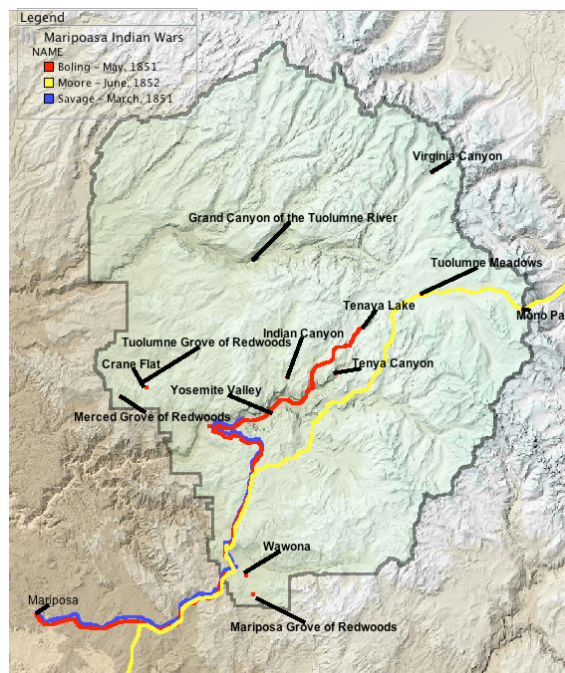


Yosemite: GIS Activities

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Contents

Introduction	1
Objectives	2
GIS Files	2
Early Trails of Yosemite	3
Data Sources	9
Additional Resources	11



Introduction

Parks for the preservation of landscape, wildlife, and history are found around the world today in places as different as Costa Rica, New Zealand, and Kenya. They owe their existence in large part to the example created by the United States beginning with Yosemite in 1864.

Yosemite is special in several important ways. Geologically, the park is a series of glacially carved, white granite canyons, many over a thousand feet deep. The most spectacular of these is Yosemite Valley itself. Archeologically, humans have populated Yosemite on and off going back almost to the end of the last ice age over 10,000 years ago. Villages of Miwok and Paiute natives existed in Yosemite until shortly after first contact with European settlers in the 1850's. Their legends provide an important and interesting perspective on many of the park's most spectacular features. And, historically, Yosemite has provided an important laboratory for the evolution of the national park idea. Writers like John Muir and Frederick Law Olmstead, artists like Albert Bierstadt, Thomas Hill, and Chris Jorgenson, and photographers like Carlton Watkins helped acquaint potential visitors and legislators with Yosemite's wonders in the late 1800s. Early Yosemite business people like Thomas Hutchings and David and Jeannie Curry helped shape how Yosemite was made accessible to visitors. And far sighted national leaders like Teddy Roosevelt brought a broad vision of preserving special pieces of the American environment.

As these individuals championed the cause of Yosemite in its early years and helped to define what it meant for a place to be a national park questions arose about the park's management that are still debated today. What was the purpose of the park? To what extent should the park be preserved in its natural state? What changes in the park's environment should be allowed? How should visitors be accommodated? By careful consideration of such questions students can be better prepared to enter into this ongoing debate.

The GIS activities included here are part of a larger unit on the early history of Yosemite. In addition to these activities the unit also includes more traditional primary and secondary resources including: letters, government documents, newspaper articles & editorials, art work, and photographs. The entire unit can be accessed on the web at:

<http://www.intimeandplace.org/Yosemite/>

The GIS activities add three important dimensions to the unit.

- First, students are able to put the events involved firmly in place as well as time.
- They are able to bring large amounts of place related data to their studies that tend to have little meaning outside a geographic framework and that provide an entirely new avenue for understanding.
- GIS investigations are fun. The software involved is an elaborate tool that with a limited amount of initial guidance puts students in charge of meaningful historical investigation.

Objectives

- Gain experience with digital maps, map layers, and the use of basic GIS tools including the:
 - measurement tool
 - link tool
- Use GIS software to explore the early trails of the Yosemite region and the related history and to study the geography of the Sierra Nevada Mountains in California.

GIS Files

Yosemite

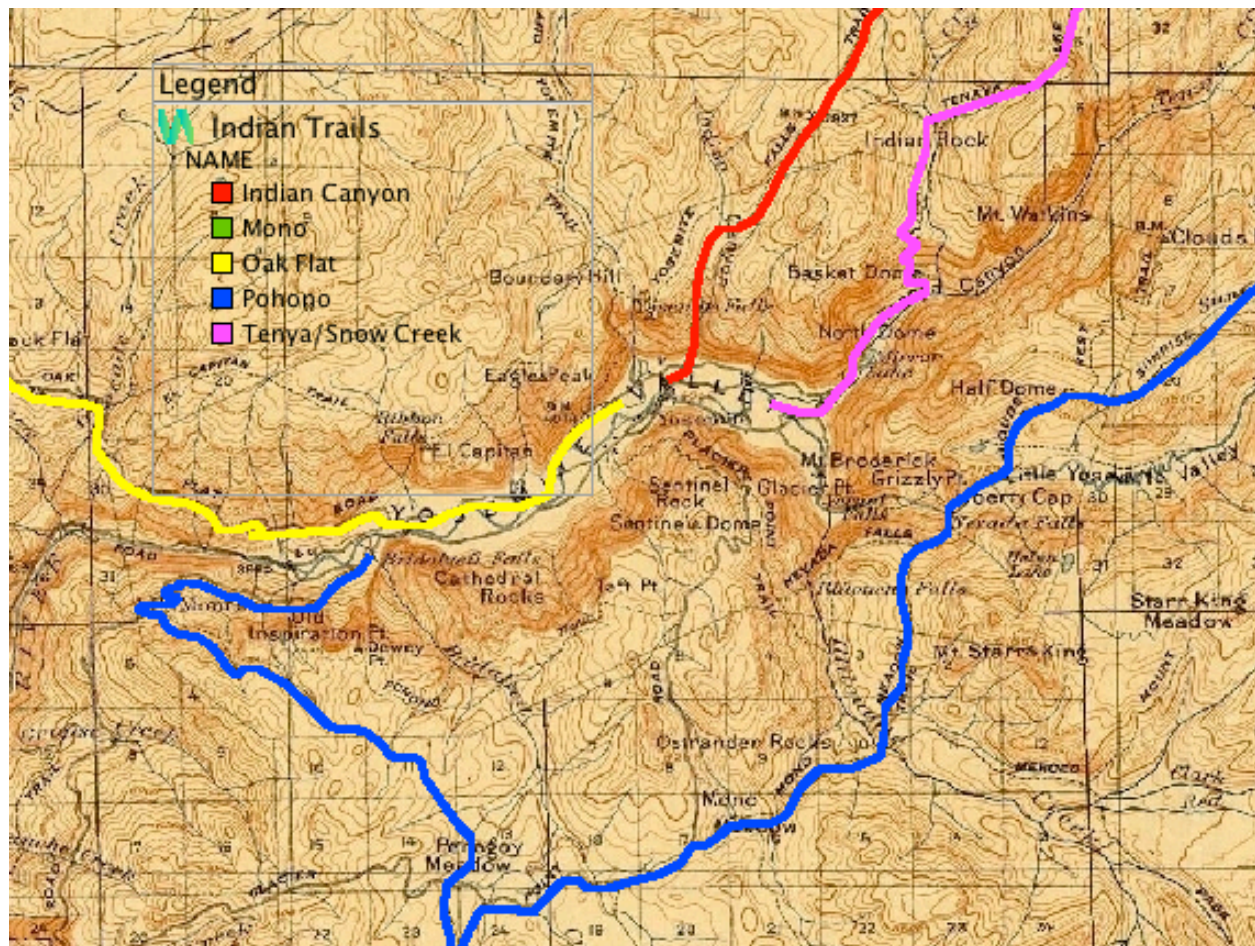
You will need to download this file at:

<http://www.intimeandplace.org/>

Scroll to the bottom of the page to the **GIS Activities** section and select the file from the table. The file needs to be copied onto your and your students' computers or onto a common server for use.

Early Trails of Yosemite

The early trails of Yosemite largely followed those of the Miwok and Paiute natives who traveled routes into Yosemite Valley and across the Sierra Nevada Mountains to trade. Early visitors finished their trip into the valley on horseback down the Pohono or Oak Flat trails. Sheep ranchers brought their flocks into Yosemite's high meadows from both the east and west following one of the branches of the Mono trail. And Army troopers assigned to protect the new Yosemite National Park ushered shepherds and their flocks out of the park (usually in opposite directions¹) following and building on trails first traveled by Yosemite natives.



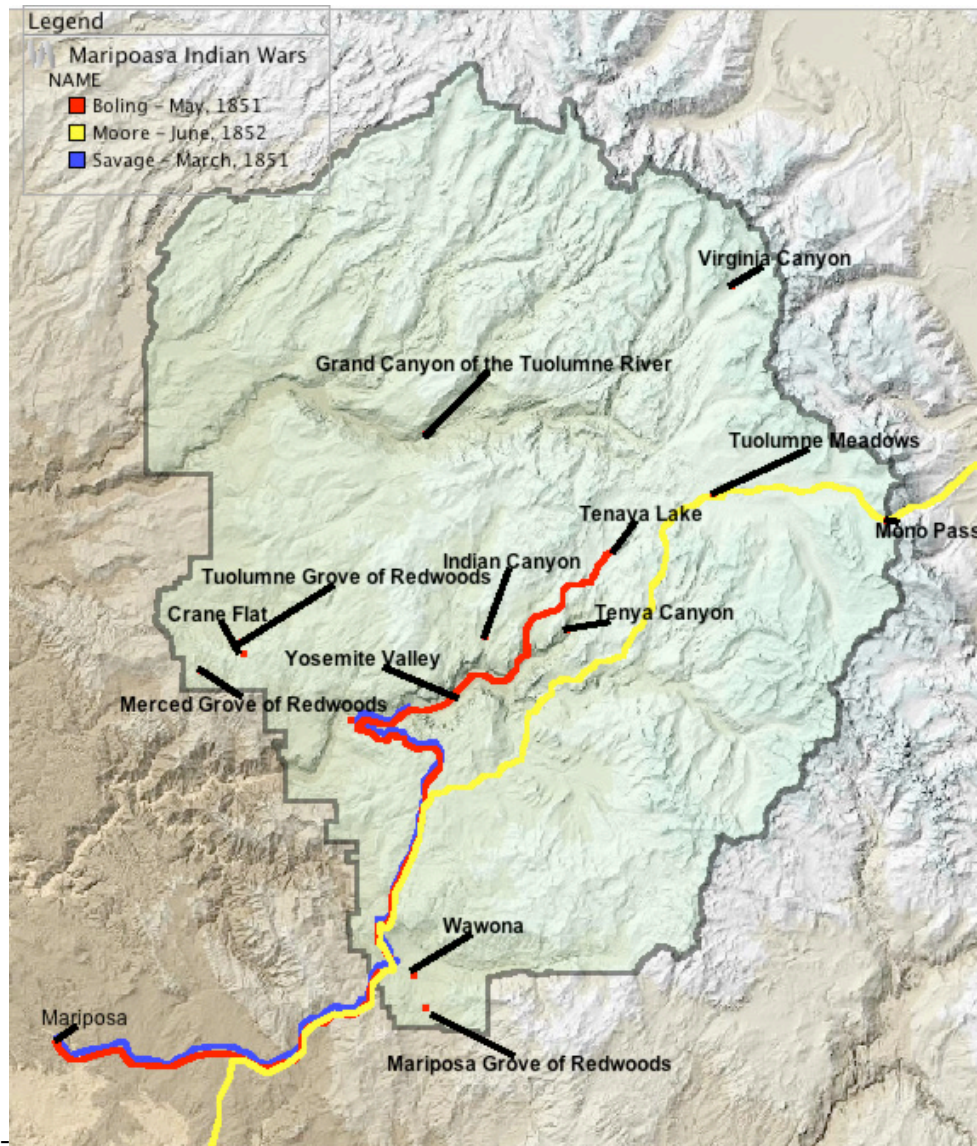
Use the following example as part of a classroom demonstration with a video projector to introduce students to digital maps and map layers. If this is your students' first experience with GIS software this activity works nicely as an introduction. Make sure that you let a student volunteer operate the computer during the demonstration leaving you free to direct discussion and address questions. An effective strategy is to divide students into the groups in which they will work on the related assignment later. Have one member of each group take careful notes about the procedures involved while their partner(s) attend to the demonstration and monitor the note taking for completeness. The example that follows is also available at:

www.intimeandplace.org/Yosemite/activities/trailsofyosemite.html


for student use in the lab.

An Example to Get Your Students Started

In March, 1851 Major James Savage of the newly commissioned Mariposa Battalion led troops after natives who had raided several area mining camps, including three of Savage's trading posts. The company went west from Mariposa in the Sierra foothills to Wawona and then north in pursuit of the Indians. They entered Yosemite Valley on March 25, becoming the first Europeans to visit the valley itself. This first entry into Yosemite Valley was followed two months later by another of Savage's units led by Capt. John Boling and then again in June, 1852 by U.S. infantry troops under the command of Lt. Tredwell Moore. Each of these expeditions, of what became known as the Mariposa Indian Wars, broadened awareness of the Yosemite region as you can see in the reports from the field.



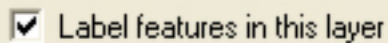
Load the **Yosemite** project file in **ArcGIS**. The example focuses on the trails followed during the Mariposa Indian Wars that led to the first European exploration of Yosemite Valley and the surrounding area.

- Students can use the **Zoom in** tool () to zero in on the park and the series of early trails or ...
- Select **Bookmarks >> Yosemite** in the main menu.
- Check the **Early Trails** group and the **Mariposa Indian War** layer on. Click the plus sign to display the legend:




Turn the other **Early Trails** layers off.


- Check the **Places** layer on. Right click on the layer name, select **Properties....**, and click on the **Labels** tab. Double check to see that the **Label features in this layer** option is checked:



The routes followed by the three expeditions are displayed.

Students can use the measurement tool () to determine distance in miles along any path on the map. Simply click to select the tool, click the cross hairs on Mariposa and then click at intervals along the route that Major Savage followed into Yosemite Valley. Double click at the end of the route. The approximate distance is 48 miles.

The entry of Major Savage's group into Yosemite Valley was recorded in the journal of the company's doctor, Lafayette H. Bunnell. The doctor described the company's descent into Yosemite Valley down the Pohono Trail, opposite El Capitan. Links are available within the map to view a Thomas Hill painting of the sight that Dr. Bunnell described. There are links attached to each of the other trails as well aimed at related reading materials.

- Select the Link tool ().
- Aim anywhere along the Savage trail and click to open the link.

For another view of the rugged descent students can zoom to the Topographic Map layer and examine the new map with the battalion's route overlaid:



The 4000 foot mark is visible at the bottom of the valley. The interval between the major, darker, contour lines is 500 feet. It is 100 feet between each of the lighter lines. Counting up from the bottom to the level of Ft. Monroe you can see that the ride to the bottom of the valley involved an approximate 2400 feet change in elevation. A check of the distance shows the ride to be about 4.5 miles down the switchbacks and more gently along the contours to the river below.

Time to give your students a chance in the lab. Have them use the tools presented in class and complete the following exercise:

Imagine that you were part of the first company of Europeans to descend into Yosemite Valley. Use the various map tools and painting introduced above and write your own short narrative of your group's discovery.

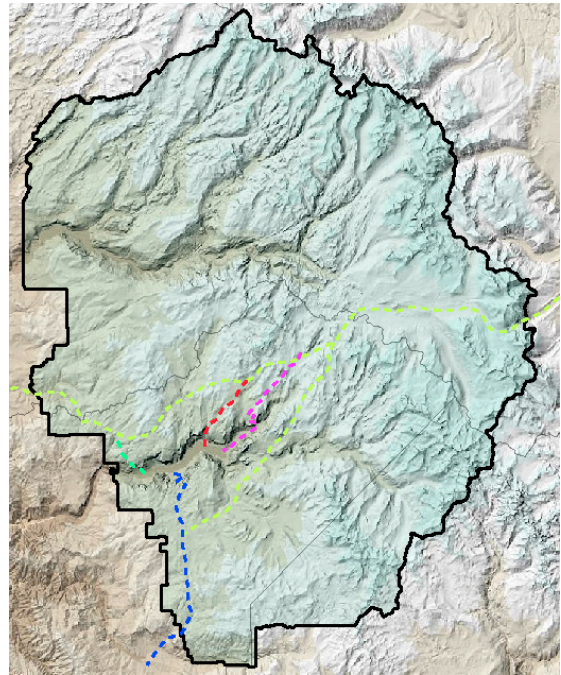
A follow-up discussion of their narratives and problems encountered in the lab will get them ready for the **Yosemite's Early Trails** worksheet.

Name(s): _____

Date: _____


Yosemite's Early Trails

The early trails of Yosemite largely followed those of the Miwok and Paiute natives who traveled routes into Yosemite Valley and across the Sierra Nevada Mountains to trade. The earliest tourists finished their trip into the valley on horseback along the trail from Wawona or down the Oak Flat trail from Crane Flat. Sheep ranchers brought their flocks into Yosemite's high meadows from both the east and west following one of the branches of the Mono trail. And Army troopers assigned to protect the new Yosemite National Park ushered shepherds and their flocks out of the park (usually in opposite directions) following and building on trails first traveled by Yosemite natives.



1) The second expedition into Yosemite during the Mariposa Indian Wars was led by Captain John Bowling. Boling's group entered the valley to find that the Yosemite Indians had fled to the northeast across the Sierras. Open the **Yosemite** file and zoom in on the map of the park. Display the **Mariposa Indian War** layer and make sure that the other trail layers are off. Use the link tool and read Captain Boling's report of his pursuit of the native group from Yosemite Valley to Tenaya Lake.

- * Use the map and write your own short report describing the route up out of valley to the lake. Make sure that you include descriptions of the terrain, elevation gain, and distances involved.

Remember, you can zoom to the topographic map level and you can also use the pan tool () to move the map so you can see different parts of the trail.

2) Today tourists enter Yosemite Valley by car or bus where formerly they came by horse drawn stage and before that on horseback or on foot. Display the **Early Tourist Route** layer and use the link tool to read James M. Hutchings' description of the first tourist party he led into Yosemite Valley along the Coulterville Road through Crane Flat and down the into the valley in 1859.

- Hutchings says that the party rode nine miles from Crane Flat before coming to the "Stand-Point of Silence." Zoom in some on the Crane Flat area and measure along the route from Crane Flat towards Yosemite Valley to the point on the rim of the canyon where you would first have a view up the valley. What is the approximate distance Hutchings' party traveled from Crane Flat to this point?
- Use the map and describe the descent from the "Stand-Point of Silence" to the valley floor.

3) You learned about using the high meadows surrounding Yosemite Valley as summer range for sheep in reading about John Muir's first summer in the Sierras. By the 1890s grazing sheep posed a serious threat to the Yosemite watershed. Calvary units operating out of headquarters in Wawona and from patrol stations throughout the Yosemite region tried to eliminate the practice. Display the **Calvary Trails**. Use the link tool to open the May 5, 1898 article from the *New York Times* describing the situation.

- Imagine that troops from the 4th Calvary caught up with you and your sheep in Virginia Canyon. You are led west out of the park on the trail north of the Tuolumne River Canyon and your sheep north out of the park where they are turned loose. How far back across the park do you have to travel in the effort to gather your flock? How long do you suppose the trip would take on foot?

Evaluation Guidelines

Read and use the legend on a data map.	5 4 3 2 1
Read a data map for specific information about a particular region.	5 4 3 2 1
Modify and/or combine GIS data to create new data fields.	5 4 3 2 1
Prepare effective data maps.	5 4 3 2 1
Prepare side-by-side data maps and interpret the correlation presented	5 4 3 2 1
Create data maps to effectively address a specific question.	5 4 3 2 1
Ask questions that lend themselves to being addressed with available GIS data base files.	5 4 3 2 1

Data Sources

The data and images in the various map layers are from a variety of sources:

Layer	Source
California Relief Map, California Counties, California Rivers & Lakes	CaSIL - The California Spatial Information Library
Information Related to Early Yosemite Trails	<p>Lafayette H. Bunnell. "Map of the Yo-Semite Valley." in Discovery of the Yosemite. New York: F H Revell Company, 1892.</p> <p>Linda W. Greene. "Early Trails." and "Historical Base Map of Roads and Trails, Yosemite National Park." in Yosemite: The Park and Its Resources. Yosemite National Park, California: National Park Service, 1987.</p> <p>Thomas Frederick Howard, Sierra Crossing: First Roads to California, Berkeley: University of California Press, 1998.</p> <p>Zenas Leonard. Narrative of the Adventures of Zenas Leonard. Clearfield, Pennsylvania: D. W. Moore, 1839.</p> <p>Tredwell Moore. "Reports from Lt. Tredwell Moore to the Pacific Division on the Mariposa Indian War of 1852." as found in Thomas C. Fletcher, Paiute, Prospector, Pioneer: The Bodie-Mono Lake Area in the Nineteenth Century, (Lee Vining, California: Artemisia Press, 1987.</p> <p>Carl P Russell. "The Geography of the Mariposa Indian War." in Yosemite Nature Notes. XXX(3,4,6,7), 1951.</p> <p>Carl P Russell. "Sketch Map of the Yosemite Region." One Hundred Years in Yosemite. Berkeley, California: University of California Press, 1932</p>

Layer	Source
Information Related to Early Yosemite Trails (continued)	U.S. Geological Survey, "Yosemite (1911), Mt. Lyell (1901), Bridgeport (1911), and Dardanelles (1896) Quadrangle 30-minute topographic maps", available at the Historic Topographic Maps of California, University of California, Berkeley Library.
Yosemite Boundary File & Yosemite Lakes	available from the National Park Service Geography and Mapping Technologies, Geographic Information Systems web page.
Yosemite Area	clipped from "30m Color Hillshade of California," available from CaSIL - The California Spatial Information Library .
Yosemite Topographic Map	"Topographic map of Yosemite National Park, California / from Geological Survey maps surveyed between 1893 and 1909," available from the American Geographical Society Library at the University of Wisconsin-Milwaukee Libraries.

Additional Resources

Those interested in learning more will find that the Internet offers a variety of interesting materials.

Yosemite National Park

Visit the [Yosemite National Park Web](#) pages to learn more about the history of this geological wonder. Included on the site are details on the history and geology of the park, photo galleries, educational resources, and much more. The [Yosemite Web](#) is a tremendous resource of both primary and secondary resources about Yosemite. The website of the [Yosemite Association](#) is also a valuable resource.

The National Park Idea

The United States created the world's first national park (Yellowstone), as well as the first national park system. Two online publications that explore the evolution of the "national park idea" are [The National Parks: Shaping the System and Parks](#) and [People: Preserving our Past for the Future](#) particularly its chapter on the National Park Service: The First 75 Years.

Park Geology

[Yosemite in Depth: Geology](#) provides an interactive introduction to the park's geology.

U.S. Geological Survey

[The Geologic Story of Yosemite Valley](#) is an essay from the U.S. Geological survey outlining the geologic history of Yosemite Valley. It touching on the roles of erosion and glacial action in carving the granite features of the park.

Library of Congress: American Memory Collection

Search the [American Memory Collection](#) for resources on Yosemite National Park.

For Further Reading

Students and educators wishing to learn more about Yosemite may want to read the following:

Alfred Runte, [Yosemite: The Embattled Wilderness](#) (University of Nebraska Press, 1990).

Carl Parcher Russell, [One Hundred Years in Yosemite; The Story of a Great Park and Its Friends](#) (Berkeley: University of California Press, 1932).