

# Riordan Mansion State Historic Park

## A Family and a Forest

*Curriculum Guide*

Grades 3 - 6





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# Arizona State Parks

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“Provide a meaningful, high quality educational experience to Arizona State Parks customers of all ages, abilities, and backgrounds and foster an awareness and appreciation for Arizona’s natural, cultural and historic resources.”



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# Correlation to Arizona State Education Standards For Science, Social Studies and Mathematics

## Foundations: Grades 1-3

Activities:	Science:	Social Studies:	Mathematics:
Occupations of the Past	3SC-F1, PO 1		
Life Then and Now		1SS-F2, PO 1 1SS-F3, PO 1,2,3	
Forest of Many Uses	1SC-F4, PO 1,2 3SC-F3, PO 1,2		
Forest for the Trees	3SC-F4, PO 1,2		
Tree Ring Timeline	1SC-F2, PO 1,2 4SC-F4, PO 3,4	1SS-F1, PO 1,2	M1-F3, PO 8 M2-F1, PO 2 M2-F2, PO 1
Web of Work	1SC-F2, PO 1,2	1SS-F3, PO 3	
Junior Ranger Activities:			
Riordan Family Bingo		1SS-F3, PO 3	
Old and New Mix and Match		1SS-F3, PO 3	
Let's Go For A Visit		1SS-F3, PO 3	

### Science Standards

#### *Standard 1: Science as Inquiry*

Students understand and use the processes of scientific investigation and scientific ways of knowing. They are able to design, conduct, describe and evaluate these investigations. They are able to understand and apply concepts that unify scientific disciplines.

1SC-F2 Construct models that illustrate simple concepts and compare those models to what they represent

PO 1 Construct physical models illustration simple concepts

PO 2 Compare a physical model to what it represents

1SC-F4 Describe relationships among parts of a familiar system.

PO 1 Identify parts of a familiar system

PO 2 Explain the relationships among parts of a system

#### *Standard 3: Personal and Social Perspectives in Science and Technology*

Students understand the impact of science on human activity and the environment and are proficient in the uses of technology as they relate to science.

3SC-F1 Identify occupations that require the application of science and technology

PO 1 Describe occupations that require the application of science and technology

3SC-F3 Describe and explain the interrelationship of populations, resources and environments.

PO 1 Describe populations, resources and environments

PO 2 Explain interactions and interdependence among specific populations, resources and environments

3SC-F4 Identify and describe how technology contributes to solving problems

PO 1 Identify various technologies

PO 2 Describe how various technologies contribute to solving problems

#### *Science Standard 4: Life Science*

Students understand the characteristics of living things, the diversity of life and how organisms change over time in terms of biological adaptation and genetics. Students understand the interrelationships of matter and energy in living organisms and the interrelations of living organisms with their environment.

4SC-F3 Identify the basic structures and functions of plants and animals

PO3 Identify basic plant structures

PO4 Describe the functions of basic plant structures

#### Social Studies

##### *Standard 1:History*

Students analyze the human experience through time, recognize the relationships of events and people, and interpret significant patterns, themes, ideas, beliefs, and turning points in Arizona, American, and world history.

1SS-F1 Demonstrate the ability to place events in chronological sequence, with emphasis on:

PO 1 using a timeline to place in order important events in a student's life

PO 2 recognizing a sequence of events

1SS-F2 Describe everyday life in the past and recognize that some aspects change and others stay the same, with emphasis on:

PO 1 using primary source materials, including photographs, artifacts, interviews, and documents to trace the history of a family from long ago

1SS-F3 Use stories to describe past events, people, and places, with emphasis on:

PO 1 contributions from past events and cultures

PO 2 examples of individual action, character, and values

PO 3 descriptions of daily life in past time and different places, including the various roles of men, women, and children

### *Standard 3: Geography*

Students analyze locations, regions, and spatial connections, recognizing the natural and cultural processes that impact the way in which people and societies live and interact with each other and their environment.

3SS-F2 Identify natural and human characteristics of places and how people interact with and modify their environment, with emphasis on:

PO 2 human characteristics of places, including houses, schools, neighborhoods, and communities

### *Standard 4: Economics*

Students develop economic reasoning skills to apply basic economic concepts, assess problems, make choices, and evaluate the choices of others as consumers, workers, and citizens participating in local, national, and global economies.

4SS-F1 Describe how scarcity affects students' lives, with emphasis on:

PO 2 natural resources, human resources, and capital resources, and how they are used to produce goods and services

4SS-F2 Describe the characteristics of production and exchange in an economy, with emphasis on:

PO 3 the work that people do to manufacture, transport and market goods and services

## Mathematics Standards

### *Standard 1: Number Sense*

Students develop number sense and use numbers and number relationships to acquire basic facts, to solve a wide variety of real-world problems, and to determine the reasonableness of results.

1M-F3 Understand the meaning for the application of the operations of addition, subtraction, multiplication and division

PO 8 Apply mathematical operations in everyday situations

### *Standard 2: Data Analysis and Probability*

Students use data collection and analysis, statistics, and probability to make valid inferences, decisions and arguments and to solve a variety of real-world problems.

2M-F1 Collect and analyze data using the concepts of largest, smallest, most often, less often and middle.

PO 2 Organize (e.g., sorting, sequencing, tallying) information from surveys or experiments

2M-F2 Construct, read and interpret displays of data to make valid decisions, inferences and predictions

PO 1 Make and label a graph (horizontal bar, vertical bar, picture graph or tally chart) from organized data.

## Essentials: Grades 4-6

Activities:	Science:	Social Studies:	Mathematics:
Occupations of the Past		1SS-E4, PO 4	
The Way It Was	1SC-E1, PO 2 6SC-E4, PO 1,2		
Forest of Many Uses	3SC-E1, PO 1 3SC-E3, PO 1,2,3 3SC-E4, PO 1		
Life Then and Now		1SS-E4, PO 3,4	
Once Upon a Time		1SS-E1, PO 1,2	
Once Upon a Time Math Extension			1M-E1, PO 1
Forest Consequences	3SC-E1, PO 1 3SC-E3, PO 1,2,3 3SC-E4, PO 1 6SC-E4, PO 2 7SC-E10, PO 1		
Forest for the Trees	3SC-E1, PO 1,2 3SC-E4, PO 1		
Web of Work	3SC-E3, PO 1,2,3	1SS-E4, PO 4	
Junior Ranger Activities:		1SS-F3, PO 3	
Logging Word Search	3SC-E1, PO 1		
Cross Word	3SC-E1, PO 1		
Let's Go For A Visit		1SS-E1, PO 2	

### Science Standards

#### *Standard 1: Science as inquiry*

Students understand and use the processes of scientific; investigation and scientific ways of knowing. They are able to design, conduct, describe and evaluate these investigations. They are able to understand and apply concepts that unify scientific disciplines.

- 1SC-E1 Identify a question, formulate a hypothesis, control and manipulate variables, devise experiments, predict outcomes, compare and analyze results, and defend conclusions.  
 PO 2 describe the functions of variables in an investigation

#### *Standard 3: Personal and Social Perspectives in Science and Technology*

Students understand the impact of science on human activity and the environment and are proficient in the uses of technology as they relate to science.

- 3SC-E1 Recognize how scientific knowledge and skills are integral to a variety of careers

PO 1 Explain how scientific knowledge and skills are integral to a variety of careers

3SC-E3 Identify a specific need and propose a solution or product that addresses this need, taking into consideration various factors

PO 1 Identify a human or environmental need

PO 2 Describe the various factors affecting the need

PO 3 Propose a solution or product that addresses the need

3SC-E4 Implement a proposed solution or design and evaluate its merit

PO 1 Evaluate the possible strengths and weaknesses of a given solution to a problem

6SC-E4 Provide evidence of how life and environmental conditions have changed

PO 1 Describe how life has changed over time (geologic and recent)

PO 2 Describe how environmental conditions have changed over time (geologic and recent)

7SC-E10 Explain how technology has impacted both earth and space science

PO 1 Explain the impact of technology on earth science

### Social Studies Standards:

#### *Standard 1: History*

Students analyze the human experience through time, recognize the relationships of events and people, and interpret significant patterns, themes, ideas, beliefs, and turning points in t Arizona, American, and world history.

1SS-E1 Understand and apply the basic tools of historical research, including chronology and how to collect, interpret, and employ information from historical materials.

PO 1 Place key events on a timeline and apply chronological terms correctly, including B.C.E. (B.C.), C.E. (A.D.), decade, century, and generation

PO 2 Identify primary and secondary sources historians use to construct an understanding of the past, using such sources as letters, diaries, newspaper articles, archaeological evidence, maps, and government records

1SS-E4 Describe the economic, social, and political life in the Arizona Territory and the legacy of various cultural groups to modern Arizona, with emphasis on:

PO 3 the lives and contributions of various cultural and ethnic groups, including American Indians, Hispanics, and newcomers fro the United States and other parts of the world

PO 4 the importance and contributions of various occupations to the growing Arizona communities, including soldiers (Buffalo soldiers), miners, merchants, freighters, homemakers, ranchers, cowboys, farmers, and railroad workers

### *Standard 3: Geography*

Students analyze locations, regions, and spatial connections, recognizing the natural and cultural processes that impact the way in which people and societies live and interact with each other and their environment.

3SS-E2 Describe the impact of interactions between people and the natural environment on the development of places and regions in Arizona, including how people have adapted to and modified the environment, with emphasis on:

PO 1 the reasons for migration to, and the settlement and growth of Phoenix, Mesa, Tucson, Flagstaff, Prescott and Yuma, including mining, ranching, agricultures, and tourism

PO 4 how people have depended on the physical environment and its natural resources to satisfy their basic needs, including the consequences of Arizonans' adaptation to, and modification of, the natural environment

### *Standard 4: Economics*

Students develop economic reasoning skills to apply basic economic concepts, assess problems, make choices, and evaluate the choices of others as consumers, workers, and citizens participating in local, national, and global economies.

4SS-E1 Use basic economic concepts such as trade, opportunity costs, specialization, voluntary exchange, and price incentives to examine historical events, with emphasis on:

PO 3 how specialization improves standards of living, including examples of how development of specific economies in the tree colonial regions developed

4SS-E3 Describe how consumers and businesses interact in the United States economy, with emphasis on:

PO 1 how competition, markets, and prices influence peoples' behavior

PO 2 how people earn income by selling their labor to businesses

PO 3 how entrepreneurs take risks to develop new goods and services to start a business

## Mathematics Standards

### *Standard 1: Number Sense*

Students develop number sense and use numbers and number relationships to acquire basic facts, to solve a wide variety of real-world problems, and to determine the reasonableness of results.

1M-E1 Read, write and order integers, whole numbers and rational numbers.

PO 1 Compare and order using concrete or illustrated models

## Introduction

The goal of the curriculum is to present information on the logging industry in Flagstaff, Arizona and how this industry provided wealth to the community and support for the families that relied upon that industry for their livelihood. It also presents information on the concerns of land use and conservation of the natural resources that provided that livelihood. Through the Riordan family history we learn about life one hundred years ago and relate that to our lives today.

The purpose of this guide is to assist teachers in preparing students for a visit to Riordan Mansion State Historic Park. The orientation section provides information about the location and rules of the park. We ask educators to become aware of the different aspects of the park and of the field trip and to share this information with their students.

Educators are encouraged to use both the background information and the activities to help the students prepare for their field trip. Activities are to be used before, during, and after your visit to the park. These activities are intended to foster an understanding of the importance of the natural resources in an area to the future development and growth of a community.

The activities were created to address the Arizona Academic Standards for Grades 3-6 for Science and Social Studies.

## Orientation

Riordan Mansion State Historic Park is a historic home built in 1904. It is located on Riordan Road in Flagstaff, adjacent to the NAU campus. The park is open daily May to October 8:30 a.m. to 5:00 p.m. and November to April 10:30 a.m. to 5:00 p.m. Guided tours of the home are offered on the hour throughout the day.

## Reservations

Reservations are required for groups. Please call **928-779-4395** for reservations. Group size is limited to 60 people on any one day. The house tours are about one hour in length. Each tour group in the house is limited to 15 people. We can sometimes accommodate up to 30 students (in two groups) per hour when staffing permits. For groups over 30 but less than 60, tours can be presented in two consecutive hours. We recommend that you plan on a minimum of **two** hours at the park. Depending on the size of your group, one group may tour the house while the second group does other curriculum activities. The groups will then exchange places and repeat the activities. Teachers will be responsible for conducting the curriculum activities for the non-touring group. Suggested activities are: Once Upon a Time, West Wing and Outdoor Activity Sheets, Tree Ring Time Line, and the Junior Ranger Activities.

Schedule your visit at least one month in advance. This will allow the park to schedule enough staff to accommodate your group. Once your reservation is set you need to call and confirm the week before your visit. The fee for groups is \$1.00 per student, payable at the time of the visit.

Please have at least one (1) adult for every seven (7) children.

Your group **must** arrive at least 15 minutes prior to your tour time in order to take care of fees, paperwork and to divide the group for the tour(s). If your group will be late, contact the park so we may move your reservation to the next available hour.

## **Being Responsible**

In order to protect the home and artifacts, absolutely no touching of artifacts is allowed on the tour. Guests are required to stay on the “new” red carpet runner throughout the tour. No photography is permitted inside the home. Be sure all students are aware of the rules inside the house.

**It is the teacher’s responsibility to maintain student discipline at all times.**

# Recommended Activities

## **Before Your Visit:**

The Way It Was  
Occupations of the Past  
Web of Work  
Forest of Many Uses

## **While You're Here:**

Life Then and Now Tour\*  
Tree Ring Timeline  
Once Upon a Time  
Once Upon a Time Math Extension  
West Wing and Outdoor Activity Sheets  
Junior Ranger Activities

## **Back At School:**

Forest for the Trees  
Forest Consequences  
Junior Ranger Activities

\*Lead by State Park Staff

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## **Student Resources**

Riordan and Logging Background Information, Riordan Mansion State Park  
*"A Family and a Forest: Curriculum Guide"*, 2002, Riordan Mansion State Park staff

Junior Ranger Journal, Riordan Mansion State Historic Park

*Flagstaff Album Flagstaff's First 50 Years in Photographs 1876-1926*  
by Richard K. Mangum and Sherry G. Mangum, 1993, Northland Graphics, Flagstaff, AZ

*Flagstaff Historic Walk* by Richard K. Mangum and Sherry G. Mangum, 1993, Northland Printing, Flagstaff, AZ

US Department of Agriculture, National Forest Service Posters

*Welcome to Samantha's World 1904*, 1999 Pleasant Company Publication, Middleton, WI

## Teacher Resources

*"A Good Burn"* by Paul MacDonald, Logging and Sawmilling Journal vol.31 no.2, March 2000

*Biography of a Small Mountain* by Donna Ashworth, 1991, Small Mountain Books, Flagstaff, AZ

Coconino National Forest, Five Year Review: Forest Plan Issues  
Greenlaw Office, Flagstaff, AZ

*Flagstaff Past and Present*, Richard and Sherry Mangum, 2003, Northland Publishing.

*Grand Canyon Stage Coach Line* by Richard K. Mangum and Sherry G. Mangum, 1999, Hexagon Press, Flagstaff, AZ

*"Learning by Doing - Education in Ecological Restoration at Northern Arizona University"* by W. Wallace Covington, Peter Z. Fule, Thomas M. Alcoze, and Teginia K. Vance Ecology vol.98 issue 10, October 2000

*Mountain Town*, Platt Cline, 1994, Northland Publishing.

*"My Most Exciting Experience as a Forest Ranger"* by E. C. Pulaski, American Forests, Autumn 2001

*"Public Perceptions of Clearcutting"* by John C. Bliss, Journal of Forestry vol.98 no.12 December 2000

*Project Learning Tree*, 1996, American Forest Foundation, Washington, D.C..

*They Came to the Mountain* by Platt Cline, 1976, Northern Arizona University and Northland Press, Flagstaff, AZ

Report of the Governor of Arizona to the Secretary of the Interior. 1893. Washington: Government Printing Office. 1893

Arizona Department of Library, Archives, & Public Records – History and Archives Division, 1700 W. Washington, Phoenix, Arizona 85007

### **Some of the websites for photographs and current forestry information:**

Northern Arizona University:

[www.for.nau.edu](http://www.for.nau.edu)

[www.nau.edu/cee/WOW/forestry.htm](http://www.nau.edu/cee/WOW/forestry.htm)

University of Arizona:

[www.ltrr.arizona.edu/~sheppard/swland/otherways.html](http://www.ltrr.arizona.edu/~sheppard/swland/otherways.html)

U.S. Forest Service:

[www.fs.fed.us/publications](http://www.fs.fed.us/publications)

FireWorks Curriculum website:

[www.firelab.org/fep/research/fireworks/fireworks.htm](http://www.firelab.org/fep/research/fireworks/fireworks.htm)

# Riordan Mansion Historic Park

## Background Information

### Flagstaff

*“In 1876, the Boston Party, a group of men who had been lured West by irresponsible promises of finding a land of milk and honey in northern Arizona, gave up an attempt to settle along the Little Colorado near present-day Winslow. They decided to try their luck in Prescott and on their way, they made camp at Antelope Spring in a mountain valley on the Fourth of July.*

*Properly patriotic, they stripped a pine tree of branches and bark and hung Old Glory at its top. The stripped tree was used as a marker for the spring by travelers afterwards, who referred to the place as the spring by the flag staff. A few sheep ranchers settled in the region, and gradually the area became known as Flag Staff, then Flagstaff.*

*As advance crews of the Atlantic & Pacific Railroad reached Flag Staff in 1880, a tent camp developed near Old Town Spring to supply the railroad workers. When the camp became a hamlet large enough to qualify for a post office, it was necessary for it to have an official name. The citizens of the community held a meeting in 1881 and named the village Flagstaff.”*

*(“Flagstaff Historic Walk” by Richard K. Mangum and Sherry G. Mangum, 1993)*

The railroad and Ayer Lumber Mill arrived hand in hand in 1882. The sawmill supplied the ties and timbers as the railroad extended across Arizona, as well as providing employment for many in Flagstaff. Mill Town grew up around the mill providing everything a family needed.

### The Riordan Brothers

The Riordan’s started their life in Flagstaff in 1884 when Denis Matthew (Matt) Riordan arrived. Edward Ayer hired Matt as the supervisor of the Ayer Lumber Mill. Matt encouraged his two younger brothers to join him in Flagstaff. Timothy left his partnership in a Chicago mercantile enterprise and arrived in Flagstaff to stay in 1886. Michael had other plans; he was studying to become a Jesuit priest. Unfortunately his health would not allow it. Michael developed tuberculosis, which forced him to give up his studies and move west to the dry Arizona climate in 1885. In 1887, Matt purchased the mill from Ayer. The Arizona Lumber Company was created with Matt as the general manager, Timothy as superintendent, Michael as the secretary and friend, F.W. Sisson, as treasurer.

By 1897, ready for a career change, Matt turned over his shares to his younger brothers and Sisson. Immediately after Timothy and Michael acquired ownership, the mill was destroyed by fire; the Riordan's were resilient and rebuilt an even bigger and better mill. The Arizona Lumber and Timber Company continued to thrive and became the largest employer in Northern Arizona, employing as many as 700 workers.

The peak of production was in the 1920's but the Great Depression brought a large decline in business. The Riordans sold their mill in 1933; the mill continued operating under various other company names until it burned in 1961.

## **The Mansion**

The Riordan's, now quite prominent, were instrumental in the growth and development of Flagstaff. By the early 1900s, Michael, Timothy and their families were ready for a new home worthy of their community status.

Their new home was constructed in a short nine months. The mansion, actually two separate houses connected in the center by a large common area - was designed in the Arts and Crafts style by Charles Whittlesey (Whittlesey also designed El Tovar Hotel on the south rim of the Grand Canyon.) Each wing of the mansion consists of 6,000 feet, plus the 1,000-square-foot common area. Timothy with his wife Caroline and their family occupied the east wing, while younger brother Michael with his wife Elizabeth (Caroline's sister) and their family occupied the west wing. The common area was a room used by both families for entertainment and recreation; it was known as the ballroom or billiard room.

Part of the Arts and Crafts philosophy was to use local materials in the construction of the home. Flagstaff, located in the heart of the world's largest ponderosa pine forest, was also the location of ancient volcanic activity. Therefore, the Riordan Mansion is a frame-built structure covered with ponderosa pine slab planks, which give the home an appearance of log construction; the masonry work consists of volcanic rock.

The floor plans are almost identical; they are mirror images with a few exceptions such as the dining rooms, which were designed to suit the personality of each of the brothers. The West wing has a rectangular dining area, more bedrooms and a sleeping porch to accommodate Michael and Elizabeth and their five children. The East wing has an oval dining room, a fountain in the breakfast room and only five bedrooms to serve Timothy, Caroline and their two daughters. Each side of the house has a reception hall, library, living room, kitchen, dining room, sewing room, servant's rooms, and a bedroom for each family member.

## **Logging in Flagstaff**

The Riordan's used a unique way to log the difficult terrain of Northern Arizona. In other parts of the country where water is plentiful, water flumes and rivers are used to carry the logs to the sawmill. In arid Arizona, logs were transported to the mill by railroad. When a section of

the forest was prepared for logging, railroad tracks were laid, and like a big traveling circus, the train brought in everything necessary to create the logging camp.

The tracks were actually the “main street” of the camp. Cabins, complete with furnishings, including stoves, were unloaded on either side of the tracks by the train’s crane. Adjoining the camp was a short section of track called a spur where special railroad cars were parked containing a dining area and a commissary (a store where lumbermen could purchase goods).

Logs were often hauled to the train tracks by “Big Wheels”. These logs were attached under a pair of ten-foot high wheels and pulled by mule, oxen or horses.

In Arizona the “donkey” engine made a good working partner with the train. A steam powered engine, nicknamed the “donkey”, was equipped with big drums of coiled steel cable and transported to the work site on a railroad flatcar. Nearby, a tall pine tree (called a spar tree) was stripped of its branches and pulleys were attached. Using cables strung through the spar tree’s pulleys, the “donkey” skidded and dragged the logs out of the forest to the railroad-loading site. Once the spar tree had completed its job, it also was harvested, cut into logs, and hauled by the train to the sawmill.

After successfully logging an area, everything at the camp was packed up, loaded onto flat cars, and relocated to a new section of the forest. Even the railroad tracks were pulled up and repositioned to service the new camp.

## **Logging on Government Land**

Shortly after the Civil War ended the government focused on westward expansion and the cross-country railroad. To finance the railroad the government gave the Atlantic and Pacific (A&P) Railroad a right of way to build the track and odd-numbered sections (one section is one square mile of surveyed land) of land on each side of the track. These sections were to be used by the railroad to help offset the construction costs. The A&P therefore owned the timber on these sections and sold the rights to cut the timber to the Ayer Lumber Company and then later to the Arizona Lumber and Timber Company (A.L.&T. Co.). Much of the lumber produced was sold to the railroad.

In 1891 the Forest Reserve system was created, including the San Francisco Mountain Forest Reserve in 1889. This Reserve included all the sections of land not owned by the railroad and many felt their livelihood was being taken away. People could no longer use public domain however they wished. The Reserve affected not only the Riordan’s lumber operation, it changed the rules on mining, cattle and sheep grazing and other natural resources.

Matt Riordan encouraged forest management to “Perpetuate our forest conditions for the benefit of future generations in the territory”. The change in government management meant a change in how the Riordan’s did business. Clear cutting (the taking of all the standing trees) was a thing of the past; the Riordan’s by 1903 were using seed tree cuts. The regulations

required they leave two seed trees (larger than 14 inches in diameter) per acre. The A.L.&T. Co. worked closely with the Forest Service to insure that the new guidelines were met although there were problems early on. The logging crews felt the lumber company deserved these large trees. The A.L.&T. Co. had purchased the timber rights and the crew believed they should get all the saleable timber. Therefore, the crews cut the best trees and left sickly crooked trees to serve as seed trees. But the little trees could not provide enough seeds to regenerate the forest. The Riordan's reprimanded the crews and forced them to change their methods. For more information on these conflicts see [Biography of a Small Mountain](#).

# Historic Perspective on Forest Lands in Arizona

The following are excerpts from various historic records and reports, and articles that give the educator a perspective of the attitude of the Riordan Family toward forestry in the Territory of Arizona prior to the turn of the century. The report from the Governor to the Secretary of the Interior includes comments from Denis Matthew (Matt) Riordan, older brother and then president of the company. During discussions with the students, you may want to consider reading his comments to the class with a discussion following.

## Report of the Governor of Arizona to the Secretary of the Interior 1893

### Forests and Lumber

The timber region of the Territory is chiefly located in the northern and central portion of Arizona, and covers an area of about 2,750 square miles. The high mountain ranges of the south and eastern portions of the Territory are also very liberally timbered. Pine wood is generally found at altitudes of from 5,000 to 10,000 feet. Below this line the timber runs into juniper, live oak, mesquite and palo verde. The two last named supply the fuel of the Territory. It is estimated that the total quantity of pine timber fit for commercial purposes is 10,000 million feet. This, however, is chiefly located in the northern and central portions of Arizona, and will be of little service to the southern section until rail communications are completed. At present the lumber for this section is supplied by California and Oregon, at prices varying from \$30 to \$60 per 1,000 feet, the high price being due to the cost of transportation. The value of the merchantable lumber in the pine forests of the north, where the output ranges from 10,000,000 to 12,000,000 feet annually, runs from \$12 to \$15 per 1,000 feet.

With reference to the output during the past year and suggestions relative to our forests, I would commend the following from the president of the Arizona Lumber Company, who is an accepted authority on the subject of which he treats:

“In my judgment the lumber production of Arizona during the year ending June 30, 1893, would amount to about 24,000,000 feet. I base this estimate upon the knowledge of what our neighbors at Williams and Challender are doing and also upon the closest possible information that I can get as to the output of the small sawmills in other parts of the Territory. For these last, however, I have to depend largely upon hearsay, but I am satisfied, nevertheless, that it is a very close approximation.

I do not know of any suggestion that I could make as to legislation for the benefit of this industry; but I believe that it is the duty of every person who can give the matter thought at all, and who is in position to influence anyone's action in the premises, to make some endeavor to perpetuate our forest conditions for the benefit of future generations in the Territory. Upon the reasonable preservation of our forests will depend the happiness and welfare, and I may say the absolute existence, of any large population in this Territory; and the time to act is the present, when the least possible injury will be done to vested rights. I believe the Government ought to withdraw all timber lands it possesses in the Territory and ought to appoint a competent forester who would make it his sole duty to see that the covering which nature has afforded our mountain top should be preserved, to the end that the valley land of the Territory would be protected either from drought or flood in the years to come. The ordinary lumberman cares simply to cut and slash, and usually his only measurement of the value of a tree is, how many feet of lumber it will make and how quickly it can be converted into money. But I contend that we have a duty to posterity, and that even the mad scramble for immediate gain in which most of us are indulging should in some measure be so guided as not to inure to the positive injury of those who are to come after us, as I believe it is now doing. The American Forestry Association has prepared a bill looking to wise conservation of existing forest conditions and the increase of the tree covering of our mountains, where more or less devastation has already taken place; and I believe if every person who cares about these things throughout the country would give such support to it as their position will admit, it would tend to put into effect the best experience of other nations as well as our own, and without working a single particle of injury to any body concerned."

Other References containing Matt Riordan's comments:

The National Geographic Magazine, July-August, 1897  
"The Forests and Deserts of Arizona" Bernard E. Fersow, Ph.D.  
Chief of the Division of Forestry, U.S. Department of Agriculture

*You may want to check out the following issue of National Geographic and the accompanying map. Remember that this reference is itself twenty years old.*

*National Geographic*  
September 1982  
Letter from the Editor, Wilbur E. Garrett

"I believe the government ought to withdraw all timber lands it possesses and...appoint a competent forester who would make it his sole duty to see that the covering which nature has afforded our mountain tops should be preserved...and the time to act is the present...."

The "present" was 1893, and the authority quoted in an early National Geographic was not a John Muir or a Henry Thoreau but the president of the Arizona Lumber Company, one Denis M. Riordan, 19 years before Arizona became a state.

Now, nearly a century later, we're still concerned about our forest lands. One reason we have any left to worry about: the advice of this lumberman soon became law. When it was still considered heroic to conquer the wilderness, President Theodore Roosevelt-both an avid hunter and a pioneering conservationist-set aside 230 million acres of federal land for national parks, monuments, forest, and wildlife refuges. Also, under his administration the U.S. Forest Service was founded in July 1905.

In this issue we take a look at how well-or poorly-this controversial agency has succeeded in protecting the forests. We also study the environmental record of Roosevelt, who set aside more land than any other U.S. President. He was a land grabber to some, even today, but a farsighted idealist to most of us.

Recently, the West's "sagebrush rebellion" has challenged the legal and logical justification for withholding mineral and forest-rich federal lands from development. Today, under the Reagan Administration, the traditional sanctity of federal lands is being officially questioned.

Under the premise that you can't tell the players without a scorecard, one side of our United States map supplement to this issue presents a comprehensive look at America's federal lands and natural resources.

To quote the Arizona lumbermen further, "I believe it is the duty of every person who can give the matter thought and...influence any one's action...to make some endeavor to perpetuate our forest conditions for the benefit of future generation...."

We are those future generation, and we now face a worldwide problem of how to deal with a misused planet. More than ever, for the benefit of generation still ahead, it is important to "give the matter thought.

## Forest Facts

### Area

- The total land area of Arizona is almost 73 million acres. Roughly 27 percent or 19.4 million acres is forest land.
- Pinyon-juniper and pure juniper forest types combined occupy almost 10.9 million acres or 56 percent of the forest land.
- Forty-two percent of the forest land is administered by the USDA Forest Service, and 41 percent is private, which includes Indian Trust land. Seven percent is administered by the USDI Bureau of Land Management, 6 percent is State owned, and the remaining 4 percent is other public.
- About 9 percent of the forest land in Arizona is in reserved status.

### Biomass and Volume

- The total biomass in live trees in Arizona forests is estimated to be over 287 million tons.
- Total volume of wood in live trees in Arizona is estimated to be in excess of 15.5 billion cubic feet.
- Ponderosa pine makes up 38 percent of the total biomass and 35 percent of the total volume.

### Growth and Mortality

- Gross annual growth of all trees on forest land in Arizona totaled about 253 million cubic feet.
- Mortality reduced gross growth by almost 19 percent to about 206 million cubic feet of net annual growth.
- Ponderosa pine alone accounted for 54 percent of the net growth.

# Before Your Trip

# Occupations of the Past

**Method:**

Students list occupations found in 1904.

**Introduction:**

What was life like in 1904? How were things different then? Where did you shop? Who did you do business with? All these questions will help students generate a list of occupations and learn how those jobs have changed over the years.

**Procedure:**

1. As a class, brainstorm a list of occupations found in the Flagstaff area in 1904 when the Riordan house was built. On the list include occupations that may not exist today.
2. Discuss what each of these jobs entailed, what were the hazards involved or the perks enjoyed.
3. Research each of these occupations. Discover what it was like to do each of these jobs. Especially the ones that we do not see today.
4. Discuss how the Riordan family may have interacted with these various occupations.
5. Discuss the importance and contributions of these various occupations to the growth of Arizona.
6. Discuss how the jobs are different from the same jobs today. For example what did a homemaker have to do then vs. now.
7. Use the list as a reference for visiting the park. Some of these occupations will be mentioned while on the tour of the home. This list will also be used in the Forest Consequences and Web of Work activities.

**Conclusion:**

Ask the students how they would feel if they had to do some of the jobs listed. Would they enjoy the work? Did some jobs affect the growth Arizona more than others?

**Extensions:**

1. Research the largest private employer in your community today. Compare their numbers and incomes with the Arizona Lumber & Timber Co. See

**Topic:** historic occupations

**Grade:** 3 - 6

**Time:** 30-45 minutes

**Concept:**

Various occupations contributed a great deal to the growth of Arizona communities.

**Objective:**

Students will be able to list various occupations that were present in the past.

Students will learn how jobs have changed over the last 100 years.

**Materials:**

chalkboard  
thinking caps

**Arizona Academic Standards:**

Science  
3SC-F1, PO1  
Social Studies  
1SS-E4, PO4

the attached Extension supplement for information on the salaries of millworkers.

**Background:**

As technology changes so do careers and occupations. One hundred years ago things were much different. Ice, milk and groceries were delivered right to your door. Horses and carriages were the most popular form of transportation therefore all the jobs to take care of them were seen every day. Not so today. The mailman is probably the only delivery person you see everyday and you're more likely to need a mechanic than a blacksmith. The list below shows some of the jobs found here in Flagstaff in 1904.

**Sample List of Occupations**

lumberjacks  
mill workers  
railroad workers  
track layer  
photographers  
naturalists  
homemaker  
furniture makers  
cattlemen  
sheep herders  
clerks  
doctors  
store keepers (mercantile and saloons)  
postal workers  
stagecoach driver  
ice man  
milk man  
carpenters  
forester  
school teacher  
farrier  
wagon maker  
blacksmith  
harness and saddle maker  
cooper  
stable hand  
blacksmith  
hotel owners  
explorers, etc.

# Web of Work

## Method:

Using the model of the activity “Web of Life,” students learn about the inter-connection of jobs within a community.

## Introduction:

Most communities start and grow because of the occurrence of resources, both natural and man-made, that are necessary for an industry to succeed. In the early days, the energy, or industry, that drove the Flagstaff economy was logging. The resources that made that industry possible were the forest, the railroad, availability of water, and manpower. Entrepreneurs like the Riordan family helped to bring all these elements together and forged the basis of Flagstaff’s early economy.

We will use the occupations we learned about in the activity “Occupations of the Past” to demonstrate how the success of an industry creates jobs in a community that, at first, seem unrelated to that industry.

## Procedure:

1. After discussing the occupations that were available in the early 1900’s in Flagstaff, have each student choose one of the occupation cards.
2. Have the students stand or sit in a circle. One student will have the Arizona Lumber and Timber Company card. Starting with the AL&T student have that student decide what one thing the company needs in order to run: employees, iron rails, tools, horses, wagons, etc.
3. While holding on to one end of the string, have the AL&T student pass the ball of string to the student who represents the occupation or service chosen. Unroll the string as it is passed.
4. The student receiving the string ball will then decide which occupation is needed in order to conduct their business. Again holding on to the string, have the student pass the string ball on to that occupation.
5. Continue until every occupation has received and is holding onto the string. Try not to go to the same occupation more than once although in a real live example there would be overlapping of uses.

**Topic:** Relationship of industry to common people

**Grade:** 3-6

**Time:** one/half hour

## Concept:

Industries that rely on natural resources often provide the basis for the local economy.

## Objective:

Students will develop an understanding of the connection of an industry to the economy and how the Riordan’s interacted with various occupations.

## Materials:

- ball of yarn or twine
- a different occupation card for each student (taken from the list generated in “Occupations of the Past”) Attach a string so that it can be worn as a sign.
- A card marked “A.L.& T.

## Arizona Academic Standards:

Science Standards  
1SC-F2, PO 1, 2  
3SC-E3, PO 1, 2, 3

Social Studies Standard  
1SS-E4, PO 4

## Sources:

Adapted from the “Web of Live” PLT #45

6. Example: If AL&T decides it needs mill workers, the string will be passed to the student holding the sign “mill worker”, it could then be passed to “milkman” who could pass it to the farrier who could pass it the store keeper, etc.

**Conclusion:**

Have the students look at the web they’ve created. The string represents the money flowing through the economy.

Discuss how each occupation, although seemingly unrelated to the AL&T, benefits from the business the company created. Discuss what would happen if the AL&T went out of business. What other jobs would have been available for those mill workers in the Flagstaff area during that time? Were there other major businesses that would also be contributing to the economy? Can the students think of examples here in Arizona when a major business collapsed and the community collapsed as well? (mining - ghost town)

**Extensions:**

1. The students could repeat the process having completely different connections.

2. Have the students pull lightly on the string creating tension. Starting with AL&T have that student tug gently on the string. When someone feels a tug on the string they are to respond by gently tugging the string as well. The tug should be felt traveling throughout the web. They will be feeling the connection or energy that fueled the economy.

Now have the students repeat the process. Starting with the AL&T card have the student drop the string. This time when they feel the string go slack they are to drop the string. They can now see how the collapse of a major industry can impact the whole community.

# A Forest of Many Uses

## Method:

Students brainstorm forest uses by dividing them into categories and discuss how resources can be managed for everyone's benefit.

## Introduction:

Explain to students that forests have many uses for people and that they will be grouping those uses into categories. They will then try to decide on how to manage a forest to meet all those needs.

## Procedure:

1. Ask students to think of what they use, or how they benefit from forests. Have them put the list on a piece of paper.
2. Ask students to name animals that live in forests, and record their answers on a chalkboard under the heading "Wildlife".
3. Ask students in which kinds of recreational activities they or their families have participated in forests. Record their answers under the heading "Recreation." Ask students what needs are satisfied by each activity listed, e.g. exercise, solitude or fun.
4. Have students list products that people get from forests and record their answers under the heading "Products." (Be sure to add oil, natural gas, and minerals to the list because they are also extracted from forestlands.) What needs are satisfied by each product on the list.
5. Explain that forests may be managed with an emphasis on different needs. Or, if possible, one forest can be managed to meet all of the needs above.
6. Divide students into teams. Have them pretend they are forest managers and need to manage a forest for wildlife. What strategies would they use to promote wildlife? What would wildlife need to survive in the forest? Have each team share its ideas and record them on the chalkboard in a column next to "Wildlife"
7. Then have the teams manage the forest for recreation. What types of activities might go on in the forest: What would the manager need to provide for these activities? (e.g. trails, roads, parking, restrooms, campgrounds,

**Topic:** forest uses

**Grade:** 3 - 6

**Time:** 50 minutes

## Concept:

Forests are a natural resource that are used by people in a variety of ways and can be managed so that these uses balance with each other.

## Objective:

Students will be able to name ways people use forest resources and explain that forests are managed to satisfy a variety of human needs.

## Materials:

Chalkboard

**Variation:** Pictures of various forest animals, forest-related activities and products.

Resources: USFS poster on forest products; nature, outdoor or tourist magazines; pictures of paper and wood products, oil rig, gas station, or car, mines, or metal objects.

## Arizona Academic

### Standards:

Science

1SC-F4, PO 1, PO 2

3SC-F3, PO 1, PO 2

3SC-E1, PO 1

3SC-E3, PO 1, PO 2, PO 3

3SC-E4, PO 1

## Source:

PTL activity #32

"A Forest of Many Uses"

Related Activity: PLT #69

"A Forest for the Trees"

picnic areas) Again have them share their ideas on the chalkboard next to "Recreation"

8. Finally have the teams manage for products. What things would they need to consider to manage the forest in this way? Which resources will be removed from the forest, how will they be taken out, and what will be needed so the resources can be removed? Have them record their ideas on the chalkboard in a column next to "Products."

9. Explain that, in many cases, forests today are managed for more than one use at a time. Have your students look at the lists they created and ask them these questions.

- Which activities listed can go on at the same time in the same forests?
- Which activities on the list might conflict with one another if someone tried to manage both at the same time?
- Would those activities always conflict or conflict only at certain times and under certain conditions?

Note – as a time saving alternative for steps 6 – 8 divide your group into three teams and have each brainstorm a list of ideas for one category.

### **Conclusion:**

Forests are managed for a variety of uses often at the same time. This is called multiple use management. Some activities may conflict with each other creating controversy over forestland use.

### **Extensions:**

1. Have students post pictures that have been collected of various forest uses in the proper categories listed above.
2. Explain that there are people who manage forests so that the forest can provide homes for wildlife and people, recreation places for people, and products people need and want.
3. Ask students to identify activities listed on the board that might go on in a forest at the same time. People may hike through a forest where animals are living. People may reach camping areas by driving on the same roads used for logging. Some animal species do well in forests that have been opened up by logging.

**Background:**

The United States has 731 million acres of forestland that make up about one-third of the total land base. To be classified as forestland, the area must be at least one acre and contain about 10 percent tree cover. About 487 million acres or two-thirds of U.S. forestlands are also classified as commercial timberland. In the United States, commercial timberlands are owned by three sectors of society: private individuals own 57 percent, public agencies own 28 percent, and forest industries own 15 percent. To varying degrees, those forests are managed to provide several resources at the same time, such as timber, wildlife habitat, and recreational areas. This strategy is called multiple use management.

Law mandates that the U.S. Forest Service will manage its commercial forests for multiple use. Although the Forest Service manages 142 million acres of national forests, timber harvesting is allowed on only 57 million acres. Those forests are also managed to protect watersheds, conserve soil, protect wildlife habitat, and provide public recreation.

Private forests are also managed for multiple use. For example, forests owned by a forest product company can be used for hiking, fishing, and camping while being managed for timber production and ecosystem protection as well.

Multiple use management involves making choices about the types of activities that can take place in particular areas. Some forest ecosystems can not support certain activities, and certain activities cannot take place in the same area at the same time. For example, few people would want to hike alongside a strip mine or camp next to a logging operation. Loggers would have a tough time doing their jobs if people using off-road vehicles were driving through an area where they worked. And protecting a watershed or a commercial fishery might mean carefully planning other activities such as road building or mining.

# The Way It Was

**Method:**

Students discuss changes in our community by looking at historic photographs.

**Introduction:**

Ask students if they've noticed any changes in their neighborhood recently. For example have any new developments or schools been built? Has any land been put aside as a park or wildlife area?

**Procedure:**

1. Ask students how changes in the community make them feel. Discuss the pros and cons of how those developments affect people and communities. Talk about how such changes might affect wild animals and plants in the area.
2. Show students the old pictures of your town. Have students identify each photo's location and describe what the site looks like now. Photocopy photos and create a display to share.
3. Have the students write about how the changes make them feel and if they feel the changes are beneficial or harmful to the community and their families.

**Conclusion:**

Ask students how they feel about the growth of their town? Do they feel it is good or bad? Do they think there should be changes made in where or how the town is growing?

**Extensions:**

1. Tell students to imagine they have traveled into the future. Have them write stories about how their community might be different 25, 50, or 100 years from now.
2. Take the Flagstaff Historic Walk by Richard and Sherry Magnum. The book is available in the Flagstaff Public Library.
3. Try Project Learning Tree activities #91 In the Good Old Days or #95 Did You Notice.
4. Brainstorm with the group to list areas in the community that have more or less been left in their natural states, for example, parks, wildlife sanctuaries,

**Topic:** Flagstaff history and change in the community

**Grade:** 4-6

**Time:** 45min - 1 hour

**Concept:**

The quantity and quality of resources and their use-or misuse- by humans affects the standard of living of societies

**Objective:**

Students will describe the social and environmental changes in their area over the past 100 years and discuss the positive and negatives of the changes.

**Materials:**

historic pictures of your town

**Arizona Academic Standards:**

Science

1SC-E1, PO 2

6SC-E4, PO 1, 2

Social Studies

1SS-E1, PO 2

**Source:**

Adapted from Project Learning Tree Learning Activity #40 Then and Now

or private holdings. Then assign the students into small groups and have each group choose one area from the list. Have the groups research the area to find out the following information:

- What is the history of the area?
- Why has the area not been developed?
- Who lives in or used the area (including wildlife)?
- Are there plans to change the area in any way?

Have members of each group prepare and present a report about their natural area.

### **Background:**

It has been said that change is really the only constant in the universe. Change is all around us - sometimes we notice it, and sometimes we do not. One pattern of change is the 24-hour day. The Earth rotates on its axis, causing the cycle we know as day and night. Small changes in the rotation and the tilt of the Earth cause changes in the length of the day and night throughout the seasons, but these, too, are predictable.

Some changes happen fast, such as a tree falling in a storm. Others happen so slowly, like the slow washing of mountains into the sea, that we are hardly aware of them. Some changes are noticeable through patient observation, like the movement of the tide. Some systems are so complex, like a forest, that we hardly notice when changes take place.

One example of change in your community could be transportation systems. Today you move around in cars, trains, buses, on bicycles, and on foot. Just 50 or 60 years ago, you probably would have observed a lot more people riding bikes and walking, and not as many cars. A hundred years ago, people probably walked, rode on horses, or drove in horse-drawn carriages - things we seldom see today. The challenge is to be aware and notice changes as they happen, and then to look back to identify patterns.

History is a record of changes, be it the history of a tree, forest, society, or nation. Humans have been recording the history of people, places, and things for thousands of years; much of this information can be found in

libraries and museums. Historians can be helpful in tracing the changes over time. Historical information may be stories in books, photographs, movies, computer records, government documents, or a person's memory.

### **Vocabulary**

historian – a person who studies and records history

community - an interacting population of various kinds of individuals in a common location.

### **Sources for Historic Pictures:**

For Flagstaff:

*The Flagstaff Album Flagstaff's First 50 Years in Photographs 1876-1926* and *Flagstaff Past and Present* both by Richard K. Mangum and Sherry G. Mangum are excellent sources. These books are available at the Flagstaff Public Library.

Pictures can also be found online through the NAU special collections library ([www.nau.edu/library/speccol/kids/kids1.html](http://www.nau.edu/library/speccol/kids/kids1.html)).

For other Cities:

Check your local library, museum, or historic society for pictures of your town.



# **Your Field Trip at the Park**

# Life Then and Now

## **Method:**

Students go on ranger led tour of Riordan Mansion to see the family's home and learn about their lifestyle as well as how they impacted Flagstaff and Northern Arizona. Students will also learn about occupations in Flagstaff (lumbermen, millworks, photographers, iceman, and household servants), and issues in the early 1900s.

## **Introduction:**

The guided tour will compare and contrast what life was like in 1904. Talk about types of houses that people lived in, what "modern conveniences" they had, what daily chores were like, and what they did for entertainment. They will also learn how the family contributed to the community through their business, employment, religious and social influence.

## **Procedure:**

1. Get to Riordan at least 15 minutes BEFORE your tour is scheduled to start.
2. Divide up into 2 groups (if you have more than 15 people). There must be 1 or 2 adults in each group.
3. One group will start their tour first with a guide and a few minutes later the other group will start with another guide.
4. Inform students (before arriving at the park) that they have to stay on the red carpet at all times and they are not allowed to touch anything in the house.

## **Conclusion:**

What did they like the best about the tour? Ask the students how their life is different then their life would have been in the early 1900s.

## **Extensions:**

See pictures online through the NAU special collections library to see how people lived in Flagstaff in the early 1900s ([www.nau.edu/library/speccol/kids/kids1.html](http://www.nau.edu/library/speccol/kids/kids1.html)).

## **Background:**

Life has changed dramatically in the last 100 years. We are used to many modern conveniences that did not exist then. Today many occupations are no longer necessary because of advances in technology. The lumber industry in Flagstaff, as well as the wealth and technology it brought, contributed to employment opportunities in the community.

**Topic:** Social Studies

**Grade:** 3-6

**Time:** one hour

## **Concept:**

What the life of a child was like in 1904 versus today.

## **Objective:**

Students will develop an understanding of what life was like for the Riordan children and how they interacted with various occupations.

## **Materials:**

students full attention.

## **Arizona Academic Standards:**

Social Studies Standard  
1SS-E4, PO 3, 4  
1SS-F3, PO 1, 2, 3

## **Sources:**

Samantha's World in 1904,  
What Was it Like to Live 100  
Years Ago?

Flagstaff's First 50 Years in  
Photographs 1876- 1926,  
Floyd Clymer's Historical  
Scrapbook

Riordan family papers

# Tree Ring - Timeline

**Method:**

Students draw a tree ring timeline of the lives of the Riordan family or of their own lives.

**Introduction:**

Each year a tree adds a ring of new wood around its trunk as it grows. Starting from the center and moving out towards the bark, each ring represents one year's growth. Each ring consists of a light and a dark section. The light section, or early wood, is the fast growth of the spring. The dark section, or late wood, shows where the tree's growth has slowed during the fall and winter. Growth rings differ with the environmental conditions during the life of the tree.

Trees can tell us the natural history of an area through their growth rings. If we know the year the tree died, or was cut, we can count back on the rings to find dates in the past. We will be getting dates from a tree cookie (cross-section) cut from a tree that died in the park in 2001. We have marked special dates in the stump. We will be counting rings to find importance dates to you, Flagstaff and to the Riordan family.

**Procedure:**

1. As you walk up the pathway from the parking lot to the visitor center you will see the stump from the tree cut January 25, 2002. Look for the dark and light rings that show each year's growth. We have marked special dates on the stump. (If weather is inclement, there is a cookie from the same tree located in the visitor center.)
2. If you were born before the year 2001, find the ring that marks your birth year. If you know when one of your parents was born, find the ring that marks that year.
3. Find the ring that marks the year the Riordan Mansion was built. What year was that and how old is the house now? How old was the tree when the house was built?
4. Find the ring that marks the year the mill was purchased by the Riordan's and the year they sold it. How long did they own and operate the mill?

**Topic:** Social Studies

**Grade:** 3

**Time:** one/half hour

**Concept:**

Past environmental conditions can be seen in the growth rings of trees. We can also indicate cultural events on a tree cookie timeline.

**Objective:**

Students will make a timeline of their life that coincides with a tree's rings

**Materials:**

- inexpensive paper plates
- crayons or pencils
- worksheet

**Arizona Academic****Standards:**

Science Standard  
1SC-F2, PO 1, 2

Math Standards  
1M-F3, PO 8  
2M-F1, PO 2  
2M-F2, PO 1

**Extension:**

SC-F3. PO 3, 4

**Sources:**

PLT #76

5. Was the tree alive during the Civil War?
6. Find how old the tree was when it died? A ponderosa pine can be 150 years old when it matures and can live for 600 years. Why do you think this tree died? Do you think it died from old age or from some other reason?
7. Now we will make our own life story in tree rings. Take a paper plate and mark the center with a small, solid circle. This represents the center of your tree ring cookie and the year you were born. The outside bumpy edge of the plate is the bark of your tree. Make a large ring just inside the smooth edge of the plate. This ring marks this year. Label one or both of these rings with the year. Now make a ring for every year of your life. (Remember that you already have two years marked: when you were born and this year.) You should have the same number of rings when you are finished as you are old.
8. Think of some significant things that have happened to you during your life. When you learned to walk, started school, learned to ride a bike, etc. Did you move to a new home? Take a special vacation? Did you break an arm? Win an award? Any thing that is special to you. With a different color marker, label those special events on your tree ring. You will need to know how old you were or the year of the event. You now have your very own timeline in rings.

### **Conclusion:**

Look at other students' life rings. How old were they when a special event happened in their lives? Discuss how this timeline could be used to show other people special events in your life.

Did the tree rings make it easier to see the history of the Riordan Mansion? Discuss how the tree ring timeline or any timeline can help us to understand events in history.

### **Extensions:**

On your plate mark the names of the layers that make up the living functions of the tree: the bark, phloem, cambium, xylem or sapwood, and the heartwood. (See PLT Activity #63 – Tree Factory)

2) Research the life cycle of the ponderosa pine. Find out the forest conditions it needs to germinate, grow and reproduce. Find out how long it can live and what it needs to survive. Find out if there are any plants or

animals that depend on this tree for their survival or if there are other plants or animals that the pine needs to survive. Find out what the relationship is between the tree and fire in the forest.

### **Background:**

By counting a tree's growth rings, you can tell its age. Every growth season, a tree adds a new layer of wood to its trunk. Each ring has two parts: a wide, light part called early wood and a narrow, dark ring called late wood. Early wood grows during the wet, spring growing season. During the dryer summer, fall and winter, growth slows and the late wood forms.

The rings provide clues about the climate of an area over time and evidence of disturbances to and around the tree, such as fire or draught. The shape and width of the annual rings often differ from year to year because of varying annual growth conditions. Scientists have found that they can learn about past climates by studying the ring patterns of very old trees. The study of tree time is called dendrochronology.

### **Vocabulary:**

bark – the outer protective layer of a tree

cambium – (KAM-bee-uhm) a very thin layer of growing tissue, makes cells that become new xylem, phloem, or cambium

dendrochronology – the science of dating events and variations in the environment in former periods by comparative study of growth rings in trees and aged wood

heartwood – the central core of the tree, is made up of dense dead wood, and provides strength for the tree

phloem – (FLOW-uhm) also called the inner bark, carries sap and nutrients from the leaves to the rest of the tree

sapwood – also called the xylem (ZEYE-luhm), brings water and nutrients up fro the roots to the leaves

timeline – a graph that indicates events in chronological order

tree cookie – a cross-section cut through the diameter of a tree

# Tree Ring - Timeline

Find the ring that marks the year the Riordan Mansion was built.  
What year was that and how old is the house now?

The year now \_\_\_\_\_  
subtract

The year the Mansion was built - \_\_\_\_\_

The age of the Mansion \_\_\_\_\_

How old was the tree when the house was built? \_\_\_\_\_  
(count the rings back from when the house was built)

Find the ring that marks the year the mill was purchased by the Riordan's  
and the year they sold it. How long did they own and operate the mill?

Year purchased \_\_\_\_\_ Year sold \_\_\_\_\_

How long did they own the mill? \_\_\_\_\_

Was the tree alive during the Civil War? \_\_\_\_\_

Find how old the tree was when it died? \_\_\_\_\_

A ponderosa pine can be 150 years old when it matures  
and can live for 800 years. Why do you think this tree died?  
Do you think it died from old age or some other reason?

# Once Upon a Time

**Method:**

Students gather data by reading the various information panels in the visitor center. Then use the dates to create a timeline for Flagstaff's early years.

**Introduction:**

The staff at Riordan Mansion State Historic Park has spent years researching family letters and other documents in order to present the information to the public in a readable format. Students will use the interpretive displays in the visitor center to gather information and dates for a time line of the Riordan family history will to get a feel for how a historian must do a lot of reading to research a subject.

**Procedure:**

1. Find the dates of the following events by reading the information panels and displays in the visitor center.
2. Add these dates to the timeline worksheet.

**Conclusion:**

Ask students how it felt to search for the dates. Historians spend every day sorting through data to find the information they need. Did the timeline help them relate to what was happening in the world when the Riordan's children were growing up?

**Extensions:**

1. Do the "Once Upon a Time" math page.
2. Students can create a timeline for their life or their parents and compare it to state and national events.
3. Students can draw or find pictures for their timeline.
4. Visit NAU Special Collection Library online to see more of the Riordan family's papers.

**Background:**

The Riordan Mansion State Park was acquired from the family in 1980. Their donation included all the items in the house and approximately 10,000 documents belonging to Timothy Riordan. Michael's collection was donated to the Arizona Historical Society Northern Arizona Division. Many years have been spent sorting those documents and putting them in a usable format.

**Topic:** Riordan timeline

**Grade:** 4-6

**Time:** 1 hour

**Concept:**

Identifying information sources the historians use to understand the past.

Timelines help us organize dates into a usable and readable format

**Objective:**

Place key events of the Riordan's and Flagstaff on a timeline.

**Materials:**

- *pen or pencil*
- *"Once Upon a Time" student activity sheet*
- *paper and diagram for drawing timeline*

*Extension 1:*

- **"Once Upon a Time" math activity sheet**

**Arizona Academic Standards:**

Social Studies Essentials  
1SS-E1,PO 1, 2

The park staff and volunteers are still working on Timothy's collection, Michael's is available to the public at the NAU Special Collections Library.

**Vocabulary:**

timeline – a graph depicting events in chronological order along a line.

**Answer Keys:**

Dates for Once Upon a Time

- |         |          |
|---------|----------|
| 1. 1882 | 10. 1903 |
| 2. 1884 | 11. 1908 |
| 3. 1887 | 12. 1884 |
| 4. 1889 | 13. 1878 |
| 5. 1890 | 14. 1885 |
| 6. 1897 | 15. 1892 |
| 7. 1887 | 16. 1886 |
| 8. 1908 | 17. 1889 |
| 9. 1904 | 18. 1904 |

**Extension:**

Math Answers:

- |                    |                          |
|--------------------|--------------------------|
| 1. $1884-1848=36$  | 11. $1904-1901=3$        |
| 2. $1886-1858=28$  | 12. $1930-1901=29$       |
| 3. $1886-1865=21$  | 13. Yes                  |
| 4. $1889-1858=31$  | 14. $1912-1896=16$       |
| 5. $1889-1865=24$  | 15. Current year-1904    |
| 6. $1892-1865=27$  | 16. $1887-1848=39$       |
| 7. $1892-1868=24$  | 17. $1933-1887=46$       |
| 8. Timothy, 88     | 18. $1912-1882=30$       |
| 9. 2, Mary, Victor | 19. Richard 1980-1907=73 |
| 10. $1901-1890=11$ | 20. $1904-1890=14$       |

# Once Upon a Time

By reading the information panels and displays in the visitor center find the dates of the following events. You may need to do math to find several dates. After finding all the dates, place the dates on the timeline.

1. Ayer Lumber Company begins operating in Flagstaff \_\_\_\_\_
2. Matt Riordan becomes general manager of the Ayer Lumber Company \_\_\_\_\_
3. Arizona Lumber Company is created \_\_\_\_\_
4. The Central Arizona Railway is formed \_\_\_\_\_
5. Arizona Lumber Company becomes Arizona Lumber and Timber Company \_\_\_\_\_
6. Matt Riordan sells his shares to his brothers and Fred Sisson \_\_\_\_\_
7. Michael Riordan writes letter to Bishop asking for a church \_\_\_\_\_
8. Fred Sisson's house becomes Milton Hospital \_\_\_\_\_
9. The Arizona Lumber and Timber Company brings Dr. Raymond to Flagstaff \_\_\_\_\_
10. The dam is built to create Lake Mary \_\_\_\_\_
11. The first United States Forest Service Experimental Station is established \_\_\_\_\_
12. Matt Riordan arrives in Flagstaff \_\_\_\_\_
13. Matt Riordan marries Celiné Beer \_\_\_\_\_
14. Michael Riordan arrives in Flagstaff \_\_\_\_\_
15. Michael Riordan marries Elizabeth Metz \_\_\_\_\_
16. Timothy Riordan arrives in Flagstaff \_\_\_\_\_
17. Timothy Riordan marries Caroline Metz \_\_\_\_\_
18. Timothy and Michael move their families into the Riordan Mansion \_\_\_\_\_

# Once Upon a Time Math

Below is a list of the year of birth and death for the Timothy and Michael's wives and children. Use these dates and those on your completed timeline to answer the following questions.

Example: How old was Timothy when he died?

Year of death take away the year of his birth,  $1946 - 1858 = 88$

	Year of birth/Year of death
Denis Matthew (Matt) Riordan	1848 / 1928
Timothy Riordan	1858 / 1946
Michael Riordan	1865 / 1930
Caroline Metz Riordan (Timothy's wife)	1865 / 1943
Mary Riordan Chambers	1890 / 1971
Anna Riordan	1901 / 1927
Elizabeth Metz Riordan (Michael's wife)	1868 / 1954
Victor Riordan	1893 / 1894
Blanche Riordan Chambers	1896 / 1985
Arthur Riordan	1897 / 1927
Clare Riordan Quirke	1901 / 1992
Robert Riordan	1904 / 1937
Richard Riordan	1907 / 1980

How old was each brother when they came to Arizona?

1. Matt? \_\_\_\_\_
2. Timothy? \_\_\_\_\_
3. Michael? \_\_\_\_\_
4. How old was Timothy when he married Caroline Metz? \_\_\_\_\_
5. How old was Caroline when she married Timothy? \_\_\_\_\_
6. How old was Michael when he married Elizabeth Metz? \_\_\_\_\_
7. How old was Elizabeth when she married Michael? \_\_\_\_\_
8. Which brother lived the longest? \_\_\_\_\_
9. How many of the children had been born by the time Flagstaff became a town? \_\_\_\_\_
10. What is the age difference between Timothy's daughter's Mary and Anna? \_\_\_\_\_
11. How old was Anna when the house was built? \_\_\_\_\_
12. How old was Clare when the Great Depression began? \_\_\_\_\_
13. Was Anna legally able to vote during her lifetime? \_\_\_\_\_
14. How old was Blanche when Arizona became a state? \_\_\_\_\_
15. How old is the house? \_\_\_\_\_
16. How old was Matt when he purchased the Ayer Lumber Company? \_\_\_\_\_
17. How many years did the Riordan's own the Lumber Company? \_\_\_\_\_
18. How many years had the railroad been in Flagstaff before Arizona became a state? \_\_\_\_\_
19. Which of the Michael's boys lived the longest? \_\_\_\_\_
20. How old was Mary when her father built the lake and named it after her? \_\_\_\_\_

# West Wing

The West Wing of the Riordan Mansion was the home of Michael Riordan and his family. Michael and Timothy were brothers. Michael's wife, Elizabeth, was the sister of Timothy's wife, Caroline. The two brothers built their homes in 1904. The families shared a connecting room between the homes called the ballroom.

The East Wing, Timothy's family home, can only be seen on a guided tour. If you visit both sides of the mansion, you can see how the two homes were similar.

In the West Wing we have exhibits that tell you the story of the importance of the family to the growth of the community of Flagstaff. Here are some things to think about as you visit the exhibit.

We titled this exhibit :

*"Logs to Legacy"*

(legacy – something handed down from the past)

What do you think this title means?

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*"From Nature's Wealth"*

The displays in Michael's office tell of the history of the sawmill. You can see actual tools used by loggers and lumbermen.

What does the title of this display mean to you?

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Check out the tools that the loggers used.

Which of these tools have not really changed all that much over the past century?

Which tools have changed a great deal?

Being a lumberjack was dangerous work. Do you think that loggers today are safer in doing their jobs than those who worked here 100 years ago? Why?

Read the poem that Michael wrote about the ponderosa pine.

# Outside the House

Think about the answers to these questions. Discuss them later with your class.

1. When you are in the visitor center you are actually in the families' garage. While you are in the visitor center look for photos of the lumber mill and the workers. Find a picture of the house. Look closely at the trees surrounding the house. Do the surrounding grounds look the same today? What is different?

2. As you walk outside down the sidewalk toward the house you are looking at the back doors. Turn RIGHT onto the sidewalk that goes around the house.

3. Near the back right corner of the house is a ponderosa pine tree. Which do you think is older, the house or the tree? Get close and smell the bark of the tree. What does it smell like?

4. As you walk around the house you will see logging wheels in the direction of the park entrance gate. Walk up to the wheels and stand next to one. Which is taller; you or the wheel? How were the logs carried with these wheels?

5. Returning to the path and the front of the house, you will find large blocks of stone and some posts. What were these used for?

6. Remember the photo of the Mansion you saw in the visitor center and try to imagine riding up to the front of the house to visit the Riordans. Are the trees around the house the same as in the photo?

Almost none of the buildings you see around the park today were here when the house was built. Look to the west toward Mars Hill. That is where the mill was located. The mill was at the base of the hill and the house was built on a knoll. Between them, a small community named Mill Town was home to many of the Riordan's employees. This community had a mercantile, a hospital and other necessary services. Most of the businesses were located in nearby Flagstaff next to the train station. Do you think the railroad was important to the people living in Flagstaff at that time? Why?

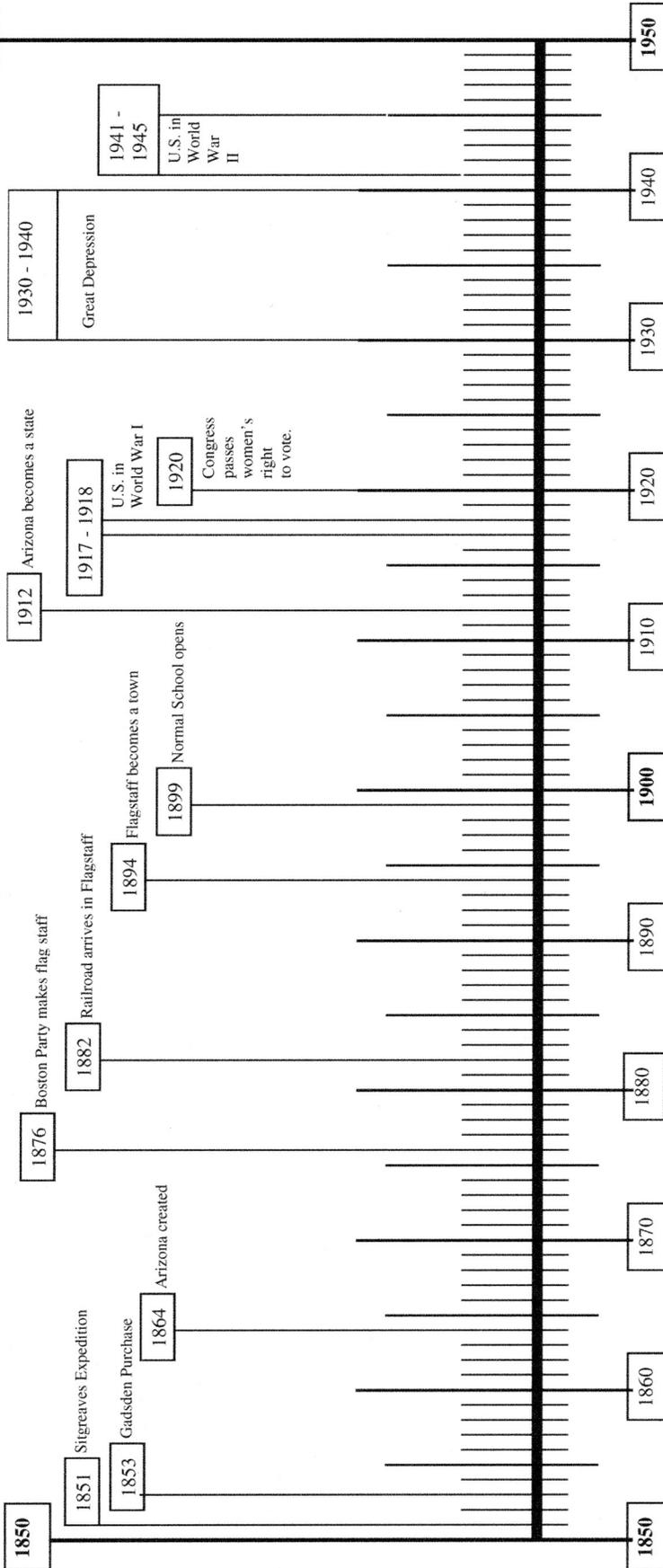
7. Continue walking around to the west side of the Mansion. In the rock garden is a fountain. Look carefully and you will see many animals carved into the rocks. Do you think these are animals found around here? The figures were carved by Mexican stone masons. Does this give you a clue as to where some of these animals might be found?

8. Back in the back yard, look toward the garage. (visitor center) On both sides of the sidewalk are two goal-shaped poles. They're not to do chin-ups on. Can you figure out what they were used for? Look on the front corners of the garage. Do you see two more poles sticking out from the building? Heavy cord was strung from these poles to the cross pieces of the goal-shaped poles. People still use these today. Now do you know what they are?

“Once Upon A Time”

Timeline

Each short line on the scale represents one year. The longer lines show five years' time. The decades are marked with heavy lines and the date in boxes.  
 This timeline spans one hundred years from 1850 to 1950.



Attach another piece of paper along this edge and continue the date lines. Add the events and dates you find for the Riordan family on the visitor center panels. You may use boxes showing the number of the question.

# Logging's "Big Wheels"



## Michigan Logging Wheels

Invented by Michigan lumberman Syllas C. Overpack, "high wheels" were first introduced to the forests of Northern Arizona in 1883. These nine-foot tall wheels adapted easily to the relatively flat terrain and proved more effective than logging wagons to move the heavy timber.

Logs were stripped, cut to length, dragged and stacked in a process known as "bunching." The high wheels were backed over the logs and the team unhitched. The "Johnson board," a heavy plank hinged to the tongue, rested on the axle and extended eight feet to the rear. By walking out onto the board the tongue could be raised upright.

Chains wrapped around the logs were then attached to the axle. The team pulled the tongue down, turning the axle that wound up the chain lifting the front of the load off the ground. The tongue and logs would be secured together and the team re-hitched. The logs were now ready to be "skidded" to a collection point where they were loaded on railcars for the journey to the mill.

# **After Your Trip**

# Forest for the Trees

## Method:

Students role-play managing a tree farm and will begin to understand the economic factors that influence management decisions for private forestlands.

## Introduction:

Ask students for the definition of a tree farm. Explain that a tree farm is a forest ecosystem that provides many valuable products. They will be acting out the role of trees in a tree farm that you own and manage.

## Procedure:

1. Divide your group into about five rows of roughly equal numbers. Prepare three signs that read FIREWOOD, PULP, and LUMBER.
2. Place students in rows. Tell them that they are now tree seedlings. You have planted them on a barren piece of land that you own. You want this land to be a productive tree farm, so you call the State Forest Service for advice. They recommend planting pine trees. They also help you develop a long-range management plan for your land.
3. Tell the trees that they have now been growing for 15 years, and they need to be thinned so they can continue to grow quickly. If they are not thinned, they will become crowded and compete for food, water and sunlight. Such competition will stunt their growth and make them more susceptible to insects and disease.
4. For this thinning, you will remove native hardwood trees such as oak or juniper that have occurred naturally in your pine plantation. These trees will be used for firewood. Place a FIREWOOD sign around one student's neck and have him or her stand to one side where the others can see. You will also need to cut some pine trees during this thinning. They will be grouped behind another student standing to the side wearing a PAPER sign (because pine trees will be turned into pulp for making paper for books, boxes, tissues, etc.) You should remove approximately every other tree during this initial thinning operation. You can designate these trees as

**Topic:** Forest Uses

**Grade:** 3 - 6

**Time:** 50 minutes

## Concept:

Conservation and management technologies, when appropriately applied to the use or preservation of natural resources, can enhance and extend the usefulness of the resources as well as the quality of the environment.

## Objective:

Students will be able to name ways forests are managed.

## Materials:

- Three signs: FIREWOOD, PULP and LUMBER

## Arizona Academic Standards:

Science

3SC-F4, PO 1, PO 2

3SC-E1, PO 1, PO 2

3SC-E4, PO 1

## Source:

modified from

PLT #69

"A Forest for the Trees"

## The Riordan

### Connection:

The Riordan brothers were instrumental in bringing the Forest Service Reserve System to northern Arizona. (See "Logging on Government Land" section of background.)

firewood or paper and have them stand behind the respective signs.

5. Tell the remaining students that they have now grown for another 10 years and need to be thinned again. This time you will harvest every other pine tree for paper. This thinning will enable the remaining trees to continue growing at the maximum rate. All trees that are cut down will join the others already behind the PAPER sign.
6. After growing another 15 years, the remaining trees will be as big as they will probably get. If left as they are, they may be attacked by insects, infected by disease, or destroyed by wildfire. If any of these things happen, the trees will lose most if not all, of their value as timber. You have decided to harvest all remaining trees for lumber. Place the LUMBER sign on one student and begin to remove all remaining trees. When all trees have been removed, explain that you will replant the land with several trees for every one that you removed in the final harvest. You may also opt to leave some seed trees standing for natural regeneration.
7. Line up all the trees in the same rows as the beginning and ask them what natural events could drastically change the forest. (wildfire, insect infestation, plant disease)) Discuss students' answers. Pretend you are a wildfire roaring through the forest and destroying the trees (all students sit down) Discuss the results: wildlife is homeless, soil is charred, streams are choked with sediment and ash, valuable timber is lost. Explain that although you are very upset, fire is a natural, and sometimes vital, part of the forest lifecycle. The forest will return through natural regeneration and planting.

**Extension:**

1. Divide students into forest management teams of three or four. Give each team a copy of the student page. Review this information with students to make sure they understand the forestry teams.
2. Tell each team they will lead the group through the same type of simulation they did in the activity only they will make all management decisions. Give teams time to plan a strategy for managing a forest in which students are the trees. They can choose one of the silvicultural systems described on the student

page, can use a combination of systems, or can make up their own system. What ever they choose to do, they must explain each action they take.

3. Allow time for each team to lead the entire group through a simulation

### **Conclusion:**

Forests are managed using a variety of techniques. The scientific study and application of these techniques is called silviculture.

### **Background:**

The United States has 731 million acres of forestland that make up about one-third of the total land base. To be classified as forestland, the area must be at least one acre and contain about 10 percent tree cover. About 487 million acres or two-thirds of U.S. forestlands are also classified as commercial timberland. In the United States, commercial timberlands are owned by three sectors of society: private individuals own 57 percent, public agencies own 28 percent, and forest industries own 15 percent. Timberlands that are owned and managed by private individuals are often referred to as tree farms.

Tree farms are forests that are managed to grow trees for wood products such as paper and lumber. Like other forests, tree farms not only produce forest commodities, but also provide homes for wildlife, produce oxygen, reduce soil erosion, help protect water quality, and offer recreation area. Although tree farmers often have different goals for managing their lands, most have one thing in common: they want to manage their forests in an aesthetically pleasing and ecologically sound way, while growing trees for forest products.

Silviculture is the practice of establishing and managing a forest to best meet the objectives of the owner. Tree farmers apply silvicultural techniques to maintain and enhance their forestland. In doing so they can control forest composition, structure, and growth. Through harvesting, cutting, thinning, prescribed burning and various other methods, a tree farmer can manipulate the variety and age to tree species within a forest, the density of trees, the arrangement of different layers or stories of vegetation and lighting and shading. Even

before a forest mature, tree farmers must consider how the next forest will be regenerated and managed. The management techniques a tree farmer applies to his or her land not only affect the present forest but also influence its future characteristics.

**Vocabulary:**

Prescribed burning – the planned application of fire to a forest, stand, prairie, or slash pile with the intent to confine the burning to a predetermined area.

Silviculture - the science and art of cultivating forest crops based on the study of the life history and general characteristics of forest trees.

Thinning – to reduce the number of trees in a stand.

Timber – a forest stand containing trees of commercial size and quality suitable for sawing into lumber.

Timberland – forests that are capable of growing 20 cubic feet per acre per year of commercial wood.

# Forest for the Trees

## Forest Silvicultural Systems

Silviculture is the practice of growing and managing forests to control their composition, structure, and growth.

Forests are managed in smaller units called stands. A stand is a group of trees similar enough in species composition, condition, and age distribution to be considered a unit. Stands may be even-aged (trees are of relatively the same age) or uneven-aged.

A forest manager can choose among several systems of silviculture to harvest and grow new trees within a forest stand. These include the clear-cutting, seed-tree, shelterwood, single tree and group selection systems.

### The clear-cutting System

All trees in a stand are harvested at once, with the expectation that a new, even-aged stand becomes established. The clear-cut system works well for establishing trees that grow best in full sunlight. The new stand may develop by seeds from nearby stands, from seeds stored in the forest floor, or from stump or root sprouts of cut trees. In other cases, a clear-cut area is regenerated by scattering seeds or by planting seedlings.

### The seed-tree System

This system requires leaving a few good seed-producing trees on each stand when mature the stand is harvested. These trees provide the seeds needed to regenerate a new, even-aged stand. The seed trees are sometimes harvested after a crop of new, young trees has become established.

### **The shelterwood System**

The shelterwood system involves a series of partial cuttings over a period of years in the mature stand. Early cuttings improve the vigor and speed production of remaining trees and prepare the site for new seedlings. The remaining trees produce seeds and shelter young seedlings. Later, cutting will harvest shelterwood trees and allow regeneration to develop as an even-aged stand.

### **The single-tree selection System**

This system differs from the other system by creating and maintaining an uneven-aged stand. Foresters examine a stand and judge each tree on its individual merit. Trees are harvested as they mature. Seedlings or sprouts grow in the spaces created. Periodic thinning and harvesting results in a stand that contains trees of many ages and sizes. Because relatively few trees are harvested at any one time, and because the forest floor is generally shaded, this system favors species that thrive in low light.

### **The group selection System**

The group selection system requires harvest of small groups rather than individual trees the openings created resemble miniature clear-cuts, with the major difference being that the resulting regeneration occupies too small an area to be considered an even-aged stand. As in the single-tree system, both thinning and harvest cuttings are done at the same time. The new trees that grow in these small openings are regarded as parts of a larger stand containing trees of many ages. In either single-tree or group selection systems, frequent harvests are needed to maintain a balance of tree ages, classes, and

# Forest Consequences

## Method:

Students role-play a city council meeting to determine the use of donated land.

## Introduction:

City council members have a big job in making decisions for their town. These meetings allow them the opportunity to hear the concerns of the citizens in their community.

## Procedure:

1. Provide copies of the background information on logging from the introduction of this curriculum.

2. Set up a public meeting to present / discuss land-use options for a 250-acre area of forested land recently donated to Flagstaff in 1904. Select students to fulfill the following roles: 4 students to act as city council members, 2 students to represent the developers, 2 to represent the lumber company, and 2 as advocates of creating a wilderness park. Each of the other students will represent one of the occupations the class listed in the *Occupations of the Past* activity. Be sure there is a mix of viewpoints represented in the class. This will insure a balanced discussion. Each student should be given time to research their role to prepare for the public meeting, so they can truly represent the concerns of their role. For example, a hotel owner needs to consider how the proposed development would affect his business.

3. Using the three proposals on the Student Page, have the developers, A.L.&T. Co., and wilderness advocate present their proposal to the "community" and city council. Open the floor to questions from the community after each presentation. City Council will vote on which proposal to approve after all three viewpoints have been presented. Of course the proposal with the most votes wins.

## Conclusion:

Discuss the outcome of the vote. Would this proposal win today, or even 50 years from now?

**Topic:** Land-use

**Grade:** 4-6

**Time:** 2 hours

## Concepts:

Forests, as well as other ecosystems, contain numerous habitats that support diverse populations of organisms.

Human societies and cultures throughout the world interact with each other and affect natural systems upon which they depend.

Cultural and social perspectives influence the attitudes, beliefs, and biases of people toward the use of resources and environmental protection.

Governmental, social, and cultural structures and actions affect the management of resource and environmental quality.

## Objective:

Students will evaluate the options for managing a piece of forested land and make a land-use decision and explore the consequences of that decision.

## Materials:

*student page, chalkboard*

## Arizona Academic Standards:

Science Essentials

3SC-E1, PO1

3SC-E3, PO 1,2,3

3SC-E4, PO1

## Source:

**Adapted from Project Learning Tree, Forest Consequences Activity #33**

**Extensions:**

To get a better understanding of forest management principles, do the activity "Forest for the Trees."

**Background:**

Just like forest ecosystems, forest issues are varied and complex; solutions to forest problems are not always obvious or satisfying to everyone. In most conflicts involving forests, many individuals, organizations, and agencies have different perspectives and beliefs on how forested land should be managed.

The conflict is often heightened when all or part of the forest involved is considered an old-growth area. What is an old-growth forest? The answer depends on where the forest is, what tree species it contains, and what criteria we use. For example, by some definitions, a white pine forest in Maine would have to be over 100 years old to be considered old growth while a Douglas fir forest in Oregon would have to be over 200 years old. The Forest Service estimates that the United States has about 13.2 million acres of old-growth forests. Approximately 8.0 million of these acres are protected within national parks and wilderness areas.

People have many different views about what laws and regulations, if any, should govern the use of the remaining 5.2 million acres of old-growth forest in the United States. Here, we present two positions that are on opposite sides. However, there are many compromise positions in between.

Many people feel that old-growth forests should be left untouched and that logging in those areas should be prohibited. Those people believe that too much old growth has already been cut and that the remaining old-growth habitat must be preserved to ensure the survival of plants and animals living there, some of which are already endangered.

Others feel that enough old-growth forest has already been set aside in parks and wilderness areas, and that harvesting and replanting should be allowed on the remaining lands. They believe that closing off old-growth forest will be capable of meeting the demands for forest products, wildlife habitat, clean water, and recreation.

This is a simplification of an issue that has complex legal, political, ecological, economical and social ramifications. In most situations like these, the people are not “good” or bad; they merely have their own needs, emotions, bias, and beliefs. In many situations, people feel that they have compromised enough, and they refuse to consider any more compromises. Such a position makes it harder to find a solution that will satisfy everyone.

# Forest Consequences

## Flag Woods

The year is 1904 and last month someone donated 250 acres of nearby land to the town of Flagstaff. The land, known as Flag Woods, is completely covered with forest including about 200 acres of old-growth forest that is over 150 years old and has very large trees. A small stream flows through the forest and has good habitat for elk, deer, raccoons, frogs, salamanders, foxes, many different birds, and other animals that live in the forest.

Flagstaff is a small, but growing town. Many people who live there work for a local lumber company, but a lot work on area ranches. Many people work in Flagstaff itself at the schools and library and all sorts of small businesses.

The City Council has to decide what to do with the land. Some people want to preserve the entire area with all of its animals and plants so that it can provide people with a “wilderness” experience close to home. A developer has offered to buy the land and build a resort and autostage (an automobile stagecoach). The local lumber company has offered to buy the forestland and manage it to provide forest products, wildlife habitat, and scenic hiking trails. If you were a member of the Flagstaff City Council, what would you vote to do?

## Proposal #1

*Proposal:* Flagstaff should retain ownership of Flag Woods and manage it as a protected natural area. They should build and maintain hiking trails through it so the people of Flagstaff can enjoy it.

*Perspective:* Flag Woods is a unique area. Giant trees, some more than 100 feet tall make up about 100 acres of the forest. Some of these trees are almost 200 years old and were growing long before Flagstaff even existed. Walking among them is an incredible experience. Many other plants and many different kinds of animals also live in Flag Woods.

If we allow trees to be cleared for development, the habitat of those creatures will be destroyed. The stream is a valuable water source for the area. Several kinds of fish breed in the stream that flows through Flag Woods. These fish depend on cool water and gravel bottoms to lay their eggs. If parts of the forest are cleared, the fish may not be able to breed because: soil and other debris from the cleared land will wash into the streams and cover the gravel; and with fewer trees to shade the stream and condition the air, temperatures in the stream will increase. Similar problems may result if parts of the forest are managed for timber production.

Flagstaff doesn't need another hotel or stagecoach. And if we did build a resort what would happen to all the hotels downtown. They'd go out of business.

There are no forests as old as Flag Woods anywhere in our region. Why should the people of Flagstaff sacrifice their natural heritage so some business people can make a lot of money? Setting the land aside and maintaining hiking trails will be the best thing for the people of Flagstaff today, and for the future residents.

## Proposal #2

*Proposal:* Flagstaff should sell Flag Woods to the Arizona Lumber and Timber Company (A.L.&T. Co.), which would manage the forest for multiple uses.

*Perspective:* A.L.&T. Co. now manages much of the forestland near Flagstaff. In fact the company has harvested and reseeded thousands of acres of forest for 20 years. Trees harvested on A.L.&T. Co. land are processed into lumber at the mill in Mill Town (Just west of downtown Flagstaff). That lumber is in high demand and is used for most local construction jobs, mining timbers for Jerome, railroad ties, and fruit packing boxes.

We, at the A.L.&T. Co., offer to buy Flag Woods and manage it for commercial as well as ecological values. We plan to set aside an area of old-growth forest and to establish a buffer strip of forest around the stream to protect those important habitat areas. In the “working” part of the forest, we will practice seed tree cuts or clear-cutting, depending on which is the best technique for managing the forest for all its resources. We will make sure that tree harvesting takes place under carefully controlled circumstances and will make every effort to minimize the visual affects of harvesting. Our regular practice is to leave seed trees to naturally reseed the harvested areas, and we will allow hiking and other recreation in the working forests.

The money from the sale of Flag Woods will provide a much-needed economic boost to Flagstaff and could help develop education and social programs. It could also provide new jobs for foresters, scientists, loggers, and mill workers.

Setting aside the entire forest as a wilderness park would lock up an important and needed supply of inexpensive, high-quality wood - and we already have several parks in and around Flagstaff including the newly established San Francisco Mountain Forest Reserve. Like other natural resources, forests should provide economic, social, and ecological values at the same time. If the land is developed for a resort, valuable resources and wildlife habitat will be lost indefinitely.

The Flagstaff area has plenty of hotels and forestland is too precious to waste.

According to our management plan, there will be minimal environmental trade-offs, and A.L.&T.Co.’s long history of responsible forest management speaks for itself.

## Proposal #3

*Proposal:* Flagstaff should sell Flag Woods so developers can build a large luxury resort hotel and auto stagecoach line while preserving its “forest character”.

*Perspective:* Flagstaff is the ideal location for a beautiful resort oasis for tourists on their way to the Grand Canyon to rest before continuing to the canyon only 70 miles away. The new hotel would provide a scenic launching point for an auto stagecoach line. Making a unique tourist opportunity available to the Flagstaff Community. The money generated from the sale of the land could be used to improve Flagstaff schools, and the town library, and to provide other social services. The hotel would bring more tourists and therefore more money to be spent in local business.

Flag Developers plans to leave a buffer strip of forest around the stream and to preserve an area of old-growth forest for everyone to enjoy through trails.

Locking up the entire woods as wilderness for a handful of nature enthusiasts is not in the best public interest. Our development plan will make the land more accessible for many for recreation and leisure activities. And why should A.L.&T. Co. be the sole beneficiary of land that belongs to all of us? It is only fair that Flag Woods is developed in a way that benefits the most people possible, and our proposal offers those benefits.

# Riordan Mansion State Historic Park

## Junior Ranger Activities

You can pick up the Junior Ranger Journal from the park to complete the activities. Some of the activities have been duplicated here for your reference. Reading sections can be done in the classroom prior to your visit. Other activities need to be done while at the park.

If the class completes the required Junior Ranger activities they will be eligible for the Rocky Ringtail button. Please make arrangements with the staff if your class wants to work towards becoming Junior Rangers.

Some of these activities can be done in class or as an alternative activity while rotating through the Mansion.

### Grade Three Activities

Do at least the three activities listed below.

Read:

“Family Focus”

Activities:

Arizona Academic Standard:

Riordan Family Bingo

1SS-F3, PO3

Old and New Mix and Match

1SS-F3, PO3

Let's Go For a Visit

1SS-F3, PO3

### Grade Fourth – Sixth Activities:

Do at least five activities including those listed below.

Read:

“Logging in Arizona”

Activity:

Arizona Academic Standard:

Logging Word Search

3SC-E1, PO1

Cross Word

3SC-E1, PO1

Mansion Maze

Just for fun!

Let's Go For a Visit

1SS-E1, PO 2

# Family Focus

Tim Riordan and his brother, Michael, came to Flagstaff in the 1880's and built their fortune in the lumber business.

Tim married Caroline Metz and Michael married her sister, Elizabeth. Tim and Caroline had two daughters, Mary and Anna. Michael and Elizabeth raised a family of five children: Arthur, Blanche, Clare, Robert and Richard.

In 1904 the two families built their homes and joined them with a central ballroom or billiard room creating the Riordan Mansion. The Riordans' were excited to move into their new homes because they had hot and cold running water, electric lights and central heat. Most homes of that time did not have those things

In 1978 the descendents of the Riordan brothers donated the mansion to Arizona to become the Riordan Mansion State Historic Park.

## Riordan Family Bingo

The Riordan family was not much different than a family of today. Although they did not have computers, television, movies or other "modern" forms of recreation, they did have plenty of ways to entertain themselves.

Look for the objects on this bingo game as you walk through the visitor center and tour the mansion. See if you can "bingo" by marking off the items as you find them. If you get three in a row, in any direction, you have made a bingo.

To use the middle square you must draw something the Riordan family might have used for recreation that is not shown on the game.

*The bingo game is printed in the Junior Ranger Journal available at the park.*

# Old and New Mix and Match

Many things have changed since the time the Riordan family built the mansion. Some things, such as the telephone, simply changed in the way they look. Other things, such as transportation, have changed a great deal.

See if you can match the old to the new.

*This activity is printed in the Junior Ranger Journal available at the park.*



## Mansion Maze

Help Rocky find his way through the forest maze to the **Riordan Mansion**.

*The Maze activity is printed in the Junior Ranger Journal available at the park.*

## Let's Go For a Visit

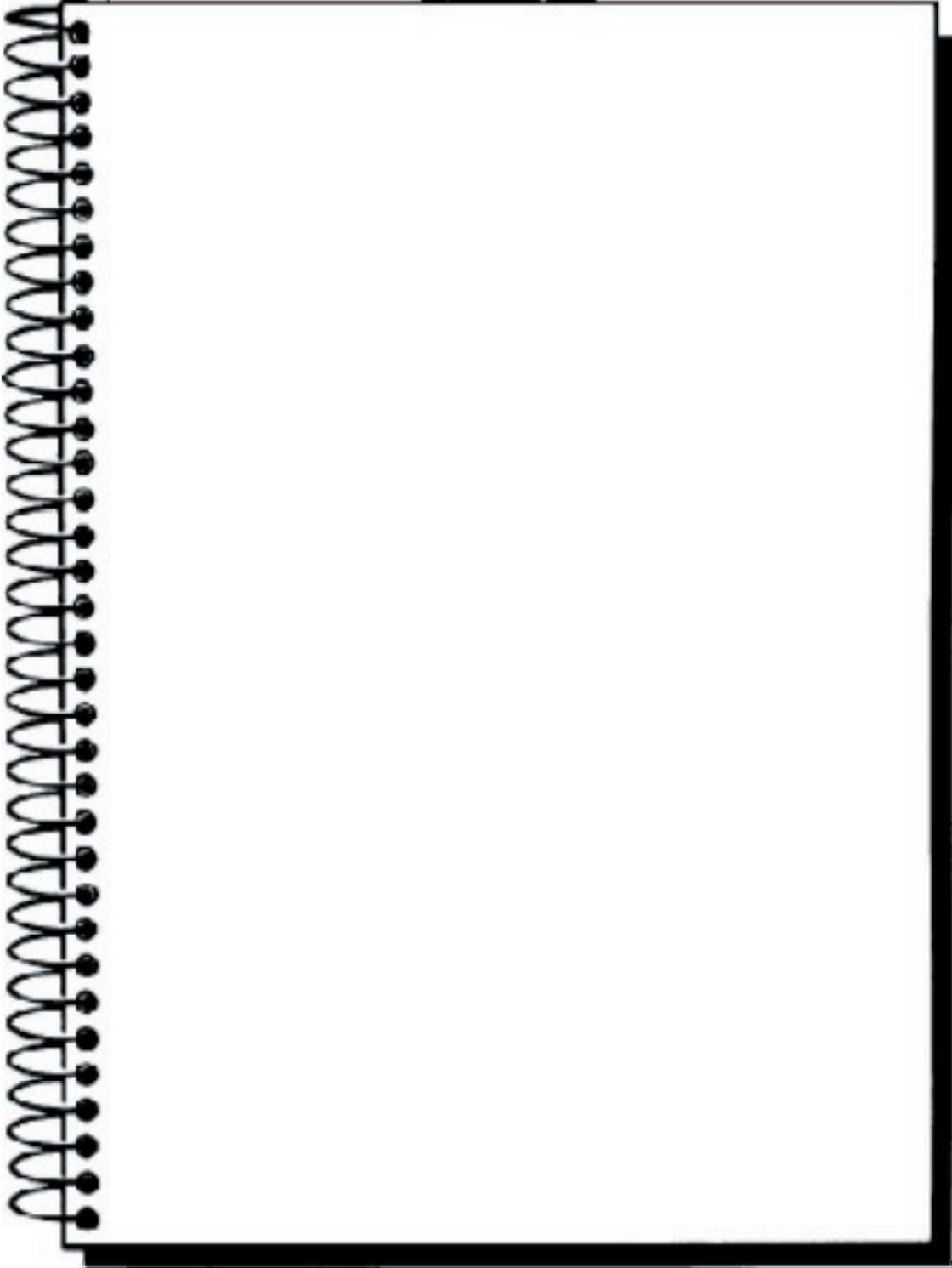
Imagine yourself living in Flagstaff in 1904.

Would you have enjoyed playing with Mary and Anna and their cousins? You could come to visit and go horseback riding, watch the trains come in or maybe go down to the lumber mill and watch the men at work.

What would your life have been like?

There were no freeways, computer games or television. What kind of games would you have enjoyed? What sports would you have enjoyed?

Draw a picture or write a story about your imaginary visit to the Riordan family in 1904.



# Logging in Arizona

The **Riordan's** developed a unique way to **log** the difficult terrain of Northern Arizona. In other parts of the country where water is plentiful, water flumes and rivers are used to carry the logs to the sawmill. In arid Arizona, logs were transported to the mill by **railroad**. When a section of the **forest** was prepared for logging, railroad **tracks** were laid, and like a big traveling circus, the **train** brought in everything necessary to create the logging **camp**.

The tracks were actually the "main street" of the camp. Cabins, complete with furnishings, including stoves, were unloaded on either side of the tracks by the train's **crane**. Adjoining the camp was a short section of track called a **spur** where special railroad cars were parked containing a dining area and a **commissary** (a store where lumbermen could purchase goods).

Logs were often hauled by "Big Wheels". These logs were attached under a pair of ten-foot high **wheels** and pulled by **mule**, oxen or horses.

In Arizona the "donkey" engine made a good working partner with the train. A **steam** powered engine, nicknamed the "donkey", was equipped with big drums of coiled steel **cable** and transported to the work site on a railroad flatcar. Nearby, a tall pine tree (called a **spar** tree) was stripped of its branches and **pulleys** were attached. Using cables strung through the spar tree's pulleys, the "donkey" **skidded** and dragged logs out of the forest to the railroad loading site. Once the spar tree had completed its job, it also was harvested, cut into logs, and hauled by train to the **sawmill**.

After successfully logging an area, everything at the camp was packed up, loaded onto flat cars, and relocated to a new section of the forest. Even the railroad tracks were pulled up and repositioned to service the new camp.

CABLE  
CRANE  
MULE  
RIORDANS  
SPAR  
TRACKS

CAMP  
FOREST  
PULLEYS  
SAWMILL  
SPUR  
TRAIN

COMMISSARY  
LOG  
RAILROAD  
SKIDDED  
STEAM  
WHEELS

# Logging Wordsearch

After you read the story of Arizona logging, look for the words listed on page 71 in the word search game. These words may be forward, backward or diagonal. When you have finished the word search, write the leftover letters, **in order**, in the blanks below to find a secret message.

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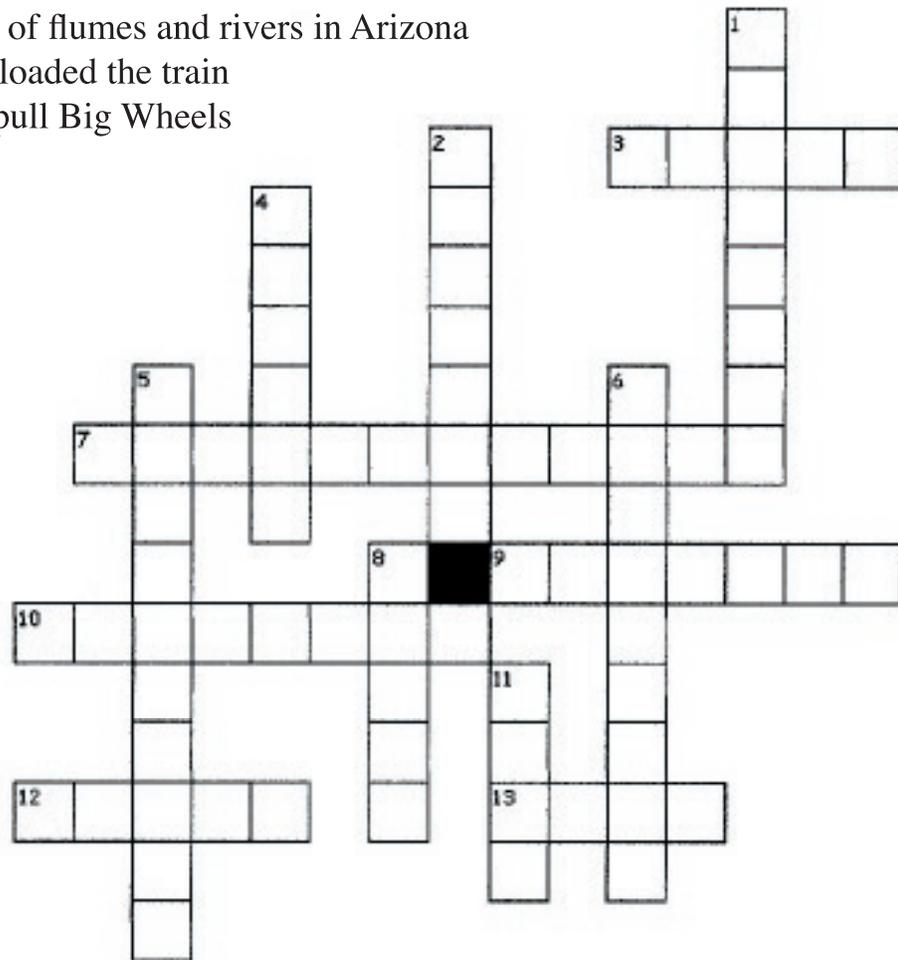
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D	A	S	R	R	I	S	Z	R	O	R	N	A
H	A	A	Y	S	I	T	K	H	U	A	E	L
A	R	O	G	E	E	O	S	C	Y	P	T	S
T	A	N	R	D	L	N	R	R	A	S	S	S
M	U	L	E	L	I	L	A	D	O	R	F	A
P	G	O	N	A	I	S	U	D	A	E	T	W
R	O	O	R	S	S	A	A	P	P	N	I	M
E	L	T	N	I	E	C	R	A	N	E	S	I
L	I	N	M	S	K	I	D	D	E	D	M	L
B	T	M	T	S	E	R	O	F	C	A	H	L
A	O	E	W	O	R	L	D	U	E	A	U	G
C	B	P	X	N	M	T	K	T	K	B	M	N
W	H	E	E	L	S	U	S	G	Q	Y	I	P

# Cross Word

## Across

3. brought in everything it took to create a logging camp
7. another name for steam engine
9. where the train hauled the timber
10. took the place of flumes and rivers in Arizona
12. loaded and unloaded the train
13. often used to pull Big Wheels



## Down

1. a tall pine stripped of its branches
2. a way of moving logs
4. these were always the main street
5. a kind of store
6. a pair of high wheels under which logs were swung
8. used to drag logs out of the forest
11. where the loggers lived



# Evaluation

# Riordan Mansion State Historic Park

## Evaluation Form for Teachers

Please take a few minutes to answer the questions below by placing a circle around the most appropriate response. Please leave your completed evaluation with a ranger before leaving the park.

Excellent-----Poor

- 1. Was your tour guide well prepared? 1 2 3 4 5
- 2. Did the tour guide review the park rules in such a way that they were understandable? 1 2 3 4 5
- 3. Did you enjoy your tour? 1 2 3 4 5
- 4. Who was your tour guide? \_\_\_\_\_
- 5. Was the tour presented on a suitable level for your students? 1 2 3 4 5
- 6. Was the teacher's guide helpful in assisting you with your lesson plan? 1 2 3 4 5
- 7. What part of the tour or teacher's guide did you enjoy most?  
\_\_\_\_\_  
\_\_\_\_\_
- 8. What part of the tour or teacher's guide was least useful?  
\_\_\_\_\_  
\_\_\_\_\_
- 9. What resources would you like added to the teacher's guide?  
\_\_\_\_\_  
\_\_\_\_\_
- 10. Are there any changes you would like to see made to the teacher's guide?  
\_\_\_\_\_  
\_\_\_\_\_
- 11. Are there any changes you would like to see made to the tour?  
\_\_\_\_\_  
\_\_\_\_\_
- 12. Additional comments?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_