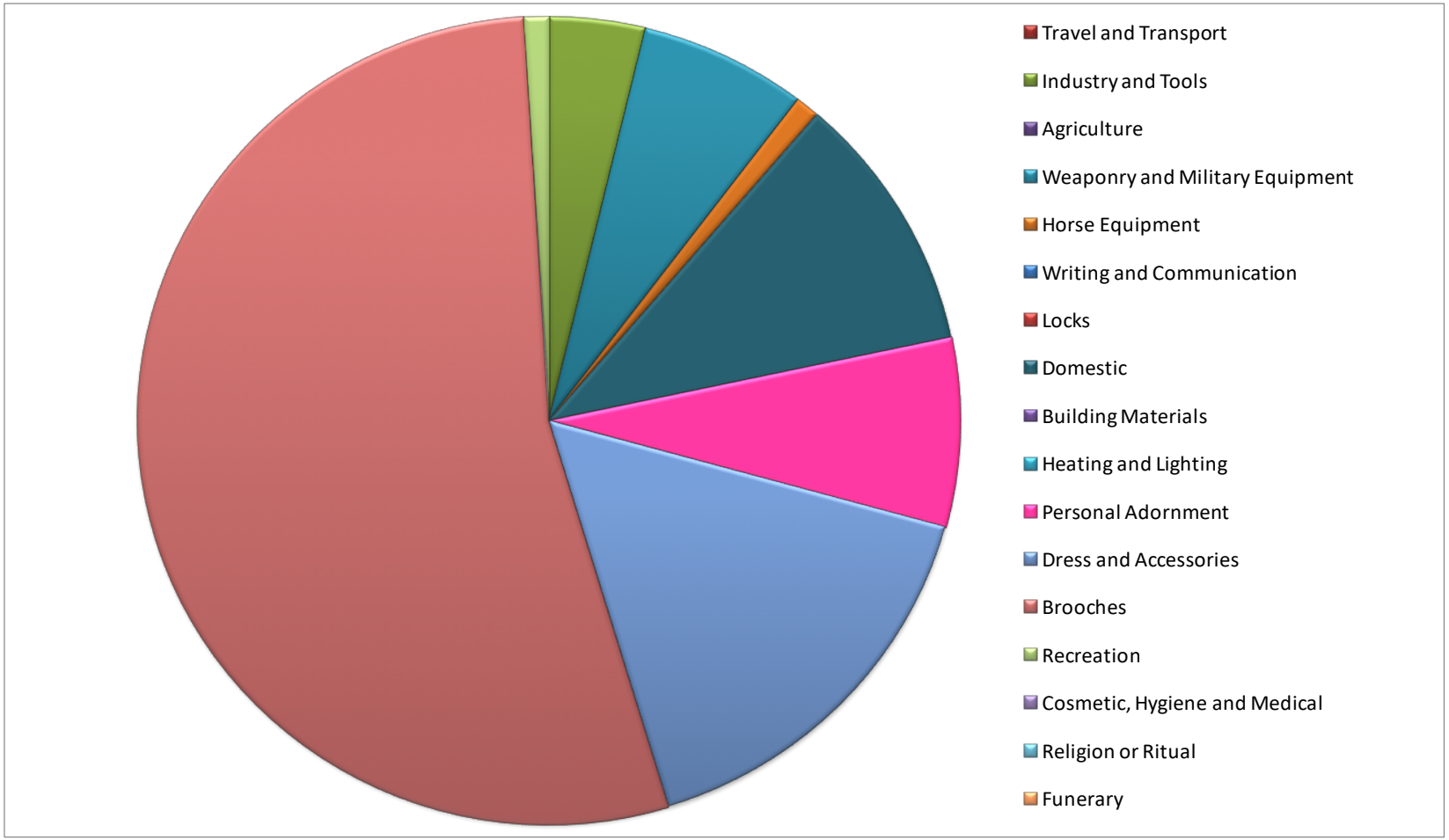


Figure 6.45 The Early Anglo-Saxon (AD 410-600) assemblage in the Highland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

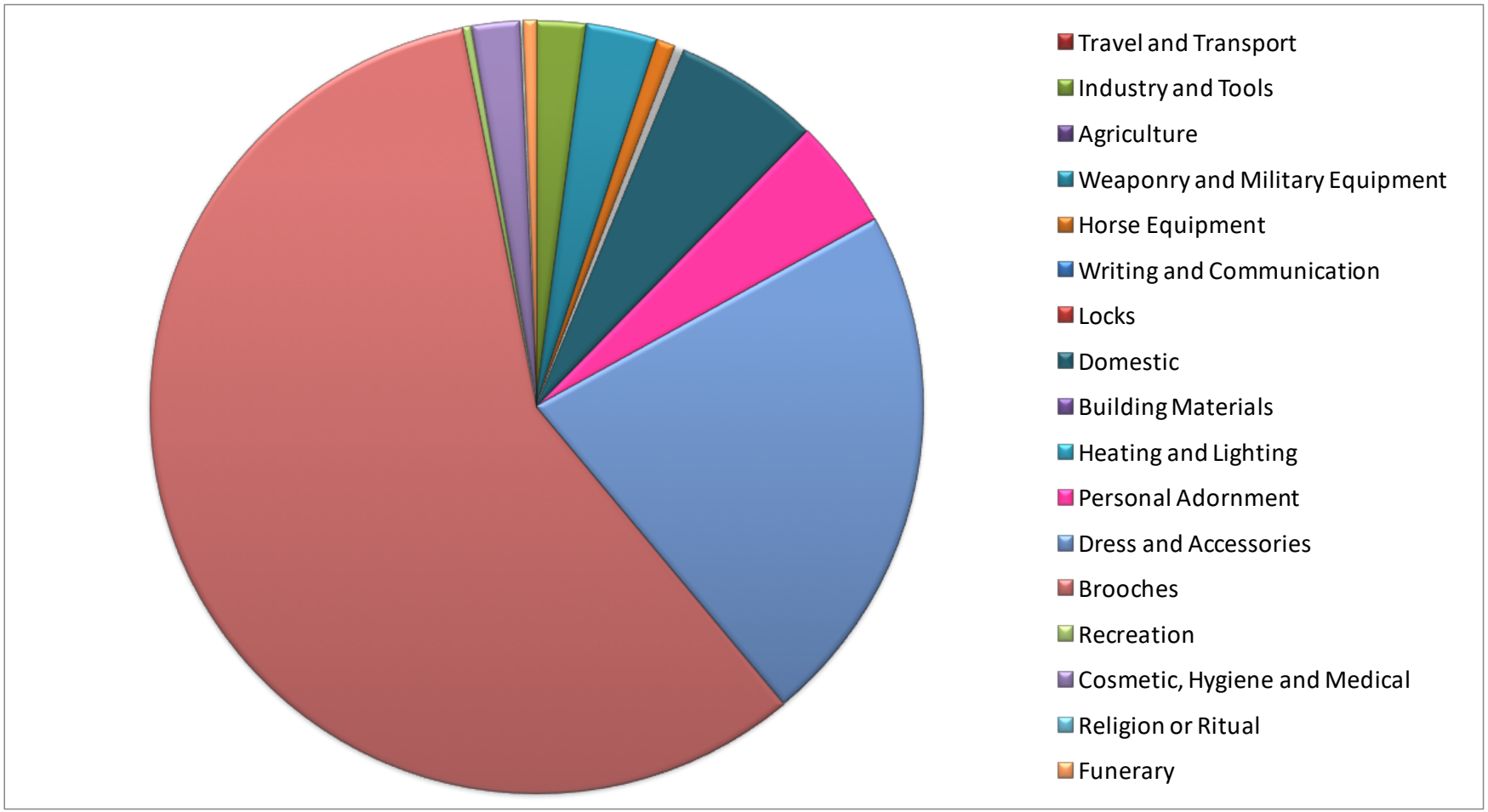


Figure 6.46 The Early Anglo-Saxon (AD 410-600) assemblage in the Lowland Zone with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

Figure 6.45 and Figure 6.46 are further evidence that the makeup of the Early Anglo-Saxon (AD 410-600) assemblages are, similarly to the Early Medieval (AD 410-1066) assemblages (Figure 6.17 and Figure 6.18), comparable in both the Highland and Lowland Zones. The main categories of finds in both zones are:

- Brooches (54% in the Highland Zone, 58% in the Lowland Zone)
- Dress and Accessories (16% in the Highland Zone, 22% in the Lowland Zone)
- Domestic (10% in the Highland Zone, 6% in the Lowland Zone)

In this case, unlike the Early Medieval assemblage, there is much greater similarity in the percentage of Brooches in the Highland and Lowland Zones. The Chi-squared tests for the Early Anglo-Saxon assemblage with Coins and Unknown/Miscellaneous finds removed (Table 6.30) back up this supposition. Unlike the Late Roman finds, there are no differences between the finds with and without the Coins and Unknown/Miscellaneous categories as there are no categories with a statistically significant difference between the two zones.

Broad Category	% Highland Zone	% Lowland Zone	P-value
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	3.7736	2.0667	0.38
Agriculture	0.0000	0.0169	0.88
Weaponry and Military Equipment	6.6038	2.9646	0.18
Horse Equipment	0.9434	0.7962	1.98
Writing and Communication	0.0000	0.1355	1.36
Locks	0.0000	0.2541	1.15
Domestic	10.3774	6.1155	0.45
Building Materials	0.0000	0.0000	N/A
Heating and Lighting	0.0000	0.0000	N/A
Personal Adornment	7.5472	4.6078	0.69
Dress and Accessories	16.0377	21.9888	0.10
Brooches	53.7736	58.0213	0.24
Recreation	0.9434	0.3558	0.82
Cosmetic, Hygiene and Medical	0.0000	1.9651	0.24
Religion or Ritual	0.0000	0.1694	1.29
Funerary	0.0000	0.5421	0.82

Table 6.30 Chi-squared tests for percentage contribution of each broad category to the Early Anglo-Saxon (AD 410-600) assemblage in the Highland and Lowland Zones with Coins an Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of Lowland Zone finds are shaded in red and those with a statistically significant higher percentage of Highland Zone finds are shaded in blue. Data from the PAS.

6.3.3 Eastern England and Western Britain

As with the previous data analysis, the broad object categories within the Late Roman and Early Anglo-Saxon data have been examined. Table 6.31 shows the number of finds in each broad object category with Figure 6.47 to Figure 6.50 displaying the data as pie charts.

Broad Category	Late Roman Western Britain	Late Roman Eastern England	Early Anglo-Saxon Western Britain	Early Anglo-Saxon Eastern England
Coins	38733	68078	9	111
Travel and Transport		8		
Industry and Tools	221	615	5	121
Agriculture	22	52		1
Weaponry and Military Equipment	23	47	14	168
Horse Equipment	39	283	6	42
Writing and Communication	25	86		8
Locks	42	400		15
Domestic	2086	6229	21	351
Building Materials	187	478		
Heating and Lighting	1	12		
Personal Adornment	455	2414	26	254
Dress and Accessories	150	952	78	1237
Brooches	361	1571	132	3350
Recreation	27	53	3	19
Cosmetic, Hygiene and Medical	84	666	2	114
Religion or Ritual	17	53		10
Funerary	2			32
Unknown/Misc	546	3465	65	703

Table 6.31 The number of finds per broad category in Western Britain and Eastern England in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Data from the PAS.

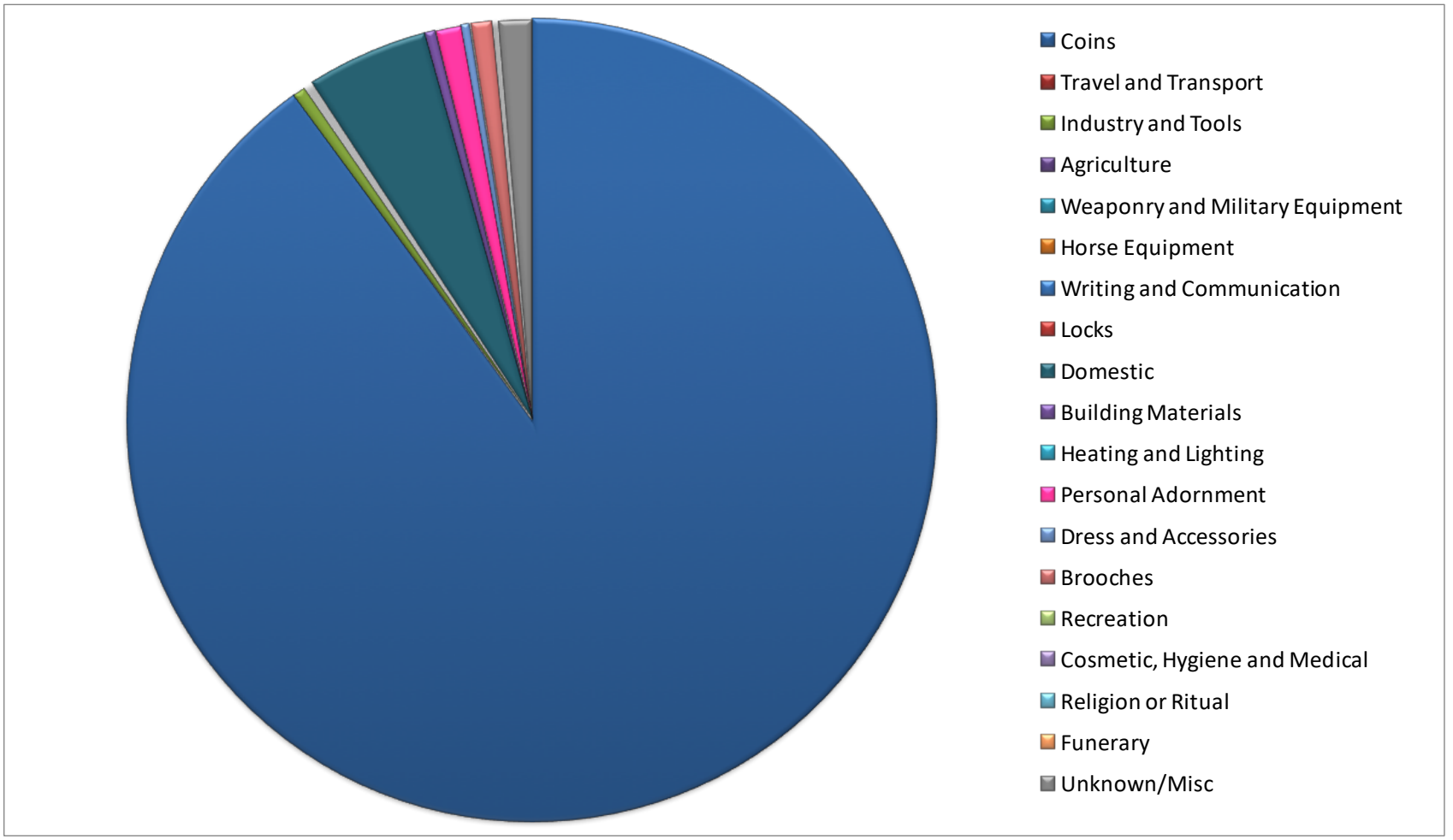


Figure 6.47 The Late Roman (AD 300-410) assemblage in Western Britain. Graph produced using data from the PAS.

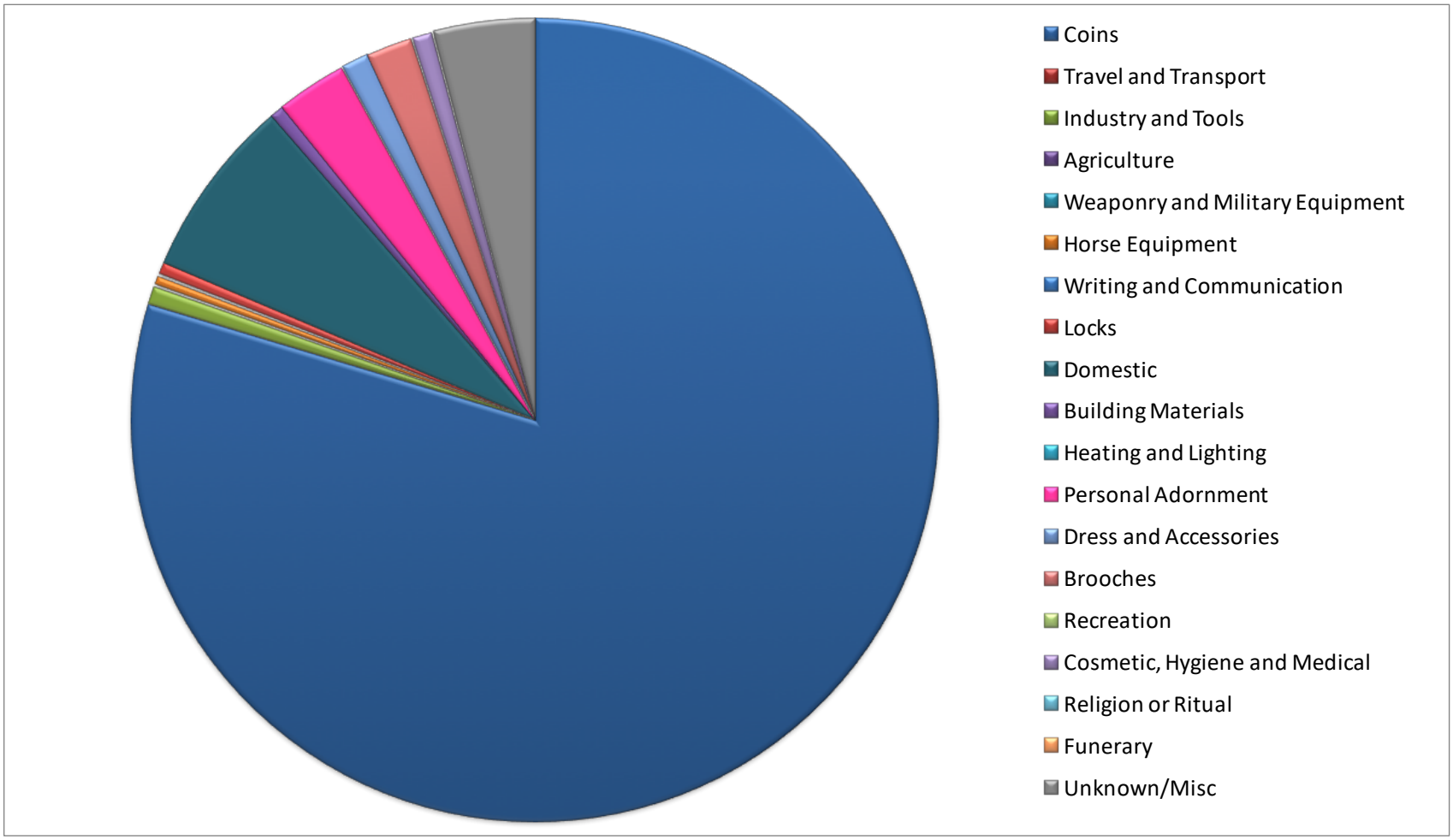


Figure 6.48 The Late Roman (AD 300-410) assemblage in Eastern England. Graph produced using data from the PAS.

The distribution of Late Roman find types between object categories is broadly similar between the two areas but with the west (Figure 6.47) being the most similar to the overall assemblage (Figure 6.35). The difference here is not as high, with 90% and 80% of the assemblage being Coins in Western Britain and Eastern England respectively compared to 96% and 79% in the Highland and Lowland Zones.

It has been seen above that the Early Medieval (AD 410-600) object types found in the PAS database appear to show more differentiation between Western Britain and Eastern England (i.e. the area of an apparent influx of Germanic, Anglo-Saxon culture) than the divide between Highland and Lowland Zones that we see in the archaeology of other periods. In contrast, the Roman (AD 43-410) finds were markedly more different across both of these boundaries. In the Roman period, the divide between different types of object found in the PAS database is roughly analogous with the boundary between the Highland and Lowland Zones proposed by Cyril Fox. In the Early Medieval period this divide appears to change so that the boundary between different types of find (and, thus, potentially different cultures or identities) is further east. The pattern appears similar here, with a statistically significant difference in proportions of find types in thirteen out of nineteen categories (Table 6.32). This further suggests that it is the Highland/Lowland divide that is important in this period. An additional difference in the Late Roman data is the higher proportion of Recreation and Cosmetic Hygiene and Medical finds in Western Britain (Table 6.36). This difference does not appear in the Roman (AD 43-410) data (Table 6.13) or the Late Roman (AD 300-410) data between the Highland and Lowland Zones (Table 6.24).

Broad Category	% Western Britain	% Eastern England	P-value
Commerce	90.0328	79.6588	1.49E-82
Travel and Transport	0.0000	0.0094	0.04
Industry and Tools	0.5137	0.7196	0.00
Agriculture	0.0511	0.0608	0.99
Weaponry and Military Equipment	0.0535	0.0550	1.82
Horse Equipment	0.0907	0.3311	8.85E-16
Writing and Communication	0.0581	0.1006	0.03
Locks	0.0976	0.4680	2.44E-26
Domestic	4.8488	7.2886	6.84E-59
Building Materials	0.4347	0.5593	0.01
Heating and Lighting	0.0023	0.0140	0.10
Personal Adornment	1.0576	2.8246	1.03E-88
Dress and Accessories	0.3487	1.1139	4.23E-44
Brooches	0.8391	1.8382	6.46E-43
Recreation	0.0628	0.0620	1.919528
Cosmetic, Hygiene and Medical	0.1953	0.7793	6E-38
Religion or Ritual	0.0395	0.0620	0.205921
Funerary	0.0046	0.0000	0.092469
Unknown/Misc	1.2691	4.0544	2.3E-156

Table 6.32 Chi-squared tests for percentage contribution of each broad category to the Late Roman (AD 300-410) assemblage in Western Britain and Eastern England. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

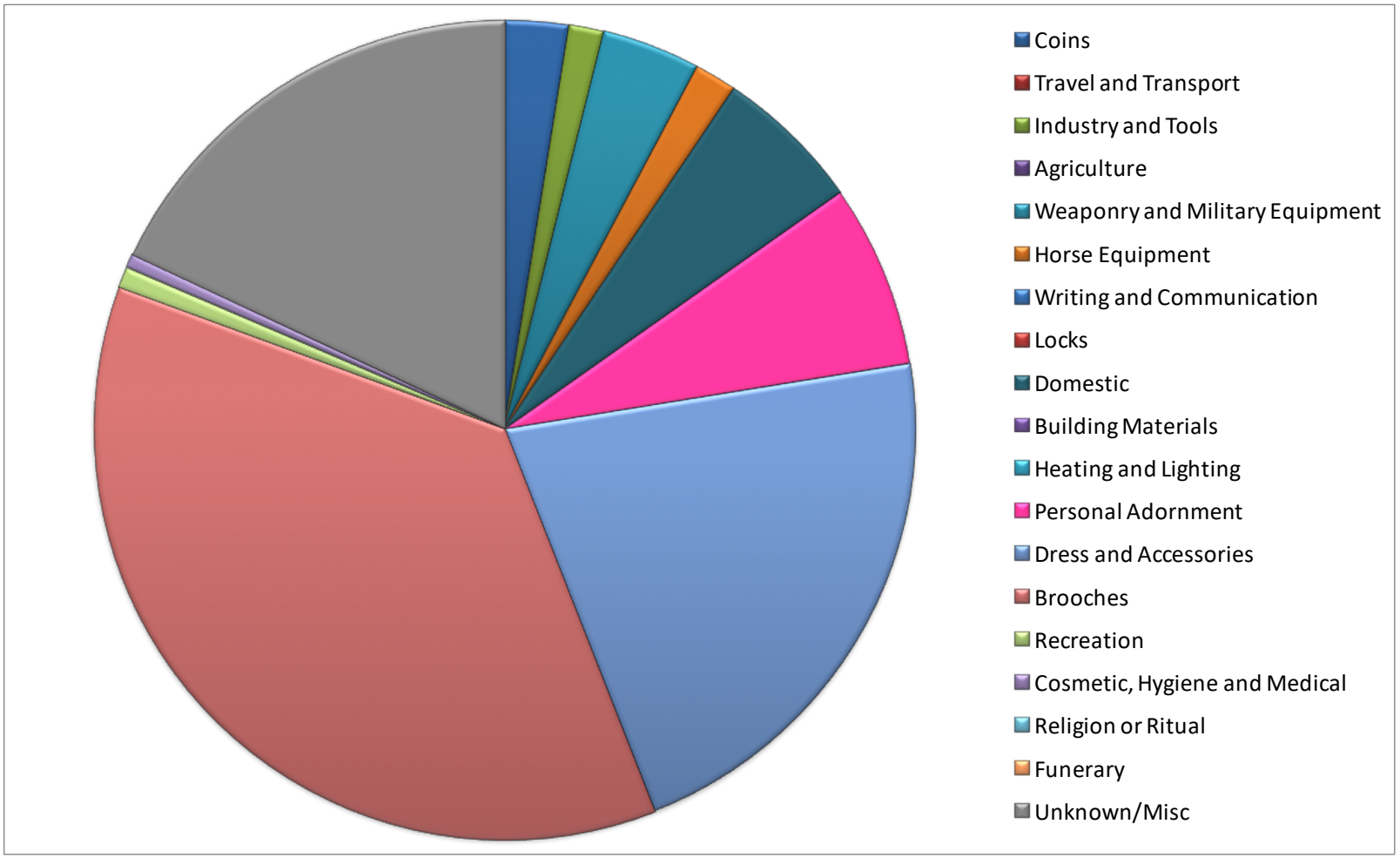


Figure 6.49 The Early Anglo-Saxon (AD 410-600) assemblage in Western Britain. Graph produced using data from the PAS.

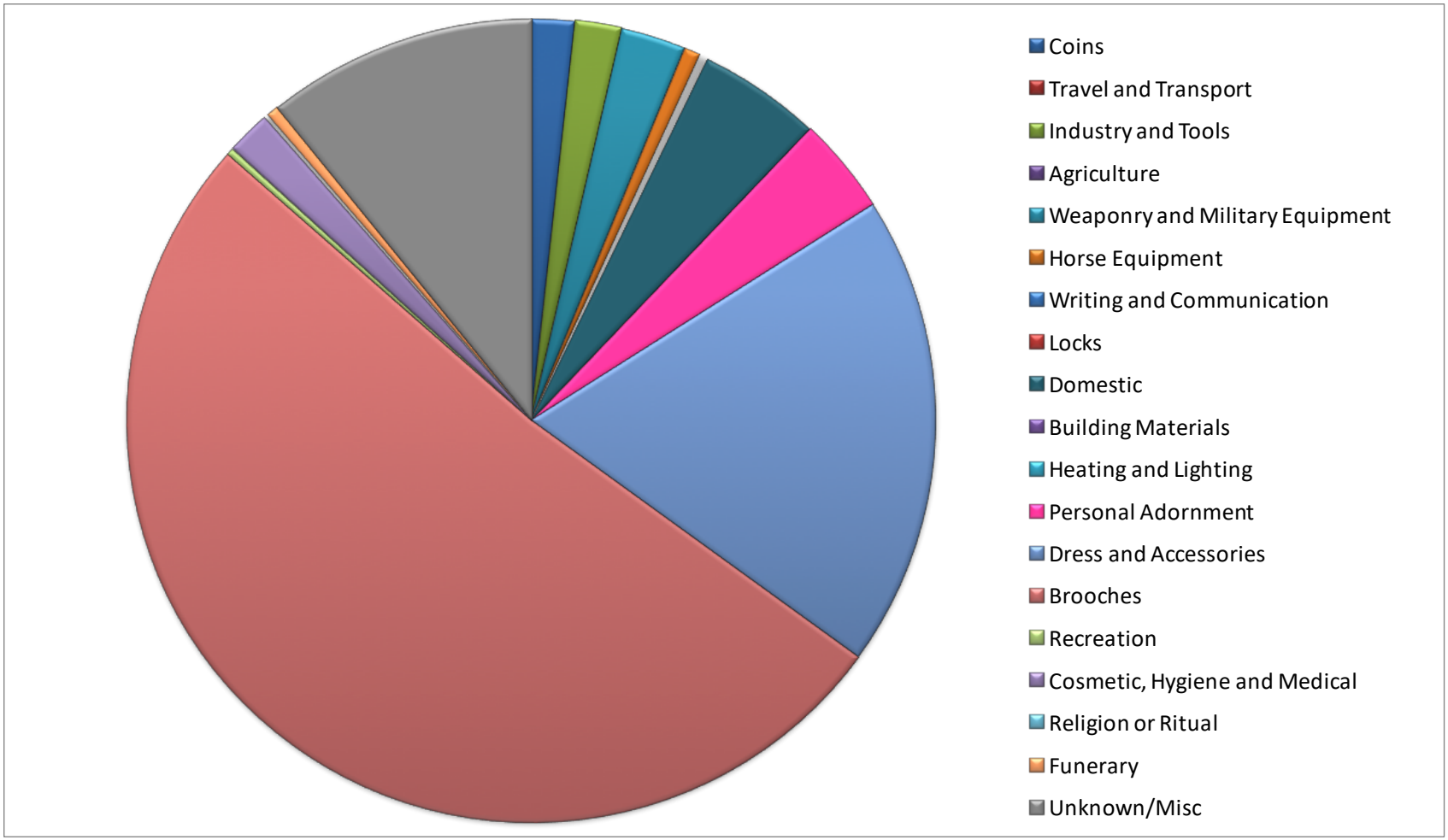


Figure 6.50 The Early Anglo-Saxon (AD 410-600) assemblage in Eastern England. Graph produced using data from the PAS.

The Early Anglo-Saxon (AD 410-600, Figure 6.49 to Figure 6.50) finds show a similar spread of find types between Western Britain and Eastern England as the Highland and Lowland Zones. The finds are largely dominated by the following categories:

- Brooches (Western Britain 37%, Eastern England 59%)
- Dress and Accessories (Western Britain 22%, Eastern England 22%)
- Unknown/Miscellaneous (Western Britain 18%, Eastern England 11%)

Unlike the Early Medieval (AD 410-1066) assemblage, Coins is not a major category (2% in Western Britain and 2% in Eastern England).

As with the Highland and Lowland Zones, there is a difference in the proportions of brooches within the assemblage which, in this case, is statistically significant. There is a statistically significant difference in four out of eighteen categories (Table 6.33) as opposed to only one between the Highland and Lowland Zones. This difference is, however, less than that for the entire Early Medieval assemblage which has a statistically significant difference in six categories (Table 6.17). Again, Brooches appears to be a key category which shows a difference between the two areas.

Broad Category	% Western Britain	% Eastern England	P-value
Commerce	2.4931	1.6983	0.266041
Travel and Transport	0.0000	0.0000	N/A
Industry and Tools	1.3850	1.8513	1.044711
Agriculture	0.0000	0.0153	1.628253
Weaponry and Military Equipment	3.8781	2.5704	0.274458
Horse Equipment	1.6620	0.6426	0.047854
Writing and Communication	0.0000	0.1224	1.012126
Locks	0.0000	0.2295	0.725053
Domestic	5.8172	5.3703	1.448894
Building Materials	0.0000	0.0000	N/A
Heating and Lighting	0.0000	0.0000	N/A
Personal Adornment	7.2022	3.8862	0.000802
Dress and Accessories	21.6066	18.9259	0.517838
Brooches	36.5651	51.2546	0.000254
Recreation	0.8310	0.2907	0.154084
Cosmetic, Hygiene and Medical	0.5540	1.7442	0.178761
Religion or Ritual	0.0000	0.1530	0.914394
Funerary	0.0000	0.4896	0.367063
Unknown/Misc	18.0055	10.7558	0.00012

Table 6.33 Chi-squared tests for percentage contribution of each broad category to the Early Anglo-Saxon (AD 410-600) assemblage in Western Britain and Eastern England. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

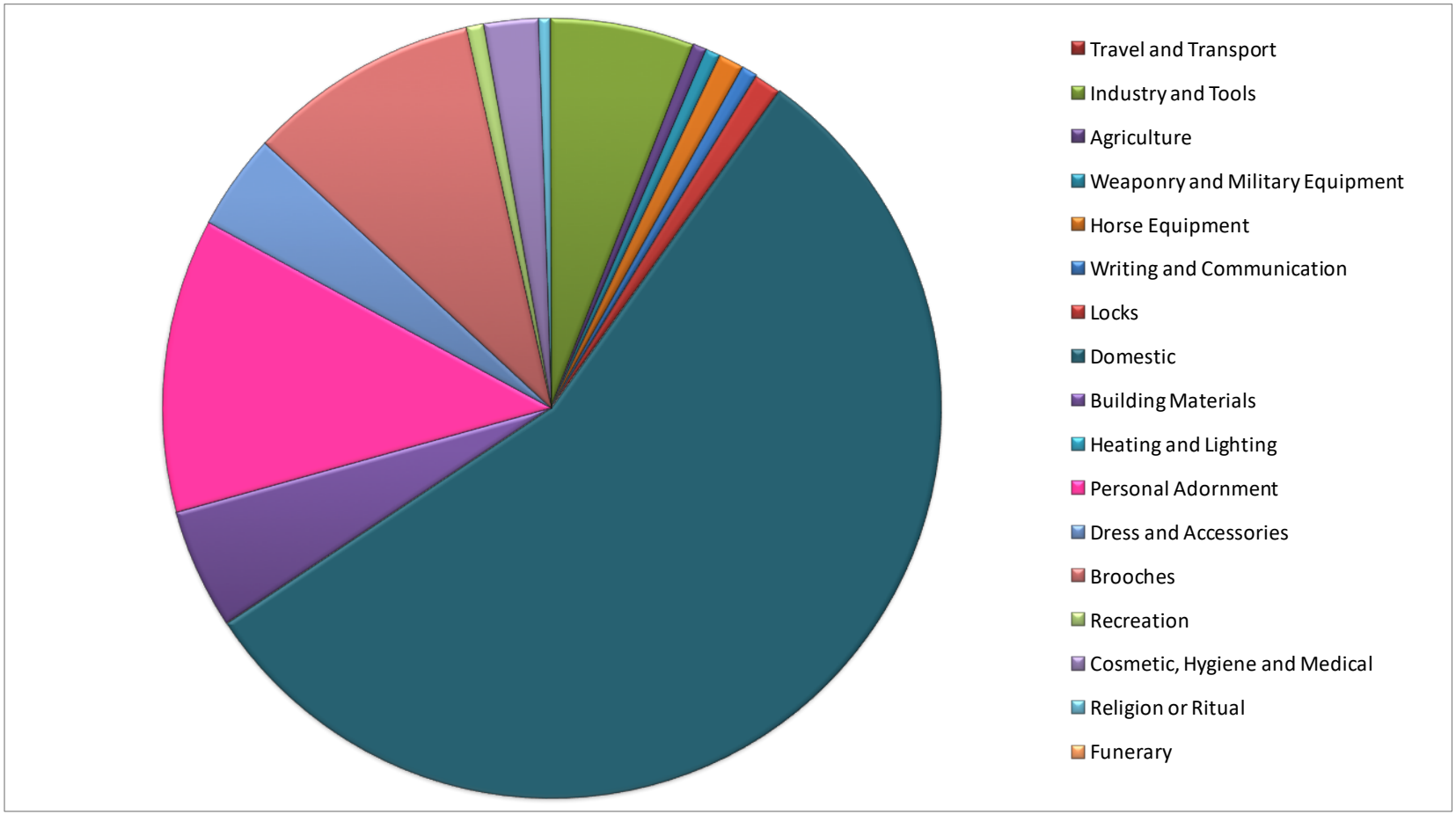


Figure 6.51 The Late Roman (AD 300-410) assemblage in Western Britain with Coins an Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

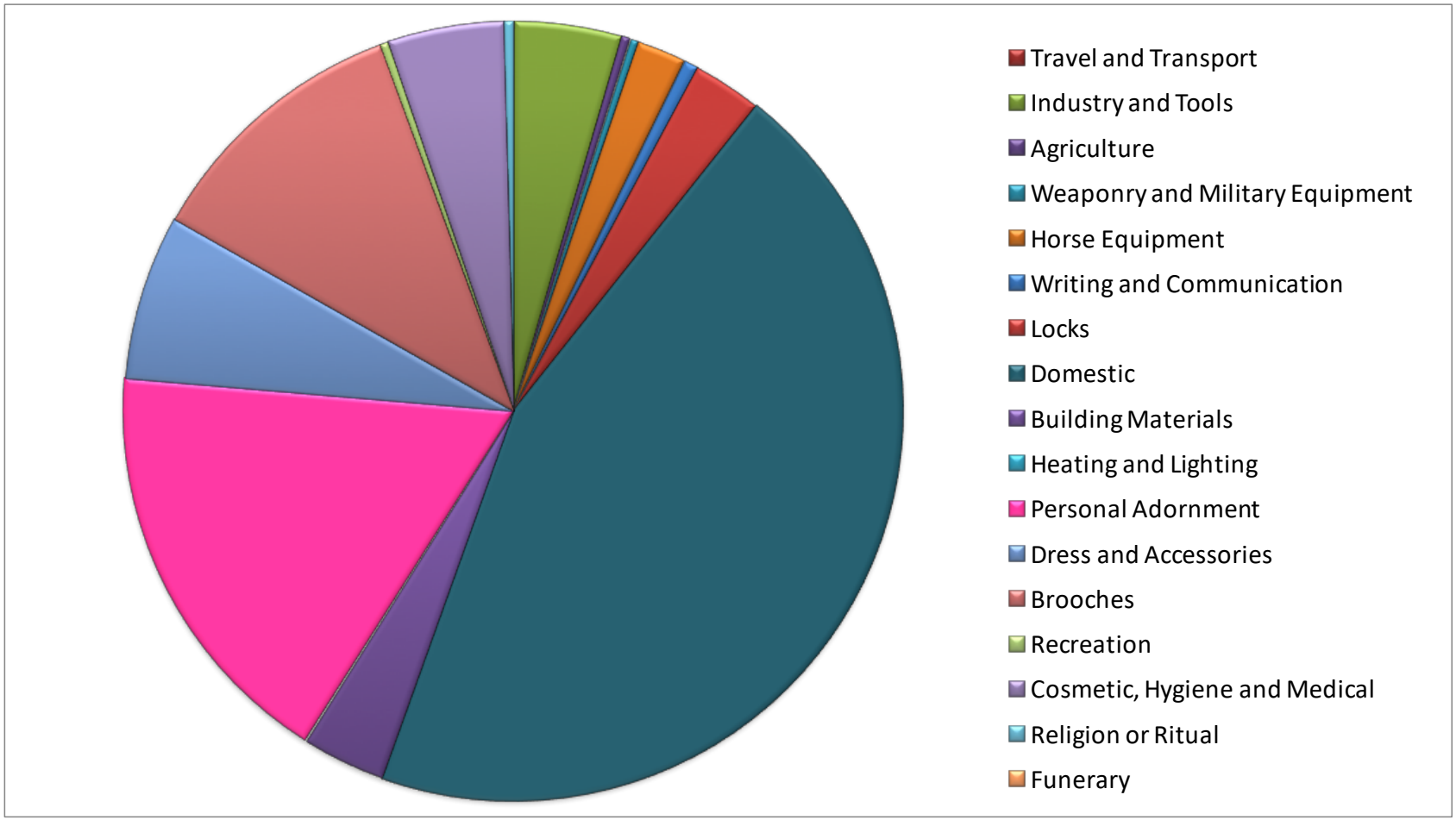


Figure 6.52 The Late Roman (AD 300-410) assemblage is Eastern England with Coins an Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

The comparison between the Roman (AD 43-410) (Figure 6.23 and Figure 6.24) and Late Roman (AD 300-410) (Figure 6.51and Figure 6.52) assemblages with Coins and Unknown/Miscellaneous finds removed is interesting. As noted previously, assessing the proportions of each broad object category making up the overall assemblage can help to overcome the bias introduced by geography and topography.

There are similarities between the Roman and Late Roman assemblages. Initial assessment appears to suggest that, much like in the Roman period, the makeup of the assemblages is broadly similar in Western Britain and Eastern England. For instance, in each case Domestic finds make up a large proportion in both Western Britain (34% in the Roman Period and 56% in the Late Roman period) and Eastern England (34% in the Roman period and 45% in the Late Roman period).

There is one main difference noticeable in the graphs. Brooches form a major part of the Roman (AD 43-410) finds with Coins and Unknown/Miscellaneous finds removed, comprising 44% of the overall assemblage in Western Britain and 47% in Eastern England. However, this is not the case for the Late Roman (AD 300-410) finds, where Brooches make up only 10% of finds in Western Britain and 11% in Eastern England. Accurately dating finds found by members of the public is difficult as they lack a stratigraphic context and are often fragmentary. The Roman finds contain all those brooches which are identifiable as Roman, including finds which can only be dated to being AD 43-410. The Late Roman finds can only include those finds which are clearly dated. This means that there are likely to be some late Roman brooch types which, whilst included in the Roman data, are not present in the Late Roman database because they cannot be closely dated. Despite problems with dating, the decline in brooch use in the late Roman period is well attested. With the exception of specific types such as crossbow and penannular, their usage appears to have dropped considerably by the end of the fourth century (Cool 2010: 279; Collins 2010; Gerrard 2013: 105).

The Chi-squared tests (Table 6.34) demonstrate a similar pattern to that for the Roman finds (Table 6.16) with, again, no statistically significant difference in Travel and Transport, Agriculture, Writing and Communication and Religion or Ritual (only Recreation doesn't have a difference in the Roman finds but does in the Late Roman ones). All other categories remain the same.

Broad Category	% Western Britain	% Eastern England	P-value
Travel and Transport	0.0000	0.0575	0.142502
Industry and Tools	5.9059	4.4184	1.39E-29
Agriculture	0.5879	0.3736	0.144308
Weaponry and Military Equipment	0.6146	0.3377	0.033771
Horse Equipment	1.0422	2.0332	0.000135
Writing and Communication	0.6681	0.6179	1.461559
Locks	1.1224	2.8738	3.66E-09
Domestic	55.7456	44.7518	6.57E-18
Building Materials	4.9973	3.4342	2.43E-05
Heating and Lighting	0.0267	0.0862	0.467497
Personal Adornment	12.1593	17.3432	5.71E-12
Dress and Accessories	4.0086	6.8396	1.5E-09
Brooches	9.6472	11.2867	0.014209
Recreation	0.7215	0.3808	0.011935
Cosmetic, Hygiene and Medical	2.2448	4.7848	4.35E-11
Religion or Ritual	0.4543	0.3808	1.051837
Funerary	0.0534	0.0000	0.012763

Table 6.34 Chi-squared tests for percentage contribution of each broad category to the Late Roman (AD 300-410) assemblage in Western Britain and Eastern England with Coins and Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

Broad Category	% Western Britain	% Eastern England	P-value
Travel and Transport	0.0000	0.0000	**N/A**
Industry and Tools	1.7422	2.1146	1.341317
Agriculture	0.0000	0.0175	1.64558
Weaponry and Military Equipment	4.8780	2.9360	0.130156
Horse Equipment	2.0906	0.7340	0.024199
Writing and Communication	0.0000	0.1398	1.05288
Locks	0.0000	0.2621	0.771461
Domestic	7.3171	6.1342	0.863836
Building Materials	0.0000	0.0000	**N/A**
Heating and Lighting	0.0000	0.0000	**N/A**
Personal Adornment	9.0592	4.4390	7.41E-05
Dress and Accessories	27.1777	21.6183	0.098916
Brooches	45.9930	58.5460	0.012817
Recreation	1.0453	0.3321	0.102666
Cosmetic, Hygiene and Medical	0.6969	1.9923	0.246456
Religion or Ritual	0.0000	0.1748	0.95762
Funerary	0.0000	0.5592	0.410383

Table 6.35 Chi-squared tests for percentage contribution of each broad category to the Early Anglo-Saxon (AD 410-600) assemblage in Western Britain and Eastern England with Coins and Unknown/Miscellaneous finds removed. Broad object categories with a statistically significant higher percentage of Eastern England finds are shaded in red and those with a statistically significant higher percentage of Western Britain finds are shaded in blue. Data from the PAS.

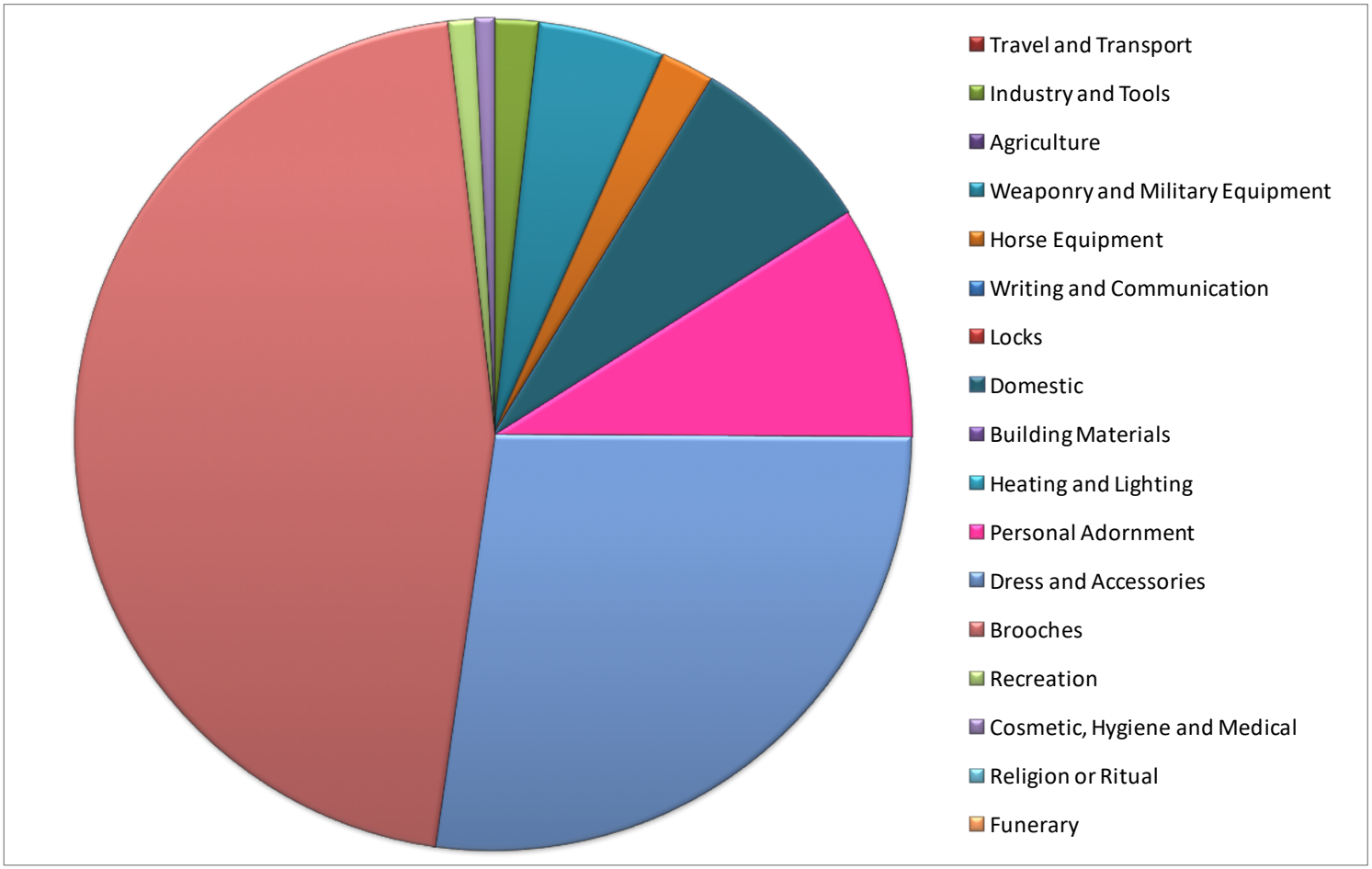


Figure 6.53 The Early Anglo-Saxon (AD 410-600) assemblage in Western Britain with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS

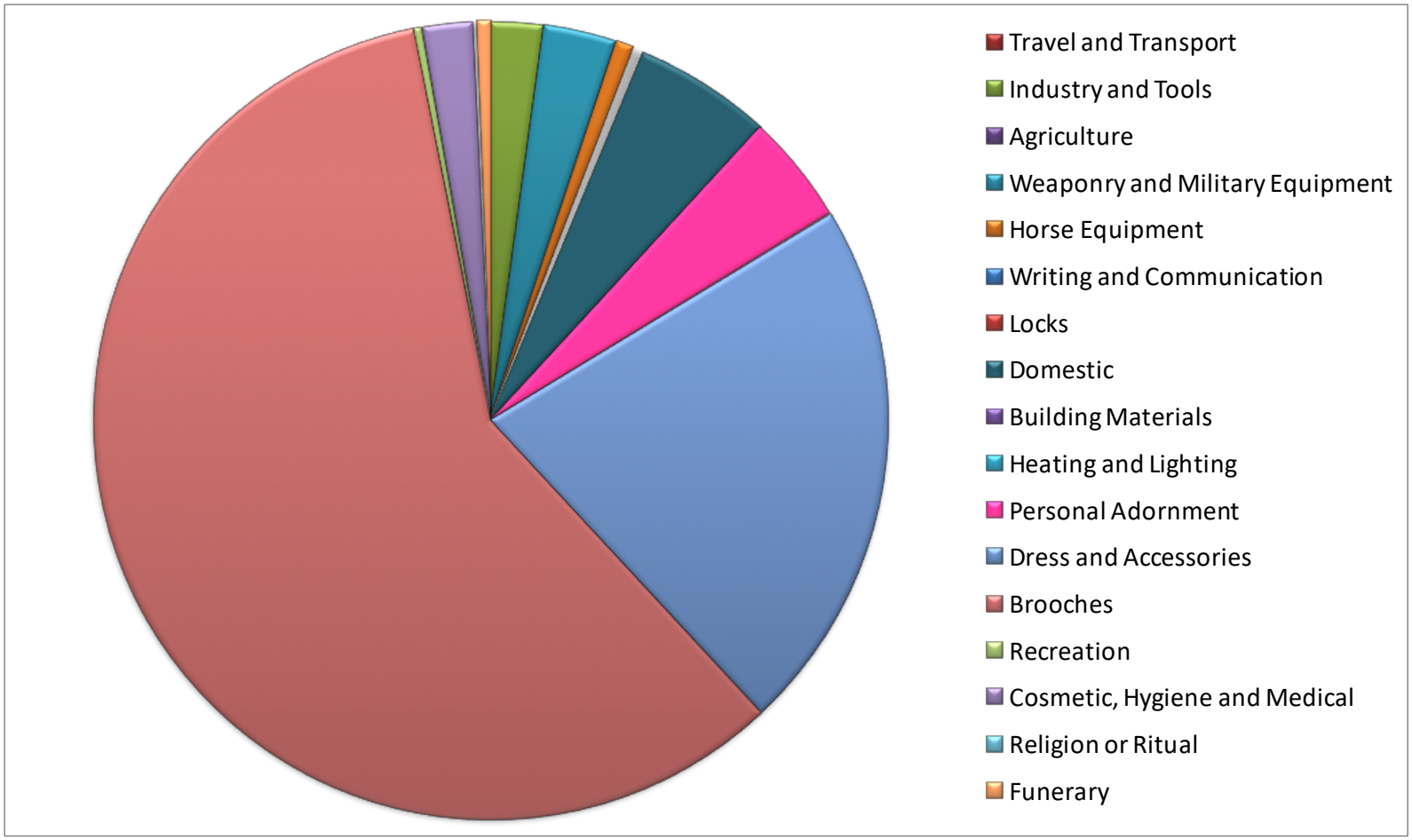


Figure 6.54 The Early Anglo-Saxon (AD 410-600) assemblage in Eastern England with Coins and Unknown/Miscellaneous finds removed. Graph produced using data from the PAS.

The graphs produced show some degree of difference in the makeup of each assemblage that was not apparent in the finds from the Highland and Lowland Zones. This is the same pattern as that seen in the Early Medieval (AD 410-1066) finds. The Chi-squared tests back up this assertion. In the assemblages with Coins and Unknown/Miscellaneous removed, there were no statistically significant differences in any category between the Highland and Lowland Zones. In the same data, there are statistically significant differences in three categories in Western Britain and Eastern England; Horse Equipment, Personal Adornment and Brooches. This suggests that, rather than being a product of the *longue durée*, the Early Medieval period was characterised by a different distribution of artefacts. Instead of the Highland/Lowland divide visible across much of the rest of British archaeology, the Early Medieval period is represented by a difference with the dividing line much further east. This is in line with perceived areas of Anglo-Saxon settlement at this time (Figure 4.11 and Figure 5.3). In the west, the Roman areas of Britain covering roughly the same area as the old province of *Britannia Prima*, brooch use declined as is attested by previous studies (Cool 2010: 279; Collins 2010; Gerrard 2013: 105). In the post-Roman period, a new kind of material culture assemblage emerges, the evidence for which is centred on funerary contexts and the types of material often found there. Points of difference between Eastern England and Western Britain in the post-Roman period are Horse Equipment, Personal Adornment and Brooches. Horses were important in Anglo-Saxon England, being found in both inhumations and cremations from the fifth to the seventh centuries AD. Distributions of horse burials (Figure 6.55) show a marked pattern in distribution towards the east, with most examples coming from the regions of The Wash, Norfolk and the Humber Estuary (Fern 2007: 93-94).

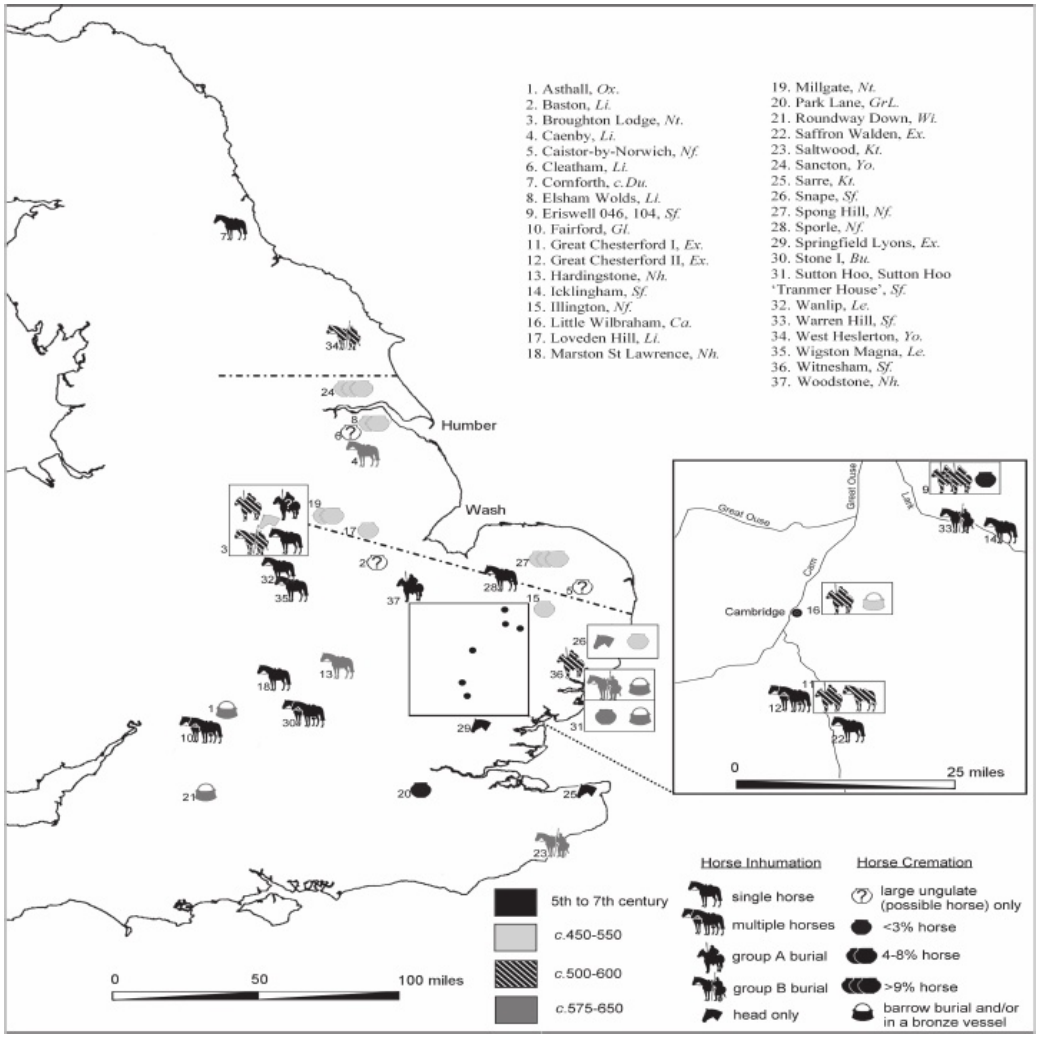


Figure 6.55 Distribution of horse burials from the fifth to the seventh centuries AD. Source: Fern (2007: 93).

Despite this, there is still a higher percentage contribution of Horse Equipment to the early Anglo-Saxon (AD 410-600) assemblage in Western Britain. It can be seen from the map of percentages of Roman finds in each county (Figure 4.21b) that high proportions of Roman (AD 43-410) finds are located in Wales. It was suggested that this is due to the militarised nature of the occupation there as there is a high number of military sites in Wales (Burnham and Davies 2010). Bishop (2015: 1) stated that 'the artefactual evidence serves to confirm the ubiquitous presence of horses in a military

context'. Horses were also important in the pre-Roman Iron Age. Excavations have uncovered horse bones deposited in ritual pits at a temple near Cambridge (Denison 2002) and chariot burials are found associated with the Arras culture such as at Wetwang Slack (Stead 1991).

6.3.4 Dating

The problems with dating finds were discussed in Chapter Two. This can be difficult even in traditionally excavated data and the problem is only compounded by the lack of context of PAS finds. The general lack of coinage in Britain after circa AD 408 (Guest 2005: 95-6; White 2007: 21) makes accurate dating of late Roman and early Medieval finds difficult. This leads to the archaeological invisibility of post-Roman culture in Britain that prompted Härke (2011: 5) to state that other sources of evidence, such as biological data must be used.

Dating of artefacts is, therefore, an important consideration when researching the distributions of PAS finds in England and Wales at this time. Particularly in the west, where Anglo-Saxon material culture did not take hold, the dating of late Roman artefacts to either before or after circa AD 410 is crucial. This is a key component of White's (2007) theory that the province of *Britannia Prima* survived and remained essentially Roman. As he points out, a fourth century artefact which remained in use until the early Medieval period is likely to be dated to the fourth century and the context of the find along with it (White 2007:24).

The issue is compounded with PAS finds where the date given is that of manufacture rather than deposition. Without secure stratigraphic context it is not possible to determine the date of deposition. White's hypothesis that post-Roman artefacts in the west looked essentially like those of the late Roman period could be tested using PAS data. It has been pointed out by White (2007) that a

fourth century artefact will likely be used to date a context to the fourth century, regardless of when it was deposited. The lack of context of PAS finds would make it almost impossible to tell an early post-Roman find from a late Roman one, especially if these artefacts look largely the same.

The issue of curation is more difficult. There may be some examples of repairs to late Roman style artefacts reported to the PAS but, without context, it is difficult to determine if the repair is late or post-Roman. If the artefacts in use in the post-Roman period are the same objects kept and repaired, these will classed as Roman finds because PAS data necessarily deal in dates of manufacture. This identifies a key limitation of PAS data in terms of its use.

There are generally more Late Roman (AD 300-410) than early Anglo-Saxon (AD 410-1066) finds in the PAS database but areas with greater numbers of finds overall would be expected to have both more Late Roman and more Early Anglo-Saxon finds recorded. Therefore, areas with a greater proportion of Early Medieval finds may be expected to have a lower proportion of Late Roman finds and vice versa. Post-Roman finds should be dated to the Early Medieval (AD 410-1066) period according to the PAS's dating scheme (Portable Antiquities Scheme 2013b). Statistical analysis was carried out on the numbers of Late Roman and Early Anglo-Saxon finds to see if White's (2007) theory seems a likely scenario for the PAS finds.

Table 6.36 and Table 6.37 summarise the statistical analysis on the number of Late Roman and Early Anglo-Saxon finds in the Highland/Lowland Zones and Western Britain/Eastern England. A T-test has been carried out to find out whether there is a significant difference between the average number of finds in each zone. A one-tailed, unpaired T-test with unequal variance has been used. This has been carried out using the TTEST function in Microsoft Excel. The results of the T-test can be interpreted similarly to those for the Chi-squared tests in Chapter Three. A P-value below 0.05 is considered

statistically significant and one higher than this suggests there is no significant difference between the two samples (Burton 2002).

The correlation between the numbers of Late Roman and Early Anglo-Saxon finds in each county has also been calculated using the CORREL function in Microsoft Excel. The value calculated for the correlation can be interpreted as follows:

- 1 means complete correlation between the two variables
- 0 means no correlation
- A negative number means that as one variable increases, the other decreases
- A positive number means that both variables increase and decrease together

(Burton 2002)

	Lowland		**Highland**	
	Late Roman	**Early Anglo-Saxon**	**Late Roman**	**Early Anglo-Saxon**
Finds per km^2	1.22	0.08	0.49	0.00
Median	538.50	26.00	17.50	2.50
Mean	1532.02	120.63	563.70	7.10
Inter-quartile Range	2192.00	91.75	146.00	152.00
Standard Deviation	2396.40	262.56	1935.67	10.81
Skewness	2.51	3.46	4.84	2.33
T-test	0.00		0.02	
Correlation	0.87		-0.19	

Table 6.36 Summary of statistical analysis on the numbers of Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) finds in the Highland and Lowland Zones. Data from the PAS.

	Eastern England		Western Britain	
	Late Roman	Early Anglo-Saxon	Late Roman	Early Anglo-Saxon
Finds per km^2	0.04	0.00	0.00	$1.2 \times 10^{-0.5}$
Median	887.00	42.00	40.00	4.00
Mean	2085.27	167.74	545.08	9.50
Inter-quartile Range	4523.00	441.00	205.00	10.00
Standard Deviation	2771.19	303.58	10.00	13.49
Skewness	2.02	2.82	5.17	2.29
T-Test	0.00		0.00	
Correlation	0.88		0.09	

Table 6.37 Summary of statistical analysis on the numbers of finds in the H Eastern England and Western Britain. Data from the PAS.

The Lowland Zone displays a greater number of average finds and greater spread of find numbers across the counties than the Highland Zone. The data for Eastern England and Western Britain reinforce that Eastern England has more finds and more variety in the numbers of finds per county than Western Britain in all periods.

Scatter graphs of the number of Late Roman (AD 300-410) finds plotted against the number of Early Anglo-Saxon (AD 410-600) finds in each county can be seen in Figure 6.56 to Figure 6.59. These have had lines of best fit added to demonstrate the correlation. The correlations have been interpreted according to Dancy and Reidy's (2004) categorisation:

- 1 Perfect
- 0.7 - 0.9 Strong
- 0.4 - 0.6 Moderate
- 0.1 - 0.3 Weak
- 0 Zero

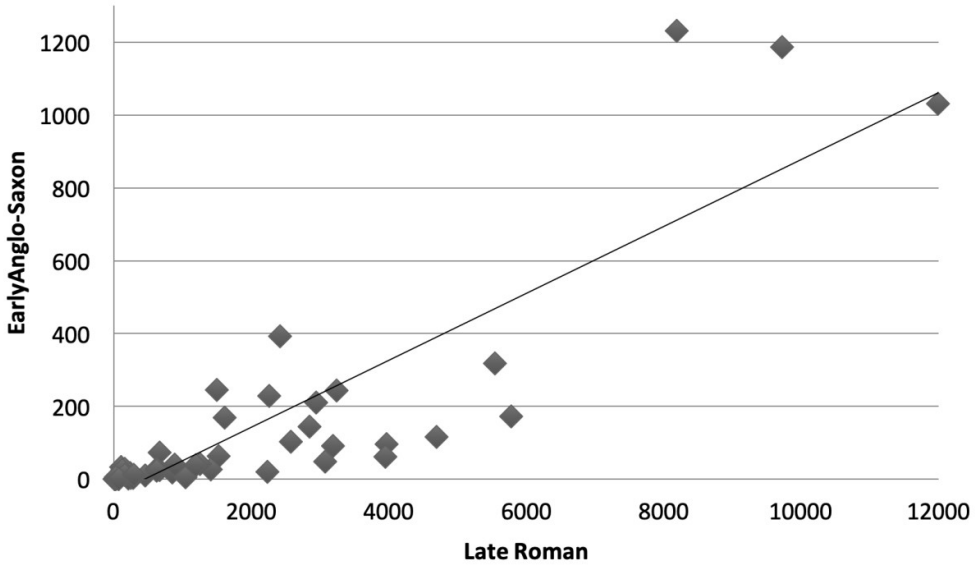


Figure 6.56 Scatter graph of Late Roman (AD 300-410) finds against Early Anglo-Saxon (AD 410-600) finds in the Lowland Zone showing a strong, positive correlation (0.87). Graph produced using data from the PAS.

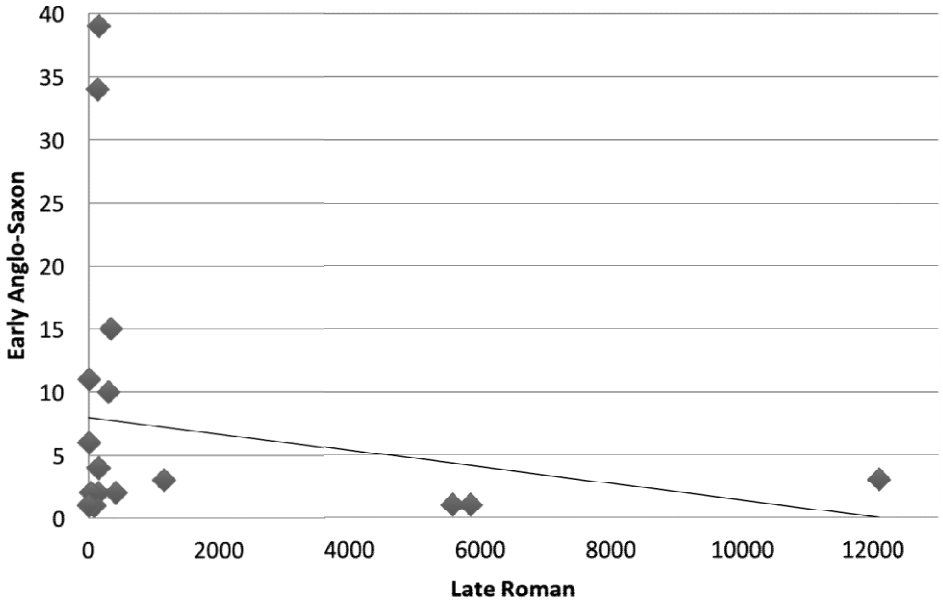


Figure 6.57 Scatter graph of Late Roman (AD 300-400) and Early Anglo-Saxon(AD 410-600) finds in the Highland Zone showing a weak, negative correlation (-0.19). Graph produced using data from the PAS.

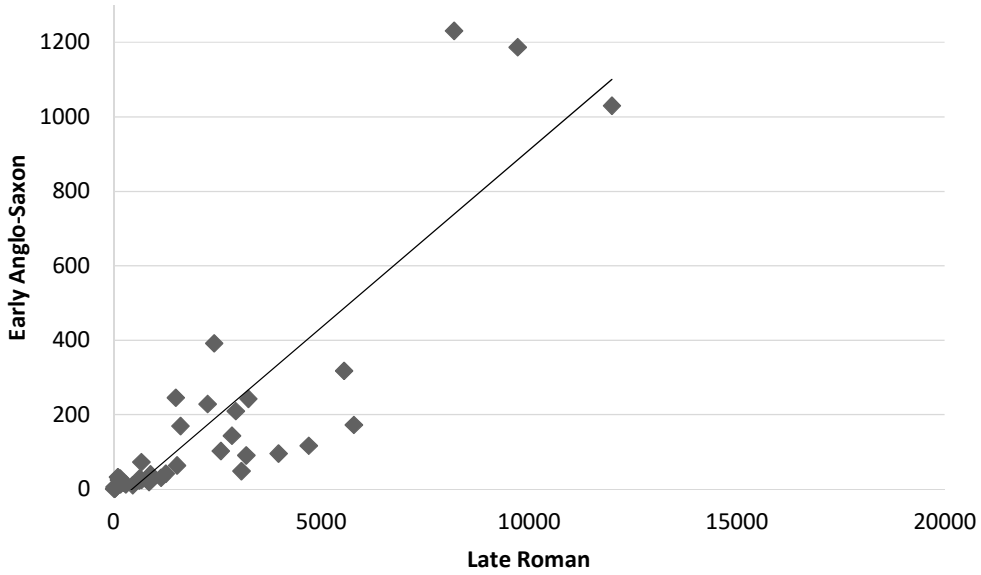


Figure 6.58 Scatter graph of Late Roman (AD 300-410) finds against Early Anglo-Saxon (AD 410-600) finds in Eastern England showing a good, positive correlation (0.09). Graph produced using data from the PAS.

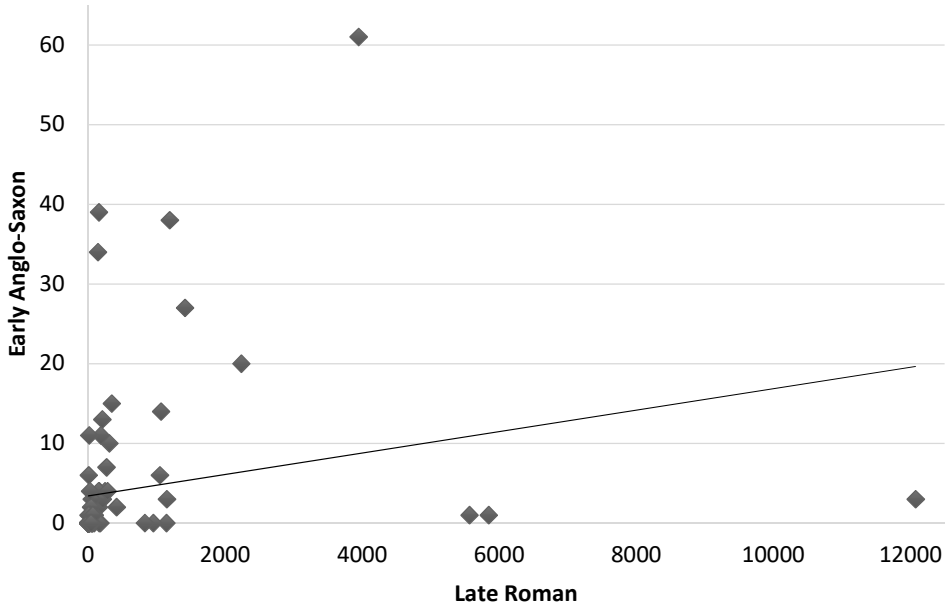


Figure 6.59 Scatter graph of Late Roman (AD 300-410) finds against Early Anglo-Saxon (AD 410-600) finds in Western Britain showing a weak, positive correlation (0.17). Graph produced using data from the PAS.

The strong, positive correlation for Eastern England suggests that the identification of Late Roman finds is not being affected by the number of Early Anglo-Saxon finds in the county. The number of Late Roman finds appears to be affected by the number of finds in general so, as the number of Roman finds increases, so does the number of Early Anglo-Saxon finds. In other words, the data here do not suggest that there is any significant misdating of post-Roman finds as Roman.

The weak correlation (0.09) for Eastern England is largely caused by one outlier with a large number of Late Roman finds. Drennan (2009: 20-1) discusses outliers in statistical analysis. He states that they can be removed where there is good reason other than simply the abnormal result. A study by Orr *et al* (1991) put forward the view that outliers do not cause a substantial degree of variance in large data sets. They also conclude that, where outlier removal is desired, visual examination of the data is preferable to statistical techniques.

It is possible that this correlation is due to differences in the types of material culture in each of these zones in the post-Roman period and the misdating of early post-Roman finds in the west as late Roman (Taylor 2014: 60). As White (2007) suggests, the material culture in the eastern areas of Britain changes to recognisably Anglo-Saxon in the years following the end of Roman rule in Britain, whereas in the west this did not happen. If the material culture initially stayed largely the same then, without any clear evidence to the contrary, this is likely to be assigned to the late Roman period, creating a discrepancy in the correlation between the numbers of Late Roman (AD 300-410) and Anglo-Saxon (AD 410-600) finds.

The correlation between Late Roman and Early Anglo-Saxon finds suggests a difference in the recovery and/or reporting of post-Roman finds in the east and west of England and Wales. In the east (Lowland Zone and Eastern England) there are strong, positive correlations. In the west

(Highland Zone and Western Britain) there are weak negative or positive results. This suggests some potential degree of under reporting of Late Roman finds in the west of England and Wales as it would be expected that, under normal circumstances, the number of Late Roman finds would rise as the number of Early Anglo-Saxon finds did. The negative correlation for the Highland Zone is very weak and is also apparently influenced by one or more outliers in the data. It is difficult to determine the cause of these outliers and removing them from the data entirely does not necessarily produce an accurate result. Anomalies due to sampling errors do not apply in this case as all counties in the area covered by the PAS are included in the data. Nevertheless, the weak correlation apparent even when including these possible outliers suggests that there is no real degree of correlation between Late Roman and Early Anglo-Saxon finds. This lack of correlation makes it difficult to conclude that the difference between east and west is down to misattribution of post-Roman finds as being late Roman. It can be said that in the west and highland areas there are fewer Roman finds in each county than would be expected based on the number of Early Anglo-Saxon finds.

There are much greater numbers of Late Roman finds than Early Anglo-Saxon. Despite this, it would still be expected that the number of Anglo-Saxon finds would generally rise along with the number of Roman finds if all other factors were equal. This is the case in the Lowland Zone (Figure 6.56), the area of most change within the archaeological record at this time. In the Highland Zone (Figure 6.57) the picture is almost the exact opposite. Where more Late Roman finds would be expected to represent more finds overall, the number of Early Anglo-Saxon finds drops as the number of Roman finds rises. A situation where post-Roman finds (those that would date to after AD 410 and thus properly belong in the Early Anglo-Saxon (AD 410-600) category) were dated as Roman (AD 43-410) would create this picture.

This does not definitively prove that the above is the case, it merely suggests that we cannot take the dating of these finds for granted or necessarily at face value. Although there is only a weak, positive correlation between Late Roman and Early Anglo-Saxon finds in Eastern England, this is in contrast to the negative correlation apparent in the Lowland Zone (the red area shown in Figure 6.61b). It has been noted previously that the boundary of Eastern England and Western Britain correlates well with that of the eastern boundary of *Britannia Prima* as proposed by White (2007) (Figure 6.61).

This difference suggests that any potential misdating of post-Roman (Early Medieval (AD 410-1066) by the period definitions of the PAS) finds as Roman is more pronounced in the far west of the old province of *Britannia Prima*. The existence of an apparent difference in the archaeology of the west and east of *Britannia Prima* fits in with White's (2007) theories regarding the divergence of the province in the west and east, particularly in the post-Roman period. White (2007) suggested that people in the east of the province sought to display wealth and status via personal adornment and dress and a more identifiably post-Roman material culture exists in the east of *Britannia Prima* than in the west. In the west, White stated that life may have gone on much as before, producing the same kinds of material culture that, when lacking stratigraphic context as in the PAS, cannot be easily distinguished from Roman material on typology alone.

White's (2007) ideas highlight a key limitation of the PAS. He stated that if material culture maintained essentially the same appearance from the Late to the post-Roman period then, without good reason to date it as Early Medieval (AD 410-1066) it would be assumed to be Roman (AD 43-410). PAS finds lack context and, therefore, it is next to impossible to accurately date by any other method than typology for the vast majority of finds. Figure 6.60 is a pot mend that is broadly dated to the Roman or Early Medieval periods. The finder noted that the area in which it was found was a

productive area of Roman finds but the PAS also noted that Roman pot mends are generally small and tidy whereas this example is massy (Foreman 2018).

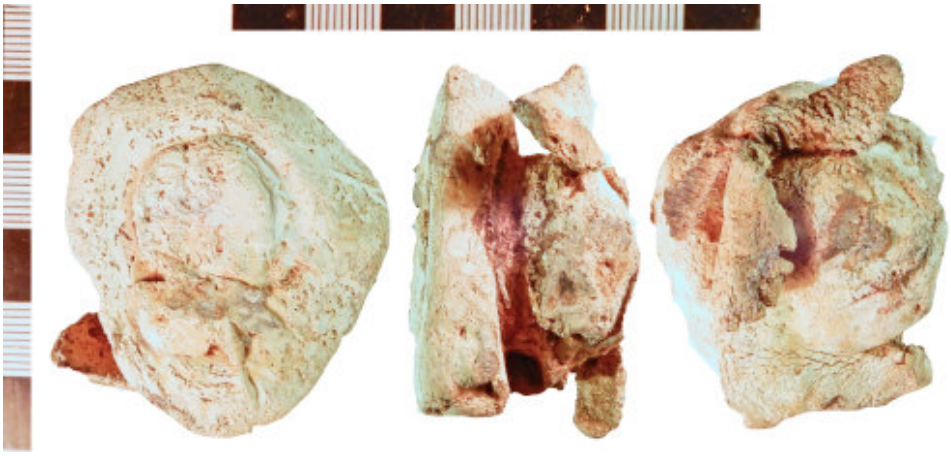


Figure 6.60 Lead vessel repair/pot mend. Possible date range of Roman to Early Medieval. Source: Foreman (2018).

6.3.5 Western Britain in the post-Roman period

The question of what PAS data can reveal about the west of Britain in the immediate post-Roman period is difficult to answer due to the general lack of finds. In terms of PAS artefacts this absence of finds in the west is a general problem rather than one specific to the period in question.

The correlation between the boundary put forward in this research for Western Britain and Eastern England and the proposed boundary of *Britannia Prima (*based on writings, inscriptions and locations of tribal and *civitates* boundaries) has already been identified. The difference between the areas of the Highland Zone and Western Britain (Figure 6.61b) can be exploited in order to identify any

differences within the area of the Lowland Zone which is also part of Western Britain (the Boundary Zone, which comprises those counties which are part of the area with a greater density of finds but generally fewer Early Medieval finds). It is worth noting here that hoards are recorded in the PAS as single finds records. Whilst these were split up into their constituent finds by the VASLE project (Richards *et al* 2009), here they were left as recorded. This prevents a large hoard made up of finds from a single category (for instance, the Staffordshire Hoard made up of thousands of finds from the Weaponry and Military Equipment category) from biasing results and allowing one find to create a statistically significant result for a particular category.

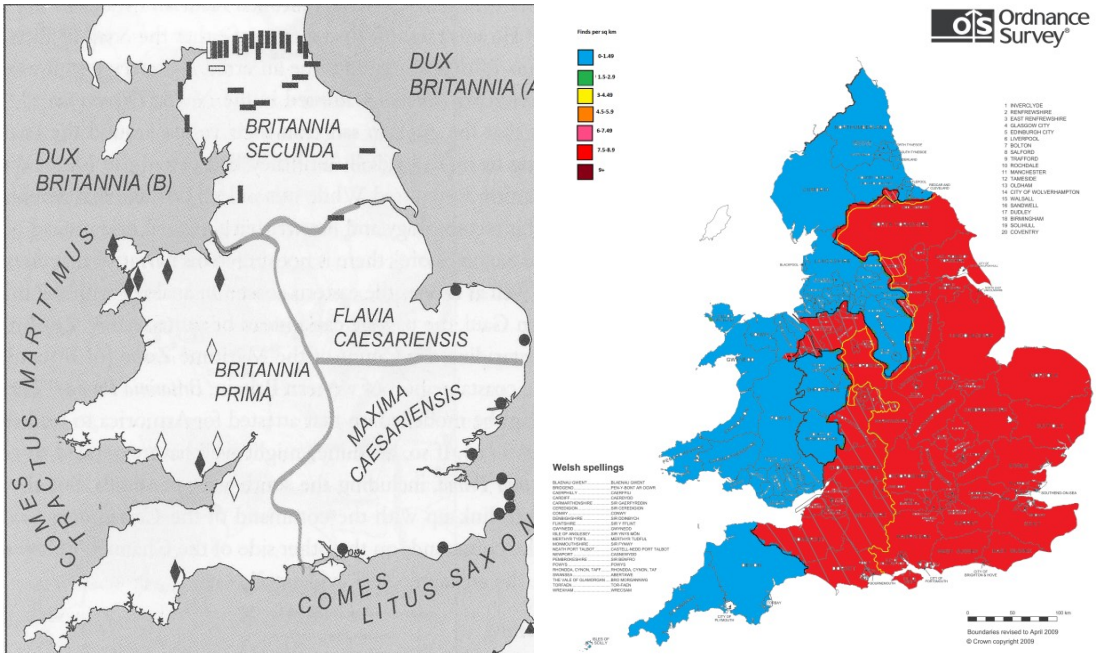


Figure 6.61 A comparison between a) the proposed border of Britannia Prima (White 2007: 60) and b) the boundary between Eastern England and Western Britain (marked in orange), base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

Figure 6.62 and Figure 6.63 show the makeup of the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) finds assemblages in the Boundary Zone. These can be compared to the graphs for the Highland Zone (Figure 6.39 and Figure 6.41) to determine any differences within the approximate area of *Britannia Prima*. From the Late Roman data it can be seen that there are broad similarities, with the majority of both areas being Coins finds. The Late Roman (AD 300-410) Boundary Zone (Figure 6.62) most closely resembles the Lowland Zone (Figure 6.40) which it is part of. For the Early Anglo-Saxon finds, there also appears to be a difference between the two areas. However, in this case there is also some degree of difference between the Boundary Zone (Figure 6.63) and the Lowland Zone (Figure 6.42).

Chi-squared tests (Table 6.38 and Table 6.39) have been carried out to test this. The Late Roman finds (Table 6.38) show a degree of difference between the east and west of the area of *Britannia Prima* with a statistically significant difference in eleven out of nineteen categories. This supports White's (2007) ideas regarding the differences between east and west *Britannia Prima,* with the west being more 'Britto-Roman and the east more involved in Romano-British culture.

Of the categories with statistically significant differences, only Coins has a higher percentage of finds in the Highland Zone with the remaining ten having a higher percentage in the Boundary Zone. This supports the idea that it is the division between Highland and Lowland Zones that was important in the Late Roman period with the Boundary Zone finds belonging firmly in the Lowland Zone.

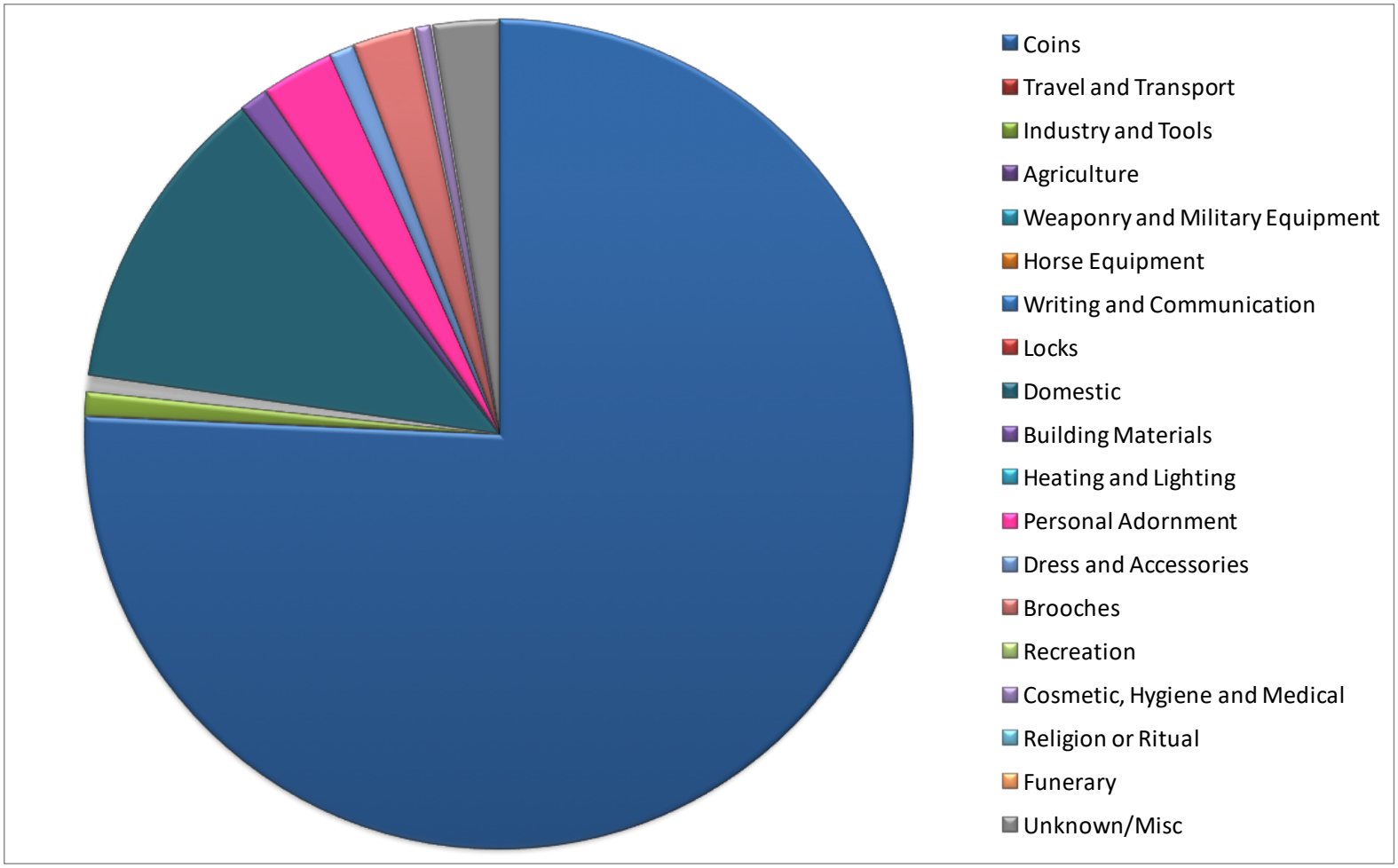


Figure 6.62 The finds assemblage in the Late Roman (AD 300-410) Boundary Zone. Graph produced using data from the PAS.

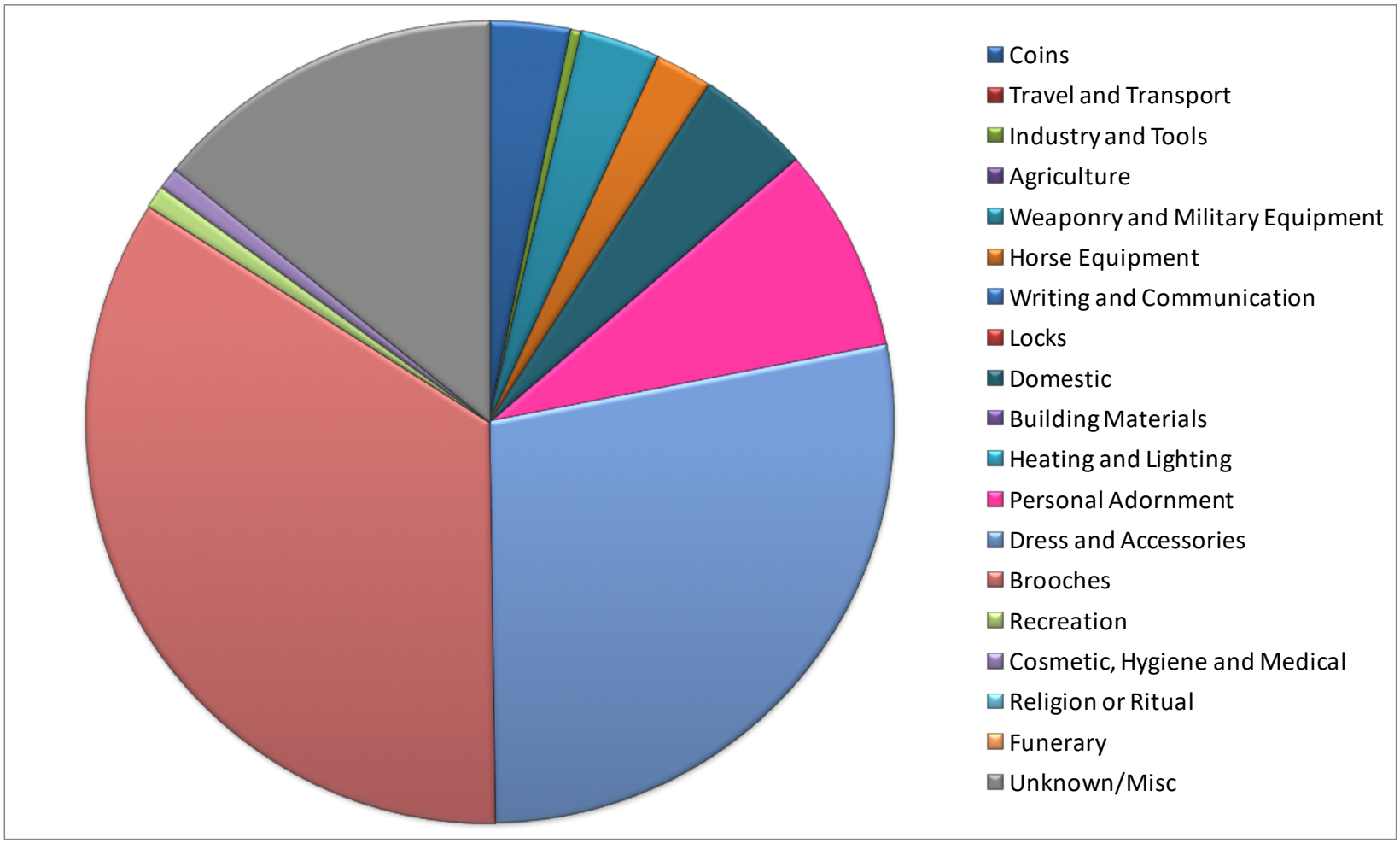


Figure 6.63 The finds assemblage in the Early Anglo-Saxon (AD 410-600) Boundary Zone. Graph produced using data from the PAS.

Broad Category	% Highland Zone	% Boundary Zone	P-value
Commerce	95.9527	75.6836	2.44E-90
Travel and Transport	0.0000	0.0000	0.520313
Industry and Tools	0.3482	0.9221	0.049716
Agriculture	0.0427	0.0715	1.663929
Weaponry and Military Equipment	0.0460	0.0715	1.151551
Horse Equipment	0.0591	0.1669	0.352158
Writing and Communication	0.0493	0.0874	1.380143
Locks	0.0329	0.2623	1.16E-07
Domestic	1.8495	12.1145	0
Building Materials	0.1511	1.1208	2.31E-37
Heating and Lighting	0.0033	0.0000	0.531013
Personal Adornment	0.3055	2.8776	6.59E-93
Dress and Accessories	0.0920	0.9698	3.05E-29
Brooches	0.2135	2.3529	0.000813
Recreation	0.0329	0.1272	0.002344
Cosmetic, Hygiene and Medical	0.0427	0.5644	6.36E-19
Religion or Ritual	0.0197	0.0874	0.005909
Funerary	0.0066	0.0000	0.107564
Unknown/Misc	0.7523	2.5199	4.75E-21

Table 6.38 Chi-squared tests between the Highland Zone and Boundary Zone in the Late Roman (AD 300-410) period. Categories with a statistically significant higher percentage of finds in the Boundary Zone are shaded orange and those with a statistically significant higher percentage of finds in the Highland Zone are shaded blue. Data from the PAS.

Broad Category	% Highland Zone	% Boundary Zone	P-value
Commerce	1.4085	3.1963	0
Travel and Transport	0.0000	0.0000	**N/A**
Industry and Tools	2.8169	0.4566	**0**
Agriculture	0.0000	0.0000	**N/A**
Weaponry and Military Equipment	4.9296	3.1963	**0**
Horse Equipment	0.7042	2.2831	**0**
Writing and Communication	0.0000	0.0000	**N/A**
Locks	0.0000	0.0000	**N/A**
Domestic	7.7465	4.5662	**0**
Building Materials	0.0000	0.0000	**N/A**
Heating and Lighting	0.0000	0.0000	**N/A**
Personal Adornment	5.6338	8.2192	**0**
Dress and Accessories	11.9718	27.8539	**0**
Brooches	40.1408	34.2466	**0**
Recreation	0.7042	0.9132	**0**
Cosmetic, Hygiene and Medical	0.0000	0.9132	**0**
Religion or Ritual	0.0000	0.0000	**N/A**
Funerary	0.0000	0.0000	**N/A**
Unknown/Misc	23.9437	14.1553	**0**

Table 6.39 Chi-squared tests between the Highland Zone and the Boundary Zone in the Early Anglo-Saxon (AD 410-600) period. Categories with a statistically significant higher percentage of finds in the Boundary Zone are shaded orange and those with a statistically significant higher percentage of finds in the Highland Zone are shaded blue. Data from the PAS.

The Early Anglo-Saxon (AD 410-600) finds (Table 6.39) display a similar difference between east and west *Britannia Prima* with statistically significant differences again in eleven out of nineteen categories. Five of the categories with no statistically significant difference are the same in the Late Roman and Early Anglo-Saxon periods:

- Travel and Transport
- Agriculture
- Writing and Communication
- Locks

- Heating and Lighting

This suggests that the differences between east and west *Britannia Prima* remained after the influx of Anglo-Saxon culture into the east of Britain. It also backs up the assertion made by White (2007) that *Britannia Prima* was an important area that remained relatively culturally stable in the immediate post-Roman period.

6.3.6 Conclusions – Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600)

In the Late Roman period (AD 300-410), distribution of artefacts appears to be mainly affected by topography and modern recovery patterns. The Early Anglo-Saxon (AD 410-600) finds deviate from this, displaying a clear difference from the control dataset. In terms of find types, the Late Roman finds assemblages differ across topographic boundaries (Highland and Lowland Zone), whereas for the Anglo-Saxon finds the boundary is different (between Eastern England and Western Britain).

There is a difference in the correlations between Late Roman and Early Anglo-Saxon finds in the Highland and Lowland Zones. In the Lowland Zone there is a strong, positive correlation whereas in the Highland Zone there is a negative to no correlation. This is not the case when the finds are divided into Eastern England and Western Britain (where both correlations are positive, albeit weak in Western Britain). This difference fits in with White's (2007: 151) notion that there was a difference in the identity and material culture of the peoples living in the east and west of *Britannia Prima* after the end of the Roman period. This also highlights a key limitation of PAS data. The lack of secure stratigraphic context of PAS data means it is not possible to study to what extent material culture remained 'Roman' into the post-Roman period. White's (2007) theory that post-Roman material remained essentially Roman in form and so is misattributed to the Roman period, relies on secure dating in order to back it up. The PAS data can only go so far in testing White's theories. The data are

more useful for studying geographic or large-scale temporal trends rather than small-scale changes over a relatively short period of time.

It has already been identified that part of the proposed eastern boundary of Western Britain correlates well with that suggested by White (2007:60) for *Britannia Prima* (see Figure 5.4 and 6.61). What this means is that, in the east of where *Britannia Prima* may have been located, we see what we would expect to in terms of correlation between finds. More Early Anglo-Saxon finds means more Late Roman finds. However, in the west we see a weak negative or no correlation between the two periods where, under normal circumstances, a positive correlation would be expected. As previously noted, this may represent the under reporting or misdating of some Late Roman finds thus skewing the correlation. This conclusion is consistent with the idea that the east of *Britannia Prima* received goods from the south east until the end of the fourth century but that following this the Roman way of life could not be maintained and the eastern areas of *Britannia Prima* saw greater changes in the fifth century (White 2007: 151, 162-164, 168). The boundary of *Britannia Prima* is not known and therefore it is not possible to draw any secure conclusions based on its boundaries. If, however, the far East of England and Wales saw greater change, then there is likely to be more diagnostically post-Roman artefacts recorded here. A lesser degree of change in the west may have led to material culture remaining largely the same, making it more difficult to distinguish late from post-Roman without stratigraphic context.

In addition, PAS finds lack the secure stratigraphic dating required for a more detailed analysis and, therefore, firm conclusions are not possible. However, it is noteworthy that the analysis carried out here based on areas of high and low finds density correlate not only with long-term cultural zones identified by Fox (1933), Mackinder (1910), Cunliffe (1991, 2001) and Oppenheimer (2006) but also with the proposed boundaries for *Britannia Prima* based on inscriptions and pre-Roman tribal

boundaries (White 2007: 36-37). In the Early Anglo-Saxon (AD 410-600) period, the boundary between zones of differing find types appears to be between Eastern England and Western Britain. This roughly corresponds to the boundary of *Britannia Prima* proposed by White (2007). The analysis represents the testing of a hypothesis regarding differences in finds assemblage between east and west and periods of difference from the long-term trends of the *longue durée*. Interpretation of the data suggests that there is some degree of support for White's (2007) interpretation of the survival of *Britannia Prima,* however, further study would be required with more structured and well dated evidence than the PAS allows.

There are some clear differences beginning to develop in material culture at the time between the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Table 6.40 and Table 6.41 summarise the Chi-squared tests and the percentage that each category contributes to the overall assemblages. These can be compared to Table 6.18 and Table 6.19 for the Roman (AD 43-410) and Early Medieval (AD 410-1066) periods.

The Late Roman finds show a lesser degree of difference between Western Britain and Eastern England than the Highland and Lowland Zones (Table 6.40). This suggests that the more important boundary in the Late Roman period is that between the Highland and Lowland Zones. This suggests that the Late Roman period in England and Wales was part of the *longue durée* and is an example of long-term divisions in Britain archaeology as recognised by Mackinder (1910), Fox (1933), Oopenheimer (2006) and Cunliffe (2001).

It was concluded above that there appeared to be a degree of difference in the PAS period of Early Medieval (AD 410-1066) finds assemblages in Western Britain and Eastern England that is not apparent between the Highland and Lowland Zones. However, it was also noted that there was still

some degree of difference between the Highland and Lowland Zones with differences in four categories versus six in Western Britain and Eastern England (Table 6.19). Even more difference is apparent in the Early Anglo-Saxon (AD 410-600) data than the Early Medieval. In the Early Anglo-Saxon data there is a statistically significant difference in only one category between the Highland and Lowland Zones (Table 6.41) and four between Western Britain and Eastern England. This is a 300% increase versus only a 50% increase in the Early Medieval period.

The only category with a statistically significant difference between the Highland and Lowland Zones in the Early Anglo-Saxon period is Unknown/Miscellaneous. Due to the nature of this category, which contains any unidentified finds along with those which do not belong in any other category, it is impossible to draw any conclusions from this difference. When Coins and Unknown/Miscellaneous finds are excluded there is no statistically significant difference whatsoever amongst the Early Anglo-Saxon assemblage in the Highland and Lowland Zones (Table 6.41).

Aside from Unknown/Miscellaneous, the categories with a significant difference between Western Britain and Eastern England are Horse Equipment, Personal Adornment and Brooches. Unsurprisingly, Brooches prove to be the main marker of identity in the Anglo-Saxon period with a key difference in contribution seen between Eastern England and Western Britain that is not visible between the Highland and Lowland Zones. The remaining two differences have higher percentage of finds in those categories in Western Britain.

Broad Category	Late Roman Highland/Lowland	Late Roman Western Britain/Eastern England		Early Anglo-Saxon Highland/Lowland	Early Anglo-Saxon Western Britain/Eastern England
Commerce					
Travel and Transport					
Industry and Tools					
Agriculture					
Weaponry and Military Equipment					
Horse Equipment					
Writing and Communication					
Locks					
Domestic					
Building Materials					
Heating and Lighting					
Personal Adornment					
Dress and Accessories					
Brooches					
Recreation					
Cosmetic, Hygiene and Medical					
Religion or Ritual					
Funerary					
Unknown/Misc					

Table 6.40 Summary of Chi-squared test results for percentage contribution of each broad object category in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods. Red shaded cells represent categories with a higher percentage in the Lowland Zone/Eastern England, blue shaded cells those with a higher percentage in the Highland Zone/Western Britain and unshaded cells those with no statistically significant difference. Data from the PAS.

Broad Category	Late Roman Highland/Lowland	Late Roman Western Britain/Eastern England		Early Anglo-Saxon Highland/Lowland	Early Anglo-Saxon Western Britain/Eastern England
Travel and Transport					
Industry and Tools					
Agriculture					
Weaponry and Military Equipment					
Horse Equipment					.
Writing and Communication					
Locks					
Domestic					
Building Materials					
Heating and Lighting					
Personal Adornment					
Dress and Accessories					
Brooches					
Recreation					
Cosmetic, Hygiene and Medical					
Religion or Ritual					
Funerary					

Table 6.41 Summary of Chi-squared test results for percentage contribution of each broad object category in the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods with Coins and Unknown/Miscellaneous finds removed. Red shaded cells represent categories with a higher percentage in the Lowland Zone/Eastern England, blue shaded cells those with a higher percentage in the Highland Zone/Western Britain and unshaded cells those with no statistically significant difference. Data from the PAS.

The following chapter will discuss the implications of the analysis and summarise the findings of the case study. It will offer some conclusions as to what these findings mean in terms of what was happening in Britain in the Roman and Early Medieval periods and also how these periods fit into the long-term trends apparent in the data.

7 DISCUSSION

7.1 Introduction

The previous chapters have set out the methodology chosen for the research and the results of the analysis. This chapter will discuss the results of the analysis from Chapters Four and Six and their implications for British archaeology. The long-term trends apparent in the PAS data will be considered along with how these are relevant to the *longue durée* approach of the *Annales* school of historical writing (see Chapter 4.4). The data will then be considered on a micro- or cultural level and compared to previous knowledge of the fourth to the fifth centuries AD (see Chapter Five). Some answers will then be put forward to the case study questions posed in Chapter 5.5.

7.2 Long-term trends in the data and the *longue durée* approach

With regard to objective one and macro-level analysis, there are two main general trends apparent in the data (see Chapter 4.2 for full discussion). Firstly, there are fewer finds in modern urban areas than in rural ones. This is largely down to modern recovery trends. This is simply common sense. Many of the major modern conurbations were cities from the Roman period and will have been areas of heavy material culture use.

There is not a total lack of finds from urban areas. The fact that artefacts were being deposited in modern major cities is demonstrated by the large number of finds in Central London. These are mainly recovered from the Thames foreshore (Figure 4.3) where metal detectorists are able to operate, whereas this is not possible in the rest of the city. There are also vast amounts of excavated evidence from urban areas (Schofield and Leech 1987).

Overall, on a nationwide scale, the main constraint on the PAS data appears to be topography. It can be seen that, at least at this scale, topography has a greater effect on finds recovery and reporting than urbanisation by the fact that most large, urban areas are actually located in the area of most dense finds distribution (Figure 4.4).

The two areas identified across the entire PAS database, the Highland Zone and the Lowland Zone, contain 62423.5 and 91544.19 finds per square kilometre respectively. This difference is statistically significant (Table 4.3). The difference in numbers of finds is highlighted by the statistic that the Highland Zone has thirty-two counties with zero finds per square kilometre whereas the Lowland Zone only has eight.

This Highland/Lowland division between areas of high and low finds densities is in evidence across most PAS periods. Key deviations are the Iron Age (800 BC-AD 42, Figure 4.20a), which has a much larger concentration of finds in the south east, and the Early Medieval period (AD 410-1066, Figure 4.24a), which has a concentration down the east coast. The high number and percentage of finds in Staffordshire is an outlier in this pattern of distribution and is the first suggestion in the analysis of the data that there may be Early Medieval finds further west than the concentration of finds down the east coast in this period. Even those periods which deviate from the overall trends do not do so dramatically. The pattern of finds distribution remains broadly similar, with more finds in the south and east than the north and west.

The Roman (AD 43-410) finds follow the Highland/Lowland division outlined above but it is worth noting that, whilst Wales has few Roman finds, a high percentage of the total finds there are Roman (Figure 4.21b). Richards *et al* (2009) link the distribution of Roman finds to locations where villas are found. The few known Roman villas in Wales are concentrated in the south where the largest

number of Roman PAS finds is reported (Figure 4.28b). However, the ratio of Roman to overall finds is high across the whole of Wales beyond the 'villa zone'. Although there are relatively few Roman finds outside the area of villas, there are few finds of all periods and 95.26% of finds from Wales are Roman (Figure 4.8). Since the publication of the VASLE project's work, a Roman villa has been identified further north at Abermagwr. This small, late Roman villa near Aberystwyth is the most north-westerly villa in Wales and greatly extends the limit of known villas in the area (Driver and Davies 2012). This may go some way towards explaining the high proportion of Roman finds in Wales.

More plausibly perhaps, the high proportion of Roman finds in Wales is also linked to the highly militarised nature of the Roman occupation here. Burnham and Davies (2010) identify eighty-three military sites in their gazetteer. With the Roman Army present here for extended periods, there is a lot of material culture left behind. The effect of the Roman army on material culture was identified by White (2013a: 143-4) in his analysis of the fort at Pentrehyling. The fort only had very brief occupation in the early Roman period but there was still a large array of finds recovered 'even in the relative wilds of south Shropshire'. The Roman period also saw an increase in use of metals. A single Roman legion would have required a vast amount of metalwork (Robinson 1975) and there are eighty three military sites known in Wales (Burnham and Davies 2010). The impact of militarised zones on distributions of PAS finds can be seen in the region of Hadrian's Wall, which is an area of higher finds density in an otherwise relatively sparse area (Figure 7.1). Roman military activity in Britain continued long after the main conquest period of circa 74-84 BC (Haywood 2001: 82-5) and military artefacts represent a large contribution to the archaeological record (Henig 1995: 45).

The general trends and period-specific datasets also demonstrate a lower proportion of Roman and Early Medieval finds in the West Midlands (Figure 4.33). The VASLE project (Richards *et al* 2009)

deemed this to reflect the use of metals in antiquity. With the current data this interpretation is no longer sustainable. Richards *et al*'s (2009) suggestion that there was a lack of use of portable antiquities in the west of Britain in the Early Medieval period does not appear to be entirely realistic. The VASLE project identified a relative dearth of finds in the West Midlands, which they identified as being a probable indicator of differing historical use. The data in Chapter Three clearly show a larger number of finds in this area, particularly in Staffordshire (Figure 4.24b). Hoards were not split up into their constituent finds for the analysis in order to prevent the biasing factor of a large number of finds of a particular type in one hoard. This means that the Staffordshire Hoard is only recorded as two finds and so does not significantly contribute to the greater number of finds here in the Early Medieval period. Keynes (2010) discusses the importance of the hoard in redressing an imbalance caused by both the previous lack of finds in seventh century Mercia and the general lack of historical material. The Staffordshire Hoard adds a large volume of material to be considered alongside the existing evidence, dominated by finds from the south and east. The Early Medieval period also includes the period of the 'Mercian Supremacy' between circa AD 600 and 900 (Stenton 1970: 48-66; Arnold 1997: 226; Brooks 1989: 59; Dumville 1989; Webster and Backhouse 1991: 193-253). Therefore, the VASLE project's (Richards *et al* 2009) conjecture that there was a genuine lack of material culture in this area in the Early Medieval period does not appear logical.

Logic dictates that people living in these areas used some form of material culture, and thus portable antiquities, in the period in question. The west of Britain is also an area of not insignificant metal mining in Roman Britain (Figure 4.5) meaning that raw materials were available. Although there are far lower densities of finds in the west, there are areas of higher finds density (see Chapter 4.2). There is some degree of correlation between areas in the west/Highland Zone where metal mining took place and those where higher numbers of PAS finds are reported. Areas of highest metal working or mining are the places where larger numbers of PAS finds are recovered.

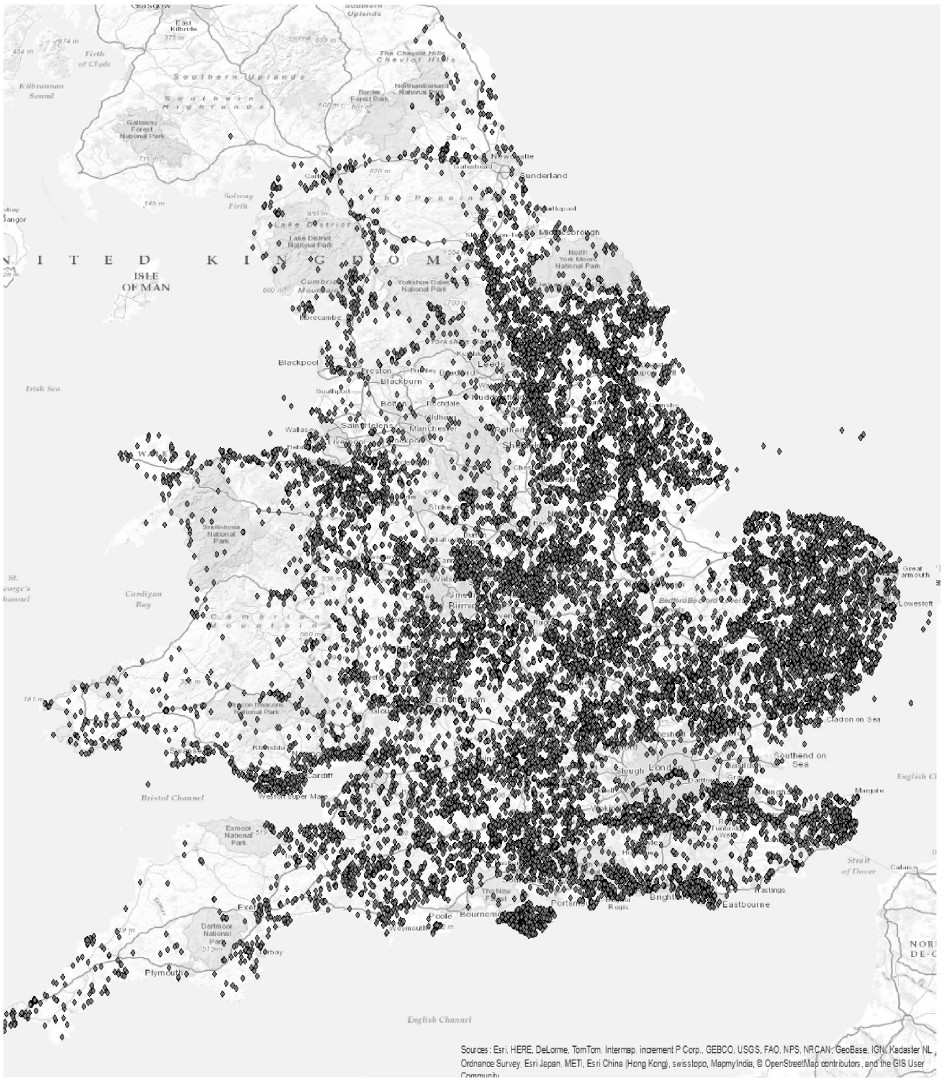


Figure 7.1 Roman finds distribution. Map produced using ArcMap with data from the PAS.

With regard to the *longue durée* approach, the main question raised by these long-term divisions seen in the PAS data is whether they reflect modern recovery and reporting or genuine historical divisions across topographic lines.

It can be concluded that there is a degree of modern recovery trends apparent in this finds distribution. It is unlikely that any significant detecting is taking place in highland areas and so finds may be being missed here. Nevertheless, it is impossible to reliably conclude that there are relatively

few artefacts to be found in the Highland Zone as there is no system in the PAS for reporting negative findings. This means that, without the widespread surveying of metal detectorists, it is not possible to determine which areas have few finds because detectorists are not operating there and those areas which have been searched by detectorists with no/few finds recovered.

Comparison with excavated evidence suggests that this Highland/Lowland Zone divide extends further than simply PAS material. The relative absence of finds in The Highland Zone is mirrored in the evidence from rural excavation in England and Wales (Figure 7.2). *The Rural Settlement of Roman Britain* is an online resource that compiles excavated evidence for Roman rural settlement in Britain from published reports and grey literature (Allen *et al* 2018). If the map of PAS Roman finds distribution (Figure 7.1) is compared with the map of excavated data for the same period (Figure 7.2), it can be seen that the distributions are extremely similar. Similarities include the same relative dearth of finds/excavated evidence in the regions of the Pennines, The Weald, The Wash and Dartmoor/Exmoor. This clearly demonstrates that it is not only PAS finds which show bias towards lowland areas.

To an extent, excavated data shares the same issue of a lack of understanding of negative findings as the PAS. Whilst excavation where few finds are recovered (either in general or from a particular period) occurs, excavation tends to take place where archaeologists expect to find something.

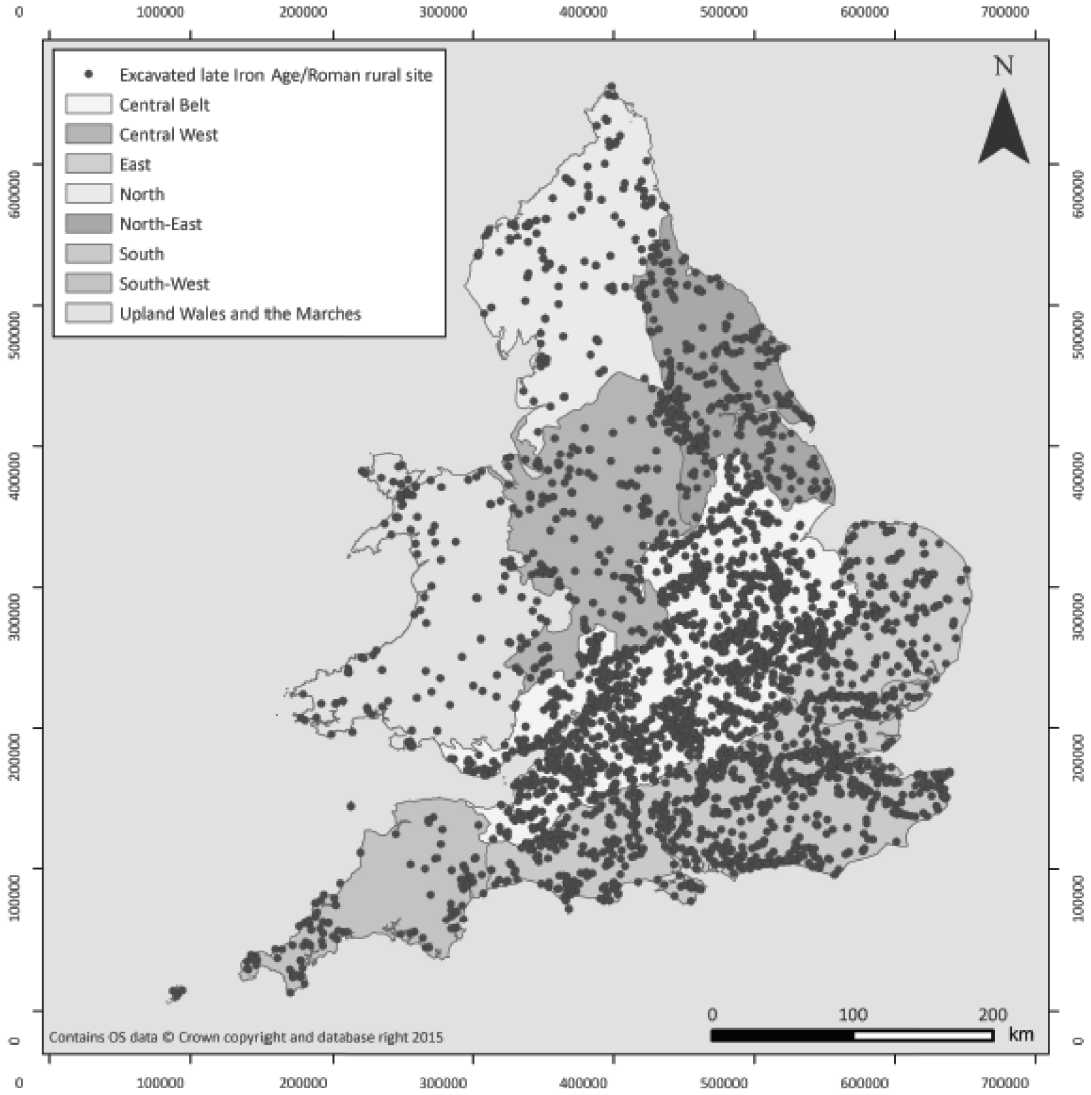


Figure 7.2 a) Excavated evidence for rural Roman Britain in England and Wales. Source: Allen et al (2018).

The long-term trends in PAS data can also be compared to other aspects of British archaeology. Chapter 4.4 introduced the idea of long-term division between cultures in the east and west of Britain. The Highland/Lowland division is one that has been identified across much of British history/prehistory including in Neolithic stone alignments, Anglo-Saxon graves and Roman towns (Figure 7.3), although the division is not always along identical lines.

Figure 7.3 a) Distribution of menhirs, stone circles and alignments in Britain showing the divide between east and west. Source: Oppenheimer (2006: 257). b) Distribution of Anglo-Saxon burials showing the bias towards the east Source: after Härke (2011: 3). c) The distribution of major and minor towns in Roman Britain showing a highland and lowland divide including a Midland Gap. Source: after Millet (1990: 143 based on Burnham 1986).

Therefore, although a lack of detectorist activity in the Highland Zone is a reasonable explanation for the lack of PAS finds here, it is also sensible to suggest that there was a fundamentally different way of life in this area because of the difference in topography and geology. Differences in topography

and geology create differing soil types which, in turn, lead to divergent land use and way of life in particular areas.

The PAS finds distributions and differences in finds assemblages mirror the divergent land and soil types in England and Wales. In Wales eighty percent of agricultural land is Less Favourable Area (RSPB 2011a) and, in the west of England and Wales, land is largely pastoral as opposed to arable in the east (RSPB 2011a Fox 1933; Evans 1975: 147-9; Pounds 1994: 5-7; Roymans 1996; Burns 2010: xiv-xvi). This model has been of great importance since it was conceived by Fox (1933), although it has been criticised, notably by Pounds (1994: 5-7), who identifies a third zone in the Midlands with clay soils (Figure 7.4). This is, perhaps, analogous with the differences apparent between the east and west of *Britannia Prima* which will be discussed below.

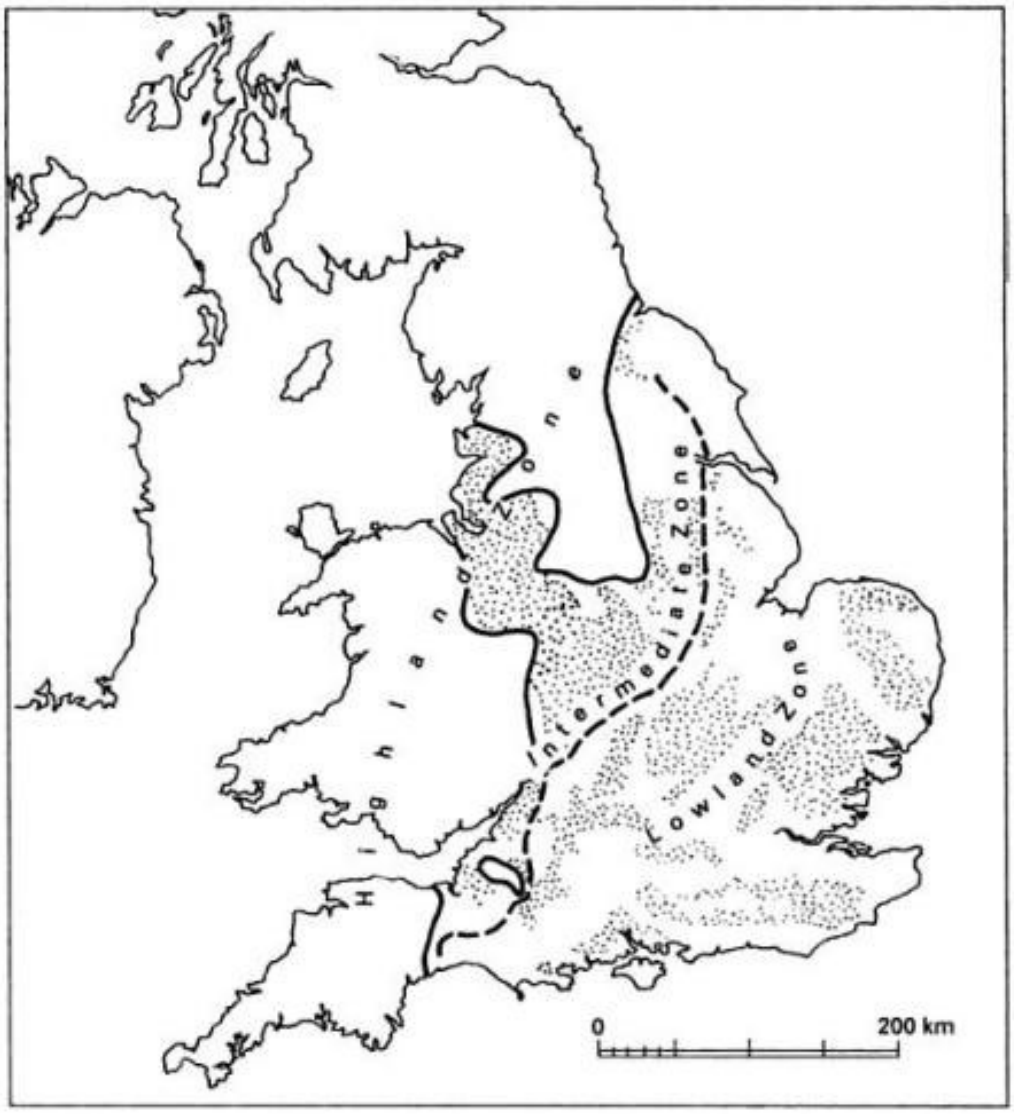


Figure 7.4 Fox's Highland and Lowland Zone with an 'intermediate zone' in the midlands as proposed by Pounds. Source: Pounds (1994: 6).

This correlation between farming regimes, topography and culture is similar to that observed by Roymans (1996) in Belgic Gaul and the Rhineland. Here, as in England and Wales, there is also a division into two zones based on the agricultural economy which appears to have produced two distinct cultures. The first zone is the sandy areas with clay and peat soils in northern Gaul. The agriculture here was largely pastoral with cattle farming being one of the most important types.

Settlements in this zone were diffuse, with isolated farmsteads. Cattle were important within the agricultural economy and also as markers of status. Similar importance of cattle in pastoral societies has been identified in societies in Ireland (Lucas 1989), northeast Africa (Herskovits 1926) and east Africa (Lincoln 1981). The second zone is the löss areas of northern France, central Belgium and the German Rhineland where the fertile soils support arable farming. Here, settlements are clusters of small buildings with a higher level of organisation and the farmhouses seen in the pastoral zone are absent.

The differences between these two areas formed the basis for the regional differences apparent in the Roman period (Roymans 1996: 58). The pastoral zone was less integrated into the Roman way of life and had a higher degree of continuity with native culture (Roymans 1996: 72-83). The arable zone underwent a greater transformation in the Roman period. It has been suggested that the villa system in Roman Gaul (which is found in the arable zone) is linked to the transformation of this arable agriculture. An aristocracy developed on the basis of amassing land (Müller-Wille 1970 in Roymans 1996: 64; Hinz 1970 in Roymans 1996: 64; Agache 1978 in Roymans 1996: 64; Drinkwater 1983: 167; Haselgrove 1990: 258; Roymans 1990: 190).

Roymans's assessment of land use and cultural differences in Roman Gaul can be extrapolated to England and Wales where, as described above, there are clear differences between highland and lowland areas. In England and Wales, the division between pastoral farming in highland areas and arable farming in lowland areas is evident in the present day. Most of the land suitable for arable farming is found in the south and east in the Lowland Zone (Figure 7.5). A greater number of dairy (AHDB 2016) and sheep (North West Upland Farming 2008) farms are found in the Highland Zone in the north and west.

Figure 7.5 Map of farming areas in the UK. Most pastoral farming takes place to the north and west of the red line and most arable farming to the south and east. Source: UK Agriculture (2016).

Kearney (1989: 18-19) warns of placing too much importance on the role of topography in British archaeology. He states that Ireland is not a highland area but that there is still a cultural link between the northwest of Ireland and the southwest of Scotland. Kearney is correct to state that Ireland is not an entirely highland area (Figure 7.6), although there are large highland areas around the coast. Northeast Ireland is identified as a highland area meaning that the link between this area and southwest Scotland does not prove that topography is not an important factor. Furthermore, regardless of topography, the agrarian economy in Ireland is extremely similar to that in the west of Britain. Pastoral farming is also a large part of the Irish agricultural economy. Of around 139,000 Irish farms, 110,000 have cattle and 32,000 have sheep. (Renwick 2013: 5). The importance of cattle in Irish agriculture (Lucas 1989) has already been mentioned. Cattle raiding is also specifically mentioned in ancient Irish mythology (Anon Táin Bó Cúailnge).

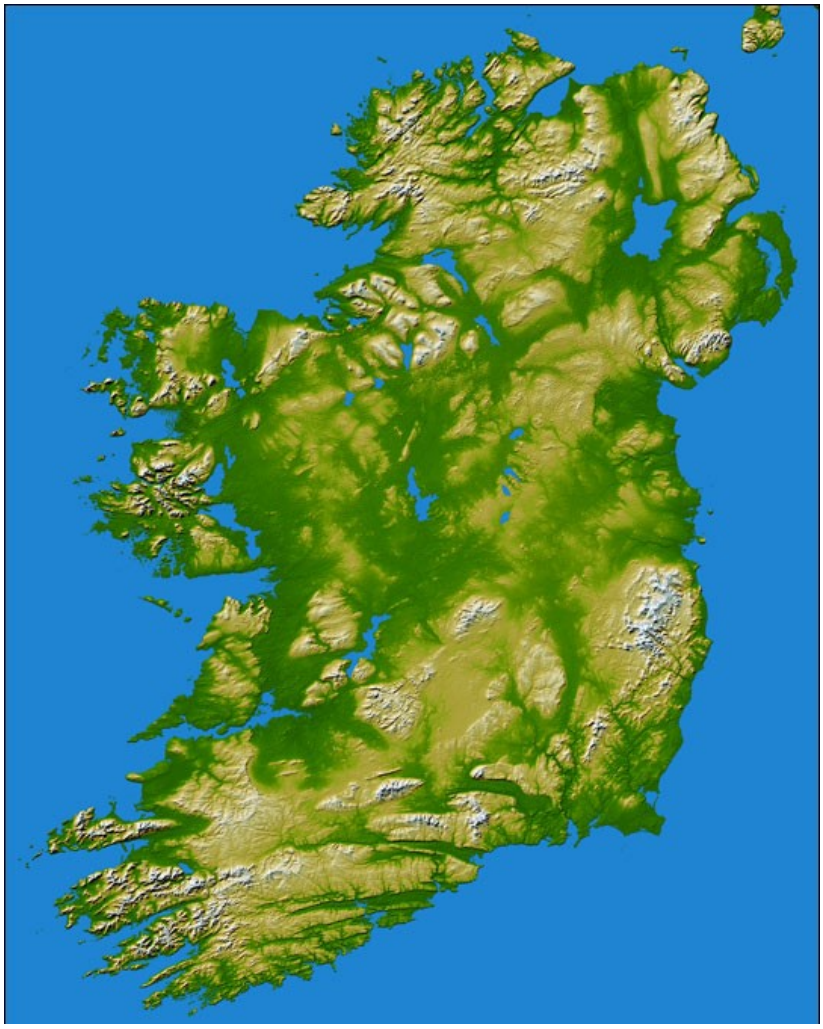


Figure 7.6 Topographical map of Ireland showing the central lowland surrounded by coastal highland areas. Source: NASA (2005).

Rather than similarities in topography and agrarian economy, Kearney (1989) emphasises the role of the Irish Sea as a method of communication between eastern Ireland and western Britain. This is essentially also the view put forward by Cunliffe (2001) and Oppenheimer (2006). However, Cunliffe's 'Atlantic zone' does not preclude explanations based on topography. Both topographic and, thus, agricultural similarities and the maritime connection via the Irish Sea can provide the explanation for the observed differences between east and west. It can also be argued that pre-existing differences between the cultural identity of the peoples living in the highland and lowland

areas of Britain were the reason for this link with Ireland not extending further east. Regardless of the reason for this difference, there is a fundamental division in British archaeology between the highland and lowland areas. This difference is apparent in the distribution of PAS finds across the majority of periods, including Roman (Figure 4.16-Figure 4.27).

Royman's (1996) analysis also identified a difference in material culture use along the topographic division he identified. The thesis methodology outlined in Chapter Three allowed for the bias created by the small number of finds reported from highland areas by studying find types and not simply find numbers across the various zones identified in Chapter Four. This also allowed the analysis to go further than the VASLE project which mainly analysed numbers of finds across England in order to identify 'productive sites' in the period of study.

7.3 The PAS and specific cultural questions

Following the initial analysis of the entire PAS dataset, examination of the Roman (AD 43 - 410) and Early Medieval (AD 410 - 1066) finds carried out objective two, micro-level research. This showed how PAS data can, contrary to the opinion of archaeologists such as Webb (2011) and Barford (2016), be used in archaeological research.

7.3.1 Roman (AD 43-410) and Early Medieval (AD 410-1066) finds

The first stage of the period-specific analysis assessed the data along the lines of the PAS period divisions of Roman and Early Medieval. The Roman finds distribution broadly follows the trends set by the entire dataset, whereas the Early Medieval data diverges from this. The Early Medieval finds are concentrated down the East Coast (Figure 4.24a). The VASLE project deems this to reflect

historical deposition and use of artefacts because it represents a deviation from the control dataset which determines the spatial biases in the data.

It must also be considered that this is an artefact of the types of find which are reported from each period. Much of the evidence for the post-Roman period is from cemetery evidence (Lucy 2000: 1). The majority of Anglo-Saxon PAS finds are Dress and Accessories and Brooches (Figure 6.8), supporting the idea that this distribution may be down to the locations of ploughed out Anglo-Saxon cemeteries. The Roman finds have a high proportion of Domestic finds (28%) (Figure 6.7) which is reduced to only 6% in the Early Medieval period (Figure 6.8). Ceramic vessels and other non-metallic domestic equipment are much less likely to be reported to the PAS than metal artefacts such as brooches and items of personal adornment. The artefact types found in Eastern England are also likely to be those that are significant markers of identity, such as brooches. The distribution of Anglo-Saxon burials fits well with the general long-term division into Highland and Lowland Zones and also the VASLE project's (Richards *et al* 2009) constraints maps (Figure 4.10). Funerary contexts are important markers of identity (Binford 1971; Joyce 2001: 12; Reimers 1999: 147; Saxe 1970, see Chapter 4.2.1). Therefore, this new division along different lines than previously, likely represents the influx of a new expression of identity, concentrated down the east coast, which was reflected in new types of material culture, particularly from funerary contexts.

The finds in the Highland and Lowland Zones were also assessed by find type across the two areas. Analysis by find type as a percentage of the overall assemblage allowed for a reduction of the bias caused by the uneven distribution of finds both chronologically and geographically. The English Landscapes and Identities Project (Donelly *et al* 2014: 54) identified a need to use more than simply

distribution maps to reach reliable conclusions. This has been achieved here via the comparison of the makeup of the finds assemblage in each area. Differences in proportions of find types are more likely to reflect historical use than differences in find numbers.

The Lowland Zone assemblages (Roman: Figure 6.12 and Figure 6.15, Early Medieval: Figure 6.14 and Figure 6.17) most closely resemble the trends seen in the whole dataset (Roman: Figure 6.7 and Figure 6.9, Early Medieval: Figure 6.8 and 6.10). This reflects the fact that the vast majority of the finds are recorded here and it is, therefore, the Lowland Zone that determines the general picture we have of Roman and Early Medieval Britain. This is also likely to be the case with the excavated finds which are biased towards the south and east. The PAS provides an immense body of data which can be easily studied across the whole of England and Wales, permitting the analysis of finds in the Highland Zone despite the small number of finds here.

In the Roman finds, the main difference in assemblage makeup is between the Highland Zone and the Lowland Zone, with a higher percentage of finds in the Lowland Zone in general. The only categories in which there is a higher percentage of finds in the Highland Zone are Coins and Funerary. When Coins and Unknown/Miscellaneous are removed (in order to reduce the biasing factor of the low numbers of finds other than Coins in the Highland Zone) the number of categories with a higher percentage of finds in the Highland Zone increases. Those find types which are generally regarded as being key indicators of ethnicity and identity (Personal Adornment, Dress and Accessories and Brooches) are more commonly found in the Lowland Zone. The Highland Zone has higher proportions of industry type finds.

The types of Early Medieval finds in the Highland and Lowland Zones are much more similar. The key boundary of spatial differentiation in this period appears to be between Eastern England and Western Britain.

This supports initial analysis from the overall distribution of finds which are concentrated along the east coast. The analysis of Early Medieval find types also largely backs up the identification of Early Medieval find distribution by Richards *et al* (2009). However, the large number of finds in Staffordshire pushes the boundaries of this area further west than their observations. It is important to bear in mind that this is only the boundary of the types of material culture suggestive of Early Medieval culture. Based on the PAS data, the broad object categories that are most indicative of an Early Medieval way of life are Industry and Tools, Brooches and Cosmetic, Hygiene and Medical whereas Horse Equipment, Dress and Accessories and Recreation finds are most likely to be identified in western areas where there appears to be more cultural continuity in this period.

Whilst reducing the number of finds further to the case study period of the fourth to the sixth centuries, it was found that there were relatively few find types that could be reliably dated to the Early Anglo-Saxon period (AD 410-600). This necessarily means that the majority of finds in this analysis are middle to late Saxon. In order to study more closely the potential cultural implications of PAS finds from the Roman to Anglo-Saxon transition, it was necessary to further narrow the parameters of the study to Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) finds.

7.3.2 Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) finds

Cutting the data from the PAS defined periods of Roman (AD 43-410) and Early Medieval (AD 410-1066) down to the case study period produced two periods that, for this research, were termed Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-1066).

By narrowing down the range of finds to the fourth to the sixth centuries, the extent of the influence of Anglo-Saxon (AD 410-600) culture was assessed. Particularly with reference to the Early Anglo-Saxon period rather than the broader Early Medieval period (AD 410-1066), there may be key differences in material culture which can help to illuminate the immediate post-Roman period. The entire Roman and Early Medieval periods were analysed initially for two main reasons. Firstly, the use of period-specific datasets is recommended in the methodology for the VASLE project (Richards *et al* 2009). Secondly, some of the more excessive proponents of the idea that there was a complete collapse of Roman way of life in Britain (see Reece 1980, 1988; Faulkner and Reece 2002; Faulkner 2004) do so on the basis of comparison between the post-Roman period and the Roman period as a whole (see Chapter Two).

Chapter Five put forward a series of questions to address objective two – can unstructured data be used to answer specific, cultural questions? Can PAS data be used to answer such questions concerning England and Wales in the fourth to sixth centuries?

7.3.2.1 What do PAS data reveal about England and Wales in the fourth to the sixth centuries AD?

The data from the PAS clearly demonstrate the Highland/Lowland divide that is apparent in other aspects of British archaeology. With regard to the data from across the Late Roman (AD 300-410) to

Early Anglo-Saxon (AD 410-1066) transition period, there is an evident division of England and Wales in several different 'zones' (Figure 7.7):

- Highland Zone – the area of relatively sparse finds overall
- Lowland Zone – the area of relative dense finds overall

- Western Britain – the area of relatively sparse Early Medieval/Early Anglo-Saxon finds
- Eastern England – the area of relatively dense Early Medieval/Early Anglo-Saxon finds
- Boundary Zone – the area in the middle which is part of the Lowland Zone but in Western Britain

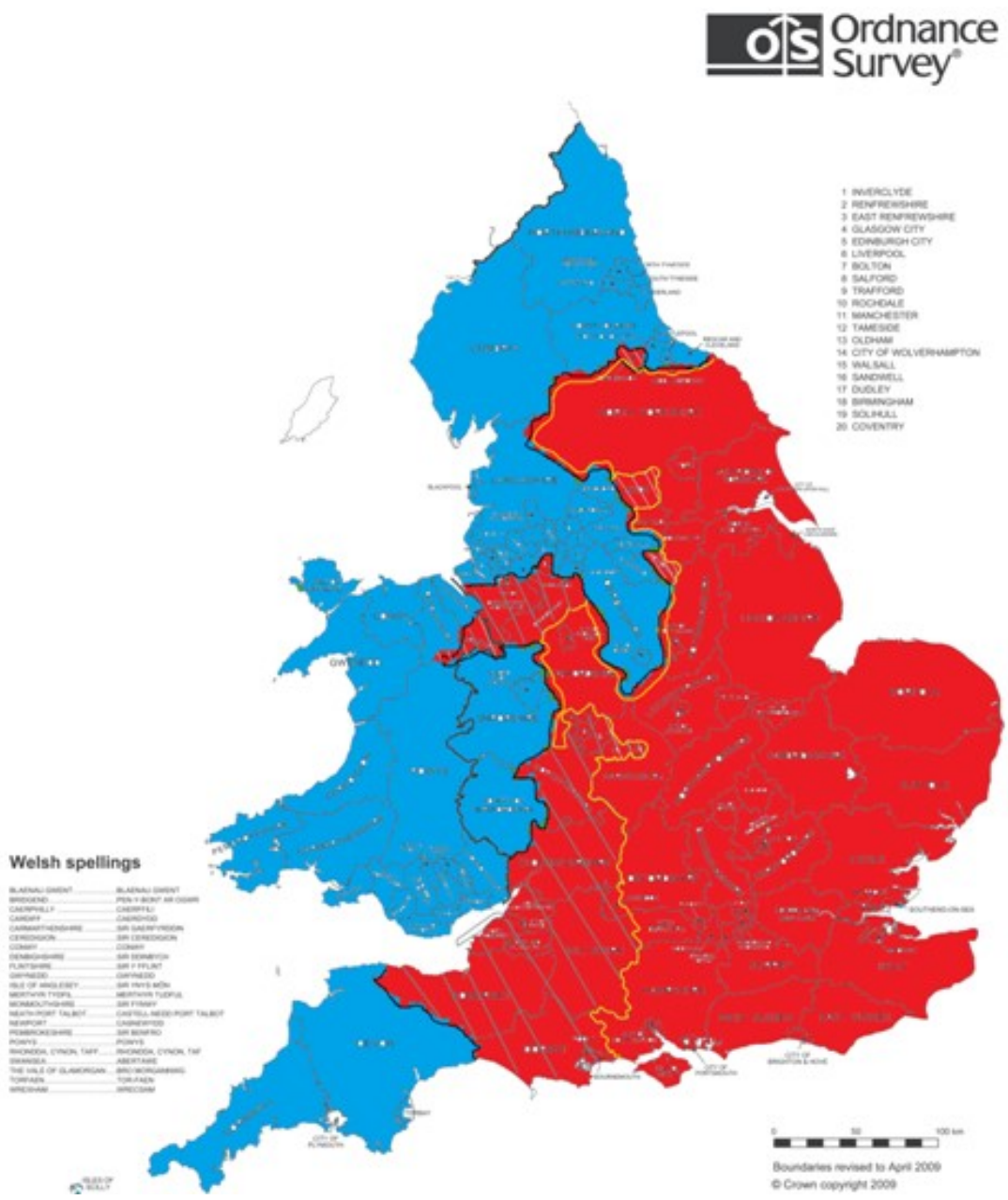
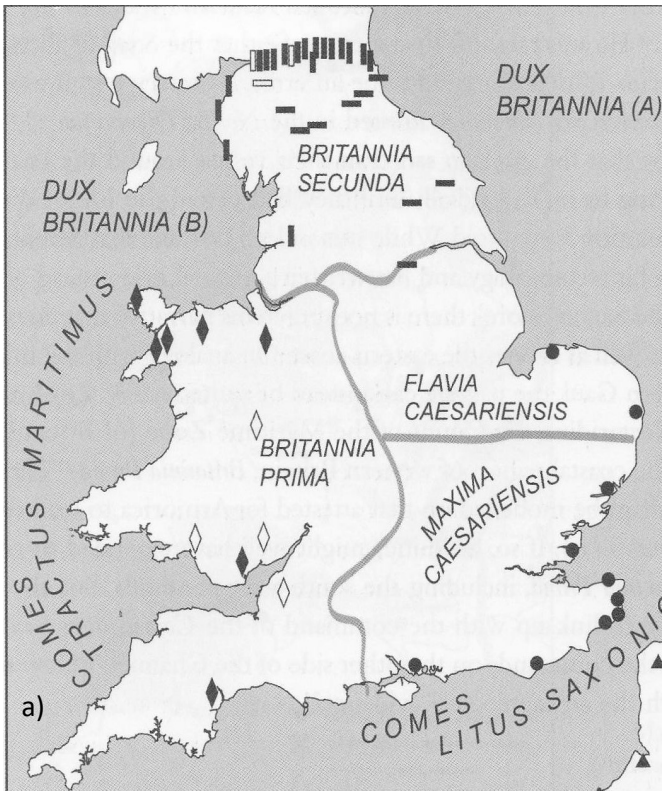


Figure 7.7 Division of England and Wales into zones based on the distribution of PAS finds. The red area represents the Lowland Zone and the blue area the Highland Zone. The orange lines mark the PAS boundary between Eastern England and Western Britain. The hashed area represents the 'Boundary Zone' the area of the Lowland Zone which is in Western Britain. Base map reproduced from Ordnance Survey map data by permission of Ordnance Survey (2013) © Crown copyright 2013.

The Early Anglo-Saxon period (AD 410-600) has a similar overall distribution to that for the Early Medieval period (AD 410-1066). There is still a concentration of finds down the east coast with very few in Wales. However, the small number of finds makes patterns difficult to identify and distribution analysis possibly unreliable.

The difference between the Highland and Lowland Zone is apparent across most of British history which means that it is significant when the finds distribution diverges from this pattern in the Early Medieval (AD 410-1066)/Early Anglo-Saxon (AD 410-600) periods. In the Early Anglo-Saxon period (AD 43-410) there appears to be much more similarity in terms of material culture across England and Wales than before and the line demarcating the area of both the densest and most different composition of finds is drawn further east. There is a clear difference in Roman find types in Highland and Lowland areas that does not exist in Early Medieval finds.

There is an apparent correlation between the boundary of Western Britain and the proposed boundary of *Britannia Prima* (Figure 7.8) although we do not actually know the boundary of any of the provinces of Late Roman Britain. The fact that the proposed eastern boundary of this province corresponds with Eastern England/Western Britain rather than the Highland/Lowland Zone suggests that may have been of great importance in the post-Roman period.



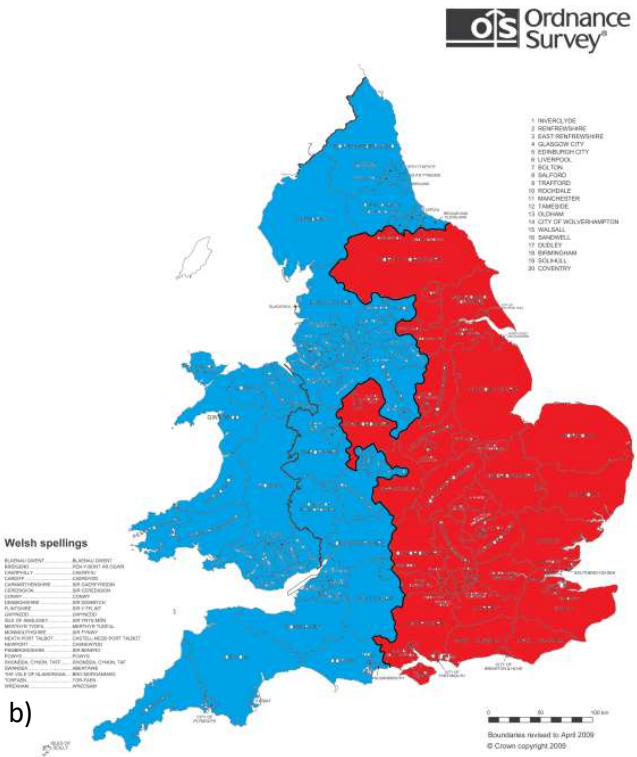


Figure 7.8 a) The provinces of Britannia in the Late Roman period, showing the eastern boundary of Britannia Prima. Source: (White 2007: 60). b) The boundary between Eastern England (red) and Western Britain (blue).

The Late Roman (AD 300-410) finds are still dominated by Coins (Figure 6.35) but, when these and the Unknown/Miscellaneous finds are removed, the assemblage is predominantly Domestic (Figure 6.37). This represents a marked change from the Roman (AD 43-410, Figure 6.7 and Figure 6.9) and Early Anglo-Saxon (AD 410-1066, Figure 6.36 and Figure 6.38) finds which are mainly brooches. A majority of the clearly dated brooches in the Roman data are trumpet brooches from the early Roman period. Others are often given a much broader date range and are, therefore, not included in the Late Roman data without any extra information being made available. In contrast, many of the Early Medieval brooches have a defined chronology. Brooches are also one of the key indicators of Anglo-Saxon culture and it is, therefore, not surprising that the assemblage is dominated by them. This is especially true when it is considered that it is not necessarily the whole spread of material culture types that are predominantly brooches but only those which can be clearly dated as being circa AD 410-600 and these are generally the culturally Anglo-Saxon (as opposed to chronologically early post-Roman) finds.

The Late Roman finds show that the key difference in the period is still between the Highland and the Lowland Zone and the overall picture is very similar to the Roman period as a whole (Table 6.40 and Table 6.41). The main categories of finds which are diagnostic of the Highland Zone are Industry and Building whereas the items of adornment which most often display identity or ethnicity are most commonly found in the Lowland Zone. This suggests that the Late Roman period is very much part of the *long durée* trends which see the Lowland Zone as more changeable and the Highland Zone as having a more long-term, subsistence based economy and way of life (see Chapter 7.2).

The Late Roman period is clearly distinguished by its material culture and way of life which differs from the early period. Late Roman portable antiquities are characterised by greater use of texture, formal patterns, abstraction and colour (Henig 1995: 139). The Thetford Treasure (Figure 7.9) and

Hoxne Hoard (Figure 7.10) demonstrate late Romano-British tastes. The Thetford Treasure displays Byzantine tastes (Johns and Potter 1983; Henig 1995: 143), whereas the Hoxne Hoard is more metropolitan (Bland and Johns 1993; Henig 1995: 147). Chip-carved military fittings in the Late Roman Military Style are also an important component of the south-east assemblages (Southern and Dixon 1996: 118-9; Bishop and Coulston 2006: 222) (Figure 7.11, see Chapter 5.4). These artefacts are examples of the type of Personal Adornment material culture which is found in the Lowland Zone. Links with the Byzantine East are displayed (see Chapter 5.4.2 and Henig 2004). The Highland Zone assemblage is more utilitarian, perhaps reflecting its pastoral economy compared to arable areas which undergo more change (c.f. Roymans 1996).

In terms of geographic zoning of broad artefact types, the Late Roman period is broadly the same as the period as a whole. In other words, although specific artefact types and their decorative styles were very different in the Late Roman period, the general dichotomy in Britain at this time was the same.

Figure 7.9 A selection of finds from the Thetford Treasure, fourth century AD, Thetford, Norfolk. From top left, clockwise: Gold belt buckle. Source: British Museum (2011a). Engraved carnelian depicting Venus with Cupid, both signifying love, and the armour of Mars, the Roman god of war. This is a standard scene in Roman iconography. Source: British Museum (2012c). Gold and gemstone rings. Source: British Museum (2012d).

Figure 7.10 Artefacts from the Hoxne Hoard, fourth or early fifth century, Suffolk. From top left, clockwise: Silver handle in the form of a tigress, probably deliberately detached from an amphora. Source: British Museum (2011b). Close up of silver strainer-spoons decorated with images of Oceanus (or another similar marine deity) with dolphins. Source: British Museum (2011b). Gold openwork bracelet (length: 6cm). Source: Henig (1995: 147). Gold body-chain (width of junction pendants: 3cm). Source: Henig (1995: 147).

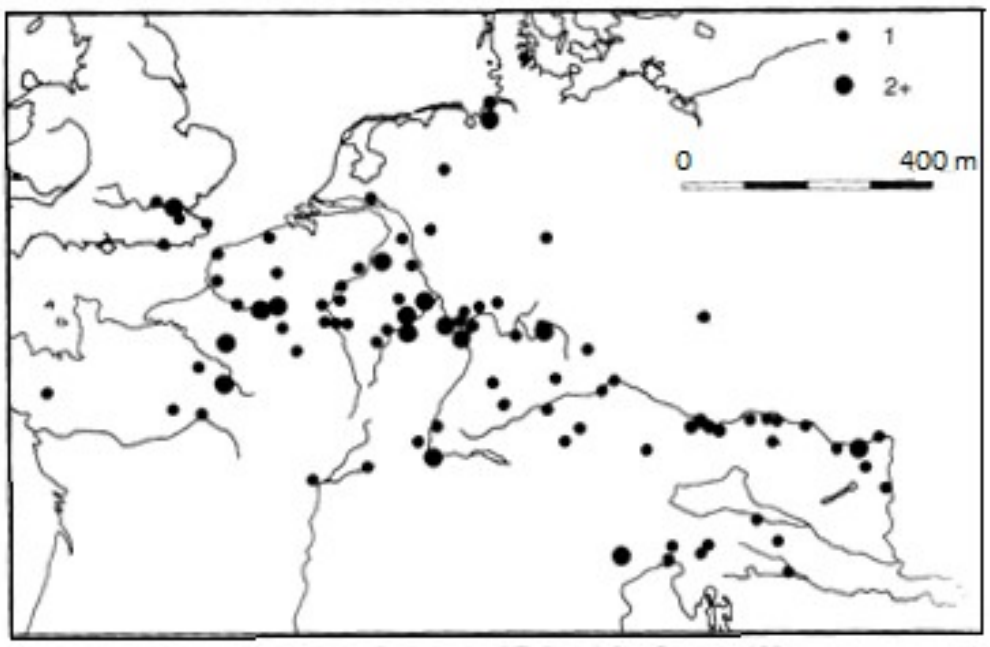


Figure 7.11 Map showing the distribution of chip-carved fittings. Source: Bishop and Coulston (2006: 222) after Sommer (1984)

The Early Anglo-Saxon data confirm that the key area of difference here is between Eastern England and Western Britain rather than the Highland and Lowland Zones (Table 6.40 and Table 6.41). There is still much more similarity between the areas than was the case during Roman Britain. The same types of find are most prevalent in each area as in the Early Medieval period. The data from the Early Anglo-Saxon period are important because there is no difference at all between the Highland and Lowland Zone. The difference between Eastern England and Western Britain is marked by items of decoration. There are higher percentages of Personal Adornment and Horse Equipment finds in Western Britain and a higher percentage of Brooches in Eastern England. The difference in artefact types between Eastern England and Western Britain is likely to be due to the high incidence of funerary evidence in Anglo-Saxon England. As noted by Lucy (2001: 1) and Richards *et al* (2009), most of the evidence for Anglo-Saxon contexts comes from cemeteries.

The Early Anglo-Saxon (AD 410-600) and Early Medieval (AD 410-1066) periods are also marked by being relatively more similar across the various zones. This is not surprising given what we know about economic exploitation of land in Roman and Early Anglo-Saxon Britain. In the Roman period, the evidence suggests continuity in farming from the Iron Age (Jones 1989) and farms and settlements favoured lighter soils (Loyn 1991: 19). Discussion above interpreted the PAS finds distributions in terms of topography, soil type and farming practice (see Chapter 7.2) and, thus, it is known that farming practices can have an effect on way of life and material culture. Therefore, any changes in the economic exploitation of land in the post-Roman period may explain this change in the divisions across England and Wales, with finds assemblages becoming more similar in the Early Anglo-Saxon period.

In the Early Medieval period there was a drastic change in agricultural practices. Farms moved to valleys, the plough was heavier and heavy clay soils were no longer a barrier to farming due to innovations including the introduction of the mouldboard plough, short fallow periods and crop rotations (Loyn 1991: 20; Hamerow 2017a; McKerracher 2017, 2018). Cultivation of heavier soils would have meant that many of the clay soils in the Highland Zone were no longer inaccessible to arable farming. This means that, whereas in the Roman period there Is a large difference in material culture assemblages between the Highland and Lowland Zones, the Early Anglo-Saxon period displays more similarities as agricultural practice became more similar across zones. Nevertheless, differences in culture and agricultural practice caused by topography and soil type would not be removed completely as differences are still seen in modern farming practices (Figure 7.5).

As well as agricultural changes, exploitation of mineral resources can be linked to changing PAS finds assemblages and the greater similarity between zones in the Early Anglo-Saxon period. There are significant amounts of raw materials in the west, with distributions of historical metal orefields

matching the division between the Highland and Lowland Zones (Figure 4.5). Metals were put to a variety of uses in the Roman Empire. Gold and silver for coinage and jewellery (Painter 1967), bronze for coinage, statues and vessels (Greene 1986: 143), lead and tin for alloys (Hughes 1977; Blagg and Reed 1977), lead alone for roofing and pipes (Boulakia 1972) and iron for tools (Manning 1976). The Roman period brought with it a much greater use of metal than previously. The Roman army alone would have increased the use of metals significantly. A single Roman legion would have required equipment such as armour, swords and spears for 5,000 – 6,000 soldiers (Robinson 1975). The number of Roman soldiers in Britain had grown to around 55, 000 in the mid second century (Mattingly 2006: 131).

In contrast, in the Early Medieval period, although the incidence of metal objects is high, mining output declined. Methods were also less efficient than those employed during the Roman period (Forbes 1957: 64; Bayley *et al* 2008: 50). Older metal objects may have been melted down and the metal reused. For instance, the gold finds in the Staffordshire Hoard had all been prised off the original weapons, suggesting the blades may have been reused and the fittings melted down (Gilmore 2018: 53). There are no known gold mines from Britain in the Early Anglo-Saxon period and gold was instead likely sourced from recycled Byzantine and Merovingian coinage (Williams and Hook 2013: 22). Owen-Crocker (2011: 96) discussed the many examples of surviving metal objects from the Anglo-Saxon period and suggested that the precious metals were obtained from melting down older artefacts such as Roman coins. Much like the late Roman decline in urban infrastructure described by Esmonde-Cleary (1989, 2014) and others (see Chapter 5.5), these changes in the supply of metal began earlier, in the third or fourth century. For example, prior to the third century, Romano-British iron production could generate thousands of tons of slag (Tylecote 1987: 65). By the fifth century, there were few sites smelting iron and each only produced a few kilograms of slag (Fleming 2012: 24). The Roman economy allowed extensive mining and use of metals but as the

Roman economy collapsed, production of freshly smelted metal declined and people needed to recycle and rework old metal objects to keep up the supply (Fleming 2012: 9-10). For example, at metal working sites in Ickham and Southwark, metalwork scraps of wide-raging date for melting and reworking have been recovered (Bennett *et al* 2010: 339-40; Hammer 2010: 166).

As well as the cost of metal extraction, a further important factor in deciding whether a mine was viable for Early Medieval people was the distance from the nearest town or village, due to the cost of transportation (Martinon-Torres and Rehren 2008). With the collapse of the Roman infrastructure this would have made many mines non-viable. This changes the distribution of metal extraction to more closely match the distribution of Early Medieval settlements. This can be linked to the increased localisation in Late Roman towns (Chapter 5.4.1) and may explain the greater similarities on a nationwide scale in the post-Roman period. As society, urbanisation and exploitation of land became more localised, differences will be less apparent on a macro level and study across smaller areas will be required to identify areas of difference.

The need to avoid the culture history paradigm was identified in Chapter Two and, whilst it is tempting to assign strict definition of 'Roman and 'Anglo-Saxon' to the peoples living in Western Britain and Eastern England respectively, this is not possible on the material culture evidence alone. There is, however, a clear difference in the material culture evidence from the PAS between these areas.

7.3.2.2 In particular, what do the PAS finds reveal about the west in the immediate post-Roman period?

The analysis appears to suggest that the post-Roman west was entrenched in the long-term trends in culture and way of life. It was part of a subsistence-based economy (see Chapter 7.2) that affected material culture use.

In the post-Roman period, life may have continued much as before in this area, with material culture remaining, in many ways, the same as in the Late Roman period. This is the area in which fewer highly decorated finds, such as jewellery. are recorded. Instead, the assemblage is dominated largely by everyday items such as Industry and Tools, Domestic items and Building Materials (Figure 6.41 and Figure 6.45). In contrast, in the east, the influx of Anglo-Saxon culture and predominance of finds categories such as Dress and Accessories and Brooches (Figure 6.42 and Figure 6.46) creates a marked change in material culture. This also means that the accurate dating of post-Roman finds is much easier in these areas, particularly where the PAS in concerned. As stray finds rely on typology for dating, finds such as jewellery and brooches will be easier to accurately date to the immediate post-Roman period. In the west it may be that, if life carried on much as before with people trying to keep up the way of life to which they were accustomed, material culture styles remained more static and, thus, more difficult to accurately date without context. The long-term trends suggest that this area of Britain remained broadly similar across many periods. It is not necessarily a Roman way of life that continued here but the broadly similar pastoral, subsistence lifestyle that likely existed across all periods as part of the *longue durée* evident in the archaeological record (See Chapter 4.4).

The correlation between the proposed boundary for *Britannia Prima* and the boundary between the Highland and Lowland Zones has been discussed above. The west of Britain in the post-Roman period was not homogenous, also displaying its own broad trends within the Highland Zone. The Highland

Zone can be divided in two along the lines of difference between the Highland Zone and Western Britain (see Figure 7.7). Analysis of the finds in this area showed that there was a degree of difference between the Boundary Zone and the Highland Zone (see Chapter 6.3.5). White (2007, 2013b, 2014) proposed that the province of *Britannia Prima* was divided in two along cultural lines and the PAS finds analysis goes some way towards supporting this idea.

There is a strong correlation between Late Roman and Early Anglo-Saxon finds in the Lowland Zone and a weak negative in the Highland Zone. In Eastern England and Western Britain, the correlations are both positive but this is bound to be the case as the zones overlap – a large part of the Lowland Zone is in Western Britain. (see Chapter 6.3.4)

The Boundary Zone (which is the most westerly area of the Lowland Zone) has a positive correlation. As the boundary between Eastern England and Western Britain is very similar to the proposed eastern boundary of *Britannia Prima*, the Boundary Zone is roughly analogous to the east of *Britannia Prima* and the Highland Zone to the west of the province. There is a difference in correlation between these two areas (positive correlation in the east and negative in the west of the province). This means that, in the east of the province, the number of late Roman finds rises along with the number of Anglo-Saxon finds. On the other hand, in the west of the province, areas which have more Anglo-Saxon finds have fewer late Roman ones.

Possible hypotheses to explain this difference include misdating of early post-Roman finds as late Roman and biasing factors of Anglo-Saxon sites such as ploughed out cemeteries (see Chapter 4.5). If post-Roman material in the west remained broadly similar in form to that from the late Roman period, without the secure context required to suggest otherwise, it may be recorded as Roman. This

issue highlights one of the main shortcomings of PAS data. This is merely a hypothesis and more securely dated evidence would be required to test it (see Chapter 6.3.4).

White (2007: 168), asserted that eastern *Britannia Prima* was more Romanised and saw greater changes in the fifth century as the lifestyle was more greatly affected. He suggested that in the west, material culture stayed broadly similar into the early post-Roman period and that it may, therefore, not be recognised as being post-Roman (see Chapter 6.3.5). This ties in to Roymans's (1996: 70) conclusions about Northern Gaul. He suggested that the border zones of the non-villa landscape may have been more integrated in villa-based economies. In Britain, was the east of *Britannia Prima* more integrated into the Romano-British way of life as seen in the Lowland Zone? This would have meant more changes taking place in the way of life and material culture following the end of the Roman period. More securely dated finds are required to test this hypothesis than are available in the PAS database. The PAS data are more suited to assessing degrees of similarity and difference in material culture assemblages in various geographic zones in any given period rather than micro-level assessments of changes through time. The data have accurate context in terms of their location data and mapping potential but generally little in terms of accurate stratigraphic context.

7.3.2.3 How do findings compare to current understanding?

By comparing the results discussed above with current debate surrounding the period (see Chapter Five), the PAS data can be used to support or refute certain arguments about this period of transition. This can demonstrate the value of research based on the PAS by showing how it can support or contradict theories based on excavated evidence.

The research conclusions support the idea that there was a broadly similar way of life in the west of Britain that survived into the post-Roman period (see Chapter 4.4 and 7.2 for discussion of *long durée* trends). This goes some way towards supporting those proponents of a degree of continuity from the Roman to the post-Roman period, particularly in the west (Dark: 1994, 2000, 2014; Higham 1992; Henig: 2002, 2004; Harris: 2003; White 2007, 2014). As PAS 'Roman' (AD 43-410) and 'Early Medieval' (AD 410-1066) finds are based on date and not culture, we would expect the same relative proportions across England and Wales even though more Roman finds will always be expected. In other words, as the number of overall (and thus the number of Early Medieval finds) increases, so too should the number of Roman (AD 43-410) or Late Roman (AD 300-410) finds. As stated, this is only the case in the Lowland Zone. In the Highland areas there is little to no correlation, suggesting that finds may be being misdated. However, this is impossible to prove with current knowledge of the database (see chapter 5.5). The long-term trends and division in material culture support the idea of long-term cultural zones as proposed by Oppenheimer (2006), Cunliffe (2001) and Fox (1933) (see Chapter 4.4). The data suggest that, in the west, there is a continuity of pastoral-based agriculture and subsistence way of life which remained relatively constant across periods. This supports those proponents of the idea that Britain was never really fully Romanised in the first place. That, at least in parts, it never fully had any Roman way of life to lose after the collapse of the Roman economy and infrastructure (Laycock 2012; Reece 1983; Russell and Laycock 2010).

This is only the picture which can be gained from the Roman and Anglo-Saxon portable antiquities of England and Wales. Many of the arguments against the survival of a Roman way of life into the post-Roman period centre around the continuity or collapse of cities (see Esmonde Cleary 1989, 2013; Faulkner 1996, 2004; Faulkner and Reece 2002; Fulford 2002; Halsall 2007: 259; Laurence *et al* 2011: 319-9; Lane 2014). The crux of the argument here is what we define as Roman. Whilst the above authors see urbanism as a critical component of Roman culture, others such as Harris (2003) and

especially Henig (2004), view being Roman as something more. This point of view is summed up well by the Henig (2004: 15) quote used in Chapter 2.5 regarding the culture of the post-Roman period remaining largely the same 'unless one defines culture in terms of the economy and drains'. The evidence suggests that in the west, perhaps in the old Roman province of *Britannia Prima*, people tried to continue their life as before. This was not necessarily a conscious effort to remain 'Romanised' or even to portray a Roman identity. It appears to be an example of a group of people trying to keep up their way of life (a pastoral, subsistence based economy that appears to have endured throughout all periods) and material culture, despite the collapse of the Roman economy and urban infrastructure which has been identified by Esmonde Cleary and others. This research also builds on the work of Ellen Swift (200b) on *Regionality in Dress Accessories* in the Late Roman period. The distributions of artefacts in Swift's study show the heterogeneous nature of Roman material culture and their spatial distributions show many of these types of find concentrated in the Lowland Zone in Britain. This work adds to this understanding by analysing a broad spectrum of find types from both the Late Roman and Early Anglo-Saxon period in England and Wales.

The distribution of PAS finds clearly demonstrates the division between Highland and Lowland in England and Wales (Fox 1933). The conclusions also support Cunliffe's (2001) ideas of differences between east and west and the existence of an Atlantic zone, as well as Royman's (1996) theory about the links between topography, farming practices and different cultural identities. However, Oppenheimer (2006) may be going too far to state that Anglo-Saxon culture made no difference to this division in Britain. There is a clear division in PAS finds east and west throughout history but also a clear divergence in this pattern in the Early Medieval/Early Anglo-Saxon period. Here, the boundary moves further east, contradicting Oppenheimer's claim that the Anglo-Saxons had no effect and the same division between east and west was in existence throughout. This also supports the view of England and Wales shown by the latest genetic analysis on the effect of migration into Britain (Leslie

et al 2015, see Figure 7.12). There is a good correlation between the zones identified here based on material culture and the areas of differing population based on the genetic evidence by Leslie *et al* (2015). This suggests that the boundary between Eastern England and Western Britain in the Early Medieval/Anglo-Saxon period is down to differences in populations, with some extent of Germanic migration into Eastern England. It is important to note that the genetic evidence (Leslie *et al* 2015) does not necessarily support a large-scale migration of Germanic peoples into England but does support the idea that a possibly small number of migrants brought about a degree of cultural change in this area which is then reflected in the PAS finds.

This boundary between Eastern England and Western Britain and its correlation with the proposed boundary for *Britannia Prima* backs up the view of this province as being important in the continuity of a Romano-British way of life into the fifth century (Dark 1994, 2000, 2014; White 2007, 2014). The PAS data and the differences between the Boundary Zone and the Highland Zone (or the east and west of *Britannia Prima*) also support White's (2007: 151) views of a fundamental difference in the east and west of *Britannia Prima*.

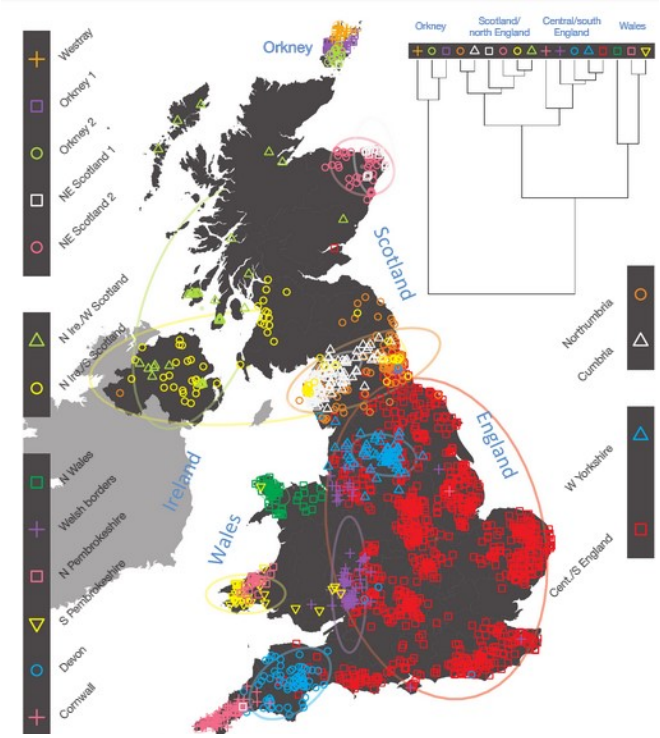


Figure 7.12 Division of the sample of UK people into seventeen clusters based on genetic data. Source: Leslie et al (2010: 310).

The differences between the Roman and Early Medieval periods are likely to be fundamentally down to differences in economy and urban infrastructure. Urban areas are a vital component of the Roman Empire (Esmonde-Cleary 1989, 2013; Laurence *et al* 2011: 2). In the Roman period in Britain there was an extensive urban infrastructure which supported mass production and distribution of goods. By the post-Roman period the Roman infrastructure had collapsed. There is evidence of people attempting to keep the way of life to which they had become accustomed at sites such as St. Albans, Canterbury and York (Lane 2014: 502). Small towns became more important in the Late and post-Roman periods and infrastructure became more localised (Millet 1990: 408-421; Rogers 2011: 179; Fitzpatrick-Matthews 2014). This is demonstrated by the localisation of metal extraction in the Anglo-Saxon period as discussed above. Mines close to towns and villages were the ones deemed viable (Martinon-Torres and Rehren 2008) due to the collapse of Roman urban infrastructure.

There is a link between the PAS finds distributions and urbanisation. In the south and east there is a higher proportion of Roman urban areas (Figure 4.28a). Richards *et al* (2009) also linked Roman finds distributions to urban areas as well as the distribution of villas.

In the Early Medieval period, distribution of finds changes to a concentration along the east coast (Figure 4.24). This may be linked with the importance of sea routes in the Early Medieval period (Naylor 2004: 51). With the collapse of Roman urban infrastructure, sea routes would have become more important for trade. The North Sea economic system became dominant in the seventh century (Loveluck and Tys 2006; Richards *et al* 2009). The importance of seaborne trade routes links in to White's (2013) ideas regarding connections between areas of Britain and the nearest part of the continent in the immediate post-Roman period (Figure 5.6).

There may be a difference in survival of *Romanitas* in the east and west. For instance, White (2013a) used material culture to identify links with different areas of the continent in the post-Roman period. The west of the old province of *Britannia* may have remained largely Roman in character (Higham 1992; White 2007) whilst the east saw an influx of new types of material culture mainly centred around dress accessories and grave goods (Lucy 2001: 1-2). In the post-Roman period, with the collapse of the urban infrastructure and monetary economy, it would have been difficult to keep up a Roman way of life.

The Roman period sees a division along Highland and Lowland lines and matches the trends seen in the overall data. This suggests that Roman Britain was part of the long-term trends in British archaeology. Indeed, Reece (1983) and Russell and Laycock (2010) stated that the Roman occupation actually had relatively little effect on way of life in Britain. In terms of agriculture, an important industry in Roman Britain, there was a significant degree of continuity from the Iron Age, although

with significant Roman innovation (van der Veen 2016). Roman Britain can be viewed as part of the *longue durée* and long-term trends in archaeology. The western areas of the country identified by Higham (1992) and White (2007) as remaining Roman may, in fact, be seen as reflecting a broadly similar, subsistence way of life across all periods rather than necessarily remaining 'Roman'.

In the Early Medieval period, there is a difference in find types and distributions that diverges from the long-term picture. The period does not seem to fit neatly into the *longue durée* of British archaeology. This is related to the collapse of Roman infrastructure and the emerging importance of seaborne trade routes. Anglo-Saxon material culture emerges, concentrated down the east coast in the zone of Anglo-Saxon graves (Figure 4.11). The point of difference between Eastern England and Western Britain is that of items of decoration versus domestic material culture. This matches the types of finds expected from ploughed out cemeteries concentrated in the east of England.

7.3.3 Case study conclusions

The case study of the fourth to the fifth centuries in England and Wales clearly demonstrates the use to which the PAS database can be put, building on the work of the VASLE (Richards *et al* 2009), English Landscapes and Identities (Gosden and ten Harkel 2011; Gosden *et al* 2012*;* 2015; Donnelly *et al* 2014) and Technologies of Enchantment (Garrow 2008; Garrow *et al* 2009; Garrow and Gosden 2012) in the use of PAS finds for specific case studies. The Welsh data are reinstated into the context of the full distribution of PAS finds which were deposited prior to the existence of the modern border. The research also builds on and utilises the work of Katherine Robbins (2013a, 2013b, 2014) and Tom Brindle (2013, 2014) in exploring the variability of distribution in PAS data.

Analysis of the broad trends in the data (Taylor 2014) demonstrated the east-west divide in PAS data. This is a divide which is apparent throughout archaeology in England and Wales. The deviation of the Early Anglo-Saxon (AD 410-600) data from the general trends suggests that the concentration of Early Medieval (AD 410-1066) finds along the east coast may reveal historical patterns of use. This must be considered in light of the correlations between reported Roman (AD 43-410) and Early Medieval finds in each zone. If post-Roman finds are being misattributed to the Late Roman period, this would greatly alter the picture produced of Early Medieval portable antiquities.

By analysing the broad object types in the PAS database it has been possible to divide England and Wales into zones on different levels. The first level is the most basic division into a Highland Zone and a Lowland Zone (Figure 7.13). A dichotomy exists between these two zones across the majority of the period. These zones are analogous with Roymans's (1996) division of northern Gaul and Cunliffe's (2001) identification of an Atlantic Zone which is essentially the Highland Zone of Britain and the west of Ireland.

A second level of division exists based on the distribution of PAS finds in the Early Medieval or Early Anglo-Saxon finds into Eastern England and Western Britain. A third level subdivides Eastern England (or *Britannia Prima*) further into an east and west zone (Figure 7.14).

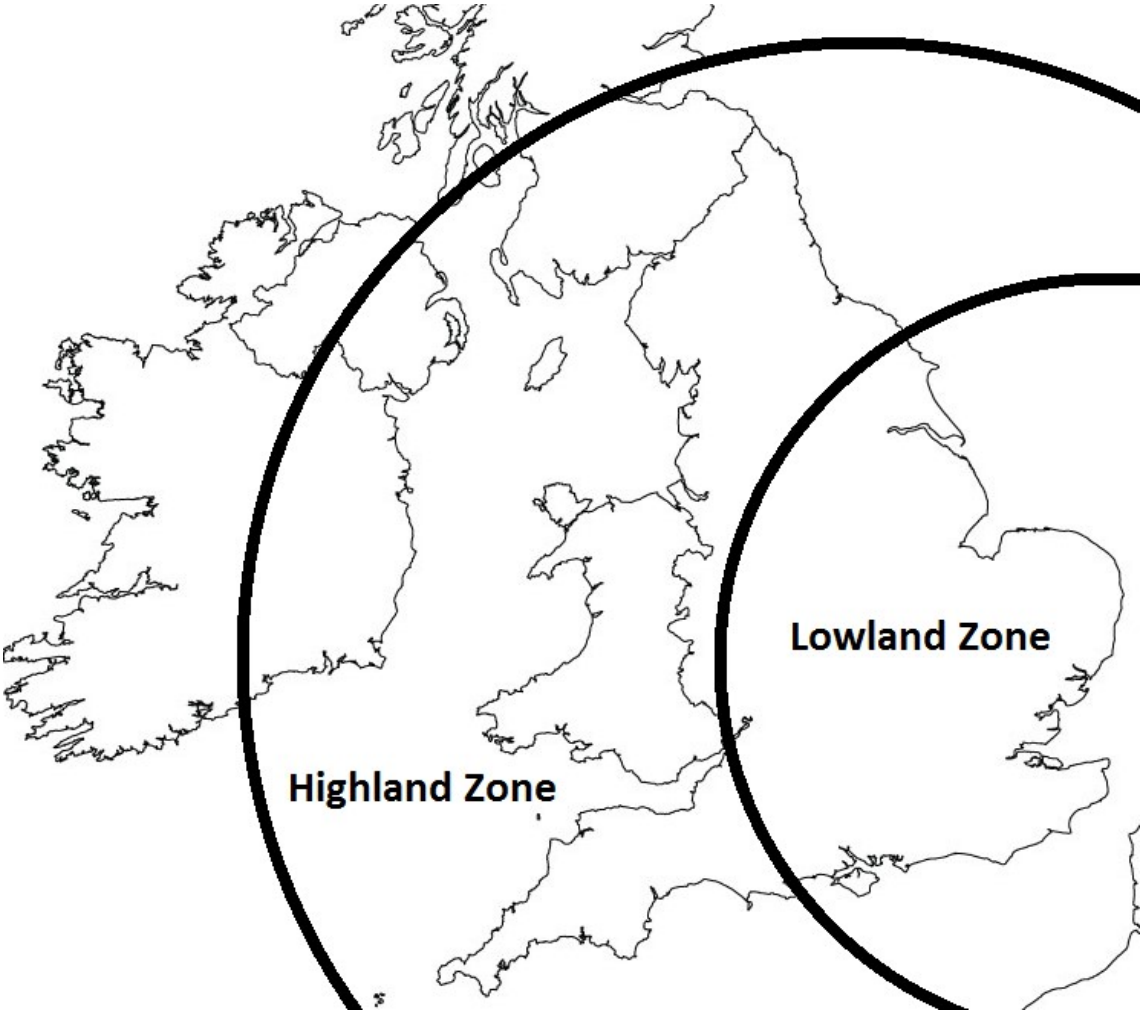


Figure 7.13 The Highland and Lowland Zone in Britain according to distribution of PAS finds.

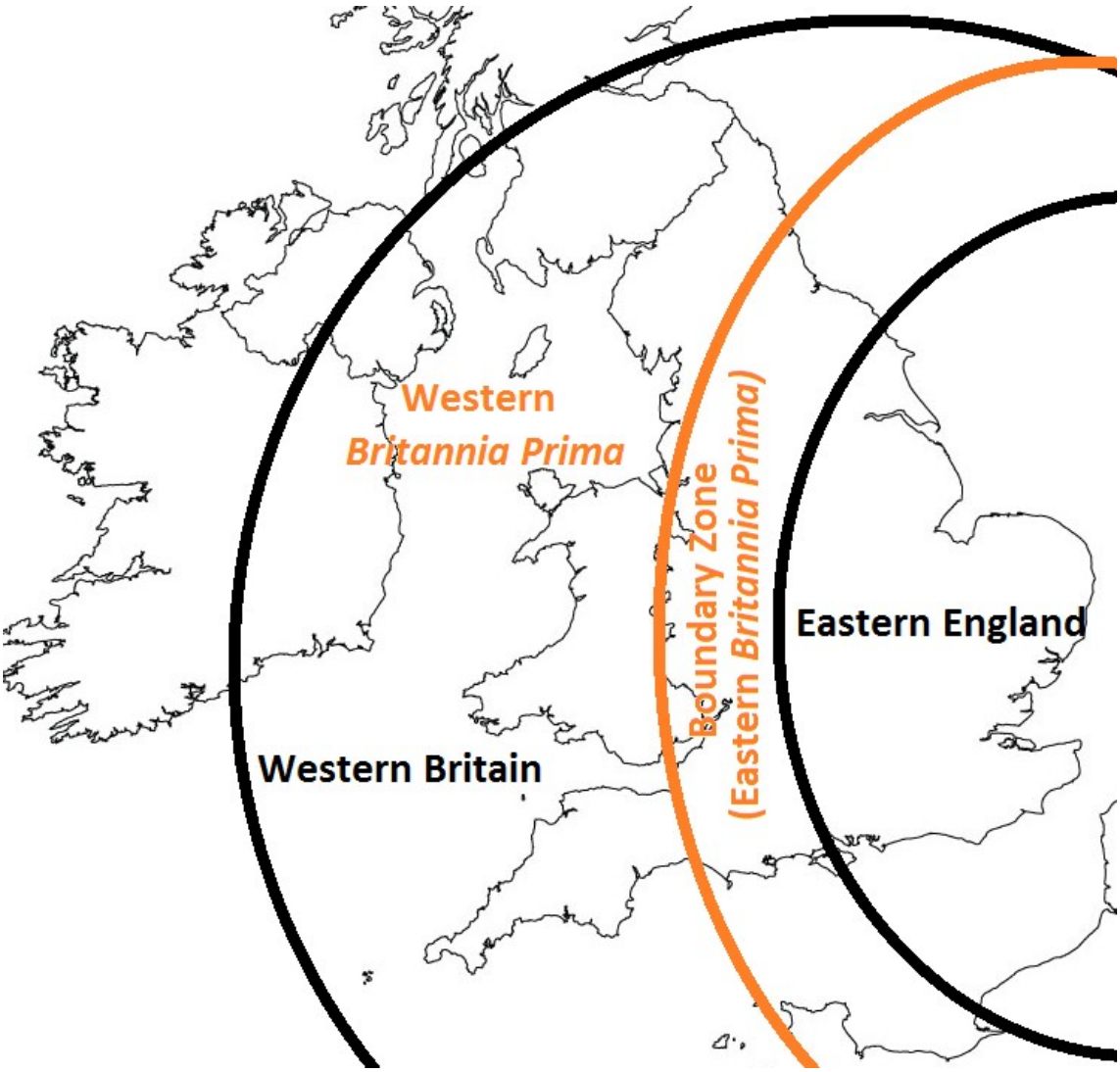


Figure 7.14 Division of Britain into Eastern England and Western Britain and the division of Britannia Prima into east and west on the basis of distribution of PAS finds.

The markers of Anglo-Saxon identity which are found in the PAS data may not be conscious markers of ethnicity and are likely to have been used in order to display status, gender or other types of identity (see Merrill and Miles 2010: 85; Mattingly 2011: 209-17; Esmonde Cleary 2014: 8). Despite this, the dichotomy in the archaeological record clearly demonstrates differences in material culture (and likely identity) in the fourth to the sixth centuries. These distinct material culture assemblages in

the various zones identified in British portable antiquities cannot be simply linked to specific ethnicities as in the culture-history model. However, as in White's (2013: 589-90) assessment of the distribution of different types of material culture and their links to the continent, there was a convention adopted in the immediate post-Roman period whereby so-called 'Anglo-Saxon' artefacts were adopted by the peoples of lowland Britain in a manner that did not take place in the Highland Zone. Whilst the eastern boundary of *Britannia Prima* correlates well with the boundary between Eastern England and Western Britain, the zones identified based on PAS data extend outwards into the territory of where *Britannia Secunda* may have been located. It is worth noting that the boundaries of the Roman provinces are merely speculative but this suggests that White's (2007) study of the province of *Britannia Prima* may benefit from being extended to study possible divides in neighbouring provinces, particularly *Britannia Secunda*.

Having discussed the results of the analysis and their specific implications for the archaeology of England and Wales and put forward some solutions to answers to the Case Study questions, the following chapter will draw some more general conclusions according to the research objectives and address the research questions set out in Chapter One.

8 CONCLUSIONS

8.1 Introduction

The previous chapter discussed the results of the research and the implications of these in terms of the archaeology of England and Wales. This chapter will draw more general conclusions with regard to the overarching aim of the thesis; assessing how useful large, unstructured databases such as the PAS are for archaeological research. The initial intent of the research was to assess the distribution of finds from several sources across England and Wales to create a general picture of material culture and potential differences in identity across the area in the fourth to the sixth centuries AD. Upon the initial download of the PAS database it became clear that this was a dataset that was immensely useful in its own right and also that the sheer volume of finds made it worthy of study. In response to this, the research was divided into two objectives. Firstly, what can unstructured data be used for? How can it be used on a nationwide scale? Secondly, what are the strengths and limitations of unstructured data? For instance, can it be used to answer specific cultural questions? The aims and objectives of the research were achieved via a two-part methodology that analysed the data in terms of both long-term and entire dataset trends followed by a micro-level study which used a case study period to go beyond distribution maps and try to answer some specific cultural questions regarding the fourth to the sixth centuries in England and Wales.

Firstly, conclusions on the utility of the PAS as a tool for archaeological research will be put forward and then some answers offered to the research questions posed in Chapter One. The PAS is essentially a case study here, assessing its utility in archaeological research. Chapter Seven discussed specific issues related to the results of the analysis carried out on the data. This chapter will apply

these results to the big questions of unstructured data in archaeology of which the PAS is possibly the largest and best example.

8.2 Comparisons to other studies

The existing studies which are most comparable with this research are:

- The VASLE project – a study landscape use in Viking period England using PAS data along with the EMCC (Richards *et al* 2009).

- The English Landscapes and Identities project – an ongoing, large scale, long-term assessment of landscape and identity in England which uses the PAS to 'complement' HER and NRHE data (Donelly *et al* 2014; Donnelly *et al* 2014; Gosden and ten Harkel 2011; Gosden *et al* 2012*;* 2015).

- The Technologies of Enchantment – research into 'Celtic Art' in Britain using PAS data in conjunction with excavated finds (Garrow 2008; Garrow and Gosden 2012; Garrow *et al* 2009).

- The Portable Antiquities Scheme database as a tool for archaeological research – a research project in understanding the spatial distribution of PAS finds and comparisons to those of other archaeological datasets (Robbins 2013a, 2013b, 2014).

The first three of these projects utilise PAS data in conjunction with other data to varying degrees and the last is solely seeking to understand the distributions in PAS finds rather than to apply the data to a specific issue. The first two listed projects, the VASLE and English Landscapes and Identities projects, are the most similar in terms of scope, aims and methodology. However, these omit data from Wales (the VASLE project does include Wales in the overall mapping of the dataset but does not include it in the analysis of settlement). As has been explained, there are relatively few finds in Wales but this in itself is significant. As this study has assessed the degree of difference in terms of distribution and broad artefact types between the Highland and Lowland zones, it would be impossible to draw accurate conclusions whilst omitting a large part of the total area of the Highland Zone.

This research also went beyond these examples of past research in order to assess how useful PAS data are for assessing material culture in terms of specific cultural questions. It has developed a methodology for studying PAS data on two levels: nationwide, long-term trends and micro-level cultural issues. In doing so, this research has gone beyond finds distribution patterns studied by the VASLE project (Richards *et al* 2009) and Katherine Robbins (2013a, 2013b, 2014) and used statistical techniques suitable for the type of data available to researchers in the PAS to analyse PAS find types across various regions. By using objective methods of statistical analysis to test outcomes, this work goes beyond the previous studies which relied solely on distribution maps to assess landscape use or settlement patterns. It has revealed some shortcomings of the data but also what it can be used for and how.

8.3 Answers to the research questions

8.3.1 To what extent are large, unstructured databases of finds a valuable tool for archaeological research

The research presented in this thesis has clearly shown that PAS data can be useful in archaeological research. In particular, this is demonstrated by the period-specific datasets which assess the *longue durée* and long-term trends. They also demonstrate how overall maps of PAS finds can be used as a base map and control dataset for studies of finds on a reduced scale. The understanding (or lack thereof) of whether an area of few finds is down to modern recovery or historical use, is key to understanding the distributions of PAS finds. In general, the research methodology has followed the work of the VASLE project (Richards *et al* 2009) in using base maps and the distribution of the entire PAS database as a control for determining whether areas with concentrations of finds are reflecting genuine historical use. Although Robbins (2013a, 2013b, 2014) states that this is not sufficient, her framework is generally more suitable for smaller scale analysis of land use, understanding of re-walking and patterns of field walking. It is also demonstrated by the analysis of finds assemblages and identification of various zones in Roman and Anglo-Saxon PAS finds and comparison of these with pre-existing understanding. The statistical analysis of the case study material went beyond distribution maps to study proportions of different find types in various assemblages and how these may relate to current understanding of post-Roman and Anglo-Saxon England and Wales. The general trends of an east-west divide are not only apparent in the distribution of PAS finds, which can be linked to geographic variations, particularly topography on this type of nationwide scale. An east-west, or rather Lowland-Highland Zone division can also be seen in the types of finds recorded and recovered.

This also revealed limitations on the data. The nature of the PAS data and their lack of stratigraphic context necessarily limits how far analysis can go. It cannot be used for very small-scale temporal changes owing to the lack of secure, narrow date ranges. The data can be used at various resolutions in time and space but is best used for either nationwide geographic trends or relatively broad temporal trends.

PAS data have been clearly shown to be useful on a macro-scale, revealing nationwide and long-term trends in the data. The large number of finds in the database not only makes the data statistically significant, it also means that the data span a large time period. The PAS is one of the few resources where data from such a wide geographic and temporal range can be downloaded and studied. This allowed the *longue durée* approach to be used, assessing slowly evolving structures in British archaeology. The period-specific datasets identified the Early Medieval period as time of change and deviation from the long-term trends. This made it an ideal case study period for the second objective of using PAS data to answer specific cultural questions.

The large volume of data allowed mathematical study. This links in to the ideas of Neumaier (2001) and Cohen (2005) regarding the importance of data and numbers. It also means that trends over time can be studied. By looking at the data from the perspective of the *longue durée*, PAS data suggest long-term divisions in the history of Britain (see Chapter 4.4 and 7.2). Nationwide trends within the PAS are apparently relatively stable, as those discovered here roughly match those found by the VASLE project in 2009.

To a sizeable extent, large unstructured databases are clearly a useful tool in archaeology. In the case of the PAS, analysis of this data involves the study of large volumes of material that would otherwise be lost to archaeologists. The data demonstrate the east-west patterning of material culture both in

terms of number and types of finds and that this is visible across most periods (Figure 4.15 to Figure 4.27). Chapter Seven discussed the importance of the data both in terms of the *long durée* and specific cultural questions.

The effectiveness of PAS data in archaeological research is particularly important with regard to PAS funding. The PAS is a government-funded project and so relies on the data being seen as important and useful in order to receive sufficient funds to keep it running. In February 2015, it was reported that the PAS was under threat from funding cuts with only an emergency grant from the Headley Trust charity keeping the scheme running (The Guardian 2015). In July of the same year Roger Bland, the head of the PAS, left the scheme following the six percent cut being passed on by the British Museum and its movement to the learning department. This occurred less than a year after the scheme reached the million objects landmark (Atkinson 2015). For this reason, it is vital to restate the importance of the PAS database as a tool for archaeological research and also demonstrate that it can be used alone rather than merely as a supplement to other sources of information.

8.3.2 If large, unstructured databases are a valuable tool then how are the data best used?

The key strength of PAS data is the sheer scale and the accurate location data that allows sophisticated mapping of finds. Understanding of the biases in the data is key to best using them. As outlined in Chapter Two, there have been various objections to the PAS including that the finds lack context and are, therefore, useless and that it encourages looting. With regard to the first objection, there are certain factors that need to be taken into account to make the most of the data available.

By outlining the biases and constraints on the data, a methodology was devised that enabled the use of the data on a variety of scales (Chapter Three). This involved a two-part methodology which

studied the data firstly on a nationwide, long-term scale and, secondly, narrowed down the data to a case study period and used statistical methods to analyse artefact assemblages in various zones to establish whether the data could be used to answer specific cultural questions (see Chapter Three, especially Figure 3.6 and Figure 3.12).

The data in the PAS is best suited for long-term trends, particularly across wide geographic areas. For example, the period-specific datasets reveal firstly that the patterns visible in the overall dataset are apparent in most periods and, secondly, which periods diverge from this pattern. The Early Medieval period (AD 410-1066) is a key period that does not fit the overall trends (Figure 4.24) as most finds and the counties with the highest proportion of Early Medieval finds, are located down the east coast. These finds distributions were also found to support long-term divisions in Britain according to geology, archaeology and genetics (see Chapter 4.4).

The vast quantity of data in the PAS database gives it greater statistical power (Breur 2016). Whilst the lack of accurate dating and associations with other archaeological material make it impossible to trace short-term continuation or variation in material culture, using a large volume of data means that accurate broad conclusions can be reached. For example, the Iron Age was a further period where finds distributions differed from the control dataset and PAS material could have been used to study the period. A similar broad-brush overview of the Iron Age would have resulted as for the Early Medieval data here. Barry Cunliffe has done a great deal of research into Iron Age Britain. One of his key theories is that of the Atlantic Zone, the idea that Iron Age Britain is part of a longer-term divide in Britain (Cunliffe 1991, 2001, see Figure 4.38). Nevertheless, Cunliffe (1991: 71) stated that this highland/lowland divide was a 'coarse-grained generalisation' and that Britain was a 'palimpsest of ecological micro-regions'. The same is true of the conclusions able to be drawn about the Late Roman (AD 300-410) and Early Anglo-Saxon (AD 410-600) periods using PAS data. The large volume

of data across a broad area gives an excellent and statistically significant coarse-grained generalisation of England and Wales during the fourth to the sixth centuries (see Chapter 7.4). A more fine-grained approach is not possible owing to the limitations on the data. To produce a more detailed analysis of small-scale regionality in the post-Roman period would require more detail in terms of dating, find types and archaeological context than PAS data can give. That's not to say that a methodology could not be constructed to use PAS data in conjunction with excavated data on a much-reduced scale and at micro-level.

The data also support arguments regarding the nature of material culture in the west of Britain in the post-Roman period. The area identified as the Boundary Zone (the area that is part of the Lowland Zone but not Eastern England) was compared to the Highland Zone and showed differences in eleven out of nineteen categories in the Early Anglo-Saxon period (Table 6.39) This supports White's (2007) theory of differences between the east and west of *Britannia Prima,* as the Boundary Zone and the Highland Zone cover roughly the same area as that proposed for *Britannia Prima* (Figure 6.71). However, caution is required over the location of the boundaries of the Roman provinces that made up *Britannia* as these are only speculative (see Chapter 7.5.3).

Big data is associated with the three concepts of volume, variety and velocity (Laney 2001) These represent the key strengths of PAS data. The vast amount of data makes it possible to study nationwide trends and gain statistical significance in a way that is much more difficult with excavated data. For instance, the *Rural Settlement of Roman Britain* project (Allen *et al* 2018) began in 2012 and only added Welsh data in 2015.

As stated by Pett (2010b) the context of the PAS finds is their location. With such a large database, the sheer number of finds along with detailed location information makes the data statistically

significant. The importance of the location data of PAS finds can be seen in the clear identification of features such as Hadrian's Wall as discussed in Chapter 7.2. In fact, the wall is still clearly demarcated on the map of finds of all periods (Figure 4.1). Errors in the data are clearly visible by the number of finds plotted in the North Sea, especially off the coasts of East Anglia and the North East (Figure 4.1). Finds density was used to try to overcome these errors as the majority of the time finds were still recorded as being in a particular county even where the grid reference data placed them off the coast.

The PAS database is constantly being updated by FLOs and can be downloaded, ready for research at any time. The data used in this research was downloaded on the 21 October 2013. Between this date and the time of writing (08 January 2016), 215,865 objects have been recorded although not all of these will be in the research database download. Although it may be thought that this makes results from PAS data meaningless, the overall distribution of the data (Chapter Three) is extremely similar to those identified by the VASLE project from data harvested in 2006 (Richards *et al* 2009) albeit with some key differences (see Chapter 7.2). The variety of the data by location and historical period also demonstrate the value of the database in terms of nationwide study and the *longue durée*. Finally, the database is constantly being updated with new material. Although the long-term trends appear to be consistent, it is worth repeating the full database download and mapping all finds as a control dataset for all new studies.

One of the most significant aspects of the initial analysis of the entire PAS dataset is the importance of the cleaning of the data. This makes the data available for use in archaeological research and also helps to reduce any bias in the data. The need for cleaning is a result of the PAS database being compiled across over a decade and by fifty eight individuals as well as finds recording volunteers. This does not prevent the data being incredibly useful. All data have bias and errors that need to be

accounted for in any analysis. In this respect the PAS is no different. Cleaning the data is a necessary step in reducing the degree of error.

It is important to note that the data cleaning did not substantially alter the broad pattern of finds distribution (Figure 3.6 and Figure 4.2). This means that cleaning is more important for micro-level study. When analysing a vast amount of finds over a nationwide area, errors can be averaged out due to the massive volume of data involved. For the case study period the data required further cleaning in addition to that carried out for the full database. The smaller the number of finds in the research database, the more the data need cleaning, and enhancing. In effect, the data can be used on a variety of scales and the more the database is narrowed down, the more important cleaning and giving the data structure become.

This means that, for future research, the full dataset could be used uncleaned and unstructured to produce a base map and control dataset for more detailed research. Chapter 7.5 offered some answers to the case study questions posed in Chapter Five. With regard to the overall aims and objectives of the thesis, it is not the actual answers to these questions that are the most important but rather whether, and to what extent, they can be answered using PAS data.

On a cultural level, the data can provide some information on the types of finds used by peoples in certain areas of England and Wales, however, this is limited. The data reveal the difference in zoning of various find types across England and Wales (see Chapter 7.3.2 and 7.4.2) and the greater similarity across all zones in the Early Anglo-Saxon period can be linked to what we know about economic exploitation of land and mineral resources (see Chapter 7.4.2). In the Early Anglo-Saxon period there are only differences in one out of nineteen artefact categories between the Highland and Lowland Zone but four out of nineteen for Eastern England and Western Britain (Table 6.41).

These categories are Horse Equipment, Personal Adornment, Brooches and Miscellaneous. This demonstrates the new culture that emerged, concentrated down the east coast and identified largely by items from funerary context such as ploughed out cemeteries (Lucy and Reynolds 2002: 1-8). The identified zone of Eastern England (Figure 4.31) correlates well with the area of Anglo-Saxon graves, including horse burials (Figure 6.57).

The more localised exploitation of resources, linked to the collapse of the Roman urban infrastructure (see Chapter 7.3.2), can be seen in the fact that coarse-grained trends in the data become less apparent in the Anglo-Saxon period (Table 6.41). As urban infrastructure collapsed and society became more localised (Fitzpatrick-Matthews 2014; Millett 1990: 408-421; Rogers 2011: 179,) broad trends in the data become less visible (the find types become more similar across the zones in the Early Anglo-Saxon period). This highlights a key limitation on PAS data which is that, having come to this conclusion, it is not possible to go any further due to constraints on PAS data.

Whilst it could be argued that the bias in the PAS database makes the finds not suitable for study, all data have bias and Chapter 7.2 (see especially Figures 7.1 and 7.2) shows that much excavated data actually has similar biases.

The relatively static general trends in the data demonstrate that the spatial distribution patterns observed in the data can be trusted to be precise and not to change wildly from year to year as more finds are recorded. However, certain key differences, such as the number of finds in the West Midlands (see Chapter 7.2), show the value of continued research using the PAS data. As it is a live database it is constantly updated and it can keep providing new information and conclusions regarding the use and distribution of portable antiquities. Along with the biases inherent in the data, these differences do not make the data worthless. In fact, it has been made clear that the PAS finds

have no more (although different) biases than excavated data. Furthermore, no database is ever complete. Not all sites are excavated and new excavations are always taking place. This constantly adds to data from excavation reports, grey literature, HERs and other sources. Once these biases are understood and overcome the data can provide equally valid conclusions. Ultimately, using PAS data is about understanding what the data are and how they can be used. Despite critiques of PAS and other data lacking stratigraphic context (Gill 2010b; Hills 2011; Webb 2011), the data are very useful. The data in their raw form are most useful on a macro-level, assessing long-term wide-scale trends in the data. The more the data are narrowed down, the more important cleaning and enhancing the data becomes. In effect, the data are given more structure.

8.3.3 What are the limitations on the data?

As the key strength of the PAS and other unstructured datasets is the large amount of data that is available for study, its primary use is in mapping trends geographically and temporally. Chapter Six utilised the data in a different way, attempting to answer specific cultural questions about a period in history. Some conclusions were reached regarding the nature of the culture in England and Wales at this time including regionality. Nevertheless, there are issues with using PAS data for this kind of study and it can only go so far.

The analysis of the data revealed broad-brush trends in fourth to sixth century data. For instance, how the data differ from national trends and the period-specific datasets. In terms of find types, some general trends were able to be shown such as, for the case study period, the data showed a difference in finds assemblages between east and west.

It is, however, difficult to give a more detailed analysis than this. More detailed analysis of how material culture changed from the Late Roman (AD 300-410) to the Early Anglo-Saxon (AD 410-600) period is not possible with the PAS data. In order to conduct a more detailed analysis it would be necessary to look for specific examples of artefacts that continued into the post-Roman period or how items changed over time. Tracing typographies of artefact types across the Roman to Anglo-Saxon transition is not possible with PAS data mainly due to dating issues. A lack of secure stratigraphic context makes dating difficult and dates are often broad. Dates are also of manufacture rather than deposition. This makes it difficult to study how find types change. For example, White's (2007) ideas of misattribution of post-Roman artefacts as Roman. In order to assess this in more detail, examples of curation would need to be identified but this is not possible when dealing with dates of manufacture not deposition (see Chapter 5.5). The lack of context also makes specific cultural questions difficult to answer. Although the PAS contains accurate location data they are rarely associated with other archaeology such as settlements, site and monuments. As the meaning of artefacts varies by context this makes going further than the broad-brush trends identified in Chapter Six impossible. There are also issues with find types. There are relatively few specifically identified find types in the database. Analysis of particular find types would be required to give more detailed answers regarding the case study period. As an example, there are only three penannular brooches in the cleaned data sample based on the PAS research database which was downloaded on 21 October 2013. Finds are likely to be broken fragments and not able to be classified accurately. In addition, Cool and Baxter (2016a: 1647, 2016b: 81) highlight the low recovery rates of penannular brooches via metal detecting. The proportion of pennanular brooches in metal detected assemblages is regularly lower than in excavated material. They suggest this is due to a two-dimensional appearance leading to low metal detector signals.

Overall the limitations on the data are those of detail. Chapter Six identified broad trends in the material culture assemblages of the fourth to the sixth century and answered some cultural questions as discussed in Chapter 7.5. More detail than this is not possible on a cultural level owing to the nature of the PAS data. The context of PAS data is its location and this is recorded accurately and in detail for a large number of finds. Where the data is limited is in dating and associations of finds with other finds or sites. The research has gone beyond simple distribution maps to a more detailed analysis and has shown what can be done with PAS data for the chosen case study period.

8.4 Suggestions for further research

This research has identified some key trends in the PAS data for the fourth to the sixth centuries and has answered the research questions posed in Chapter One. As a result of this research, further avenues for research have been identified that have not previously been considered.

The analysis of the case study period has demonstrated the utility of PAS data in relation to the Roman to Anglo-Saxon transition and this has shown clear potential. Hence, there is a clear direction to do the same for other periods, particularly given that the outcomes might be more marginal in periods of less change or fewer reported PAS finds. This means that the obvious direction of further research is to conduct similar studies for the PAS finds from different time periods. In the same way that Chapter Six expanded on the initial period-specific datasets in Chapter Four, a more detailed assessment of the find types in other periods would demonstrate the value of the PAS. In particular, the constant updating of the PAS database means that additional research using the data is always helpful. That is not to say that research using the PAS, especially large-scale analysis, rapidly becomes out of date. The overall pattern of finds distribution appears to represent a long-term trend (see Chapters 4.4 and 7.2).

With regard to the patterns in the finds distribution and the division into various key zones, the research would benefit most from being expanded into Scotland and Ireland. Scotland is largely made up of Palaeozoic rocks with mountainous regions formed by the Caledonian orogeny (Fig 8.1). This suggests that it should display similar patterns to that of the Highland Zone which has a similar geology. It is also part of Fox's (1933) Highland Zone. The relevance of Ireland has been discussed in Chapter Seven.

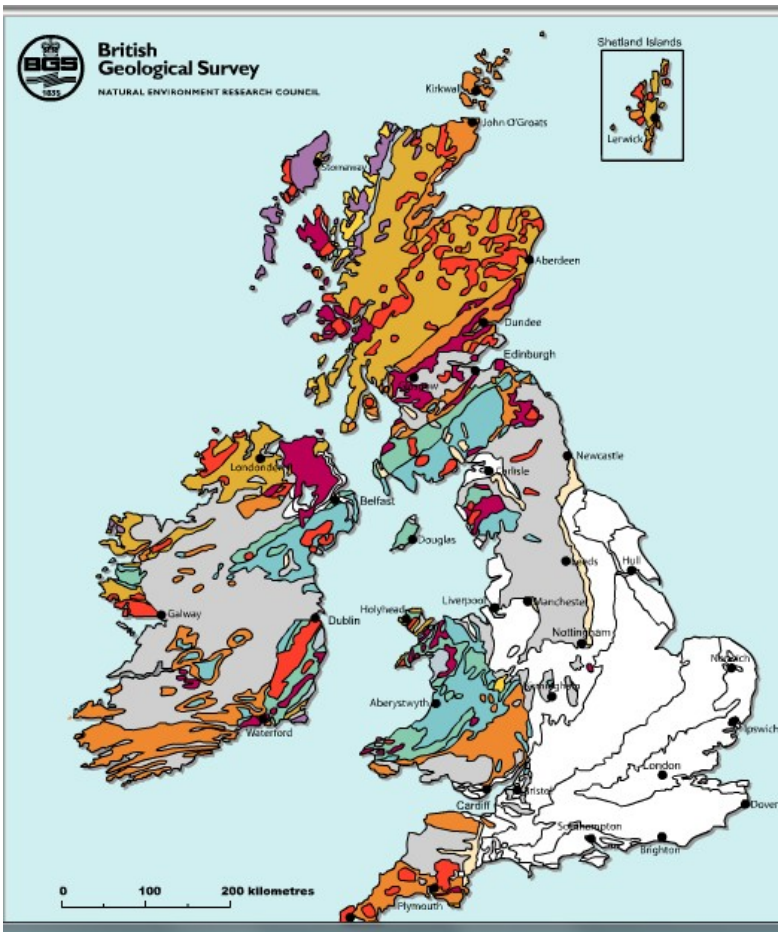


Figure 8.1 Geological map showing the Palaeozoic rocks of the Highland Zone, including Scotland. © NERC 2014. Source: British Geological Society (2014).

Expanding the research into these areas would allow an assessment of the degree of difference between the Highland and Lowland Zone in an area not affected by the influx of Anglo-Saxon culture. Furthermore, links between the areas (Figure 8.2) and the existence of Cunliffe's (2001) 'Atlantic Zone' could be further studied. It has already been identified (Figure 7.6) that the east of Ireland also has highland areas and pastoral farming. An expansion of the area of study could identify whether there is a similar division into highland and lowland areas in Ireland and whether portable antiquities in the east of Ireland/the highland areas have any similarity to those in the Highland Zone of England and Wales.

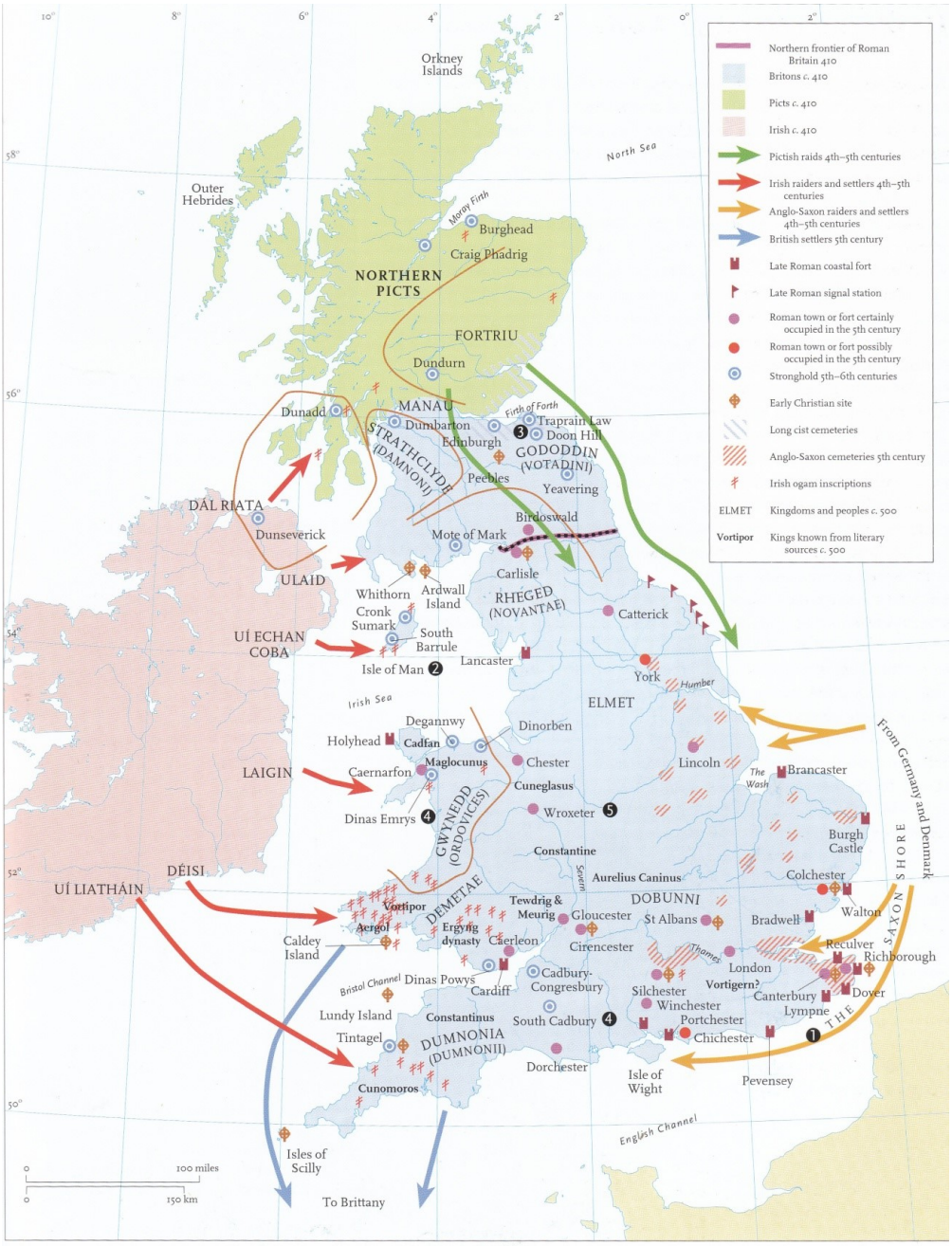


Figure 8.2 The 'Atlantic Celts' circa AD 300-550. Source: Haywood (2001: 89).

The main barrier to the expansion of this type of research is the fact that the PAS does not operate in Scotland or Ireland. In Scotland all finds should be reported as Treasure Trove, not only those made of precious metals or over 300 years old (Campbell 2013; Treasure Trove Scotland 2014a). A relatively new collaboration between Treasure Trove Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) collates Treasure Trove data into the RCAHMS database, Canmore. Precise findspot data are not provided in order to prevent looting (Treasure Trove Scotland 2014b) but Treasure Trove Scotland have indicated that researchers who require more detail could contact National Museums Scotland for this (Ferguson 2016).

There are also estimated to be far fewer metal detectorists in Scotland, around 500 as opposed to 9,000-10,000 in England and Wales (Bland 2013). However, Treasure Trove Scotland are currently in the process of improving their digital output through Canmore and also their website, which is anticipated to be available by the end of 2016 (Ferguson 2016).

Under Irish law, it is an offence to search for archaeological material, with or without a metal detector, without a licence from the Minister for Arts, Heritage and the Gaeltacht (*National Monuments Act 1930-2004*). The situation is similar in Northern Ireland where, although it is covered by the Treasure Act (Portable Antiquities Scheme 2019), any search for archaeological material that involves disturbing the ground requires a licence from the Historic Environment division (NI Direct 2018). This makes any study of portable antiquities in Scotland and Ireland more difficult than in England and Wales, as a database of finds would likely need to be compiled from various different sources such as museum collections and excavation reports.

More detailed, small-scale research into specific areas would also be profitable. This is more often done with culturally Anglo-Saxon finds such as Høilund Nielsen's (1999, 2010) studies of the Kentish

and Anglian material. Studies of western Britain have more typically focussed on the continuation or otherwise of Romano-British ways of life (see Higham 1992, 2007; Dark 1994, 2000; Esmonde Cleary 1989; Gerrard 2013). Small-scale research could further demonstrate the heterogeneity of Roman and Early Medieval cultural material within the provinces that made up *Britannia.* Correspondence Analysis could be carried out on specific find types or sites in small-scale research to determine what similarities and differences exist between these.

Broad trends are clearly apparent in the data but it is known from sites such as Wasperton (Carver *et al* 2009) and Stretton-on-Fosse (Ford 2003) that a mixed culture did exist at this time. Nationwide study on a large scale is useful but so is more specific analysis of portable antiquities, both those found by members of the public and by archaeologists. Despite being incredibly useful, PAS data alone cannot provide all the answers. Studies based on excavated data such as Allen *et al*'s (2015) assessment of evidence of 'The Rural Settlement of Roman Britain' can be compared to data from the PAS to produce a more detailed picture.

This research has taken a nationwide approach to the data and identified key general trends between the east and west in a similar approach taken by Cunliffe (2001), Oppenheimer (2006) and White (2007, 2014). Research into differences within the above identified zones (Fig 6.13 and 7.14), particularly the so-call 'British' west, would prevent them from being viewed as culturally homogenous. The DNA analysis carried out by Leslie *et al* (2015) demonstrated that, whilst the Anglo-Saxons appear to have had a significant effect on the genetic makeup of Britain, the 'native' or 'Celtic' areas were very heterogeneous. Analysis of finds on a much smaller scale, as well as further integrations with excavated finds, could also more easily take into account Mattingly's (2011) ideas on discrepant identity (see Chapter 2.6.2). Figure 8.3 shows the different scales at which the PAS data can be used. This research has set out a methodology for using the PAS on a nationwide scale.

When the study area is reduced, a similar methodology could be used, although more constraints can be mapped. On a more local scale, Robbins's (2013a, 2013b, 2014) methods come to the fore as the smaller the study area the more constraints can be mapped, such as degree of field rewalking and specific land use. If the study area were to be reduced even further, this would drastically reduce the number of finds available for study. The importance of the PAS database is the volume of finds which it contains. The greater the number of rows in any given dataset, the greater the statistical power (Breur 2016: 61) and the greater the level of confidence in the conclusions reached. Pett (2010b) stated that the point at which the data became statistically significant was when it reached the million object mark and a reduced study area and period would likely reduce the number of finds to well below this. At such a local level the data would likely need to be supplemented with excavated data. This research has set out a methodology for using PAS data on a nationwide level and in isolation. PAS data have their own specific set of biases requiring a unique methodology. PAS data have been used as a supplement to excavated material, for example, mapping of PAS finds around a site or as part of a landscape study. In order to fully integrate PAS data into that from excavations, a new methodology would need to be constructed.

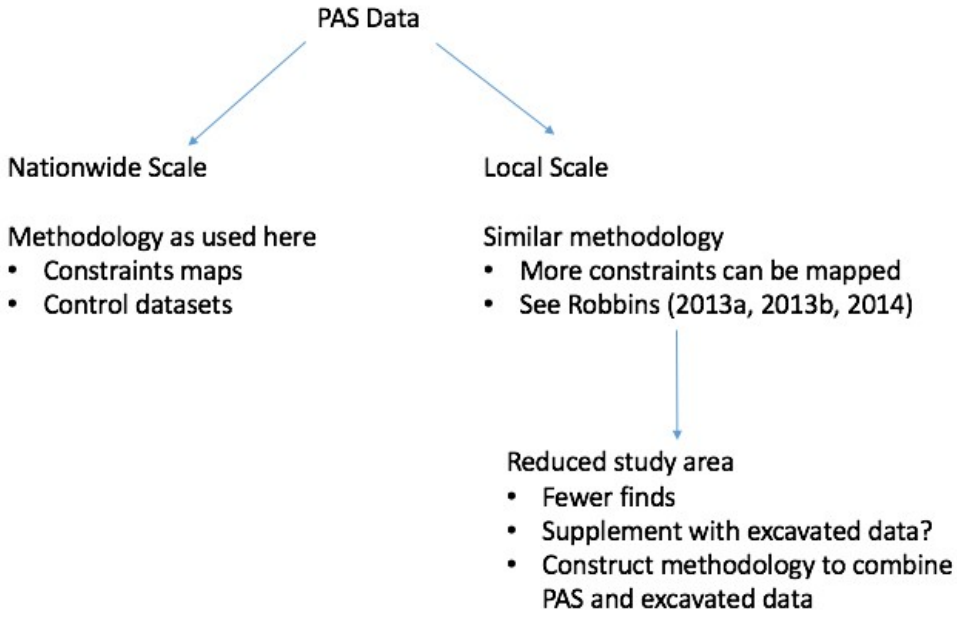


Figure 8.3 Scales of PAS use.

Further analysis of the PAS data from the period AD 300-600 could be carried out using the data in Appendices One to Three. The comparison of the data with the work carried out by the VASLE project (Naylor 2006; Richards *et al* 2009) demonstrated the similarities between the two datasets from 2006 and 2013. This suggests that the long-term trends in overall PAS distribution are relatively static, allowing future researchers the option to focus on a specific period or location, comparing to the overall control dataset outlined here. Alternatively, the entire, updated PAS database could be downloaded and cleaned. Continued improvements to the PAS database may make cleaning the data a shorter and easier task for future researchers.

8.5 Addressing the aim

The overarching aim of the thesis was to assess the utility of large, unstructured datasets such as the PAS in archaeological research. The results clearly show that PAS data are useful in archaeological study. Pett (2010b) was correct to state that the importance of PAS data was the accurate mapping potential and location data. He stated that this was the data's context. The data can be used for accurate mapping of portable antiquities and studying long-term and nationwide trends in archaeological material. The mapping of the overall dataset demonstrated the constraints on the data and determined the search area. Period-specific datasets showed long-term trends and highlighted only two key periods, Iron Age and Early Medieval, where the data differ significantly from the control. This emphasises the idea of the *longue durée* in British archaeology and the existence of long-term trends (see Chapter 4.4). Nevertheless, the data can be used to go somewhat further than mapping of finds and can began to answer specific cultural questions albeit still on a broad scale.

Through wider understanding and acceptance, the importance of the PAS can only grow and improve. It is essential to continue to demonstrate the importance of the data for archaeological research. As discussed above, the PAS relies on government funding and, particularly in times of funding cuts, it is imperative to show the data are useful and vital to archaeological understanding,

Owing to the nationwide trends in the database remaining relatively stable despite new finds being added every day, the future of research into PAS finds appears to be on a more local scale or research into specific periods. This allows constraints to be mapped and gives fewer finds to work with. Finds could be cleaned and enhanced in more detail.

Large, unstructured databases are an important resource in archaeology. It is essential to demonstrate their importance, particularly in the case of the PAS, to secure government funding in times of cuts. The data are most useful for analysis of finds distributions and mapping of trends but they can be used to go beyond simple distribution maps. Statistical analysis can be used to assess find types and how they vary by area. The data can be used on a variety of scales, reducing either the time period or geographic area to be studied (Figure 8.4).

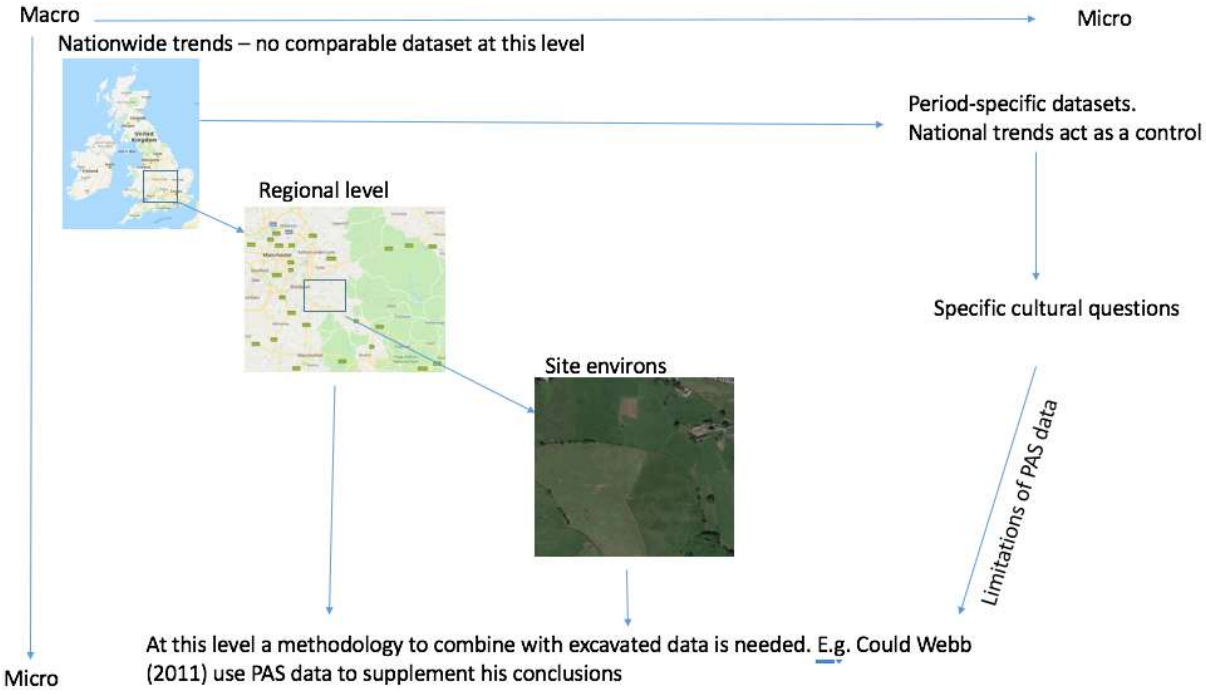


Figure 8.4 Macro- and micro-levels of research using PAS data.

In conclusion, the research achieved its overall aim of assessing the utility of PAS data in archaeological research. The data can clearly be used to demonstrate certain aspects of British archaeology. Large, unstructured datasets appear to be most useful for determining macro-level trends in the data, both in terms of a wide geographic area and long-term temporal trends. This was demonstrated by objective one – how can the data be used on a macro-level? This is in contrast to

Brindle's (2013) assertion that PAS data are most useful on a micro-level. The sheer scale, both geographically and temporally, of the database lends itself to study of macro-level data. The idea of the *longue durée* can be identified and studied. Whilst the overall trends in the data are undoubtedly affected by modern recovery issues, there is not necessarily a simple cause and effect relationship here. Topography is the main broad-scale factor that influences the data on this scale. However, topography is not likely to only affect modern recovery, it also affects way of life through differing soils, rainfall, types of farming and raw materials. The degree of influence of way of life in the past versus modern recovery and reporting is difficult to determine, as the PAS lacks a system of recording negative findings.

The research addressed this by comparing the period-specific datasets, identifying that most periods match the overall trends. Only the Iron Age (800BC-AD 42) and Early Medieval (AD 410-1066) periods diverge from this pattern. This suggests the idea of long-term trends in British archaeology matching the ideas of Oppenheimer (2006) and Cunliffe (2001) with two key periods of difference.

Objective two demonstrated some of the further strengths and limitations of the data. It went beyond macro-level distribution maps in order to overcome modern recovery bias by looking at artefact types from a specific period. This managed to identify some key, broad-brush trends but also brought to the fore some limitations of the data. Namely, it is difficult to answer specific cultural questions due to lack of context of artefacts and also a difficulty in identifying certain types of artefacts in the database. Artefact meaning changes according to context which is lacking is PAS data. Also, no secure, reliable means of dating means that short-term temporal trends are difficult, if not impossible, to determine.

The PAS is clearly a useful resource in archaeology. It is undoubtedly worth compiling, funding and utilising in research. That is not to say that it does not have its limitations. These limitations, as outlined above, mean that the data are best suited to broader trends than specific cultural questions. These can begin to be addressed but lack of context, dating and artefact identification mean that more detailed answers cannot be obtained. The creation of a methodology to fully integrate PAS data and excavated material would go a long way towards rectifying this and radically increase the number of uses to which PAS data could be put.

9 APPENDICES

Appendix One: The uncleaned PAS database

Appendix Two: The cleaned PAS database

Appendix Three: Database: finds per county and finds per square kilometre

Appendix Four: Late Roman and early Anglo-Saxon finds

10 BIBLIOGRAPHY

Abbreviations

Am. Antiq.……*American Antiquity*
Am. J. Archaeol.…… *American Journal of Archaeology*
Anglo-Saxon Engl……..*Anglo-Saxon England*
Anglo-Saxon Stud. in Archaeol. and Hist……*Anglo-Saxon Studies in Archaeology and History*
Annu. Rev. Anthropol……*Annual Review of Anthropology*
Antiq. J……*Antiquaries Journal*
Archaeol. J……*Archaeological Journal*
BMQ……*The British Museum Quarterly*
Br. Archaeol. Rep., Br. Ser……*British Archaeological Reports British Series*
Br. Archaeol. Rep., Int. Ser……*British Archaeological Reports International Series*
Cambridge Archaeol. J……*Cambridge Archaeological Journal*
CBA Res. Rep……*Council for British Archaeology Research Report*
CD……*Collins Dictionary*, http://www.collinsdictionary.com/ (accessed 27 Feb 13)
Curr. Anthropol……*Current Anthropology*
Curr. Archaeol……*Current Archaeology*
Curr. Biol……*Current Biology*
Int. Migr. Rev……*International Migration Review*
J. Brit. Archaeol. Ass……. *Journal of the British Archaeological Association*
J. Mar. Archaeol……*Journal of Maritime Archaeology*
J. Roman. Archaeol……*Journal of Roman Archaeology*
JRPS……*Journal of Roman Pottery Studies*
Medieval. Archaeol……*Medieval Archaeology*
MOLA……*Museum of London Archaeology*
Mol. Biol. Evol……*Molecular Biology and Evolution*
Occas. Pap. Sociol. and Anthropol……*Occasional Papers in Sociology and Anthropology*
SAR……*Scottish Archaeological Review*
Sci. Am……*Scientific American*
Soc. For Am. Archaeol……*Society for American Archaeology*
Trans. of the Birm. and Warks. Archaeol. Soc……*Transactions of the Birmingham and Warwickshire Archaeological Society*
Trans. of the Bristol and Glos. Archaeol. Soc……*Transactions of the Bristol and Gloucestershire Archaeological Society*
Trans. of the Shrops. Archaeol. and Hist. Soc……*Transactions of the Shropshire Archaeological and Historical Society*
World. Archaeol……*World Archaeology*

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