

Sources for Historic Aerial Photography and Maps of the United States

Joshua Sky and Leslie A. Morrissey, Ph.D.
Rubenstein School of Environment and Natural Resources
University of Vermont

Introduction

Historical maps and aerial photographs provide insight into the condition of landscapes at a given point in time. Understanding and interpreting historic maps and aerial photographs helps researchers document the evolution and changes that have shaped our important historical landscapes. The search for and procurement of maps and aerial photographs of a given location is a daunting task. This document summarizes the key historic map and aerial photography archives in the United States. Ideally, this document will serve as a starting point from which historic preservationists and other cultural resource professionals can launch a search for historic maps and aerial photographs.



Fig 1: 1860 Aerial View of Boston from a hot air balloon, taken by James Wallace Black

Historic Aerial Photography

The first aerial photographs were created when photography pioneers first mounted hot air balloons and took photography to the skies in the late 1850's. Although this technique was first pioneered in France, the oldest photograph in existence is one taken of Boston by James Wallace Black in 1860 (Fig 1.) The availability and coverage of these photographs is very limited and

the serve as a footnote to the more comprehensive sources of aerial surveys conducted by the U.S. government. Since the mid 1930's comprehensive photographic surveys of the entire U.S. have been conducted. These resources are stored within the various agencies of the government and are discussed in detail in the following sections.

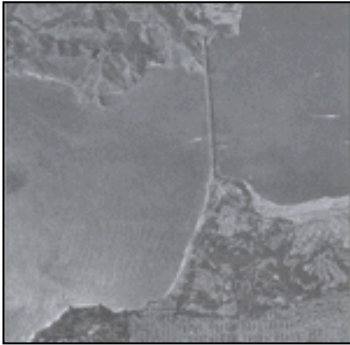


Fig 2: Vertical Aerial Photograph, Golden Gate Bridge, San Francisco, Calif., National Aerial Photography Program, August 1993.

Aerial photographs are images captured on film from an airborne platform and are usually reproduced as photographs. These images are further defined by their perspective, oblique or vertical. Vertical aerial photographs (Fig. 2) are created when the camera is aligned perpendicular to the horizon and are the focus of this paper. Aerial

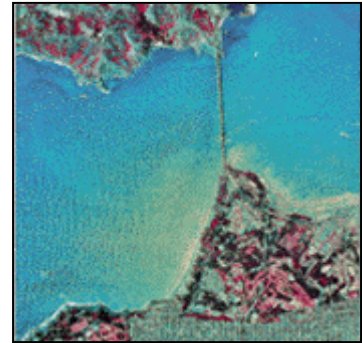


Fig 3: Golden Gate Bridge, San Francisco, Calif., National Aerial Photography Program color-infrared aerial photograph, June 1987

photographs are also categorized by the photographic medium they are captured on, black and white, natural color or color infrared (CIR) film. Black and white photographs, also called panchromatic, are the most common type of historical aerial

photography. Natural color images are less common, but provide an inexperienced observer with an easily understandable view. CIR images, which are available from the 1960s, are especially suited to differentiating vegetated and non-vegetated areas (Fig 3) because the infrared wavelength that is captured on this film is sensitive to green vegetation and soil moisture.

Scale is the property of an aerial photograph that determines ground coverage and the ability to resolve landscape features. The scale of an aerial photograph is determined by dividing the focal length of the camera by the altitude of the flight platform. An aerial photograph, although it will come complete with scale information, can not be used like a paper map. The differences in elevation, displacement of features toward the edges of the photograph, and the angle of capture contained in the photograph will cause linear distortions between points on the ground. An orthophoto is an aerial photo that has had the distortions removed by a photogrammetric process. Given this warning, the original scale of an aerial photograph is important in deciding what application it is most suited for. A large tract of land such as a National Forest or major watershed may be best served by a small scale, above 1:40,000, photograph that will provide good coverage and adequate detail. Conversely, a large scale photograph (e.g. 1:5000) is ideally suited to small study areas, like historic battlefields or managed historic landscapes.

Aerial photographs are available in a number of formats that specify the type of medium and size of the finished product. Common mediums are paper print, film positive, film negative and digital data. Many photographs are presented as 9-by-9 inch prints, or 4.5-by-4.5 inch and 9-by-18 inch prints. However, more and more photographs are being transferred to and acquired in digital format. When selecting a format, the final use of the product should be considered. For example, if you are interested in using digital image processing or GIS to evaluate your image you should select a digital format. In summary, when searching for and acquiring aerial photography, criteria for selection should include scale, film type, and format

Historic Maps

The United States has been mapped consistently since the first European explorers ventured across the Atlantic. Since that time, everything from Native American maps drawn on the earth to advanced orthographically-corrected color aerial photographs have been used to capture the landscape. Historic maps come in many different shapes, scales and formats, and the USGS has some excellent references to help map hunters to quickly find information on potential sources for maps. These three are a good starting point:

Map Collections in the United States and Canada: A Directory compiled by David K. Carrington and Richard W. Stephenson and published by the Special Libraries Association, New York, c1985. 188p. 4th ed.

Antique Map Reproductions: A Directory of Publishers & Distributors of Antique Map, Atlas & Globe Facsimiles & Reproductions edited by Gregory C. McIntosh and published by Plus Ultra Publishing Company, New York. October 1, 1998. 56p. 1st ed.

Guide to U.S. Map Resources edited by David A. Cobb and Published by the American Library Association, 1990. 2nd ed.

Starting a Search

The first step in a search for historic aerial photographs and maps is to define a study area. Identify latitude and longitude, or geographic coordinates, for the four corners of a rectangle surrounding the area of interest. A paper map, preferably from a USGS topographic series, with the study area outlined is also very useful. Make several copies of this map, as you will probably have to send it out to several different parties during the search process.

The second step is deciding where to begin searching. If your study area is located nearby it is good idea to begin your search using local resources. However, if your study area is located far away or in a remote area the federal sources are a good starting point. In either case the Internet can also be an excellent starting point from which to see what types of information might be available for your study area. Many local, state and federal sources provide descriptions of the type of data available on their websites. It is even possible to order photographic prints or maps from many Government Webpages.

After finding several potential sources for historical data the third step in the search for historic maps and photographs is to record all of the bibliographic information available. This information, which is often overlooked, can save hours of wasted research time. Record as much information about the data source as possible, such as the flight information of an aerial photograph, or the cartographer and publisher of an historical map. Often this information is only available on-site and even small details can prove to be very useful at some point during subsequent research.

After actually locating historic maps and aerial photographs it is necessary to obtain an adequate reproduction. Many sources for historic documents offer on site reproduction in analog or digital format. However, certain facilities, offer almost no means to reproduce an image and it is advisable to pre-arrange a method for obtaining a copy of the desired map or photograph.

The Local Level: State, County, Town, and Other Sources

The search for historic maps and aerial photographs through local channels is different for each location. However, some general strategies and tips are suggested here. Perhaps the best advice is to start with a broad search and then focus your efforts when you begin to find where the best repositories are. State agencies responsible for taxation, transportation, natural resources, and general geographic information often conduct mapping programs and are excellent places to begin a search. Often these agencies will have contact information available on the WWW. Another excellent resource for historical material is to locate the State Historical Archive or Records Depository.

Most state agencies will have several map and aerial photographic sets that offer very good coverage of their state. When attempting to find an individual photograph for a particular study area, it is useful to use an index (composite of several aerial photographs). State agencies are not usually equipped to produce large quantities of photographic prints or map reproductions to the general public, so ingenuity is often necessary to obtain copies of important historical documents. Whenever possible it is best to visit a specific agency with a recording or reproduction device (e.g. scanner and laptop, or digital camera and tripod) for the map or photograph of interest.

Many states are modernizing the collection and distribution of their geographic resources into a computerized Geographic Information System (GIS). Access to a description of the holdings and often free data layers can be found through most states

WWW portal. The information available varies from state to state, with Massachusetts providing full color, ½ meter pixel size, digital orthographic photographs online and Colorado providing a link to several federal government sources for GIS archives. The major drawback to finding historical data in a state GIS is that the organizations are relatively new. Therefore much of the information in these GIS archives focuses on the current rather than historical conditions of the landscape.

Another source of historical imagery is a college or university map room. Map rooms are repositories for all of the spatial data contained within a particular library and often contain a variety of maps and aerial photographs. Map rooms are often repositories for state agency, federal agency, and commercial materials. All of these data types can be found in an array of formats, conditions, and completeness. A preview of the map and photograph collections stores within map rooms is often listed in the University or College Web Site. Map rooms are best approached through the WWW and then by a site visit. If a visit is impractical then contacting the administrator and requesting a detailed description of specific holdings may be necessary first step. This will usually determine whether a site visit is practical or not. It is important to remember to ask what type of hardware is available to make reproductions of the various maps and aerial photographs as the originals generally do not circulate to the public.

Town and county offices can also be good sources for historical maps and aerial photographs. Many study areas, especially those of historical importance, have been selected due to interesting characteristics that have long been known by local inhabitants.

Consequently, some of these areas are associated with a museum or local historical society. A few select areas may even have privately funded archives dedicated to maintaining a complete historical record of the area. Historical societies, museums and private archives will often have unique or hard to find maps and imagery that may not be available elsewhere. The geographic coverage of these materials is often very limited, but it will often include a portion, if not complete coverage of specific study areas.

A major problem associated with maps and aerial photographs found in smaller institutions is the lack of resources to adequately reproduce of the material. It is advisable to call ahead when approaching these sources and obtain permission to reproduce any images you may need. Often this will require that photographic reproduction or large format scanning be used to capture the images. Usually an outside source (e.g. reprographic service) is needed to scan or digitize large base images and it can be quite expensive.

Federal Sources of Historic Aerial Photographs and Maps

The U.S. Government is the largest single repository for aerial photography. Federal agencies have been photographing the U.S. since the mid 1930's. Six major agencies (summarized in Table 1) hold the majority of photographs and maps and they can be searched in a variety of different ways. The holdings of each of the major federal agencies will be discussed in the following section.

Table 1: Summary of Federal Sources for Historic Aerial Photographs and Maps

Agency	Aerial Photograph Availability Range	Film Format	Product Format	Map Availability Range	Map Holding Highlights
United States Geological Survey	1940s-Present	B&W CIR Color	Print Negative Positive Digital	1884 – Present	Topographic
United States Department of Agriculture	1940s –Present	B&W CIR	Print Negative Positive	1900s – Present	Agricultural Census Data
Library of Congress	1900s-Present	B&W CIR Color	Print Digital	1500s- Present	Early American Maps
National Archives and Records Administration	1935-1960s	B&W	Print	1774 – Present	Public Land Survey Records
National Ocean Service	1940s-Present	B&W CIR Color	Print Negative Positive	1700s - Present	Nautical Charts, Early Topographic Maps
Tennessee Valley Authority	1935 – Present	B&W CIR	Print Negative Positive	1933 – Present	Historic City Maps

United States Geological Survey

The U.S. Geological Survey (USGS), established in 1879, has a large number of historical topographic maps and aerial photographs available for public use. Maps dating to 1879 as well as aerial photographs from 1939 to the present are available. The USGS preserves out-of-print maps on microfilm and photographs are preserved as negatives. In this way, the USGS can limit its vast inventory to the most current data and still provide copies of older maps and photographs. Out-of-print maps are available for purchase as

black-and-white photographic paper reproductions and photographs are available in a variety of formats.

To obtain a reproduction of a particular topographic map from the USGS, send a research inquiry to a regional USGS Earth Science Information Center (ESIC). The letter of inquiry should give as much information as possible, including the State, county, and town or township; year of interest or range of years; as well as the type of information you are seeking on the map. For example different types of information might include, streams and rivers, railroad lines, roads, or geographic or cultural features. Map reproductions are approximately 24 by 30 inches in size at a cost of \$6-7 dollars a sheet.

Select USGS Earth Science Information Centers

Reston - ESIC
USGS
507 National Center
Reston, VA 22092
(703)648-6045

Salt Lake City - ESIC
222 West 2300 South, 2nd Floor
Salt Lake City, UT 84119
(801)975-3742

Rolla - ESIC
USGS
1400 Independence Road
Rolla, MO 65401
(314)341-0851

Menlo Park - ESIC
USGS
Room 3128, Bldg. 3
345 Middlefield Road
Menlo Park, CA 94025
(415)329-4390

Lakewood - ESIC
USGS
Box 25046, Federal Center
Denver, CO 80225
(303)236-5829

Anchorage - ESIC
USGS
4230 University Drive, Room 101
Anchorage, AK 99508-4664
(907)561-5555

Nationwide Information Number: (888) ASK-USGS

Historic USGS maps are available from the Historical Map Archives of the National Mapping Division Reference Collection. In addition digital versions of USGS topographic quadrangles of New England and New York are available online through the Diamond Library at the University of New Hampshire. The online collection of over 1500 topographic maps (<http://docs.unh.edu/nhtopos/nhtopos.htm>) includes complete

U.S. Geological Survey
NMD Reference Collection
Historical Map Archives
522 National Center
Room 2B125
12201 Sunrise Valley Drive
Reston, VA 20192 USA
E-mail: slowell@usgs.gov
Phone: 703-648-4800
Fax: 703-648-5199
<http://mac.usgs.gov/historical.html>

geographical coverage of New England and New York from the 1890s to 1950s. The database of historical maps is searchable by state and town and map images can be downloaded in JPEG image format at no cost.

The U.S. Geological Survey (USGS) is searchable via mail, phone, fax or the internet. A basic search of the USGS for aerial photos involves accessing the Aerial Photographic Summary Record System (APSRs). The APSRS is a record of aerial photographic coverage of the U.S. from federal and participating state, regional, and commercial sources. APSRS is available on CD-ROM or the USGS will search the database for a fee. If the CD-ROM is not available, the search must be performed by contacting an Earth Science Information Center. Photographs can not be ordered from APSRS results, the sources listed in the results must be contacted directly.

An APSRS search will undoubtedly list the Earth Resource Observation Systems (EROS) Data Center as a source for many aerial photographs. The EROS Data Center holds millions of aerial photographs from the 1940s to the present. Photographic holdings

are summarized at the USGS EROS Data Center web page, <http://edc.usgs.gov/products/aerial.html>. The main holdings of the EROS data center are the National High Altitude Program (NHAP), and the National Aerial Photography Program (NAPP) photographs.

USGS
 EROS Data Center
 Sioux Falls, SD 57198
 (605)594-6151
<http://edcwww.cr.usgs.gov/>

The NHAP was enacted in 1980 to acquire aerial photography of the entire U.S. The NAPP, successor to the NHAP program, systematically collects 1:40,000 scale CIR photography of the entire U.S. every five years. These aerial photographs provide high quality inexpensive products dating back 20 years. The general characteristics of these photographs are summarized in Table 2.

Table 2: NHAP vs. NAPP

	NHAP	NAPP
Collection Dates	1980-1987	1987-Present
Scale	1:58,000 and 1:80,000	1:40,000
Ground Area	8 x 8 miles and 11 x 11 miles	5 x 5 miles
Film Types	black & white, CIR	black & white, CIR

Obtaining aerial data from the EROS Data Center can be a difficult process, but there are some shortcuts that can expedite the process. Historical searches, that don't necessarily focus on NAPP and NHAP photos, can be accomplished by filling

out the "Inquiry Form: Geographic Search for Aircraft Data" to the best of your ability. This form is available upon request from EROS Data Center. Another way to search the EDC database is through the WWW. This method is preferable because secure online ordering of photographs is available as soon as you find them. The EROS Data Center website provides links to several other searchable databases; these are detailed in Table 5. The USGS is continually updating and refining the process by which aerial photographs are archived and reproduced, please visit <http://ask.usgs.gov/photos.html> to see the most recent updates.

Table 5: USGS Aerial Photograph Websites

Site	Web Address	Products
EarthExplorer	http://edcsns17.cr.usgs.gov/EarthExplorer/	A complete search and order tool for aerial photos and other USGS products.
PhotoFinder	http://edc.usgs.gov/Webglis/glisbin/finder_main.pl?dataset_name=NAPP	USGS National Aerial Photography Program (NAPP) Photos.
Global Land Information System	http://edc.usgs.gov/webglis	A search and order tool for aerial photos and other products distributed by the USGS.

United States Department of Agriculture

The U.S. Department of Agriculture (USDA) stores all of its aerial photography in its Aerial Photography Field Office (APFO) in Salt Lake City, Utah. This agency has been acquiring aerial photography since the 1930s and can generally reproduce pictures from the 1940s to the present. APFO can be contacted directly and will perform a search for photos. Three agencies within the department, the Consolidated Farm Service Agency, the Natural Resources Conservation Service and U.S. Forest Service use a great deal of

USDA
Consolidated Farm Service Agency
Aerial Photography Field Office
P.O. Box 30010
Salt Lake City, UT 84130-0010
(801)975-3505
Fax:(801)975-3532
<http://www.apfo.usda.gov/>

the USDA aerial photography. It is worth contacting a local office to locate photographs that may not be stored at the APFO location. NAPP and NAHP photographs are also available through the APFO.

Historic maps created by the USDA are available through the National Cartography and Geospatial (NCG) Library. A computerized database exists in which the maps produced by NRCS are cataloged. This catalog of products, listing both in-house and Federal Records Center files is comprised of over 12,000 entries and is growing continuously. It may be searched by old and new identifying numbers, type of

USDA/NRCS
NCG Library
P.O. Box 6567
Fort Worth, Texas 76115-0567
Phone: (817) 509-3394 or (817) 509-3411
Email: dgaster@ftw.nrcs.usda.gov or
rvenable@ftw.nrcs.usda.gov

map, geographical or political location, title, and scale. Specialized printouts may be created. Manual records (cards) are kept on materials archived prior to 1979.

National Archives and Records Administration

The National Archives and Records Administration (NARA) holds over 9 million aerial photographs and more than 2 million maps produced by civilian and military branches of the U.S. government in its Cartographic Archives and Architectural Division. Photography records date from 1935 to the mid 1960s and maps are available from 1774 to the present. The scale of the photography varies (generally from 1:15,000 to 1:56,000). NARA will process a written request for information and has indexes available to the public in the research room of the Cartographic Archives Division. NARA has published a useful document entitled *Aerial Resources in the National Archives*: Special List Number 25. NARA also has an online database called NARA Archival Information Locator (NAIL), <http://www.nara.gov/nara/nail.html>, which is described as a working prototype of a future database. It contains information about aerial photography and map holdings, but does not provide specific geographic details in the search results. The following publications, which can be viewed online, may prove useful in conducting historical map research through NARA:

Cartographic and Architectural Branch (NWDNC) National Archives 8601 Adelphi Road College Park, MD 20740-6001 Reference Inquiries 301-713-7040 Fax Number 301-713-7488 http://www.nara.gov/

General Information Leaflet No. 26

Cartographic and Architectural Records

http://www.archives.gov/publications/general_information_leaflets/26.html

Special List No. 29

List of Selected Maps of States and Territories

http://www.archives.gov/publications/finding_aids/special_list_29/index.html

Library of Congress

The Library of Congress serves as the research arm of Congress and is recognized as the national library of the United States. As the world's largest library, it is a great resource for scholars and researchers. In the Geography and Map Division Reading Room of the Library of Congress, researchers can find the largest cartographic collection in the world, including more than 4.5 million maps and 60,000 atlases, as well as cartographic materials in other formats. These cartographic materials date from 14th century portolan charts through recent Geographic Information System data sets. The Geography and Map division also houses seven million aerial photographs and other remotely sensed images of the earth taken by National Aeronautics and Space Administration and USDA. Additional aerial photography can be found in the Prints and Photographs Division of the Library. These images are from various sources and date from the 1900's to the 1940's.

Geography and Map Division
Library of Congress
101 Independence Ave. SE
Washington, D.C. 20540-4650
Phone: 202-707-6277
Fax: 202-707-8531
E-mail: maps@loc.gov

Prints and Photographs Division
Library of Congress
101 Independence Ave. SE
Washington, D.C. 20540-4730
Phone: (202) 707-6394
Fax: (202) 707-6647
E-mail: "Ask a Librarian"

The best option for searching the Library of Congress is to pay a visit to Washington, DC and look through the card catalog or the Reading Room of the Geography and Map Division. The *Library of Congress Geography and Maps: An*

Illustrated Guide (lcweb.loc.gov/rr/geomap/guide) is a useful publication for becoming familiar with the resources available in the Geography and Maps division. Library staff will also accept specific research requests via phone, fax or e-mail. Once a photograph or map is located, a reproduction can be produced and mailed out to a researcher.

Recently, the Library of Congress has made its card catalog available online at <http://catalog.loc.gov/> and records for aerial photography can be retrieved. At present, the search interface is somewhat difficult to understand and the search results lack specific geographic coordinates. The Library of Congress webpage, <http://www.loc.gov/>, has a feature called "Ask A Librarian", where specific research requests are accepted. "Ask a Librarian" results are usually returned within 5 business days and are conducted by the library's professional staff. A dedicated search of the Library will often result in the location of some of the oldest and rarest historical data of a particular study area.

National Oceanic and Atmospheric Administration

National Ocean Service

The U.S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA) maintains a branch called the National Ocean Service (NOS). NOS is charged with making nautical charts for U.S shorelines in the Atlantic, Pacific and Great Lakes regions. The creation of these charts is conducted by the Remote Sensing Division of the NOS National Geodetic Survey. Since the late 1930s, NOS has been conducting aerial surveys of the U.S. coastline and airports. There are 500,000

photographic negatives indexed and archived from 1945 through the present. As of October 2002, NOS had roughly 45,000 of these images scanned and available online at the NOS MapFinder web site (<http://ohio.nos.noaa.gov/default.html>). The agency has

Special Projects Office National Ocean Service - NOAA 9th Floor, SSMC4 1305 East West Hwy. Silver Spring, MD 20910 (301)713-3000 x132 mapfinder@noaa.gov

plans to add all 500,000 photographic records to MapFinder, so the site is worth repeated visits. NOS photographic records differ from many of the other federal sources because the agency has experimented

with natural color film.

NOS also maintains a collection of over 20,000 maps and charts from the late 1700s to the present day in the Office of Coast Survey's Historical Map and Chart Collection.

Some of the nation's earliest nautical charts, hydrographic surveys, topographic surveys, geodetic surveys, city plans and Civil War battle maps are housed in the NOS collection.

The Historical Map and Chart Project has scanned each map or chart and offers the images free to the public through the Coast Survey web site

(<http://historicals.ncd.noaa.gov/historical/histmap.asp>). The Project is managed by the

Cartographic and Geospatial Technology Program of the Coast Survey Development

Laboratory.

Tennessee Valley Authority

In 1933 President Roosevelt created the Tennessee Valley Authority (TVA) through the New Deal program. Over 400,000 square miles of land in Alabama, Mississippi, Georgia, Kentucky, Virginia, North Carolina and Tennessee were put under the management of the federal government to ensure that agricultural and industrial development would be coordinated and the natural resources conserved. Maps and aerial photographs of the region can be purchased through the TVA map store. At present, a searchable database of current products is under construction, but a map store representative will respond to specific requests.

Tennessee Valley Authority – Map Store
1101 Market St.
Chattanooga, TN 37402-2801
(432)751-MAPS
(800)MAPS-TVA
Fax:423-751-6216
E-mail:mapstore@tva.gov
<https://maps.tva.com/>

Maps of the TVA lands are available in a wide variety of formats and tend to focus on the dams, locks, towns, and other constructed features.

Topographic maps of the area are also available through the map store. Aerial photography products include black and white, color, and CIR

photographs. Most of these photographs were produced from low altitude flights and range in scale from 1:8,000 to 1:24,000. Reprints from the TVA map store are available in many sizes (18x18, 27x27 or 36x36 inches).

Conclusion

There are many different sources for historical maps and aerial photographs in the United States. From the small historical society, run by a single person and holding a single map, to state and federal archives, staffed by thousands and maintaining millions of map and photographic documents, the amount information available is staggering. This information is accessible, and with a little planning, the different search options can be prioritized.

This document provides recommendations on a process. Start with a broad search in the federal archive, and then narrow down your options by looking in local sources such as University map rooms, town offices, and historical societies. In addition this document provides a summary and contact information for major archives. The information provided should be an excellent starting point for a search for historical maps and photographs.

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Contact Information: Dr. Leslie A. Morrissey, University of Vermont, Rubenstein School of Environment and Natural Resources, 325 Aiken Center, Burlington, VT. 05405, 802 656-2695, Leslie.Morrissey@uvm.edu