

1. Overview of the Watermills in Dumfriesshire

This document provides a summary table for the results of Alastair Robertson's detailed analyses which are presented at the end of each of the journeys along a Dumfriesshire river. The table summarises the numbers of different mill functions and the total numbers of mills in the main river catchments (i.e., the river itself, its tributaries, and their feeder streams) and along lesser streams in the area, split into 4 subdivisions based on a progression round the coast line. There are two types of number in the table. The upper part of the table deals in mill functions, and this includes the horizontal totals. However, totals in the bottom two rows are numbers of individual watermills. A significant number of mills had more than one function during their lifetime and therefore the total number of mill functions exceeded the total number of mills in most catchments. Some discussion of the contents follows.

Mill Function	Main Rivers							Lesser Rivers				Total: All Rivers
	Esk	Sark	Kirtle	Annan	Lochar	Nith	Total: Main Rivers	Pow	Newbie	Dornock	Total: Lesser Rivers	
Corn	20	2	5	29	4	31	91	2		1	3	94
Saw	8	1	4	25	4	25	67	2			2	69
Textile	6		1	10		14	31					31
Paper							0					0
Tannery	1			1		3	5					5
Starch							0					0
Farina							0					0
Bone		1		1		1	3					3
Mining/quarrying						3	3	1			1	4
Forge/smithy		1	1	1		3	6					6
Snuff							0					0
Brewing/distilling	2			1			3					3
Other					1		1					1
Unknown				4	2		6					6
Threshing	20	6	5	76	28	239	374	3	1	1	5	379
Mills												
Total: Excluding Threshing	37	5	11	65	11	79	208	5	0	1	6	214
Total: All Mills	57	11	16	141	39	315	579	8	1	2	11	590

The sources of information which have allowed the production of the overview are accessible in the Appendices attached to the accounts of the river journeys, where threshing mills are discussed but the methodology was applied more generally along with exhaustive surveys of sources given in the Reference list attached to the Introduction. In brief, the first edition of the Ordnance Survey (OS) six inch to the mile maps which were published around 1850 was the main source used to identify the mills. Joe Rose's "Mills in Scotland" map, the

second edition of the OS 25 inch to the mile maps and the Scotland's Places Website were supplementary sources of information.

The results stand on their own, as valuable information for those interested in the topic, but taken together they do raise some questions which are addressed if not fully answered in the remainder of this short document.

(i) Mill Locations

The watermills, which have been investigated, operated within the time frame from 1750 until the early years of the 20th century, and the majority were conceived and built in the first half of that period. In general, they were located near to the source of the raw material on which they would operate, i.e., wood, wool, or grain crops, because at that time transport was difficult and costly. Milling usually reduced the bulk or dimensions of the raw material making onward transport easier. If centres of population were large enough, the advantage of having the market for the milled product on the doorstep, could outweigh issues associated with getting the raw material to a more distant mill, but this probably only affected Dumfries in this county. If the rivers had been navigable by sizeable boats, cheap water transport might have altered the distribution of the watermill locations, but this was probably a minor factor in the county. So the distribution of mills reflected land use in the time period during which they were built. (There were of course water mills in Dumfriesshire in early times, even pre-medieval, but the information about them is rather scanty, so they can only be studied as isolated artefacts, rather than as part of a large assemblage, which is the aim here, hence the lack of attention given to them).

Water mills were found across much of each catchment. Some mills, especially saw mills, corn mills and threshing mills, were found well upstream but the majority of all mills was found in the lower reaches of the catchments. This distribution is not wholly predictable in the light of the present landscape, and I was misled before beginning this project. Driving in Dumfriesshire along most of the river valleys, the upper reaches are dominated by forests of Sitka Spruce, with the intervening areas in pasture, or left as moorland on which some rough grazing for sheep seems to be the only farming option. Moving downstream, the forests thin out, fenced farmland predominates, though the fields are mainly pasture on which cattle join sheep, and the river banks appear as a ribbon of deciduous trees winding along the floor of the valley. By the time the lower reaches come into view, fields of grain, some root crops, and the yellow peril, oilseed rape appear, while grazing animals become scarcer; evergreen tree plantations never disappear, but they are joined by a few deciduous woods. Finally as the rivers approach the Solway Firth, saltmarshes appear on the banks and nature reserves take over from farms. Of course this picture is a simplification, but it drives an expectation that in such a scenario, corn mills and threshing mills would be found near the lower reaches, saw mills, and maybe textile mills upstream from there.

That expectation is at best partially correct, as can be seen in most of the appendices which follow individual river journeys, and the explanation lies in the fairly dramatic change in land use over the past 2½ centuries. Firstly, the hills surrounding the upper reaches of the rivers were largely devoid of trees until the 20th century. Only then was it realised that sources of useful timber like Sitka Spruce could thrive in the adverse climate and thin waterlogged soils of the higher hills, provided that, prior to planting, extensive drainage was put in place. In the lower reaches, misconceptions can also arise; although farm improvers, were having an impact in the late 18th century, they still had a long way to go, especially as regards drainage. So the lower reaches of some of the rivers, where they and their tributaries meandered, were surrounded by mosses, on which pools of stagnant

water collected, and grassy areas were interspersed with marsh plants in boggy patches. There was no possibility of growing arable crops, and good grazing land was absent. Many drainage schemes were completed in the ensuing years, though it took time, in some cases several decades. However, the schemes eventually opened large areas to exploitation, either as farmland, (often after additional work to remove stones and persistent 'weeds', and liming), or forests, and to produce the present landscape. It is an irony that the wheel has turned full circle, and there are now proposals, which would reverse these achievements in the interests of restoring marshland habitats for plants and animals.

However, some land use developments in the period of interest, 1750 to 1900, seem to have gone in the opposite direction. It is a fact, that many corn mills and especially threshing mills were located well upstream on rivers and their tributaries, where now there is no sign of cornfields in the neighbourhood. One must assume that when the mills were built, some by local landowners, others by tenant farmers, corn was grown near at hand. There has been no dramatic change in climate conditions, indeed, temperatures have risen a bit since 1750, and I am not just talking about very recent decades. The growing of corn on marginal land, high up in upper river valleys, became possible because of some of the improvements instituted during the 18th century, but yields were never as good as in lower, more fertile areas, and costs of production were higher. They were just about sustainable, while wars raged during a large part of the 18th century so that imports were only intermittently available, and this was especially true during the long war between Britain and France, which was only paused once between 1793 and 1815. Landowners were exhorted to turn over more marginal land to crop growing, because in years of poor harvests there was a risk of some starvation in Britain and especially in Ireland. Cornmills and threshing mills were built near to corn growing areas, then.

By 1804, landowners who were powerful in Parliament, feared a glut of corn when the wars ended, though that was to be more than a decade away, and they secured the enactment of a Corn Law which gave them a measure of protection from imports. When the war did end, the landowners persuaded the government of Lord Liverpool, which depended on their support, to strengthen protection in 1815. This should have held prices high enough, to keep upland corn-farmers in business, (and guarantee large profits for those farming more productive areas). However, prices collapsed during the Depression which followed the wars, never during the next decade, reaching the trigger price, above which large-scale importation would have been allowed. Agitation for the repeal of the Corn Law at this time, was based on a false premise, because it was having virtually no impact on the price of bread. (That was controlled by the simple fact that wheaten bread would have been priced out of the market, in a period of falling wages, if prices had not dropped, and prices of other grain were tied to that of wheat). The low prices reduced the production of corn in upland areas, causing a reduction in the number of rural cornmills by 1830, and I guess many farms in Dumfriesshire had changed their line of business, by then. In remoter areas, the transport costs associated with bringing in flour, allowed some upland corn to compete for longer, in spite of low yields. but the coming of the railways, and other factors like the rise of grain merchants brought that to an end fairly quickly. Large market-oriented urban mills powered by steam and then electricity became the norm. Landowners never stopped agitating for a fixed higher price regime, but governments would have none of this, and arguments rumbled on until the Corn Laws were repealed in the late 1840s, though the immediate effect was minimal. From that point onwards, substantial imports became a given, and only those farmers with conditions very much in their favour, can make profits growing corn nowadays in Great Britain.

The situation as regards sawmills is also confused by looking at the present day landscape. Before the planting of the large forests which now enclose the upper river valleys, water powered sawmills were mainly estate machines, maintained to chop up wood culled from hedgerows, copses, and relatively small woodlands, making artefacts like fence posts and palings, apart from supplying firewood, for the landowner's house and the tenants. It seems likely that utilisation will have been fairly low for many of them, Textile mills spun, and weaved fabric, and given the relatively small bulk of the fleeces which were their main raw material, their locations would most often have been influenced by a need to ensure good transport links to customers and the towns in the county were the obvious places in that regard.

So, to summarise, the landscape can indeed provide clues to where watermills of different types might be found, but it is the very different landscape of 2 centuries ago which matters, not the one visible now.

(ii) Threshing Mills

The most eye-catching numbers in the table refer to threshing mills. The rate at which these machines were taken up, is astonishing; a paper referenced at the end of this document shows in qualitative terms, the spread across Great Britain between 1794 and 1808. Andrew Meikle only patented the first practical machine in the late 1780s, and until then, threshing (or thrashing) had been the most labour-intensive, time-consuming, and wasteful operation on any arable farm. Corn-stalks had to be laid on a hardcore floor and beaten with flails for some time, a tiring job requiring shifts of workers, then the straw had to be gathered, and the separated grain swept up and collected, before the next batch could be threshed. With Meikle's machine, a single worker fed stalks in continuously, the straw came out the other end, and grain collected in a sack below; the grain had been torn off by squeezing it between a rotating drum carrying bars, and the walls of a cage. Circling horses could drive the drum, but this meant adding to the number of horses on a farm and employing men to look after them and specifically to lead the animals, as they circled. Consequently a waterwheel, which was cheaper and could also rotate the drum faster was preferred. At a stroke, a process which required 3 or 4 strong men had become a single-man operation, and a substantial source of losses of grain had been eliminated. A number of agricultural gurus of the time, like Arthur Young, recorded the significance of the development.

Installation of the water powered variant was not cheap, because as well as purchasing the machine, a farmer had to arrange a water supply which usually meant digging out ditches to lead water into a mill pond. The pond also had to be excavated, lined, and fitted with a sluice to control flow down a lade to the water wheel. The lade and a drain carrying waste water from the machine-house to a nearby stream were the other necessary components. Nonetheless, the cost-savings must have given quick pay-back, and appeared like a life-saver to many farmers struggling to compete on price. Hence, presumably, the very large numbers in the Table, which seem to have been reproduced across Scotland's arable farms; there may have been 4500 by 1850, and the numbers we have found support an estimate of that order.

Nonetheless, I find aspects surprising. There seems to have been very little sharing between adjacent farms, with each installing a machine, and I think this must have been the case, even when farmers were tenants of the same landowner, who probably stood some of the installation costs. There are significant variations in the numbers of threshing mills between catchments, greater than in the numbers of cornmills, the latter presumably reflecting the amount of corn grown in the catchment. One factor which does not seem to have been relevant anywhere in Scotland was strong resistance by farm workers to the roll-out of the machines, on the grounds

that employment would be reduced. In Cumberland, just over the border, there was such resistance, with riots mirroring those further south, and the Luddite campaigns against mechanisation in factories. However, at least in Cumberland, any effect was minimal, as over 300 machines were recorded there, in the early 19th century; that was not necessarily true in southern counties of England where the distribution was patchy.

Nowadays, there are no threshing mills, but the technology survives as an integral part of combine harvesters, which as well as cutting and collecting corn stalks (reaping) also separate the grain from straw, the corn stalks, so Meikle's invention lives on. As regards sharing, while some large farms retain their own machinery, others make use of contractors who carry out harvesting, and other operations, which have been totally mechanised, like ploughing and sowing, on a number of farms in an area.

In conclusion, there is more to be learnt from study of these data, both in isolation and in conjunction with similar data from other parts of the country, but in this overview I have expanded on two of the more salient points identified by my collaborator, Alastair Robertson.

Reference; The Progress of the Early Threshing Machine, author, Stuart Macdonald, The Agricultural History Review, Vol. 23, No. 1 (1975), pp. 63-77.