National Park Service
U.S. Department of the Interior

Mississippi National River and Recreation Area

Journey to the Falls Teacher's Guide

grades 4-6

Mississippi River classroom activities
and educational resources

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Journey to the Falls Teacher's Guide is coordinated by:

Mississippi National River and Recreation Area
(National Park Service)

Partners:
Minneapolis Park & Recreation Board
Minneapolis Queen Riverboat
Minnesota Center for Book Arts
Minnesota Historical Society (Mill City Museum)
Mississippi River Fund
U.S. Army Corps of Engineers

2012

Journey to the Falls
Teacher's Guide 2012

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Journey to the Falls Educational Partners

Journey to the Falls Coordinator

Mississippi National River and Recreation Area,
National Park Service
A 72-mile corridor of river and land extending through the Twin Cities metropolitan area was designated in 1988 as the Mississippi National River and Recreation Area (MNRRA) to represent the national significance of the Mississippi River. This National Park unit works with numerous partners to preserve, protect and enhance the historical, cultural, natural, scientific, economic, recreational and scenic resources of the corridor. Journey to the Falls (JTF) introduces young students to these resources in the Minneapolis area. On JTF field trips National Park Rangers present learning experiences about the geological and human forces of change on the river. MNRRA staff also provides overall coordination for Journey to the Falls.

Educational Partners

Mill City Museum, Minnesota Historical Society
Mill City Museum opened in 2003 as the latest addition to the Minnesota Historical Society's network of museums and historic sites. Built within the ruins of the National Historic Landmark Washburn A Mill, Mill City Museum creates opportunities to discover the people and industries that built Minneapolis, transformed a region and influenced our world. It is located on the Minneapolis Riverfront just a short walk from the Mississippi River's only significant waterfall, the Falls of St. Anthony. On Journey to the Falls field trips, Museum staff will conduct an activity onboard the riverboat and as well as a hike near the museum and on the Stone Arch Bridge.

Mill Ruins Park, Minneapolis Park & Recreation Board (MPRB)
Mill Ruins Park is a relatively new addition to the Minneapolis Park system. Opened in 2001, the park is located immediately adjacent to the Mississippi River at the west end of the Stone Arch Bridge in downtown Minneapolis. In its heyday, this area of mills, canals, and other historic features was the center of Minneapolis' booming 19th century flour industry. Well-known companies, including Pillsbury and General Mills began here. Many immigrants began their new lives in America working here as well. The park features partially revealed mill ruins and the restored tailrace, walking paths, and fabulous views of the river, the downtown skyline, and adjacent mill buildings. On Journey to the Falls, MPRB interpreters provide an archaeology activity.

Minnesota Center for Book Arts (MCBA)
MCBA is a nonprofit arts organization working to engage diverse artists and learners in finding creativity, expression and inspiration through the book arts. MCBA provides classes in the arts of papermaking, letterpress printing, printmaking and bookbinding for youth, families and adults. Youth workshops engage youth (preK-12) in hands-on bookmaking experiences, with a focus on building creativity and literacy through arts-infused learning. In MCBA's studios and school classrooms, students explore papermaking, printing and bookbinding and create their own book artwork. In-school residencies provide deeper arts-infused learning experiences for students and are customized to fit classroom curriculum. MCBA's teacher workshops provide instruction in basic techniques and integration of book arts into classroom curriculum. MCBA regularly presents customized programs at teacher conferences and school in-service days. For Journey to the Falls MCBA provides teachers with instruction on journal-making as a keystone preparation for field trip experiences.

The Riverboat "Minneapolis Queen"
The Minneapolis Queen, christened in 2005, provides both public tours and private charters for groups from 40-125. The Minneapolis Queen is a state of the art vessel, meeting all of the U.S. Coast Guard regulations for passenger safety and comfort, yet boasts a decor of years gone by. As you travel on the Mississippi River through downtown Minneapolis by the famous St. Anthony Falls you feel the rich history of this city built from the river and the falls. The century-old mills are still present. The downtown area is a mecca for visitors and residents, providing outdoor recreation and historical activities. On their "Journey to the Falls" field trip aboard the Minneapolis Queen, students will learn about America's greatest river, and discover the heart of Minneapolis and it's history.

U.S. Army Corps of Engineers, St. Paul District
A branch of the United States Army, the Corps of Engineers provides a variety of services for the country, including management and operation of river navigation systems for water transportation. The Corps maintains navigation channels much like road crews maintain highways. In the 1930s Congress mandated that the Corps construct a system of navigation locks and dams on the Mississippi River so vessels can transport goods upstream of St. Louis, MO. Today a 9-feet-deep navigation channel utilizing 29 locks and dams is maintained on the Upper Mississippi River. Dams hold back water to form deeper navigation "pools," and river vessels use a series of locks to "step" up or down the river from one water level to another. On Journey to the Falls field trips, students will be introduced to how this system works and the role the Corps has played at Saint Anthony Falls.

Program Support

Mississippi River Fund, National Park Foundation

The Mississippi River Fund's mission is to strengthen the enduring connection between the people and the Mississippi River by restoring, preserving, and encouraging exploration of the Mississippi National River and Recreation Area (MNRRA). This is done by raising and granting funds in support of MNRRA's education and stewardship programs, increasing awareness of our National Park and the Mississippi River, and making strategic grants to support innovative partnerships. The Fund provides funding support for the Journey to the Falls program, including scholarships, teacher workshops, and educational components.

1.
Classroom Activities

Pre and post visit
Mississippi River classroom activities

1. Waterfall on the Move
2. Lumber and Sawmilling
3. Explorers
4. How a Mill Works
5. Archaeology
6. Journal Making
7. Big River Art Contest
8. Surf the River at St. Anthony Falls

A Waterfall on the Move
An Overview of Three Activities

Overview
The following three activities about St. Anthony Falls and Mississippi River geology will prepare students for their Journey to the Falls experience; Mississippi River Bluff Strata, St. Anthony Falls from 1680-1876, and Map the River in the Twin Cities. Each activity can stand alone but the three activities combined will best prepare students for their Journey to the Falls experience. The activities build upon each other and provide context for what the students will see and learn on the boat. The "Mississippi River Bluff Strata" activity sets the stage for the other two activities and should be done first followed by St. Anthony Falls from 1680-1876 and Map the River in the Twin Cities.

Overview of the three activities

Part 1- Mississippi River Bluff Strata
This activity gives students the background to understand how the geology of the river determined the course of the Twin Cities. In this activity, students learn about the three types of sedimentary rocks found within the river bluffs. Students will understand how the bottom layer of soft sandstone was eroded by a rushing waterfall causing the harder top layers to collapse with the result of the waterfall moving upstream. In its wake, the waterfall left rock debris in the river making navigation difficult between St. Paul, where the Falls originated, and its present location of St. Anthony Falls in Minneapolis. St. Paul was established as a port city, a safe place to land steamboats before the fallen rocks and rapids upstream made travel on the river too difficult. Minneapolis began because of its location offering waterpower provided by St. Anthony Falls.

Part 2- St. Anthony Falls from 1680-1876
How do we know how much and how fast St. Anthony Falls moved? This measuring activity describes N. H. Winchell and his use of St. Anthony Falls location information provided by early explorers. As a geologist, Winchell examined the river bluffs, read early explorers journals then developed a map to show St. Anthony Falls' recession. The map records both the natural recession of St. Anthony Falls as well as increased recession due to human-made changes at the Falls. Human impact increased the rate of recession at the Falls because the dams built to channel the river to the saw and flour mills on each river bank often left little water flowing over the Falls. Limestone is quite porous and became vulnerable to the freeze-thaw cycle in winter. Often logs escaped from log booms battered the fragile limestone accelerating the recession.

Part 3- Map the River in the Twin Cities
In this activity, students map various features on a map of the Mississippi River. There are 14 different mapping items for students to complete. If students are unable to complete all items, it is strongly recommended that they complete numbers 1, 2, 4, 7, 8 and 9 of this worksheet with #8 being the most important. Students will travel the section on this map between the Lower St. Anthony Falls lock and Broadway Avenue.

A Waterfall on the Move

Part 1: Mississippi River Bluff Strata

Objective: Students will learn the names and characteristics of three sedimentary rocks found along the Mississippi River in the Twin Cities. Students will understand the role these rocks played in combination with a Glacial era Mississippi River in the development of the Twin Cities.

Grade Level: Grades 4-6

Time required: 30-45 minutes

Materials:

- At least one set of sandstone, shale and limestone rock samples
- Worksheets titled "A Waterfall on the Move: Part 1 Mississippi River Bluff Strata,"
- *River of History*, chapter 1, available as a pdf at: http://www.nps.gov/miss/historyculture/collections.htm,
- *First Came the River* (pgs 3-5)
- Army Corps of Engineers publication, *Engineering the Falls,* (http://www.mvp.usace.army.mil/docs/history/engineering.pdf).

Procedure:
First read through the following information. Make a copy of the student activity for individual or small groups of students or use a display method for whole class.

Answers are provided in the Teacher Guide.

Follow steps 1-6 in the Student activity.

Note:
Where can I get rock samples?
One good location to get both limestone and sandstone is at the entrance to Crosby Farm Park in St. Paul. The road slopes down into the park and small samples of limestone and shale are typically found on the left side when going down the hill. Limestone can represent the harder rock layers as shale is less available. Check with St. Paul Parks and Recreation to see if collection is allowed.

Limestone is visible on Bloomington Road near the entrance to historic Fort Snelling.

Sandstone is exposed on Shepard Road near the entrance/exit of 35E.

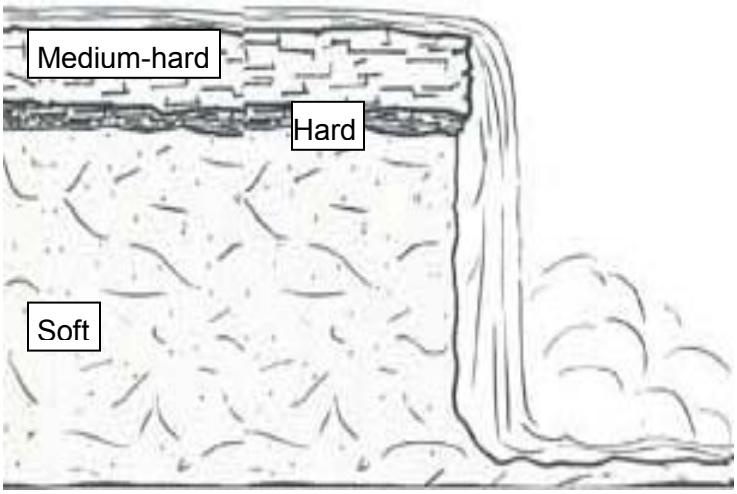
A Waterfall on the Move
Part 1: Mississippi River Bluff Strata

Imagine a waterfall a mile wide and 200 feet in height. The waterfall would be as tall as a 20 story building and so wide that it would take a half-hour to walk from one side to the other! Almost 12,000 years ago, a waterfall of that size was in downtown St. Paul.

What happened to the waterfall?
The answer to that question is found in the rock layers (strata) of the Mississippi River bluffs between Minneapolis and St. Paul. Geologists tell us that over 450 million years ago ancient seas deposited layers of sediment that eventually formed three types of sedimentary rock; sandstone, shale and limestone. As the glaciers began melting 11,700 years ago, the meltwater made its way to the Twin Cities in a river called Glacial River Warren. Near downtown St. Paul the river fell over a cliff made up of the three sedimentary rock layers. This 200 foot high, mile wide waterfall, called River Warren Falls, eventually moved 10 miles upstream to become St. Anthony Falls.

How did the waterfall move?
1. Examine the classroom set of rocks- compare the hardness and color of each rock. Do any rocks have fossils? Could water wear away any of the rocks?

2. Draw a line to connect the name of each rock with where it is found in the river bluffs. Hint! Use the rock hardness and color to match the rock to the descriptions below.



Limestone
A sedimentary rock composed of calcium carbonate deposited by the remains of marine animals. Often contains fossils. Usually yellowish or light grey in color.

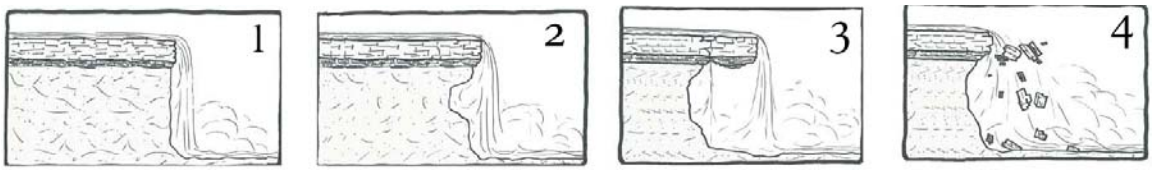
Sandstone
A sedimentary rock composed of sand-like grains of quartz, often yellow but sometimes white, tan or red.

Shale
A sedimentary rock composed of mud, clay, or silt often containing fossils. Usually medium grey in color.

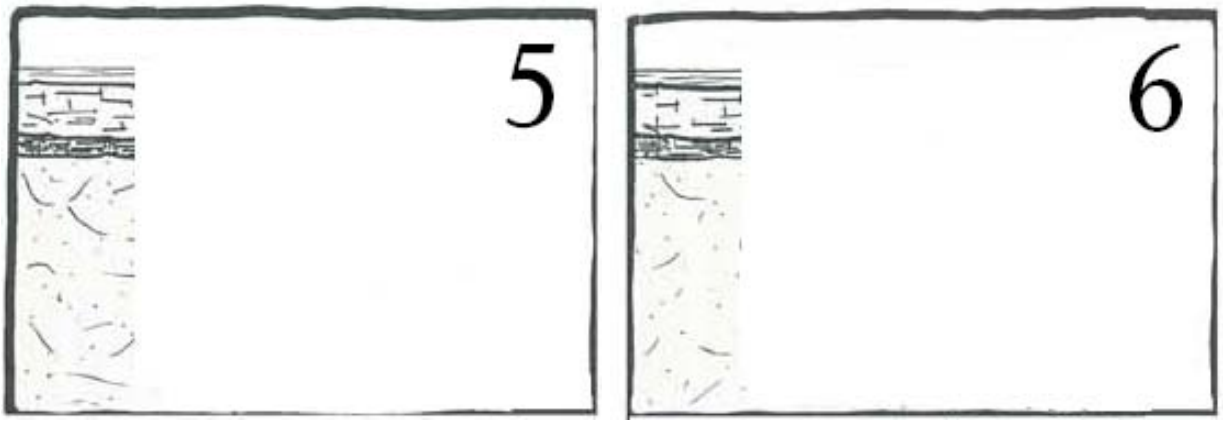
3. Think about this- notice the softest rock is on the bottom. Did you think water could wear away the softest rock?
(Go to next page)

A Waterfall on the Move
Part 1: Mississippi River Bluff Strata

4. Look at pictures 1 – 4 to see what happened as the waterfall eroded the soft rock on the bottom layer.



Draw what you think will happen next in pictures 5 and 6. Part of the rock layers are drawn in for you.



5. What role did the waterfall play in the history of Minneapolis and St. Paul?
With your class discuss the following:

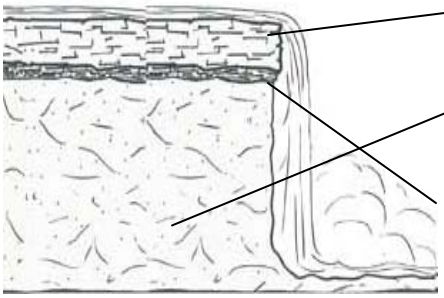
- What happened to the rocks after they broke off?
- For a boat traveling on the river in the 1850s, would it be easier to land at St. Paul or Minneapolis? Why?
- How did Minneapolis businesses near the river use St. Anthony Falls to their advantage beginning in the 1850s?

6. Write a short paragraph describing why there are the "Twin Cities" of Minneapolis and St. Paul.

A Waterfall on the Move
Part 1: Mississippi River Bluff Strata

1. **Time Travel** with your students! Have the class close their eyes while they listen to a description of River Warren Falls and the environment and animals that may have been around the Falls. The booklet, *First Came the River,* has a description of the environment on page 5.

2. Students should **examine** the three different sedimentary rocks found along the river bluffs. Notice the color of each rock, whether it is hard or soft (for a rock), and if there are fossils. After examining rocks, student will draw a line to connect the rock name and description with where it is found in the river bluffs.



Limestone
A sedimentary rock composed of calcium carbonate deposited by the remains of marine animals. Often contains fossils. Usually yellowish or light grey in color.

Sandstone
A sedimentary rock composed of sand-like grains of quartz, often yellow but sometimes white, tan or red.

Shale
A sedimentary rock composed of mud, clay, or silt often containing fossils. Usually medium grey in color.

3. **Discuss** as a class the process of the recession of St. Anthony Falls. The recession process and riverfront geology is described in *River of History*, chapter 1, available as a pdf file at: http://www.nps.gov/miss/historyculture/collections.htm
Additional recession information can be found in *First Came the River* (pgs 3-5) and the Army Corps of Engineers publication, *Engineering the Falls,* (http://www.mvp.usace.army.mil/docs/history/engineering.pdf).

4. **Students should draw what they think pictures 5 and 6 might look like.**

Picture 5 might look like one of these drawings:

Picture 6 should look like this:

5. **Discuss** with the class the role the waterfall played in the history of Minneapolis and St. Paul.

6. Students will **write** a paragraph describing why there are two cities close to each other; the Twin Cities of Minneapolis and St. Paul.

A Waterfall on the Move

Part 2: The Recession of St. Anthony Falls- 1680 to 1876

Objective:
The student will calculate the distance and rate of recession of St. Anthony Falls between 1680 and 1876 using a map developed by N. H. Winchell in the 1870s. The student will graph the recession of St. Anthony Falls. The student will understand why St. Anthony Falls receded at different rates during different time periods.

Grade Level: Grades 4-6

Time required: 1 hour total; 30 minutes for calculations, 30 minutes for reading and discussion

Materials: Map developed by N. H. Winchell showing recession of St. Anthony Falls, calculator (optional), "A Waterfall on the Move: Part 2- The Recession of St. Anthony Falls" worksheets.

Resources for Teachers/Students:
First Came the River booklet

River of History
http://www.nps.gov/miss/historyculture/collections.htm

Engineering the Falls
http://www.mvp.usace.army.mil/docs/history/engineering.pdf

Forest Fields and Falls
http://discovery.mnhs.org/ConnectingMN/

Wheat Farms, Flour Mills, and Railroads: A Web of Interdependence
http://www.nps.gov/history/nr/twhp/wwwlps/lessons/106wheat/106wheat.htm

Journey to the Falls Student Activity

A Waterfall on the Move
Part 2: St. Anthony Falls from 1680 to 1876

When Father Hennepin visited St. Anthony Falls in 1680 it wasn't where it is today! Newton Winchell made a map to show the locations of St. Anthony Falls between 1680 and 1876.

Who was Newton Horace Winchell?

N. H. Winchell was a geologist and a very curious person. He came to Minneapolis in 1872 to work for the University of Minnesota. He was very interested in the geology of the Mississippi River between St. Paul and Minneapolis. As a geologist, Winchell knew some interesting facts about the river bluffs. He knew the bluffs were made of layers of sedimentary rocks and that St. Anthony Falls had receded (moved backwards or upstream on the river.)

But how far and how fast did St. Anthony Falls move? Winchell looked at journals and other records from early explorers such as Hennepin and Carver. He calculated St. Anthony Falls took about 10,000 years to move from Fort Snelling to downtown Minneapolis. Modern research says it took 12,000 years. Winchell was pretty close!

Today you can walk along a trail named after N. H. Winchell. The Winchell Trail in Minneapolis winds through parkland on top of, and past, the geology Winchell examined.

Student Activity

In this activity, you will use Winchell's map to calculate how far and how fast St. Anthony Falls receded between different years.

1. Find the numbers1-4 on the left side of the map. Draw a horizontal line from each number to the scale on the right side of the map. Make sure your line touches the dashed line (the top of St. Anthony Falls.)
2. Now you will make some calculations. Write your answers in the table.

- Calculate the number of years between the time periods listed in the table. Round off to the nearest ten.
- Calculate the number of feet the Falls receded between the time periods in the table. Round off to the nearest hundred.

	Number of years	Number of feet
▪ Hennepin (1680) and Carver (1766)		
▪ Carver (1766) and 1856		
▪ 1856 and 1876		
▪ Hennepin (1680) and 1856		
▪ Hennepin (1680) and 1876		

Graph it!

Use the map to plot the locations of St. Anthony Falls for these dates:

- 1680, 1766, 1856, and 1876.
- Was the speed of recession increasing, decreasing or staying the same from1860 and 1876?

_____

How do you know?

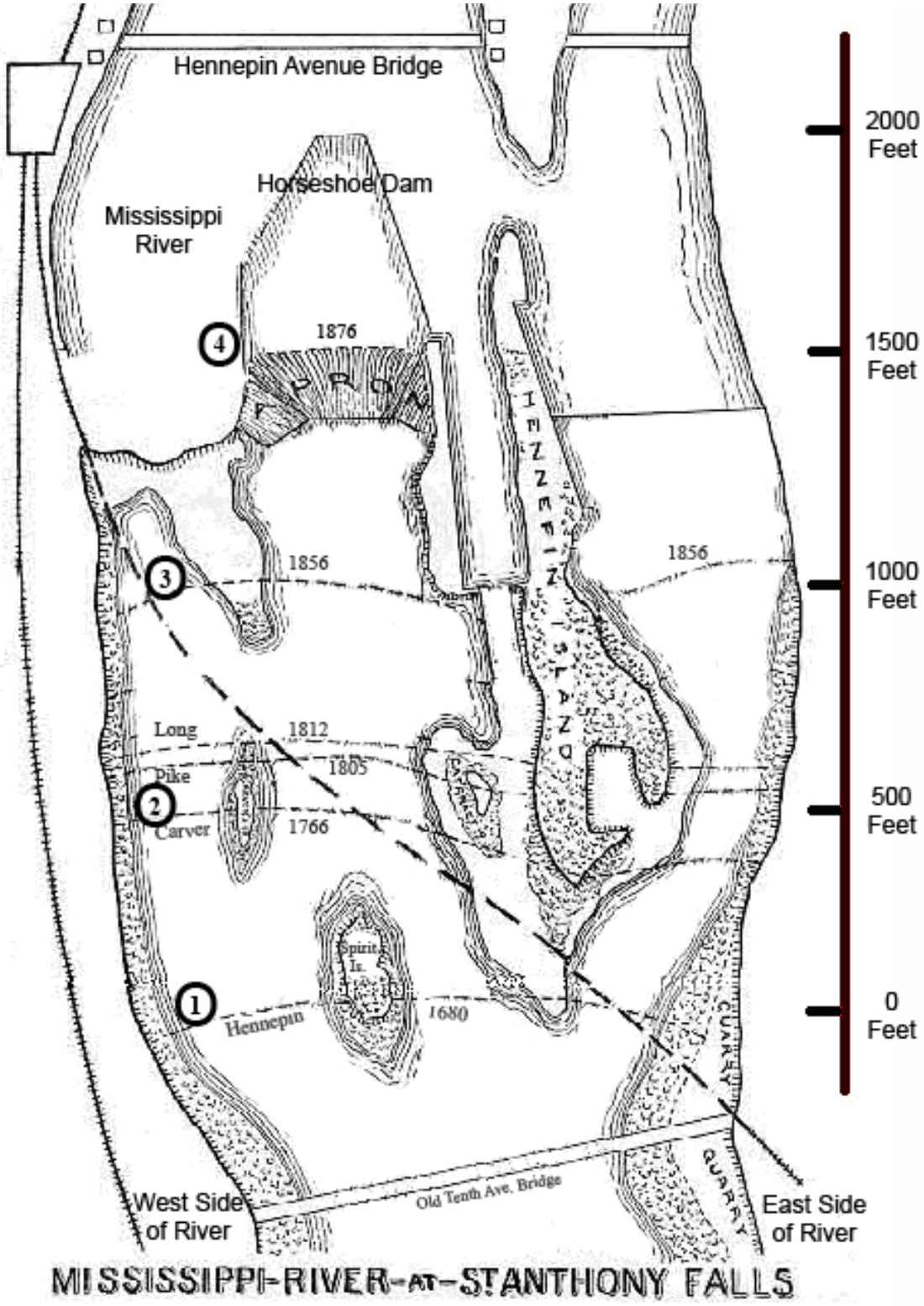
_____

Recession of St. Anthony Falls

Feet														
2000														
1750														
1500														
1250														
1000														
750														
500														
250														
0														
	1680	1700	1720	1740	1760	1780	1088	1820	1840	1860	1870	1880	1900	Year

Journey to the Falls Student Activity

<u>A Waterfall on the Move</u>
Part 2: St. Anthony Falls from 1680 to 1876



Use the booklet, "Engineering the Falls" to learn what was happening at St. Anthony Falls in the 1850s – 1870s. Discuss with your class. Your teacher may suggest other resources.

Journey to the Falls Teacher Guide

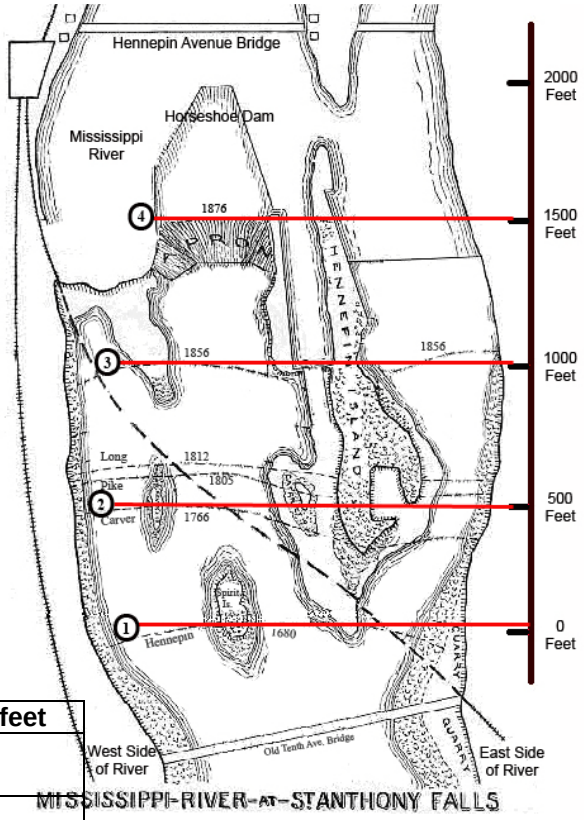
A Waterfall on the Move
Part 2: St. Anthony Falls from 1680 to 1876

Teacher Guide to Student Activity

In this activity, you will use Winchell's map to calculate how far and how fast St. Anthony Falls receded between different years.

1. Find the numbers1-4 on the left side of the map. Draw a horizontal line from each number to the scale on the right side of the map. Make sure your line touches the dashed line (the top of St. Anthony Falls.)
2. Now you will make some calculations. Write your answers in the table.

- Calculate the number of years between the time periods listed in the table. Round off to the nearest ten.
- Calculate the number of feet the Falls receded between the time periods in the table. Round off to the nearest hundred.



	Number of years	Number of feet
▪ Hennepin (1680) and Carver (1766)	86 (90)	500
▪ Carver (1766) and 1856	90	500
▪ 1856 and 1876	20	500
▪ Hennepin (1680) and 1856	176 (200)	1000
▪ Hennepin (1680) and 1876	196 (200)	1500

Graph it!

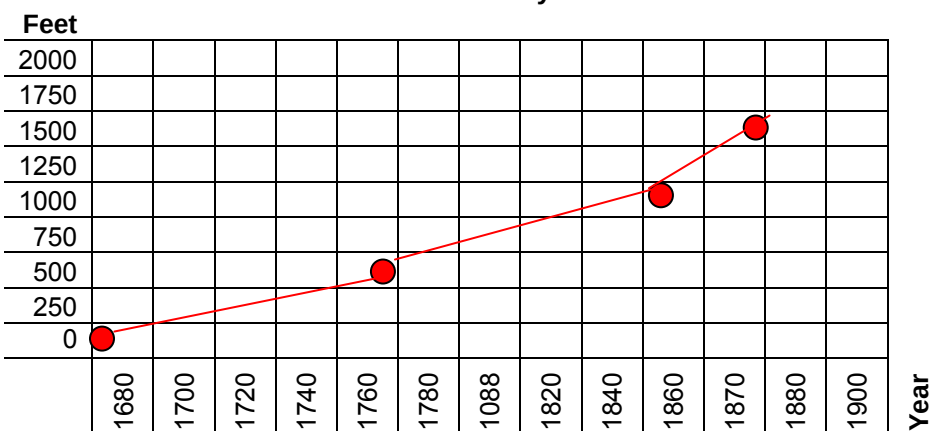
Use the map to plot the locations of St. Anthony Falls for these dates:

- 1680, 1766, 1856, and 1876.

Was the rate (speed) of recession increasing or decreasing? __increasing____

How do you know? ____the line goes up at a steeper angle in a shorter amount of time___

Recession of St. Anthony Falls



A Waterfall on the Move
Part 2: St. Anthony Falls from 1680 to 1876

1. Instruct students to **find number** 1 on the map. Students will **draw** a straight horizontal line from number 1 across the top of the Falls (the dashed line) to the scale on the right. The right side of the line will be near "0 feet." This marks where the Falls were located when Father Hennepin saw St. Anthony Falls in 1680. Repeat for numbers 2, 3, and 4.

2. Calculations

a.) Students will calculate the number of years between when Father Hennepin and Jonathan Carver saw the Falls, between when Carver saw the Falls and 1856, and between 1856 and 1876. Round off all numbers to the nearest ten. Students will write the answer to each calculation on the appropriate line in the "years" space on the left side of the map.
Answers: Hennepin and Carver- 86 years rounded up to 90, Carver and 1856- 90 years, 1865 and 1876- 20 years

b.) Use the scale on the right side of the map to calculate how many feet the Falls receded between the time periods below. Round off to the nearest hundred. Write your answers on the line.
Answers: Hennepin (1680) and Carver (1766) 500 feet, Carver (1766) and 1856 500 feet, 1856 and 1876 500 feet.
The rate (speed) of recession was increasing.

Bonus: If St. Anthony Falls continued to recede or erode at the same rate as it did in the 20 years between 1956 and 1876, where might you expect St. Anthony Falls 20 years after 1876 in 1896?
Answer: St. Anthony Falls would have moved upstream another 500 hundred feet, moving just past the tip of Nicollet Island and just downstream of the Hennepin Avenue Bridge. This is at, or very near, the end of the limestone layer under the Falls. Once the Falls moved past the limestone layer, the Falls would become a series of rapids. The capacity to harness the waterpower would be more difficult and the Falls would have moved past the infrastructure already developed to harness waterpower.

3.) Graph It!
Students will plot the locations of St. Anthony Falls' recession on the graph.
Answers: The speed of recession was increasing. We know this because the line goes up at a steeper angle in a shorter amount of time.

4.) Students will **read and discuss** the booklet "Engineering the Falls." This booklet describes what was happening at the Falls in the 1850s-1870s.
Synopsis: Both saw and flour milling increased rapidly beginning in the 1850s. A water canal was built in 1857 along the river to harness the power of the Mississippi River as it fell over St. Anthony Falls. Construction began in 1876 on an "apron" or covering to protect the Falls from erosion and further recession. Unfortunately the apron also meant the natural look of the Falls was gone. St. Anthony Falls has been in the same location since 1876.

Journey to the Falls Classroom Activity

A Waterfall on the Move

Part 3: Map the River in the Twin Cities

Objective: Students will create a map of the Mississippi River in the Twin Cities. Students will draw in the location of bridges, historical, cultural, and recreational sites. Students will label creeks, islands and waterfalls. Students will create and add a scale and compass rose.

Grade Level: Grades 4-6

Time required: 30-60 minutes depending on the amount of detail included on the map.

Materials: Blank map of the Mississippi River through the Twin Cities, assorted maps, color pencils

Resources for Teachers/Students: Some maps are included in the Journey to the Falls Teacher Guide including:

- DNR Canoe and Boating Guide- Anoka to Fort Snelling to Hastings (Maps 8 and 9)
- Padelford Packet Boat Co.- Historic Mississippi River- Minneapolis
- Audubon- Great River Birding Trail- Map 4, Twin Cities Area
- Minneapolis Riverfront District Map
- Mississippi National River and Recreation Area Map
- Mississippi River Companion

On-line maps:
The city of Minneapolis provides a variety of maps at its website. This link includes walking trails and bridge crossings.
http://www.ci.minneapolis.mn.us/maps/index.htm

The "Dakota Presence in the River Valley" map by the Shakopee Mdewakanton Sioux (Dakota) Community shows the historical presence of the Dakota in the Minnesota and Mississippi river valleys.
http://minnesotahumanities.org/resources/bdote/Dakota%20Presence%20in%20the%20River%20Valley.pdf

http://www.nps.gov/miss/planyourvisit/missrivercomp.htm The Mississippi National River and Recreation Area guide, the Mississippi River Companion has information and maps about the 72 mile stretch of the Mississippi River that makes up the park. Maps 9 and 10 cover the area traveled on Journey to the Falls.

http://www.mngeo.state.mn.us/chouse/mapgallery.html This site, from the Land Management Information Center (LMIC), is a “first stop” source for maps of MN.

http://www.dnr.state.mn.us/maps/index.html This Department of Natural Resources site includes links to many map resources.

Journey to the Falls Classroom Activity

A Waterfall on the Move
Part 3: Map the River in the Twin Cities

Instructions for students: Use the map template "Mississippi River: Minneapolis/St. Paul, Minnesota" and other maps and resources (including National Park Service brochure) to create your own map of the Mississippi River in the Twin Cities.

1. Complete the **compass rose** beneath the map title by writing "N" for north, "S" for south, "E" for east, and "W" for west. In the lower part of the page, draw a line with numbered division marks to create a "**scale of miles**" to measure distances on the map. (1 mile = approximately 1¼ inches on the map)

2. Locate and label downtown **Minneapolis** and downtown **St. Paul** on your map.

3. Locate and label the **Minnesota River** and **Minnehaha Creek** on your map. Draw a line across Minnehaha Creek where **Minnehaha Falls** is, and label it. Color rivers, lakes and streams light blue.

4. Locate and label **Nicollet Island**, **Pike Island, and Boom Island Park**. Color them light green.

5. Use city maps to locate where the **Interstate 94**, **Interstate 35W**, and **Interstate 35E** highways cross the river, and draw the bridges onto your map.

6. Locate and draw the **Broadway Ave., Hennepin Ave. bridge**, **Washington Ave. bridge**, and the **Lake St. bridge** on your map. Optional bridges: Franklin Ave., Ford, and Smith Ave.

7. Locate, draw in, and label present-day **St. Anthony Falls**.

8. Using the "Journey of a Waterfall" map (see teacher), indicate the locations and dates of **historic St. Anthony Falls** from its beginning as "River Warren Falls" (in St. Paul) to its present site in Minneapolis.

9. Locate and label the sites for the **Bohemian Flats**, **University of Minnesota**, **Lock & Dam** #1, and **Historic Fort Snelling**.

10. Draw a line across the river where **Lock and Dam #1 ("Ford Dam")** is located; label it. Optional: Label **"Meeker Island Lock & Dam,"** the historic site of the first lock and dam on the Mississippi River located just upstream from Lake Street.

11. If **your school** and/or **your home** can be located on the map, mark them with a red star (school) and a blue star (home), and label them "school" and "home."

12. Locate and label at least **four more historic or modern river sites**. Possibilities include railroad bridges, historic mills, Mississippi River Gorge, Crosby Lake, Indian Mounds Park, Fountain Cave, Carver's Cave, Kaposia, Fort Snelling State Park, Minnehaha Park, Mill Ruins Park, boat access sites and canoe campsites.

13. Use a National Park map (or others) to find "**river miles.**" (River miles, used for navigation, indicate the number of miles upstream from the Ohio River; on your map these numbers will be from 835 to 855.) Indicate them on your map for every 5 miles.

14. Optional: Make a "**map key**" that identifies different colors used for rivers & lakes, islands, historic sites, and roads & bridges. Decorate and color the map accordingly.

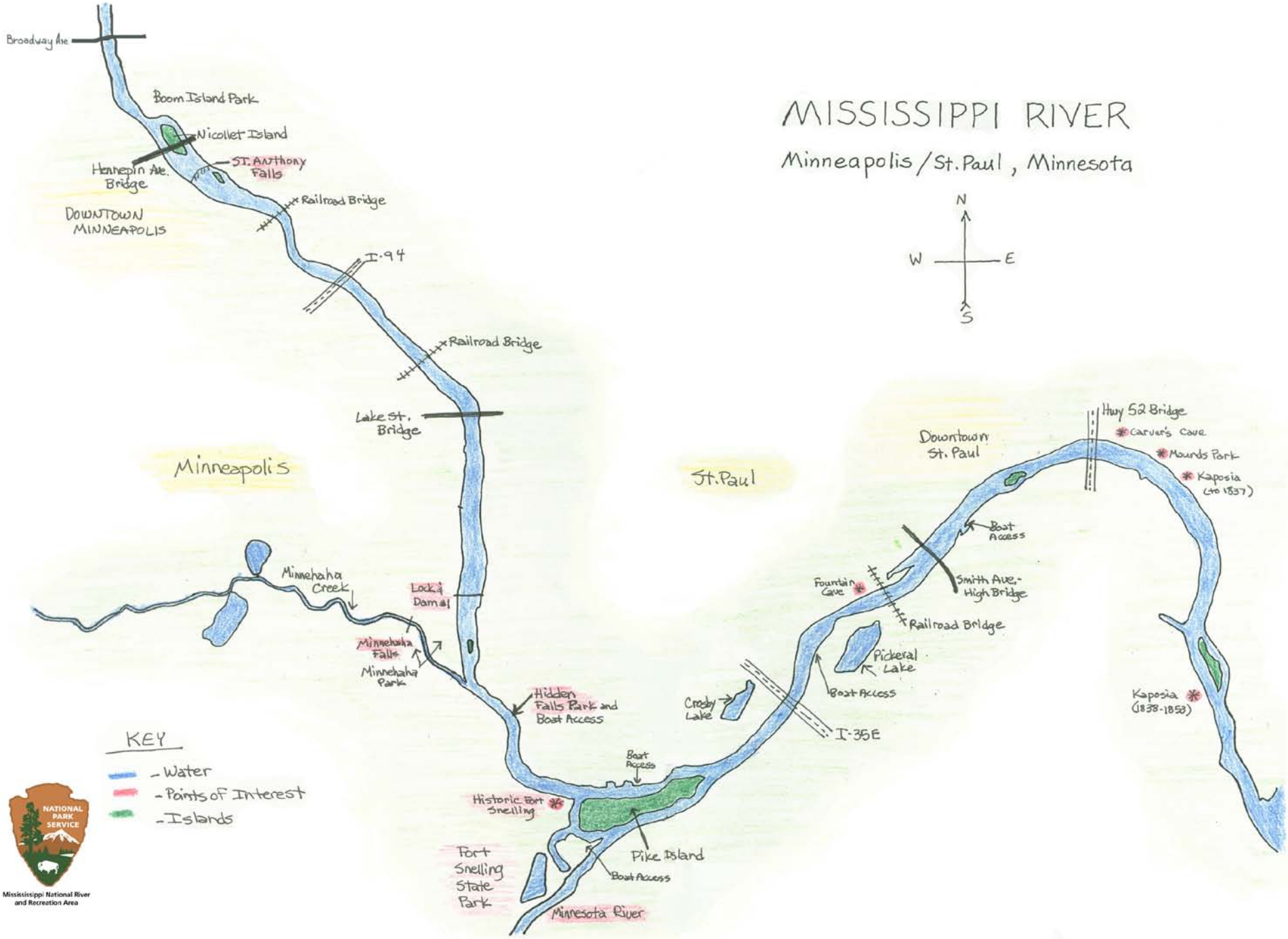
Mississippi River

Minneapolis - Saint Paul, Minnesota

Mississippi National River and Recreation Area

MISSISSIPPI RIVER

Minneapolis / St. Paul, Minnesota



Lumber and Sawmill Activities
An Overview

Overview
Through the following three sets of activities, students will become familiar with the historic lumber and sawmill industries of Minneapolis. Students will learn what lumbering is and why the river was important to this industry and the economy of Minneapolis. Students will read a primary source document, examine and write a variety of writing styles and perform simple math calculations. These three activities can be used to either prepare students for their Journey to the Falls or serve as post-trip activities. Parts 1 and 2 each have two sections.

All activities are designed for students in grades 4-6 and require no additional materials beyond copies of the following student worksheets. Some activities may be enriched using color pencils or note cards. Student access to the internet will allow students to explore a site designed for students (Forests, Fields and Falls.) Each activity requires approximately 30 minutes.

Part 1- A Visit to a Minneapolis Sawmill
Section 1A: Reading for comprehension
Section 1B: Writing (journals, postcards, letters, newspapers)
Students will read excerpts from a journal written in 1917 for the children of Charles Jerome after a visit to one of the sawmills located near St. Anthony Falls. The journal is illustrated by historic photos from the Minnesota Historical Society photo and art database (www.mnhs.org). The pages “Childhood Life” and “Life on the River at Bohemian Flats” describe the experiences of children along the river between the late 1870s and 1900. Students will also read a short newspaper article, excerpt from a letter and a postcard as examples of different types of writing. Students will be asked to write in various styles. Students will read for comprehension and learn vocabulary associated with the lumber industry.

Part 2- Minneapolis Lumber- Building the Midwest
Section 2A: Rounding off, calculations
Section 2B: Making a graph
Students will examine the amount of lumber milled at various points in time and will use this information to round off numbers, make a graph and perform mathematical calculations. Students will examine the use of lumber around the turn of the century.

Part 3- The Art of Lumbering
Log Marks
Students will design their own log stamp image.

Teacher Resources
Lumber and Sawmill Activities

Recommended Books

- ***Walter Meets Mack*** by Michael Stoesz- This fictional story is based on real-life events and places. To learn more about this book researched and written by a Minneapolis teacher visit http://waltermeetsmack.com
- ***Mill City*** edited by Shannon Pennefeatherby- page 54 Henry Griffith, page 55 Melvin Frank, page 57 Paul Gyllstrom, page 58 Walter E. Dexter
- ***The Bohemian Flats*** compiled by the Workers of the Writers Program of the Work Projects Administration- pages 16-18
- ***Old Rail Fence Corners*** edited by Lucy L. W. Morris

On-line Teacher Resources

Mississippi National River and Recreation Area- National Park Service
www.nps.gov/miss
The Mississippi River can be used as a theme to link subject matter across the curriculum – science, history, cultures, geography, reading, writing, art, music, computer learning, and more.

Minnesota Historical Society
Forest, Fields, and the Falls
http://discovery.mnhs.org/ConnectingMN/
Explore the lumbering and sawmilling industries of northern Minnesota and at St. Anthony Falls. This interactive online comic book for students explores the connection between the northern pine forests, the Mississippi River and St. Anthony Falls. Click on the "Index" tab at the bottom of the page for detailed links to additional information.

Photo and Art Database
http://collections.mnhs.org/visualresources
Search the photograph, art and poster collections at the Minnesota Historical Society. Not all collections are online, but over thousands of images are available.

Teaching with Historic Places (TwHP)
http://www.nps.gov/history/nr/twhp/wwwlps/lessons/106wheat/106wheat.htm
TwHP is a program of the National Park Service's National Register of Historic Places. This site explores the connection between railroads, North Dakota wheat fields, and Minnesota flour mills during the late 19th and early 20th centuries. Full color maps, photos, and other documents may also be useful in exploring the lumber/sawmill story.

Hennepin County Library
http://www.hclib.org/pub/search/specialcollections/
The Hennepin County Library features an on-line description of Minneapolis history featuring historical photos and text. Click on Minneapolis Collection.

Journey to the Falls Student Activity

A Visit to a Minneapolis Sawmill

Part 1A: Reading for comprehension

Bourne and Ida Jerome
8 and 7 years old

Ida and Bourne Jerome grew up in Minneapolis. They were seven and eight years old when their father took them to the sawmill in 1917.

Read the journal that Ida and Bourne's father wrote for them and then answer the following questions.

1. **What is a sawmill?**

2. **What is lumber?**

3. **Where did the logs come from and how did they get to Minneapolis?**

4. **Why were the days of lumbering in Minneapolis almost done in 1917?**

5. **What is a log boom?**

A Visit to a Minneapolis Sawmill

Part 1A: Reading for comprehension

Ida and Bourne Jerome grew up in Minneapolis. They were seven and eight years old when their father took them to the sawmill in 1917.

Bourne and Ida Jerome
8 and 7 years old

Read the journal that Ida and Bourne's father wrote for them and then answer the following questions.

Note: Page numbers refer to the 2 sided printed journal. To assemble after printing, fold the pages in half and insert one page inside the other to create the journal.

1. What is a sawmill?

Answer found on front cover, last sentence.
"A sawmill is a place where logs (trees that have been cut down) are cut into wood pieces called lumber."

2. What is lumber?

Answer found on front cover, last sentence.
"A sawmill is a place where logs (trees that have been cut down) are cut into wood pieces called lumber."

3. Where did the logs come from and how did they get to Minneapolis?

Answer found on page 1, lower text box.
"The pines were cut every winter in the vast pine forests far north of Minneapolis."
"The logs were hauled to the brink of the rivers…they floated downstream…until they reached the saw mills of Minneapolis"

4. Why were the days of lumbering in Minneapolis almost done in 1917?

Answer found on page 2.
"Nearly all of the pine forests have been cut away that were near enough to the Mississippi River…"

6. What is a log boom?

Answer found on page 3.
"The freely floating logs were held from getting away by a chain of logs. Such a chain of logs is called a boom"

Childhood Life
on and near the Mississippi River at St. Anthony Falls

Notes on Early Minneapolis by Paul Gyllstrom, ca.1870s
This excerpt also in the book, **Mill City**, pages 57-58

"The log driving season offered great sport. In those days the sawmills were only a short distance above the St. Anthony Falls. The loggers working at the booms had instructions to let logs with certain markings pass through for the mills in St. Paul. Logs of all sizes, up to two feet in diameter, would come slushing along, and the larger they were the better they suited our purpose. It was a wonderful sight as one thinks of it now to see those "river rats"- not one of whom could have been more than ten years old- executing some fanciful dive, climbing back [on the logs], and setting themselves for another plunge."

Sawmill City Boyhood by Melvin L. Frank (unpublished), ca. 1910-1920
More of this excerpt in the book, **Mill City**, pages 55-56

"For us boys the sawmill always offered the number one attraction in summertime outdoor activity...Occasionally we would venture onto the long catwalk that overlooked the whining, thrumming scene where logs were cut up into lumber. As long as we stayed on the walk-way and out of danger we were permitted to watch the operation.

Most enthralling, I guess, was the start of the wet log on the way to becoming lumber. It came, dripping, up from the river on an endless chain lift runway…[then] a steam powered machine drove the log into the whirring band saw that made the initial cut, and then with lightening speed reversed its motion back to the starting position, flipped the log and fastened it in place and rode it to the next cut…

As we continued on the catwalk we saw the boards move from the saw on steam powered rollers to the next saws that rimmed them to the desired width and cut them into standard lengths…The lumber…was stacked in neat piles…We kids knew how the men piled the lumber, reversing each course so the pile could breathe and the boards dry out evenly…"

The New Sawdust Town by Henry L. Griffith, ca. 1880
More of this excerpt also in the book, **Mill City**, pages 54-55

"My best playgrounds were the big lumberyards near the mills…All the neighborhood boys used this lumberyard as play space, and the mill owners, far from objecting to our trespass, silently approved. They knew that boys were alert and observant, and would quickly note any pilfering of their property. Our games were exciting, and as I look back on them, rather dangerous. We jumped from pile to pile, and the piles were some 30 feet high.

The lumber was stacked so that the ends of boards, at intervals, extended about two feet from the pile. These made high steps by which we could mount to the top in no time. The ground of the yard had a thick covering of sawdust, spread there so that the horse-drawn lumber wagons would not sink in the mud in wet weather. We exercised ourselves in a wide repertoire of yard games…"

Life on the River at the Bohemian Flats

From the book, <u>The Bohemian Flats,</u> Compiled by the Workers of the Writers' Program of the Work Progress Administration in the State of Minnesota, MHS Press

The Writers' Project was created in 1935 as a national program to give writers work during the Depression. The book was intended to tell the reader about the neighborhood called the Bohemian Flats, located along the river in Minneapolis, near the Washington Avenue Bridge. The excerpts below are from pages 16-18. The Bohemian Flats was an area where many new immigrants began life in the United States. In 1900, the census (a count of all the people living in the United States) found people from many countries living on the Bohemian Flats.

635 Slovakia	28 Germany	2 Finland
208 Sweden	10 Poland	2 America
195 Czechoslovakia	7 Switzerland	1 Russia
49 Ireland	4 Austria	25 of mixed nationalities
43 Norway	3 Denmark	

"…From the 1880s on, the Bohemian Flats enjoyed a steady growth…The men found employment in the lumberyards, sawmills, and flour mills near the settlement. Since the usual pay at the lumberyards was a dollar and a half a day, work at the Washburn, Pillsbury, and other mills, which paid two dollars a day, was preferred. "Those two dollars appealed to them as much as ten or twenty dollars would now (1941)," an old settler declares…

…Some of the men went into work in the coopering shops, for cooperage was an industry that was expanding to meet the demand for flour barrels, butter tubs, and pickle kegs. Others were employed as laborers by the railroads and the streetcar company.

Children too young to work in the city found jobs waiting for them in their own back yard- the river. They gathered the billets of wood, mill ends, "dead heads" (entire logs), and other sawmill waste that came floating downstream. In the hectic days of logging- one of the chief industries of early Minnesota- the river was full of logs from early spring until the first of July. The yard behind each house was filled with wood piles. Some of the wood was used for household fuel and the remainder was sold…"

"Of the harvest, from April to November, an almost uninterrupted stream comes. Slabs, shingles, strips, blocks, boards, and sometimes entire logs can be seen hurrying down the river, which is quite rapid at this point, and it is a very novel spectacle to see the way they manage to secure the valuable flotsam that the waters are always bringing to them at their door…..With crooked sticks or pronged instruments they grasp the stick of wood that comes in reach, and land it usually, with much dexterity…"
"…little boys and girls, ten to twelve years old, are kept fishing for wood and taking it into the land. When they gather it, they are quite willing to step out, and apparently obliged to do so, into the shallow water itself for the prizes they seek." (1887)

Journey to the Falls Student Activity

A Visit to a Minneapolis Sawmill

Part 1B: Writing (journals, postcards, letters, newspapers)

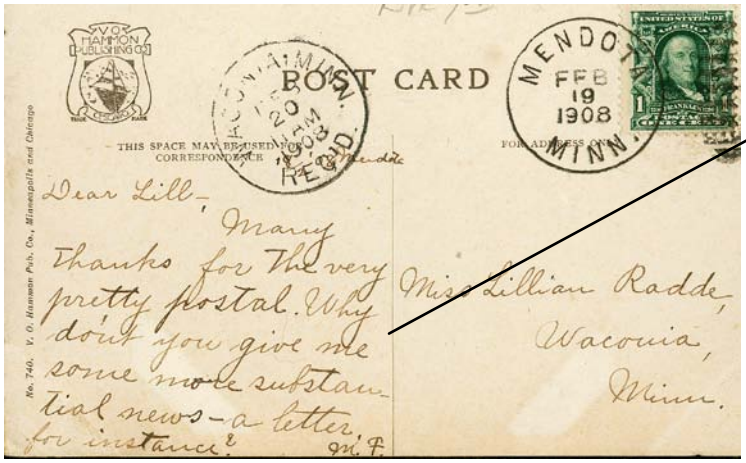
People write for different reasons. Some writing is done to record thoughts and feelings (journals.) Other types of writing share information, either with a friend (postcards and letters.) Some writing informs a community (newspapers.) Using your Journey to the Falls experience, choose one of the following writing types and write a brief sample.

Journals

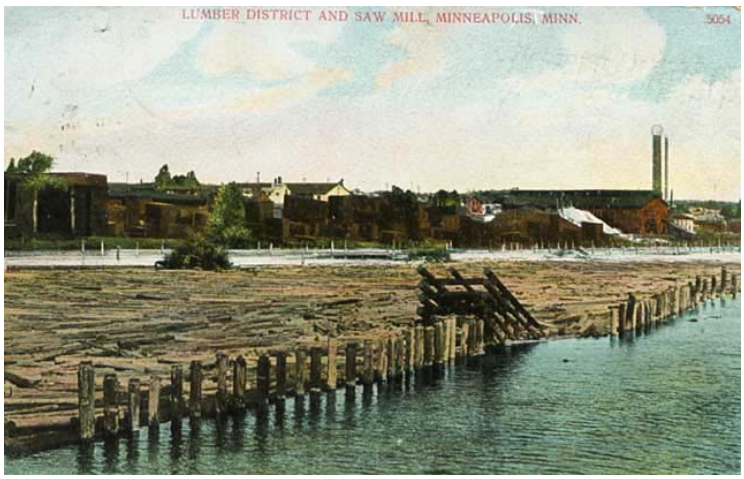
You have read the journal that Ida and Bourne's father kept for them. You may want to keep your own journal of what you do and your thoughts about what is happening in your life. You can start by writing a descriptive "journal entry" about a place you have visited. Your teacher may ask you to write in your Journey to the Falls journal after the trip.

Postcards

Make a postcard out of an index card and mail it to a friend or family member. On one side draw a picture. On the other side write a message on the left half of the card. Put the address of the person you are writing to on the right side. Don't forget a stamp!



M. F. wrote:
"Many thanks for the very pretty postal. Why don't you give me some more substantial news- a letter for instance?"



Postcards

Postcards are meant for a short note. One side usually has a pretty picture.

The other side is divided into two halves. The left hand half is for the message.

The right hand half is for the address and stamp.

Journey to the Falls Student Activity

A Visit to a Minneapolis Sawmill

Part 1B: Writing (journals, postcards, letters, newspapers)

Letters

Write a friend or family member a letter describing your day while on Journey to the Falls. Ask an adult how to properly address an envelope if you don't know how. You will need a stamp to mail your letter.

Horace Glenn worked as a sawyer in the pine forests of northern Minnesota in 1901. Here is part of a letter he wrote to his parents:

> "... I believe I enjoy the work better than any I ever did before. Sawing to my notion is the best job in the woods, the time passes quickly, and although it is very cold, from zero to 30 below so far, you don't notice it so much in the timber and what I eat at home would be scarcely a light lunch for me here. There is no boss over you while you work, you go into the woods and saw all day and give in your logs at night. We saw from 80 to 110 according to the size of the timber.... It is steady but if you know how to saw and have a good partner it is not hard."

Newspapers

Newspapers tell the people what is happening in their community and in other places. Read this exciting account of a Minneapolis lumberyard fire in 1920.

The Minneapolis Morning Tribune

FLAMES SWEEP LUMBER YARD

Half Million Dollar Loss

Polish Soil Nearly Clear of Soviets

Camera Catches Devastating Flames

U. S. Suffrage Decree Within

Freight Tariffs on Great Lakes

Flames Sweep Lumber Yard

"Thousands Watch Fierce Blaze Which Destroys Timber Piles, Burns Sheds, Ties Up Traffic and Threatens Nearby Homes, While Occupants Rush Furniture into Street.

"Swept in a sea of flames, lumber yards of the Northland Pine Lumber company at Thirty-second avenue north and Second street last night, covering 25 acres, were destroyed by fire with an estimated loss that will exceed $500,000."

"Embers scattered over a large section of the city and scorched roofs of several homes. Although declared under control at 10 p.m., 7,000,000 feet of lumber and 5,000,000 shingles still were burning, lighting up that section of the city."

Minneapolis Morning Tribune, August 25, 1920

Now, using your Journey to the Falls trip experience, write a newspaper article describing your day. Remember- newspaper articles contain facts rather than opinions.

“Outside the sawmill was an immense lumber yard. Some of the lumber piles were very high, as high as a two-story house. Within the lumberyard men would pile the boards into orderly lumber piles. The piles were in double rows with long alleys between each two double rows.

We watched men building one pile. Already it had been built quite high, but it had not been finished. A man at the top of the pile took each board as it was raised and laid it upon the pile.

We had seen the lumber mill and the lumber yard and we came away.”

July 1917, C.W.J.

Boys on a lumber pile in lumberyard, ca 1910, MHS Photo

Brochure developed by Minneapolis Park and Recreation Board, Mill Ruins Park program. For more information call 612-313-7784 or visit www.minneapolisparks.org.

A Visit to a Minneapolis Sawmill

C. A. Smith Sawmill, ca. 1905, MHS Photo

Inside is the story of a visit to a sawmill in 1917. On most Saturdays, Charles Jerome would take his children, Ida and Bourne, to different sites in Minneapolis.

They visited flour mills, foundries, historic sites, grain elevators, and more. Afterwards, Mr. Jerome would write descriptions of the visit from the children’s point of view in a journal he kept for each child.

Back in July 1917, when Ida and Bourne Jerome were father to come home from work one Saturday afternoon. always wanted to see a saw mill. Her Mama said "Papa, take me to thee a thaw mill!" Today she would sawmill, Papa explained why there were so where logs are cut into flat pieces of

The old lumber

"Minneapolis began as a lumber village and city. For miles and miles above St. Anthony Falls our great river was filled all summer long with floating logs awaiting their turn to be cut into lumber. Years and years ago, there were thirteen sawmills in Minneapolis. All day and all night, from the time the ice went out of the river in early spring until late autumn, these mills were all at work. They were sawing pine logs into beams and boards and shingles."

"These logs were of course the trunks of pine trees. The pines were cut, every winter, in the vast pine forests far north of Minneapolis.

Lumbermen on Mississippi River, 1864, MHS Photo

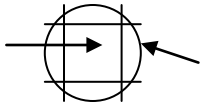
The logs were hauled to the brink of the rivers that flow into the Mississippi north of our city. And when the ice of the rivers melted in the springtime, the logs were rolled over into the stream. So they floated down with the current until at length they reached the saw mills of Minneapolis. There seemed to be no end of the logs."

What do you think we saw next?

"The boards that had been cut by the gang saw were now cut by another saw called a circular saw. Papa pointed out to us a man sitting behind a row of levers. The man would pull towards him one lever or another or perhaps two levers at a time. Whenever he pulled a lever a circular saw would rise halfway through a slot in the floor, cut a board to a particular length, and then dropped down through the slot in the floor. In this way all the boards were cut to the lengths intended by the men at the levers. Each lever man decided in a second what was to be the length of each board as the board was approaching his saws."

Saw Mill interior, ca 1915, MHS Photo

“Inside the sawmill we heard the shrill z.z.z.zoon of the band saw cutting off a face of the log. It was very interesting to see the logs cut into squares.

Squared off log  Face of log that is cut off

We watched them for a long time at their rapid, hard work. Then we walked along to where we could see the gang saw at work. From the band saw the squared and partly squared logs are carried on moving chains to a broad gang saw.

The gang saw is not far from the center of the mill; and it takes the logs from both band saws. But what is a gang saw? I will tell you. It is a number of saws set upright in a frame. In this gang saw there were perhaps thirty of these saws. They were about six feet long. They all moved together rapidly up and down. Thus they cut the logs into boards. They were cutting two to four logs at a time. How many logs they can cut at once depends upon how big are the logs. As soon as the gang saw had cut through one set of logs it began on another set, then another, then another.”

Gang saw, ca 1910

7 and 8 years old, they anxiously waited for their
Today they were going to visit a sawmill! Ida had
that when Ida was a very little girl, she would say,
finally get to see one. On the streetcar trip to the
many sawmills in Minneapolis. A sawmill is a place
wood ready to use for building.

days of Minneapolis

West bank of Mississippi River, Minneapolis, ca 1890, MHS Photo

“Now the days of the Minneapolis saw mills are nearly over. There are only two mills still sawing logs in Minneapolis- two left of the thirteen mills that used to be busy all the time. Father said he had read in the newspaper that after the end of the next season there would never again be another log sawed in a lumber mill in Minneapolis. Nearly all of the pine forests have been cut away that were near enough to the Mississippi River so that logs may be floated down the river. “

July, 1917 CWJ

Ida and Bourne visit a Minneapolis Saw Mill

"As soon as we were off the street car we smelled the fragrance of the freshly sawed pine lumber. As we came a little nearer to the big mill we could hear the everlasting roar and buzz of the lumber cutting.
At first we did not go into the mill but walked past it and down to the bank of the river, and a little ways out over the water upon a narrow walk. We wanted to see how the logs are brought from the river into the mill. And here was where that was being done.
The freely floating logs were held from getting away by a chain of logs. Such a chain of logs is called a boom. This boom ended at the saw mill. The booms, Papa told us, used to extend up the river for many miles and formed divisions in the river.

McMullen Sawmill, Minneapolis, 1894, MHS photo

Next we saw two men hard at work each with a boat hook. They were pulling the logs about in the stream in order to direct the end of each log into a sort of broad trough. This trough reached from below the level of the river clear up into the second story of the mill. The chain had a sort of teeth that would catch the logs and pull them from the river into the mill. This was an interesting sight, the men directing the logs and the logs gliding up the long trough. And we stood and watched for some time. At last we left this place and went within the mill."

C. A. Smith Sawmill, Minneapolis, ca 1885, Stereoscope, Underwood and Underwood photographers, MHS Photo

Journey to the Falls Student Activity

Minneapolis Lumber- Building the Midwest

Part 2A: Rounding off, calculations

Lumber Milled in Minneapolis

1.) Round off the number of board feet to the nearest 100 million. The exception is the year 1857. That year is rounded to the nearest 25,000,000 and is already done for you.

2.) Write your answer in the column titled "Rounded off #"

Year	Board Feet	Rounded off #
1857	12,000,000	*25,000,000*
1867	77,419,548	
1876	200,371,277	
1888	337,663,301	
1899	594,373,000	
1910	100,000,000	
1920	0	

What was all the lumber used for?
Mr. DeLaittre, a Minneapolis lumberman, tells us that one lumber camp cut about 5,000,000 board feet in one year. In 1900 a 2-story house would use about 12,000 board feet of lumber.

How many houses could be built from the lumber of that one camp?

Do the math and write your answer on the line. Round off to the nearest 100 and write that amount on the line and circle it.

. _____ .

Between 1839 and 1932, Minnesota's forests were turned into 67,500,000,000 (67½ billion) feet of lumber. That's 5½ million 2-story houses!

What else was the lumber used for?
Beside houses, the lumber was used to make barrels, pails, window frames, doors, window blinds, shingles, wooden buckets, other containers, railroad ties, electric poles, grain elevators, stores and businesses, furniture, tools (the handles for hammers, saws, screw drivers, etc.) and even sidewalks!

What are those items made of today? Where do those materials come from? The lumber industry provided many jobs beyond sawing down the tress and working in a sawmill. Thousands of people found work building houses and making other products that used wood.

Minneapolis Lumber- Building the Midwest

Part 2A: Rounding off, calculations

Answer Sheet:

Lumber Milled in Minneapolis

Round off the number of board feet to the nearest 100 million.
The exception is the year 1857. That year is rounded to the nearest 25,000,000 and is already done for you.

Answers:

Year	Board Feet	Rounded off #
1857	12,000,000	25,000,000
1867	77,419,548	100,000,000
1876	200,371,277	200,000,000
1888	337,663,301	300,000,000
1899	594,373,000	600,000,000
1910	100,000,000	100,000,000
1920	0	0

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What are those items made of today? Where do those materials come from?
The lumber industry provided many jobs beyond sawing down the tress and working in a sawmill. Thousands of people found work building houses and making other products that used wood.

Journey to the Falls Student Activity

Minneapolis Lumber- Building the Midwest

Part 2B: Making a graph

Student Directions:
Now take the rounded off amounts from the previous activity and color in the graph. The year 1857 is done for you.

Board Feet of Lumber								
600,000,000								
550,000,000								
500,000,000								
450,000,000								
400,000,000								
350,000,000								
300,000,000								
250,000,000								
200,000,000,								
150,000,000								
100,000,000								
75,000,000								
50,000,000								
25,000,000								
	1857	**1867**	**1876**	**1888**	**1899**	**1910**	**1920**	**Year**

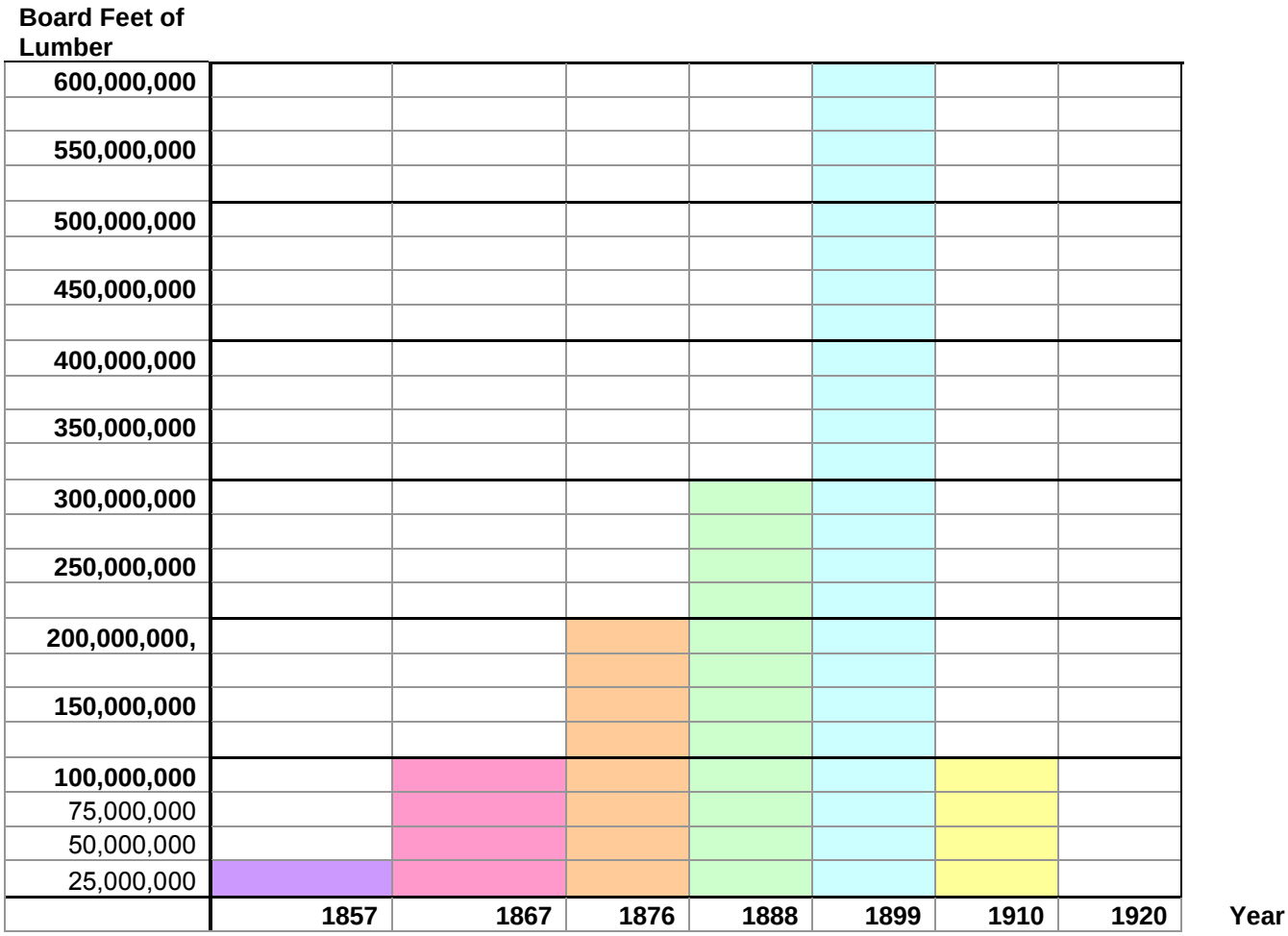
Minneapolis became the #1 city in sawmilling (lumbering) in 1899. That meant Minneapolis cut more trees (logs) into lumber than any other city in the whole United States. Actually, Minneapolis was #1 in the world until 1905. Six busy years! After that the amount of lumber milled in Minneapolis began to decline.

Why was that?
Most of the trees that were cut down in Minneapolis were hundreds of years old. People thought there were enough trees to last forever. The cut down forests would take a long time to re-grow. Sadly, there were not enough trees to last forever.

Of course trees were not just useful for lumber. They were part of a unique ecosystem of plants, animals, insects and birds. You can learn more about ecosystems along the Mississippi River by reading the book, **The Mississippi River**, by Maria Mudd Ruth.

Minneapolis Lumber- Building the Midwest

Part 2B: Making a graph



Minneapolis became the #1 city in sawmilling (lumbering) in 1899. That meant Minneapolis cut more trees (logs) into lumber than any other city in the whole United States. Actually, Minneapolis was #1 in the world until 1905. Six busy years! After that the amount of lumber milled in Minneapolis began to decline.

Why was that?
Most of the trees that were cut down in Minneapolis were hundreds of years old. People thought there were enough trees to last forever. The cut down forests would take a long time to re-grow. Sadly, there were not enough trees to last forever.

Of course trees were not just useful for lumber. They were part of a unique ecosystem of plants, animals, insects and birds. You can learn more about ecosystems along the Mississippi River by reading the book, **The Mississippi River**, by Maria Mudd Ruth.

Teacher note: The activities *Web of Life* and *Birds Beaks and Adaptations* in the Big River Teacher's Guide and on-line at www.nps.gov are good introductory activities to ecosystems.

Part 3- The Art of Lumbering

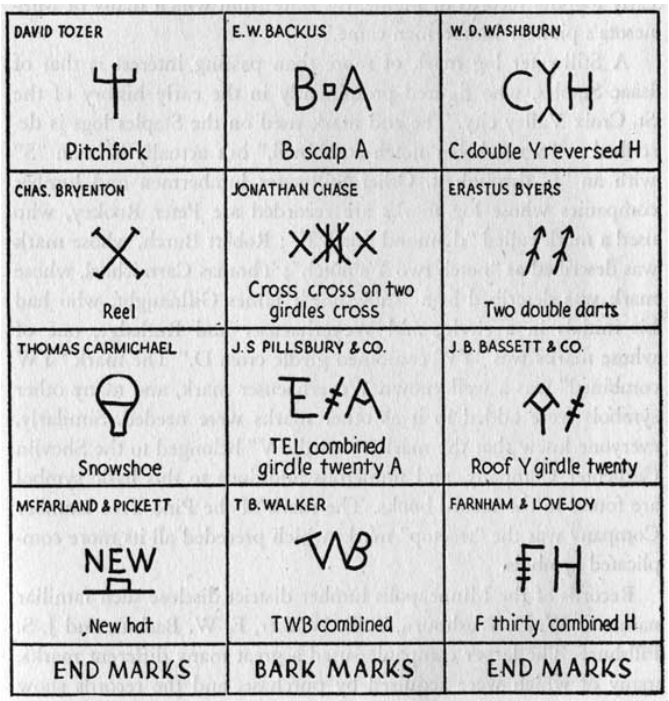
Log Marks

One of the State of Minnesota's more unusual records is a collection of record books in which more than 20,000 log marks are recorded. Log marks were a way to identify the logs that were floated down the river from the forests in northern Minnesota to the sawmills in Minneapolis and other cities. They are like western cattle brands which many people are familiar with.

After the trees were cut down, the logs were marked on both ends as well as on the bark. Loggers swung a special hammer with a long handle, similar to an ax, marking each log multiple times. When the loggers marked trees on cold mornings, "the clear, sharp ring of the hammer could be heard for long distances."

Once the logs were marked and began their journey down the river, they were sorted into booms filled with thousands and thousands of logs belonging to different owners. The booms could be over 4 miles long!

Student Activity
Look at the marks below. The marks are a combination of letters and symbols. Design your own logging mark using letters or symbols that will help the "river pigs," the people who sort the logs, know which logs are yours.



Draw your log mark in the box. Remember that a simple design is easier to read.

Part 3- The Art of Lumbering

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Teacher Note:

The above information was taken from an article written by Elizabeth M. Bachman for Minnesota History magazine, Summer 1945 (Volume 26, No. 2, pages 126-137) titled Minnesota Log Marks. It is available on-line at:
http://www.mnhs.org/market/mhspress/MinnesotaHistory/FeaturedArticles/2602126-137/index.htm

Activity Extensions:

- After creating a log mark, have the class make a record book or poster showing everyone's log mark.
- How do we track items today? How do we know what companies make an item? Students will make a poster showing how we track the origin of items today- UPC codes, sticky labels on fruits and vegetables, clothing labels, brand logos, license plates, and serial numbers are just a few of the ways that come to mind.
- Simulate the sorting action that took place on the river by creating "logs" out of pieces of paper (cut cardstock into strips aprox. 1" x 5"). Create three or four different log marks and draw each mark on 10-20 "logs." You will also need 4 or 5 bins; one to serve as the "river" and one for each log mark. Label the bins appropriately. Divide the students into three or four relay teams. Place all the "logs" into a bin which will serve as the river. Students will take one log at a time and sort it into that log's "boom" (another bin). Continue until all the logs are sorted in a basic relay race fashion. Sort safely!
- Make a log mark stamp by carving a soft vegetable such as a potato or by cutting out pieces of foam in the shape of the log mark design. Remember the design will need to be a mirror image when carved into the potato or cut out of foam. If cutting the design out of foam, glue it to a hard surface to create the stamp.

Student Activity

Look at the marks below. The marks are a combination of letters and symbols. Design your own logging mark using letters or symbols that will help the "river pigs," the people who sort the logs, know which logs are yours.

Minnesota Historical Society- Mill City Museum

Activities to prepare for Journey to the Falls
Explorers boat station and Mills History Hunt land based station

Contents

Pre and/or Post Visit Activities to support Explorers boat station

1. Exploring at School
   This activity will introduce the concepts of explorers and expeditions and will encourage students to observe the world around them as historical explorers did. Students will engage in a team decision making process and decide what to record from their expedition.

2. How did explorers communicate?
   Explores of the Upper Mississippi each had a specific reason, or job, as the purpose of their expedition and were required to communicate their findings in writing to their superiors (bosses). Students will use quotes from Jonathan Carver and Stephan Long and historic images of St. Anthony Falls.

3. You, too, can be an explorer
   Lewis and Clark were explorers of America a long time ago but there are still explorers today. In fact, anyone who takes action to find out something he or she did not know before is an explorer. Students will compare Lewis and Clark explorations with those of modern explorers.

Pre-visit activity to support land based activity

4. Mills at the Falls and How a Mill Works
   Students will learn the basic components of a waterpower system. Students will label the parts of the waterpower system at St. Anthony Falls.

Additional Support Information

- Mills History Hunt- description of MHS led land based station
- Upper Mississippi River Exploration Timeline
- Graphics of St. Anthony Falls
- Websites

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Activity 1

EXPLORING AT SCHOOL[1]

CONNECTION TO THE MISSISSIPPI

There are famous American explorers like Lewis and Clark and Zebulon Pike. Yet there are many less well-known explorers who mapped, traversed and established contacts across Northern America before it became the United States. Some of these traveled up and down one of the most powerful rivers in our nation – the Mississippi.

OVERVIEW OF THIS ACTIVITY

Students form groups to explore the playground, their own classroom, another room at school--perhaps the library or cafeteria--or even a nearby park. After the exploration, students report on what they found and experienced.

PURPOSE(S)

To introduce the idea of explorers and the idea of going on an expedition to children.
To help students engage in a decision making process, as a team, to decide what to record and then share those recordings.
To encourage students to observe the world around them as historical explorers did.

MATERIALS/TOOLS NEEDED

- Group name tags (purchased or handmade) –with Leader, observer, recorder
- Markers
- Paper or journals

ADVANCE PREPARATION

1. Visit the playground (or other site that has been chosen for this activity). Mentally divide the area into as many zones as explorer groups.
2. Prepare group nametags. The teacher may assign group names prior to the activity or let the groups choose their own names.

IMPLEMENTATION

1. Divide the class into groups of explorers, having as few children as possible in each group. For younger students, assign one adult to each group. For older students, choose a captain by drawing slips of paper, only one of which has the word CAPTAIN written on it. The adults and student captains are "in charge" of their groups.
2. Instruct children to look for things with a certain goal in mind. Examples: "We pass by here every day – what can you notice today that you think (another teacher, the principal, your parent, a friend) might be interested in hearing about? We don't often come over here on this side of school but I have worked here a long time – see if you can find something that you think I take for granted or don't notice every day.
3. Distribute group nametags: Leader, recorder, observer or other designations as you choose.
4. At the exploration site, direct each group to one of the predetermined zones. Each group of explorers must search their zone carefully to see what is there--flowers, rocks, bushes, birds, insects, trash, playground swings, a tree with a nest in it, etc.

FOLLOW-UP ACTIVITY

After a predetermined length of time, the groups return to the classroom where they report their observations to the class. Reports may be oral, written, or drawn according to age and capability.

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[1] Adapted from: www.nps.gov/archive/jeff/lewisclark2/Education/Explorers/ExplorersExploringAtSchool

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Activity 2

HOW DID EXPLORERS COMMUNICATE?

Your students will hear and do activities centered on explorers who came to the upper Mississippi, what they brought with them, how they traveled and also – how they had to communicate their experience. Each explorer was sent here with a specific job – to find something, to map some area, to establish communications with people who were already here... They each had to report back to someone and they did this only through writing.

Use the following pages to give your students a quick example of how two explorers wrote about seeing St. Anthony Falls and the surrounding area.

Ideas for use:

1) Read aloud the quotes and analyze their content
    a. Can you picture this place in your head?
    b. What do you think it looked like based on how it is described?
    c. How does the language this person is using help us to "see" what they were seeing?
    d. Who do you think this person is writing for – themselves or for someone else or both?
    e. What would someone do with this information if the explorer sent it to them?

2) Show a picture of St. Anthony Falls
    a. Do the quotes match up with what you pictured in your heads?
    b. How would you describe it with words we use today?

3) Writing
    a. Try writing a detailed description of a place – so detailed that someone else could draw a picture of it!
    b. Try writing a journal entry or letter to the principal or another teacher describing, in detail like Stephen Long, the view out your classroom window or your classroom or a room at home.

Jonathan Carver

- 1766
- Sent by a British Lieutenant to secure lands won by the French
- Personally he wanted to find the source of the Mississippi

- "We could distinctly hear the noise of the water full fifteen miles before we reached the falls, and I was greatly pleased and surprised, when I approached this astonishing work of nature. . . . This amazing body of waters, which are above 250 yards over, form a most pleasing cataract; they fall perpendicularly about thirty feet. . .

  Jonathon Carver, 1766

[14]

" cave, May the firſt, one thouſand ſeven
" hundred and ſixty-ſeven."

Hawnopawjatin his mark

Otohtongoom-liſheaw his mark

Soon after the above period, our author concluded to return to Boſton, where he arrived in 1768, having been abſent two years and five months, during which time he had travelled about ſeven thouſand miles. After digeſting his journal and charts, he ſailed for England, and arrived there in the year 1769. The reaſons which induced him to undertake this voyage, are amply related by himſelf in his travels (page 177.) to which I refer.

Few objects have excited a more general enquiry than the diſcovery of a north-weſt

Stephen Long

- 1817
- Scientist – first to bring actual measuring instruments
- Traveled with
  - 28 soldiers
  - Zoologist
  - Professor of mineralogy and chemistry
  - Landscape painter
  - 2 guides
  - Astronomer

"The place where we encamped last night needed no embellishments to render it romantic in the highest degree. The bans on both sides of the river are about 100[50] feet high, decorated with Trees and shrubbery of various kinds. The Post Oak, Hiccory, Walnut, Lynden, Sugar tree, White Birch & the American box also evergreens, such as the Pine Cedar, Juniper…added their embellishments to the scene. Amongst the shrubbery were prickly ash, plumb and cherry tree, the gooseberry, the black and red raspberry, the Choak berry and grape vine…on our left was the majestic cataract of the Falls of St. Anthony. The murmuring of the Cascade, the roaring of the river, and the thunder of the cataract, all contributed to render the scene the most interesting & magnificent of any I ever before witnessed."

Stephen H. Long. Thursday, July 1817.

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Activity 3

YOU, TOO, CAN BE AN EXPLORER[2]

THEME

Explorers are people who travel about the world looking for adventure, meeting new people, and finding new information. Lewis and Clark were explorers of America a long time ago, and there are still explorers today. In fact, anyone who takes action to find out something he or she did not know before is an explorer. Sometimes explorers get lost. In fact one of the young men on the expedition got lost twice--once for two weeks. Anyone who goes exploring needs to have a plan with ideas of what they should do if they become lost.

GOALS

- To introduce students to the concept of exploration through stories of Lewis and Clark on the trail.
- To call attention to the fact that there still are explorers today.
- To broaden the meaning of exploration to include the student's own experiences.
- To stress the need to know what to do if one becomes lost while exploring.

OBJECTIVES

When the lesson is completed, students will be able to:

- List three ways Lewis and Clark traveled on their expedition.
- Describe two kinds of explorers today.
- Relate one way in which they themselves have been explorers.
- State the basic rules for what to do if one gets lost.

ADVANCE PREPARATION

1. Preview the contents and teachings aids for this unit by clicking on the following capitalized titles: The INTRODUCTION provides an overview of the unit's contents and organization. The SYNOPSIS of the Lewis and Clark Expedition briefly sums up the historical background on which this lesson plan (YOU, TOO, CAN BE AN EXPLORER) is based.
2. Before beginning the lesson, refresh your memory about the Lewis and Clark Expedition by reading the brief SYNOPSIS. Discuss the information with the class.
3. Collect the following pictures of the Lewis and Clark expedition to use while telling the expedition story: walking on the trail, sailing or canoeing on the river, and riding horses through the mountains.
4. Collect pictures of modern explorers such as mountaineers, divers, astronauts, etc. to use during class discussion.
5. Collect pictures of children doing such things as reading, hiking, catching butterflies, visiting a museum, etc. to use during class discussion.
   (For assistance in finding books and pictures click on TEACHING AIDS "A.")
6. Obtain a large map of the United States and a map of the Lewis and Clark trail to use while telling the story. A free trail map may be obtained from any of the National Park sites along the trail. For addresses, click on NATIONAL PARK SITES ON THE LEWIS AND CLARK TRAIL. Trail Maps also may be obtained from the Lewis and Clark National

[2] www.nps.gov/archive/jeff/lewisClark2/education/explorer/ExplorersLessonplan

Historic Trail at www.nps.gov/lecl/maps.htm. For animated maps, click on http://www.nps.gov/jeff/LewisClark2/HomePage/HomePage.htm.

IMPLEMENTATION

Background Story

After Christopher Columbus sailed to North America in 1492, two hundred years passed before people from Europe began coming to make their homes in the New World. Many tribes of Indians already lived here, of course, but there seemed to be enough room for everyone. Spanish people settled in the Southwestern part of America. *(Ask a student to point out the Southwest on a United States map.)* French people settled along the coasts of Canada and along the St. Lawrence and Mississippi Rivers *(Ask a student to point out those areas on the map.)*

Many of the newcomers from England settled along the Atlantic Seacoast of America. (Ask a student to point out the Atlantic seacoast.) It was these settlers that eventually created the United States of America. Only a few Europeans settled in the interior part of the country west of the Mississippi River. *(Ask a student to point out this area.)* Many different Indian groups lived there, but not much was known about them or the land in which they lived.

When Thomas Jefferson became president, he believed it was time to find out. He could not go himself, so he chose a young army captain named Meriwether Lewis to explore the western part of America. Captain Lewis asked a friend, William Clark, to go along. Together they chose a group of strong, young men to go exploring with them. They called themselves the Corps of Discovery.

The men chosen by the captains were from many different backgrounds. Thirty-five of them were soldiers in the United States Army. Twelve men were boatmen hired to help take the expedition's three large boats up the Missouri River. Others came along to hunt or because they could speak Indian languages.

Some members were French, others were English, and still others were members of native tribes. One Corps member named York was a black man, a sloave owned by Captain Clark. A family joined the Corps later on--a French Canadian interpreter named Toussaint Charbonneau, his Shoshone Indian wife, Sacagawea, and their infant son, Jean Baptiste, also called Pomp.

There were no cars, trains, or airplanes back then, so the Corps of Discovery traveled in boats, on horseback, or on foot just as the Indian people did. On their long journey, they passed through prairies, crossed high mountains, saw many rivers, and described lots of plants and animals they had never seen before. They also met many Indian people who gave them food and helped them find the way.

The explorers had some hard times, too, but no amount of bad luck stopped them. They just kept going and going. They went all the way across America to the Pacific Ocean and then back to St. Louis. The journey took two years and four months.

Class Discussion: Explorers Today

Lewis and Clark were explorers a long, long time ago. Do you suppose there are still

explorers today? *(Use this lead-in to discuss modern explorers such as astronauts, deepsea divers, mountain climbers, etc.)*

Only a few people are able to become mountain climbers, divers, or astronauts, but that doesn't mean ordinary people can't be explorers, too. In fact, I'll bet some of you have been explorers. Have you ever gone on a field trip--maybe to a park, a zoo, or a museum? YOU WERE AN EXPLORER! Have you ever taken a hike in the woods to look for insects, leaves, animals, flowers, birds? YOU WERE AN EXPLORER! Did you ever want to know more about something or how to do something, so you went to the library and read books about it? YOU WERE AN EXPLORER because you took action to find out something you didn't know before.

Class Discussion: Getting Lost While Exploring

It is fun to be an explorer, but it's not fun to get lost. One of the members of the Lewis and Clark Expedition, Private George Shannon, got lost for sixteen days. The Corps of Discovery had two horses with them and one night they strayed away from camp. The next morning Shannon went out to look for the horses and got lost himself. He thought he was behind the expedition, so he kept hurrying to catch up with them. Unfortunately, he was ahead of them, so no matter how much he hurried, he couldn't catch them. Finally, he decided they had left him behind and he started back the way he had come. He hoped he would meet a trader who would take him back to St. Louis. Imagine his surprise and joy when he met the Corps members coming toward him. He was very hungry, but otherwise all right.

Whenever you go exploring away from your own home, always have an adult go with you. Never explore alone--and be sure you know what to do in case you should get separated from your friends or family. *(Ask students if they have ever been lost and what they did about it. Go over the rules for what to do when lost. (Click on* TEACHING AIDS "A" *and scroll to "Getting Lost.")*

CONCLUSION

It is fun and exciting to read stories about Lewis and Clark and other explorers of long ago. It is also interesting to read about people today who have traveled all the way to the moon, to the top of the highest mountains, or dived into the deepest parts of the ocean. Maybe you will be an explorer like that yourself someday. However, you don't have to go to the moon or the bottom of the ocean to be an explorer. There are always places and things to visit nearby, and lots of books to read for those who want to know more about the world around them.

Activity 4

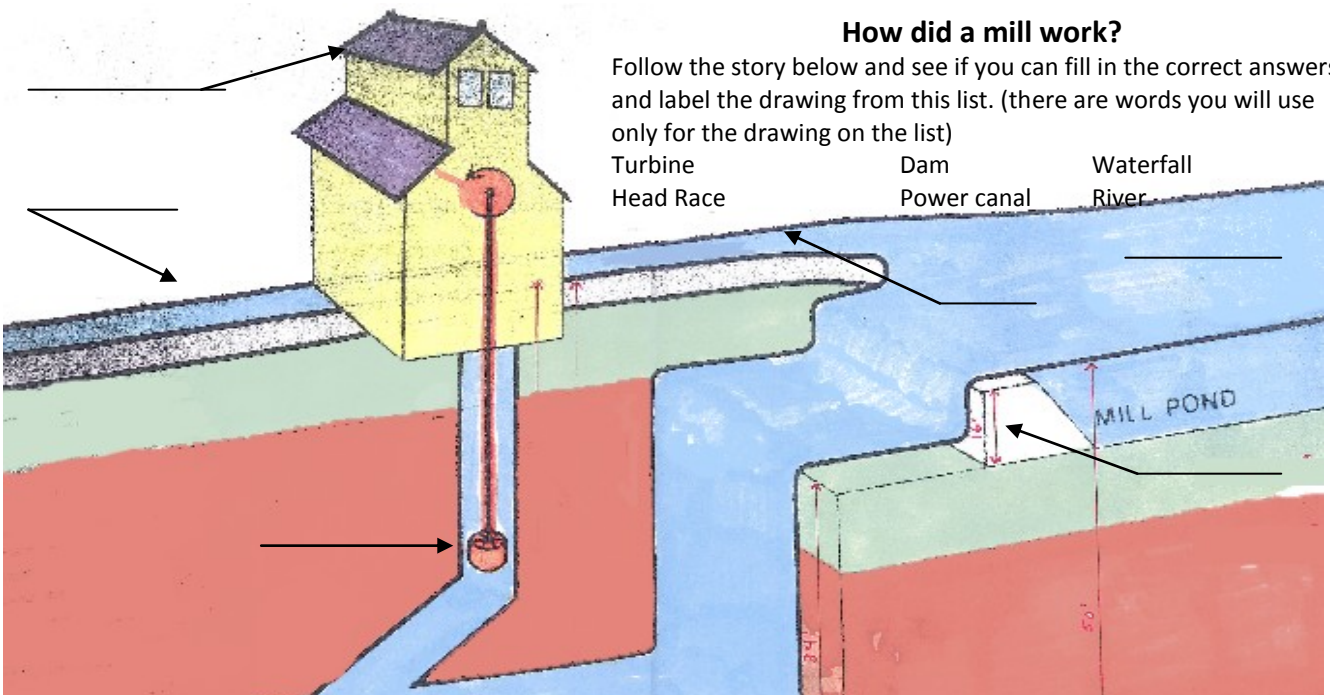
Mills History Hunt

Some of your students will trek down into Mill Ruins Park where they will see an archaeological site. Pieces of the milling process below ground are exposed so we can see it now! They will see previously buried mill walls, tail races, pieces of a head and an example of a turbine!

Use the following drawing to explain how mills along the banks of the Mississippi at St. Anthony Falls got the water that powered all of the machines. Then your students will be able to understand some of the things they are seeing on their hike and how the falls worked to power 32 mills on the banks of the Mississippi!

Find the DAM – the horseshoe dam was built in the Mississippi River above the falls to raise the level of the water so that it would fall even farther than the natural falls and to force the flowing water toward the shore before it went over the waterfall.

1. Find the HEAD RACE – the head race was a man-made trench dug into the shore. The water from the dam would flow down the head race to the mils.
2. Find the HEAD – water flowing down the head race would flow through openings cut into the walls of the mills below street level! Inside each mill there were 15 – 45 ft deep holes where the water flowing under the walls would then fall, turning a turbine at the bottom of the hole.
3. These were called TURBINE PITS. Find the turbine.
4. Find the TAIL RACE – the tail race was where the water that had just turned the turbine would flow back into the river!



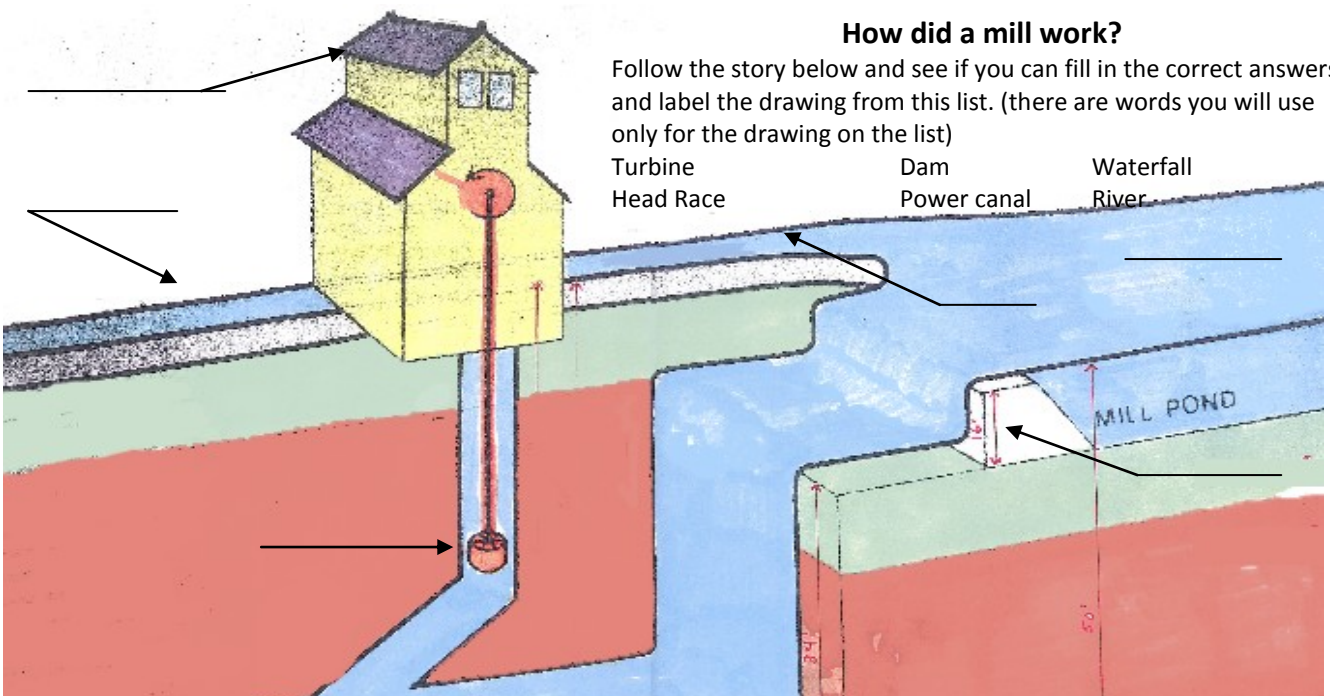
How did a mill work?

Follow the story below and see if you can fill in the correct answers and label the drawing from this list. (there are words you will use only for the drawing on the list)

Turbine	Dam	Waterfall
Head Race	Power canal	River

The millers of Minneapolis first built a _____to raise the level of the water that was falling over the falls and push the water toward the shore. Then they dug a canal into the shore of the river that would bring the water to the mill. Because it was at the top it was called the _____ _____.

The water then flowed into the mills out of the canal and fell down a pit where the water hit the _____ so it would spin! The spinning upright power shaft connected to a gear inside the mill where it was connected to every other machine using ropes and belts. The water then came back out into the lower half of the river at the bottom of the pit through the _____ _____. This simple system created enough turning power to make close to 200,000,000 pounds a flour a DAY!



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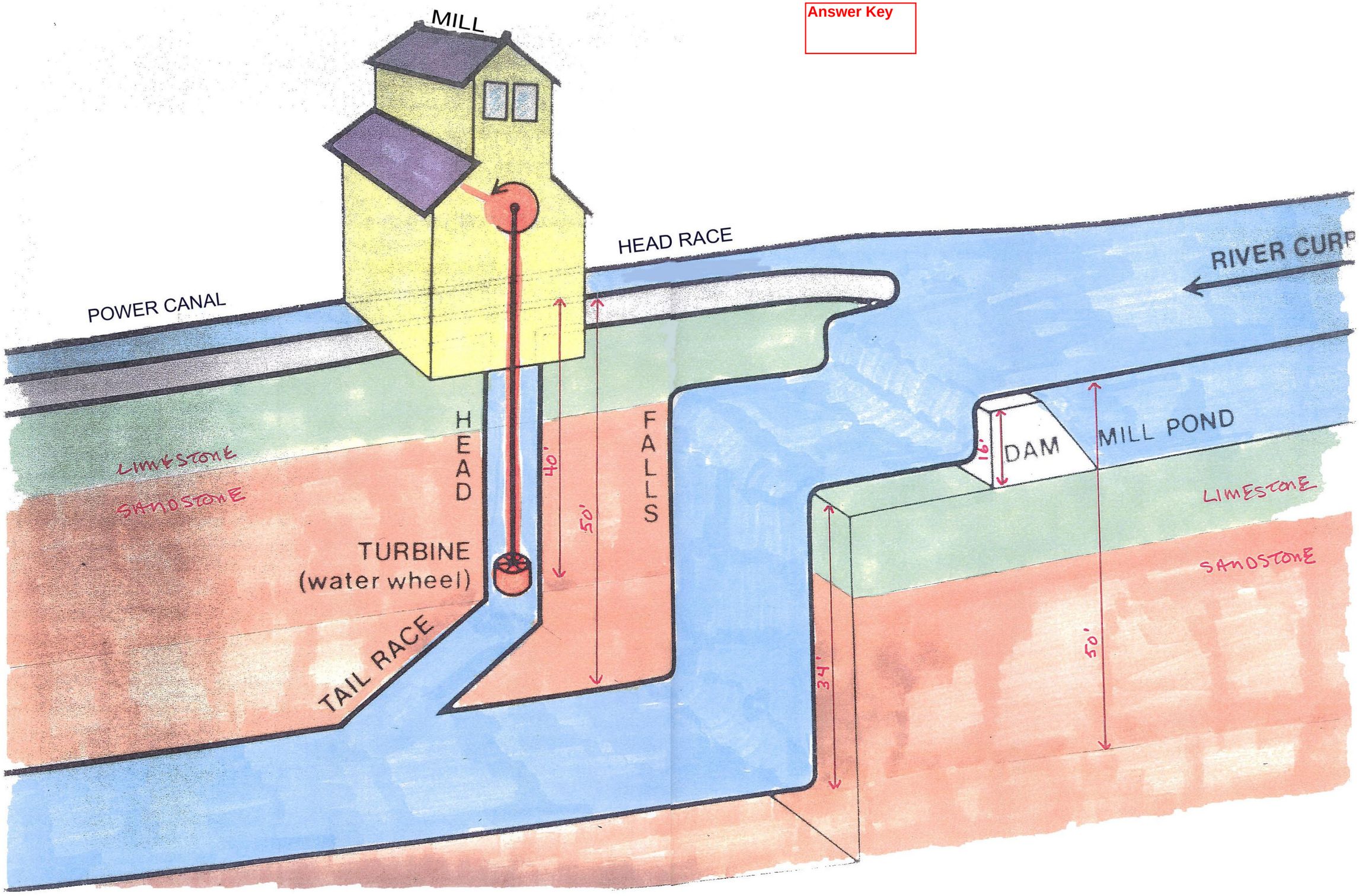
Answer Key


MILL
HEAD RACE
RIVER CURR
POWER CANAL
HEAD
FALLS
40'
50'
LIMESTONE
SANDSTONE
TURBINE
(water wheel)
TAIL RACE
16'
DAM
MILL POND
LIMESTONE
SANDSTONE
34'
50'

ADDITIONAL SUPPORT INFORMATION

HISTORY HUNT DESCRIPTION

Explore the history of the Minneapolis riverfront with an educator from Mill City Museum. The group will trek under the Stone Arch Bridge into Mill ruins Park. They will be charged with using visual clues to find objects that tell the story of industry at St. Anthony Falls, linking the place to the past. Students will explain their object to the group and sketch in their journals. They may also act out how people through history crossed the river from St. Anthony to Minneapolis or view the falls from either the Upper St. Anthony Falls Lock Visitor Center or the Stone Arch Bridge.

45 minutes. (Presenter: Mill City Museum, MN Historical Society)

UPPER MISSISSIPPI RIVER EXPLORATION TIMELINE

1680 Father **Louis Hennepin** joins a French expedition up the Mississippi led by Michel Accault. As a captive of the Dakota Indians, Hennepin visits the Falls of St. Anthony which he named after his patron saint. Hennepin's book about his travels becomes a best seller in Europe. (figure 1)

1766 **Jonathan Carver** is sent up the Mississippi by the British to secure the lands recently won from the French, to convince Indians to trade with the British, and to find a Northwest Passage to the Pacific Ocean. He discovers a cave that now bears his name in present day St. Paul, and draws the first published image of St. Anthony Falls. (figure 3)

1805 Lieutenant **Zebulon Pike** explores the Mississippi to prepare the area for American trading posts, to establish treaties with the Dakota and Ojibwe Indians, and to find the source of the Mississippi River. His 1805 treaty with the Dakota includes much of future Minneapolis including St. Anthony Falls. (figure 4)

1817 **Stephen Long** is sent by the U.S. Secretary of War to map the Upper Mississippi and located potential military sites. He recommends the confluence of the Mississippi and Minnesota rivers as the location for a fort.

1819 Colonel **Henry Leavenworth** begins the construction of what would be called Fort Snelling at the confluence of the rivers.

1820 Michigan Territorial Governor **Lewis Cass** explores the Mississippi, incorrectly identifying Cass Lake as the source of the river.

1823 Italian **Giacomo Beltrami** fails to find the source of the Mississippi.

1832 **Henry Rowe Schoolcraft** is sent up the Mississippi to stop warfare between the Dakota and Ojibwe. During his trip he establishes Lake Itasca as the true source of the Mississippi River.

1835 Artist **George Catlin** visits Minnesota as part of his effort to record North American Indians in pictures. He sketched a group of Ojibwa portaging around the Falls of St. Anthony, which he later turned into a painting. Catlin suggested a "Fashionable Tour" by steamboat to the Falls of St. Anthony, an idea that was popular through the 1850s. (figures 5 & 6)

1836 French cartographer **Joseph Nicollet** begins exploring and documenting the region. His 1843 report includes the fundamental map of the Upper Midwest. (figure 2)

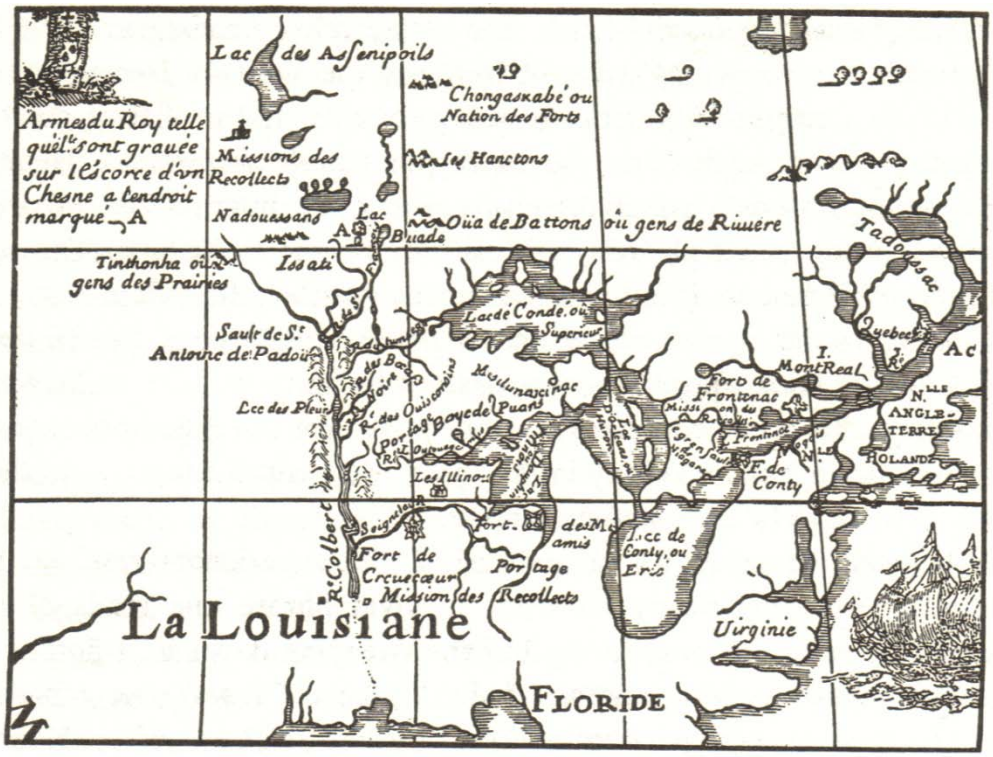


Figure 1. Map by Louis Hennepin in his *Description de la Louisiane*, published in 1683

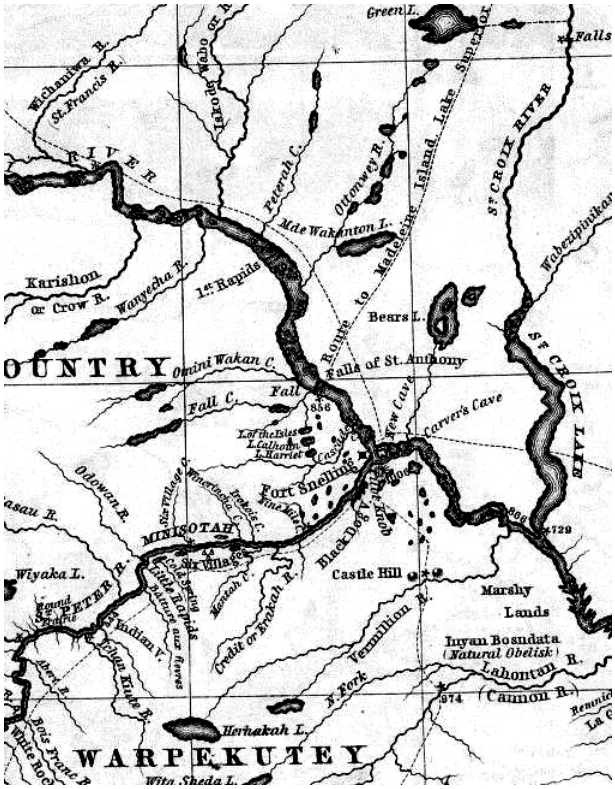


Figure 2. Joseph N. Nicollet, **Hydrographical Basin of the Upper Mississippi River. 1843**

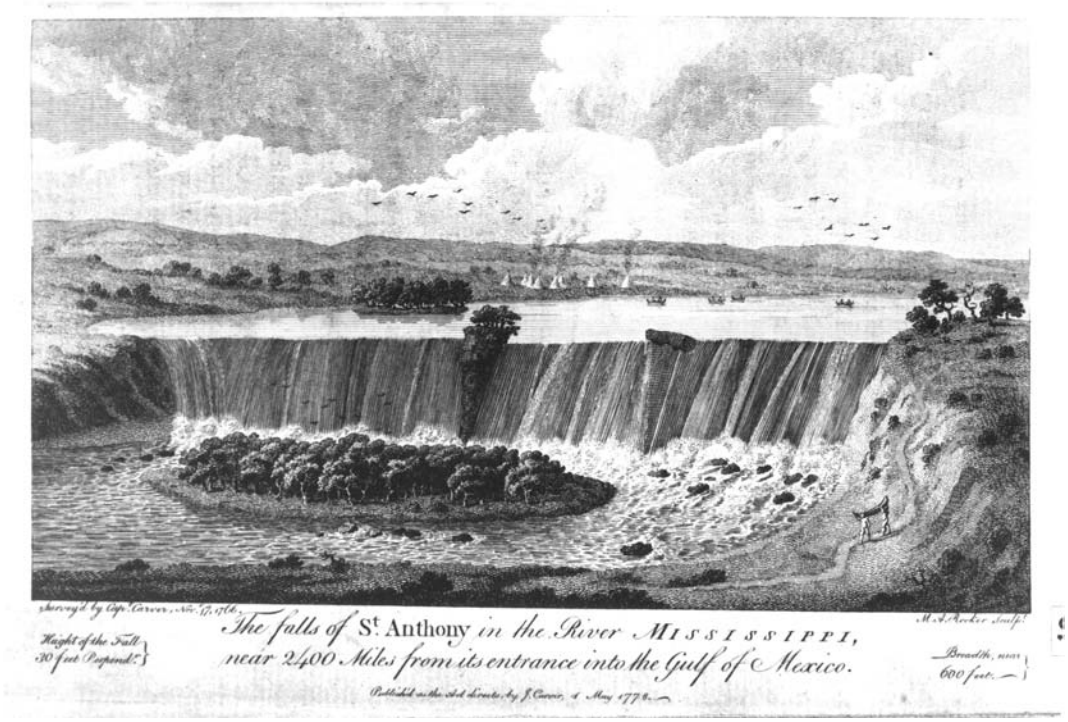


Figure 3. Jonathan Carver's drawing of St. Anthony Falls, 1788

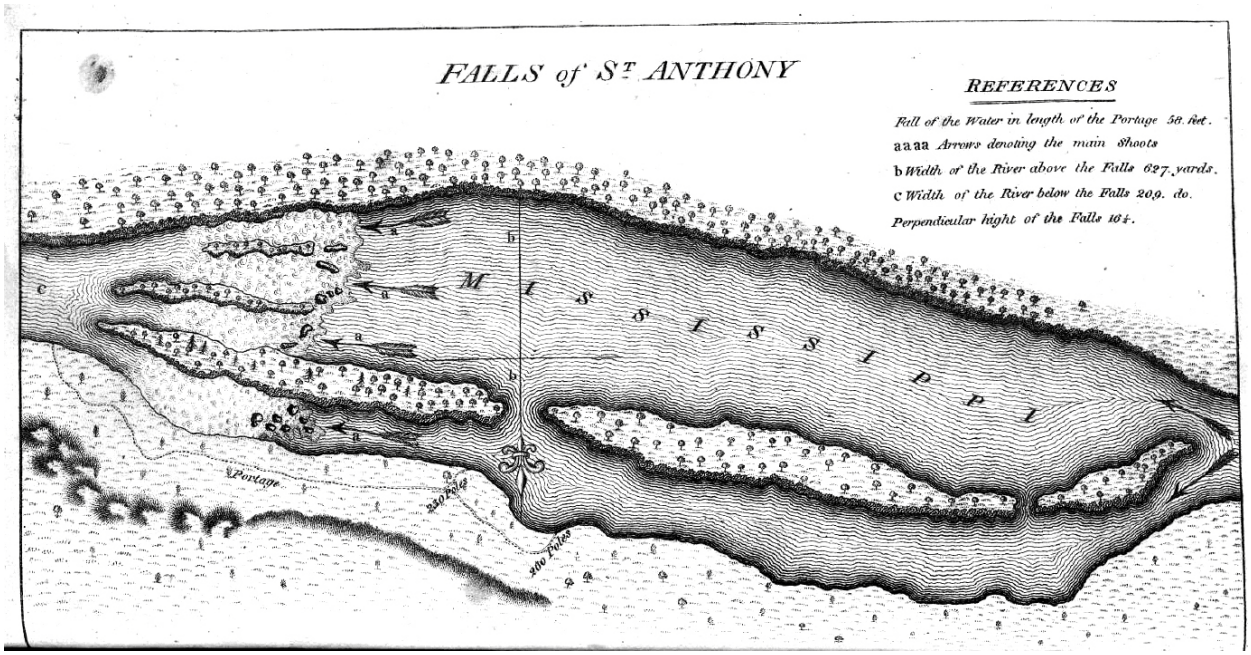


Figure 4. Zebulon Pike's map of St. Anthony Falls, 1810

Figure 5. George Catlin's sketch of Ojibwa portaging around St. Anthony Falls, 1835-6

Figure 6. George Catlin, **Ojibwa Portaging Around the Falls of St. Anthony, 1835-6**

Minnesota Historical Society- Mill City Museum

Websites you may find helpful

MN **Historical Society:**

http://www.mnhs.org/places/historycenter/exhibits/territory/fortune/trader/index.html

http://www.mnhs.org/places/historycenter/exhibits/territory/territory/index.html

http://discovery.mnhs.org/ConnectingMN/

http://events.mnhs.org/Timepieces/SourceDetail.cfm?SourceID=304

Lesson plan websites:

You too can be an Explorer, Exploring at School and What did you see? What did you learn?

This site is about Lewis and Clark but it has lots of explorer type activities and lesson plans at that can be generalized.

http://www.nps.gov/archive/jeff/LewisClark2/HomePage/HomePage.htm

Decisions, decisions

What kinds of decisions did early explorers have to make? Students can find out while completing Lead the Way!, a terrific interactive activity from USA Weekend. In this activity, students follow the trail blazed by Lewis and Clark, learn about some of the decisions the explorers had to make, and then compare the actual decisions to their own.

http://www.usaweekend.com/97_issues/971102/lewis_and_clark/971102trail_intro.html

Trailblazers -- Now and Then
http://score.rims.k12.ca.us/activity/blazers/index.htmlhttp://score.rims.k12.ca.us/activity/blazers/index.html

The Age of Exploration Student Activities
The Mariners' Museum provides a number of excellent exploration-related activities, including making a compass, learning about latitude and longitude, and creating a globe. The site includes a word search and a crossword puzzle.

http://www.mariner.org/educationalad/ageofex/activities.php

Journey to the Falls- Land Based Activity

Simulated Archaeological Dig

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Web sites related to archaeology-history

Activity Overview

In this 45 minute program, students will engage in hands on archaeology by excavating dig units that have been seeded with artifacts. Students will receive a quick site orientation to the river and the mills, and then delve into a discussion about the purpose of archaeology. They will learn proper dig techniques including use of tools, mapping, documentation and analysis. Students will then be divided into smaller groups and assigned a dig unit to excavate. At the end of the session, there will be a brief “show and tell” for students to share the results of their work and explain what they found, and how the site and artifacts were previously used.

Archaeology Vocabulary

Archaeology- A scientific method of studying past human cultures and analyzing material evidence (artifacts and sites)

Archaeological Site- A place where human activity occurred and materials were left

Artifact- Any object made or used by humans which is portable

Context- The surroundings in which an artifact is found. This also includes other artifacts found nearby or in association with the artifact

Culture- The set of learned beliefs, values, and behaviors generally shared by members of a society

Excavation- Systemic uncovering and recording of archaeological sites

Excavation Unit- An area of archaeological site (usually 1x1 meter square) that is being excavated

Feature- Like an artifact, a feature is anything that was made or used by humans, but is not portable. Example: a fire pit or a well

Inference- A conclusion, or hypothesis, based on observations

Observation- Recognizing or noting a fact or occurrence

Screen- A tool used to sift the soil that comes out of an excavation unit in order to find small artifacts that the excavator may have missed

Stewardship- Protecting and caring for a resource like an archaeological site

Stratigraphy- The layering of deposits in archaeological sites. The layer on the bottom is usually the oldest; the layer on the top is the youngest

Symbol- A thing which represents something else

Trowel- A small, pointed hand shovel used in archaeological excavations

Archaeology Dig- Mill Ruins Park

Background Information for Teachers and Chaperones

The goal of Archaeology is to learn about past people through the objects and features the people left behind. Archaeology is a science: the archaeologists form a hypothesis, collect data, and draw conclusions. Objects recovered in a dig are cataloged and conserved. Archaeology makes use of mapping skills, inference (forming a hypothesis), observation, and deduction (interpretation).

An archaeological dig is only one part of the process. It would be a mistake to focus only on the digging aspect of archaeology. Still, the dig is the part of archaeology that often catches people's imagination. Your job as teachers and chaperones is to provide balance by helping students form a hypothesis, and engage in proper data collection and analysis.

Mill Ruins Park

Mill Ruins Park is one of Minneapolis's most unique parks, and is a relatively new addition to the Minneapolis Park system. Opened in 2001, the park is on the shores of the Mississippi River at the west end of the Stone Arch Bridge in downtown Minneapolis. In its heyday, this area of mills, canals, and other historic features was the center of Minneapolis's booming 19th century lumber and flour industry. Well-known companies, including Pillsbury, General Mills, and Weyerhaeuser began here. The Park features partially revealed mill ruins and the restored tailrace, walking paths, and fabulous views of the river, the downtown skyline, and adjacent historic mill buildings.

Powered by the waterpower of St. Anthony Falls on the Mississippi River, Minneapolis's flour milling industry became #1 in the nation in 1880 and held that position for 50 years. The flour mills, built primarily in the 1870s, were powered through an elaborate waterpower system of canals and tailraces. Water from the Mississippi River was diverted above the falls into a 5-block long water canal. Mills were built on either side of this canal. Water entered the mills through openings (headraces) located on the canal side, dropped approximately 35 feet to turn turbines that were connected to the machinery within the mill. After the water dropped and turned the turbines, it exited the mill (through tailraces), flowed into a tailrace canal and re-entered the Mississippi River.

Minneapolis lost its status as the nation's #1 flour miller in 1930. At that point, many of the mills on the river side of the canal were torn down, leaving only the foundations. Sand, gravel and dirt eventually covered these foundations for over 50 years. The structures you will see as part of Mill Ruins Park are the foundations of the mills, now uncovered.

Today, these features help tell the story of Minneapolis's rise from a small prairie town to a major metropolitan center. The flour milling industry was a key component in this growth. The Mill Ruins Park site provides information about the lives of workers in the flour mills, area railroads, machinery shops, and the waterpower canal.

Role of Teachers and Chaperones- Mill Ruins Park Archaeology Dig

What to do as a teacher in the classroom <u>prior to the dig</u>

1) Familiarize students with the main concepts of archaeology:

- Archaeology lets us learn about people who lived in the past.
- Archaeologists study artifacts: things that were made or used by people.
- An archaeological site is any place where people lived, worked, or played in the past.
- Excavation is a careful process of digging, drawing, and recording information.
- Archaeologists excavate to answer questions about the past.
- Excavation tools include trowels, brushes, dustpans, buckets, and sifting screens.

2) Discuss the Vocabulary list

3) Develop observation, deductive, and interpretive skills by having students do some of the following activities. The Penny and the Boy in the Water activities develop observation and inference skills. The Potato activity is a fun and easy activity to develop description skills. The "re-building a Pot" activities put interpretive skills to the test.

What to do as a teacher or chaperone the <u>day of the dig</u>

- Minneapolis Park and Recreation and National Park Service staff will lead the site tour and dig, but teachers and chaperones are expected to actively help at the dig site.
- Minneapolis Park and Recreation or NPS staff will present a brief site history and viewing of the Mill Ruins Park site as well as an introduction to archaeological concepts and procedures.
- Approximately 30 minutes is spent in excavation. Students begin removing sand from the site and placing it in buckets for sifting. As artifacts and features are revealed students will place them in a designated place.
- Encourage students to excavate the site in layers. The tendency is to dig around an object that is emerging. Do not let students pull objects from the site. If it appears an object needs to be removed, ask one of the staff or volunteers.
- Encourage students to remove sand from the site and fill the buckets. The tendency is to move sand from place to place within the dig site. Help students sift the sand as the buckets are filled.
- Help all students to be actively involved in the dig and to <u>remain at their own dig site</u> rather than visiting other dig sites.
- In the last 5 minutes each dig site will share with the whole group what was found at individual sites. Minneapolis Park and Recreation staff will lead this activity.

Activities to Support Archaeological Discovery

Observation and Inference- Penny Activity

Archaeology is a way to learn about people who lived long ago. Archaeologists learn how people lived long ago by studying the objects left behind. Archaeologists are like detectives. They examine evidence and clues, often buried beneath the earth. The objects Archaeologists find buried are called ARTIFACTS. Artifacts are any objects made by humans. Your clothes, schoolbooks, and toys are artifacts of modern people. Archaeologists can learn to "read" artifacts, just as you might read a book.

A penny is easy to read because it is familiar. Some ancient (very old) artifacts are easy to read because they resemble objects similar to objects we use today. Archaeologists often find artifacts that look very different from objects we use today.

Reading an Artifact

Materials needed: a penny or other coins, a magnifying glass

Questions to ask

How many things can you tell about the people who made this object? Here are some questions to get you started:

1. When was the coin made?
2. From what material is it made?
3. Can you tell what language(s) did the people speak?
4. Could the people have spoken more than one language?
5. What type of buildings did the people build? Can you tell what the building was used for?
6. What country is the coin from?
7. Who is the man and why is he on the coin?
8. Did the people have a religion?
9. Could you answer questions 7 and 8 if you did not know who Abraham Lincoln or who God was?
10. How was this object used?
11. What if you didn't know this object was a coin?

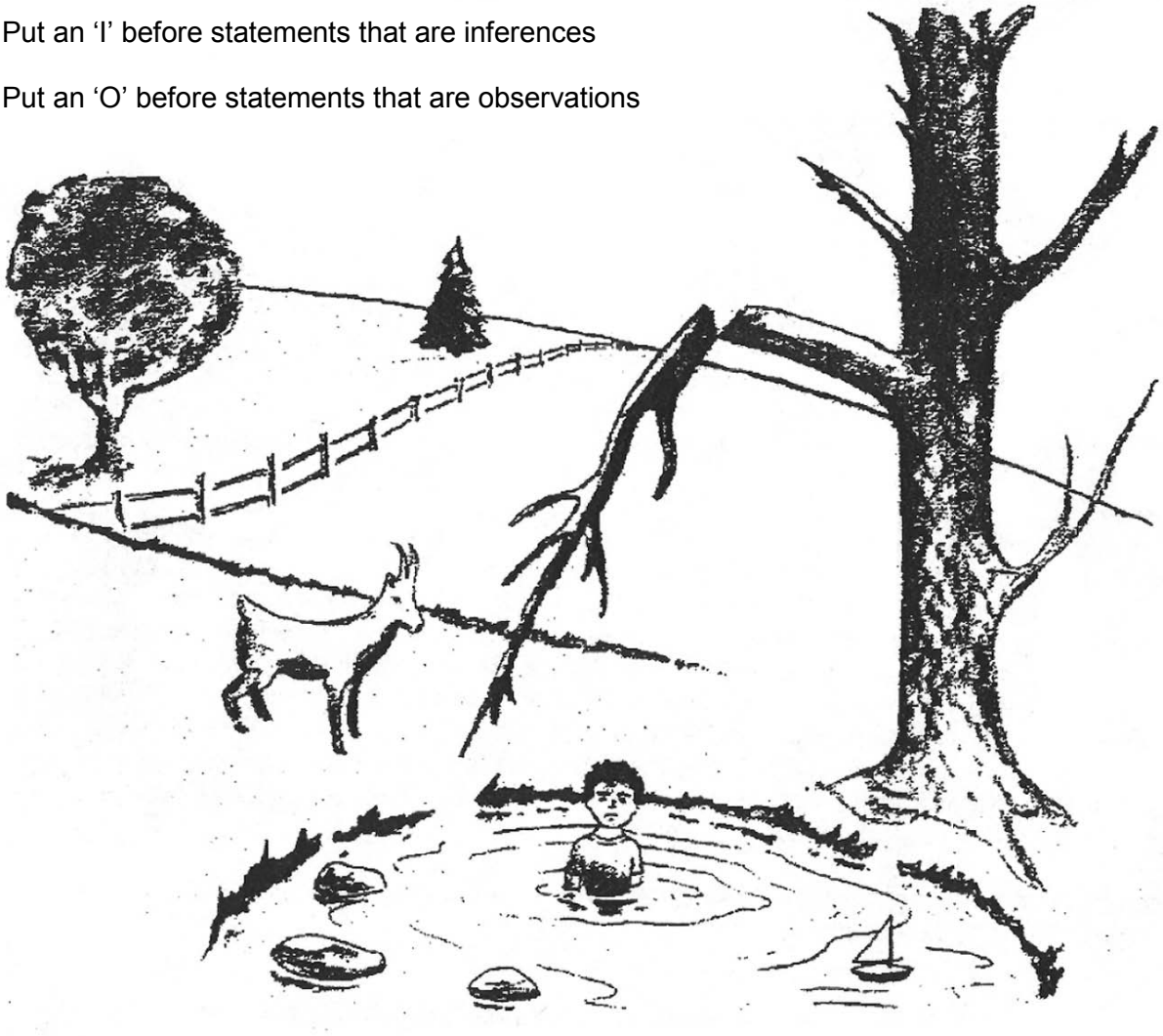
Now try reading an artifact that is unfamiliar to you. Possible "artifacts" may include chop stick holder (available at import store), slide rule, odd looking hardware or plumbing parts, specialized kitchen utensil or hobby item.

1. What can you tell about the people who might have used this object?
2. Write down four facts about the unfamiliar object.
3. What can you tell about the people who might have used this object?

Observation and Inference- Boy in the Water

Put an 'I' before statements that are inferences

Put an 'O' before statements that are observations



___1. The boy is in the water

___2. The weather is cold

___3. The tree branch is broken

___4. If the boy crawled out of the water, the goat would push him

___5. The boy fell off the branch

___6. The goat is standing by the pond

___7. The branch will fall on the boy's head

___8. The boy fell off the rocks

___9. There is a sailboat in the water

___10. The sailboat belongs to the boy

___11. The goat will soon leave the pond

___12. The tree by the pond has no leaves

___13. There are three rocks in the pond

___14. The tree by the pond is dead

___15. If it rains, leaves will grow on the tree

___16. The goat pushed the boy into the pond

Observation and Inference- Boy in the Water **Teacher Guide**

Materials needed:

- Boy in the water activity sheet

Time needed:

30 minutes

Procedure:

Archaeologists use observation and inference to learn more about the story of past people and cultures. By making observations and inferences about things (artifacts) and places (sites) archaeologists infer behavior of the people who used and created those object or places. When archaeologists find remains of old structures (an observation), they could infer, for example, that the people who built them either worked or lived in them. If they choose the inference (hypothesis) that the people lived in them, they would look for evidence of household activities like broken dishes, food remains, and parts of clothing (like buttons). If they find these things their hypothesis might be proven correct. Because only part of the past is preserved or available for us to research, archaeologists must make careful hypotheses when making inferences from archaeological data.

Vocabulary:

Hypothesis A proposed explanation for a set of facts that can be used as a basis for further investigation; a hypothesis is subject to proof.
Inference A conclusion based on observations
Observation Recognizing or nothing a fact or occurrence

- Pass the worksheets to the students.
- Students will determine if each statement is an observation or an inference. Put an 'I' for an inference and an 'O' for an observation. They should have a reason for their answer.
- Discuss how one of the inferences (hypotheses) might be tested.
- Students should form their own definition of observation and hypothesis.

"Boy in the Water" Worksheet answers:

Observation: 1, 3, 6, 9, 12, 13
Inference: 2, 4, 5, 7, 8, 10, 11, 14, 15, 16

Describing an artifact- Potato Archaeology

Materials needed:

- Paper, pencil, ruler for each group
- A potato for each group of students

Time needed:

30 minutes

Procedure:

1.) Divide the class into small groups of 3-4 students.

2.) Give each group a potato, paper, pencil, and a ruler.

3.) Have the groups write and draw a detailed description of their potato with 5-10 minutes.

4.) The teacher should collect all potatoes and put them in a container.

5.) Working together, each group should use their descriptive data to locate their potato in the container. Alternatively, each group could be given the description of another group's potato and locate that potato.

6.) After the potato is found, discuss the following items as a class:

- What types of descriptions were given for the potatoes (measurements, descriptive information such as color, number of eyes, texture or markings on the skin, etc.)
- Which descriptions were most useful for finding the original potato? Which were least useful?
- What information about the potato was not available from this activity?

Garbage Can- Recycling Bin Archaeology

Archeologists often try to interpret the material remains that they find in terms of the activities carried out by ancient people. But not all activities generate material remains nor are all activities carried out in separate locations. Some spaces may be used for many purposes, while others are reserved for a more limited range of activities. Debris from activities is not always thrown away on the spot; in fact, we devote a lot of effort to training our children NOT to throw things away on the spot. Trash cans are a monument to something, namely the dump, which could only develop once people lived in one place for a long enough time to be bothered by garbage. Often the most concentrated archeological remains in an area really represent the dump.

The following exercise is designed to demonstrate what can be learned from material remains at an archeological site. Students will explore the relationship between material remains and activities in different areas.

Materials Needed:
One or two days of trash and garbage from at least two wastebaskets located in different areas of a school or home, for example: the student lounge and the teachers' lounge, the lunchroom and the classroom, the living room and the bathroom. Do not tell the class where the bags came from. Also recommended is a large plastic drop cloth for each trash bag. CAUTION: Wear gloves when handling garbage. Select a trash can unlikely to hold sharp objects.
Materials from two different recycling bins may also be used.

1.) Divide students into as many groups as there are trash bags. Spread the dropcloths on the floor and dump out the trash. Each group should analyze the trash in the following terms:
   a. Number of different kinds of trash; for example, vegetable remains, animal remains, paper food containers, plastic food containers, metal food containers, beverage containers (group or individual sized?), paper with writing, paper with printing, pencils, cardboard tubes, etc.
   b. Apparent functional groupings of trash; for example, remains of meals, remains of snacks, remains of drinks, remains of work, remains of games, debris from cosmetic activities, discarded printed matter, etc.
   c. Proportional representation of each functional group. Is most of the trash food? Or is most of it reading material?
2.) Analyze the information from each trash bag.
   a. What does it represent in terms of activities? Does it represent more than one activity? Which activities were most frequently represented? Do you think all the activities were carried out near the trash can or in a different space? If debris from an activity was transported to the trash can, was it all transported or was some left on the activity site or disposed of in another way?
   b. Does the trash reflect group activities or individual activities? Was the context of activity the family or the society? If the society, what is the importance of these activities to the society at large?
   c. The group could also interview the actual users of the space asking what they did in a particular area to show how physical remains give a different picture from oral history, i.e. What did you eat or drink?
3.) Now compare the results of two or more bags

a. Where did each bag come from? If the class has problems with this, you could provide a list of choices (i.e. who used the space: teachers, students, 7th graders, children, and/or parents, and how did they use it?)

Web sites related to Archaeology and History

The Institute for Minnesota Archaeology

http://www.fromsitetostory.org/

This site discusses in detail archaeology conducted within the Minneapolis Riverfront area. The "Stories" section covers MN history from pre-contact through contact. At the bottom of the Home Page is a link, Twin Cities Metro Area, which will take you to specific dig sites. The Bridgehead and Federal Courthouse links apply to the St. Anthony Falls area.

Minnesota Historical Society

http://www1.umn.edu/marp/index.html

This site contains some dated information but gives a good overview of the excavation of Mill Ruins Park and information on industrial archaeology (the type conducted at Mill Ruins Park). To go directly to the site that followed the excavation of Mill Ruins Park over a 6-week period go to http://www1.umn.edu/marp/dig/mrp2000_week1.html.

Teachers' notes
re: "Surf the Mississippi at St. Anthony Falls"

A.1. research.

A.2. (Answers will vary.) Items that might be found in student's homes might include toys, dishes, toothbrush, cooking items. Items unlikely to be found in student's homes might include a slate, shoemaking supplies, pigs feet bones, beads

A.3. A privy is an outdoor toilet. The waste falls into a pit dug into the ground. Future archaeologists would most likely need to go to a municipal dump to find evidence of what people ate but they would not be able to connect the evidence to a particular family.

B.1. The diagram shows the recession, or erosion, of the waterfall from 1660 to 1887.

B.2. The falls have been valued for religious significance, a landmark, geological interest, scenic beauty, water power, and navigation.

B.3. 1) 12,000 years ago the predecessor of St. Anthony Falls was located near downtown St. Paul. (It is referred to as River Warren Falls.)

B.3. 2) what is now Ft. Snelling; four

B.3. 3) 180; 16-20

C. The exact web site location is...
http://www.mnhs.org/places/nationalregister/shipwrecks/mpdf/incraft.html

C.1. Ways to power vessels on the Mississippi River without fuel include: wind, water, hand (human power or paddle), and horse. (Indicated in first subtitle of this web site.)

C.2. Flatboats are strong, box-like boats with flat bottoms, perpendicular sides, and upturned ends. They sometimes were covered throughout their entire length. They were constructed to float with the current (they were water-powered) and were steered by large oars or sweeps placed at the ends. Most flatboats never returned after descending the river; often, they were dismantled and used or sold for lumber at their downstream destination.

D. Optional: Explore other river-related web sites:
For students:

1. http://discovery.mnhs.org/ConnectingMN/ (Forest, Fields and Falls- MHS site)
2. http://www.nps.gov/miss/forteachers/teacherresources.htm (click on "Locking Through Interactive" near bottom of page for kayak animation through a lock.)
3. http://education.usace.army.mil/ (Educational resources and games for kids)

For teachers:

1. http://www.mrdbridges.com/stoneArch.php (St. Anthony Falls area bridges- photos, history, descriptions)

JOURNAL MAKING INSTRUCTIONS

MATERIALS

- three sizes of cover weight paper:
  - pamphlet with pockets, 12 * 18”
  - back cover, 6 * 9”
  - accordion spine, 9 x 9
- 8 pages text paper, 8-1/2 x 11”
- one stick, approx. 9”
- one, size 33 rubber band
- bone folders or craft sticks
- glue sticks
- scissors
- awls or push pins
- small paper clips
- large paper clips
- copies of historical images of Mississippi River
- colored pencils
- paper scraps

PAMPHLET:

1. Fold cover weight paper in half the hamburger way, using your bone folder to make the crease.
2. Unfold the paper, and then fold it in half the hot dog way using your bone folder again.
3. With the paper folded this way, draw two dots, one on the open edge on the crease from your hamburger fold, and the other at the top of the paper on the fold.
4. Design a line to connect these dots—it can be straight, wavy, or anything in between. This line will create a triangle-like shape on top half of the folded sheet. Make sure that the bottom of the triangle is at the open edge, and the top point is on the fold.
5. Cut along the line you drew. Then unfold the paper. It should resemble a house, with the triangle shape you cut as the roof. Tip the roof of the house down so the top point meets the bottom of the piece of paper. Re-fold with your bone folder along the hot dog fold so that the roof is on the inside. This is your cover, with two folders on the inside.
6. Then take one sheet of text paper and fold it in half the hamburger way. Hold the bone folder sideways and run it along the fold to crease it well. Fold the rest of the sheets in half the same way, one by one.
7. Nest all the folded pages by opening up one of the sheets like a V and placing a second folded sheet inside so that the folds line up. Open the second sheet and place the third sheet inside of the second in the same way, until you’ ve nested all the pages.
8. Open this folded packet of pages and place it inside the cover so that all of the center folds line up and so that equal amounts of cover show at the top and the bottom. Make sure the cover is aligned so that the tip of what was the roof of our house is at the TOP of the book and the folders are on the inside.
9. Take one large paper clip and clip the pages to the cover on one side at the top. Use a second paper clip to secure the pages to the cover on the other side at the bottom. This keeps the pages from moving while you bind your book.

RUBBER BAND BINDING:

1. Make two dots with your pencil, equidistant along the centerfold of your nested text paper.
2. Make two holes by puncturing the awl through each dot. If you use a push pin to make the holes instead, follow this step by wiggling a pencil tip into each hole to enlarge them slightly.
3. Take a small paper clip and bend it out so that it resembles a cane with a long tail and a hook on one end. Loop a rubber band inside the hook and squeeze it closed.
4. Start on the inside of the book and wiggle the pointed end of the paper clip into one of the two holes. Pull it through until just the end of the rubber band pops though to the outside cover.
5. Take off the paper clip.
6. Loop this part of the rubber band around the stick and leave the stick in place.
7. Repeat steps one to six on the second hole.

ACCORDION FOLD (M-fold or 8-section accordion):

1. Bend the square paper gently in half in one direction, then in the perpendicular direction. The direction that bends easier identifies the paper grain. Always fold paper with the paper grain for easier and crisper folding.
2. Lay paper flat on the table. Fold it in half along the grain. This is a *mountain* fold. Hold the bone folder sideways and run it along the fold to crease it well. Use the bone folder to crease all other folds.
3. Fold one paper cut edge up to the *mountain*.
4. Turn paper over and fold other cut edge up to the *mountain*. This is a 4 section *M-fold* with two *mountain* folds and one *valley* fold. **You can stop here or continue to make an *8-section accordion.***
5. Fold one cut edge up to the *mountain*.
6. Turn paper over and fold the other cut edge up to the *mountain*. This now resembles one large *mountain* and two small *mountains* on the outside.
7. Reverse the large *mountain* fold. This now resembles one large mountain with two small *mountains* on the inside.
8. Pinch one small inside *mountain* and fold it up to the large *mountain*.
9. Turn paper over and pinch other small inside mountain and fold it up to the large mountain. This 8-section fold is an *accordion* fold.

ASSEMBLING THE BOOK:

1. Set your accordion fold on the table so it looks like a W, with the end edges pointing up.
2. Set your pamphlet book on the table with front cover face down and back cover face up.
3. Apply glue on the outside of the last right section of the accordion fold and attach it to the left side of your pamphlet book (opposite the spine).
4. Apply glue to the other outside edge of the accordion
5. Lay your 6 * 9” paper on top of the glue, lining up its left-hand edge with mountain edge of the accordion.

IMAGES:

1. Add historical images or cut paper scraps to illustrate the Mississippi River landscape.

Mississippi River Detectives

Using clues on historic maps describe the river and landscape of "then."

Mississippi River- Then_____

Date

Look at the river and landscape around you and describe the river of "now."

Mississippi River- Now _____

Date

Mississippi River – Future Write one thing you would like to the Mississippi River of the future to have.

Explorers

Johnathon Carver came here *245 years* ago! But he probably saw some of the same kinds of things you are seeing today when he rowed his canoe up the Mississippi. Of course, many other things are different.

List the things you can see outside the boat that might be the same and ones that are different.

SAME	DIFFERENT

Archaeological Dig or Mills History Hunt

Official Mill Ruins Park archaeology stamp or Mills History Hunt stamp

Draw one of the artifacts found at your site.

Viewing the River

Compare the river from the past as seen in a photo from the 1890s with the river today. Describe one of the photos. Draw a picture or write about how the river has changed in appearance or in its use.

Key Words

Write a short definition of these words

Ojibwe

Lock

Boom

Mill

Explorer

Archaeology

Artifact

_____

_____

_____

Viewing the Lock and St. Anthony Falls

In the space below or on a blank page:

Write or draw about what you saw when viewing the lock. What did you find interesting? Can you describe how a lock works?

Write or draw about what you saw or how you felt when you looked at St. Anthony Falls.

After your trip

What will you remember most about Journey to the Falls?

What is something you learned on Journey to the Falls?

What more would you like to learn about the Mississippi River?

Before your trip

What do you know about the Mississippi River?

What do you hope to see or learn?

What are you most excited about?

Big River Art Contest 2012

The annual Big River Art Contest engages students in the science, heritage and stewardship of the Mississippi River through art.

Open to: All students, grades 4-6

Categories (choose one themes for the subject of your art)**:**

1) The Mighty Mississippi
2) Caring For the River
3) Big River Journey*
4) Journey to the Falls**

** Must have been on a Big River Journey trip*
***Must have been on a Journey to the Falls trip.*

How to enter:
All entries must be original, on **11" x 17" paper**, flat, and signed. Work may be created using pencil, pen, markers, pastels, crayon, watercolor, paint, or flat collage. Original poetry may be included in the artwork for example a stewardship message in category 2 ("Caring for the River.") Each student may submit one work of art. Student's name, home address and phone #, school name, grade, phone #, and teacher's name must be clearly printed on the back of the artwork, along with name of the chosen category theme. Students may instead fill in the entry form template and attach it securely to the back of the artwork. **Entries must be received by 4:00 p.m., Tuesday, June 5, 2012**. Submit school packets of entries to: *Art Contest, Mississippi National River and Recreation Area, 111 E. Kellogg Blvd., Suite 105, St. Paul, MN 55101-1256.*

Prizes: In each category a grand prize winner and three winners will be chosen.
Student prizes: For categories 1, 2 and 3 each winner will receive two tickets for a boat ride on one of the Padelford boats and two tickets to the Science Museum of Minnesota (including Omni Theater). For category 4 each winner will receive two tickets for a regular site seeing cruise on the Minneapolis Queen Riverboat and two tickets to the Mill City Museum (MHS). In addition to these prizes, the grand prize winner in each category will receive an additional prize.
Teacher prizes: For categories 1, 2 and 3 one grand prize winner teacher will receive a free trip (which may be Big River Journey.) The other two grand prize winner teachers each receive a free trip (*not* Big River Journey.) Each trip is for up to 30 students on a Padelford Packet Boat Co. boat during the 2012-13 school year. For category 4 the grand prize winning teacher will receive two tickets for a Sunday Brunch cruise on the Minneapolis Queen Riverboat.

Judging criteria and selection of winners:
Works of art will be selected by a panel of judges who will evaluate works on artistic merit, content (including relevance to chosen theme), and *originality*. Winners will be notified by mail or phone; prize tickets will be mailed to the home address of each winning student.

Additional information and display of winners' art:
All works of art submitted shall become the property of the Mississippi National River and Recreation Area (National Park Service.) No works will be returned. Winning art may be displayed at the Science Museum of Minnesota, Fort Snelling State Park Visitor Center, Mill City Museum, and/or other venues. The winning art will be featured on the website of the Mississippi National River and Recreation Area (http://www.nps.gov/miss/index.html).

Sponsors: Mississippi National River & Recreation Area (National Park Service), Padelford Packet Boat Co., Science Museum of Minnesota, Minneapolis Queen Riverboat, Big River Journey and Journey to the Falls Partners

Further information: Kathy Swenson, 651-293-8424

Big River Art Contest 2012 - Ideas to get you started:

1) **The Mighty Mississippi-** This category is about the Mississippi River – its wildlife, plant life, scenery and recreation – and its relationship to you.
   - Exploring the river with friends, canoeing, fishing, hiking, biking, etc.
   - The river as a home for animals - turtles, frogs, mussels, beaver, otter, fox, deer, raccoon, etc. (Add a poem about the animal!)
   - Birds and bird watching or the Mississippi River as a flyway
   - Fish and fishing (portray specific species like catfish, paddlefish, or sturgeon)
   - Aquatic insects (idea: show how aquatic insects are part of a food chain)
   - Following animal tracks

2) **Caring For the River-** Here are some ideas:
   - Drink water? Then help care for the river! It's our water source!
   - Your street flows to the river!
   - Be a friend of the Mississippi River!
   - Do you like songbirds? Save their river habitats!
   - Show how YOU keep the river clean
   - Help the river by keeping leaves and grass out of streets!
   - Leave no pollution- ride a bike, turn off lights, reuse, recycle, restore
   - Plant native trees and shrubs!

3) **Big River Journey-** Draw what you did, saw or learned on Big River Journey
   - Show what you did or what you saw on the boat; include your favorite learning station or activity.
   - Draw the boat with you and your friends at your favorite learning station
   - What did the river look like from the boat?
   - Draw the boat with you and your friends viewing birds, animals, boats, buoys or the river confluence
   - What birds, wildlife or plant life did you see?
   - What did you see or do at Fort Snelling State Park?

4) **Journey to the Falls-** Draw what you did, saw or learned on Journey to the Falls
   - Show what you did or what you saw on the boat
   - Draw the boat with you and your friends at your favorite learning station
   - What did the river look like from the boat?
   - Draw the boat with you and your friends viewing birds, animals, boats, bridges, the falls or other river sites
   - What did you see or do at the archaeological dig?
   - What did you see or do on the history hike?

PRINT Neatly

Student Name	
Home Address City, State, Zip Code	
Student phone #	
Student Grade Level Circle student grade	**4** **5** **6**
School Name, City	
Teacher Name	
School Phone #	
Art Contest Category (circle ONE)	1) Mighty Mississippi 2) Caring for the River 3) Big River Journey 4) Journey to the Falls

Journey to the Falls Student Activity: History/Computer Learning

Surf the Mississippi at St. Anthony Falls

Instructions for students:
Visit the following internet sites and answer the following questions.

A. Explore Archaeology in Twin Cities at: http://www.fromsitetostory.org
First click on "Twin Cities Metro Area", then "Bridgehead (Federal Reserve Site)"

1. Before beginning an archaeological dig, archaeologists must first _____ the history of the site.

2. Scroll down to the excavation findings (Step 4) for 28 1st Street North (Knoblach Boot and Shoe Manufacturer).
Name two items found at this site that might also be found at your home:
_____ and _____.

Name two items found at this site that probably would NOT be found at your home:
_____ and _____.

3. What is a privy? _____.
Many clues to what the Knoblach family ate were found in the family's privy. Where would future archeologists find clues to what your family eats?
_____

_____

B. Explore St. Anthony Falls at: http://www.mvp.usace.army.mil
First click on "History," then *"Historical Publications",* then *"Engineering the Falls."*

1. Click on the diagram of the falls to enlarge it. What is the main idea shown by the diagram?
2. Read the first paragraph in the "Overview" section, then name four values or uses that people have had for St. Anthony Falls.
3. Scroll down to the part about "Geology."
   1) 12,000 years ago a huge waterfall over 175 feet tall existed near what present-day place?
   2) From its origins near _____, St. Anthony Falls retreated slowly upstream at about _____ feet per year until it reached its present location.
   3) Geologists estimate that the waterfall was originally about _____ feet high, but by the early 19th century, explorers described it as only about _____ feet high.

C. Explore historical river vessels (boats) at: http://www.mnhs.org/
Click on "Search." Then type in "Mississippi River vessel types."
Find and click on "Vessel Types on Minnesota's Inland Waters."
1. Name three ways of powering a vessel on the Mississippi River without fuel.
2. Describe a flatboat. How was it propelled and steered? What were its uses?

2.
Journey to the Falls
Field Trip Logistics

What you need to know
to make your field trip a success

1. Learning Stations
2. Field Trip Logistics
3. Daily Schedule
4. Template for class organization
5. Name Tag Template
6. Scholarships
7. Maps and Directions

Journey to the Falls
Learning Stations & Activities

Boat Activities

Journaling
Like river explorers of previous times who traveled the Mississippi River, students will observe the river today, and then use their journals to make notes and sketches about what they see and experience (environment, activity, sights, sounds, smells, etc). Historical photos will allow students to see what these places looked like in the past. Once back in the classroom they will use their notes for writing a post card to a friend – real or imagined. (Teachers will be provided with blank cards for students to make the post cards in the classroom – where they will make a picture of a river scene or detail on one side, and write about what they saw and experienced on the other.) 15 minutes. *(Activity introduced; teachers supervise activity.)*

Exploring the River
This activity focuses on the early European explorers of the Upper Mississippi River, how they recorded their observations using words and pictures, what they would have needed for their trip, and how they would have traveled up the river. Students will spend time at three interactive stations to choose the proper boat Stephen Long should use for his expedition, to pack the necessary items that Lt. Pike would have needed to map St. Anthony Falls and the upper Mississippi, and to record their own observations in their journals. Students will learn how the skills of observation, writing, planning and sketching can enrich their understanding of the river and their world. 25 minutes. *(Presenter: Mill City Museum, Minnesota Historical Society)*

River History Detectives
The Mississippi River we know today has experienced significant change, both from geological forces and human decisions. Students will use maps, historic images, and memoirs to figure out what the river was like long ago, how the river was used, and just what happened here over the past 110+ years. An 1895 map will serve as a focus and jumping off point to compare the river environment, industries, transportation, and recreational options between 1895 and today's Minneapolitans. 25 minutes. (*Presenter: Mississippi National River and Recreation Area, National Park Service.)*

Land Activities **(each student will do either Activity A or B; all students will view the falls)**

Activity A: Mills History Hunt
Explore the history of the Minneapolis riverfront with an educator from Mill City Museum. The group will trek under the Stone Arch Bridge into Mill Ruins Park. They will be charged with using visual clues to find objects that tell the story of industry at St. Anthony Falls, linking the place to the past. Students will explain their object to the group and sketch in their journals. They may also act out how people through history crossed the river from St. Anthony to Minneapolis. 45 minutes. (*Presenter: Mill City Museum, MN Historical Society*)

Activity B: Archaeology Dig at Mill Ruins Park
Students will engage in hands-on archaeology by excavating dig units that have been seeded with artifacts. Students will receive a quick site orientation to the river and mills, and then delve into a discussion about the purpose of archaeology. They will learn proper dig techniques including use of tools, mapping, documentation and analysis. Students will then be divided into smaller groups and assigned a dig unit to excavate. At the end of the session, there will be a brief "show & tell" for students to share the results of their work and explain what and how the site and artifacts were previously used. 45 minutes. *(Presenter: Minneapolis Park & Recreation Board)*

Viewing and Sketching Saint Anthony Falls & Lock (all students)
Students will observe and sketch Saint Anthony Falls and a Mississippi River lock, and hear from a representative of the U.S. Army Corps of Engineers about how a lock works. Students will learn how the system of locks and dams provides a "stairway of water" enabling barges to travel from Minneapolis to St. Louis and beyond, connecting Minnesota with the rest of the world via water transportation. Students will learn the about the Corps' work in the late 1800's to stop the recession of the falls by constructing a cement apron over it in order to maintain water power for the rapidly expanding milling industry along the riverbanks – thereby creating the appearance of today's falls. 20 minutes. *(Presenter: U.S. Army Corps of Engineers; teachers coordinate sketching/journaling activity)*

Journey to the Falls Field Trip Logistics

Cooperative Groups

Teachers must organize their class into cooperative groups in advance. Each group should have approximately four students. Students will work together as a group at the learning stations.

Learning Activities

Each student will experience all on-board learning activities, and one land-based activity. See separate descriptions of all stations and activities, as well as a specific itinerary of times. ***It is the teacher's responsibility to assign students in advance to either Rotation A or Rotation B, and to arrange for each student to have a nametag indicating "A" or "B" on it.*** It is suggested that students share about their different land-based learning experiences in the classroom after the trip.

"A" Rotation

While on-board, following the whole group sessions, Rotation A students will go first to the upper deck for the "River History Detectives" station, led by a National Park Ranger. When students are told to switch, they will go to the lower deck for the "Exploring the River" station led by Mill City Museum presenters.

On land, those in "A" rotation will go first to view Saint Anthony Falls with staff from the Army Corps of Engineers, and then to the Mills History Hunt led by an interpreter from Mill City Museum.

"B" Rotation

While on-board, following the whole group sessions, Rotation B students will go first to the lower deck for the "Exploring the River" station led by Mill City Museum presenters. When students are told to switch, they will go to the upper deck for the "River History Detectives" station led by a National Park Ranger.

On land, those in "B" rotation will go first to the Archaeology Dig at Mill Ruins Park, an activity led by an educator for the Minneapolis Park & Recreation Board (and/or the National Park Service and/or Army Corps of Engineers), and then to view Saint Anthony Falls with staff from the Army Corps of Engineers.

Accessibility, Special Needs

The Minneapolis Queen is wheelchair accessible to the main (lower) deck. Please inform us in advance of any particular accessibility needs or other special needs that we should be aware of. Journey to the Falls (JTF) partners are committed to making these trips as accessible and appropriate as possible for all students.

- ***over -***

Other Preparations (chaperones, clothing, food)

Teachers and adult **chaperones** should take an active role in assisting with student engagement at the learning stations (however, they should not do the students' work for them). Chaperones set an important example by listening and engaging with the activities. If necessary, we may ask teachers to assist with behavior issues. Please share the "Learning Stations and Activities" description sheet with chaperones so they know what to expect. We suggest one teacher or chaperone for every 10 students, including at least two adults for each rotation group (A & B). Due to limited space, a maximum of 4 adults per class are suggested.

Dress warmly, and ***be prepared for inclement weather****, rain and wet ground!* It can be much colder on the river than around school, and much time will be spent outside.

Students should bring a "**brown bag lunch**." Time for eating lunch (at Boom Island Park or Mill Ruins Park) will occur between the boat activities and the land activities. There are two shelters at Boom Island Park and some benches at Mill Ruins Park (space will be available in the Saint Anthony Falls Visitor Center in the event of rain). No food is to be purchased or consumed while engaged in Journey to the Falls learning activities.

Bus Reservations & Payment

Bus reservations are the teacher's responsibility. Reserve your trip early to ensure that buses are secured. A bus will be necessary at lunchtime to transport your class between the boat and the land-based activity areas. Maps and addresses for field trip sites are included in this Teacher's Guide.

Locations & Directions

Journey to the Falls will take place onboard the Minneapolis Queen Riverboat on the Mississippi River (boarding at Boom Island Park) and in the area of Mill Ruins Park and the historic Stone Arch Bridge, Minneapolis. *See separate pages for directions and maps.*

Boarding, departure times

Please arrive at Boom Island Park or Stone Arch Bridge drop off site 10-15 minutes prior to departure or start of activity. See separate timeframe plan (daily schedule). Your promptness is necessary to keep us on schedule, and important as a courtesy to other schools.

Minneapolis Queen Riverboat & Billing

Boat trip duration is 1 hour, 30 minutes. A list of Journey to the Falls schools, estimated student numbers, and trip dates/times is provided to the Minneapolis Queen Riverboat, which will bill the schools prior to the trips. One complimentary fare per 15 students is provided. Payment is due 10 days prior to the trip. Questions may be directed to Amber Ellison, 952-474-8058, x-101.

Journey to the Falls Spring 2012 – Schools' Schedule

Journey to the Falls- Trip One

Boat Schedule- Groups A and B

9:30	9:40	11:10	11:40	11:55
Arrive at Boom Island Park. Board boat	Boat departs. 90 minute boat trip with stations. Trip ends at 11:10	Lunch at Boom Island	Leave Boom Island. Bus to upper parking lot at west end of Stone Arch Bridge.	Arrive at upper Stone Arch Bridge parking lot. Divide into A/B groups

Land Schedule- Group A

11:55	Noon	12:10	12:20	12:30	12:45	1:30
Arrive at upper Stone Arch Bridge parking lot Divide into A/B groups	Walk on Stone Arch Bridge to lock and falls views	Lock talk	Draw Falls	Walk back to Mill Ruins Park	Mills History Hunt- MHS (group A) – 45 minutes	Board busses

Land schedule- Group B

11:55	Noon	12:45	1:00	1:10	1:20	1:30
Arrive at upper Stone Arch Bridge parking lot Divide into A/B groups	Simulated Archaeological Dig- NPS/MPRB (group B) - 45 minutes	Walk on Stone Arch Bridge to lock and falls views	Lock talk	Draw Falls	Walk back to parking lot	Board busses

Journey to the Falls Trip Two

Land schedule- Group A

10:00	10:05	10:15	10:25	10:35	10:50	11:35
Arrive at Mill Ruins Park. Divide into A/B groups.	Walk on Stone Arch Bridge to lock and falls views	Lock talk	Draw Falls	Walk back to Mill Ruins Park	Mills History Hunt- MHS (group A) – 45 minutes	Lunch at Mill Ruins Park

Land Schedule- Group B

10:00	10:05	10:50	11:05	11:15	11:25	11:35
Arrive at Mill Ruins Park. Divide into A/B groups.	Simulated Archaeological Dig- NPS/MPRB (group B) - 45 minutes	Walk on Stone Arch Bridge to lock and falls views	Lock talk	Draw Falls	Walk to Mill Ruins Park	Lunch at Mill Ruins Park

Boat Schedule- Groups A and B

12:05	12:20	12:30	2:00
Leave Mill Ruins Park. Bus to Boom Island.	Arrive at Boom Island Park. Board boat.	Boat departs. 90 minute boat trip with stations. Trip ends at 2:00	Journey to the Falls ends. Board busses.

Journey to the Falls Field Trip Logistics
class organization

<u>Cooperative Groups/ Rotation A or B</u>:
Enter approximately 4 students/box and an equal number of students in A & B rotations.

Students (in groups)	**A**	**A**	**B**	**B**
	A	**A**	**B**	**B**

NAME

ROTATION

"A"

NAME

ROTATION

"B"

NAME

ROTATION

"A"

NAME

ROTATION

"B"

NAME

ROTATION

"A"

NAME

ROTATION

"B"

NAME

ROTATION

TEACHER

NAME

ROTATION

CHAPERONE

Instructions for Journey to the Falls Scholarship Schools 2012

1. **If you have requested and been approved to receive a scholarship, confirm your eligibility in a letter signed by your principal.** We require a statement (by mail or by fax, 651-290-3815) from the school's principal indicating the basis for the school's eligibility. Either your school's percentage of students of color, or your percentage of student enrollment in the free-and-reduced lunch program, must be at least 50%. The principal should indicate the percentage and category that qualifies the school. You are not approved for scholarship until this statement is received by the National Park Service.

2. **Eligible schools will pay only $4/student to Minneapolis Queen Riverboat for your Journey to the Falls trip.** Payment is arranged with the Minneapolis Queen Riverboat, which will bill you based on your registered number of students. The remainder of the boat fee will be covered by the scholarship. Adults are not covered by the scholarship. When arranging payment with the Minneapolis Queen Riverboat, be sure that they know you are a Journey to the Falls Scholarship School (a list of confirmed schools will be provided to them). When you receive an invoice from them for the boat fee, ***please pay your portion ($4/student, plus any adults at full fare) of the bill, and indicate on the invoice that you are a JTF Scholarship School.*** We will see to it that the remainder of your bill is paid (together with those of all other scholarship schools) after all trips.

3. **You are responsible for reserving and paying for your school's buses.** Be sure to note required pick-up and drop-off times and locations (consult your field trip logistics information.)

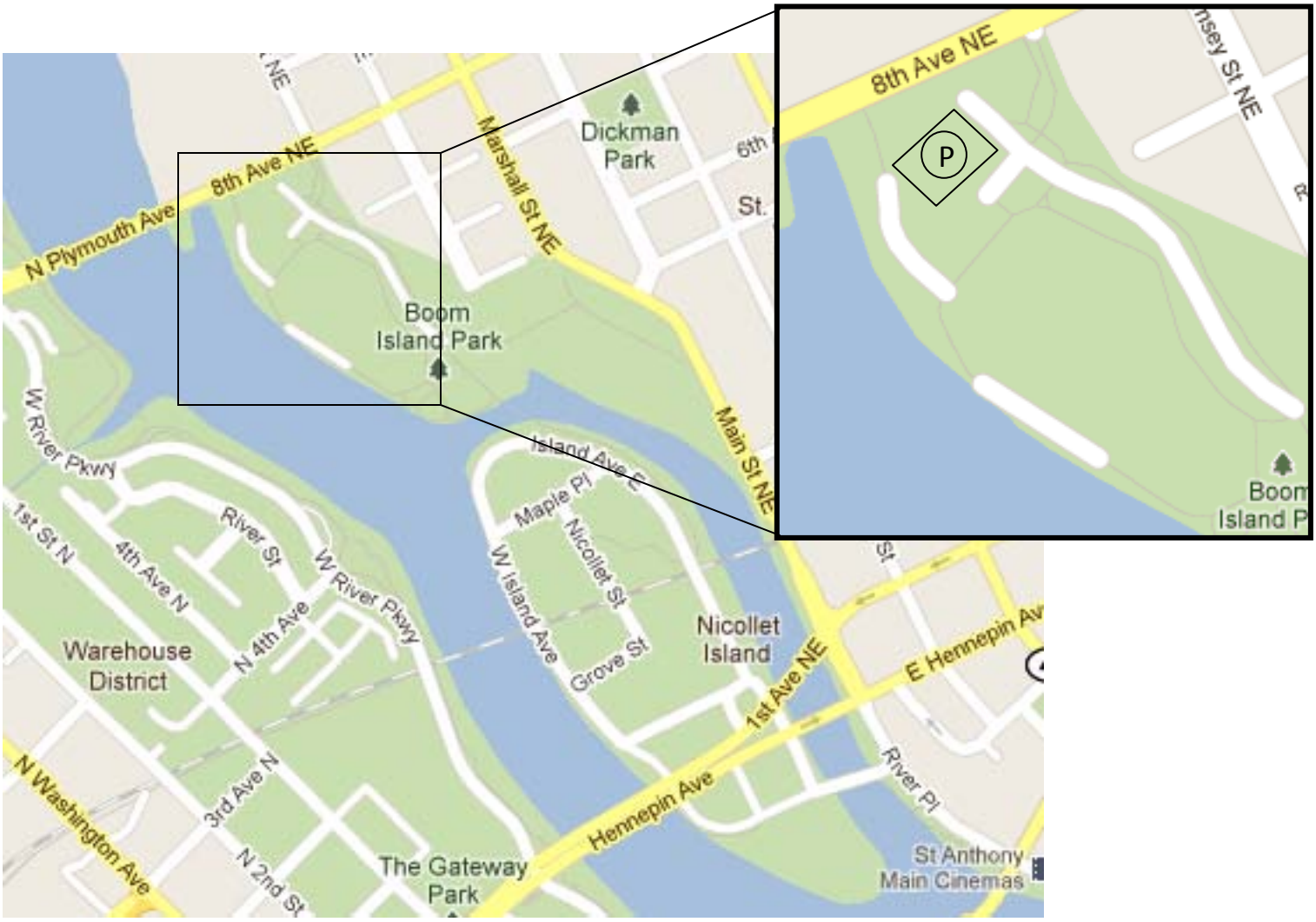
4. **If you have questions**, contact us at 651-293-8414 (Brian), or 651-293-8426 (Lyndon).

Journey to the Falls Scholarships are provided by a grant from the Mississippi River Fund (MRF). MRF shares the belief that by connecting students to the Mississippi River and by engaging them with activities that teach about the river and how to care for it, we contribute toward a healthy river future.

Journey to the Falls Scholarships
Mississippi National River & Recreation Area
111 E Kellogg Blvd., Suite 105
St. Paul, MN 55101-1256

Boom Island Park

800 Sibley St NE, Minneapolis MN



Minneapolis Queen Riverboat/Boom Island Park

612-378-7966
www.minnepolisqueen.com

The parking lot for Boom Island Park and the Minneapolis Queen is accessed from 8th Ave NE **(Note: the Plymouth Ave bridge is closed until further notice)** The parking lot is immediately adjacent to the Minneapolis Queen Riverboat dock and park facilities including picnic shelters and restrooms.

Mill Ruins Park/Stone Arch Bridge West

Near 103 Portland Ave S, Minneapolis MN 55401 (100 feet west of the intersection of West River Parkway and Portland Ave)

Mill Ruins Park/Stone Arch Bridge West

612-313-7793 or 612-370-4900 for information

www.mineapolisparks.org

Students should be dropped off at the parking lot at the West end of the Stone Arch Bridge, approximately 100 feet west of the intersection of West River Parkway and Portland Ave. The parking lot has two entrances allowing buses to enter and exit without having to turn around.

Directions from **Mill Ruins Park/Stone Arch Bridge West** to **Boom Island**:

1. Turn left out of the Stone Arch Bridge parking lot onto **West River Rd**

2. Turn right onto **Portland Ave S** heading toward **S 2nd St**

3. Take the 1st right onto **S 2nd St**

4. Take the 2nd right onto **3rd Ave S**

5. Continue onto **Central Ave SE**

6. Turn left at **SE University Ave**

7. Turn left at **1st Ave NE**

8. Take the 2nd right onto **Main St NE**

9. Continue onto **County Rd 23/Marshall St NE**

10. Turn left at **8th Ave NE**

11. Turn left at **Sibley St NE.** Continue through the parking lot to the Minneapolis Queen boarding area

Directions from **Boom Island** to **Mill Ruins Park/Stone Arch Bridge**:

1. Turn right onto **8th Ave NE** heading toward **Ramsey St**

2. Take the 2nd right onto **County Rd 23/Marshall St NE**

3. Continue onto **Main St NE**

4. Turn right at **1st Ave NE**

5. Continue onto **Hennepin Ave**

6. Turn left at **S Washington Ave**

7. Turn left onto **Portland Ave S**

8. Turn left at **West River Rd.** Parking lot will be on the right in approx. 100 feet

3.
Resources and Reference Materials

Mississippi River educational resources

1. Key Words and Concepts
2. Mississippi River Facts
3. Books for students and teachers
4. Engineering the Falls (Army Corps)
5. Barge Equivalents-Cargo Capacity
6. Mississippi River Quotes
7. Photos and Sketches
8. Academic Standards
9. Journey to the Falls Contacts

Journey to the Falls

Key Words & Concepts

Natural Environment

cataract- another name for a waterfall

forest – an ecosystem in which trees are the most dominant member

gorge- a deep and narrow river valley with steep rocky sides. A gorge is similar to a canyon but smaller and less wide.

limestone- a medium hard sedimentary rock composed of calcium carbonate deposited by the remains of marine animals; may contain fossils; Usually tan but or light gray.

prairie – a grassland community; ecosystem in which grasses are dominant

rapids- water in a river or stream moving quickly over and around rocks or other obstacles

recession – a movement backwards or upstream in the case of a waterfall

sandstone- a soft sedimentary rock composed of sand-like grains of quartz; color often white or yellow but can be red, or brown

shale- a hard sedimentary rock composed of mud, clay or silt; may contain fossils; usually gray.

Mills and Milling

boom- a series of logs attached together end to end and placed in the river to form separated areas in the river in which to direct the logs from different logging companies.

flour- ground up grain (like wheat). Bread, cereal, and pasta are made from flour.

flourmill- a building with machines that grind grain into flour

grain- the hard seed of a plant

grain elevator- a building for storing and unloading grain such as wheat or rye

lumber- pieces of wood ready to use for building

logging- the process of cutting down trees in a forest

log jam- a non-moving group of logs piled together in a river

lumberjack- a worker whose job is to cut down trees; also called a logger

mill- a building where machines make or process (change) things. In Minneapolis wheat was ground into flour in flour mills, trees were cut into lumber at sawmills, and wool was spun and woven at woolen mills.

miller- a person who grinds grain into flour; a worker in a mill

millstone- big, round, flat stones used for grinding wheat

sawmill- a building with machines for sawing logs

sawyer- a worker that cuts trees into pieces of lumber

wheat- A plant type of grass grown in Minnesota for food. The grain [hard seeds] of wheat can be ground into flour to create breads, cereal, and pasta.

Waterpower

apron- a wood or concrete covering placed over the underlying rocks of a waterfall to protect the rocks from damage or erosion

direct drive- a system to run machinery in a mill; the machinery is powered directly by the force of falling water

drop- the distance water falls inside a mill using waterpower. A large drop creates a large amount of power. A small drop creates a small amount of power.

headrace- the point where water enters a mill to power the machinery within the mill

indirect drive- a system to run machinery in a mill; the force of falling water is converted to electricity which is then used to power the machinery within the mill

mill pond- a pond that supplies the water for a mill. A part of a river formed to supply water

tailrace- The area where water exits a mill after powering the machinery within the mill

turbine- a machine with vanes or blades driven by the pressure of falling water

water canal- long underground waterway made to bring water from the Mississippi River above St. Anthony Falls to the mills located along the river. The canal was covered by wooden plank road.

Navigation, Locks & Dams, Bridges

arch bridge - a bridge made up of one or more curved structures that support the deck (road). The Stone Arch Bridge and the Third Avenue Bridge near St. Anthony Falls are Arch Bridges

dam - a barrier constructed across a river to control the flow or raise the level of water

drop - the distance water is raised or lowered inside of a lock. The Upper St. Anthony lock has a drop of 49.2 feet. The Lower St. Anthony lock has a drop of 25 feet

ferry - a boat that takes passengers from one side of a body of water to another

lock - an enclosed chamber at a dam on a river with gates at each end used to raise or lower boats from one level to another by admitting or releasing water

locking through - the process of going through a lock

miter gate - a type of gate in a lock used in pairs for preventing the flow of water in or out of the lock chamber. Miter gates open and close from the center.

navigation - transportation by boat; moving of goods or people on waterways

suspension bridge - a bridge where the deck (road) is hung from cables. The cables are supported by towers and anchored into the ground

tainter gate - a type gate in a lock used to control water flow. A side view of a Tainter gate resembles a slice of pizza with the crust edge facing upstream; the gate pivots up and down from the point.

Archaeology

archaeologist- a scientist trained to do archaeology

archaeology- the study of past human life through the finding and examination of items left behind, such as graves, buildings, tools, and pottery.

artifact- objects produced or used by people (spear points, flint chips, pottery, china and glass, gun parts, bricks, food remains.) These items are often removed from an archaeological site

context- the surroundings in which an artifact is found. This also includes other artifacts found nearby or in association with the artifact

excavation- the careful digging that archaeologists do to collect information by uncovering and recording artifacts, features, and associations

features- material remains that cannot be moved from an archaeological site such as fire pits, storage pits, wall foundations, and post holes

grid- a set of evenly spaced north-south lines that cross a set of evenly spaced east-west lines

inference- a conclusion or hypothesis based on observations

observation- recognizing or noting a fact or occurrence

screen- a tool used to sift the soil that comes out of an excavation site in order to find small artifacts that the excavator may have missed

sites- places where human activity resulted in features or deposits of artifacts, such as hunting camps, mills, farmsteads, villages, towns, battlefields, etc.

stewardship- protecting and caring for a resource like an archeological site

trowel- a small pointed hand-shovel used in archaeological excavations

History & Exploration

cartographer – a mapmaker

Dakota- an American Indian people of the northern Mississippi valley

expedition - a journey by a group of people for a specific purpose, such as exploration

explorer- a person who travels through a country to find out about it

journal - a record, often daily, of occurrences, experiences, or observations

Northwest Passage - a sea route sought by early explorers from the Atlantic Ocean to the Pacific Ocean through northwestern America

Ojibwe - An American Indian people of the northern Great lakes and Upper Mississippi region; Anishinabe (pronounced ah-NISH-in-AH-bay) is the name they call themselves

settler- a person who settles in a new country or area

tourist- a person traveling for pleasure

treaty- a formal agreement between two or more nations (such as the Dakota and the United States) regarding peace, alliance, business, or other relations

voyageur- a man hired to take on many different tasks in uncharted territories during exploration voyages

Mississippi River Facts

- The Mississippi is much more than a ribbon of water; it is a *watershed* or basin that drains all or parts of 31 states and 2 Canadian provinces. It is the dominant watershed in North America, and drains 41% of the continental United States; it is the fourth largest watershed in the world, after the Amazon, Congo, and Nile.

- The name "Mississippi" comes from the Anishinabe people (Ojibway Indians.) They call the river "Messippi" or "Mee-zee-see-bee," which means "Big River" or "Great River." Dakota Indians call the river "Haha Wakpa," meaning "River of the Falls" in reference to the falls now known as Saint Anthony Falls. They also call it "Tanka Wakpa," meaning "Great River."

- The Mississippi River is the fourth longest river system in the world when including the Missouri River tributary. The Mississippi itself stretches approximately 2350 miles from Lake Itasca to the Gulf of Mexico. The actual length of the river may vary from year to year. Its length is now shorter than it was a century ago due to the cutting off of meanders, engineering and other factors.

- Over geological time the river has grown by the depositing of sediment at its mouth – this process even helped to create the Gulf states! Roughly 250-500 million tons of sediment is carried annually to the Gulf by the river. Sediment deposits in the delta area of the Gulf built the "barrier islands" that help protect inland areas from storms; however, levies now prevent river sediments from accessing and rebuilding these islands, and thus, barrier islands are rapidly eroding away. Much sediment is also trapped behind dams.

- The Upper Mississippi River carved its path with the meltwater of receding glaciers from the last Ice Age 12,000 years ago. In geological terms, the Upper Mississippi from its headwaters to the Twin Cities is a very young river.

- The glacial River Warren Falls, one of the largest waterfalls ever seen in North America, thundered beside the area that is now downtown St. Paul 11,700 years ago. At that time the falls was likely nearly 200 feet high and a mile across. It was fed by a torrent of meltwater from Glacial Lake Agassiz coursing down what is now known as the Minnesota River valley. The location of the falls moved slowly upstream as a layer of soft sandstone rock eroded away beneath the hard limestone caprock, which then collapsed piece by piece. By 10,000 years ago the falls had passed the confluence of the Minnesota and Mississippi Rivers, and the falls we know as Saint Anthony Falls had begun carving a gorge on its way to its present location. Saint Anthony Falls is the only waterfall on the entire length of the Mississippi, and the gorge below it that divides Minneapolis and St. Paul is the river's only true gorge.

- The place where the Minnesota River meets the Mississippi River was called "Makoce Cokaya Kin" by the Mdewakanton Dakota Indians, meaning "Center of the Earth." The river confluence was also referred to as "M'dota" or "B'dote," a Dakota word used to name the present-day city of Mendota. The area is considered sacred by many Dakota.

- On Sept 21, 1805, Lt. Zebulon Pike first set foot on the island that bears his name at the mouth of the Minnesota River. (Dakota Indians called the island Wita Tanka meaning

-OVER-

"Big Island.") Pike's objective was to secure permission for the construction of a fort (Fort Snelling) on the bluff overlooking the rivers, which he did two days later in a historic treaty. At that time the cities of Minneapolis and St. Paul did not exist, though in the early 1800's the Dakota Indian village of Kaposia (led by Little Crow) was located near what is now Mounds Park in St. Paul, and other Dakota villages were located along the Minnesota River valley.

- 241 species of fish are at home in the Mississippi River watershed; 292 bird species use the Mississippi Flyway. Other wildlife of the river, bottomlands and bluffs of the Mississippi watershed includes 57 species of mammals, 45 species of reptiles and amphibians, 40 different species of mussels, and countless invertebrates.

- The river and its major tributaries supply drinking water for more than 18 million people. The Mississippi River is both sewer and drinking water source!

- To enable towboats and barges to travel upstream from St. Louis, 29 locks and dams have been built between there and Minneapolis. A navigation channel is maintained at a depth of at least nine feet by a combination of dredging and wing dams that focus river flow to the center of the channel.

- From 1880 to 1930, Minneapolis was the milling capitol of the nation (and sometimes the world!) because of the enormous power of the river's only natural waterfall, Saint Anthony Falls. The falls were first used to power sawmills, and later flour mills.

- The Mississippi River is the reason the Twin Cities exist where they do. Minneapolis grew around Saint Anthony Falls as a source of waterpower, while St. Paul was at the upper end of the commercially navigable river in the 1800's, and thus served as major link in the transportation of people and products.

- The Mississippi National River and Recreation Area and its immediate surroundings in the Twin Cities metropolitan area contain 114 designated hazardous waste sites.

- At the mouth of the Mississippi River in the Gulf of Mexico there is an area of 5,000 - 8,000 square miles referred to as the "Dead Zone." The Dead Zone is severely depleted of oxygen due to an overabundance of nutrients (from fertilizers, decaying plant matter, etc.) and contaminants carried into the Gulf from the Mississippi. Nutrients stimulate growth of algae, which consumes oxygen as it dies. Because the everyday practices of people, agriculture, and industry caused the Dead Zone, it is by changing our everyday practices that we can restore the Dead Zone to good health. Practicing river-friendly yard care and supporting river-friendly farming (such as buying organic food and eating less meat) are among the daily choices that can improve river health and reduce the Dead Zone.

- According to the U.S. Environmental Protection Agency, the leading cause of Mississippi River pollution is runoff from rural farmland and urban areas. Runoff carries pollutants directly to the river without treatment.

Books and Resources

St. Anthony Falls and the Mississippi River

For Students

First Came the River
Mississippi National River and Recreation Area, National Park Service, 2005
(Only sold at the Mississippi River Visitor Center located within the Science Museum of MN- $1.50) This 28 page illustrated booklet provides an introduction the natural history, ecological history and human history within the park corridor up to the time of Minnesota statehood.

The Adventures of Huckleberry Finn by Mark Twain
Viking Penguin, New York. 1953 *Grades: 6-Adult*
A boy and a runaway slave travel the Mississippi on a raft in an exciting and sometimes dangerous trip. The Mississippi River influenced much of Twain's work, even his pen-name (from a riverboat working command). While the language and dialect reflect their time, and can be discussed in class, Twain's humanity comes through.

Biography of a River: The Living Mississippi by Edith McCall
Walker and Co., New York. 1990 *Grades: 6-12*
This "biography" details stories of human interactions with the Mississippi, from Native Americans, European explorers, and immigrant settlers to modern engineers and dam-builders. The river "speaks" in the first person in the opening chapter. The emphasis on the "living" nature of the river underscores an important environmental lesson.

Walter Meets Mack by Michael Stoesz
Beaver's Pond Press. 2011
Based on research and historical fact, *Walter Meets Mack* is as much a Minnesota History and Social Studies resource as it is a novel. For any class using the *Northern Lights* Minnesota History textbook, *Walter Meets Mack* is a good curriculum supplement. Readers will learn many of the Minnesota Social Studies Standards.
Plot summary: Sixteen-year-old Walter arrives in Minneapolis at the turn of the 20th century from Finland, and he ends up working in the northern Minnesota logging camps. Although Walter makes a living cutting down mature pines, he sees logging's devastating effects on the environment.

Flood: Wrestling with the Mississippi by Patricia Lauber
National Geographic Society, Washington, D.C. 1996 *Grades 5-12*
Flood… explains that the Mississippi's dynamic nature is to change its course, re-arrange the land, and leave its banks, occasionally causing great flooding. We try to control the river, but are not always successful. Well illustrated. The book asks how we should manage the Mississippi's future, but falls short of a full look at restoration and alternatives.

Historical Atlas of the Earth by Stephen Jay Gould, et. al.
Henry Holt Reference Book, Henry Holt & Co. 1996
This large beautifully illustrated book describes the evolution of Earth landscapes to the present. Forces shaping the Earth, evolution of life, and ecosystems are depicted.

Little Crow: Taoyateduta: Leader of the Dakota by Gwenyth Swain
Borealis Books, Minnesota Historical Society Press. 2004 *Grades: 3-adult* This book shows a clear, sympathetic telling of the life of Little Crow from his childhood on the banks of the Mississippi River near what is now St. Paul to his death in July 1863. *Little Crow* offers an accessible account of both the man who led the Dakota into war and the causes behind

Journey to the Falls Resources

Websites for Teachers

Mississippi National River & Recreation Area/ Park Video (18 min)
http://www.nps.gov/

Teacher resources, on-line curricula, field trip & workshop opportunities
http://www.nps.gov/miss/forteachers/index.htm or
http://www.nps.gov/miss/forteachers/jtfresources.htm *(under "Resources" includes powerpoint on explorers and interactive about locks)*

National Parks
http://www.nps.gov

"Minneapolis Past" video
http://www.tpt.org (search "vault" then the title "Minneapolis Past"), or
http://www.mnvideovault.org/program_titles.php?letter=M#

Urban Water Cycle (interatctive)
http://cgee.hamline.edu/UWC/UWC-MN/ **or**
http://www.health.state.mn.us/water/urbancycle/

DNR Volunteer "Young Naturalists" series

Article on Mississippi River
http://www.dnr.state.mn.us/young_naturalists/mississippi/index.html
Click on "Teacher's Guide"

Article on Minnesota Geology
http://www.dnr.state.mn.us/young_naturalists/rockyroots/index.html
Click on "Teacher's Guide"

Article on The Wonder of Water
http://www.dnr.state.mn.us/young_naturalists/water/index.html
Click on "Teacher's Guide"

Grand Excursion Trunks information
http://cgee.hamline.edu/GE04Guide/

Service Learning: Watershed Action Projects
http://cgee.hamline.edu/watershed/action/projects/

Water Ways (a Minnesota Water Primer for teachers)
http://www.dnr.state.mn.us/projectwet/waterways/index.html

that wrenching conflict. Swain's story is an excellent starting place for young and older readers to begin understanding the context of the Dakota War of 1862.

Minn of the Mississippi by Holling Clancy Holling
Houghton Mifflin, Boston. 1951 *Grades: 4-8*
The journey of Minn, a snapping turtle, is followed from northern Minnesota to the bayous of Louisiana. The turtle's adventures with people, animals, and the changing seasons are vividly described, and bring the river's history to life. Wonderful drawings and maps accompany the story. Newbery honor book.

Mississippi by Diane Siebert, illustrated by Greg Harlin
Harper Collins. 2001 *Grades: 1-6*
A poetic journey down the length and breadth of the Mississippi River, this picture book depicts the origins, nature, human interactions and changes of the great river.

The Mississippi River (Ecosystems of North America series) by Maria Mudd Ruth
Benchmark Books/Marshall Cavendish, Tarrytown, New York. 2001 *Grades: 4-10*
An excellent exploration of how the Mississippi River works ecologically, this well illustrated book examines the relationship between the river and its backwaters, flood-plains, watershed, delta, plant life, animal life, and human life. Poses questions of the river's future, articulates key science concepts, includes activities, glossary, & references

Mississippi River: A Journey Down the Father of Waters by Peter Lourie
Boyds Mills Press, Honesdale, PA. 2000 *Grades 4-9*
Author Peter Lourie travels the modern Mississippi by canoe and over land from Lake Itasca to the delta. Feel the river change from a peaceful shallow marsh to an industrial ocean port. Along the way you will travel through a navigation lock, explore historic sites, share the river with mighty barges, and hunker down for a hurricane in New Orleans.

Our Endangered Planet: Rivers and Lakes by Mary Hoff and Mary M. Rogers
LernerPublications, Minneapolis. 1991 *Grades: 4-9*
A global look at the importance of water and its stewardship. Many illustrations and photographs communicate key water concepts, such as "we all live downstream."

Painting the Dakota: Seth Eastman at Fort Snelling by Marybeth Lorbiecki
Afton Historical Society Press, Afton, MN. 2000 *Grades: 4-adult*
Extraordinary watercolor paintings by an Army lieutenant depict Dakota Indian life in the area around Fort Snelling and the confluence of the Minnesota and Mississippi Rivers during the early-mid 1800s. From prairie and river landscapes to images of hunting, gardening and village life, Eastman's paintings and Lorbiecki's text bring the reader closer to the life and customs of the Dakota at a turning point both in their history and that of the Minnesota landscape. A useful complement to the book is the video, "Seth Eastman: Painting the Dakota," which includes the commentary of Dakota people (produced by Twin Cities Public Television and Afton Historical Society Press).
5th grade Social Studies unit on-line as a pdf at http://www.ccsmdc.org/crp/edu.html

The River That Gave Gifts: An Afro-American Story by Margo Humphrey
Children's Book Press, San Francisco. 1987 *Grades: K-5*
Four children in an African village make gifts for wise old Neema. Yanava does not know what to give and seeks inspiration from the river. In addition to themes of respect for elders and validity of different kinds of achievement, the river is portrayed as a source of power.

Rivers (Make It Work! series) by Andrew Haslam & Barbara Taylor
Two-Can Publishing, London. 1996 *Grades: 3-9*

Hands-on science and geography models and experiments fill this colorful, practical book about rivers and their features. Explores water cycle, river sources, drainage patterns, waterfalls, dams, deltas, human uses of rivers, flooding, managing rivers, and more.

Rivers and Lakes by Simon Holland and Anna Lofthouse
Dorling Kindersley Limited, New York. 2003 *Grades: 3-9*
Packed with facts, this accessible text incorporates excellent photographs and a glossary of terms explaining important words to do with rivers and lakes around the world. The book describes the physical characteristics of rivers as they flow to the sea, and the biological life within them.

The Wind in the Willows by Kenneth Grahame; illustrated by Ernest Shepard
Aerie Books, New York. 1988 *Grades: 3-adult*
This wonderful, humorous classic, filled with the curious lives of eccentric animal characters, takes place along a river. The scenic descriptions accurately reflect the habitats of each animal. While the book is often read aloud to younger children, the pace and comic conversations makes it highly entertaining for adults. Includes some challenging vocabulary.

Horns and Wrinkles by Joseph Helgerson, Houghton Mifflin Company, Boston. 2006
Grades 4-7
Along a magical stretch of the Mississippi River near Blue Wing, Minnesota, twelve year old Claire and her bullying cousin Duke are drawn into an adventure to save family and friends turned to stone by a river spell. Cousin Duke struggles with a Pinocchio type horn which grows each time he refuses to perform an act of kindness while Claire navigates through tricky situations involving river characters such as Bodacious Deepthink the Great Rock Troll, a helpful fairy, and a group of trolls looking for their fathers.

Tomorrow the River by Dianne E. Gray, Houghton Mifflin, Boston. 2006 *Grades 6-8*
In 1896, fourteen year old Megan joins her sister and family on their steamboat for the summer riding up the Mississippi River towards St. Paul, Minnesota. Through all of her adventures, learning to swim, navigate the river, take photographs, and work at a clamming business, Megan realizes what is her "true calling." Newspaper articles give hints about the characters whom Megan meets and are an integral part of the plot. History and river life are skillfully woven into the fast-moving plot.

For Teachers

The Falls of St. Anthony: The Waterfall That Built Minneapolis (Paperback)
by Lucile M. Kane (Author)
Minnesota Historical Society Press, 1987
Book Description: The Mississippi's major waterfall played an important role in the development of lumbering, flour milling, and hydroelectric power in Minneapolis. The revised edition contains more than 50 photographs and a new epilogue by the author describing the commercial development along the waterfront since the 1960s.

Mill City: A Visual History of the Minneapolis Mill District
By: Edited by Shannon M. Pennefeather**,** Foreword by Nina M. Archabal**,** Introduction by Kate Roberts
Publisher: MHS Press, 2004
Book Description: This book includes accounts by the earliest European visitors to St. Anthony Falls, the children who played in the 1880s lumberyards along the banks of the Mississippi River, and workers in twentieth-century flour mills. Primary documents describe innovations in waterpower and the milling process that contributed to the successes of the Mill City. And witnesses to disasters along its shores--including the 1869 tunnel collapse that

nearly destroyed the falls and the 1878 Washburn A Mill explosion that killed eighteen workers and leveled the west side milling district--provide vivid narratives of these events and the unity of purpose with which the Mill City's residents worked to ensure the survival of its industries.
Through stories and images, the history of Minneapolis is firmly connected to St. Anthony Falls, where it all began.

Old Rail Fence Corners
Edited by: Lucy Wilder Morris
Publisher: MHS Press, 1976
Book Description: Personal stories of hardship and happiness told by 154 early Minnesota settlers re-create everyday frontier life from the 1840s to the 1860s. This collection of reminiscences was first published by the Daughters of the American Revolution in Minnesota in 1914. These short accounts include childhood memories.

Bohemian Flats
By: Federal Writer's Program
Publisher: MHS Press (1986)
Book Description: Compiled by the workers of the Writers' Program of the Work Projects Administration in the State of Minnesota ; with an introduction by Thaddeus Radzilowsky.

First Came the River
Mississippi National River and Recreation Area, National Park Service
(Only sold at the Mississippi River Visitor Center located within the Science Museum of MN-$1.50)
Book Description: This 28 page illustrated booklet provides an introduction the natural history, ecological history and human history within the MNRRA Corridor up to the time of settlement.

Making Minnesota Territory, 1849-1858
By: Edited by Anne R. Kaplan and Marilyn Ziebarth Publisher: MHS Press
Book Description: In this lively collection of essays, historians reassess the events and meaning of Minnesota Territory 150 years after its creation. They describe how its birth in 1849 during the growing national conflict over slavery forever changed the lives of Minnesota's native and mixed-blood residents. Reinterpreting the rush to statehood in 1858, these writers offer fresh insights into the roles played by wildly optimistic territorial promoters and the no-holds-barred newspapers of the time.
This book originated as a special issue of Minnesota History, the quarterly of the Minnesota Historical Society. It is being published to mark the 150th anniversary of the territory.
Eight fictional "Day in the Life" essays, as well as more than 75 historical daguerreotypes, paintings, photographs, and curators'-choice artifacts, call up the sights, sounds, and surroundings of ordinary people living in tumultuous territorial times. An essay on surviving buildings and landscapes offers readers the opportunity to see and experience territorial Minnesota today.

Union Against Unions: The Minneapolis Citizens Alliance and its Fights Against Organized Labor, 1903-1947
by William Millikan (Author), Peter Rachleff (Introduction)
Minnesota Historical Society Press, 2003
Review: A one-of-a-kind study, providing an insight into the complex nature of labor relations in the United States, a perspective on the power of class and business alliance in American politics, and an exploration into the ways powerful interests have used the state to distort the labor market, the workplace, and the political arena. This book will reshape the way we think and teach about labor and politics in the twentieth-century American city." -- Elizabeth Faue, author of Community of Suffering and Struggle: Women, Men, and the Labor Movement in

Minneapolis, 1915-1945 This valuable history of Minneapolis' most powerful business organization . . . details how employers secretly fought labor unions. . . . well-researched.--Minneapolis Star Tribune

Down & Out: The Life and Death of Minneapolis's Skid Row
by Joseph Hart (Author), Edwin C. Hirschoff (Author), University of Minnesota Press, 2002
Book Description: Minneapolis's skid row, known as the Gateway district, was a lively area consisting of dozens of bars, flophouses, pawnshops, burlesque houses, charity missions, and office buildings that had aged past their prime. Encompassing some twenty-five blocks centering on the intersection of Hennepin, Washington, and Nicollet Avenues, the neighborhood was demolished between 1959 and 1963 as part of the first federally funded urban renewal project in America. Gathered here for the first time, Edwin C. Hirschoff's stark and moving images of the Gateway district's final days-its streets, buildings, and parks, the rubble, smoke, and heavy equipment of its destruction-eloquently capture its demise. Down and Out provides a unique historical perspective and the most extensive photographic record available of the Gateway demolition project.

Joseph Hart's engaging and comprehensive essay complements Hirschoff's photographs by detailing the district's social and economic evolution and the political decision making that led to its destruction. Hart presents a popular history of Minneapolis's skid row and the people who lived there, migrant workers who learned that changes in the local economy could quickly degrade their status from valued laborer to societal menace (vagrant, tramp, or bum). By capturing the texture of life on skid row, Hart reveals the lost American culture of a bygone community.

A creative photographer, entrepreneur, and inventor, Edwin C. Hirschoff had a successful career in public relations before founding Art-o-graph, a Minneapolis business that has prospered for more than half a century. Born in Zurich, Switzerland, in 1905, he lived in Minneapolis for almost ninety years.

The Minnesota Archaeologist; Vol. 48, No. 1-2, 1989
Archaeology of the Central Minneapolis Riverfront
by Scott F. Anfinson, Published by the Minnesota Archaeological Society
Book Description: A study of the archaeology of the central Minneapolis riverfront. Part 1 provides the historical overview and site inventory. Part 2 presents an overview of urban archaeology.

Red River Trails
By: Rhoda R. Gilman, Carolyn Gilman, and Deborah M. Stultz
Publisher: MHS Press
Book Description: Oxcart Routes between St. Paul and the Selkirk Settlement, 1820-1870
The Red River Trails traces the historical development of the paths that ran through Minnesota, North Dakota, and Canada. These rutted, tangled roads helped to open the West and provided a passageway for the exchange of furs and trade goods hauled by skilled métis (mixed-blood) drivers in their famed Red River oxcarts
In the mid-nineteenth century, a network of primitive roadways carried an international trade in furs and merchandise between the burgeoning commercial center of St. Paul in the south and the colony that grew into modern Winnipeg in Canada to the north. These were the legendary Red River Trails, as important to the commerce and development of the West as the Santa Fe and Oregon trails.
Using nineteenth-century travel accounts and a wide variety of other sources, the authors vividly describe the trails, which passed through more than thirty-five Minnesota counties as well as southern Manitoba and eastern North Dakota. Numerous illustrations and detailed maps will help readers to visualize life on the trails and to locate the remnants that still exist today.

River of History: A Historic Resources Study of the Mississippi National River and Recreation Area (MNRRA)
By John O. Anfinson with contributions by Thomas Madigan, Drew Forsberg and Patrick Nunnally (Only sold at Miss. River Visitor Center located in Science Museum of MN-$14.95)
Book Description: Chapter titles include: The Geology of the MNRRA Corridor, Early Native American Life in the MNRRA Corridor, Discovery and Disposition, Transforming the River I: Commerce and Navigation Improvements, 1823-1906, Transforming the River II: Commerce, Navigation Improvements and Hydroelectric Power, 1907-1963, St, Anthony Falls: Timber, Flour and Electricity, The Patterns of Agriculture, Commerce, Industry and Transportation, Settlement and Urban Residential Development Along the River, 1841-1950, and Novel and Familiar Places.
Available on-line as a pdf at www.nps.gov/miss

The River We Have Wrought: A History of the Upper Mississippi
by John O. Anfinson (Author)
University of Minnesota Press, 2003
Book Description: The River We Have Wrought is a landmark history of the upper Mississippi, from early European exploration through the completion of a navigable channel and a system of locks and dams in the mid-twentieth century. John Anfinson examines how politics has shaped the landscapes of the Upper Midwest and how taming the Mississippi River has affected economic sustainability, river ecology, and biological diversity.

A Peculiar Imbalance: The Fall and Rise of Racial Equality in Early Minnesota
By: William D. Green
Publisher: MHS Press, 2007
Book Description: W. Green unearths previously untold stories of African Americans in early Minnesota. In the 1850s, as Minnesota Territory was reaching toward statehood, settlers from the eastern United States moved in, carrying rigid perceptions of race and culture into a community built by people of many backgrounds who relied on each other for survival. History professor William Green unearths the untold stories of African Americans and contrasts their experiences with those of Indians, mixed bloods, and Irish Catholics. He demonstrates how a government built on the ideals of liberty and equality denied the rights to vote, run for office, and serve on a jury to free men fully engaged in the lives of their respective communities.

Historic Photos Online
http://collections.mnhs.org/visualresources/
http://www.mpls.lib.mn.us/ (Photos in 'Unique Collections,' Minneapolis Photos)
http://memory.loc.gov/ammem/index.html (Searchable database- maps and photos)

Other on-line resources
Hennepin County Library- http://www.hclib.org/ - Click on Reference and Research, Databases A-Z, Historic Minneapolis Tribune 1967-1922. To access this database first register your library card with Hennepin County (it can be from any metro library system.) There are many other databases at this site including census information.

Maps
http://www.dnr.state.mn.us/maps/index.html
http://www.lmic.state.mn.us/chouse/land_use_historic.html Click on Map Gallery tab- right side
www.nps.gov/miss

History

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Engineering the Falls: The Corps Role at St. Anthony Falls

Overview

People have always been drawn to the power and beauty of St. Anthony Falls. For Native Americans, the falls possessed religious significance and harbored powerful spirits. For the early European and American explorers, the falls provided a landmark in a vast wilderness as well as an interesting geological phenomenon. During the 19th century, settlers, tourists and artists were drawn to St. Anthony Falls' picturesque beauty, while entrepreneurs seized the water power of the falls for their lumber and flour mills. Meanwhile, promoters of river transportation viewed St. Anthony Falls as an obstacle to be overcome, as they dreamed of extending navigation on the Mississippi River above Minneapolis.

Mississippi River at St. Anthony Falls: Showing the erosion of the waterfall from 1680 to 1876.
(Click image to view larger)

The U.S. Army Corps of Engineers has played an important role in the history of St. Anthony Falls. In the 19th century, the Corps was responsible for saving the waterfall from destruction. In the 20th century, the Corps designed and constructed the Upper Harbor Project, which extended the Mississippi River's navigation channel over the falls by way of the Lower and Upper St. Anthony Falls locks.

Today, the St. Paul District, U.S. Army Corps of Engineers, operates and maintains the Upper and Lower St. Anthony Falls locks and dams.

Geology

Imagine a waterfall 2,700 feet across and 175 feet high with the meltwaters of the colossal Glacial Lake Agassiz pounding over it. Such a waterfall existed about 12,000 years ago near what is now downtown St. Paul. As the water rushing over the valley's bedrock of limestone scoured away the underlying sandstone, large slabs of limestone collapsed into the river, causing the falls to migrate upriver. About 10,000 years ago, this huge waterfall reached the junction of the Mississippi and Minnesota Rivers, and split into two falls. The waterfall that followed the course of the Mississippi River upstream was St. Anthony Falls.

Geology dictated a natural extinction for St. Anthony Falls, for the limestone bedrock covering the soft sandstone ends only about 1,200 feet above its present location. Once the falls reached the end of this protective cap, it would erode into rapids. The limestone bedrock in this area is also relatively thin. At its maximum, the limestone at St. Anthony Falls is only 14 feet thick, compared to the usual 25-foot thickness of the bedrock downstream. Thinner limestone cracked more readily, hastening the demise of the waterfall as it moved upstream.

From its origins near Fort Snelling, St. Anthony Falls retreated slowly upstream at a rate of about 4 feet per year until it reached its present location in the early 1800s. Geologists estimate that originally the falls were about 180 feet high. As the waterfall receded, it also decreased in height. In 1680, Father Louis Hennepin became the first white person to encounter the waterfall on the Mississippi River, naming it for his patron saint, Anthony of Padua. Hennepin estimated the falls' height to be 50 or 60 feet. Early 19th century explorers described St. Anthony Falls as being in the range of 16 to 20 feet high.

St. Anthony Falls' retreat upriver was greatly accelerated in the mid-1800s when settlers began building lumber and flour mills along the waterfall's edge. To supply their mills with water, millers

drove shafts through the limestone bedrock and excavated canals in the sandstone underneath. During floods, hundreds of logs escaped from holding ponds and pounded the falls' edge. Dams built to divert water to the mills left large sections of the limestone dry, exposing the rock to more freezing and thawing, and causing cracking. Water flowed down through the cracks, eroding the underlying sandstone.

With the development of milling, the migration of St. Anthony Falls accelerated to as much as 35.5 feet per year in 1852. Between 1857 and 1868, the waterfall was receding at an average of about 26 feet per year, and coming perilously close to the limits of the limestone cap.

History

Before Father Hennepin named St. Anthony Falls for his patron saint, Native Americans living in the region had given the waterfall various names. The Ojibway called the falls Kakabikah (the severed rock). The Dakota used the terms Minirara (curling water) and Owahmenah (falling water). For the Dakota, the falls had religious meaning and were associated with legends and spirits, including Oanktehi, god of waters and evil, who lived beneath the falling water.

To European and American explorers, St. Anthony Falls was a landmark in a vast wilderness. In 1683, Hennepin published a book about his travels in America that was widely read in Europe. His description of the beauty and wonder of the waterfall on the Mississippi River made the site famous.

In the 1700s and early 1800s, others came to explore the region and view the Falls of St. Anthony for themselves. Jonathan Carver, a Connecticut colonist, came in 1766 representing Great Britain. Twelve years after his visit, Carver published a book that became a best-seller and included the earliest known sketch of St. Anthony Falls. Carver described the waterfall as "pleasing and picturesque," estimated its height at 30 feet and noted that six islands surrounded the waterfall.

Lieutenant Zebulon Montgomery Pike was the first American to explore the Upper Mississippi River after the United States acquired the region in the Louisiana Purchase of 1803. In 1805, the Federal Government hired Pike to lead an information-gathering expedition and to secure permission from Native Americans to build military posts along the river.

Pike described St. Anthony Falls as 16.5 feet high and lacking the majesty he had expected from the descriptions of Hennepin and Carver. Pike did note, however, that at high water, the waterfall "is much more sublime, as the quantity of water then forms a spray, which in clear weather reflects from some positions the color of the rainbow, and when the sky is overcast covers the falls in gloom and chaotic majesty."

The establishment of Fort Snelling at the confluence of the Minnesota and Mississippi Rivers in 1820 attracted many tourists, writers and artists to the region. In 1823, the first steamboat navigated the Mississippi River as far as Fort Snelling. By 1851, St. Paul had established itself as the head of navigation on the river. Tourists disembarked at St. Paul and hired carriages or wagons for sightseeing excursions to St. Anthony Falls, Minnehaha Falls, and nearby lakes.

The development of milling at St. Anthony Falls led to its demise as a tourist attraction. Visitors in the 1850s and 1860s found that the natural landscape of St. Anthony Falls had been altered by the construction of mills, by the noise of mill machinery, and by milling waste products. In 1862, one visitor complained that, "St. Anthony Falls are all covered with mills and refuse." Johannes Kohl, a German geographer and scientist, described the falls as they appeared in 1856:

Walls and dams have been built out onto the falls.... The water being so low, the Mississippi could

not carry away the load of sawdust, chips, odds and ends of board and plank, and logs dumped in upstream. This industrial waste was stuck everywhere in big jumbled heaps in the falls' attractive little niches and in the rocky clefts intended by Nature for the joyous downward passage of crystalline waters.

Milling at St. Anthony Falls

While the scenic beauty of St. Anthony Falls attracted early explorers and tourists, it was more important to settlers as a source of water power. Soldiers at Fort Snelling built the first sawmill at the falls in 1821, and in 1823 added a grist mill. By the 1850s, as many as 16 sawmills crowded the falls. During the 1860s alone, lumber production at the falls increased from 12 million to 91 million board feet. In 1869, there were six sawmills on the east side of the falls and eight on the west side.

During the 1860s, flour milling increased substantially at St. Anthony Falls. Flour production rose from 30,000 barrels in 1860 to 256,100 barrels in 1869. In 1869, there were 8 flour mills on the west side of the river and 4 in St. Anthony. By 1880, 27 mills were producing over 2 million barrels of flour annually, making Minneapolis the national leader in flour production.

Franklin Steele, a local entrepreneur, obtained much of the land on the east side of St. Anthony Falls in 1838 and constructed a dam and sawmill there in 1848. Steele's dam was located above the edge of the falls. It crossed the east channel and ran from the shore to a short distance above Hennepin Island and then to the foot of Nicollet Island.

In 1849, Steele registered the plat for a townsite, which he named St. Anthony. By 1850, more than 600 residents lived in the town, and by 1855 the population had grown to 3,000.

The land on the west side of the Mississippi River remained part of the military reservation surrounding Fort Snelling until 1852, when Congress reduced the size of the reservation and opened the land for sale. However, commandants at Fort Snelling had been granting permits to allow settlement on the west side since the 1840s, and many other settlers had staked claims without permission. This community, which would later become Minneapolis, numbered only about 300 in 1854, but by 1856 the population had grown to 1,555.

In 1849, Robert Smith obtained a lease to run the government grist mill and sawmill on the west side of the falls. In 1853, Smith purchased the government mills and went into partnership with several others. By 1855, a partnership of 12 men controlled the west-side mills and the adjacent land. However, this group did little to develop water power at the falls before 1856.

In 1856, two companies received charters from the Minnesota Territorial legislature to develop the water power at St. Anthony Falls. The Minneapolis Mill Company, representing west side owners, and the St. Anthony Company, representing the east side, agreed to work together to improve the water power for milling at St. Anthony Falls. The companies cooperated to construct a dam across the river above the falls that divided the flow of water into miliponds on the east and west sides of the river. When the project was finished, the two companies had built a single large dam in the shape of a V, which angled out from both shores and met upriver.

The Minneapolis Mill Company quickly moved ahead of the St. Anthony Company in developing ways to distribute water power. The west-side owners built a canal angling inland from the millpond and running along the shore to carry water to numerous mill sites. Beginning in 1857, the Minneapolis Mill Company began excavating the canal, which would be 14 feet deep, 50 feet wide and 215 feet long. The canal was lengthened in later years to accommodate the demand for more access to the water power of the falls.

The west-side water system included smaller canals to carry water from the main canal to the mills (headraces) and from the mills back to the river (tailraces). When the system was completed, the Minneapolis manufacturing district consisted of 2.9 miles of tunnels and open canals.

In contrast to the system developed by the Minneapolis Mill Company, the St. Anthony Company

did not build canals to distribute water power on the east side of the falls. Instead, the St. Anthony Company owners relied on shafts and ropes running from water wheels on the dam to supply the mills.

The canal system enabled Minneapolis to quickly surpass St. Anthony in the development of manufacturing at the falls. By 1869, Minneapolis was producing five times as much flour and twice the amount of lumber as east-side manufacturers.

The population of Minneapolis also soon outgrew that of St. Anthony. Between 1857 and 1870, the population of St. Anthony increased by only 324, while Minneapolis grew from 3,391 residents in 1857 to 13,066 in 1870.

Eastman Tunnel Collapse

The water power companies that controlled the mills at the edge of the falls had forgotten to secure title to Nicollet Island, located a short distance upstream. As a result, in 1865, William Eastman and John Merriam acquired the island. The new owners quickly sued the St. Anthony Company to force the removal of the east-side mills, claiming that the installations infringed on their water rights.

In 1867, the St. Anthony Company and the Nicollet Island owners compromised. The company was allowed flowage, dam and boom privileges on the island's shore, while Eastman and Merriam were allowed to draw enough water to create 200 horse power for use at their own mills. Unfortunately, the agreement also allowed Eastman and Merriam to excavate a tunnel under Nicollet and Hennepin Islands for their tailrace.

In September 1868, Eastman, Merriam and two additional partners began excavating the tailrace. The plans called for a 6-foot by 6-foot tunnel cut through 2,500 feet of sandstone. Workers began digging at the downstream end of Hennepin Island and by October 4, 1869, they had tunneled through 2,000 feet of sandstone, bringing them as far as the toe of Nicollet Island. That day, however, workers discovered water leaking, and then rushing, into the upper end of the tunnel.

Early the next morning, the river broke through the limestone at the upper end of the project, forming a large whirlpool that sucked everything nearby into the tunnel. The water quickly scoured out the 6- by 6-foot tailrace, enlarging its width as much as 90 feet and increasing its depth to 16 and a half feet. As the roof of the tunnel fell in, Hennepin Island began to sink and the falls were in danger of collapsing.

Almost immediately, word spread through Minneapolis and St. Anthony that the falls were going out. Quickly, citizens dropped what they were doing to hurry to the river's edge and view the disaster for themselves. One witness of the scene recalled that "proprietors of stores hastened to the falls, taking their clerks with them; bakers deserted their ovens, lumbermen were ordered from the mills, barbers left their customers unshorn; mechanics dropped their tools, lawyers shut up their books or stopped pleading in the courts, physicians abandoned their offices."

Responding to the emergency, citizens of St. Anthony and Minneapolis worked together to build large rafts of timber, which they floated over the whirlpool and filled with dirt, rocks and other debris until the rafts sank into the hole. Once this break was plugged, however, another hole appeared.

Throughout the day, volunteers built rafts to fill the river where the limestone bedrock had collapsed. By the afternoon, workers and spectators were walking across a network of rafts that had apparently succeeded in preventing further erosion. Then suddenly, the rafts lurched, and as people scrambled to safety, the river swallowed all of their efforts in one massive gulp. According to one local newspaper, the whirlpool in the Mississippi River "tossed huge logs as though they were mere whittlings," standing them on end "as if in sport" before swallowing them.

The failure of this initial attempt to save the falls made it clear that a more permanent solution was needed. A temporary dam was completed by the end of October 1869, while mill owners and citizens of the two cities debated long-term solutions to the problem.

During the winter and spring of 1869-1870, the St. Anthony Company worked to repair the tunnel and to protect damaged areas near its property on Hennepin Island. A flood in April 1870 destroyed these repairs. Flood water and debris raced through the old tunnel, scouring out the sandstone under the mills on the downstream end of Hennepin Island. The limestone cap soon collapsed, and several mills and other buildings fell into the river.

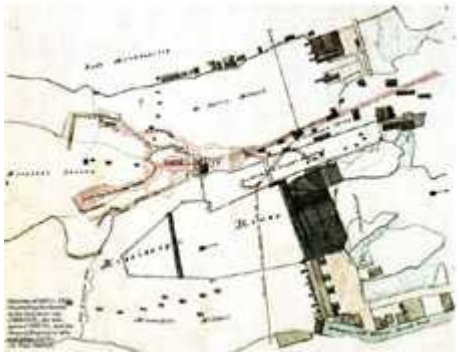
The progressive deterioration of the falls continued and the end of the limestone bedrock was drawing near. Without a dramatic preservation effort, St. Anthony Falls would quickly disappear.

Preservation of St. Anthony Falls

The St. Paul District Office of the U.S. Army Corps of Engineers had just been established three years when the Eastman Tunnel collapsed in 1869. In response to the disaster, the Corps hired an engineer, Franklin Cook, to survey the damage and recommend actions that should be taken to preserve St. Anthony Falls. At the time, the Corps had no authority from Congress to work on the falls and could not obtain such authority unless the project was related to the Corps of Engineers' navigation mission.

Cook recommended the construction of a timber apron to prevent further degeneration of the falls as well as the construction of a dam near the edge of the waterfall to maintain a constant level of water over the limestone cap to prevent freezing and cracking.

Cook argued that the Corps should seek authorization from Congress to save the waterfall on the basis that navigation above Minneapolis would be lost if St. Anthony Falls were destroyed. Congress reluctantly accepted this argument and provided $50,000 for the Corps of Engineers to save the falls.



In August 1870, the Corps hired Cook as supervising engineer and started to work by taking over the tunnel repair project from the St. Anthony Company. The engineers also built a dam between the St. Anthony and Minneapolis millponds that extended from the upper limit of the limestone ledge to the falls. The dam was constructed of timber cribs loaded with stone and was intended to be a permanent wall around the upper breach in the Eastman tunnel.

While the Corps made significant progress, in July 1871, the engineers discovered that the tunnel was once again filling with water. After a considerable search, they found that the leak originated between Nicollet Island and the east shore of the river. Water had traveled under the new dam and had scoured a cavity 16 feet wide by 8 feet deep under the limestone. To fix this new problem, the Corps built another dam from Boom Island to Nicollet Island, cutting off water to the St. Anthony millpond.

In August 1871, another new tunnel scoured out by the river threatened the existence of the Minneapolis millpond and led the citizens of Minneapolis to raise money to repair the tunnel and build an apron to protect the foot of the falls. When this new failure occurred, the Corps of Engineers surveyed the sandstone above the limit of the limestone ledge and found it was filled with holes.

The condition of the underlying sandstone led Cook to conclude that only a wall under the limestone, extending across the entire width of the river, would save St. Anthony Falls. However, Congress had not authorized funds for such a project.

In the years between 1871 and 1874, the Corps, mill owners, and private

citizens labored continuously at the falls to avert one crisis after another. The Corps worked to clear debris, plug holes and line the walls of the tunnels to prevent further collapses.

In April 1873, a flood destroyed the dam on the west side of Nicollet Island, opening a gap 150 feet wide and flooding the tunnel. A month later, a great hole opened in the dam at the head of the limestone bedrock. The engineers discovered that the flood water had scoured a new channel under the limestone from its head to the Eastman tunnel.

In response to these continued but unsuccessful efforts to save St. Anthony Falls, a special Federal board of engineers met in Minneapolis in April 1874 to study the situation. The board recommended the construction of a cutoff wall or dike, a new apron to protect the edge of the falls, and two dams above the falls. This time, Congress recognized the immediate need for the dike and authorized the funds needed for the project.

In July 1874, the Corps began construction of the dike. First they excavated a 75-foot-deep vertical shaft on Hennepin Island. Next they began digging a horizontal tunnel four feet wide and eight feet high just below the limestone for the removal of water and excavated material. Then the Corps began excavating for construction of the concrete wall. Building the dike proved to be a formidable challenge, as flooding, leaking, and collapses occurred frequently.

By November 1876, the Corps of Engineers had completed the dike, which was 40 feet deep and 1,850 feet long. Between 1876 and 1880, the engineers also completed the apron below the falls, built two low dams above the falls to maintain a safe water level over the limestone, and constructed a sluiceway to carry logs over the falls. Between 1870 and 1885, the Federal Government spent $615,000 to save St. Anthony Falls.

In 1885, the Corps' work at St. Anthony Falls ended and the maintenance of the waterfall once again became the responsibility of the water power companies and the City of Minneapolis. The dike is still in place under the limestone, helping to prevent the erosion of the falls.

Upper Harbor Project

The idea of extending navigation above St. Anthony Falls by constructing locks was first introduced by settlers in the 1850s. The City of Minneapolis and its boosters kept this idea alive over the years and continuously lobbied Congress to authorize such a project. In the Rivers and Harbors Act of August 1937, Congress approved the Upper Minneapolis Harbor Development Project, which extended the 9-Foot Channel in the Mississippi River by 4.6 miles.

The 9-Foot Channel Project was authorized in 1930 and completed in 1940. It included the construction of a series of 23 locks and dams on the Mississippi River between St. Louis and Red Wing, Minnesota, as well as dredging a deeper channel, to improve navigation. [Lock and Dam #1 (the Ford Dam) and Lock and Dam #2, at Hastings, were built in 1917 and 1930, respectively, under previous Congressional authorizations.] Prior to the construction of the Minneapolis Upper Harbor Project, the 9-Foot Channel reached only as far as the Northern Pacific Railway bridge, just upstream of Washington Avenue.

World War II, numerous economic and engineering studies, and project planning combined to delay construction of the Minneapolis Upper Harbor Project until 1948, when dredging for the

project began.

The Minneapolis Upper Harbor Project included the construction of the Lower Lock and Dam (completed in 1956), the Upper Lock (completed in 1963), dredging a channel 9 feet deep and a minimum of 150 feet wide, and alterations to bridges and utilities within the project area.

The fragile geology of the St. Anthony Falls area and congestion due to urban development called for a departure from conventional design and construction practices for the Upper Harbor Project. In 1939, the Corps built a 1 to 50 scale model of the project site from Hennepin Avenue to the Washington Avenue Bridge at the St. Anthony Falls Hydraulic Laboratory at the University of Minnesota. Other models were also made to aid in the design of the spillway for the lower dam and the filling/emptying system for both locks.

Three railroad bridges ran through the Upper Harbor Project area. The Corps had to alter all three without discontinuing rail service. In each case, the Corps replaced part of the original bridge with a steel truss to allow the passage of river vessels.

Remodeling the Great Northern Railway's historic Stone Arch Bridge presented the most complex engineering problem. Because it was not feasible to reroute the large number of trains that used the bridge, the Corps had to remove one pier and two spans of the structure without disrupting train traffic. To erect the truss and remove two arch spans under these conditions, the railroad grade was raised 5 feet and the trains were limited to the use of one track.

The total cost of the Upper Harbor Project was approximately $3 million. The Upper and Lower St. Anthony Falls locks make possible the navigation of numerous commercial and pleasure vessels over the Mississippi River's only waterfall. Although the project dramatically changed the appearance of the St. Anthony Falls area, it fulfilled a century-old dream to extend river navigation above Minneapolis.

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Center for Global Environmental Education
HAMLINE UNIVERSITY

RIVERS OF LIFE
Inquiry Projects

Compare Cargo Capacity

Huge quantities of grain, corn, coal, petroleum, and other products make their way up and downstream on the Mississippi River each year. How huge? Study the comparisons on this page--then do the simple math problems at the bottom of the page, and you'll be amazed!

One Barge
1500 Ton
52,500 Bushels
453,600 Gallons

One 15 Barge Tow
22,500Ton
787,500 Bushels
6,804,000 Gallons

Jumbo Hopper Car
100 Ton
3,500 Bushels
30,240 Gallons

100 Car Train Unit
10,000 Ton
350,000 Bushels
3,024,000 Gallons

Large Semi
26 Ton
910 Bushels
7,865 Gallons

Equivalent Units

One Barge carries the same quantity as:

15 Jumbo Hopper Cars (above) & **58 Large Semis** (right)

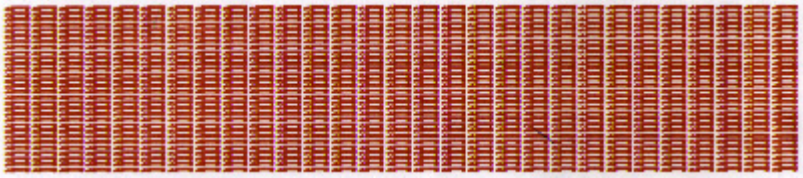
and subsiquently.....

One 15 Barge Tow carries the same quantity as:

2.25 100-Car Unit Trains (above) **& 870 Large Semis** (right)

Equivalent Lengths

One 15 Barge Tow is .25 miles long



2.25 100-Car Train Units is 2.75 miles long & the **870 Large Semis** are 11.5 miles long
(bumper to bumper)

In 1997, 38.8 million tons of cargo was transported on the Upper Mississippi River. With the above information, figure out the answers to these questions.

1) If all the cargo transported in 1997 was done by semis, how many semis would it have taken?

2) If all the cargo transported in 1997 was done on barges, how many 15-barge tows would it have taken?

2) How many bushels of cargo is in the 11.5 mile long string of large semis?

3) EXTRA CREDIT.....How long is a string of 58 large semis going down the highway, bumper to bumper?

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River Quotes

Jonathan Carver, 1766
(From *The Falls of St. Anthony* by Lucille Kane)
"We could distinctly hear the noise of the water full fifteen miles before we reached the falls and I was greatly pleased and surprised, when I approached this astonishing work of nature….This amazing body of waters, which are above 250 yards over, from a most pleasing cataract; they fall perpendicularly about thirty feet, and the rapids below…render the descent considerably greater, so that when viewed at a distance, they appear much higher than they really are…These falls vary much from all the others I have seen, as you may approach close to them without finding the least obstruction from any interesting hill."

Jonathon Carver, 1766
"The country around here is exceedingly beautiful. It is not an uninterrupted plain where the eye finds no relief, but composed of many gentle ascents, which in the summer are covered with the finest verdure, and interspersed with little groves that give a pleasing variety to the prospect. On the whole, when the falls are included, which may be seen at a distance of four miles, a more pleasing and picturesque view, I believe, cannot be found throughout the universe."

Zebulan Pike, 1805
"As I ascended the Mississippi, the Falls of St. Anthony did not strike me with that majestic appearance which I had been taught to expect from the descriptions of former travelers. In high water the appearance is much more sublime, as the great quantity of water then forms a spray, which in clear weather reflects from some positions the colors of the rainbow, and when the sky is overcast covers the falls in gloom and chaotic majesty."

Stephen Long, July 1817
"The Mississippi above the St. Croix emphatically deserves the name... Clear River. The water is entirely colorless and free from everything that would render it impure, either to sight or taste…When taken into a vessel [it] is perfectly clear."

Stephen Long, 1817 From his book, *Skiff Voyage to the Falls of St. Anthony*
"The place where we encamped last night needed no embellishments to render it romantic in the highest degree. The banks on both sides of the river are about one hundred feet high, decorated with trees and shrubbery of various kinds. The post hickory, walnut, linden, star tree, white birch, and the American box; also various evergreens, such as the pine, cedar, juniper, etc., added their embellishments to the scene. Amongst the shrubbery were the prickly ash, plum, and cherry tree, the gooseberry, the black and red raspberry, the chokeberry, grapevine, etc,. There were also various kinds of herbage and flowers, among which were the wild parsley, rue, spikenard, etc., red and white roses, morning glory, and various other handsome flowers. A few yards below us [was] a beautiful cascade of fine spring water, pouring down from a projecting precipice about one hundred feet high. On our left was the Mississippi hurrying through its channel with great velocity, and about three-quarters of a mile above us, in plain view, was the majestic cataract of the Falls of St. Anthony. The murmuring of the cascade, the roaring of the river, and the thunder of the cataract, all contributed to make the scene the most interesting and magnificent of any I ever before witnessed."

Henry Lewis, 1848 *Mississippi River Panorama*, Pg. 45
"From the Falls of St. Anthony an enormous prairie reaches out in all directions. Toward the north and the west it disappears on the distant horizon; toward the southwest it touches upon the St. Peter's (Minnesota) River and stretches for another eight miles over the bottom lands formed by the junction of the same with the Mississippi and is bordered by the hills of the St. Peter's Valley; toward the south it reaches as far as Fort Snelling which is built on the high promontory overlooking the confluence of the two rivers."
"There is in this region much of interest for the naturalist, as well as for the admirer of the scenic beauty especially among the thrilling waterfalls; one of these, about two and one-half mile s distant from Fort Snelling, is called 'Brown's Fall'- 'Little Fall'- or also Calhoun's Fall'- and is of all of them by far the most interesting. The little river, which forms the waterfall, comes from Lake Calhoun, which lies, along with several other beautiful clear lakes, about eight or ten miles west of Fort Snelling. Without a doubt the Calhoun River at one time poured over the cliff into the Mississippi about two miles above the Fort; however the water gradually washed the soft stone away so that the river now forms a small bend and rushes from a flat cliff twenty feet wide into a chasm more than forty feet deep, shaded by dark forests. The Fall creates a constant fine mist and causes a brilliant rainbow when the sun's rays strike it at the right angle. The constant washing of the waters against the cliff has hollowed out a cave in the same which forms, together with the water flowing over the ledge, a spacious chamber so that one can pass behind the waterfalls from one bank to the other, with no other danger than being thoroughly drenched by the fine mist. This chamber is similar to the Cave-of-the-Winds behind the famous Niagara Falls, which is visited by numerous strangers, and whose origin can be attributed to the same natural cause."

General William LeDuc, 1850 pioneer, *Old Rail Fence Corners*, pg. 43
"I crossed the river to the west side in a birch bark canoe, navigated by Tapper, the ferryman for many years after, until the suspension bridge was built. Examining the Falls, I went down to an old saw mill built by and for the soldiers at Fort Snelling and measured the retrocession of the fall by the fresh break of the rock from the water race way and found it had gone back one hundred and three feet which seemed very extraordinary until examination disclosed the soft sandstone underlying the limestone top of the falls."

Frank Blackwell Mayer (diary, June 1851)
Re: Little Crow (Taoyateduta) and Kaposia (Dakota) Indians -
"I visited the Chief Little Crow, a man of a very ambitious and determined nature, but withal exceedingly gentle and dignified in his deportment. His face is full of intelligence, and his whole being is that of a gentleman. Indeed, I have seldom met with the same number of persons taken from the ranks of civilized life who possessed so much genuine politeness, gentlemanly feeling, and kindliness of nature as the Kaposia Indians."

Miss Carrie Stratton, 1852 pioneer, *Old Rail Fence Corners*, pg. 183
"…I can remember too, like all the others here who were children at that time, the stupendous roar of the falls, which was constantly in our ears especially if we were awake at night, when every other noise was stilled."

anonymous Minneapolis resident, April 19, 1854 writing about waste below St. Anthony Falls
"O, [Heavens] what intolerable nuisances are these?... debris of every kind, rolling and putrefying in the fervid rays of the sun, polluting the clear waters,… and endangering the health… How long shall the beauty of the stream be disfigured by these hideous deformities, and the course of the laughing waters over their rocky bed be obstructed by these unsightly heaps of rubbish? "Why not make a 'bee,' and every man, woman and child turn out, and with two to three hours energetic work, restore the stream to its pristine beauty and purity?"

Horace Cleveland, June 19, 1885
"Preserve above all the wild and picturesque character of the river banks, and do not suffer them to be stripped of their foliage or scarred and seamed by excavation. The day is no distant when the thickly wooded banks, the deep and dark ravines, the rugged and precipitous rocks, and the picturesque cascades which form the shores of the majestic river will be regarded as your choicest possessions for the unique character they will confer upon the city."

Boards of Health for Minnesota and Wisconsin-1928
"…a zone of pollution extends from Minneapolis to the mouth of the St. Croix at Prescott. The river in this zone is unfit for use as a source of water supply, for bathing or for boating, and is a potential danger from a health standpoint to persons and livestock coming in contact with the water…fish life has been practically exterminated."

Clarence Jonk, Oct 1933 *River Journey*
"We lie about a quarter mile below the Washington Avenue bridge... The city bustles about us, dirty, noisy, with a glare of light at night... The "Betsy Nell" has been lowered into the sewage laden water where fish die, bloat, and turn idly about in the eddies, showing their worm infested bodies like a curse to the men who infected their world. Continuously their white mouths nudge the manure of humanity, the off-wash of the streets and gutters; and here curling under our starboard side, a brown foam bubbles and steams. Such is our baptism into the Great River. Needless to say, we are pressing rapidly for our departure..."

Metropolitan Council employee, 2004
"Where today we find 28 live species of mussels in this stretch of the river (near Newport), in the 1970s there were only nine. Where now mussels can be found throughout the river corridor, 30 years ago their range was restricted to just below Lock and Dam 1. The Metro Area had grown significantly in the 1960s and 1970s, and the Metro Plant was not keeping up to wastewater demands. A series of expansions and upgrades took place at the Metro Treatment Plant, especially in the 1980s. Now the plant meets standards among the highest in the country."

Big picture

"The face of the river, in time, became a wonderful book... which told its mind to me without reserve, delivering its most cherished secrets as clearly as if it had uttered them with a voice. And it was not a book to be read once and thrown aside, for it had a new story to tell every day."
– Mark Twain, *Life on the Mississippi*

"You cannot step twice into the same river, for other waters are continually flowing on."
-Heraclitus

"Perhaps one of the reasons why people have been drawn to rivers since time immemorial and why they have regarded them as sacred is because they are the perfect metaphor for our lives."
-Keith Harrison, *Minneapolis Star Tribune*, July, 95.

"The river, like an eagle or a forest, has a value that eludes measuring. The river lives within us."
-Keith Harrison, *Minneapolis Star Tribune*, July, 95.

"The river has no beginning or end.
In its beginning, it is not yet the river,
In its end it is no longer the river.
What we call headwaters is only a selection from among innumerable sources which
Flow together to compose it.
At what point in its course does the Mississippi become what the Mississippi means?"
- T.S. Eliot (born in St. Louis, MO near the banks of the Mississippi River; later moved to England)

Caring for rivers

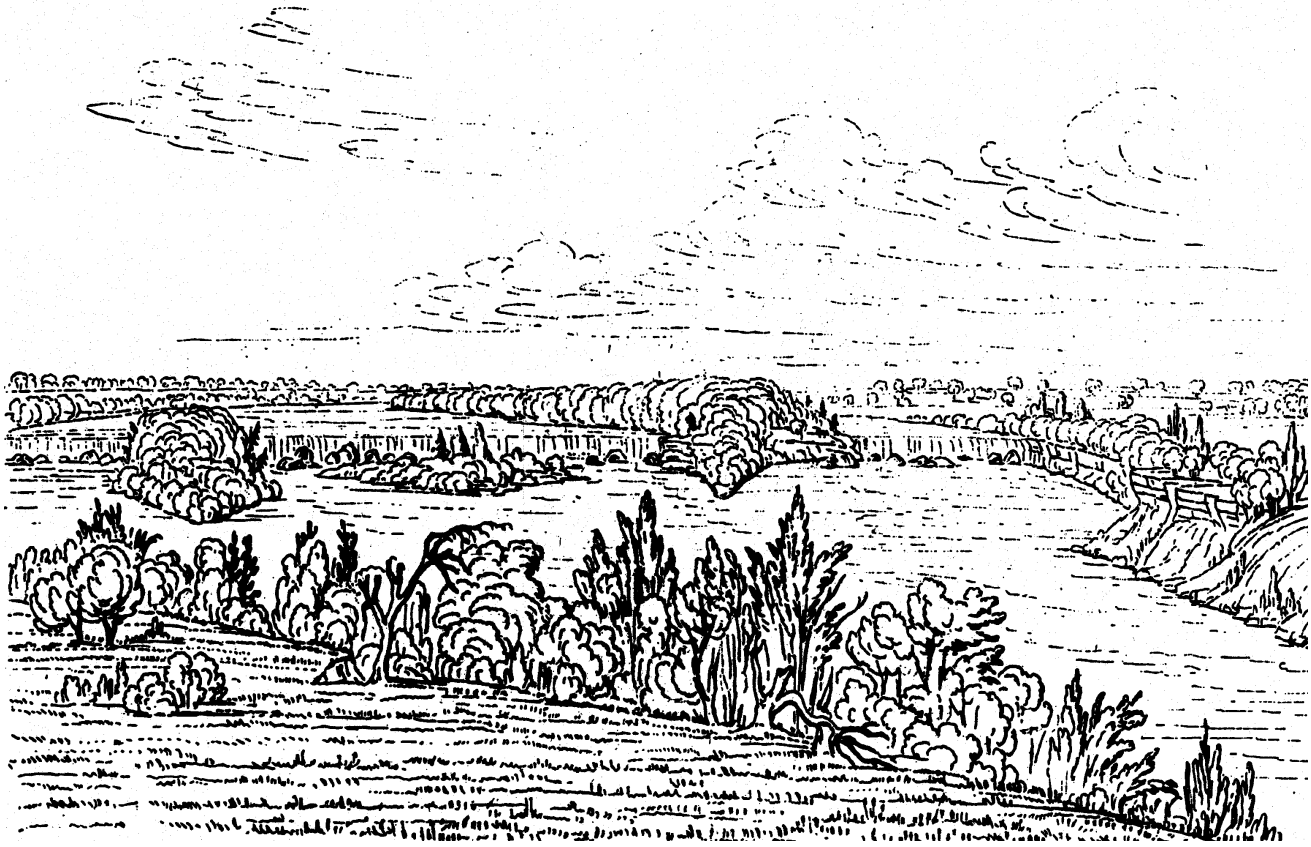
"The care of rivers is not a question of rivers, but of the human heart."
-Tanaka Shozo

"If we appreciate a clean drink of water, then shouldn't we also appreciate the banks and bed that provide the structure for a river's health, the flood plain that purifies the flow, the headwaters streams that feed it, the raindrops that coalesce to form running water, and the ground on which the raindrops fall?"
-Tim Palmer

"Anything else you're interested in is not going to happen if you can't breathe the air and drink the water. Don't sit this one out. Do something. You are by accident of fate alive at an absolutely critical moment in the history of our planet."
-Carl Sagan

"Never doubt that a small group of thoughtful committed citizens can change the world; indeed, it's the only thing that ever has."
-Margaret Mead

George Catlin Sketch, 1844- Portaging around St. Anthony Falls



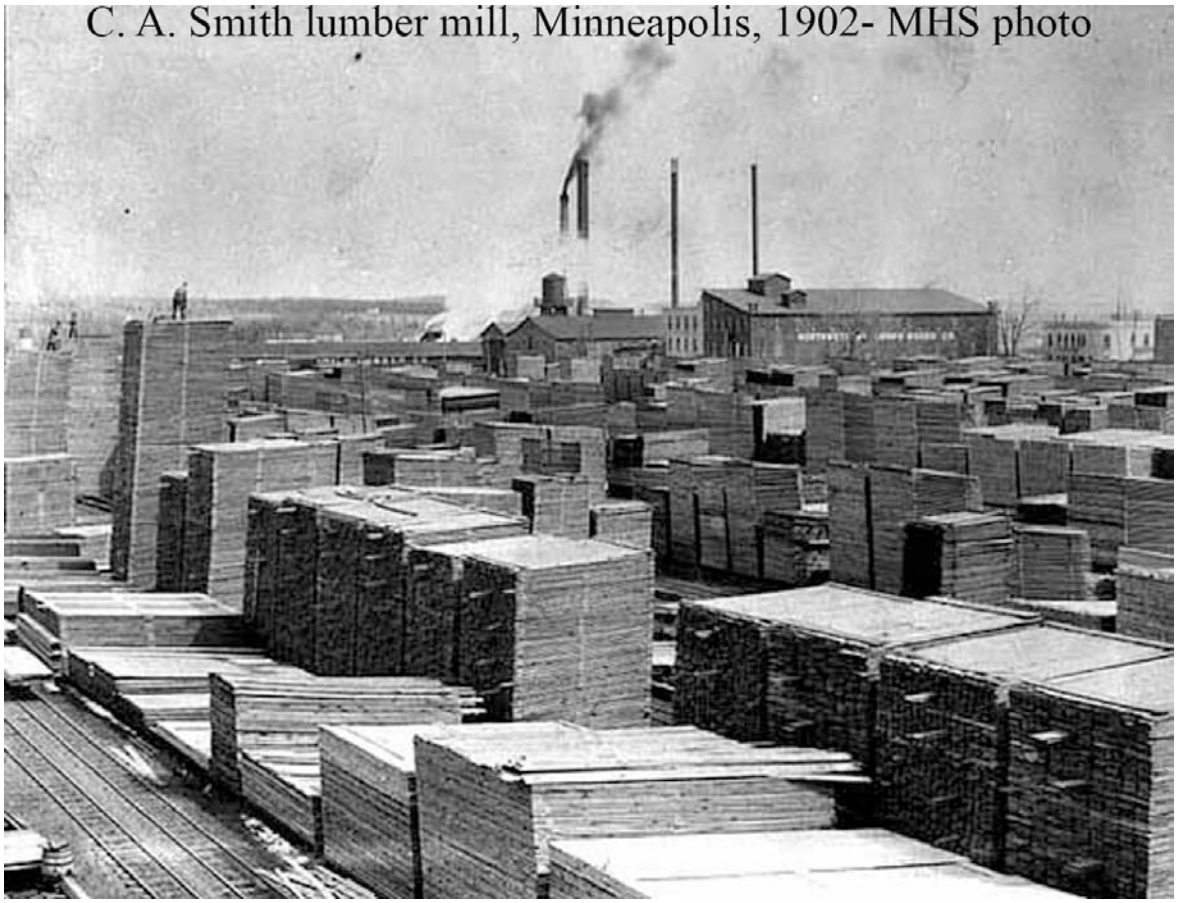
St. Anthony Falls, ca. 1926

Indian tepees at the site of Bridge Square in Minneapolis, about 1852, attributed to Tallmadge Elwell. Note a corner of the John Stevens house. Minnesota Historical Society Collections.

The Falls of Saint Anthony, 1852. Minnesota Historical Society Collections.

Looking up the west bank of the Mississippi River, ca. 1890, MHS

C. A. Smith Sawmill, ca. 1905, MHS photo



Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Field Trip Event					
Gr	Strand	Sub-Strand	Standard	Code	Benchmark
4	Geography	Geospacial Skills	People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.	4.3.1.1.1	Create and use various representations and kinds of maps, including overlaying thematic maps, of places in the United States, and also Canada or Mexico; incorporate the “TODALS” map basics, as well as points, lines and colored areas to display spatial information.
4	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	4.3.3.6.1	Explain how geographic factors affect population distribution and the growth of cities in the United States and Canada.
4	Geography	Human Environment Interaction	The environment influences human actions; and humans both adapt to and change, the environment.	4.3.4.9.1	Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.
4	Geography	Human Environment Interaction	The meaning, use, distribution and importance of resources changes over time.	4.3.4.10.1	Describe how the location of resources and the distribution of people and their various economic activities has created different regions in the United States and Canada.
4	History	Historical thinking Skills	Historical inquiry is a process in which multiple sources and different kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past.	4.4.1.2.1	Use maps to compare and contrast a particular region in the United States, and also Canada or Mexico, at different points in time.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Field Trip Event (continued)					
5	Economics	Economic Reasoning Skills	People make informed economic choices by identifying their goals, interpreting and applying data, considering the short- and long-run costs and benefits of alternative choices and revising their goals based on their analysis.	5.2.1.1.1	Apply a decision-making process to identify an alternative choice that could have been made for a historical event; explain the probable impact of that choice.
6	Geography	Geographical Skills	Create and use various kinds of maps, including overlaying thematic maps, of places in Minnesota: incorporate the “TODALSS” map basics, as well as points, lines and colored areas to display spatial information.	6.3.1.1.1	Create and use various kinds of maps, including overlaying thematic maps, of places in Minnesota; incorporate the “TODALSS” map basics, as well as points, lines and colored areas to display spatial information.
6	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and other human settlements.	6.3.3.6.1	Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and the growth of cities in different parts of Minnesota.
6	Geography	Human Environment Interaction	The meaning, use, distribution and importance of resources changes over time.	6.3.4.10.1	Describe how land was used during different time periods in Minnesota history; explain how and why land use has changed over time.
6	History	United States History	As the United States shifted from its agrarian roots into an industrial and global power, the rise of big business, urbanization and immigration led to institutionalized racism, ethnic and class conflict and new efforts at reform.	6.4.4.20.1	Analyze how the rise of big business, the growth of industry, the use of natural resources, and technological innovation influenced Minnesota's economy from 1860 to 1920.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Waterfall on the Move					
Gr	Strand	Sub-Strand	Standard	Code	Benchmark
4	Geography	Geospacial Skills	People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.	4.3.1.1.1	Create and use various representations and kinds of maps, including overlaying thematic maps, of places in the United States, and also Canada or Mexico; incorporate the “TODALS” map basics, as well as points, lines and colored areas to display spatial information.
4	Geography	Geospacial Skills	Geographic inquiry is a process in which people ask geographic questions and gather, organize and analyze information to solve problems and plan for the future.	4.3.1.2.1	Choose the most appropriate data from maps, charts, and graphs in an atlas to answer specific questions about geographic issues in the United States, and also Canada or Mexico.
4	Geography	Places and Regions	Places have physical characteristics (such as climate, topography vegetation) and human characteristics (such as culture, population, political and economic systems).	4.3.2.3.1	Locate and identify the physical and human characteristics of places in the United States, and also Canada or Mexico.
4	History	Historical thinking Skills	Historical inquiry is a process in which multiple sources and different kinds of historical evidence are analyzed to draw conclusions about how and why things happened in the past.	4.4.1.2.1	Use maps to compare and contrast a particular region in the United States, and also Canada or Mexico, at different points in time.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Waterfall on the Move (continued)					
4	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	4.3.3.6.1	Explain how geographic factors affect population distribution and the growth of cities in the United States and Canada.
4	Geography	Human Environment Interaction	The environment influences human actions; and humans both adapt to and change, the environment.	4.3.4.9.1	Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.
4	Geography	Human Environment Interaction	The meaning, use, distribution and importance of resources changes over time.	4.3.4.10.1	Describe how the location of resources and the distribution of people and their various economic activities has created different regions in the United States and Canada.
5	Economics	Economic Reasoning Skills	People make informed economic choices by identifying their goals, interpreting and applying data, considering the short- and long-run costs and benefits of alternative choices and revising their goals based on their analysis.	5.2.1.1.1	Apply a decision-making process to identify an alternative choice that could have been made for a historical event; explain the probable impact of that choice.
6	Geography	Geographical Skills	People use geographic representations and geospatial technologies to acquire, process and report information within a spatial context.	6.3.1.1.1	Create and use various kinds of maps, including overlaying thematic maps, of places in Minnesota; incorporate the “TODALSS” map basics, as well as points, lines and colored areas to display spatial information.
6	Geography	Goegraphical Skills	People use geographic representations and geospatial technologies to acquire process and report information within a spatial context.	6.3.1.1.1	Create and use various kinds of maps, including overlaying thematic maps of places in Minnesota, incorporate the “TODALSS” map basics, as well as points, lines and colored areas to display spatial information.

Minnesota Academic Standards

Journey to the Falls – Social Studies (2/17/12)

Waterfall on the Move (continued)					
6	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and other human settlements.	6.3.3.6.1	Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and the growth of cities in different parts of Minnesota.
6	History	United States History	Economic expansion and the conquest of indigenous and Mexican territory spurred the agricultural and industrial growth of the United States; led to increasing regional, economic and ethnic divisions; and inspired multiple reform movements.	6.4.4.18.1	Describe how and why the United States claimed and settled the upper Mississippi River region in the early nineteenth century; explain the impact of steamboat transportation and settlement on the physical, social and cultural landscapes.
6	History	United States History	As the United States shifted from its agrarian roots into an industrial and global power, the rise of big business, urbanization and immigration led to institutionalized racism, ethnic and class conflict and new efforts at reform.	6.4.4.20.1	Analyze how the rise of big business, the growth of industry, the use of natural resources, and technological innovation influenced Minnesota's economy from 1860 to 1920.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Lumber and Sawmill Activities					
Gr	Strand	Sub-Strand	Standard	Code	Benchmark
4	Geography	Geospacial Skills	Geographic inquiry is a process in which people ask geographic questions and gather, organize and analyze information to solve problems and plan for the future.	4.3.1.2.1	Choose the most appropriate data from maps, charts, and graphs in an atlas to answer specific questions about geographic issues in the United States, and also Canada or Mexico.
4	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and human settlements.	4.3.3.6.1	Explain how geographic factors affect population distribution and the growth of cities in the United States and Canada.
4	Geography	Human Environment Interaction	The environment influences human actions; and humans both adapt to and change, the environment.	4.3.4.9.1	Explain how humans adapt to and/or modify the physical environment and how they are in turn affected by these adaptations and modifications.
4	Geography	Human Environment Interaction	The meaning, use, distribution and importance of resources changes over time.	4.3.4.10.1	Describe how the location of resources and the distribution of people and their various economic activities has created different regions in the United States and Canada.
5	Economics	Economic Reasoning Skills	People make informed economic choices by identifying their goals, interpreting and applying data, considering the short- and long-run costs and benefits of alternative choices and revising their goals based on their analysis.	5.2.1.1.1	Apply a decision-making process to identify an alternative choice that could have been made for a historical event; explain the probable impact of that choice.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Lumber and Sawmill Activities (continued)					
5	History	Historical Thinking Skills	Historians generally construct chronological narratives to characterize eras and explain past events and change over time	5.4.1.1.1	Explain the construct of an era; interpret the connections between three or more events in an era depicted on a timeline or flowchart.
6	Geography	Human Systems	Geographic factors influence the distribution, functions, growth and patterns of cities and other human settlements.	6.3.3.6.1	Locate, identify and describe major physical features in Minnesota; explain how physical features and the location of resources affect settlement patterns and the growth of cities in different parts of Minnesota.
6	History	United States History	Economic expansion and the conquest of indigenous and Mexican territory spurred the agricultural and industrial growth of the United States; led to increasing regional, economic and ethnic divisions; and inspired multiple reform movements.	6.4.4.18.1	Describe how and why the United States claimed and settled the upper Mississippi River region in the early nineteenth century; explain the impact of steamboat transportation and settlement on the physical, social and cultural landscapes.
6	History	United States History	As the United States shifted from its agrarian roots into an industrial and global power, the rise of big business, urbanization and immigration led to institutionalized racism, ethnic and class conflict and new efforts at reform.	6.4.4.20.1	Analyze how the rise of big business, the growth of industry, the use of natural resources, and technological innovation influenced Minnesota's economy from 1860 to 1920.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Explorers					
Gr	Strand	Sub-Strand	Standard	Code	Benchmark
4	Geography	Human Environment Interaction	The meaning, use, distribution and importance of resources changes over time.	4.3.4.10.1	Describe how the location of resources and the distribution of people and their various economic activities has created different regions in the United States and Canada.
5	Economics	Economic Reasoning Skills	People make informed economic choices by identifying their goals, interpreting and applying data, considering the short- and long-run costs and benefits of alternative choices and revising their goals based on their analysis.	5.2.1.1.1	Apply a decision-making process to identify an alternative choice that could have been made for a historical event; explain the probable impact of that choice.
5	History	United States History	Rivalries among European nations and their search for new opportunities fueled expanding global trade networks and, in North America, colonization and settlement and the exploitation of indigenous peoples and lands; colonial development evoked varied responses by indigenous nations, and produced regional societies and economies that included imported slave labor and distinct forms of local government.	5.4.4.16.1	Identify various motivations of Europeans for exploration and settlement in Asia, Africa and the Americas from the fifteenth to early seventeenth centuries.

Minnesota Academic Standards
Journey to the Falls – Social Studies (2/17/12)

Explorers (continued)					
5	History	United States History	Rivalries among European nations and their search for new opportunities fueled expanding global trade networks and, in North America, colonization and settlement and the exploitation of indigenous peoples and lands; colonial development evoked varied responses by indigenous nations, and produced regional societies and economies that included imported slave labor and distinct forms of local government.	5.4.4.16.2	Describe early interactions between indigenous peoples, Europeans and Africans, including the Columbian Exchange; identify the consequences of those interactions on the three groups.
6	History	United States History	Economic expansion and the conquest of indigenous and Mexican territory spurred the agricultural and industrial growth of the United States; led to increasing regional, economic and ethnic divisions; and inspired multiple reform movements.	6.4.4.18.1	Describe how and why the United States claimed and settled the upper Mississippi River region in the early nineteenth century; explain the impact of steamboat transportation and settlement on the physical, social and cultural landscapes.

Hike to the Falls Activity					
Gr	Strand	Sub-Strand	Standard	Code	Benchmark
4	Economics	Fundamental Concepts	Because of scarcity individuals, organizations and governments evaluate trade-offs, make choices and incur opportunity costs.	4.2.3.3.1.	Define the productivity of a resource and describe ways to increase it.

Minnesota Academic Standards
Journey to the Falls – English Language Arts 4/28/2011

Waterfall on the Move- Reading				
	Informational Text	**Key Ideas and Details**		
4			4.2.1.1	Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
4			4.2.2.2	Determine the main idea of a text and explain how it is supported by key details; summarize the text.
4			4.2.3.3	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text
5			5.1.1.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
5			5.2.2.2	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
6			6.5.1.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
	Informational Text	**Craft and Structure**		
4			4.2.4.4	Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
4			4.2.5.5	Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
5			5.2.4.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
5			5.2.5.5	Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
			6.4.4.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone.
			6.5.4.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

Minnesota Academic Standards
Journey to the Falls – English Language Arts 4/28/2011

Lumber and Sawmill Activities- Reading				
	Informational Text	**Key Ideas and Details**		
4			4.2.1.1	Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
4			4.2.2.2	Determine the main idea of a text and explain how it is supported by key details; summarize the text.
4			4.2.3.3	Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text
5			5.1.1.1	Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
5			5.2.2.2	Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
5			5.2.3.3	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
6			6.5.1.1	Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
6			6.4.2.2	Determine a theme or central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
	Informational Text	**Craft and Structure**		
4			4.2.4.4	Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
4			4.2.5.5	Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
5			5.2.4.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
5			5.2.5.5	Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.
6			6.4.4.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone.
6			6.5.4.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

Minnesota Academic Standards
Journey to the Falls – English Language Arts 4/28/2011

Lumber and Sawmill Activities- Writing				
4		**Text Types and Purposes**	4.6.2.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
5			5.6.2.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
		Writing Process: Production and Distribution of Writing		
4			4.6.4.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
5			5.6.4.4	Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)
6			6.7.4.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade- specific expectations for writing types are defined in standards 1–3 above.)

Minnesota Academic Standards
Journey to the Falls – Science 2009

Field Trip Event					
Gr	Strand	Sub-strand	Standard	Code	Benchmark
4	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.	4.1.2.1.1	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
4	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	4.1.2.2.1	Identify and investigate a design solution and describe how it was used to solve an everyday problem. For example: Investigate different varieties of construction tools.
5	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	5.1.1.2.2	Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.
5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.1	Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. For example: Water, iron ore, granite, sand and gravel, wind, and forests.
5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.2	Give examples of how mineral and energy resources are obtained and processed and how that processing modifies their properties to make them more useful. For example: Iron ore, biofuels, or coal.

Minnesota Academic Standards
Journey to the Falls – Science 2009

Waterfall on the Move					
Gr	Strand	Sub-strand	Standard	Code	
4	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.	4.1.2.1.1	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
5	3. Earth Science	1. Earth Structure and Processes	2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	5.3.1.2.2	Explain how slow processes, such as water erosion, and rapid processes, such as landslides and volcanic eruptions, form features of the Earth's surface.
5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.1	Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. For example: Water, iron ore, granite, sand and gravel, wind, and forests.
5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.2	Give examples of how mineral and energy resources are obtained and processed and how that processing modifies their properties to make them more useful. For example: Iron ore, biofuels, or coal.
Lumber and Sawmill Activities					
4	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.	4.1.2.1.1	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.1	Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. For example: Water, iron ore, granite, sand and gravel, wind, and forests.

Journey to the Falls
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