THE THAMES THROUGH TIME

The Archaeology of the Gravel Terraces of the Upper and Middle Thames: The Thames Valley in the Medieval and Post-Medieval Periods AD 1000–2000

The River Thames

Historic England

oxfordarchaeology
southsouthsouth

The River Thames

By James Bond, Anne Dodd, Jill Hind and Trevor Rowley

INTRODUCTION

By AD 1000, the Thames was largely established along its modern course (Fig. 1). The character of the river and its immediate environs has been studied as part of numerous archaeological investigations in the valley (Booth *et al*. 2007; Lambrick *et al*. 2009; Morigi *et al*. 2011). By the time of Domesday Book, extensive areas along the river banks were cultivated as hay meadow, and detailed local archaeological studies suggest that this could have begun as early as the 8th or 9th century (eg Booth *et al*. 2007, 331–6). In places, earlier channels silted up as the alluvium left behind by seasonal floods heightened, extending old river islands and creating new ones. There is abundant evidence for human intervention in these processes from the late Saxon period onwards, with the dumping of soil and refuse at the water-edge to raise the ground level, infill unwanted channels and extend habitable land. The cutting and stabilisation of these channels provided water for milling, industrial processes and navigation.

Between AD 1000 and 2000, the Thames provided a wide range of resources to local inhabitants. It was an indispensable source of water for brewing, washing, irrigation and industry; it was the chief drain and sewer of the region, carrying away human and industrial waste; it provided power for mills; it was a source of fish and wildfowl, and of reeds, rushes and willow for flooring and wickerwork; and, it was a highway for transport between the west, the midlands and the port and capital city of London. Long-distance navigation required a clear passage along the river, but many of these other uses, which had more local concerns, caused serious obstructions. Throughout the medieval and early post-medieval period, the story of the river is punctuated by the conflicts between these different interests, and it was not until the later post-medieval period that these began to be resolved by improvements in technology and river management.

This chapter focusses on the life of the river as part of the transport network through the valley. The importance of waterborne transport to the region was probably variable, depending on the level of local, regional and long-distance demand, and on the availability, relative efficiency and cost of alternatives. The Middle Thames became a key route for the

supply of grain, malt and timber to London from the later medieval period, but the main impetus for serious improvements to the navigability of the whole river coincided with its integration into national canal networks from the later 18th century. At this point, it was a vital link in the distribution routes for coal and other raw materials and manufactured goods, between the west, the midlands and London. From the middle of the 19th century, waterborne transport declined in significance, losing ground first to the railways and then to motorised road transport in the 20th century. Until the later 20th century, the decline in commercial activity was offset by the rising popularity of leisure boating.

A network of long-distance and local roads crossed the Thames Valley and its rivers throughout the medieval and early post-medieval periods. The overland transport network was complementary to the river route, and in the medieval period often involved elements of both. The places where the Thames could be crossed by bridge, ford or ferry formed an integral part of this network. Overland transport is considered in greater detail in the *Road, Rail and Aviation in the Thames Valley* chapter.

THAMES NAVIGATION

Thames navigation to *c* 1500

by James Bond

Navigation: problems and possibilities

There has been much controversy over the extent to which goods were transported by river in the middle ages. Edwards and Hindle (1991) saw water transport as a significant factor in the development of trade and urban growth. However, Langdon (1993) believed that where water routes did exist, their use was often limited and infrequent due to seasonal fluctuations, and that, even where specific cargoes were mentioned, this need not imply regular use, merely occasional ventures. He makes an important distinction between the upper limit of feasible navigation and the regular effective head. His work on the royal purveyance accounts of the first half of the 14th century showed that carrying grain and other goods on the Thames was undertaken mainly in winter when water levels were high and road transport more difficult. Bulk water traffic was generally confined to moving goods downstream towards the estuary.

His view was that water transport was generally in decline through the later middle ages as overland transport improved, and that any argument linking it with urban growth was unsustainable. Holt (2000, 55–6) has more recently argued the case that the importance of water transport has been exaggerated. He pointed out that, while significant improvements in overland transport can be recognised in the middle ages, with investments in the construction and repair of bridges and the increasing use of horse-drawn over oxen-pulled vehicles, no such investment in the improvement of watercourses can be recognised. Jones (2000) achieved some reconciliation between these opposed views by pointing out that the most convincing evidence for more extensive use of water transport came from the earlier middle ages, whereas Langdon's study was based largely upon 14th-century accounts, a time when the navigability of inland waterways was in decline. Blair (2007, 1) has also put forward a strong case for water transport being a great deal more important in the 11th and 12th centuries than it was after about AD 1200.

There is documentary and field evidence that the navigability of the Thames was not merely maintained, but actively improved during the early middle ages. Blair (ibid., 264–83) has identified a series of canalised and artificial watercourses along the Upper and Middle Thames, some of which are datable from charters and place-names to the late Anglo-Saxon period. A couple of these are diversion cuts which leave and then re-join the main stream, while three are in effect cul-de-sac branch canals of some length, providing connections to the Thames from estate centres at Faringdon, Bampton and Blewbury. According to the 12th-century chronicle of Abingdon Abbey, Abbot Orderic (1052–66) was persuaded to cut a navigable bypass through the abbey's meadow so that Oxford traders could avoid a difficult length of shallows between Thrupp and Barton Court. In return, a toll of one hundred herrings was paid by each boat to the abbey cellarer (Chron. Abingdon, i, 480–1, ii, 282). This bypass was almost certainly an enlargement of a pre-existing natural backwater later known as the Swift Ditch, about 2km in length, along the eastern side of Andersey Island at the foot of Culham Hill (Blair 2007, 258, 266–8). Domesday Book records that tenants of the king at Wallingford owed carrying services 'with horses or by water as far as Blewbury, Reading, Sutton Courtenay and Benson'. Of those places, only Blewbury is not on the Thames, lying 6km to the west. However, the Mill Brook, which rises in Blewbury, shows clear evidence of canalisation at South Moreton where it passed through several straightened stretches, and immediately south of Wallingford where it enters the Thames via Bradford's Brook, which was cut directly through the gravel terrace (ibid., 264–6). In 1205, King John

granted a charter to the Cistercian monks at Beaulieu that permitted free boat passage along the Thames from their grange at Faringdon, down to London and out to sea. Evidence arising from disputes in 1219 and 1222 suggests that this may have been associated with a new navigation cut, and Blair (ibid., 278–83) has traced a plausible line from the head of the long withy-bed alongside the south-bank causeway to Radcot Bridge (which may have served as a dock) continuing for some 2.5 miles (*c* 3.7km) to join the main stream of the Thames just above Rushey Weir.

Despite the effort put into such improvements, there is also evidence of tensions, from the early middle ages, between boatmen who wished to pass freely along the length of the river and riparian landholders who created barriers across the river for their own purposes (Fig. 2). The first record of this conflict, and the first of a long series of attempts to protect the interests of boatmen against hindrances to their trade, occur in a proclamation made by King Edward the Confessor in the last days of his reign, which declared that navigation should be the paramount interest on the Thames, and that 'If mills, fisheries, or any other works are constructed to their [the four royal rivers] hindrance, let these works be destroyed, the waters repaired, and the forfeit to the King not forgotten.' (Thacker 1914). In 1215, the Magna Carta included a clause (33) ordering the removal of all fishery weirs on the Thames, which suggests that such obstructions were becoming perceived as a serious problem (this was still law in England until 1960).

Although mill-weirs and fish-weirs presented obstructions across the watercourse, they never fully blocked the passage of boats. Fish-weirs could be bypassed by short navigation cuts, and some of the eyots along the Thames may well have originated in this way. Mill-weirs presented more of a problem since they invariably created a change in the water level: the staunch was commonly made of close-set timber stakes backed up with clay or rubble and was designed to stem back the flow of the river to provide a head of water for milling. However, the passage of boats through a weir was achieved by means of flash-locks, consisting of a single gate set in an opening of about 3–6m wide. A case can be made for mill-weirs and flash-locks improving the quality of navigation by slowing the natural flow-rate of the river and maintaining a floating depth of water for boats. Without the weirs, some shallows and rapids may have been impassable.

The operation of flash-locks undoubtedly caused practical problems for boatmen, millers and farmers. When passage for a boat was required, paddles in the weir were raised, the gate was opened, and a great 'flash' of water passed through. Boats going downstream

simply shot the rapids. Boats coming upstream had to be hauled by rope, horse, a gang of bowhaulyers, or a windlass, once the first rush of water had passed. Getting a boat through a flash lock could be dangerous, risking the lives of boatmen and the loss of vessels with their cargoes. The problem for millers was that flash locks wasted enormous amounts of water. In dry summers, it might take weeks to replenish the reach after each flush, seriously impeding subsequent milling and navigation. For this reason, millers claimed a right to levy tolls on passing barges to compensate them for the loss of water, for which, predictably, boatmen expressed resentment. In 1227, Henry III issued a patent to Wilfrid de Lucy to inspect and measure all weirs on the Thames in Oxfordshire and Berkshire and to identify cases where illegal tolls had been taken. This suggests that some weir owners had acquired legitimate rights to take tolls. There were also numerous complaints about flooding caused by mill dams of excessive height.

The real complaint was not so much about the existence of weirs across the river, as their increasing numbers. Davis (1973, 262–5) suggested that between *c* 950 and 1190 the construction of mill-weirs and flash-locks was generally beneficial to navigation, but thereafter, as more weirs were constructed, their influence became a negative one, as the practical difficulties of negotiating an increasing number of flash-locks and the rising costs of additional tolls made water traffic less competitive. The adverse impact appears to have been especially severe between Oxford and Henley, where the steeper profile and more rapid flow of the river offered the most attractive sites for mill construction.

A decline in the use of water transport and in the maintenance of waterways ensued in many parts of England from the middle of the 13th century. Despite this, there were still concerns to keep the Thames open for navigation and pressures to remove obstructions. In 1274, Edward I ordered the Thames ‘to be so widened that ships and great barges might ascend from London to Oxford, and descend, without hindrance from any weirs; as the Thames was so narrowed in divers places that ships could not pass’ (Thacker 1914). It is evident, at least in principle, that the river was still regarded as a continuous highway, and its use was not yet limited to local use in certain sections. By the early 14th century, however, navigation above Henley was becoming severely restricted. In 1316, a complaint was recorded against the Abbot of Abingdon and others who had weirs on the Thames between Oxford and Wallingford and ‘have reconstructed them of such a height that the lands on each bank are flooded; and they have constructed certain obstacles on the weirs called lokes by which ships and boats are obstructed’. Sometimes the exasperated bargemasters took matters

into their own hands: on one occasion in the mid-14th century, the weir at Sandford Mill was broken down by Oxford boatmen (Thacker 1914, 134).

Throughout the later Middle Ages, the bargemasters seem to have been fighting a rear-guard action to preserve their rights against the proliferation of mills and weirs of various sorts, resulting in a string of legislative measures. An 'Act Remedying Annoyances in the Four Great Rivers of England, Thames, Severn, Ouse and Trent', passed in 1346–7, attempted to enforce some control over the number of obstructions to the navigable highway of the river. The execution of the Act was entrusted to a commission, which in 1350 requested John Golafre and others to survey the river between London and Radcot Bridge, and it was ordered that all 'gorces, wears, mills, stanks, stakes and kiddles' which disturbed the passage of ships and boats on the great rivers of England be pulled down without being renewed (ibid.).

These efforts seem to have produced little or no result, and in 1371 a new Act of Edward III set a fine of 100 marks for unauthorised obstruction of the river. A further eight Acts concerned with the removal of obstructions and the improvement of navigation were passed between 1394 and 1495, but their sheer repetitiveness suggests that they cannot have been effectively enforced. Evidence for navigation on the Thames in the late Middle Ages has been reviewed by Peberdy, who identified the likely location of probable mill-dams and flashlocks (see Peberdy 1996, fig. 2 for locations; see Table 2 for a review of these with updates from S. Capel-Davis). Peberdy draws attention to a series of indictments against lock-holders in south Oxfordshire that can probably be dated to the period 1395–9. The indictments identify 18 locks that, it was claimed, were so high as to cause flooding of adjacent land and so narrow that they created currents that were too strong and dangerous for navigation. Of these, 11 were probably mill-dams and flashlocks, while the others were either certain or probable fish-weirs. Further detailed information is provided by the two complaints of John Bishop to Elizabeth I's government in 1580 and 1585, both of which are preserved in Strype's edition of Stow's *Survey of London* (see Kingsford 1908).

Taking all the evidence together, Peberdy (1996) suggests that there appears to have been no flash-locks below Maidenhead in the medieval period. The construction of dams below Staines is likely to have been prevented by the effects of the tide, which probably reached this far. The London Stone (Fig. 3) which later marked the boundary between the jurisdiction of the Thames Commissioners on the non-tidal stretch of the river and the City of London on the tidal stretch was located here (Thacker 1914, 20). Below Staines, the absence

of medieval locks is harder to explain but Peberdy (1996, 319) suggests that here the river was increasingly broad and sluggish, and mills may have been built for preference on the faster-flowing side streams, such as the Hogsmill at Kingston, or on adapted side channels as at Windsor and Chertsey (Fig. 4). Upstream from Maidenhead, however, the number of locks steadily increased with no fewer than 7 within the 17 miles between Caversham Bridge and Wallingford, and a further 9 within the 24 miles from Wallingford to Oxford (ibid., table 1).

By 1300, the primary navigation on the Thames was associated with the supply of grain and timber to London, and Henley emerges as the major transhipment point. Above Henley there was only a secondary navigation generated by the upriver towns, with infrequent voyages in response to much lower levels of demand and inferior navigability. It was argued by Davis (1973) that the deterioration of the Thames navigation may have been a significant factor in the decline in Oxford's economic fortunes in the later middle ages. However, the importance of the Oxford's river trade should not be overstressed, and it seems unlikely that this was the primary reason. It is doubtful whether boats on the upper river had much advantage over road traffic in the middle ages: they were probably unable to carry much more than carts, they were slower going upstream, they required more capital investment, and they were riskier as sunken cargoes were rarely salvaged. The dangers of river transport were illustrated in July 1315 when Abbot Richard Clive of Abingdon, three monks and two boatmen were drowned when their boat was swept away in a flood (Preston 1971). Peberdy (1996, 324) suggests that neither Oxford nor Wallingford produced goods that depended on water for the import of raw materials or the distribution of products. Wallingford's most prominent craftsmen were goldsmiths, shoe makers and leather workers, while Oxford's main industries were textiles and leather. Raw materials would have been available locally or could be readily brought by road. Between the mid-15th and the mid-16th century, however, it seems that navigation on the Thames upstream of Henley was at a very low level. It is likely that this was due to a combination of factors. At a time of economic depression and low population levels, demand is likely to have been low, which reduced incentives to clear the river for navigation. By the time demand began to increase again from the middle of the 16th century, larger, stronger barges had been introduced, and, for these, the shallow and impeded stretch of the river between Burcot and Oxford was impassable.

Vessels

Different types of ships and boats operated on the Thames through the middle ages. However, interpretation of the documentary evidence for medieval watercraft is made difficult by the variety of terms used. It is not always clear what the distinctions were or whether they were employed in any precise technical sense. *Naves*, 'ships', are mentioned on the Thames at Dorchester, Abingdon and even as far upstream as Radcot (Blair 2007, 284). The widely-used term *batellae* seems to cover boats of a variety of sizes, from small rowing boats up to large keeled vessels fitted with sails which could be used in estuarine and coastal conditions. *Naviculae* or *navicellae*, 'small ships' are also mentioned on the Thames at Radcot and elsewhere, and this may also be an umbrella term for a wide range of vessels. Even terms familiar from the recent past, such as *bark*, may be misleading, as it cannot be assumed that this meant the same in the 14th century as it did in the 19th. The usage of some terms is strongly localised, which may reflect the development of specialised vessels designed to suit local conditions. Cargo boats referred to as *shoutae* or 'shouts', probably derived from the Dutch *schuit* or *schuyt*, figure prominently on the lower Thames, though they were also found around the Kentish coast and occasionally elsewhere. In 1344, Edward III ordered a commission to commandeer 'shouts' on the Thames between Gravesend and Henley to take stone upriver from London for work on the Round Tower at Windsor Castle. The building accounts show many boats making the journey through the spring, summer and autumn (Tatton-Brown 2007, 53, 56). Shouts appear to have been flat-bottomed wherries, pointed at both ends, with a sufficiently shallow draft to be able to negotiate the flash-weirs below Maidenhead. *Bargeae* or 'barges' may have been similar to shouts, but by the 14th century the term was becoming used in a more restricted sense to refer to larger, flat-bottomed river craft. *Craierae* or 'crayers' seem to have been used as lighters, oared vessels carrying goods from larger ships to shore in the Thames estuary, though around the west and south coasts the word applied to small sailing vessels of 30–50 tons. Other terms refer to vessel function rather than structure: *piscators* were fishing–boats, while *rysbotes* or 'rushboats' were used for carrying rushes into London (Langdon 2007, 112–7). The primary function of the *dungebots* mentioned in building accounts for the Tower of London in 1348 and 1352 is self-evident, though they had been pressed into temporary service for carrying building materials (Salzman 1952, 350). Motive power included sails, oars (the Abingdon chronicle refers to the unimproved river at Thrupp as being 'difficult for rowers') and local use of bowhaulyers.

The remains of several medieval boats have been found in the tidal Thames around London and further down the estuary. A flat-bottomed, broad-beamed, clinker-built, single-masted vessel with shallow draught, sunk at Blackfriars in the 15th century and excavated in 1970, was clearly not a sea-going vessel and was designed only for use in local trade on the river. This boat, known as 'Blackfriars ship 3', may provide an example of a Thames 'shout' (Marsden 1971; Marsden 1972). A possible reconstruction of this ship is shown as an artist's impression in Figure 5.

By contrast with the tidal river and the evidence from London (Marsden 1996), archaeological remains of boats used on the Middle and Upper Thames during the middle ages are very limited and our present knowledge of smaller craft depends almost entirely upon occasional documentary records. Punts, widely used as working boats on the upper river in later centuries, seem to have made their appearance as early as the 1240s, when one John the Punter fell off a *batellum* on the Thames at Abingdon (Blair 2007, 285, n. 82). In 1237, Henry III granted the Blackfriars of Oxford two oaks from Windsor Forest to make a barge, perhaps for conveying building material to their new site below Littlegate Street (Close R., 1234–7, 462). In 1238, the Augustinian Canons of Notley Abbey were granted an oak from Windsor Forest to make a ferry-boat, possibly a log-boat, for pilgrims to the shrine of the Virgin Mary on the island at Caversham. Log rafts may also have been used to float goods downstream, the timbers being disengaged and reused for other purposes once the load had reached its destination.

Several logboats or dugout canoes have been recovered from abandoned and silted-up backwaters. Boats of this type represented one of the most basic forms of construction and are often assumed to have been prehistoric vessels, though radiocarbon and dendrochronological dating has shown that a significant proportion are post-Roman, some as late as the 14th century (McGrail and Switsur 1979). Examples of 7th- and 10th-century date have been recovered from the valley of the River Lea and an example from Kew, once thought to be prehistoric, has been re-dated to the mid-13th century (Marsden 1996, 222). Logboats were capable of carrying up to four people or light cargoes such as fish, poultry or dairy products, and they were particularly suited to local trade in inland waters. They may have been the commonest type of craft on the Thames in the early middle ages, but an increasing shortage of suitably large timbers may have contributed to their general replacement by plank-built boats by the 14th century.

There is archaeological evidence for shipbuilding, ship repair or ship-breaking in London as far back as the 10th century from several sites in the Queenhithe area (Goodburn 1991). These activities were generally carried out on open foreshores. By the 13th and 14th centuries, shipbuilding was being pushed further downriver as London's waterfront became increasingly built-up. Marsden (1996, 24–5) estimated that working boats on the Thames in the middle ages could have been used for about 75 years before becoming uneconomic to maintain. Langdon's (2007, 128) calculation that some 55,000 quarters of grain came downriver to the capital each year from the direction of Henley, based on a carrying capacity of 120 quarters per vessel and a dozen return journeys per year, would imply a little under 40 vessels engaged on this trade alone. Allowing for other commodities, it seems likely that at any one time between 50 and 100 cargo vessels would be operating on the Thames between Henley and London, and that may imply a need for one or two new boats to be built every year. Shipwrights probably residing in London were being hired by piecework to build new boats in the late 14th century. To date, there is limited archaeological evidence for medieval boat-building on the Thames above London. An excavation at Kingston in 1986–7 revealed a wattle pen built out from the waterfront, apparently used for storing timber, still containing three roughed-out oak knees dating to the early 14th century (Potter 1991, 144). To what extent this trade was present in towns further upstream at this period remains unknown.

The investigation of the waterfront at Kingston revealed a series of revetments of 14th-century date, several of which included reused timbers from clinker-built boats probably dating from the second half of the 13th century. The material included several fragments of radially-cleft oak planks 15mm thick, some of which showed evidence of being fastened together with tree-nails (wooden pegs with expanded ends). These would have derived from small boats. There were also more-substantial, articulated sections, between 6m and 13m long, of the sides of three medium-sized barges used for the carriage of loose cargoes such as stone. Their planks were between 35mm and 50mm thick, luted with tarred hair and held together with iron rivets. Their frame elements were originally fastened with treenails of willow or poplar and replacements in oak. Enough survived for the original length of two of these vessels to be calculated at about 15m and 17m, the third being even larger. The smallest of the three large vessels had been constructed by highly skilled shipwrights having to make do with timber of indifferent quality. All three had been extensively and carefully repaired, but their condition had degenerated dangerously by the time of their break-up (Goodburn 1991, 108–11; Potter 1991).

Landing-places, waterfronts and quays

Place-names provide valuable evidence for the use of riverine transport during the early medieval period. Cole (2007) has identified seven examples of the Old English word 'hythe', meaning 'landing-place', on the Thames between Bablock Hythe and the tidal head, documented at various dates between the 11th and 16th centuries. Three occur around the great bend of the river west of Oxford: Bablock Hythe, High Croft in Eynsham (Huythecroft in 1328), and Hythe Bridge in Oxford. Below Oxford, the name does not reoccur until Bolney (Bollehede in 1086) above Henley, then further examples occur at Maidenhead, Glanty near Egham (Glenthuthe in a 13th-century transcript) and Hythe opposite Staines. The term occurs more commonly on the Thames than any other English river, but a place called 'Hidden' (*on Hyddene*, 'valley with a hythe'), named in a charter of AD 984, shows that the River Kennet was navigable at least up to Kintbury. The largest cluster of 'hythe' names (again, not always immediately recognisable because of later evolution of the name) occurs on the tidal river above and below London, including Putney, Chelsea, Lambeth, Rotherhithe, Queenshithe, Stepney, Erith and Greenhithe (ibid., 69–70). While the general meaning of 'hythe' names is clear, and the sites appear to have been carefully chosen to provide firm ground alongside the river, they may have included anything from beaches where boats could be drawn up onto the bank to small quays where they could be tied up afloat for loading and unloading. Places where boats could be drawn up out of the water were often referred to as 'hards', and Blair (2007, 283) notes two mid-13th-century references to a place called Jureyscherd or Juresherd, the 'Jury's hard', on the Oxfordshire bank near Radcot, perhaps a place where courts concerned with riverine disputes were held.

Occasional documentary records for the construction of wharves or quays identify features that might survive archaeologically. A carpentry agreement for the rebuilding of Broken Wharf on the Thames in London in 1347 was to recorded to include a framework of oak posts, the uprights being 12 feet in length, a shed at either end, a bridge in the middle with steps leading down to the water, and the whole structure was to be surrounded by a wooden fence 10-feet high (Salzman 1952, 434–5). Since the late 1970s, the archaeological potential of urban waterfronts, both as a record of trade and as a repository of preserved organic material, has increasingly been recognised. Excavations on either side of St Aldates

in Oxford have done much to elucidate the transformation of the topography of the floodplain during the early middle ages through causeway, bridge and mill construction, but no evidence for the construction of wharves has yet been found (Dodd 2003, 13–16, 79–82).

Cargoes

Water transport was especially suitable for carrying heavy and bulky goods downstream. Blair (2007, 14) has discussed operations between the 9th and 12th centuries, with bulk loads moving downriver towards the coast and lighter materials coming back upstream, such as the herrings paid as toll by the boatmen of Oxford to Abingdon Abbey (see above). Several incidental documentary references, such as King John's grant to Beaulieu Abbey (see above), show that the transport of grain downstream by water, even from the upper reaches of the Thames, was the main concern (Blair 2007, 260). In 1271, a *batellum* carrying nearly a ton of wheat, along with eleven sacks and a chain and padlock, sank near Radcot (Blair 2007, 283 n.75, 285). Tenants of the bishop of Lincoln in and around Dorchester owed various services related to carrying the bishop's grain to boats at Oxford or Wallingford and assisting with steerage downriver to London in the 1220s. This was probably a long-standing arrangement (Blair 2007, 258). In 1317, a custumal of Exeter Cathedral (Dean and Chapter Archives MS.2931) records that the tenants of Chimney owed the labour service of shipping grain from the demesne of Bampton rectory downriver to Oxford (Blair, 2007, 259–60, 278).

The rapid growth of London created a considerable demand for food from the surrounding countryside and by about 1300, grain was being supplied to the capital from a substantial hinterland, which extended up the Thames Valley as far as Henley and Abingdon. The importance of Henley's grain market through the later middle ages owed much to its position at the highest point of regular navigability. Discussing the grain requirements of the capital, Langdon (2007, 128) has suggested that perhaps 55,000 quarters per annum were brought downstream on the Thames. Firewood from the Chilterns was another important commodity entering London in considerable quantity.

Building stone from the Cotswolds was certainly being employed in Oxford by the 14th century, possibly earlier, but many accounts show that it was carted the whole way from the Cotswold quarries to the building site. Only occasionally was it transferred to barges, and

then only for short distances, as in 1331 when stone for Merton College was carried overland to Eynsham, then brought down by boat to the Hythe in Oxford (Arkell 1947, 61).

When stone was destined for building operations lower down the river, it was usually carted overland all the way to Henley, where it was loaded onto barges for the last part of its journey. In April 1362, stone ordered by the king from the quarries at Taynton and Wheatley for works at Windsor Castle was to be brought to the site 'by land and water', along with timber from Coombe Park (Cal. Pat. R. 1361–4, 194). Similarly, when Taynton stone was brought in for the building of Eton College in 1456–7, it was carted overland to Henley and shipped from there. It is possible that long-distance water-transport of stone was either uneconomic or impractical. The building stone used at Chertsey Abbey was almost exclusively from sources that would have needed land transport (sarsen and conglomerate from the local area, chalk from the North Downs and greensand from the Reigate area), despite its proximity to the Thames.

Timber from Windsor Forest was frequently carried by water down to London and beyond. In 1252, the constable of Windsor Castle was ordered to cut down and carry a great beech to the river, intended for tables in the royal kitchen at Westminster. Proximity to the Thames was sometimes a factor in the selection of timber: the Close Rolls of 1248 record that 25 oaks given for building works to be undertaken by Peter de Sabaudia were to be 'as conveniently near to the waters of the Thames as possible'. For the building of the roof of Westminster Hall in 1395, timbers were being cut to size near Farnham then carted to 'Hamme' on the Thames before being taken by water for the rest of the journey (Salzman 1952, 350–1). Timber was occasionally taken upstream, as in 1343 when wood from the Black Prince's park at Byfleet was sent by water for building works at Wallingford Castle (Reg. Black Prince, i, 151).

Droitwich salt was another commodity brought to and transported on the Thames. Charter and place-name evidence permits the reconstruction of the routes by which salt was carried by packhorse from Droitwich, and two separate journeys came over the Cotswolds to converge upon Lechlade, while Bampton was the destination of another route. From Lechlade, it seems probable that salt was carried downriver by barge to London (Hooke 2007, 37–8).

Thames navigation *c* 1500–1900

by Jill Hind and Anne Dodd

The 16th to mid-18th centuries: The Oxford-to-Burcot Commission and the first pound locks

The late medieval period may have seen an equilibrium reached in navigation on the Thames. Thacker (1914, 37) found very little evidence of complaints until well into the 16th century, and Peberdy (1996) suggests that economic depression may have caused long-distance navigation to cease between Oxford and Reading or Henley (Tiller and Darkes 2010, 50). There was concern, however, about pollution and over-fishing, particularly of fry. Dissatisfaction was mounting again during the reign of Elizabeth I. John Strype's *Survey of the Cities of London and Westminster* suggests that there had been a surge in the economic use of the river from the late 1570s. His sources included the complaints made by John Bishop to Lord Burleigh in the 1580s, which are reproduced in detail by Thacker (1914, 45–57). According to Bishop, about the year 1578 or 1579 there had been 23 locks, 16 mills, 16 flood-gates and seven weirs on the Thames between Maidenhead and Oxford, but by the year 1584 or 1585 the number of locks and weirs had increased to more than 70, while the number of barges working on that stretch of the river had increased from about 10–12 to 80 and were moreover 'of much greater Bulk and Bigness than before was used'. Not only this, but the locks 'were extraordinary dangerous in passing' and barges had been sunk, bargemen drowned, and the cargoes of corn and malt destroyed. To this, the owners of the locks, weirs and mills countered that the number of accidents had increased because there were more barges, which were often overloaded, poorly built, and worked by 'people of no skill' who 'travelled so late & so early as to be unable to see what they were doing' (Thacker 1914, 53). Bishop made two separate appeals to Lord Burleigh, in 1580 and in 1585, to which he appended lists of the obstructions on the Thames between Oxford and Maidenhead, which Thacker called 'the oldest extant personal survey and description of the river Thames' (ibid., 57). These are shown in Table 1, in which the lock names in bold are accepted by Peberdy (1996) as probable mill dams and flashlocks, while a smaller number of other obstructions noted by Bishop are more likely to have been fish-weirs or located on side streams or backwaters. Orders for the conservation of the River Thames were issued in 1584, although there is some evidence that Elizabeth's government may have considered setting up a conservancy, the orders of 1584 contained nothing new (Thacker 1914, 40–43, 57).

By the early 17th century, the Thames between Oxford and Burcot was considered impassable, due in part to the ever-increasing size of barges. In 1605, an Act of Parliament (3 James I c. 20) appointed commissioners charged with improving the river so that it was navigable at least to Oxford. They seem to have been effective upstream from Oxford but the difficult stretch to Burcot remained a problem. At the instigation of Oxford University, a new Act was passed in 1623 (21 James I c. 32) that enacted the Lord Chancellor to appoint eight commissioners, four from the University and four from the City of Oxford, having full powers to 'cleanse and make navigable the said river of Thames between Oxford and Burcot, and amongst other things to open, prepare or make all weirs, locks and turnpikes for the said passage', to make provision for a towpath and install winches for the hauling of barges (Thacker 1914, 66). Accordingly, the first three pound-locks, then often referred to as 'turnpikes', were constructed and in operation by 1635 (Table 1; Fig. 6). These were located at Iffley, Sandford and Swift Ditch at Abingdon. The Swift Ditch was diverted from the main route of the Thames by Abbot Orderic in the 11th century. A flash lock was in use around 1585 and the pound lock from *c* 1636 until 1790 when major alterations were made (VCH 1962, 28). The remains of the 17th–18th century pound lock still survive incorporated within later work (OAU 2000a) and it is now a Grade II Listed structure (No. 1059788).

Despite this promising start, no further substantial improvements are recorded, and complaints persisted. John Taylor, who called himself the 'water poet', was a London waterman who wrote about life on the river. In *Thames Isis* of 1632, an account of a journey along the Thames, he grumbles about obstructions from weirs and fishtraps, shallows and dangerous currents. His *Carriers Cosmographie* of 1637, by contrast, suggests that despite the obstructions there was a substantial and regular river trade from London as least as far as Reading (Thacker 1914, 99–100).

To Bull Wharfe (neere Queenhithe) there doth come & goe great boats twice or thrice every weeke betwixt London and Kingston; also thither doth often come a Boat from Colebrooke.

Great Boats that doe carry Passengers & goods betwixt London and Maydenhead, Windsor, Stanes, Chertsey, with other parts of Surry, Barkeshire, Midlesex, & Buckingamshire do come every Munday, & Thursday to Queenhith, & go away upon tuesdayes & thusdaies.

The Redding Boat is to be had at Queenhith weekly.

During the late 17th and early 18th century, dissatisfaction continued with increasing concern about the tolls being extracted from boatmen for passing the privately-owned locks and weirs, and the rates being charged by the bargemasters themselves for carriage. In 1751, a new authority was set up by Act of Parliament (24 George II c. 8) to oversee the interests of navigation on the Thames upriver of Staines; below Staines, the river remained under the control of the City of London. The new authority had around 600 members, but its powers were limited to settling rates, correcting abuses and effecting minor repairs and not 'to take away any jurisdiction, power or authority of any other body or persons whatsoever' (Thacker 1914, 115). Meanwhile, it was alleged that goods were being carried by land in preference to water because Thames charges were so high, and the inconveniences and delays had become so 'unendurable'. Barges of 160–180 tons were now travelling on the river; their great size meant that the flashes to float them over the weirs needed to be much stronger. Consequently, weirs were built higher and flashes had to run for two–three hours, and it could then take days to build up the height of water again. The great flashes of water were damaging the weirs themselves and flooding the adjacent land (Thacker 1914, 118–9).

Thames navigation in the canal age: the Thames Commissioners

The development of canals was to prove the most important stimulus for the eventual improvement of the Thames navigation. In the late 1760s, plans were underway to link the Trent and Mersey Canal to the Thames via Coventry and Oxford; acts were obtained for the Coventry canal in 1768 and the Oxford canal in 1769 (Hadfield 1979, 82–90). Difficulties in raising funds during the 1770s led to delays in completing this work, but from 1782 work was underway between Coventry and Oxford, and to link the canals to Birmingham. The whole route was open by 1790. After several false starts, the Stroudwater Canal from the River Severn to Stroud was completed and opened in 1779 with plans for a second section, the Thames and Severn Canal, to link the Stroudwater to the Thames. The act for the Thames link was passed in 1783 and the canal was opened in 1789, meeting the Thames at Inglesham, above Lechlade. By the standards of canal engineering, navigation on the Thames was primitive. No further pound locks had been built since the days of the Oxford–Burcot Commission, and passage along the river remained dependent on the expensive and

dangerous flashes. There were serious proposals to bypass long stretches of the river entirely; in 1770 the leading canal engineer, James Brindley, suggested that a new canal should be built from Isleworth to Monkey Island near Maidenhead, and a second canal from Monkey Island to Reading was also under discussion. In the event, proposals to bypass the river with canals were superseded by action for the navigation of the Thames itself. The unsatisfactory legislation of 1751 was replaced by a new Act of Parliament in 1771 (11 George III c. 45) constituting the Thames Commissioners. The membership was even more vast and unwieldy than before, including not only all landowners with land worth more than £100 annually in the seven riparian counties, but all MPs in those counties, the Corporation of the City of London, clergy from Westminster, St Paul's and all the riparian parishes, the mayors and recorders of the riparian towns, and representatives of the Wey navigation (see below). All were entitled to sit and vote, but (as with so many of the trusts and commissions of the time) the quorum was fixed low (in this case at 11 members), which ensured that vested interests were accommodated, but the few active commissioners were able to carry out effective business. The Thames Commissioners' powers were substantially extended and now included the authority to make and acquire land compulsorily for towpaths, to purchase the old flash locks, and to construct and maintain pounds or turnpikes (pound locks) in place of flash locks and weirs (Thacker 1914, 124).

One of the first improvements carried out by the Commission was the construction of a new series of eight timber pound locks on the stretch of the river between Maidenhead (Boulter's Lock) and Sonning, constructed in 1772 and 1773 (Table 1). A second series of new pound locks were built from Reading to Oxford between 1777 and 1795 (Hadfield 1979, 209). The Commissioners also regulated tolls payable at locks and limited the draught of the barges by the dimensions of the locks. To prevent barges passing through with their masts up timber strides, or lintels, were erected. These have all disappeared, probably when steam barges with high funnels were introduced. As early as 1780, the new locks were beginning to decay and the idea of rebuilding in stone or brick was mooted, although rejected as timber was cheap.

The construction of these locks meant that the Thames between Oxford and Maidenhead was now in a reasonable condition and able to take 150-ton barges, but it was the state of the river above Oxford that was a concern for the Thames and Severn Canal (ibid.). The Thames Commissioners seem to have had a particularly acrimonious relationship with the proprietors of the Thames and Severn. Some improvements were made to this stretch

of the river, including six new pound locks were built upstream from Osney (Oxford) to Lechlade (St John's) in 1790 and 1791 and stone ribs were removed from beneath one of the medieval arches of Newbridge. However, the dispute between the canal company and the Commissioners eventually went as far as the House of Commons, the company claiming that the state of the Thames navigation was injuring their trade, and the Commissioners claimed that there was insufficient trade from the canal to cover the cost of the desired improvements (ibid., 209–10). Finally, in 1813, the Thames and Severn Company joined with the Wilts and Berks Company to promote a new canal, the North Wilts, which would allow narrow boats to bypass the Upper Thames altogether. The development of the Kennet and Avon Canal (opened in in 1810) prompted the City of London to build six completely new locks within its jurisdiction below Staines between 1811 and 1815, and the Commissioners filled in the gaps upstream, until the building of Bray lock in 1845 completed the series below the junction with the Oxford Canal at Oxford (ibid.). From 1774, the Commissioners began to provide accommodation for the lock keepers. Initially, these were small wooden houses at Temple, Hurley, Hambleden and Sonning, costing £12 each, but before long, brick-built cottages became the norm and several of these survive, including the Grade II Listed stone building at Buscot Lock. This was originally built in the early 1790s as a 'fish house which cannot be robbed' for Edward Townsend Loveden, the improving owner of Buscot House, who was a promoter of the Thames and Severn Canal. After the building of the new pound locks at Lechlade and Buscot, the fish house was used to provide accommodation for the lock-keeper, who was paid by Loveden out of the tolls from boats passing the lock, which went to him as landowner. Early 19th-century lock-keepers' cottages, also Listed Grade II, survive at Chertsey and Penton Hook Locks (Fig. 7).

By the middle of the 19th century, river traffic was in decline following the expansion of the rail network, with a corresponding decline in the state of structural repairs. The level of sewage in the river was also causing concern. The responsibility for the whole length of the River Thames finally passed to a single body in 1866 when the Thames Conservancy Board, established in 1857 to cover the stretch downstream from Staines, replaced the Commissioners (Fig. 8). An important aspect of their powers was the transfer of all but a handful of the privately controlled weirs to the Board. New tolls and a ban on sewage outfall were introduced. Where funding was permitted, the Board carried out programmes of repair and improvement, including dredging, which led to the recovery of many archaeological items, particularly prehistoric metalwork. Thacker (1914, 246) notes, for example, that in

1868 the British Museum had been permitted to retain a bronze helmet and two swords that had been dredged up, 'until the Conservators form a museum of their own' (see Hayman *et al*. 2012, 24, for wider discussion of this phenomenon). Little had been done to improve the upper parts of the river, however, and there were complaints that many of the higher locks were falling to pieces (Thacker 1914, 249). Several old weirs in the upper reaches of the river were removed in the late 1860s and 1870s, and new pound locks were built at Grafton, Radcot, Shifford and Northmoor in the 1890s. Mapledurham Lock was rebuilt in 1865–7 (Fig. 9), but the flash-locks at Eynsham and King's were not replaced until 1928.

By the late 19th century, the river was increasingly being used for recreation and this was acknowledged with the passing of the Thames Preservation Act of 1885 for 'the preservation of the River above Teddington lock for purposes of public recreation, and for regulating the pleasure traffic therein'. The Act made it lawful for all persons, for pleasure or profit, to travel or to loiter upon any and every part of the river except private cuts and channels. By 1897, regulations at Richmond and Teddington gave pleasure craft precedence over barges, and by 1898 the first prizes were being offered for attractive lock gardens (Thacker 1914, 254). The years from 1879 to the outbreak of the First World War were the golden age of pleasure boating. Over the period 1879–1887 tolls from pleasure boats doubled and overtook barge toll income. The increasing urban population of London and the Midlands, together with rising standards of living for middle class and better-off working class people, meant there was a vast new market for leisure. Interest in boating was stimulated by the growing popularity of the sport of rowing in the 19th century, and boating on the Thames was popularised by fashionable events such as the Henley Regatta, and in favourite works of fiction such as *Alice in Wonderland* and *Three Men in a Boat*. One of the best-known firms was Salter's of Oxford, who provided a range of services, from week-long rowing and camping holidays, to one-way river trips on passenger boats. These could be as long as a 5-day downriver trip from Oxford to Kingston, or a day trip offered in partnership with the Great Western Railway, who would transport passengers from the West Midlands to Marlow, where they were taken by boat to Windsor, and pick up the train home (Fig. 10).

The canals

Improvements to river navigation and the creation of canals began well before the post-medieval period, with many new watercourses cut to supply mills. Local ventures of this kind continued, such as the link cut from the River Colne to supply the mill at Isleworth, which was owned by the Abbey of Syon. During the reign of Henry VIII, this line was recut a mile further upstream and became was known as the Old River, which was renamed in 1766 the Duke of Northumberland's River after the family who bought Syon in 1603–5 (the river still supplies Syon Park and its ornamental lakes). Running alongside it is the Longford River, previously known as the New River, which had been built for Charles I to improve the water supply to Hampton Court.

One of the earliest rivers in England to undergo canalisation to improve its navigation was the Wey. The Wey Navigation was promoted by the Corporation of Guildford, not just in response to the proliferation of weirs and mills along the river, but also as an opportunity to provide employment when the traditional wool industry was in decline. Sir Richard Weston of Sutton Place had a cut made from Stoke Mills to his estate to irrigate and improve his land. This stretch contains Stoke Lock, the oldest pound lock in Surrey. Weston studied the Dutch system of canals and, after the Civil War, was one of the those responsible for the creation of the Wey Navigation in 1651–3. Despite the inevitable wrangles over money, the new waterway was a great success, supplying London with a wide range of goods including corn, timber, flour and gunpowder (much of which came up from the Tillingbourne and the gunpowder mills at Chilworth were established in 1624 by the East India Company (https://www.tillingbournetales.co.uk/places/mills/)). Imported goods and coal were shipped in the opposite direction.

Sustained development of canals began in the middle of the 18th century with the successful creation of a network around Liverpool and Manchester. Between 1770 and 1810, the Thames Valley was rapidly integrated into national canal networks that provided direct links with the coalfields and manufacturing districts of the north and the midlands, and that linked London across country to the Severn at Gloucester, and to Bristol. The first to be realised was the ambitious project to connect the Thames, Severn, Humber and Mersey in a national network of trunk canals, from which local connections could be run off. This was built as a series of four canals, the Trent and Mersey (or Grand Trunk), the Staffordshire and Worcestershire, the Coventry, and the Oxford; much of the construction took place between 1770 and 1780, with the final connection to Oxford in place and opened in 1790. The canal terminated at the Oxford Canal basin on the west side of the city centre (Fig. 11). The Oxford

Canal was commercially successful for many years and carried around 400,000 to 500,000 tons a year between 1828 and 1868 (Hadfield 1979, 244). It benefited from the incorporation of the northern part of its length in the main line of the Grand Junction Canal (below), which carried an immense tonnage of freight between London and Birmingham, and from compensation paid for loss of business. The route of the Oxford Canal passed through Banbury where a dock has been excavated. Tooley's Boatyard closed in 1995, but the historic workshops have been preserved as a museum (BUFAU 2000). The canal has two connections to the Thames at Oxford, the Duke's Cut (1790) leading to King's Lock on the river and the Isis Lock Cut (1796), just above Osney Lock (Fig. 12). The Duke's Cut was built for the Duke of Marlborough, but soon transferred to the canal company.

The Thames and Severn Canal was a totally man-made waterway, running from Stroud to join the Thames at Lechlade. A canal was constructed from Framilode on the banks of the Severn to Stroud in 1775–9. As the Stroudwater Canal was profitable, the company wished to extend it to London via the Thames, leading to conflict between the canal company and the Thames Commissioners over navigation in this upper stretch of the river. Nonetheless, the extended canal opened in 1789. The main cargo from the west was coal, but there was less demand for cargoes such as wool and grain on the return leg and the Kennet and Avon Canal was to provide serious competition. The Thames and Severn suffered from severe problems of leakage, losing up to three million tons of water a day, and was never very successful (Hadfield 1979, 90).

The River Kennet had been canalised to make it navigable between Reading and Newbury between 1715 and 1723, despite much opposition at Reading, where people feared the loss of the town's status as a transhipment point. A similar process was carried out on the river Avon from Bristol to Bath. The project for the Kennet and Avon canal was 'on a grand scale, for a broad canal, 57 miles long, to include a great flight of 29 locks at Devizes.' (ibid., 91). After many problems, the line was completed in 1810 at a cost of £980,000. The shareholders already had a controlling interest in the Avon navigation, and went on to buy the Kennet navigation for £70,000 cash and £1500 per year. Fortunately, following such colossal expenditure, the canal was a success. In its prime it carried 341,878 tons of goods in 1838–9, compared with the 60,894 tons carried by the Thames and Severn in the same year (ibid.).

Coal was also a spur to construction of the Wilts and Berks Canal (1796–1810). The opening of deeper mines around Radstock after 1763 had resulted in a considerable increase in production from the Somerset coalfield, which prompted the construction of the Somerset

Coal Canal (1794–1805), linking up with the Kennet and Avon Canal near Claverton. The Wilts and Berks was a narrow canal cut from Semington, about 8 miles east of Claverton, to link with the Thames at Abingdon by way of Swindon, with branches to Chippenham, Calne and Wantage. It was proposed to carry coal to the agricultural areas of the Vale of White Horse and take away agricultural produce. It proved expensive to build (£255,000) and enjoyed moderate success before the coming of the railways, carrying 62,899 tons in 1838. Because navigation of the Thames above Abingdon was still difficult, the North Wilts Canal was opened in 1819, linking the Wilts and Berks Canal near Swindon with the Thames and Severn at Latton near Cricklade. This was not a success, mainly because the Kennet and Avon continued to provide a more direct route to larger urban centres.

Owing to the need for a better link from Birmingham to London avoiding the Thames, the Grand Junction Canal was built between 1793 and 1805. The Grand Junction canal was connected to Birmingham via the new Warwick and Birmingham Canal and the Warwick and Napton Canal, joining the Thames at Brentford. It had branches to Aylesbury, Wendover and to the brickworks at Slough. It reduced the distance between the Midlands and London by 60 miles (*c* 100 kilometres) and made the journey reliable. In 1838, the Grand Junction canal carried about a million tons of traffic, and the list of commodities 'reads like an inventory of industrial England. Besides coal, iron and building materials, it carried Cheshire salt, Stourbridge glass, Staffordshire pottery, Manchester textiles, a variety of metal goods, foodstuffs, agricultural produce, and much else' (Harris 1973, 207)

By 1790 there were direct connections for waterborne traffic to and from the Thames via the Thames and Severn Canal from the Severn below Gloucester, and from the industrial areas of the north and the midlands via the Oxford Canal. For a short time, the Oxford Canal and the Thames became the main route for goods to and from the capital, but from 1805 the Grand Junction Canal offered a significantly quicker alternative, which completely bypassed the Thames Valley. However, the Oxford Canal continued to provide significant benefits within the county. From 1810, the Kennet and Avon Canal linked Reading to the Somerset coalfield and, via the Avon navigation, to the port of Bristol, while the Wilts and Berks provided a route into the Upper Thames at Abingdon. One of the first effects of the building of the canals was to increase pressure for the upgrading of the Thames navigation, and the resulting improvements have been noted above. For a period of some 50 years, until the opening of the railways, the linked canal and Thames navigation systems enabled the carriage of bulk goods into and out of the region in previously undreamt-of quantities, and the

tonnages carried on the eve of the railway age in 1838 have been noted above. The canals brought coal, iron and manufactures, and facilitated the bulk importation and transportation of building materials such as stone, brick, lime and slate. They took away grain, malt, cheese and other agricultural produce. The canals also influenced and facilitated the location and development of larger-scale and new industries (for example, the development of gas works, which were overly reliant on bulk coal supplies).

Boats and boat-building on the Thames

Many of the types of boats used during the medieval period continued to operate on the Thames into the post-medieval period. More is known about the design and production of vessels from this period because they appear in large numbers of paintings and later photographs. Some of the boat yards still exist and others only closed in the 20th century, while a few wrecks have been discovered.

The clinker-built vessels with flat keels and without a high freeboard were ideal for the shallow water of the inland river. The term ‘barge’ became more commonly used from the 15th century onwards, replacing ‘shout’, and Western barges were first recorded in 1548, the expression meaning that the vessels traded inland. Used for carrying cargoes up and down river, barges were a common sight, demonstrating several different designs some of which related to their place of origin. When the canal network was established other barge designs were seen, Newbury barges on the Kennet & Avon and ‘trows’ on the Thames & Severn canal (Fig. 13). Two sorts of bow are shown in pictures of barges. In the ‘swimhead’ type, the flat bottom rose to a square-cut, partly decked bow. Other barges had a stemmed rounded bow. Both types generally had what is known as a ‘budgett’ stern, square and undercut with a deadwood from which the long rudder would hang. The size of barges varied from 25 to 200 tons with the former sometimes called ‘wussers’. The larger barges had a draught of four feet and were excluded for a time by the 1768 Act which limited draught. The large barges could usually travel 25 miles upriver in a day and 35 miles downstream. However, they required large amounts of manpower to haul them, sometime 50–80 men or 12–14 horses, while small barges could be moved using poles, and sails were also employed.

The earlier barges were square rigged with the mast set well forward. Some of the rectangular sails were very tall and narrow. The masts were equipped with yard braces to the

gunwale just aft of the mast and, when there was no stern awning, sometimes also had back-stays. A 1777-picture of Eton College shows a square rigger with its braces. Later, the mast moved further forward, and spritsail rigging was employed, as shown in Serres' view of the Thames near Shillingford Bridge. This painting also shows the smaller version, known as a 'stumpie', with its mast down. The mast always had to be lowered when the boats passed under the low bridges along the river. It also shows the 'tilt' at the stern, a canvas awning over iron hoops to provide crew accommodation. Further away is a chalk barge, which unusually had a proper stern cabin. The use of set poles rather than anchors for mooring is also shown.

Another type of boat which can still be found on the Thames is the punt. These simple flat boats were easily adapted for a variety of uses. Those used for fishing were around 8 metres long with a maximum width of just over a metre. They were equipped with a wet well, a box running across the width of the punt with grills in the sides to allow fresh water to circulate. Working 'flats' were used for a variety of jobs along the river including dredging. These are heavy and clumsy vehicles which were often towed from the path rather than poled. Originally, pine wood was used for punts, but modern flats are steel. Larger versions of the punt were often used as ferries, as they provided a stable platform for carrying carts and other heavy loads. Wire ropes over rollers were often used to pull them across. The construction of lighter, faster punts for recreation began in the early 19th century.

In 2003, cable work in Port Meadow, Oxford, uncovered part of a boat eroding from the bank of the Thames. This became known as the Binsey Boat, which was partially excavated in 2004, and consisted of a square-ended vessel, probably measuring 20.6m by 2m was found (Durham *et al*. 2006). It is likely that this is the remains of a working punt or canal boat used for carrying cargo such as sand or gravel (Fig. 14). It was not possible to date the boat directly, but associated finds and historic maps showing the changing position of the bank suggest it had been there since at least the mid-19th century.

The dimensions of canal boats using the Thames reflect the restrictions imposed by the narrower artificial waterways, and the vessels were made to be longer to compensate. Newbury barges were commonly *c* 33m long and 5m wide, capable of carrying 110 tons. Following the canalisation of the Kennet, the maximum width fell to 4.2m, and some canals could only take boats around 2.2m in width. Lock dimensions imposed restrictions on the length of boats, and some had folding rudders. Canals also led to the demise of swimheads, as these were likely to damage the artificial linings of the waterways.

Rowing boats were also used on the river. Wherries were the usual means by which passengers travelled around on the Thames, particularly high-status travellers. They were also used for delivery of small loads and the houseboats of the late 19th century would have been provisioned by them. Wherries are associated with the tidal Thames, though the 1555 statute which introduced regulation of the trade extended as far upriver as Windsor. This legislation led to the formation of the Watermen's Company and licensed watermen wore a livery with metal badges on their arms. Members would compete in regattas using stripped-down craft and took part in the Henley Regatta from 1845. The wherry design formed the basis for pleasure boats such as gigs and skiffs in the 19th century.

Steam appeared on the River Thames in the early 19th century for passenger services and pleasure cruises. The first service began in 1814 between London and Richmond and a service to Hampton Court began in 1840. The service from Oxford to Kingston using paddle steamers operated from 1876 to 1882. It was subsequently replaced by more conventional craft operated by Salter's of Oxford. Charter craft were also very popular, the journey enlivened by music and refreshments. Smaller vessels were produced for private owners and working boats also turned to steam. At the end of the 19th century, some electric launches were produced, which required a series of charging stations along their route, but petrol engines replaced them soon after the turn of the century.

There were numerous boat builders operating along the various waterways in the Thames Valley region, although some craft came from further afield. There are still boat builders on the Thames, mainly producing leisure craft or restoring old boats, but it is difficult to identify continuity from the earlier companies. Immisch & Co. were one of several companies that operated from the small eyots in the river. The firm was later taken over by Thorneycroft and went on to make flying boats before the business was transferred to Southampton from Platt's Eyot. One long-running company was Benn's, on the eyot of that name, which operated from the 17th century until after World War II. Another was run by Tom Tagg, who opened his yard on Tagg's Island in 1868.

Salters Boatyard opened in Oxford in 1858 and the company is still in existence, although only a few small glass-fibre boats are now manufactured, and the bulk of the business lies in pleasure cruises and boat hire. The family firm moved from Wandsworth to take over the site of King's Boatyard in St Aldate's. Opposite them on Folly Bridge Island was Thomas Hall's yard which was taken over in 1870. By 1887, Salters Boatyard had extended to the south bank of the river, on both sides of the main road and there were also

workshops near the Iffley Road (Wenham 2006). The firm made a range of pleasure boats including racing craft, but later extended to include steam vessels. The boatyards closed in the later 20th century when extensive recording work was carried out (OAU 2000b). All that remains at Folly Bridge is a small boat hire and excursion business.

One barge-building yard has been preserved as a museum at Dapdune Wharf on the Wey Navigation at Guildford, where one of the exhibits is an original barge, 'Reliance'. This boatyard was operated by William Stevens & Sons. Other yards carried out repairs and the yard on the Oxford Canal in Jericho, Oxford, has only recently closed. Proposals to redevelop this yard, which featured in Philip Pullman's 'Dark Materials' books, for housing have proved controversial. One traditional boatyard, Tooley's, has been preserved as a museum in Banbury, and a dry dock was excavated close by in 1998 (BUFAU 2000).

Cargoes, wharves and yards

Many towns along the rivers and canals operated as collection and dispersal points for goods, some brought in from the surrounding area, but others *en route* from much further away, particularly coal and raw materials such as iron and copper from Wales and the Midlands. These towns also attracted manufacturers, who were able to make use of the goods and find a ready market for their own products.

Until improvements were made to the river in the early 17th century it was not possible for barges to operate further upstream than Henley (see above). Goods coming up river from London included items such as sea coal, earthenware, glass and raw materials for distribution by road, and in the 18th century, wharfs were improved and bargemen discouraged from downloading where they pleased (https://www.victoriacountyhistory.ac.uk/explore/items/henley-and-thames-river-trade). As the leading transhipment point on the Thames, however, Henley was finally undermined by the canals, particularly the Kennet and Avon, which joined the Thames at Reading. Nonetheless, the 19th century saw Henley re-invented itself as a centre for rowing and pleasure boating.

There was a wharf in Oxford at Hythe Bridge in the 16th century, known as the 'timber wharf' but it was also used for hay, slate and Cotswold stone (Prior 1982; Peberdy 1996). Another with a wet dock was established north-east of Folly Bridge *c* 1625, which

eventually became Salters' Boatyard. During the 19th century, several large wharves were developed around Folly Bridge and westwards on the north bank (OAU 2000b). Timber, stone and coal yards were also established in Jericho on the Oxford Canal, which culminated at an extensive coal yard, now the site of Nuffield College. Most of the wharves on the river closed or were taken over by Salters by the end of the 19th century, but the main coal depot operated until 1950. There is very little evidence for these yards. The Wharf House public house is all that remains of the 1830s Friars Wharf, which had been the largest in the town and similarly part of the Folly Bridge Wharf, which is now the Head of the River public house.

The Kennet and Avon Canal opened in 1723, helping Newbury to become an important port in the 18th and 19th centuries, while Lechlade benefited from the opening of the Thames and Severn Canal in 1789. Kingston-upon-Thames was already an important riverside town. Excavations in the 1990s at Charter Quay demonstrated how land reclamation and revetments along the river bank allowed properties to exploit the frontage from the medieval period onwards (Andrews 2003). Charter Quay lies between the river and the town's market place, over the Hogsmill. By the end of the 17th century, the bank had been extended well into the river and straightened. A timber yard and malthouse were already in operation, with a brewery to their south. In the 1860s, the timber yard became a boat-builders, Burgoigne's, which closed in 1910, and wharves extended southwards from this area.

Navigation on the River Thames and its Canal Network in the 20th century

by Trevor Rowley

Changes to the River Thames in the 20th century reflected the wider economic and social fluctuations experienced by southern Britain at the time. In 1900, the middle reaches of the river were still commercially active, but heavily polluted. The Upper Thames saw less long-distance traffic, while still playing the same role in the lives of its riparian inhabitants as it had for centuries. By 2000, the situation was dramatically different. Along the length of the Thames, commercial barges had been replaced by pleasure craft. The towpath had become a long-distance footpath, the Thames Path. The river became a focus for a wide range of sports and recreations, while sections of it were protected for the benefit of plants and animals.

In 1894, various elements of piecemeal legislation affecting navigation on the Thames were consolidated in a new Act, the old Thames Conservators were reconstituted, and old debts were largely written off. In 1908, the Port of London Authority was formed to control the port and tidal river, and the Conservancy handed over its powers relating to the lower Thames, inherited from the City of London, to the Authority. Until 1974, the Port of London Authority controlled the tidal Thames from an imaginary line some 265 yards below Teddington Lock to the estuary, and the Thames Conservancy had jurisdiction over the whole non-tidal river from its source to Teddington. The Land Drainage Act of 1930 established the Conservancy as the drainage board for the whole catchment area of the Thames, giving it jurisdiction over the Thames tributaries as well as the river itself. In all this represented some 2402 miles of river. In 1974, the Thames Conservancy was absorbed into the Thames Water Authority, one of ten new Regional Water Authorities responsible for the conservation of water supplies and land drainage. In 1989, this role was taken over by the National Rivers Authority and from 1995 by the Environment Agency.

In 1905, the Thames above Staines still carried over 711,200 tonnes of commercial traffic a year, much of it going to and from associated waterways such as the River Wey and the Oxford Canal. On the higher reaches, this activity still included localised, horse-drawn, barge traffic, represented by the movement of grain out of the Vale of White Horse, from wharves at Sutton Courtenay and elsewhere, to Reading. In addition, there were the new screw-driven steam barges and steam tugs which were regularly used to tow barges up as far as Oxford. Steam barges carrying *c* 50.8 tonnes of imported grain travelled from London to several mills, sometimes returning with beer from H & G Simmonds brewery at Reading. Emanuel Smith's barges transported timber, coal and other merchandise. Timber was known to 'fall' overboard on a regular basis. This resulted in a rash of new shanty riverside buildings including sheds and even bungalows; in response, the Thames Conservancy secretary issued the following instructions to lock staff in 1926:

Complaints have been received from firms trading upon the river that a serious leakage occurs during transit between the point of loading and the point of discharge of commodities such as coal, timber, etc., and all lock-keepers are directed to assist, as far as they are able, to detect any interference with cargoes while vessels are in the vicinity of their locks, and to report any cases of pilfering or unauthorized removal of any goods from barges. Lock-keepers, weir-keepers and ferrymen are particularly warned against receiving or

purchasing from persons in charge of craft any merchandise whatsoever, and any case of a Conservator's employee so doing will be severely dealt with (Thames Water 1926).

Midland narrow boats from the Oxford Canal continued to supply coal to riverside wharves at Benson and to mills such as Wolvercote and Sandford. They also carried pottery and other goods from Staffordshire and the Midlands. By the 1920s, the Thames Conservancy average annual merchandise figures for traffic above Teddington had fallen to 355,600 tonnes. There was a continuous programme of navigation improvements along the river. By 1928, this included the rebuilding of Godstow lock, the removal of Medley flash lock, and the replacement of King's and Eynsham flash locks with new pound locks. These improvements allowed the river above Oxford to reopen: it had become so awkward that the few canal boats which used the Upper Thames bypassed Godstow Reach via the canal and Duke's cut. King's weir had been particularly difficult to navigate, as boats had to negotiate a single pair of mitre gates, similar to pound lock gates, instead of paddle and rymer tackle (Wilson 1987). Other trade at the time included the movement of rags for paper making, which were brought to Taplow, Temple and other paper mills, and imported grain, which went to corn mills such as Marsh and Sonning. From the 1930s, Samuel Beckett's tugs towed special Dutch-built steel barges on regular runs to the timber yards at Marlow, Reading and Oxford. Two of the largest steam tugs working on the non-tidal river were the *Thames* and the *Black Prince*. Both were used on Thames Conservancy maintenance work until the late 1930s. The Conservancy gradually built up a large fleet of wooden and, later, steel barge, working flats as well as some narrow boats for lock and weir building and maintenance. Steam dredgers gradually replaced hand-dredging equipment and some boats continued to use steam engines until the 1950s, when many tugs were converted to diesel or replaced by motor tugs.

During the Second World War the merchandise figures for the river above Teddington almost doubled, reaching over 609,000 tonnes by 1944. H & G Simonds brewery at Reading exported beer to overseas troops by water, and throughout the war, tugs travelled as far as Oxford. Between 1942 and 1944, 70 barge loads of stores for RAF Abingdon were delivered. In May 1944, 168 tonnes of copper were carried through from Brentford to Oxford, and in the same month two pairs of narrow boats carried 80 tonnes of steel in the other direction. After 1944, little commercial traffic is recorded, the main exception being between September 1949 and June 1951, when the narrow boat *Columba* made a number of journeys carrying salt to

Newbury and Reading from Cerebos Ltd at Northwich in Cheshire via the canal system. Another short-lived attempt to use the river commercially was made in 1959 when grain for chicken feed was carried from London Docks to Marsh Mills at Henley.

An average of about 300,000 tons of freight per annum continued to be carried along the river in the 1950s. In March 1952, however, Beckett's took their last barge load of grain to Sonning Mill in Reading and thereafter the mill was obliged to use road transport, which was more economical. There was a rapid decline in trade above Teddington and by the early 1970s, most commercial traffic to the Wey had ceased; even the timber wharves at Hampton Wick and Kingston were no longer supplied by water. Samuel Beckett's had sold their tugs, and a few stayed on the Thames with Aubrey Watson's, the dredging contractors. By 1972 there were only 4064 tonnes of merchandise**.** By the 1980s the only trade on the Upper Thames was occasional, in the form of narrow boats bringing coal from the Midlands via the Oxford or Grand Union canals to supply lock keepers and other riverside dwellers.

The demise of commercial traffic was mirrored by the rise of the Thames as a leisure amenity. The publication of Jerome K Jerome's *Three Men in a Boat* (1889) did much to stimulate interest in the river for holidaymakers. The hire of small boats for pleasure grew because the railway was able to bring passengers to within easy walking distance of the Thames from Abingdon to Windsor. In 1903, there were about forty small companies offering similar services including traditional wooden skiffs and punts (with the addition of canvas covers which could be hired for camping by the week), Canadian canoes, dinghies and fishing punts, all by the day or the hour. With such competition, customer service was important. Two firms offered the hire of electric launches, while others supplied steam launches, open boats with canvas awnings and space for a set of basket chairs. Most companies also stored craft for private customers and provided changing or dressing rooms, while riverside hotels offered 'every accommodation to water and picnic parties'.

Boating remained popular in the 1920s. Salter's ran steamers with pick-up and set-down points between Oxford and Kingston, linking with rail and bus for return journeys. By 1922, in Reading alone there were five competing firms, just one of whom, the Moss Boat and Punt Building Company Ltd, had 120 hire craft, and there were many privately-owned boats. The peak of the working year was Henley Regatta Week when local firms took their boats by water to Henley, adding to their services picnic hampers for those spending the day afloat. After the firework display on Saturday evening, the boats were loaded up again ready for a dawn start back to catch the local Sunday trade. The war years 1939–45 were busy on

the river as people took their holidays and outings near home or near where they were stationed. Local boat-building skills were in also demand for the war effort: Salter's turned from steamers to landing and support craft, while Bushnell at Wargrave built and tested air-sea rescue boats and sent them via the Thames and Kennet Canal for dispatch by rail. There were river sections of the Home Guard, and a flotilla of Thames boats went to collect troops from Dunkirk. A plaque on the lock-keeper's cottage at Teddington records that one hundred small boats assembled there in May 1940 before their departure across the English Channel. After the war, there was a short-lived vogue for converting assault and landing craft into houseboats, but they disappeared as the post-war housing situation improved.

The petrol engine had the same impact on river boats that it had on the road; it allowed larger vehicles to go faster and further, displacing the smaller ones. In 1951, the Thames Conservancy published guidance 'for persons in charge of launches' which established requirements for lighting and for the use of a horn for warning signals. 'Speed must be carefully regulated so as not to cause a wash that will inconvenience other vessels, particularly punts, skiffs and canoes.' The use of new materials led to changes in boat design, tending to make old skills obsolete. The river was still popular, but the hire business now concentrated on fleets of self-drive cabin cruisers. The advantage went to those firms who had an island or backwater for secure mooring. Private owners needed access to a slipway to enable them to get their boats onto land for winter storage.

After the Second World War, the number of pleasure craft on the river increased rapidly. This led to the application of modern engineering to the locks in the post-war years to enable the rapid passage of large numbers of small vessels from one section of the river to the next. To cope with the increase in the volume of small craft, it was necessary to improve the efficiency of the filling and emptying process. In this context, the reconstruction of Sandford Lock in 1972–3 represented a major step forward in lock design (Kemplay 2000, 42).

The number of registered pleasure vessels increased from the mid-1950s, reaching a peak in 1973. Subsequently, the number gradually declined until 1983 when there was a slight recovery. However, after 1990 there was a sharp decline and by 1993 the number of passages of pleasure craft through locks had fallen by 35% (Kemplay 2000, 78). The busiest part of the river, based on figures recorded between 1973 and 1997, was near Henley, between Marsh and Boveney locks, while the least traffic recorded was between Lechlade and Oxford. Marsh Lock was exceptionally busy because of the Henley Royal Regatta, the

Festival of Music and the Arts, and other regattas. These events attracted many additional small craft to the reach between Marsh and Hambleden locks. Other locks were affected by the proximity of boatyards where small craft were available for daily hire. River traffic was at its peak in 1980, boatyards flourished at Abingdon, Benson, Wargrave, Maidenhead, Chertsey, Sunbury, Thames Ditton and many other places, though only a few of these survived into the 21st century.

The river systems are all now accessible and heavily used, dependent on road, not rail, to bring people to their banks. There is an eclectic mixture of river craft with narrow boats, Mississippi-style river boats, launches, cabin cruisers, kayaks, and fibreglass hulls with outboard engines. The Thames Path and the Kennet Walk are now open. Sonning Mill was converted into a theatre and Mapledurham Mill, which claims to be the last working flour mill on the Thames, sells flour to visitors. Some firms and boats trading before 1903 continued into the 21st century. Peter Freebody restores classic boats, and Salter's steamers are still flourishing. Thames Steamers operate the *Alaska,* which was built in 1883, and is the last coal-powered steamer on the Thames. The Holy Brook, which was once the source of power for the Abbey Mill in Reading, but long buried underground, was restored to become a feature in the new shopping mall. In 1998, riverside flats, some with mooring rights, and the Oracle shopping centre opened Reading's waterways as focal features in the contemporary townscape.

River bathing from bank and boat was popular on both the Thames and the Loddon. In the summer, children and adults could swim unsupervised from lidos, areas marked with a floating boom, and there were some organised long-distance swims. The Winter Bathers, principally men from the Reading business community, flourished between 1910 and 1914. River swimming continued until the early 1950s on the Berkshire Thames and continues up to the present at Port Meadow in Oxford, although Parson's Pleasure, the nudist male swimming area in the University Parks on the Cherwell in Oxford, was closed in 1991 (Hibbert 1988, 316).

Locks and weirs

The lock system on the Thames, for a long time the only defence against flooding, remained the first line of defence during the 20th century. There are 43 locks on the non-tidal Thames, plus Blake's Lock on the Kennet, which is administered by the Environment Agency as part of the River Thames. The locks with their adjacent weirs are used for controlling the flow of

water and provide for navigation above the tideway. The Thames Conservancy built several new locks in the 20th century, the last of which were Eynsham and King's, upstream from Godstow, in 1928. Most of the other Thames locks were rebuilt or modified in the 20th century. The Iffley lock and weir were completely reconstructed in 1922. The highest upstream lock is St John's at Lechlade (73.10 m OD) and the lowest is at Teddington (4.30 m OD). There is also a lock at Richmond on the tidal stretch of the river.

The last of the flash locks, at Medley just below Port Meadow in Oxford, was not taken down until 1937, as part of a programme of flood improvements on the Upper Thames, as was the weir at Eaton Hastings. The original flash lock capstan used at the Hurley flash lock has been restored as a riverside feature next to the Thames at Wittington House, between Henley and Marlow. The weirs at Northmoor, Rushey, Iffley, Goring and Streatley are still operated using traditional paddles and rymers (OA 2010). Electro-mechanical equipment was installed at Mapledurham Lock in 1956, but the first reliable hydraulic system was fitted to Shiplake Lock in 1961 and it was this system that was eventually applied to all the locks between Teddington and Godstow. The locks above Godstow are still all operated manually (www.the-river-thames.co.uk). The lock system admits boats up to 36.6m long and of 5.2m beam up to Abingdon, 33.5m long and 5.2m beam to Oxford and 30.5m long and 4.3m beam to Lechlade. The navigable channel provides a 1.98m draught from Teddington to Staines, 1.67m from Staines to Windsor, 1.37m from Windsor to Reading, 1.2m from Reading to Oxford, and 0.92m from Oxford to Lechlade. This is sufficient water for six- and eight-berth cruisers to get up to Lechlade, although the low clearance under Osney Bridge still restricts navigation above Oxford.

The fall and rise of the canal network in the 20th century

Although the Thames remained an active waterway throughout the 20th century, the canal network that linked it to other parts of the country was virtually redundant by the First World War as freight was transferred to the railways. However, from the middle of the century onwards renewed interest in canals led to restoration and revival. This change came partly out of nostalgia for the loss of an apparently tranquil form of transport but accompanied a growth of interest in industrial archaeology and the recognition that canals were a valuable recreational and ecological resource. It is generally acknowledged that the start of this revival

was initiated in 1939 by a journey made by L T C Rolt around the canals of England and Wales in the narrow boat *Cressey*, which started at Banbury on the Oxford Canal. Rolt's account of his journey, *Narrow Boat* (1944), led to a rekindling of interest in canals and eventually to the establishment of the Inland Waterways Association. This was the body which was responsible for restoring many of the canals in England. In recognition of his inspirational work one of the bridges over the Oxford Canal at Banbury Quay was renamed the Tom Rolt Bridge. Although canal restoration remains a work in progress, and subsequent development has prevented the re-opening of some sections, such projects remain the most important initiatives for the investigation and conservation of the physical remains of these monuments of the industrial revolution.

The Thames and Severn Canal

After several unsuccessful attempts at repair and revival, the Thames and Severn Canal was formally abandoned between Lechlade to Whitehall Bridge in the Golden Valley in 1927. This was followed by the abandonment of the length to Stroud in 1933. Sections of the canal which had been abandoned in the early part of the century soon became derelict. Sapperton Tunnel suffered two roof collapses and sections of the canal were returned to agricultural use or had factory buildings erected over them. The construction of the M5 motorway and its link road to the A38 resulted in the loss of Bristol Road and Meadow Mill locks and the one mile of canal linking them. A flood-relief scheme by Severn Trent Water Authority near Whitminster merged the canal with the River Frome for about 400 yards and resulted in the infilling of Whitminster lock. A total of nine swing bridges were fixed, and over the years the remaining locks were allowed to decay with various service pipelines being installed at water level. The Cotswold Canals Trust has vigorously promoted a reversal of the destructive processes and has undertaken specific restoration works using volunteers. The result of all this effort has been that most of the canal corridor has been declared a Conservation Area (www.cotswoldcanals.com; Sinclair 2007, 5). It is hoped to restore a ring of Cotswold canals which will eventually re-establish the link between the Thames and the Severn.

The Kennet and Avon Canal

The Kennet and Avon Canal was bought in 1852 by the Great Western Railway, who proceeded to levy prohibitively high tolls on its use. The Somerset Coal Canal and the Wilts and Berks Canal, which supplied the Somerset coalfield trade to the Kennet and Avon, closed

in 1904 and 1906 respectively. The Kennet and Avon Canal was largely unnavigable by 1910, although local sections were used until the end of the Second World War. During the early part of the war, the canal was identified as part of the General Headquarters Line to defend against an enemy invasion. Many of the pillboxes built at that time still survive. In 1956, the Kennet and Avon Canal Association successfully campaigned against attempts at legal closure, and in 1963 British Waterways took the canal over and began restoration work. The Kennet and Avon Canal Trust, formed in 1962, worked to restore navigation from Reading to Bath. This immense task involved the restoration of 86 derelict locks, 172 pairs of gates, a leaking canal bed, decaying aqueducts, and abandoned pumping stations. Eventually in 1990, Elizabeth II was able to re-open the fully restored waterway with its 104 locks. In addition to providing an important heritage tourist destination for both narrow boats and cruisers, the canal also represents a valuable wildlife conservation resource (Phillips 1993, 215).

The Wilts and Berks Canal

The decline in output of the Somerset coalfield and competition from the Kennet and Avon Canal, not to mention the Great Western Railway, meant that the Wilts and Berks Canal's role as a commercial waterway was almost over by 1900. The collapse of a section of the Stanley aqueduct between Calne and Chippenham in 1901 left the canal all but useless, and within thirteen years an official Act of Abandonment was passed by Parliament, with the land on which the canal had been built returned or sold to the adjoining landowners. After abandonment, the canal continued to degenerate, aided in places by the infilling with domestic rubbish of the locks in urban areas and the use of the structures for military demolition practice during the Second World War. Nevertheless, much of the canal remained in a surprisingly good condition, especially in rural areas where most it lay**.** In 1977, the Wilts and Berks Canal Amenity Group (now the Wilts and Berks Canal Partnership) was formed with a view to restoring its whole length. The major works required consisted of the rebuilding of structures, locks, bridges and wharves. New facilities were also required to cope with the impact of post-abandonment developments, such as the M4 motorway crossing south of Swindon.

The Wey and Godalming Navigations

The Wey and Godalming Navigations consist partly of canal sections and partly of the River Wey. They are joined by the Basingstoke Canal at West Byfleet and the Wey and Arun Canal near Godalming. Unlike most canals in the region, the Navigations survived the railway era and continued to trade commercially until well after the Second World War. The last owners, Stevens and Sons, donated the canal to the National Trust in 1964 and today it is one of the few self-financing waterways in Britain. It is also an important recreational facility for cruisers and hikers. Its links with two National Trails, the Thames Path at Weybridge and the North Downs Way at St Catherine's, providing a traffic-free route through a densely built-up part of south-east England. Parts of the towpath are also designated as part of the European long-distance path E2, which extends over 4850km from Galway in Ireland to Nice in southern France.

The Oxford Canal

The Oxford Canal put up a tougher fight for life. Leicestershire coal brought to Oxford by canal remained substantially cheaper than rail-borne coal. The University's paper mill at Wolvercote, the electricity works at Osney and one of the Oxford breweries continued to receive coal by canal into the 1950s. However, in 1937, its main wharf was sold as the site for Nuffield College (built after the war) and apart from a few coal contracts much of its carrying-trade was gone. The canal basin is now occupied by a car park and the original headquarters of the canal company in New Inn Hall Street serve as the entrance lodge to St Peter's College. Canal House, which superseded it in 1827, is now the residence of the Master of St Peter's.

THAMES CROSSINGS

Medieval Thames crossings

Bridges

Bridges were erected and maintained by a variety of means during the Middle Ages. Some were provided by the Crown, some by monastic houses or episcopal authorities, some by secular landowners, some by corporate boroughs, and some through some form of joint proprietorship. Clause 23 of Magna Carta (1215) states 'No town or individual shall be

compelled to make bridges at river banks, except those who from of old were legally bound to do so'. Certainly, responsibility for the upkeep of bridges continued to be the responsibility of a range of institutions for several centuries after. Construction and maintenance might be supported by individual personal donations, and by pontage grants from the Crown, which permitted proprietors to levy tolls for those purposes, either from boats carrying goods beneath or from travellers crossing the bridge itself. Permission to levy pontage might be granted for the construction of a new bridge, but more commonly it was employed to fund maintenance of a pre-existing structure. However, the proprietors were sometimes dilatory in collecting tolls, and sometimes the collected income was diverted to other purposes, so pontage grants are of dubious value in providing dates for bridge construction or repair. Bequests by laymen and acceptance of corporate responsibility tended to become more important in the later middle ages as the role of the church receded.

Medieval bridges, like their Roman predecessors, might be constructed entirely of timber, entirely of stone, or of a combination of the two. Simple plank bridges or stone clapper bridges could serve to span small or shallow streams, but arched bridges were the only way of crossing wider rivers. Where a bridge was built over a pre-existing ford then it is likely that the river-bed would be hard and the water relatively shallow. The choice then would normally be to lay the foundations in the water, by sinking loads of rubble in wickerwork containers at selected points, or by dumping rubble into enclosures formed by iron-shod wooden piles driven into the river-bed to form artificial islands or *starlings*. Alternatively, pier foundations could be constructed by temporary diversion of the water or by using coffer dams. Medieval bridges constructed entirely of stone tended to be sturdily built, with short spans and massive piers. Up to the beginning of the 13th century, the arches of stone bridges tended to be semi-circular and barrel-vaulted. Thereafter, pointed arches were increasingly employed, the high rise relative to the span reducing the side-thrust inherent in any arch. The underside of the arch was commonly reinforced by ribs of ashlar. The piers between the arches were often so broad that they blocked more than half the width of the stream. They were not always evenly spaced, but sited wherever it was easiest to lay the foundations. It was an inherent weakness of this type of construction that starlings and piers partly obstructed the passage of the river, thereby increasing the pace of the flow through the gaps, and this led to scouring of the river bed which in turn led to the undermining of the piers. Cutwaters had been used on the upstream side of many Roman bridges, but during the Middle Ages they were commonly placed on the downstream side too,

to reduce the erosive power of eddies. Many bridges were designed more for horse and pedestrian traffic than for wheeled vehicles, so were often narrow and steep. The parapets were normally offset over the cutwaters, thereby providing pedestrian refuges in the event of laden carts crossing. Towards the end of the Middle Ages, new bridges tended to adopt more flattened four-centred arches, thereby reducing the central hump. Some medieval bridges carried secondary structures such as defensive gates, shops and houses, and most of the medieval bridges over the Thames (with the exception of Staines) were associated with chapels accommodating hermits or chantry priests. These men were charged with the responsibility of collecting alms and pontage tolls, administering legacies for the maintenance of the bridge, ministering to travellers and praying for the souls of founders and benefactors. In some cases, the chapel was part of the bridge structure, commonly being placed alongside the roadway on an enlarged starling. Alternatively, the chapel might be at one end of the bridge or on dry land nearby.

About 20 bridges are known to have been constructed over the Thames between Cricklade and London during the Middle Ages (Table 2), of which three stone bridges survive substantially intact: Radcot, Newbridge and Abingdon. Others retain parts of their medieval structure, despite considerable later rebuilding. Evidence suggests most Thames bridges in the medieval period were built of timber or a mixture of timber and stone, often approached on either side by a causeway of embanked earth with stone flood-arches. The timber bridges were not very durable structures and documentary records suggest they were prone to failure and needed frequent repair. All were ultimately to be replaced, generally in the late 18th and early 19th centuries (see below). Brief notes of many medieval bridges which have since been reconstructed occur in John Leland's Itinerary of *c* 1535–43 and in John Ogilby's road book *Britannia*, published in 1675. More extensive details on the Upper Thames bridges are provided by Thomas Baskerville's survey of 1692. Other sources of information include documentary records of repairs and maintenance, ownership of rights to collect tolls, the appearance of bridges on early maps, and views such as the Jan Siberechts paintings of Henley. The contribution of excavation has to date been relatively limited, but it clearly has considerable potential to refine our understanding of the date and location of the first medieval bridges (see below).

The date when the medieval bridges over the Thames were first constructed is rarely known. The earliest record is for the building of the Grandpont at Oxford, dated by the monks of Abingdon to 1091. Archaeological excavation has demonstrated that this represented the

replacement and upgrading of an earlier crossing that incorporated a timber bridge and a ford (Dodd 2003). The bridge at Wallingford may also have been a Norman replacement for an earlier ford. It has been rebuilt several times, but a detailed survey undertaken for the Wallingford *Burh* to Borough project has identified three arches that retain medieval rib vaults, and a land arch at the east end with voussoirs that may be of 12th-century date and suggest that the bridge was made at least partly in stone, well before its documented 13th-century reconstruction (Christie and Creighton 2013, 224–9, fig. 6.8). Radcot Bridge, now regarded as the oldest surviving on the Thames, is mentioned as under repair in 1208–9. It carries the road from Witney and Burford to Faringdon, and the crossing here may be considerably older; by the early 12th century this was the site of a castle complex, and it has been suggested that a crossing here could have been developed by the late 11th-century landowner, Aelfsige of Faringdon, to connect his estates on either side of the river (WA 2009, 2). The bridge may have been associated with the Cistercian colony initially settled on the royal manor of Faringdon by King John and subsequently moved to Beaulieu. An unusual feature of the bridge, which points to religious connections, is what appears to be the stump of a cross on the upstream parapet, and a niche in the downstream parapet formerly known to have contained a statue of the Virgin Mary, broken up by the Levellers in the 17th century.

Most of the major medieval bridges on the Thames are recorded by the middle of the 13th century and archaeological research now shows that some date from the late 12th century. Bridges first mentioned at this time are Lechlade (although there was an earlier timber bridge), Caversham, Henley, Marlow, Windsor, Staines and Kingston. The origins of the bridge at Kingston have been dated by excavation to *c* 1170, and excavations at Staines revealed part of the High-Street extension towards the first medieval bridge, with pottery suggesting the road extension had been laid in the mid to late 12th century (Jones 2010, 316). A stone arch on the town side of Henley Bridge survives in the basement of the Angel Inn, and the arch retains tooling marks that are datable to *c* 1170 (VCH 2011). Newbridge on the Upper Thames was built around 1250, and Maidenhead perhaps during the 1260s, when the chapel is first mentioned; the bridge itself is first mentioned in 1280. The bridges at Abingdon and Chertsey were relatively late. At Abingdon, three linked stone bridges with a causeway were constructed to replace an earlier ford in the early 15th century, largely through the efforts of the townspeople in their Fraternity of the Holy Cross, while at Chertsey, a timber bridge was built around 1410 to replace the earlier ferry (Fig. 15). A bridge is mentioned in 1301 at Shillingford, an important crossing leading to Wallingford, but

the bridge appears to have gone out of use as there are later records of a ferry here. Elsewhere, the date of the two-arched stone bridge at Godstow, near Oxford, is unclear. References suggest that there may have been a timber bridge in the medieval period at Whitchurch, alongside a ferry. Leland mentions a timber bridge at Sonning *c* 1535, and bridges of timber and stone alongside ferries and causeways are mentioned by Baskerville in 1692 at Cricklade, Castle Eaton, Hannington and Sutton Courtenay.

Fords

The course of the Thames is punctuated by fords throughout its upper and middle reaches, and there were many more examples on its tributaries (Table 3). Fords are frequently mentioned in the boundary clauses of Anglo-Saxon charters, and many are commemorated in the names of local villages and hamlets. The word 'ford' eventually became one of the commonest of all topographical terms employed in English place-names and frequently forms the second element of a compound name. The first element sometimes describes the character of the crossing (for example Langford, meaning the 'long ford', Twyford, meaning the 'double ford', or Sandford, meaning the 'sandy ford'). Alternatively, it may denote distinctive commodities regularly carried over it, for example, barley (Barford), hay (Heyford) or salt (Salford), or domestic livestock regularly herded through it such as oxen (Oxford), sheep (Shefford, Shifford), swine (Swinford) and geese (Gosford). At least a dozen fords over the Thames itself are commemorated in settlement names, with many further examples on the tributaries. They are especially concentrated in the upper part of the valley above Oxford. The highest ford on the Thames to be commemorated in a place-name is at Somerford Keynes, 6km below Thames Head, while Moulsford, marking one of the crossings of the Icknield Way in the throat of the Goring Gap, is the lowest major 'ford' name on the river. Waggons laden with grain crossed the Thames at Little Stoke Ferry in times of drought in the earlier 19th century, and occasional passage was made by horsemen including on one occasion a one-horse chaise between Goring and Streatley (Thacker 1914, 204, 211). The bridge between Whitchurch and Pangbourne replaced a low-water ford immediately upstream (ibid., 221). Charter evidence suggests that there may have been another ford near Hardwick in Whitchurch in the early 11th century (Grundy 1933, 73–4), but no later reference to this is known. Other possible fording-points have been noted near Cliveden, at Bray, at Laleham and possibly at Kingston (Thacker 1914, 318, 336, 404, 454).

Small streams usually presented no great obstacle, so it comes as no surprise to find that place-names incorporating words for 'ford' occur most commonly around the headstreams of the Thames and its tributaries. Most of these narrow fords were eventually replaced by small bridges on or adjacent to the same site. As the volume of water increased downstream, the choice of potential crossing-points became ever more limited. Fords require shallow water, and the best sites therefore often tend to be where the natural stream was at its widest. Alternatively, braided sections of the river, where the volume of water was dissipated through several different channels, would be sought out. In either case, the floodplain was often relatively wide, and this might make the approach roads themselves impassable in winter when water levels were high. In contrast, bridges ideally required the shortest possible span, where the water was likely to be at its deepest, and where reasonably solid ground could be found on either bank. Where fords served as important focal points of both long-distance and local routeways, considerable technical difficulties often had to be overcome in the middle ages to replace them with bridges. In some cases, as at Duxford, Appleford and Moulsford, the small volume of local traffic never justified the cost of replacing a ford with a bridge. Those fords, with the approach roads leading to them, dwindled in importance as travellers preferred to seek out alternative crossings a few miles upstream or downstream. Fords had also been an obstacle to navigation, and for this reason those on the lower river were soon eliminated by dredging as alternative crossings became available nearby. Even on the upper river, Duxford is now the only place on the navigable reaches where the Thames can still normally be crossed on foot.

Ferries

Ferries over the Thames are documented from the 13th century. A few medieval ferries are recorded upstream from Oxford, at Shifford, Bablock Hythe and Swinford, but they become more numerous further downstream as the width and depth of the river increases. At least 16 examples in use before 1550 have been identified between Shifford and Richmond from records of proprietors, ferrymen, rents, dues and grants of various types. The village of North Hinksey bore the alternative name of Ferry Hinksey and the presence of a ferryman at the crossing of the Hinksey Stream is mentioned in several documents, including two deeds in the Lyell Cartulary of Abingdon Abbey in the 13th century (Lambrick 1969, 81) and in the Osney Cartulary in the 14th century (Salter 1936, 1). A few ferries belonged to the crown, some to lay proprietors, others to monastic houses: Shifford ferry belonged to Eynsham

Abbey, Bablock Hythe ferry to Deerhurst Priory. The ferry between Goring and Streatley was granted to the nuns of Goring Priory by Henry I and contributed a significant part of their income up to the Dissolution. Whitchurch ferry belonged to Reading Abbey's manor of Pangbourne. A ferry at East Throp or Lower Caversham is recorded in 1306 (Pearman 1894, 15). Interests in the Caversham ferry were acquired by the canons of Notley, and in about 1493 they obtained an outright grant of the ferry, with its boat, the old lock, mills and mill barge (Thacker 1914, 228, 233).

Proprietorship disputes are sometimes recorded. The ownership of Swinford Ferry was contested between the Benedictine abbeys of Eynsham and Abingdon, landowners on the Oxfordshire and Berkshire banks respectively. In 1299, they reached a settlement whereby Abingdon allowed Eynsham free passage and an annual rent of 1s in return for the profits from the ferry (Tucker 2012). Ownership of the Datchet ferry was in dispute in 1387 between the Crown and the de Molyns family, who claimed to have acquired it with the manor fifty years earlier (Thacker 1914, 369). The former existence of other ferries is identified in a variety of miscellaneous records, for example the grant of a virgate of land by Abbot Hugh of Abingdon (1189–1221) to the ferryman of Hinksey in exchange for a gift of ten cartloads of lead for roofing the new extensions to the abbey church. A ferry at Sandford was recorded in *c* 1219 and survived at least to the early 18th century. A ferry was operating between Nuneham and Radley by 1279, and there was another by the ford at Clifton Hampden in the early 14th century. In 1299, payment was made to Sibille, ferrywoman of Chertsey, for carrying the king and his family over the river on their way to Kingston (ibid., 410). Some ferries may have been seasonal operations only: John Leland's description of the ferry 'at highe watars' at Dorchester may imply that the river was normally forded when the water was lower. Many early ferries were superseded by bridges in later centuries, but occasionally the reverse occurred: a ferry mentioned at Shillingford in 1376 and 1387 replaced a decayed bridge (Thacker 1914, 182).

Archaeological evidence for ferries potentially includes approach roads or causeways and landing-stages on either bank, ferry boats, and perhaps temporary or permanent shelter for the ferryman. Tracks approaching the sites of medieval ferries are likely to survive if the ferry itself survived into later centuries, as at Bablock Hythe, and may become heavily-used roads where the ferry was later superseded by a bridge. A stone mounting-block of uncertain date was discovered in 1938 by the site of Sandford Ferry, and is preserved by the present Sandford Lock. Otherwise, survival of medieval structures or artefacts related to ferries is

very limited. Little is known about the nature of the ferry-boats, though there are occasional documentary references to responsibilities for their provision and maintenance: on two occasions in the 1230s grants of oak timber for the construction of boats for the ferry at Caversham are recorded (Thacker 1914, 228) and 'a great barge for the king's ferry' at Datchet was ordered in 1278 (ibid., 369). In some cases, boat maintenance seems to have been the responsibility of the tenant, in other cases of the proprietor. In 1320, the tenant of the Bablock Hythe ferry was required not only to maintain the boat but also to keep in repair the causeway approaching it, nearly 1½ leagues in length, whereas towards the end of the 15th century, the *fferybarge* at Shifford was maintained by the abbot of Eynsham (ibid., 72–3, 88).

Post-medieval Thames crossings

Few new bridges were built between the early 16th century and the middle of the 18th century. Instead, the early post-medieval centuries were characterised by protracted disputes over responsibility for existing bridges, and a long struggle to maintain the network inherited from the medieval period by piecemeal repairs and replacements. Many medieval bridges and ferries had been owned and maintained by religious foundations. With the dissolution of the monasteries, chantries and religious guilds their assets were dispersed, but grants often failed to mention any associated responsibilities and the new owners (including in some cases, the Crown) were keen to avoid the charge. Chertsey is a well-documented example. In 1530, Leland found 'a goodly Bridg of Timber newly repaired,' but the abbey was dissolved eight years later and in 1541, the Earl of Southampton had to spend £489 repairing the bridge (Phillips 1981, 142). By 1580, it was again seriously dilapidated but by now nobody was accepting liability for it, and in 1582 Elizabeth passed an act making the upkeep of the bridge the responsibility of the Middlesex and Surrey Justices with immediate repairs to be funded by rates levied on the inhabitants and a royal donation of timber. The scale and cost of the work are suggested by the records of the commission set up by Elizabeth to investigate liability. The works required 140 loads of timber for 'pyles, somers, joystes, plancks, plats, postes, rayles, bracs, camshids & other necessaryes', £100 for wages for 'fellinge, hewinge, squaringe, sawinge, digginge, takinge upp tholde brydge' etc, £5 for 'showing' the new piles with iron, £8 15s for half the cost of carrying timber from the Queen's woods, with the local inhabitants being expected to carry the rest, and £2 for carrying and handling the gravel, as to

which 'we fynde the Inhabitants redye to put their helping handes therunto & supposse will carrye ye same at their own chardge' (Thacker 1914, 412). Further repairs were needed in 1593–4 (£1736), 1620 (£430), 1630 (£555) and 1661 (£175 to make the bridge safe for winter), an overhaul between 1725 and 1728 (£704) and major repairs over three years from 1738 (£1862), but even so by 1779 the bridge was so rickety that the Surrey and Middlesex Justices, who were still responsible, decided to proceed with a totally new bridge (opened in 1785) (Phillips 1981, 145–6).

In the larger towns, responsibility for bridges and their upkeep had either been acquired by the burgesses during the medieval period (as at Henley, Kingston and, later, Wallingford), or was granted to them as a corporation or via a charitable guild along with the requisite resources under the later Tudors (as at Abingdon, Reading and Maidenhead). At Windsor, uncertainty about the division of responsibility between the Crown and the town persisted for several hundred years. One of the few recorded substantial undertakings at this time was the construction of the Botley Causeway, carrying the westward route from Oxford over the Thames floodplain with bridges over several river channels. John Claymond, President of Corpus Christi College, is generally credited with this initiative, and he was a generous benefactor of the city and university. It is likely that others continued his work for a while during the later 16th and 17th century (VCH 1979, 284, 288), but the causeway was apparently in poor condition again by the 18th century (Phillips 1981, 44).

During the Civil War, Thames crossings became strategically important and suffered considerable damage. Radcot, Newbridge and Abingdon were the location of significant battles and Godstow Bridge was garrisoned for King Charles, who had his capital at Oxford nearby. Many bridges were modified for the insertion of drawbridges. The royalist governor of Wallingford Castle, Colonel Blagge, broke down four arches of the bridge to insert drawbridges, which were apparently still in place in 1671 when the bridge was closed to inhabitants of Crowmarsh and Newnham to keep the plague out of the town (ibid., 73). Drawbridges were also inserted into the bridges at Caversham, Marlow, Windsor and Kingston. Henley Bridge was badly damaged in severe fighting in 1642 and a levy was imposed on all the townspeople in 1645 for its repair.

The first entirely new bridges were privately built. The ferry at Datchet had been much used by royalty and courtiers travelling from London to Windsor Castle. William III bought the ferry and some adjoining land in 1699 as part of a scheme to enlarge the castle gardens and may have been planning to build a bridge (ibid., 127). In the event, it was Queen

Anne who, in 1706, ordered the construction of a new timber bridge to replace the ferry, together with a new carriage approach. The bridge was toll free, maintained and rebuilt at the expense of the Crown until it collapsed in 1794, whereupon George III, unwilling to pay for a replacement, ordered the temporary reintroduction of a free ferry. Two highly unusual bridges were built at Walton and Hampton Court, in 1750 and 1753 respectively. Walton was built by Mr Samuel Dicker, a wealthy plantation owner who lived nearby. His petition to parliament for permission to build the bridge notes the greatly increased population of the area, the danger of the ferry and the great inconvenience for London travellers having to go to Kingston or Chertsey in time of flood (ibid., 148). The bridge was built by William Etheridge as a 'mathematical' or 'perpetual' bridge of timber, and Dicker engaged Canaletto to depict it. The bridge at Hampton Court was built for James Clarke in the 'Chinoiserie' style of the popular Chinese porcelain. Clarke held the lease of the two ferries at Hampton Court, and Phillips suggests he probably undertook the building of the bridge to ensure that his own family's interests in the river crossing were protected from rival schemes (ibid., 152). Neither bridge proved durable and both were replaced in the 1780s before a third bridge was built between 1864 and 1866 (Fig. 16).

By the middle of the 18th century, the Thames crossing network of patched-up old bridges, fords and ferries was having to cope with a greatly increased volume of both road and river traffic, and larger and heavier road vehicles and barges. The next 50 years were to see a transformation of the Thames crossing network on a scale unparalleled since the 13th century, coinciding with the years of the so-called turnpike and canal manias. Schemes for new turnpike trusts for roads and new projects for canals were reaching their height and increasing numbers of commissions were being created to enhance public facilities in towns across the country. The replacement of bridges was part of the general fashion for improvement, and bridges were frequently rebuilt in conjunction with the turnpiking of the roads they carried, with the cost of rebuilding covered by the collection of tolls from the bridge users (Table 2). One of the earliest examples in the Thames Valley was the act obtained in 1763 for the turnpiking of the Shillingford-to-Reading road and the construction of a bridge across the Thames at, or near, Shillingford Ferry. The Trust was set up the following year and the opening of the bridge was advertised in *Jackson's Oxford Journal* in 1767:

The New Bridge over the Thames at Shillingford being now open for Carriages, and the Turnpike Roads from thence through Wallingford to Reading and Henley entirely compleated: *Notice is hereby given*, That Neat Post-Chaises, with Able Horses and Careful Drivers may be had...to Oxford, Reading, Henley and Wantage (Rosevear 1995, vol. 11, fig. 11.23a).

The bridge was constructed of stone piers supporting a timber road deck 'fenced with a neat Chinese Railing'. In 1769, a stone bridge was built to replace the ferry at Swinford as part of the improvement of the Oxford-to-Crickley Hill turnpike route (part of the important London-to-Gloucester road). As part of the same project, the derelict Botley Causeway at Oxford was repaired and a series of bridges over the Thames channels along its length were probably all repaired, restored or rebuilt (VCH 1979, 288). Swinford was rapidly followed by another important bridge on a long-distance route crossing, at Maidenhead, where the Great West Road crossed the Thames. Here, the bridge was the responsibility of the Corporation, who obtained an Act of Parliament in 1771 authorising the reconstruction of the bridge and engaged John Townsend of Oxford, the builder of Swinford Bridge, working to a design by Robert Taylor. To reduce the cost, the bridge was constructed with only the river arches in Portland stone and the rest in brick—it was completed and opened in 1777. The construction of the Thames and Severn Canal in the 1780s, which joined the Thames above Lechlade and the Oxford Canal, led to considerable pressure for improvement on the Upper Thames where the arches of the old medieval stone bridges were too narrow for barges to pass. At Radcot and Godstow, these were bypassed by new navigation cuts. The medieval stone piers of Newbridge were cut back, and a wider navigation arch was inserted into Abingdon Bridge.

Anticipation of increased trade following the opening of the Thames and Severn Canal encouraged the building of the new Halfpenny Bridge at Lechlade and Tadpole Bridge near Bampton. Halfpenny Bridge was constructed in 1792 and carried the newly turnpiked main road from Burford to Highworth and Swindon. The Thames Commissioners insisted that the bridge should not obstruct river traffic, so the navigation arch was designed with a semi-circular span of 40ft, which saved boats from needing to lower their masts. The arch was formed with stones arranged radially, following the method introduced by the Swiss engineer, Charles Labelye, at Old Westminster Bridge 60 years earlier. On the Middle Thames, numerous old ferries and timber bridges were replaced in the 1780s and 1790s. A new timber bridge was built in 1792 at Whitchurch by a small group of ten proprietors,

replacing the ferry between Whitchurch and Pangbourne, and a brick bridge was built at Sonning, which is still standing and remains the only road crossing of the Thames between Reading and Henley. At Henley, the much-repaired medieval timber bridge had been swept away in the severe flooding of 1774, and the present stone bridge was constructed by 1786, again by John Townsend and finished by his son Stephen after John's death in 1784 (Blanchflower 1986, 5). The 'mathematical' bridge at Walton was ruinous by 1780 and replaced in 1783–6 by a brick-and-stone bridge built by James Paine for Mr Dicker's nephew, Dicker Sanders. Paine was also engaged on the rebuilding of Chertsey Bridge in stone in 1785. A new stone bridge by Sandby at Staines in 1792–4 was not a success and was abandoned in 1798.

The replacement of old bridges and ferries continued in the early 19th century. Some new bridges were built in timber, as at Goring and Streatley in 1837–8, Cookham in 1839–40, and Whitchurch in 1852 replacing the earlier timber bridge of 1793. Timber was cheaper than stone, although less durable, and cost was an important consideration on quieter routes where only a modest income could be expected from tolls. Elsewhere, cast iron was increasingly employed from the early 19th century. The earliest examples were replacements for Sandby's failed bridge at Staines, where an iron bridge was constructed in 1803 which failed soon after and had to be replaced by another iron bridge in 1807. This also proved inadequate and the bridge was reconstructed for the fourth time in white granite by George Rennie, opening in 1832. The old timber bridge at Windsor was replaced with a new bridge of cast iron and granite in 1822–4. This bridge still stands but was closed to motorised traffic in 1970. The most innovative was the celebrated iron suspension bridge built at Marlow in 1829–32 by William Tierney Clark (Fig. 17), who went on to build a larger version over the Danube at Budapest. During the mid-late 19th century, iron and steel, sometimes combined with concrete and stone, were used for bridges at Osney (Oxford), Caversham, Cookham ('the cheapest bridge on the River for its size'), Walton and Hampton Court. Nonetheless, stone continued to be utilised, particularly on the Upper Thames and in major towns.

Stone bridges were constructed in 1807–9 at Sutton Courtenay where a new lock and navigation cut were introduced, at Shillingford in 1827 to replace the 1767 timber bridge, at Oxford in 1825 when the medieval Folly Bridge was replaced and a new navigation channel was cut, at Lechlade in 1831 when St John's Bridge was reconstructed, and at Hannington near Inglesham where a stone bridge replaced an earlier timber bridge in 1841. A stone bridge in classical style was built to replace the old timber bridge at Kingston in 1825–8.

Here, the original intention had been to build a cast-iron bridge, but the design was abandoned in favour of stone because of concerns about the rising cost of iron. Three stone arches were rebuilt in Wallingford Bridge in 1809–12 following damage, and a stone balustrade and parapet were added. Clifton Hampden bridge, built in Gothic style and in brick (Fig. 18), was opened in 1867 to replace the ferry crossing to Long Wittenham. The manor of Clifton Hampden belonged to Henry Hucks Gibbs, Governor of the Bank of England from 1875–7, who undertook considerable improvement of his estate, constructing a new manor house and estate cottages, restoring the village church and building the bridge at his own expense (although tolls were charged at a low rate to cover the cost of maintenance). Gibbs employed George Gilbert Scott as architect for all his improvements, and the bricks were made in a special kiln constructed on Clifton Heath.

Despite the progress that was made, the repair and maintenance of bridges was frequently accompanied by lengthy disputes about responsibility, made worse by the fact that the county boundaries ran along the centre of the river necessitating cooperation between the authorities on both banks. This was rarely forthcoming. Perhaps the most notorious dispute occurred at Datchet in 1834, when the Datchet section of the bridge needed extensive repair. Berkshire declined to contribute, on the basis that the county was responsible for its half of the bridge, not for half the cost of maintenance. The Berkshire section of the bridge then collapsed, and the county suggested replacing the entire bridge with a new one of iron. Buckinghamshire rejected this. When the Buckinghamshire section of the bridge also collapsed, in 1836, the counties set about rebuilding their own parts, Berkshire in iron and Buckinghamshire in timber 'with as little collaboration as possible' (Thacker 1914, 372). The resulting oddity was superseded in 1851 by the new Victoria and Albert Bridges and demolished (http://datchethistory.org.uk/general-articles/datchets-thames-bridge-and-the-railway/).

Under the Local Government Act of 1888, the newly created county and county borough councils were given responsibility for the repair of county roads and to purchase existing bridges and build new ones. Many Thames bridges saw campaigns of repair and replacement in the late 19th century. The increasing weight of steam-driven agricultural machinery was causing concern in rural areas, and by the 1920s and 1930s the increase in motorised traffic led to widespread rebuilding. Public opinion, however, increasingly favoured the retention of old bridges, and where that was not possible, styles of building that were sympathetic to earlier traditions and the preservation of their appearance. In 1902, the

artist, Holman-Hunt, and the architect, Lutyens, led protests against the Oxfordshire Roads and Bridges Committee's proposals to create an iron lattice-girder approach to Sonning Bridge (Phillips 1981, 95). Between 1910 and 1914, May Morris campaigned successfully for the preservation and repair of the old medieval Radcot Bridge, which had fallen into disuse and disrepair after the creation of the bypass navigation channel. The timber bridge at Goring and Streatley was replaced in 1923 by a new structure with timber struts and balustrade, echoing the style of the Thames timber bridges of the past. At Abingdon, the total rebuilding of the bridge in 1927–9 was undertaken with care to preserve its medieval external appearance, and the same care was taken for the major reinforcement of Wallingford Bridge after its transfer to Berkshire and Oxfordshire County Councils in 1934. The fourth in the sequence of bridges built at Hampton Court was constructed by W P Robinson and Sir Edwin Lutyens in 1930–3 in ferro-concrete, but with brick and Portland stone cladding to blend with the important buildings nearby. Tolls were gradually discontinued over the course of the later 19th and early 20th centuries as trust debts were paid off and the ownership of bridges passed to the local authorities. Tolls had been widely resented, and their lifting was often accompanied by considerable public celebration. Only two toll bridges remain on the Thames at the time of writing, at Eynsham (Swinford) and Whitchurch. The bridge at Eynsham is largely as built in 1769, but Whitchurch was replaced again in 1902, with the new bridge in stone and steel. In 2013, the bridge was undergoing a reconstruction to install new piers and new load-bearing girders, but with the retention of the existing piles, pier caps and latticework side girders as key visual elements (http://www.whitchurchbridge.com/reconstruction.html). Some timber footbridges remain, particularly upstream from Lechlade, between Cricklade and Kempsford. The last ferry to operate on a regular basis was that at Bablock Hythe which closed *c* 1986, although there were apparently seven available on demand at certain times of the year in 1981 (Phillips 1981, 34). In several locations, including Bablock Hythe, the slipways from the former ferries remain.

Most of the railway bridges constructed in the region were for the GWR and were therefore often designed by Brunel. Many were brick, including those at Maidenhead which has particularly large, flat arches and a footbridge at Appleford. However, one crossing the River Kennet in Reading has a steel-framed accommodation bridge attached and the Windsor bridge uses the bow-and-string girder construction later employed at Saltash (these are all Listed structures). There are later examples of iron bridges at Bourne End and Shiplake. The

late 19th-century footbridge at Wokingham Station was constructed from worn-out rails and is Grade II Listed. Another steel bridge was built in 1886 for the Gas & Coke Co. in Oxford, whose works lay on both sides of the river. It originally carried a road, a rail link and a gas main, but now only supports pedestrians.

SUMMARY

Throughout the medieval period, the Thames provided a vital transport link between the towns and villages of the Upper and Middle Thames and the capital at London. However, its suitability as a route was tempered by its role as an economic resource. A long history of tensions between those who sought to navigate it, the traders and bargemasters who moved from settlement to settlement, and those who harnessed its power for milling and depended on it for fish and other commodities. The river underwent numerous alterations, with new canalised stretches dug by Abbeys and other landowners, and structural additions including weirs, pound locks and flash locks, providing obstructions to boat movements.

The post-medieval period saw a continuation of these tensions as even more intensive exploitation of the river occurred. This was notable in the construction of several canals which were designed to develop the economic infrastructure of England, linking London and the south with the expanding industries of western, midland and northern England. As an economic resource, the importance of the river during this period is exemplified by the wide range of people who held an interest in it and wanted access to it. This was characterised in the over-bureaucratic Thames Commission, which had representatives from almost every land-owner, politician, and clergyman within touching distance of its banks. And while the river, its tributaries and canals, were central to the economy, the upkeep of locks, wharfs and bridges was also a constant source of argument, highlighted by the almost-comical dispute between Berkshire and Buckinghamshire Councils for the maintenance of Datchet Bridge.

Further changes continued into the modern period, as the importance of the canals declined with the railways and eventually the roads taking over as the primary transport routes. The river took on a new character with the rise of leisure boating and the growth of the tourism sector in the 19th and 20th centuries. Concerns about the environment also came to the forefront with a recognition of the river as an important habitat for wildlife, and there is now an appreciation for the river within the natural and cultural landscape

(http://www.riverthamessociety.org.uk/conservation.aspx). This has developed alongside increasing interest in the heritage of the river, as canal trusts have saved these historic routeways from abandonment and kept them in use for public enjoyment. It is true that the river reflects economic, political, and social change in England over the past 1000 years.

References

Andrews, P, 2003 *Charter Quay – The Spirit of Change: The Archaeology of Kingston's Riverside*, Salisbury

Blair, J, 2007 *Waterways and Canal-Building in Medieval England*, Oxford

Blanchflower, G, 1986 *The Bridge at Henley*. Henley Archaeological and Historical Group, Henley

Booth, P, Dodd, A, Robinson, M, and Smith, A, 2007 *The Archaeology of the Gravel Terraces of the Upper and Middle Thames: The Early Historical Period: AD 1–1000*. Thames Valley Landscapes Monograph, Oxford

BUFAU, 2000 Archaeological Recording at Tooley's Boatyard, Banbury, Oxfordshire. Birmingham University Field Archaeology Unit, Report No. 0553.01

Cole, A, 2007 The place-name evidence for water transport in early medieval England, in *Waterways and Canal-Building in Medieval England* (ed J Blair), Oxford, 55–84

Christie, N and Creighton, O H, 2013 *Transforming Townscapes, from Burh to Borough: The Archaeology of Wallingford, AD 800–1400*, Soc Med Archaeol Mono **35**, London

Davis, R H C, 1973 The ford, the river and the city, *Oxoniensia*, **38**, 258–67

Dodd, A, 2003, *Oxford before the University*. Thames Valley Landscapes Monograph **17**, Oxford

Durham, B, Briscoe, R and McKewan, C, 2006 The Binsey Boat: a post-medieval story of the Thames at Binsey, Oxford, *Oxoniensia* **71**, 423–54

Edwards, J F and Hindle, B P, 1991 The transportation systems of medieval England and Wales', *J Hist Geog* **17.2**, 123–34

Goodburn, D, 1991, New light on early ship- and boatbuilding in the London area, in *Waterfront Archaeology: Proceedings of the Third International Conference, Bristol, 1988* (eds G L Good, R H Jones and M W Ponsford) CBA Research Report **74**, London, 105–15

Grundy, G R, 1933, *Saxon Oxfordshire: Charters and Ancient Highways*. Oxfordshire Record Soc **15**, Oxford

Harris, A, 1973 Changes in the early railway age, in *A New Historical Geography of England after 1600* (ed H C Darby), Cambridge, 165–226

Hayman, G, Jones, P and Poulton, R, 2012 *Settlement Sites and Sacred Offerings: Prehistoric and Later Archaeology in the Thames Valley, Near Chertsey*. Spoilheap Monograph 4, Chertsey

Hibbert C, 1988 *Encyclopaedia of Oxford*, London

Holt, R, 2000 Medieval England's water-related technologies, in *Working with Water in Medieval Europe: Technology and Resource-use* (ed P Squatriti), Leiden, 51–100

Hooke, D, 2007, Uses of Waterways in Anglo-Saxon England, in *Waterways and Canal-Building in Medieval England* (ed J Blair) Oxford, 37–54

Jones, E T, 2000 River navigation in medieval England, *J Hist Geog*, **26.1**, 60–82

Jones, P, 2010 *The Roman and Medieval Town of Staines*, SpoilHeap Publications Mono **2**, Woking

Kemplay, J, 2000 *The Thames Locks*, London

Kingsford, C L, 1908 (ed), John Stow, *A Survey of London*. Reprinted from the Text of 1603, Oxford <British History Online http://www.british-history.ac.uk/no-series/survey-of-london-stow/1603>

Lambrick, G, 1969 Some old roads of North Berkshire, *Oxoniensia* **34**, 78–93

Lambrick, G, Robinson, M, and Dodd, A, 2009 *The Archaeology of the Gravel Terraces of the Upper and Middle Thames: Late Prehistory 1500 BC–AD 50*. Thames Valley Landscapes Monograph, Oxford

Langdon, J, 1993 Inland water transport in medieval England, *J Hist Geog*, **19.1**, 1–11

Langdon, J, 2007 The efficiency of inland water transport in medieval England, in *Waterways and Canal-Building in Medieval England* (ed J Blair) Oxford, 110–30

Marsden, P, 1971 Archaeological finds from the city of London, 1967–70, *Trans London and Middx Archaeol Soc* **23**, 1–14

Marsden, P, 1972 Blackfriars wreck III: a preliminary note, *Int J Nautical Archaeol* **1**, 130–2

Marsden, P, 1996 *Ships of the Port of London: Twelfth to Seventeenth Centuries AD*. English Heritage Archaeological Report 5, London

McGrail, S and Switsur, R, 1978 Medieval logboats, *Medieval Archaeol* **23**, 229–31

Morigi, T, Schreve, D, White, M, and Hey, G, 2011 *The Archaeology of the Gravel Terraces of the Upper and Middle Thames: Early Prehistory to 1500 BC*. Thames Valley Landscapes Monograph, Oxford

OAU, 2000a Abingdon Swift Ditch Lock. Oxford Archaeological Unit unpublished client report

OAU, 2000b Salters' Boatyard, Oxford Archaeological Unit unpublished client report

OA, 2010 Paddle and Rymer Weirs on the Thames. Unpublished Oxford Archaeological client report 4720

Pearman, M T, 1894 *Historical Notices of Caversham, vol. 1*

Peberdy, R, 1996 Navigation on the River Thames between London and Oxford in the late Middle Ages: a reconsideration, *Oxoniensia* **61**, 311–40

Phillips, D, 1993 *Berkshire: A County History*, Newbury

Phillips, G, 1981 *Thames Crossings: Bridges, Tunnels and Ferries*, Newton Abbot

Potter, G, 1991 The medieval bridge and waterfront at Kingston-upon-Thames, in *Waterfront Archaeology: Proceedings of the Third International Conference, Bristol, 1988* (eds G L Good, R H Jones and M W Ponsford) CBA Research Report 74, London, 137–49

Preston, A E, 1971 *The Church and Parish of St. Nicholas, Abingdon, and other papers*, Wakefield

Prior, M, 1982, *Fisher Row: Fishermen, Bargemen and Canal Boatmen in Oxford, 1500–1900*, Oxford

Rosevear, A, 1995 *Roads across the Upper Thames Valley, vol. 11: A History of the Turnpikes in Berkshire and Oxfordshire*, privately published

Salter, H E, 1936 *Medieval Oxford*, Oxford

Salzman, L F, 1952 *Building in England down to 1540: A Documentary History*, Oxford

Sinclair, M, 2007 *The Thames: A Cultural History*, Oxford

Tatton-Brown, T, 2007 The Round Table Building: The building stone used for the Round Table Building, in *Edward III's Round Table at Windsor: The House of the Round Table and the Windsor Festival of 1344* (eds J Munby, R Barber and R Brown), London, 53–59

Thacker, F S, 1914 *The Thames Highway, Vol. 1: General History* (published privately 1920; republished David & Charles 1968)

Thames Water, 1926 *Instructions to Lock, staff book*

Tiller, K, and Darkes, G, 2010 *An Historical Atlas of Oxfordshire*, Oxon Rec Soc **67**, Chipping Norton

Tucker, J, 2012 *Ferries of the Upper Thames*, Stroud

VCH, 1962 Parishes: Culham, in *A History of the County of Oxford: Vol. 7, Dorchester and Thame Hundreds* (ed M Lobel), London, 27–39

VCH, 1979 Communications, in *A History of the County of Oxford: Vol. 4, the City of Oxford* (ed A Crossley and C R Elrington), London, 284–295

VCH, 2011 Henley: Communications, in *A History of the County of Oxford: Vol. 16* (ed S Townley, Woodbridge, 23–30

WA, 2009 Radcot, Oxfordshire: Archaeological Evaluation and Assessment of Results. Unpublished Wessex Archaeology report, ref. 68733.01

Wenham, S, 2006 The history of Salters' of Oxford through a century of evolution (1858–c.1960), *Oxoniensia* **71**, 111–4

Wilson, D G, 1987 *The Thames: Record of a Working Waterway*, Edinburgh

Tables

Table 1: Locks on the Thames

Lock	Pound lock	Bishop's list of 1585	Earlier weirs in this reach	
St John's Lock	1790		1775	
Buscot Lock	1790			
Grafton Lock	1896		1762 Day's/Lower Hart Farmer's Harts	
Radcot Lock	1892		1746 Beck's, Clark's or Buck's Old Eye	
Rushey Lock	1790		Old Nan's	
Shifford Lock	1898		1762 Tadpole (Kent), Thames, Ten foot, Shifford Upper, Duxford, Limbre's	
Northmoor Lock			Limbre's	
Pinkhill Lock	1791		pre-1791 Ridge's (Langley), Ark, Skinner's	
Eynsham Lock	1927		Flash lock pre 1791	
King's Lock	1890? 1928		1541	
Godstow Lock	1790			
Osney Lock	1790		1227 Medley (Binsey)	
Iffley Lock	by 1632	Ifle Lock 1585	Mill from late C12 **Peberdy 1996 mill-dam and flash lock**	Oxford-Burcot Commission pound lock
Sandford Lock	by 1632	Samfords Lock 1585	1279 fishery, lock *gurgite*, two water mills and a fulling mill held by Templars Lasher's weir *c* 16th **Peberdy 1996 mill-dam and flash lock**	Oxford-Burcot Commission pound lock
Nuneham Courtenay		Three Locks at Newnam 1585	Domesday mill 1225 'Sotiswere' 1279 water holdings mentioned 1576 'Thupper Locke'	See Oxo ii (1937) pl xiii 1788 flashlock belonging to Lord Harcourt

Lock	Pound lock	Bishop's list of 1585	Earlier weirs in this reach	
			Peberdy 1996 mill-dam and flash lock	
Abingdon Lock	1790	1585	1316 complaint against abbot for heightening his weir and causing floods **Peberdy 1996 mill-dam and flash lock**	
Swift Ditch (Culham) Lock	1624-8	Collombe weare 1585	**Peberdy 1996 Collombe weare mill dam and flash lock**	Oxford-Burcot Commission pound lock on Swift Ditch navigation channel
Culham Lock	1809			
Sutton Courtenay		4 locks 1585	3 mills in Domesday Book **Peberdy 1996 Sutton Courtenay mill-dam and flash lock**	
Long Wittenham		One weare at longe Witnam 1585	mill and fishery by 1295 **Peberdy 1996 Long Wittenham mill-dam and flash lock**	
Clifton	?1822			replaced Long Wittenham?
Day's	1789	Little Witnham weir and a weir and lock in Dorchester 1585	1 Domesday mill on Thames **Peberdy 1996 Little Wittenham and Dorchester mill-dam and flash lock**	
Benson	1788	1585 lock and weare	Two mills in Domesday Book **Peberdy 1996 Bensington mill-dam and flash lock**	Flash lock 1746
Wallingford, North and Little Stoke		locks, mills, floudgates 1585	Mills in Domesday Book lokkes 1395-9 **Peberdy 1996 Little Stoke, North Stoke and Wallingford mill-dams and flash locks**	
Chalmore Lock	1838		Removed 1883	
Cholsey?		Sowthmill Weare. In the parish of Chowlsey 1585		
Cleeve Lock	1787	1585	Water mill in Hundred Rolls lokke 1395-9 **Pebery 1996 mill-dam and flash lock**	

Lock	Pound lock	Bishop's list of 1585	Earlier weirs in this reach	
Streatley (parish)		Two weares mill and floudgate 1585		
Goring	1787	1585	Mill in Domesday Book lokke 1395-9 **Peberdy 1996 Goring and Streatley mill-dam and flash lock**	
Gatehampton		Harts Locke 1585	Mill in Domesday Book fulling mill and wear C13 lokke 1395-9 **Peberdy 1996 mill-dam and flash lock**	
Whitchurch Lock	1787	1585	Mill in Domesday Book lokke 1395-9 **Peberdy 1996 mill-dam and flash lock**	
Mapledurham Lock	1777	Mawple Durham Lock 1585	Mill in Domesday Book lokke in 1395-9 **Peberdy 1996 mill-dam and flash lock**	
Caversham Lock	1778	Cawsam Lock and Cawsam weare 1585	Mill in Domesday Book mill(s), fishery and passage with boats (ferry?) 1375 'lokke' 1395-9 *c* 1493 old lock, mills and mill barge, ferry and boat **Peberdy 1996 mill-dam and flash lock**	
Sonning Lock	1773	Suning Lock belonging to Mr Richard Blunte kept by Robte ffrewyne & John Wydmore being sellers of watter 1585	Two mills in Domesday Book **Peberdy 1996 mill-dam and flash lock**	
Shiplake Lock	1773	Shiplack weare 1585	Mill at Lashbrook in Shiplake Parish in Domesday Book 'loke' in 1395-9 **Peberdy 1996 mill-dam and flash lock**	
Wargrave		Wargroves weare 1585		
Bolney		Bowney Weare ...In the parishe of		

Lock	Pound lock	Bishop's list of 1585	Earlier weirs in this reach	
		Waregrove 1585		
Marsh Lock	1773	1585 At the marshe two mills having one Locke & one weare	Mill in Domesday Book detailed complaints about lock and winch 1395-9 **Peberdy 1996 Rotherfield Peppard mill-dam and flash lock**	appears in Siberechts' view of Henley from the Wargrave Road *c* 1690
Hambleden Lock	1773	Hambledon Lock belonging to Mr Scrope & kept by Thomas Bulter 'a seller of water' 1585	Mill in Domesday Book Two water mills, a haulage of ships, a lock and fishery 1338 Two accidents at Hambledon lock 1383, 1384 **Peberdy 1996 mill-dam and flash lock**	
Hurley Lock	1773	Newlock 1585	Mill in Domesday Book Mill in 1536 **Peberdy 1996 mill-dam and flash lock**	
Temple Lock	1773	1585	winch, mills and fishery 1544 **Peberdy 1996 Bisham mill-dam and flash lock**	
Marlow Lock	1773	Marlowe Locke...myll and floudgate 1585	1 mill in Domesday Book windlass for hauling boats 1307, 1314 Water mills at Bisham in 1328 **Peberdy 1996 mill-dam and flash lock**	1753 plan of flash lock and winch
Cookham Lock	1830	Hedgeworthe Weare in the parishe of Cowcombe (Cookham) 1585		
Boulter's Lock (Maidenhead)	1772 (moved 1828)	Rea Locke 1585	Ray Mill lease 1346 **Pebery 1996 mill-dam and flash lock**	
Bray Lock	1845			
Boveney Lock	1838			
Romney Lock	1797			
Old Windsor Lock	1822			
Bell Weir Lock	1817			
Penton Hook Lock	1815			
Chertsey Lock	1813			

Lock	Pound lock	Bishop's list of 1585	Earlier weirs in this reach	
Shepperton Lock	1813			
Sunbury Lock	1812			
Molesey Lock	1815			
Teddington Lock	1811			
Richmond Lock	1894		Half tide lock	

Table 2: Principal historic Thames road bridges (after Thacker 1920; Phillips 1981; VCH Oxon iv)

Bridge	**First recorded**	**Rebuilt**
Cricklade	Roman and Anglo-Saxon crossing. Timber footbridge and ford in Baskerville, 1692	Now A419 road bridge built in 1988
Castle Eaton	Bridge and causeway of timber and stone described by Baskerville, 1692	Replaced 1893 with present iron bridge described by Thacker as a 'deplorable iron trough' (ii, 28)
Hannington	Bridge of timber and stone described by Baskerville, 1692	Described as wooden in 1790 and 1828; present bridge probably built *c* 1841
Lechlade, Town or Halfpenny Bridge: the Burford-Lechlade-Swindon Turnpike Trust	Built 1792-3; the name Halfpenny Bridge derives from the 1/2d toll for pedestrians	Repaired in 1875 and 1973
Lechlade, St John's Bridge: the main route from Gloucester to London	Timber bridge destroyed by floods in 1203; stone replacement built 1220-1228	Reconstructed 1831, completely rebuilt 1884-6
Radcot Bridge, road from Burford to Faringdon	Earliest bridge date unknown but under repair in 1208-9. Present structure C13th and C14th	Much of the medieval bridge survives; bypassed by new navigation channel and bridge in 1787; restored in 1914 through intervention of May, daughter of William Morris
Tadpole Bridge: road from Asthall to the road from Faringdon to Oxford	Probably built *c* 1789 (Phillips 1981, 28)	Minor repairs; late C18th single span stone bridge still standing
Newbridge, road from Witney to Abingdon	Built around 1250 (Thacker ii, 77).	Substantial repairs in 1460s; modified with loss of some medieval fabric 1801
Swinford (Eynsham) Bridge: road from Oxford to Gloucester	Stone bridge built to replace ferry in 1769	Still functioning as toll bridge in 2013
Godstow Bridge, now near the Trout Inn	Stone bridge with two arches through which laden barges pass recorded by Baskerville 1692 but date of origin unknown	Old bridge bypassed by new navigation channel and bridge by 1792, but extensively repaired in 1892
Oxford, Grandpont, routes south out of the town	Timber bridge piles of mid Saxon date; Grandpont constructed by Robert d'Oilly in 1091; rebuilt 13th century	Replaced 1825 with new navigation channel
Oxford, Hythe Bridge, western routes	First known bridge probably timber built 1200-1210; rebuilt in stone 1378-1403	Replaced with present iron bridge in 1861
Oxford Botley Causeway and major bridges on western route	Road (early C13th) and stone causeway with timber bridges (by 1467) to junction with stone causeway to Hinksey Ferry. Superseded by extended Botley Causeway during C16th. Oseney Bridge probably early; stone by early C17th	Botley Causeway rebuilt under 1767 Turnpike Act Oseney Bridge widened *c* 1777; replaced in iron 1889 St Frideswide's Bridge rebuilt C18th Bulstake Bridge rebuilt to improve navigation 1767 and again 1923-4

Bridge	First recorded	Rebuilt
	St Frideswide's Bridge footbridge early C17; stone by 1674 Bulstake Bridge single stone arch built *c* 1530 Seven Arches Bridge raised roadway on causeway with flood arches possibly by 1660	Seven Arches Bridge apparently replaced C18th; demolished 1923
Abingdon: road from Abingdon to Culham, Burcot and Dorchester	Ford or fords before 15th century. Burford Bridge, Maud Hales Bridge and Culham Bridge built 15th century	Navigation arch inserted in 1790; rebuilding for motor traffic in 1920s, though medieval arches survive
Sutton (Courtenay) Bridge	Ferry and footbridges described by Baskerville 1692	Stone, brick and concrete bridge built by 1811 in conjunction with new navigation cut
Clifton Hampden Bridge	Built to replace ferry by 1867 in Gothic style by Sir George Gilbert Scott	
Shillingford Bridge: road from Shillingford to Wallingford	Bridge mentioned in 1301, but later this was the site of a ferry; a timber and stone bridge by 1767 under Turnpike Act for road from Shillingford to Reading	Replaced by present stone bridge 1827
Wallingford Bridge	Date of first bridge unknown; mentioned 1220 but probably much earlier; Leland described it *c* 1535 as 'large thing of stone across the Tamise'	Regular grants of pontage and toll rights from 1344 for repairs; badly damaged in floods of 1774 and 1807-8; rebuilt and widened 1810-13; further repairs and reinforcement 1934
Goring and Streatley Bridge	Ferry replaced by timber bridge in 1837-8	Rotting timber led to its replacement with concrete and timber bridge in 1923
Whitchurch Bridge	Ferry and wooden footbridge in medieval period replaced by timber bridge in 1793	Replaced by second timber bridge in 1852; third bridge of stone and steel opened 1902. Remains a privately owned toll bridge in 2013
Caversham Bridge	Between 1200 and 1219, timber with stone foundations and central stone pier Also downstream ferry	Replaced with steel bridge 1869; inadequate for increasing traffic and replaced by concrete and granite bridge 1923-26
Sonning Bridge: B478 Play Hatch to Twyford	Timber bridge reported by Leland 1535	Replaced in brick by 1787 with replacement of backwater bridges in 1906 and 1986. In 2013 Sonning remains the only road crossing of the Thmaes between Reading and Henley
Henley Bridge: A423 Henley to Hurley	Timber bridge possibly on stone foundations replacing earlier ferry by 1220s	Swept away 1774. Replaced with present stone bridge with celebrated carvings in 1786
Marlow Bridge: A308 Marlow to Maidenhead	Timber bridge by 1227	Partial collapse and repairs in 1786; totally replaced with iron suspension bridge 1829-32; repaired in 1927 and reconstructed 1956-7 following original design. Grade I listed, and only suspension bridge over the non-tidal Thames. Now bypassed except for local

Bridge	First recorded	Rebuilt
		traffic
Cookham Bridge	Timber bridge built 1839-40 to improve existing ferry crossing	Replaced by iron girder bridge in 1867 'the cheapest bridge on the River for its size'
Maidenhead Bridge: A4 London to Bath	Timber bridge by 1280s	Replaced by present bridge of brick and stone 1772-7
Windsor Bridge	Timber bridge by 1172	'tottering, ruinous, rotten old fabric' in 1811; new bridge of cast iron and granite 1822-4; closed to motorised traffic in 1970; repaired 2002; now pedestrian/cycle bridge only
Datchet: Victoria and Albert Bridges	Ferry at Datchet mentioned in 1249; much used by royalty. Replaced by Queen Anne's timber bridge in 1706	Continual problems with repair and replacement led to demolition in 1848 and the building of Victoria and Albert bridges by 1851. AB rebuilt 1928; VB 1966-7
Staines Bridge	Site of Roman bridge Timber bridge by 1222; excavated evidence for road approach by mid to late C12th	New bridge built by Sandby 1792-5, abandoned 1798. After two more failed new bridges, George Rennie's white granite bridge opened in 1832
Chertsey Bridge	Ferry mentioned in 1299; timber bridge 1410	Replaced by stone bridge James Paine 1785; centre arch reconstructed 1891
Walton Bridge: A244 Walton on Thames to Shepperton	'Mathematical' or 'perpetual' bridge constructed for Mr Dicker 1750; painted by Canaletto	Ruinous by 1780; replaced by brick and stone bridge by James Paine 1783-6. Painted by Turner. Replaced 1863 with bridge of iron girders on brick and stone piers; two further bridges finally replaced with new steel single-span bridge opened 2013
Hampton Court Bridge	Ferry by 1536	Timber bridge in 'chinoiserie' style built 1753; replaced by timber bridge 1788; third bridge of iron, brick and stone 1864-5 painted by Sisley; fourth bridge by W P Robinson and Sir Edwin Lutyens 1930-33 of ferro-concrete clad with brick and Portland stone
Kingston Bridge: A308 Hampton to Kingston	Possible Anglo-Saxon and Roman precursors Timber bridge with stone piers by1208-1233; excavated evidence for construction *c* 1170 in earliest form	Timber bridge remained into early C19th. New stone bridge in 'classical' or 'Grecian' style built 1825-8. Widened 1912-14 and 2000

Table 3: Thames fords

Ford	**Notes**
Somerford Keynes	Name implies a seasonal crossing, not passable in winter months
Kempsford	Mentioned in Anglo-Saxon Chronicle. Probably located just below the church where present village ends in a cul-de-sac; Blackford Farm close by on opposite bank. Superseded by bridges at Castle Easton (upstream) and Hannington (downstream)
Cricklade	Placename element '*gelad*' implies (difficult) crossing. Located where Roman Ermin Street crosses the Wiltshire Ray, the original course of the Churn in less than 3 km. Timber footbridge and causeway 'in time of floods' mentioned by Baskerville in 1692. Now A419 road bridge built 1988
Lechlade	Placename probably implies (difficult) crossing of river Leach. Thacker says that St John's Bridge replaced a ford, though this bridge is on the Thames
Duxford	Hinton Waldrist parish; first mentioned in Domesday Book, but placename *Dudochesford* suggests older origins.
Shifford	First mentioned in charter of 1005 and in Domesday Book
Sansom's Ford	Thacker locates this a mile and a half below Shifford; now very remote
Swinford	On opposite bank of Thames from Eynsham. The ford survived until the Eynsham/Swinford toll bridge was built in 1767 as part of the Oxford to Crickley Hill road improvements
Binsey Ford	Thacker locates this a quarter of a mile above Medley weir, and in 1909 reported that the hard gravel bed was still clear to see
Oxford	Late Saxon ford across the Thames south of the medieval town replaced by causeway and bridge from 1091.
Sandford	Placename occurs in pre-Conquest charters. By 1219 there was a valuable ferry here, and it seems that the ferry was used when the ford was impassable due to high water (VCH Oxon 5)
Abingdon	*Wylfingford* in Culham charter boundary of 940. Replaced by bridges and causeway in early 15th century; memory of ford preserved in name of Burford Bridge
Appleford	Placename occurs in land grant of Alfred the Great.
Dorchester	*Ealden stret ford* mentioned in two mid-10th-century charters, at crossing point of Roman road. May have remained passable at low water into C16th; Leland v2
Wallingford	Timber bridge by late 11th century.
Moulsford	One of the crossings of the Icknield Way in the Goring Gap. The lowest major 'ford' name on the Thames. Documented from C12th