

CHAPTER SEVENTEEN

THE NAVIGATION UNDER THE SUPERVISION OF THE TRUSTEES

17.1 Use made thereof

Another function that the Trustees were neither empowered nor stimulated to undertake was the collection of data about the traffic carried along the river. As a result there is insufficient evidence to allow any proper evaluation about whether the traffic increased or whether there was any change in its pattern as a result of the Trustees' limited improvements. That which is, suggests little growth, and that the navigation continued to be dominated by the carriage of malt, meal and grain downstream, and coal upstream.

Contemporaries themselves had difficulties in calculating the traffic. In 1774 one witness told Parliament 'that when the Improvement of the River Lee was in Agitation, they had great Difficulty to come at the Tonnage; that, to the best of his Recollection, they computed it at 36,000 Tons a Year' ¹. Levels which seem little different from those estimated the previous century (see 13.2).

Other contemporaries were as impressionistic. In 1746 the Water Bailiff of the City of London stressed that few rivers 'can boast of greater Utility', making particular mention of the vast quantities of grain and malt carried to the capital. ² In the same year Samuel Simpson noted the importance of the weekly market at Ware and added that '5000 Quarters of Malt and Corn are often sent in a week to London by the Barges, which return chiefly with Coals'. ³

Evidence does remain however, which allows some rough indication of the number of barges using the river, but which does not allow any trends to be determined. For the first time, data is available about the income from tolls at Waltham Turnpike, albeit for only a few years. Additional confirmation can be obtained from the Trustees' accounts about the income from tolls at Dobbs Weir, and reports of weir-keepers annual income from tolls when the Trustees were investigating major improvements in 1766-67.

Ever since a Chancery decision in 1703, Waltham Turnpike was jointly owned by the heirs of Samuel Jones, lord of the manor of Waltham, and the heirs of Peter Floyer, whose father had purchased the arrears of Kinnoull annuity in 1699 and thus became entitled to any future income from the turnpike until the Chancery decision of 1703.⁴ Thus any income from tolls or from leases to the turnpike were split equally between the owners.

4. *Jones argued it was unfair that he as the major local landowner should be responsible for wharfing 11 miles of the river bank from the turnpike to Waltham High Bridge, and for allowing bargemen access to his land to hale their barges, yet receive no income from either the turnpike or the mill.*

By 1740 Charles Jones was lord of the manor, and thus entitled to half the income from the 5/- toll which had to be paid by the barges every time they passed through the Turnpike, though this sum covered the return trip as well.

TABLE 11

CHARLES JONES' INCOME FROM TOLLS AT WALTHAM TURNPIKE

	1740	1741	1742	1743	1744
March 24-31	3 2 6				
April	11 19 6	7 5 0	8 2 6	8 17 6	10 15 -
May	8 - -		10 5 -	10 5 -	7 5 -
		21 - -			
June	9 - -		6 2 6	6 10 -	6 12 6
July	6 10 -	8 2 -	8 10 -	5 10 -	8 5 -
August	7 - -	8 - 6	8 17 6	7 15 -	6 5 -
September	7 11 6	8 15 -	7 10 -	5 2 6	5 8 -
October	8 5 -	7 14 6	8 10 -	7 12 6	9 2 6
November	8 17 6	11 - -	9 17 6	7 10 -	5 2 6
December	9 17 6	10 10 -	8 10 -	8 - -	
January	9 10 -	8 7 6	9 5 -	10 17 6	46 7 -
February	10 7 6	11 - -	8 7 6	7 15 -	
March	11 - -	9 17 6	6 7 6	10 2 6	- - -
	<u>111 1 -</u>	<u>111 12 -</u>	<u>100 5 -</u>	<u>95 17 6</u>	<u>105 2 6</u>

Source:- NRO, Additional Wake Papers 1965/129, Rentals of Mr Jones' estate at Waltham, Nazeing, Courtenhall, Wootham and Quinton

Jones' income from the turnpike from 1740 to 1744 is reproduced above as Table 11, whilst from Lady Day 1762 to Lady Day 1763 a total of £90 9 6 was received, with a further £95 5 0 for the following twelve months.⁵

Unfortunately some of monthly incomes recorded in Table 11 are not multiples of 2/6, as should be expected. This problem means that the estimates of the number of barges using the river each year (1 barge = 2/6) must be treated with caution

TABLE 12

ESTIMATED NUMBER OF BARGES AT WALTHAM TURNPIKE

April 1 1740-March 31 1741	863
April 1 1741-March 31 1742	892
April 1 1742-March 31 1743	802

April 1 1743-March 31 1744	767
April 1 1744-March 31 1745	841
Lady Day 1762-Lady Day 1763	723
Lady Day 1763-Lady Day 1764	762

Source:- as Table 11

However other sources confirm similar numbers of journeys in a year. The Trustees' accounts reproduced in Table 10 show that for two periods of account the gross receipt of tolls at Dobbs Weir were recorded. As the toll was 6d a barge for a return journey, this means that between June 25 1749 and June 5 1750 744 barges passed through the weir, and that from June 6 1750 until June 27 1752 another 1420 barges made the journey.⁶

The above tolls, at Waltham Turnpike and Dobbs Weir, were collected every time a barge passed, but tolls at other fishing weirs were only collected if the weir was closed to provide a pen and a flash. Thus the scarce evidence of toll income at these weirs cannot be used as a proper gauge of traffic, except that the income recorded does suggest that tolls were being paid at some weirs on every occasion, such was the importance of pens and flashes to the passage.

In 1767 the owners of Sotheby's Upper Weir claimed an annual toll income of £60 a year from a toll of 1/6 a journey, £100 a year at Sewardstone Mills from a toll of 2/- down and 1/- upstream, and £50 a year at Sotheby's Lower Weir from a toll of 2/- for a return journey.⁷ Such figures suggest at least 800 journeys a year, but do illustrate just how variable were the conditions at the different weirs. Similar levels of traffic are suggested by the other toll incomes at fishing weirs which are known.⁸

The above does suggest at least 800 return journeys a year from the river ports along the upper river. Since the evidence presented in Table 3 suggests that less than 100 journeys a year were made along the river between Hertford and Ware, the importance of Ware and Stanstead is emphasised.

It has to be assumed that London was the major destination for the cargoes carried, even if many barges unloaded at Hackney or Stratford rather than proceeding all the way to London. However there must have been some local traffic, some cargoes were destined for export rather than the London markets,⁹ and gunpowder was taken to magazines at Barking and Greenwich, no longer to the Tower.¹⁰

10. *The Walton family set up their own warehouses in Barking Creek as early as 1721, whilst complaints of problems in transporting powder through London streets caused the Ordnance office to issue orders in 1707 that powder be delivered to Greenwich:*

The toll income quoted above suggests that many weirs were receiving a toll practically every time that barges moved along the river, and evidence presented in 1767 shows that tolls were an important cost on any journey. Flashes were required every two miles or so,¹¹ and barges, were paying up to 59/- a journey in tolls. Nevertheless the river still enjoyed cost advantages compared to competing road carriers. In 1750 Samuel Whitbread

was paying a carriage rate of 1s 3d a quarter for malt brought by river and road from Ware to his Chiswell Street Brewery compared to 2s 2d a quarter for malt brought from Hitchin by land.¹² On the other hand the miller at Dicker Mill in Hertford told M.P.s in 1767 that rising costs on the river had forced him to use land carriage to supply meal to his London customers.¹³

17.2 Technological development

During the seventeenth century there had been a substantial growth in the size of barges using the river. It is not possible to establish whether this trend continued as a result of the Trustees' improvements, for no references have been found to the carrying capacity of barges during the decades immediately preceding or following the passage of the Act of 1739. All that can be noted is that in 1766 bargemen stated that barges carried 35-40 tons downstream and 10-15 tons on the return journey, whilst in 1767 mention was made of barges carrying 40-60 tons through Sewardstone. This in comparison with Houghton's assumption in 1698 that they carried 30 tons.¹⁴

Similarly, little can be said about whether the design of barges evolved at all during this period. The earliest description found dates from 1774, and is unfortunately incomplete:-

These are Thirteen Feet wide, and in general about Seventy-one Feet long(exclusive of the rudder) ... at present the Barges when full loaded draw Two Feet Six or Seven Inches of Water, at that Draught will carry from Thirty five to Forty Tons¹⁵

By this date these boats were using the canalised Lea and Stort navigations, and may have been adapted for that purpose.

One development which did take place was that horses began to be used instead of men to haul the barges from the bankside. It is hard to be precise just when this practice began, or how common it had become before 1767, but an impression is gained that it was not until the late 1740s or early 1750s that the horses became that important.

A bargemaster, James Hewson, told Parliament in 1759 that he had known the Lea over 50 years 'and that Horses have been used to tow Vessells all that time'.¹⁶ However it is difficult to believe that horses were important as early as that. In 1728 Nathaniel Salmon noted that 'The Barges are generally drawn up the Stream by Men; Sailing being but of little Service here'.¹⁷ Furthermore there is no mention of any need to provide towpaths for horses during the 1730s, when the bargemen were discussing various improvement schemes, and the Act of 1739 awarded the Trustees no powers to deal with such problems, even though horses required better laid out paths than did men. If horses were being used frequently before 1739, this seems an unusual omission.

Horses were introduced because they were more efficient than men. Hewson told M.P.s that

Horses do less damage to the Lands than men, as the Horses make but one Track, and tow from the Body of the Barge, whereas the Men pull from the Mast Head, and go 8 or 10 pole further on the Lands, and do more Damage than the Horses; and that the Navigation cannot be carried on by the Men so well as by the Horses, for one Horse will draw as much as Ten Men

Yet it was not all gain for the bargemasters, as land-owners began to demand tolls for the privilege of allowing the horses over their land, when previously they had never been entitled to a toll from the men who had hauled the barges.

Another witness told the M.P.s that 'exorbitant Demands have lately been made for the Liberty of towing with Horses'; whilst another mentioned that tolls for the passage of horses had only been a recent development. One example was quoted where no toll was demanded at the beginning of the 1750s, but that then 3d, then 6d and finally 1/- had been demanded by one landowner.¹⁸

Since the Trustees had no powers, no mention was ever made of this problem in their minutes, but the provision of towpaths for horses was one of the improvements wanted when the bargemen approached Parliament in 1759. With the failure of this attempt, it was not until the act of 1767 that the new Trustees gained the necessary powers. They purchased land along the bankside, laid out proper towpaths, thus allowing an even more efficient use of horses, without demanding any tolls for their use.

17.3 The deficiencies of the river navigation

For a long time the benefits of pound locks, artificial navigation cuts and other improvements had been known of, and introduced along many English rivers, but not along the Lea. Even as late as 1759 an approach to Parliament was concerned merely to make a better and more efficient use of the existing arrangements, it was not until 1765 that serious consideration was given to canalisation schemes, and not until 1767 that the necessary powers were obtained.

These discussions about the improvements meant that much evidence was collected and presented which emphasised the deficiencies of the existing flash-lock navigation, and the need to replace it. Such deficiencies had always existed, but had been accepted. It seems probable that the interest in canal building which was generated by the success of the Duke of Bridgewater's canal in the late 1750s brought about a change of attitude, and meant that higher technical standards were considered as necessary, when before the flash-lock navigation had been considered adequate.¹⁹

A particular comment was the very frequency of weirs and turnpikes along the river. Smeaton noted eighteen such, as well as pound locks at Ware Mills and Hackney waterworks, and the tidal lock at Bow.²⁰ The bargemen complained that they were obliged to demand flashes of water every two miles, such was frequency of shallows and shoals.²¹

They further stressed that these frequent flashes were not always efficient or adequate. In 1759 Thomas Hankin told Parliament that:²²

Vessels are very often stopped for want of Water between Ware and London; that a Vessel, with a proper Quantity of Water, may perform a Voyage in Five Days; but that sometimes they are Three Weeks, and sometimes a Fortnight

In 1767 James Fordham made similar complaints, and presented specific details about problems at Waltham Gull where²³

they get over ... by Means of a great Body of Water, which in dry Seasons must come from Hertford, with the Addition of Mr Walton's Water [of Waltham Abbey Gunpowder Mill] which Assistance they can commonly have Twice a Week; but in very dry Seasons only Once; That the stated Days for this Supply of Water are Wednesdays and Sundays, but in short Water Times, Sundays only; so that if a Barge happens to be stopped on a Sunday, it must necessarily lie there till the Wednesday, if not, till the Sunday following; but that they are never refused Water on a Sunday, even for a single Barge

It was obvious that the reliance on flashes from mills was only a last resort. It can be noted that the bargemen were not complaining about the lack of co-operation from the millers, merely that the existing arrangements had certain disadvantages.

The bargemen emphasised other problems associated with the system of flashing. Boats were often forced into the bankside, the strong current of water scoured the bed of the river to such an extent that shoals moved about, banks were broken down, and new hazards developed too frequently. They also stressed that barges travelling upstream against the current were restricted to 10-15 tons carriage, and that even then there were problems in hauling. Indeed barges were sometimes 'beat in Pieces' by the current.²⁴

Leading engineers also emphasised the disadvantages that the practice of flashing brought to millers. Not only were there occasions when they had to close down their mills to provide additional assistance to the bargemen, but they also suffered when flashes from weirs and turnpikes sufficed. The penning back of water and the release of flashes meant that depth of water in the river could be extremely variable.

Furthermore the progress of a flash downstream could cause the miller problems, and was itself an inefficient use of the power available, as Smeaton emphasised:-²⁵

for as they cannot possibly increase the Quantity of Water, which would otherwise be uniformly discharged by a River, and which must be the same upon the Whole, whether pent up or not, and by how much a Flash increases a Head while present, it must afterwards be diminished by the Loss of the same Water, which Diminution is of more Disadvantage than the Increase is of Advantage; for as more Water comes by a Flash than can possibly be used by the Mills, the greatest Part runs to waste, and is a Loss, for which there is not anything to

compensate: And, notwithstanding the Head is at First increased by the coming of a Flash, it is soon after diminished by the Water going round the Course of an open River, which obstructs the working of the Mill by the back Water(that is, by diminishing the Head and loading the Tail)

In fact, Joseph Nickalls, an engineer hired by the owners of Abbey Mills in Stratford to report on Smeaton's proposals for the Lea, reported back that 'much water will be saved that is now wasted in by Flashes, therefore the Mills in general will be much better'd the some, much more then Others'.²⁶

As well as these problems, there were specific problems to be faced when the barges entered the tidal stretches of the Lea. The Trustees themselves emphasised these, as an argument in favour of their proposed Limehouse Cut. They noted that barges could not pass through Bow Lock except on a high tide, that it often needed two tides to get from Bow Lock to the mouth of the river, and that even if it took only one, they then had to wait at the mouth for the tide to turn so that they could progress round the Isle of Dogs up to London. Furthermore sails were needed along the Thames, and if the wind blew strongly from the south or south west then the barges could not make their way.²⁷

Such problems had always existed, but besides the fact that the bargemen now had higher expectations, they were also arguing that the navigation had declined as a result. In 1759 Thomas Hankin noted that the uncertainties of the navigation meant that goods often lay in warehouses at Stanstead and Ware, only to be sent eventually by land. In 1767 James Fordham said that the number of barges using the river had decreased, that land carriage was sometimes cheaper than barge carriage, and that in particular flour was usually now carried by land, when if the navigation was more certain, it would be better carried by barge.

This last was confirmed by Thomas Marlborough, the miller at Dicker Mill, who told M.P.s that he had stopped using the Lea some years previously.²⁸

17.4 The desire for improvement

The growing awareness of the benefits of radical improvement was first displayed in somewhat impractical suggestions made by a correspondent, 'Com. Hertf.', in the Gentleman's Magazine for the months of August and September 1754. He favoured a cut across the Isle of Dogs from Limehouse to the Lea, but thought that such a cut, along with policies of clearing the river of weirs and straightening out any bends, would allow the tidal waters to flow further up the Lea, almost to Ware itself.²⁹

Another of the magazine's correspondents, 'C.D.', returned to the theme of improving the Lea in 1758. He suggested that cuts be made between the river Roding, above Woodford Bridge, and the Lea, and another between Limehouse and the Lea. These cuts would admit more water into the Lea, and thus ease the problems of water shortage He felt that such improvements would allow clay lands in Hertfordshire to be improved with chalk

and lime from Northfleet, allow more corn to be brought upstream, as well as more corn, timber and hay be carried downstream to London.³⁰

This growing interest affected the Trustees. In 1757 the Act of 1739 was reprinted, and the Trustees ordered that 200 copies of it be bought. Then in December 1757 22 new Trustees were appointed to replace those who had died or resigned in the preceding years, and for the first time several barge-owners and maltsters who used the navigation were included. Then in 1758 it was decided to improve Dobbs Weir by inserting a turnpike gate when it was rebuilt.³¹

Another influence was that maltsters at Bishop Stortford decided to make the Stort navigable for the first time. Since mills blocked its course, canalisation was essential, and in December 1758 an engineer, Thomas Yeoman, surveyed the river from Bishops Stortford to its confluence with the Lea. His plans to make the river navigable for barges carrying 30 tons were authorised by Act of Parliament in 1759, but financial problems meant that nothing was achieved until after further legislation was obtained in 1766. It was not until 1769 that the Stort was opened to traffic.³²

At this same date several Trustees of the Lee petitioned Parliament seeking further improvements to the Lea. Little is known of this approach, which was certainly not minuted as being under discussion at the Trustees' meetings. What does emerge is that canalisation of the Lea was not being proposed, rather it was a limited scheme, to deal with specific problems that obviously lay outside the existing powers of the Trustees.

New powers were being sought to allow punishment of bargemen who were damaging the navigation, in particular forcing open the turnpike gates against the instructions of the turnpike keeper. They also sought powers to scour the river deeper than it anciently had been, and to provide proper towpaths for horses. A contemporary newspaper report also makes reference to an 'additional communication' between the Lea and the New River. A bill was presented, but it did not proceed beyond its first reading.³³

33. *The Commons Journals state that several Trustees petitioned parliament, but the minutes of the Trustees merely noted after the event that the expenses of several bargemasters who had approached parliament should be met:*

This interest in improvement was further illustrated by the fact that expert advice from leading engineers was sought over specific problems along the Lea. In October 1759 Smeaton's advice over problems at Waltham was sought, and in 1762 Thomas Yeoman represented the bargemen in disputes with the owners of Waltham Abbey Powder Mills. It was to these two that the Trustees were to turn when canalisation was decided upon.³⁴

On 5 August 1765 the Trustees resolved 'to have the said Navigation settled(if they can) on such a New Plan as will be Conducive to the good of the Publick', ordering their clerk to approach Smeaton. It was not until the following July, however, that the Trustees further resolved that Smeaton and his assistant, Thomas Yeoman, should make a survey in which they were to be 'as particular as he(sic) can in the Description of such parts of

the Course of the said intended Navigation where he shall be of Opinion that new Cuts ought to be made'.³⁵

It is thus not clear whether the Trustees had decided upon canalisation before they decided to solicit Smeaton's advice in 1765, whether they took such a decision themselves, or whether they were responding to Smeaton's advice when they instructed him to make the survey in July 1766. Whatever, the survey must have been a routine matter for Smeaton and Yeoman, for they presented their report in September 1766.³⁶

This report suggested improvements to the Lea 'To make a safe & certain navigatn in the driest Seasons with 3 feet water in general, & at least 2f 6in on the shoals in the river, and fords across the cuts'. It was intended to use the existing channel wherever it was deep and straight enough, but made various suggestions about new cuts which would be advantageous.

To this end the report presented three alternatives, 'The first contains every improevmt yt the expence considerd I wd recommend. The 2d the most frugal scheme: The 3d a medium between both, which, all things considered, seems most eligible'. The costs for these alternatives were estimated to be £29152 7/-, £25634 7/- and £26652 18/- respectively.

In addition a recommendation was made that a cut be built across the Isle of Dogs from Limehouse to the Lea at an estimated cost of £2497. This last suggestion seems to have been an afterthought that was first suggested by Yeoman, for Smeaton writes in the original report:-

On a re-inspectn of the plan it seems very desirable yt a cut shd be carried from the 4 mills at Bromley to the Thames at Limehousehole; which from a general view of the ground I beleive very practicable. For this I must refer to Mr Yeoman's report, who had the same thought, & has view'd & levelled the ground

In the report printed later, Smeaton stated that the idea of the Limehouse Cut did not occur to him until he was preparing his plan.³⁷ Unfortunately Yeoman's report no longer remains.

The Trustees accepted Smeaton's report, and resolved to give further consideration to the first and third alternatives. To further this task 1000 copies of the report was printed, a public meeting was advertised for 31 December 1766, a committee was set up to confer with landowners whose properties were affected, and Yeoman was instructed to survey such properties and suggest any alterations which might avoid any splitting up of property or bring other benefits.³⁸

Over the ensuing months Yeoman and the committee negotiated with landowners, millers and weir-owners whose property was affected, with local residents who were interested in the proposals, and with any potential opponents. Substantial agreement with these parties, and some important changes to the original proposals were made both before and

after a petition was submitted to parliament on January 1767 seeking leave to submit a bill, leave which was granted.³⁹

There is no evidence of serious dissension to the principle of canalisation or of any prolonged argument over the details of the plan. The proprietors of lands mills and weirs along the river did hold their own meetings at Searles Coffee House or the Devil Tavern, and they did retain the services of Joseph Nickalls to provide expert engineering advice, but they did not oppose the proposals, and Nickalls himself had experience in river canalisation schemes and thought that canalisation of the Lea would benefit the mills.⁴⁰

40. *In 1760 Nickalls won a prize offered by the Society of Arts for a design for tide mills, soon afterwards he rebuilt Waltham Abbey Powder Mills. In 1762 he built a water pumping engine to Smeaton's design at West Ham Waterworks, having already worked as an assistant to Smeaton in 1760 on another river improvement scheme, before being dismissed by Smeaton. In December 1766, he surveyed the Abbey Mills estate at West Ham, and in 1768 built an engine for London Bridge Waterworks*

The Trustees also took care to inform the City of London of their proposals, for the City still had jurisdiction over the lower Lea. In November 1766 the Trustees presented a memorial to the aldermen, who, after noting that the proposed Limehouse Cut did interfere with their jurisdiction, concluded that they could not discover any real prejudice to their interests. By the time that the bill was presented to Parliament, the City had gone further, and was prepared to finally relinquish any claims to jurisdiction over the lower Lea. They petitioned Parliament to this effect.⁴¹

When the bill came before Parliament the only outright opposition came from the Trustees of the turnpike road between Stones End and Enfield who feared competition, and from 'several Brewers of the City of London, and of several Maltsters, Malt Factors, Farmers, and others, using the Navigation of the River Lee' who felt their interests would be harmed. Unfortunately the specific fears and intentions of this last group are not further recorded, but neither group seems to have provided any real threat to the passage of the bill.⁴²

There were also several petitions opposing the bill from interested parties, but these were designed more to protect their own interests rather than impede the bill. Such petitions were submitted by the owners of Waltham Abbey Powder Mills, West Ham waterworks, a calico printing works at Waltham, and mills at Waltham, Tottenham and Sewardstone, and by inhabitants and business interests in Old Ford, Bromley and Stratford who were worried that their rights to navigate the lower Lea and the numerous millstreams in Stratford without paying tolls would be threatened.⁴³

The Trustees had prepared their submission well. The opposition was not strong, objections which were submitted were met without any delay to the progress of the bill, and there were no major technical changes to the proposals submitted to Parliament, such changes had been agreed on before submission of the bill. The only such change was that, at the request of the inhabitants of Hertford, the head of the navigation was extended a

short distance above Hertford Bridge to the gates of the Town Mill, at an estimated cost of £50.⁴⁴

On 29 June 1767 the Royal Assent was given to 'An Act for improving the Navigation of the River Lee from the Town of Hertford to the River Thames, and for extending the said Navigation to the Floodgates belonging to the Town Mill in the said Town of Hertford'.⁴⁵ The flash-lock navigation was to be no more.

17.5 The Act of 1767

The act nominated a further 282 Trustees in addition to those who were serving as Trustees under the conditions of the Act of 1739. In addition the ex officio members were added to, by the appointment of the Comptroller of the Works and Revenues of London Bridge, and the Governor, Deputy Governor and Treasurer of the New River Company. Despite this great increase in the number of available Trustees, the necessary quorum was reduced to five, or seven for some purposes, compared to the ten required by the Act of 1739. Obviously there was intent to overcome the problem of inquorate meetings that had bedevilled the Trustees between 1739 and 1767.

The act gave these Trustees comprehensive powers to canalise the navigation. They were authorised to deepen, straighten and enlarge the existing navigable channel wherever necessary, to use alternative channels such as the millstreams serving Enfield and Tottenham Mills where this was beneficial, and to dig fourteen artificial navigation cuts which were specified in the act.

Along this track the Trustees were empowered to remove all weirs and turnpikes and erect pound locks at the most convenient points. They were also to purchase land along the banks to provide proper towpaths for the horses or men who hauled the barges.

In order to implement these measures the Trustees were authorised to purchase all fishing weirs. The act specified the terms of purchase for some, but for others the terms had already been settled or were left to future negotiation, with proper provision for arbitration if dispute arose. Since the fishing rights were retained by the weir-owners, the terms for the fishing weirs were only compensation for the loss of income from tolls which arose from the fact that flashes were no longer required. Most of these weirs were to be dismantled, but those that stood along stretches of the traditional navigable channel which were no longer to be used once the new track had been built could be left in situ. In fact Sir William Maynard, who owned France Weir in Walthamstow, had a clause inserted which forbade the Trustees to make any future changes to France Weir without his permission.

Once more Waltham Turnpike was to be treated as an exception. It stood along a stretch of the river which was no longer to be used, but the rights of its owners had to be respected. The Trustees did not purchase it, but they were obliged to keep it in repair so that it controlled the flow of water to Waltham Abbey Powder Mills, Waltham Corn Mills, and a calico printing works in the vicinity. Furthermore the owners were to be paid

5/- for every barge that passed through Kings Weir as compensation for the loss of their toll at Waltham Turnpike.

Other interests were also protected. Numerous clauses specified conditions controlling the supply of water to mills and waterworks, maintained navigation rights along parts of the traditional river so that millers at Walthamstow and Sewardstone could still bring barges to their mills, and alterations to Bow Lock were prohibited without the permission of the owner of Four Mills.

One major feature of the act was that no alteration was made to those conditions controlling the intake of water by the New River Company that had been fixed by the Act of 1739. The only change that affected the Company was that a short cut by-passed the channel in which their pound lock stood next to Ware Mills. They thus lost the right to collect tolls, but were compensated by the award of a payment of 6d from the Trustees for every barge that used the new route past Ware Mills.

To finance these ambitious proposals the Trustees were empowered to raise loans and sell annuities, to supplement the rental payment of the New River Company which the act continued at its previous level. To repay these additional sums, the Trustees were empowered to collect tolls from the bargemen, at rates and at three separate collection points which were specified in the act.

Pound locks, artificial navigation cuts, towpaths for horses, tolls. At long last the Lea was to become a typical river navigation, and within a few years it was.

17.6 Canalisation was better, wasn't it?

It undoubtedly should have been, and indeed was. In 1767 Smeaton calculated the average discharge of water passing through Waltham Turnpike in a dry season. He found it to be 2 million cubic feet a day, a discharge which Professor Skempton has noted is equivalent to 250 lockfulls of water a day.⁴⁶

Canalisation could allow control of this flow, so that sufficient water was held back for the benefit of the navigation rather than be allowed to run to waste by passing downstream quickly. Particularly valuable in dry summers when pens built up slowly and flashes passed down too quickly.

Other users could benefit from canalisation as well. Even though much water was reserved for the navigation, sufficient would be left for the use of the millers and riparian land-owners, and measures could be introduced to regulate their supplies so that they would not be so irregular or so liable to interruption as they had been when flashes were frequently demanded.

Such aims were recognised by Smeaton and Yeoman when they made their recommendations, and it was Yeoman himself who acted as resident engineer

implementing the canalisation scheme on behalf of the Trustees, until his resignation in 1771. By this date much of the work had been completed.

There were some immediate benefits. Yeoman told Parliament in 1774 that the traffic was about 50,000 tons a year compared to about 32,000 before canalisation, though both his figures were admitted estimates.⁴⁷ Another benefit was trumpeted in a newspaper report in 1773:⁴⁸

The navigation of the river Lee is brought to that perfection, that a barge went on Saturday last from London to Hertford in eight hours, though they met with some stoppages

Such a timetable relied on favourable winds and tides along the Thames and lower Lea, and favourable circumstances along the canalised river, and must be seen as a 'record attempt' with all the stops pulled out rather than the norm. Indeed Smeaton only envisaged a time of 13 hours along the canalised river when he made his plans, and in the early 1950s horses still took two days to draw a barge from Bromley to Ware (steam tugs took four days).⁴⁹ Yet a quicker and more regular pattern of movement should have been attained as a result of canalisation.

But to temper this, it must be emphasised that there were major problems with the implementation of the canalisation scheme, both technical and financial. These problems were sufficiently serious to warrant query as to whether the canalisation scheme was that efficient when first introduced.

There were problems with the Limehouse Cut. Within a couple of years of being opened in 1770 it had to be widened to allow barges to pass each other, and the towing paths had to be extended. Furthermore, it could only be used at high tide. At low tide there was not enough water in the Cut to allow the movement of barges. This serious deficiency was not corrected until the 1850s, even though the remedy was not that technically difficult.⁵⁰

Another defect was that the initial scheme made no provision to improve the tidal river between Old Ford Locks and Bow Locks. Barges still faced problems in passing over the shallows and shoals at Old Ford, and still relied on the movement of the tides to take them down to Bow Locks and the Limehouse Cut. Rennie criticised this deficiency in 1805, suggesting another navigation cut, but no action was taken.⁵¹

There were also some serious problems along the canalised stretches of the Lea above Hackney. Such defects were emphasised by obviously interested parties, proponents of a canal from Waltham Abbey to Moorfields which would seriously threaten the viability of the Lee Navigation, but the criticisms were not answered by the Lee Trustees when the scheme came before Parliament in 1774.

The engineer of the proposed canal, Robert Whitworth, stated that 'it is impossible to navigate Vessels up the River Lee, in Times of Flood'. An opinion which was seconded by other supporters of the canal scheme.

Thomas Thruckston, a miller and coal merchant who owned three barges using the river, was particularly critical. He said that the passage was often interrupted by floods, that the pound locks were frequently out of order, that shoals were still a major problem, and that the new cuts were often drawn dry 'by the Willfulness or Carelessness of the Bargemen'. In fact the bargemen were often manipulating the locks so that they could obtain a current of water to help them on their way downstream (old habits die hard), or were drawing several lockfuls of water to help them over shoals in the cuts below. As a result of these defects, Thruckston claimed, barges were only carrying 26 tons of goods, and there were still problems in carrying upstream.

Unexpectedly, another witness in favour of the canal scheme was Thomas Yeoman himself. He also mentioned the problems with floods, and was of the opinion that nothing could be done to prevent their ill effects. That Parliament was aware of his potentially embarrassing position is obvious from the following exchange:-

And being asked, Whether, if the River Lee was as defective now as it was when he gave his Plan for its Improvement, he would vary the present Navigation? He said, under all the Circumstances of the Question he could not give a direct Answer to it; that the other was carried on with a View to save Expence, and preserve the old Navigation, and Communication with the Thames

Much effort was put into the bill, but to the relief of the Lee Trustees, it was rejected.⁵² Other reasons to query the success of the canalisation scheme were that some expected developments did not take place. Proper engineering should have allowed larger barges to use the navigation on a regular basis. Even if Thruckston's evidence to Parliament in 1774 is discounted as being biased, the fact that legislation in 1805 limited barges to 40 tons suggests that this was not achieved.⁵³ It was not until after improvement during the 1850s that larger barges could use the river.

Furthermore the customers do not seem to have enjoyed any reduction in their transport charges as a result of the improvements. Professor Mathias has noted that the freight charges borne by London brewers remained constant at 1/- per quarter from 1746 until 1791, and recent research by Edgar Jones has confirmed this.⁵⁴

In fact the bargemen had little scope for reducing their charges. The tolls collected by the Lee Trustees between 1767 and 1778, 1/5 per ton on malt from Ware to London, were little different in their total effect to the 59/- that a 40 ton barge was said to be paying to millers and fishermen every journey before 1767. Then in 1778 financial problems forced the Lee Trustees to increase their tolls, to 2/2 per ton of malt.⁵⁵

Such an increase was necessary to deal with the severe debt problems the Trustees had incurred, problems due largely to the Trustees' own mismanagement. In 1767 the Trustees had attempted to raise £35,000 at 4%. They were inundated with offers, £161,500 in total. Ballots were held to determine whose offers were taken up. Yet the

Trustees had miscalculated their needs, and in 1770 were forced to seek a further £15,000.

They chose to raise it by selling annuities. In 1771 they called a halt to such sales after having raised £22,566, but in March 1773 authorised a further £5,000, only to find in 1778 that an unauthorised £17,740 had been sold. With such mismanagement, it is not surprising to note that no formal accounts were ever produced before 1779. So serious was the debt that legislation was needed to authorise a substantial increase in tolls, and it was not until the end of the century that this debt was finally cleared.⁵⁶

Even though the debt was cleared, the Trustees took no further action to upgrade the navigation, even though a report from Rennie in 1805 suggested that such work was necessary. It was not until the threat of rail competition materialised that the Trustees made further substantial improvement, a successful response. It is thus only from the 1850s that the fuller potentialities of canalisation were realised. Before that the Lee Navigation was not that much better or more efficient than the flash-lock navigation it replaced.

NOTES TO CHAPTER SEVENTEEN

1. CJ, xxxiv.642-44.
2. R. Griffiths, *An Essay...Conservancy of the River Thames*, 55-56.
3. S. Simpson, *The Agreeable Historian* (3 vols, London 1746), ii.278.
4. PRO, C10 363/3. Jones argued it was unfair that he as the major local landowner should be responsible for wharfing 11 miles of the river bank from the turnpike to Waltham High Bridge, and for allowing bargemen access to his land to hale their barges, yet receive no income from either the turnpike or the mill.
5. NRO, Additional Wake Papers 1965/129, General Accounts of Essex Estate 1762-1782.
6. Trustees, 26 September 1750, 25 September 1752.
7. ERO, D/DQt 125.
8. Trustees, 17 March 1767, 1 April 1767.
9. PRO, RAIL 845/53, Court of Sewers, 14 September 1743.
10. The Walton family set up their own warehouses in Barking Creek as early as 1721, whilst complaints of problems in transporting powder through London streets caused the Ordnance office to issue orders in 1707 that powder be delivered to Greenwich: Lincoln Inns Library, MP 102 fo.174; Royal Armament

- Research and Development Establishment (Waltham Abbey), WASC 436; PRO, WO 47/24 Fo.270; PRO, CII 113/19.
11. CLRO, Repertories 71 fo.68; CJ, xxxi.308-11.
 12. E. Jones, 'A transport private saving calculation for the brewers Truman Hanbury & Buxton, 1815-63', *Journal of Transport History*, 3rd series, vii(1986), 1-17.
 13. CJ, xxxi.308.-11.
 14. CLRO, Repertories 171 fo.6-3; ERO, D/DQt 125; J. Houghton, *Collection for Improvement*, 22 April 1698.
 15. Guildhall Library, Fo pamp 3400, *Petition of the City of London for making a navigable canal from Moorfields to Waltham Abbey (London, 1774?)*.
 16. CJ, xxviii.436.
 17. N. Salmon, *History of Hertfordshire*, 2
 18. CJ, xxviii.436. 465
 19. W.T. Jackman, *The Development of Transportation*, 355371; C. Hadfield, *The Canal Age (Newton Abbot, 1968)*, 22-49.
 20. Enfield, *The Report of John Smeaton, Engineer, upon the New making and completing the Navigation of the River Lee, from the River Thames, through Stanstead and Ware to the Town of Hertford; another copy: Bodl. Gough Maps 17.*
 21. CLRO, Repertories 171 fo.68.
 22. CJ, xxviii.436.
 23. *Ibid*, xxxi.308.
 24. *Ibid*; *ibid*, xxviii.436; LJ, xxxi.627; CLRO, Repertories 171 fo.68.
 25. Enfield, *The Report of John Smeaton...*; CJ, xxxi.308; For details of Smeaton's work on mills: D. Smith, 'Mills and Millwork' in A.W. Skempton, editor, *John Smeaton, FRS*, 59-81.
 26. Guildhall Library, MS. 13539.
 27. CJ, xxxi.308; CLRO, Repertories 171 fo.68.

28. CJ, xxxi.308; *ibid*, xxviii.436.
29. Gentleman's Magazine, xxiv.376-77,426.
30. *Ibid*,xxviii.326.
31. Institution of Civil Engineers, Rivers 1695-1850(7); Trustees, 21 November 1757, 26 December 1757, 27 February 1758.
32. 32 Geo II, c.42; 6 Geo III, c.78; CJ, xxviii. 380, 411,439,475,486,498; *ibid*, xxx.453,517,603,624,681, 685,734,781; LJ, xxix.74~_5,446,450,452; *ibid*, xxxi. 324,325,327,338,341.
33. CJ, xxviii.394,436,453; The Gazetteer and London Daily Advertiser, Saturday 10 February 1759. The Commons Journals state that several Trustees petitioned parliament, but the minutes of the Trustees merely noted after the event that the expenses of several bargemasters who had approached parliament should be met: Trustees, 25 June 1759.
34. Trustees, 8 October 1759, 11 October 1762, 8 November 1762.
35. *Ibid*, 5 August 1765, 16 July 1766.
36. Enfield, The Report of John Smeaton...
37. Reports of the late John Smeaton (4 vols,London,1812 -14), ii.155-63.
38. Trustees, 29 October 1766, 30 September 1766, 17 November 1766; London Borough of Tower Hamlets, Local History Collection 980.
39. London Borough of Hackney Library Services, 912. 1767 LEE; CJ, xxxi.98; Trustees, 18 December 1766, 31 December 1766, 17 January 1767, 3 February 1767, 17 March 1767, 1 April 1767.
40. In 1760 Nickalls won a prize offered by the Society of Arts for a design for tide mills, soon afterwards he rebuilt Waltham Abbey Powder Mills. In 1762 he built a water pumping engine to Smeaton's design at West Ham Waterworks, having already worked as an assistant to Smeaton in 1760 on another river improvement scheme, before being dismissed by Smeaton. In December 1766,he surveyed the Abbey Mills estate at West Ham, and in 1768 built an engine for London Bridge Waterworks: A.W. Skempton, E.C. Wright, 'Early members of the Smeatonian Society of Civil Engineers', Transactions of the Newcomen Society , xlv(1971), 23-42 R. Bennett, J. Elton, A History of Corn Milling (4 vols London,1898-1904), ii.21 ; C. Hadfield, 'Rivers and Canals' in A.W. Skempton, editor, John Smeaton,FRS, 105; D. Smith, 'Mills and Millwork in A.W. Skempton, John Smeaton,FRS, 69-70; ERO, D/DSO E20; Guildhall Library, MS.13539

41. CLRO, Repertories 171 fos-29,68; CJ, xxxi.201.
42. CJ, xxxi.116,361.
43. Ibid, 186,195,204,308,350,361,365.
44. Ibid, 335,338.
45. 7 Geo III, c.51.
46. Reports of the late John Smeaton, i.279; A.W. Skempton, 'Engineering on the English River Navigations to 1760' in M. Baldwin, A. Burton, editors, Canals: A New Look, 37.
47. CJ, xxxiv.642-44.
48. London Borough of Tower Hamlets, Local History Collection 980.
49. R.A. Cory, A Study of the River Lea between Lea Bridge Road and Waltham Abbey (London, 1952), 16
50. P.I. Champion, 'The Lee Navigation, 1767-1869' (unpublished Ph. D. thesis, Univ of London,1978), 82-83; J. Boyes, R. Russell, Canals of Eastern England, 21-22; ERO, D/DYc 11/2.
51. Institution of Civil Engineers, Manuscript Reports of John Rennie, iii.207-18.
52. CJ, xxxiv.638-46.
53. 45 Geo 111, c.69 Local.
54. P. Mathias, The Brewing Industry in England 1700-1830, 441; H.E. Jones, The Lea Valley 1750-1900: A Regional Survey of Transport and Industrial Development' (unpublished Ph.D. thesis, Univ of Oxford,1982),179ff.
55. 7 Geo III, c.51; 19 Geo III, c.58; CJ, xxxi.308-11; PRO, RAIL 845/5, Trustees 22 February 1779.
56. P. Mathias, The Brewing Industry in England 1700-1830, 445-46; P.I. Champion, 'The Lee Navigation 1767-1869', 98ff.