Making Sense of Maps

David Stephens

(from the Making Sense of Evidence series on *History Matters: The U.S. Survey on the Web*, located at http://historymatters.gmu.edu)

Making Sense of Maps offers a place for students and teachers to begin working with maps as historical evidence. Written by David Stephens, this guide offers an overview of the history of maps and how historians use them, a breakdown of the elements of a map, tips on what questions to ask when analyzing maps, an annotated bibliography, and a guide to finding and using maps online. David Stephens is professor of geography at Youngstown State University. He holds a Ph.D. in geography from the University of Nebraska. His recent research interests have focused on the use of primary documents to understand the processes of early settlement in the northeastern Ohio and western Pennsylvania.

What is a Map?

Maps can be an important source of primary information for historic investigation. But what is a map? This is a deceptively simple question, until you're asked to provide an answer—you may find it far more difficult than you think. Yet we encounter maps on a daily basis. The media uses them to pinpoint the location of the latest international crisis, many textbooks include them as illustrations, and we consult maps to help us navigate from place to place. Maps are so commonplace; we tend to take them for granted. Yet sometimes the familiar is far more complex than it appears. "What is a map?" has more than one answer.

Norman Thrower, an authority on the history of cartography, defines a map as, "A representation, usually on a plane surface, of all or part of the earth or some other body showing a group of features in terms of their relative size and position." [Norman Thrower, *Maps and Civilization: Cartography in Society* (Chicago: University of Chicago Press, 1996, 245.] This seemingly straightforward statement represents a conventional view of maps. From this perspective, maps can be seen as mirrors of reality. To the student of history, the idea of a map as a mirror image makes maps appear to be ideal tools for understanding the reality of places at different points in time. However, there are a few caveats concerning this view of maps. True, a map is an image of a place at a particular point in time, but that place has been intentionally reduced in size, and its contents have been selectively distilled to focus on one or two particular items. The results of this reduction and distillation are then encoded into a symbolic representation of the place. Finally, this encoded, symbolic image of a place has to be decoded and understood by a map reader who may live in a different time period and culture. Along the way from reality to reader, maps may lose some or all of their reflective capacity or the image may become blurred.

So what is a map? A map is text. John Pickles, a geographer with interests in social power and maps, suggests:

> maps have the character of being textual in that they have words associated with them, that they employ a system of symbols within their own syntax, that they function as a form of writing (inscription), and that

> they are discursively embedded within broader contexts of social action and power. [John Pickles, "Text, Hermeneutics and Propaganda Maps," in Barns and James S. Duncan, eds., *Writing Worlds: Discourse and Metaphor in the Representation of Landscape,* London: Routledge, 1992, 193.]

In this view, maps are a form of symbolization, governed by a set of conventions, that aim to communicate a sense of place. To fully understand a map we need to know how to decode its message and place it within its proper spatial, chronological, and cultural contexts. Maps, even modern maps, are historic. They represent a particular place at a particular point in time. This definition of a map (although, like the mirror image idea, is also problematic) suggests that maps can afford the viewer a great opportunity to gain insights into the nature of places.

Why do relatively few scholars outside of geography use maps and why do maps intimidate people? Michael Peterson, a cartographer and professor of geography at the University of Nebraska, Omaha, raises a critical issue that may also help to explain why maps are not utilized. He asserts that even highly educated people have trouble using maps and that more than half lack "basic" map competency. Peterson concludes that, "Most people are essentially map illiterate." [Michael P. Peterson, "Cartography and the Internet: Implications for Modern Cartography," at http://maps.onomaha.edu/NACIS/paper.html] My own experience teaching geography courses for more than thirty years substantiates Peterson's assertions. Students often lack the basic skills necessary to read maps, much less the analytical skills needed to grasp the insights that maps can afford. This guide aims to help provide those basic skills.

Where Did Maps Come From?

No one knows for sure when the first map was constructed. A probable scenario suggests that the earliest map was a mental image used by some ancient beings to organize the space in which they lived. That same being may have used sounds and gestures to convey spatial information about the local environment to others. Eventually, using a stick to etch a sand canvas that has long since been erased, early humankind may have drawn a likeness of these mental and oral maps. By 2300 BC, Babylonians used clay tablets to record map-like images. Chinese mapmaking traditions date from about the same time. Some early cave and tomb art has map-like characteristics. The Greeks are credited with proving the earth was spherical. Ptolemy [http://archive.ncsa.uiuc.edu/SDG/Experimental/vatican.exhibit/exhibit/d-mathematics/Ptolemy_geo.html], a Greek geographer, created a map of the then known world that marked the culmination of ancient cartography. Following the collapse of the Roman Empire, ecclesiastical influenced "T" and "O" maps dominated cartography for 700 years. These maps with East, the orient, at the top, had water bodies in a T-form separating the continents and an O shaped ocean surrounding them.

In 1187, the magnetic compass revolutionized navigation and led to the development of sea charts [http://www.nmm.ac.uk/cmr/coll_text/coll_charts.html], or navigational maps. These early charts were drawn by hand on sheepskins. The travels of Marco Polo in the 1270s and 1280s aroused interest in world maps. The rediscovery of Ptolemy's work and its translation to Latin in 1405 coupled with the arrival of the printing press in 1450 further spurred interest in mapping the world. Up until this point in time, maps had to be laboriously copied by hand. Because of their

cost and scarcity they were the purview of only the rich and powerful. With the invention of the printing press they could be accurately reproduced on paper and geographic knowledge became more widely disseminated.

Improvements in ship design and navigation, along with the rising interest in exploration, led to the development of a clearer picture of the world. As the empty parts of maps were filled in, maps gained wider distribution and use. The rise of nation-states and their military prowess fueled the need for more accurate mapping. World War II was a stimulus for mapping much of the world. In fact, military purposes have been the driving force in the development of modern mapping technology based on satellite imagery. Until the 1970s maps were drafted in pen and ink, a slow and often frustrating process. With the computer, digital maps can be produced very quickly. One downside to the ease of today's mapping is that computers enable unknowing individuals to produce a large number of erroneous maps very quickly. Hence, you need to be a wary map-reader.

Where Do I Begin?

When reading in a foreign language, you may need to consult a dictionary to fully understand what has been written. When reading a map, you need to understand its symbolism. The following items are a checklist to be used in helping you translate maps.

Title—Like a newspaper headline, the title of a map should tell the reader "what," "where," and "when" about the map. The date should help the reader fit the map into its proper chronological niche. Note: the date in the title may not be the date the map was constructed.

Orientation—By convention, cartographers place North at the top of maps. If there is a deviation from that practice, the map should have a compass rose or some other symbol to help orient the user.

Scale—The map scale should be shown so that the reader can make judgments about distances. Graphic scales are an absolute must when dealing with maps as computer images or printing images from digital sources. Ratio and written scales are virtually meaningless in this medium.

Legend—There must be a key that explains the symbols used by the cartographer. To visualize reality the map reader needs to be able to convert various shapes, colors, and textures into the phenomena they represent.

Grid—The map needs to have a coordinate system, in the form of parallels of latitude and meridians of longitude, so that the area can be placed in its proper geographic location on the globe.

How Do You Make A Flat Map Out of a Round World?

Creating a map involves fitting the round world onto a flat surface. To visualize the problems inherent in this transformation, consider what happens to a hollow ball when it is completely flattened. Flattening distorts the ball. There is no way to flatten without bending and tearing, forcing a three dimensional object to become a two

dimensional surface. Utilizing mathematics, cartographers have created a variety of less-than-perfect solutions to this problem. These solutions, known as map projections, produce maps that represent the same place, but these maps can have very different appearances. Perhaps you have seen a map [http://www.ombomb.org/maps/rgs/world.html] that shows Greenland's area to be much larger than Australia's. In reality, Australia is three times larger than Greenland. Things are not always as they might seem when you look at maps.

On a flat map many properties such as size, shape, angular relationships, and distance are compromised in the projection process. For a detailed discussion of map projections and their properties see Peter Dana's contributions on projections [http://www.colorado.edu/geography/gcraft/notes/mapproj/mapproj_f.html] in the Geographer's Craft Project.

Does Scale Make A Difference?

Maps represent a scale model of the world. To fit on a piece of paper the world has to be greatly reduced in size. A map's scale is a statement about the relationship between map distance and distance in the real world—the amount of reduction that has occurred to get the representation of the world to fit on a sheet of paper. By convention, the scale is given as a ratio between distance on a map—expressed as one unit of distance—and real world distance—the number of the same units of distance in the real word. Thus, on a map with the scale 1:633,600, one inch on the map would be equal to 633,600 inches in the real world. This scale may also be written as one inch equals 10 miles. Scales are also represented graphically. A graphic scale is a bar that has been calibrated to show map distances. When working with any maps that have been enlarged, reduced, or reproduced on a computer monitor, this graphic scale is absolutely essential. On maps that have been reduced or enlarged by photocopying, the original ratio and written scales are incorrect, since the relationship between map distance and real world distance has been altered. But if the graphic scale has been enlarged or reduced to the same extent as the map, it is still correct. To explore the concept of scale more fully see the links about map scale at about.com [http://geography.about.com/cs/mapscale/index.htm?once=true&], especially the link to About.com's own guide [http://geography.about.com/library/weekly/aa110397.htm?once=true&].

Map scales can be divided into two categories, large and small. Geographers use these concepts differently than many people. From the geographer's perspective, a large scale map shows a limited amount of space and provides a considerable amount of detailed information about that space. Large scale maps might show the location and dimension of all the buildings in a city block or the location of all the churches, social organizations, and bars in an urban neighborhood. The battlefield at Gettysburg [http://icg.fas.harvard.edu/~maps/civilwar/oval.html] is another example of a large scale map. Small scale maps typically represent extensive areas, but they offer only a gross perspective on details. Maps with small scales are used to show things such as the United States and Mexico in 1859 [http://purl.nypl.org:8080/mrsid2/bin/show.pl?client=HW139&image=hw139.sid]. They are appropriate for showing large countries, continents, and the world.

Scale can also distort features on a map. When extensive areas are shown (a small scale map) the potential for distortion is great. If the map shows only a limited area, but great detail (a large scale map) then distortion is usually not a problem. Hence,

distances on world and continental maps need to be viewed with great caution, while those on a large scale map may be more accurately estimated. Areas having limited spatial extents like neighborhoods, towns, cities, counties, and most states, will be shown on large scale maps and have the potential for considerable accuracy. Maps of large countries, the continents, and the world are drawn at small scales. The potential for accuracy drops as the area mapped grows larger and the scale grows smaller.

Who Made This Map and Why?

Using an analogy from writing, to fully understand historical prose, you need to know about the author: his / her background, motivations, and when and where the author wrote. This information is essential in order to place the writing within a proper historical context. Similarly one needs to place maps in their proper spatial and chronological contexts to fully appreciate their meaning. This information can shed more light on a map's historical context. All these elements may not be present on every map but knowing information about several of them will make it much easier to fit the map into geographical and historical niches.

Author / Publisher—Knowing who created the map may offer hints as to the map's bias or biases. Does this person or organization have a vested interest in how the map is perceived by the map reader? For example, "town plats," maps created by western promoters, were aimed at attracting prospective settlers. Often they were purely propaganda.

Place of Publication—In what country or city was the map published? What language(s) does the map employ? This could provide insights into potential nationalistic biases.

Date—When the map was constructed helps to place the map in its chronological context. Does the map reflect true facts? Post-1990 maps of Europe should show one Germany, not two.

Audience—Who was the intended audience? What message did the mapmaker want to send? Why was the map produced?

Source of Data—If the map uses secondary data sources, such as census material, knowing the source of the data will help in assessing the appropriateness of the data and thereby the map.

Origin—Was the map drawn? printed in limited numbers? mass-produced? This is often related to the date the map was initially created.

Context—How does the map fit with earlier and later maps? How does the map reflect new discoveries?

Using these tools to assess a map will assist in assessing its relevance as an image of a particular point in time.

Just as historians cannot record every minute detail of an event, cartographers cannot show all aspects of a place. In the case of maps, more details about the world are omitted as the map's scale becomes smaller. This process, called ***map simplification***, is part of a larger

process of cartographic generalization. During the simplification process the cartographer has to reduce details. For example, the Mississippi River is a meandering stream. To fit the Mississippi on a map in a textbook only a few of the biggest changes in direction can be shown. In the simplification process most of the meanders are omitted and the result is an image of a relatively straight stream, while in reality the Mississippi is a highly convoluted watercourse. When cartographers opt to emphasize a single theme such as population density by census tract or cotton production by county, they omit all other information about the places. What is emphasized and what is omitted is another dimension of the simplification process. In this process a map can be manipulated to create a false impression. Mapmakers can show only the information they want to convey and omit the things they want to obscure. This is a very powerful tool in hands of an unscrupulous or novice mapmaker. When examining a map, always ask: "What is not shown?"

How Is the Data Organized?

Classification is a second part of cartographic generalization. It involves reducing data to a form that can be easily represented on a map. An example of this type of generalization would be to arrange data on poverty into five classes of counties with each group having a mutually exclusive value range. With this arrangement the map reader can get a sense of the spatial pattern of the data without having to examine the value for each individual county. Here again is the opportunity for skullduggery. Ken Foote's Geographer's Craft has a section on issues of statistical generalization
[http://www.colorado.edu/geography/gcraft/notes/cartocom/section6.html] that offers a good illustration of this truth.

To represent elements of the physical and cultural landscape on a map, they must be reduced in complexity and then fitted into a scheme so that their meaning can be understood by a map reader. Cities are shown as dots of differing sizes, blue lines represent streams, and regions are defined by colored polygons. This cartographic shorthand involves a third part of generalization, that of ***symbolization***. Well-made maps have a legend or key that explains the meaning of each type of symbol used on a map. Without this information, a map is difficult to interpret. Differences in symbols' shapes, sizes, hues, orientations, gray tone values, and textures are properties that are used to denote spatial and quantitative variation on a map. As with projections, the use of inappropriate symbols can convey erroneous information, and, as with projections, symbols can be manipulated to create false impressions. Again Foote's Web site [http://www.colorado.edu/geography/gcraft/notes/cartocom/section5.html] offers a good explanation of how cartographers utilize symbols.

The final part of cartographic generalization is ***induction***.. This occurs where the map contains more information than was in the original data. For example, with a phenomenon that has a continuous distribution like elevation or rainfall, one can infer the elevation or rainfall total at any point on a map, yet the data used to create that map may have been only a few points with known elevations or rainfall totals. Such maps are only approximations of reality. The greater the number of data points used to create them, the better their approximation of the truth.

As discomforting as it may be, you need to understand that no map is a totally truthful representation of the world. All maps are lies. Some lie more than others. To ferret out the truth you need to know how to decode the messages of maps and place maps into their historical context.

Model Interpretation: Northern Illinois, 1833 and 1853

A good place to see how historians want students to learn by using historic maps is Bruce Fetter's Teaching Graphicacy in the University Classroom [http://www.newberry.org/nl/smith/mapline88-2.html]. Without referring to the text, see how well you can do using the maps found here to identify the changes that occurred in northern Illinois' Joe Davis County between 1833 and 1853.

Next use the Questions to Ask to evaluate these maps and place them in their historical context. No title is provided, but Fetter offers a description that gives us a place—North America—and the dates—1833 and 1853. There is no subject, other than Fetter's classification of general reference maps. No orientation is given, so you could assume that the top of the map represents north. (You could confirm this by examining maps of the same area with a known orientation.) The map has no scale, so you need to be very careful about any assumptions concerning distance. To get a sense of correct distance you could take known points on the map and determine distance between them on a map of known scale. Several pairs of observations should be made before making any assumptions about the scale of the map. There is no legend, although that might appear on parts of the maps that are not shown. Some physical features such as swamps are identified. Streams are labeled, as are some political divisions, forts, and places. Fetter indicates that Indian villages are present. They are probably the small triangle symbols. Given the date, you could assume that the transportation lines are roads and not railroads. The presence of a legend would assist in more analysis. Meridians are shown, so the map can be placed in terms of longitude. At least one parallel occurs, but it cannot be identified. No projection is given, so it is difficult to assess the amount and type of distortion the map might contain.

Fetter indicates the maps are taken from Sheet IX of the North America series produced in 1833 and 1853 for potential British immigrants by the Society for the Diffusion of Useful Knowledge in London. From this we have information on the author/publisher, place and date of publication, purpose, and intended audience. Did the Society have a particular agenda in publishing these maps? Given their purpose, they were at least printed in limited numbers and perhaps mass-produced. We do not know the sources of the map data. With this information you are better able to assess these maps and how representative they may be for particular points in time.

Model Interpretation: Pittsburgh, 1871 and 1902

The forks of the Ohio River have played an important role in American history. The location of Fort Prince George, Fort Duquesne, and Fort Pitt at this point where the Allegheny and Monongahela meet underscores the Ohio's significance in the French and Indian War. Later this spot evolved into one of the premier industrial cities in the world, Pittsburgh, Pennsylvania. To understand part of that evolution, examine the following three images. Use the checklist in "Where Do I Begin?" to evaluate these materials. Note that not all items in the checklist will be applicable to all images.

The first two images are panoramic views of Pittsburgh. Panoramic images are not maps, but they have some of the properties of maps. Before beginning the analysis, see Panoramic Mapping, A Popular View of Victorian American Cities and Towns on the Library of Congress American Memory Web site [http://memory.loc.gov/ammem/pmhtml/panintro.html]. This should help place panoramas in their historical context and explain how they differ from maps.

Examine the 1871 panoramic view of Pittsburgh. [http://memory.loc.gov/cgi-bin/map_item.pl?data=/home/www/data/gmd/gmd382/g3824/g3824p/pm008321.sid&style=gmd&itemLink=D?gmd:1:./temp/~ammem_yUrW::@@@mdb=gmd,pan,lhbprbib,gmd,gmd&title=Pittsburgh,+Allegheny+%26+Birmingham+] Using this image, answer the following questions:

- What about the site of Pittsburgh helps explain why it became a major industrial city?
- Why was Pittsburgh often referred to as the "Smoky City"?
- Which river has the most traffic? Why?
- Which buildings are the tallest? How tall (in approximate stories) are they?
- Why are there so few trains and so many steamboats in this image?
- What do you think the quality of life was like in Pittsburgh in 1871?

Stream junctions are natural meeting places. In the age of steamboats the junctions of navigable streams were especially advantageous locations for towns. The relatively flat promontory of land between the two rivers offered a good location for development of a settlement. The extensive use of coal as fuel for transportation and in manufacturing gave rise to the label the Smoky City. It is interesting to note that the city was probably far smokier, as inspection of the chimneys in the image shows no smoke. It must have been a very hot summer day when no one was cooking a meal if the image is to be believed. Traffic is heaviest on the Monongahela River. Most of the city's iron works were on the Monongahela because it was used to reach the major source of coal for the iron making process. Proximity to the coking coals of the Monongahela Valley was one of the important factors in Pittsburgh's rise to prominence as an iron and later steel center. Some of the factories are three and four stories, as are some commercial buildings. However, the tallest structures other than smoke stacks are church spires. What does this suggest about the role of religion in American life in the 1870s? Railroads were just emerging as an important part of the nation's transportation system. The advent of steel rails would allow the movement of much heavier loads at greater speeds. Steamboats were still effective competition for the nascent rail industry. The quality of life in 1871 Pittsburgh probably left much to be desired. This can be inferred from the density of buildings, the lack of open spaces, and the smoky environment—keep in mind that the artist probably underrepresented smoke in this image to show details.

Next, examine the 1902 panoramic view of Pittsburgh. [http://memory.loc.gov/cgi-bin/map_item.pl?data=/home/www/data/gmd/gmd382/g3824/g3824p/pm008330.sid&style=pmmap&itemLink=D?gmd:150:./temp/~ammem_yYAo::&title=Pittsburgh,+Pennsylvania+1902.+] How has the city changed over time? How might you explain these changes? Changes in transportation, industrial, and building technologies were major factors. Other factors such as the presence of entrepreneurs like Andrew Carnegie and Henry Frick are even evident from the panorama. Consult the listings of buildings along the bottom margin to find the buildings connected to these two men. Notice, too, how skyscrapers, the cathedrals of capitalism, have superceded churches as the dominant element in the skyline.

To get a feel for what the city was like, examine the large scale plat maps found in the Historic Pittsburgh Project. Visit the Map Project Description [http://digital.library.pitt.edu/maps/mapsexplained.html] to learn more about these maps. To get a sense of the city and its various neighborhoods, examine several parts of the city. The 1903 Supplement to Volume 3 Central Pittsburgh—The Point [http://digital.library.pitt.edu/maps/03sv3ind.html] offers maps of the areas that are prominently displayed in the 1902 panoramic view of Pittsburgh. Start by examining the

legend and then pick one or more of the plates (I suggest plates 8 and 14). The two cathedrals, religious and capitalistic, are evident here. Next, try 1904 Volume 1—East End of Pittsburgh (including Oakland and Squirrel Hill) [http://digital.library.pitt.edu/maps/04v01ind.html]. Compare plates 31 and 4. Which of these neighborhoods has a higher status? How did you decide? Which one has the largest lots, most green space, and is nearest the railroad?

Maps Online

Some online maps are easier to navigate and manipulate than others, due in part to the large size of image-rich documents. Several sites require special software or plugins (available for free download) to read and manipulate maps; some maps download very slowly, even with a fast connection. A large number of maps, however, are available online, covering a broad range of topics, time periods, and perspectives. This list was created to provide an introduction to the kinds of maps available online and to emphasize some of the larger collections. The Library of Congress is one of the richest sources and offers many specific collections rich in maps that are not included on this list; in addition, there are a number of smaller sites that address specific topics. Many of these can be found in *History Matters* (from the full search page check the "maps" category from the "Making Sense of Evidence" categories).

Central Pacific Railroad Photographic History Museum
Central Pacific Railroad Museum
http://cprr.org/Museum/Maps/
On May 10, 1869, in Promontory Summit, Utah, a rail line from Sacramento, California, met with another line from Omaha, Nebraska. When the last spike was driven, the Central Pacific became the first transcontinental railroad. This site provides a vast collection of online materials documenting the history of the Central Pacific Railroad and rail travel, including more than 400 railroad and travel maps. Maps range from tourist guides to land office maps to summit contour maps.

Exploring the West from Monticello: A Perspective in Maps from Columbus to Lewis and Clark
Alderman Library, University of Virginia; Lewis and Clark Trail Heritage Foundation http://www.lib.virginia.edu/exhibits/lewis_clark/home.html
This 1995 exhibition presents approximately 70 maps designed to illustrate Thomas Jefferson's "views of the West and the nature of the quest to the Pacific," and the development of cartographic knowledge in North America before Lewis and Clark. Arranged into five sections, the site covers the period from the arrival of Columbus in North America to Lewis and Clark's 1803 voyage. Well-written background essays explain the role of technology in mapmaking and explore the social and intellectual contexts of Western exploration. The site offers both European and American perspectives. Particularly useful for understanding the evolution of geographic knowledge about North America and for tracing the history of cartography during this period.

Geography and Map Room
Library of Congress
http://lcweb.loc.gov/rr/geogmap/

A good beginning point for finding historic maps of the Americas. "Geography and Maps: An Illustrated Guide" offers an excellent overview of the Library's collections. Online collection titles are divided into seven topical areas: Cities and Towns; Conservation and Environment; Discovery and Exploration; Cultural Landscapes; Military Battles and Campaigns; Transportation and Communications; and General Maps. No commentary accompanies the maps, but there is a brief introduction to each collection. Several exhibitions contain historic maps. "Luso-Hispanic Cartobibliography" is a guide to the Library's collection of maps focusing on the exploration, discovery, and colonization activities of Portugal and Spain. The Colombian Exchange, the collision of old and new worlds, and the resulting exploration, colonization, and acculturation are explored in "1492: An Ongoing Voyage." "African-American Mosaic" and "African-American Odyssey" each contain several maps. "John Bull & Uncle Sam: Four Centuries of British-American Relations" documents U.S.-British relations over 400 years with maps related to exploration, colonization, and the Revolutionary War. "Language of the Land" is based on literary maps.

The Hargrett Rare Book and Manuscript Library
University of Georgia
http://www.libs.uga.edu/darchive/hargrett/maps/maps.html
This collection of more than 800 maps, dating from 1544 to 1939, covers primarily North American locations, with an emphasis on nineteenth-century Georgia. Maps are organized into nine chronological and topical divisions: New World, Colonial America, Revolutionary America, Revolutionary Georgia, Union and Expansion, American Civil War, Frontier to New South, Savannah and the Coast, and Transportation. Includes maps of battles, American Indian nations, railroads, and roads. Useful especially for studying military history and Southern development.

Historic USGS Maps of New England
University of New Hampshire Dimond Library
http://docs.unh.edu/nhtopos/nhtopos.htm
Created by the United States Geological Survey from the 1890s to the 1950s, the more than 1,100 topographical maps in this collection cover New England and selected areas of New York. The maps—revealing roads, buildings, rail lines, bodies of water, and elevations—occur in 15-minute and 7.5-minute quadrangle series (a minute is one-sixtieth of a degree of latitude or longitude). In addition, the collection includes six maps with 30-minute quadrangles. For most states, users can view a state image map and select a point within a grid marked off in 15-minute increments to find listings for available images accompanied by the dates of survey, creation, and revision. Towns within each quadrangle are listed along with names of adjacent areas, and users also may search an alphabetical list of towns within each state. Maps are presented in JPEG format and are typically two megabytes, so download times may be slow.

Historical Map and Chart Collection
Office of Coast Survey, National Oceanic and Atmospheric Administration
http://chartmaker.ncd.noaa.gov/csdl/MAP-COLL.htm
Provides more than 1,000 historical maps and nautical charts, mostly from the nineteenth century, produced or acquired by the Office of Coast Survey. Includes a Civil War collection of approximately 500 maps; a 90-sheet 1888 topological survey of

the Washington, D.C. area; a 48-sheet topological survey of Cincinnati made in 1912; and 16 facsimiles of explorer George Vancouver's charts of the Pacific Northwest made between 1791 and 1798. Additional resources include 27 maps of the Erie Barge Canal created between 1917 and 1923; a 43-sheet survey of the Mississippi River made between 1868 and 1880; and approximately 50 sketches of landscape areas along both coasts. Maps can be viewed at 100 dpi or downloaded at 300 dpi and are organized by region and type of map.

Map Collections: 1500-1999
Library of Congress, American Memory
http://memory.loc.gov/ammem/gmdhtml/gmdhome.html
Focusing on Americana and "cartographic treasures," this large collection of maps covers the sixteenth century to the present day. Special presentations include essays on "George Washington: Surveyor and Mapmaker," "The 1562 Map of America by Diego Gutierrez," and "National Atlases: Presenting the Nation's Cultural Geography." Users may zoom in to view details and download maps. Many specific map collections contained within this larger site are described in detail in *History Matters*, including: "Discovery and Exploration;" "The American Revolution and Its Era;" "Railroad Maps, 1828-1900;" "Panoramic Maps, 1847-1929;" "Civil War Maps;" and "Mapping the National Parks."

Map History/History of Cartography
Tony Campbell, Map Librarian (retired), British Library, London
http://www.ihrinfo.ac.uk/maps/
With an emphasis on early maps, this comprehensive gateway offers links to more than 100 sites on historical maps and the history of cartography. Includes sites offering images of early maps as well as sites that explore map collecting, Web projects on early cartography, histories of maps, and articles on cartography. Searchable by index or keyword. Extremely useful starting point for online cartographic resources.

Odden's Bookmarks: The Fascinating World of Maps and Mapping
KartLab, Cartography Section, Utrecht University, The Netherlands
http://oddens.geog.uu.nl/index.html
A gateway to more than 14,000 sites on and about cartography and geography. Allows searching by keyword and browsing by countries and categories, including maps and atlases, collections, societies, departments, government cartography, libraries, and literature. Provides links to 585 sites that offer historical maps and atlases.

Perry-Castañeda Library Map Collection
The University of Texas at Austin
http://www.lib.utexas.edu/maps/historical/index.html
These 500 historical maps of the U.S. are sorted thematically. Materials include three maps of early inhabitants, 11 of exploration and early settlement from 1675 to 1854, and 15 of territorial growth from 1775 to 1970. Of the 95 military history maps covering engagements from 1763 to 1967, 50 focus on World War II. Among 183 late nineteenth- and twentieth-century maps are 146 of U.S. cities produced around 1920. Historic sites, memorials, and battlefields are represented in 191 maps of sites such as Aztec ruins in New Mexico, the Bering land bridge in

Alaska, and the Vicksburg battle site in Mississippi. Most of the maps are excerpted from twentieth-century historical atlases.

The David Rumsey Collection
Cartography Associates
http://www.davidrumsey.com/index.html
A private collection currently presenting more than 4,400 historical maps of North and South America. Rumsey, a builder and real estate developer, is gradually making his personal collection accessible to Web users via two formats: a standard browser designed for the general public, and one requiring Insight Java software (can be downloaded) for more serious researchers. Most of the maps were made in the eighteenth and nineteenth centuries; many are notable for their craftsmanship. Includes "atlases, globes, school geographies, books, maritime charts, and a variety of separate maps, including pocket, wall, children's, and manuscript." Searchable by country, state, publication author, keyword, date, title, event, subject, and name of engraver or printer. Users may zoom in to view details. Especially useful for its ability to convey ways that locations have changed over time.

Smith Center for Cartographic Education, University of Southern Maine
Osher Map Library
http://www.usm.maine.edu/maps/web_exhibit.html
Twelve exhibitions offer more than 500 maps and related documents centering on aspects of history revealed through the study of maps. Many exhibits deal with Maine and New England locales. Exhibits that focus on American history include "The American Way," a collection of twentieth-century road maps and guidebooks; "Carto-Maine-ia," on popular uses of maps; and "Maine Wilderness Transformed." In addition, "The Cartographic Creation of New England," addresses European exploration and settlement, "The 'Percy Map,'" presents a map significant for its use during the Revolutionary War; and "John Mitchell's Map," called "the most important map in North American history," offers insight into diplomatic disputes. Valuable for studying the history of exploration, colonial history, New England history, and the importance of cartography in American history.

Selected Bibliography
Black, Jeremy. *Maps and Politics*. Chicago: University of Chicago Press, 1997.
Maps and politics have been interconnected since the dawn of mapmaking and imperial conquest. This book makes a strong case for the political power of maps. Black buttresses his commentary with an abundance of illustrations.

Buisseret, David. ed., *From Sea Charts to Satellite Images: Interpreting North American History Through Maps*. Chicago: University of Chicago Press, 1990.
This is a collection of works by historians, geographers, and map librarians who discuss how to use maps in teaching and research. The topics covered range from the European Antecedents of New World mapping to Aerial Imagery.

Harley, J.B. *The New Nature of Maps: Essays in Historical Cartography*, ed. Paul Laxton. Baltimore: John Hopkins University Press, 2001.

This is a posthumously issued collection of the writings of one of the leading scholars of philosophy of cartographic history and the meaning of maps in the last quarter of the twentieth century. See especially chapter 5, “Deconstructing the Map.”

Monmonier, Mark. *How to Lie with Maps*. 2d ed. Chicago: University of Chicago Press, 1996.
This is an easy-to-read guide for what to look for and what to watch out for when you read a map. When you finish this book you will be a far savvier map reader.

Ristow, Walter W. *American Maps and Mapmakers: Commercial Cartography in the Nineteenth Century*. Detroit: Wayne State University Press, 1986.
Ristow, who retired in 1978 as the Chief of the Map Division of the Library of Congress, brings together in this work commentary on the great variety of maps that appeared in the nineteenth century. This is a good starting point for anyone interested in maps of that period.

Thrower, Norman J. *Maps and Civilization: Cartography in Culture and Society*. Chicago: University of Chicago Press, 1996.
Initially published as *Maps and Man* in 1972, Thrower’s book is a must for students of the history of cartography. Here, in very readable and concise prose, is the story of the development of mapmaking that treats both the scientific and artistic nature of cartography. It contains an extensive bibliography.

Tyner, Judith. “Persuasive Cartography,” *Journal of Geography* 81 (1982): 140-44.
A dated, but concise, guide for keys to how maps can be used to stretch the truth.

Wood, Denis. *The Power of Maps*. New York: Gilford Press, 1992.
The titles of three chapters in this book explain it well. They are: “Maps Are Embedded in a History They Help Construct,” “Every Map shows this…But Not That,” and “The Interest the Map Serves is Masked.”