

Heritage Education Plan
Bollinger Mill State Historic Site
Burfordville, Mo



Table of Contents

Goals and Objectives p. 3

The Bollinger Mill: A Historical Summery p. 4-5

Show Me Standards p. 6-8

Glossary p. 8-10

Specific Resources for Further Study p. 11

Visiting the Bollinger Mill p.12

Group Tour Information p.13-14

Goal:

This program will acquaint you with The Bollinger Mill and The Burfordville Covered Bridge.

Objectives:

Teachers using this Heritage Education program will find out why this Gristmill, located on the White Water River in Southeast Missouri, is a rewarding topic of study and interesting site to visit for school classes of a variety of education levels.

This program supports criteria in Missouri's Show Me Standards of Social Studies, Science, Math, Communication Arts, and Health/Physical Education.

The Bollinger Mill: A Historical Summary

George F. Bollinger was born 1770 in Tryon County, North Carolina to parents Henry and Elizabeth Bollinger. He was the eleventh descendent of a family of twelve. George learned milling at a young age by helping his father run his Gristmill in North Carolina. When George came of age he and a friend, John "Moose" Mussgenug decided to explore the west. In 1796 the pair arrived in, Cape Girardeau, a Spanish post in the upper Louisiana Territory. It was here that George met a Spanish Land Commandant known as Louis Lorimer. Louis Lorimer hoped to bring more settlers to the area and offered George up to 640 arpens of land to every family he could bring to settle the area. George accepted the challenge, parted ways with John Moose, and returned to North Carolina. After returning to North Carolina in 1798, George married a woman named Elizabeth Hunsucker on her 18th birthday. The couple soon had a daughter named Sarah. George gathered 20 families to return to the Cape Girardeau area; however, Elizabeth was too ill to make the trip so she and their daughter Sarah remained in North Carolina. Elizabeth never recovered from her illness and died soon after George had left for the Louisiana Territory. George and the 20 families were all given the land promised to them by Louis Lorimer. In 1800, George built a wood grist mill and dam on the Whitewater River, which he eventually rebuilt with limestone in 1825. George successfully ran his gristmill up until his death in 1842. Upon his death, his daughter Sarah took over the milling business with her two oldest sons Samuel and George Frederick Daugherty. The family continued to run a very successful milling business going into the Civil War. During the Civil War the family helped the Confederate army by supplying material support such as flour and cornmeal. The Daugherty brothers were also suspected of being part of a group of Confederate sympathizers that shot at a union supply wagon. In retribution for both of these acts, two Illinois regiments burned the mill to the ground in late August/early September of 1861. The damages from this put the family into massive debt and they had to sell all their land to recoup the losses.

In 1866 Burford bought the destroyed Bollinger Mill and the 1,200 surrounding acreage from Sarah Bollinger Daugherty. In 1867 Burford rebuilt the mill, using the surviving limestone foundation he add-on 3 additional brick upper stories. This new mill was fitted with more advanced technology such as a Leffel Vertical Left-hand turbine to power the mill as opposed to the traditional water wheel. By 1870, Burford's mill was producing \$28,450 in flour and meal annually. In addition to the mill Burford also operated a 1,300 acre farm where he grew various crops such as corn, oats, wheat, and raised some livestock, however much of his wealth was on paper. By 1879, Burford was so far in debt he had to find a business partner to help run and pay for the mill. In the

mid-1880's Burford defaulted on his loans and the mill was sold at a sheriff's auction to the highest bidder.

By the turn of the century Cape County Milling Company had purchased the mill to add to their regional milling operation. Bollinger Mill, as it is called today, was Cape County Milling Company's third mill, known simply as Mill C. Cape County Milling Company operated until 1953. They sold Mill C to the Vandivorts, who used the mill for storage. By 1961, the Vandivorts gifted the mill to a local historical society who gave it to the Missouri State Park Service in 1967.

Show Me Standards:

For those Concerned with developing activities that help meet the requirements of the 1996 Show Me Standards, a visit to the Bollinger Mill State Historic Site or class time devoted to the Bollinger Mill and the Burfordville Covered Bridge can address at least these standard performance requirements.

Social Studies

#2. Continuity and change in the history of Missouri, the United States, and the World

(i.e. George F Bollinger helped to develop the southeastern region of Missouri as a territory and eventually helped Missouri to become a state in 1821. He was a member of both the Missouri House and Senate.)

#4. Economic concepts and principles

(i.e. Grain milling was and remains a very important business. There are two main economic models for gristmill's, cash mills and toll mills. A cash mill is a mill in which the miller buys grain to mill flour and then sell the flour for money. A toll mill is a mill in which the mill keeps an agreed upon amount of the product as payment.)

#5. The major elements of geographical study and analysis and their relationships to change in society and environment

(i.e. The geographic location of the gristmills is very important. Being on a river meant the mill had a free power source. This power source would be used to operate all the machines in the mill, allowing for higher profits.

Having a gristmill on the White Water River brought many more settlers to the area because it allowed them to process their grain into flour and cornmeal.)

#6. Relationships of the individual and groups to institutions and cultural traditions

(i.e. The relationship between mill and farmer was a very important one. Farmers would often bring their entire families to the mill. The farmer would trade his grain for flour, the children would play in the river, and the wives would gossip with other members of the community sharing stories and the news.

During the Civil War Missouri was split between Union and Confederate supporters. George F. Bollinger's grandsons Samuel and George Frederick Daugherty were on the Confederate side, their allegiance to the south ultimately led to the Union burning down the mill during the American Civil War.)

Science

#1. Properties and principles of matter and energy

(i.e. The water wheels and water turbines that gristmills use to power their machines convert matter (water) into energy. This process is completed using a drive shaft connected to a water wheel or turbine to turn pulleys on various line shafts. The pulleys have belts attached to them that transfers the energy from the line shaft to the various machines in the gristmill.)

#2. Properties and principles of force and motion

(i.e. The water turbine, drive shaft, and line shafts are great examples of how force and motion can be harnessed to create energy.)

#8. Impact of science, technology, and human activity on resources and the environment

(i.e. Technological development: Oliver Evans, known as the father of automation, invented the fully automated milling system. This system uses water power, drive shafts, line shafts, pulleys, and belts to power various machines that increase production and profits in the milling industry.

Environmental science: using water as a power source is a sustainable power source that has little impact on the surrounding natural resources.)

Math

#1. Addition, subtraction, multiplication, and division; other number sense, including numeration and estimation; and the application of these operations and concepts in the workplace and other situations

(i.e. Millers weighed the grain to place a value on it. The heavier the grain the less it was worth because heavier wheat meant it contained more moisture, which is bad for milling. Miller would have to establish exchange rates based upon differing weights and qualities of grain.)

Communication Arts

#3. Reading and evaluating nonfiction works and materials

(i.e. The Bollinger Mill offers a large selection of education panels describing various machines and processes in the mill.)

#5. Comprehending and evaluating the content and artistic aspects of oral and visual presentations

(i.e. The guided tour our site offers is a great example of how oral history can be presented using artifacts.)

#6. Participating in formal and informal presentation and discussions of issues and ideas

(i.e. The guided tour our site offers is an informal presentation that often creates discussion on various historic issues and ideas as well as modern ones.)

Health/Physical Education

#3. Diseases and methods for prevention, treatment and control

(i.e. Millers lung also called farmer's lung, is a lung disease caused by inhaling flour dust or any other agricultural products. Gristmills had dust collectors that would help control the amount of dust in the area, helping to prevent this type of lung disease.)

Glossary:

Auger: Augers are an Archimedean screw inside a trough that, when rotated, push the contents of the trough from one end to the other. Many machines used auger to collect and move stock to an exit spout. Augers were also used for moving material from one place in the mill to another when there was not enough elevation to use gravity flow.

Covered Bridge: Covered bridges were an important innovation because they allowed for wooden bridges to last far longer than non-covered bridges. By covering a bridge the inside of the bridge is protected and only the cover is affected by outside forces such as rain and sunshine.

Dam: A dam creates a drop in the water, making a more powerful current to power the water turbine.

Drive Shaft: A drive shaft is the connected to the water turbine and is used to transfer the energy generated from the water turbine to a horizontal line shaft.

French Buhr Millstone: French Buhr millstones mined from a specific quarry in France are prized for their hardness. The quartz in the stone provides the hardness that allows them to remain sharp for a very long time. These 42" diameter stones are used for producing cornmeal. Corn is poured into the center of the upper "runner" stone and is ground between it and the stationary "bed" stone as the upper stone turns. Grooves or furrows cut in the face of each stone create a shearing action as they cross over each other.

Grain Elevator: Grain elevators used vertical belts with small buckets attached to continuously move grain up to different levels of the mill.

Gristmill: A mill for grinding grain, especially the customer's own grain.

Line Shaft: A line shaft, connected to the drive shaft by a set of bevel gears, has many belts connecting it and individual machines powering them.

Middlings: A product of the wheat milling process that is not flour; they are used to make fodder for livestock and pets

Middlings Purifier: The middlings purifier is designed to separate material by weight. As middlings pass over an inclined vibrating sieve, a current of air flowing up through the screen causes the lighter unwanted shorts to float toward the end of the sieve and tail over. The desired middlings, being heavier than shorts, pass through the sieve and continue on to the next process.

Reel Sifter: Reel sifters have a long cylinder running its entire length. Ground grain enters the upper end of the slightly tilted cylinder as it rotates. The finer flour or meal sifts through to an auger below and the tailing or coarser products exit from the opposite end.

Roller Mill: As milling technology advanced, millstones were replaced by roller mills, improving the quality of the mill's flour and increasing its production capacity. The grain passes between two iron cylinders (rollers) turning toward each other at slightly different speeds. The difference in surface speed of the two rollers creates a shearing action that grinds the grain.

Scalper: A scalper performs the first separations after the initial grinding of the wheat. The throughs went to a reel or sifter for grading. The Tailings would end up in feed or be ground again in another roller mill.

Scouring Machine: This machine was used to remove the beard from the end of wheat kernels and clean the dust from the crease. Foreign material was then blown into the tubular dust collector.

Sieve: An instrument with a meshed or perforated bottom, used for separating coarse from fine parts of loose matter.

Separator: After a load of grain is tested and weighed, it is elevated up to a separator. The separator gives the wheat a preliminary cleaning, removing foreign substances such as straw, sticks, and stones. The grain then falls into sieves with different sized perforations. The wheat passes through the first, while larger particles tail off. The last screen has smaller perforations

than the wheat. Smaller particles fall through and the wheat tails off. As the wheat falls, it is subjected to a current of air that draws the chaff and dust into the dust collectors.

Shorts: Wheat Shorts consist of fine bran particles, germ and a small portion of floury endosperm particles as separated in the usual process of commercial flour milling.

Tailings: Residue separated in the preparation of various products (such as wheat or ore)

Tubular Dust Collector: This machine has a number of cloth tubes arranged in rows around a rotating cylinder. The tubes are open to the center and dust-laden air entering the cylinder passes into the tubes allowing the debris to be captured there. Every time a row of tubes reaches the top of the rotation a hammer strikes the wooden bar joining the end of that row together causing the contents to drop into a trough. An auger moves the material to a spout to be carried downstairs to be discarded

Vertical Bran Duster: This machine consists primarily of a screen-covered cylinder rotating a vertical axis. A brush rotating very rapidly inside the cylinder throws bran against the screen and any flour still clinging to the bran passes through to be collected separately.

Water Turbine: Water turbines, used to power the machines in the mill, are powered by opening a series of louvers around the outside of the machine. The louvers control the flow of water through the turbine.

Specific Resources for Further Study:

Construction of Mill Dams – James Leffel

James Leffel's, *Construction of Mill Dams*, describes the materials and uses of various types of mill dams as well as how they are constructed.

Finding Julia – Kaye Smith Hamblin

Hamblin's book, *Finding Julia*, dives into the Bollinger family tree as it expands from George Fredrick Bollinger. Her book also covers some 19th century Missouri history.

The Gristmill – Bobbie Kalman

Bobbie Kalman's childrens book, *The Gristmill*, outlines the importance of gristmills as well as an overview of how they are built and run.

Millstone Manufacture in Virginia: Interviews with the Last Two Brush Mountain Millstone Makers – Charles D. Hockensmith

Millstone Manufacture in Virginia is a book that describes how millstones are made from quarry to mill.

Textile Bags – Anna Lue Cook

Anna Lue Cook's book, *Textile Bags*, discusses the evolution of the textile bag from the traditional 196 lbs. flour barrel to the cotton and paper bags of today. She also describes the development of clothing from textile bags in the early 20th century.

Practical Milling – B.W. Dedrick

Practical Milling, by B.W. Dedrick is a technical manual to all things milling, this book discusses in detail everything someone may want to know about milling grain and the machines that are used to do so.

The Young Mill-Wright and Miller's Guide – Oliver Evans

Evans' book, *The Young Mill-Wright and Miller's Guide*, describes the inner workings of the milling especially the automated milling system that he created in the 19th century.

Visiting the Mill:

Before your Visit

Have the students find the Bollinger Mill on a Missouri Road Map. Ask them why they think it was built so close to a river?

Ask the students about how often they eat bread.

Teach them about Gristmills and why flour milling was so important to early settlers and continues to be important today.

Show the students a picture of the Burfordville covered bridge, and ask them why they think people built covered bridges. (see glossary: *covered bridge*)

Group Tour at the Bollinger Mill

The tour of the Bollinger Mill discusses Milling as it evolved in the 19th century and into the 20th. (See *Show Me Standards*)

Suggestions for After your Visit

Ask students how the mill compared to their previous ideas of what a Gristmill was. If they had no previous ideas discuss how food is processed from field to table. Did the students know so much work went in to making bread?

Ask the students about the Burfordville covered bridge and why they think that modern bridges are not covered. (Modern bridges are constructed of concrete and steel and do not weather as quickly as historic wood bridges)

Group Tour Information:

Bollinger Mill State Historic Site

113 Bollinger Mill Rd

Burfordville, Mo 63739-9031

Phone: (573)-243-4591

FAX: (573)-243-5385

E-Mail: BollingerMillStateHistoricSite@dnr.mo.gov

Web Site: <https://mostateparks.com/park/bollinger-mill-state-historic-site>

Hours

On-Season (March 16th - November 14th)

Mondays-Saturdays: 10 A.M. – 4 P.M.

Sundays: 12 P.M. – 4 P.M.

Off-Season (November 15th – March 15th)

Mondays: 10 A.M. – 4 P.M.

Closed Tuesday-Wednesday

Thursday-Saturday 10 A.M. – 4 P.M.

Sundays 12 P.M. – 4 P.M.

Schedule a group tour by contacting Bollinger Mill State Historic Site. Tours run approx. 45-60mins.

Admissions (*15+ person Group rates available upon scheduling a tour*)

\$5 for 18+

\$4 for 6-17

Free for Under 6

ADA Accessibility

Bollinger Mill State Historic Site guided tour is not wheelchair accessible, however a flip book of all the interpretive panels is available on the ground floor of the mill. Restrooms have handicap parking and accommodate wheelchairs.

Restrooms

Bollinger Mill has two sets of single occupant pit latrines located in the day use area.

Parking

The day use area has three separate parking lots and can accommodate school buses.

Day Trips

If your group plans to be here for several hours, a picnic lunch might be desirable. Bollinger Mill State Historic Site's day use area offers many picnic tables and barbeque grills.