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RESEARCH ARTICLE

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Flowing through time: a longue durée perspective on riverine deposition in the Middle Thames Valley

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ABSTRACT

This paper presents the first long-term, multi-period analysis of riverine deposition within the Middle Thames, focusing on the period c. 2200 BC to 1100 AD. Utilizing a comprehensive dataset of 2,337 river finds, it investigates patterning in the selection and distribution of deposited objects, with particular emphasis on weapons, tools, and martial objects. This study identifies significant regional and chronological variation, as well as patterns of long-term behavioural continuity, including the dominance of spearheads across the Bronze Age and Early Medieval periods, and a restructuring of depositional practices, avoiding martial associations, in the Roman period. In addition to compositional changes, this paper highlights the variable physical and mental geography of the Middle Thames Valley, identifying an evolving relationship between key crossing points, socio-political authority and emerging religious ideas. Methodologically, the study applies a novel raster-based approach within GIS to integrate both high and low-resolution spatial data, offering a new framework for interpreting riverine assemblages recovered without precise provenance. In doing so, it demonstrates that while the underlying logic dictating riverine deposition in the past may remain elusive, patterns of change and continuity are clearly discernible, revealing the Middle Thames as a dynamic and enduring ritual landscape shaped by sustained, structured deposition.

Introduction

In 1860, during routine ballast dredging in the Thames, a short distance downstream of Cookham Bridge in Berkshire, an unnamed workman discovered an ornate iron dagger and an accompanying copper-alloy sheath while sorting through a spoil heap. After being cleaned in the Thames, the dagger and sheath were presented to Mr Child, the local landowner, who swiftly contacted the British Museum. The objects were soon acquired and placed on display. More than half a century later, almost identical circumstances are repeated. In 1921, another unnamed workman, operating a mechanical dredging barge in the same area, uncovered an assortment of artefacts, including two bronze spearheads, four iron

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spearheads, and a Neolithic bowl. These finds, too, were passed into private hands before being donated to the British Museum, where they remain on display (Baynes 1921).

These episodes, separated by decades, exemplify the methodological challenges present in the study of river finds. Whilst the Cookham dagger is certainly an exceptional find, the circumstances of its recovery are by no means exceptional. Over 4,000 archaeological finds have been recovered from the Middle Thames alone, the vast majority privately collected during the 'golden age' of Thames discoveries between the late 19th and early 20th centuries (see Cotton 1999; Lawrence 1929). Yet, despite this wealth of material, river finds from this stretch of the Thames have received markedly less attention than those from the Lower or Upper Thames.

This comparative neglect is not accidental, but a symptom of the inherent methodological difficulty associated with the study of non-tidal river finds, which has directed attention elsewhere. In Britain, river finds have primarily been recovered via dredging or accidental discovery rather than through systematic archaeological excavation and typically lack precise provenance or contextual information (Lawrence 1929). Furthermore, historical collecting practices often introduced significant selection biases, favouring visually impressive or complete objects over more mundane or fragmented finds (see Davis 2012; Lynch and Lynch 1968). Consequently, despite their aesthetic appeal and frequent appearance in museum displays, river finds often occupy a peripheral position in archaeological discourse, treated more as exceptional, 'one-off' examples rather than integral components of human-river relationships across thousands of years.

Previous research on British river finds has often focused on the objects themselves, exploring their typology, chronology, and potential 'life histories', including the manufacturing process, evidence of use, and pre-depositional handling or intentional modification (e.g. Colquhoun and Burgess 1988; Welton 2018; York 2002). While valuable, this object-centred perspective risks a teleological flattening of the object's history, reducing the act of river deposition to merely a terminal stage in its life-history or biography. This interpretation often rests on an underlying assumption of irretrievability, a fundamental conceptual distinction from hoards, which are frequently interpreted as acts of delayed consumption implying potential future access. Focusing on the artefact's perceived 'end' risks overlooking the agentive role of the river itself, reducing it to a passive receptacle for discarded or lost items, whilst the finds themselves become 'dead agents' whose stories concluded before entering the water (see Campbell 2023; Edgeworth 2011).

Turning specifically to the Thames, interpretative approaches to river finds have traditionally been somewhat fragmented, having been strongly influenced by period-specific research traditions. Perhaps the most influential work on British river finds, Richard Bradley's (1990) seminal book 'The Passage of Arms', popularized a votive interpretation of later prehistoric river finds amongst British archaeologists, drawing on a narrative of competitive elite consumption of prestige goods and metalwork developed in earlier work (Bradley 1982). Bradley's work proved instrumental in applying the concept of structured deposition to river finds, effectively shifting the focus away from assessing the content of assemblages towards constructing grand narratives, exploring the wider depositional landscape (Bradley 1990).

In contrast, Roman and Early Medieval studies have traditionally favoured interpretative narratives that directly link specific river finds to specific historical events, typically centred around military history. This approach, heavily reliant on literary sources and historical documents, is exemplified by the long-standing debates using river finds to pinpoint the location of Caesar's 54 BC Thames crossing (e.g. Grayson 2010; Thornhill 1976) and similar attempts to locate specific eight and ninth century Thameside battles recorded in the Anglo-Saxon Chronicle using accumulated weapon deposits (e.g. Abels 1997; Cooksey 1905; Wilson 1965).

More recently, the votive potential of finds from these periods has been highlighted. Votive interpretations in Early Medieval scholarship are centred around connections to foreign socio-cultural influence and an influx of pagan religious ideas, typically directly related to increasing Scandinavian activity in Britain between the 8th and 11th centuries (e.g. Lavelle and Roffey 2015; Raffield 2014) or narratives of long-term continuity of practice with later prehistoric behaviour, with depositional practices surrounding 'martial' deposits being intentionally 'Christianised' and continuing into the Medieval period (e.g. Maczek 2021; Stocker and Everson 2002). Romanists in Britain have proven slightly more theoretically conservative and reluctant to engage with votive narratives; the strict criteria placed on 'votive' finds in Roman archaeology have caused ritual interpretations to be dismissed in favour of a 'rational' explanation, including fluvial erosion of terrestrial deposits and the mundane disposal of rubbish (see Eckardt and Walton 2021).

This disciplinary separation, coupled with a general preference amongst British and European scholars to analyse specific object types, such as swords or axes, in isolation, has hindered the development of a genuinely holistic, long-term perspective on riverine deposition.

The present study adopts a perspective rooted in the *longue durée*, examining patterns of deposition in the Middle Thames from the Bronze Age (2200 BC) through to the Early Medieval period (1100 AD). By analysing finds data spanning over three thousand years, this study aims to move beyond period-specific interpretive frameworks and identify genuine long-term patterning in depositional behaviour. This shift in perspective has been repeatedly called for in British archaeology (e.g. Bradley 1998; Brudenell et al. 2024; Naylor 2015), and recent research further underscores the potential of such an approach. A recent study (Arthur, Sidell, and Bonney 2025), presented a new radiocarbon dataset for human remains recovered from the Thames, spanning nearly 6,000 years of repeated depositional activity within a consistent depositional landscape.

The Middle Thames provides an ideal case study for this *longue durée* approach. Despite yielding one of the highest concentrations of river finds in Britain, this region remains relatively underexamined. This article seeks to harness this substantial underutilized dataset to advance our contemporary understanding of long-term deposition in rivers. Through actively considering the changing hydrological and environmental properties of the non-tidal Middle Thames landscape, alongside the physical and sensory properties of river deposits themselves, the recursive relationship between deposition, visibility and lived experience highlights potential new avenues from which to challenge traditional perspectives on retrievability in a riverine setting, whilst simultaneously exploring the underlying behaviours behind this genuinely long-term

phenomenon. In doing so, it also aims to provide a replicable methodological template for engaging with the inherent challenges of 'low resolution' archaeological data.

Materials and methods

Chronology and data analysis

This study covers the chronological period c. 2200 BC – 1100 AD, broadly divided into the Bronze Age (2200 – 800 BC), Iron Age (800 BC – 43 AD), Roman (43 – 410 AD) and Early Medieval periods. (410 – 1100 AD). These major phases are further sub-divided following typical period-specific divisions (Table 1). Notably, this includes finds which are potentially Late Neolithic in origin, this subset of finds, dated broadly to the Late Neolithic – Early Bronze Age transition (c. 2900 – 2200 BC), will be discussed in a later section.

Where possible, all objects included in this study have been attributed to a specific sub-period, and the corresponding broad period. Where this has not been possible, the broad period has been used exclusively. Any finds which could not be confidently dated to any single period have been omitted from this study.

This study defines 'river finds' or 'river deposits' as any archaeological materials or objects deposited within the fluvial context, specified here as objects recovered directly from the river channel or its immediate banks. While other studies have advocated for a broader definition encompassing the wider riverine environment, including surrounding marshes, fens and abandoned former channels (e.g. Champness, Donnelly, and Haggart 2015; Lund 2008; Yates and Bradley 2010), this paper adopts a more constrained approach. This methodological constraint is necessary as it is beyond the scope of this research to accurately model the river's fluvial geomorphology or reconstruct channel migration across all relevant periods. Consequently, while objects found in close proximity to the modern channel are *potentially* riverine (perhaps representing deposits within a paleochannel), they are not treated as 'river finds'. For this paper, only objects directly associated with the river's contemporary bed and banks are classified as 'river finds'. However, while terrestrial stray finds are excluded from this 'riverine' dataset, their spatial relationship to defined 'river finds' will be directly explored.

Table 1. Broad chronological periods and sub-periods referenced within the Middle Thames dataset.

Broad Period	Broad Period Dates	Sub-Period	Sub-Period Dates
Late Neolithic to Early Bronze Age	2900 BC – 2200 BC	–	–
Bronze Age	2200 – 800 BC	Early Bronze Age	2200 – 1550 BC
		Middle Bronze Age	1550 – 1150 BC
		Late Bronze Age	1150 – 800 BC
Iron Age	800 BC – 43 AD	Early Iron Age	800 – 400 BC
		Middle Iron Age	400 – 100 BC
		Late Iron Age	100 BC – 43 AD
Roman	43 – 410 AD	Early Romano-British	43 – 200 AD
		Late Romano-British	201 – 410 AD
Early Medieval	410 – 1100 AD	Early Saxon	410 – 660 AD
		Middle Saxon	660 – 899 AD
		Late Saxon/Viking	900 – 1100 AD

In total, 2337 river finds from across the Middle Thames region are considered. The data for this study were recovered from a wide range of sources, including local and national museums, HER records alongside published and unpublished regional and typological catalogues. For full details see Appendix.

Most river finds included in this dataset, alongside the overwhelming majority of finds recovered from British rivers, are assumed to have been recovered through navigational dredging. Whilst this assumption does appear likely, given dredging activity in the 18th and 19th centuries directly fed into a 'golden age' of antiquarian collecting, there has been little research on archaeological recovery in British rivers and many objects from the Middle Thames dataset have been recovered through other means, such as construction and maintenance works, chance finds from leisure bathers or most recently, via magnet fishing and underwater detecting. Problematically, each of these recovery methods often fails to produce contextual information.

Navigational dredging is often regarded as the primary method for recovering British river finds, yet both the process and its distinctive limitations for the archaeological record remain poorly understood. The issue of dredging crews failing to accurately record the findspot of recovered objects was introduced to British archaeological discourse by Margaret Ehrenberg (1980), who noted a tendency to record locations through referencing local landmarks, bridges or towns. Ehrenberg (1980, 5) highlighted the problem with the example of 'The Thames at Taplow', stating this could refer to any location on a three-mile stretch of river. Whilst certainly problematic, Ehrenberg's example pales in comparison with the most exaggerated instances of such vague recording. Finds from the Middle Thames have been attributed to far larger stretches, such as dredging crews reporting finds which were recovered 'Between Staines and Teddington', referencing a stretch of approximately 25 kilometres (Thames Conservancy Archives 1896).

Alternative recovery practices have received less academic attention and demonstrate similar limitations. Opportunistic, chance finds have been recovered from the Thames for centuries, most have been attributed to leisure users or waterborne workers who recover finds during day-to-day activity. The circumstances of recovery are typically documented anecdotally and the findspot is secondary to describing the object itself, with only a vague geographical reference to the actual find location (e.g. 'the side of the bridge' or 'near the lock'). More recently, the increased popularity of amateur 'treasure hunting' in the form of magnet fishing and underwater metal detecting has led to a spate of new finds across Britain; however, the documentation of these discoveries remains inconsistent, with findspots vaguely recorded or potentially deliberately obscured. As these activities often operate in legal grey areas (e.g. Canal and River Trust 2020; Port of London Authority 2025) some practitioners are reluctant to disclose precise locations or otherwise follow legal reporting procedures.

These recording practices present an obvious methodological hurdle to the task of mapping the distribution of river finds. As findspots are often uncertain and individual finds are broadly attributed to large areas, traditional methods of mapping distributions, where finds are assigned precise co-ordinate point locations, become unsuitable as they introduce an unacceptable risk of severe spatial displacement.

Previous studies examining river finds have typically avoided this methodological problem. Most scholars have either explored find distributions highly selectively,

omitting any finds with problematic contextual information (e.g. Fontijn 2012; York 2002) or tacitly acknowledged the inherent inaccuracy of river finds data, but still applied precise 'point' based mapping techniques (e.g. Fontijn 2019; Naylor 2015; Stocker and Everson 2002).

To address this methodological challenge directly, this study adopts an approach integrating both 'low-resolution' and 'high-resolution' spatial data. All finds within the dataset have been assigned a 'spatial confidence' or SC value, ranging from 1 (lowest confidence) to 5 (highest confidence), based on multiple factors including the perceived reliability of the data source, the precision of any existing spatial identifiers and the degree of spatial uncertainty (if any).

The dataset is then rasterized. Given the extensive geographical area covered by this study, a 40 m ×40 m grid cell size was selected to provide a pragmatic balance between the innate requirements of both low-resolution and high-resolution data. Whilst a finer resolution would theoretically provide more detailed insights into spatial patterns for high resolution finds, the larger cell size functionally smooths over minor inaccuracies caused through integrating low resolution finds, providing an overall more accurate but less precise dataset. As this research aims to identify macro-scale patterning across a large area, a 40 m grid is sufficient to capture these regional-scale patterns.

During the rasterization process, each input (individual find) contributes to the value of the cells it influences, with each contribution weighted by its corresponding spatial confidence (SC) value and the quantity of finds recovered. Finds with higher total values will exert a stronger local influence upon their respective cells, whilst lower values will exert a weaker influence upon a larger body of cells, reflecting the increased spatial uncertainty associated with lower SC values.

This approach acknowledges the inherent imprecision of poorly contextualized findings data, without discarding it entirely. Once rasterized, Kernel Density Estimation (KDE) was used to produce density-driven heatmaps of find distributions. This novel methodological approach, explicitly incorporating spatial confidence and data of different resolutions within a raster framework, presents a significant advancement in the analysis of spatial data with inherent uncertainty, whilst simultaneously providing an avenue for identifying previously obscured spatial-distribution patterns.

Study area and environment

The Middle Thames accounts for approximately 125 km of the Thames's total 240 km length. Geographically, the Middle Thames is defined from Goring Gap, where the Thames cuts between the Chiltern Hills and the Berkshire Downs and flows east, to Teddington Lock, which marks the modern tidal limit of the Thames (Figure 1). The Middle Thames has historically been overlooked in regard to river finds, despite the relative abundance of finds within the region, with the greatest concentration of finds outside of Greater London (Humphreys 2019). Despite the limited engagement with the Middle Thames, period-specific studies have highlighted the significance of the area as a depositional locale, but the period-specific focus of these studies has prevented genuinely long-term patterns from being identified (Ehrenberg 1980; Naylor 2015; Reynolds and Semple 2011).

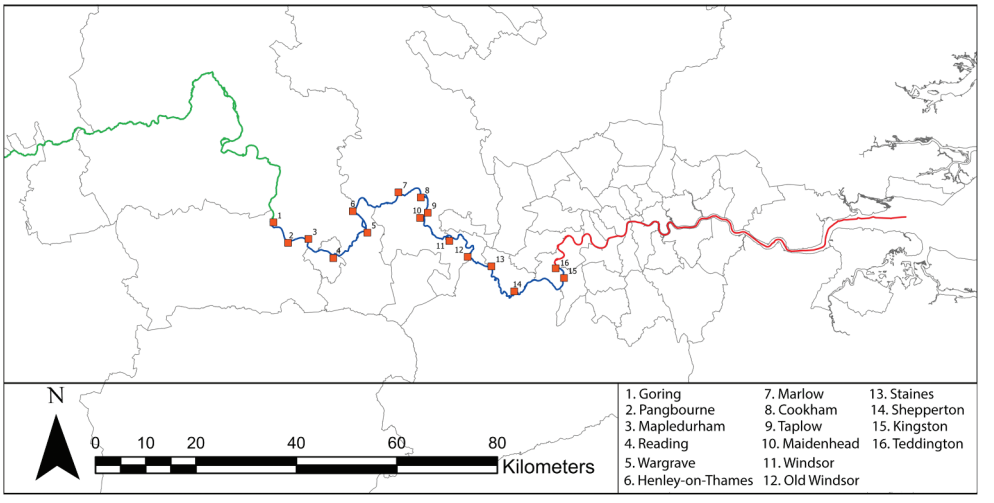

Figure 1. The Thames Valley and modern course of the River Thames. Red = Upper Thames, blue = Middle Thames, green = lower Thames.

The modern non-tidal Thames is a typical example of a lowland river system, characterized by a relatively slow flow (1–3 kph), a broad channel and extensive floodplains (Gregory 1997; Howard and Macklin 1999). It is important to recognize that the modern Thames is a product of innumerable cumulative alterations, having been embanked, widened, narrowed, canalized, and otherwise modified over thousands of years (Słowik 2023). The modern Thames, as with most other lowland river systems in Britain, has effectively been transformed into a safe and highly controlled resource; the morphology, hydrology and immediate environment of the river have changed significantly over the last three thousand years (Allen, Gill, and Miles 1997; Edgeworth 2011). It is therefore necessary to understand the changing hydrology and environment of the Middle Thames riverscape to appropriately contextualize long-term patterns in deposition across the region.

Despite the relative dearth of interest in river finds from the Middle Thames region, the Thames Valley has been subject to numerous geoarchaeological and paleoenvironmental studies providing significant insights into the changing landscape and environment across the region (e.g. Macklin 2016; Parker et al. 2008; Robinson 2011). It is beyond the scope of this paper to provide a full overview of the changing landscape in the Thames Valley, and it has been discussed at length in specialist literature (see P. Booth 2007; Yates 2001). Broadly, the non-tidal Thames gradually changes from a braided, high-energy river to a meandering, low-energy river system. This process is initially slow but becomes increasingly exaggerated due to wider environmental changes and cumulatively intensifying human influence (Allen, Gill, and Miles 1997; Elias, Webster, and Amer 2009). The non-tidal river simplifies from a complex series of shallow, fast-moving, linked channels in the Early-Middle Bronze Age, becoming a deeper, slower meandering river in the Late Bronze Age and Iron Age. Simplification continues into the Roman and Early Medieval periods, where, despite being shallower, faster, and more braided than the modern Thames, the

hydrology and morphology of the river are broadly comparable (Clark 2005; Parker et al. 2008).

This shifting hydrology was accompanied by changes to the immediate environment. In the Middle-Late Bronze Age the transformation from a braided system to meandering channels was accompanied by intensive deforestation of up to 80% of the woodland in the Middle Thames region, the meandering channel became isolated and abandoned former channels across the deforested floodplain, creating an extensive wetland of bogs, pools and swampland up to 5 km from the primary channel (Elias, Webster, and Amer 2009). This fundamentally changed the character of the floodplain from semi-flooded woodland to open wetland, it is notable that this environmental shift was unique in the wider context of the Thames Valley, where the Upper Thames was predominantly dry and the Lower Thames was dominated by flooded estuarine woodland (Elias, Webster, and Amer 2009; Słowik 2023). Throughout the Late Iron Age, Roman and Early Medieval periods, these wetlands were gradually drained as agricultural activity intensified, whilst flood events became increasingly frequent and intense as the channel deepened and the overall rate of flow slowed (Nicholls et al. 2013).

Results

Changing rate of deposition in the Middle Thames dataset

The total number of Middle Thames River finds represented within this dataset is detailed in Table 2 and visualized in Figure 2, demonstrating considerable shifts in the rate of deposition across each major chronological period.

The highest number of precisely dated finds is deposited during the Bronze Age, and the number of finds deposited per sub-period remains generally consistent, with a slight decrease between the Early and Middle Bronze Age, before a dramatic increase and peak during the Late Bronze Age. The number of deposits falls significantly during the Iron Age, with the fewest finds of any major period. The number of finds is consistently low throughout the Iron Age, with a relative peak during the

Table 2. Number of finds recovered from the Middle Thames region by chronological sub-period.

Chronological Sub-Period	No. of Finds
Late Neolithic to Early Bronze Age (LN-EBA)	185
Early Bronze Age (EBA)	83
Middle Bronze Age (MBA)	234
Late Bronze Age (LBA)	320
Bronze Age (Unknown Sub-Period)	95
Early Iron Age (EIA)	37
Middle Iron Age (MIA)	15
Late Iron Age (LIA)	42
Iron Age (Unknown Sub-Period)	52
Early Romano-British (1st-2nd)	46
Late Romano-British (3rd-4th)	385
Romano-British (Unknown Sub-Period)	527
Early – Early Medieval (5th-7th; EEM)	51
Middle – Early Medieval (8th-9th; MEM)	40
Late Early Medieval/Viking (10th-11th; LEM)	158
Early Medieval (Unknown Sub-Period)	67

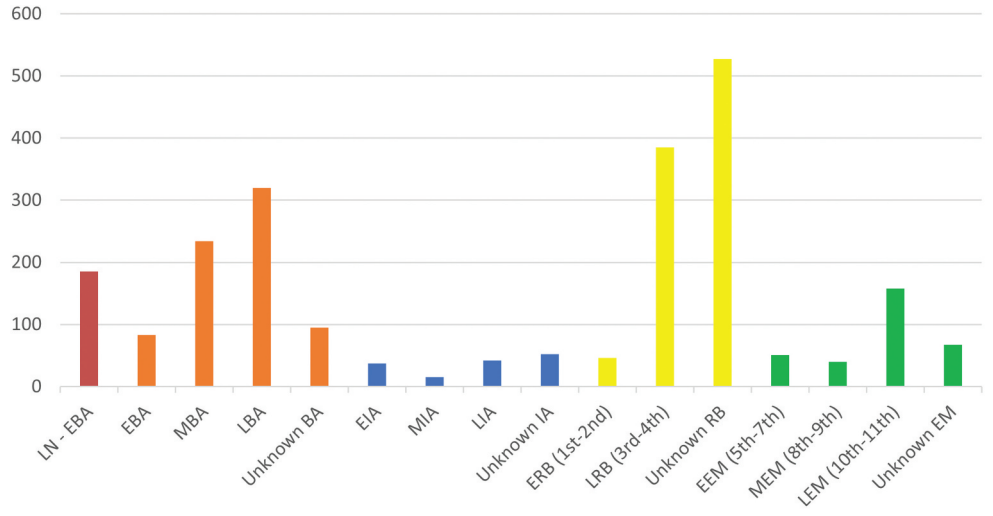

Figure 2. Approximate rate of deposition across chronological sub-periods.

Late Iron Age. The Roman period sees the highest number of total finds per major period, with a far greater number than the preceding Iron Age, although less than half of the Roman assemblage can be dated to an internal chronological division (431; 44%). This more precisely dated material witnesses a dramatic increase in deposition in the Late Roman period. The overall rate of deposition falls significantly during the Early Medieval period, returning to similar levels seen in the Iron Age. There is a minor decrease in finds deposited between the Early and Middle Saxon periods, with a dramatic spike in the number of objects deposited during the Later Early Medieval period.

These dramatic changes in the number of finds recovered between major periods are notable but not unexpected. Large quantities of Bronze Age metalwork in the Thames have been noted by various authors over the past three decades of study (see Bradley 1998; York 2002). Similarly, the Late Bronze Age has been recognized as a peak period of depositional activity, both within the river and the broader Thames Valley landscape (Allen, Gill, and Miles 1997; Davies 2022).

The comparative dearth of Iron Age river finds has also been tentatively highlighted in some previous work but has not been explored in any detail (Bradley 1998; Ehrenberg 1980). Similar to the preceding peak in the Late Bronze Age, the scarcity of Iron Age river finds fits within a broader, pan-British pattern of declining rates of deposition. This phenomenon has been previously noted in the context of terrestrial finds, including a notable drop in the quantity and metal-richness of hoards throughout much of the Iron Age, save for a modest return in the Late Iron Age (Wilkinson 2019). Similarly, Iron Age burials across Britain display a similar trend, characterized by a distinct lack of archaeologically detectable grave goods throughout the EIA and MIA, with the singular exception of increasing quantities of weapons in the LIA (Lamb 2022). It is also highly likely that the drastic decrease in the number of river finds deposited from the Bronze Age into the Iron Age has been influenced to some

extent by changing recovery practices, but this patterning will be explored in more detail later.

While the significant increase in deposition during the Roman period may initially appear surprising, this agrees with prior research, which has suggested that the non-tidal Thames contains significant quantities of Roman archaeological material. However, this observation has not been accompanied by any recent archaeological discussion or systematic examination (Fulford 2014).

The quantity of Early Medieval material from the Middle Thames has been far more accurately represented in previous literature, though this study does suggest that the quantity of Early Medieval finds recovered from the Middle Thames is greater than has been previously suggested (Ehrenberg 1980; Naylor 2015). Overall, whilst there is some agreement with the patterning suggested by previous, period-specific studies, this new dataset reveals significant hitherto unrecognized inter-period variation over the long-term.

Composition of the Middle Thames dataset

The Middle Thames dataset comprises a total of 2,887 finds, representing a diverse range of object types. Where appropriate, these functional object types have been further expanded according to the object form using broad multi-period categorization from established typological conventions. e.g. weapons expand into swords, spearheads, daggers. etc. swords, spearheads, daggers. etc. Certain categories have been further subdivided based on existing typological frameworks; these will be discussed in more detail in a later section.

It should be noted that some object types can be attributed to multiple functional classes, a classic example being the role of axes across later prehistory (Fontijn 2005). In this study, axes have been broadly categorized as 'tools' except objects explicitly labelled as 'battle axes' or 'fighting axes', this is primarily relevant for Early Bronze Age and Early Medieval finds but is broadly applicable to each major period under consideration.

Due to the destructive and largely imprecise nature of riverine recovery methods, particularly mechanical dredging, this study considers all objects within the Middle Thames dataset to be single finds. Whilst some objects, particularly finds of pottery, coins and non-precious metal, are occasionally recovered as collective deposits, it is often impossible to determine whether objects were intentionally deposited together or dispersed by post-depositional processes (Burgess and Colquhoun 1988; Ehrenberg 1980). Additionally, there is no standardized practice to record the size or quantity of collective deposits; instead, potential multi-find deposits are vaguely referred to as 'small' or 'large'. Therefore, this analysis treats all finds as individual deposits, acknowledging the unique limitations imposed by riverine recovery methods.

Figure 3 depicts the relative proportions of each functional object category in the entire assemblage through time. Weaponry is the most prevalent category across the entirety of the assemblage, accounting for 35% of all Middle Thames finds. The prevalence of weaponry shifts significantly through time. Across the Bronze Age, weaponry is the dominant object type, representing 56% of all Bronze Age objects and approximately 21% of the entire Middle Thames dataset. Throughout the Bronze

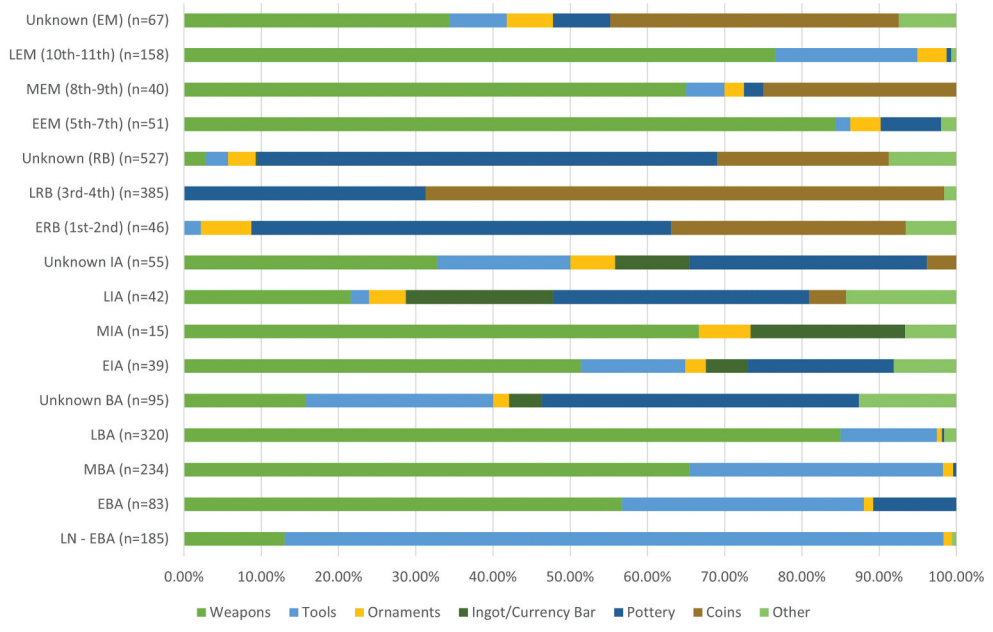

Figure 3. Relative proportions of Middle Thames finds per sub-period by object category.

Age, weapon deposition steadily intensified, with weapons accounting for 65% of all MBA finds and 85% of all LBA finds. During the Iron Age, weapons remain significant, accounting for 40% of all finds, though the proportion of weapons decreases from 51% in the EIA to 21% in the LIA. The Roman period sees a dramatic shift in this general pattern, weapons become largely insignificant, accounting for under 2% of finds. In the Early Medieval period, weapon deposition resumes at intensified levels, representing 67% of all Early Medieval finds within the dataset. The proportional significance of weaponry returns to levels seen during the MBA and LBA, accounting for over 60% of finds from each sub-period.

To further understand the role of weaponry as the dominant functional category of Middle Thames finds, it is necessary to examine broad patterns in the composition of the weapon assemblage itself. The Middle Thames dataset contains a total of 800 weapons, which are highly varied in type and form. The relative proportions of each weapon type are presented in Figure 4. The dominant category of weapon through time is the spearhead, which represents 55% of all Middle Thames weapon finds and approximately 18.5% of the entire assemblage. Spearheads find are most prevalent in the Bronze Age and the Early Medieval period. Throughout the Bronze Age, the relative proportion of weaponry represented by spearheads intensifies through time, from 19% in the EBA, to 46% in the MBA to 53% in the LBA. During the Early Medieval period the relative proportions and quantities of spearhead finds peak in the Early Saxon period (97%), declining to 84% of the Middle Saxon period and 67% in the Late Saxon/Viking age period. Spearheads also represent a significant proportion of weapon finds broadly dated to the Iron Age and Roman periods, but these finds are mostly

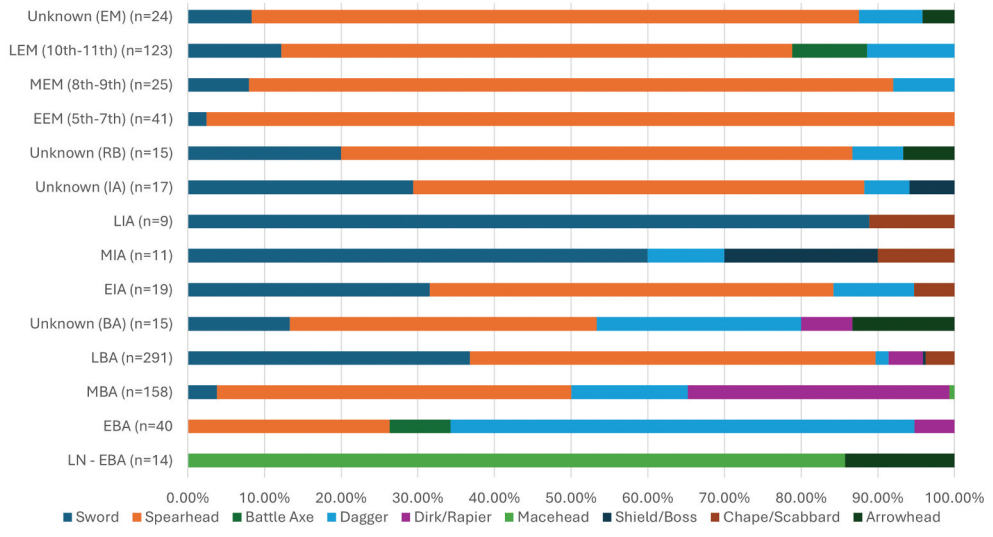

Figure 4. Relative proportions of Middle Thames weapon finds per sub-period by object sub-category.

imprecisely dated and represent insignificant quantities of the overall weapon assemblage (< 3%). Spearheads further distinguish themselves within the weapon sub-assemblage due to their long-term consistency in prevalence, representing an average of 52% of the weapon finds across all sub-periods.

Other weapon types exhibit far greater variation through time. Swords stand out as another significant category of weapons, accounting for approximately 20% of the entire weapon sub-assemblage. In contrast to spearheads, which are prevalent from the EBA onwards, swords become prominent later during the LBA (36%). The proportional significance of swords peaks during the Iron Age, representing 60% of MIA and 88% of LIA weapon finds, though it should be noted that similarly to IA spearheads, whilst proportionally significant IA sword finds represent an insignificant quantity of the total Middle Thames assemblage (< 1.5%). Whilst swords are present within the Early Medieval weaponry sub-assemblage, they are far less significant than spearheads across each sub-period, with a relative peak in the LEM where they represent 12% of weapon finds.

The EBA exhibits a distinct depositional profile compared to later periods. During this period, bronze daggers (44%) are the most prevalent weapon type, though if the dataset is expanded to include LN-EBA finds, stone mace-heads (23%) are also highly significant. In the MBA, these are briefly replaced by larger dirks and rapiers (34%). By the LBA, swords gain prominence (37%), while spearheads become increasingly dominant (53%), alongside a significant decline in the deposition of other bladed weapons, including daggers, dirks, and rapiers. Notably, chapes and scabbards primarily appear in later prehistory, during the LBA and throughout the Iron Age, aligning with the periods where swords are most prominent.

These trends appear to generally reflect broader period-specific trends in high-value metalwork deposition across Britain. The rapid shift from daggers and rapiers to the

prevalence of larger, leaf-bladed swords and spearheads in the LBA, for instance, aligns with well-documented changes in material culture across both terrestrial and 'watery' contexts (see Knight, Boughton, and Wilkinson 2019; Mercer 2006). Critically, the long-term patterns observed in the weapon deposits recovered from the Middle Thames appear to reflect previously observed, period-specific trends, which become increasingly exaggerated at this supra-regional, macro scale.

Another notable long-term pattern is the relative scarcity of tools across the entirety of the assemblage, with the singular exception of the Bronze Age. The quantity and relative proportion of tools peaks during the LN-EBA transition, where they represent over 68% of finds, before gradually declining throughout the MBA (33%) and LBA (12%) as weaponry becomes increasingly prominent. Whilst tools are present in each major chronological period, finds are sporadic and after the Early Bronze Age, tools do not represent more than 18% of the finds dated to any sub-period.

Figure 5 illustrates the relative proportions of different tool types over time. Axes dominate the tool sub-assemblage, comprising 55% of all tools and 9% of the entire Middle Thames dataset. The prominence of axes is most pronounced during the Bronze Age, particularly the Middle Bronze Age (MBA), where they represent 92% of all tools. However, axes maintain a significant presence throughout all major periods. Notably, the prevalence of axes aligns chronologically with periods in which spearheads are most prominent, highlighting a potential correlation between the two object categories.

Other patterns in the tool sub-assemblage reveal significant shifts over time. Stone tools, including flint handaxes, hammerstones, and chisels, are well represented across the Late Neolithic – Early Bronze Age, where they make up 46% of all tool finds, but decline sharply in the Middle Bronze Age (7%) and disappear entirely from the Late

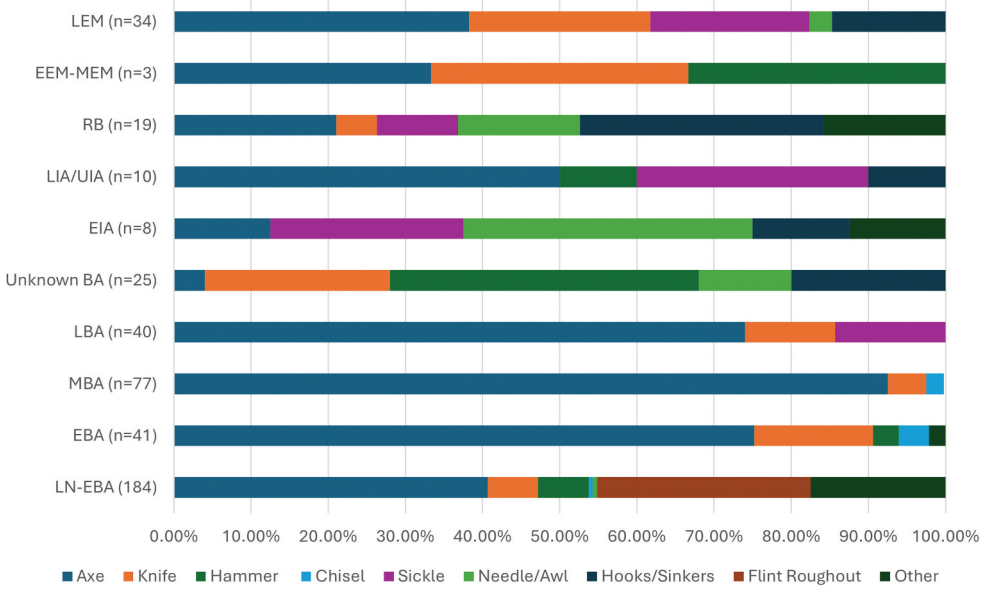

Figure 5. Relative proportions of Middle Thames tool finds per sub-period by object sub-category.

Bronze Age onwards. During the Iron Age and Roman periods, agricultural tools such as sickles and mattocks, along with fishing equipment like needles and hooks, were highly significant. Agricultural tools represent approximately 34% of IA tools and 26% of RB tools, whilst fishing equipment represents 27% of the IA tool finds and 47% of the RB tool assemblage. However, these finds diminish throughout the Early Medieval period, where agricultural tools represent under 18% of all tool finds, and fish equipment represents 13% of the sub-assemblage. Uniquely in this period, knives (24.32%) represent the most prevalent tool after axes.

Spatial distribution of the Middle Thames dataset

River finds from the Middle Thames are widely distributed across the entire study area, with large quantities of archaeological material having been recovered from every major stretch of the river (Figure 6). However, the presence of finds throughout the region does not indicate that depositional behaviour conforms to a uniform pattern. A comprehensive analysis of the distribution reveals significant statistically significant hotspots or concentrations of finds. Overall patterning shows a clear trend towards the eastern section of the study area, with 64% of finds recovered downstream of Marlow. The highest concentrations are observed in specific stretches of the river, including

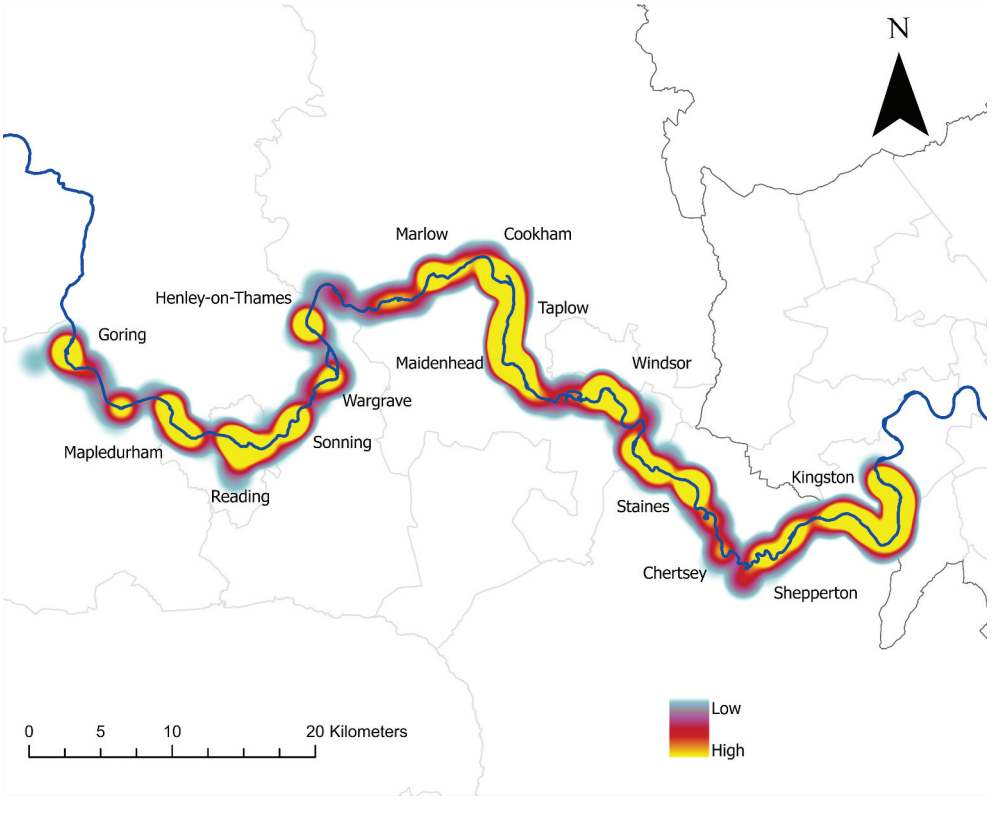

Figure 6. Kernel density estimation displaying the distribution of river finds across the Middle Thames.

between Reading – Wargrave, Cookham – Maidenhead, Windsor – Staines, the Shepperton Ranges, and Kingston – Teddington.

These broad distribution patterns in the overall assemblage can be refined further through analysing changes across each chronological period and through incorporating the changing relationship between river finds and their immediate archaeological context, including analysis of crossing sites, settlements, terrestrial stray finds and burial sites within 2 km of the modern Thames. The following section will provide an overview of finding distributions by period.

The distribution of Bronze Age finds (Figure 7), generally follows the spatial patterning observed in Figure 6, with the addition of depositional cold spots in areas lacking significant concentrations of finds. The most prominent concentration is a highly significant cluster between Kingston-on-Thames and Teddington Lock in the easternmost section of the study area, spanning approximately 4.5 km. Another dense and statistically significant cluster is located between Taplow and Maidenhead in the central Middle Thames Valley, where finds are evenly distributed across a stretch of approximately 4 km.

In addition to the highly dense concentrations, numerous low-density zones are scattered across the study region, with a general eastern bias in distribution. From west to east, these low-density sites include Goring, Reading, Henley-on-Thames, Marlow, Cookham, Windsor, Bray, Egham, and the Shepperton Ranges. A comparison between the distribution of Bronze Age river finds and terrestrial stray finds within 2 km of the river reveals a positive correlation, with terrestrial stray finds clustering in areas with dense concentrations of river finds (Figure 7). However, there are significant deviations: stray finds do not exhibit the same eastern bias observed in the distribution of river finds, this is particularly apparent with the presence of terrestrial stray finds in river find cold spots in the western and central Middle Thames area, such as between Goring and Reading, and between Henley-on-Thames and Marlow, where no significant quantities of river finds have been recorded.

This relationship suggests there is a broader spatial logic underlying different deposition patterns, with a connection between the distribution of river finds and other features within the depositional landscape. This relationship becomes more apparent when burial sites, settlements and crossing points are considered (Figure 8). Contrary to terrestrial stray finds, burial sites are located near the densest concentrations of river finds but remain peripheral. Burial sites are not situated within the stretches containing the highest quantities of finds, but instead cluster around them, all instances being located within 1.5 km of the highest density local hotspot. The connection with settlement sites and crossing points is more direct, known and potential crossing points, primarily fords, correspond with hotspots of river finds across the entire study region, with the greatest densities of finds being recovered from crossing points adjacent to known occupation sites.

Iron Age finds are presented in Figure 9; the lower quantity of finds dated to this period noticeably impacts the density of findspot concentrations, resulting in a distribution map with multiple low-quantity, high relative density hotspots. The distribution presents a similar overall pattern to the Bronze Age, though there are significant changes. Most notably, each of the major concentrations present in the Bronze Age recur in the Iron Age, but whereas Bronze Age hotspots are spread across

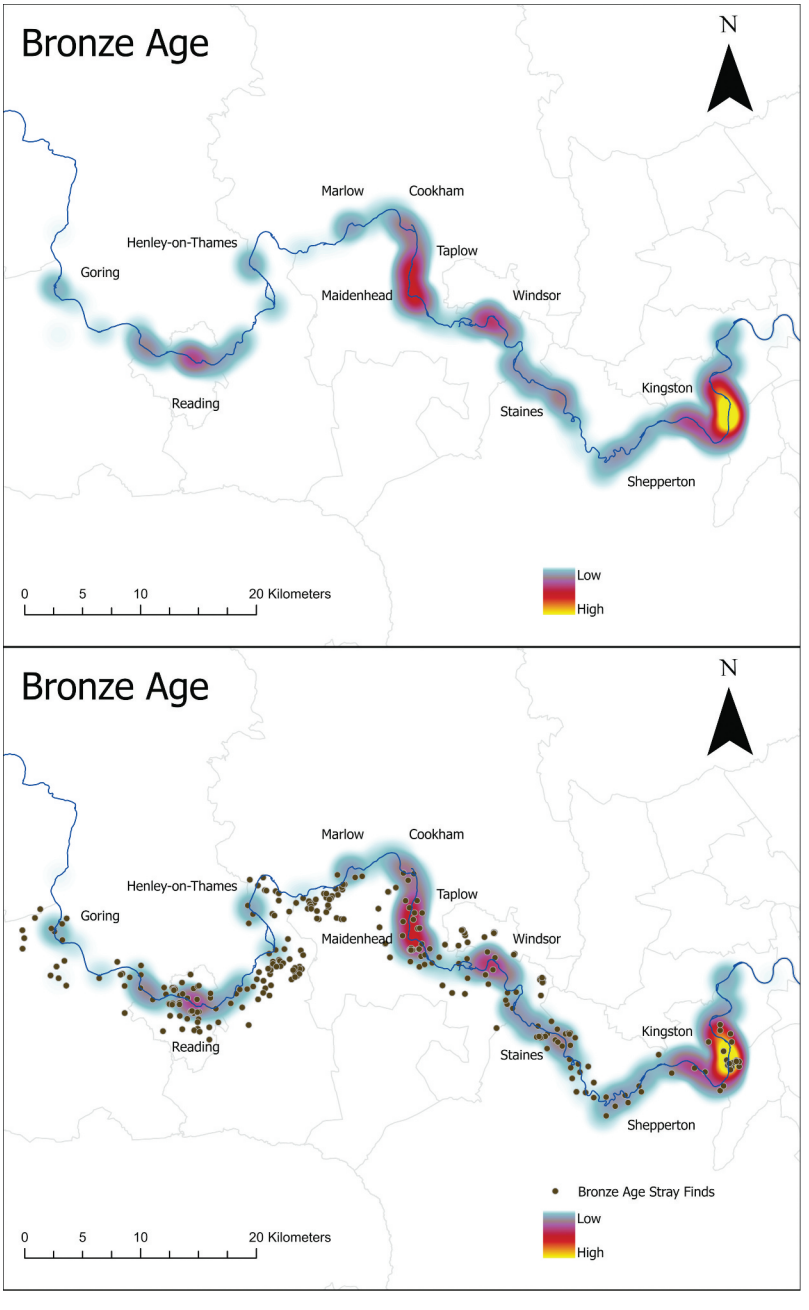

Figure 7. Kernel density estimation of Bronze Age finds from the Middle Thames (above) with terrestrial stray finds (below).

large stretches averaging approximately 4 km, Iron Age finds are less dispersed, clustering around specific focal points in the landscape.

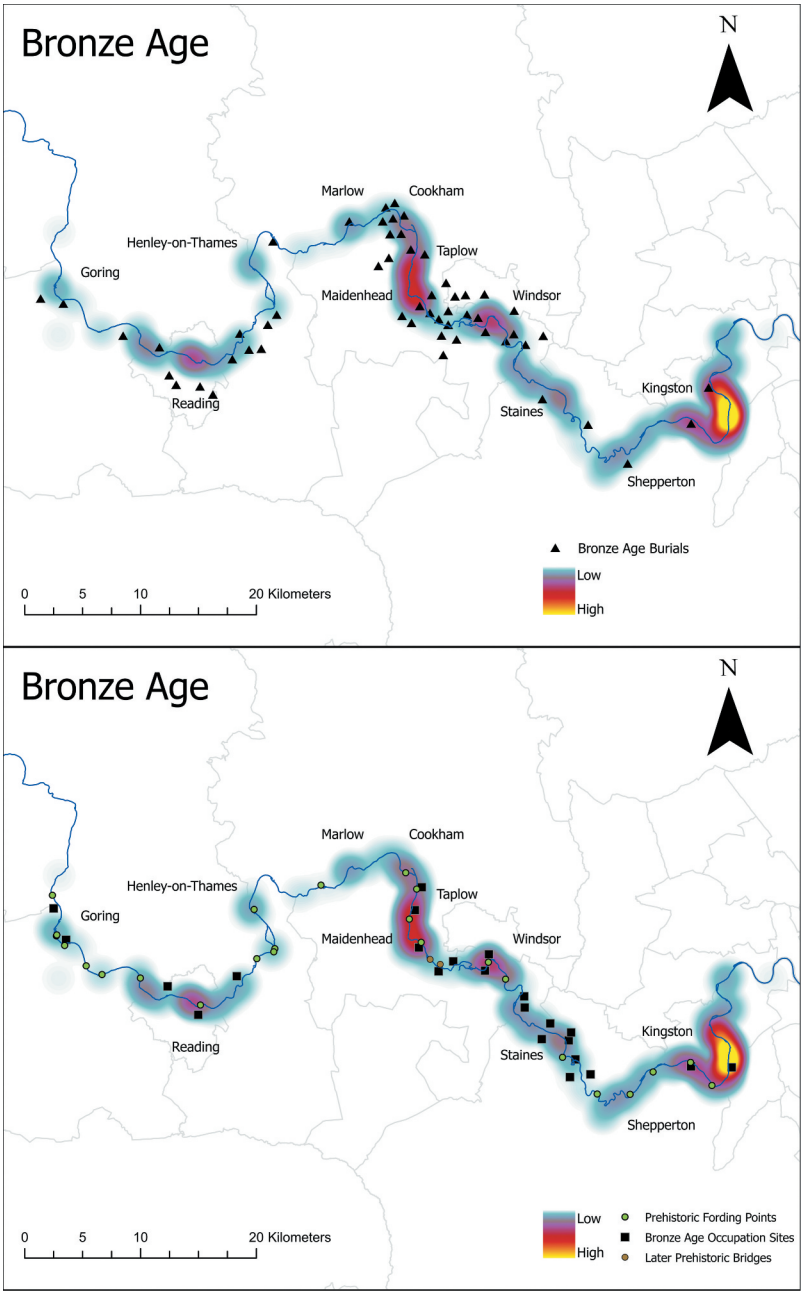

Figure 8. Kernel density estimation of Bronze Age finds from the Middle Thames with burials (above) and settlements/crossing points (below).

The western section of the Middle Thames, broadly defined between Goring and Marlow, a stretch of approximately 32 km, becomes increasingly significant during this period as the eastern bias dissipates. There are notable concentrations of finds centred on Goring, Mapledurham, Reading, Wargrave, Henley-on-Thames and Marlow.

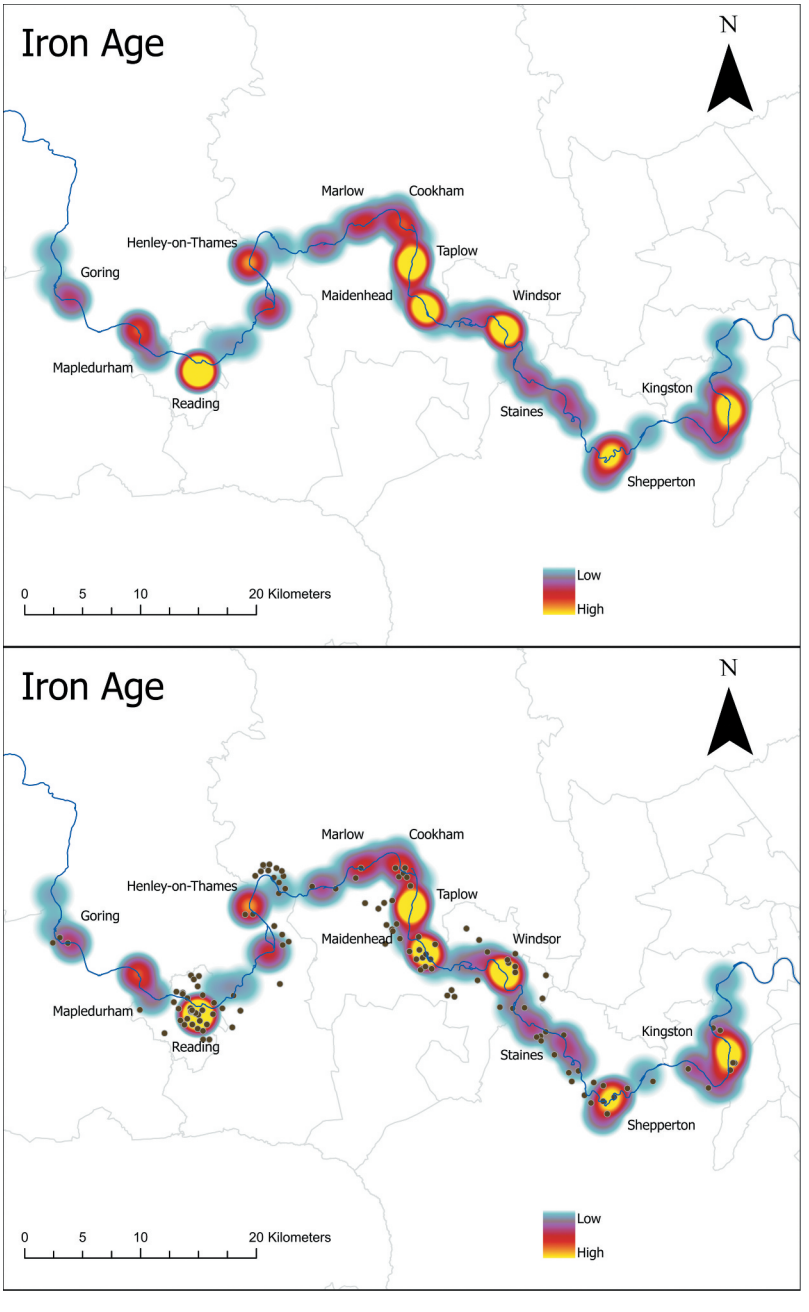

Figure 9. Kernel density estimation of Iron Age finds from the Middle Thames (above) with terrestrial stray finds (below).

These new and recurring hotspots demonstrate a strong positive correlation with clusters of terrestrial stray finds, with both datasets tightly distributed around key locations (Figure 9). Notably, in stark contrast to the earlier Bronze Age, there is no clear relationship between burial sites and the broader distribution of river finds. This

patterning likely reflects the widely recognized 'paucity of formal deposition' that characterizes Iron Age Britain (Booth and Madgwick 2016; Tobin et al. 2022), where formal, visible, cemetery burial appears to have been a minority practice. Whilst there is some evidence of clustering Iron Age burial sites in the central Middle Thames, possibly indicating a continuation of the peripheral patterning around major deposition zones observed in the Bronze Age, the available data is limited, making any interpretation speculative and largely a product of this wider trend of archaeologically invisible funerary practices in the period.

Settlements and crossing points demonstrate a far clearer spatial relationship with river finds. The latter become increasingly significant during this period and directly correspond to the aforementioned 'focal points' in the deposition of river finds and terrestrial stray finds (Figure 10). Notably, the density of river finds is significantly greater in hotspots, which are associated with a bridge crossing or multiple fords. This appears to reflect an increasing preference for highly stable, permanent crossing points. Additionally, the highest density hotspots are each located in areas where there are occupation sites on either side of the riverbank, averaging less than 2 km apart.

The Roman period sees a significant shift in the overall depositional profile of the region, Figure 11. The overall spatial patterning of river finds is not dissimilar to that of the Iron Age, many of the previously observed hotspots recur in this period, including dense concentrations of finds at Reading, Marlow, Cookham, Maidenhead, Staines and Kingston-on-Thames. However, several locales which previously contained significant quantities of finds become statistical cold spots in this period, including Wargrave, Henley-on-Thames, Hurley, Taplow, Egham and Sunbury. The previously observed trend where finds are increasingly tightly distributed around key focal points, rather than across stretches of the riverine landscape, is further exaggerated, with a marked shift towards urban centres, such as Reading, Staines (*Pontes*) and Kingston-upon-Thames.

There is no identifiable correlation between terrestrial stray finds, burials and river finds in the Roman period, and the distribution of both datasets does not appear to be related to river deposition. Instead, significant concentrations of finds are exclusively centred around known Roman settlements, with the greatest density of finds recovered at Goring, Reading, Cookham, Staines and Kingston-on-Thames (Figure 12). These sites are each associated with known crossing points of the Thames and connect directly with the Roman road network. However, the density of finds is greatest at major settlement crossings, whilst there are finds recovered from all known Roman crossing points, rural fords do not represent significant findspots. Minor settlements and villa sites also display a strong correlation with hotspots, despite not typically being associated with any known crossing points.

The distribution of Early Medieval river finds is presented in Figure 13. The overall distribution is markedly different from that of the preceding Roman period, closely resembling later prehistoric spatial patterning. Early Medieval finds are widely dispersed across the study region, the previously exaggerated emphasis on specific focal points seen in the Iron Age and Roman periods generally abates, and concentrations of finds are more broadly distributed along larger stretches of the river. Examples of this include the reoccurrence of hotspots in the stretches between Reading and Wargrave, Taplow and Maidenhead and between Windsor and Staines, averaging a distance of 8.5 km.

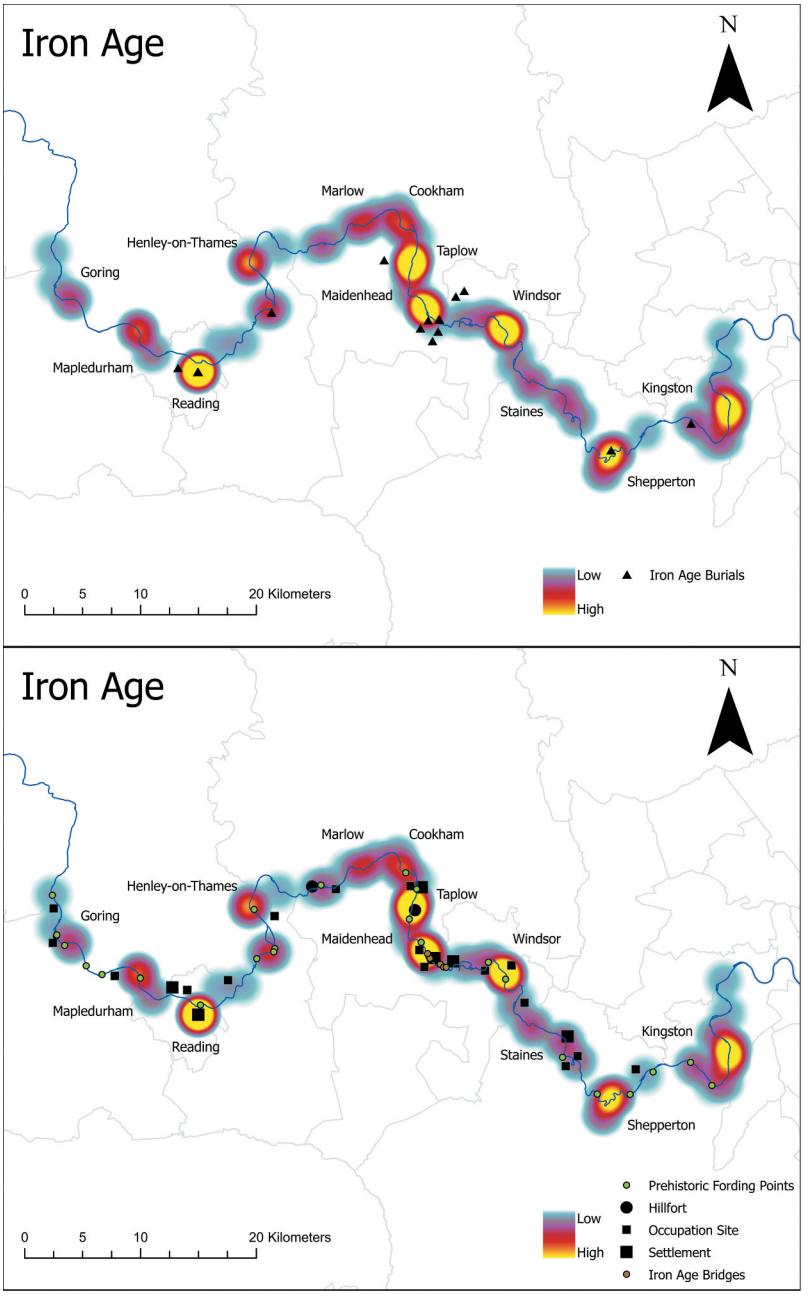

Figure 10. Kernel density estimation of Iron Age finds from the Middle Thames with burials (above) and settlements/crossing points (below).

A major impact of this broader distribution pattern, marking a significant shift from the Roman period, is the increasing prominence of hotspots in rural, highly dispersed areas. There are multiple minor fording points which are not directly associated with any major settlement, which act as local foci for river finds in this period (Figure 14).

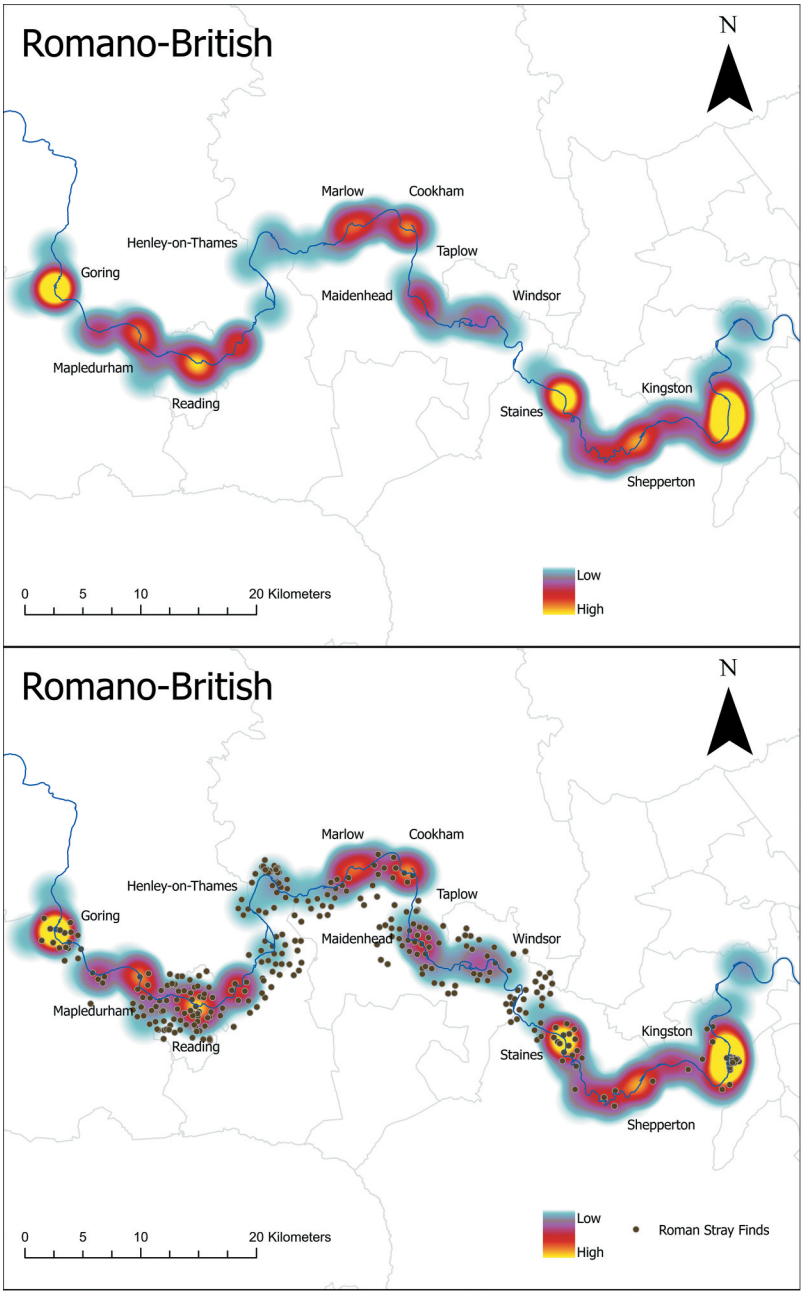

Figure 11. Kernel density estimation of Romano British finds from the Middle Thames (above) with terrestrial stray finds (below).

Examples of such fords are particularly prominent in the western Middle Thames, such as those at Pangbourne, Mapledurham, Wargrave and Hurley. The significance of rural crossing points in this period is further suggested in the distribution of terrestrial stray finds, which directly cluster around known rural fording points.

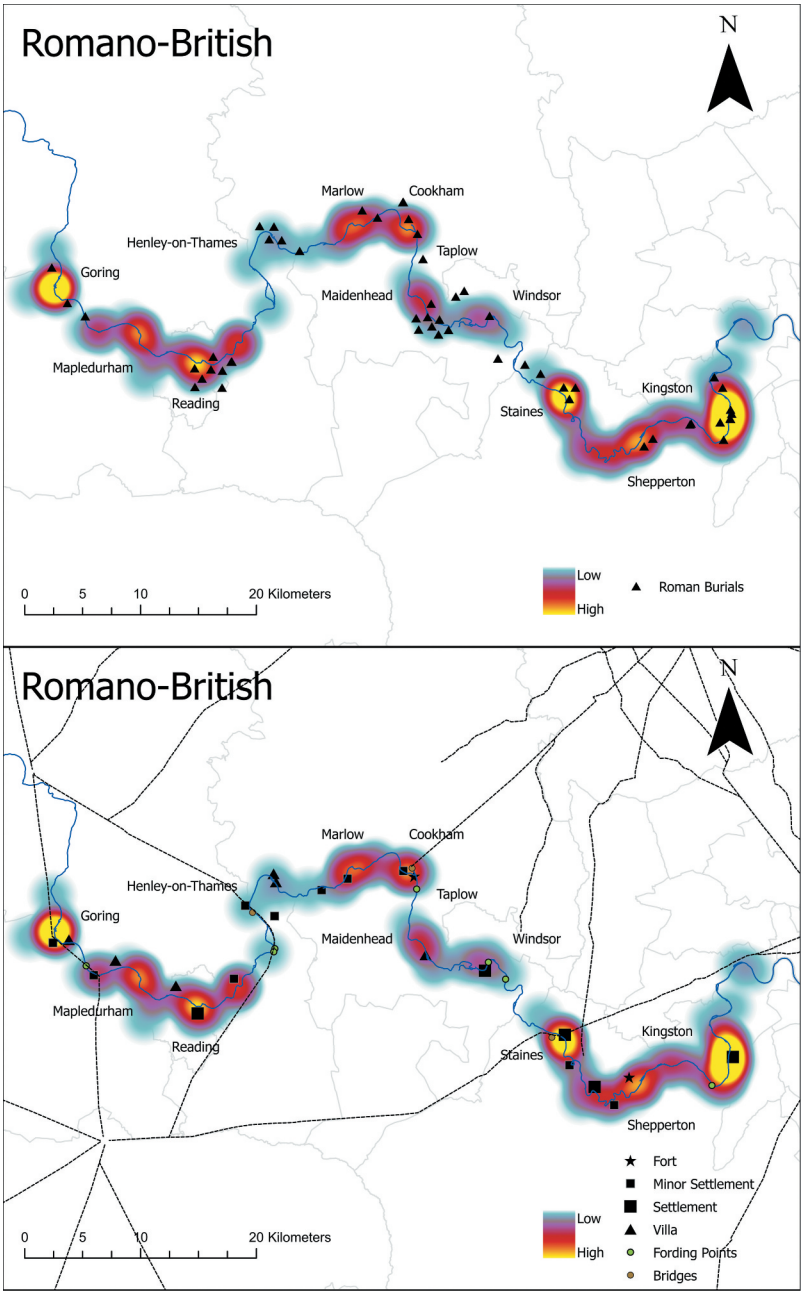

Figure 12. Kernel density estimation of Romano British finds from the Middle Thames with burials (above) and settlements, crossing points and major roads (below).

Higher-density concentrations of finds are more closely associated with known bridges, with the greatest concentrations strongly correlating with bridges within nucleated settlements, but it should be noted that rural bridge sites, not associated with any major settlements, also consistently display a higher density of finds than rural

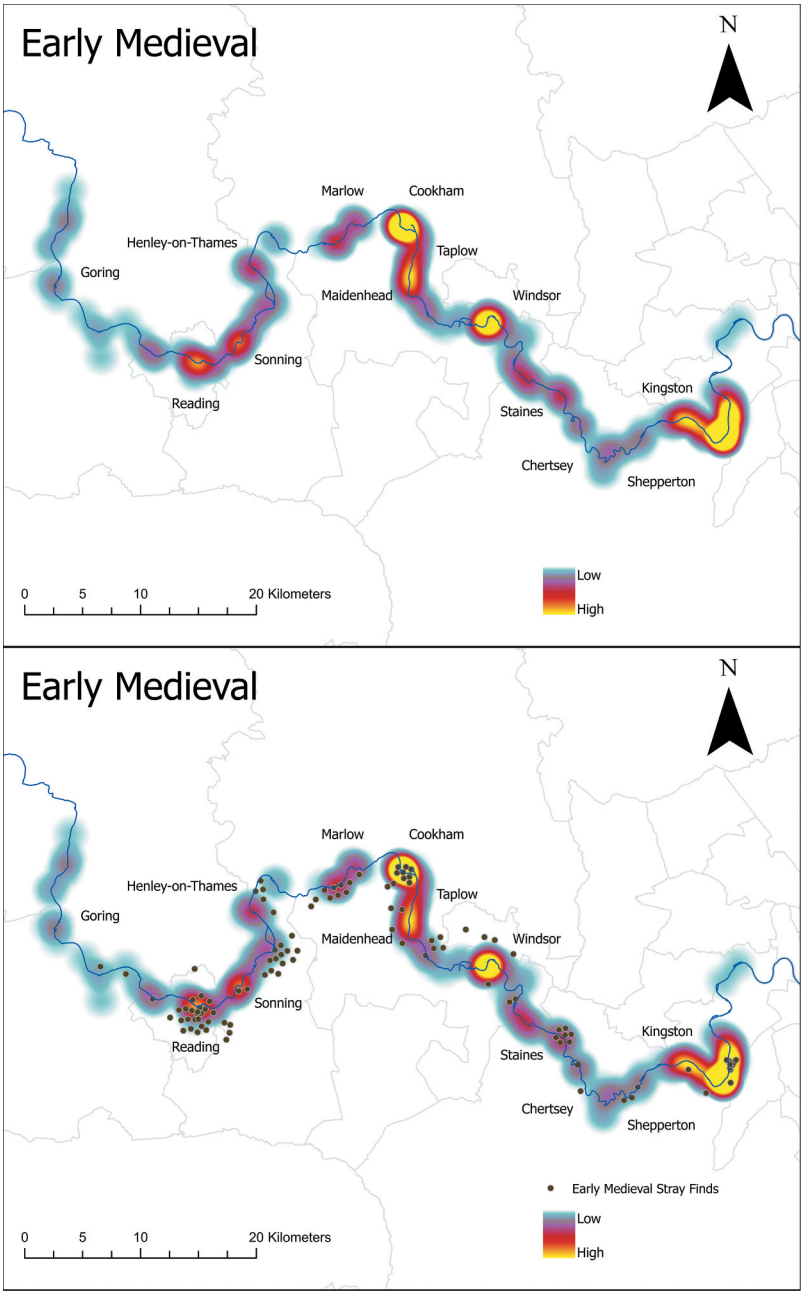

Figure 13. Kernel density estimation of Early Medieval finds from the Middle Thames (above) with terrestrial stray finds (below).

fording sites. The increased significance of bridges over fords in this period is similarly reflected in the tighter clustering of terrestrial stray finds around both rural and centralized bridge sites. In addition, many rural crossing points, primarily rural bridge sites strongly associated with high-density find spots, display a clear spatial relationship

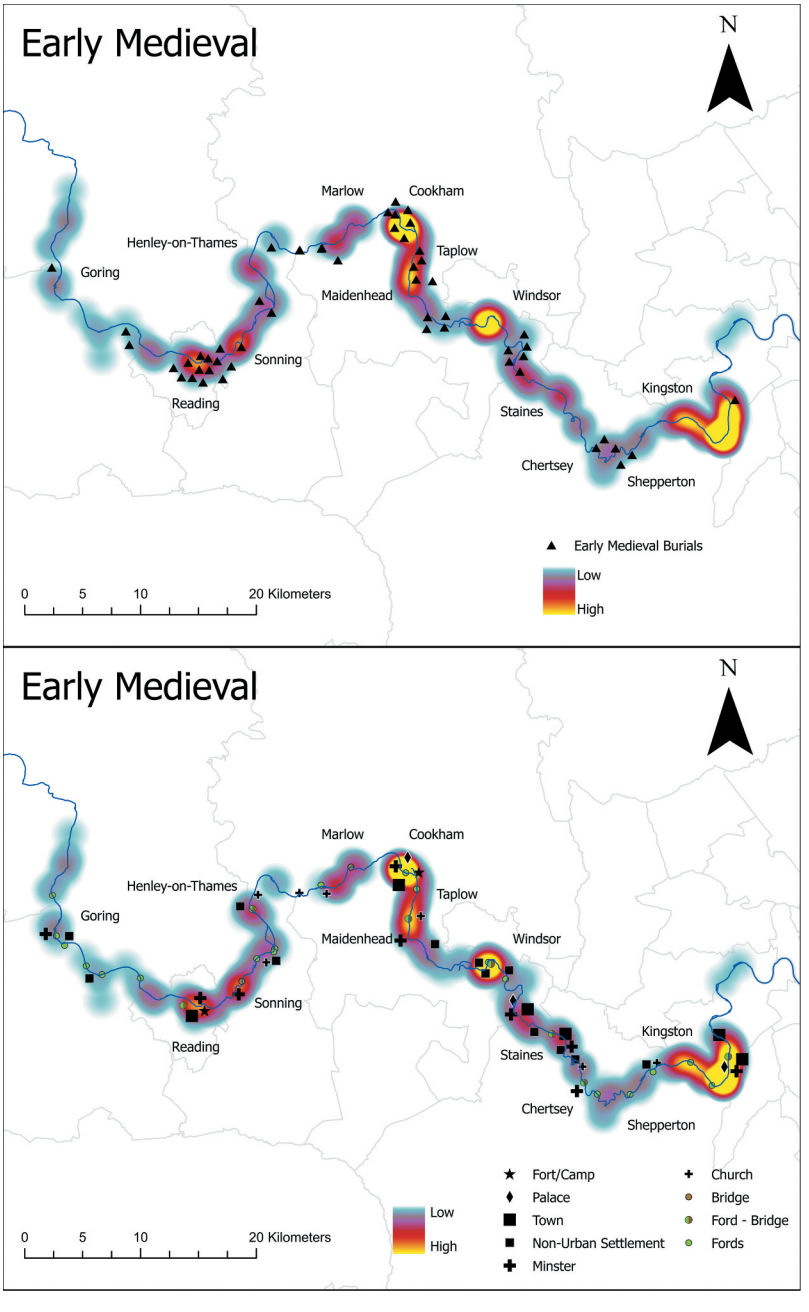

Figure 14. Kernel density estimation of Early Medieval finds from the Middle Thames with burials (above) and settlements/crossing points (below).

with religious sites, often being located within proximity to parish churches or monastic communities such as Cookham and Bray.

Whilst crossing points are demonstrably linked to the distribution of river finds in this period, the previously observed connection between high-density findspots and

major settlements is still present, though significantly altered. Previously important Roman crossing points such as Staines (*Pontes*) and Henley-on-Thames are underrepresented in this period, potentially reflecting the diminishing significance of the Roman infrastructure network. Instead, new centralized crossing sites, likely maintaining bridges and/or ferries, witness the greatest rates of deposition in this period, including Reading, Cookham, Old Windsor and Kingston-on-Thames. Notably, these locations are all associated with important religious sites, and in the case of Old Windsor, Kingston and Cookham, also represent the location of royal residences.

Discussion

This study is the first to provide a long-term, multi-period overview of riverine deposition across the entirety of the Middle Thames region. The study of river finds at this scale necessitates grappling with a large and methodologically challenging dataset, drawn from a wide variety of previously isolated sources. Through directly acknowledging and managing the inherent limitations of 'low resolution' or 'fuzzy' finds data, shaped by complex formation processes and recovery practices, it is possible to identify new patterns in the rate of deposition, composition and spatial distribution of Middle Thames finds over the *longue durée* (c. 2200 BC–1100 AD). Critically, these patterns have not been interpreted in isolation, but are further contextualized against their local archaeological environment, encompassing the long-term changing relationships between settlements, terrestrial stray finds, burials and environmental transformation in the Thames Valley.

Bronze Age

The depositional profile for the Bronze Age Middle Thames generally aligns with broadly established patterns, although the absolute quantity of material identified here is remarkably high. The intensifying rate of deposition throughout the period, culminating in a major peak during the LBA conforms with trends established by earlier studies examining Bronze Age river-metalwork (Bradley 1998; Ehrenberg 1980; York 2002) and fits supra-regional patterns of intensifying bronze deposition across North-West Europe, encompassing river finds, terrestrial hoards, and terrestrial stray finds (Arnoldussen 2015; Fontijn 2012; Griffiths 2023; Knight 2022).

Notably, however, the total quantity of Bronze Age material attributed to the Middle Thames is significantly greater than suggested by previous regional assessments (Humphreys 2019; York 2002), a difference attributed to the inclusion of previously overlooked 'low-resolution' data and non-metal finds.

Turning to the composition of the Bronze Age assemblage, the general emphasis on weaponry is similarly unsurprising; weapons and martial objects comprise 56% of all Bronze Age finds from the Middle Thames analysed here. The general abundance of bronze weaponry recovered from all sections of the Thames has garnered significant attention for decades (e.g. Evans 1881; Lawrence 1929), shaping general expectations regarding 'typical' depositional behaviour amongst British prehistorians (see Hume 1956; Mullin 2012).

Compositionally, the specific types of weaponry identified in the Middle Thames generally conform with established typochronological trends observed in Britain and Northern France (cf. Colquhoun and Burgess 1988). A prominent example is the Middle Bronze Age (MBA) sub-assemblage, which is primarily characterized by dirks and rapiers, largely superseded in the Late Bronze Age (LBA) by the prevalence of larger, leaf-shaped swords, mirroring patterns seen elsewhere (Burgess 1968; Knight, Boughton, and Wilkinson 2019).

Alongside confirming these well-attested patterns, this study provides empirical quantification for the striking abundance of spearhead depositions throughout the Bronze Age. Whilst noted previously (Bradley 1979; Ehrenberg 1980), the extent of their contribution relative to swords has been notably underemphasized in academic discourse. This relative underemphasis appears to be a by-product of both the traditional archaeological preoccupation with swords, which are presented as high-status, elite objects in contrast to the more commonplace spearhead (e.g. Bradley 2017; Raffield 2014).

It is therefore highly significant that spearheads consistently dominate the Bronze Age assemblage in the Middle Thames dataset (representing 19% of EBA, 46% of MBA, and 53% of LBA weapons analysed), firmly establishing them as the single most numerous weapon and object deposited within the region (swords, for example, by contrast, represent 0%, 4% (Rapier = 34%) and 36%). The broader implications of this pronounced dominance, as viewed across the longue durée, will be explored further below.

It's crucial to recognize that the emphasis on depositing specific types of weapons, such as spearheads, represents a gradual development during the Bronze Age, rather than a long-term tradition, or the continuity of a pre-existing phenomenon. Demonstrating this, the depositional profile of the Early Bronze Age (EBA) stands in stark contrast to that of later periods. During the EBA, the weapon assemblage predominantly features smaller blade forms, primarily bronze daggers (44% of EBA weapons) alongside blunt weapons in the form of LN-EBA stone mace-heads (23%), preceding the deposition of larger bladed weapons, such as dirks, rapiers, swords and spearheads in later phases.

Additionally, the EBA is characterized by significantly higher relative proportions of tools, in comparison to the MBA and LBA. Problematically, this 'tool focus', includes a large quantity of stone implements. It is important to acknowledge that it is impossible to provide a conclusive chronological attribution to many of these object types based on typological characteristics alone, and the lack of contextual dating evidence forces these objects to be assigned a broader date range, encompassing the Late Neolithic and Early Bronze Age transition (c. 2500 – 2200 BC). However, this issue is selective and does not apply to all stone 'tool' finds; certain objects, such as axe-hammers and stone 'copies' of bronze flat axes, can be attributed to the Early Bronze Age with relative confidence (see Needham 2018; Roy 2020). Notably, with potential Late Neolithic finds removed from the EBA assemblage, the observed 'tool focus' of the EBA declines, with 31% of EBA finds represented by bronze tools, predominantly flat axes (68%).

Therefore, whilst this 'tool focus' may feasibly represent a new EBA practice, it may also reflect continuity of earlier, well-established depositional behaviours (Lamdin-

Whymark 2008). Previous studies have indicated that the broader phenomenon of intentional riverine deposition likely began in the Later Mesolithic (c. 6000 – 4100 BC) and may have intensified in the Neolithic (c. 4100 – 2500 BC) (see Adkins and Jackson 1978; Bradley 1984).

However, the character of riverine deposition across these earlier periods is poorly understood, at least relative to later prehistory. Whilst previous cornerstone studies (e.g. Adkins and Jackson 1978; Field 1989) have attempted to map the changing typological composition and distribution of stone tools recovered from the Thames, more recent work has highlighted significant methodological flaws, suggesting that identified Mesolithic and Neolithic findspots are drastically misrepresentative due to the impact of cumulative morphological change, recovery biases and poor understanding of riverine recovery methods (see Haughey 2009).

This lack of comparative spatial data makes it difficult to directly connect earlier and later prehistoric river deposition, particularly in relation to period-specific, concentrations of deposition in the landscape. The issue is exacerbated further by the potential for stone implements to be variably interpreted, both as tools and potentially, weapons.

The categorization of an object as a weapon hinges on an object being directly intended for martial activity, or alternatively, possesses the potential to be used for violence, a quality, which problematically, can be applied to almost any object (Vandkilde 2015). Prehistoric stone tools, including handaxes, adzes and 'Thames picks', broadly fit within the latter criteria, despite widespread acknowledgement that of their myriad potential functions, violence was not likely their primary role (A. Roy, Crellin, and Harris 2023). Moving beyond stone implements, it is also worth noting that the distinct categorization of any object within discrete functional categories is inherently problematic; almost every object is capable of mutli-functionality, and could feasibly be categorized by any of its various functions, for example a knife can simultaneously and interchangeably act as a weapon, tool or an item of personal adornment (see Knox 2016). However, the broad scope of this study necessitates categorization, and therefore, objects have been broadly classified based on their primary use-function.

The deposition of stone implements throughout the Mesolithic and Neolithic could feasibly represent the deposition of 'weapons', it is unlikely this practice reflects direct, long-term continuity of martial deposition. The subsequent emphasis on explicit 'weapon' forms from the MBA onwards appears to be a distinct shift, regardless of how this earlier material is interpreted. However, the ideological precedent does appear to emerge within the broader Late Neolithic – Early Bronze Age with the creation of specialist, non-utilitarian weapon forms, such as stone mace heads.

It should also be noted that this was a period witnessing the ongoing simplification of the river system, from an initial braided, fast-flowing form to a gradually deepening meandering channel, with woodland clearance beginning earnestly in the Neolithic and intensifying during the Early Bronze Age, preceding the development of extensive riverine wetlands in the MBA and LBA. The deposition of tools or 'multi-purpose' objects, not weapons, within entirely different environmental conditions reinforces the suggestion that the pronounced weapon-centric deposition seen later is a distinct development, not an intrinsic characteristic or 'baseline' for prehistoric river deposition. It is also important to note that tools are far more commonly and widely deposited

within the terrestrial environment when compared to weapon deposits across the entirety of the British Bronze Age (Bradley 2017; Griffiths 2023), further suggesting the developing martial preference for riverine deposits represents a distinct and highly structured category of depositional behaviour.

Turning to spatial patterns, the distribution of Bronze Age finds recovered from the Middle Thames further reinforces the suggestion of selective deposition within specific landscape contexts. Whilst finds are highly dispersed across the study region, this analysis identifies significant concentrations emerging within key stretches, most prominently between Maidenhead-Taplow and Kingston-Teddington. Although previous research has highlighted the significance of the eastern Middle Thames more generally (Allen, Gill, and Miles 1997; Bradley 1990), the methodology employed here, incorporating low-resolution data, provides for a clearer definition of specific high-density hotspots.

Before exploring these new patterns, a pronounced eastern bias in the distribution of Bronze Age finds is immediately apparent. This tendency has been noted previously in studies of Bronze Age metalwork (Ehrenberg 1980; York 2002) and is generally attributed to recovery bias, resulting from the intensive London-centric dredging programme of the late 19th and early 20th centuries. However, whilst certainly plausible, it is important to emphasize that the specific spatial impact of recovery practices (including dredging) upon the archaeological record has yet to be directly quantified for the non-tidal Middle Thames. Therefore, interpreting the extent to which this pronounced eastern distribution reflects genuine archaeological patterning versus recovery bias requires caution and remains an area that warrants further investigation.

Riverine deposition across the Middle Thames appears to be deliberately focused on specific terrestrial deposits and features, but not uniformly. The positive spatial correlation observed between hotspots of river finds and terrestrial stray finds suggests that riverine deposition was embedded within a broader schema of deposition within the landscape; these were not isolated acts being performed in empty, liminal backwaters, but took place within an 'active' socio-cultural landscape, directly adjacent to occupation sites, agricultural land and routeways where the casual loss and discard of material culture was frequent. However, the noted divergence within the dataset, wherein terrestrial finds lack the aforementioned eastern bias of river finds, often clustering around riverine 'cold spots' is equally significant. The data appear to suggest that whilst riverine deposition occurred generally within 'active' landscape zones, the specific choice to deposit material in the river followed a highly selective, underlying logic, distinct from that governing the deposition of terrestrial finds.

A clear distinction is maintained between high-density 'focal points' of river finds and Bronze Age burial sites. Burial sites consistently remain peripheral to the densest hotspots of river finds, but are consistently within close proximity. This relationship may represent a conceptual partitioning of the landscape, possibly reflecting distinct underlying ideas governing where it is appropriate to place the dead within the landscape versus depositing objects within the river.

It is important to note that whilst burial sites are peripheral to riverine hotspots, their relative closeness and the consistency of the peripheral spatial relationship suggest they occupy related zones within the same landscape, rather than representing entirely separate reflections of distinct mental geographies. Previous research based on the

foundational work of Walter Torbrügge (1972), has hinted at mutual exclusivity between weapons deposited in funerary contexts and weapons deposited within rivers, suggesting the latter finds may represent the only archaeological trace of the practice of riverine burial (Bradley 1979; Ehrenberg 1980). The patterns reflected in this dataset are perhaps better understood as evidence of the deliberate spatial organization of a broader depositional landscape, rather than reflections of mutually exclusive spheres of behaviour. Within this organized landscape, specific zones along the river are favoured for deposition, whilst other areas are deemed suitable for funerary deposition, all of which occurred against the backdrop of a living, active landscape.

The strongest and most immediately apparent spatial correlation exists between high-density hotspots of river finds and river crossings, which during the Bronze Age were overwhelmingly likely natural fords, given the scarcity of evidence for bridges or ferry crossings from this period (Parker et al. 2008).

Crucially, the finding that the highest find densities occur specifically when these fords are directly adjacent to settlement sites, invites further connection between riverine deposition and the wider depositional landscape. Whilst previous studies have emphasized the inherent liminality of the riverine environment, viewing rivers through the lens of distinct socio-political and ritual boundaries (cf. Bradley 1990), the concentration of finds at the direct interface between fords and adjacent settlements suggests a closer integration. Rather than occurring within marginal, mentally distant or 'othered' space, the most intensive deposition appears focused precisely on key crossings where the river was most strongly embedded within the lived experience and conceptual geographies of nearby communities. It suggests that the interface between the settled community and the river was a particularly potent or appropriate zone for the most intensive depositional acts. Performing these acts at primary crossing points, which would undoubtedly function as local-regional routeways, may have served multiple purposes, potentially embedding socio-cultural memories or claims to the landscape (e.g. Fontijn 2002; York 2002), mediating the human relationship with the river itself (e.g. Bradley 2000), or providing an avenue for social performances to be enacted at the intersection between the local, inhabited and wider, travelled worlds (Brück and Fontijn 2013; Fontijn 2002).

Interpreting the concentration of finds at crossing points inevitably intersects with the long-standing dichotomy between 'votive' and 'mundane' explanations for river finds. Such locations, likely acting as hubs of local transit and supra-regional activities, would undoubtedly witness both accidental losses and the casual disposal of non-meaningful objects, forming 'mundane' deposits. However, as multiple previous studies have identified, explaining the sheer quantity and specific character of the deposited material, predominantly valuable weaponry, solely through accidental loss and casual disposal seems inadequate (Bradley 1990; Ehrenberg 1980). Whilst accidental loss and mundane factors such as the erosion of riverside middens likely contributed to the assemblage, the intensively focused deposition of high-value, predominantly martial objects at these specific loci suggests deliberate deposition, likely embodying ritual or symbolic significance, was undoubtedly a major factor. Rather than a strict dichotomy, perhaps these locations represent points where otherwise distinct conceptual boundaries blurred; the inherent significance of a safe crossing point near settled communities may have rendered it an appropriate place for deliberate deposition, in the form of

votive offerings, structured discard (e.g. middens), or social performance, occurring alongside the inevitable losses of day-to-day activity.

Iron Age

In stark contrast to the preceding Bronze Age, the Iron Age is characterized by a striking and immediate decline in the quantity of recovered river finds, with the fewest finds of any major period in this study. This apparent 'dearth' of Iron Age material, particularly relative to the LBA peak, aligns with general observations noted in earlier scholarship (Bradley 1990; Ehrenberg 1980; Hingley 2006), but demands careful interpretation within its broader geographic and chronological context. Understanding this shift is inherently problematic, it is likely the result of a combination of several influential factors. The most immediately obvious of these are post-depositional factors, including the lower rate of survival of iron objects in the riverine environment and recovery bias, the poor visibility of iron objects, and documented preference for bronze finds amongst dredging crews (Lynch and Lynch 1968).

While these taphonomic factors and recovery biases undoubtedly contribute in some fashion, the scale of this change suggests a shift in the underlying depositional behaviour. Moreover, it is important to note that many Iron Age finds feature bronze components or are wholly bronze in composition and any such objects would effectively circumvent the aforementioned recovery biases, as illustrated by the opening example of the Cookham dagger and its bronze scabbard.

This scarcity of riverine finds is not an isolated phenomenon, but is consistent with a broader, pan-British decline in the frequency of deposition across all contexts, including terrestrial hoards, grave goods and other deposits in watery places (e.g. bogs and lakes) (see Yates and Bradley 2010), as discussed earlier.

Despite this marked reduction in the overall frequency of deposition during the Iron Age, analysis of the assemblage composition demonstrates a general continuation of several established trends. Weaponry, whilst declining proportionally throughout the periods, from 51% of EIA finds to 21% of LIA finds, remained a highly significant category overall, accounting for 40% of all dated IA finds. Notably, the types of weapons deposited remain broadly consistent with the most prevalent weapons of the preceding Middle and Late Bronze ages, with the dominant object classes being swords and spearheads. However, the general dominance of spearheads observed throughout the MBA and LBA is replaced by a focus on swords, particularly in the LIA. Other sword-related objects, such as chapes and scabbards, are also more prominent in this period than in any other covered in this study. This shifting preference from spearheads to swords through time suggests that whilst there is a degree of martial continuity, the objects considered appropriate for deposition, the underlying 'depositional grammar' governing which specific objects should be deposited, remains malleable, and as deposition became more infrequent, it subsequently became more selective. This shift could be interpreted as a reflection of changing socio-economic ideas, reinforcing the significance of a hierarchical, martial elite (Hingley 1990; Pearson and Field 2003), the selective deposition of swords, often with scabbards, acting as a more potent expression of individual status, whilst deposition becomes rarer overall, and perhaps embodies a more conspicuously performative act.

Significant changes are also exhibited within the assemblage of deposited tools. The dominant tools throughout the Bronze Age, primarily axes, diminish significantly as they are replaced by agricultural implements, such as sickles and mattocks, alongside implements strongly associated with riverine fishing, in the form of needles, hooks and net sinkers.

Whilst this fishing equipment only represents a minor portion of the Iron Age assemblage (6; 3.5%), its presence warrants some discussion. Zooarchaeological evidence, particularly that from inland sites, consistently indicates a pattern of extremely low fish consumption, often interpreted as evidence of a widespread cultural taboo and intentional avoidance of freshwater fish in the later prehistoric diet (Dobney et al. 2007; Jay 2008). Dobney et al.'s (2007) foundational study, demonstrated that fish constituted a vanishingly small proportion (c. 0.01%) of identified bone even at sites that were sieved, concluding that the dietary role of freshwater fish in the Iron Age was negligible.

Initially, the juxtaposition of the archaeological evidence, with the recovery of functional fishing equipment set against a general scarcity of evidence for the consumption of freshwater fish, appears to present a challenge to the perceived scarcity of freshwater fishing in later prehistory. However, the presence of such minor quantities of fishing equipment does not fundamentally challenge the general consensus that Iron Age freshwater fishing was not practiced at any significant scale. Instead, it appears to suggest small-scale, localized activity. If interpreted through the lens of a widespread taboo, this may indicate procurement of fish for non-dietary purposes, such as bait for other hunting or to be exploited for other raw materials, reflecting a functionally limited engagement with riverine resources. However, the limited nature of the assemblage and the limited general understanding of Iron Age fishing practices across Britain make any interpretations largely speculative.

This broader compositional change in the riverine assemblage, with increasing diversity in the types of object deposited, may reflect evolving human interactions with the river and the adjacent landscape, potentially linked to the intensification of arable farming and changing hydrological conditions of the river itself, perhaps reflecting increasing exploitation of or changing interaction with the river as it morphologically simplifies, becoming deeper and shallower.

It should be noted that previous interpretations of Bronze Age metalwork from the Thames have noted the absence of agricultural equipment relative to axes, suggesting that agricultural tools are more suitable for terrestrial deposition in hoards (Ehrenberg 1980).

Assessed together, these shifts in both weapon and tool deposition suggest a fundamental restructuring of the depositional landscape between the LBA and the Iron Age. Beyond compositional changes, the spatial distribution of Iron Age finds provides further evidence of this. The marked tendency for finds to cluster tightly around specific focal points, typically recurring Bronze Age hotspots, rather than exhibiting the broader dispersal across large stretches seen previously, indicates a changing relationship with the wider depositional landscape. The increasingly concentrated deposition patterns within the river, occurring alongside a rapid decline in the quantity of finds deposited, align with suggestions from other scholars that Iron Age depositional practice may have increasingly favoured other contexts, specifically non-riverine wetlands, which have been tenuously linked to emerging cult sanctuaries or

'natural' temples (Hansen 2013; Treadway 2023). It is important to note that even with acknowledgement of other 'watery place' finds potentially replacing riverine deposition, recent research suggests that deposition across all contexts, including terrestrial hoarding and deposits in wetlands or other still-water contexts (e.g. bogs and lakes) demonstrate a marked decline in comparison to earlier periods (Crease 2015; Hingley 2006; Treadway 2023; Yates and Bradley 2010).

It could be argued that the changing composition, tightening spatial distribution and overall decline suggest the underlying rules governing deposition become increasingly restrictive throughout the Iron Age, concentrating the reduced number of highly specific depositions to fewer, specific locations. The changing relationship between river deposits and terrestrial features further underscores this transition. The absence of any discernible relationship between river finds and contemporary burials signals a departure from the structured, albeit peripheral relationship observed in the Bronze Age, suggesting a changing organization of the lived and mental landscape. Conversely, the connection with crossing points, which are represented by each major recurring hotspot, appears substantially reinforced.

The emphasis on emerging bridges and stable, permanent fords may reflect the changing physical and mental landscape. Intensifying agricultural activity and floodplain clearance throughout the Thames Valley resulted in the Thames simplifying, by which the river became deeper, slower and susceptible to intense flooding (Nicholls et al. 2013). This change would likely cause many fords to become far less reliable, with increased flood scour displacing gravel bars, which would have permitted crossings in shallower sections of the river (Campbell 2023). These changes likely fundamentally altered human perceptions of the Thames as an increasingly hazardous, unpredictable entity. Therefore, bridges and stable crossings between settlements may have assumed an elevated status as dually functional and symbolic places, necessary to navigate the physical and mental landscapes of the Middle Thames valley.

In addition to changing the hydrology and morphology of the Thames, agricultural run-off and reduced flow would increase alluvial suspension throughout the water column, rendering the water dark and turbid (Campbell 2023; Gooley 2016). As noted by Cooper (2006) changes to visibility would have rendered crossings at fords far more difficult. Cumulatively, these changes may have reinforced a perception of the Thames as a dangerous, liminal entity.

Alternatively, this visual change may have fundamentally shifted the perceptual, lived experience of the depositional landscape and directly impacted the underlying principles governing where objects should be deposited. Metal finds are noted to be highly visible under suitable conditions, and many anecdotal accounts of change recovery acknowledge visually identifying metalwork underwater, *in-situ*.

> there was the boatman at Chiswick who was about to moor his craft in a backwater when **he saw something gleaming beneath the surface of the water**. He reached down for what he hoped would be gold and recovered a fine, Bronze Age, socketed axe-head. (Hume 1956, 49)

This anecdotal example from Ivor Hume explicitly refers to a unique quality of bronze, which is often overlooked, its visual similarity to gold. Most recently, Jill York (2002, 91) has hinted at this attribute, tentatively suggesting that depositing bronze objects into water symbolizes the sun 'sinking into water'.

The Thames darkening may have diminished the visual significance of earlier depositional locales, where recognizing the crossing point itself and understanding its significance in the depositional landscape, may have relied on visually identifying deposits within the river. Bridges and the visual markers of a ford may therefore not only represent a fixed and controlled crossing, but a semi-permanent or permanent *place* providing defined points of interaction with the river, visible above the now obscured riverbed. However, current understanding of the specific hydrological conditions in the Middle Thames is limited, making any suggestion of visual change within the landscape highly speculative.

Roman

In stark contrast to the later prehistoric material, the deposition profile of the Roman Middle Thames is rather surprising. The period witnesses a distinct resurgence in deposition, particularly in the Later Roman period from the third century AD onward, but it is characterized by a profound compositional shift. The previously established template, where prestige metalwork and weaponry dominate the assemblage, effectively collapses. Weapons become statistically insignificant, accounting for less than 2% of dated finds (Figure 3). Instead, the assemblage is characterized by entirely different material categories, primarily vast quantities of pottery and coins.

This compositional change is particularly surprising given the acknowledged antiquarian bias towards Roman metalwork finds. It is well attested that during the 'golden age' of British antiquarianism, collecting weapons and martial equipment recovered from the Thames was in vogue amongst the British upper classes (Black 2000), and any material which could be tentatively identified to be Roman fetched a far higher price in comparison to objects which were pre-Roman and 'barbarous' or post-Roman and 'gothic' (Lynch and Lynch 1968). Consequently, the distinct lack of weapons or military paraphernalia recovered from the Middle Thames suggests not only a genuine absence of such objects, but also that this period represents a significant departure from the established prehistoric martial character of the river.

Instead, the prevalence of pottery, coins and domestic objects points towards different underlying motivations and depositional pathways influencing the assemblage. It is difficult to contextualize the Middle Thames dataset within the immediate Roman landscape, as dedicated analysis of Roman period finds from the non-tidal Thames has been limited, perhaps contributing to the 'surprising' nature of the depositional profile. The Middle Thames dataset does contrast markedly with assemblages recovered from major continental European rivers, particularly those along militarized frontiers (cf. Franconi 2023; van de Zande 2023). Similar disparities are seen with Northern British sites such as Piercebridge, where the assemblage contains both military and civilian objects (Eckardt and Walton 2021). The scarcity of any military finds in the Middle Thames dataset likely reflects its position as a non-militarized, non-frontier zone post 43 AD (see Mattingly 2006). Distinguishing intentional deposition from accidental loss and casual discard becomes exceptionally difficult with such a highly limited assemblage. Whilst specific votive practices in riverine contexts, such as coin offerings, are well attested and remarkably commonplace across the Roman provinces

(Eckardt and Walton 2021; Watts 1998), the heterogeneous nature of the assemblage more widely complicates a straightforward ritual or mundane interpretation.

Spatially, the distribution of Roman finds presents another significant departure from earlier prehistoric patterns, reinforcing the notion that human-river interaction has assumed a fundamentally different character. Whilst previously established hotspots do recur, others diminish, and the Iron Age trend towards clustering at specific focal points becomes increasingly exaggerated, manifesting through marked concentrations almost exclusively fixed around towns and villa estates. The relationships between river finds and terrestrial finds and features effectively disappear, with no discernible spatial relationship with terrestrial stray finds or local burial sites.

Instead, riverine deposition appears to have become intrinsically linked to population centres and the associated infrastructure network. The greatest densities of finds are consistently concentrated around major settlements associated with bridge sites and directly connected to major Roman roads. In contrast, rural fords and crossings yield very few finds and become depositionally insignificant. The focus towards settled places within the landscape is made apparent by the observed clustering around minor settlements and villa estates, typically independent of river crossings.

The overwhelming association with settled places, seemingly directly tied to larger, urban population centres, suggests that deposition in the Middle Thames reflects depositional patterns emanating directly from these centres. Increased settlement density and a potential increase in riverine traffic and trade may have contributed to a higher background level of accidental loss and casual discarding of refuse within the waterway. Simultaneously, the abundance of pottery and coins at these locations may reflect specific Romano-British votive traditions intimately tied to settlements and their immediate river frontages, entirely distinct from the 'martially' focused, broad landscape engagement prevalent throughout later prehistory.

Early Medieval

The transition to the Early Medieval period heralds yet another shift in the depositional profile of the Middle Thames. Following the peak observed in the Later Roman Period, the overall rate of deposition initially declines significantly during the Early and Middle Saxon phases (c. 400 – 900 AD), reaching levels comparable to the Iron Age. However, this dramatically reverses in the final centuries of the Early Medieval period (c. 901 – 1100 AD).

Compositionally, the period marks a dramatic reversal from the observed Roman pattern, with a distinct resurgence of martial deposits, particularly weapons. The large-scale deposition of coins and pottery, which cumulatively accounted for 88% of all Roman finds, diminishes abruptly, representing less than 10% of the Early Medieval assemblage. Instead, weaponry forms the dominant object category, accounting for 67% of all Early Medieval finds within the Middle Thames dataset (Figure 3). This martial character is broadly unsurprising; various authors have highlighted the Middle Thames as a significant Early Medieval depositional locale, acknowledging the general prevalence of weapon finds (Naylor 2015; Raffield 2014).

The specific composition of the weaponry sub-assemblage is perhaps more notable, particularly regarding the returning dominance of spearheads. Previous studies have

typically emphasized the presence of swords, which are treated as far more notable objects due to their position as the quintessential high-status, elite objects of the period, and their comparative rarity outside of funerary contexts (see Costello 2023; Reynolds and Semple 2011; Sayer, Sebo, and Hughes 2019).

It is therefore significant that within the Middle Thames dataset, spearheads are the most common type of object deposited overall, and in the Early Medieval period the rate of deposition for spearheads returns to a level of proportional significance not seen since the Bronze Age, averaging 82.6% of weapon finds per sub-period (Figure 4). The large quantity of Early Medieval spearheads recovered from the Thames, particularly the non-tidal Upper and Middle reaches, has been noticed consistently through time (e.g. Cuming 1857; Naylor 2015; Swanton 1974), but the position of spearheads as the dominant weapon, and by extension the dominant object, has not been fully explored.

A straightforward interpretation is that the higher proportion of spearheads simply reflects their comparative abundance in general circulation compared to rarer, high-status swords (Welton 2018). However, this does not account for the fact that the pronounced 'spear-focus' in the Middle Thames is a distinct regional characteristic. It contrasts sharply with other Early Medieval assemblages from other major rivers, such as the Witham in Lincoln, where swords are the dominant object from the eighth century onwards (Stocker and Everson, 2002), or the river Ljubljanica in Slovenia where swords consistently outnumber spearheads (Gaspari 2017).

Spatially, the Early Medieval period again marks a departure from the previously observed Roman patterning, with deposition more closely resembling that seen throughout later prehistory. Finds are widely dispersed across the study region, with notable concentrations re-emerging across broad stretches of the river, such as between Reading and Wargrave, Cookham and Maidenhead or Windsor and Staines, contrasting with the intensive urban clustering observed in the Roman period (Figure 13). Immediately, this appears to suggest a widespread shift in engagement, potentially encompassing a more expansive depositional practice, taking place within a wider, contiguous landscape.

The most prominent development in this period is the heightened significance of crossing points across the entirety of the study region, including both fords and increasingly prominently, bridges. Similarly to the preceding Roman period, the densest concentrations of river finds are directly associated with prominently located crossings, typically situated within settlements such as Reading, Cookham, Old Windsor and Kingston-upon-Thames. However, in contrast to the Roman period where the distribution of finds almost exclusively clustered tightly around urban settlements and their associated bridges, the distribution of Early Medieval finds, whilst similarly centred on crossing points, appears to be strongly structured in relation to religious sites.

Notably, all statistically significant concentrations of riverine finds are located less than 1 km downstream of the nearest Thameside Church or monastic centre, as well as averaging less than 0.5 km from the nearest crossing point (Figure 14). This clear spatial relationship between hotspots of riverine deposition and Early Medieval religious sites echoes tentative suggestions made in previous studies, most notably Naylor's (2015) overview of non-precious metalwork recovered from the Thames and is defined here in detail for the first time.

This broad pattern can be refined further when differentiating between crossing types. The densest concentrations of finds directly correspond to the sites of permanent bridges, the majority of which were constructed between 900 – 1200 AD and were associated with local monastic communities (Cooper 2006). This connection is not incidental; an injunction from a church council held in Gumley in 749, for example, freed monasteries from public obligations, with the notable exception of bridge work (Cooper 2006).

While Saxon charters make no explicit references to a similar duty maintaining fords or ferries, the close association between monastic establishments and river crossings is widely acknowledged, and not unique to the Thames. Stocker and Everson's (2002) work on the River Witham has convincingly demonstrated a robust connection between river deposition and the terminal points of causeways across the Witham, which are interpreted as jetties for ferry crossings, and appear to be directly controlled by local monastic estates, potentially representing a means of 'Christianising' a long-standing votive tradition (Stocker and Everson 2002).

It is therefore entirely plausible that the de facto control exerted over bridges by powerful local monastic orders in the Thames Valley may have extended further, potentially including oversight of any strategically or economically important fords, particularly any permanent, non-seasonal crossings within their territory. This responsibility, whether understood as an extension of the formal 'bridgework' obligation or a practical consideration to maintain local passage and exchange, placed monastic estates, which were themselves often focal points of the regional economy, wielding significant local influence and authority, in direct control of critically important, fixed crossings (Thomas 2013).

However, the presence of a bridge is not the sole determinant for a depositional hotspot. The highest densities of finds appear where a combination of factors intersect: a major, centralized crossing point, a high-status religious site (Minster) and a royal residence. The hotspots at Cookham and Kingston-upon-Thames, two of the most significant sites in terms of finds density, exhibit all three characteristics. Other major sites demonstrate varying combinations: Old Windsor features a palatial complex and a Minster but no discernible crossing, whilst Reading has a permanent bridge and associated Minster but no clear royal association. This suggests the most significant depositional locales represented a convergence of logistical, religious and secular authority. Even minor fords, such as those at Wargrave and Mapledurham, frequently function as local depositional foci when associated with a nearby church, reinforcing this relationship on a smaller scale.

The act of depositing weaponry at known crossing points takes on a greater significance when considered alongside the changing physical environment of the Early Medieval period. The previously discussed process of channel simplification was an ongoing, long-term change that intensified through time. A renewed programme of woodland clearance, extensive drainage of wetlands, and the construction of mill leats and weirs led to the Middle Thames becoming faster, darker and more susceptible to local flooding than its Roman or Prehistoric counterparts (Cooper 2006; Oliver 2013). These shifts, resulting in the river becoming more unpredictable and harder to see through, would have directly contributed to the increasing danger and unreliability of seasonal fords.

Consequently, viable fords and the newly constructed bridges replacing now untenable crossing points may have assumed greater status. The act of depositing weapons at these locations, maintained and controlled by a religious order, potentially in proximity to a royal residence, directly entwines and redefines the long-term behaviour of martial deposition with Christian religious ideas and authority (see Stocker and Everson 2002).

Within this framework, the Early Medieval period appears to reflect another complex restructuring of the physical and mental landscape, wherein environmental changes, shifting networks of authority and an increasingly 'Christianised' landscape are recognized through deliberate, highly contextualized deposition.

The semiotics of this restructuring are complex; polysemic objects in the form of weapons, primarily spearheads, which are inalienably linked to martial ideas, are deposited *en masse* in a newly redefined, ideologically charged landscape. Whilst this macro-scale phenomenon is reified through innumerable functionally identical actions, on a micro-scale, deposition is a highly individual, materially and experientially embodied act (Fredengren 2018).

To understand the significance of Early Medieval deposition as an embodied, individualized experience and account for the significant regional variations observed between the Middle Thames and other major rivers, we can perhaps turn to the ideological landscape of the period. For this, Old Norse skaldic poetry offers a potential conceptual framework. Whilst Anglo-Saxon literature lacks direct parallels for the ideas present in these sources, their application is justified by the widely acknowledged socio-cultural exchange and ideological diffusion between Early Medieval England and Scandinavia (Lavelle and Roffey 2015; Raffield 2014). Therefore, the following literary examples are not employed to suggest the direct transplantation of specific beliefs from one region to another, but to demonstrate an existing mental geography present in the broader, supra-regional, ideological landscape.

Old Norse poetry from the ninth century onwards frequently references the notion of a river filled with weapons. Examples include *'of the fire of the brook of weapons' (elds lækjar vápna)* or more directly '*river of weapons*' (*Gjǫll vápns*). Typically, river-weapon kennings are interpreted as metaphors for battle, but they also seem to represent rather apt descriptions of an archaeological reality (see Lund 2010). In several instances, they appear to support the notion that a river may be primarily associated with a particular type of weapon e.g. *'river of the spear' (fleina sÿr*) or 'the *stream of spear points* '(*flauma odda*) (Nordberg 2016, 25; Sahlgren 1927, 69–77, 113–141; Wolf 2008, 935).

The same idea is present in the description of rivers in Norse mythology, the river Geirvimul 'the spear-filled' or 'spear-teeming' contrasts the river Slíðr 'the sharp', which is described as being filled with knives and swords, or the river surrounding Valhall (*Valglaumr* or *Thund*), within which 'the sword thrives' (Af Edholm 2021, 233–234; Larrington 1996, 8–9). These Scandinavian literary examples provide a plausible conceptual lens through which to approach mass-weapon deposition, allowing the contrasting assemblages of the Middle Thames and the Witham to be understood not as contradictory, but as parallel expressions of distinct regional traditions where a river could be defined through an association with a specific class of object.

As well as referencing the broader macro-scale phenomenon of weapon deposition in rivers, the materiality and physicality of individual weapon deposits are also

explored within Scandinavian literary sources. Scandinavian poetry frequently makes use of kennings, compound metaphor-expressions, which consistently describe weapons through references to aquatic imagery. Whilst the specific linguistic association is highly variable, including links to serpents, semi-aquatic birds and marine mammals, the most common association is to link bladed weapons with predatory fish.

For example, a sword may be referred to most simply as 'the fish' (*fiskr*) or by way of a kenning, 'the glittering fish of the shield' (*fránhvítinga rítar)*, whilst a spear may be referred to as 'the wound-salmon' (*sár-lax*) or 'the corpse-trout (hræ-birting*a*) (Grove 2022, 650; Nordberg 2016, 233; Poole 2012, 348). The specific connection is also suggested directly through named examples, such as the sword name '*Fiskhryggr*' or 'Fish Spine' (Ellis-Davidson 1962, 167).

Whilst this has been linked to the visual effects of pattern-welding or the flash of blades during battle (Af Edholm 2021; Nordberg 2016), this distinct visual attribute whereby weapons are directly acknowledged to 'flash' and appear 'fish-like' bears a striking resemblance to Ivor Hume's anecdote, wherein an unnamed boatman spots a socketed bronze axe 'gleaming beneath the surface of the water' (Hume 1956, 49).

Similar instances of metal finds being identified *in-situ*, underwater, appear semi-frequently in both antiquarian and modern accounts. Further examples include the Gilling sword, discovered by a boy playing in a tributary of the River Swale (Yorkshire Museum 2025), or the Lugg Spatha, found by a dog-walker in Herefordshire (Marston 2025). Notably, in each instance the finder was not actively treasure-seeking but discovered the object through chance after noticing a 'glint' in the water.

Conclusion

Over the last fifty years, the study of riverine archaeology, and more specifically the study of archaeological material recovered from rivers, has developed dramatically. Before the 1990s, British and European archaeologists often conceptualized rivers as passive entities, lines on a map that functioned as potentially infinite repositories of archaeological finds, detached from their physical reality. This led to rivers frequently being treated as one-size-fits-all vessels, broadly understood as ritual contexts but with attention firmly centred on the artefacts themselves. Recent research demonstrates a marked change in perspective, the 'movement turn' in archaeology has placed rivers at the centre of discussions regarding mobility and inter-regional connectivity in prehistory (Brudenell et al. 2024), whilst Romanists and Early Medievalists are increasingly embracing rivers as a means of tracing identity within changing cultural landscapes (see Arnold 2024; Eckardt and Walton 2021; Tibbs and Campbell 2023).

Yet, a widespread disconnect between many archaeologists and the lived, physical reality of rivers appears to persist. Perhaps the most tangible example of this disconnect is Moucheron's (2023, 1) anecdote of a speaker who claimed rivers were the 'motorways of prehistory', only to recount without irony that their modern motorboat had been overpowered by a river's current during fieldwork. It is not difficult to understand why this disconnect exists. Rivers are complex entities, and uniquely problematic archaeological contexts. Rivers are inherently dynamic, they are defined by a constant flow of water, with specific hydrological conditions and their morphological characteristics in a state of perpetual change; this constant flow allows objects

and sediments to be transported within the water column and scour from flooding can unearth and redeposit objects on a semi-regular basis (Campbell 2023). In short, rivers move.

The complexity of these riverine dynamics presents a significant methodological challenge to archaeologists: the 'low-resolution' (spatially) deposits common to rivers, and the nature of an inherently 'active' context, are fundamentally incompatible with many traditional forms of archaeological analysis, particularly precise mapping or contextual analysis. This inherent difficulty has often incentivized a simplified conceptual approach, where the river is treated as a generic ritual backdrop or simply ignored, rather than being understood as a complex depositional environment. In effect, the river on paper and the physical river become entirely separate entities, and it is easy to see how Moucheron's speaker might have reflexively disconnected the two.

This tendency is reinforced by an additional structural problem of disciplinary isolation. By studying each chronological period independently, the long-term physical evolution of the river-system, and the changing human–river relationship is obscured, making it easier to overlook the changing physical reality and depositional profile of the river. Consequently, the combination of these methodological challenges and the separation of period-specific studies has, until now, prevented a holistic, long-term perspective from developing.

This study was developed as a response to these challenges, alongside the repeated calls for a *longue durée* approach to transcend period-specific narratives (e.g. Bradley 1998; Naylor 2015). This paper has sought to resolve the methodological hurdle presented by the large, but poorly provenanced assemblage of finds recovered from the Middle Thames by employing a novel methodological approach directly incorporating 'low resolution' data and spatial uncertainty. By contextualizing emblematic finds such as the Cookham Dagger, within the totality of the wider archaeological record, it has been possible to move beyond the innate spectacularism of previous studies and demonstrate that it is possible to identify profound shifts in depositional behaviour over three thousand years of human activity.

This analysis has not revealed an unbroken, continuous depositional tradition, but rather demonstrated that river deposits throughout the Middle Thames Valley reflect a series of distinct and environmentally contingent depositional regimes. The Bronze Age depositional profile sees the rapid intensification of martial deposition across large stretches of the riverine landscape, with a gradually intensifying preference for larger bladed weapon forms and a notable long-term preference towards spearheads. This is supplanted in the Iron Age by a dramatic decline in the frequency of deposits and a shift towards increasing selectivity in terms of the content and location of deposits. The Roman period marks a complete reconfiguration of previously observed patterns, where the civic and potentially votive character of the assemblage contrasts sharply against both the militarized assemblages seen in Roman provincial frontiers, as well as the weapon-focused deposition of later prehistory. The Early Medieval period reverses this change, with the re-emergence of martial deposition, now spatially organized within a new framework of ecclesiastical and developing seigneurial power. The return of the spearhead as the overwhelmingly dominant find in this period demonstrates an example of long-term significance amidst profound socio-cultural change.

Explaining this long-term interplay of radical, episodic discontinuity and an underlying thematic continuity requires a nuanced theoretical approach, and consideration of the wider environmental and socio-cultural context of the Middle Thames Valley. In his seminal work 'Economies of Destruction', David Fontijn (2019) argued that deposition in later prehistory is highly structured and follows strict socio-cultural conventions with specific objects deposited in specific areas and receiving specific treatment over long periods of time. Fontijn further suggested that narratives of a long-term continuity which emphasize 'cultural memory' of ritualized places, particularly in pre-literary societies, were ultimately naïve, and instead argues that trans-generational ideas and practices related to deposition should most appropriately be thought of in relation to these broader ideas, 'the right way to act' (Fontijn 2019, 25–6). Fontijn therefore provided a framework to understand changing period-specific rules which govern deposition alongside apparently continuous, recurring ideas, which together culminate in the 'right way' to treat the 'right object' in the 'right place'.

Fontijn's ideas are perhaps best thought of in terms of providing the framework to a depositional 'grammar', where the wider phenomenon of riverine deposition does not represent a singular, monolithic tradition of continuous behaviour, but rather a palimpsest of distinctly articulated ritual 'dialects'. Whilst connected through common ideas and general adherence to macro-scale 'rules', they are equally subject to pronounced local and regional variation. These variations, such as the specific 'spear-focus' of the Middle Thames, which contrasts the depositional profiles of other British and European rivers, should not been seen as invalidating the shared 'grammar' of river deposition, instead they are the exceptions which 'prove the rule' and demonstrate that a coherent underlying logic can simultaneously accommodate long-term continuity and profound regional or local change.

Through this lens, broad shifts in the composition and spatial distribution of finds reflect a fundamental rewriting of this depositional grammar. A clear example from the Middle Thames is the transition from Bronze Age weapon deposits, situated at fords not associated with known settlements, to Roman coins and pottery concentrated at urban bridge sites; this is not merely a change in the available material culture, but a complete reconfiguration of the rules governing depositional practice. Yet despite these significant changes, some underlying ideas, such as the focus on crossing points and the preference towards martial objects, persist in the long-term. This continuity suggests a mechanism beyond direct cultural transmission.

Here, Fontijn's ideas regarding memory and place are highly instructive. Fontijn argues that in terms of long-term continuity, it should not be thought of as the continuation of a specific idea, but instead that aspects of 'the right thing' or 'the right place' in either period overlap (Fontijn 2019). Fontijn draws on Rundkvist's tidy summary, 'the idea might not be "This is a known place where the Lady of the Lake has been contacted . . . but This is the *kind* of place where She may be contacted" . . . ' (2015, 22, cited in Fontijn 2019, 146).

The data from the Middle Thames assemblage firmly supports the notion that deposition appears to be determined by experiential perception. For example, turning to crossing points, primarily fords, it is unlikely that exact locations were retained through cultural memory, especially when hydrological and morphological changes would cause specific crossing points to shift or become

unusable, but instead the intrinsic qualities of a suitable crossing, slower flow, shallow water, and firm footing would be directly identifiable to an observer without specific knowledge of the area.

This same logic can be applied to the qualities that mark out a suitable location for deposition; in the case of the Middle Thames, the underlying principles appear to directly overlap. This idea is strengthened by exploring the role of visibility in relation to river deposits. This study has argued that key concentrations of river finds may well have been visible to past peoples, a phenomenon demonstrated by numerous accounts of finds being identified, *in-situ* and underwater, by modern observers. It is therefore plausible that identifying 'the right place' for deposition may have been directly related to the experience of seeing a prior deposit 'glimmering' in the water. Consequently, the literary convention of describing weapon-filled rivers and associating weapons with glittering fish was likely not just an abstract concept, but one grounded in the lived, sensory experience of seeing these objects revealed within the river at specific, potent locales.

This recursive relationship between deposition, visibility, and lived experience provides a powerful mechanism for the reproduction of a specific depositional grammar over time. Furthermore, the idea that valuable objects were left *in-situ*, visible from the surface in such large quantities, challenges modern assumptions that retrieval was physically impossible (Cf. Needham 2001), particularly in relation to objects lost at shallow crossings, instead suggesting a powerful notion of ritual property or widespread taboo against retrieval existed within the broader, supra-regional grammar of deposition. An object deposited within the river may have entered a conceptual precinct akin to a Graeco-Roman *temenos*, its ownership transferred, and its retrieval becoming a transgression (see Ekroth 2024).

Whilst it is likely impossible to ever fully understand the underlying rules and grammar which define riverine deposition, this paper has identified long-term patterning which was beyond the scope of previous studies. The depositional record of the Middle Thames appears to be one of both radical transformation and remarkable, experience-driven continuity. The *longue durée* approach reveals the river not as a passive archive, but as a durable, dynamic feature of the landscape whose ritual significance was continuously maintained and reproduced through structured depositional behaviour for over three thousand years.

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Appendix

Data Source	Name/Institution	Scope	Middle Thames Finds (Quantity)	Excluded (Poor Provenance and Spatial Uncertainty)
Museum Catalogue	Ashmolean Museum	National	6	9
Museum Catalogue	British Museum	National	241	482
HER Records	Bucks HER	Regional (County)	10	0
HER Records	East Berks HER	Regional (County)	588	0
Museum Catalogue	Eton Museum of Antiquities	Local	8	0
HER Records	Greater London HER	Regional (County)	317	0
Museum Catalogue	Henley River and Rowing Museum	Regional	10	1
Museum Catalogue	Manchester Museum	Regional	26	13
Museum Catalogue	Marlow Museum	Local	4	0
Museum Catalogue	Museum of London	National	82	1
Museum Catalogue	National Museum of Scotland	National	8	5
HER Records	Oxfordshire HER	Local (County)	80	0
Museum Catalogue	Peabody Museum	International	0	2
Museum Catalogue	Pitt Rivers Museum	National	24	27
Museum Catalogue	Reading Museum	Local	409	21
Museum Catalogue	Royal Ontario Museum	International	44	3
Museum Catalogue	Southend Museum	Local	0	4
HER Records	Surrey HER ELM	Regional (County)	27	3
HER Records	Surrey HER RUN	Regional (County)	41	0
HER Records	Surrey HER SPEL	Regional (County)	38	0
Museum Catalogue	Tullie House	Local	2	1
Museum Catalogue	University of Pennsylvania	International	0	1
Museum Catalogue	Wallingford Museum	Local	1	0
HER Records	West Berks HER	Regional (County)	168	0
Museum Catalogue	Windsor and Royal Borough Museum	Local	200	0
Museum Catalogue	York Museum Trust	Regional	3	6