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# PART I: ASSESSMENT REPORT (PHASE I)

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## 1. EXECUTIVE SUMMARY

This phase one interim project report summarises the resource assessment of the Lower and Middle Palaeolithic archaeology (c. 500–40,000 years BP) and Pleistocene fluvial terrace landforms and deposits of the south-west Britain region (Cornwall, Devon, west Dorset and south Somerset). The Lower and Middle Palaeolithic archaeological focus in this region has traditionally highlighted cave sites, and this assessment draws attention to the findspots and artefacts associated with fluvial landscape fragments in secondary context.

The report is organised into four sections:

- Section 2 (introduction and background): an introduction to the report and a summary of the project background (the Lower and Middle Palaeolithic archaeological resource and the fluvial landscapes resource of the south-west region, the threat to the aggregates resource, and previous research), and the rationale behind the project.
- Section 3 (interim assessment report of the fluvial landforms and deposits of the south-west region): summary of fluvial terrace geomorphology (landforms, sediments and formation processes); project methodology; terrace mapping; OSL dating potential. *The resource assessment indicates that there is a greater fluvial terrace resource in the south-west region than has traditionally been perceived, with widespread potential for absolute dating, and the development of geo-chronological frameworks and models of Pleistocene fluvial landscape evolution. Key fluvial landscapes identified are the Axe, Exe and Otter rivers.*
- Section 4 (interim assessment report of the Lower and Middle Palaeolithic archaeological resource of the south-west region): summary of base-line knowledge; project methodology; review of ‘new’ findspots and artefacts identified within the phase one resource assessment; summary of key patterns and trends. *The resource assessment indicates that there is a larger (c. 50%) archaeological resource in the south-west region than previously documented in national syntheses. Patterns in findspot distribution generally mirror those already documented, although findspots/artefacts have also been identified in previously ‘blank’ areas.*
- Section 5 (summary): summary of key results of the resource assessment; identification of key implications for phase two of the project. *The Axe, Exe and Otter are key fluvial landscapes for phase two fieldwork, although there are sufficient fluvial landscape fragments throughout the region to merit additional, targeted fieldwork should they come under threat during the duration of phase two. The quantity of new findspots and artefacts identified during phase one merits an expanded review of the private collection resource during phase two and the development of public outreach.*

The resource assessment has demonstrated that the Lower and Middle Palaeolithic archaeological record and the fluvial terrace record of the south-west region are wider in scope and of greater interest than previously perceived. These resources have the potential to support, respectively, a new synthesis of the Pleistocene hominin occupation of the south-west Britain region (proposed for phase three of this project); and targeted geoarchaeological fieldwork to develop new models of fluvial landscape formation in the south-west, and contextualise the extant findspots and artefacts in terms of their geochronological significance and palaeoenvironments (proposed for phase two). The phase two fieldwork will be critical in informing current and future aggregates resource management strategies for the region.

The project has also detected sufficient interest in the Palaeolithic archaeology and Pleistocene landscapes of the south-west (in both public and professional spheres) to merit the development of outreach and dissemination schemes that will promote the future recording and reporting of archaeological/geological resources, and inform the management of the aggregates resource through the regional Minerals Planning Authorities (MPAs).

## **2. INTRODUCTION & BACKGROUND**

This report summarises phase one of the Palaeolithic Rivers of South-West Britain project, which undertook a resource assessment of the Lower and Middle Palaeolithic archaeology and Middle and Late Pleistocene fluvial (river terrace) geomorphology of the south-west region of Britain. The project was instigated in light of potential threats to the aggregates resource of the region (Section 2.1) and contemporary developments in Palaeolithic archaeological and Pleistocene geological research (Section 2.2).

The goals and objectives of the resource assessment phase of the project were as follows:

- Identification of all river systems in the south-west region where past aggregates extraction has taken place, where aggregates extraction currently occurs, and where mineral planning has identified Areas of Search in each of the local authorities within the study region.
- Assessment (including field verification) of the Palaeolithic geoarchaeological potential of the river systems of the south-west region, with regard to the presence/absence of: (i) terrace landforms containing coarse- and/or fine-grained fluvial sediments of Pleistocene age; (ii) sediments appropriate for the application of optically stimulated luminescence dating (OSL); (iii) Palaeolithic archaeological material, either stone tools or organic artefacts; and (iv) biological material appropriate for palaeo-environmental reconstructions (e.g. pollen assemblages).
- Collation of extant and ‘invisible’ records documenting the Lower and Middle Palaeolithic archaeology (findspots and artefacts) associated with the fluvial landscapes of the south-west Britain region.

### **2.1 Potential Threats to Aggregates Resources in the South-West**

In the counties of Cornwall, Devon and Somerset there is no large scale aggregates extraction from post-Tertiary sands and gravels (Brown 2004). The majority of existing and future aggregate provision is, and will be, met by hard rock sources, particularly from the Mendips (Somerset CMLP), and Cenozoic and Mesozoic sands and gravels (Cornwall CCMLP & Devon CMP). However, this has not always been so and there is some both current, and potentially future, small-scale extraction in the region. The soft aggregate resource in south-west England has never been

fully evaluated, yet geological mapping has shown that the major valleys including the Axe, Exe, Tone, Taw, Torridge and Tamar, and smaller valleys in Cornwall, contain gravel terraces or suites (Brown 2004). The archaeology associated with these deposits is largely unknown and yet is under threat from a variety of directions:

- Continued small-scale sand and gravel extraction (including the re-working of old permissions). Examples include the active sand and gravel quarry at Chard Junction (RMC Group) in the Axe Valley, the Kilmington site in the Axe valley, and the pit at Trewint Marsh, Bodmin being worked by the Bodmin Alluvial Sand and Gravel Company, which is not even *recorded* in the Cornwall Minerals Local Plan. Many farmers also episodically use small pits which are rarely (if ever) recorded.
- Several sites now come under the aggregate tax due to secondary production of sand and gravel. These are sites where the primary economic mineral is not sand and gravel but typically ball clay or kaolinite and these resources frequently lie underneath Quaternary sand and gravel deposits. If they sell sand and gravel they now come under the tax. This includes the kaolinite sites at Petrockstowe Basin and in the Bovey basin, both of which contain Quaternary gravels, and the ball clay sites in the Bovey basin.
- Prohibition order sites. These are sites which are presently dormant (for more than two years), but which retain full permissions, and therefore applications can be made for these workings to be re-activated.
- The neglect and/or infilling of old quarries. In particular the flooding or infilling of quarries with inert materials renders the aggregates and archaeological resource inaccessible and effectively sterile.
- Borrow pits. These are temporary mineral workings that are required to supply aggregate materials (often over the short-term) for use in specific construction projects. Borrow pits tend to be local to the projects, and the prohibition order sites described above would be candidates to be utilised in this capacity.

These varied threats illustrate that although the aggregate archaeology resource in south-west England is different to that in many other regions of the UK, it is under threat and, critically, there is virtually no data regarding the types of archaeology and palaeo-landscape evidence that are present and the quantities that are being threatened. These are clearly issues of aggregates resource management covered by the ALSF criteria, and a key goal of the overall project is the provision of new data to assist in the current and future management of the resource.

## 2.2 Academic Context

The wider context for an ALSF-funded assessment of the Lower and Middle Palaeolithic archaeology, Pleistocene fluvial landscapes, and hominin occupation of south-west Britain covers a range of factors: (i) the paucity of Palaeolithic studies undertaken in the south-west region, particularly over the last twenty years, despite other developments such as Campbell's (1998) review of the Quaternary of south-west Britain; (ii) the limited understanding of the Palaeolithic archaeology of this marginal region at the north-western fringes of the Acheulean world (e.g. Wessex Archaeology 1993; Wymer 1999); (iii) the development of complementary regional studies and national studies of the British Quaternary and Palaeolithic archaeology, which have contributed to the continuing development of a dynamic, national research framework; (iv) recent advances in the understanding of the evolution of the English Channel, particularly with respect to the palaeogeography of the Channel River and its tributaries (e.g. Antoine *et al.* 2003; Bates *et al.* 2003; Gibbard & Lantieri 2003; Lericolais *et al.* 2003; Reynaud *et al.* 2003), and their relevance to the

processes of hominin colonisation and movement in the northern France/English Channel 'landscape'/southern Britain region; and (v) recent recognition of the archaeological potential of secondary contexts (Hosfield & Chambers 2004), and the importance of assessing the fluvial, secondary context component of the south-west's Palaeolithic archaeological record (i.e. assemblages of derived stone tools occurring in fluvial sands and gravels, which at a national level represent 80–90% of Britain's known Palaeolithic heritage (Wymer 1999)), alongside its better known cave deposits (Campbell & Sampson 1971; Straw 1995, 1996; Wymer 1999).

### **2.3 Pleistocene Fluvial Geology of the South-West**

The rivers of the south-west region are beyond the limits of the Anglian (OIS-12) glaciation as traditionally defined (Figure 1). However the Clevedon exposures (a buried channel filled with glacial out-wash) and a glacially striated boulder at Kenn Pier in Somerset suggest that the Anglian, or possibly an OIS-16, glaciation did extend southwards beyond the Bristol Channel (Wymer 1999: 182). The probable line of the ice limit in Devon and Somerset on the basis of this evidence is therefore also indicated here (Figure 1). Nonetheless, it is clear that the Pleistocene fluvial deposits of the majority of the south-west region's rivers have not been subject to direct glacial modification, although the potential impacts of indirect glacial processes (e.g. pro-glacial lake overflows) have been the subject of discussion (e.g. Stephens 1974, Green 1974).

The Pleistocene geology of the south-west region is highly variable and complex, reflecting a combination of factors: (i) the considerable thicknesses of gravels in the Axe valley are poorly understood, since a potential explanation of pro-glacial lake overflow (creating the Chard Gap and supplying 'catastrophic' quantities of gravel into a previously minor Axe valley) is not supported by the absence of glacial erratics in the River Axe gravels (Wymer 1999: 183); (ii) westwards of the River Exe, river gravels are typically poorly preserved, reflecting the steep profiles of the rivers in their descent from the Dartmoor and Exmoor plateaux to the sea, and their resultant cutting of narrow, gorge-like valleys in which Pleistocene-age deposits are often poorly preserved; and (iii) the age of the well preserved terrace gravels of the River Otter and the Doniford Head gravels remains unknown.

### **2.4 Archaeological Background**

With respect to its Palaeolithic archaeology the south-west region is typically renowned for its caves and rock shelters: Somerset Limestone Quarry, Westbury-Sub-Mendip, Somerset (Bishop 1975; Andrews *et al.* 1999); Kent's Cavern, Torquay, Devon (Campbell & Sampson 1971, Straw 1995, 1996); Windmill Cave, Brixham, Devon; Rhino Hole, Wookey, Somerset; Hyena Den, Wookey, Somerset (Tratman *et al.* 1971); and Somerset Uphill Quarry, Weston-Super-Mare, Somerset (Harrison 1977). These sites have yielded archaeological materials dating to both the pre-Anglian (OIS-12) period (Westbury-Sub-Mendip and Kent's Cavern) and the Middle Palaeolithic (Kent's Cavern, Rhino Hole and the Hyena Den, and the Uphill Quarry).

It is clear from recent syntheses however (Wessex Archaeology 1993; Wymer 1999) that the south-west region also contains Palaeolithic archaeological materials (stone tools) associated with surface deposits (e.g. clay-with-flints) and fluvial contexts (e.g. river terrace gravels), alongside the better known caves and rock shelter archaeology. However, it is also noted that the numbers of Palaeolithic artefacts are small, especially in south Somerset and Cornwall. Moreover, the majority of recorded deposits and artefacts are currently undated (*c.f.* the Broom assemblage (Hosfield & Chambers 2002; Hosfield & Chambers 2004; Toms *et al.* 2005)). Finally, the majority of the stone tools and other artefacts recovered from fluvial contexts are also derived, and are often recovered

from Holocene alluvium deposits into which they have been re-worked over time.

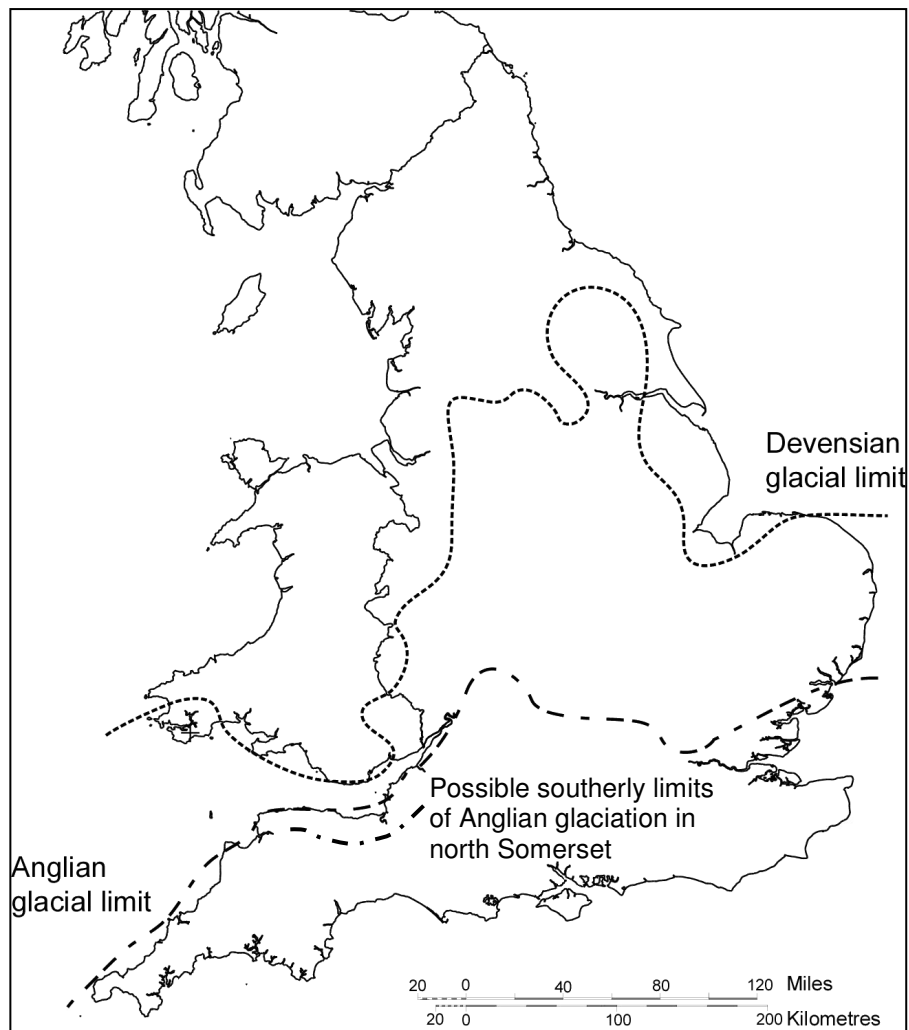


Figure 1: Southerly extents of the Devensian and Anglian glaciations (after Wilkinson 2001: Figure 1; Wymer 1999: Figure 43)

The question of how Palaeolithic hominins accessed the south-west region remains unresolved. This reflects both the poor understanding of the archaeology of the region, and wider issues regarding the Palaeolithic occupation of Britain. Current dating of the British Palaeolithic indicates a complete abandonment of Britain between OIS-6 and OIS-4/3 (Wymer 1999), a trend traditionally linked to the severe glacial climates of OIS-6 and the high sea-levels (preventing access from continental Europe) of the Ipswichian interglacial (OIS-5e). Moreover, recent models (White & Schreve 2000; Ashton & Lewis 2002) have proposed detailed cycles of Palaeolithic colonisation, occupation and abandonment, associated with the glacial/interglacial phases of the Middle and Late Pleistocene. It is against the background of those models that the colonisation and occupation of the south-west region must be explored. Wymer (1999: 181) has suggested: (i) entry along the southern side of the Severn Estuary into the northern zone of the south-west region; (ii) entry along a corridor lying between the headwaters of the River Kennet and the Hampshire Avon, and the Bristol Avon; and (iii) entry into the River Axe valley system through the South Dorset Downs. All of these routes stem from the more intensively occupied Palaeolithic regions in central southern and eastern England (e.g. the Thames valley and the Solent River system), which ultimately link into the continental river networks (e.g. the Thames/Rhine system in the southern North Sea basin and the

Solent River/Channel River/Seine system in the central English Channel basin).

However, recent investigations into the Pleistocene Channel have highlighted the complex palaeogeography of this region during periods of low sea-levels. The distribution of the Channel River and its tributaries indicates the potential for landscape connections between the south-west region, the Channel region (during glacial phases and low sea level) and, further to the south, north-western continental Europe (especially the Normandy and Brittany regions of France). These potential links also require assessment with regard to possible routes for hominin access into the south-west region.

## 2.5 Previous Archaeological & Geological Research

There has been relatively little investigation of the Lower and Middle Palaeolithic archaeology of the south-west region, particularly with respect to the open-air ‘sites’ (i.e. not cave deposits) associated with fragmented fluvial landscapes. Wymer (1999: 181–188) provides the most recent and comprehensive review, documenting the artefact finds from the river gravels exposed in the Broom, Chard Junction and Kilmington pits (the River Axe valley); the artefacts exposed in the Doniford Head Gravels at Watchet (see also Wedlake & Wedlake 1963); and the surface sites (on clay-with-flints and Upper Greensand bedrock) and other poorly provenanced finds both to the east (including Whitestaunton, Wambrook, Membury, Chardstock, Tatworth, Lyme Regis, Shute, Seaton, Weymouth, Portland and Bere) and to the west (including Kingsteignton, Haccombe with Combe, Teignmouth, Tiverton, Thorverton, Budleigh Salterton, Sidmouth, Ladock and St Buryan) of the River Exe. A sample of the data from Wymer (1999: 181–188, derived from Wessex Archaeology 1993) is summarised in Table 1, indicating both the scope (and limitations) of the existing data.

Location (where given)	Site NGR (where given)	Archaeological & geological information
Thorncombe	ST 341045	-
Chard Junction Pits	ST 345044	c. 10 handaxes; “several others” with Chard provenance, including 2 Levallois flakes
Broom Gravel Pits & Hawkchurch	ST 328025 & ST 326020	Minimum 1800 handaxes; 1 Levallois core & 2 flakes; deposit thickness & divisions; assemblage origins
Axminster	-	-
Wyke District	-	-
Kilmington & Kilmington Pit	SY 277982 & SY 275980	c. 10 handaxes
Whitestaunton	-	Surface sites on Clay-with-flint-and-cherts; mostly individual handaxes
Wambrook		
Membury		
Chardstock	-	Surface sites on Upper Greensand; mostly individual handaxes
Tatworth		
Lyme Regis	General provenance only	Mostly individual handaxes
Shute		
Seaton		
Weymouth		
Charmouth	-	One handaxe, possibly from river gravel
Portland	-	Two handaxes; found on Portland Beds
Bere	-	Two handaxes
Watchet	ST 090432 – ST 115434	Artefacts on beach, derived from head gravel (Doniford Gravel) on top of cliff; minimum 24 handaxes, 29 cores, 148 flakes, 1 Levallois flake
Watchet	-	Single handaxes; found in Doniford Gravels

Williton		
Bradford-on-Tone	-	Two palaeoliths; from edge of alluvium in valley of River Tone
Taunton	-	Surface finds from hills south of Taunton
Exeter (Magdalen Street)	-	One handaxe; in River Exe gravel ( <i>in situ</i> )
Thorverton	-	Derived handaxe(s?); found near bottom of river coombe
Kingsteignton Hacombe with Combe Teignmouth	-	Single handaxes; recovered from alluvium
Tiverton	-	Two handaxes; found on surface of river gravel
Halberton	-	8 handaxes and fragment of another; on surface of Palaeozoic rocks
Wigginton	-	One handaxe; on edge of terrace gravel
Budleigh Salterton (Tidwell Mount)	-	One handaxe; on edge of Terrace 5 gravel
Sidmouth (Mutters Moor)	-	One handaxe; on Head gravel
Newton Poppleford Harpford, Woodbury Budleigh Salterton	-	Single handaxes; found on Palaeozoic rocks
Brent Moor	-	Single handaxe; surface site
Constantine	SW 730303	Single handaxe; very worn & stained
Grade Ruan	SW 768186	
Landewednack	SW 695135	
St. Buryan	SW 405276	
Ladock	SW 893505	Broken handaxe (pointed end); from riverbank
-	SW 704129	Broken handaxe; very worn & stained
Lanhydrock	SX 077636	Broken handaxe; very worn & stained
-	SW 679129	Tip of handaxe; very worn & stained
-	SW 707129	Bifacial fragment; very worn & stained
St. Keverne	SW 725205	Single handaxe, bifacial fragment and 8 flakes; very worn & stained
Higher Polcoverack Farm	SW 769188	Struck Levallois core; very worn & stained

Table 1: Lower Palaeolithic data for the south-west region, synthesised from Wymer (1999)

However, it is also clear from discussions with regional archaeological staff (e.g. Chris Webster and Dr Frances Griffith) that the south-west also has an ‘invisible’ Palaeolithic resource, consisting of findspots and artefacts (often held in local and regional museums and private collections) which is not documented either in the Southern Rivers Palaeolithic Project (SRPP; Wessex Archaeology 1993) or in Wymer’s (1999) recent synthesis. Moreover, the recent EH-funded syntheses (Wessex Archaeology 1993; Wymer 1999) provided little or no detail regarding artefact typology (e.g. biface types) and/or the physical condition of the material, and were restricted in the south-west region to summaries of numbers of artefacts from findspots and their division into very broad categories (e.g. bifaces (handaxes), cores, and flakes). Finally, the EH syntheses were also limited (reflecting the scope of those projects and the periods in which they were undertaken) in terms of geochronological data.

Although the cave and rock shelter sites of the region have been well documented, the only major investigation of an open air assemblage has occurred for the Broom pits in the River Axe Valley (Reid Moir 1936; Shakesby & Stephens 1984; Green 1988; Marshall 2001; Hosfield & Chambers 2002, 2004). These studies have documented the archaeology as a late Acheulean (*c.* 250,000–300,000 BP) biface-dominated assemblage in secondary context (fluvial river terrace gravels and sands); although Hosfield & Chambers (2004) argue that the stone tools have been principally

derived from local rather than regional sources. The richness of the Broom biface assemblage highlights one of the major academic research questions associated with an investigation of the Lower and Middle Palaeolithic archaeology of the south-west: *does the rich archaeology of the River Axe valley represent a 'western' frontier in terms of the British Lower and Middle Palaeolithic, beyond which Palaeolithic occupation of the south-west region was highly sporadic? Or is the apparent paucity of archaeology to the west of the Axe valley due principally to issues of taphonomy and sampling?*

In contrast to the limited suite of archaeological investigations, there have been a wider range of geological studies with respect to the Pleistocene geology of the south-west region (Salter 1899, 1906; Ussher 1906; Woodward 1911; Green 1947; Stephens 1970a, 1970b, 1974, 1977; Green 1974; Shakesby & Stephens 1984; Campbell 1998; Brown *et al.* in prep.). These studies have also been augmented by the recent re-mapping of the Exeter region by the British Geological Survey. Alongside the mapping of the major Pleistocene deposits of the region, these studies have also highlighted two issues whose further research is critical to the interpretation of the south-west region's Lower and Middle Palaeolithic archaeology:

- The absence of robust geochronological frameworks for the Pleistocene fluvial deposits (with the recent exception of the Middle Pleistocene sands and gravels exposed at Broom in the Axe valley).
- The limited understanding of the processes of terrace development in the south-west region, which appear to be markedly different to those documented for the Thames valley and the Solent River in south-east and southern England (e.g. Bridgland 1994, 2001; Maddy *et al.* 2001).

Recent investigations of the River Axe valley's Palaeolithic archaeology, principally the assemblage from the Broom pits (Hosfield & Chambers 2004), developed theoretical models of secondary context assemblage formation and artefact re-working in fluvial systems. The field testing of these models against the Palaeolithic fluvial landscapes of the south-west region is central in developing an improved understanding of two key elements of the regional archaeological record:

- Why is the distribution of derived artefacts in the River Axe valley so heavily biased towards Broom, particularly in light of the major gravel exposures at Kilmington and Chard Junction?
- Do the isolated artefact finds from the south-west region (especially to the west of the River Exe) genuinely represent a minor archaeological presence or are they the remnants of larger assemblages whose identification has been hindered by the poor preservation of river terrace deposits in the steep-gradient valleys?

## 2.6 Summary

Building upon the state of knowledge summarised above, the phase one resource assessment addressed the issues of the distribution and potential of the fluvial landscapes of the south-west and the nature of their threats (Section 3 & Part II; Section 2.1), and the scope of the Lower and Middle Palaeolithic archaeological resource in the south-west region, both visible and invisible (Section 4). Preliminary interim reports based on those two resource assessments are included below (Sections 3 & 4).

### **3. GEOARCHAEOLOGICAL POTENTIAL OF THE SOUTH WEST RIVERS OF BRITAIN**

#### **3.1 Introduction and Report Structure**

This section describes the project assessment of the geoarchaeological resource and potential of the south-west region with respect to the Palaeolithic period. As outlined in the phase one project design under module one, this assessment was to be achieved through the completion of the following tasks:

- Organisation of consultation meetings with curatorial and Minerals Planning staff
- Acquisition and analysis of the south-west region's Historic Environment Records (HER)
- Literature review
- Analysis of local authority MLPs and OMPs
- Analysis of BGS maps sheets and memoirs
- Analysis of BGS borehole data
- Consultation meeting (curatorial and minerals planning staff)
- Field verification of digital and desktop data
- GIS/database construction, data entry, data checking and data correction
- Organisation of phase 1 milestone meeting
- Production of desktop assessment report
- Identification of key river valley systems for Phase 2 fieldwork

All these tasks were completed in the allotted timeframe and the results of this work have been successful.

The following sections begin with a summary of general background information pertinent to the resource assessment module, and then describe the methodological rationale behind the tasks outlined above. The results of the work are discussed, and areas of greatest potential for the proposed phase two fieldwork are highlighted.

#### **3.2 Contextualisation of the Research**

##### *3.2.1 The impacts of climatic change on the south-west during the Pleistocene*

The Pleistocene can be defined as a period of fluctuating ice masses, for which there is no simple cause and numerous inter-related effects. Orbital influences (Milankovitch cycles) are considered as the primary driving force behind the advance and retreat of the ice sheets. While Herbert (1997) has argued that such orbital influences may be traced back into the deep geological past, it is for the last 2.5 mya, and particularly the Quaternary, that they come to dominate. However, the relationship between climate change and orbital forcing is not clear-cut. The external forcing mechanisms cause chain reactions in the Earth's internal mechanisms resulting in non-linear responses in the global climate system (Benn & Evans 1998). Thus, numerous additional inter-related factors play a role, including carbon dioxide, continental uplift, variations in land and sea configuration, vegetation cover, and changes in oceanic circulation. As the ice sheets advanced, vast quantities of water became locked up; as they retreated, the water was released. Consequently, one of the most notable features of the Pleistocene, are the fluctuations in sea levels. These fluctuating masses of ice and water have also affected uplift and subsidence (Westaway 2005), but this isostasy is relatively minor in comparison to the ongoing uplift generated by the massive earth movements which

occurred during the Tertiary (Boulton 1994). Ice cover, changing sea levels and uplift have all had a significant impact on the fluvial systems and Quaternary landforms of south-west Britain; particularly the formation of river terrace systems, which are the primary focus of this report.

Currently, the earliest evidence of glaciation in south-west Britain is *c.* 600 kya BP, though the dating evidence is insecure. At Kenn Pier in Bristol, a channel fill with fossils, and estuarine deposits known as the Yew Tree Formation, is indicative of temperate conditions. These deposits overlie members of the Kenn Formation, which has been interpreted as glacial outwash and till. Amino acid racemization (AAR) dates have suggested the Yew Tree Formation can be correlated with OIS 15, which in turn suggests a pre-Anglian age for the underlying deposits (Campbell 1998). The Oxygen Isotope record suggests a major climatic deterioration and very large ice volumes during OIS 16, so an association of the Kenn Formation with this OIS does not seem unreasonable (Campbell 1998). Evidence for such early glaciation is virtually unknown elsewhere in Britain, and other authors tend towards an Anglian or more recent cold event association for the Kenn Pier deposits (Kellaway & Welch 1993). As shown in Figure 2 however, it is possible that the maximum extent could be as old as OIS 16, and could also be the source of the glacial erratics found on the coasts of Devon and Cornwall (Campbell 1998). There is evidence to suggest the ice extended southwards beyond the Bristol Channel, but it is unlikely that it covered more than the very fringe of the North Devon landmass, and probably terminated in the Bristol Channel. Deposits such as the Fremington Clay, previously thought to be associated with ice-cover, are better interpreted as having formed in a glacio-lacustrine environment (Campbell 1998). The age of the Fremington Clay formation is as controversial as its history of interpretation, but it is possible it dates to OIS 12 (Campbell 1998).

Irrespective of whether the maximum extent of glaciation is associated with the Anglian (*c.* 478–423 kya BP) or OIS 16 (*c.* 600 kya BP, part of the Cromerian Complex), south-west Britain lay at the limits of the ice sheets. This means that most of the study area was spared the consequences of direct glacial erosion. Instead, it has been strongly affected by periglacial processes. These include denudation and the formation of thick “head” deposits (discussed further below), which characterise large areas of the south-west. During the Last Glacial Maximum (OIS 3 at *c.* 18 kya BP), also shown in Figure 2, ice cover only extended as far south as South Wales. Nevertheless, periglacial processes would have destroyed, masked, or re-worked many of the features associated with earlier glaciations, though certainly not all of them. Essentially then, because the study area was not glaciated, fragments of Quaternary landscapes predating the Last Glacial Maximum have been preserved. Terraces in the lower reaches of the valleys, and estuaries associated with several major drainages, are also preserved, but because of the rise in sea levels since the Last Glacial Maximum these are now submerged (e.g. Edwards & Scrivener 1999; Antoine *et al.* 2003).

### 3.2.2 Rivers, Terraces and Archaeology

The earliest known occupation of the British Isles by hominins is represented at sites such as Boxgrove (*c.* 500 kya BP (Roberts 1994)), Swanscombe (*c.* 400 kya BP (String & Hublin 1999)), and Kent’s Cavern, where recent re-dating and re-examination of the sequence suggests correlation of the artefact-bearing breccia with OIS 10 (*c.* 380–339 kya BP) or earlier (Proctor *et al.* 2005). Therefore, evidence for the occupation of the British Isles by hominins occurs during the latter part of the Pleistocene from the Cromerian onwards (see Table 2).

The cave sequences of the south-west region are comparatively well documented, and this project has been concerned with finds from “open” sites of the south-west, and particularly those associated with river terrace deposits. As noted by Wymer (1999) “...the great majority of the evidence for the

*Palaeolithic occupation of Britain comes from river deposits*”; and in general these are the river terraces of south-east Britain. Because these are so extensive, they have been widely exploited as a primary aggregate resource, and a far greater proportion of archaeological material has been retrieved from them. They have been well studied, and have formed the basis for the development of widely accepted models of climate-driven terrace formation (e.g. Bridgland 2000; Maddy *et al.* 2001), as summarised in Figure 3.

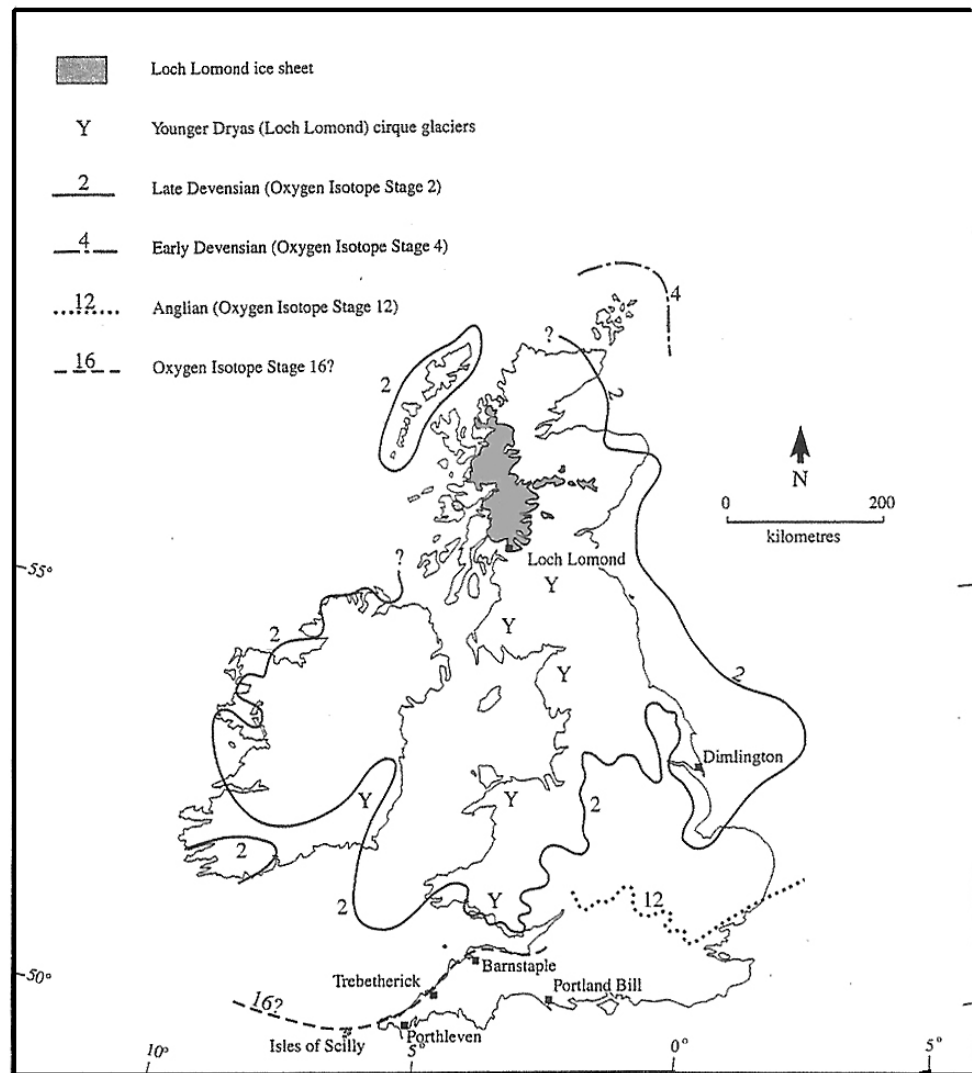


Figure 2: Reconstructed Pleistocene maximum ice limits adapted from Campbell (1998: Figure 2.3)

River terraces are most easily defined as past floodplains which have been abandoned by river incision and so now exist as landforms above the present river and floodplain. Their archaeological significance comes from both the attraction of floodplains for many human activities (hunting, fishing, plant and rock gathering) and the inevitability of human interaction with rivers (crossings and transport). The open game-rich character of Palaeolithic floodplains has always been associated with open-air scatters such as knapping sites, butchery sites and camps. Once abandoned through river incision terraces remain attractive to hominin settlement due to close proximity to the river and floodplain resources but less risk of flooding (Brown 1997). Terraces may form “by any environmental factor which causes river incision into the old floodplain, including climatic change, changes in sediment availability, changes in catchment hydrology, tectonic activity and base level change” (Brown 1997). Such floodplains may be divided into cold, glacial, periglacial or cold

temperate conditions, and generally consist of gravels with few organic remains, or under interglacial, or interstadial conditions, finer sediments with organic-rich channel fills. For the vast majority of the Pleistocene however, gravels in SW Britain would have been formed under periglacial conditions.

OIS	Quaternary name		Age years BP	Archaeological Periods
1	Holocene		10.5 K-present	Mesolithic-Modern
2	Late Devensian		12.5 -10.5 K	Late Palaeolithic (Upper Palaeolithic)
3	Middle Devensian		50-12.5 K	Middle Palaeolithic
4	Early Devensian		70-50 K	
5a			110-70 K	
5b				
5c				
5d				
5e	Ipswichian <i>sensu stricto</i> (T)	130-110 K		
6	Wolstonian 3		186-130 K	
7	Ilfordian	Stanton Harcourt (T)	245-186 K	
8	Wolstonian 2		303-245 K	
9	Wolstonian 1/2		339-303 K	Lower Palaeolithic
10	Wolstonian 1		380-339 K	
11	Hoxnian (T)		423-380 K	
12	Anglian (C-G)		478-423 K	
21-	Cromerian Complex		c. 500 K	
13				

Table 2: A Pleistocene Chronology, adapted from Brown (forthcoming)

In contrast to the impressive “staircase” sequences associated with the Middle Thames for example (Bridgland 1998), very little attention has been paid to the terrace sequences of south-west Britain. Although it cannot be denied the river terrace deposits are not as widespread as in the east of the country, this does not mean they are unimportant or not at risk from extraction. The cave sites clearly show hominins were present in this area of the country and provide an excellent sequence into which palaeo-landscape reconstructions could be tied. It is most important then that the research bias with respect to the river terraces is redressed. These river terraces are one of the few sources of information we have about the palaeo-landscapes inhabited by the earliest occupants of Britain.

That river terrace deposits exist in the area and that some of these could be of considerable antiquity has been known for many years (e.g. Ussher 1876). The only study that has considered Palaeolithic archaeology in relation to these deposits in the south-west was conducted by Wessex Archaeology some ten years ago (Wessex Archaeology 1993, Wymer 1999). He identified a number of findspots in the south-west region, and contrasted the considerable thicknesses of gravels in the Axe valley,

with the more fragmentary terraces to the west. He wrote, “...westwards the geology is very different and terrace gravels are non-existent or very poorly preserved. The Exe, the Teign, and the Dart all have their sources on high land on Exmoor or Dartmoor between 450 and 500m OD. Thus they have very steep gradients in their descent to the sea and correspondingly cut narrow gorge-like valleys. The result is that as such rivers cut down, they leave nothing of their previous deposits” (Wymer 1999). This is in part true. The bedrock geology is an important consideration in terrace formation, as is the base level gradient (Brown 1997), but Wymer considerably overstates the fragmentary nature of the terraces. This is largely due to the lack of research that has been conducted on them. Their landscape morphology does differ from the terraces found further to the east, but exactly why, is something that needs further investigation and is unlikely to be related solely to the bedrock geology. As discussed further below, considerable swathes of terrace deposits exist in the south-west region particularly in association with the Exe, Otter, Taw, Torridge, Tamar, Bristol Avon, and at Doniford in association with the palaeo-river Washford. In recent re-mapping by BGS, river terraces are better differentiated from other gravel deposits, as well as altitudinally (discussed further below), which was not the case in the 1990s (e.g. Wessex Archaeology 1993). Where rivers lack terraces, or have a restricted staircase, this is not necessarily related to bedrock, base level or preservation, but to the fact that the drainage course may be a relatively recent phenomenon — for example the River Sid, or the Honiton branch of the River Otter.

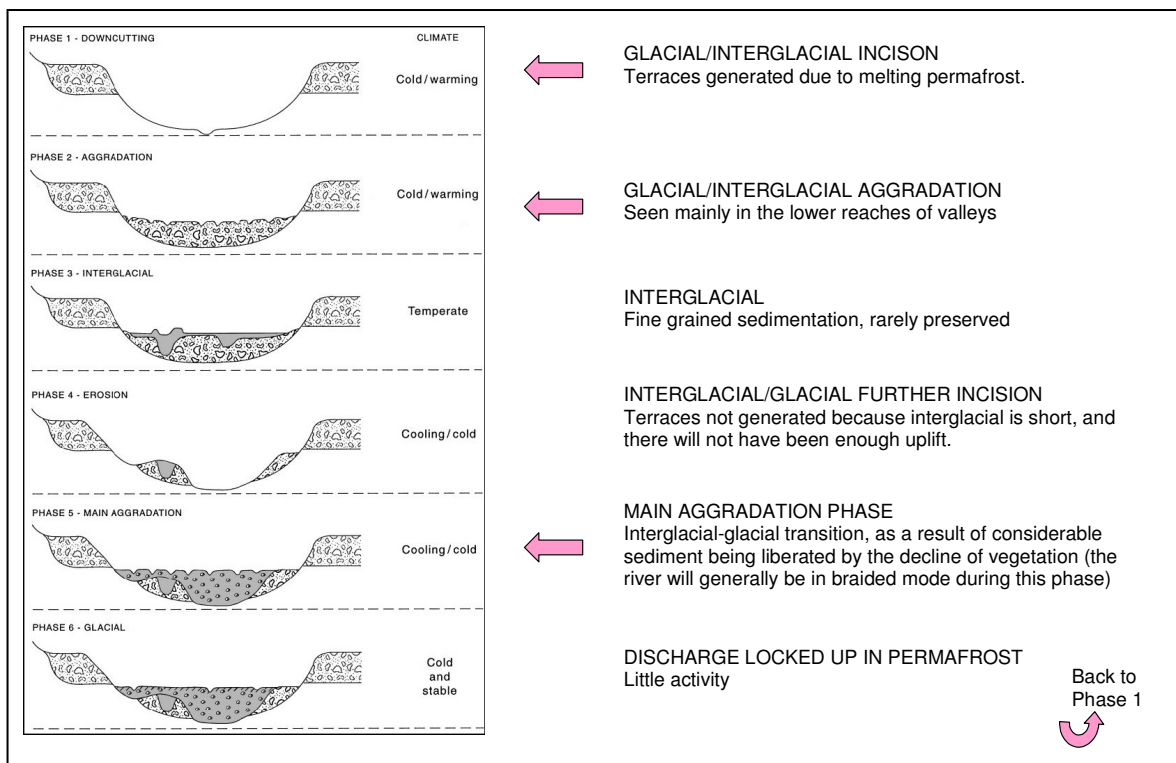


Figure 3: Major Terrace Formation Periods: Bridgland’s Cyclic Climatic Fluctuation Model, adapted from Bridgland (2000: 1295 & Figure 1)

Beyond this, very little is known about the south west terraces. We do not understand how the considerable thicknesses of gravels in the Axe valley formed, since a potential explanation of proglacial lake overflow (creating the Chard Gap and supplying ‘catastrophic’ quantities of gravel into a previously minor Axe valley) is not supported by the absence of glacial erratics in the River Axe gravels (Wymer 1999). Pre-Devensian terraces (such as the Doniford gravels, and the terraces associated with all the drainages listed above) remain undated (though see discussion below). The major exception to this is the date of c. 250–300 kya BP obtained by Dr Robert Hosfield and Dr

Philip Toms for the terrace deposits at Broom by OSL (Toms *et al.* 2005). In contrast to the deposits of the south-east none of the terraces have been named, and no members, units, or sub-divisions between or within terrace systems have been defined. As this report will show, such differences do exist, but no comprehensive study or work has been conducted on these in the south-west region. Further study of these deposits provides an excellent opportunity to:

- Contextualise the Palaeolithic hominin occupation of Britain.
- Ascertain the likelihood of Palaeolithic artefacts being recovered from specific terrace deposits.
- Gain a much clearer understanding of mid-late Pleistocene landscape evolution and palaeolandscape configuration in the south-west region (including the possibility of gaining a handle on differential uplift rates).
- Understand differences and similarities in the morphology of terrace deposits in the south-west in comparison to the south-east of Britain.
- Provide information on palaeoclimatic change and palaeoenvironmental conditions and intra-terrace differentiation.
- Ultimately, gain an idea of what the landscapes inhabited by hominins actually looked like through the employment of visualisation techniques.

### **3.3 Methodology**

This section describes how each of the tasks outlined in the introduction was achieved. The results are discussed in Sections 3.4 and 3.5.

#### *3.3.1 Acquisition and analysis of South-West Region Historic Environment Records (HER)*

Following the results of the assessment of the BGS maps and memoirs (discussed below), for the purposes of phase one, Devon was chosen as a primary focus area to supplement the wider-ranging assessment of HER and museum data undertaken by Dr Simon Hounsell (Section 4). The purposes of this task were to:

- Assess whether more finds were represented than discussed in the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993; Wymer 1999).
- Put the data into a coherent digital format.
- Display the data in a GIS database.
- See what patterns were generated when the HER records were displayed against the geological data.

HER records for all find spots/sites recorded as having a Palaeolithic component were acquired from the relevant sources (Devon County Council, Torbay Council and Plymouth Council). Records entered as “Prehistoric” were also requested and searched. A detailed Access database was built purely for Devon, which fully incorporated all the relevant HER data, and data from the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993). The database accommodates general site information, geological and archaeological data in a series of linked tables displayed as forms to facilitate data entry. The geological data was derived from the HERs and from studying the BGS map sheets and memoirs described below. Data was split into numerous separate categories to aid a) querying the data, and b) entering a similar resolution of data for the other counties in the study area should this be required at a future date.

Once the original Access database for Devon had been built and the data entered, it became apparent that ArcGIS is limited in the number of characters that can be displayed for a findspot.

Consequently, a pared down version of the database was prepared solely for use with ArcGIS (see below), where data entries were shorter and several categories of data were removed entirely. The coding of findspots corresponds with the original, more detailed database, which can be consulted if more information is required about a site by the GIS user. A check box was added to the GIS-linked Access database to show whether further information on the site/findspot is available in the independent, more detailed Access database. The database for GIS display had one further additional category specifying the accuracy of the grid reference to 1000m, 100m or 10m. This allows the accuracy of findspots as defined by grid reference to be displayed visually in GIS. The Southern Rivers Palaeolithic Project's (Wessex Archaeology 1993) accuracy categorisation was not employed, because there were more find spots than identified by that study (see Section 4) and the information used to define these accuracy categories was not readily available for all of the new find spots.

### *3.3.2 Literature review*

Literature review has been ongoing throughout phase one, and many of the texts consulted are referenced in this report. Probably the single most important text dealing with Quaternary landforms in the south-west was Campbell (1998), while the Southern Rivers Palaeolithic Project for the south-west region (Wessex Archaeology 1993; Wymer 1999) provided an excellent foundation to build on. A bibliographic Endnote database of the texts consulted was also constructed.

### *3.3.3 Analysis of BGS maps sheets and memoirs*

The purpose of this was to:

- Determine which areas of the study area were mapped in detail, and when.
- Ascertain the extent and location of the terrace deposits.
- Identify which areas should be purchased for the GIS database.
- Learn what information was available on the terraces from the memoirs.

Geological solid and drift maps exist for the whole of the south-west at a scale of 1:50,000. All the most recent maps covering the study area were studied. A catalogue was created in Microsoft Excel that noted number of terraces mapped on each sheet, the river they were related to, and how much head was shown (this catalogue is not presented in this report). Coverage of solid and drift maps for the study area at a scale of 1:10,000 varies and is shown in a BGS catalogue. Obviously more detail is shown on maps at this scale, but of particular use is that selected borehole data is also presented alongside the map, and shown on it. A limited number of these 1:10,000 maps were consulted at BGS Exeter. The Exeter Sheet was purchased because: the area had been recently re-mapped in great detail; a considerable number of terraces associated with the River Exe are present in this area; the degree of development made it very difficult to identify the exact extent of terraces and location of boreholes at a scale of 1:50,000. Selected memoirs and technical reports were also consulted for map sheets where significant quantities of terrace deposits were shown.

### *3.3.4 Analysis of BGS borehole data*

Borehole data is useful because it can record limited, localised information on the depth of river terrace deposits, and the material they consist of, without large-scale excavation or exposure. Borehole data coverage for the south-west can be viewed online through the BGS website at <http://www.bgs.ac.uk/geoindex/home.html>. This website provides basic information: the borehole type, location, precision, date of borehole code and which company conducted the work. The majority of boreholes are drilled prior to housing/industrial development or road construction, which is demonstrated very clearly by viewing the borehole distributions in relation to major roads,

towns and cities. There appear to be a large number of boreholes, but the relevance of these to clarifying the depth, constituent materials and dating potential of possible river terrace deposits is extremely variable. Bennett (forthcoming PhD thesis) has put this data to excellent use across a section of the River Exe, using a series of records from boreholes drilled prior to road construction. This enabled her to create profiles of the river valley and its terrace deposits in an area that is now developed.

Only a fraction of the boreholes shown on the web site are located on areas mapped as terrace deposits, and on closer examination of the paper records which has been possible at BGS Exeter and larger scale maps, many of these are of little use. Where 1:10,000 coverage of an area is available, selected borehole records are detailed in the map legend, but the most useful information comes from studying the original paper logs. Some borehole records are classified, and not available for study without express permission from the company who conducted the work. (No such records were examined for this phase of the project). For others, the detailed log data is “missing” though the grid reference of the boreholes is known. The data shown on the paper records varies according to the type of borehole, the reason for drilling it, the date of the work, the company that was involved, the level of recording detail and the experience of the person interpreting the sequence. Of particular interest are those records where more than one person has interpreted the data retrieved, as these demonstrate the diversity of possible interpretations.

Frequently, the solid (bedrock) deposits are of primary interest to the company conducting the work, and the superficial (drift) deposits retrieved from boreholes are ignored or only cursorily described. Where superficial deposits such as terrace river gravels are described, the detail given can vary from extremely general: e.g. “Terrace deposit” to more specific: e.g. “Medium dense red/brown, sandy, well-graded gravel”. More detailed records may provide good descriptions for several strata, which are then collectively interpreted as river terrace deposits. Such records are extremely useful. They allow one to assess the accuracy of the interpretation as remnant terrace rather than as head for example, and whether it contains materials suitable for dating. In the case of Optically Stimulated Luminescence (OSL) dating for example, the presence of sand or silt lenses or beds in the deposit. Where river gravels lie directly on bedrock, such detailed descriptions also make it much easier to distinguish the depth at which terrace deposits end and regolith begins.

In order to calculate the depth of a possible terrace deposit, the most useful records are those where the ground level O.D. is given. Some borehole records provide a good borehole log, but only an approximate ground level. Where none is given at all, an approximate level can be gained by looking at the nearest contour, or by re-locating the site and working out the present day ground level O.D. This is not ideal, particularly if the borehole was drilled some time ago or construction has occurred since the borehole was drilled. The most useful records then, are those that contain strata interpreted as river terraces, where the logs provide some detailed descriptions of the deposits, and where both the ground level O.D., and the depths and/or levels of the various strata are recorded. Whilst time consuming, by careful selection of specific boreholes and close examination of the data in their logs, it has proved possible to examine the differences between the river terraces associated with the River Exe and its tributaries.

### *3.3.5 Consultation Meeting (Curatorial and Minerals Planning Staff) and Analysis of Local Authority MLPs and OMPs*

Meetings with the relevant Minerals Planning Staff from Devon, Cornwall and Somerset County Councils were conducted. Communication and discussion of the project with Dorset County Council has only been possible through telephone conversations and e-mails. The purpose of this was to discuss aggregate extraction and waste management policies, and to assess how this research

might be most usefully employed by the Minerals Planning Authority Staff. It also served to identify areas particularly at risk, as discussed in the phase two project design that follows this report. The published Minerals Local Plans from each of the relevant counties were acquired and examined with the same goals in mind.

### *3.3.6 Field verification of digital and desktop data*

Several field trips were conducted during Phase 1 with the primary purposes of:

- Examining of locations where dating has been achieved.
- Identifying exposures potentially suitable for dating and fieldwork in phase two.
- Learning to use the differential GPS and conducting survey to ascertain to what degree terraces are altitudinally separated.
- Examining some of the sites where river terrace deposits have been/are being exposed, and removed.

The first visit was to examine areas mapped as river terrace deposits, head deposits and the influence of the solid geology on the River Exe and its tributaries. One trip focussed primarily on the terraces 1 to 4 of the River Exe. A second trip (LB and Dr Richard Scrivener (BGS)) focussed on the higher-level terraces and head deposits. Two further days were spent learning to use the differential GPS and then surveying river transects. One transect was conducted across the River Exe, and the other across the River Culm.

Visiting Corfe Mullen, a site that has yielded numerous handaxes from terrace deposits associated with the River Stour, to look at old quarry faces re-exposed by Dr Robert Hosfield and Dr John McNabb provided an extremely useful example of the different nature of terrace deposits east of the River Axe. A day was spent conducting survey at Broom using the differential GPS to resolve some inconsistencies between three previous surveys of the area. Another trip examined some of the higher-level terraces associated with the River Otter to look at their landscape form, accessibility and potential for dating. A further day was spent with Dr Raemus Gallois (BGS) visiting Kilmington Gravel Pit, Broom, and Blackhill Quarry to examine the river gravel exposures in these areas, and in the higher terrace exposures associated with the Otter in the cliffs at Budleigh Salterton. A field trip to look at the terraces at Beam Quarry has been approved by the quarry manager, but it has not yet been possible to visit this site.

### *3.3.7 GIS/database construction, data entry, data checking and data correction*

On the basis of the preliminary research, Devon and Dorset were identified as the areas of highest potential (as discussed below), and the geological digital data for Devon and Dorset was purchased. To minimise file sizes, and speed up display, only the superficial deposits have been incorporated in the initial GIS model, though for example data files showing solid deposits (bedrock) and faults could be added to this very quickly. The geological data can be clicked on and associated data displayed, or labels added. The former method of display was chosen for clarity. The data from the Access database from Devon, described above was then added to the GIS database so that each of the find spots/sites could be viewed and when clicked on, a list of associated data displayed. Cave sites as recorded in the Devon HER were also added, but only the name, grid reference and HER number is displayed. Ordnance Survey data for Devon was downloaded from Digimap, and can be displayed as a backdrop to the superficial geological deposits. Finally, all the quarry sites and prohibition order sites listed in the Devon Minerals Local Plan are also shown, but again only their name, grid reference, and MLP reference number are associated with each point. It would be possible to add further information to these data points and to the cave location points.

A digital copy of the GIS model has been circulated with this report.

### *3.3.8 Organisation of Phase 1 Project Milestone Meeting and Outreach*

A meeting was organised and held at the University of Exeter on the 16<sup>th</sup> June. A wide range of people from different counties and institutions were invited. Around 30 people from various areas attended the meeting, and feedback from participants has been extremely positive. Many of those who attended as well as those unable to attend, requested and were sent a CD of the PowerPoint presentations (for personal/institutional use only). An Access database of contact details for people and institutions that have an interest in this project was created. Two RIGs meetings and a SWARF meeting were also attended.

## **3.4 Results**

The following section highlights recent findings about the Pleistocene fluvial deposits in the south-west *as a result of the work undertaken by this project*. It should be noted from the outset that Devon was swiftly identified as the county with the most potential for expanding our knowledge in this respect. While it would be possible to discuss the other counties in the south-west region in some detail, this would largely replicate discussions presented in Campbell (1998) and Wymer (1999), and the BGS memoirs and reports. As far more, little-known data was identified for Devon, what follows is biased in favour of that county. However, it should be noted that the potential exists for similar data to be generated in the future, through targeted fieldwork in Cornwall and Somerset. These data will also complement work being undertaken in adjacent regions to the Palaeolithic Rivers of South-West Britain study region (e.g. Bates & Wenban-Smith's (2004; Bates 2005) research into the Pleistocene deposits of the Bristol Avon area).

### *3.4.1 Mapped Terrace Differentiation and Head Deposits*

Four key questions were addressed:

- What terrace deposits are there and where are they?
- How and to what degree are the terraces differentiated laterally and altitudinally on the BGS maps?
- What is the actual degree of altitudinal separation between some of these features on the ground?
- What do we know about the structure and material that makes up the terraces?

Examination of the BGS maps at a scale of 1:50,000, the associated memoirs and discussions with staff at BGS Exeter, shows that there is considerable variability in the level of detail shown. Factors such as the skill and experience of the field-cartographer, time and resources all play a role in this. Several areas have recently been re-mapped (e.g. Exeter Sheet (British Geological Survey 1995)) and comparing the old and new versions of the same sheet, or the level of differentiation between the new sheet and older adjacent sheets, these differences are clearly shown. There are five sheets in particular which are currently being re-mapped, or which are difficult to interpret. These sheets are: Tiverton, Wellington, Ivybridge, Tavistock, and Dartmoor Forest (pers. obs.; Dr R. Scrivener, pers. comm. to LB). It is clear from studying the maps that while terraces are present across the whole of the south-west region, Devon has some of the largest exposures of terrace deposits, several recently mapped sheets cover some of these deposits, and the greatest degree of differentiation between terraces occurs here.

More recently mapped areas tend to show greater terrace differentiation between areas mapped as river gravels, and between head and terrace deposits. The number of terraces/gravel deposits defined and the major drainages are shown in Table 3.

Numbers are used to differentiate terraces on the basis of altitudinal separation, but correlation between adjacent map sheets does not always occur. On more recent maps, “plateau gravels” are commonly re-defined as higher level terraces as this separation was related primarily to their topographic positions, and not to any difference in the structure of the deposit. An example of very high-level terraces overlying the Budleigh Salterton Pebble Beds, can be seen at Blackhill Quarry in Devon (Nicholas 2004). Today, these deposits fall on the catchment boundary between the Rivers Exe and Otter. This demonstrates that the river that formed those deposits existed in an environment and drained an area very different to the one we see today.

COUNTY	NUMBER OF TERRACES/GRAVELS DEFINED
<b>Devon</b>	
Exe	U and 1 to 8
Otter	U and 1 to 10
Dart	U
Axe	U and 1
Teign	U and 1
Torridge	U and 1 to 9
Sid	U
Taw	1 to 10
Erme	U
Petrockstow	1 to 4
<b>Somerset and Bristol</b>	
Parrett	U
Avon (Bristol)	U and 1 to 3
Tone	U
<b>Cornwall</b>	
Fal	U
Neet	U and 1
Tamar	U and 1 to 8
Fowey	U
Camel	U
<b>Dorset</b>	
Axe	U and 1
Frome	U and 1
Piddle	U and 1

*Table 3: Number of terraces/gravel deposits differentiated for the major drainages of the south-west region according to the most recent BGS 1:50 000 maps available. Note: When the digital superficial data was received, it was noted that large numbers of terraces (c. 15) have now been differentiated in association with the Frome and the Piddle.*

Examination of the memoirs and discussion with the staff at BGS, has also shown that the higher-level terraces (formerly “plateau gravels”) differ from lower terraces in their landscape form. They tend to “drape” over the landscape rather than form reasonably sharp breaks of slope evident in the lower terraces. This point has been made specifically in relation to the River Exe, terraces 5 and above (Edwards & Scrivener 1999). It may be that this difference of form is related to the generation of the terrace through periglacial outwash. As no dates have been obtained on the upper terraces and no sedimentology has been conducted, it is currently impossible to verify or refute this possibility. It is also important to note that in many diagrams of terraces, the base of gravels is portrayed as flat, but this is a gross simplification. As with any deposit associated with dynamic processes, the forms the terraces take are variable.

Areas previously mapped as “valley gravels” are often re-defined as “head” deposits, or “head and colluvium”. Because different processes generate them, terraces differ from head deposits in their structure, and clast morphology (see above for “river terrace definition” and below for discussion of “head”). However, as terraces are effectively defined by a “*break of slope separating two relatively flat surfaces*” (Brown 1997) it can be difficult in the absence of exposed sections, exposed ground, or borehole data to separate head deposits slumping down from higher ground, from terrace deposits in some areas (Dr Richard Scrivener and Dr Raemus Gallois pers. comm. to Laura Basell). However, all these features considered when mapping is undertaken by BGS, so differentiation between head and terrace deposits is reasonably good.

The term “head” was first used in the geological literature by De la Beche in 1839 (Edwards & Scrivener 1999). It has been employed in different ways, but today, generally refers to masses of locally derived rubble of weathered surface material (regolith) in clay and sand moved downslope in periglacial conditions by solifluction and freeze-thaw processes (Scrivener 1984; Selwood *et al.* 1984). These deposits are widespread across the south-west. They are so common on some (usually earlier) BGS maps, the cartographers chose not to map them at all (particularly where they were thin and patchy (Kellaway & Welch 1993)). Campbell (1998) points out that many head types can be recognised, and where exposed in coastal sequences, these are generally divided into Upper and Lower Head. A Wolstonian (Saalian) age is preferred for the Lower and a Devensian age for the Upper on the basis of their relationships to raised beach deposits. Dates have been achieved on the Upper Head deposits at Boscawen in Cornwall suggesting an age of no older than 30 kya BP, or a “Late Devensian” attribution (*ibid.*). The age of the Lower Head deposits remain unknown but could relate to a number of Pleistocene cold phases, such as OIS 4 or 6.

Inland, less is known about the age of head deposits. Depending on their stratigraphic context and the material from which they are composed however, they may be used to suggest the age of related features. For example, in the Bristol district, the large head deposits “*which mantle the exposed Triassic marl supporting the patch of Terrace Gravel at Sheephouse Farm, Easton-in-Gordano [808 774], postdate the formation of the nearby terrace...and predate deposition of the Estuarine Alluvium. Since the extensive belt of head at Easton-in-Gordano was formed by the degradation of all the younger Terrace gravels as well as the Triassic bedrock, it must also be Devensian in age*” (Kellaway & Welch 1993). This example shows clearly that it is currently only through the focussed study of specific drainages that it is possible to gain a handle on relative ages of these landforms, and landscape evolution. It also highlights the most important point that because head deposits are derived from locally derived material, this may include old terraces. On some maps, (e.g. Sidmouth (British Geological Survey 2004)) where further localised differentiation occurs, different head types are distinguished (e.g. as on the Sidmouth sheet where a contrast is drawn between soliflucted deposits restricted to valleys (‘Valley Head and Colluvium’), and ‘Other’ head deposits).

In order to clarify the extent to which terraces are altitudinally separated, two cross-valley transects were conducted using differential GPS over the lower terraces associated with the Rivers Exe and Culm. The Exeter sheet has recently been re-mapped so the actual altitudinal differences could be related to the differentiated mapped deposits. The results from these transects are shown in Figures 4 & 5 below. The differences between terraces 1–3 are clear, but relatively small. Between terraces 3 and 4 there is a significant separation. This suggests terrace 4 is associated with a major event; and given its structure and the dates on terrace 3 discussed below, this could be a cold event such as OIS 4 or 6. However, more dates and study of the sedimentology is necessary to confirm this. Analysis of the borehole data further supports these differences, as it shows basal separation between the deposits. These findings are important as they show *contra* the Southern Rivers

Palaeolithic Project (Wessex Archaeology 1993; Wymer 1999; which drew on the work of Kidson) that although the terraces are different those in the south-east, they can be defined as separate, altitudinally separated entities, which is in keeping with Bridgland's models of terrace formation.

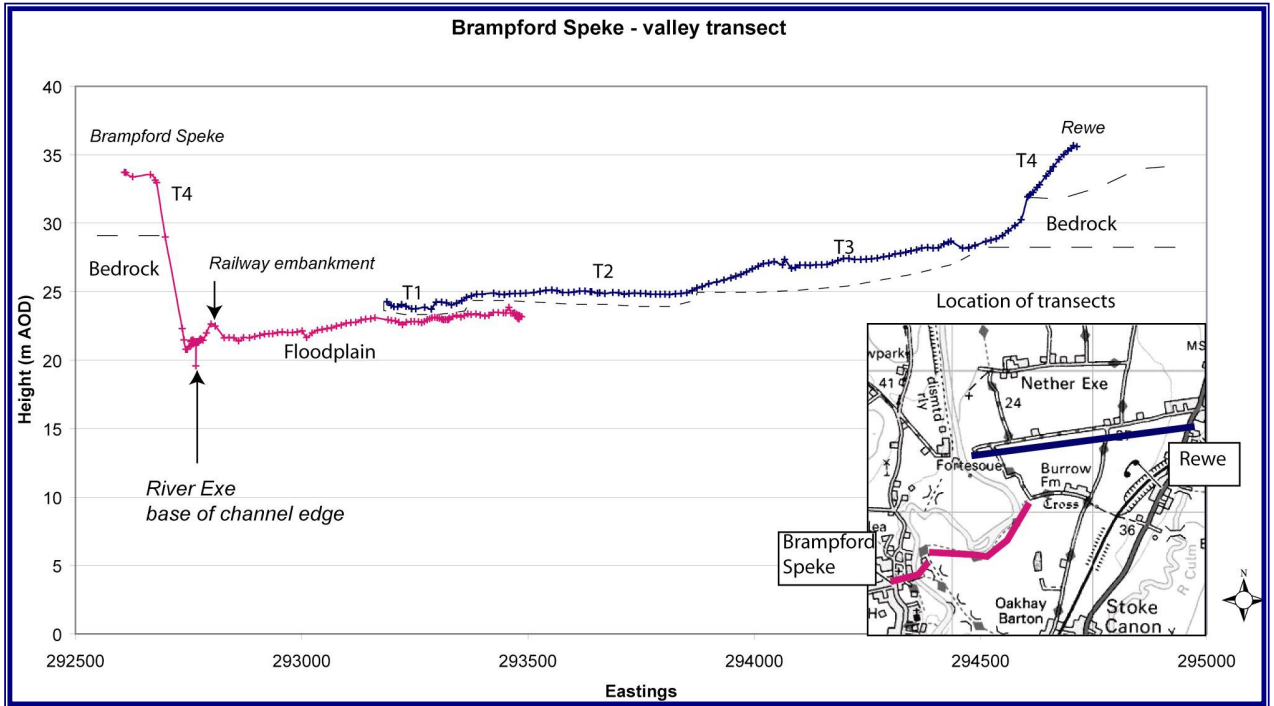


Figure 4: Terrace separation at Brampford Speke, River Exe. Results of differential GPS survey conducted by L. Basell & J. Bennett. Results drawn up into this diagram by J. Bennett. Unpublished PhD research.

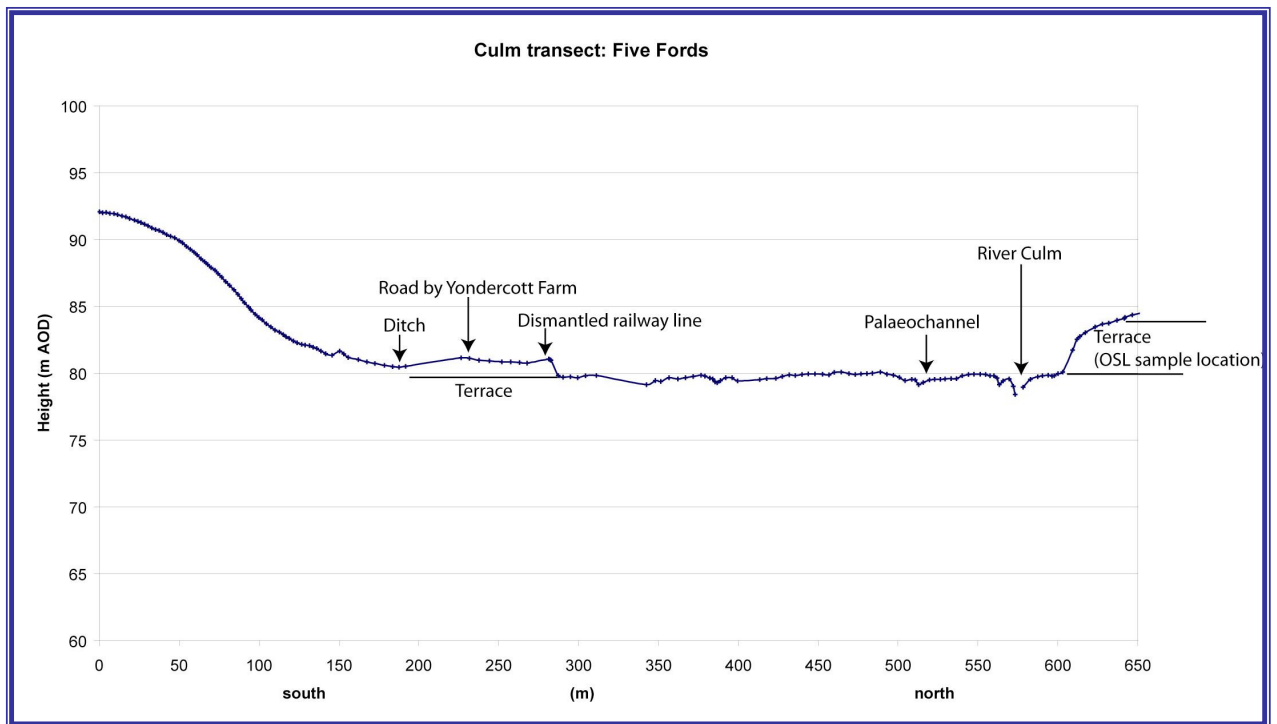


Figure 5: Terrace separation at Five Fords, River Culm (Exe Tributary). Results of differential GPS survey conducted by J. Bennett and L. Basell. Results drawn up into this diagram by J. Bennett. Unpublished PhD research.

### 3.4.2 Dated river terrace deposits and sites yielding environmental information

Key questions asked here included:

- What do we know about the age of the river terraces?
- What can we tell about past catchments?
- Are there any associations with particular terraces and archaeological finds?

In addition to the dates achieved at Broom on terrace material associated with the River Axe, mentioned above (Toms *et al.* 2005), some pollen data has also been recovered from the clays and silts at Kilmington. This is interpreted by Scourse (Shakesby & Stephens 1984; Campbell 1998; Scourse pers. com.) as indicating boreal forest. However the relationship between the gravels at Broom, Kilmington, and the supposed cold stage accumulation at Chard Junction Pits (Campbell 1998) remains unresolved, and can only be clarified by further dating, sedimentological analysis and sampling. Otherwise no dates or environmental information is available in any other terrace deposits in the south-west. Dates have been achieved on raised beach deposits in the area, and on the Burtle Beds in Somerset, frequently suggesting an OIS 5e correlation (Campbell 1998), but no connections between these deposits and the river terraces have been made, beyond speculation, with one exception.

During the construction of the Honiton bypass in 1965 a “mossy peat” deposit was revealed which included organic material, and bones originally thought to have been embedded in the peat, but that were possibly remobilised in mud flow and moved a short distance during the Last Glaciation (Turner 1975). Mammal remains from 17 individuals included *Hippopotamus amphibious* (which earned the site its name of the “Honiton Hippo Site”), *Palaeoloxodon antiquus*, *Cervus elaphus* and *Bos primigenius* (hippopotamus, elephant, giant ox and red deer). Samples of the peat taken from both the surrounding peat material and from inside the animal bones was analysed. Sparse tree pollen from a range of species was represented, and a high representation of herb pollen. A list of macro-fossil remains was also compiled. The general picture obtained from the analysis of this site was of a rich marsh flora and grass landscape occupied by grazing herbivores. It is now commonly attributed to OIS 5e (e.g. Edwards & Scrivener 1999). On the old BGS Sidmouth sheet, these deposits were mapped as undifferentiated river terrace deposits associated with the River Otter. On the most recent map, they were remapped as head. This is in keeping with Turner’s original interpretation that the peat and its contents had been “remobilised” during the Last Glaciation. Though the fauna is likely to be 5e (Turner 1975), this does not give us any clue to the age of any extant landform, as head deposits by their very definition are made up of reworked material, and no terraces are now mapped in the immediate vicinity of the findspot. Indeed north of Alfington, no terraces are mapped in association with the Otter.

Recently however, two dates have been achieved on terrace deposits associated with the River Exe. These have not yet been published. At Five Fords by the River Culm (a tributary of the River Exe), an OSL sample on a sand deposit in the terrace shown in Figure 6 has yielded a date of  $39,450 \pm 2,930$  BP (work conducted by Prof. Tony Brown). This geological sheet is currently being remapped by BGS, so the terrace remains undifferentiated. However it is likely to be degraded Terrace 3 (Dr Richard Scrivener, pers. comm. to Jenny Bennett).

At Washfield by the River Exe a further unpublished date obtained by OSL on bulk sample from the terrace shown in Figure 6, has yielded a date of  $27,500 \pm 240$  BP. Ms J. Bennett conducted this work as part of her PhD research. The site lies on the Exeter map sheet, recently been re-mapped in great detail by BGS. This site is defined as Terrace 3.

These dates are extremely important. They demonstrate the potential antiquity of the higher terraces associated with the Exe, which is entirely in keeping with the archaeological associations with Terrace 5 (see below), and more dates of this kind could provide a means of judging regional uplift.

Field trips to exposed sections and areas mapped as terrace deposits in farmland areas, associated with the Rivers Axe, Exe and Otter have led to the identification of several sites which will be suitable for fieldwork and for dating. These include the undifferentiated deposits of the Axe, and some of the higher-level terrace deposits of the Exe and Otter which appear to be associated with Palaeolithic finds (see below). In addition, current excavations at the Princesshay development in Exeter should penetrate gravels defined as terrace 6, associated with the River Exe. Preliminary discussions have been held with Exeter Archaeology Unit regarding this matter.



*Figure 6: Dated terrace at Five Fords*



*Figure 7: Dated terrace at Washfield*

Work on the terraces will also help us to determine whether significant catchment changes have taken place in the Palaeolithic. For example it has been assumed that because most of the peninsular was not glaciated the Exe catchment would have persisted throughout the Pleistocene. However, the

shape of the basin (planform) and the existence of high-level terraces on internal interludes and the mis-match between terrace distribution and present river size suggests that at some point in the Pleistocene the Exe catchment has changed, probably by capturing northerly drainage and by loosing easterly drainage areas. This is potentially important for the environment and routeways of early hominins in SW England. The terraces are also cut by the many pronounced blind-dry valleys which on present evidence may not have existed at all in the Lower and Middle Palaeolithic.

Perhaps the most striking feature of the rivers in the region is the dominance of a North–South trend in their flow. While this is clearly related to the bedrock geology, which influences the drainage, there are some strong indications, that not all rivers have always followed this course. The course of the River Torridge today flows eastwards, then turns sharply northward. This is odd, and suggests that it once drained south, and was later captured by the Okement.

Paired terraces (i.e. where terrace deposits that broadly correspond in terms of altitude above the floodplain, are found either side of the current river or a dry valley) are evident on many of the rivers in the south-west region — for example the River Axe. These are especially important because they indicate that that particular section of the river has not shifted laterally by any great amount since the terraces were formed. In effect then, the limits of these areas represent landscape remnants, potentially of great antiquity. Not only do they provide a clue to the size of the river and past drainage patterns, but importantly suggest that these areas are of higher archaeological potential in terms Palaeolithic artefacts. It is envisaged that these will be a focal point of the Phase two fieldwork. Finally, buried channels at river mouths (e.g. Exe, Teign) are also a feature associated with low sea levels and although undated most probably date to OIS 3–2, although they may have been older exhumed and infilled features perhaps associated with OIS 12.

### *3.4.3 Palaeolithic findspots from terrace deposits in Devon*

More than 80 open locations in Devon have yielded finds attributed to the Palaeolithic. This is considerably more than the number of findspots represented in the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993), a finding supported for the rest of the study area by Dr Simon Hounsell's work. As most of the find spots have yielded only single finds, this does not significantly increase the number of known Palaeolithic artefacts in Devon, but does suggest the potential for such finds. A number of these open findspots are close to rivers and about 13 lie within a kilometre of areas mapped as river gravels.

The level of detail recorded in the HERs for Devon varies considerably between find spots. Because the majority of open Palaeolithic find spots in Devon are surface finds, the find spot location is often very general and the context from which the find was recovered is not always recorded. Several queries have been run on this data, revealing a number of interesting patterns. One of these shows that just under half (41) of the HER findspots for Devon correspond with the sites studied by the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993). Of the remaining findspots/sites recorded as containing Palaeolithic archaeology from open contexts, two are faunal remains, and some refer to Upper Palaeolithic finds, but there are not many of these. This shows that the Southern Rivers Project (Wessex Archaeology 1993) did not incorporate all Lower and Middle Palaeolithic finds in Devon. Interestingly, where the date of discovery was recorded for Devon (which was not very frequently), the distribution of discoveries over time was very even.

Of the archaeological data, four separate sites are accurately located within or directly on top of river terrace deposits in Devon. Where these deposits are numbered on sheets covering the Rivers Exe and Otter, they are named as Terrace 5 which occurs *c.* 30 metres above flood plain. On the

Tiverton sheet where terrace differentiation has not been mapped, height above floodplain was calculated and is the same as Terrace 5. These sites include Friars Gate and Tidwell Mount at Wiggaton (Smith 1933–1936), the Magdalen Street hand axe from Exeter (Pickard 1933–1936) and findspots near the River Lowman (Exe Tributary) which were discovered during fieldwalking by Tiverton Archaeology Group.

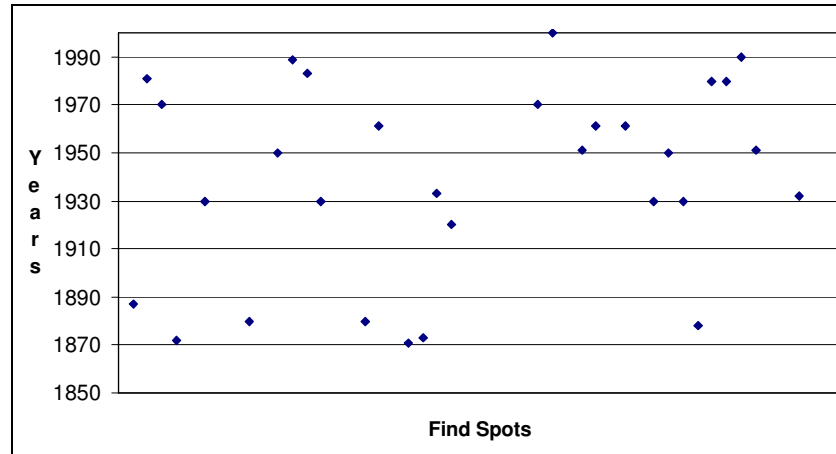


Figure 8: Discovery of dates of Palaeolithic finds in Devon (where recorded in the HERs)

### 3.5 Discussion and Conclusions

The geographical difference in the distribution of Palaeolithic finds is more likely related to history of aggregate extraction than a difference in patterns of the hominid occupation of Britain. Since The Southern Rivers Palaeolithic Project (Wessex Archaeology 1993; Wymer 1999), further work and re-mapping has better distinguished between terrace and head deposits in association with the rivers of the south-west region. Work conducted during Phase 1 for Module 1 has shown that:

- The principal terrace distributions are located in the east of the study area and most of the rivers with a significant amount of terrace differentiation occur in Devon.
- In contrast to the south-east, although there is superficial differentiation between terraces, no data exists naming members or different features within terraces, although preliminary examination of the borehole records and exposed sections at sites such as Broom show that such differentiations exist.
- It is possible to date river terraces, and dates obtained so far suggest some of the high-level terraces may be of significant antiquity.
- Dating the terraces also provides dates on associated and relevant features such as dry valleys, where the stratigraphic relationship between such features and the terraces has been studied in a specific drainage.
- Terraces are altitudinally separated both superficially and basally.
- More Palaeolithic archaeological finds are present in Devon than previously thought.
- Five unequivocally Palaeolithic finds in Devon have come from four sites directly associated with river gravels of the same height above the floodplain, in association with the River Otter, the River Exe and the Lowman (one of its tributaries). Where mapped this terrace level is distinguished as Terrace 5.

Tentative links have been made between the higher-level terraces of both these rivers. Both areas have recently been re-mapped and have a large number of differentiated terraces. As a result of this

work, three areas stand out as being of particular importance, and as having high potential for the targeted fieldwork envisaged for Phase two. These are the Rivers Axe, Exe and Otter. The River Axe is already known as an important area, but our understanding of this area needs to be improved as the drainage and its terraces are anomalous when considered in relation to other drainages in the immediate vicinity.

Developing the study from the Axe westward is logical. It works from:

The *Axe* which:

- Is an area of prolific archaeological finds in association with terrace deposits. As Campbell (1998) writes “*Some sites and areas are recognized as internationally important...the Palaeolithic site at Broom aspires to this level of importance on archaeological grounds alone*”
- Is geomorphologically anomalous in comparison to all the drainages immediately surrounding it in that it has large amount of undifferentiated terraces with one or two very small patches of terrace one, rather than numerous altitudinally separated terraces.
- Has a long history of terrace exploitation for aggregates as a primary aggregate source.
- Has been successfully dated by OSL, but yielded dates, which raise interesting questions about the terraces and the archaeology that could be resolved by further study.
- Has only “undifferentiated” and “terrace 1” deposits defined.
- Has been recently re-mapped by BGS.
- Remains under threat from extant permissions, and backfilling.
- Remains poorly understood in terms of terrace and palaeolandscape evolution.

Via the *Otter* which:

- Has a large number of terraces in direct contrast to the River Axe.
- Has a small number of Palaeolithic finds in its immediate vicinity, some of which are directly associated with Terrace 5.
- Is a misfit river with few tributaries.
- Has terraces that have been correlated with the River Exe.
- Has exposures of terrace deposits suitable for dating.
- Has a number of dry valleys.
- Has been little studied and never been dated.
- Runs through geology that differs from both the Axe and the Exe.

To the *Exe* which:

- Is a large River with numerous tributaries.
- Due to development in the area over the last 20 years, a large amount of borehole data is available.
- Has two dates on its lower terraces which indicate high potential for further successful dates and clarification of the terrace sequence.
- Has upper terraces (6–8) that may indicate periglacial outwash.
- Has a number of dry valleys.
- Has been contrasted with the Axe in terms of the quantity of Palaeolithic finds retrieved from its terraces, but nonetheless has finds from within terrace deposits high above its floodplain.

The overwhelming impression from the work undertaken during Phase one is that the landscapes of the south-west were not just marginally different to the landscapes we see today; it is not the case that the Quaternary in the study area saw a few slight changes in the course of one or two major

drainages, accompanied by fluctuations in sea level. Rather the period covered by the human occupation of Britain has witnessed in the south-west (as in the south-east) dramatic changes in drainage, topography, vegetation and fauna. We know very little about these changes; but one of the single most useful sources of information that remains are river terrace deposits. While these are not as extensive as in other parts of southern Britain, they are under threat from aggregate extraction policies. Indeed their lesser extent makes them more valuable in terms of their status as a potential source of information. Once they are gone, the opportunity to contextualise the Palaeolithic archaeological artefacts found both within the gravels, and in non-terrace contexts, through landscape reconstruction will be severely diminished.

## **4. THE LOWER AND MIDDLE PALAEOLITHIC ARCHAEOLOGICAL RESOURCE IN SOUTH-WEST BRITAIN**

### **4.1 Introduction**

The relative paucity of Palaeolithic studies undertaken in the south-west region, particularly during the last twenty years has limited the understanding of the Palaeolithic archaeology of this district. This has important ramifications with regard to the understanding of hominin migration and colonisation in an area at the very north-western fringe of the Acheulean world. Consequently the resultant need for focused research into the Palaeolithic archaeological/Pleistocene geological resources in the south-west region has been at the heart of this project's aims and objectives, particularly given the relative wealth of Palaeolithic archaeological and Pleistocene geological research associated with surrounding regions such as the Avon valley and the Bristol region (e.g. Oriel 1903; Davies & Fry 1928; Lacaille 1954; Fry 1955; Donovan 1964; Roe 1974; Bates 2003; Bates & Wenban-Smith 2004) and the Solent River (e.g. Allen & Gibbard 1993; Bridgland 1996; Wenban-Smith & Hosfield 2001).

The aims of the resource assessment of the Lower and Middle Palaeolithic archaeology of the south-west region were as follows:

- Collation of the extant Lower and Middle Palaeolithic archaeological records, through analysis of the regional Historic Environment Records (HERs), and museum records, as appropriate.
- Visual assessment of the extant Lower and Middle Palaeolithic archaeological stone tool assemblages, based on the analysis of museum artefact collections.

### **4.2 Aims & Methodology**

During the first phase of the project (module 2) attention was placed upon the clarification and documentation of the level of known and unknown or "invisible" (e.g. artefacts and findspots not collated in major published works such as Roe (1968), Wessex Archaeology (1993), and Wymer (1999)) Palaeolithic archaeological material, originating from fluvial, and typically secondary, contexts within the defined study area of the south-west region. This was achieved by:

- Firstly collating the existing records from extant syntheses of the region's Palaeolithic archaeology (principally from the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993) to provide a baseline of current knowledge.
- Once this had been established consultations were set up with staff from the regional Historic Environment Record (HER) offices (Cornwall, Devon, Dorset, Plymouth, Somerset and Torbay

and Bath) and the archaeological curators from the main regional museums (Royal Cornwall museum, Royal Albert Memorial museum (Exeter), Devizes museum, Dorset County museum (Dorchester), Somerset County museum (Taunton), Plymouth museum, Torquay museum, Bristol City museum, and Cambridge Archaeology & Anthropology museum). The purpose of these meetings was to identify the 'invisible' resources present in their records, and those collections appropriate for inclusion in this resource review and assessment.

- Further to this, the opportunity was taken to undertake an artefact-sampling programme of the material held in the regional museums. The aim of this aspect of the project was to generate morphological, typo-technological and physical condition data on each artefact. The artefact recording procedures followed the methodologies established by Roe (1968) for artefact dimensions, and Wymer (1968) for artefact abrasion and typo-technology. The data generated included the following categories:
  - Maximum artefact length (mm).
  - Maximum artefact thickness (mm; handaxes only).
  - Artefact weight (grams).
  - Level of abrasion (using the 'mint', 'fresh', 'rolled/slightly rolled', 'very rolled' and 'extremely rolled' categories of Wymer (1968)).
  - Artefact breakage (yes/no).
  - Artefact provenance.
  - Artefact typology (including distinguishing features).
  - Bibliographical information.
  - Photographic archive.

The recording criteria for use in this project was developed in collaboration with, and with due awareness of, the recording being done on *The Lower and Middle Palaeolithic Occupation of the Middle and Lower Trent Catchment* project and the *Medway Valley Palaeolithic Project*. This ensured that all the recorded artefact data in these related ALSF-funded Palaeolithic research projects is of a consistent standard and format, enabling inter-project data transfers and collaborations and the production of consistent resources for future HER enhancement.

By following this programme of research it has been possible to significantly develop understanding of the Lower and Middle Palaeolithic resource in the south-west region, with reference to those artefact findspots associated with fluvial landforms, sediments and depositional contexts. Specifically, understanding has been developed with reference to:

1. The spatial distribution of Lower and Middle Palaeolithic archaeological findspots throughout the south-west region, and its implications for our understanding of: (i) future management of both the archaeological and aggregates resources in the region; and (ii) the hominin occupation of the region.
2. Morphological, typo-technological and physical condition patterning in the handaxe assemblages of the south-west region.
3. The representation of non-handaxe Lower and Middle Palaeolithic lithic artefact types in the region (handaxes predominate in the extant syntheses for this region).

The resource assessment has also generated new resources for the interpretation and management of the Lower and Middle Palaeolithic archaeological resource:

- An updated findspots database, combining the documented records from the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993) with the 'new' findspot records recorded during the resource assessment from the HERs and the museum records. A digital copy of the

findspots database (PRSWB\_Findspots.mdb) has been distributed with this document, and the database contents are summarised in Section 4.4 below.

- An artefact database, documenting records of the artefacts examined from the regional museums during the resource assessment. A digital copy of the artefacts database (PRSWB\_Artefacts.mdb) has been distributed with this document, and the database contents are summarised in Section 4.4 below.

### 4.3 The Lower and Middle Palaeolithic Resource

The literature review undertaken as part of the resource assessment focused upon the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993; also Roe 1968; Wymer 1999), as the most comprehensive and up-to-date source of Lower and Middle Palaeolithic sites and findspots from fluvial contexts in the south-west region. The Southern Rivers Palaeolithic Project volume (Wessex Archaeology 1993) lists 152 findspots from within and around the margins of *The Palaeolithic Rivers of South-West Britain* project study area, and provided the baseline resource for the project.

The pattern of recorded findspots in the extant literature shows that there are Lower and Middle Palaeolithic findspots distributed in a number of distinct zones across the entire south-west region (Figure 9). In particular findspots are focused in:

- The Axe valley, Devon/Dorset/Somerset (e.g. the findspots at Broom, Kilmington and Chard Junction).
- The Otter valley, Devon (e.g. the findspots at Budleigh Salterton and Otterton).
- The Exe valley and the Teign valley, Devon (e.g. the findspots at Exeter, Tiverton, and Bishopsteignton).
- South and west Somerset (e.g. Bradford-on-Tone, Watchet and West Quantoxhead).
- South Cornwall, in the areas of St. Buryan and St. Keverne (e.g. the findspots at Coverack, Higher Polcoverack Farm, and Lower Leah Farm).

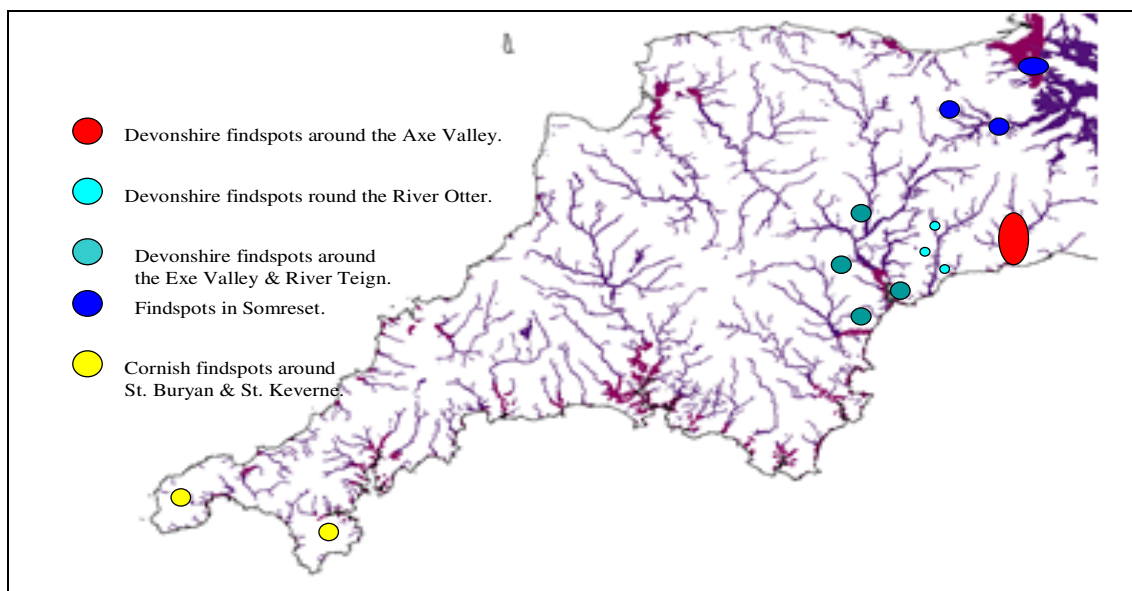


Figure 9: Distribution of Lower and Middle Palaeolithic Findspots in the South-West Region

However, within these patterns the two most significant areas (in terms both of numbers of findspots and numbers of artefacts) are the River Axe and the River Exe valley.

In the River Axe valley region 25 findspots occur, from the mouth of the river at Beer in the south, along the length of the river (*c.* 11–12 km) up to Chard Junction, including the locales of Cloyton, Kilmington, Hawkchurch and Thorncombe. This is an area well known for its Palaeolithic richness, with the commercial aggregates excavations at Broom having yielded *c.* 1,800 handaxes (Hosfield & Chambers 2004).

The River Exe valley region has 23 findspots, which are distributed over the longer extents of the Exe (*c.* 500km<sup>2</sup>), although the majority of the findspots are located below Tiverton (*c.* 14–15 km above the mouth of the Exe). Key locales include those at Tiverton, Thorverton, Upton Pyne, and Exeter).

The county of Cornwall has the fewest number of findspots recorded (11), although whether this is an accurate depiction of the county's Palaeolithic record or a sampling bias is as yet unknown (and will be addressed in the third phase of the project). However, what is clear is that where discoveries have been made they have always been in the far south of the county. Without exception the Palaeolithic archaeology of Cornwall is located either on the “Lizard” at places such as St. Keeverne and Landewednack or on the extreme south-western peninsula in areas such as St. Buryan.

The recorded findspots in Somerset are distributed throughout the county, with no areas of particular concentration. Findspots are located in the north around the Cheddar area (e.g. at Shipham and Priddy), in the west (e.g. at Watchet, Doniford, and West Quantoxhead), in the south (e.g. at Pitminster, Taunton, and located around the River Axe valley region, at Crewkerne and Chard), and centrally (e.g. at Middlezoy). No finds have as yet been documented from the eastern area of Somerset.

During the research undertaken in this project however it became clear that the published record of Lower and Middle Palaeolithic archaeology from fluvial contexts in the south-west region of England (summarised above) is incomplete. The short resource assessment undertaken in phase one of the project has indicated that many more findspots exist than have so far been recognised in the published literature. As stated the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993) lists 152 findspots in the south-west region, this number can now be increased to 224, an addition of 72 new findspots (a 48% increase) from the “invisible” record (Figures 10, 11 & 12).

The majority of these ‘new’ findspots (*n*=49, 67%) come from the county of Devon. Many of these are located in east Devon, in districts already well known as Palaeolithic “hotspots” such as Thorncombe in the Axe valley region. Such records however remain of value despite the well-documented richness of the area, as they serve not only to confirm the areas importance, but also add a further level of understanding of spatial patterns in hominin occupation histories. Of potentially greater importance in Devon however are the new findspots identified in areas where little evidence has been previously documented, such as the discoveries around the River Otter at Gittisham, Otterton, and Sidmouth. The new findspots are indicated in the attached database (PRSWB\_Findspots.mdb).

Finally, a significant number of these novel findspots are located in areas of relatively low archaeological occurrence, such as locales to the far west of the region in southern Cornwall (*n*=5, 7%). Whilst these findspots follow the same distribution pattern for that county (i.e. they are distributed across the south-western margins of Cornwall) they remain of importance as they increase our knowledge of hominin landscape use within the region as a whole. Similarly in Somerset the 15 new findspots (21%) repeat the distribution pattern of those already recorded, with

a roughly even distribution across the central, southern, northern, and western county, although again with no finds in the east.

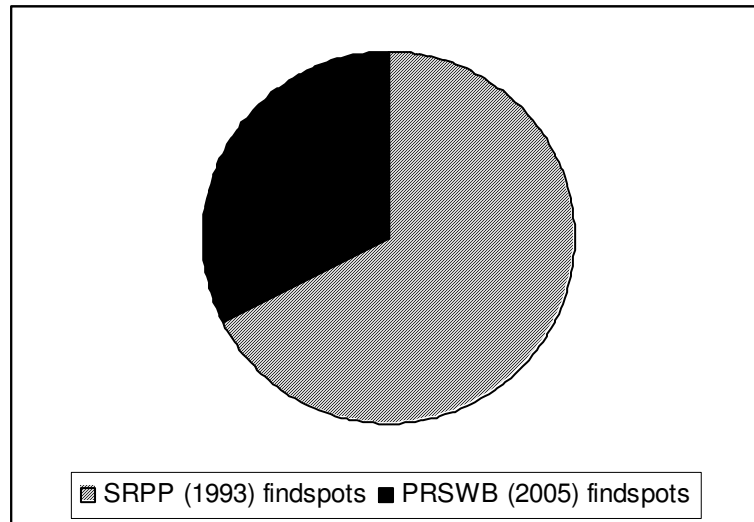


Figure 10: Lower and Middle Palaeolithic findspots from South-West Britain, as recorded by the Southern Rivers Palaeolithic Project & the Palaeolithic Rivers of South-West Britain project (the “invisible” record)

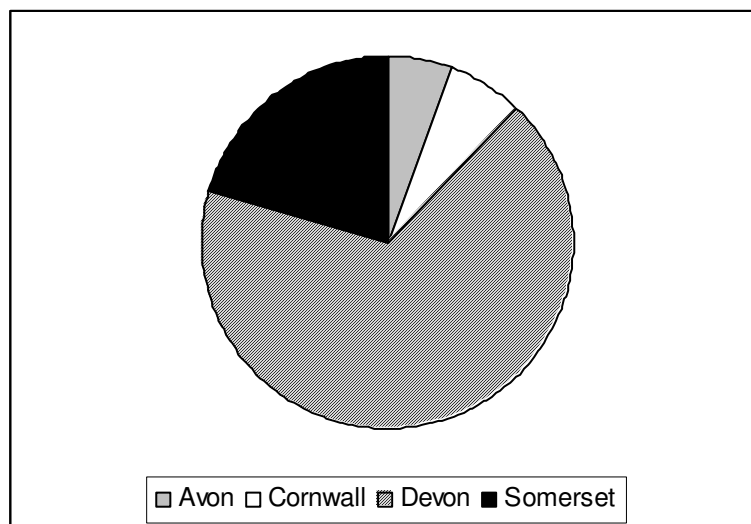


Figure 11: Distribution of ‘new’ Lower and Middle Palaeolithic findspots in South-West Britain by county

Table 4 (below) documents the ‘new’ Lower and Middle Palaeolithic findspots in south-west Britain, as identified by the current project, with a summary of findspot co-ordinates, county, location, context, artefact(s) type(s), and additional comments where available/relevant.

<b>Co-ordinates</b>	<b>County</b>	<b>Location</b>	<b>Context</b>	<b>Artefact type</b>	<b>Comments (verbatim from HER records)</b>
SW 403253	Cornwall	Pendrea, St Buryan	Surface find	Core	Found in ploughed field by Mr P. Pearman 1988.
SS 214057	Cornwall	16 Hawthorn Ave, Bude	Found in garden	Handaxe	Found in 1975.
SW 751198	Cornwall	Field in Kerrier, St Keverne	Surface find in field	Retouched flake	Found by Mr P. Steele 1988 while field walking.
SW 636439	Cornwall	Raskajeage Downs,	Surface finds	Miscellaneous	Found by Mr H.J. Berryman

		Illogan		finds	over 15 year period. Only 3 artefacts from Upper Palaeolithic with no listing as to what types.
SW 513308	Cornwall	Marazion Beach, Penwith	Surface find	Handaxe	Found by Mr J. Matthews 1997, identified by C. Thorpe of CAU. Stone not native to Cornwall. Handaxe (?) possibly brought in ships ballast. Possible derived from Palaeolithic forest deposits.
SX 460570	Devon	Brickfields Devonport, Plymouth	Slope of fields	Handaxe	Deposits of widely separated ages. Scatter.
SX 470560	Devon	Ford Park, Stoke Damerel, Plymouth	/	Handaxe	Worked flints found during building operations. Scatter.
SX 464572	Devon	Greenslade Park, Beacon Park, Plymouth	Garden	Flake, core	/
SX 465581	Devon	Penycross, Plymouth	Found in soil heap	Handaxe	Raised by bulldozer making new road to serve Burringdon industrial estate.
SX 479537	Devon	Plymouth Hoe	/	Handaxe	Found during works on Marine biology lab, tools accompanied by teeth of Ox and Boar. Scatter.
SX 506521	Devon	Field at Higher Hooe near Plymouth (not precisely located)	/	Handaxe	Quartzite axe.
SX 874686	Devon	Aller Brook, Teignbridge, Kerswells	Found in sandy gravels 1.22m thick overlying ball clay	Miscellaneous finds	Clactonian, found opposite zigzag quarry near 50 ft contour.
SX 98-79-	Devon	Dawlish Warren, Teignbridge	/	Handaxe	Flint implements.
SX 921820	Devon	Haldon, Teignbridge, Kenton	Found on disturbed surface	Flake	Clactonian, near ruined barrow.
SY 099875	Devon	Pin Beacon area, Otterton	/	Retouched flake, scraper, blade	In Hutchinson collection, possibly Palaeolithic.
SY 119869	Devon	Jacobs Ladder, Sidmouth	Found in cliff fall	Chopper/core	Rough possible chopper on Broom flint.
SY 226879	Devon	Beer Head	/	Handaxe	Miscellaneous collection of tools including Neolithic.
SY 216995	Devon	Beer head plateau, Beer	Surface & excavated finds	Handaxe	Excavations took place in 1920's, thousands of artefacts found, span period from Palaeolithic, Mesolithic & Neolithic.
SY 235898	Devon	Beer to Seaton road, Seaton	<i>In situ</i>	Handaxe	Layer may be correlated with upper boulder clay glaciation of East Anglia & upper tumbled gravel at Broome Pit. Mousterian or Clactonian.
SY 254927	Devon	North of Colyford station, Colyton	/	Handaxe	Worked flints similar to those found on Beer head plateau (NSA-6/3)
SX 899739	Devon	Market garden near Wolfsgrove, Bishopsteignton	Surface	Handaxe	Found by Mr Rogers. Includes Neolithic finds. NGR not particularly near Wolfsgrove.
SX 86-73-	Devon	Broadway, Kingsteignton	/	Handaxe	Retained by Mr Gill of Ashburton.

SX 458546	Devon	Brickfields, Devonport, Plymouth	/	Handaxe	Found in 1933 (possible duplicate of NSA-4/9)
SX 629541	Devon	Clenmeads, Ermington	/	Handaxe	Handaxe of vesicular spilite.
ST 230036	Devon	Stocklands little camp, Stockland	/	Handaxe	Mesolithic axe also found here unsure if there are two separate entries.
ST 23-03-	Devon	Corry Brook or Millstream, near Millhayes, Stockland.	Found in waterways	Handaxe	/
ST 257083	Devon	River Yarty, Yarcombe	Found in waterway	Miscellaneous finds	Found by Mr C.T. Shaw in 1930's possibly Palaeolithic.
SY 275980	Devon	Gammon's Hill Quarry, Kilmington	/	Handaxe	/
SY 246940	Devon	Near Colyton.	/	Handaxe	May have come from ballast gravels at Broom.
SY 24-91-	Devon	Manor Pit, Seaton	Gravel pit found on 50 foot terrace	Handaxe	/
SX 48-74-	Devon	Tavistock	/	Handaxe	Made on Broom chert.
SY 12-88-	Devon	New cemetery, Sidmouth	Surface find	Miscellaneous finds	Found by Mr H. Ede 1878.
ST 265015	Devon	Beekford bridge, River Yarty Stockland	Found in waterway	Handaxe	/
SS 998120	Devon	Halberton	/	Handaxe	Organised fieldwalk, miscellaneous artefacts from all periods including Palaeolithic. Scatter.
SS 983131	Devon	Tiverton	/	Handaxe	Fieldwalking. Miscellaneous finds including Mesolithic/ Neolithic/early Bronze age. Handaxe found by Mr S. Bush. Scatter.
SS 990114	Devon	Rowridge Farm, Halberton	/	Handaxe	Found by Mr M. Britton. Evidence of multi-period activity. Scatter.
ST 257052	Devon	Membury	Surface finds	Handaxe	Collected from field by N. Pearce. Scatter.
SS 42-29-	Devon	Westward Ho! Northam	Raised beach	Miscellaneous finds	Worked stone possibly Palaeolithic/Mesolithic.
ST 04-08-	Devon	Kentisbeare	/	Handaxe	Also Mesolithic axe from same area.
SY 241903	Devon	18 Seaton Down Rd. Seaton	Found in garden	Handaxe	/
SY 143996	Devon	Route of SWW pipeline, Gittisham	/	Handaxe	Handaxe of probable Palaeolithic date.
SY 244939	Devon	Colyton	/	Handaxe	Found during evaluation at stonewalls representing residual material incorporated into deposits of a later date. Felt to date to around 35 kya.
ST 480527	Somerset	Northeast of Carscliff Farm, Cheddar	/	Flake, scraper	Found by V Russett 1983. No period given.
ST 376411	Somerset	South of Newclose Drove, Chilton Polden	/	Retouched flake, flake	Found in 1971. No period given.
ST 352368	Somerset	Mount Close Batch, Chedzoy	/	Flake	Burnt flake found in molehill. No period given.
ST 349367	Somerset	Mount Close Batch, Chedzoy	/	Retouched flake	Found after ploughing. No period given.
ST 423373	Somerset	Greylake, Middlezoy	/	Handaxe	"Probable prehistoric date".
ST 418402	Somerset	Skidders Wood,	/	Handaxe	Prehistoric finds.

ST 482554	Somerset	Shapwick East of Piney Sleight Farm, Cheddar	/	Handaxe	Flint scatter.
ST 43- 16- ST 080413	Somerset Somerset	South Petherton Long street, Williton	/ Dug up in garden	Handaxe Handaxe	/ Ovate, similar to those in Broom gravels. Found by Mr L. Ketting 1966
SS 93-43-	Somerset	Wootton Courtenay	/	Scraper	
ST 23-14-	Somerset	Otterford	Bed of Yarty Stream	Scraper, Levallois flake, core	Found by T. Leslie & St Gorge Gray family 1902 & 1915.
ST 166219	Somerset	West of Hetherton Park, Bradford-on- Tone	Clay embankment of stream	Handaxe	Found by Mr A. Discombe. Taunton museum bout coupe Handaxe Accession No. 84- AA-11
ST 334047	Somerset	Lower Hurtham, South Chard, Tatworth	/	Handaxe	Found in spoil heap from shallow trench. Handaxe, tip broken.
ST 343072	Somerset	The Drift, east of Forton	/	Handaxe	Found on surface of tracks, probably imported to site as bricks etc... form surface here.
ST 504153	Somerset	Odcombe	Dug up in garden of Odcombe rectory	Scraper	/
ST 600500	Avon	Clutton	Found besides stream	Miscellaneous finds	Found by H. Strachey 1928.
ST 635704	Avon	Keynsham, Bath & Northeast Somerset	Found on surface of ploughed field	Handaxe	Artefacts destroyed in war.
ST 660657	Avon	Burnett, Compton Dando	/	Handaxe	Localised concentration of flints. Very patinated retouched flake may be axe resharpener flake.
ST 563560	Avon	East Harptree	/	Handaxe	Widespread flint scatter. Possible prolonged use of site.
SY 79----	Devon	Woodsford, West Dorset	/	Handaxe	/
ST 623119	Devon	Near Lillington Beacon, West Dorset	Found in field	Miscellaneous finds	Worked ochreous flint.
SY 37-99-	Devon	Lamberts Castle (?) Marshwood	/	Handaxe	Unfinished roughout handaxe
ST 342044	Devon	Gravel pit Thorncombe	Dug up in gravel 14 ft down	Handaxe	Found by Mr G. Osborne 1955. Ovate handaxe.
ST 339043	Devon	Westford Farm Gravel pits, Thorncombe	Dug up in gravels	Miscellaneous finds & handaxe	Palaeoliths, including handaxes.
ST 344045	Devon	Thorncombe quarry	Found below screening plant & spoil heap	Handaxe, flake	Found by J Wymer in 1974. Handaxe & flakes.
ST 344049	Devon	Thorncombe quarry	Found on surface	Handaxe	Found by C. Waller 1986.
ST 347048	Devon	Hodge Ditch Thorncombe	1m below surface during ditch	Handaxe	Found by Mr. D. Waller in 1988.

ST 343045	Devon	North side of present quarry, Thorncombe	digging /	Handaxe	Abraded, twisted ovate handaxe (flint) found by J. Wymer 1959.
ST 339042	Devon	Thorncombe gravel pit	/	Handaxe	Findspot. Palaeoliths found by G. Osborne 1–5m depth.
ST 340042	Devon	Thorncombe gravel pit	/	Miscellaneous finds & handaxe	Implements including handaxe found by W.G Larcombe, north side of road opposite Batehams Farm.

Table 4: ‘New’ Lower and Middle Palaeolithic findspots documented during project phase one resource assessment

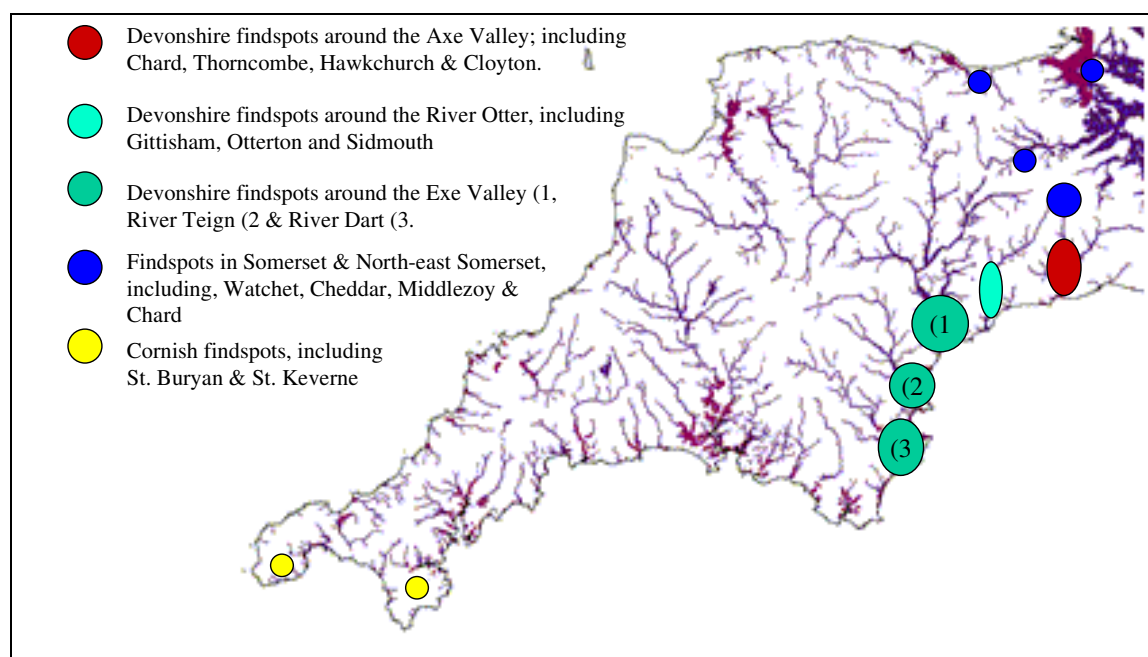


Figure 12: Location of selected ‘new’ Lower and Middle Palaeolithic findspots in South-West Britain, as identified in the project phase one resource assessment

As indicated in Table 4 and the attached database, a number of additional patterns were also apparent in the newly identified and documented findspots:

- Although all of the ‘new’ findspots are believed to have originated from an ‘open landscape’ context (there is no indication that any of the findspots are cave deposits), information regarding the specific geological and/or depositional context was scarce. Location evidence indicated that 11 (15%) of the findspots were associated with pit or quarry sites (Brickfields, Devonport, Plymouth; Gammon’s Hill Quarry, Kilmington; gravel pit and/or quarry at Thorncombe; Manor Pit, Seaton; north side of present quarry, Thorncombe; Westford Farm gravel pits, Thorncombe), while ‘gravel’, ‘river gravel’ or ‘floodplain gravel’ were indicated as the probable geological context for an additional four of the findspots. Geological information was generally rare (n=6, 8%), with ‘loam and clay’ and (rather ambiguously) ‘chert with clay content’ recorded as the contexts for two other findspots. There were also records relating to the circumstances of discovery (Table 5), although unfortunately those suggesting a river gravel context (n=5, 7%) all related to findspots where a gravel pit location was already known (see above).

Discovery context	No. of findspots
Surface finds	13
Unspecified excavations	7
Modern watercourses	6
Gravel pits/quarries	5
Miscellaneous (including cliff-fall, raised beach & boulder clays)	3
<b>Total</b>	<b>34</b>

Table 5: Generalised discovery contexts for 'new' findspots identified during the phase one resource assessment

- Data relating to the accuracy of the findspot location was rare (n=7, 10%), reflecting the nature of the records, although in all cases where it was recorded the findspots were classified as 'accurate' (i.e. to within 100m).
- Data relating to the number of artefacts from each findspot was of variable quality, since in a significant number of cases (n=28, 39%) references were made to 'artefacts', 'implements' etc without further details being supplied. In the remaining instances however, single artefact finds (n=35, 49%) were dominant, with smaller numbers (n=9, 12%) of single figure artefact finds (Figure 13).

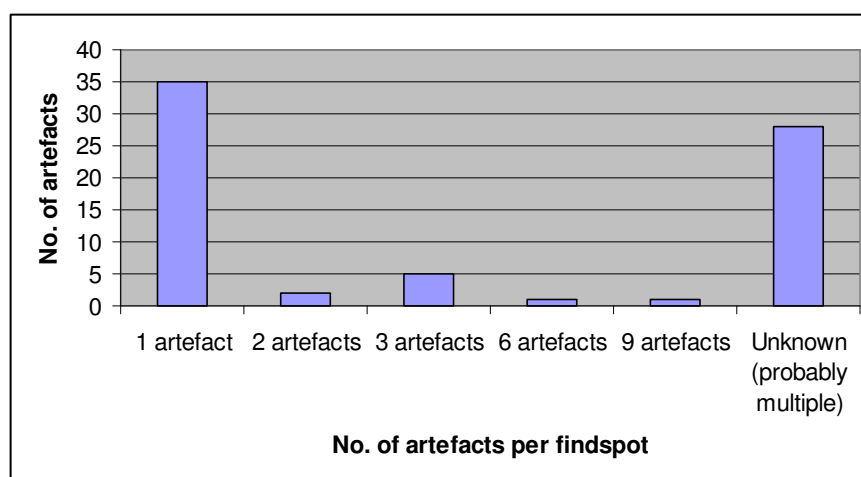


Figure 13: Number of artefacts per findspot

- The artefacts identified by type (Figure 14) were dominated by handaxes, which were definitely present in 25 (35%) of the findspots. Of these, 23 findspots (32%) were single handaxe finds, with one instance of a 'handaxe with flakes', and one instance of two handaxes found on a single findspot. This is perhaps unsurprising given the nature of the findspot discoveries described above. The other artefact categories were present in far fewer of the findspots.

In general the evidence from the resource assessment indicated a number of small artefact discoveries documented in the HER records, but which had been absent from the major syntheses. These tended to be single/single figure artefact finds, both from aggregates pit and quarries and also from non-industrial excavations and surface finds.

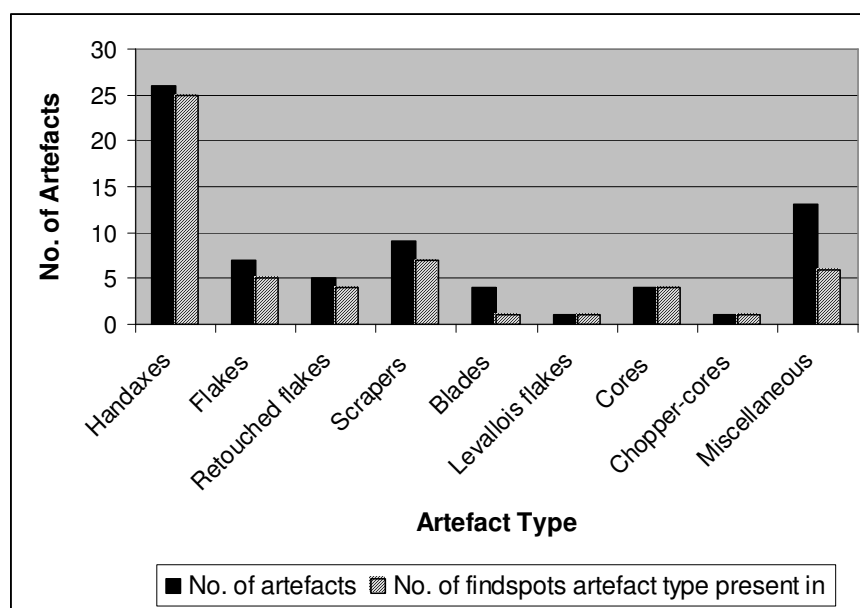


Figure 14: Finds by artefact type

The second aspect of data collection within the Lower and Middle Palaeolithic resource assessment concerned the specific artefact sampling programme. Artefact data was recorded from collections housed in all of the major regional museums in the south-west (including the Royal Cornwall museum, Royal Albert Memorial museum (Exeter), Devizes museum, Dorset County museum (Dorchester), Somerset County museum (Taunton), Plymouth museum, Torquay museum and Bristol City museum), as well as those from the Cambridge Archaeology & Anthropology museum stores.

364 artefacts were recorded (Table 6). However, in many cases it was difficult (and in some cases impossible: see comments below) to link individual artefacts in the collections with their specific findspot records (whether extant (e.g. Wessex Archaeology 1993) or 'new' findspots), and therefore it is not currently possible to assess what proportion of the identified findspots' artefacts have been recorded (this issue will be addressed during the phase three project synthesis). Nonetheless, where provenancing information was available it was clear that the provenance locations of the artefacts broadly followed the distribution patterns outlined in the findspot data, with the great majority (n=202; 55%) originating from the Axe Valley region in Devon/Dorset/Somerset (and therefore suggesting that these artefacts are associated with the documented findspots), and the bulk of these coming from the gravel pits at Broom (n=166, 46%). Similar distribution patterns as to those outlined above are also found in each of the other counties studied (i.e. artefacts in Cornwall were predominantly recorded from the southern margins of the county).

It is stressed that many of the artefacts recorded have probably been documented previously, be Roe (1968), Wessex Archaeology (1999) and Wymer (1999). Unfortunately, knowing which artefacts have, and which have not, is difficult. This is partly due to the quality of the baseline knowledge upon which the resource assessment is based. The lack of museum accession numbers in Roe (1968) and the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993; Wymer 1999) has inevitably made the cross-correlation of individual artefacts in museum collections with those already listed in the extant literature extremely difficult. This was further compounded by the level of detail in the records associated with the artefacts, particularly those regarding their provenance. In almost every case there was no information concerning the context in which the artefact was found or, in many cases, the person who found the artefact. This lack of detail can of course largely

be ascribed to the age of the records/collections, with many being deposited at the turn of the last century. These factors, together with the paucity of cross-referencing between individual artefacts or groups of artefacts and the HER records meant that very few of the palaeoliths recorded during this phase of the project can be identified as either:

- Artefacts which are already known; *or*
- ‘New’ artefacts from the “invisible” record.

The implications of these difficulties are discussed in more detail below.

Nonetheless, the resource assessment did provide a range of new data which develops previous records (Roe (1968) and the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993) simply listed types and numbers of artefacts: reflecting the scope and goals of those projects). This project’s resource assessment has generated a limited range of new data (e.g. typological, morphological, and photographic) for a significant component of the south-west region’s Lower and Middle Palaeolithic artefacts. However, in the light of the difficulties in provenancing individual artefacts to findspots (discussed above), patterns within the artefact sample are only discussed in general terms.

<b>Artefact Type</b>	<b>No. of artefacts</b>
Blades	7
Chopper/cores	1
Cores	11
Flakes	24
Handaxe (including fragments)	291
Handaxe roughouts	3
Levallois cores	2
Miscellaneous (including chunks, shatter, ‘worked’ flints, & implements)	22
Retouched flakes	1
Scrapers	2
<b>Total</b>	<b>364</b>

*Table 6: Artefact types recorded during phase one resource assessment*

Nonetheless, certain factors and patterns were clear during this artefact analysis stage of the data collection process:

- *The type of artefacts being recovered:* In all of the museum collections visited handaxes made up the overwhelming majority of the known Palaeolithic artefacts (n=294, 81%). This is to be expected given the high visibility of these tools (reflecting their size and distinctive morphology), and their status as a diagnostic artefact (enabling them to be assigned with relative ease to either the Lower or Middle Palaeolithic periods). This is a key point particularly with regard to fluvial contexts and deposits, since artefacts recovered from these secondary contexts have been re-worked and it is therefore extremely difficult to assign un-diagnostic pieces (e.g. débitage flakes) to a particular period. Moreover, smaller/lighter artefacts (e.g. flake tools) are also more vulnerable to destruction/damage beyond the point of recognition during transportation and re-working in fluvial environments, while the larger sized artefacts such as handaxes were more prone to be spotted and recovered by gravel workers/collectors in the context of aggregates quarries and pits. These factors almost certainly explain the prevalence of handaxes in Palaeolithic museum collections, rather than any unusual hominin behaviour (e.g.

the introduction of handaxes from outside the region and their sole discard, with all other lithic material culture removed from the region by the hominins).

- *The types of raw materials employed by hominins in the region:* The overwhelming majority of the raw material used is that of chert (n=296, 81%), while the rest of the artefacts are made on flint (n=64, 18%) with the exception of one handaxe from Mill Hayes, Stockland in Devon which was made on igneous rock (unfortunately weathering and abrasion of the artefacts prohibited identification of the igneous rock type during this assessment).
- *Artefact condition:* Similarly it is possible to assess the general physical condition of the artefacts (Figure 15), following the Wymer (1968) classificatory scheme based on flake scar ridge abrasion. None of the artefacts were classified as mint, 24% (n=88) were classified as sharp, 49% (n=177) as slightly rolled, 23% (n=84) as rolled, and 4% (n=15) as very rolled. These preliminary results suggest that the majority of the sampled artefacts had been subject to fluvial transportation and were extremely likely to have been recovered from fluvial gravel (probable secondary) contexts.

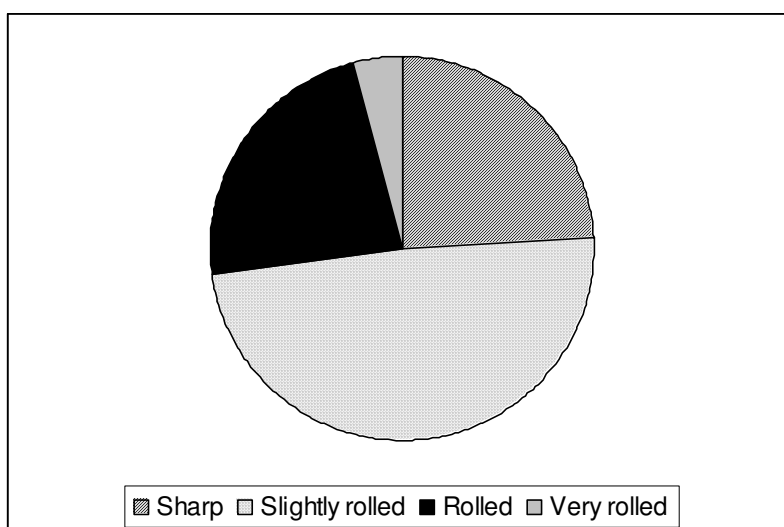


Figure 15: Lower and Middle Palaeolithic artefact abrasion (after Wymer 1968)

The individual artefact data is available in the resource assessment database (PRSWB\_Artefacts.mdb).

#### 4.4 Interpretations and Conclusions.

The resource assessment has indicated that the Lower and Middle Palaeolithic fluvial context findspot and artefact record for the south-west region is greater than that which is already known and has been previously reported. This is clearly true both in terms of identifiable findspots (a c. 48% increase) and individual recorded artefacts (this is more difficult to demonstrate at the current time but is a logical extension of the previous statement).

However, it is important to note that whilst the data gathered from the regional HERs is complete, the artefact data from the region's museum collections thus far consists of that from only the larger, regional museums. This simply reflects the quantity of material identified at those museums and the time constraints on the first phase of the project. The larger museums sampled included Bristol City museum, Taunton museum, Devizes museum, Cambridge Archaeology and Anthropology museum, Dorset County museum, Plymouth museum, Torquay museum, The Royal Albert Memorial museum (Exeter) and the Royal Cornwall museum (Truro). While this sampling programme has

identified a significant quantity of Palaeolithic material, we suggest that further relevant data will be gained by visits to, and examinations of, those collections held by the smaller, local museums within the region, and also recording of those private collections where artefacts may be housed which have not yet been included in the literature. Therefore in order to provide a complete picture of the Palaeolithic archaeology from the south-west region, the second phase of the project will include an additional sampling programme to cover the museums and private collections identified above.

The data provided through the resource assessment also has implications with regard to the archaeological interpretation of the south-west region (and the south of England as a whole) during the Middle and Late Pleistocene. The main archaeological question posed by this project concerns the extent to which the south-west region was occupied, and how this is represented in the current interpretation of the region's Palaeolithic archaeological record. This can be summarised with the question:

*Does the rich archaeology of the River Axe valley represent a 'western' frontier in terms of the British Lower and Middle Palaeolithic, beyond which Palaeolithic occupation of the south-west region was highly sporadic? Or is the apparent paucity of archaeology to the west of the Axe valley due principally to issues of taphonomy and sampling?*

The data collected in the resource assessment highlights a number of potential avenues for addressing the above question. Overall it can be seen that many of the 'new' findspots recorded in this project lie in areas of well documented Palaeolithic activity within this "western" frontier, for example the Axe valley region in Dorset & Devon. This pattern confirms the interpretation of Pleistocene occupation in this region (i.e. that the Axe valley was a key foci for hominin occupation, *at least* during the late Middle Pleistocene (Toms *et al.* 2005). However, several of the 'new' findspots lie further west and south of this area, suggesting some form of occupation beyond this boundary. Such findspots include the recent discovery of a handaxe at Marazion Beach, Penwith in Cornwall in 1997 and the Levallios flake in Otterford, Somerset. Whilst evidence of occupation in these areas had been previously documented, the number of findspots prior to this project was far lower than in the east of the study region. Consequently the addition to these locations of 'new' findspots is of significance as it reinforces the idea of hominin occupation beyond the region of the Axe valley. Furthermore these findings have been combined with BGS geological survey maps of the Devon region (Section 3) in order to produce Palaeolithic archaeological findspot/Pleistocene terrace deposit location maps where locales suitable for further investigation have been identified.

#### **4.5 Discussion.**

During the implementation of the resource assessment programme several limiting factors have occurred with some frequency:

- The most major of these has concerned the resolution of the available data, regarding previous documentation of artefacts and archaeological findspots. In order for a clear picture to be built as to what is already known of the Palaeolithic of south-west England, it is fundamental to be clear as to which records have (or have not) been cited. Without this information subsequent research must necessarily start from a position of ignorance as to which dataset is associated with particular artefacts and findspots. Fortunately much of the data provided by the regional HER offices included whether the record had been included in previous studies, and if so which ones. However, this was not the case when gathering data from museum collections. In practice

there were no records as to whether any of the artefacts recorded had been included in previous studies. This obviously created problems when trying to identify ‘new’ artefacts from the “invisible” record. Leading on from this it was also apparent that there is little correlation between the HER records and museum collections, again this creates difficulties in establishing which records have already been catalogued, thus increasing the possibility of duplication.

- The Palaeolithic material housed in many of the south-west museums is underused as a resource, with handaxes constituting the vast majority of the *documented* artefacts in any collection, and other possible Palaeolithic material simply being boxed, and often ignored. Whilst this is understandable given the secondary context origins of the findspots (handaxes are both likely to over-represented in individual collections and are also ‘easier’ to interpret when dealing with disturbed and re-worked findspots), it does mean that often previous research in these areas have simply “gone over old ground”, in that the handaxe assemblages tended to repeatedly be the focus of research. This is not to say that further material is lacking however. In almost all of the museums visited during the resource assessment non-diagnostic artefacts of possible Palaeolithic age were present (often in abundance). However, there was little or no information as to the assemblage’s provenance, and therefore the chronological affiliation of the material is rarely known. Unfortunately this means that without a much more detailed analysis of the artefacts very little pertaining to their origins can be inferred at the current time.

It is important to stress however that the difficulties outlined above are not viewed as insurmountable obstacles to Lower and Middle Palaeolithic research in the south-west of England. Indeed, the ‘new’ findspots and artefact information gathered by the resource assessment illustrate that gainful data from this period can be collected. In particular the project databases developed as part of this resource assessment have:

- Documented artefact museum accession numbers (where known) and linked them with specific findspots (using either the Southern Rivers Palaeolithic Project (Wessex Archaeology 1993) findspot codes or the new findspot codes generated as part of this project: these will be disseminated to the HERs at the end of phase one).

Furthermore, bringing such complications to the forum allows them to be addressed more readily. Such issues were the subject of a workshop discussion at the Regional Palaeolithic Networks meeting held on the 16<sup>th</sup> of June 2005. The outcome of this discussion demonstrated the interest of HER & museum staff members, local enthusiasts and regional archaeological societies for further research into the Palaeolithic of the region. Discussion also took place as to how best these individuals and organisations could tackle the issues outlined above, and also expand the level of research being carried out. The need for further training and education into artefact and river terrace identification was highlighted as an important factor. This would be a clear advantage to further research in the area. Not only would it increase the probability of additional findspots coming to light via fieldwalking and the knowledge of local enthusiasts, but also it would help to resolve some of the issues concerning artefact identification in extant museum collections. Similarly it was agreed that sessions should be held to outline the role of non-flint raw materials for artefact production in the south-west Palaeolithic record. Much of the lithic assemblages from the south-west region are produced on flint and chert (both siliceous materials). However it is now being recognised that an increasing amount of stone tool production used non-siliceous rocks such as quartzite. The fracture dynamics of such materials is very different to that of flints and cherts, and therefore the identification of palaeoliths made on this material can be difficult. These sessions will be run as part of project phase two, with arrangements already having been made to work in partnership with other regional Palaeolithic research initiatives (such as the National Ice age Network in

Birmingham).

Overall the key conclusions of the resource assessment of the Lower and Middle Palaeolithic archaeology of the south-west region are as follows:

1. The findspot record for the region is richer than had previously been documented in the overarching, national syntheses.
2. It is assumed that the artefact record for the region is richer than had previously been documented in the overarching, national syntheses: however, this has not yet been fully demonstrated because of the difficulty of linking all of the individual artefacts to their specific findspots.
3. New artefact data (typo-technological, morphological, physical condition) has been generated, enabling provisional patterns to be identified and acting as a baseline resource to support future artefact research.
4. There is both a need and an enthusiasm for future training in the identification, reporting and recording of Palaeolithic artefacts, both among amateur/public and professional archaeologists.

## **5. SUMMARY & PHASE TWO IMPLICATIONS**

The key results of the phase one resource assessment and its implications for the proposed second phase of the project are as follows:

### **5.1 Phase One Deliverables**

- The project website can currently be viewed at:  
*<http://www.personal.rdg.ac.uk/~sgs04rh/SWRivers/arch-intro.htm>*
- The phase one resource assessment databases and GIS models are currently being prepared (in accordance with advice received from the regional HER officers) for final dissemination to the regional HER offices, prior to 20/08/05 (the digital copies distributed with this report are interim versions).
- The C.E. Bean collection (from the Broom (Pratt's New Pit) Lower Palaeolithic site) is currently being re-boxed (in accordance with Dorset County Museum policy) for its return to Dorset County Museum, Dorchester, prior to 20/08/05.
- Short research notes are currently being prepared for submission to PAST and the Devon Archaeological Society Newsletter, prior to 20/08/05.

### **5.2 Key Results**

1. There are a series of threats to the aggregates resources of the south-west region, and currently a paucity of strategy information concerning the potential and value of the different landforms, deposits and sequences to inform our understanding of the Pleistocene archaeology of the region.
2. The Lower and Middle Palaeolithic findspot (and by implication artefact) record in the south-west region is significantly more substantial than previously suggested in key extant synthesis works. The 'new' findspots identified through the regional HERs occur both in areas and regions with well documented Palaeolithic heritage (e.g. the Axe valley), but also in areas (e.g. the extreme south-west of Cornwall and the Plymouth region) where Palaeolithic archaeology has previously been given a very low profile, particularly in the national literature.
3. Due to the quantity of Lower and Middle Palaeolithic artefacts present in the south-west

regional museums, artefact recording and analysis during the first phase of the project was limited to the regional museums.

4. The Pleistocene fluvial landscape resource (e.g. terrace landforms and deposits) in the south-west region is more substantial than has previously been argued in key extant synthesis works. Recent re-mapping of the Exe region has indicated that altitudinally-distinct terrace landforms are present, while OSL applications have indicated Devensian ages for the lower terraces. The rivers of east Devon (e.g. the Axe, Exe, and Otter) provide the most substantial fluvial terrace resources, although deposits and landforms of Pleistocene age occur across the extents of the south-west region (although they are more fragmented and sporadic in the west).
5. There are very few robust geochronologies for the fluvial landscape deposits and landforms in the south-west region, resulting in a Palaeolithic archaeological resource which is severely de-contextualised.
6. There is a need, and support, for training in Palaeolithic artefact and Pleistocene fluvial landform identification, to support both reporting, and curation, of the resource in the future.

### **5.3 Implications**

- A need for focused fieldwork and desktop research to develop understanding and interpretation of fluvial landforms and deposits, and promote new models of Pleistocene landscape evolution in the south-west region.
- Key targets for focused fieldwork are the Axe river valley, the Exe river valley and the Otter river valley.
- There is a need for targeted fieldwork, undertaking rapid recording of a sample of fluvial deposits throughout the south-west, as they become exposed through short-term/local aggregates extraction activity.
- A need for OSL sampling programmes to develop geochronological frameworks, to aid both modelling of Pleistocene landscape evolution and the contextualisation of the Lower and Middle Palaeolithic artefact resource.
- A need for identification, recording and analysis of the Lower and Middle Palaeolithic artefacts held in private collections and local museums within the south-west region.
- A need for the provision of training events, in both Palaeolithic artefact identification (principally targeted at amateur collectors, contract archaeologists, and museum curators) and the identification, assessment and interpretation of Pleistocene fluvial landforms (principally targeted at Minerals Planning Authority staff and archaeological curators).