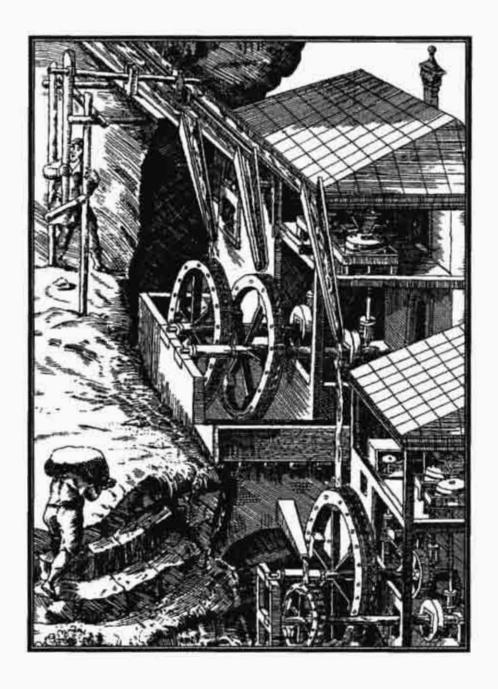
CATAWBA RIVER VALLEY GRISTMILL SURVEY



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Written by Deborah Joy with Linda France Stine and John W. Clauser, Jr.

Submitted to

The Catawba Regional Council of Governments Rock Hill, South Carolina

The Katawba Valley Land Trust Lancaster, South Carolina

and

The South Carolina Department of Archives and History Columbia, South Carolina

Ву

Legacy Research Associates, Inc. Durham, North Carolina

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CATAWBA RIVER VALLEY GRISTMILL SURVEY

1. INTRODUCTION

In 1992 the South Carolina Department of Natural Resources, the South Carolina Department of Parks, Recreation, and Tourism, and the Catawba Regional Council of Governments joined forces to initiate the *Catawba River Corridor Plan* that focuses on a 30-mile section of the river that flows through York, Lancaster, and Chester counties. The objective of the partnership and the plan is to work toward preserving the river and its adjacent tributaries before they are destroyed by commercial and residential development. The primary concern is to protect not only the natural beauty and character of the river, but also its significant cultural resources. This historical research and archaeological survey report on gristmills is just one avenue of research that contributes to this effort. Gristmills were selected because they demonstrate the importance of waterpower and the milling industry during the early history of Piedmont South Carolina and because they often have visible archaeological remains.

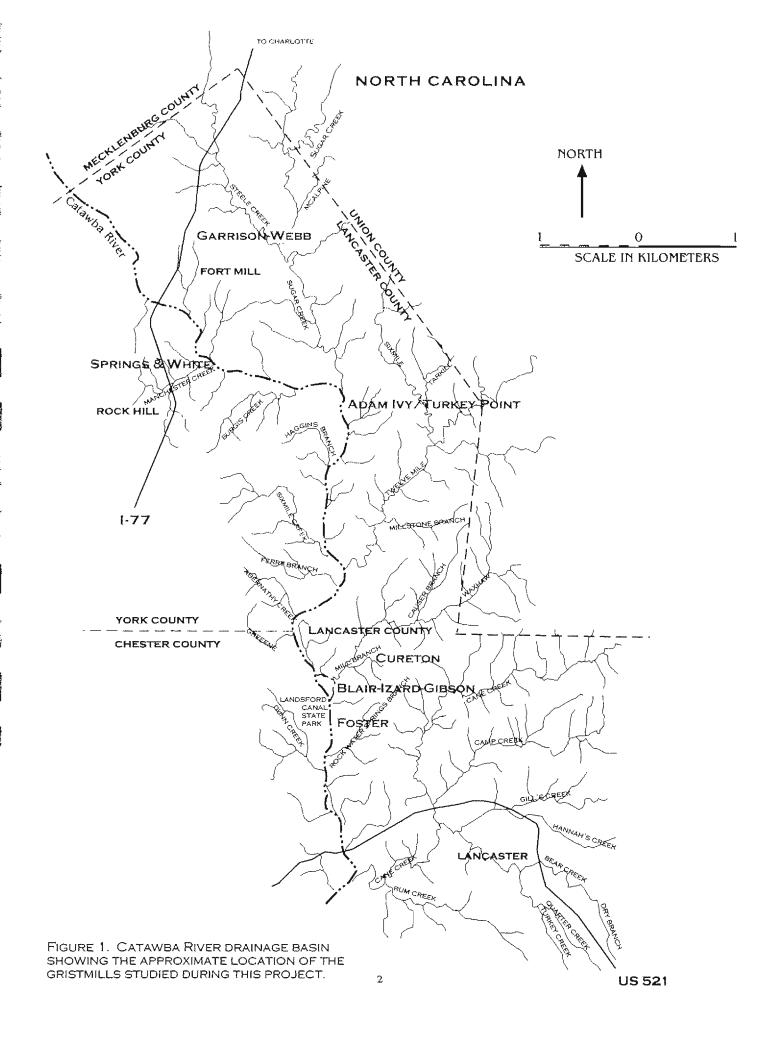
The Catawba River Valley Gristmill Survey project was designed to achieve several objectives. The first was to develop an historical context that could be useful in understanding the gristmill industry in the Carolina Piedmont region. The second objective was to survey eight gristmill sites (Table 1, Figure 1). The final objective of the project was to integrate the results of background research and field reconnaissance in a professional archaeological report. Project sponsors also requested that information about other gristmill sites in the three counties would be included as a contributing element of the research (see Appendix 1 through 6).

TABLE 1. SELECTED GRISTMILLS IN THE CATAWBA RIVER STUDY AREA.

SURVEY Number	Name	LOCATION
1	GARRISON-WEBB	STEELE CREEK, YORK COUNTY
2	SPRINGS-WHITE	Nation Ford, Catawba River, York County
3	ADAM IVY/TURKEY POINT	KINGS BOTTOM, CATAWBA RIVER, LANCASTER COUNTY
4	CURETON	MILL CREEK, LANCASTER COUNTY
5	FOSTER	Catawba River, Lancaster County
6	GIBSON	CATAWBA RIVER, LANCASTER COUNTY
7	Blair-Izard	Blair's Ford, Catawba River, Lancaster County
8	WITHERSPOON	CATAWBA RIVER, LANCASTER COUNTY

Note: During the background research phase of this project, Gibson (#6) was found to be a later owner of Blair-Izard (#7).

¹ http://water.dnr.state.sc.us/water/envaff/river/rivercor/catawba.html



2. THE DEVELOPMENT OF THE SOUTH CAROLINA PIEDMONT GRIST MILLING INDUSTRY

European settlers found their way into the Catawba River region during the mid 1700s. Following the Wateree River from the south and the Great Trading Path from the north, settlers from both directions moved into land occupied by the Catawba (Merrell 1989: 171; Hargrove 1998: 11). By 1755 nearly 500 families lived within thirty miles of the Catawba Nation (Merrell 1989: 171). Soon after, a report from Waxhaw, a Scotch-Irish settlement near the Catawbas, claimed that it was "most surprisingly thick settled beyond any spot in England ... " (Merrell 1989: 171).

Firsthand descriptions of living conditions in the early eighteenth-century Carolina region depict a frontier society where "the wealthiest people use handmills (Figure 2), and the poorer class are obliged to pound their grain in mortars made of oak ..." (Gray 1941: 47).

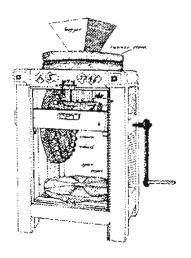


FIGURE 2. SKETCH OF A HAND MILL (VINCE 1983: 29)

With time, these labor-intensive methods were replaced because settlers who moved into "undeveloped" regions like the northern backcountry of South Carolina had "dreams ... of plowed fields and wooden fences, of millponds and wagon roads" (Merrell 1989: 170). This vision has been attributed to a long history that "trained Europeans and their descendants to view the land" as waiting for improvement and exploitation (Martin 1991: 92). Evidence in the "Statutes of South Carolina" that dates back to 1712 supports this premise by strongly encouraging the building of gristmills in the "northern parts of the Province":

For advancing ... trade to the northern parts of this Province, and the encouragement of sowing wheat and barly in places most agreeable for the growth of those grains, and by that means supplying the inhabitants of this Colony and creating a foreign trade with flour, Be it enacted, that what person or person so ever shall first after the ratification of this Act erect a wind or water mill for grinding wheat, barly and Indian corn, shall from the time of finishing the same, enjoy the same privilege for the space of five years, for erecting those kind of mills, as is given in the foregoing paragraph to those who first erect saw mill, together with the same forfeiture and penalties against any who shall within the space of five years erect any other wind mill or water mill for grinding wheat without their consent. (Statutes of South Carolina Volume II. 1682-1716, 1837: 388).

Whether someone became the first "inventor" of gristmills after the 1712 Statute is unclear. However, the intent of the statute - to encourage the development of gristmills was realized. According to a late 1800s survey of the industrial development in the United States, gristmills "followed the pioneers everywhere... and formed the nucleus of every settlement and neighborhood" (Bolles 1878: 274-275). They continued to be an essential element of most rural communities until the "self sufficiency of the farm household" gave way to a growing dependence on "store bought" goods (Kuhlmann 1929: xiii).

3. GRAIN AND GRISTMILLS

Processing grain is the main function of a gristmill. Corn and wheat were the primary food crops grown in the Carolina Piedmont for milling. Com was one crop among many from the Americas that had been introduced to Europeans in the late 1500s. It became a significant part of the "backcountry" life because it could be used in many ways. As a food, corn could be prepared in various forms - on the cob, stewed, or as soup, in bread, muffins, cake, grist, commeal mush, and as a vegetable. Its importance as a substantial part of the early settlers diet is emphasized by Edgar (1998: 192-193) who reports that "For those who barely got by, especially in the backcountry, pork and combread appeared on the table twice a day ... flour, milk, and eggs were rare and coffee and tea unknown luxuries." Corn was also distilled into alcohol that could substitute for imported rum. beer, and wine that were taxed by the South Carolina colonial government (The Colonial Records of South Carolina, Series 1, The Journal of the Commons House of Assembly, March, 2, 1751). In addition to being distilled into alcohol or prepared as a food, comwas also the principal grain used to feed stock (Gray 1941: 171).

A report on the regulation of toll, the fee charged by the miller, at gristmills that was presented to the South Carolina House of Representatives on February 2, 1785 indicates that these three products of com - food, alcohol and fodder - were recognized as the typical yield of the gristmilling process. The committee determined (Figure 3) that "Oneeighth part ... for all grain made into good Meal Flour ... and for all Grain chipped for Hommony, feeding Stock and for Distilling one Sixteenth part" (The State Records of South Carolina Journal of the House of Representatives, 1785-1786, 1979: 46).

An Aft for regulating the Toll to be taken at the A. D. 1785. Seberal Grift Mills throughout the State.

1. B Est enailed. That from and after the passing of this act no person that take more toll Toll allowed for for grinding corn, wheat, type or any other graininto good meal or flour than one-graining grain. eight part for any quantity under to bushels, and for so bushels or any quantity above at one time brought, one-touth part only; and for all grain as aforesaid choped for homony, seeding stock, or for diffilling, one-fixteenth part.

II. Any person or persons taking more tell than herein-before directed, that be subject to persons the sales of the tell to all the persons to be seen to be subject to the sales.

pay a fine to the amount of rotines the value of the toll fo taken to be recovered in the must fummary way before the nearest magistrate, one-half to the profecutor, and the other half to

the perion aggricurd

8th Maich, 1785.

TOHN LLOYD. Prefident of the Senate. JOHN FAUCHEREAUD GRIMKE, Speaker of the House of Representatives.

FIGURE 3. SOUTH CAROLINA'S 1785 ACT FOR REGULATING TOLL AT GRISTMILLS (THE STATE RECORDS OF SOUTH CAROLINA, JOURNAL OF THE HOUSE OF REPRESENTATIVES, 1785-1786). Unlike corn, however, wheat was familiar food crop for European settlers and it adapted well to southern Piedmont soils (Lewis 1998: 93). In the mid 1760s "back-country" settlers were "sowing wheat and erecting mills" (North Carolina Colonial Records V, xiii). Within a few years the amount of wheat being grown in the Carolina Piedmont was sufficient enough to ship thousands of barrels of flour and shipbread to Charleston (Lewis 1998: 94).

However, the "back settlements of the Catawba" were discouraged from raising large quantities of trade commodities because the "badness of their roads and the want of a good ferry over Santee River made it impracticable" for supplying the Charleston market with goods that could be traded with markets in Pennsylvania and New York (The Colonial Records of South Carolina, Series 1, The Journal of the Commons House of Assembly, May 9, 1752).

Poor transportation networks kept the Catawba region in relative isolation from markets until the late 1700s, when efforts to improve the situation were presented to the South Carolina government. Beginning in the late 1780s, Thomas Spratt and Daniel Sturges, two early settlers of York County, petitioned the state for permission to establish a ferry on the Catawba River near Nation Ford (The State Records of South Carolina, Journals of the House of Representatives, February 6, 1786). The ferry would help with crossing the "frequently inundated" river for those traveling "to and from the northern states ... into Georgia" and the western parts of South Carolina. The request did not claim to help transport goods to Charleston. Land routes remained unsuitable for transporting goods from the Catawba region to the Charleston market until 1823 when a "new road was laid out ... from old Nation ford on the Catawba ... to John Springs' mill (at Half Mile Creek) ... to the Chester line, near to a place called White's lower mill" (The Statutes at Large of South Carolina 1841). This "new road" connected with the Landsford Canal in Chester County, also completed in 1823. The canal was one of four built to bring crops, primarily cotton, from the headwaters of the Catawba to Charleston. Use of the canal system, however, was short-lived when the interest in transportation "improvements" shifted toward the railroad, which not only could move more goods than a canal barge, but also could get them to market quicker.

4. TYPES OF WATER-POWERED GRISTMILLS

Although turning grain into either meal or flour is the primary function of a gristmill, there are other aspects of gristmills that give us a better understanding their significance. These approaches hinge on recognizing its importance in the community and identifying its technological characteristics.

GRISTMILLS AND THE COMMUNITY

Gristmills can be identified by three categories of mill ventures. These are private mills, plantation mills, and merchant mills. These categories are based on an assessment of how connected the mill was with the local community. These are not static classifications, through time the role of a particular mill in a community could change. Mills were and in some instances still are business ventures. Today, many of few remaining mills that are working mills operate as a business, whether as a historical site that brings tourists to an

area or as a private enterprise that markets what is now considered to be a rare commodity, stone-ground grain from a water-powered mill.

Historically, however, there were three types of mill ventures. One of which was the private mill. These were generally "small-scale, casual operations that ground com and sometimes wheat for a fee" (Stilgoe 1982: 307). The mill was generally owned and operated by a farmer who would grind com seasonally for neighbors (Kovacik and Winberry 1989: 114-115). Because the nature of private mills there is very little historical documentation about them.

The second category of mill ventures is the plantation mill. This type of mill was owned and operated by large farms or plantations during the eighteenth and early nineteenth centuries. The plantation mill was a small structure that operated primarily to grind corn and gin cotton for the plantation (Worthy 1983: 21-22). Some plantation mills ceased operation when the plantation dissolved. However others continued to operate, although in a different way, much like the change in the plantation system changed to tenant farms.

This change in the milling business is the third type called a merchant mill (Kovacik and Winberry 1989: 114-115). Merchant mills accepted "payment in vegetables, labor, and goods" for milling (Stilgoe 1982: 307). They often incorporated sawmills, cotton gins, and molasses mills as part of the service they offered the community. It was not unusual to have a general store and post office located within or nearby the mill. In addition to providing the community with services and goods, the merchant mill was also an informal community meeting area.

GRISTMILLS AND TECHNOLOGY

The decision of where to build a mill and what technology to use at the mill was determined by experience and knowledge. Someone seriously considering building a mill in the mid 1800s had access to guidebooks for building and operating a gristmill. Most notable is Oliver Evans' *The Young Mill-Wright and Miller's Guide* that was originally published in 1832. Evans' work is detailed and thorough. He discusses not only the different kinds of mills, but also the mill dams and mill machinery (see Appendix 7 for a description of the common features of a mill site). He gives instruction on building mills, as well as the sharpening millstones. His instructive essays address clearly important information like "Calculating the Power of a Mill Seat" and "Sharpening Stones When Dull," to more provocatively captioned subjects such as "The Seventh Law of Spouting Fluids" and "Directions for Grinding Wheat with Garlic." When Evans' published his book, there were at least 32 millers in York, Lancaster, and Chester counties who quite possibly would found it informative. As time passed and Evans' book was reprinted many times over – the 13th edition was dated 1850 - this number of millers increased to 35. Today few people, aside from those interested in history, who would find this a useful reference.

With the amount of published information about gristmills was difficult to decide what technological attribute among the many could be useful in understanding the archaeological remains of the mills along the Catawba River. But by taking some direction from the census data and noting what categories of information was deemed important at the time we can narrow our focus. Beginning in 1880, census takers were instructed to include information about gristmills that had previously been recorded; most notably, the location of the mill, the type of waterwheel, and the size of the waterwheel.

Since one of the common questions asked about mills that are now archaeological sites is what kind of wheel did it have? It seemed an obvious choice. Unfortunately, not all the entries for mills recorded during the 1880 census include this information. Exactly one-third of the mills operating in 1880 in York, Lancaster, and Chester counties were recorded without this information (Table 2). Despite its limitations, the 1880 census provided an opportunity to understand waterwheels at mills in York, Lancaster, and Chester counties. Overshot wheels were the most prevalent among those that were identified. Breast wheels, tub wheels, reaction wheels, and turbines were reported in much smaller numbers. There is no record of either the undershot or pitch-back wheel being used at any of the mills recorded in the 1880 census for York, Lancaster, or Chester counties.

TABLE 2. WATERWHEEL TYPES IDENTIFIED ON THE 1880 FEDERAL MANUFACTURING & INDUSTRY SCHEDULE FOR YORK, LANCASTER, AND CHESTER COUNTIES.

COUNTY	OVERSHOT WHEEL	BREAST WHEEL	TUB	REACTION WHEEL	TURBINE	UNIDENTIFIED WHEEL TYPE	TOTAL
YORK	5	2			777	2	9
LANCASTER	6		1	2		8	17
CHESTER	3	1		12	7	4	16
TOTAL	14	э	- 11	3	7	14	42

Overshot wheels, the most preferred type, received water from a flume positioned directly above the wheel. Overshot wheels are most effective with falls of 15 to 35 feet and less effective with falls of eight feet or less (Evans 1972: 179-184). The 14 overshot wheels reported in the 1880 census above varied in diameter from three feet to four feet, with only one reported with a twelve-foot diameter.

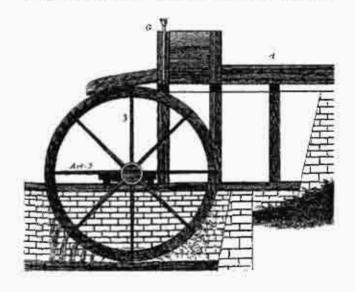


FIGURE 4.

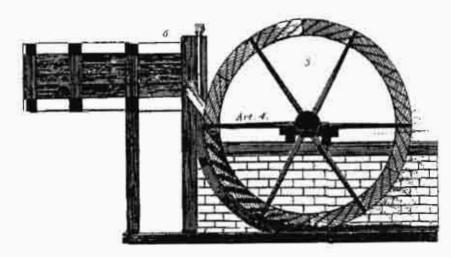
OVERSHOT WHEEL DEPICTED IN OLIVER EVANS THE YOUNG MILL-WRIGHT AND MILLER'S GUIDE (1972).

This gristmill wheel was noted on the 1880 census as a "reaction tub."

Three mills with breast wheels (Figure 5) were counted during the 1880 census. This type, also called a central discharge wheel, receives power midway between the top and bottom of the wheel, operating by gravity (Evans 1972: 172-179). Only one of the three breastwheels reported in the 1880 census above included a notation about its size. It was four feet across.

FIGURE 5.

BREAST WHEEL DEPICTED IN OLIVER EVANS THE YOUNG MILL-WRIGHT AND MILLER'S GUIDE (1972).



The tub mill was a horizontal waterwheel (Figure 6). Their main advantage was that they were simple and cheap to build, and they had very few parts that could wear down and require repair. Tub mills were effective in situations where there was at least 9 or 10 feet of fall and there was plenty of water. Another advantage was that unlike outdoor wheels, it could be used while temperatures were freezing. Only one gristmill on the 1880 census was identified as a tub, another was identified as a "reaction tub."

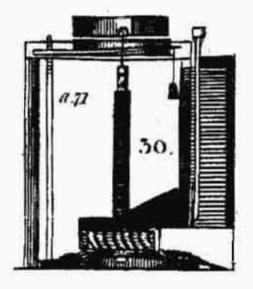


FIGURE 6. TUB WHEEL DEPICTED IN OLIVER EVANS' THE YOUNG MILL-WRIGHT AND MILLER'S GUIDE (1972).

The reaction wheel was developed in the 1820s. Water was channeled through an enclosed chamber onto blades that deflected water against the runner vanes, quite similar to the tub wheel (See Figure 6). The invention was described as "a wheel of universal and continuous pressure or hydraulic turbine" (Harper's Ferry National Historic Park 1999). However, reaction wheels needed a constant amount of water pressure to be efficient. During drought conditions reaction wheels were almost useless (Fitz Steel Overshot Waterwheels, Bulletin 70, 1928).

The horizontal wheel eventually evolved into the turbine, which in 1842 was the last development in the history of water milling in the United States (Figure 7). Turbine mills became popular in the following decades and by 1880 they were the most popular wheel in general use. Seven turbine mills were reported in the 1880 census. The wheels varied in diameter from two and half feet to 17 ½ feet. Turbines were desirable because with the penstock they could use the waterpower more effectively.

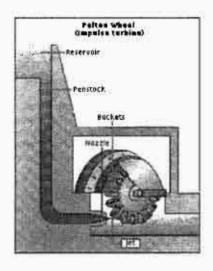


FIGURE 7.
NINETEENTH CENTURY TURBINE
(HTTP://ENCARTA.MSN.COM/X99MEDIA/MAX/ILT/T050482A)

5. THE RELATIONSHIP OF THE NATURAL ENVIRONMENT OF THE CATAWBA RIVER STUDY AREA AND GRISTMILLS

The decision of whether or not a location was suitable for a mill was based on several important geological factors, primarily topography and hydrology. The proper location of a mill was extremely important to its success. Potential mill locations, often called mill seats, had to be inspected to determine whether the river or stream would be able to generate enough waterpower to operate the mill continuously. The best locations have natural elevation changes that would allow the force of gravity created by the change in elevation, or fall, to drive the water-powered mill.

The "fall" of the Catawba River is highly favorable for capturing waterpower. Reporting on the waterpower for the Tenth Federal Census in 1880, George F. Swain wrote:

It would be difficult to select another stream of equal drainage area, which can offer so large a number of excellent powers, from the smallest to the largest. From the Great Falls of the Catawba with a fall of 173 feet to the numberless fine small powers on the smaller streams on western South Carolina, the range is largest and offers powers of all scales and magnitudes (Swain 1885: 782).

An important factor to consider when "seating" a mill was the availability of local rock. Swain's report on waterpower (1885) claims that the rocky beds of the South Carolina Piedmont streams "afford everywhere good sites and permanent foundation for mill dams." He also pointed out that "the metamorphic rocks ... furnish material for dams and buildings of the best quality ... there are few localities where a fine-grained and easily splitting granite is not to be had" (Swain 1885: 186-187).

Another consideration in "seating" a mill was the presence of a good ford so customers could cross the river. An 1879 map of the Catawba River (Figure 8) shows several mills that are situated near fords (*Catawba River, South Carolina* examined under the direction of Capt. Chas. B. Philips, Corps of Eng'r' U.S.A. by J.M. Wolbrect, Ass't Eng. 1879). These include Jones Mill near Steadman's Shoals, White & Springs Mill at Nation Ford, Brady's Mill at Kings Bottom Ford, and Davie's Gristmill at Landsford.

6. THE PREVALENCE OF GRISTMILLS IN THE CATAWBA RIVER STUDY AREA

Statistical data on mills were not recorded until 1850, when the Federal census began including data on non-population interests, such as industry, agriculture, and social statistics (National Archives, Reference Information Paper No. 67, GS 4.15: 67). Despite the absence of earlier census data, Robert Mills' 1825 Atlas of the State of South Carolina provides a general indication of the number of mills and their locations in the Catawba River and its tributaries in the York, Lancaster, and Chester counties (Appendix 1). It should be noted that these maps do not specify the type of mill, some could be sawmills.

A total of 58 mills were counted on the Mills' Atlas maps in these three counties (Table 3). Of these, 39 were in the Santee River drainage, which includes the Catawba River and its tributaries in York, Lancaster, and Chester counties. Together, Chester and Lancaster county with 29 and 25 mills respectively, have 93% of the mills. York County had only four mills.³ Only one mill on the study list for this project - Izard's Mill in Lancaster County - was identified by name on the Mills' Atlas maps.

TABLE 3. SUMMARY OF GRISTMILLS IDENTIFIED ON THE 1825 MILLS' ATLAS MAPS OF YORK, LANCASTER, AND CHESTER COUNTIES.

COUNTY	RIVER DRAINAGE	NUMBER OF MILLS	NUMBER OF MILLS ON THE PROJECT SUDY LIST
YORK	CATAWBA BROAD	1 3	0
LANCASTER	CATAWBA PEE DEE	20 5	1
CHESTER	CATAWBA BROAD	18	0
ALL THREE COUNTIES	CATAWBA BROAD PEE DEE	39 1 1 5	1
TOTAL		58	1

In comparison with the Lancaster and Chester maps, the York map had very few mills identified. Since different surveyors prepared all three maps, then it is possible that the difference can be attributed to the preferences or style of each surveyor.

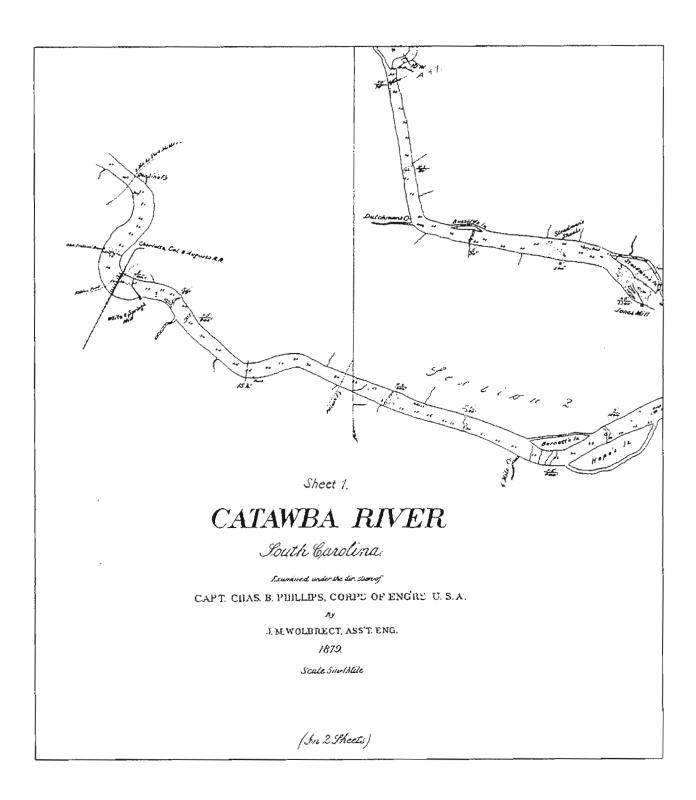


FIGURE 8. EXCERPT OF THE 1879 US ARMY CORPS OF ENGINEERS MAP OF THE CATAWBA RIVER. FEDERAL CARTOGRAPHIC ARCHIVES.

The earliest records that provide more specific information about the number and location of gristmills in South Carolina are found in the Federal Manufacturing & Industry Schedules. In 1850, 35 gristmills were recorded in York, Lancaster, and Chester counties (Table 4). By the end of 1870 there was one additional gristmill in operation in the region. Both figures indicate that there was little or no increase in the building of gristmills along the Catawba River and its tributaries since 1825 when Mills' Atlas reported 36 gristmills along the Catawba River and its tributaries.

TABLE 4. GRISTMILLS IN THE FEDERAL MANUFACTURING & INDUSTRY SCHEDULE FOR YORK, LANCASTER, AND CHESTER COUNTIES IN 1850 AND 1870.

COUNTY	1850 Seventh Schedule	1870 Ninth Schedule
YORK	9	10
LANCASTER	12	12
CHESTER	1.4	1.4
TOTAL	35	36

By the time of the Tenth Census in 1880, 551 grist and flourmills were counted in South Carolina. More than half of these were in the Santee River system, including the Catawba River with 42 (see Table 2), which is an increase over counts that appear in the 1850 and 1870 census. The high percentage of mills in the Santee River system reflects Swains assessment that this South Carolina piedmont stream was not only a highly conducive location for gristmills, but it also provided the best quality of granite material for dams and buildings.

Swain's 1880 assessment of waterpower in South Carolina also revealed that nearly 54 percent of manufacturing was water-powered with the balance being steam (Swain 1885). This was a significant decrease from the 1870 census where 70 percent of South Carolina manufacturing was water-powered.

The move away from waterpower to steam power had been of interest for a long period of time. As early as the late 1700s, experimenters had been trying to find better ways to generate power. One early experimenter, James Rumsey observed that "On considering the common method of applying water to work mills ... there is but a very small part of the power applied, inadequate greatly to what might be had ... (Rumsey 1924: 237).

The earliest reference to steam-powered milling in the York, Lancaster, and Chester county study area appears in the 1850 Manufacturing and Industry Schedule. Two of the 36 grist and saw milling businesses in these three counties were using steam power. Together, these two, Henry Massey & Co. in Lancaster County and James Lowry in the Chester County, employed one-fourth of the counties' mill workers.

⁴ Gristmills were the dominant industry reported in the census. For example, a total of 17 industries were recorded in the 1870 census for York County. Ten were gristmills; the remaining manufacturers included shoemakers (2), cabinet makers (2), saddle and harness makers (1) and coach factories (2).

7. HISTORICAL AND ARCHAEOLOGICAL RESEARCH METHODOLOGY

The investigation phase of this project consisted of archival and archaeological research that focused on the eight selected gristmills in the Catawba River study area (Figure 1, Table 5).

Archival research was conducted primarily at the Register of Deeds Office in Lancaster and York counties. This work supplemented a substantial amount of deed research previously compiled by Louise and Lindsay Pettus. Several other resources proved valuable for this study of gristmills along the South Carolina Catawba River. The earliest is "The Surveyors Plat Book and Indian Commissioners Rent Book" that documents leases within Catawba Indian Land in York and Lancaster counties between 1795 and 1829 (Appendix 2). Plats associated with the land grants dated after the Treaty of 1840 are located in the York County Courthouse in a bound volume titled "Book G: Indian Lands." Several of the 1840 plats depict gristmills, these have been photocopied for inclusion in Appendix 3. The federal Manufacturing & Industry Schedules for 1850 through 1880 were also important sources of information. In particular the 1880 census that identified mill locations (Appendix 4). Two additional sources of information pertaining to gristmills in the Catawba River area were the 1825 Mills' Atlas maps of York, Lancaster, and Chester counties (Appendix 1), and the 1879 U.S. Army Corp of Engineers map of the Catawba River (Appendix 5).

TABLE 5. GRISTMILLS IN THE CATAWBA RIVER STUDY AREA THAT WERE SELECTED FOR HISTORICAL AND ARCHAEOLOGICAL INVESTIGATION.

#	Name	Location	STATE SURVEY NUMBER
1	GARRISON-WEBB	STEELE CREEK, YORK COUNTY	2142
2	SPRINGS & WHITE	NATION FORD ON THE CATAWBA RIVER, YORK COUNTY	2143
3	ADAM IVY/TURKEY POINT	KINGS BOTTOM ON THE CATAWBA RIVER, LANCASTER COUNTY	2144
4	CURETON	MILL CREEK, LANCASTER COUNTY	2145
5	FOSTER	CATAWBA RIVER, LANCASTER COUNTY	2146
6	GIBSON, SEE #7	Catawba River, Lancaster County	DEED RESEARCH FOUND THAT GIBSON'S MILL WAS A LATER VERSION OF THE BLAIR-IZARD MERCHANT MILL (#7)
7	Blair-Izard-Gibson	BLAIR'S FORD ON THE CATAWBA RIVER. LANCASTER COUNTY	2147
8	Witherspoon	Catawba River, Lancaster County	NOT LOCATED, LAND ALTERING CONSTRUCTION ACTIVITIES APPEAR TO HAVE REMOVED TRACES OF THIS SITE

⁴ A summary of the Catawba Land Records compiled by Douglas Summers Brown appears in *The South Carolina Historical Magazine* LIX (1958).

Archaeological reconnaissance of specific mill sites followed the archival research. The location of nearly all the selected mill sites was locally known prior to the initiation of the field inspection. The location of two sites – the Gibson (#6) and Witherspoon (#8) mills – was uncertain. In both cases, field reconnaissance failed to locate the mill remains in areas that were locally considered to be the most likely location. The mystery of the missing Gibson mill was solved with additional archival research. As the fieldwork phase of the project came to a close, land conveyances were found in the Lancaster County Courthouse that document Gibson's acquisition of the Izard mill (#7) in 1835. As for the Witherspoon mill, the location was generally known and there was detailed plat map from the 1880 that showed an extensive mill "sluice. However, the field survey found widespread and recent land altering construction activities where the Witherspoon mill should have been. No remains of the Witherspoon mill "sluice" or mill foundations were found on the significantly disturbed landscape.

Aside from the above difficulties, archaeological field reconnaissance at each mill site consisted of a systematic survey to search for associated features such as dams, raceways, and possible outbuildings. After the site components were located, an approximate site plan was mapped and documentary photographs were taken. Detailed mapping and subsurface site testing was not included in the scope of work for this project.

Field methods took into consideration the types of mill features that are associated with the location of the mill. Mills that are located along rivers have a fairly constant water supply that is conducive to a raceway system that diverts water from the river to the mill and then returns the water to the river. Gristmills situated on creeks, streams, and branches depend on a seasonal flow of water. These mills generally require building a dam across a stream to create a millpond from which water can be released into a raceway or sluice when needed (Figure 9).

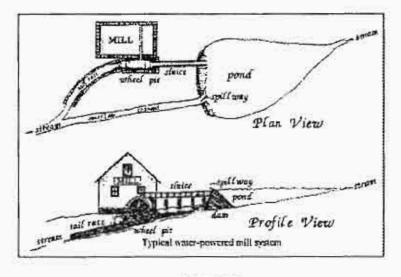


FIGURE 9

TYPICAL PLAN OF A GRISTMILL SITE WITH A MILLPOND.
HTTP://www.home.garthlink.net/~alstall.smith/site.html

8. RESULTS OF HISTORICAL AND ARCHAEOLOGICAL INVESTIGATIONS

1

This section of the report presents the information that gathered about the eight gristmill sites (See Figure 1, Table 5). During the course of the project, there was only one significant change made to the list of eight. Deed research found that gristmill #6 was a later version of gristmill #7. Consequently, there is not a separate description for gristmill #6. Information about the changing ownership of this site is presented chronologically with gristmill #7. Furthermore, information about gristmill #8 is brief. This site was not located, the field reconnaissance survey found that the presumed location of the mill had recently been buildozed leaving no archaeological evidence of mill site. The only record of this property is an 1880 partition of land for the estate of James Witherspoon. Efforts to trace the history of this piece of property were limited largely because James Witherspoon had been a very active lawyer who settled estates for many people in Lancaster County. As a result of his work his name appears on numerous land conveyances. The amount of work required to inspect all the deed book entries exceeded the scope of work for this project.

GARRISON-WEBB

Historical Background Research

Prior to the initiation of this project, the precise location of the Garrison-Webb gristmill site⁵ was uncertain, although it was locally known to have been situated at the Steele Road crossing of Steele Creek just north of the town of Fort Mill. Local tradition claims that in the mid 1700s this location was the center of population and activity of "Little York," which was renamed Fort Mill in 1830. Furthermore, Steele Road was part of the Catawba Trading Path, also known as Nation Ford Road. According to local tradition, the first structure built by white settlers at this location was a gristmill erected by Isaac Garrison and Theodoric Webb. The significance of the Garrison-Webb gristmill to the community that built up around it was eventually memorialized when "Little York" relocated in 1804 to become present-day Fort Mill. The Garrison-Webb gristmill is the "Mill" in Fort Mill (Hargrove 1998:11; Thomas 1995: 13, 25).

Although no historical documentation has been located, it is locally believed that Garrison and Webb had acquired the land from Thomas Spratt, who was one of the first white settlers in the present-day Fort Mill area. References to Webb's Mill Pond and Webb's Mill Road appear in several ca. 1811 Catawba Land Leases that were originally leased to Thomas Spratt (Appendix 2, Figures 1, 6, & 9). However, it is not clear whether these references are to the Theodoric Webb gristmill, or to another Webb gristmill.

During the search of historic records for information about Isaac Garrison and Theodoric Webb, it became clear that more than one Webb owned a gristmill in York County. In the last will and testament of James Webb proved on March 14, 1814, sons Steven Webb and Thomas Webb were left their father's "mill and the land belonging to the said mill" (On file, Historical Center of York County). The will does not make the location of the mill

⁵ GRISTMILL SURVEY NUMBER 1 / STATE SURVEY NUMBER 2142

clear however, an entry for James Webb, deceased, dated June 14, 1814, in the Catawba Land Lease record book as comprising 1,009 acres on Blackberry Branch and the Catawba River (page 100). It also shows a wagon road to a bridge on Steele Creek and an island in the river.

Isaac Garrison's name also appears as a Lessee in the Catawba Land Lease records as having acquired 683 acres of land in 1810 (page 9) and as having formerly owned land leased to William E. White in 1811 (no page number). Neither entry indicates the Steele Creek location or the presence of a gristmill. However, William White's name appears on several Catawba land leases. One, dated 1814, shows a gristmill on Steele Creek.

Similarly, a search of the ca. 1840 plats of "Indian Land" that were granted to leaseholders after the Treaty of Nation Ford, found a reference to land on Steele Creek that shows a mill pond (Appendix 3, Figure 7). This land was awarded to Hugh M. White and is possibly the same property indicated on the William E. White land lease. Whether the 1814 William White and the 1847 Hugh White Steele Creek mills are the same or whether either Isaac Garrison or Theodoric Webb previously owned them is open to interpretation.

Archaeological Assessment

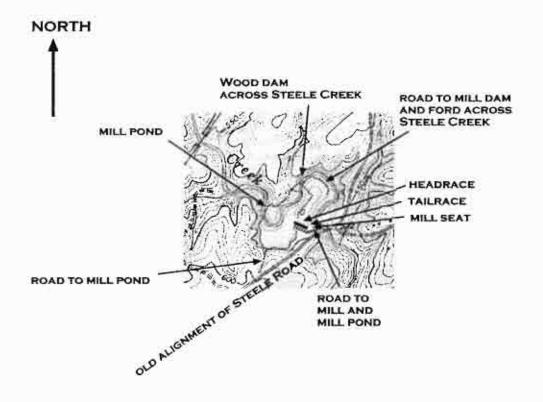
Archaeological evidence of a gristmill was found in a wooded area at the northwest quadrant at the Steele Road crossing of Steele Creek (Figure 10). This site area is part of the Anne Close Springs Greenway near Fort Mill in York County. Site components include road traces, a raceway system, a section of a stone foundation, a wooden dam across Steele Creek, and an area that appears to have contained a 13 acre millpond (Figure 11)

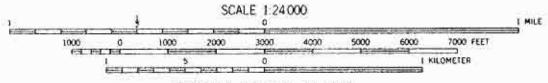
As you approach the site from the southeast off of an abandoned section of Steele Road, the first sign of past activity is a road remnant that lies parallel to old Steele Road. To the east, the road trace leads to Steele Creek. Following the road northwesterly leads to a level area with a small section of a stone foundation (Figure 12). After examining the surrounding area it is apparent that the remnant foundation is situated between a headrace and a tailrace. The tailrace is clearly defined for about 70 feet, as it approaches Steele Creek it fades away (Figure 13). The headrace is particularly impressive in depth and extent. Some sections are at least 20 feet deep. The headrace extends approximately 500 feet before it disappears at the old millpond. The remains of a wooden dam were found submerged in Steele Creek about 900 feet northeast of the point where the headrace meets the millpond. Based on the topography of the landscape and the location of headrace and wooden dam, it appears that the millpond covered a fairly extensive area, probably 13 acres. Other site components include a network of road traces that follow the meanders of the creek leading to the mill and a ford across Steele Creek.

⁶ There is no entry for Theodoric Webb. In addition, a search of the grantee/grantor index at the York County Courthouse found no record of Theodoric Webb's name connected with any land conveyance.

White's Steel Creek gristmill appears in the 1860 and the 1880 Federal Manufacturing and Industry Schedule for the York County, SC. The 1880 census reports that it had a 4-foot diameter wheel that revolved nine times a minute. The mill operated 9 months of the year and was idle for three months.

⁸ The depth of the headrace clearly shows on the USQS topographic map.





CONTOUR INTERVAL 10 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 10

GARRISON-WEBB MILL SITE FORT MILL VICINITY, YORK COUNTY, SOUTH CAROLINA

> USGS FORT MILL (SC-NC) QUADRANGLE, 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE PREVIOUS ALIGNMENT OF STEELE ROAD, NEW ROADWAY NOT SHOW. OTHER FEATURES IDENTIFIED INCLUDE ROAD TRACES, THE MILL SEAT, HEADRACE & TAILRACE, THE ESTIMATED BOUNDARIES OF THE MILL POND, AND THE LOCATION OF THE WOOD DAM ACROSS STEELE CREEK.

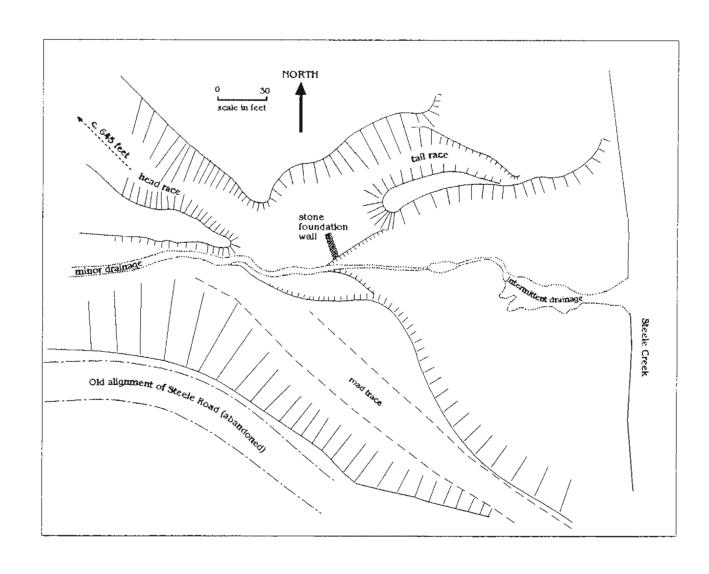


FIGURE 11
GARRISON-WEBB SITE PLAN



FIGURE 12

GARRISON-WEBB STONE FOUNDATION VIEW SOUTHEAST FROM HEADRACE



FIGURE 13
GARRISON-WEBB HEADRACE
VIEW NORTHWEST FROM MILL SEAT

SPRINGS & WHITE

Historical Background Research

The earliest documentary evidence of the gristmill built by John Springs and William E. White is found in a letter written by Springs to his son, Dr. Leroy, in 1832 (original letter in the Chester County Public Library). In this letter Springs mentions that he and his son Andrew sold 46 bales of cotton in Camden and returned with two pair of millstones for a mill that he and William E. White were building at the ford.⁹

The Springs & White gristmill¹⁰ appears in the 1850 Federal Manufacturing & Industry Schedule for York County. The mill was valued at \$6000, and that it produced 10,000 bushels of wheat, 5,000 bushels of com and 10,000 feet of lumber. There is no record of the Springs & White gristmill in any of the federal industry schedules after 1850.

White died in 1862. His share in the mill was sold to Springs and few years later William White's heirs received \$3150.04 for the "Old Mill" and the meat and hides on hand (York County Estate Records, Wills, Case 57, File 2584, 1866). In 1868, the Springs & White mill, than referred to as "White's Grist Mill at Nation Ford," was the meeting place for the Catawba and the Indian Agent Thomas Whitesides (Blumer 1999). The Catawba were destitute and starving. Whitesides purchased com in Charlotte and had it delivered by train to the bridge crossing over the Catawba River. The com was ground at White's Gristmill and distributed to the Catawba.

The mill appears on the 1879 US Army Corps of Engineers (USCOE) map of the Catawba River as "White & Springs" mill. It is interesting to note that even though the mill is noted on the 1879 map, it does not appear in either the 1870 or the 1880 Federal Manufacturing and Industry Schedules.

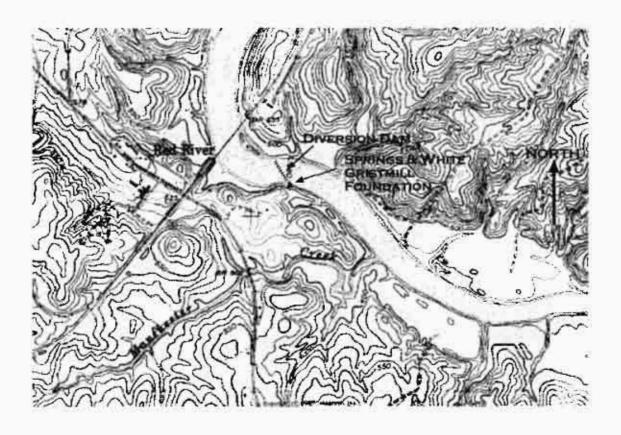
Although the year that the business enterprise of John Springs and William White ended is uncertain, it is known that the physical remains of the Springs & White Mill washed away in the Great Flood of 1887 (Louise Pettus, personal communication, 1999).

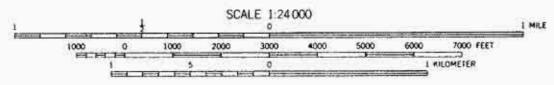
Archaeological Assessment

Because of the historical documentation about the Springs & White Merchant Mill, in particular, the 1879 USCOE map of the Catawba River, we had a clear idea of the site location and that historically it had an extensive diversion dam across the Catawba River (Figure 14). We also knew that the 1887 flood very likely destroyed aboveground evidence of the mill, which had been located at the edge of the river. Fortunately, the train trestle and the diversion dam, which appear on the USCOE map (Figure 15), helped us locate the mill site. Other than the diversion dam, there was very little aboveground evidence of the mill. Only a small corner of an *in situ* hewn stone foundation (Figure 16) was exposed, while numerous others (Figure 17) were scattered along the water's edge.

⁹ Prior to constructing the ca. 1832 mill at Nation Ford both Springs and White had other gristmills in the area. An 1823 entry in the South Carolina statutes that reports an agreement to build a new road leading from Nation Ford toward Chester reveals that the road would pass through William E. White's land "to John Springs mill crossing Half-Mile Creek" and continue to "a place called Whites lower mill" on Fishing Creek (Acts Relating to Roads, Bridges, and Ferries XXXIX, The Statutes at Large of South Carolina 1841).

¹⁰ GRISTMILL SURVEY NUMBER 2 / STATE SURVEY NUMBER 2143





CONTOUR INTERVAL 10 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 14

SPRINGS & WHITE MILL SITE YORK COUNTY, SOUTH CAROLINA

USGS ROCK HILL EAST (SC) QUADRANGLE 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE LOCATION OF THE HEWN STONE FOUNDATION AND DIVERSION DAM.

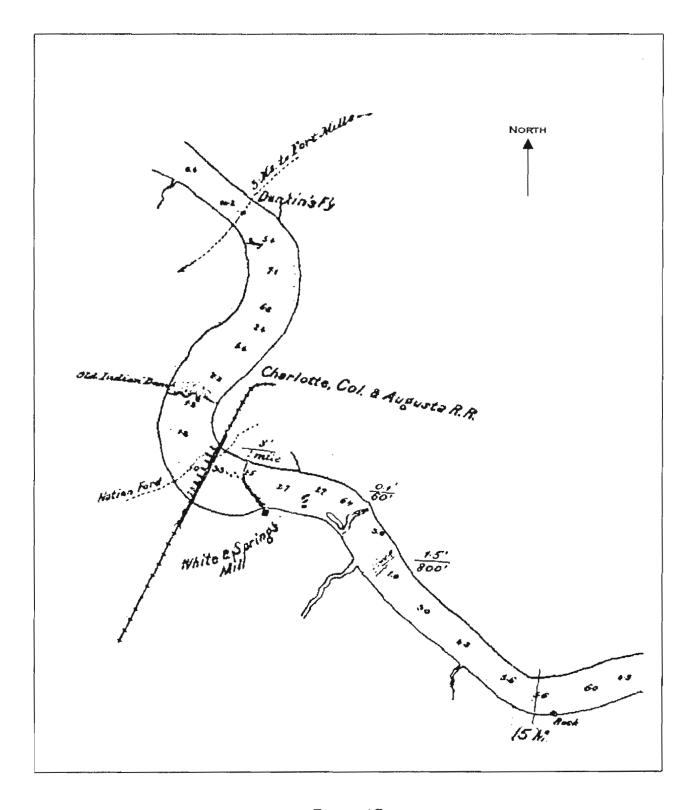


FIGURE 15
SPRINGS & WHITE MILL BELOW NATION FORD

EXCERPT FROM THE 1879 USCOE MAP OF THE CATAWBA RIVER, SOUTH CAROLINA, BY J. M. WOLBRECT, ASS'T ENG. AND EXAMINED BY CAPT. CHAS. B. PHILLIPS, CORPS OF ENG'RS, U.S.A., NATIONAL CARTOGRAPHIC ARCHIVES.



FIGURE 16
SPRINGS & WHITE IN SITU STONE FOUNDATION VIEW SOUTHEAST FROM RIVER BANK



SPRINGS & WHITE FOUNDATION BLOCKS SCATTERED ALONG THE EDGE OF THE RIVER

ADAM IVY/TURKEY POINT

Historical Background Research

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The earliest record of the Turkey Point Merchant Mills 1 appears in 1855 when John M. Doby deeded his 1/4 ownership of the mill to Adam Ivy (Lancaster County Deed Book R: 151). This deed came with "a reservation of five acres on which the Turkey Point Mills are built." In 1856 Adam Ivy partitioned the Lancaster County Court for the sale of the Turkey Point Merchant Mills described as having been erected at Kings Bottom by four business partners, Adam Ivy, John M. Doby, Benjamin S. Massey and James Stewart. By the time the 1860 Federal Manufacturing & Industry census was taken, Adam Ivy of Craigsville was identified as the owner, even though he only held 1/2 interest in the mill. Ivy reported that in 1859 he and one employee milled corn and wheat, together valued at \$10,000, using two sets of runners (millstones). The following year, Ivy's mill was valued at \$3,600. The value of his milling efforts also increased in value to \$22,000. The 1870 census reports that the Ivy mill had two reaction wheels operated by two employees year round.

In 1871, the Ivy Mill tract was deeded to Adam Ivy's sons, James Morrow Ivy and Adam Clark Ivy. The latter only held onto his interest in the mill until 1875, when he sold it to his brother, James Morrow Ivy (Lancaster County Deed Book A: 324-325). In 1898, the mill was taken over by Williams, Black, & Co., cotton merchants of Rock Hill. Even though Adam Ivy and/or his heirs owned the Ivy Mill until 1898, it is interesting to note that the 1879 USCOE map of the Catawba River (Figure 18) shows "Brady's Mill" at this location and that the Ivy Mill is not reported in the 1880 Industry census. It is possible that the Ivy heirs either rented the mill to someone named Brady or they hired Brady to manage their mill.

Despite this inconsistency in the historical data, Ivy's Mill remained a local monument through the early twentieth century. It was mentioned in 1912 when Lancaster County began building a road "from the end of Roddey bridge over the Catawba River at Ivy's Mill, in the river bend ..." (Rock Hill Record, 19 August 1912) and in 1916 when the Waxhaw Enterprise reported that "the Old Ivy Mill, one of the ancient landmarks, went down before the fury of the Catawba early Monday morning" (19 July 1916). A final reference to the Ivy Mill appeared in the Rock Hill Evening Herald on March 31, 1949. In reporting on the John T. Roddey home, a former tavern, schoolhouse and post office, it was mentioned that the foundation of the Roddey home had been constructed out of "huge sandstone blocks sawed by hand from the sandstone in the neighboring Catawba River at Ivy's Old Mill."

Archaeological Assessment

The Ivy Mill is located on the Catawba River just below the confluence with Sugar Creek (Figure 19). It is on privately owned property and is fairly difficult to locate without either being shown where the site is located or having a topographic map that indicates the site location.

³¹ GRISTMILL SURVEY NUMBER 3 / STATE SURVEY NUMBER 2144

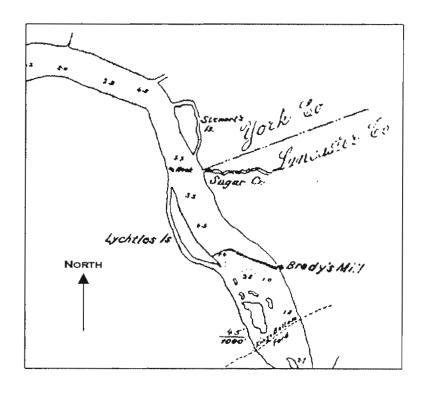


FIGURE 18
BRADY'S MILL ABOVE KINGS BOTTOM FORD

EXCERPT FROM THE 1879 USCOE MAP OF THE CATAWBA RIVER, SOUTH CAROLINA, BY J. M. WOLBRECT, ASS'T ENG. AND EXAMINED BY CAPT. CHAS. B. PHILLIPS, CORPS OF ENG'RS, U.S.A. NATIONAL CARTOGRAPHIC ARCHIVES.

Site components consist of a rock diversion dam at the entrance of the headrace, two sandstone foundation walls, and a tailrace (Figure 20). This mill site is different from the others on the study list in several ways. Most notable was that the foundation walls were constructed with sandstone blocks (Figures 21 & 22). According to the 1912 and 1949 newspaper articles that mention the Ivy Mill, sandstone was the local building material and there was a lot of it. The 1912 road building crew reported that "at the abutment of the Ivy Mill" there was a "tremendous hill" that was "almost solid rock." The other mills on the study list that have rock foundation walls were constructed with granite. Another interesting and different feature of the mill was the relatively short headrace that is tied in with a rock diversion dam that extends into the river (Figure 23). The Ivy headrace was about 140 feet long, which compared to the Foster and Blair-Izard-Gibson headraces that were also along the Catawba River was remarkable short. The Foster headrace is approximately 1640 feet long and the Blair-Izard-Gibson is 1320 feet. Even the two mills with headraces on creeks were longer. The Cureton headrace was about 550 feet long and the Garrison-Webb Gristmill headrace was 650 feet long.

Overall, the integrity of lvy Mill site has been seriously compromised. It is in poor condition that can not be entirely attributed the 1916 flood that destroyed the mill or from weathering over time, although sandstone is more vulnerable to weather than granite. Another factor that has probably affected the site were caused by twentieth century construction, notably the 1912 road work and the 1949 quarrying of sandstone.



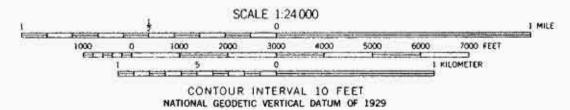


FIGURE 19

ADAM IVY MERCHANT MILL SITE, ALSO KNOWN AS TURKEY POINT MERCHANT MILLS LANCASTER COUNTY, SOUTH CAROLINA

> USGS CATAWBA NE (SC) QUADRANGLE 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE LOCATION OF THE ROCK DIVERSION DAM, HEADRACE, STONE FOUNDATION OF THE MILL, AND TAILRACE.

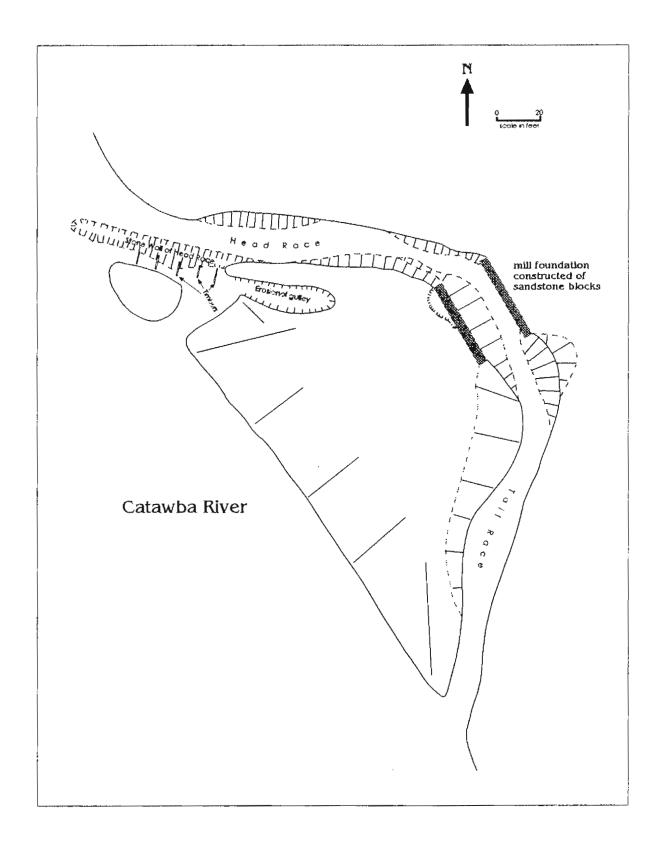


FIGURE 20
ADAM IVY/TURKEY POINT SITE PLAN



FIGURE 21

ADAM IVY/TURKEY POINT
WEST FOUNDATION WALL, VIEW NORTHEAST FROM TAILRACE



FIGURE 22

ADAM IVY/TURKEY POINT
EAST FOUNDATION WALL VIEW SOUTHEAST FROM HEADRACE



FIGURE 23

ADAM IVY/TURKEY POINT
DIVERSION DAM, VIEW NORTH

CURETON

Historical Background Research

The documentary research conducted for the Cureton mill site ¹² resulted in conflicting information about the mill. Lancaster County Court House records reveal that W.J. Cureton acquired land from John Springs on what was called Millstone Branch in 1844 (Lancaster County Deed Book O: 512). Springs had just acquired the Millstone Branch land from M. A. Culp on October 23, 1844. In fact both land conveyances were recorded on the same page. Neither the Culp nor the Springs' conveyance mention the presence of a mill on the property situated on Millstone Branch.

Whether this is the same land has not been determined. Today, there is a Millstone Branch Road, yet there is not a Millstone Branch in modern USGS maps. However, there is a Mill Branch, which is where the Cureton Mill site inspected during this project is located. So its seems quite possible that Mill Branch was at one time known as Millstone Branch and that only the road has retained the name.

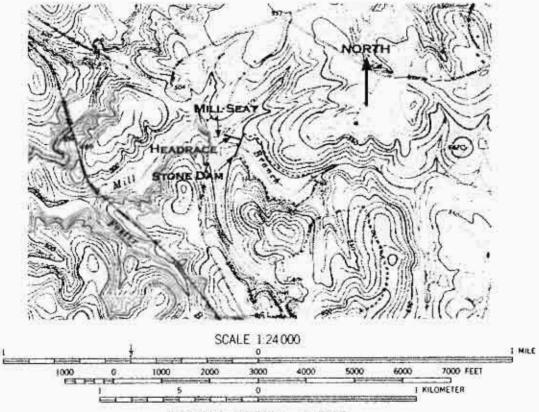
A more serious complication is the fact that the 1880 Federal Manufacturing and Industry Schedule for Lancaster County reports that the Cureton Merchant Mill is located on Bear Creek. Bear Creek appears on the USGS map not far from Mill Branch. Several questions come to mind with this information. The first is where was the Cureton Merchant Mill located, on Mill Branch or on Bear Creek? The second question is did Cureton have more than one mill, one on Mill Branch and another on Bear Creek? The archaeological ruins of Cureton's mill on Mill Branch area described below.

Archaeological Assessment

The Cureton mill site inspected during this project is located on Mill Branch in Lancaster County (Figure 24). Site components include a rock dam and a headrace (Figure 25). The most impressive feature of this mill site is a 260 feet long stone dam (Figure 26). With the exception of a break in the dam where it once spanned Mill Creek, this feature appears intact. Based on the landform appears that the dam impounded a millpond that may have covered 20 acres of low-lying land to the east of the dam. The other observable feature of the site is the headrace (Figure 27). It is a shallow canal, no more than four feet deep and six feet across, that was excavated in the earth. Erosion has made parts of the millrace obscure, and an unpaved farm road cuts across the raceway. The raceway extends from the remnant section of the rock dam on the north side of Mill Creek to a low grassy pasture about 540 feet to the west. There is no above ground evidence of the wooden sluice gate or of the mill foundation.

¹² GRISTMILL SURVEY NUMBER 4 / STATE SURVEY NUMBER 2145

¹⁵ The Cureton Mill is not reported in the 1850 census, but it is in the 1860 census, which identifies the W.J. Cureton Merchant Mill valued at \$5000. The 1860 census reported that Cureton ran the mill with two sets of runners. By 1880 Cureton had four employees who worked two months of the year full time, three months at three-quarter time, two months half time and five months idie. The water wheel on Bear Creek was reported to be 35 feet in diameter with 44 revolutions per minute that generated 32 horsepower.



CONTOUR INTERVAL 10 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 24

CURETON'S MILL SITE LANCASTER COUNTY, SOUTH CAROLINA

USGS VAN WYCK (SC-NC) QUADRANGLE 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE LOCATION OF THE STONE DAM ACROSS
MILL BRANCH, THE ESTIMATED EXTENT OF THE MILL POND, THE
LOCATION AND EXTENT OF THE RACEWAY AND THE APPROXIMATE
LOCATION OF THE MILL SEAT NEAR THE CONFLUENCE OF MILL BRANCH
AND AN UNIDENTIFIED TRIBUTARY.

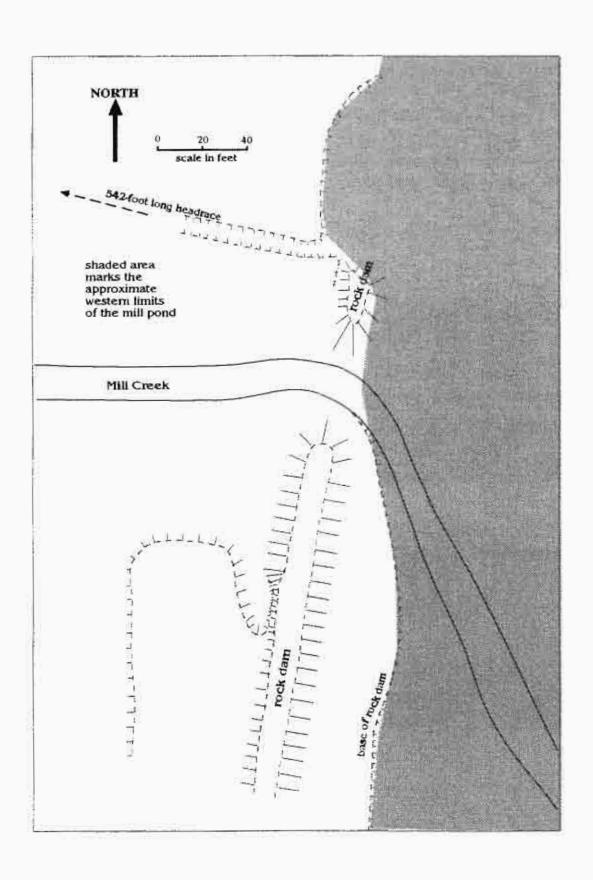


FIGURE 25
CURETON MILL SITE PLAN



FIGURE 26

CURETON'S MILL

ROCK DAM, VIEW NORTHEAST



FIGURE 27

CURETON'S MILL

END OF TAILRACE, VIEW NORTHEAST

FOSTER

Historical Background Research

Initially information about the history of Foster's mill was difficult to uncover. "J. Foster" does appear on the 1825 Mills Atlas Map of Lancaster County. However, unlike Izard's mill to the south, the map notation does not indicate that Foster had a mill at this location. Foster owned land in 1825, but as of that year had not built a gristmill. The earliest record of a "Foster Mill" appears in the 1860 Industry and Manufacturing Schedule for Lancaster County. The Foster Mill is not reported in the 1850 census, so we can surmise that the mill was built sometime between the census years.

In the 1870 census the Foster mill was reported as having a tub wheel that was in operation year round. The 1880 census identified two reaction wheels, each measuring 6 feet in diameter and generating 12 horsepower. This could be a change in technology, or perhaps another mill.

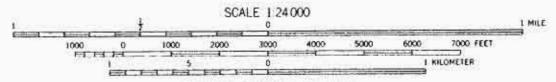
In 1892, Joseph H. Foster's widow Charlotte R. Foster, bought his land at public auction (Lancaster County Deed Book G2, page 621-622). The land conveyance describes the land as 154 acres known as the "Foster Mill Tract." Soon afterward, Charlotte Foster conveyed the land to Grace Springs (Lancaster County Deed Book C, page 42). In 1907 Grace Springs deeded the land to Leroy Springs (Lancaster County Deed Book C, page 50). Leroy Springs held ownership of the land until 1932 when he sold it and several other tracts of land along the Catawba River to the Wateree Power Company (Lancaster County Deed Book A-2, page 345-347). The 154-acre "Foster Mill Tract" is identified as the Sixth Tract and the boundary description places the beginning of the survey at the "corner of the Gibson Mill Tract."

Archaeological Assessment

Foster's mill site is located on the east bank of the Catawba River in Lancaster County (Figure 28). The site is on land that is managed by the South Carolina Department of Parks, Recreation, and Tourism. Site components consist of a headrace, stone mill foundation, a talirace, and a road trace that lies parallel to the millrace (Figure 29). The headrace (Figure 30) is approximately 30-34 feet wide and 5-8 feet deep. The connection between the river and the raceway has been washed away or filled in with soll and rock deposited during river flooding. A well defined section that is about 1640 feet long remains relatively intact having just a few areas where the embankment has collapsed. These areas generally have a fallen tree sticking out of the side of the raceway. The stone foundation (Figure 31) is made of quarried granite and sandstone blocks, some three feet wide and two feet thick. The foundation consists of three parallel walls that vary in length from 33 feet to 40 feet and in width from 6 feet to 9 feet. Distance between the walls varies widely because of several intentional setbacks, which were probably designed to accommodate the two tub wheels. The tailrace is not as clearly defined as the headrace. It meanders about 66 feet toward the river before it disappears.

During the survey, a small mound of hand-made brick fragments was found approximately 180 feet east of the mill foundation. These indicate that the site may have an associated structure, perhaps a miller's house.





CONTOUR INTERVAL 10 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 28

FOSTER'S MILL SITE LANCASTER COUNTY, SOUTH CAROLINA

USGS VAN WYCK (SC-NC) QUADRANGLE 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE LOCATION OF THE STONE FOUNDATION, THE RACEWAY, ROAD TRACE THAT LIES PARALLEL TO THE HEADRACE, AND THE NEARBY BRICK PILE.

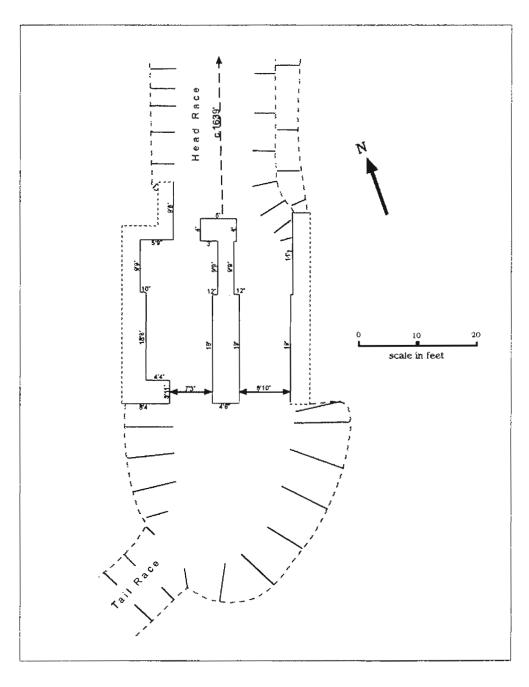


FIGURE 29 FOSTER'S MILL SITE PLAN



FOSTER'S MILL
HEADRACE, VIEW NORTHEAST FROM THE STONE FOUNDATION



FOSTER'S MILL
HEWN STONE FOUNDATION, VIEW NORTHEAST FROM TAILRACE

BLAIR-IZARD-GIBSON

Historical Background Research

Local tradition claims that this the mill¹⁴ was owned by John Blair in the late 1700s and that it in 1780 Lord Cornwallis' troops crossed the Catawba River near Blair's mill and left the sick and wounded behind. It is believed that Henry Izard purchased this same land around 1812. In February 1812, Ralph Izard and Lewis Morris, Jr. bought 150 acres of land at Landsford from Henry Izard. The land conveyance, which was recorded in 1818, describes the property as "being a mill seat on which a grist mill is erected at Landsford" (Lancaster County Deed Book I: 88).

In 1835 Walter Izard deeded (Lancaster County Deed Book N: 40) 65 acres of the land "known as the Izzard's mill tract" to Samuel R. Qibson (Figure 32). In 1843 the same 65 acres, this time *identified as being "the seat and mills formerly known as Izards and Gibson's" was deeded (Lancaster County Deed Book O: 367) to Mary A. Gibson. Interestingly, the 1843 survey map (Figure 33) attached to this land conveyance only indicates one mill house, not two. Also, the mill house is noted in parentheses as "burnt."

In 1875 Mary A. Gibson, now Mary A. Mobley, deeded the 65 acres "known as the Izzard tract" to her daughters, Mary E. and Sarah J. Gibson (Lancaster County Deed Book A: 376). The survey plat (Figure 34) that is attached to this deed is dated 1847, only a few years after Mary Gibson acquired the property. This plat not only shows the Izard Mill House, a canal and an unidentified "old house" at the northern end of the property, but it also shows a small section of a canal at the south end of the property. Although a second mill is not on the map, the canal suggests that it lead to a mill, additional research found that this was the Foster Mill.

In 1905 the Gibson sisters sold the 65 acres, identified as the Gibson mill tract, to the American Development Company (Lancaster County Deed Book O: 146). The plat for the conveyance of the Gibson mill tract shows Izard's old mill site at the northern end and a section of the Foster millrace at the southern end.

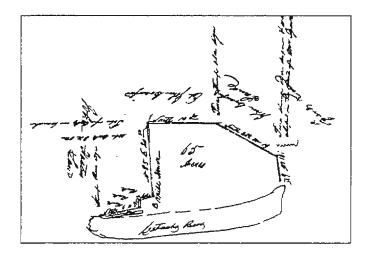


FIGURE 32
1835 PLAT OF IZARD PROPERTY

¹⁴ ORISTMILL SURVEY NUMBERS 6 AND 7 / STATE SURVEY NUMBER 2146

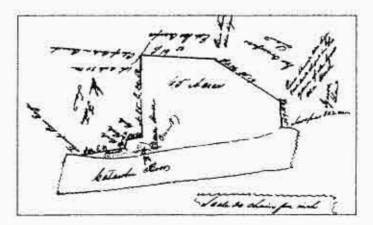


FIGURE 33 1843 PLAT OF IZARD-GIBSON PROPERTY

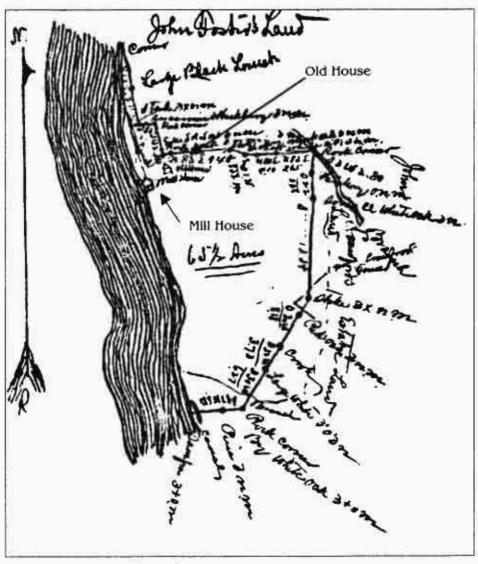


FIGURE 34
1847 PLAT OF IZARD-GIBSON PROPERTY

Archaeological Assessment

The Blair-Izard-Gibson gristmill site is located on the east bank of the Catawba River in Lancaster County (Figure 35). Most of the site is located on land managed by the South Carolina Department of Parks, Recreation, and Tourism. A small section that contains the rock diversion dam is on land owned by the Katawba Valley Land Trust. Site components include a diversion dam, headrace, stone foundation, and a tailrace (Figure 36). Approximately 20 feet of the rock diversion dam is exposed although somewhat obscured by vegetation and alluvial deposition (Figure 37). A small section does extend into the river (Figure 38). Recent landfilling has obliterated a section of the site that lies between the rock diversion dam and the headrace. The headrace extends 860 feet north from the stone foundation before it vanishes. It is comparable with the Foster mill headrace in depth and width. The hewn stone foundation (Figure 39) consists of two walls approximately 35 feet long that are spaced 26 feet apart. The walls vary in thickness from two to four feet wide, and are remarkably lower in height compared with the Foster mill. The tailrace is very shallow but clearly extends for 70 feet before it disappears; at which point it is only about five feet from the water's edge.

As with the Foster Mill there nearby piles of brick that suggests the presence of an associated structure. The 1847 plat (see Figure 34) indicates the location of an "old house just east of the "mill house." This relationship compares well with the archaeological remains at the site.

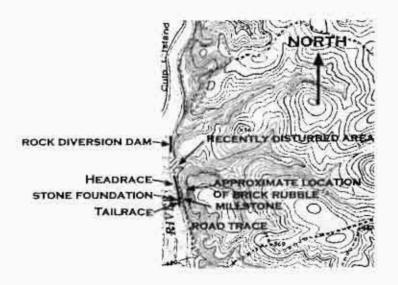
WITHERSPOON

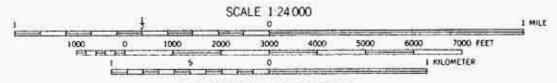
Historical Background Research

The Witherspoon mill¹⁵ appears on an 1881 plat (Figure 40) that illustrates the division of land for the estate of J. D. Witherspoon.¹⁶ The property conveyance (Lancaster County Deed Book G-2, page 116-120) indicates that the mill sluice was partitioned in tracts 4 and 5. The dividing line between the two was established by maintaining a main public highway running from Lancaster Court House to Cureton's Ferry on the Catawba River. They wanted the road to be kept open and used as a public right of way by each of the new property holders that went to J. Harvey Witherspoon and Sarah E. Corbett. The Witherspoon Mill does not appear in any of the nineteenth-century federal manufacturing and Industry schedules for Lancaster County.

¹⁵ ORISTMILL SURVEY NUMBER 8

¹⁶ J.D. Witherspoon was a prominent and active attorney in Lancaster County. A collection of his letters on file at the William R. Perkins Library, Duke University, reveals that the was involved with post Civil War reconstruction, in particular helping those who had become destitute. Other letters address his concern and participation with efforts to removal the Catawba from York and Lancaster counties.





CONTOUR INTERVAL 10 FEET NATIONAL GEODETIC VERTICAL DATUM OF 1929

FIGURE 35

BLAIR-IZARD-GIBSON MILL SITE LANCASTER COUNTY, SOUTH CAROLINA

USGS VAN WYCK (SC-NC) QUADRANGLE 7.5 MINUTE SERIES (TOPOGRAPHIC)

MAP SHOWS THE LOCATION OF THE STONE FOUNDATION,
THE EXTENT OF THE HEADRACE AND TAILRACE, THE ROAD TRACE
THAT LEADS TO AND FROM THE MILL, THE STONE DIVERSION DAM,
THE DISTURBED AREA BETWEEN THE DIVERSION DAM AND THE
HEADRACE, AS WELL AS THE APPROXIMATE LOCATION OF BRICK RUBBLE
THAT IS VERY LIKELY ASSOCIATED WITH THE "OLD MILL HOUSE" INDICATED
ON THE 1847 PLAT (SEE FIGURE 34) AND A MILLSTONE.

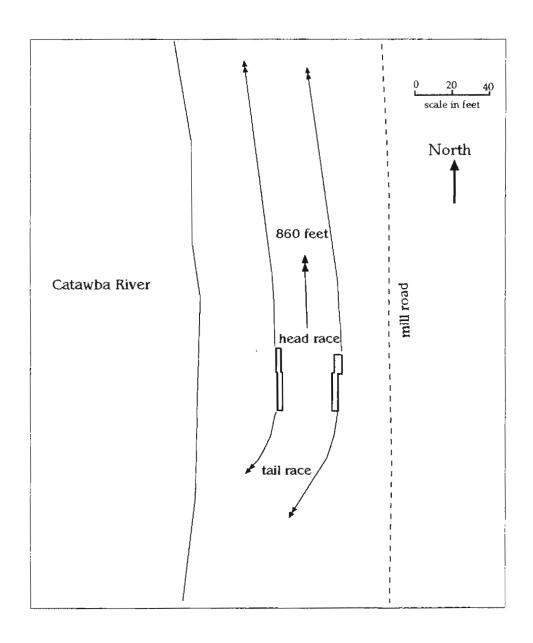


FIGURE 36

BLAIR-IZARD-GIBSON MILL SITE PLAN

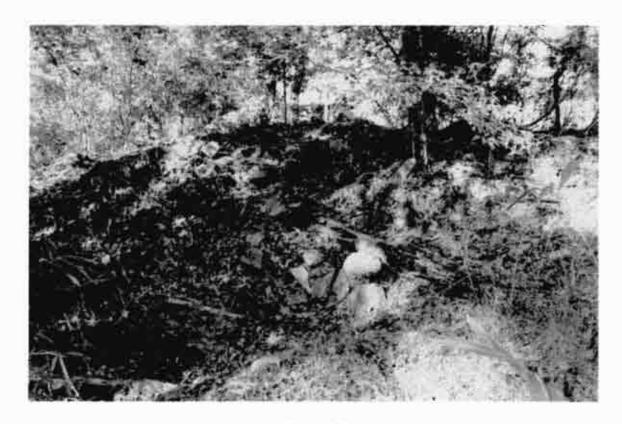


FIGURE 37

BLAIR-IZARD-GIBSON MILL

ROCK DIVERSION DAM, VIEW NORTHWEST



FIGURE 38

BLAIR-IZARD-GIBSON MILL.

ROCK DIVERSION DAM, VIEW NORTHWEST



FIGURE 39

BLAIR-IZARD-GIBSON MILL
EAST FOUNDATION WALL, VIEW NORTHEAST FROM TAILRACE

Archaeological Assessment

An intensive pedestrian survey along the river in the vicinity of the Lancaster County Airport failed to locate any evidence of a millrace or mill foundation remains. The area is currently being developed with heavy land-altering machinery. At the time of the field inspection it was apparent that a significant amount of landscape change had occurred and that these changes have more than likely erased visual evidence of the site, including the 1880 Witherspoon mill sluice.

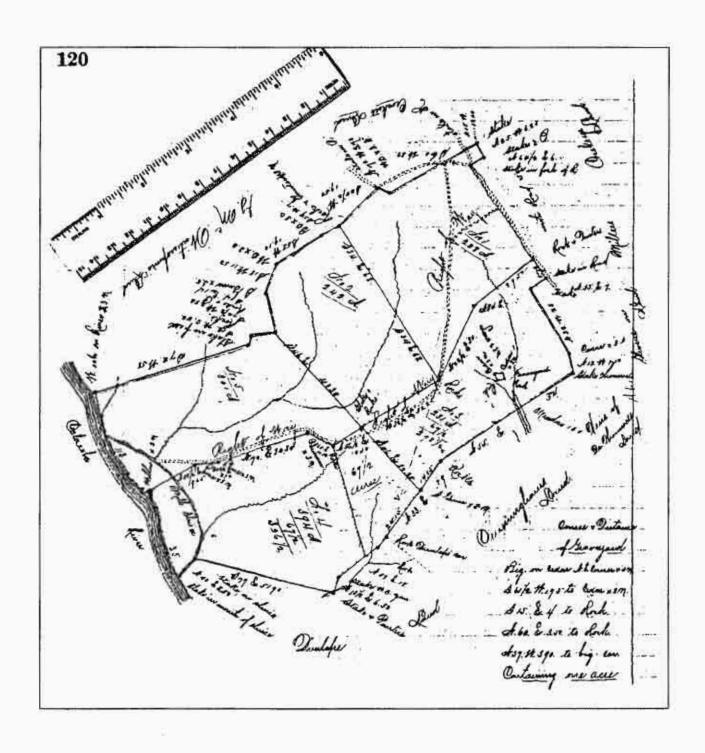


FIGURE 40

1881 PLAT OF WITHERSPOON ESTATE
PLAT SHOWS A LONG "MILL SLUICE" ON THE EAST SIDE OF THE CATAWBA RIVER

9. SUMMARY AND RECOMMENDATIONS

The main focus of this research was to document selected gristmill sites located along the Catawba River drainage in York, Lancaster, and Chester counties (see Table 1). Project investigators were given three major tasks by the project sponsors; members of the Katawba Valley Land Trust, the Catawba Regional Council of Governments, and the South Carolina Department of Archives and History.

The first task was to conduct intensive historical research on water-powered milli development in the tri-county area. This included interviews with local historians and enthusiasts as well as documentary research. The result was the creation of a regional historic context on gristmill development. This context served as a comparative framework for interpreting the physical remains at specific area mill sites.

The second task was to conduct an archaeological reconnaissance of the eight selected gristmill sites. The project sponsors provided the general location of all the sites that was largely based on oral tradition. However, document research at four of the mill sites found information that is different than what is commonly known.

The location of Foster's Mill (#5) was believed to be north of the Blair-Izard Mill (#7), which was thought to be north of Gibson's Mill (#6). Deed research at the Lancaster County Courthouse found that Foster's Mill was located where Gibson's Mill was believed to have been.

Further research found that Gibson's Mill (#6) was a later name for the Blair-Izard Mill (#7). The connection between these mills is clearly documented in land conveyances that date from the 1830s and 1840s (see Figures 32-34). However, the connection between Blair's mill and Izard's mill is not as clear. Izard bought Blair's land and mill in 1818 and built a new mill. The unanswered question is did Izard build a new mill on the same location as Blair's mill? If he did, then there might be archaeological evidence of Izard's improvement to Blair's mill. If Izard's mill was built on a new location, then it is possible that the ruins of Blair's abandoned mill may be located on the land Izard bought in 1818 (see Figures 32-34). For the purposes of this study Blair's Mill has been incorporated in the discussion of Izard's based solely on information in the 1818 deed.

The Garrison-Webb Mill (#1) is locally known as being the mill of Fort Mill. The land is believed to have been acquired by Isaac Garrison and Theodoric Webb from Thomas Spratt in the mid 1700s. However, a search of the York County Courthouse records and the Historical Center of York County found no documentation for the purchase, sale, or lease of land for either Garrison or Webb that connected them with a mill on Steele Creek. There are several ca. 1811 Catawba Land Leases that identify "Webb's Mill Pond" and "Webb's Mill Road," but none mention Steele Creek.

The only references that connect a mill with Steele Creek are an 1814 lease to William White, an 1847 state land grant to Hugh White, and the 1880 census that identifies White's Steele Creek Mill in York County. Although we mention this possible connection several times in the report, it can only be substantiated with more intensive background research, perhaps starting with a chain of title search.

One other site has a complicated and uncertain genealogy – Cureton's Mill (#4). The Lancaster County Court House records reveal that W. J. Cureton acquired land from John Springs on Millstone Branch in 1844. The land conveyance does not mention a mill, which does not exclude the possibility that Millstone Branch is the same as Mill Branch and that the mill was built after Cureton acquired the land.

A more serious complication is the fact that the 1880 Federal Manufacturing and Industry Schedule for Lancaster County reports that the Cureton Merchant Mill is located on Bear Creek. ⁴⁶ Bear Creek appears on the USGS map not far from Mill Branch. Like the problems with the Garrison-Webb mill, this discrepancy is pointed out in the report and may be clarified with more deed research.

The third major project task was to integrate the results of background research and field reconnaissance in a professional archaeological report. This final chapter of the report summarizes the results of archaeological field reconnaissance and various management options are considered for the mill sites. The final section is a discussion of potential research domains for future study of milling practices along the Catawba River and its tributaries.

Summary of Findings

Gristmills were an integral part of agrarian life in the eighteenth, nineteenth, and early twentieth centuries. They provided an important service, turning corn and wheat into more readily consumable products.

The region along the Catawba River and its tributaries consisting of portions of York, Lancaster, and Chester counties offered high potential for mill sites. The natural characteristics of the region, such as its ample and forceful water supply, varying elevations, local deposits of building stone and its relatively gentle riverbanks were conducive to mill development.

The rise and fall of the various mill operations described in this report supports the notion that long-term, successful milling was a difficult enterprise. Natural disasters such as floods, droughts and deep-freezes, inherent when one is dependent on a river's waters, would be amplified by man-made disasters caused by economic fluctuations and changing labor policies.

Area Mill Chronology

Two mill sites that date to this period of early settlement were identified during the survey. The Garrison-Webb Mill (Project Site #1, South Carolina Survey #2142) was located along Steele Creek at one of the Trading Path fords. It is believed that this mill may date to the

⁴⁶ The Cureton Mill is not reported in the 1850 census, but it is in the 1860 census, which identifies the W.J. Cureton Merchant Mill valued at \$5000. The 1860 census reported that Cureton ran the mill with two sets of runners. By 1880 Cureton had four employees who worked two months of the year full time, three months at three-quarter time, two months half time and five months idle. The water wheel on Bear Creek was reported to be 35 feet in diameter with 44 revolutions per minute that generated 32 horsepower.

1780s founding of the town of "Little York." In fact, it may have stimulated the development of that community. It is not clear, but this mill site may have transformed around 1870-1880 as White's Steele Creek mills.

The only other eighteenth-century mill site recorded during the survey is part of the Blair-lzard complex (Project Site #7, South Carolina Survey #2147), at least under the early ownership of Blair (ca. 1780-1812). This early mill reportedly included a log domestic structure as well as the gristmill. Under the next mill owners, the Izard family, the mill venture was changed to a merchant mill (ca. 1812 to 1835).

The majority of mills recorded during the archaeological reconnaissance date to the nineteenth century. Most of these mills functioned as merchant mills. During the third decade of the nineteenth century three of the project mill complexes were started. These are the following sites: Springs-White merchant mill (Project Site #2; South Carolina Survey #2143); Adam lvy-Turkey Point merchant mill (Project Site #3; South Carolina Survey #2144); and the Foster's merchant mill (Project Site #6; South Carolina Survey #2146). It is possible that another project mill site, the Cureton mill (Project Site #4; South Carolina Survey #2145) may have been a merchant mill. The 1880 census identifies "Cureton's Merchant Mill." However, the mill is noted as being located on another creek, which causes some confusion. The last project mill site (Project Site #8; no South Carolina Survey Number assigned), the Witherspoon mill complex, is believed to have started in the 1880s. No physical remains of the site were discovered in the heavily disturbed lands of the purported mill complex.

The number of area gristmills remains constant in the region throughout the nineteenth century. During the 1818-1820 period (Mills 1972) a total of 39 mills were recorded in the tri-country region (Note: these mills are not specifically identified as gristmills, some may have been sawmills.). With the census data from 1850 to 1880 we get a better understanding of the number of gristmills in the area. For example, a total of 35 gristmills were listed in 1850 compared to a total of 36 in 1870. It is not clear why this number remained so consistent. Further research could show that only a set number of good, possible mill seats were available in the region, based on natural and cultural factors. On the other hand, the cultural area could simply have been conservative, that is, slow to accept changes. Additional research is needed to help clarify this pattern of mill development in the region and correlate with population numbers from the same time period.

Mill Ventures

Three types of water-powered gristmills were used to identify the contributions of the mill to the community. These are private mills, plantation mills, and merchant mills. Of the others we are uncertain. The ca. 1780-1812 Blair mill (Project Site #6, South Carolina Survey #2147) could have been either a private or a plantation mill. We assume that it was not a merchant mill, because the subsequent owner, Izard, rebuilt the mill and changed the venture into a merchant mill. Also, research found no information that would suggest that the Garrison-Webb (#1) and Witherspoon mill (#8) were operated as merchant mills. We can also include our suspicions about the nature of the Cureton mill (#4), based largely on the location discrepancy in the 1880 census (see above). The remaining mills –

Springs-White (#2), Adam Ivy/Turkey Point (#3), Foster (#5), and Izard-Gibson (#7) were reported in the 1880 census as "merchant" mills.

Mill Features

The archaeological survey of the at the project mill sites identified two types of mill complexes: mills along the river and mills on small tributaries.

Five of the project mills were located along the Catawba River. Excluding the Witherspoon mill (#8) that not located during the survey, these river mills used the waterpower of the river in two different ways. The Springs-White mill (#2) was a "run of the river" mill. River water was diverted with a rock dam directly to the mill that was situated at the water's edge. The other mills – Adam-Ivy/Turkey Point (#3), Foster (#5), Blair-Izard-Gibson (#7) – also diverted the water from the river but then channeled through long headraces dug into the earth to the mill and then back to the river in the tailrace.

The remaining two mills – Garrison-Webb (#1) and Cureton (#4) – were located on small tributaries of the Catawba River. In order to use these small sources of waterpower that had seasonal fluctuations, these mills dammed the water to create a millpond. To operate the mill, water was released from the pond and directed to the mill through a raceway (see Figure 9).

Other differences include the comparative length of the headraces and the occurrence of diversion dams. The Adam Ivy/Turkey Point headrace measured about 140 ft, as compared to those recorded for the Foster Mill (1640 ft) and that of the Blair-Izard-Gibson Mill (1320 ft). The other project site located on the Catawba River, the Spring-White Mill, did have evidence of the millrace.

The two mill sites located along tributaries of the Catawba River - the Cureton Mill (550 ft) and the Garrison-Webb Mill (650 ft) – also have comparatively long raceways. These differences may be directly related to the natural features of these sites, such as elevation differences, amount of water flow, and so forth. Significant topsoil loss and erosion in the nineteenth and twentleth centuries led to erosion, silting and other changes in piedmont river systems (Kovacik and Winberry 1989:112; Newman 1984:96). These factors, as well as changes wrought on the rivers through construction of major hydroelectric projects have significantly altered the flow of the river and its tributaries. This makes it difficult to determine some of the original physiographic characteristics of the mill sites.

During the nineteenth century major innovations in the harnessing of waterpower were developed, especially with the invention of the turbines that used water pressure to turn the mill machinery. Prior to that invention the physical characteristics of the landscape influenced the weight (e.g., gravity) of the falling water and thus its ability to power the mill (Newman 1984:2, 7, 10, 11, 14). They type of waterwheel used at nearly all the project mill sites has yet to be determined. The only sources of information that specify types of waterwheels are the 1870 and 1880 census. Only one of the project mills – the Foster Mill (#5) - is listed on the census with information about the type of waterwheel. In 1870 the Foster Mill used a tub wheel in year-round operation, a decade later it reported two reaction wheels (pressure as opposed to gravity system). Additional archaeological

investigations will be needed at each of the discovered mill sites to search for evidence of what type of wheel (vertical or horizontal and/or gravity based or pressure based wheel systems) was used at each site.

One other major feature found at these mill sites can be compared, the presence or absence of a diversion dam. Rock diversion dams were noted at the following sites: Adam Ivy/Turkey Point, Blair-Izard-Gibson, Cureton, and Springs & White. No diversion dam was noted at the Foster mill. A wooden dam was found at the Garrison-Webb mill site, as well as an estimated 13-acre millpond. A 20-acre millpond was estimated for the Cureton mill.

Mill Complex Management Considerations

Mill complexes offer a unique challenge for those who wish to understand and to protect these sites. These industrial sites tend to incorporate large landscape features, such as dams, millponds, headraces, tailraces, mill buildings, roads, and fords. Certain types of mill complexes also offer associated structures such as domestic dwellings and stores. These complexes each element should be initially treated as separate, and thus each with its own treatment options. After the assessment of each individual element on its own merits the entire complex can be judged as to future management options. Some of the sites found retain important mill complex elements. Some of the mill facilities have been reused and adapted over the years, making it difficult at present to associated specific mill components with specific periods of mill ownership. At least one of the mill sites appears to have been destroyed. A separate section follows the following general discussion of management options for the project mills.

No Treatment

This option is to do no further work at the sites. This would result in further erosion of the mill complex features. The advantage to this option is that no funds or further management responsibilities would be needed. The obvious disadvantage is that the remnants of the mill sites would be destroyed and thus physical evidence of the mill complexes would be lost.

Additional Archaeological Recording

This second option would entail fully documenting each of the surviving mill complexes through photogrammetry, measured drawings, and systematic archaeological survey and testing. This will be a major commitment of funds, but will result in fully documenting each element of each complex. The results will be synthesized and compared to study intra- and inter-site site patterning over time and space. The results will also be used to assess each site's worthiness for nomination to the National Register of Historic Places (see below). This will guarantee that possible future development projects using federal funds or technical assistance will have to consider the "effect" the project undertaking would have on any of the mill sites located within the boundaries of those development projects. The disadvantage to this "recording only" option is that the extant mill complex

⁴⁷ Archaeological evidence of associated structures was noted at the Foster mill (#5) and the Blair-Izard-Qibson Mill (#6 & 7).

features would eventually decay and be destroyed, as may have occurred at one of the studied mill sites - the Witherspoon Mill.

Long-term Site Management

This third option involves direct ownership or management of the mill sites. Additional historic archaeological work would still be needed to further investigate features, isolate additional site components, and to assess the quality of the remains. However more time could be taken to develop plans for stabilization, interpretative exhibits for the public, and for other management considerations. There are a number of management arrangements possible: fee simple purchase, rental or lease, or purchase or donation of protective covenants. Some of the mill sites are already under the protection of cultural resource managers (e.g., Blair-Izard-Gibson complex, Foster Mill, and Garrison-Webb). The disadvantages to long-term site management include the long-term commitment of funds (taxes, maintenance, and insurance), commitment of work hours, initial costs of stabilization and repair, and investment costs in building interpretative trails and exhibits. The major advantage of long-term site management is the protection of these important historic sites. These mill complexes are typically aesthetically pleasing, with their location along rivers and streams. Since mill sites tend to follow the river they can readily be incorporated into greenways and other linear parks.

The first stage in active, long-term site management is clearing obscuring undergrowth. The removal of smaller growth and deadfalls will also enable more intensive recording of the mill site elements. This will allow site managers to develop site-specific stabilization plans. Vegetation such as larger bushes and trees will have to be removed where its continued presence would damage site features. Major structural damage should be repaired professionally, but with no attempt to replace missing elements or to make any element operational. Minor landscaping and path construction should be undertaken at this time. Small interpretative signs could be placed at each of the major features at the site. It is at this point that the site complex could be opened to the public as a passive park.

The second stage in active site management is the construction of support facilities such as parking lots, restrooms, and picnic shelters. These facilities will help to attract additional visitors to the sites. A systematic archaeological survey of the site complex would be in order prior to deciding where to place the new facilities. (If an intensive survey had not been completed before that time.) Further development of support facilities and of interpretative exhibits may not be needed at these kinds of sites. Site managers may choose to continue their long-term commitment to protecting the site while allowing visitors passive use of the facility as a park.

Some of the site managers may decide to complete the third stage in active site management, restoration of the mill site. This is an intensive step that requires a major commitment in time, funds, and research. It should be approached very cautiously. Restoration may include making the site a working mill again, rebuilding the upper-story of the mill buildings, replacing the mill machinery, rebuilding the dams and races, and generally making the mill operational. It should be noted that operational mills require continuous operation and maintenance. The wheel, for example, must be kept turning or it will warp "out of round" and become unusable. Reconstruction of a milldam also

requires a number of differential government approvals, requires regular cleaning of debris, and is extremely expensive.

National Register of Historic Places

The National Register of Historic Places (NRHP) is a management tool that should be used to help protect the significant mill complexes found in the study area. It is recommended that a multiple property nomination be completed for all of the sites. Witherspoon Mill (Project Site #8) may prove to be a non-contributing element in the region's multiple property nomination. Additional mill sites were reported in historic sources that were uncovered during this project (see Appendix 1-6). These potential sites will have to be excluded from the NRHP nomination until each is investigated archaeologically.

Future Research Questions

A number of questions for future research have been raised as a result of the archaeological reconnaissance of the project mill sites. In a preliminary comparison of results, it appears that mill development in the project area followed some, but not all trends marked in other piedmont mill studies. It is often difficult to determine the interplay of factors that influenced initial community and mill development. Did settlers conclude they needed a mill to service their community, and thus fostered a local mill venture, or did a miller first construct his facility at a choice location and thus initiate community development (e.g., Newman 1984:13)? A community appears to have developed around a project mill site along a tributary to the Catawba River (Garrison-Webb Mill on Steele Creek). Was this a common phenomenon in the southeastem piedmont in the eighteenth century? Why did only one project mill site enhance the development of a viable community? Is it because that particular mill was located along a well-known crossing of the Great Trading Path? Although the Springs & White mill (#2) was located at Nation Ford, a major crossing of the Catawba River.

The majority of mill ventures along the Catawba and its tributaries appear to have been merchant mills. The reasons for this are as yet unclear. Obviously the Izard brothers, who took over the Blair mill facilities, believed that they could succeed better as a merchant mill venture. Otherwise they would not have expanded to include cotton processing. It appears that many of the Catawba area merchant mills were developed in the antebellum period, with the remainder started in the decades following America's Civil War. Additional research should clarify the relationship of changing transportation and economic systems in the project area to the relative occurrence of plantation and merchant mills.

In his study of seven piedmont mill sites located along the Upper Savannah River drainage, Newman discovered that the majority of mills were plantation and private mill ventures until the appearance of merchant mills in the last decades of the nineteenth century. He believes that this was due to several factors. The earliest gristmills were located near known ferries and fords. The road system was poor and the rivers were not really navigable throughout most of the eighteenth and nineteenth centuries. With the development of the railroads into the area in the late nineteenth century commercial and merchant mills became economically feasible (Newman 1984:98). In a study of four

piedmont mill sites along the Oconee River in Georgia, archaeologists discovered a similar pattern of development. The initial mill complexes were seated near important ferry and road crossings. In each case "small service communities developed around them" (Newman 1984:100). These private venture gristmills were expanded by the end of the nineteenth century to include a "small merchant milling capacity" (Newman 1984:100).

In some cases later York, Lancaster, and Chester county mills were built on or near earlier mill sites. What natural and cultural factors affect the "persistence" of certain mill sites, but not of others? (e.g., Newman 1984:14). Did some mill seats have naturally superior physiographic features? Successful mill development was dependent upon a good understanding of engineering principles, complete knowledge of local physiographic features, as well as having a good grounding in local and regional economics. Perhaps it was easier or less expensive to adapt earlier races, dams, and building foundations than to construct new ones.

Another avenue for future comparative research concerns mill landscapes. Why do mill archaeological site signatures vary? Is it always due to differences in the natural features of the landscape such as height of riverbanks, elevation changes in the river, and underlying bedrock? How do cultural features influence the site signature of a mill complex? Do different types of mill ventures (private, planter, or merchant) necessitate different spatial arrangements of sites? Do merchant mills, for example, always contain more varied processing areas and thus need additional structures and machinery? Why do some sites have associated domestic structures while others do not? Do similar industrial architectural styles appear in the region? How do these variables change over time?

Newman found that late nineteenth-century mill sites along what is now the Columbia Reservoir in the Tennessee piedmont have a "striking degree of similarity in architectural configuration" (Newman 1984:14). On the other hand, archaeologists discovered that a survey of nineteenth-century mills in the ridge and valley region of northwest Georgia had varied site signatures. These mills in a four-county portion of upper Georgia were primarily grinding grain. Some of these mostly frame mill buildings were located close to the river, some were located far from the river and subsequently had comparatively long millraces (Newman 1984:101). In the Catawba River study area the most of the mills were seated relatively close to the river. However, some of the mills had long millraces while others had shorter races. It is still unclear what actual milling technology was used at the study sites. The relationship of mill technology (type of waterpower used) to area physiographic features should be researched. This may clarify why some of the mill features such as dams, millponds, and races differed. It will also be interesting to see how these features compare over time.

The nineteenth century was marked by innovations in mill technology. The work of Evans (Appendix 7) and other inventors lead to the development of pressure operated wheels (e.g., reaction wheels, turbines) that were not solely dependent on gravity as were impact wheels (e.g., tub wheels, vertical wheels) (Newman 1984:5-7). Southeastern rivers were often "low head settings" and turbines were not very effective under those conditions. New "mixed flow" turbines were developed to make these machines more effective under those conditions. By the 1870s these kinds of turbines were readily available throughout the southeast (Newman 1984:10-11). Additional historic archaeological research at the Catawba area mill sites should offer data on the types of mill machinery used at the

different sites. It is known from historic records that the Foster Mill, for example, was using a tub wheel in 1870 and two reaction wheels (early turbines) a decade later. What factors influenced this change in mill machinery? Did all of the mills use similar types as their prime motive power? How quickly were innovations in milling incorporated? Were they uniformly accepted?

In comparison at the seven Russell Project mill sites Newman discovered that millers were conservative about adopting new technologies. He found that vertical and tub mills prevailed until the late nineteenth century. By the end of the century two of the mill sites retained their use of traditional vertical wheels, while the other mill sites incorporated the "new" turbine technology (Newman 1984:14; 98-99).

Additional research should also help to clarify additional questions about Catawba area mill sites. For example, who labored at these mills? What labor pools were available over time? Were slaves ever used? If so, where were they housed? What positions did they fill? What gender and age requirements were felt necessary for a miller and/or for help at the mill? Did millers hire temporary help during the peak milling seasons? Where did the miller and his or her family live?

Future study of the mill sites located through archaeological reconnaissance and of potential mill sites revealed through documentary research should help to address these and other important questions about regional mill development. The initial archaeological reconnaissance and historic research at the York, Lancaster, and Chester mill sites has resulted in documentation of six definite mill complexes. It has also clarified some questions concerning mill ownership and mill names. Only one site, the Witherspoon Mill complex, appears to have been destroyed through modern land-altering practices.

The majority of the sites are in relatively good condition, although erosion and flooding have altered some of the site features. More intensive archaeological investigation of these sites will offer researchers an opportunity to address some of the comparative research questions outlined above. Site-specific research will also allow archaeologists to detail the condition of each mill's archaeological remains. This will enable land managers and preservationists to make informed judgements about the long-term preservation needs of these important historic sites.

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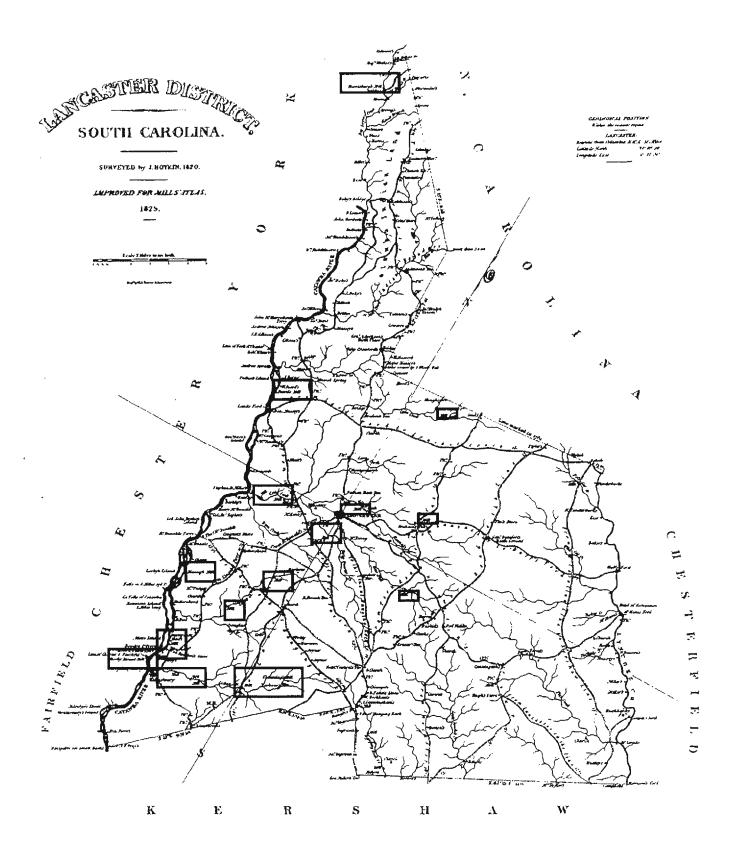
Catawba River, South Carolina examined under the direction of Capt. Chas. B. Philips, Corps of Eng'r' U.S.A. by J.M. Wolbrect, Ass't Eng. 1879. Federal Cartographic Archives.

APPENDICES

APPENDIX 1 1825 MILLS' ATLAS MAPS OF YORK, LANCASTER, AND CHESTER COUNTIES

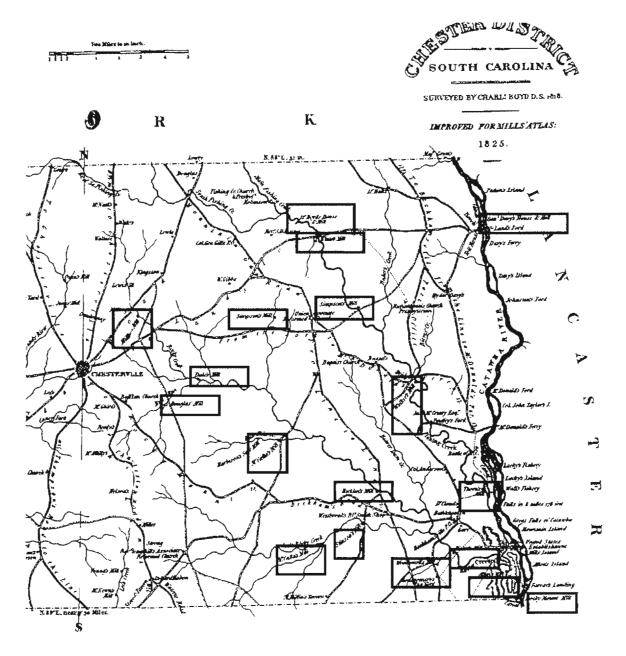
SHOWING APPROXIMATE LOCATIONS OF GRISTMILLS IN THE PROJECT STUDY AREA

Соинту	NUMBER OF MILLS / NUMBER IDENTIFIED BY NAME	IDENTIFIED MILLS
YORK	1/0	
LANCASTER	20 / 6	MASSEY'S MILL HARRISBURG MILL FLEMMING'S MILL ROCKY MOUNT MILL IZARD'S MILL YARBOROUGH MILL
CHESTER	18 / 15	DR. BOYD'S MILL WHITES' MILL SIMPSON'S MILL MILLER'S MILL DALES' MILL DOUGLAS' MILL MCCALLA'S MILL STINSON'S MILL WOODWARD'S MILL ALLEN'S MILL PICKETT'S MILL ROCKY MOUNT MILL THORNS MILL HICKLIN'S MILL GEN. DAVY'S MILL



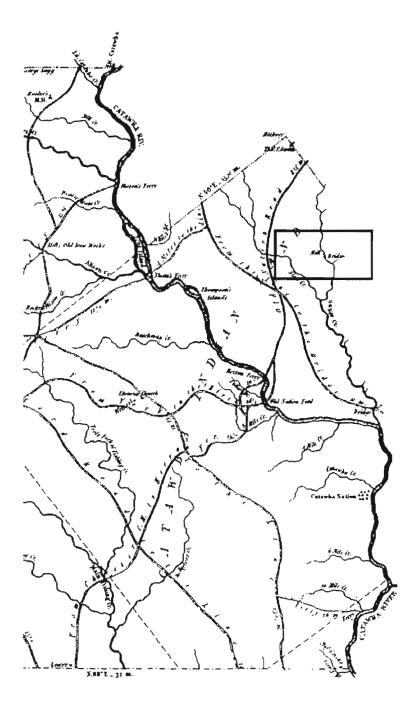
APPENDIX 1, FIGURE 2

MILLS' ATLAS LANCASTER DISTRICT, SURVEYED IN 1820 PRINTED IN 1825 (MILLS 1972)



APPENDIX 1, FIGURE 3

MILLS' ATLAS CHESTER DISTRICT, SURVEYED IN 1818, PRINTED IN 1825 (MILLS 1972)



APPENDIX 1, FIGURE 1

MILLS' ATLAS YORK DISTRICT, SURVEYED IN 1820 PRINTED IN 1825 (MILLS 1972)

NOTE: This map shows only one mill in the Catawba River Drainage basin. It is located along Sugar Creek on Indian Land.

APPENDIX 2

CATAWBA LAND LEASES THAT PROVIDE DOCUMENTATION OF GRISTMILLS IN THE PROJECT STUDY AREA.¹

APPENDIX 2 FIGURE NUMBER	LEASEE	ACREAGE	SURVEY/LEASE DATE	DESCRIPTION	PAGE IN HUGH WHITE'S RECORDING BOOK
1	JNO. BENNETT	45.5	SURVEYED 1/20/1810	ADJOINS WEBB'S MILL POND	82
2	JAMES CLARK	255	SURVEYED 5/13/1824	MILL POND ON SUGAR CREEK ABOVE FISHTRAP BRANCH	323
3	NAT. ERWIN, SR. LEASED TO JOHN SPRINGS	208	SURVEYED 12/1/1812 AND LEASED TO JOHN SPRINGS "BEING PART OF AN ORIGINAL TRACT RENTED BY NAT. ERWIN SR.	MILL POND ON STEELE CREEK	273
4	SMITH MILLER	235	SURVEYED 7/31/1811	MILL POND OR SWAMP ON SUGAR CREEK	275
5	JOHN REEVES LEASED TO DAVID WILSON	365	SURVEYED N.D. LEASED 5/1/1811	LAND INCLUDES A MILL AND IMPROVEMENTS	7
6	HENRY W. SMITH LEASED TO JAMES LISTENBEE	188	SURVEYED 2/28/1817 LEASED 8/13/1818	WEBB'S MILLPOND ON THE SOUTHERN BOUNDARY LINE	287
7	THOMAS SPRATT AND JOHN GARRISON LEASED TO WILLIAM E. WHITE	350	SURVEYED JULY 1808 LEASED 5/1/1811	MILL POND AND MILL ROAD	350
8	THOMAS SPRATT LEASED TO H. WHITE	210	SURVEYED 5/1/1811	Possible Mill Pond	19
9	J. SPRINGS, JR.	327	LEASED 7/20/1810	WEBB'S MILL ROAD	327

¹ Extracted from Hugh White's "Surveyors Plat Book and Indian Commissioner's Rent Book" of leases within Catawba Indian Land in York and Lancaster counties between 1795 and 1829 (York County Public Library, Rock Hill, SC) and a summary of the Catawba Land Records compiled by Douglas Summers Brown (*The South Carolina Historical Magazine* LIX, 1958).

15/2 and Sing Some Start Springer Song Sing Song 1810

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Figure 1. Jno. Bennett's 45.5 acres showing Webb's mill pond. Surveyed May 4, 1813. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 82.

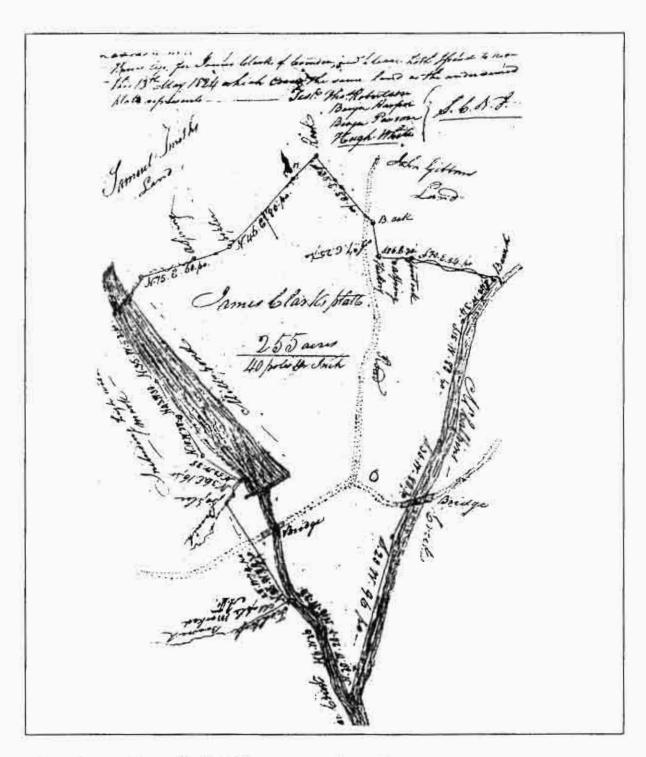


Figure 2. James Clark's 255 acres on the forks of Sugar and McAlpin Creeks.

Surveyed May 13, 1824. Shows two roads, one having bridge crossings over Sugar and McAlpin Creeks and a Mill Pond on Sugar Creek just north of the bridge and above Fishtrap Branch. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 323.

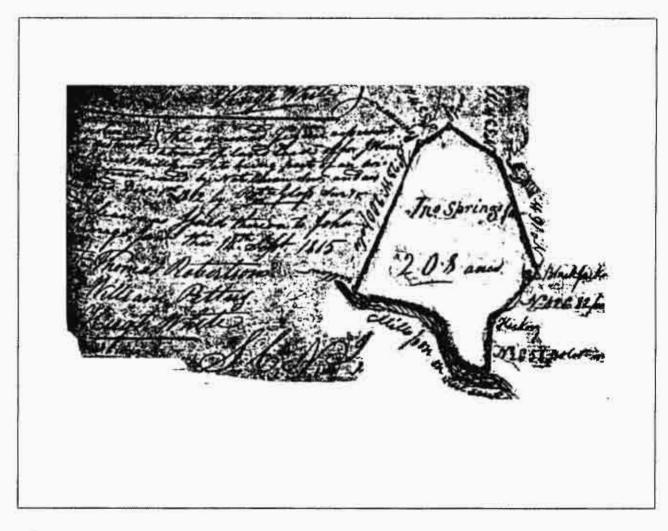


Figure 3. Jno. Springs 208 acres, originally leased to Nat. Erwin, Sr., showing a millpond on Steel Creek. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 273.

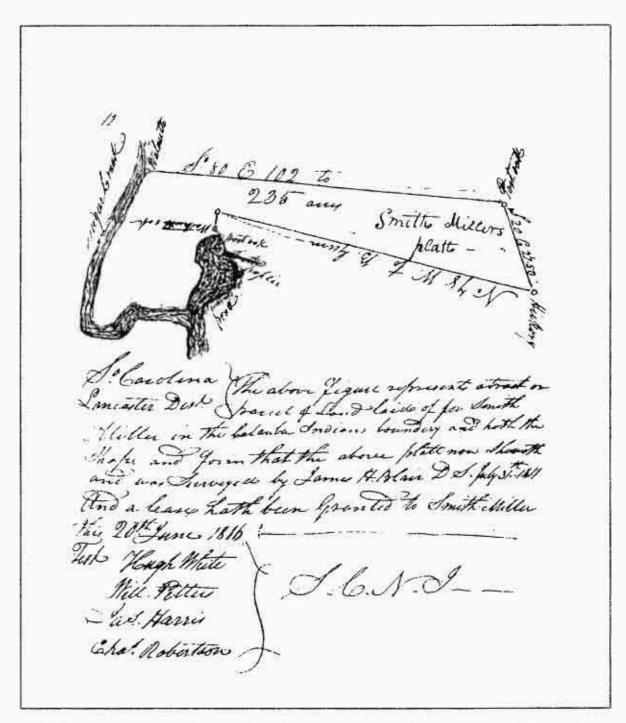


Figure 4. Smith Miller's 235 acres on Sugar Creek showing either a swamp or mill pond. Surveyed June 20, 1816. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 275.

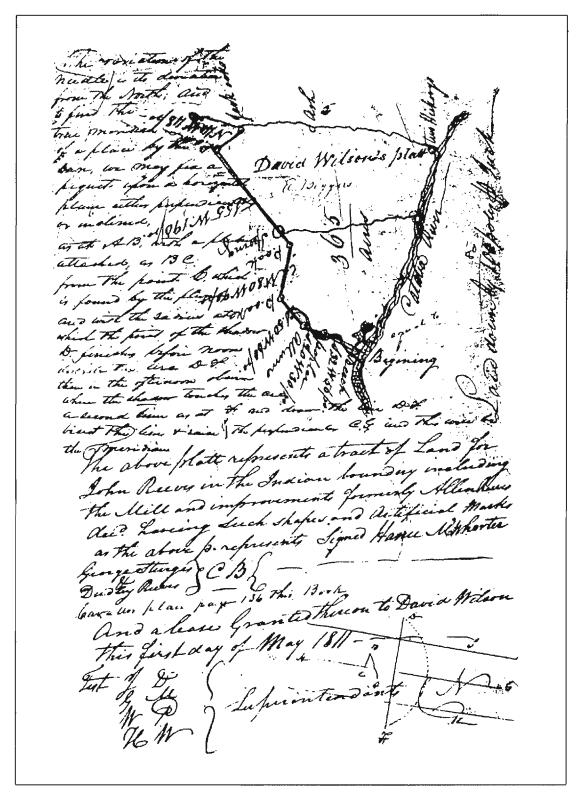


Figure 5. David Wilson's 365 acres, originally leased to John Reeves.

Although a mill is not depicted on the plat it is mentioned in the document. "the above plat represents a tract of land for John Reeves in the Indian boundary including the Mill and improvements formerly Allen Reeves, decd....". Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 7.

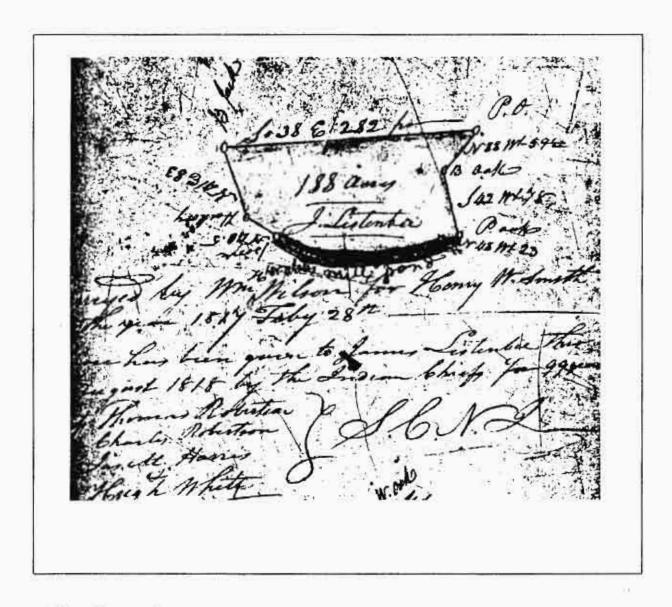


Figure 6. James Listenbee's 188 acres, originally leased to Henry W. Smith. Plat shows Webb's mill pond on southern boundary line. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 287.

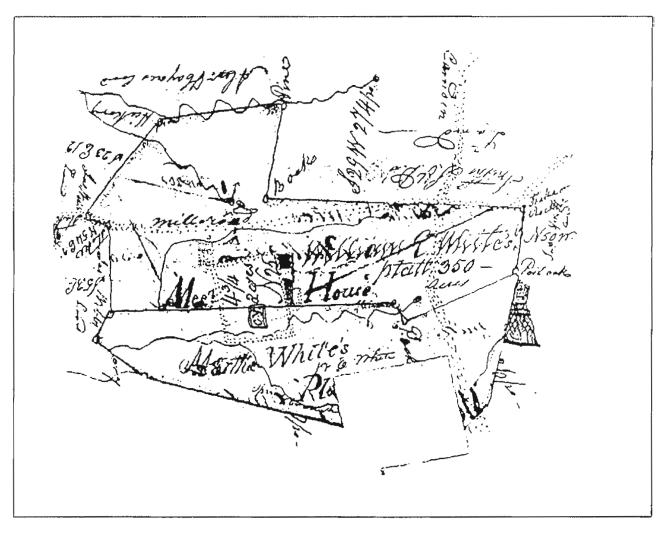


Figure 7. William E. White's 350 acres originally leased to John Garrison, Sr. that was part of the original lease of Thomas Spratt, Sr. Surveyed June 5, 1811, Leased June 7, 1811. Plat shows a mill pond, mill road and "Meeting House". Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 350.

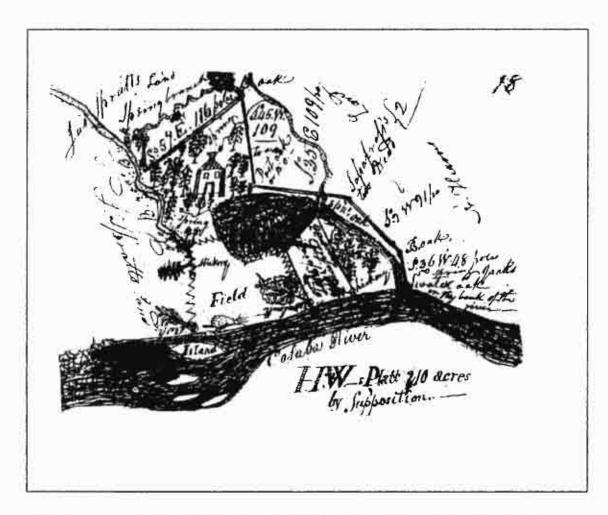


Figure 8. Hugh White's 210 acres on the Catawba River originally leased to Thomas Spratt, Sr. Surveyed July 1808, leased May 1, 1811. Plat shows a mill pond created by damming an unnamed tributary of the Catawba River. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 19.

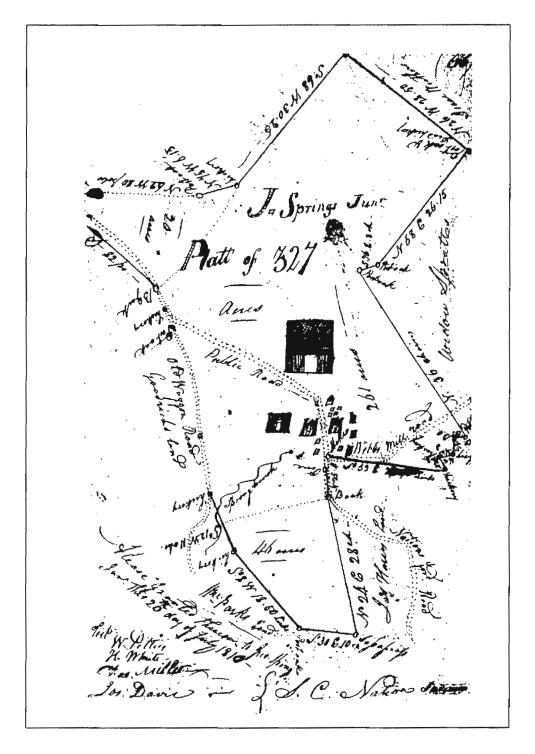


Figure 9. J. Springs Jr.'s 327 acres. Plat shows Nation Ford Road and Webb's Mill Road. Hugh White's Surveyors Plat Book and Indian Commissioner's Rent Book, page 327.

APPENDIX 3 Ca. 1840 PLATS

STATE LAND GRANTS THAT PROVIDE DOCUMENTATION OF GRISTMILLS IN THE PROJECT STUDY AREA.1

APPENDIX 3 FIGURE NUMBER	PROPERTY OWNER	DATE OF SURVEY	ACREAGE	MILL LOCATION	PAGE IN BOOK G	PLAT NUMBER IN BOOK G
1	ELI BIGGERS	2/2/1847	373	CATAWBA RIVER, SHOWS THE LOCATION OF THE SCHOOLEY & HARRIS MILL TRACT AND HOUSE	359	388
2	JOHN CULP	9/3/1841	6	WEST SIDE OF SUGAR CREEK	145	NONE
3	F. H. HARRIS, SAML. SCHOOLEY AND D. F. SCHOOLEY	11/1/1845	5	WEST SIDE OF THE CATAWBA RIVER ABOVE MOORE'S FERRY	360	345
4	CADWALLADER JONES	11/6/1841	1874	HALF MILE CREEK, NOW MANCHESTER CREEK	220	254
5	JOHN MASSEY	3/9/1842	621	WEST OF THE CATAWBA RIVER	213	NONE
6	JOHN S. SITGREAVES	2/11/1842	1188	SIX MILE CREEK	252	219
7	HUGH M. WHITE	10/7/1847	232	STEEL CREEK	362	393
8	WILLIAM E. WHITE	9/21/1841	818	HALF MILE CREEK, NOW MANCHESTER CREEK	147	NONE

Note: in addition to the above, several other properties were determined to have gristmills. Photocopies of these plats are not included in this report, however they are deeded to James P. Henderson plat 70, Elizabeth Wrenn, plat 343 and William Moffatt, plat 316, James Spratt plat 183 (State Land Grants: Book G: Indian Lands, 1840).

¹ Extracted from State Land Grants recorded in "Book G: Indian Lands, 1840" in the York County Courthouse and from a composite map of the land grants compiled by Mr. and Mrs. J. Thomas Williams, Sr. A copy of this map was obtained from Paul Gettys, Catawba Regional Planning Office in Rock Hill, SC.

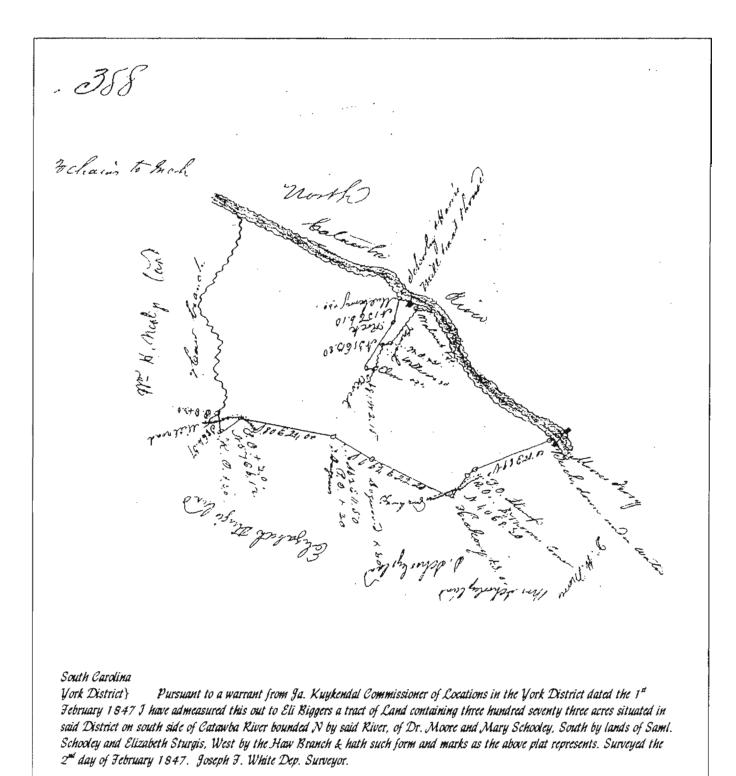


Figure 1. Eli Bigger's 373 acres on the Catawba River showing the location of Moore's Ferry and the Ferry Road, Haw Branch, Schooley & Harris Mill Tract and House and a Mill Road. York County Courthouse, Book G: Indian Lands, page 359.

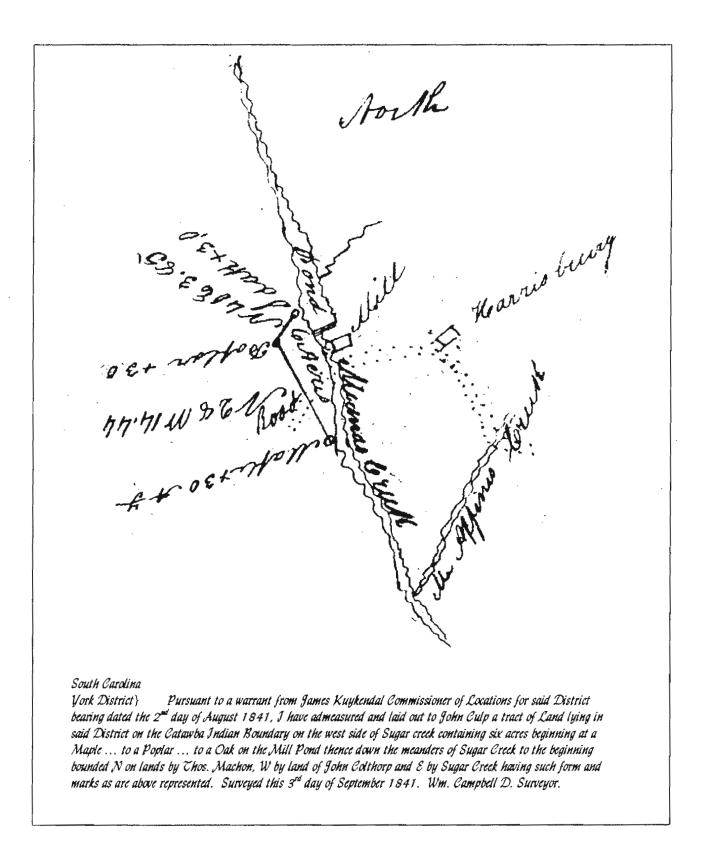


Figure 2. John Culp's 6 acres on Sugar Creek showing the mill dam, mill pond, and mill as well as an unnamed road that crosses Michnas Creek below Culp's mill and passes through Harrisburg before crossing McAffines Creek. York County Courthouse, Book G, Indian Land, page 145.

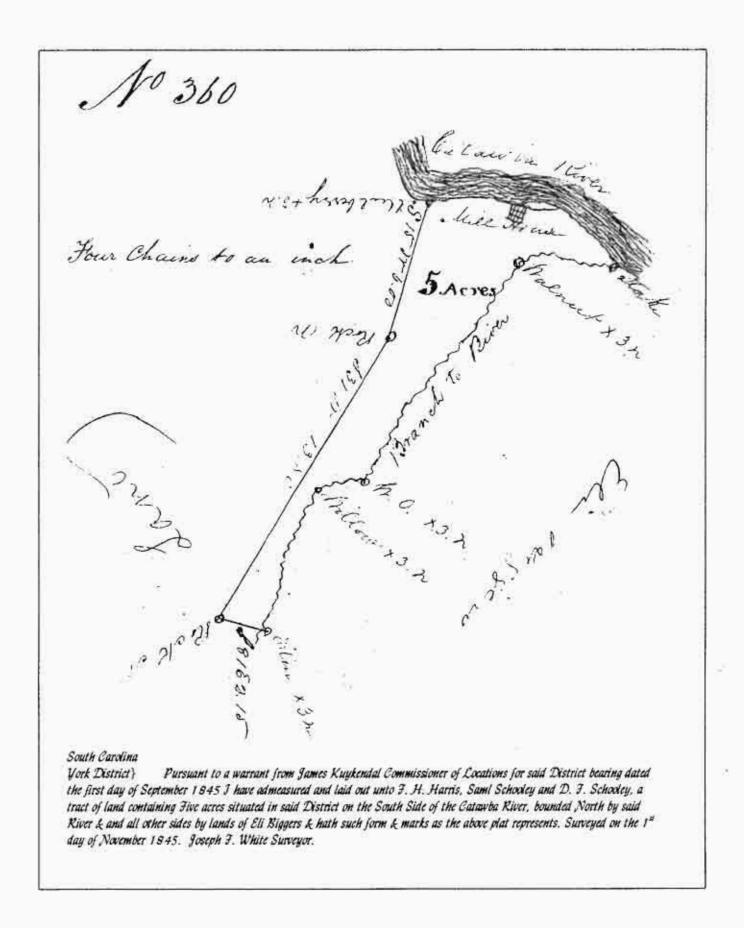


Figure 3. F.H. Harris, Samuel Schooley and D. F. Schooley's 5 acres on the Catawba River. Plat shows the location of a mill race and mill house. York County Courthouse, Book G. Indian Land, page 345.

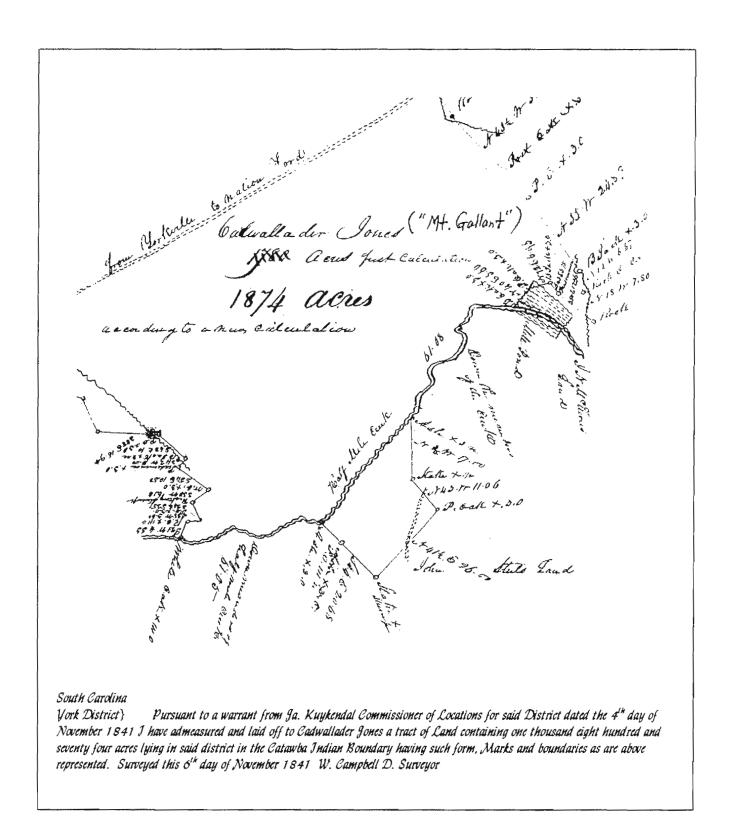


Figure 4. Cadwallader Jones' 1874 acres showing the location of the mill pond on Half Mile Creek. York County Courthouse Book G, Indian Land, page 220.

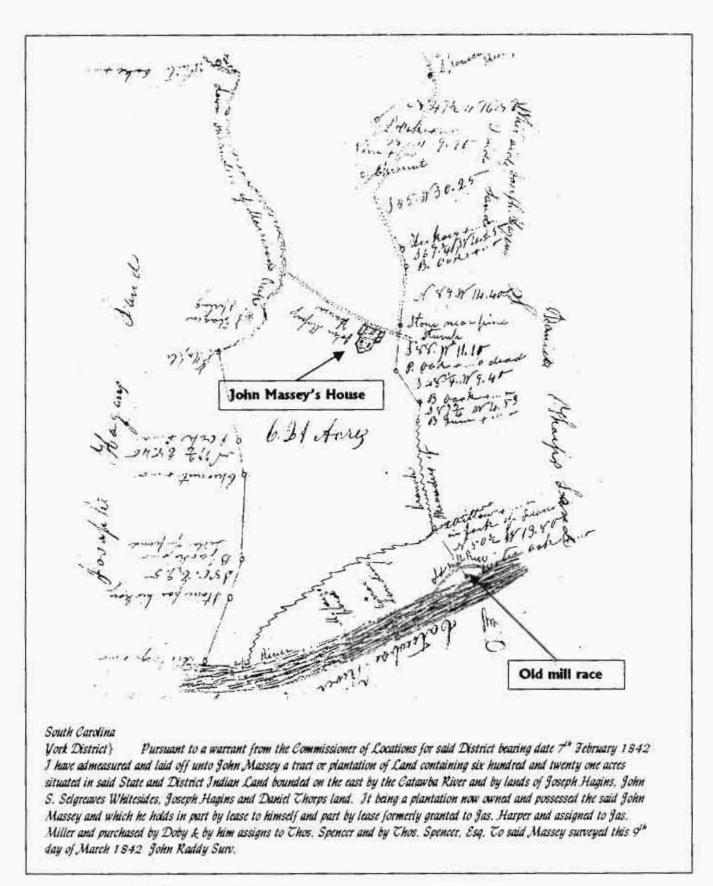


Figure 5. John Massey's plat of 621 acres on the Catawba River showing the location of his house and an old mill race. York County Courthouse, Book G, Indian Land, page 213.

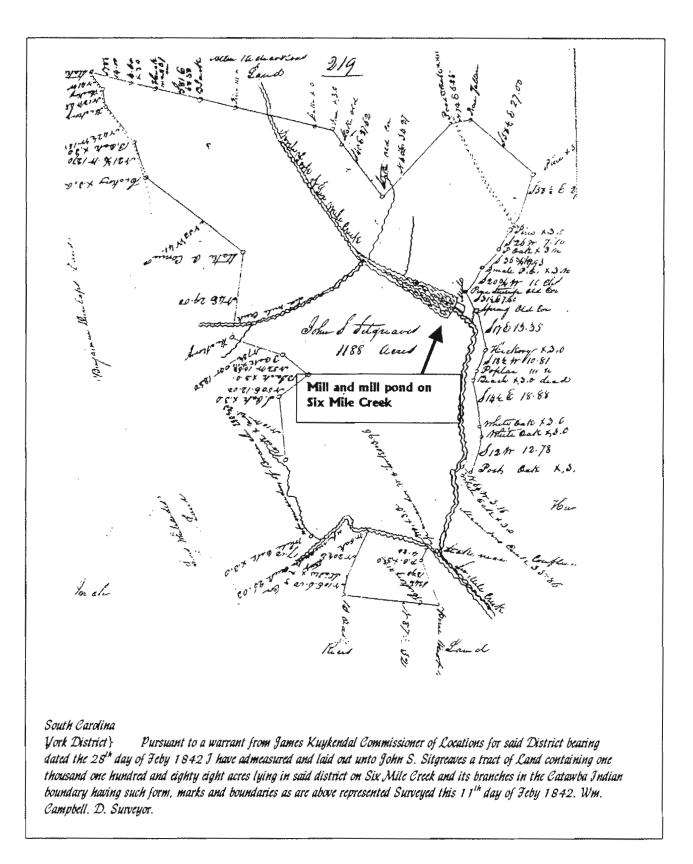


Figure 6. John S. Sitgreaves' 1188 acres on Six Mile Creek showing the location of a mill and mill pond. York County Courthouse Indian Record Book, page 219.

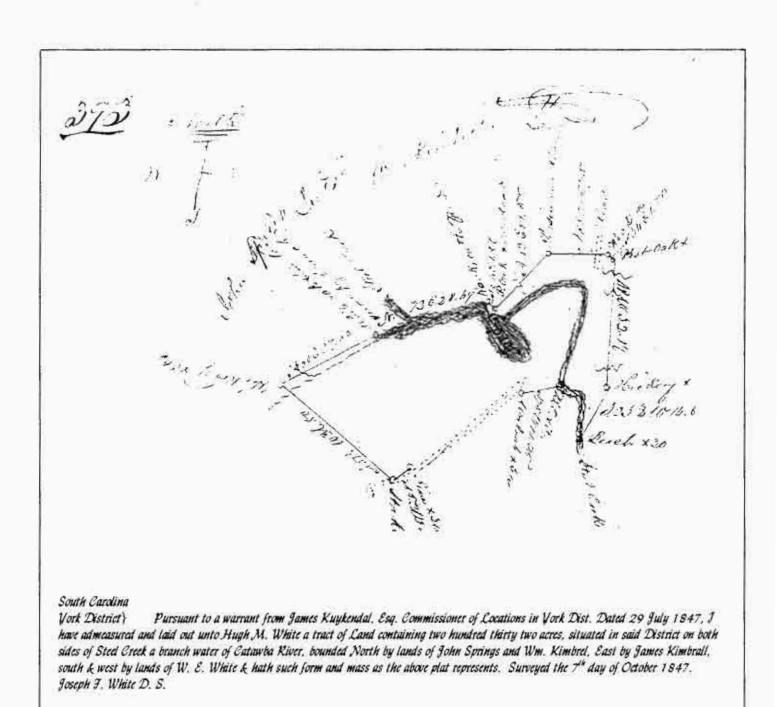
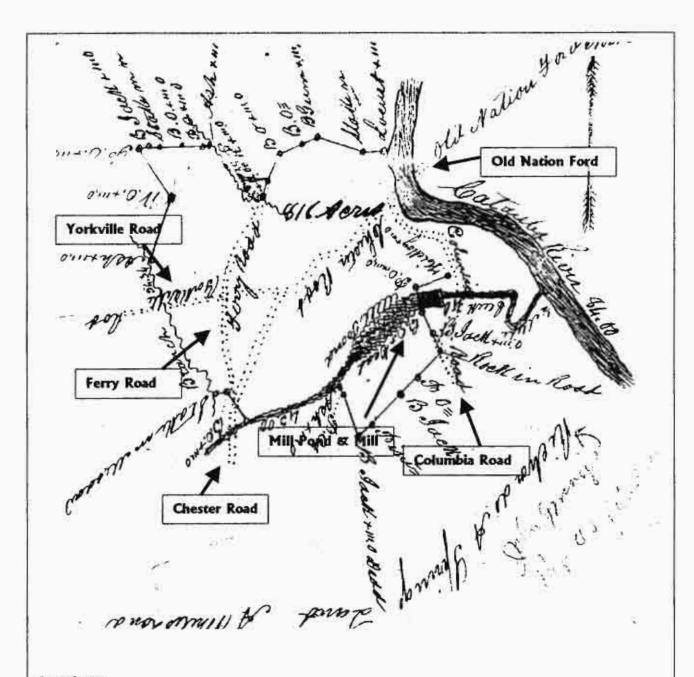


Figure 7. Hugh M. White's 232 acres on Steel Creek showing a mill pond and two unnamed roads. York County Courthouse, Book G, Indian Land, page 362.



South Carolina

Vork District \ Pursuant to a warrant from James Kuykendal Commissioner of Locations for said District bearing dated the 14th day of August 1841 I have admeasured and laid out unto William E. White a tract of Land containing eight hundred and eighteen acres situated on the west side of the Catawba River in said District within the Catawba Indian Boundary bounded on the N by lands of William E. Schooley on the NE by the Catawba River SE and S by lands of RA Springs SW by lands of Archibald & white West by lands of David Hutchison, Esq. Beginning at the mouth of half mile Creek and running the various meanders thereof to where the Columbia Road crosses with said Road to a Hickory on Columbia Road ... to rock in the road ... to an Ash on the bank of 1/2 mile Creek ... near where Chesterville road crosses thence up the said branch ... to the Chesterville Road or Ferry road ... to a Locust on the bank of the River thence down the various courses of the river to the mouth of half mile creek and hath such form and mass as the above plat represents. Surveyed this 21st day of Sept. 1841. Joseph F. White Surveyor.

Figure 8. William E. White's 818 acres on Half Mile Creek, showing Old Nation Ford Road cross the Catawba River, Chester Road, Ferry Road, Yorkville Road and Columbia Road, as well as a dam and mill on Half Mile Creek, now known as Manchester Creek. York County Courthouse, Book G, Indian Land, page 147.

APPENDIX 4 GRISTMILL LOCATIONS IDENTIFIED ON THE 1880 CENSUS

	COUNTY	NAME	TYPE OF WHEEL	SIZE OF WHEEL	MILL LOCATION
1	YORK	JNO. CONNOR	UNSPECIFIED	2 FEET	CATAWBA RIVER
2		HOKE & BARBER	UNSPECIFIED	2 ½ FEET	SIX MILE CREEK
3		BANON & FANS	BREASTWHEEL	UNSPECIFIED	CATAWBA RIVER
4		JONES & MCCULLOUGH	BREASTWHEEL	UNSPECIFIED	CATAWBA RIVER
5		G. THOMAS	OVERSHOT	4 FEET	BRANCH OF THE CATAWBA RIVER
6		EPPS & CO.	OVERSHOT	3 FEET	GUM BRANCH
7		S. WHITE	OVERSHOT	4 FEET	STEELE CREEK
8		MRS. J. WHITE	OVERSHOT	3 FEET	MCKEES CREEK
9	LANCASTER	BARBER TURNER	OVERSHOT	3 FEET	CLEM'S BRANCH AS IT EMPTIES INTO SUGAR CREEK
10		ROBINSON & SNIPES	OVERSHOT	3 ½ FEET	WILDCAT CREEK
1 1		C.A. PLYLER	OVERSHOT	3 1/2 FEET	POLE CAT CREEK
12		TAYLOR G. CURETON	UNSPECIFIED	35 FEET	BEAR CREEK
13		ROBERT N. PERRY	REACTION TUB	12 FEET	WHERE SIX MILE CREEK EMPTIES INTO TWELVE MILE CREEK
14		JNO. B. ERWIN	OVERSHOT	12 FEET	CATAWBA RIVER
15		W. R. HOOD	OVERSHOT	3 FEET	DOBY'S BRANCH
16		JAMES MAY	REACTION	6 FEET	CATAWBA RIVER
17		F. McDorn	OVERSHOT	4 FEET	CEDAR CREEK
18	CHESTER	W. R. DAVIE	TURBINE		CATAWBA RIVER
19		O. A. (ILLEGIBLE)	TURBINE		FISHING CREEK
20		R. H. NEELY	TURBINE	17 1/2 FEET	ROCKY CREEK
21		W. H. HARDING	TURBINE	17 1/2 FEET	SEALY'S CREEK
22		A. T. WALKER	OVERSHOT	5 FEET	WHITE'S CREEK
23		ROBERT DOUGLAS	OVERSHOT	4 FEET	BULL RUN INTO ROCKY CREEK
24		M. B. CLARKSON	BREASTWHEEL.	4 FEET	ROCKY CREEK
25		SAMUEL MCALILY	OVERSHOT	5 FEET	ROCKY CREEK
26		SAMUEL MCALILY	TURBINE	UNSPECIFIED	SANDY RIVER
27		F. H. BOSHER	TURBINE	2 1/2 FEET	FISHING CREEK
28		OSBORN BARBER	TURBINE	2 1/2 FEET	TRIBUTARY OF ROCKY CREEK
29		JAS. CALDWELL	TUB	UNSPECIFIED	ROCKY CREEK
30		Wm. GIBSON	ILLEGIBLE	UNSPECIFIED	ROCKY CREEK

APPENDIX 5

EXCERPTED SECTIONS OF THE 1879 US ARMY CORPS OF ENGINEERS MAP OF THE CATAWBA RIVER SHOWING THE LOCATION OF MILLS.

1879 map of the Catawba River, South Carolina, by J. M. Wolbrect, Ass't Eng. and examined by Capt. Chas. B. Phillips, Corps of Eng'rs, U.S.A.

National Cartographic Archives.

(Copy of map provided by Marcus Norton, York County Planning Department)

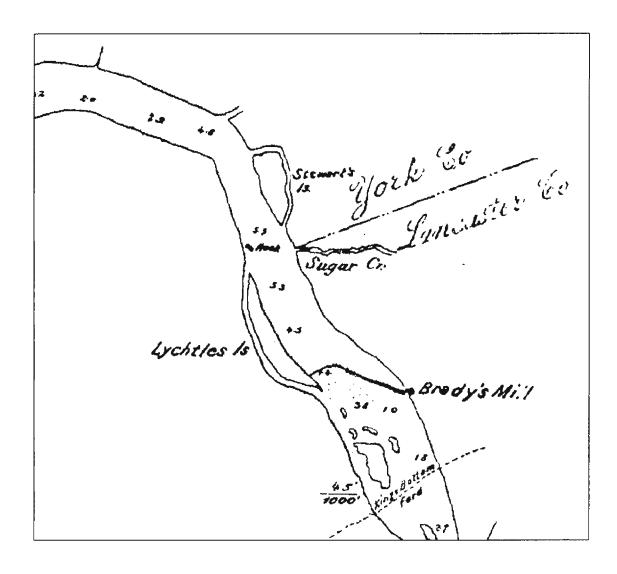


FIGURE 1
BRADY'S MILL ABOVE KING'S BOTTOM FORD

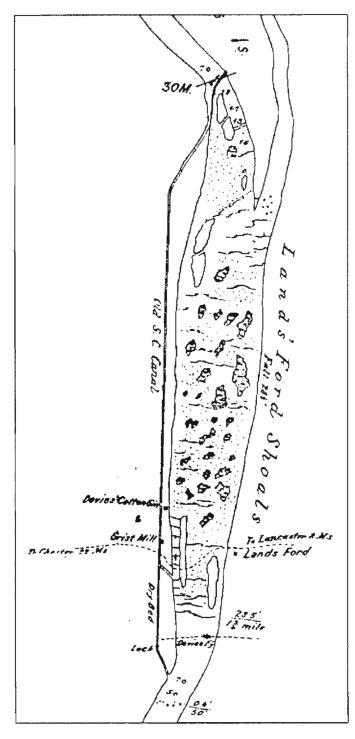


FIGURE 2

Davies Cotton gin and Grist Mill below Landsford Shoal

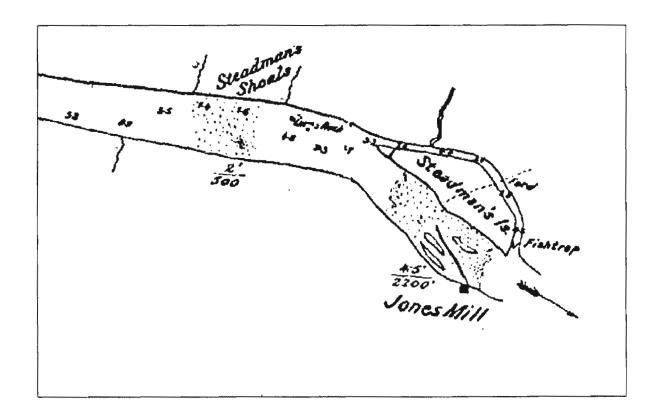


FIGURE 3

JONES MILL BELOW STEADMAN'S ISLAND

APPENDIX 7

COMMON FEATURES OF GRISTMILL SITES

The following descriptions of mill features have been extracted from several sources. These include Bennet and Elton's 1899 History of Corn Milling: Cross' 1979 The Milling Industry in the Lower Eno Valley; Garber's 1979 Waterwheels and Millstones; Grimshaw's 1882 The Miller, Millwright and Millfurnisher; Hughes 1862 Miller and Millwright; Hunter's 1979 The History of Industrial Power in the United States, 1780-1930; Leffel's 1881 Leffel's Construction of Mill Dams and Bookwalter's Millwright and Mechanic; Reynolds; 1970 Windmills and Waterwheels; Zimiles and Zimiles 1973 Early American Mills; and Oliver Evans 1875 The Young Millwright and Miller's Guide. This is a composite description of a nineteenth-century mill and does not represent a particular mill.

The Millhouse

The mill structure that housed the stones, gears and sacks of grain was functional. It had very little ornament, except perhaps for a weather vane or sign. The architecture was similar to barn construction with single gabled roofs, a stone foundation and a wooden structure.

Distinguishing features include an extended roof where a hoist could be attached to raise the grain to the top floor from the delivery wagons. One face of the building usually had a series of doors that opened on each floor to allow equipment and/or tools to be hoisted. The other façades had double hung windows for light and ventilation. Often the façade facing the wheel had no windows. This shielded the mill from the cold winds and cut down on some of the noise from the wheel.

Exteriors were usually covered with clapboard or shingles; the walls were constructed of braced frames characterized by heavy timber posts at the comers often with intermediate posts between them. The whole structure was built on a heavy foundation. Enormous timber girths ran from post to post. Mortised joints joined all parts. Most of the beams were hand-hewn oak. Often they were massive, spanning eighteen feet. The strong construction was meant to withstand the elements and the constant vibration of the wheel and stones. To further strengthen the buildings flood abutments were placed upstream or against the mill. The center of gravity of the mill rested over the center of the foundation and the entire building rested on a deep foundation dug below the frost line.

The interiors were arranged for functional tasks. Some mills had a series of trap doors for hoisting sacks and materials through the floor. The top floor was for storage of sacks of unprocessed grains, which were hoisted directly from the delivery wagon. From the top floor grain could be poured into the hopper and stones on the floor below. At the very bottom were gears and shafts; the wheel was usually out of doors, but sometimes the mill was built directly over the sluice with the wheel inside.

The last stage of milling was bolting or sifting of flour into grades. The bolting machine consisted of a long rectilinear frame holding a long revolving hoop. The hoop was covered with fabrics or screens of varying weave and were slightly tilted. At the end where the flour was introduced a fine fabric sifted only the powdery flour. At the other was the coarse weave that sorted the bran.

the flour was introduced a fine fabric sifted only the powdery flour. At the other was the coarse weave that sorted the bran.

In the early 1800s, Oliver Evans invented the elevator, conveyor, drill, descender, and hopper-boy. These conveyances eliminated the need for manually transporting the grain and meal throughout the mill. All of these devices could be run off the wheel with appropriate gearing. The wheel instead of being hand-turned could also be driven by bolters. Bolters were sieves used to produce the various grades of flour and to eliminate sand, grit, and other impurities.

The Millrace

Other common features of mill sites that endure the passing of time are millraces, also known as penstock. The headrace directed water from the millpond to the mill, while the tailrace returned the water to the stream after the wheel had been turned. The race is a ditch, trough or sometimes a metal pipe that carries water from the millpond to a sluiceway where the water flow can be regulated. Whether constructed as ditches cut into the earth, cement troughs or metal pipes, or millraces, they are easily recognized features of mill sites.

The mill extended from the dam on the stream where the water was impounded and diverted by a head gate into the race, to a point where the tail-race joined the stream and carried the water on its normal course after passing through the mill. The distance covered may have been a half-mile or more.

The depth of water in the millrace varied from one to five feet depending upon the amount of water needed to ensure a fall at the wheel. Because the millrace would become silted every few years, the mill would be shut down and the race drained and cleaned.

Situated between the headrace and the tailrace was the mill wheel. Several types of wheels were used at water-powered mills. There were vertical and horizontal wheels, overshot and undershot wheels, breast wheels, tub wheels and the more efficient modification turbines. However, with the exception of the turbine, waterwheels rarely survive through time because they were typically made of wood and were frequently exposed to water. Structural elements of the mill, such as millstones and cast iron gears and shafts, were made of more durable materials.

The Mill Dam

Milldams were built with basic considerations in mind. They were constructed so that the water tumbling over them could not undermine their foundations at the lower side. They were also constructed so that heavy logs or other debris floating down river did not catch against any part, but instead would slide over easily. The dams were designed so that the pressure or force of the current would reinforce the dam's strength. The abutments were built high enough to prevent overflow in time of freshets. The dam and mill were set a sufficient distance apart so that the dam would not raise the water level on the mill, even in time of flood.

Dams that were built of stone survive the weathering of time and water. Occasionally wooden dams survive if they have remained more or less underwater.

The Mill Pond

Sometimes a poor location resulted in an unpredictable water flow to the mill. One way to overcome this problem was to build a diversion dam that would create a millpond.

The Waterwheel

Overshot, breast, and undershot waterwheels were commonly used. Overshot wheels, the most preferred type, received water from a flume positioned directly above the wheel. Overshot wheels are most effective with falls of 15 to 35 feet and less effective with falls of eight feet or less. An overshot wheel rotates forward with the weight of the water filled buckets, and after one third of a revolution, the water is spilled from the wheel. The water striking the wheel gives it the initial momentum, but the weight of the water in the buckets keeps the wheel turning and the millstones grinding.

Undershot wheels receive water beneath the wheel. They are not driven by gravity but by the impulse action of water flowing against the paddles. They can develop as much as 60 percent of the potential power of the water, but are limited by the velocity of the stream.

Breast wheels receive power midway between the top and bottom of the wheel, operating by gravity. They require a large portion of the total fall to be used as head. Breast wheels turn with the direction of the stream flow giving them an advantage over overshot wheels in times of high water in the tallrace, as the breast wheel does not have to work against the current.

A very old variant of the waterwheel was the horizontal wheel by which power was transferred vertically from the shaft to the stones. The horizontal wheel eventually evolved into the turbine, which in 1842 was the last development in the history of water milling with the introduction of the turbine into the United States. Turbine mills became popular in the following decades and by 1880 they were the most popular wheel in general use. Turbines could develop 80 percent or more of the useful effect of the water, being able to utilize the full head. An 11.5-inch turbine could give more power than a 22-foot overshot wheel.

The Mill Gears

Power to operate the mills was relayed from the waterwheel to the capstone by gears. The early mills had no line shafts with belt operated equipment. Early gears were made of hardwood, usually oak. By the early nineteenth century wooden gears were replaced by cast iron.

For vertical waterwheels, the waterwheel was paralleled by another large wheel attached to the same shaft. The parallel wheel was called a face wheel. It meshed with a much small gear called the lantern gear, which turned a vertical shaft. The meshing of these two gears translated the vertical power of the waterwheel into the horizontal action needed for stones.

The Millstones

Millstones were arranged in pairs, the upper 'runner stone' rotating above the lower fixed 'bed stone.' Sizes varied but a diameter of about four feet came to be generally accepted as standard. A four-foot diameter stone could weigh over a ton when new and functioned most efficiently at a speed of 125-150 revolutions per minute.

Early stones were made of local material, later stones from imported granite and sandstone. ¹ French buhrstone was considered to be the best material for a grindstone. It was exported to American in pieces that were fitted and cemented together then bound with iron hoops and backed with plaster.

The runner and the bed stone had to be furrowed. Furrows were cut patterns on the bottom of the runner and on the top of the bed stone. The area left uncut between the furrows was called the land. The land or flat area was used for the actual grinding of the kernel into flour. Early furrow patterns were sickle shaped, later ones were made with a variety of straight-line designs. Different furrow patterns were used for grinding different types of grain. The edges of the furrows functioned like the blades of scissors, ripping off the grains outer husk. The furrows also channeled the ground flour to the edge of the stone and they also allowed air to pass through to carry out the heat generated by the friction.

¹ Tuomey, Report on the Geology of South Carolina, p. 290. "Silicified shell beds of Barnwell, near Cedar Creek, furnish excellent materials. Pieces may be found that agree exactly with the French buhrstone, French burr millstones are made of from 16 to 20 pieces cemented together and bound by iron hoops. Also near Dean Swamp, Orangeburg, a bed of close-grained siliceous rock was is explored for millstones, but nearly all those that are not imported are procured from the coarse granites."