

2nd Updated Summary of the Locations and Types of Watermills in British River Catchments – July 2022 (amended August 2022)

1. Introduction

Towards the end of 2021, we published a Pamphlet, **Investigations into Watermill Locations and Types on 34 River Catchments** centred on Tables presenting the numbers and types (functions) of watermills, operating after 1750, in selected river catchments. We indicated that some of the data for those catchments was incomplete, and that we intended to remedy this and investigate more catchments, and that updates would appear on the website, historicaljourneysalongbritishrivers.com/. The first such update appeared in April 2022, and this is a second. Having completed the investigations of the Rivers Witham and Welland, the full results are presented, for these rivers, but discussion is postponed, until the next Updated Summary. Our methodologies, were laid out at some length in the pamphlet, which is also posted on the website, so they shall not be discussed in detail here, though we have made some refinements in interpretation, and they shall be dealt with in the next section. There follows a description of augmented results, which are mainly presented in Tables, similar to those in the pamphlet, and there is an overview section. A brief account of our present intentions as regards future work ends the update.

2. Objectives and Enhancements to the Methodology

The original objective of the project has not changed, namely to recount virtual journeys along British rivers, taking a historical view, and focusing on landscape features, man-made artefacts, and notable people associated with the rivers, rather than natural life or leisure activities. However, the emphasis has changed, with greater attention given to watermills, to the extent that the desire to answer questions about them, has strongly influenced our recent selections of rivers to investigate. The update is entirely concerned with this aspect.

As regards watermills, our initial focus was on what we define as commercial mills. In them, the completion of any milling task involved payment in cash or kind. This could take the form of a farmer delivering his grain to a cornmill, and either selling it to the mill, or paying the miller for his services, recovering the flour, and selling it at a profit. In the latter case, grist (grain) mills operated on the basis of payment in kind, with the miller keeping a fraction of the flour produced from the farmer's grain. (The expression 'all grist to the mill' derived from the fact that all the grain crop contributed to someone's profit). Our main aids in locating commercial mills were the historic OS maps displayed on the website, <https://maps.nls.uk/>, though information from various sources, referenced in the accounts of individual river journeys, helped in identifying mill types. Figure 1 is an example of the presentation of information about commercial watermills, for a recently considered catchment, that for the River Wyre. The sketch map locates the watermills, but also gives an idea of features of the catchment; information in this form is available for each historical river journey, while the attached Tables identify the mills, and in most cases, define their functions.

Finally, attention is drawn to the fact that in this update, and all the tabulations and sketch maps, on which it draws we deal only with watermills which operated after 1750. We acquired much information on watermills, which operated earlier, from the 11th century onwards, while progressing the project, and where appropriate, incorporated it in the accounts of the river journeys. However, such information is incomplete by any test, and

availability is almost random, for Northern England, Wales, and Scotland, so we have made no attempt to record it systematically.

We realised that there was another class of watermills, namely farm mills, which were mostly threshing mills, though a few were churns making milk products. A farm mill can be regarded as a piece of farm equipment, like a plough or a milking parlour, installed by the farmer, or the landowner; no payment is associated with its use. The mechanical threshing mill was invented by an East Lothian, millwright, Andrew Meikle, and installations spread rapidly across Scotland and into England from the early 1790s. The operation involved corn stalks being fed in, then beaten between a rotating drum carrying vanes, and a metal cage; the straw passed through, and the grain dropped into a sack. The drum had to be driven, against considerable resistance as it tore off the grain, so a substantial power source was required to generate the necessary torque. In 1790, there were two options, power supplied by a waterwheel, or horse power. The decision between the two depended on many factors, not least costs, both capital and operating, which were different for the two systems. Water power could be ruled out in dry, flat areas, as it would be impossible to supply a waterwheel with enough water, flowing sufficiently strongly, while on small farms, providing a team of 4 horses might be a big ask.

Initially we took on the task of identifying those powered by water, and they were included in tabulations for Scottish river catchments; Alastair Robertson has refined his methods for identifying these artefacts, which are often un-named on the Nls maps, but which leave signs including sheds, mill-lades and mill ponds. Checks had to be carried out to ensure that the ponds were at higher level than the sheds containing the farm mills, and thus capable of powering a mill, as some ponds were simply farmyard features. By 1840, steam powered threshing mills were being installed in significant numbers. Roughly, two decades later, threshing machines could be placed on a cart, with power supplied by a traction engine, which moved the cart, when required. Such portable arrangements did not feature on maps, an issue for the work described here, when it is remembered that the first OS maps for some areas, did not appear until 1880. Nonetheless, the water supply arrangements, usually survived for some years after a fixed threshing machine was replaced by a mobile version. To finish the story, combine harvesters, in use now, incorporate a threshing machine working on Meikle's principles, and move from farm to farm, albeit very slowly.

For completeness, we wished to consider horse gins, one of which is preserved at the Beamish Museum in County Durham, and shown alongside; the thick central rotating shaft can be seen. Horses or ponies, often 4 in number, attached to the shaft were led in circles inside the walls of the 'round' house, and cogwheels either in the roof or below the floor took the movement, by way of drive shafts and gears, to the rotating drum of the threshing machine. In this case, the machine is in a barn to the left of the frame of the photograph. At a fairly late stage in our work



on Scottish river catchments, we had the privilege of communicating at some length with Professor Paul Bishop of Glasgow University, who sadly died not long afterwards. He explained how horse driven farm mills, horse gins, could be recognised on 19th century OS maps. The task of seeking them out is onerous, and time-consuming, but we have done so for all river catchments looked at since, though for only a few of the Scottish river catchments, that had already been investigated; results are presented, in the notes attached to the Tables for each set of catchments, and in a separate tabulation.

In order to compare the frequency of occurrence of farm (threshing mills) in different river catchments we have calculated the ratio of the number of threshing mills (water powered and horse powered, where available), to the number of commercial corn mills, taking the latter number as a rough measure of how much corn was grown in the catchment. The ratios appear in the results section, but it was immediately obvious that the values were far higher in Scotland than in England. We thought it probable that this was a real effect, and considered possible explanations. However, another factor might have been the later survey dates of most 1st edition OS maps for England typically, in the 1880s or even 1890s, whereas the corresponding Scottish survey dates were in the 1840s or 1850s. This was likely to be significant, because steam-powered, movable threshing mills became available in the 1860s, and began to replace the fixed installations, which appear on OS maps. It is true that the buildings and earthworks associated with the latter, often survived for a long time after they have gone out of use, but this was not always the case. To assess the scale of this effect, we selected two catchments in Scotland, those of the River Leven in Fife, and the River Urr in Galloway, and in England, the River Wyre in Lancashire, for which there are 1st edition maps surveyed in the 1840s, and 2nd edition maps surveyed in the 1880s or 1890s. We then compared the numbers of farm (threshing) mills, both water powered and horse powered, marked on the maps of each edition. This gave us a measure of how many mill installations might have disappeared between the 1840s and the 1880s.

2. Results

Tables 1, 2, 3, 4 deal with Scottish river catchments, respectively in the Lothians, Fife & Clackmannanshire, Dumfriesshire, and Galloway and are slightly modified versions of the equivalent Tables in the Pamphlet; (5, 6, 7, & 8); we have taken the chance to make minor corrections, alterations and additions. The watermills within the catchments of 21 rivers are included, together with those on many small streams in the named counties/regions.

One addition is to quote river lengths. When reviewing the number of watermills in different river catchments, one factor influencing any differences will be the lengths of the watercourses capable of providing a viable power source, and that quantity will often be linked qualitatively to the length of the river. So, as a simple illustration, if River A is twice as long as River B, one might start with an assumption that there would be twice as many cornmills in the catchment of River A. That will most likely not be the case, and explanations would then be sought in such factors as differences in numbers/lengths of tributaries, rates of fall of the streams, or the types of farming practiced in the period of interest. The lengths of the rivers provide a sensible start point for any such investigations, but no more than that.

We have placed all saw mills in the commercial category, although many were located on estates or farms and operated, like farm mills without payment for individual tasks. It might have been possible to assign many of

them to one or other category, but there would have been doubts about some, and the overview which reflected land-use in catchments, would have been lost.

Since issuing the pamphlet we have looked at 2 more Scottish river catchments, namely those of the Moray River Avon, and the Lanarkshire Avon Water. The information collected about watermills is presented in Table 5; as regards threshing, horse gins have been enumerated, and that data is presented in the notes to Table 5.

The pamphlet contained what are best described as preliminary results of investigations of watermills in the catchments of English and Welsh Rivers, with a focus on commercial watermills. We have since completed full investigations on fourteen English and one Welsh river catchments, both as regards commercial and farm (threshing) mills, and the data for the following river catchments is presented in Tables 6 & 7:

River Tees

Yorkshire River Esk

Yorkshire River Don

Warwickshire River Avon

Hampshire River Avon

Hampshire Avon Water

River Camel in Cornwall

Devon River Avon

Bristol River Avon

Little River Avon, in Gloucestershire

River Wyre in Lancashire

Eastern River Rother in East Sussex/Kent

and the River Afan in South Wales,

together with the latest additions, the Rivers Witham and Welland

Tables 8 & 9, repeat preliminary results, presented in the pamphlet, for English and Welsh river catchments; the commercial watermills on the rivers and major tributaries, are identified and located, but the farm mills have not been investigated, nor have minor tributaries. Results are for the following catchments;

In England,

River Yare

River Wensum

River Waveney

River Bure

and in Wales,

River Usk

River Towy

River Teifi

In total, 45 river catchments have been investigated to some degree; the Tables now follow.

Table 1. Frequencies of Occurrence of Watermill Types in River Catchments in the Lothians

Watermill Type	Numbers of Watermills in Catchment						All Catchments
	Avon (31km)	Almond (45km)	Water of Leith (29km)	Esk + N +S Esk (64km)	Tyne (48km)	Smaller Streams	
Commercial							
Food, Drink and Beverages							
Corn	20	23	40	18	29	28	158
Farina						1	1
Brewing/ Distilling	2	1					3
Dairy				1			1
Textiles, Leather							
Textile	11	4	13	14	14	6	62
Leather			2	1	5		8
Metals, Construction							
Saw	3	9	9	5	9	7	42
Clay/Brick	2						2
Metal industry	1	2					3
Chemicals, Fertiliser							
Glue			2				2
Paper, Printing	3	5	13	15	2	1	39
Special							
Flint						5	5
Gunpowder				3			3
Snuff/Tobacco	1		3	1			5
Unknown	5	7		2	4	7	25
All Commercial Watermills	46	48	68	53	52	53	320
Farm Watermills							
Threshing	36	61	30	43	58	67	295
Churn	5	3		1			9
All Farm Watermills	38	62	30	43	58	67	298
All Watermills	84	107	97	94	110	120	612

Notes:

1. The total number of watermills operating in the Lothian river catchments at some time after 1750 was 612. Of these watermills, 320 were commercial mills as we have defined them, and 298 were farm mills.
2. Almost half of the commercial mills were corn mills, 158, which aligns with a long history of corn-growing farmland in the Lothians. All 42 saw mills appear as commercial, though some fitted the definition of farm mills.
3. The Table highlights some industrial specialisations in different river catchments like paper-making in the River Esk and Water of Leith catchments, and that textiles were manufactured in all catchments.
4. As regards water-powered threshing mills, they were fairly uniformly spread through all the Lothian catchments. In the River Almond catchment, 123 horse gins were found as well as 61 water-powered threshing mills. So there were 184 threshing mills and 23 commercial corn mills, a ratio of 8 : 1.

Table 2. Frequencies of Occurrence of Watermill Types in River Catchments in Fife & Clackmannanshire

Watermill Type	Numbers of Watermills in Catchment				
	Devon (54km)	Leven (26km)	Eden (48km)	Smaller Streams	All Catchments
Food, Drink and Beverages					
Corn	3	43	46	59	151
Starch			2		2
Brewing/ distilling	1	1	2	4	8
Coffee			1		1
Textiles, Leather					
Textile	29	41	28	28	126
Metals, Construction					
Saw	5	20	12	15	52
Metal industry		2		5	7
Chemicals, Fertiliser					
Bone				1	1
Paper, printing	2	4	1		7
Special					
Flint		1			1
Pencil		1			1
Snuff/Tobacco		1	1	1	3
Unknown		2	10	12	24
All Commercial	39	111	94	124	368
Farm Watermills					
Threshing	12	37	50	47	146
Total: All Watermills	51	147	140	167	505

Notes:

1. The total number of watermills operating in the Fife and Clackmannan river catchments at some time after 1750 was 505. Of these watermills, 368 were commercial mills as we have defined them, and 146 were threshing mills; that balance would have been altered if we had assigned 52 saw mills differently.
2. Almost half of the commercial mills were corn mills, 151, understandable, given that arable farms predominated in large parts of the countryside. The exception was the River Devon catchment, where even given the landscape, high ground upstream, and coalfields downstream, the number is remarkably small.
3. The Table highlights the importance of textile production throughout the area, but the Table hides differences; woollen cloth was produced in the River Devon catchment, but linen was produced elsewhere.
4. As regards water powered threshing mills, they were fairly uniformly spread through all the catchments, including those of the lesser and smallest streams except unsurprisingly that of the River Devon.
5. Allocation of horse driven threshing mills (horse gins) to river catchments must be inexact. However, 179 horse gins were linked to the River Eden catchment, compared with 50 water powered threshing mills; the low rainfall in much of the area, presumably ruled out waterpower. The ratio of the total number of threshing mills 229 to the number of corn mills in the River Eden catchment is 5 : 1. In order to make sensible comparisons between catchments both power sources must be considered.

Table 3. Frequencies of Occurrence of Watermill Types in River Catchments in Dumfriesshire

Watermill Type	Numbers of Watermills in Catchment							All Catchments
	Nith (101km)	Lochar (34km)	Annan (90km)	Kirtle (29km)	Sark (22km)	Esk (77km)	Smaller Streams	
Commercial								
Food, Drink and Beverages								
Corn	31	4	29	5	2	20	3	94
Brewing/ distilling			1			2		3
Textiles, Leather								
Textile	14		10	1		6		31
Leather	3		1			1		
Metals, Construction								
Saw	25	4	25	4	1	8	2	69
Limeworks							1	1
Metal industry	4		1	1	1			7
Chemicals, Fertiliser								
Bone	1		1		1			3
Mining	1	2						3
Unknown		2	4					6
All Commercial	79	10	65	11	5	37	6	213
Farm Watermills								
Threshing	239	29	76	5	6	20	5	380
Total: All Watermills	315	39	141	16	11	57	11	590

Totals cannot always be obtained by adding items because some watermills had more than one function in their lifetimes.

Notes:

1. The total number of watermills operating in the Dumfriesshire river catchments at some time after 1750 was 590. Of these watermills, 213 were commercial mills as we have defined them, and 379 were farm mills; that balance would have been altered if we had assigned 69 saw mills differently.

3. Corn mills and saw mills predominate amongst the Commercial watermills, perhaps highlighting the fact that Dumfriesshire is predominantly rural. The distribution of both indicates the changes in landscape in the upper river valleys; in the 19th century, corn was grown in areas now afforested or rough moorland.

4. As regards water powered threshing mills, they were not uniformly spread through the catchments. They were surprisingly rare in the eastern catchments, i.e. the River Esk, River Sark, and Kirtle Water, common in that of the River Annan, and remarkably abundant in the River Nith catchment, especially in the lower reaches. We have done no assessments of numbers of horse gins so cannot relate numbers of threshing mills to numbers of commercial corn mills.

Table 4. Frequencies of Occurrence of Watermill Types in River Catchments in Galloway

Watermill Type	Numbers of Watermills								
Commercial									
Food, Drink and Beverages									
Corn	1	3	9	7	6	26	17	29	98
Farina	1		1	2	1			1	6
Starch	1		1					2	4
Brewing/ distilling			1	1	1				3
Textiles, Leather									
Textile		3	3	6	5	5	5	9	36
Leather		2		2	2	1			7
Metals, Construction									
Saw	1		6	5	3	10	9	13	47
Quarrying							1		1
Limeworks								1	1
Metal industry			1				2	1	4
Chemicals, Fertiliser									
Bone						1			1
Manure							1		1
Mining									
				1		1			2
Paper/ printing									
						1	1		2
Special									
Snuff/ Tobacco				2		1			3
Unknown									
		1	2	1	2	3	3	4	16
All Commercial	4	8	24	23	19	48	36	54	216
Farm Watermills									
Threshing	22	17	37	52	32	118	99	196	573
Total: All Watermills	26	25	61	74	51	166	135	245	783

* The length given for the river Dee is the sum of the lengths of the Water of Deugh, the Water of Ken and the River Dee.

Notes:

1. The total number of watermills operating in the Galloway river catchments at some time after 1750 was 783. Of these watermills, 216 were commercial mills as we have defined them, and 573 were farm mills; that balance would have been altered a little but not substantially, if we had assigned 47 saw mills differently.
2. Corn mills and saw mills predominate amongst the Commercial watermills, perhaps highlighting the fact that Galloway is predominantly rural. In the 19th century corn was grown in areas now afforested or rough moorland.
3. There is evidence for 37 horse gins linked to the Water of Urr catchment, and for 99 water-powered threshing mills. On 11 farms, the latter may have replaced the former, because markers for both are visible on the OS maps. So, there were 136 threshing mills, and 17 commercial corn mills, a ratio of 8 : 1.

Table 5. Frequencies of Occurrence of Watermill Types in 2 Scottish River Catchments

Watermill Type	Numbers of Watermills in Catchment	
	Moray Avon (64km)	Lanarkshire Avon (39km)
Commercial		
<i>Food, Drink and Beverages</i>		
Corn	7	14
Brewing/ distilling	2	
<i>Textiles, Leather</i>		
Textile	1	6
Leather		
<i>Metals, Construction</i>		
Saw	1	4
Metal industry		
<i>Mining</i>	1	
<i>Paper/ printing</i>		1
<i>Unknown</i>	2	1
All Commercial	13	24
<i>Farm Watermills</i>		
Threshing	51	14
Total: All Watermills	64	38

Notes:

1. There were perhaps fewer commercial watermills along the Moray River Avon than might be expected if its length alone is considered, but a substantial part of its course, (and those of its tributaries) is through high moorland on which no cultivation has ever taken place.
2. There was little industry along either river, although woollen material was produced in mills in the stretch of the Lanarkshire Avon around Strathaven, and there were distilleries in the Moray River Avon catchment, and more not far away.
3. The 51 water-powered threshing mills in the Moray River Avon, were not augmented by any horse gins; presumably the abundance of fast flowing streams meant that water power was always the preferred option. With only 7 cornmills in the catchment, the ratio of the number of threshing mills to them is 7.3 : 1. This may give a slightly wrong impression because grain will also have been supplied to 2 distilleries in the catchment.
4. In addition to 14 water-powered threshing mills in the Lanarkshire Avon Water catchment there were 32 horse gins. There were 14 commercial cornmills so the ratio of the number of threshing mills to corn mills is 3.3, perhaps below the emerging norm for Scottish river catchments.
5. The watermills found in these catchments, bring the total number identified in Scottish river catchments to 2619, of which 1154 were commercial mills, and 1463 were farm mills, almost all threshing mills.

Table 6. Frequencies of Occurrence of Watermill Types in Nine River Catchments in the North and Midlands of England

Watermill Type	Numbers of Watermills in Catchment								
	Tees (135km)	Yorks Esk (46km)	Yorks Don (114km)	River Wyre (58km)	River Witham (132km)	River Welland (104km)	Warks Avon (136km)	Bristol Avon (134km)	Little Avon (15km)
Food, Drink, Beverages									
Corn	76	18	108	18	31	41	195	196	32
Bean									
Brewing/ distilling			3				1	7	2
Textiles, Leather									
Textile	20	6	45	14	1		27	89	40
Leather				1			2	7	
Metals, Construction									
Saw	4	1	5	1	1	1	5	11	1
Quarrying					1				
Stone cutting			1						
Metal industry	3		153	4		1	4	27	2
Needle							17		
Chemicals, Fertiliser									
Chemicals			5					2	
Glue			1					1	
Bone			1	3	1		1		1
Mining	18								
Paper/ printing	4	1	19	4	3		9	15	2
Special									
Pencil	1								
Glass grinding			1						
Gunpowder								4	
Ropeworks					1				
Snuff/ Tobacco			5					6	
Engine			1						
Rubber								2	
Pottery								2	
Unknown	4		9	1	6	6	42	15	
All Commercial	118	24	332	35	41	49	284	334	54
Farm Watermills									
Threshing	19	12	18	36	21	21	67*	232	34
Total: All Watermills	137	36	350	71	57	70	284	564	88

* Partial coverage only: see note 6 for discussion of the Warwickshire Avon threshing mills.

Notes:

1. On each river, except the River Don, and the Little River Avon, the number of watermills, under the umbrella term, cornmill, (essentially all those processing cereal grains) considerably exceeds the number performing all other tasks.

2. The picture for the Yorkshire River Don is completely different from those for all the other rivers in Great Britain, which have been investigated, thanks to the very large number of metal processing watermills in and around Sheffield. The only other major metal-related industries highlighted are needle manufacture in the middle reaches of the Warwickshire River Avon, foundries beside the lower Bristol River Avon, and lead mining beside the upper River Tees. Steelmaking near the mouth of the River Tees was a late 19th century development, in the age of steam, unlike the Sheffield Iron and Steel industry which grew up more than a century earlier. It should be noted that there were also many cornmills along the Yorkshire River Don, and its tributaries, mainly higher in the catchment; this is unsurprising given the large regional population to be fed.

3. As regards textile mills, the large sheep population in the Cotswolds explains the many woollen mills in the catchments of the Bristol River Avon and the Little River Avon, while the number of woollen mills in the Yorkshire River Don catchment reflects the importance of the Yorkshire wool industry. Textile mills are a feature associated the other rivers, an indication of the importance of fabric manufacture in much of England from medieval times up to the fairly recent past.

4. The Yorkshire River Don passes through the Sheffield/Rotherham conurbation, the Bristol River Avon passes through Bath and Bristol, and the Warwickshire River Avon skirts the West Midlands conurbation, in all of which population centres, documents of many kinds were indispensable, and this explains the number of papermaking and printing mills in these catchments.

5. A puzzling feature is the scarcity of water-powered saw mills in these river catchments except for the Bristol River Avon, in comparison with Scottish river catchments. Certainly there are more forests on Scottish hills nowadays, but much of the planting was in the 20th century, so the difference remains unexplained.

6. Our mode of comparison of the numbers of threshing mills on different river catchments, is the ratio of that number, to the number of commercial corn mills. We had two problems in the calculation that for the Warwickshire River Avon catchment. A key marker for a water powered threshing mill on old OS maps is the existence of a mill pond, suitably located. In this catchment there were many farm ponds, which could not have been associated with farm mills. Differentiation was possible, but very time-consuming, so we decided that we would conduct only a limited survey, over c30% of the catchment. A second problem was the exceptionally large number of commercial mills of undetermined function. We received advice from an expert, Mr. Tim Booth, before his untimely death, that the great majority of those had been corn mills. Of those watermills of determined function, 80%, were corn mills, so we added that proportion of the undetermined mills to the number of known corn mills in the parts of the catchment covered by our 30% survey. The results are shown in Table 6A. The value of the ratio of number of threshing mills to number of commercial corn mills is 0.8, within the range found on English rivers. Surprisingly, we found no horse gins in the part of the catchment which we surveyed.

Table 6A. Estimation of the Ratio of Numbers of Threshing Mills, to the Numbers of Corn Mills, in different parts of the Warwickshire River Avon catchment

Catchment	Threshing Mills	Corn Mills	Unknown Function	Threshing/ (corn +80% of unknowns)
Avon: Sowe to Source	12	16	6	0.6
River Swift	0	3	0	0.0
River Leam	25	7	9	1.8
River Stour	19	34	11	0.4
River Swilgate	11	7	0	1.6
Totals	67	67	26	0.8

7. Further comments on the information gathered about threshing mills will be made in the Overview section.

Note that comments on the Rivers Witham and Welland will appear in the next Updated Summary.

Table 7. Frequencies of Occurrence of Watermill Types in five Southern English River Catchments and one Welsh River Catchment

Watermill Type	Numbers of Watermills in Catchment					
	Devon Avon (41km)	Hants River Avon (96km)	Hants Avon Water (14.5km)	Eastern Rother (48km)	Camel (48km)	River Afan (18km)
Food, Drink, Beverages						
Corn	19	86	3	26	53	3
Bean		1				
Brewing/ distilling		1		1	1	
Textiles, Leather						
Textile	4	19			3	2
Leather	1				1	
Metals, Construction						
Saw		4		1	4	1
Quarrying					2	
Stone cutting						
Metal industry	1	2		3	1	4
Needle						
Chemicals, Fertiliser						
Chemicals						
Glue						
Bone		1			3	
Mining					2	
Paper/ printing	1	3		1		
Special						
Pencil						
Glass grinding						
Gunpowder		1		2		
Ropeworks					1	
Snuff/ Tobacco						
Engine						
Rubber						
Pottery						
Unknown	1	12	1		4	1
All Commercial	20	122	4	32	74	10
Farm Watermills						
Threshing	45	47	6	101	95	2
Total: All Watermills	65	169	10	133	166	12

Notes: see over

1. Corn mills, (taken as an umbrella term for all grain processing) predominate in all the English catchments, reflecting the need to provide flour locally to populations during much of the period considered, because bulk transport before the coming of the railways was slow and costly.
2. The number of textile mills in the Hampshire River Avon catchment is a reflection of the corn/sheep husbandry, which was the farming practice in much of the area.
3. As regards the English catchments, there are no other striking features to which we need draw attention.
4. The landscape of the River Afan catchment during the period in question was largely a mix of moorland and the wastes of coalfields, so the small number of watermills in total is understandable. However, the metal mills reflect the industrialisation in the lower valley, and the textile mills, the sheep which roamed the moors.

Table 8. Frequencies of Occurrence of Commercial Watermill Types in 4 English River Catchments

Watermill Type	Numbers of Watermills			
	Yare (84km)	Wensum (75km)	Waveney (95km)	Bure (80km)
<i>Food, Drink and Beverages</i>				
Corn	15	17	14	20
Mustard	1			
<i>Textiles, Leather</i>				
Textile	2	1	3	2
<i>Metals, Construction</i>				
Saw	1	1		
Quarrying				
<i>Chemicals, Fertiliser</i>				
Bone		1		
<i>Paper/ printing</i>	2	4		1
<i>Unknown</i>				1
All Commercial	17	18	14	21

Notes:

1. These results cover only the rivers and major tributaries, and not lesser tributaries. Threshing mills are not considered. Further comment will be withheld until more information has been gathered.
2. A total of 70 commercial watermills have been identified on these 4 catchments, so far.

Table 9. Frequencies of Occurrence of Watermill Types in 3 Welsh River Catchments

Watermill Type	Numbers of Watermills in Catchment		
	Teifi (120km)	Towy (121km)	Usk (130km)
Commercial			
<i>Food, Drink and Beverages</i>			
Corn	57	115	52
Brewing/ distilling			
<i>Textiles, Leather</i>			
Textile	84	62	6
Leather		1	
<i>Metals, Construction</i>			
Saw	11	9	3
Metal industry	2	6	13
<i>Mining</i>			
<i>Paper/ printing</i>			4
<i>Unknown</i>	25	49	20
All Commercial	178	239	97
<i>Farm Watermills</i>			
Threshing	*	*	*
Total: All Watermills	178	239	97

Notes:

1. The numbers of cornmills and textile mills taken together greatly exceed the number of all other types, on each river. However, the balance between the types is completely different, with few textile mills in the River Usk catchment, a predominance of them in the River Teifi catchment, with the River Towy catchment in between, though still with a very large number of textile mills.
2. Watermills employed in the metal industry are most common in the River Usk catchment, and specifically along the tributaries of the lower reaches, like the River Ebbw, but the numbers are nowhere near as large as those in the Yorkshire River Don catchment.
3. There are significant numbers of watermills of types as yet unknown to us in these catchments. We are of course at the mercy of such sources as we can find in this regard, but would hope to reduce the number in that category.
4. We have identified 514 commercial watermills which operated in 3 Welsh river catchments, so far, and the data are interesting. However, this is work in progress, and we expect to be able to say more in future, as we attempt to build towards a more comprehensive view. We have not as yet looked for threshing mills in these catchments.

3. Overview

As a start, it is worth considering how many watermills have been identified, located on sketch maps, or in the case of threshing mills, verbally, and listed in Tables 1 to 9 The numbers are as follows;

	Commercial Mills	Farm (Threshing) Mills	Totals
Scottish	1154	1462	2592
English	1573	689	2262
Welsh	524	Not assessed	524
Totals	3251	2151	5378

We have nothing to add concerning commercial watermills to the comments made in the notes to each Table. However, we record the fact that these Tables record much information, and make comparisons between watermill distributions in different river catchments relatively easy.

Table 10 shows how the number of threshing mills of both types and the number of commercial corn mills varied between different catchments. It is reasonable to take the number of cornmills in a catchment as a rough measure of the amount of corn produced there, remembering that in the period of most interest in the present context, 1790 – 1850, transport of bulk materials like grain was difficult and expensive. Consequently, the ratio of threshing mills to corn mills, should provide an estimate of the take-up of threshing mills, (column 6).

Table 10. Numbers of Water-Powered Threshing Mills and Horse Gins compared with Numbers of Cornmills in Selected River Catchments

Catchment	Number of each mill type in catchment				Ratio of threshing mills to corn mills in catchment
	Water-powered threshing	Horse-powered threshing	All Threshing	Corn mills	
Moray River Avon	51	0	51	7	7.3
River Eden (Fife)	50	179	229	46	5.0
River Leven (Fife)	47	133	180	43	4.2
Lanarkshire Avon Water	14	32	46	14	3.3
Water of Urr	99	37	136	17	8.0
River Tees	19	108	127	76	1.7
Yorkshire River Don	18	9	27	108	0.3
River Wyre	36	3	39	18	2.2
Warks River Avon*	67	0	67	67	1.0
Bristol River Avon	232	5	237	196	1.2
Little Avon	34	0	34	32	1.1
Hampshire River Avon	47	3	50	86	0.6
Hampshire Avon Water	6	0	6	3	2.0
Devon River Avon	45	4	49	19	2.6
River Rother	103	10	113	26**	4.3
River Camel	95	8	103	52	2.0
River Afan	2	1	3	3	1.0
All River Catchments	965	532	1497	813	1.8

* Partial coverage only: see note 6 for discussion of the Warwickshire Avon threshing mills.

** Windmills were unusually common in this catchment: 25 were noted and the majority were corn mills.

Emphasising that the numbers in column 6 of Table 10 should be treated as rough measures only, it can be seen that the high values for Scottish catchments imply very high take-up of what was after all, a Scottish invention; indeed, it has been suggested that the market had reached saturation. Moving into Northern England, there still seems to have been appreciable take-up, but it had dropped off rapidly by the time South Yorkshire was reached. Our other data concern the South of England, and here take-up seemed to be appreciable, even although the introduction of the technology was opposed sometimes violently by machine-wreckers, as in the 'Captain Swing' riots of 1830/31. The other qualitative information obtainable from Table 10 is that in drier, flatter catchments to the east, horse gins predominated, whereas in wetter, hillier catchments, mainly to the west, the opposite is true.

It was realised that the differences between catchments in Table 10 are influenced by the survey dates of the OS maps used to find farm (threshing) mills. Although 1st edition maps were always used, the survey dates varied from the 1840s to the 1880s, with those in Scotland produced earlier. The significance of this lies in the fact that portable, steam powered threshing mills became available in the 1860s, and they were not recorded on OS maps. Evidence of fixed installations, whether mill ponds or horse gin round houses, can long survive discontinuation of use, but not all will do so. To get a handle on the possible scale of this effect, we have selected 3 catchments for which there are 1st edition maps surveyed in the 1840s, and 2nd edition maps surveyed in the 1880s, and counted farm (threshing) mills on each. Table 11 shows the results for the River Leven (Fife), the Water of Urr (Galloway), and the River Wyre (Lancashire); for each catchment a significant proportion of the mills disappear between the two surveys. This probably explains part, but certainly not all, of the differences in the ratio of threshing mills to commercial corn mills in Table 10. It remains true that take-up of threshing mills was higher in Scottish river catchments than in most English ones.

Table 11. Comparison between the Numbers of Farm (Threshing) Mills marked on 6 inch 1st and 2nd Edition OS Maps in Selected River Catchments

Catchment	Water Mills			Horse Gins		
	1st Edition	2nd Edition	Survival (%)	1st Edition	2nd Edition	Survival (%)
Leven	47	34	72	133	88	66
Urr	98	65	66	23	10	43
Wyre	22	13	59	3	1	33

4. Future Work

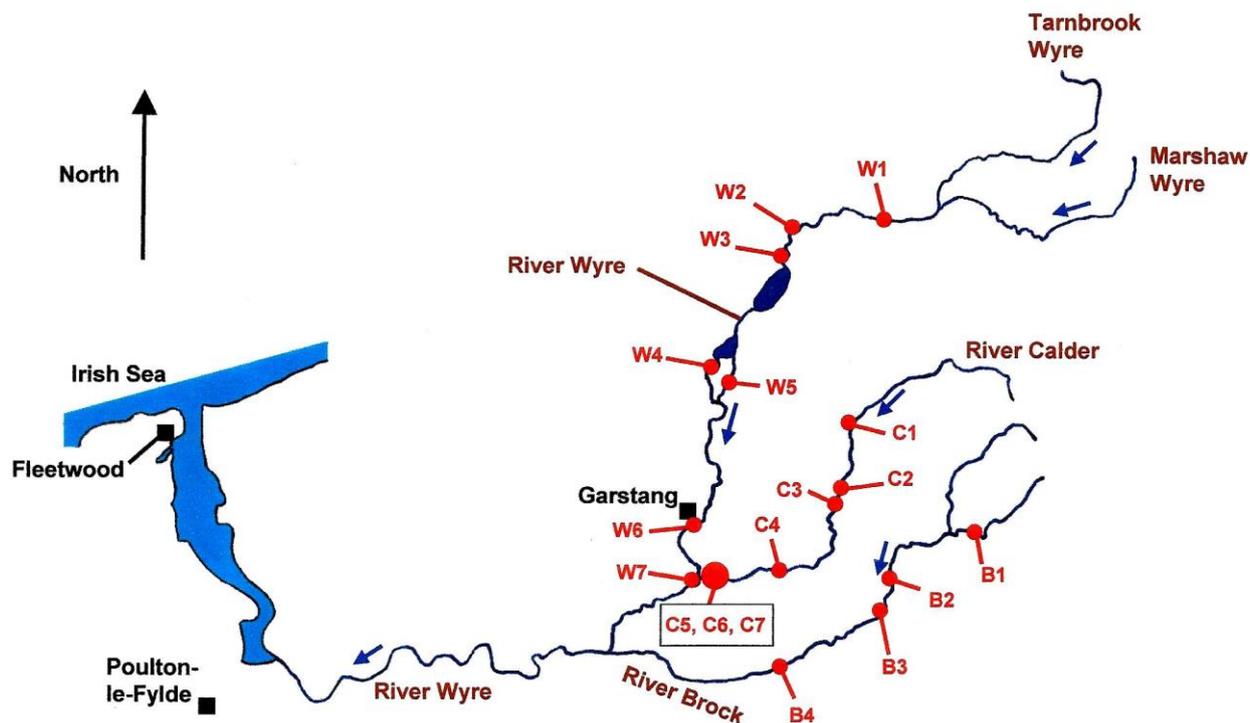
As of now we have looked at 45 main river catchments together with a number of smaller streams. However, there is more to be done on 4 English rivers and 3 Welsh ones, to cover lesser tributaries and farm mills.

We have identified 3 more catchments, which we might investigate to improve our coverage of the country, namely, the River Clwyd in North Wales on which work is now in progress, the River Aln in Northumberland, and the River Nairn or the River Ythan in Northern Scotland.

Thereafter we will produce a 3rd Update, and probably a 2nd Pamphlet.

Any further work may involve adapting results from other sources to the template used here.

Figure 1: Water Mills on the River Wyre and its main Tributaries



River Wyre

Code	Mill	Mill Type
W1	Caw Mill	Corn, Fulling
W2	Dolphinholme Worsted Factory	Worsted, Cotton, Corn
W3	Corless Mill	Corn
W4	Clevely Corn Mill	Corn
W5	Scorton Factory	Cotton
W6	Garstang Corn Mill	Corn
W7	Kirkland Corn Mill	Corn

Tributaries

River Calder

Code	Mill	Mill Type
C1	Oakenclough Paper Mill	Corn, Paper
C2	Caldervale Mill	Cotton
C3	Caldervale Cotton Factory	Cotton
C4	Sandholme Mill	Corn
C5	Pymont Works	Cotton
C6	Holden's Tannery	Tannery, Currier
C7	Catterall Mill	Paper, Calico, Worsted, Bobbin, Iron

River Brock

Code	Mill	Mill Type
B1	Higher Brock Mill	Corn
B2	Lower Brock Mill	Corn
B3	Brock Bottom Factory	Paper, Cotton, Rollers, Files
B4	Matshead Mill	Linen, Paper

References, etc.

The numerous documents and websites, which assisted in the compilation of this update, are to be found in the select bibliographies attached to the accounts of the historical river journeys on the website, <https://historicaljourneysalongbritishrivers.com/>.

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