National Geospatial Program

Specification for the U.S. Geological Survey Historical Topographic Map Collection

Chapter 11 of
Section B, U.S. Geological Survey Standards
Book 6, Collection and Delineation of Spatial Data

Techniques and Methods 11–B6

U.S. Department of the Interior
U.S. Geological Survey

COVER. *Cartographers in the Field*. This Depression-era oil painting, created by Hal Shelton in 1940, depicts mapping techniques used in the early days of cartography, including an alidade and stadia rod for determining distances and elevations and a plane-table for sketching contour lines. This 4-by-6 foot painting is on display in the U.S. Geological Survey (USGS) library in Menlo Park, California. Photograph by Terry Carr, USGS.

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SALLY JEWELL, Secretary

U.S. Geological Survey
Suzette M. Kimball, Acting Director

U.S. Geological Survey, Reston, Virginia: 2014

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)

SI to Inch/Pound

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
	Area	
square kilometer (km^2)	0.3861	square mile (mi^2)

Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD27), unless stated otherwise.

A U.S. Survey Foot is defined as: 1 meter = 39.37 inches. Dividing 39.37 inches by 12 (12 inches per foot), the resulting conversion factor is 1 meter = 3.280833333 U.S. Survey Feet (reference *www.ngs.noaa.gov/faq.shtml*).

Abbreviations and Acronyms

BAT	batch file
CSDGM	Content Standard for Digital Geospatial Metadata
CSV	comma-separated variable
DPI	dots per inch
Esri	Environmental Systems Research Incorporated
FGDC	Federal Geographic Data Committee
GDA	geospatial data architecture
GDAL	Geospatial Data Abstraction Library
GeoTIFF	georeferenced TIFF
GeoPDF	georeferenced PDF
GIS	geographic information system
GNIS	Geographic Names Information System
HTMC	Historical Topographic Map Collection
HTML	hypertext markup language
ISBN	international standard book number
JPEG	joint photographic experts group
KML	keyhole markup language
NAD	North American Datum
NAD27	North American Datum of 1927
NGP	National Geospatial Program
PDF	portable document format
PPI	pixels per inch
RBG	red green blue (image color channels)
SDK	software development kit
SRS	spatial reference system
TIFF	tagged image file format
USGS	U.S. Geological Survey
US Topo	U.S. Geological Survey's digital topographic map product
XML	extensible markup language

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Introduction

This document provides the detailed requirements for producing, archiving, and disseminating a comprehensive digital collection of topographic maps for the U.S. Geological Survey (USGS) Historical Topographic Map Collection (HTMC). The HTMC is a digital archive of about 190,000 printed topographic maps published by the USGS from the inception of the topographic mapping program in 1884 until the last paper topographic map using lithographic printing technology was published in 2006. A digital file representing the original paper historical topographic map is produced for each historical map in the HTMC in georeferenced PDF (GeoPDF) format (a portable document format [PDF] with a geospatial extension).

Applicability

This specification is applicable to the USGS HTMC project. The requirements in this document are specific to the printed USGS topographic maps originally published between 1884 and 2006. The requirements are applicable to approximately 180,000 printed historical maps that were scanned, georeferenced, and added to the HTMC over a 3-year period (2009–2012). The requirements are also applicable to more than 10,000 additional maps discovered and added to the HTMC after 2012. The requirements in this document are not considered best practices, because they may not be directly applicable to other printed map collections or to smaller scope projects.

Although the requirements in this specification are primarily driven by the GeoPDF format for HTMC digital maps, the USGS reserves the right to distribute historical topographic maps in other file formats. Future updates to this specification may include such definitions.

Related Standards

This specification is a companion document to the Historical Topographic Map Collection Product Standard (Allord and others, 2014). The HTMC Standard defines the digital map product and its high-level format and structural requirements. This specification contains the detailed requirements for producing, archiving, and disseminating the HTMC digital map product.

Maintenance Authority

The USGS National Geospatial Program (NGP) is the maintenance authority for this document and other standards and specifications for *The National Map*. Submit questions and comments concerning this document through the National Geospatial Program Standards and Specifications Web site at *http://nationalmap.gov/standards/* or email *nmpstds@usgs.gov*.

Document Organization

This specification is organized into seven main sections, in addition to this Introduction:

Background—Provides background information on the USGS Topographic Mapping Program, the scope of the HTMC project, and an overview of the process used to create the HTMC digital maps.

Source Data—Describes the type of historical maps that are incorporated into the project and the associated quality requirements (such as the condition of the paper map).

Scanning—Describes the optical resolution, bit-depth, compression, and output-file-format requirements for scanning a large archive of printed USGS topographic maps.

Metadata—Describes the required information that is extracted from the map collar of each scanned map and the formats for providing the information.

Georeferencing—Describes the requirements for tying the scanned maps to a known Earth coordinate system using automated processes.

Product Development—Describes the details about how the HTMC GeoPDF map product and its supporting file formats are created.

References Cited—Lists the full citations of all the references used in this specification.

Requirement Terminology

Requirements are provided at the end of each section as bullet-point “must” or “should” statements:

- A “must” statement means the requirement must be met in all cases.
- A “should” statement indicates the requirement is expected to be met wherever possible but exceptions to implementation may exist.

Background

Project Overview

The USGS is scanning all scales and all editions of approximately 190,000 topographic maps published by the USGS between 1884 and 2006. This scanning provides a comprehensive digital repository of USGS topographic maps that is easily discovered, browsed, and downloaded by the public at no cost. Each map image is scanned "as is" and captures the current content and condition of each one. The project provides ready access to maps that are no longer available for distribution in print. A new generation of digital topographic maps called "US Topo" was defined in 2009. US Topo maps, though modeled on the legacy 7.5-minute topographic maps, conform to different specifications (see Cooley and others, 2011, for more information on the US Topo product).

John Wesley Powell gained authorization from the U.S. Congress to begin systematic topographic mapping of the United States in December 1884. During an address to Congress, Powell said, "*A government cannot do any scientific work of more value to the people at large than by causing the construction of proper topographic maps of the country.*" The USGS created and printed topographic maps using traditional cartographic methods and lithographic processes from 1884 until 2006 (U.S. Geological Survey, 2010a,b). Thus, all topographic quadrangle maps produced between 1884 and 2006 are included in the HTMC project. See the project Web site at *http://nationalmap.gov/historical/* for more information. The HTMC project does not include county maps, State base maps, geologic maps, and many other series that are not topographic quadrangle maps.

The HTMC project involves archiving digital copies of the original paper topographic maps and creating metadata (complete information about each map) to accompany the high-resolution, digital maps. The primary HTMC product is a digital file representing the original paper historical topographic map distributed as a GeoPDF. The GeoPDF digital map is intended to be used by the general public and users requiring reference maps for a geographic area that may not have geographic information system (GIS) software. Digital maps are georeferenced (tied to a known Earth coordinate system) to provide for basic map analysis, such as distance and area calculation, and coordinate readouts. The coordinate readout is confined to the neatline of the map, as opposed to the entire image, which includes the map collar, so that adjacent digital map files can be seamlessly tiled together. The digital maps are also "GeoMark enabled" meaning that a user can add text, annotation, or shapes (including points, lines, and polygons) to the map. The geographic locations of the markups can be exported into a different format, such as Environmental Systems Research Incorporated (Esri) shapefiles or keyhole markup language (KML) files. Digital maps also provide zoom, pan, and printing capabilities (printing the entire map or any desired portion of the map).

The digital HTMC maps are available publicly at no charge. At the time of this publication (2014), digital HTMC maps are available for download from the USGS Map Store (*http://store.usgs.gov*), the TopoView Web site (*http://ngmdb.usgs.gov/maps/Topoview/*), the HTMC Web site (*http://nationalmap.gov/historical*), and *The National Map* viewer (*http://viewer.nationalmap.gov/viewer/*). As of 2014, more than 6 million GeoPDF digital maps have been downloaded since the HTMC digital maps were first released in September 2011.

Process Overview

The process developed for the HTMC project was driven by both the nature of the printed USGS topographic quadrangle maps (rectangular mapped area in latitude and longitude with a regular grid of control marks) and the large scope of the project (scanning, archiving, georeferencing, and disseminating approximately 190,000 topographic maps). The HTMC project aimed to automate as much of the production process as possible. For example, by automating the georeferencing process, the HTMC project achieved approximately 45 person-years of manual work (Burt and others, 2014a) in less than 3 years.

Figure 1 presents a high-level overview of the HTMC production process. Historical topographic maps are first scanned into a tagged image file format (TIFF), typically at a resolution of 600 pixels per inch (PPI). Then, metadata is collected from the information printed in the map collar of the scanned map. Scanned maps are georeferenced to the original map datum and reprojected to the original map projection. The GeoPDF digital map file is generated using TerraGo Publisher for Raster software. To support the seamless viewing of multiple GeoPDF files, neatline coordinates are added to the GeoPDF header file. The neatline confines the georeferenced area to the mapped area (the map collar area is excluded). Lastly, an extensible markup language (XML) metadata file complying with the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geographic Metadata (CSDGM) is generated and attached to the GeoPDF.

As seen in figure 1, the main steps in the HTMC production process include scanning, metadata collection, georeferencing, and product development. Each step, and its associated requirements, are discussed in detail in the following sections.

Source Data

All available editions of all USGS standard topographic maps, at all published scales and series, are included in the HTMC project. Every printing (that is, restock and [or] update) of each historical map is considered a unique source map for inclusion in the project. The primary collection of source-data for the HTMC project is the USGS Map Library in Reston, Virginia. Other source-data contributors include the Library of Congress, the USGS Map Store, the State of Maine, the University of California-Santa Barbara, and the University of Wisconsin-Madison Map Library.

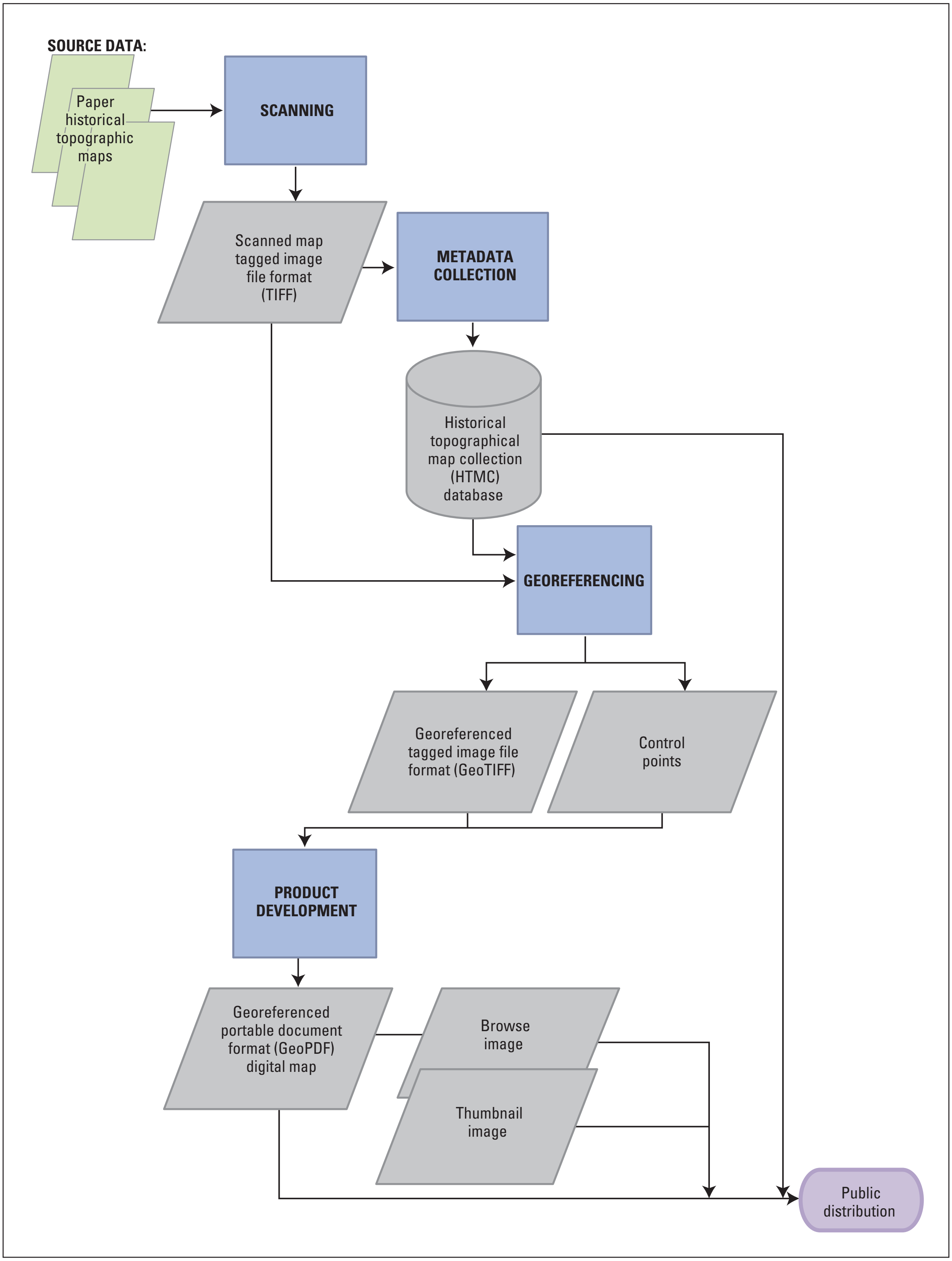

Figure 1. Overview of Historical Topographic Map Collection (HTMC) production process.

Source data requirements for the Historical Topographic Map Collection are as follows:

- Source data maps from the following scales (series) must be scanned:
  - 1:24,000 (7.5×7.5 minutes)
  - 1:25,000 (7.5×7.5 minutes)
  - 1:24,000 (7.5×15 minutes)
  - 1:31,680 (7.5×7.5 minutes)
  - 1:48,000 (15×15 minutes)
  - 1:62,500 (15×15 minutes)
  - 1:63,360 (Alaska)
  - 1:100,000 (30×60 minutes)
  - 1:125,000 (30×30 minutes)
  - 1:250,000 (1×2 degrees)
- All available maps included in the stated series published by the USGS from 1884 through 2006 must be scanned.
- All versions, editions, printings, and dates of stated series must be considered unique source maps.
- Source maps must meet the following conditions:
  - Tearing is minimal such that the map is complete, including all the printed material on the map collar required for documenting HTMC metadata (see Metadata section for details).
  - Distortion is minimal such that georeferencing accuracy requirements can be met.

Scanning

Scanning is the process of converting hard-copy maps into a digital format. Scanner optical resolution refers to the number of PPI that the scanner actually samples. Bit depth represents the precision with which colors are specified in an image.

For the HTMC project, each printed map is scanned “as is”; no enhancements or restorations are made to the digital TIFF output file. Maps are scanned in bulk on a State-by-State basis. For efficiency, all maps are scanned at once, with no assessment or distinction about maps being unique from one another. In addition, although the paper maps may vary in size, they are scanned using an unvarying page width (typically 24 inches). This reduces the amount of time to run the maps through the scanner because the operator is not required to adjust the width parameter each time a slightly differing page width comes through the scanning queue.

Any extra “empty” content created along the edge of the map as a result of using an unvarying page width is removed from the output file using a semiautomated process based on the “typical” page size for a particular map series, State, scale, and anchor point from which the excess pixels are trimmed. For example, a 1:24,000-scale, 7.5-minute-series map is typically 27 inches tall by 22 inches wide, and HTMC scans typically use an anchor point that is left center. Additionally, colored tint or lightening of map features should not be introduced to the digital map during scanning.

The scanning output is a valid, uncompressed TIFF file. This is confirmed by creating a smaller resolution file from the original full-resolution-scan output file. In addition to confirming a valid scanned-map output file, the smaller resolution file is also used for collecting metadata from the map collar (see Metadata section). The smaller resolution file is more efficient in the amount of time required for opening than the full-resolution image, while still retaining the legibility of the smallest printed metadata on the scanned maps.

Scanning requirements for the Historical Topographic Map Collection are as follows:

- Historical paper maps must be scanned in their entirety, that is all collar and marginalia information is included.
- Historical paper maps must be scanned using an unvarying page width (typically 24 inches).
- Historical paper maps must be scanned “as is,” meaning no extraneous notes, marks, or paper-background discolorations are removed.
- Historical paper maps must be scanned as a color (24 bit) image.
- Historical paper maps should be scanned at an optical resolution of 600 PPI.
- Historical paper maps must be scanned at a minimum optical resolution of 400 PPI.
- Historical paper maps must be scanned at a bit-depth of 8 bits per pixel per red/green/blue (RGB) color channel.
- The scanned historical paper-map output-file format must be an uncompressed TIFF as specified by the TIFF Format Specification Revision 6.0. (see *http://partners.adobe.com/public/developer/tiff/index.html*).
- The scanned TIFF output files must be uniquely named using the following naming convention: Quadrangle Name_State_Year_Scale.tif (for example, *Adell_TX_1959_24000.tif*)
  - Replicate file names must be differentiated by appending a hyphenated file-number suffix (“-X”) to the file name (for example, *Adell_TX_1959_24000-1.tif*).

- A valid uncompressed TIFF output file (400–600 PPI) must be created for each map.
- The northern border of the map must be at the top of the digital output file.
- Excess "empty" content outside of the map collar in the TIFF output file must be removed (clipped).
- Light- or dark-colored tint must not be introduced into the TIFF output file during scanning.
- The average brightness value for the canvas pixels in the map image must be greater than or equal to 97.

Metadata

The term "metadata" refers to descriptive information about data and includes producer information, accuracy and currency statements, collection methodologies, data resolution, key words, and other pertinent information. Metadata is key to ensuring that a dataset or data product can be found through data mining and that it is usable for the application intended. Without metadata to describe the "who, what, where, when, how, and why" the data or product was created, the data or product cannot be used with any level of confidence.

Metadata for the HTMC are primarily captured from the map collar of the historical topographic maps. The information in the historical topographic map collar varies, depending on the original product, and may include USGS and U.S. Department of Interior logos, map title, map date, source notes, projection, horizontal and vertical datum and coordinate system information, quadrangle location and adjoining quadrangle diagrams, scale bars and map scale, accuracy statements, north arrow, and magnetic declination diagram. Supplemental metadata information is added during the production process, such as the name of the GeoPDF digital map file produced from the scanned map. Metadata for the HTMC are stored in a relational database. The HTMC database fields for storing metadata are described in appendix A; the fields are populated according to the specifications in appendix B.

Metadata is the foundation of information required to generate HTMC GeoPDF maps. HTMC metadata is collected early in the production process, on an individual scanned-map-file basis, before production continues. Collection of metadata in this way increases the chances of identifying duplicate map records through unique metadata element comparison. Among a set of identical maps, the sheet with the best visual aesthetic is always retained for generating a GeoPDF for the HTMC collection. Duplicate map records are flagged and no longer processed, thus eliminating any labor that would have otherwise been spent processing these files. Removal of duplicate scanned maps increases the integrity of the collection, while reducing overall data storage requirements for the project.

Duplicate scanned map records are identified using the "Magic 7" Uniqueness Test. The Magic 7 Uniqueness Test consists of a comparison of seven metadata fields. The metadata fields in the Magic 7 Uniqueness Test are map name ("Name"), map scale ("Scale"), primary State ("State"), date on map ("DtOnMap"), imprint year ("Imprint"), Woodland Tint ("Wood"), and visual version number ("VisVrsNum") (fig. 2). Visual differences are any observable difference between the two maps, including the presence or absence of a USGS logo or international standard book number (ISBN) barscan, different coloration of features, differences in ink saturation of printing, and hand-stamped notes indicating the maps were from different press runs. Maps with identical values for the six metadata fields but with visually distinct images were assigned a value for the visual version number metadata field to distinguish them as unique map editions. Examples of unique scanned map records identified using the Magic 7 Uniqueness Test are shown in figure 2.

The metadata information in the relational database is used to (1) generate an HTMC Metadata Report, (2) generate a FGDC compliant XML metadata file, and (3) generate information required for georeferencing the scanned map, such as the projection and datum (see Georeferencing and Product Development sections).

HTMC metadata are available through the HTMC Web site (*http://geonames.usgs.gov/pls/topomaps/)* and the TopoView Web site (*http://ngmdb.usgs.gov/maps/Topoview/*). From these Web sites, a user may search for and view metadata for an HTMC digital map product in a hypertext markup language (HTML) format called an HTMC Metadata Report (see fig. 3). Metadata for multiple HTMC digital map products may also be downloaded from the HTMC Web site into a comma-separated variable (CSV) formatted file. CSV formatted files are readable in many database and (or) spreadsheet software packages. Data in a subset of the metadata fields in the HTMC database are used to populate the HTMC Metadata Report and the .csv-extension-formatted downloadable metadata file. Appendix C lists the metadata fields in the HTMC database

Name	Mapname for Sort Without case	Scale	State▲	DtOnMap	Imprint	Wood	VisVrsNum	Magic 7
Clarksville	Clarksville	24000	MD	1957	1966	Y		CLARKSVILLE MD 24000 1957 1966 Y
Clarksville	Clarksville	24000	MD	1951		N		CLARKSVILLE MD 24000 1951 N
Clarksville	Clarksville	24000	MD	1951		Y		CLARKSVILLE MD 24000 1951 Y
Clarksville	Clarksville	31680	MD	1944		Y		CLARKSVILLE MD 31680 1944 Y

Figure 2. Screen image of Historical Topographic Map Collection metadata showing unique scanned map records.

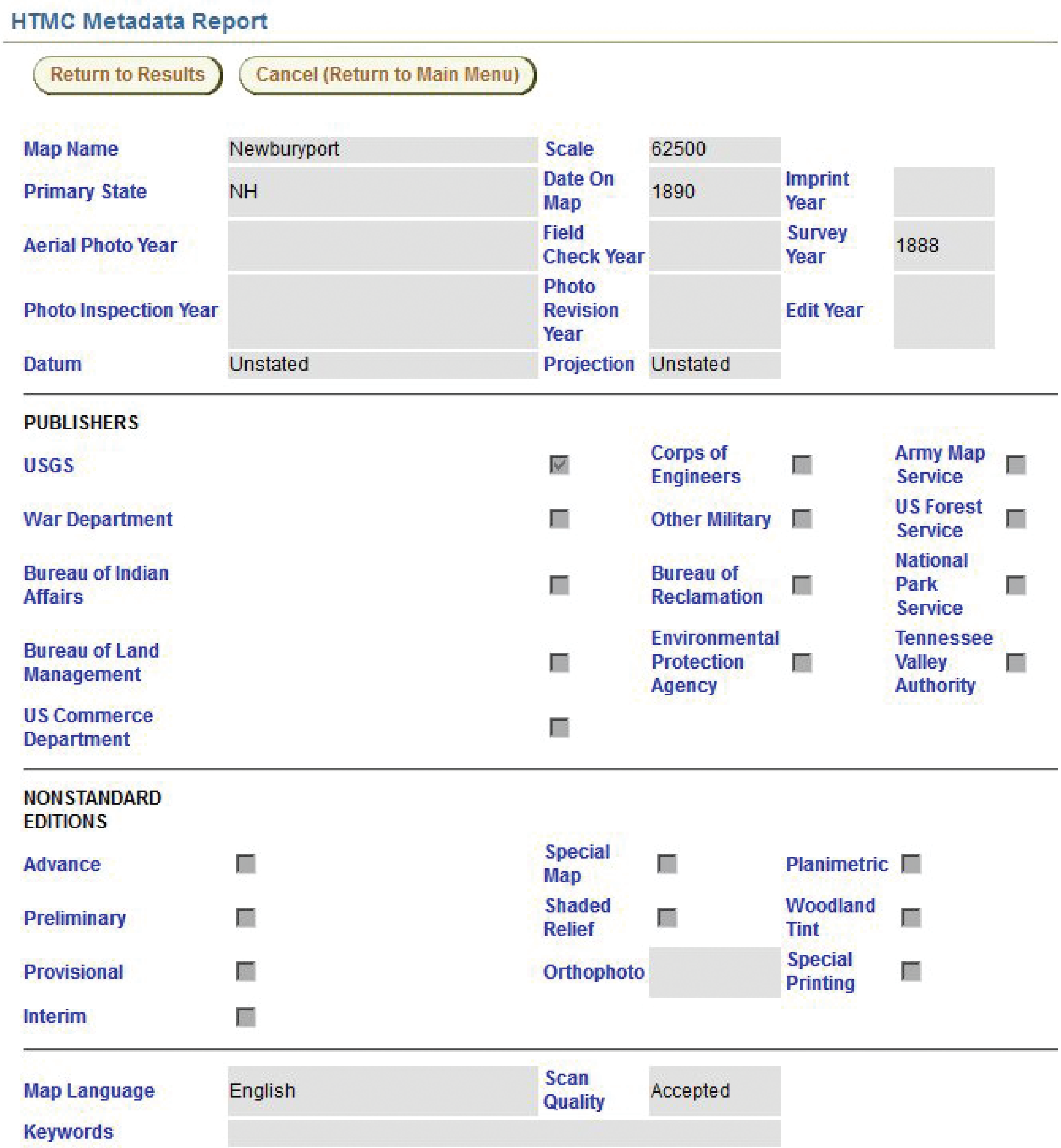

Figure 3. Historical Topographic Map Collection Metadata Report for 1890 Newburyport topographic map.

and the corresponding tags used to capture these fields in both the HTMC Metadata Report (in HTML format) and in the CSV formatted downloadable metadata file. Examples of the HTMC Metadata Report and the CSV downloadable file metadata products are shown in figure 3 and appendix D, respectively.

Additionally, the USGS documents metadata according to the FGDC CSDGM (Federal Geographic Data Committee, 1998). This FGDC compliant metadata is provided in XML format. A subset of the metadata captured from the map collar is used to populate the FGDC compliant XML metadata file. Appendix C contains a table with the metadata fields in the HTMC database and the corresponding XML tags used to capture these fields in the FGDC compliant metadata file. The XML file is generated by querying the HTMC database and exporting the metadata field for the XML tags into an XML file. Additional text is also added to populate some of the required FGDC XML tags. This XML file is attached to the GeoPDF digital map product and is viewable on the HTMC Web site. An example HTMC FGDC compliant metadata file is provided in appendix E.

Metadata requirements for the Historical Topographic Map Collection are as follows:

- Metadata fields defined in appendix A must be captured for each historical topographic map.[1]
- Metadata fields must be captured in a relational database with the field names, field types, field lengths, and null value restrictions defined in appendix A.[2]
- Metadata fields in appendix A must be captured according to the specifications in the Metadata Glossary (see appendix B).
- There must be only one metadata record in the HTMC database for each unique scanned map in the HTMC.
- An HTMC Metadata Report in HTML format must be available for every map in the HTMC.
    - The HTMC metadata fields defined in appendix A will be incorporated into the HTMC Metadata Report as designated in appendix C.
    - The HTMC Metadata Report will conform to figure 3 in both structure and format.
- The HTMC metadata fields defined in appendix A will be incorporated into the downloadable CSV file metadata report as designated in appendix C.
    - The metadata file will conform to appendix D in both structure and format.
- A metadata file conforming to the FGDC CSDGM (Federal Geographic Data Committee, 1998) must be produced in XML format for every map in the HTMC.
    - HTMC metadata fields in the HTMC database will be incorporated into the FGDC compliant XML metadata file as designated in appendix C.
    - The metadata file must conform to FGDC CSDGM (Federal Geographic Data Committee, 1998) in both content and structure.
- The FGDC compliant XML metadata file must be named as detailed in the HTMC Standard (Allord and others, 2014): ***state_ mapname_scanID_ year_scale_*****geo.*****yyy*** (for example, *MA_Newburyport_352890_1890_62500_geo.xml*).

where,

- ***state*** is the two-letter capitalized postal abbreviation of the U.S. State whose printed name is listed first in the map collar.
- ***mapname*** is the printed name on the specific HTMC map. The first letter in each word of the map name is capitalized.
- ***scanID*** is a unique six- or seven-digit integer assigned to the scanned map.
- ***year*** is the four-digit date in the lower portion of the map collar that is the year the map was created.
- ***scale*** is the denominator of the ratio of paper map units to ground units.
- **geo** is a string literal that indicates the file is georeferenced.
- ***yyy*** is the filename extension associated with the file type:
    - ***pdf*** indicates Adobe portable document format (PDF).
    - ***xml*** indicates an extensible markup language (XML) file.

Georeferencing

Images may be tied to a known coordinate system, or georeferenced. Typically this is done by manually identifying a few locations, called control points, both on the image (in image coordinates) and also in a real world reference system (in geographic coordinates of latitude and longitude). These control points are used to establish a relation between the image and the real world. This relation is applied to the entire image so that the resulting image contains pixels with real world geographic coordinates (latitude and longitude) (Burt and others, 2014a,b).

Although georeferencing can be done manually, the HTMC project's scope of georeferencing approximately 190,000 maps required a procedure for automating this process. The University of Wisconsin-Madison, with support from the USGS, developed a software program for semiautomated georeferencing images of scanned maps. The software program, QUAD-G, is described in Burt and others (2014b) and is publicly available at *http://www.geography.wisc.edu/research/projects/QUAD-G/*. QUAD-G applies the same approach used for manually georeferencing an image, with the exception that the control points on the image are found automatically by the software program instead of manually by a user. Thus, a large number of scanned images can be georeferenced at a time (Burt and others, 2014a).

[1]Note: The metadata fields in appendix A are the requirements for the USGS HTMC project, which may not represent best practices.

[2]Note: The relational database design in appendix A is the requirement for the USGS HTMC project, which may not represent best practices.

The QUAD-G georeferencing software makes the following assumptions about the input image (Burt and others, 2014a):

- The mapped area is a geographic rectangle bounded by lines of latitude and longitude.
- The mapped area contains a regular grid of interior control marks of known latitude and longitude. For example, a standard on-grid 1:24,000-scale 7.5-minute map has 16 control points in a 4×4 grid, with control points at evenly spaced 2.5-minute intervals. This is illustrated in figure 4 by the red-colored circles and crosshairs that are drawn over the control points on the scanned map.
- The control points have standard shapes and color. For example, an interior control point has a "+" shaped mark, whereas a top-middle control point has a "T" shaped mark. All control points are assumed to be black, and the map is assumed to be bounded by a black neatline surrounded by a white map collar (note, the red-colored circles and crosshairs in figure 4 are drawn on top of the black "+" shaped marks and [or] "T" shaped marks on the printed topographic maps).

The georeferencing software locates the control points on the image with the help of information about the image stored in an input file. This information includes the image file name, map extent, control-mark layout and spacing, scan resolution, map scale, datum and control-point size (Burt and others, 2014a,b).

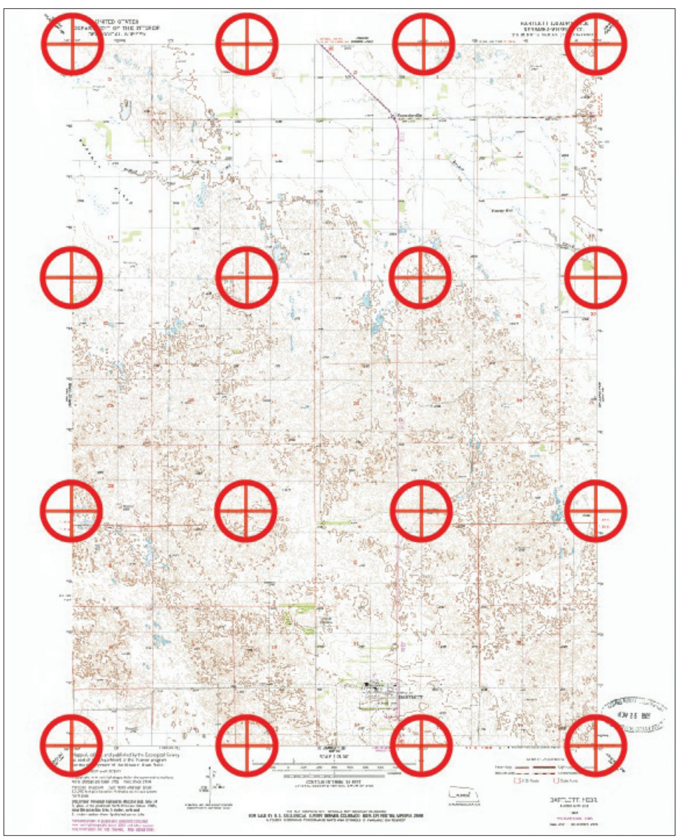

Figure 4. Regularly spaced control points on a standard-grid 1:24,000-scale 7.5-minute U.S. Geological Survey topographic map.

A pattern search is used within each search window (see red circles in fig. 4 for an example of the search window extent) to find the control point on the scanned map. The pink symbol in figure 5 shows an example of the actual location of an interior control point in a search window. A low-degree, least squares, polynomial equation is used to predict the location of each control point, which is represented by the blue symbol in figure 5.

Residuals of the difference between the observed control-point location and the predicted control-point location are calculated for each control point (see fig. 6).

If the residual error for each control point is below the HTMC user-defined threshold of one line width of the scanned graticule tick, the transformation equation is used to produce a georeferenced image file (Burt and others, 2014a). For HTMC production, one line width is typically around four pixels. In an automated QUAD-G georeferencing session, maps with any one control point exceeding this error limit will not be georeferenced and instead must be georeferenced manually in QUAD-G. The output from the QUAD-G georeferencing software is a GeoTIFF (georeferenced TIFF with TIFF header tags referencing the unprojected geographic coordinate system parameters) in an unprojected geographic coordinate system parameter (geographic GeoTIFF). An XML file is also produced with the image coordinate to spatial reference system (SRS) relation for the control points used in the transformation.

Note, although the QUAD-G software assumes a standard grid of evenly spaced control marks, nonstandard grids with unevenly spaced control points and (or) control points that do not include the neatline corners can also be georeferenced with QUAD-G by manually locating the control points. (See appendix B, addendum 2 for a detailed discussion and examples of nonstandard historical topographic maps.)

Georeferencing requirements for the Historical Topographic Map Collection are as follows:

- The input file must be an uncompressed TIFF.
- The input file map-graticule ticks in the uncompressed TIFF output file must be vertically aligned,[3] meaning they must be less than 0.4 degrees from vertical alignment.
- The output file must be an uncompressed GeoTIFF, as specified by the GeoTIFF Format Specification Revision 1.0 (*http://www.remotesensing.org/geotiff/spec/geotiffhome.html*), with the northern border of the map at the top of the output file.
- Historical topographic maps must be georeferenced to the native datum in the original printed map.
  - If the datum is not stated on the original paper map, then the map must be georeferenced to the North American Datum of 1927 (NAD27).

[3]Burt and others (2014b) found scanned images are typically rotated by a few tenths of a degree from vertical.

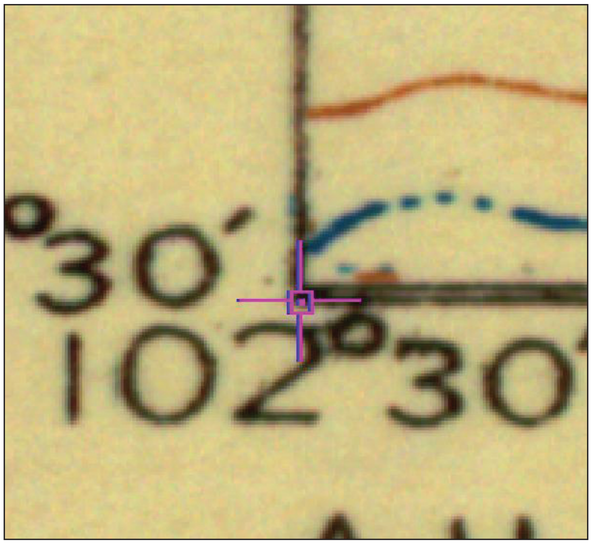

Figure 5. Close-up of observed (pink symbol) and predicted (blue symbol) control-point locations in the University of Wisconsin-Madison QUAD-G software.

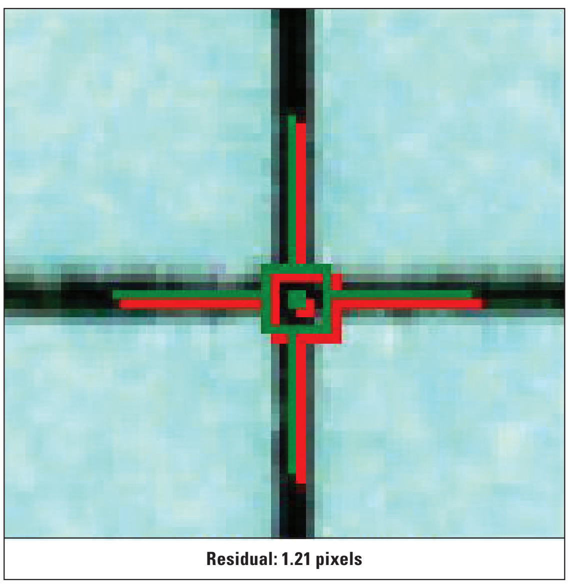

Figure 6. Least squares model prediction residual error between observed (red) and predicted (green) control-point locations.

- If the datum on the original paper map is Clarke Spheroid of 1866, then the map must be georeferenced to the NAD27.
- If the datum on the original paper map is North American Datum (NAD), then the map must be georeferenced to the NAD27.

- Standard, on-grid historical topographic maps with evenly spaced control points, including the neatline corners, must use all corner and graticule tick coordinates available in the map for georeferencing as defined in table 1.
- Nonstandard historical topographic maps with unevenly spaced control points and (or) control points that do not include the neatline corners must use a minimum of three graticule ticks in both the latitude and longitude directions for georeferencing.
- Historical topographic maps must be georeferenced such that all transformed image control marks are within the lineweight of the graticule tick depicted on the original map (typically four pixels).
- The historical topographic map must have a Geographic Names Information System (GNIS) cell identification and corresponding boundary coordinates.

Product Development

A digital file representing the original paper historical topographic map is produced for each historical map in the HTMC as a GeoPDF. The GeoPDF digital map is the primary HTMC product at this time (2014) intended for public distribution and general use. Supporting files, including a browse image and a thumbnail image used in the discovery of HTMC digital maps, are also produced. The requirements for the GeoPDF and supporting files are described in the following subsections.

GeoPDF Digital Map

The digital map product is a color image of the printed historical topographic map in a georeferenced PDF format, called a GeoPDF (see fig. 7). Scanned images of the printed historical topographic maps are georeferenced using the datum and projection printed on the original paper map. The GeoPDF provides the user with a digital version of the historical map that can be printed in its original form. The GeoPDF also allows for the digital file coordinate readouts in the digital map to correspond to the coordinates printed on the historical map image (see fig. 8).

Table 1. Number of graticule ticks by standard U.S. Geological Survey map scale and series.

Standard map scale (series)	Number of graticule ticks used for georeferencing
1:24,000 (7.5×7.5 minutes)	16
1:25,000 (7.5×7.5 minutes)	16
1:24,000 (7.5×15 minutes)	28
1:31,680 (7.5×7.5 minutes)	16
1:48,000 (15×15 minutes)	16
1:62,500 (15×15 minutes)	16
1:63,360 (15×15 minutes)	16
1:63,360 (Alaska)	Varies
1:100,000 (30×60 minutes)	45
1:125,000 (30×30 minutes)	16
1:250,000 (1×2 degrees)	45

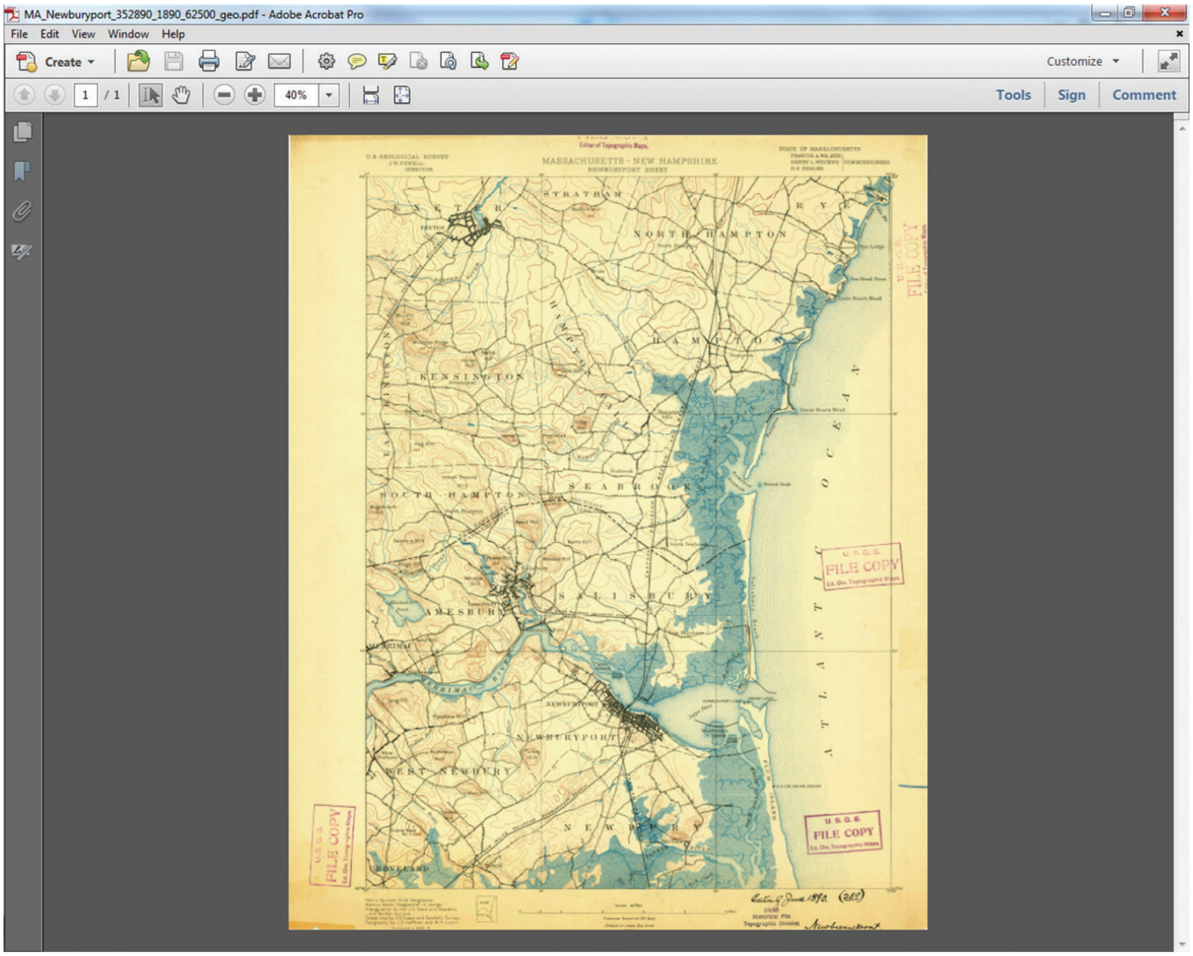

Figure 7. Georeferenced portable document format (GeoPDF) of the 1890 Newburyport Historical topographic map.

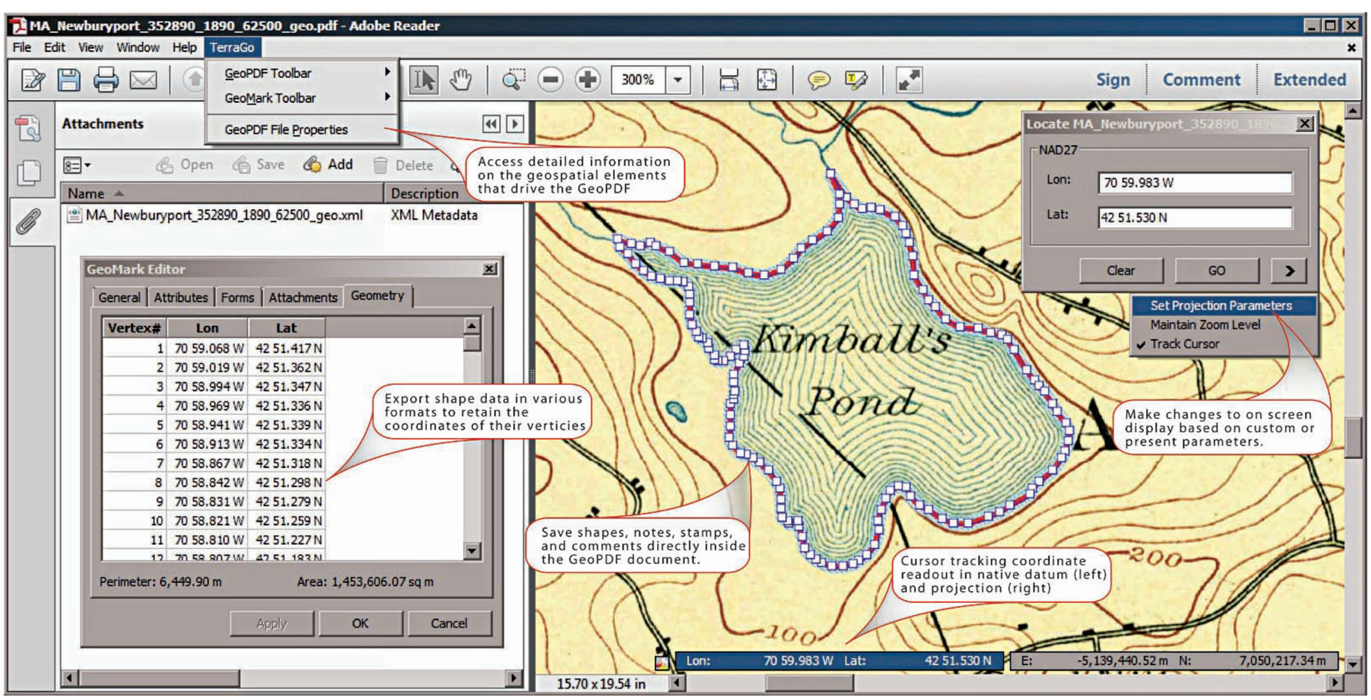

Figure 8. Example TerraGo Toolbar functions of a georeferenced portable document format (GeoPDF) map.

The georeferenced area is limited to the area inside the map frame (a digital neatline restricts the coordinate from displaying over the map collar) that is encompassed by bounding coordinates. This restriction allows for the seamless tiling of adjacent GeoPDF maps together. In addition, the GeoPDF file has been altered to allow for the user to mark up the GeoPDF with text, highlighting, sticky notes, or shapes (points, lines, polygons) using the comment/mark-up toolbar in Adobe Reader. This GeoPDF functionality is called, GeoMark Enabling. The markups can be saved to the GeoPDF file and also exported into KML or shape-file formats, which preserves the spatial location information. Lastly, the GeoPDF file includes an XML file attachment containing FGDC compliant metadata (see fig. 8). (See Metadata section for more information on the FGDC compliant XML metadata file.)

Similar to the other steps in the HTMC production process, the GeoPDF map product is generated using batch files to primarily automate the production of GeoPDF maps. In brief, the GeoPDF production process consists of five steps: (1) project the GeoTIFF (output from Quad-G) to the projection in the original printed map, (2) generate the GeoPDF, (3) embed a modified neatline into the GeoPDF to limit the extent of the readable coordinate space to the area inside the printed-map neatline, (4) attach XML file with FGDC compliant metadata, and (5) enable GeoMark functionality in the GeoPDF.

First, the GeoTIFF file created during the georeferencing step (see Georeferencing section) is projected into the map projection printed on the original paper map. The image projection and warping utility from Geospatial Data Abstraction Library (GDAL) (*http://www.gdal.org/*), gdalwarp, uses the datum, projection, and GNIS boundary coordinates in this process. The output is a new GeoTIFF file in the same spatial reference system used in the original printed map (“Native GeoTIFF”).

Second, a GeoPDF is created from the Native GeoTIFF using TerraGo Publisher for Raster software and HTMC metadata (datum, projection, transformation points, and scale). The output is a GeoPDF file of the historical map with a joint photographic experts group (JPEG) compression-quality setting of 25 percent (the minimally accepted level of compression).

Third, the GeoPDF is modified so that the extent of the readable coordinate space is limited to the area within the GNIS cell boundaries of the map. TerraGo NeatLineManager software (a custom utility built for the HTMC project that requires a desktop commercial version of Terra Go Publisher for Raster) and an XML file containing HTMC metadata (map name and neatline coordinates in latitude and longitude) are all used in this step.

Fourth, an XML file is attached to the GeoPDF. The XML file contains FGDC compliant (Federal Geographic Data Committee, 1998) metadata generated by querying the HTMC relational database (see Metadata section). The XML metadata file is attached to the GeoPDF using the PDFTron PDF Attach utility. During the attachment process, a type of compression is introduced to the PDF document by the attachment utility. Modifications applied after this step cause changes in the PDF structure, which cut off the ability for other tools to read and manipulate the file. Removal of this compression is necessary in order to perform other necessary operations with tools mentioned in earlier steps. Thus, the production process must follow these steps in this exact order to ensure the integrity of the final product.

The last step in producing the GeoPDF digital map product is activating the file to allow GeoMark tools to be used in Adobe Reader. This GeoPDF function is called GeoMark Enabling. Additional modifications to the GeoPDF document are not allowed after the GeoMark function is enabled, thus this is the last step in producing the GeoPDF map product. The GeoMark features in the GeoPDF file are activated using TerraGo Software Development Kit (SDK).

Georeferenced PDF (GeoPDF) requirements for the Historical Topographic Map Collection are as follows:

- A GeoPDF digital map must be produced for each historical topographic map in the HTMC.
- The GeoPDF document must consist of a single JPEG image with a 25-percent compression and dot per inch (DPI) relative to the scale of the original map.[4]
- The GeoPDF map must be projected to the projection in the original printed map.
  - If the projection of the original printed map is not known, the Polyconic projection must be used, with the central meridian at the center of the quadrangle. This projection, and slight variations, was used almost exclusively for large-scale mapping in the United States until the 1950s.
- The GeoPDF should display georeferenced coordinates over the image inside the original printed-map neatline that are encompassed by bounding coordinates. (Georeferenced coordinates are not displayed over the map collar or over any overedge content not encompassed by bounding coordinates.)
  - The number of points, or bounding coordinates, used to generate the digital neatline in the GeoPDF that restricts the extent of the display of the georeferenced coordinates should be based on the distance between the map corners on each side of the map (more points are required for greater distances), as specified in table 2.
- The GeoPDF must be GeoMark Enabled.
- The GeoPDF must include an XML file attachment containing Federal Geographic Data Committee (1998) compliant metadata.

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[4]The DPI is determined on a map by map basis by the Publisher for Raster software program and is based only on the scale of the incoming image (as opposed to being explicitly hardcoded to a single value). Print dimensions, on the other hand, are determined by pixel dimensions and pixels per inch of the complete full-scanned image.

Table 2. Number of points on the side of a map used to generate the digital neatline.

Distance between map corners on the side of a map (decimal degrees)	Number of points on the side of a map used to generate the digital neatline
<0.25	4
≥0.25 to <0.5	6
≥0. 5 to <1.0	8
≥1.0 to <1.5	10
≥1.5 to <2.5	12
≥2.5	14

- The GeoPDF file must be named as detailed in the HTMC Standard (Allord and others, 2014): ***state_ mapname_ scanID_year_scale_geo.yyy*** (for example, MA_ Newburyport_*352890_1890_62500_geo.pdf*)

  where,

  - ***state*** is the two-letter capitalized postal abbreviation of the U.S. State whose printed name is listed first in the map collar.
  - ***mapname*** is the printed name on the specific HTMC map. The first letter in each word of the map name is capitalized.
  - ***scanID*** is a unique six- or seven-digit integer assigned to the scanned map.
  - ***year*** is the four-digit date in the lower portion of the map collar that is the year the map was created.
  - ***scale*** is the denominator of the ratio of paper map units to ground units.
  - **geo** is a string literal that indicates the file is georeferenced.
  - ***yyy*** is the filename extension associated with the file type:
    - ***pdf*** indicates Adobe portable document format (PDF).
    - ***xml*** indicates an extensible markup language (XML) file.

Supporting Files

Supporting files are used in the discovery of the HTMC digital map products and include a browse image and a thumbnail image. The browse image and thumbnail image are created from the GeoPDF digital map.

Browse Image

The browse image provides the user with a preview of the map. It is a lower resolution and smaller file size than the GeoPDF digital map. The browse-image allows the user to identify the overall trends of the mapped area. Large individual features, such as urban areas and rivers and lakes, are visible, but the user may not be able to discern smaller map features and most text. HTMC browse images are similar to the image shown in figure 9.

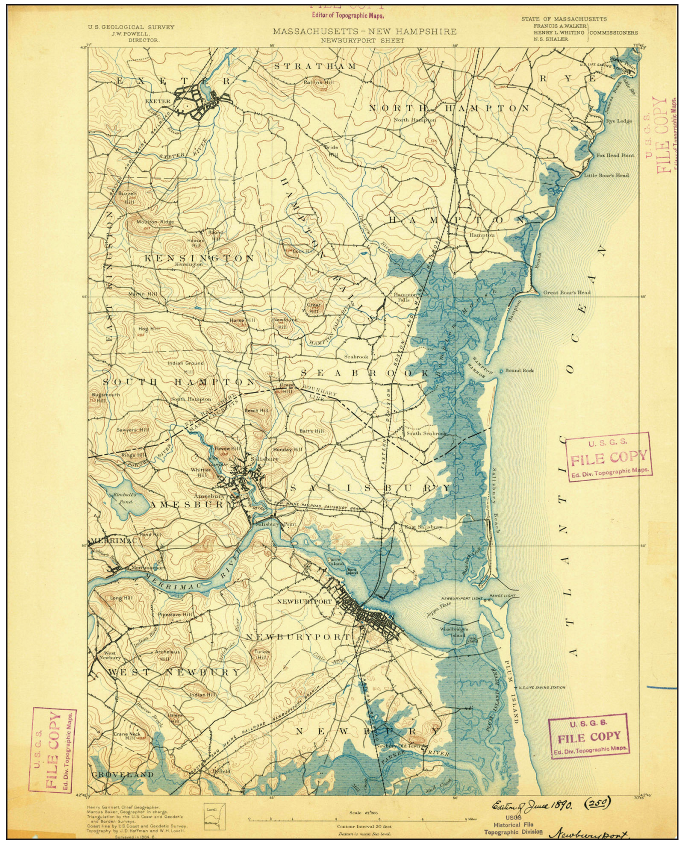

Figure 9. Historical Topographic Map Collection browse image for the 1890 Newburyport topographic map.

Similar to the HTMC GeoPDF digital map, the browse image was created using a semiautomated batch process. Browse images are created with the utility gdal_translate (version 1.8 or after, when GeoPDFs were first supported). The utility resamples the map image in the GeoPDF to create a smaller, compressed JPEG format image of the map.

Browse image requirements for the Historical Topographic Map Collection are as follows:

- A medium resolution browse image in JPEG format must be produced for every map in the HTMC.
- The browse image must be produced using a JPEG compression-quality setting of 75 percent.
- The browse image must have a resolution of 150 DPI.
- The browse image must be named as follows: ***state_ mapname_scanID_year_scale.jpg*** (for example, *MA_Newburyport_352890_1890_62500.jpg*)

  where,

  - ***state*** is the two-letter abbreviation of the U.S. State in which the majority of the mapped area exists on the ground. The abbreviation is capitalized.
  - ***mapname*** is the printed name on the specific HTMC map. The first letter in each word of the map name is capitalized.

- ***scanID*** is a unique six- or seven-digit integer assigned to the scanned map.
- ***year*** is the four-digit date in the lower portion of the map collar that is the year the map was created.
- ***scale*** is the denominator of the ratio of paper map units to ground units.
- ***jpg*** is the filename extension associated with the file type, where jpg indicates a JPEG file.

Thumbnail Image

Thumbnail images of the scanned historical topographic map are produced in JPEG format. They provide the user with a small preview of the map but at a lower resolution and file size than the browse image. The thumbnail image is a small summary overview of the mapped area. Large individual features, such as urban areas, woodland areas, and oceans are visible, but the user may not be able to discern most map features and text. An example of the HTMC thumbnail image is shown in figure 10.

Similar to the HTMC GeoPDF digital map, the thumbnail image is created using a semiautomated batch process. Thumbnail images are created with an image resampling utility. The utility resamples the map image in the GeoPDF to create a smaller, compressed JPEG format image of the map.

Thumbnail image requirements for the Historical Topographic Map Collection are as follows:

- A low-resolution thumbnail image in JPEG format must be produced for every map in the HTMC.
- The thumbnail image must be produced using a compression-quality setting of 80 percent.
- The thumbnail image must be 200 pixels wide.
- The thumbnail image must be named as follows: ***state_ mapname_scanID_year_scale_*tn.*jpg*** (for example, *MA_Newburyport_352890_1890_62500_tn.jpg*)

  where,

  - ***state*** is the two-letter capitalized postal abbreviation of the U.S. State whose printed name is listed first in the map collar.
  - ***mapname*** is the printed name on the specific HTMC map. The first letter in each word of the map name is capitalized.
  - ***scanID*** is a unique six- or seven-digit integer assigned to the scanned map.
  - ***year*** is the four-digit date in the lower portion of the map collar that is the year the map was created.
  - ***scale*** is the denominator of the ratio of paper map units to ground units.
  - **tn** is a string literal that indicates the file is a thumbnail.
  - ***jpg*** is the filename extension associated with the file type, where jpg indicates a JPEG file.

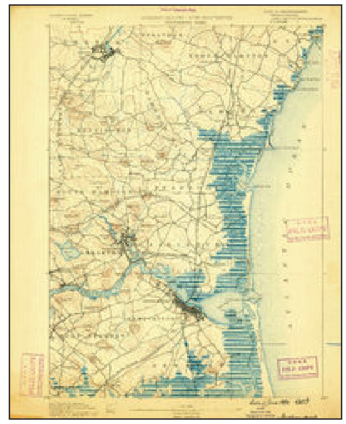

Figure 10. Historical Topographic Map Collection thumbnail image for the 1890 Newburyport topographic map.

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U.S. Geological Survey, 2010b, 125 years of topographic mapping: U.S. Geological Survey Web site, *http://nationalmap.gov/ustopo/history.html*.

Glossary

National Geospatial Program (NGP) An administrative unit of the U.S. Geological Survey (USGS) responsible for mapping and Geographic Information System (GIS) activities. The NGP is under the USGS Core Science Systems. Information about the NGP is available at *http://www.usgs.gov/ngpo*.

Metadata Information about a map or other geospatial product that describes how the product was made, the sources of data, and other relevant information (see *http://geology.usgs.gov/tools/metadata/)*. The Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (ver. 2.0), FGDC-STD-001-1998, defines content and organization of metadata files.

Standard Cell Geographic quadrangle that aligns with appropriate increments of latitude and longitude. These cells, their official names, and other attributes are stored in the Geographic Cell Names Database (GCNDB), a part of the Geographic Names Information System (GNIS).

Useful Web Sites

http://geology.usgs.gov/tools/metadata/

This site provides useful information about how to implement the FGDC metadata standard.

http://get.adobe.com/reader/

The free Adobe Reader software may be downloaded from this site.

http://nationalmap.gov/

This is the USGS home page for *The National Map*.

http://nationalmap.gov/historical/

This is the USGS home page for the Historical Topographic Map Collection.

http://nationalmap.gov/standards/

Feedback for the Historical Topographic Map Collection standards and specifications can be submitted via this site.

http://nationalmap.gov/ustopo/

This is the USGS home page for the US Topo maps.

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=34342

This is the Web site for obtaining the TIFF specification, ISO 12639:2004 Graphic technology—Prepress digital data exchange—Tag image file format for image technology (TIFF/IT).

http://store.usgs.gov/

This is the Web site for the USGS store. HTMC digital GeoPDF maps may be downloaded from this site.

http://www.terragotech.com/home/

The free TerraGo Toolbar extension may be downloaded from this site.

http://www.fgdc.gov/

This is the home page for the Federal Geographic Data Committee.

http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/

The FGDC Content Standard for Digital Geospatial Metadata may be downloaded from this site.

http://www.gdal.org/

This is the home page for the Geospatial Data Abstraction Library (GDAL).

http://www.geography.wisc.edu/research/projects/QUAD-G/

This site provides a user guide for the georeferencing tool used by the USGS for the scanned historical topographic quadrangle collection developed by the University of Wisconsin in Madison.

http://www.osgeo.org/

This is the home page for the Open Source Geospatial Foundation.

http://www.usgs.gov/ngpo/

This is the home page for the USGS National Geospatial Program.

http://ngmdb.usgs.gov/maps/Topoview/

This is the beta version of a USGS webpage for downloading HTMC digital GeoPDF maps.

http://viewer.nationalmap.gov/viewer/

This is the homepage for the USGS *The National Map Viewer*. HTMC digital GeoPDF maps may be downloaded from this Web site.

Appendixes

Appendix A. Relational Database Structure for HTMC Metadata Fields

This appendix contains a list of all metadata fields included in the HTMC relational database, the field definition, the field type and size, any null value restrictions, and the source of the database information (for example, collected from the map collar or populated during the production process). This information is summarized in table A–1, below.

Note, table A–1 is not a list of all fields in the HTMC relational database. Table A–1 only includes metadata-related fields.

Table A–1. Historical Topographic Map Collection (HTMC) metadata fields, definitions, and relational database structure.

HTMC database metadata field name	HTMC database metadata field definition	HTMC database field type	Database field size or precision/scale	Null value restrictions	Source (map collar or production)
SCAN_ID	The unique ID of the scanned map.	NUMBER	PRECISION: 38	Not Null	Production
SCAN_FILE_NAME	The filename of the scanned map.	VARCHAR2	SIZE: 240 BYTE		Production
MAP_NAME	The printed name of a specific map.	VARCHAR2	SIZE: 240 BYTE		Map collar
MAP_SCALE	The ratio of paper map units to ground units.	VARCHAR2	SIZE: 30 BYTE		Map collar
PRIMARY_STATE	The geographic jurisdiction (U.S. State) in which the majority of the mapped area exists on the ground. In border areas showing more than one State (or country), this is the first State (area) listed directly along with the map name.	VARCHAR2	SIZE: 3 BYTE		Map collar
DATE_ON_MAP	The four-digit (YYYY) date for the year the map was created.	VARCHAR2	SIZE: 4 BYTE		Map collar
IMPRINT_YEAR	The four-digit (YYYY) date for the year the map was printed.	VARCHAR2	SIZE: 4 BYTE		Map collar
WOODLAND_TINT	A flag that indicates whether or not the map included Woodland Tint or National Forest (assumes woodland present inside National Forest).	CHAR	SIZE: 1 BYTE		Map collar
SCAN_QUALITY	Value for recording the quality of the completed scans.	VARCHAR2	SIZE: 35 BYTE	Not Null	Map collar
KEYWORDS	Words or phrases associated with the maps that enhance catalogue search capability.	VARCHAR2	SIZE: 240 BYTE		Map collar
AERIAL_PHOTO_YEAR	The four-digit (YYYY) date of the aerial photography used in the creation of the map.	VARCHAR2	SIZE: 4 BYTE		Map collar
FIELD_CHECK_YEAR	The four-digit (YYYY) date representing the year the map content was last verified in the field.	VARCHAR2	SIZE: 4 BYTE		Map collar
EDIT_YEAR	The four-digit (YYYY) date representing the year the map was last globally edited or revised.	VARCHAR2	SIZE: 4 BYTE		Map collar
PHOTO_INSPECTION_YEAR	The four-digit (YYYY) date representing the year when a photo inspection was last done on the map.	VARCHAR2	SIZE: 4 BYTE		Map collar
PHOTO_REVISION_YEAR	The four-digit (YYYY) date representing the year when new photos were used to revise a map.	VARCHAR2	SIZE: 4 BYTE		Map collar
SURVEY_YEAR	The four-digit (YYYY) date representing the year when a field survey was completed for the mapped area (used generally before the 1950s).	VARCHAR2	SIZE: 4 BYTE		Map collar
DATUM	A mathematical model that approximates the size and shape of the Earth. This field is used to identify the specific datum used to create the map.	VARCHAR2	SIZE: 100 BYTE		Map collar
PROJECTION	A mathematical model used to represent the spherical shape of the Earth's surface on a flat surface (paper map). This field is used to identify the specific projection used to create the map.	VARCHAR2	SIZE: 100 BYTE		Map collar
ADVANCE	A flag that identifies the map as an advance copy or sheet.	CHAR	SIZE: 1 BYTE		Map collar
PRELIMINARY	A flag that identifies the map as a preliminary sheet or edition.	CHAR	SIZE: 1 BYTE		Map collar
PROVISIONAL	A flag that identifies the map as a provisional copy or sheet.	CHAR	SIZE: 1 BYTE		Map collar
INTERIM	A flag that identifies the map as an interim edition.	CHAR	SIZE: 1 BYTE		Map collar
PLANIMETRIC	A flag that identifies the map as one that has no elevation contours.	CHAR	SIZE: 1 BYTE		Map collar
SPECIAL_PRINTING	A flag that identifies the map as one that has no Woodland Tint and no elevation contours for that press run.	CHAR	SIZE: 1 BYTE		Map collar
SPECIAL_MAP	A flag that identifies the map as an oddly sized or off-grid map that was created for a special purpose.	CHAR	SIZE: 1 BYTE		Map collar
SHADED_RELIEF	A flag that identifies the map as one that includes a three-dimensional shadow effect enhancing visualization of terrain relief.	CHAR	SIZE: 1 BYTE		Map collar
ORTHOPHOTO	A flag that identifies the map as one that includes an orthophoto.	VARCHAR2	SIZE: 4 BYTE		Map collar

Table A–1. Historical Topographic Map Collection (HTMC) metadata fields, definitions, and relational database structure.—Continued

HTMC database metadata field name	HTMC database metadata field definition	HTMC database field type	Database field size or precision/scale	Null value restrictions	Source (map collar or production)
PUB_USGS	A flag that identifies the U.S. Geological Survey as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_ARMY_CORPS_ENG	A flag that identifies the U.S. Army Corps of Engineers as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_ARMY_MAP	A flag that identifies the U.S. Army Map Service as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_WAR_DEPT	A flag that identifies the U.S. War Department as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_MILITARY_OTHER	A flag that identifies Other Military Agencies as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_FOREST_SERV	A flag that identifies the U.S. Forest Service as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_RECLAMATION	A flag that identifies the Bureau of Reclamation as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_BUR_LAND_MAN	A flag that identifies the Bureau of Land Management as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_NATL_PARK_SERV	A flag that identifies the National Park Service as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_INDIAN_AFFAIRS	A flag that identifies the Bureau of Indian Affairs as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_EPA	A flag that identifies the U.S. Environmental Protection Agency as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_TENN_VALLEY_AUTH	A flag that identifies the Tennessee Valley Authority as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
PUB_USCOMMERCE	A flag that identifies the U.S. Department of Commerce as the Federal agency that produced or cooperated in the production of the map.	CHAR	SIZE: 1 BYTE		Map collar
MAP_LANGUAGE	The language of the map text.	VARCHAR	SIZE: 240 BYTE		Map collar
SCAN_COMMENTS	Free-form text field for noting internal process issues and (or) items with no current HTMC scanning menu choice.	VARCHAR2	SIZE: 240 BYTE		Map collar
SCAN_RESOLUTION	The optical resolution used to scan the map. This is the number of pixels per inch that the scanning hardware samples.	VARCHAR2	SIZE: 100 BYTE		Production
VISUAL_VERSION_NUMBER	A sequential number code given to maps having visible printed differences but the same metadata elements that typically identify unique maps.	NUMBER	PRECISION: 38		Production
GNIS_CELL_ID	The Geographic Names Information System permanent, unique identifier for geographic quadrangle cells. One cell can have any number of maps associated with it.	VARCHAR2	SIZE: 30 BYTE		Production
N_LAT	The maximum north latitude included in the map extent.	NUMBER	PRECISION: 8 SCALE: 3		Production
S_LAT	The maximum south latitude included in the map extent.	NUMBER	PRECISION: 8 SCALE: 3		Production
W_LONG	The maximum west longitude included in the map extent.	NUMBER	PRECISION: 8 SCALE: 3		Production
E_LONG	The maximum east longitude included in the map extent.	NUMBER	PRECISION: 8 SCALE: 3		Production
GEOPDF_FILENAME	The name of the GeoPDF file of the scanned historical map.	VARCHAR2	SIZE: 1000 BYTE		Production

Appendix B. HTMC Metadata Glossary

This appendix contains a glossary of the metadata elements captured from the maps in the HTMC (see fig. 3 for metadata elements included in the HTMC Metadata Report) and definitions of concepts and (or) other terms used in the glossary.

The HTMC Metadata Glossary is organized into four main sections:

- **How to Read and Use this Glossary**—An overview of the content included in the glossary and its organization
- **Glossary Entries**—All HTMC Metadata Glossary terms, listed alphabetically
- **Frequently Asked Questions and Important Things to Remember**—A list of questions commonly asked about some of the HTMC metadata elements and their associated responses, as well as tips on metadata entry
- **Addendums**—Supplemental, more detailed descriptions and examples for some of the metadata elements requiring additional clarification

How to Read and Use this Glossary

All glossary terms are given in a bold heading. Underlined bold entries describe printed text or content on the map sheet recorded directly as metadata, or which can be given certain conditions, for example, "date on map." Nonunderlined bold terms, that are not boxed, relate to some aspect of the map sheet that is not officially recorded in the database, be it printed text or some generic concept (for example, "reconnaissance" or "map collar").

All boxed terms relate to database fields and content not literally printed on the page. Such information is recorded in the database for production purposes (for example, "Scan Quality"). Underlined boxed terms relate to a concept that identifies some visual aspect of the map sheet and must be denoted through observation (for example, "overedge" or "inset").

Each term or phrase is followed by indented information explaining its meaning, map sheet placement, any notable variations, and coding procedures, in the following format:

Glossary Term: Glossary definition

See related: Reference to similar or closely related metadata concepts and elements

Synonyms: Map wording combinations for which the same coding will apply

Location & Appearance: [position on sheet] General placement of the element and how it may appear

Typical Placement: Given when variation is possible

Placement Variation: If applicable

Frequency: How often this element tends to be encountered

Notes on Variations: Clarification in cases of multiple instances and/or more complex elements

At Final Metadata Verification: Coding instructions and additional notes for staff validating metadata

Color illustrations of many elements accompany this standard format description. Also, within entries, any reference to another glossary element will appear capitalized and in single quotes. For example: 'Survey Year' or 'Primary State.'

[required field]—Indicates that you cannot advance unless the corresponding field in the metadata entry form contains some text information. Otherwise, the term is optional and has a preset default value. These entries are critical for identifying unique scans. Several of these fields are used directly in product file names.

YYYY—Represents a four-digit year (for example, 1890). It is to account for the large range of map dates/years on the maps. Throughout this glossary, data elements needing this format are generically described in this way, unless it is a specific date example. For example: 'Reprinted in YYYY,' which may appear as 'Reprinted in 1972' on the actual map.

—A small red box appears in many screenshots of map images throughout this glossary. Each red box contains an abbreviation indicating the location on the printed map where that element can be typically found: LL = lower left, LR = lower right, UL = upper left, UR = upper right, UC = upper center, and LC = lower center. If there is not a red box the term is most likely in the 'Map Banner' (top of the map).

—Text outlined with a simple black box denotes a glossary entry that is not literally printed on the map sheets. These terms comprise keywords to describe visually discerned content or database fields necessary for HTMC content production.

Glossary Entries

Advance: Printed text labeling that specifies map as an advance copy or sheet (see fig. B1)

See related: 'Interim,' 'Preliminary,' and 'Provisional'

Location & Appearance: [Printed in map 'Collar'] In black, diagonal text

Typical Placement: Upper right map 'Banner'

Placement Variation: Lower right map 'Collar' (printed near 'Map Name' of 'Orthophotoquads')

Frequency: Common

At Final Metadata Verification: Ensure the 'Advance' checkbox is marked for this item.

Figure B1. Source of 'Advance' metadata element on a printed historical topographic map.

<u>**Advance Field Check**</u>: See 'Field Check'

(Do **not** confuse this with the 'Advance' map edition element.)

<u>**Aerial Photo Year**</u>: The YYYY date given in a map's descriptive text for the aerial photography used in the creation of the particular map

(See addendum 1 for full discussion of correct Photo Year coding[s] with examples.)

See related: 'Photo Inspection Year' and 'Photo Revision Year'

Synonyms: "…from imagery taken YYYY…"

Location & Appearance: [Printed in map 'Collar']

Typical Placement: Lower left corner descriptive paragraph(s)

Frequency: Begins to appear in the late 1920s-era maps and is on virtually all maps by the 1960s

Notes on Variations: A large number of maps with aerial photo dates have *multiple* aerial photo dates! For example, when a map has been photo inspected or revised, the text describing those processes often gives a year for the revision photos *as well as* still printing the "base" aerial photo date(s). When a map uses multiple versions of the 'aerial photograph' phrases and (or) gives a date range for photos, use the latest actual year *definitively* provided. (If you cannot tell, leave the entry blank and note ambiguous or conflicting dates in the 'Comments' field as needed.)

At Final Metadata Verification: Ensure the most current photo date cited for the map in the map 'Collar' is accurately entered into the 'Aerial Photo Year' field. Also, ensure photo revision and (or) inspection years are correct.

<u>**Alternate Map Name**</u>: Occurs when a printed 'Map Name' has been supplemented with a statement such as "Formerly known as" *or* has been crossed out manually by a map librarian with another name being indicated (most often handwritten)

See related: 'Map Name' and 'Comments'

Location & Appearance: [Printed or written in map 'Collar']

Typical Placement: Lower right near 'Date on Map,' preceding 'Primary State,' upper right corner of 'Map Banner'

Frequency: Uncommon

Notes on Variations: Only note the *handwritten* name as the 'Alternate Map Name' and the *printed* name as the true 'Map Name.'

At Final Metadata Verification: Ensure that the 'Alternate Map Name' is in the 'Comments' box in the above format, and the original, printed 'Map Name' is entered as the actual 'Map Name.'

<u>**Army Map Service**</u>: See 'Publisher' and 'Imprint Year.' (Maps published by the Army Map Service often print 'Imprint Year' formats as a month and a two-digit year. HTMC will code these 'Imprint Years' in the standard YYYY year format.)

<u>**Atomic Energy Commission**</u>: See 'Publisher'

Banner: The entire top portion of the map 'Collar' (see figs. B2 and B3)

See related: "Publisher," 'Collar'

Synonyms: Top portion of 'Collar.'

Notes on Variations: Text content and position within this area of the 'Collar' will vary between each map series. In any case, content will be printed in one or more of three predictable sections: upper left, upper center, and upper right. Metadata found in the map 'Banner' may include map name, publisher, map scale, as well as other information not captured as HTMC metadata.

The upper left and center text blocks in the banner are often good places to look for the map publisher information. Different agencies will be listed in separate text regions across the banner starting from the upper left corner. Some map series do not have publisher information in the map banner; you must look to other text for this information (often in the lower left corner).

Figure B2. Example upper right corner 'Banner' content.

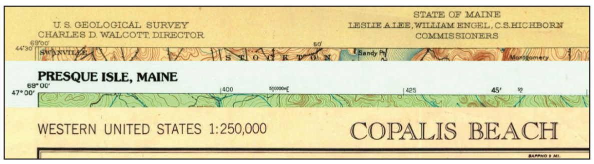

Figure B3. Example upper left corner and upper center 'Banner' content.

<u>Bathymetry by National Ocean Service</u>: This element occurs when a printed map has had depth contours mapped in ocean areas and the National Ocean Service is listed as a cooperative producer.

Location & Appearance: [Bathymetry lines printed in the map content and National Ocean Service cited in the map 'Collar']

Frequency: Only in some coastal ocean quadrangles

At Final Metadata Verification: Ensure that the phrase 'Bathymetry by National Ocean Service' is entered in the 'Comments' field.

<u>Boundary Coordinates:</u> Printed coordinates marking the Earth position of the map boundary in latitude and longitude as measured within the surveyed geographic coordinate system. The official boundary coordinates for an HTMC scan, used in association with the Geographic Names Information System (GNIS), are those printed for the standard enclosed *rectangular* neatline. Any other coordinates printed on the page for overedge sections should be ignored.

These coordinates should be collected by looking at two places on the map page. The lower right and upper left corners of the neatline will contain all the necessary information. An operator should first look to the bottom-right, record the south latitude and then the east longitude. Then, proceed to the top-left, record north latitude and then west longitude. The latitude or longitude boundary coordinate is identified by the value that resides at the end of the respective neatline edge; for example, following the top of the neatline to either end, the value you run into is the north latitude coordinate boundary.

Coordinates in figure B4 would be entered in "DDMMSS" format or "degrees minutes and seconds," as printed on the page. This must be followed by a value to indicate the hemisphere of that parameter, (that is, "N" for north, "S" for south, "E" for east, and "W" for west). For the example in figure B4, the 'Boundary Coordinate' values are north latitude: 350000N., west longitude: 870000W., south latitude: 343000N., and east longitude: 863000W.

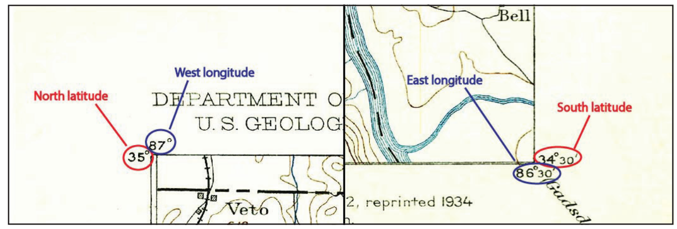

Figure B4. Source for 'Boundary Coordinate' metadata element on a printed historical topographic map. Left image shows the coordinates in the upper left corner of the map, and the right image shows the coordinates on the lower right corner of the map.

Enter these coordinates in the "GNIS Cell" query to find the matching cell. If cell match is not found, then it is possible that a new cell must be created. Note: Coordinates will not be printed with any symbolization for their hemisphere. Every map has its own north, south, east, and west boundaries, whereas the hemisphere of each is dependent on the position of the mapped area. Add 'Comments' for any unexpected irregularities or typos (see 'Comments').

If a coordinate's hemisphere is not immediately clear, it is easy enough to find this out by looking at the change in latitude and longitude. For example,

Values increasing right to left (east to west): map is in Western hemisphere.

Values increasing left to right (west to east): map is in Eastern hemisphere.

Values increasing bottom to top (south to north): map is in Northern hemisphere.

Values increasing top to bottom (north to south): map is in Southern hemisphere.

<u>Bureau of Indian Affairs</u>: See 'Publisher'

<u>Bureau of Land Management</u>: See 'Publisher'

<u>Bureau of Reclamation</u>: See 'Publisher'

<u>Collar</u>: The entire printed text area surrounding the body of the map (that is, the paper space outside the 'Neatline')

Comments: Text field for noting internal process issues, questions, or metadata elements without a matching menu choice. Each separate entry in this field must be delimited by a colon, whereas a comma may be used to separate items with each entry.

See related: 'Alternate Map Name'

Synonyms: "Scan comments"

At Final Metadata Verification: 'Comments' are retained primarily as process "flags" for any internal coding issues. Some 'Comments' may denote the need for resolution before a record can be considered verified and accepted. Always check the 'Comments' field before changing 'Scan Quality.' Any questions stated in 'Comments' field that are resolved and no longer an issue must be removed.

Some key terms entered as 'Comments' may be carried forward as keyword terms or trigger phrases to better explain some aspect of the map sheet. For example, coordinate typo phrases use "lat typo" or "long typo" for a typo in the latitude coordinate and a typo in the longitude coordinates, respectively. A generic typo simply uses "typo."

Compiled: A term used in lower left descriptive paragraph(s) on some maps. Typically referring only to other published source maps of the area, done at a different scale, and giving no new metadata information beyond the current map's given 'Date on Map' and 'Imprint Year.' This term is to be generally ignored for metadata purposes.

Contours: These are the curved, typically brown, lines on 'Topographic' paper maps that portray terrain relief (see fig. B5, left image).

See related: 'Topographic,' 'Planimetric,' and 'Special Printing'

Location & Appearance: [Printed in the map content]

Typical Placement: Entire content portion of the map

Frequency: Majority of maps

Notes on Variations: There are 'Special Printing' maps labeled with the phrase "*contours and woodland symbols omitted.*" In this case, though the maps still says 'Topographic' in the upper right corner, it is NOT. It should be coded as 'Planimetric' meaning it has no contours. There *are also map series labeled as 'Planimetric,' per se; see 'Planimetric' glossary entry for further details.*

At Final Metadata Verification: Ensure that records marked as Planimetric do not have contours.

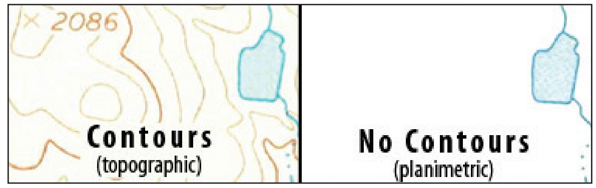

Figure B5. Example of printed historical topographic map content showing a map with contours (left image) and a map without contours (right image). The left image would be coded 'Topographic' (has contours), whereas the right image would be coded 'Planimetric' (does not have contours).

<u>Control Mark Layout and Spacing</u>: Printed and derived information necessary for automating the georegistration of the scanned images (see addendum 2 on geospatial metadata components for complete details)

Copy: See 'Print,' 'Map,' 'Sheet,' and 'Quadrangle.' These terms are used interchangeably.

Synonyms: 'Print,' 'Map,' 'Sheet,' and 'Quadrangle'

<u>Corrected</u>: See 'Edit Year'

<u>Corps of Engineers, U.S. Army</u>: See 'Publisher'

<u>Date on Map</u>: [required field] The YYYY date in the lower map 'Collar' giving the year the map was created. It is important to note that the HTMC metadata field of the same name will *always* contain data. However, a fair number of older maps will not have a traditional 'Date on Map' and instead will have a different value (see details below for substitution rules).

See related: 'Imprint Year,' 'Edit Year,' and 'Mapped by'

Synonyms: 'Edition of YYYY,' 'Edition YYYY,' and 'Preliminary Edition YYYY' (all of which may need to be used as the value for 'Date on Map' depending on what is available)

Location & Appearance: [Printed in lower map 'Collar']

Placement Variation: (See examples in fig. B6).

- Usually an unlabeled YYYY date in the lower right corner, just under 'Map Name' (see fig. B6A)
- May appear in small text, near the map 'Neatline,' following the words 'Preliminary Edition' (see fig. B6B)
- May appear in a text phrase giving an 'Edition' *and* an 'Imprint Year' (see fig. B6C). The 'Date on Map' is the first date in the phrase (*not* the 'Imprint Year'). See 'Imprint Year' for further clarification.

Frequency: Majority of maps (by HTMC definition, this element will *always* have a value)

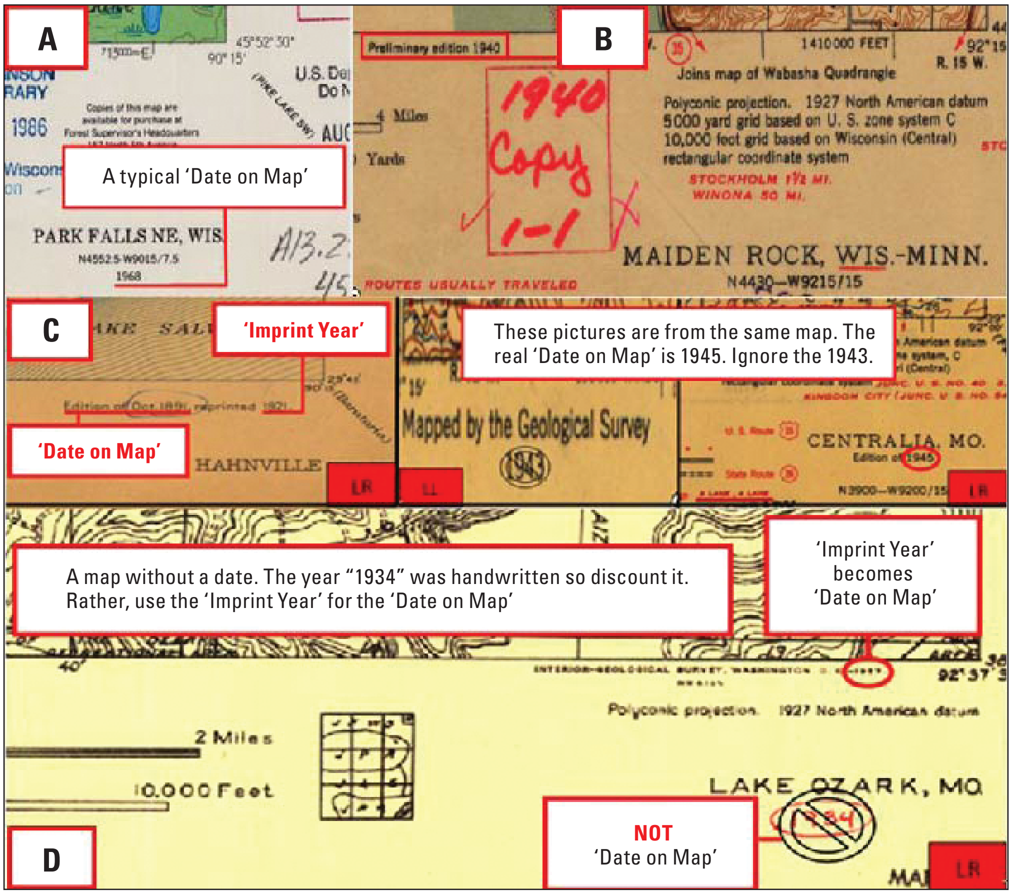

Figure B6. Example sources of the 'Date on Map' metadata element on printed historical topographic maps. Image B6A shows the typical placement of the 'Date on Map' metadata element. Image B6B shows a placement variation of the 'Date on Map' metadata element following the words 'Preliminary Edition' near the map 'Neatline'. Image B6C shows another placement variation of the 'Date on Map' metadata element in a text phrase giving an 'Edition' and 'Imprint Year.' Image B6D shows another variation where 'Imprint Year' is used as the 'Date on Map' when a typical 'Date on Map' is not available (handwritten dates are not used). LR, lower right; LL, lower left.

Notes on Variations:

1. If there is no typical 'Date on Map,' then use the 'Imprint Year' (see fig. B6D).
2. If there is no 'Imprint Year,' then use the 'Survey Year' (superseded by 'Field Check' date) as the 'Date on Map'.
3. If there are any other printed dates (for example, engraving), aside from magnetic declination, then use the earliest of those dates.
4. If the only printed date on a map is a magnetic declination, then use that date (see 'Magnetic Declination').
5. If there is no printed date anywhere on the map sheet, then do not select any dates for any of the date fields, rather follow rules for 'Undated Maps.'

At Final Metadata Verification: Ensure that a YYYY date is correctly entered in the required 'Date On Map' field. If there is a 'Comment' for no date on map, then double check to confirm this and select the '0000' option, if available, or leave blank on the default setting.

Datum: [required field] Printed text giving the mathematical datum of the printed map (for example, North American Datum [NAD], North American Datum of 1927 [NAD27], and North American Datum of 1983 [NAD1983])

See related: 'Projection'

Location & Appearance: [Printed in lower map 'Collar']

Typical Placement: Usually found in the lower left descriptive text paragraph(s)

Placement Variation: Elsewhere in the lower map 'Collar'

Frequency: Majority of maps (not often printed on earlier maps, more frequent after early 1900s)

Notes on Variations: Ignore information detailing "placement of grid ticks" and (or) "to place this map on… (some alternate datum)." *This alternate information is given to show the difference between two datums*. Each map has only one true 'Datum' and 'Projection.'

At Final Metadata Verification: Ensure the correct 'Datum,' as printed on the map, is entered into the metadata.

- If no 'Datum' is printed on the sheet, enter "Unstated."

Dup: Librarians will sometimes write this abbreviation for "duplicate" onto a map sheet when two quadrangles from their map collection are very similar or exactly the same (see fig. B7). This will not always be present on duplicate prints and should not be the single means of identifying and coding a sheet as a duplicate sheet.

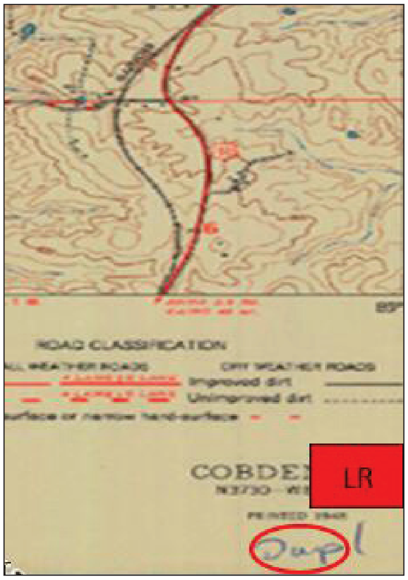

Figure B7. Source of 'Dup' metadata element on a printed historical topographic map. LR, lower right.

See related: 'Woodland Tint,' 'Imprint Year,' 'Visual Version Number,' and 'Scan Quality'

Synonyms: Duplicate and true duplicate

Location & Appearance: [Written on map 'Collar']

Typical Placement: Lower right somewhere near the 'Map Name'

Placement Variation: Because it is handwritten, it could be placed anywhere on the paper map.

Frequency: Interspersed. Duplicates will occur within any 'Primary State.'

At Final Metadata Verification: Presence of these or similar words on the map need not be explicitly referenced in the metadata. It is most important to confirm that records marked as "True Duplicate" (see 'Scan Quality') have an identical matching image. Records identified as duplicates will later be moved out of the working metadata table. The original scans of these files should be set aside as well.

It is important to often cross-check records in the collection to ensure that no two scanned maps are true visual duplicates of the exact same map edition. There are some variations that may set apart two otherwise identical maps.

The most common distinguishing feature is 'Imprint Year' (that is, the year the map was printed). Sometimes the only difference, though sometimes subtle, is the 'Woodland Tint.' If two maps with matching metadata records have ANY printed differences, code both maps with a visual version notation (see 'Visual Version Number'). There is an exception only for the black and white copies (see 'Nonstandard Press Run').

Final steps: Make note of the matching scan as a 'Scan Comment' as "Duplicate of <ScanID>," and set 'Scan Quality' to "True Duplicate."

<u>Edit Year</u>: The YYYY date explicitly given for a map's latest global edit or revision.

See related: 'Photo Revision Year,' 'Imprint Year,' and 'Reprinted with Corrections'

Synonyms: When listed with or near the 'Date on Map' in phrases such as 'Corrected' YYYY, 'Minor Revision' YYYY, 'Revised by…,' and 'Limited Revisions'

Location & Appearance: [Printed in map 'Collar']

Typical Placement: Near the lower right normal 'Date on Map' or in lower left descriptive text

Placement Variation: In a specific text paragraph detailing a 'Photo Revision' or on early vintage maps, it is often printed as 'Reprinted with Corrections.'

Frequency: Uncommon

Notes on Variations: There are many variations over time in placement and wording relating to the 'Edit Year' concept. When similar phrases appear within the lower left descriptive paragraph(s) (as in fig. B8, left image), they are often less "global" than dates printed alongside the

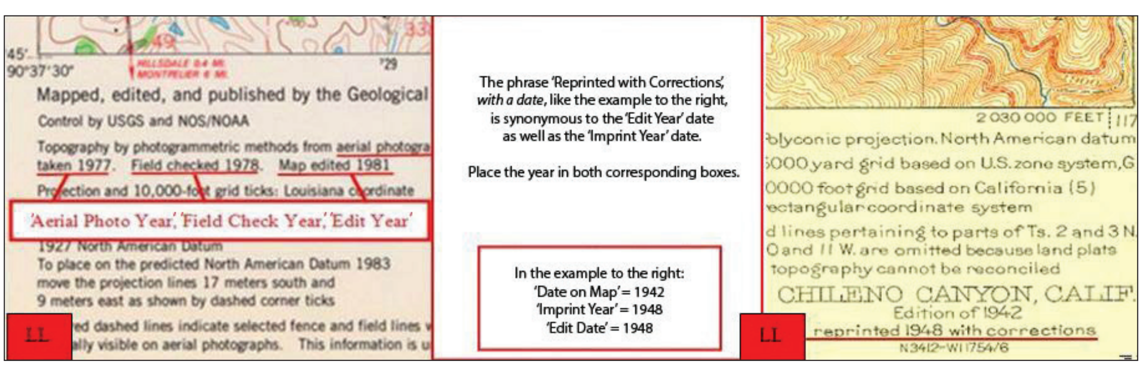

Figure B8. Example sources of 'Edit Year' metadata element on printed historical topographic maps. LL, lower left.

'Date on Map' in the lower right corner (see fig. B8, right image). Also, on earlier vintage maps, it is often worded as 'Reprinted with Corrections,' shown in figure B8, right image. In these cases the 'Reprinted with Corrections' year is both the 'Edit Year' and the 'Imprint Year.' In addition, it is common to see phrases referring to changes made to only one "layer" of a given map (for example, "Culture revised…"). The concept of 'Edit Year' should be applied generally to the map as a whole, giving a YYYY date as printed and generally disregarding any submap layer-revision information.

At Final Metadata Verification: Note the revision and edit date placements on the scanned map. Ensure they are correctly entered in 'Edit Year' and 'Imprint Year' fields as needed.

Edition: See 'Date on Map'

Synonyms: 'Date on Map,' 'Edition' of YYYY, and 'Preliminary' 'Edition' YYYY.

Engraved Date: A YYYY date given the copperplate engraving year (see fig. B9).

See related: 'Date on Map' and 'Imprint Year'

Location & Appearance: [Printed in lower map 'Collar']

Typical Placement: On the lower left side under the 'Neatline'

Frequency: Only seen on older map editions (typically pre-1930s)

Notes on Variations: Do not confuse with 'Imprint Year,' which has a similar placement

At Final Metadata Verification: Ensure there is a correct 'Date on Map,' and that there are no comments about the 'Engraved Date.' If there is no other 'Date on Map,' the 'Engraved Date' may be used as the 'Date on Map.'

Field Check: Printed text telling the user what year the map content was last checked in the field. (This came into use in conjunction with aerial photo compilation methods and essentially replaces the older 'Survey Year' concept once aerial photos became widely available.)

Synonyms: 'Field Examination,' 'Partial Field Check,' 'Advance Field Check' photos, and field annotated

Location & Appearance: [Printed in map 'Collar']

Typical Placement: Lower left paragraph(s) of descriptive text

Placement Variation: As seen in figure B10, 'Partial Field Check' is found most often in the photorevised (see 'Photorevision Year') paragraph with purple text. When 'Field Checked' occurs, it is most often paired directly with an 'Aerial Photo Year' date.

Frequency: Common

Notes on Variations: Multiple versions of 'Field Check' are at times printed on the same map!

For example, when a map has been 'Photoinspected' or 'Revised,' the text describing that revision process often also tells of 'Field Check' status. When any map uses multiple versions of the 'Field Check' phrases always use the latest actual year *definitively* provided. (If you cannot tell *definitely, then leave 'Field Check' blank.)*

At Final Metadata Verification: Ensure the correct YYYY date value is in the 'Field Check' data field.

For more information see "Frequently Asked Questions" section of this Metadata Glossary.

Field Examination: See 'Field Check'

Forest Service: See 'Publisher'

(Maps made by the U.S. Department of Agriculture [USDA] Forest Service have a distinct visual presentation, though most dates and labels are in the same positions as a typical USGS map.)

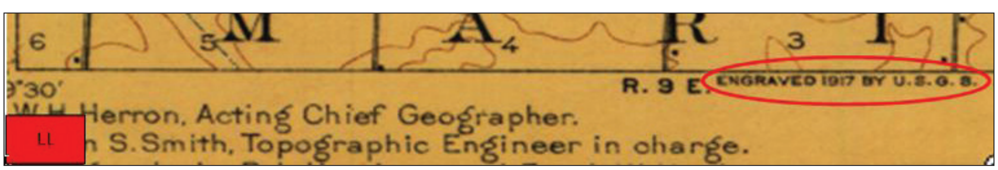

Figure B9. Source of 'Engraved Date' metadata element on a printed historical topographic map. LL, lower left.

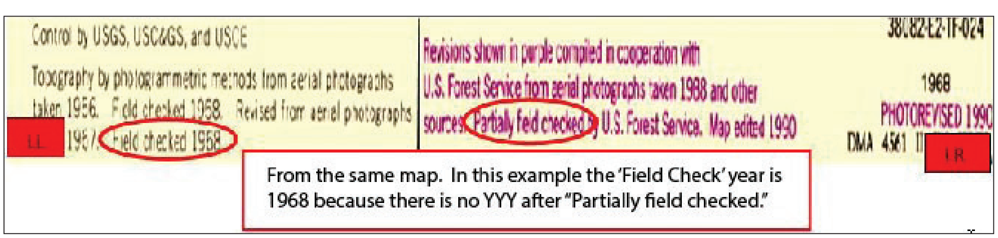

Figure B10. Source of 'Field Check' metadata element on a printed historical topographic map. LL, lower left; LR, lower right.

GNIS Cell: The Geographic Names Information System (GNIS) is the Federal and national standard for geographic nomenclature. A GNIS cell is defined by its geographic extent and has several key attributes: Cell identification (ID) number, a cell name, and boundary coordinates. Other attributes providing other potentially useful information include cell sizes and cell-size types (as they relate to regular spaced grids of cells across the country). The GNIS cells provide the geospatial backbone of the HTMC project and are critical for guaranteeing accurate georeferencing of the scanned maps. Before georegistration, the scanned images cannot tell you any more about their mapped geographic region than what you can see from only looking at the image. It is critical for every HTMC entry to have an associated 'GNIS Cell' ID. There is a many-to-one relation between 'GNIS Cells' and HTMC maps (that is, by nature of the product, searching the HTMC collection for one cell, or a single geographic region associated with a cell, will deliver one or more HTMC maps).

It is important that these 'GNIS Cell' associations are only made with the geographic boundary coordinates. It is not uncommon for the official map names to change over time (see 'Alternate Map Name'). 'GNIS Cells' will always be named for the most current name of the cell and may, or may not, reference the historic name printed on the scanned map sheet. Before a record can be "Accepted" (see 'Scan Quality'), it must have an assigned 'GNIS Cell.' HTMC metadata validation forms will allow an operator to perform a cell query based on the boundary coordinates of the map (see 'Boundary Coordinates').

Imprint Year: Printed text in the lower map 'Collar' (in small font) giving the YYYY date a map was physically printed. By definition, the 'Imprint Year' should not be earlier than any other modification dates for the map (that is, a map cannot be printed before it is edited or revised). 'Imprint Years' can change even if map content was not revised since its last printing. This is a very important data element for differentiating *many* similar maps from each other.

See related: 'Date on Map,' 'Edit Year,' and 'Engraved Date'

Synonyms: 'Reprinted,' 'Reprinted with Corrections,' or any such variation

Location & Appearance: [Printed in lower map 'Collar']

Typical Placement: In a small font, near the lower right map 'Neatline,' often as a part of the phrase "Interior—Geological Survey, Washington, D.C. – YYYY" (see fig. B11)

Placement Variations: Some small-scale map series have the 'Imprint Year' near the neatline on the left side of the page. 'Modified for Forest Service Use' printings will place this year in the far lower right corner, near the bottom of the sheet. Furthermore, certain series of 'Army Map Service' sheets will have this year in the lower left corner, away from the neatline.

Frequency: Majority of maps

Notes on Variations: 'Imprint Year' is *not* always printed on older maps, and it is not explicitly put on *all* maps. In some instances, when there is no typical 'Date on Map,' the 'Imprint Year' is to be used in its place.

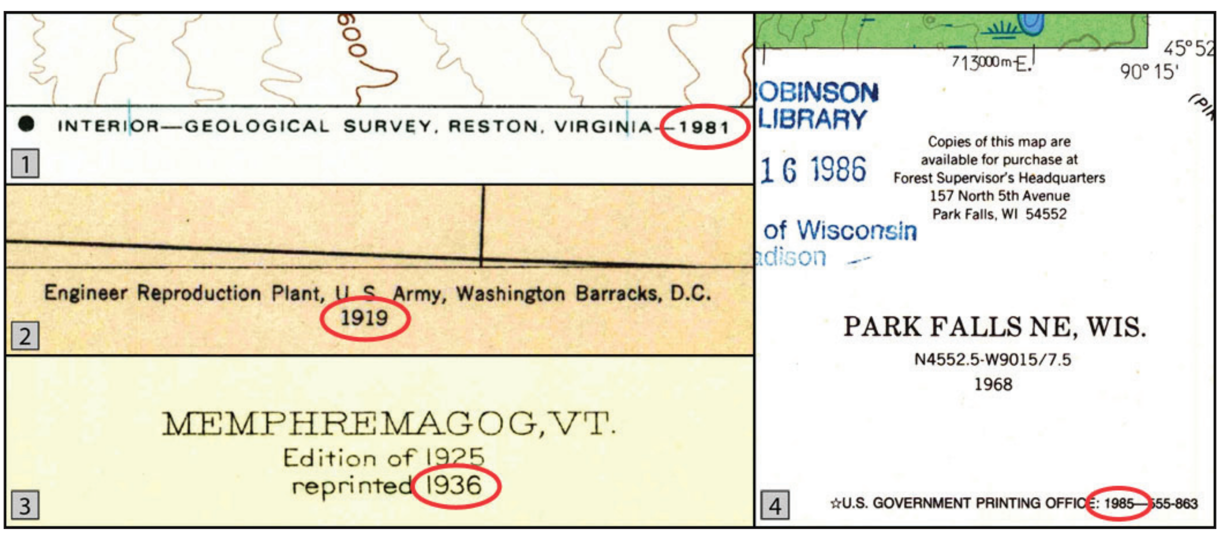

Figure B11. Sources of 'Imprint Year' metadata element on printed historical topographic maps. Panel 1 shows a common appearance of imprint year, near the bottom edge of the neatline in lower right or lower left corners. Panel 2 shows variation seen in some U.S. Army published maps, where the 'Imprint Year' is near the bottom edge of the neatline in typical type size (though sometimes farther away in lower collar region). Panel 3 shows variation seen in maps where reprint text is used, which 'Imprint Year' may appear near or away from neatline in different type size (seen here near map name in lower right corner). Panel 4 shows a variation seen only in 'Modified for Forest Service' maps where the 'Imprint Year' appears in the far lower right corner near the bottom edge of the printed sheet.

At Final Metadata Verification: Ensure that any visible YYYY 'Imprint Year' is entered in the 'Imprint Year' field and that this date is not earlier than any other printed date. It is often the case that the printing year is the only variation that will set it apart from a seemingly identical map. It is necessary to retain all such maps to account for every unique printed variation.

The examples in figure B11 show four different variations of 'Imprint Year' source information. Panel 1 shows a common appearance of imprint year, near the bottom edge of the neatline in lower right or lower left corners. Panel 2 shows variation seen in some U.S. Army published maps, where the 'Imprint Year' is near the bottom edge of the neatline in typical type size (though sometimes farther away in lower collar region). Panel 3 shows variation seen in maps where reprint text is used, which 'Imprint Year' may appear near or away from neatline in different type size (seen here near map name in lower right corner). Panel 4 shows a variation seen only in 'Modified for Forest Service' maps where the 'Imprint Year' appears in the far lower right corner near the bottom edge of the printed sheet.

<u>Inset</u>: A 'Keyword' phrase entered for maps that contain map detail as an inset frame within the larger map 'Neatline.'

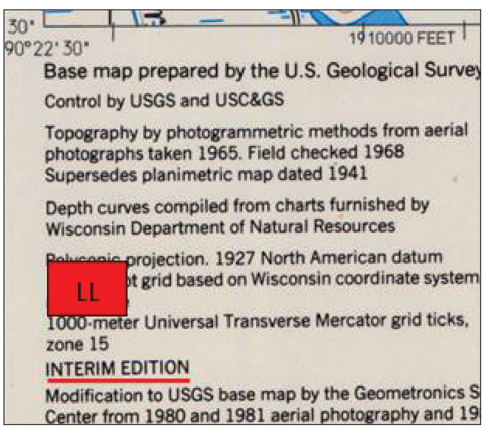

Figure B12. Source of 'Interim' metadata element on a printed historical topographic map. LL, lower left.

Interim: Printed text labeling the map as an "Interim Edition" map (see fig. B12).

See related: 'Advance,' 'Preliminary,' and 'Provisional'

Location & Appearance: [Printed in lower map 'Collar']

Typical Placement: In lower left paragraph of descriptive map text

Frequency: Uncommon

At Final Metadata Verification: Ensure the 'Interim' checkbox is marked if the map is labeled as such.

<u>**Interior–Geological Survey, Washington, D.C.–YYYY**</u>: See 'Imprint Year'

Keywords: Specific words or phrases denoting unique and (or) rare items about a particular map. Accepted unique 'Keywords' terms are 'Nonstandard Press Run,' 'Overedge,' and 'Inset.' Some combination of these terms can be selected from the keyword term dropdown list.

<u>**Limited Revisions**</u>: See 'Edit Year'

<u>**Magnetic Declination**</u>: A measure of the number of degrees and direction between true north and magnetic north (see fig. B13). The date for this geographic phenomenon, at the time of map creation, is entered for metadata ('Date on Map') only in *rare* cases when there is *no other* printed date on the map.

See related: 'Date on Map'

Location & Appearance: [Printed in lower map 'Collar']

Typical Placement: Just to the left or right of the 'Scale' information

Frequency: Majority of maps

At Final Metadata Verification: Ignore this date unless no other date is printed on the map. In such a case, ensure that the 'Magnetic Declination' date is used for the 'Date on Map.'

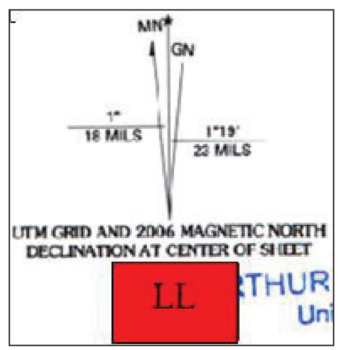

Figure B13. Source of 'Magnetic Declination' metadata element on a printed historical topographic map. LL, lower left.

Map: See 'Print,' 'Copy,' 'Sheet,' and 'Quadrangle.' They are used interchangeably.

Synonyms: 'Print,' 'Copy,' 'Sheet,' and 'Quadrangle'

Map Banner: See 'Banner'

<u>**Map Name**</u>: [required field] The *printed* name of a single quadrangle map sheet (appearing in either mixed or upper case lettering). The HTMC only recognizes the entire quadrangle name *as printed* (disregarding case), including printed additions to the end of the base name (for example, any variation of compass directions (NW., East, and so forth), as shown in figure B14). This is required information for uniquely identifying the mapped region at that time period (see "Notes on Variations" heading for more information on map name changes over time).

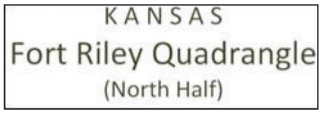

Figure B14. Source of 'Map Name' metadata element on a printed historical topographic map. In this example, the 'Map Name' is "Fort Riley (North Half)."

It is also necessary to include any parenthetical text that may appear adjacent to the map name. This text will identify an attribute of the sheet that may set it apart from other similarly named quadrangles. It is not necessary to match the name of the sheet to a GNIS cell name. Map name and cell name changes guarantee that this will not be possible for all sheets.

See related: 'Alternate Map Name': ________ for similar but distinct concepts

Location & Appearance: [Printed in map 'Collar']

Typical Placement: In *both* the upper right 'Map Banner' *and* the lower right corner with or near the 'Primary State.'

Frequency: Every map (though not *always* printed)

Notes on Variations: On some occasions a paper map will have a change in 'Map Name.' If the name is printed, it may indicate the same geographical area has had a recent name change. If it is hand written, the original name may have been crossed out by a librarian to show the name change. For examples see the images in figure B15 and the 'Comments': "'Alternate Map Name': _______" glossary entry.

Some map sheets may have regions that can be attributed to multiple pre-existing 'Quadrangles.' The complete title of the sheet, shown in the upper right map banner, may then use the word 'Quadrangles' following the name of the map. The name of the map is derived in the same way as before. For example, the sheet with the heading "Niangua-Grovespring Quadrangles" receives the map name: "Niangua-Grovespring," though no consideration is given to the original quadrangles with those names.

Recording the name of the map sheet as printed will guarantee preservation of all variations across every map series. One such example is the use of abbreviations for the words "Saint" and "Mountain," which may appear as "St., Mt., Mtn., and so forth." Similarly apostrophes may be used to separate segments of words, such as in "O'Neil." There may be variations in punctuation and abbreviations between printings of maps that share a common GNIS cell. To avoid delay it is best to always use whatever is printed on that particular sheet, disregarding case.

As with all HTMC metadata elements, case of the printed text is not strictly retained. All map names should be recorded with a capital letter at the beginning of each word, in a sentence-case style, for example, "O'NEIL" is recorded as "O'Neil" with the second word capitalized and the apostrophe intact.

Incorrect spelling may occur in the printed names on the map sheets. If correct names are known, it is better to enter the correct data and add a phrase to the 'Comments' field containing the word "typo." This will trigger a generic typo phrase that will be recorded in the final metadata content for this record. Other questions or inconsistencies in the map name across the sheet should be noted in this field as well.

The name of the map is not always printed on the older sheets. In these cases a handwritten name might appear in the lower right corner (similar to the alternative names). Such handwritten names *must* be cross-checked with the GNIS cell database before they are used as the official map name. If the name is completely different from those associated with the GNIS cell, it is likely an unrecorded historic cell name.

At Final Metadata Verification: Ensure the printed 'Map Name' is entered into the 'Map Name' box and any name change is entered in the 'Comments' field as an 'Alternate Map Name.'

Additional, nonwritten name changes will be identified when the map sheet is matched with a 'GNIS Cell.' If the name for this quadrangle has changed in later editions, then the current cell name that matches the boundary coordinates of the map's printed neatline will not match the printed map name. This is the reason why geospatial data for the quadrangle must be only acquired by matching against the printed geographic information.

Mapped by: Typically *not* entered as a metadata element and should be used only as clarification of unclear 'Publisher' information from the 'Map Banner'

See related: 'Publisher' and 'Date on Map'

Location & Appearance: [Printed in the map 'Collar']

Typical Placement: Lower left descriptive paragraph

Frequency: Common

Figure B15. Example sources of 'Map Name' metadata element on printed historical topographic maps. UR, upper right; LR, lower right.

At Final Metadata Verification: Ensure that the correct ‘Publisher(s)’ are marked for the map. The ‘Publisher’ agency information overrides the more ambiguous ‘Mapped By’ references. Only if there is not enough Federal agency information in the ‘Map Banner,’ look to the lower left paragraph(s) for a ‘Publisher’ description.

Minor Revision: see ‘Edit Year’

Modified for Forest Service Use: A printed text label identifying the map as part of a subset of modified USGS maps (see fig. B16); the appearance of which is not directly captured into a metadata element but instead indicates the presence of variation in printing.

See related: ‘Publisher’ and ‘Imprint Year,’ and ‘Interim’ Edition

Location & Appearance: [Printed in upper map ‘Collar’]

Typical Placement: Label is in upper left text block.

Frequency: Relatively common in some States

Notes on Variation(s): Similar to, but distinct from, ‘Forest Service’ maps; this series has its own unique visual presentation and metadata placement variation. Variations that impact coding instructions will include the following:

- ‘Imprint Year’ statement is differently placed and worded—It is found in the extreme lower right map collar (and will supersede any typical ‘Imprint Year’ statement that may still appear near the lower right neatline,
- These maps are typically associated with the ‘Interim’ editions (only if labeled as such in the lower left collar text), and
- The *latest* ‘Edit Year’ and ‘Aerial Photo Year’ data appear on these maps in the extreme lower left corner with the words “modification to USGS base map by…”

At Final Metadata Verification: Ensure that the correct ‘Publisher(s)’ are marked for the map. The ‘Publisher’ for this type of map is the USGS, *not* the Forest Service. Check that all the most recent dates from the lower left descriptive paragraph have been covered and denote whether or not it is an ‘Interim’ edition.

Neatline: The black line (border) that divides the actual map content from its ‘Collar’ text and is used as a location reference point for some metadata elements (see fig. B17). For example, ‘Engraved Date’ and ‘Imprint Year’ are often found printed along the outside edge of this line. Imperative for other stages of production, the neatline is recognized only as the solid line used to form the enclosed rectangular shape connecting *marked* boundary coordinates. It is this shape that will match with a corresponding ‘GNIS Cell,’ which will be identified by said boundary coordinates. There must be a matching cell for the neatline of every map. See ‘Overedge’ when content extends beyond this border and is considered to be outside the neatline.

Frequency: Every map (with the exception of a few)

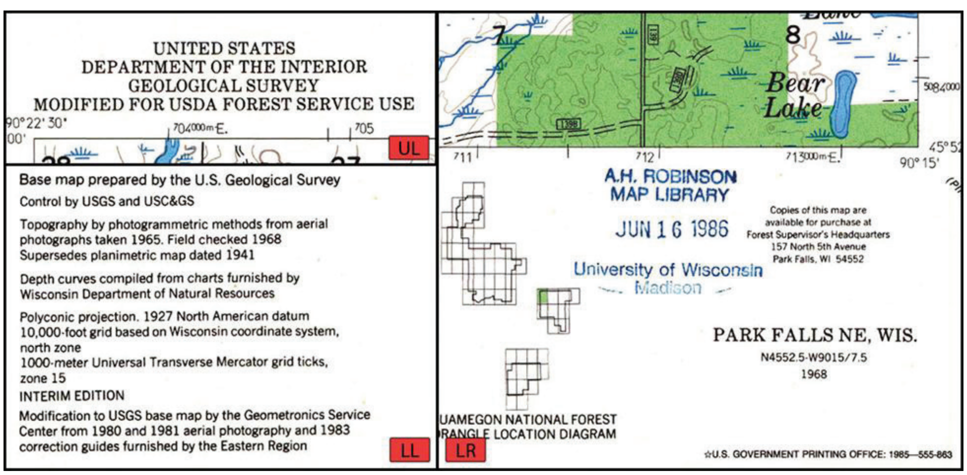

Figure B16. Example of ‘Modified for Forest Service Use’ metadata element on a printed historical topographic map. UL, upper right; LL, lower left; LR, lower right.

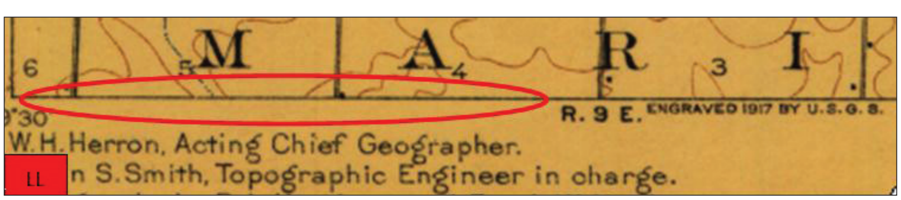

Figure B17. Example ‘Neatline’ on a printed historical topographic map. LL, lower left.

<u>Nonstandard Press Run</u>: A ‘Keyword’ phrase used to denote the (relatively uncommon) occurrence of maps in which only one or two colors were used for its production. The colors are typically black and white, brown and black, or a blue-line color (diazo process) (see fig. B18 for examples). The content of the map is typically standard; it has just been through a different kind of ink printing or reproduction process. In rare cases, these unique maps will appear to have been photo-enlarged or reduced as well. Carefully double check the ‘Map Scale’ for any such maps. Note any such oddities in the ‘Comments’ field. This keyword is also applied to all black and white ‘Orthophotoquad’ prints. Select ‘Nonstandard Press Run’ for the ‘Keyword’ field.

Important Note: When an exact black and white copy of a published map is scanned along with its original, the black and white copy is a “True Duplicate” (see ‘Scan Quality’).

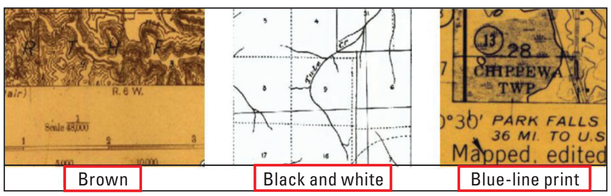

Figure B18. Example ‘Nonstandard Press Run’ on a printed historical topographic map.

<u>Orthophotomap</u>: Printed text identifying a paper map that combines an orthophoto base print with blue water tinting and linework, transportation, and other color map features printed on top (see fig. B19, right image).

Location & Appearance: [Printed in upper map ‘Collar’] orthophoto visible within body of map

Typical Placement: Upper right of ‘Map Banner’ near ‘Map Name’ and ‘Primary State’

Frequency: Uncommon

Notes on Variations: It is easy to identify these maps visually. Look for the actual label of ‘Orthophoto*map*’ when seeing bodies of blue water printed on top of a color photo base.

At Final Metadata Verification: Select “Map” from the ‘Orthophoto’ drop-down list (see fig. B20)

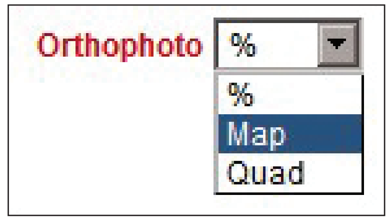

Figure B20. Orthophoto drop-down menu selection for an ‘Orthophotomap’ during final metadata verification of a printed historical topographic map.

<u>Orthophotoquad</u>: Printed text identifying a paper map as an orthophoto print (usually in black and white). These typically have only a ‘Map Name,’ label text, and location grid(s). They traditionally do not show ‘Contours.’

Synonyms: ‘Orthophotograph’ (see fig. B19 for comparison to ‘Orthophotomap’)

Location: [Printed in upper map ‘Collar’] Orthophoto visible within body of map

Typical Placement: In the upper right of the ‘Map Banner’ under ‘Map Name’ and ‘Primary State’

Frequency: Interspersed

Notes on Variations: It is easy to identify these maps visually. Look for the actual label of ‘Orthophoto*quad*.’ Many of these prints are also labeled as ‘Advance’ prints as well.

At Final Metadata Verification:

Select “Quad” from the ‘Orthophoto’ dropdown list (see fig. B21)

For black and white prints: Select the ‘Nonstandard Press Run’ keyword

Figure B19. Example ‘Orthophotoquad’ and ‘Orthophotomap’ metadata elements on printed historical topographic maps.

Figure B21. Orthophoto drop-down menu selection for an 'Orthophotoquad' during final metadata verification of a printed historical topographic map.

Overedge: A 'Keyword' phrase entered for maps that contain map detail extending beyond the 'Neatline' of the quadrangle frame. Maps showing overedge detail extending into Canada, Mexico, or an ocean are noted as "Overedge with No Adjacent Map."

See related: 'Keywords'

Paper Map: The physical, lithographically printed paper map that was fed through the scanner and contains all the printed metadata to be entered into the HTMC database.

Partial Field Check: See 'Field Check'

Partial Revision: See 'Edit Year'

Photoinspection Year: Printed text giving the YYYY date when a photo inspection was done on the map

See related: 'Aerial Photo Year' and 'Photorevision Year'

(See addendum 1 for full discussion of correct photo year coding[s] with examples.)

Synonyms: Photoinspected

Location & Appearance: [Printed in lower map 'Collar'] Often, though not always, in bright red ink

Typical Placement: The lower right corner near 'Map Name' and 'Date on Map' (see fig. B22)

Placement Variation: Sometimes written in the lower left corner descriptive text paragraph(s)

Frequency: Rare (more common after 1970s)

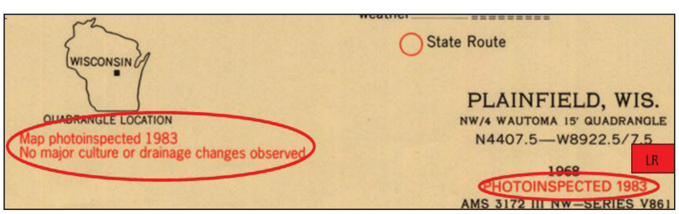

Figure B22. Source of 'Photoinspection Year' metadata element on a printed historical topographic map. LR, lower right.

Notes on Variations: The phrase "photoinspected using imagery dated YYYY; no major culture or drainage changes observed" also appears (not always in red). In those cases, use the year given as a 'Photoinspection Year' and NOT as the "base" 'Aerial Photo Year' for the map.

At Final Metadata Verification: Ensure any map with a cited 'Photoinspection Year' is entered in the correct field. 'Photoinspection Year' should be equal to or later than the 'Date on Map.'

Photorevision Year: Printed text giving the YYYY date when newer photos were used to revise a map.

See related: 'Aerial Photo Year,' 'Photoinspection Year'

(See addendum 1 for full discussion of correct Photo Year coding[s] with examples.)

Synonyms: Photorevision

Location & Appearance: [Printed in lower map 'Collar'] Typically in bright purple (magenta) ink

Typical Placement: It is usually just under the 'Date on Map.'

Placement Variation: There is an associated text paragraph (also in bright purple ink) elsewhere in the lower map 'Collar' providing more details of the revision (see fig. B23).

Frequency: Uncommon (more frequent after 1970s)

Notes on Variations: If a map gives the YYYY aerial photo date in purple, use this more recent date as the map's 'Aerial Photo Year' and NOT the older aerial photo date still shown in the lower left paragraph text. 'Edit Year' is also frequently given here.

At Final Metadata Verification: Ensure the correct YYYY is entered in the 'Photo Revision Year' box. Also, double check the accuracy of 'Aerial Photo Year' when multiple photo dates appear in any given map.

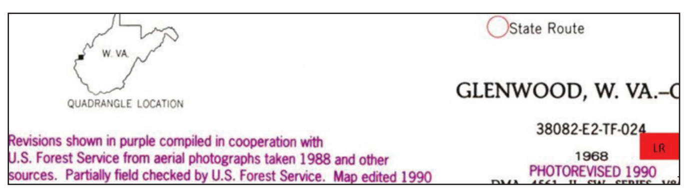

Figure B23. Source of 'Photorevision Year' metadata element on a printed historical topographic map. LR, lower right.

Planetable Methods: See 'Survey Year'

Planetable Survey: See 'Survey Year'

PLSS: Public Land Survey System (PLSS). This term may generally be ignored for metadata purposes.

Planimetric: A map with no ‘Contour’ lines. At times, a text label is printed in the upper right ‘Banner’; otherwise, it is visually discerned (see fig. B24 for examples).

See related: ‘Topographic,’ ‘Special Printing,’ and ‘Contours’

Location & Appearance: [Printed in the map ‘Collar’ and (or) visible in the map content]

Typical Placement:

A map is likely Planimetric if any one of the following applies:

- The term ‘Planimetric’ is printed in the upper right corner (see fig. B24, left image), or
- The map content does not display any contours (see fig. B24, center image), or
- A ‘Special Printing’ label with “contours and woodland tint are omitted” *text appears at the lower right side of the paper map near the vertical ‘Neatline’ (see fig. B24, right image).*

Frequency: uncommon

Notes on Variations: In the case of ‘Special Printing,’ though it often still says ‘Topographic’ in the upper right ‘Banner’ text, it should be coded as ‘Planimetric.’ Some maps will not have any specific labeling regarding this concept, but if they do NOT contain contours in the map content, they are ‘Planimetric.’ In very rare cases, some areas of *extremely* flat relief may note that contour intervals exceed the terrain change in the area and thus are not shown—in this case it is *not* a ‘Planimetric’ map.

At Final Metadata Verification: Ensure that the map is in fact ‘Planimetric,’ even if it says ‘Topographic’ at the top, and mark the ‘Planimetric’ checkbox accordingly.

Preliminary: Printed text labeling that specifies map as a ‘Preliminary,’ ‘Sheet,’ or ‘Edition’ (see fig. B25)

See related: ‘Advance,’ ‘Interim,’ and ‘Provisional’ for similar but distinct metadata elements

Location & Appearance: [Printed in map ‘Collar’]

Typical Placement: Lower left map corner near ‘Neatline’ (similar to ‘Imprint Year’) (see fig. B25).

Location Variation: More rarely, a map may be labeled within the map body as a ‘Preliminary’ copy.

Frequency: Common

Notes on Variations: These maps will often NOT display a typical ‘Date on Map.’ The YYYY format ‘Preliminary’ date is then used as the official ‘Date On Map’ as well.

At Final Metadata Verification: Ensure the ‘Preliminary’ checkbox is marked, clear any ‘Comment’ text about it, and enter the date as ‘Date On Map’ if needed.

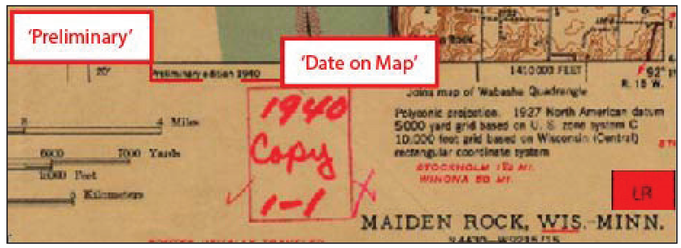

Figure B25. Example source of ‘Preliminary’ metadata element on a printed historical topographic map. LR, lower right.

Primary State: [required field] The geographic jurisdiction (U.S. State) in which the mapped area actually exists on the ground. In border area, maps showing more than one State (or country), this is the first State (or area) listed directly along with the ‘Map Name.’ (If the area listed is not in the United States, the most appropriate U.S. State.) The value used for this element will not always match the primary State derived from other definitions, for example, GNIS cell primary State.

Synonym: ‘State’

Location & Appearance: [Printed in upper and lower map ‘Collar’]

Typical Placement: In upper right ‘Map Banner’ *and* alongside the ‘Map Name’ in lower right corner. The ‘Primary’ State is always the first listed State within any series of States (or areas).

Frequency: Every map (though not *always* printed)

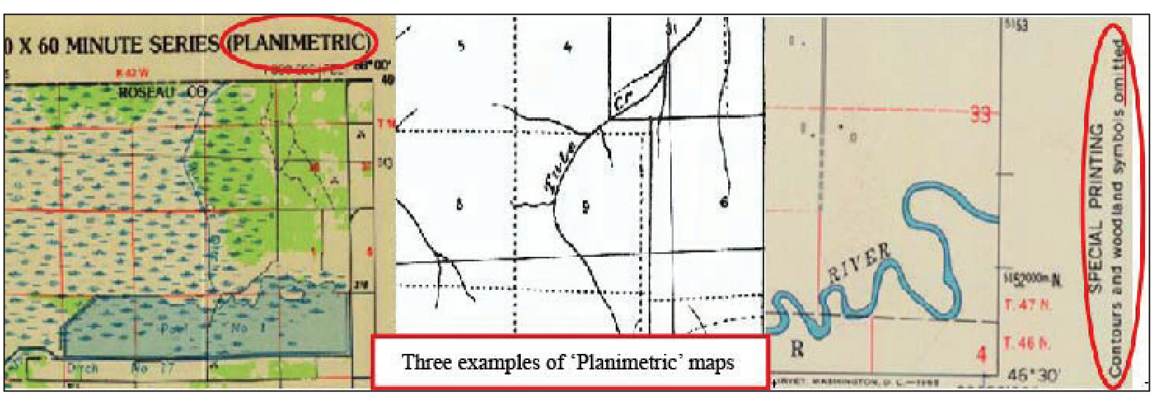

Figure B24. Example sources of ‘Planimetric’ metadata element on a printed historical topographic map.

Notes on Variations: Infrequently “Indian Territory,” “Canada,” “Mexico,” “Guam,” “D.C.,” and (or) others will show up in the description. These are the conceptual equivalent to ‘Primary State.’

At Final Metadata Verification: Ensure the correct State (geographic area), as printed first on the map, is entered into the ‘Primary State’ field. Over time some map cells did change a State’s order in the list. For HTMC coding purposes, ‘Primary State’ is always the first listed on that particular printed edition of the map.

If for some reason, a State is not clearly given on the map sheet, then look to the ‘GNIS Cell’ as a secondary means of identifying the ‘Primary State’ (see ‘GNIS Cell’).

Print: ‘Map,’ ‘Copy,’ ‘Sheet,’ and ‘Quadrangle’

Synonyms: ‘Map,’ ‘Copy,’ ‘Sheet,’ and ‘Quadrangle’

Projection: [required field] Printed text giving the mathematical projection of the printed map.

See related: ‘Datum’

Location & Appearance: [Printed in lower map ‘Collar’]

Typical Placement: *When present***,** found in the lower left or lower right map descriptive text

Frequency: Printed on majority of maps after the 1920s

Notes on Variations: Placement and appearance varies somewhat over time. Ignore information describing “placement of grid ticks” and (or) “to place this map on… (an alternate datum).” *That information is given to show the potential difference between two datums and projections.* Each map has only one true datum and projection. Enter only the one detailed as the printed projection for this map. [These terms indicate map projections: Universal Transverse Mercator, Transverse Mercator, Polyconic, Lambert Conformal Conic, Polar Stereographic, and so forth.]

At Final Metadata Verification: Ensure the correct ‘Projection,’ as printed on the map, is selected in the projection drop-down list. If no ‘Projection’ is explicitly given enter the “Unstated” value.

Provisional: Printed text labeling that specifies map as a provisional copy or sheet.

See related: ‘Advance,’ ‘Interim,’ and ‘Preliminary’

Location & Appearance: [Printed in map ‘Collar’]

Typical Placement: Usually lower left in a specific ‘Provisional’ text box (see fig. B26, left image) and under ‘Map Name’ in lower right (see fig. B26, right image)

Placement Variations: More rarely, found in the usual ‘Imprint Year’ position near the ‘Neatline’ as well as possibly in the actual map body appearing in partially unmapped areas

Frequency: Common with the dark red ‘Collar’ text; more rarely in map body or near ‘Neatline’

At Final Metadata Verification: Ensure the ‘Provisional’ checkbox is marked

Publisher: Refers to any Federal agency that cooperated with producing the map. State agency-level cooperators are *not* captured in the metadata and should be ignored for HTMC coding purposes. Many maps will have multiple valid ‘Publisher’ names.

See related: ‘Banner’

Location & Appearance: [Printed in map ‘Collar’]

Typical Placement: Spread across the map ‘Banner’ typically upper left and upper center

Placement Variation: Lower left map descriptive text

Frequency: Virtually all maps

Notes on Variations: The information in the ‘Map Banner’ is the *presiding* source for this metadata element (see fig. B26 for examples). It will contain one or a combination of labels; there a limited number of accepted official publishers will be reported.

Note: Publisher information appearing in any other section of the map ‘Collar’ (for example, lower left descriptive text), when there is publisher information already in the map ‘Banner,’ should *only* be used for clarification.

The following publishers are recognized by the HTMC as valid Federal agencies (printed text will appear in the form given here, or some close variation thereof): ‘USGS’ (most frequent), ‘War Department,’ ‘Bureau of Indian Affairs,’ ‘Bureau of Land Management,’ ‘U.S. Department of Commerce,’ ‘Army Corps of Engineers,’ ‘Bureau of Reclamation,’ ‘Environmental Protection Agency,’ ‘Army Map Service,’ ‘Forest Service,’ and ‘Tennessee Valley Authority.’ The category “Other Military Map” is used for

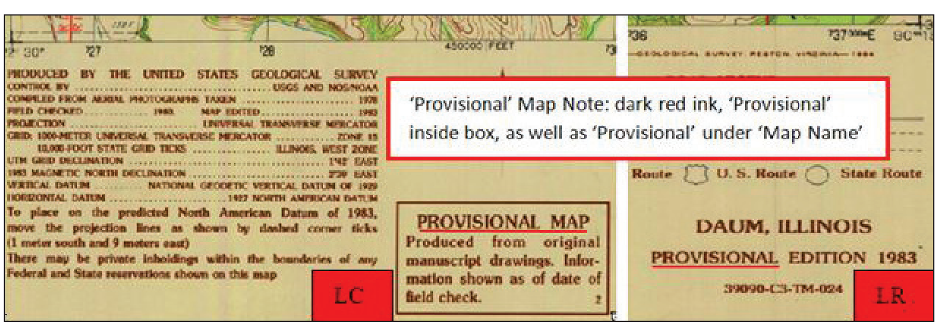

Figure B26. Source of ‘Provisional’ metadata element on a printed historical topographic map. LC, lower center; LR, lower right.

such publishers as ‘U.S. Department of Defense National Image and Mapping’ and ‘U.S. Army.’ It is *not* a requirement for an HTMC record to have any of these publishers.

Other Federal agencies not recorded as official publishers include as comments in the metadata record: “U.S. Atomic Energy Commission,” “U.S. Customs Service,” and “National Geospatial-Intelligence Agency.”

At Final Metadata Verification: Each valid publisher will have its own checkbox on the metadata entry form, which corresponds to a distinct predefined database field; that is, every record can be queried for every valid publisher. No assumptions are made, and the default value for all publishers is “no” until they are individually set.

Ensure the correct ‘Publisher’ checkboxes are marked according to the agencies printed on the map. Ensure that *each* Federal ‘Publisher’ listed in the map banner has been checked in the appropriate ‘Publisher’ checkbox. These maps *will have multiple* ‘Publisher’ entries. Publisher names for Federal agencies that do not match any of the official agencies must be entered as a ‘Scan Comment,’ “Publisher: <List of publisher>.”

Figure B27 shows three examples of ‘Publisher’ variations. In the top image, ‘USGS’ is the only value for ‘Publisher.’ In the middle image, there are two values for ‘Publisher’: ‘USGS’ and ‘USFS.’ In the bottom image, only three values for ‘Publisher’ are recorded: ‘USGS,’ ‘War Dept.,’ and ‘Army Corps of Engineers,’ for the three Federal agencies. Non-Federal entities, such as the University of California, are not recorded as values for ‘Publisher.’

Quadrangle: ‘Print,’ ‘Copy,’ ‘Sheet,’ and ‘Map’

Synonyms: ‘Print,’ ‘Copy,’ ‘Sheet,’ and ‘Map’

Reconnaissance: A relatively uncommon descriptive term used on some maps, which is not recorded as metadata for the map sheet.

Reprinted in YYYY: See ‘Imprint Year’

Reprinted with Corrections: A YYYY date printed near the ‘Map Name’ and ‘Date On Map’ (see fig. B28). For the case shown in figure B28, the given date is both the ‘Edit Year’ *as well as* the ‘Imprint Year’ (for example, ‘Date on Map’ = 1942, ‘Imprint Year’ = 1948, ‘Edit Year’ = 1948).

See related: ‘Date on Map’

Synonyms: ‘Edit Year’ and ‘Imprint Year’

Revised or **Revised by… YYYY**:

See related: ‘Edit Year’ and ‘Photo Revision Year’

Synonyms: ‘Edit Year’

Location & Appearance: [Printed in lower map ‘Collar’]

Typical Placement: Lower left paragraph of descriptive text

Frequency: Common

Notes on Variations: Sometimes the phrase ‘Revised’ appears without a YYYY date. In this case it can be ignored because no definitive date can be entered.

At Final Metadata Verification: Ensure any definitive YYYY revision date is accurately entered in the ‘Edit Year’ field.

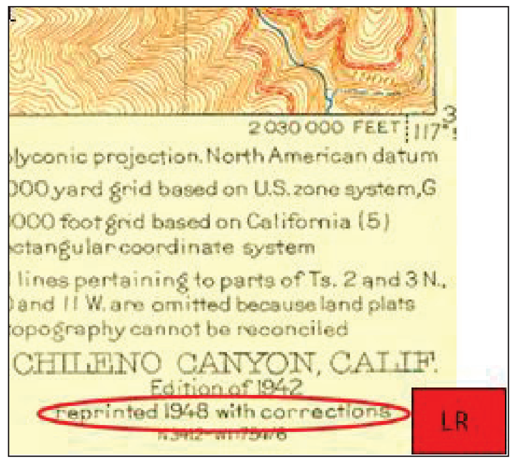

Figure B28. Source of ‘Reprinted with Corrections’ metadata element on a printed historical topographic map. LR, lower right.

Revision by USDA Forest Service (YYYY): See ‘Publisher’ and ‘Forest Service’

Scale: [required field] This is the ratio of paper map units to the actual ground units measured in the real world (see fig. B29).

Location & Appearance: [Printed in lower map ‘Collar’]

Typical Placement: Centered in the lower map ‘Collar’

Frequency: Every map

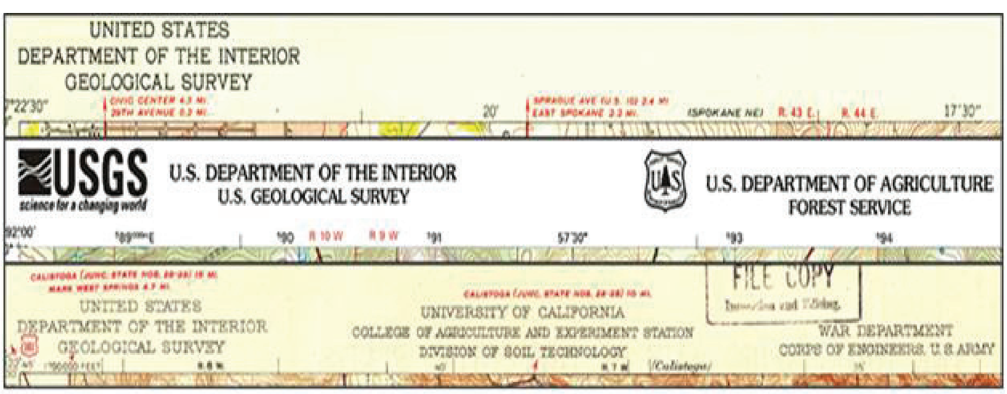

Figure B27. Example sources of ‘Publisher’ metadata element on a printed historical topographic map.

Notes on Variations: On *very* rare occasions, a photo enlargement or reduction may have been done to a particular 'Map'; ensure the correct 'Scale' is recorded. Also, some maps produced at a standard scale may not always cover the standard grid-cell area. (One set in California, for instance, was published at 1:24,000 scale but covered only 6 minutes of latitude/longitude, not the typical 7.5 minutes.) Even though the scale will be the same as other standard sheets, the area covered is then different, which requires a different 'GNIS Cell.'

At Final Metadata Verification: Ensure the correct scale is entered for each paper map in the "Map Scale" field.

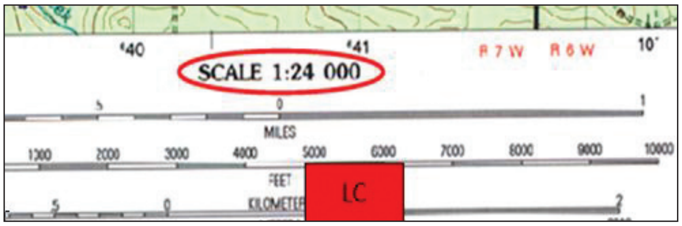

Figure B29. Source of 'Scale' metadata element on a printed historical topographic map. LC, lower center.

Scan Comments: See 'Comments'

ScanID: [required field] A unique six- or seven-digit integer sequence automatically generated for each new database record, corresponding to a single scanned map. No two records can contain the same ScanID, and this value should never be changed. The unique factor of this field is maintained in the database as records are moved between tables. This value does not relate to any other database field. Any recognized correlation does not hold any significance. The ScanID sequence does not return to fill in gaps where records were removed or were created in error. When a rescan is requested, for whatever reason, the new scanned image will use the ScanID and all associated records, or the first original scan.

There is not a restriction for values in this field to be in a continuous order between records, and as such there may be gaps in values. Even with the high total possible number of entries in the collection, the number of digits used in this field can allow for different ScanID starting points. ScanID grouping, from multiple starting points, is not a significant feature and should only be used as a passing reference. The sequence and order of values in this field is not significant and should only be used for some clarifying reference. It is also common that gaps in ScanIDs will appear often in one table as records are moved and deleted.

Scan File Name: The filename used for the scanned image is generated at the time of record creation within the metadata database. This value comprises the five core filename elements that are carried through to all HTMC product filenames. These core elements appear in the following order: 'Primary Map,' 'Map Name,' 'ScanID,' 'Date On Map,' and 'Scale.' All core and supplementary filename components are delimited by underscores. Though the 'Map Name' field in the database will hold the name of the map as printed on the paper sheet, this value must be modified for the filename to remove certain characters that would otherwise conflict with file-system naming conventions. Often following these core filename elements is a supplementary identifier that may refine the type of file as given by the extension, for example, "orig" for "original," with Tagged Image File Format ("TIFF") scans appearing as "_orig.tif," or "geo" for "geographic," with "PDF" files appearing as "_geo.pdf." Note: The term *original* is used to denote the primary scanned TIFF image, which will remain the same for a given record even as rescans are made.

All stages of HTMC production and the utilities that control the separate stages make the assumption that all these components are in place. The database will control the generation of the first original scan file name, whereas other products may have their filenames set by production utilities. A changing of a filename does not imply a change to content within a file. Conversely, changes to the content of the file do not always imply a change to the filename (for example, "rescans"). Changes to the core metadata elements within the database must then be externally reflected in the names and metadata of all file products.

Scan Quality: The value in this field serves as a production progress indicator and an assessment of the quality of the completed scans. Default value is "Unverified," when new records are created. Once a record has undergone complete metadata validation, this field must be set to match one of the following values from the drop-down list: "Accepted," "Rescan Complete," "Rescan Incomplete," "Not Optimal," "True Duplicate," and "Unverified." Only records with "Accepted" or "Not Optimal" in this field can be considered verified for production. Products will not be generated for any scans with records any other 'Scan Quality' value.

Scan Quality—Continued

At Final Metadata Verification: Select the appropriate value from the drop-down list. If the metadata record is complete and the scan is of good quality, select "Accepted." If the scan is of less than perfect quality, and all data elements check out, then select "Not Optimal." Either of these values will indicate that the scan is likely capable of passing through production. Image adjustments for "Not Optimal" scans can be made on an individual or bulk basis. Enter a scan 'Comments' for any records set to the following values:

- "Low Resolution": The scan is below minimum accepted resolution values (400 DPI).
- "Missing Scan": Original scan cannot be found. This does not imply completion of the record.
- "Rescan Reqd…": For either complete or incomplete metadata records, rescan required due to any number of reasons (such scans may have a loss of metadata or map content). It is not necessary to request a rescan if image processing can rectify the issue.
- "To Be Resolved": Records in this category must contain some variation of an element or aspect of the map that does not fit within current production methods, for example, printed datum not matching one in the accepted list (local or astronomical), multiple maps, and no 'GNIS Cell' (in some cases new cells may be created).
- "True Duplicate": When the scan associated with this record matches another scan on all visual aspects. One of the matching scans must be selected to stay behind. Typically the best looking scan is retained. Duplicate records are moved to an alternate table. See 'Dup' glossary entry and HTMC de-duplication documentation in addendum 3.
- "X Collection": Use only for scans that do not fit within the scope of the HTMC project.
- Hold Map for Question": Use only as a temporary flag for errors or questions with the metadata record. This term may be used to catch any remaining concerns.

Shaded Relief: A three-dimensional shadow effect that enhances visualization of terrain relief on maps (see fig. B30).

Location & Appearance: [Appears in body of map (see fig. B30)]

Frequency: Uncommon

At Final Metadata Verification: Ensure all maps that contain this type of content are coded as 'Shaded Relief.'

Figure B30. Source of 'Shaded Relief' metadata element on a printed historical topographic map.

Sheet: 'Print,' 'Copy,' 'Map,' and 'Quadrangle'

Synonyms: 'Print,' 'Copy,' 'Map,' and 'Quadrangle'

Special Map: Printed text that usually signifies an oddly sized (or off-grid) map that was created for a specific geographic area (see fig. 31).

Location & Appearance: [Printed in map 'Collar']

Typical Placement: With 'Map Name' in upper right of 'Map Banner' or the lower right 'Collar' or both places

Frequency: Extremely rare

At Final Metadata Verification: Ensure 'Map Name' entry is correct and mark the 'Special Map' checkbox.

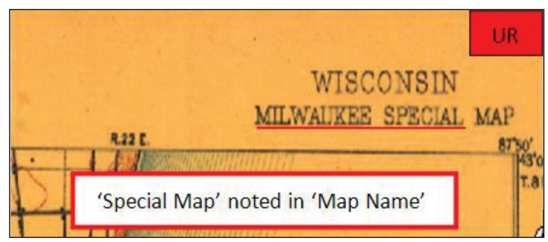

Figure B31. Source of 'Special Map' metadata element on a printed historical topographic map. UR, upper right.

Special Printing: Printed text labeling maps that have had woodland tint and contours left off for that particular map press run.

(Do not confuse this with the 'Special Map' metadata glossary entry.)

See related: 'Planimetric,' 'Topographic,' 'Contours,' and 'Woodland Tint'

Location: [Printed in lower right map 'Collar'] in vertical**,** black text

Typical Placement: Located near lower right side of the map 'Collar' along the right 'Neatline' (see fig. B32). The 'Topographic' label will still appear in the 'Map Banner' near the 'Map Name,' but it is a 'Planimetric' map in this case.

Frequency: Uncommon

At Final Metadata Verification: Mark the 'Special Printing' and 'Planimetric' checkboxes for these particular maps. 'Woodland Tint' should be "No" (unchecked) indicating 'Woodland Tint' is not present.

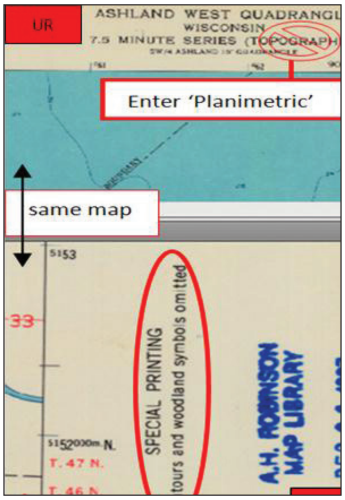

Figure B32. Source of 'Special Printing' metadata element on a printed historical topographic map. UR, upper right; LR, lower right.

__**State**__: See 'Primary State'

Survey Control Current as of: This printed phrase is not entered as metadata. It appears generally on more modern maps.

(Do not confuse with, or enter as, a 'Survey Year.')

Survey Year: A YYYY date given when a field survey was completed for the mapped area—generally before the 1950s. When more than one year, or a range of years is given, the latest YYYY date is entered (see fig. B33).

Synonyms: 'Planetable Methods,' 'Planetable Survey,' 'Survey Methods,' 'Survey Year,' and 'Surveyed'

See related: 'Survey Control' current as of YYYY

Location & Appearance: [Printed in map 'Collar']

Typical Placement: Lower left paragraph of descriptive text

Frequency: Occurs on older maps and begins to phase out with the introduction of photogrammetric methods.

Notes on Variations: Occasionally there will be more than one reference to a 'Survey Year' in the lower left paragraph. Use the most relevant information to the actual map content. This is usually signified by being located on a single line. The latest date given is entered.

At Final Metadata Verification: Ensure that the correct YYYY date is in the 'Survey Year' data field.

The examples in figure B33 show the source of the 'Survey Year' metadata element circled in red. The latest date is used as the 'Survey Year.' Note the circled line in the top right image. Here the 'Survey Year' of "1950" is taken from the single line, even though a synonym is used, and the term "surveyed" appears above the red circled text.

Tactical: A relatively uncommon descriptive term used on some maps, which is not recorded as metadata for the map sheet.

__**Tennessee Valley Authority**__: See 'Publisher'

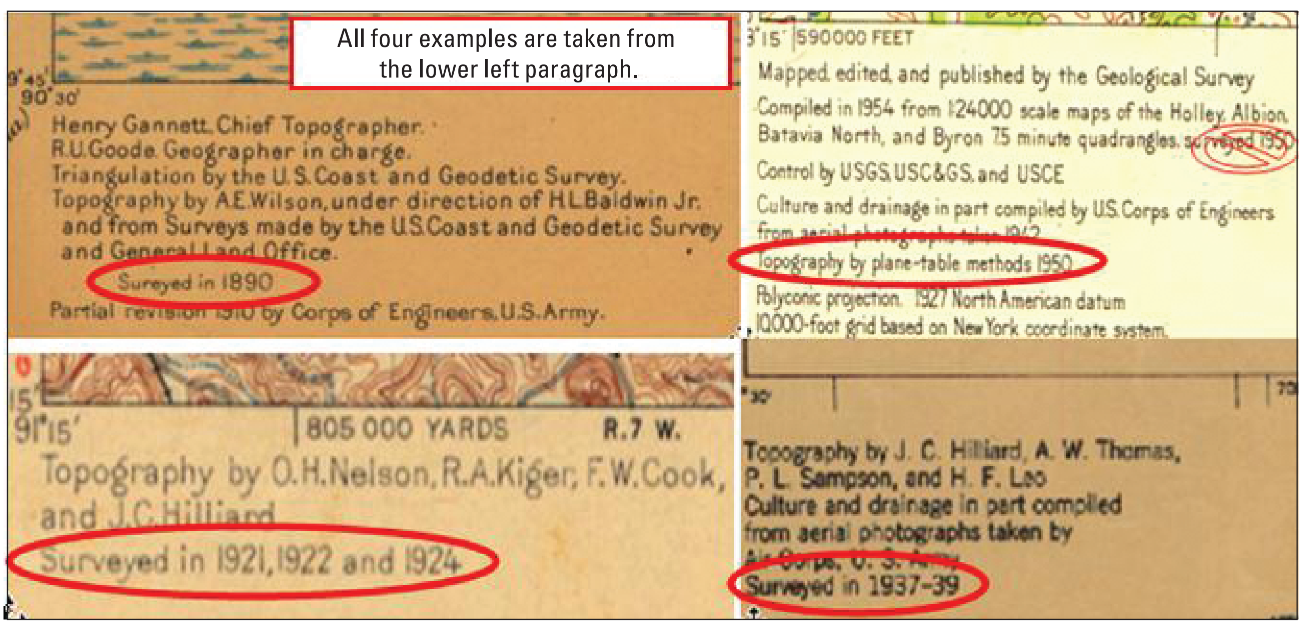

Figure B33. Example sources of the 'Survey Year' metadata element on a printed historical topographic map.

Topographic: Describes a map with ‘Contours’ (see fig. B34, left image). It will usually be labeled as such in the upper right map corner. Even if the text label “Topographic” appears printed on the page, a map without contours is recorded an ‘Planimetric’ (see fig. B34, right image). See ‘Special Printing’ and ‘Planimetric.’

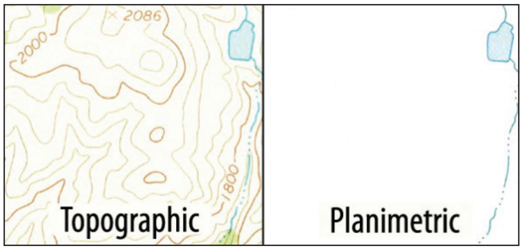

Figure B34. Example sources of ‘Topographic’ and ‘Planimetric’ metadata elements on printed historical topographic maps.

Topography by Plane-Table Methods YYYY: See ‘Survey Year’

Undated Map: This term is to be used in the ‘Scan Comment’ section only if there is absolutely no date on the ‘Map.’ This includes the ‘Magnetic Declination’ date (see ‘Magnetic Declination’ on how to proceed if this is provided) and any printed or stamped dates. If no date is available to be used for the ‘Date on Map’ field (as defined for HTMC metadata), from the date-on-map drop-down menu, select ‘0000’ and ignore all other date fields. The ‘Scan File Name’ will then be adjusted to contain four zeros for the date element.

See related: ‘Date on Map’

Synonyms: “No ‘Date on Map’”

At Final Metadata Verification: Look over the map to confirm that no date can be used for this ‘Sheet.’

U.S. Army: See ‘Publisher’

USGS: United States Geological Survey (USGS); see ‘Publisher’

Visual Version Number: This is an arbitrarily assigned sequential number given to maps having visible printed differences but have valid, identical values for the six-metadata-element field that typically identify unique maps. This metadata element codifies the fact that visually distinct printed editions of a map having the same basic metadata do exist and were produced in different press runs over time.

This number is used in order to retain records with matching key metadata elements but differ in other fields or have unrecorded printed visual differences. The visual version number (VVN) must be manually set after comparison of complete metadata records and their corresponding image scans. By default this field does not have a value.

Visual Version Number—Continued

Constraints in the database flag unverified records that match on all of the following fields: ‘Primary State,’ ‘Map Name,’ ‘Map Scale,’ ‘Date on Map,’ ‘Imprint Year,’ ‘Woodland Tint,’ and the VVN itself. Consequently, published scans cannot match on all seven fields. Metadata fields, outside of those used in the constraint (orthophoto, publishers, other date fields, and so forth), will qualify as printed differences, along with barcodes, logos, and anything else printed on the paper map sheet.

All scans that collide on this parameter must be opened simultaneously for confirmation of existing metadata. Then any of these images, with further visual differences, already found to be matching on the aforementioned metadata elements, must be *each* assigned a VVN. The VVN number assignment itself is arbitrary, and no significance is given to the actual number used. Nothing can be learned from filtering on the variation of how these numbers were used. Verified records, accepted for production, that match on the six basic uniqueness elements will also have a VVN. Images that have been identified as matches, through the constraint, but do not have any other printed differences, will not receive a VVN and must be recorded as duplicates (see ‘Dup’).

Example 1: In the course of metadata validation, three records have been flagged for matching on the six basic uniqueness elements. All corresponding images have been opened for visual assessment. All three records match exactly across *all* metadata fields. However, ScanA has the USGS logo in the top left corner, whereas ScanB and ScanC do not have the logo or any additional printed variations.

In this case the two scans without the logo, ScanB and ScanC, are duplicates, whereas the first, ScanA, has a notable visual difference. The duplicate scan of lesser quality (generally subjective) will be recorded as “True Duplicate” (see ‘Scan Quality’). The remaining scans will each be assigned visual version numbers. The number that either scan receives makes no difference (no rule is followed). The two retained scans will no longer collide on the test against the seven key metadata validation elements and will continue through production.

Example 2: Two records are flagged for violating the uniqueness constraint and are compared for matching metadata attributes. Both records do match on the six basic uniqueness elements, though other metadata fields would indicate some difference between the two scans. The orthophoto field for ScanA reads ‘Map,’ whereas the orthophoto field for ScanB reads ‘Quad.’ After opening both scans, it is clear that both of these records accurately reflect the printed content of the map sheet. Since this metadata field is not part of the six basic uniqueness elements, a visual variable number must be set for each of these records. After the VVN attribute is set, both scans will be permitted to pass through final validation and on through production.

For more details and additional examples, see the deduplication documentation in addendum 3.

War Department: (superseded by: 'Department of the U.S. Army'), see 'Publisher'

Woodland Tint: [required field] cartographic symbols showing woodland cover in a green or sometimes yellow tint. All areas of green vegetation, as defined and marked by the USGS topographic map symbols (see fig. B35) are included here.

See related: 'Special Printing,' 'Visual Version,' 'Dup,' and 'Planimetric'

Location & Appearance: [Visible within body of map]

Typical Placement: This metadata element is defined by the visually discerned presence or absence of vegetation symbols (see fig. B35), in green or yellow tint, within map content (see fig. B36 for examples).

Frequency: Common

Notes on Variations: See the vegetation legend for the various representations of green tint appearing on the maps. There are a rare number of maps that contain printed symbols for woodlands that are not printed as the traditional green tint. This woodland symbolization is still coded "Yes" indicating the presence of 'Woodland Tint' on the printed historical topographic map. For example, *color* orthophoto maps with green vegetation tints are also coded as "Yes." Maps specifically marked 'Special Printing' with woodland symbols omitted are also coded as a "No," indicating the absence of 'Woodland Tint' on the printed historical topographic map.

At Final Metadata Verification: Ensure each map has had a 'Yes' or 'No' correctly entered for its 'Woodland Tint' code, indicating the presence or absence of 'Woodland Tint.' Watch for very small areas (in arid portions of the country) and faint saturation greens in some prints. With many map pairs the *only* difference is the 'Woodland Tint.' Generally speaking, if there is green within the map content area, then the 'Woodland Tint' element is recorded as "Yes." Compared to one another, two map pages with the same detail, but where one contains green woodland tint and the other does not, are different in their metadata values *only* by a "Yes" versus "No" code for 'Woodland Tint.'

Figure B35. Example 'Woodland Tint' symbology on printed historical topographic maps.

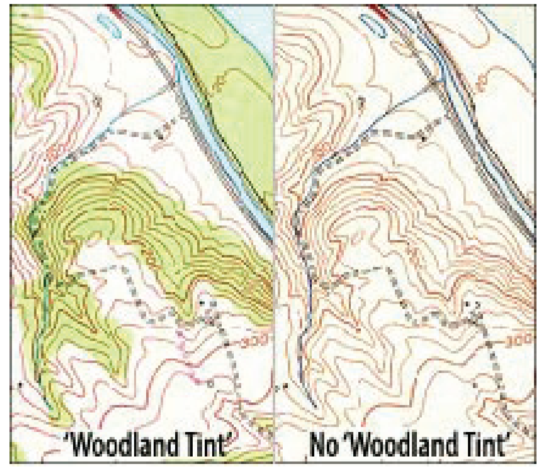

Figure B36. Presence and absence of 'Woodland Tint' metadata element on printed historical topographic maps.

Frequently Asked Questions and Important Things to Remember

What is the time period that I will be looking for in terms of 'Date on Map'?

The maps can range from 1879–2009.

Will every map have a 'Date on Map'?

Not every sheet will have an official printed date on map in its proper location. The 'Date on Map' attribute in the HTMC is not restricted to only contain the official 'Date on Map.' This field is used directly in all product filenames and must have a value. See 'Date on Map' for details on the order in which to consider additional dates.

What if a map gives a range of dates or multiple dates?

Use the latest date given in any range. For example,

- A date range of "1927–29" will be recorded as "1929."
- A date range of "1917, 1918, and 1919" will be recorded as "1919."

What if I have duplicate maps (maps that have completely identical printed content)?

Only retain the best quality one, but make sure they are *exactly* the same by double-checking all other metadata fields, including 'Imprint Year' and 'Woodland Tint.' Additionally look out for other printed content, such as logos and barcodes. It is intentional for the HTMC to capture all printed variations of maps. See 'Dup' and 'Visual Version Number' in the glossary for more detailed information.

What if my maps are exactly the same except for _______?

All map sheets will be scanned, whereas only those with printed variation will be accepted.

How is the 'Primary State' determined for border quadrangles that represent more than one State?

The 'Primary State' for the HTMC is always the *first* printed State alongside the 'Map Name' in the 'Collar' text (see fig. B37). This State will not necessarily match the "GNIS primary State." Some (small scale) maps will list the United States as the primary area. In this case, use the 'Primary State' of the corresponding 'GNIS Cell'.

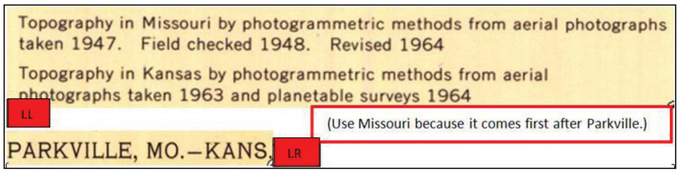

Figure B37. Example 'Primary State' metadata element coding when more than one State is listed on a printed historical topographic map. LL, lower left; LR, lower right.

Will I ever see a paper map that is not part of the United States?

Canadian and Mexican border States will sometimes have the neighboring *country* rather than a U.S. State listed first. Small-scale maps that cover multiple State areas may list just the United States as the area mapped. These maps should be coded with the State assigned to the area in the 'GNIS Cell' database for that mapped cell.

Will there ever be maps in languages other than English?

There is a rare possibility that you will see a map in either French or Spanish. Maps in different languages will tend to appear in predictable geographic regions. Use the 'Language' drop-down list to change the language of the scan, or record as a comment if unavailable.

What if an original 'Map Name' is crossed out and a handwritten name is given?

If a 'Map Name' is crossed out by hand on the map 'Collar,' enter the original map title, as printed, in the 'Map Name' field *and* note in 'Comments' as "'Alternate Map Name': *as written*" (see 'Map Name' entry in glossary definitions). This will often indicate a map name change, which will be reflected in the current name of the corresponding 'GNIS Cell.' The printed version will likely be recorded as a historic name for that cell. It is because of these name differences that it is imperative that 'GNIS Cells' are matched to the quadrangles by their boundary coordinates only.

What should be entered into the 'Comments' field?

- Anything referring to notable variation in map content or quality that does not have a menu option. Examples include (a) map damage such as tears, folds, and stains; (b) map data obscured by pen or stamp inking; (c) crossed-out original name changes or adjustments to spelling; (d) bathymetry lines in coastal areas; and (e) any details referring to map content as a whole.
- Cooperating Federal publishing agencies given for that particular map with no selection option on the HTMC metadata entry form. The HTMC 'Publisher' can be found in the 'Map Banner' and have text or logos pertaining to one or more publishers. Other common Federal agencies, not recorded as official publishers, that must be recorded in the comments section include: "U.S. Atomic Energy Commission," "U.S. Customs Service," and "National Geospatial-Intelligence Agency."
- See 'Comments' for details on formatting for this field.

What can I ignore on the paper map?

Some of the paper map textual information can be considered "under the radar" and will not need to be entered. For example,

- In the paragraph in the lower left corner, ignore terms like "Cultural Revision…," "Transportation partially revised…," and so forth. These are sublayer attributes of a map and do not indicate a general map edit date.
- "Reconnaissance" and "Tactical" on all maps can be ignored.
- The phrases "Mapped by…" and "Compiled…" are generally ambiguous. Other data found in the 'Map Banner' and in other descriptive text should provide more concrete information for coding as defined in the glossary. These pieces of information only refer to individual data sublayers and are not recorded for HTMC purposes.
- Ignore PLSS specific dates and Survey Control dates. They do *not* indicate the 'Survey Year.' (Most maps which note aerial photography as the main data compilation source do *not* record a 'Survey Year' as well.)

What are the criteria for good 'Scan Quality'?

Evaluation is based on a combination of the condition of the paper map *and* the digital scan. The metadata element 'Scan Quality' encompasses more concepts than the aesthetic presentation of the image. Read more on the specifics in the glossary.

General coding choices are as follows:

- **Accepted**: Map has no obscuring marks or stains. All printed data in 'Collar' and body of map is clearly legible. There are no (or very minimal) edge tears, folds, paper yellowing, and no visible scan line artifacts. Maps should not be considered accepted with obvious scanner streaks or flaws.

- **Not Optimal**: Map and scan are readable but a higher quality version is desired (see fig. 38). At times a map scan may have digital, colored streaking that varies in intensity. In the end it is up to the operator to make the assessment and record the quality as being "not optimal." Records with this quality setting will pass validation.
- **Rescan**: Outright flaws, dark lines through any map data, any map content obscured by tears, pen marks or stamp inks, garish markings or highlighting, a dark "bleed through" from the back side that hinders reading the face of the map, maps torn in half along fold lines and taped back together, and so forth (see fig. 38). Records with this quality setting will not pass through validation and will remain in the unverified database table.

Note: If quality of the scan can be increased through image processing, then it is necessary to follow this route to improve the overall scan quality. Image adjustments can be made to scans as long as the original aesthetic of the paper sheet is retained. It is not within the scope of this project to enhance or improve on the printed product.

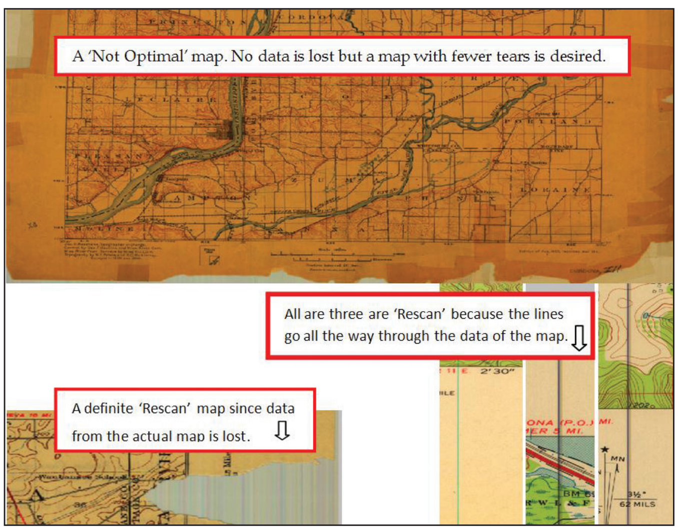

Figure B38. Example 'Scan Quality' metadata element coding.

Addendum 1: Photo Year Metadata Elements

This addendum provides additional clarification and instructions for ensuring maps in the HTMC containing aerial photograph source information are coded accurately. The first section of the addendum summarizes the three related photo year metadata elements: 'Aerial Photo Year,' 'Photoinspection Year,' and 'Photorevision Year.' The second section contains six examples showing how to assign the correct dates to photo-related HTMC metadata elements.

Photo Year Metadata Elements

There are three photo-year-related metadata elements in the HTMC: 'Aerial Photo Year,' 'Photoinspection Year,' and 'Photorevision Year.' The HTMC Metadata Glossary entries for these three metadata elements are provided below:

Aerial Photo Year: The YYYY date given in a map's descriptive text for the aerial photography used in the creation of the particular map.

See related: 'Photo Inspection Year' and 'Photo Revision Year'

Synonyms: "…from imagery taken YYYY…"

Location & Appearance: [Printed in map 'Collar']

Typical Placement: Lower left corner descriptive paragraph(s)

Frequency: Begins to appear in the late 1920s-era maps and is on virtually all maps by the 1960s.

Notes on Variations: A large number of maps with aerial photo dates have *multiple* aerial photo dates! For example, when a map has been photo inspected or revised, the text describing those processes often gives a year for the revision photos *as well as* printing the "base" aerial photo date(s). When a map uses multiple versions of the 'aerial photograph' phrases and (or) gives a date range for photos, use the latest actual year *definitively* provided. (If you cannot tell, leave the entry blank and note ambiguous or conflicting dates in the 'Comments' field as needed.)

At Final Metadata Verification: Ensure the most current photo date cited for the map in the map 'Collar' is accurately entered into the 'Aerial Photo Year' field. Also, ensure photo revision and (or) inspection years are correct.

Photoinspection Year: Printed text giving the YYYY date when a photo inspection was done on the map (see fig. B1–1).

See related: 'Aerial Photo Year' and 'Photorevision Year'

Synonyms: Photoinspected

Location & Appearance: [Printed in lower map 'Collar'] Often, though not always, in bright red ink

Typical Placement: The lower right corner near 'Map Name' and 'Date on Map' (see fig. B1–1)

Placement Variation: Sometimes written in the lower left corner descriptive text paragraph(s)

Frequency: Rare (more common after 1970s)

Notes on Variations: The phrase "photoinspected using imagery dated YYYY; no major culture or drainage changes observed" also appears (not always in red). In those cases, use the year given as a 'Photoinspection Year' and NOT as the "base" 'Aerial Photo Year' for the map.

At Final Metadata Verification: Ensure any map with a cited 'Photoinspection Year' is entered in the correct field. 'Photoinspection Year' should be equal to or later than the 'Date on Map.'

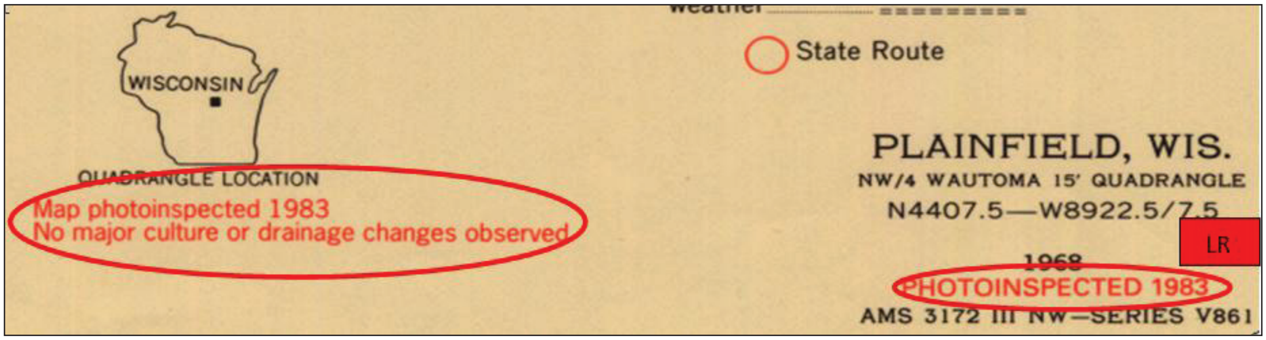

Figure B1–1. Source of 'Photoinspection Year' metadata element on a printed historical topographic map. LR, lower right.

<u>**Photorevision Year**</u>: Printed text giving the YYYY date when newer photos were used to revise a map.

See related: 'Aerial Photo Year' and 'Photoinspection Year' (see addendum 1 for full discussion of correct Photo Year coding(s) with examples).

Synonyms: Photorevision

Location & Appearance: [Printed in lower map 'Collar'] Typically in bright purple (magenta) ink

Typical Placement: It is usually just under the 'Date on Map.'

Placement Variation: There is an associated text paragraph (also in bright purple ink) elsewhere in the lower map 'Collar' providing more details of the revision (see fig. B1–2).

Frequency: Uncommon (more frequent after 1970s)

Notes on Variations: If a map gives the YYYY aerial photo date in purple, use this more recent date as the map's 'Aerial Photo Year' and NOT the older aerial photo date still shown in the lower left paragraph text. 'Edit Year' is also frequently given here.

At Final Metadata Verification: Ensure the correct YYYY is entered in the 'Photo Revision Year' box. Also, double check the accuracy of 'Aerial Photo Year' when multiple photo dates appear on any given map.

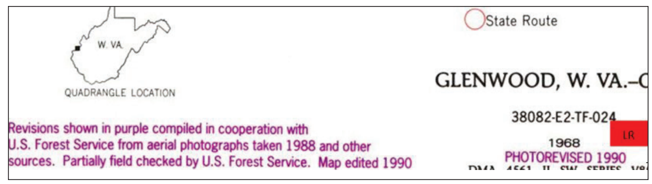

Figure B1–2. Source of 'Photorevision Year' metadata element on a printed historical topographic map. LR, lower right.

Summary of Photo Year Metadata Element Coding

The overall rule for correctly assigning a date to any HTMC photo-year-related metadata element is to capture the latest, definitive date given for the aerial photos that were used to compile or revise content on the map.

Photo Year Metadata Element Coding Examples

The following six examples illustrate how the photo-year-related metadata elements described in the previous section are coded in the HTMC.

Example 1: Typical Base Map with Standard Citing of Photo Usage

This example is a typical "base" map edition with standard citing of aerial photo usage in the lower left descriptive text of the map collar (no revision, no inspection) (see fig. B1–3).

In this example, the value for the following HTMC metadata elements is

- ***'Aerial Photo Year': 1956***

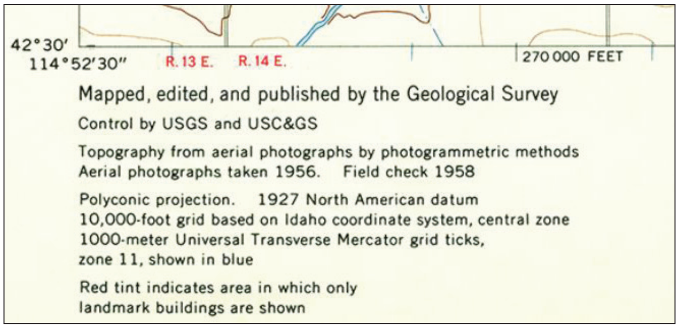

Figure B1–3. Example of a typical printed historical topographic map with standard citing of aerial photo use.

Example 2: Typical Base Map with Date Range Citing of Photo Usage

This example is a typical "base" map edition where aerial photo usage with date ranges in the lower left descriptive text of the map collar (no revision, no inspection) (see fig. B1–4). When a date range is given, the latest date provided is the correct value to enter for the HTMC metadata element.

In this example, the value for the following HTMC metadata elements is

- ***'Aerial Photo Year': 1956***

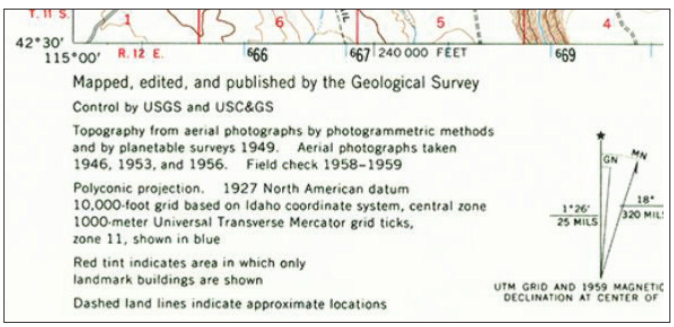

Figure B1–4. Example of a typical printed historical topographic map with date range citing of aerial photo use.

Example 3A: Typical Photo Revision Map

This example is a typical Photo Revision map. As shown in figures B1–5 and B1–6, the map collar text gives an original photo date (1954), a photo revision year (1971), and the year the revision photography was taken (1971) (photorevision information is usually in magenta text). In many cases the year the photos were taken will precede the actual map revision work by a year or two.

Photo Revision information, when provided, supersedes the corresponding 'base' photo year code for that map.

In this example, the values for the following HTMC metadata elements are

- 'Date on Map': 1958
- 'Imprint Year': 1972
- 'Photo Revision Year': 1971 (Note, 1954 is superseded)
- '***Aerial Photo Year***': *1971*
- 'Survey Year': 1958

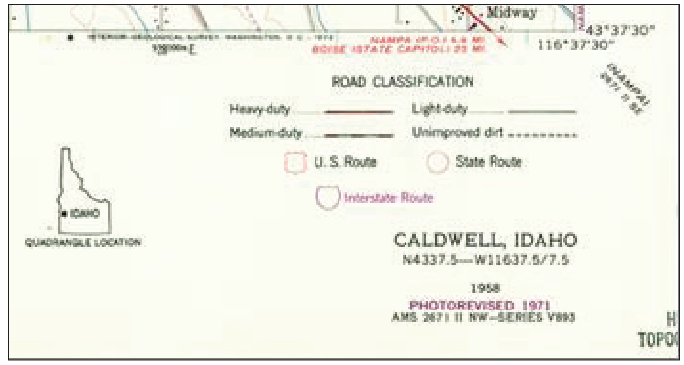

Figure B1–5. Example of a typical photo revision printed historical topographic map (lower right map collar).

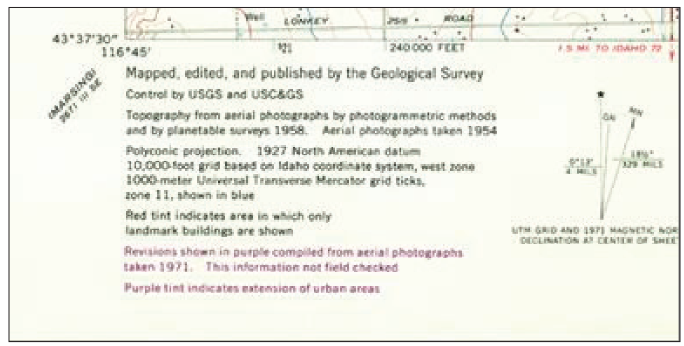

Figure B1–6. Example of a typical photo revision printed historical topographic map (lower left map collar).

Example 3B: Later Printing of a Typical Photo Revision Map

This example is a later printing (1986) of the typical photo revision map shown in example 3A. When compared to the photo year information shown in figures B1–5 and B1–6, figure B1–7 shows typical alternative text placements used for photo year information over time.

In this example, the values for the following HTMC metadata elements are

- 'Date on Map': 1958
- 'Imprint Year': 1986
- 'Photo Revision Year': 1971
- ***'Aerial Photo Year'***: *1971*

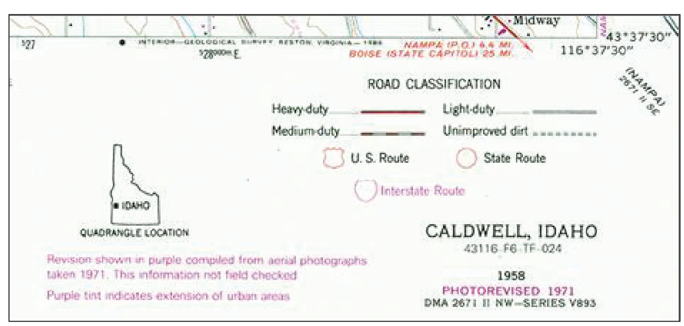

Figure B1–7. Example of a later printing of a standard photo revision printed historical topographic map (lower right map collar).

Example 4: Typical Photo Inspection Map

This example is a typical photo inspection map (see figs. B1–8 and B1–9). Note, in this example, the map collar descriptive text shows both an original "base" photo date (1939, in black text) and a photo inspection year (in bright red text) but does not give the year in which the inspection photos were taken.

Photo inspection maps usually note in the 'Collar' text that "no major changes were observed," thus the map content cited for the "base" YYYY photos on such a map are NOT superseded. Most photo inspected maps (as in the example in figs. B1–8 and B1–9) do not even give a specific year for the inspection photos. HTMC metadata should always record the given 'Photo Inspection Year' but code only the latest, definitive date provided for photos that were used to change the content of the map. In this example "1939" is the corresponding 'Aerial Photo Year.'

In other words, when a photo inspection process is noted but did NOT result in any actual revision to the map AND the map reader is not given a specific date for these inspection photos, then the original "base" aerial photos are the ones to be cited by HTMC as the source 'Aerial Photo Year.'

In this example, the values for the following HTMC metadata elements are

- 'Date on Map': 1957
- 'Imprint Year': 1979
- 'Photo Inspection Year': 1976
- ***'Aerial Photo Year'***: 1939
- 'Field Check': 1957

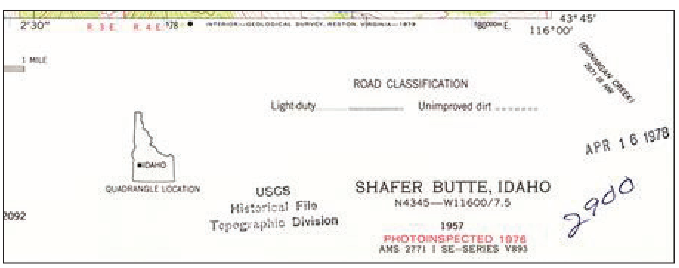

Figure B1–8. Example of a typical photo inspection printed historical topographic map (lower right map collar).

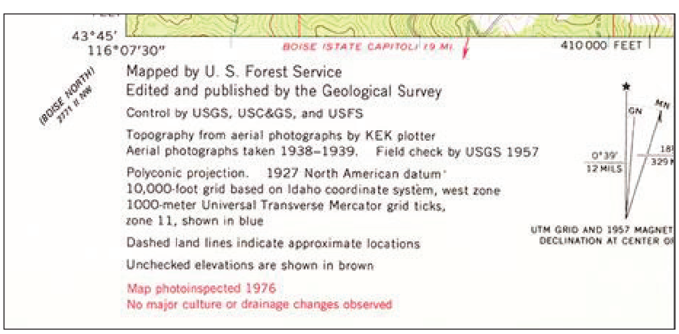

Figure B1–9. Example of a typical photo inspection printed historical topographic map (lower left map collar).

Example 5: Photo Inspection and Photo Revision Map

This example is both a photo inspection and photo revision map (see figs. B1–10 and B1–11). As seen in figures B1–10 and B1–11, the map collar descriptive text cites four aerial photo related dates:

- An original "base" 'Aerial Photo Year' of 1949,
- A 'Photo Inspection Year' (in red text) of 1975 (but NOT a year in which these inspection photos were taken), and
- An earlier 'Photo Revision Year' of 1971, with its photos taken in 1971.

The printed 'Photo Inspection Year' and the printed 'Photo Revision Year' should be recorded for these HTMC metadata elements, as given on the printed historical topographic map. However, the latest, definitive date provided for map content source should be recorded for the 'Aerial Photo Year' HTMC metadata element. In this example, 1971 is the year of the photos that were used to change the content of the map in its most recent photo revision.

To summarize, when a photo inspection process is noted but did NOT result in any actual revision to the map AND is usual (the map collar does NOT give a specific date for these inspection photos), then the latest, definitive aerial photo date given as the source for this map content is the correct "Aerial Photo Year" metadata element for this map. This is 1971 for this example.

In this example, the values for the following HTMC metadata elements are

- 'Date on Map': 1960
- 'Imprint Year': 1983
- 'Photo Inspection Year': 1975
- 'Photo Revision Year': 1971
- ***'Aerial Photo Year'***: *1971*
- 'Field Check': 1951

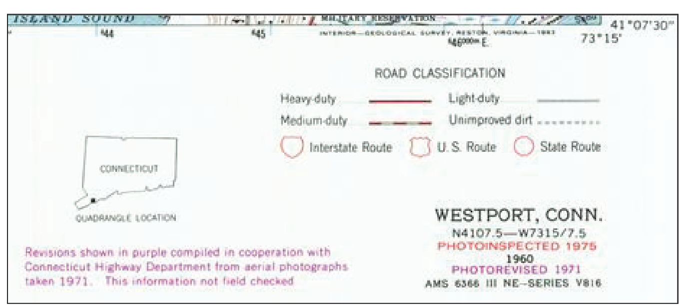

Figure B1–10. Example photo inspection and photo revision printed historical topographic map (lower right map collar).

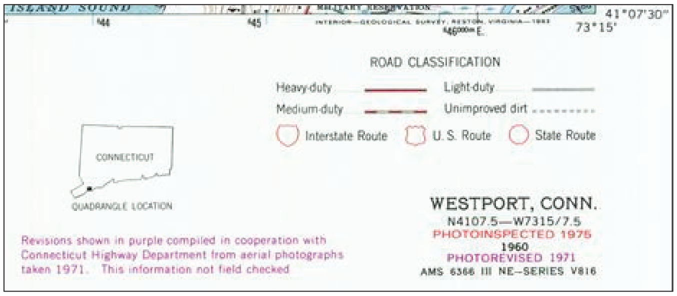

Figure B1–11. Example photo inspection and photo revision printed historical topographic map (lower left map collar).

Example 6: Photo Inspection Map with a Photo Inspection Year

This example is a photo inspection map where the ‘Photoinspection Year’ is provided (see figs. B1–12, B1–13, and B1–14 for different variations).

Photo inspection information, if and when a definitive date is provided, still does not imply changes to the map content. HTMC metadata elements should always capture any given ‘Photo Inspection Year’ and also capture the latest, definitive date provided for photos that were used to revise the content of that map in the ‘Aerial Photo Year.’ (See the correct ‘Aerial Photo Year’ entries in the following figures.)

In figure B1–12, the values for the following HTMC metadata elements are

- ‘Photo Inspection Year’: 1997
- ***‘Aerial Photo Year***’: 1990

In figure B1–13, the values for the following HTMC metadata elements are

- ‘Photo Inspection Year’: 1992
- ***‘Aerial Photo Year***’: 1975
- ‘Field Check’: 1977
- ‘Edit Date’: 1977

In figure B1–14, the values for the following HTMC metadata elements are

- ‘Photo Inspection Year’: 1992
- ***‘Aerial Photo Year***’: 1983

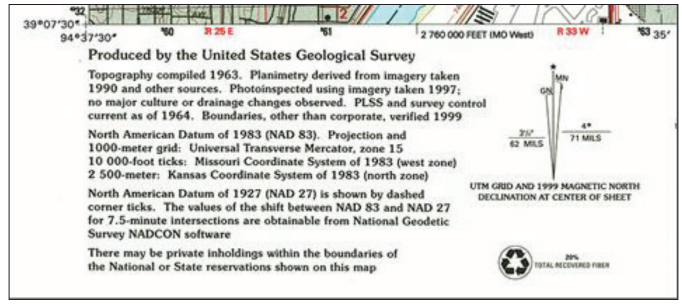

Figure B1–12. Example photo inspection map with a photo inspection year recorded on the printed historical topographic map.

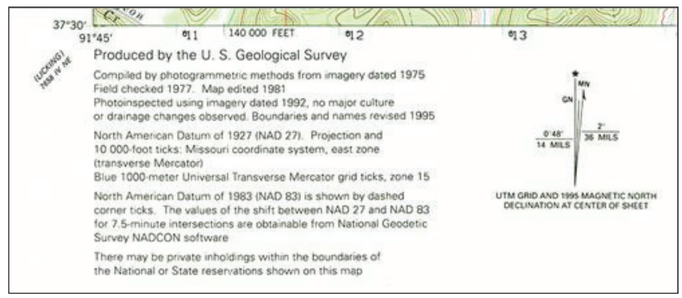

Figure B1–13. Example photo inspection map with a photo inspection year, field check year, and edit year recorded on the printed historical topographic map.

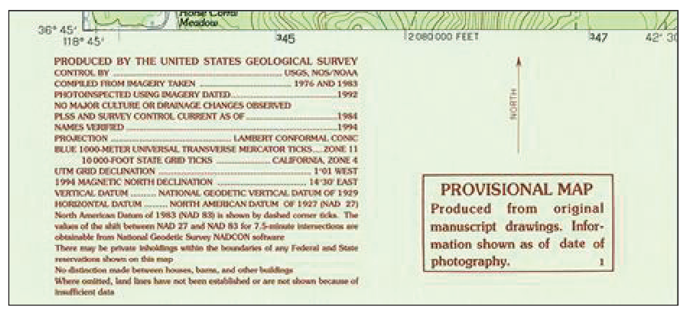

Figure B1–14. Example provisional photo inspection map with a photo inspection year recorded on the printed historical topographic map.

Addendum 2: Geospatial Metadata Components

This section contains additional details on the geographic metadata elements that must be recorded when collecting information from around the map sheet. These elements are critical for facilitating the georegistration of the scanned historic maps. ‘Boundary Coordinates,’ ‘Control Mark Layout,’ and ‘Control Mark Spacing’ are described in detail in the following subsections.

Boundary Coordinates

Printed coordinates marking the Earth position of the map boundary in latitude and longitude as measured within the surveyed geographic coordinate system. The official ‘Boundary Coordinates’ for an HTMC scan, used in association with the GNIS, are those printed for the standard enclosed rectangular neatline. Any other coordinates printed on the page for overedge sections should be ignored.

The four ‘Boundary Coordinates’ include south latitude, east longitude, north latitude, and west longitude. These represent the four bounding coordinates of every map and serve as an accurate identifier of the GNIS ID. The coordinates will be entered in the format they appear on the printed page: “degrees,” “minutes,” and “seconds.” The standard degree symbol (°), standard minutes symbol (′), and standard seconds symbol (″), will be used to identify degrees, minutes, and seconds, respectively. There will not, however, be any indication for positive or negative, or any other cardinal direction that would allow one to identify the correct hemisphere. All printed coordinates appear as positive.

The hemisphere of each coordinate must be indicated by the appropriate letter (“N” for north, “S” for south, “E” for east, or “W” for west). The coordinate input is defaulted to north (“N”) and west (“W”) for latitude and longitude, respectively, because that is where the majority of maps will reside. The operator should typically be able to identify the quadrant without the need for gathering any additional outside information not provided on the map page itself.

If a coordinate’s hemisphere is not immediately clear, it is easy enough to find this out by looking at the change in latitude and longitude. The vast majority of maps are in the Northern and Western hemispheres; there are mapped areas in other hemispheres that will exhibit opposite coordinate behavior:

- If longitude values are increasing right to left (east to west), the map is in the Western hemisphere.
- If latitude values are increasing bottom to top (south to north), the map is in the Northern hemisphere.
- If longitude values are increasing left to right (west to east), the map is in the Eastern hemisphere.
- If latitude values are increasing top to bottom (north to south), the map is in the Southern hemisphere.

These coordinates should be collected by looking at two places on the map. The lower right corner and upper left corner of the neatline will contain all the necessary information. An operator should first look to the bottom right corner of the neatline (fig. B2–1) and record the south latitude and then the east longitude. Then go to the upper left corner of the neatline (fig. B2–2) and record north latitude, and then west longitude. The latitude or longitude value is identified by the value that resides at the end of the respective neatline edge. That is to say, following the top of the neatline to either end, the value you run into is the value that represents a coordinate in that orientation, which in this case is latitude.

Due to the nature of the scanning project, it is possible for the occasional coordinate to be cut off due to misprinting, page tearing, or scanning oversight. It may be possible to determine these coordinates from the opposing boundary coordinate or by the sequence of the intermediary coordinates along the same meridian or parallel. The pattern of intermediary coordinates, along with the map name, may provide enough data for identifying the ‘GNIS Cell’ of the map. If the ‘GNIS Cell’

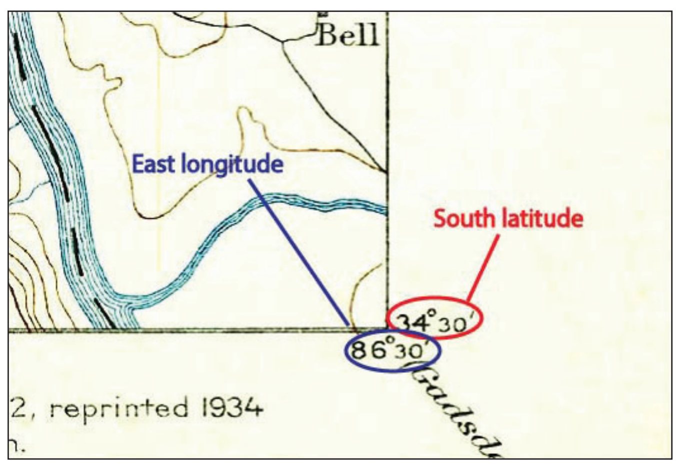

Figure B2–1. Boundary coordinates in the southeast corner of a printed historical topographic map (bottom right corner of map).

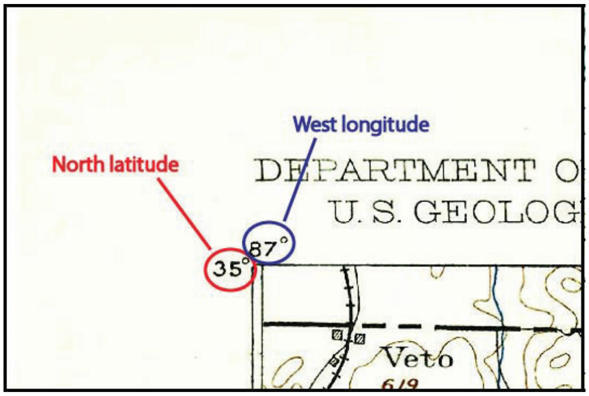

Figure B2–2. Boundary coordinates in the northwest corner of a printed historical topographic map (upper left corner of map).

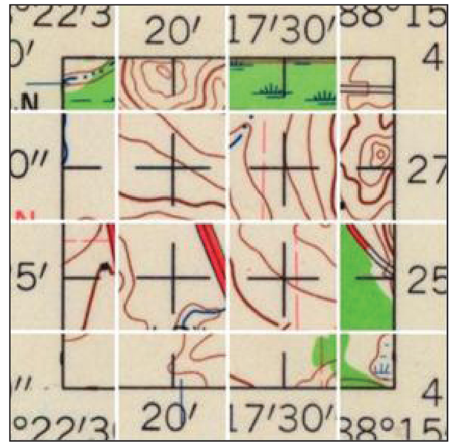

Figure B2–3. Example control marks on the neatline and within the body of the map.

cannot be determined, a better copy of a similar map should be used. If a better copy is unavailable, then a new scan *may* need to be requested, while the map is held back from production due to inadequate metadata. It is not necessary to request a rescan if only part of one coordinate is slightly clipped off. A rescan should be requested only when entire metadata elements cannot be ascertained.

Control Mark Layout

Control marks are printed on the map to denote places where spatial orientation is known. These marks are printed in a grid pattern across the body of the map and surrounding neatline. The marks themselves may appear as crosshairs on the map (+), a hash mark on the neatline extending into the body of the map (-), or the intersection of two neatline boundaries (|). Examples of all three types of control marks are shown in figure B2–3. There may be other markings on the neatline representing distance measurement in meters, which should be ignored. Control marks on the neatline are labeled with a value in degrees, minutes, or seconds (figs. B2–4 and B2–5), which is often relative to the preceding control mark (B2–6).

The value to enter in HTMC metadata for the control mark layout is found by counting the number of evenly spaced control points in the latitude (west–east) and longitude (north–south) directions. Figure B2–7 shows the control mark layout for a standard cell with evenly spaced control marks (see red crosshair marks) in the longitude and latitude directions (4×4 layout, including all map corners). This map should easily pass though automated georeferencing.

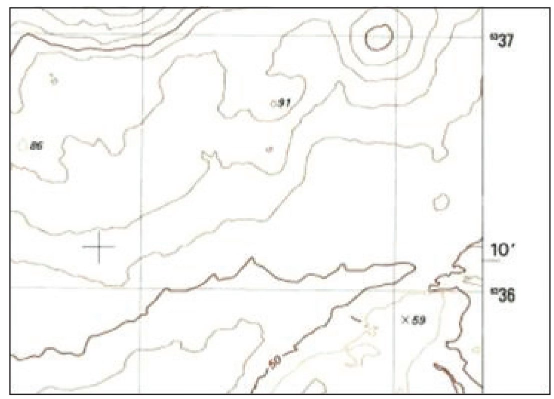

Figure B2–4. Control mark printed as crosshair on map, alongside grid; control mark on neatline is denoted in minutes; neatline control mark hash extends inward from the edge.

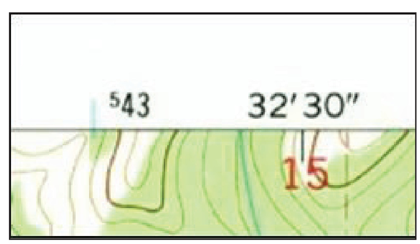

Figure B2–5. Control mark on edge denoted by minutes and seconds that must be added to a degree value given at a nearby coordinate or corner.

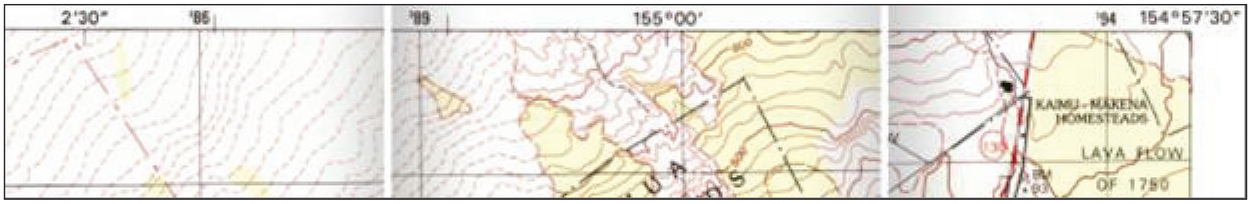

Figure B2–6. Images of the top sections of maps show a control mark with a coordinate printed in only minutes and seconds (left), a control mark with an even decimal value (middle), and a corner coordinate with degrees minutes and seconds (right). Values are increasing to the left so the degree value for a control mark without degrees should be found by looking to the right; for example, the coordinate of the control mark in the left panel is 155°2′30″. Similarly, any control mark between the middle and right panels would be fall within 154°.

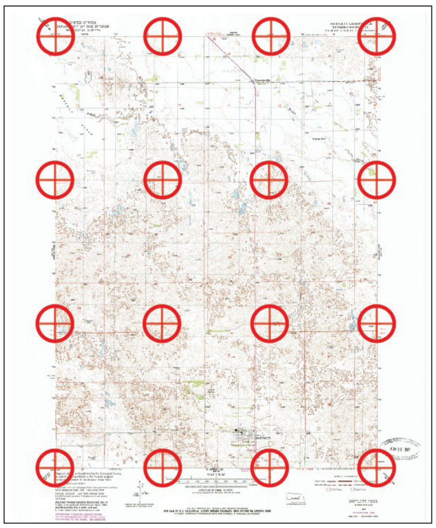

Figure B2–7. Standard cell control mark spacing and layout with evenly spaced control marks across the entire map, including all four corners (layout: 4×4).

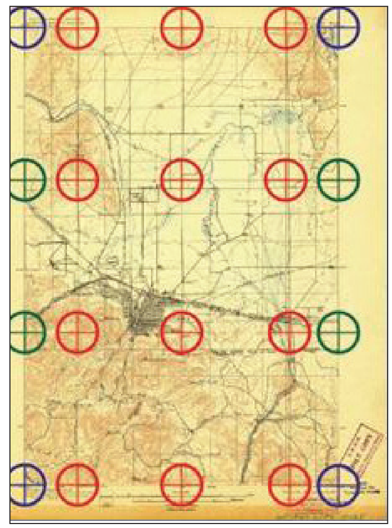

Figure B2–8. Nonstandard cell control mark spacing and layout (layout: 4×3). Control marks on the right and left sides are not evenly spaced with the control marks in the middle. See figure B2–12 for color key for control marks.

It is important to note that the control mark layout will not always include the corners. Cells that are not standard, off the grid, or oversized are examples of maps where the set of evenly spaced control marks will not extend to the corners (see figs. B2–8 to B2–11 for examples). The maps shown in figures B2–8 through B2–11 cannot be georeferenced automatically, because the even set of control marks (red crosshair marks) does not include the control marks at the printed corners.

For example, in figure B2–9, starting from the southeast corner, the next two control marks in either direction, north or west, are not at equal distance. In this example, it is necessary to keep moving inward until the evenly spaced grid is found (denoted by the red crosshair marks). A minimum of three control marks in the latitude and longitude directions are necessary for georeferencing.

Figure B2–12 provides the key for the colored crosshair marks shown in the nonstandard cell maps in this addendum. Red crosshair marks indicate control marks in the evenly spaced grid. Blue crosshair marks indicate corner boundary coordinates that are not a part of the layout (that is, not included with the even-set of control marks). Green crosshair marks indicate other control marks on the page outside the evenly spaced grid that should be ignored for layout purposes, though they may be considered for control mark spacing.

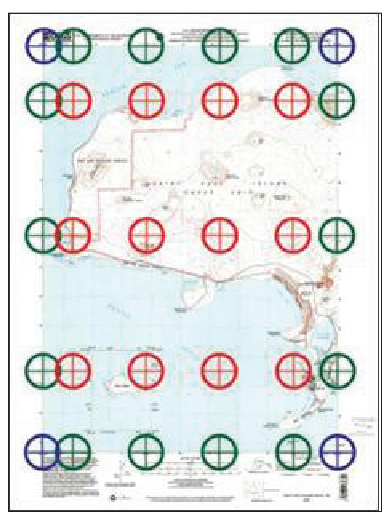

Figure B2–9. Nonstandard cell control mark spacing and layout (layout: 3×4). None of the control marks along the neatline can be used in the layout. The even set of control marks (red crosshair marks) do not include the printed corners. See figure B2–12 for color key for control marks.

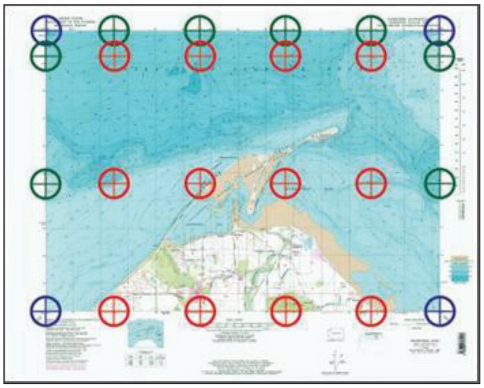

Figure B2–10. Nonstandard cell control mark spacing and layout (layout: 3×4). Control marks on the right and left sides of the map are close to being part of the evenly spaced control marks in the center (red crosshair marks) but not quite far away to be included in the evenly spaced control marks for the layout. A new layout cannot easily be made to include the control marks on the neatline. See figure B2–12 for color key for control marks.

Figure B2–11. Nonstandard cell control mark spacing and layout (layout: 4×4). The cell in this map is elongated to the south, which adds a line of control marks that is too close to the last evenly spaced row of control marks to use for georeferencing. Though the 4×4 layout is common, the oversized cell removes the ability to automate georeferencing because not all neatline corners are included in the evenly spaced layout (red crosshair marks). See figure B2–12 for color key for control marks.

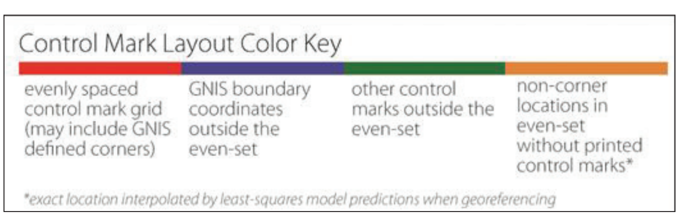

Figure B2–12. Color key for control marks (colored crosshair marks) on nonstandard cell historical topographic maps. GNIS, Geographic Names Information System.

It may not always be possible to find three printed coordinate marks with equal spacing in both directions. Some historical maps, like the one in figure B2–13, were created to show only portions of a standard cell. The coordinate grid is not redrawn for the mapped area leaving uneven gaps between printed control marks. The even-set for these maps will include nonprinted locations as control marks (denoted in examples with orange targets). When georeferencing scanned maps, locations of these control marks are accurately interpolated when our control mark spacing is correctly set. For example, the 7.5′×15′ maps depicting a north or south portion of a standard 15′×15′ quadrangle will need a north to south control mark spacing for the 7.5′ grid, that is, 2′30″, which will include the interpolated row of control marks (as seen in fig. B2–13).

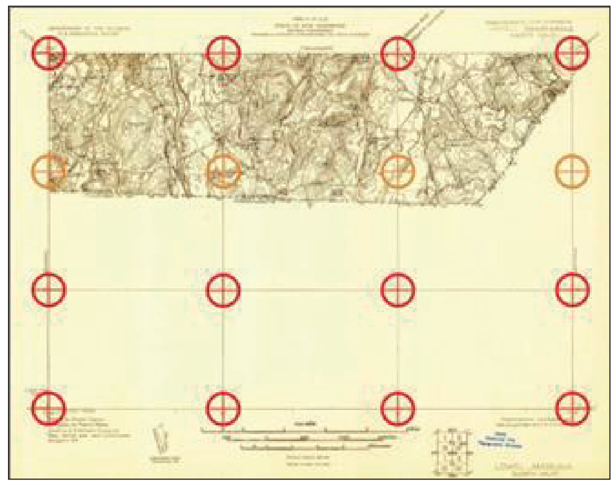

Figure B2–13. Nonstandard cell: An exact half-portion of a 15-minute cell (the complete 7.5-minute grid is not shown). An even set of control marks cannot be read directly off the map for latitude spacing, because a minimum of three control marks are required for a side. Standard spacing, from the 7.5-minute grid marks, may still be used when a new row is added (orange crosshair marks). These 7.5-×15-minute cells are on the standard grid, though may not automate well, because the new row must be predicted with least squares modeling. (Layout: 4×4, including corners when new row [orange crosshair marks] is added).

Depending on the map series, the number of latitude control marks within the map frame may differ from the number of longitude control marks (see figs. B2–8 through B2–10). There are two separate HTMC metadata entry fields, for latitude and longitude control marks, to account for this distinction (see fig. B2–14).

It is necessary to note whether or not the evenly spaced control marks include the printed corners of the map. It is important to pay attention to the inclusion of *printed* corners, rather than ‘GNIS Cell’ corners, because these will not always match. It is possible for the even-set to line up perfectly with the ‘GNIS Cell’ boundaries but not with all printed corners, as shown in figure B2–15.

Figure B2–14. Historical Topographic Map Collection metadata control mark layout and control mark spacing data-entry screen. Region 1 is where the control mark layout is entered, Region 2 indicates whether or not the printed map corners are included in the control mark layout (which determines whether or not the map can be georeferenced automatically), and Region 3 is where the control mark coordinates are entered, which are used to calculate the latitude and longitude of evenly spaced control marks.

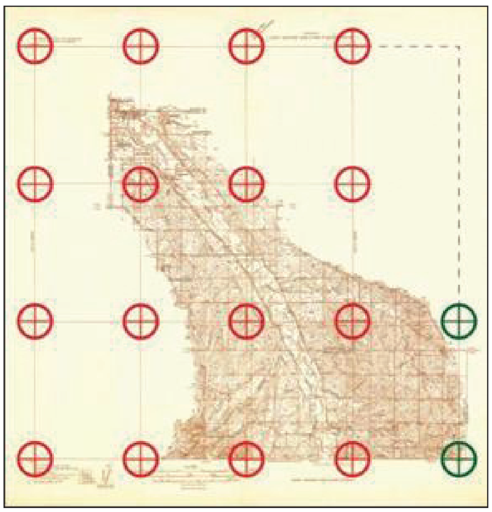

Figure B2–15. Evenly spaced control marks do not perfectly match the 'GNIS Cell' boundaries (the two green crosshair marks are overedge or outside of the 'GNIS Cell' boundary). See figure B2–12 for color key for control marks.

Figure B2–15 is an overedge variant of a standard 15′×15′ on-grid cell where the coordinate grid has been extended to include a portion of the overedge content. The evenly spaced grid does not extend beyond the rectangular neatline. The dashed line indicates where the northeast corner would fall had the neatline been completed for that region. Overedge map content, beyond the standard neatline, will be outside the final GeoPDF digital neatline (digital coordinates will not be displayed on overedge content). The even-set control marks (red crosshair marks) include all four corners of the standard neatline, though the printed corner of the overedge portion will mean automatic georeferencing cannot be done and manual georeferencing is required.

The software for georeferencing will first consider the corners and then use the layout and spacing of control marks to mark out the rest of the grid. It is not possible to fully automate the georeferencing of an image in which the evenly distributed control marks do not include all visible corners. Through the use of a separate database field, it is possible to optimize production and flag these maps where the control mark layout does not include all corners.

Control Mark Spacing

A control mark spacing is found by taking the coordinate difference of any two control marks that are in the evenly spaced set. The control mark spacing *must* be calculated separately for both latitude and longitude directions. Two metadata fields are provided for both latitude and longitude pairs. Similar to the boundary coordinates used to identify GNIS cells, the coordinates used for the spacing calculation can be entered into the provided fields, as printed on the map, with distinct degree, minute, and second values, without any hemisphere designation. The result from the difference of these coordinate pairs is used to populate the latitude and longitude control mark spacing metadata elements.

Control mark coordinates along the neatline, without degree values, are meant to be combined with the degree value of the corner coordinate of lesser value (the direction of which will depend on hemisphere) (see fig. B2–16). If the nearest corner is printed as 124° 22′ 30″, then a control mark on the neatline printed with 30′ has a complete value of 124° 30′.

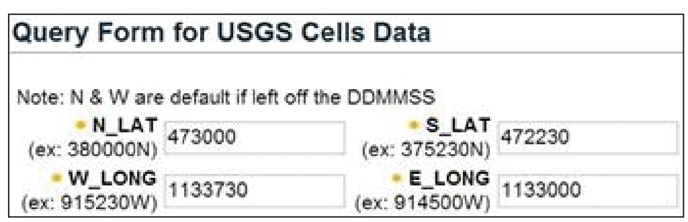

Figure B2–16. 'GNIS Cell' query form. Boundary coordinate values are collected from the north, west, south, and east corners of the map in degrees, minutes, and seconds (DDMMSS) format.

To summarize, a standard HTMC metadata lookup procedure may proceed as follows:

1. First, collect all standard HTMC metadata from around the map 'Collar.'
2. Find boundary coordinates at SE and NW corners.
   - Enter these coordinate pairs in 'GNIS Cell' query form (see fig. B2–16),
   - Only coordinates associated with complete rectangular neatline should be entered, and
   - Record returned 'GNIS Cell' ID number on main HTMC metadata form (see fig. B2–17).

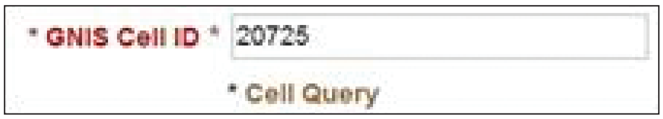

Figure B2–17. 'GNIS Cell' identification (ID) number entry and cell query access link on the main Historical Topographic Map Collection metadata entry form.

3. Look for evenly spaced control marks.
   - Enter value for "Latitude Control Marks" (see fig. B2–14, Region 1),
   - Evenly spaced control marks are on left or right sides, running top to bottom (number of rows = latitude layout),
   - Enter the coordinates for two of these control marks in the control mark spacing coordinate-pair fields (see fig. B2–14, Region 3),
   - Enter value for "Longitude Control Marks" (see fig. B2–14, Region 1),
   - Control marks in event-set on top or bottom, running left to right (number of columns = longitude layout), and
   - Enter the coordinates for two of these control marks in the control mark spacing even-set coordinate-pair fields (see fig. B2–14, Region 3).
4. Check if the even-set of control marks includes all four *printed* neatline corners.
   - Overedge sections with partial neatlines do not count (see fig. B2–15).
   - Select the appropriate value from the drop-down list (see fig. B2–14, Region 2).

Addendum 3: De-Duplication of HTMC Metadata Records

This addendum contains metadata coding instructions for ensuring unique map records are retained in the final HTMC.

Overview

When all expected scanned images of the paper historical topographic maps for a State were received and a basic metadata record for each scanned map had been created in the HTMC database, then the metadata record was verified, completed, and duplicate map records were eliminated.

This de-duplication process involved a comparison of completed HTMC metadata records and the corresponding scanned maps for each specific map edition over time, at each map-scale series. Using the built-in flexibility of the search/edit data forms, and working alphabetically through a State, map records for a specific map name, at any scale, were queried (see fig. B3–1, for example), and the resulting map records (see fig. B3–2) were examined to ensure all scanned images of paper historical topographic maps in the HTMC had unique codes for all final metadata elements (duplicates were eliminated).

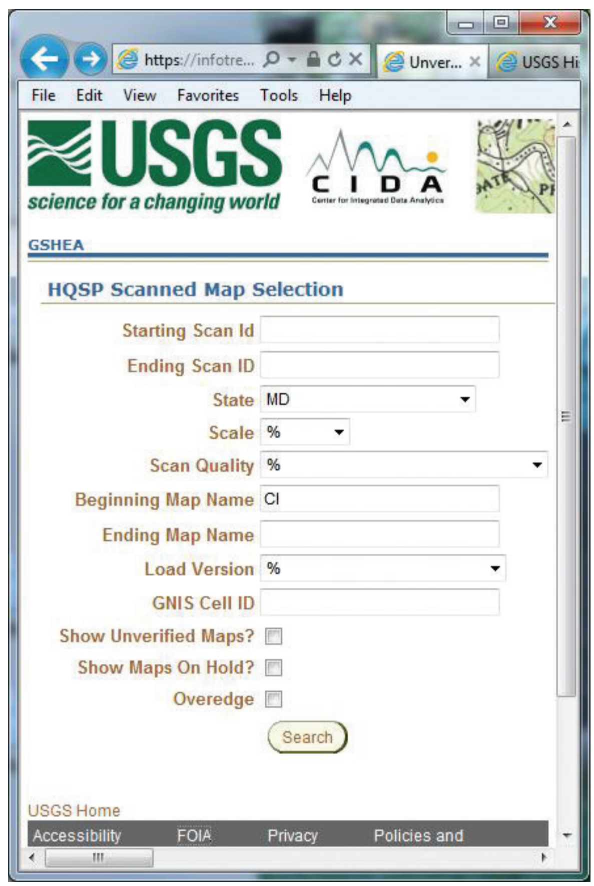

Figure B3–1. Metadata query for records in the Historical Topographic Map Collection database beginning with "CI."

ScnQual	Name	Mapname for Sort Without case	Scale	State ▲	DtOnMap	Imprint	Wood	VisVrsNum	Magic 7	Comments
Accepted	Clarksville	Clarksville	24000	MD	1957	1966	Y		CLARKSVILLE MD 24000 1957 1966 Y	
Accepted	Clarksville	Clarksville	24000	MD	1951		N		CLARKSVILLE MD 24000 1951 N	
Accepted	Clarksville	Clarksville	24000	MD	1951		Y		CLARKSVILLE MD 24000 1951 Y	
Accepted	Clarksville	Clarksville	31680	MD	1944		Y		CLARKSVILLE MD 31680 1944 Y	
1-4										

Figure B3–2. Metadata query results for records in the Historical Topographic Map Collection database beginning with “Cl.”

De-Duplication Method

A comparison called the “Magic 7” was used throughout the HTMC project to ensure only unique records were maintained in the collection. (A data constraint on the Oracle database would actually not allow two records to be entered with identical values across this virtual set of seven fields for each record.)

In general, five basic metadata elements will uniquely identify most map editions: ‘Map Name,’ ‘Map Scale,’ ‘Primary State,’ ‘Date on Map,’ and ‘Imprint Year.’ In addition, a significant number of actual map printings occurred wherein the same map edition was published twice, once with a green ‘Woodland Tint’ symbol used and once without. Each HTMC map had the specific metadata element of ‘Woodland Tint’ marked as “Yes” or “No” to help differentiate those versions with no woodland content from any matching map that did have green tint included.

Lastly, any occurrences of map records that still appeared to be identical across the five primary metadata values and the woodland tint values would then have their corresponding map scans more closely visually compared for any actual printed differences. If any two maps were found to have identical primary data sets, but still could be seen to be visually distinct from each other, then both versions of the map were kept as unique HTMC records. They were coded with ‘Visual Version’ numbers to ensure they were saved and catalogued as unique map editions, printed at separate times, even if their basic data elements still remain identical. These seven items constituted the “Magic 7” uniqueness constraint.

Conversely, if (upon visual inspection) any two map scans were found to be duplicate copies of the same map edition, the highest quality copy was kept and coded as the accepted HTMC version of that map and any other (truly matching) scans were then coded as a “True Duplicate” and no longer processed for HTMC archival purposes. The duplicate scan files themselves were given a “-dup” suffix and segregated into a subdirectory not subject to further production processing.

Visual Version Metadata Element Examples

Following are some visual examples of the most common types of ‘Visual Version’ differences the HTMC project encountered regularly in the printed USGS maps.

Example 1: Presence or Absence of USGS Logo and International Standard Book Number (ISBN) Barscan

Figures B3–3 through B3–5 show visual differences based on the presence or absence of the USGS Logo and (or) the presence or absence of an ISBN barscan. Figure B3–3 shows visual version differences between two historical topographic maps based on the presence or absence of the USGS logo, wherease figure B3–4 shows visual version differences between two historical topographic maps based on the presence or absence of the ISBN barscan. In figure B3–5, visual version differences between the historical topographic maps are based on the presence or absence of both the USGS logo and the ISBN barscan.

Example 2: Visually Distinct Imprint Statements

Imprint statements can have visual distinctions even if they cite the same imprint year. For example, they can have visually distinct imprint statements (as shown in fig. B3–6), usually accompanied with noticeable differences in ink saturation and hand-stamped “evidence” that the maps have a different press run as well.

Example 3: Urban Tint Visual Differences

Figure B3–7 shows visual differences in the color of tint used for urban areas on some of the 1:250,000-scale maps in the HTMC.

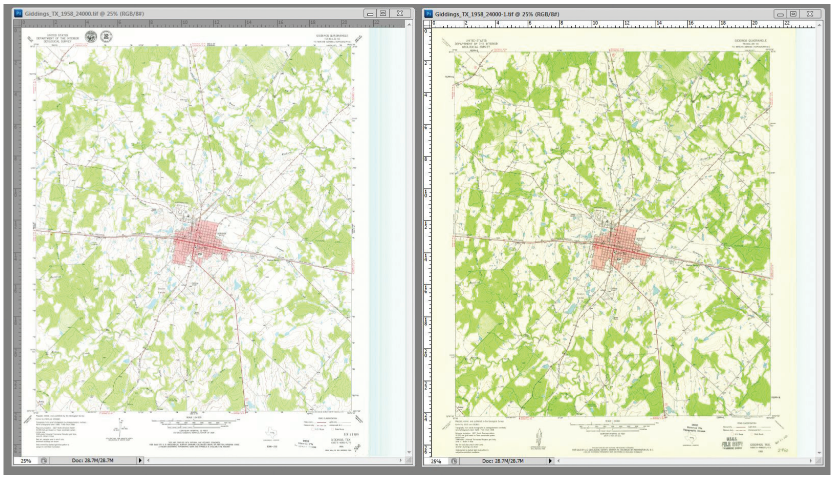

Figure B3–3. Visual version differences identified from the presence or absence of the U.S. Geological Survey (USGS) logo. The map on the left has a USGS logo, whereas the map on the right does not have a USGS logo.

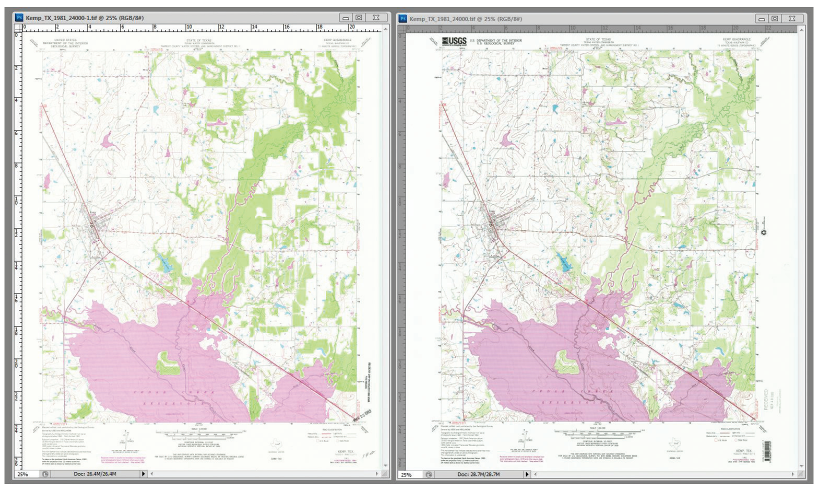

Figure B3–4. Visual version differences identified from the presence or absence of the U.S. Geological Survey (USGS) logo and International Standard Book Number (ISBN) barscan. The map on the left does not have a USGS logo or ISBN barscan, whereas the map on the right has both a USGS logo and an ISBN barscan.

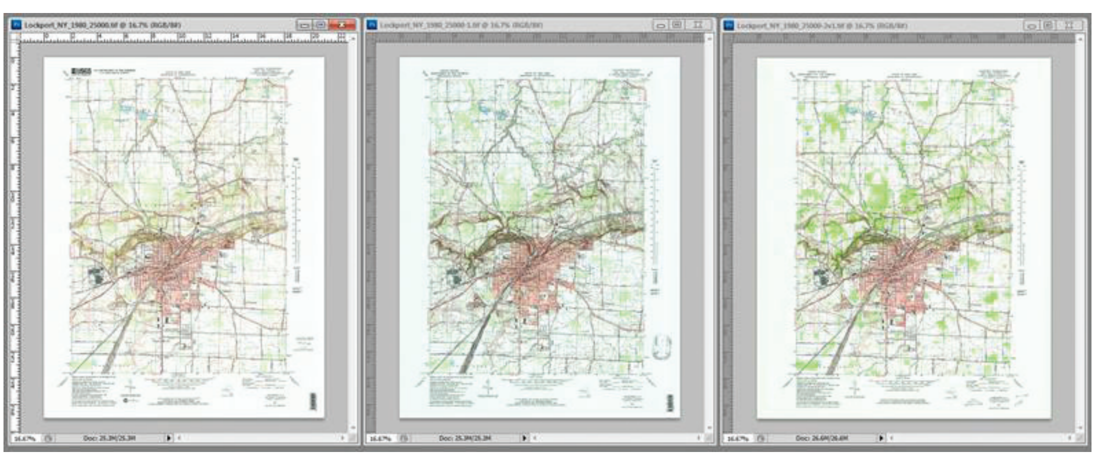

Figure B3–5. Visual version differences identified from the presence or absence of the U.S. Geological Survey (USGS) logo and (or) International Standard Book Number (ISBN) barscan. The map on the left has a USGS logo and an ISBN barscan. The map in the middle only has an ISBN barscan. The map on the right does not have a USGS logo or an ISBN barscan.

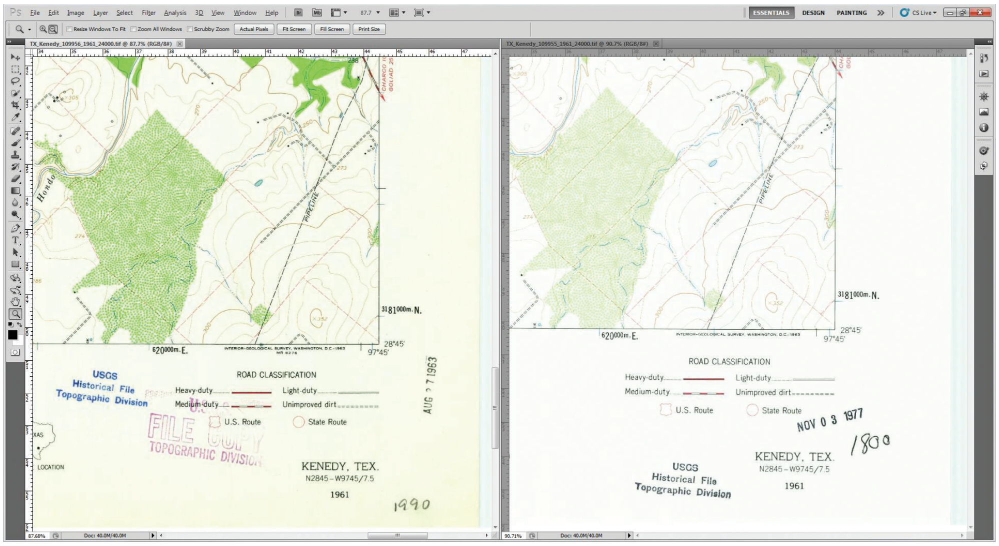

Figure B3–6. Visual version differences identified from the visually distinct imprint statements.

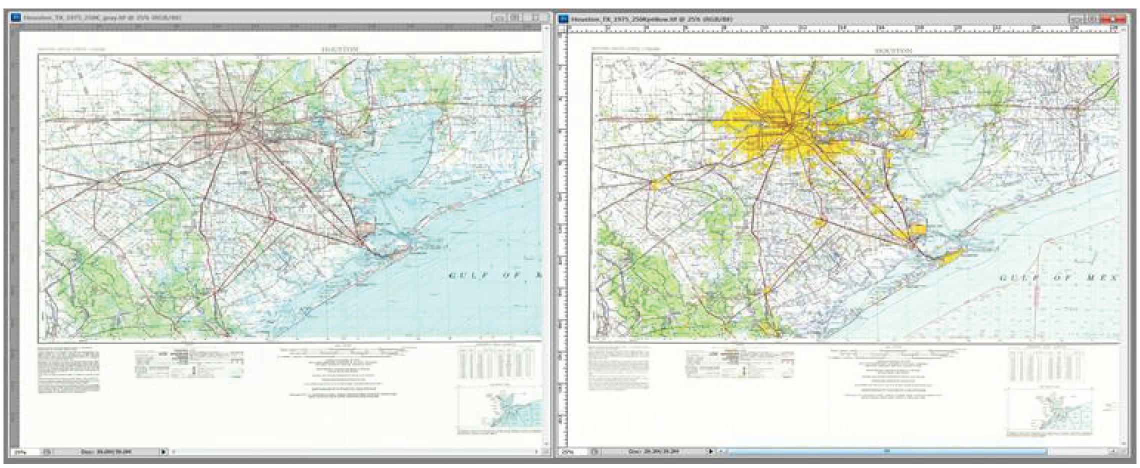

Figure B3–7. Visual version differences identified from the urban tint color. The map on the left uses a gray color to distinguish urban areas, whereas the map on the right uses a yellow color to distinguish urban areas.

Appendix C. HTMC Metadata Report Fields

Table C–1 summarizes the relation between metadata fields in the HTMC database and the corresponding metadata fields in the HTMC metadata report (in HTML format), the downloadable HTMC Metadata Report (in the CSVformat), and the FGDC compliant metadata file (in XML format).

Table C–1. Historical Topographic Map Collection (HTMC) database metadata field names and corresponding field names in HTMC metadata reports.

[HTML, hypertext markup language; CSV, comma-separated variable; FGDC, Federal Geographic Data Committee; --, metadata field is not included in the metadata report]

HTMC database metadata field name	HTMC database metadata field definition	HTMC HTML metadata report field name	HTMC CSV downloadable metadata field name	FGDC compliant metadata tag name[1] (/tag hierarchical path/<tag name>)
SCAN_ID	The unique ID of the scanned map.	--	--	--
SCAN_FILE_NAME	The filename of the scanned map.	--	--	--
MAP_NAME	The printed name of a specific map.	Map Name	Map Name	/metadata/idinfo/keywords/place/<placekey>
MAP_SCALE	The ratio of paper map units to ground units.	Scale	Scale	/metadata/dataqual/lineage/srcinfo/<srcscale>
PRIMARY_STATE	The geographic jurisdiction (U.S. State) in which the majority of the mapped area exists on the ground. In border areas showing more than one State (or country), this is the first State (area) listed directly along with the map name.	Primary State	Primary State	/metadata/idinfo/keywords/place/<placekey>
DATE_ON_MAP	The four-digit (YYYY) date for the year the map was created.	Date on Map	Date on Map	/metadata/dataqual/lineage/procstep/<procdate>
IMPRINT_YEAR	The four-digit (YYYY) date for the year the map was printed.	Imprint Year	Imprint Year	/metadata/dataqual/lineage/procstep/<procdate>
WOODLAND_TINT	A flag that indicates whether or not the map included woodland tint or National Forest (assumes woodland present inside National Forest).	Woodland Tint	Woodland Tint	/metadata/idinfo/descript/<supplinf>
SCAN_QUALITY	Value for recording the quality of the completed scans.	Scan Quality	--	--
KEYWORDS	Words or phrases associated with the maps that enhance catalogue search capability.	Keywords	Keywords	/metadata/idinfo/<keywords>
AERIAL_PHOTO_YEAR	The four-digit (YYYY) date of the aerial photography used in the creation of the map.	Aerial Photo Year	Aerial Photo Year	/metadata/dataqual/lineage/procstep/<procdate>
FIELD_CHECK_YEAR	The four-digit (YYYY) date representing the year the map content was last verified in the field.	Field Check Year	Field Check Year	/metadata/dataqual/lineage/procstep/<procdate>
EDIT_YEAR	The four-digit (YYYY) date representing the year the map was last globally edited or revised.	Edit Year	Edit Year	/metadata/dataqual/lineage/procstep/<procdate>
PHOTO_INSPECTION_YEAR	The four-digit (YYYY) date representing the year when a photo inspection was last done on the map.	Photo Inspection Year	Photo Inspection Year	/metadata/dataqual/lineage/procstep/<procdate>
PHOTO_REVISION_YEAR	The four-digit (YYYY) date representing the year when new photos were used to revise a map.	Photo Revision Year	Photo Revision Year	/metadata/dataqual/lineage/procstep/<procdate>
SURVEY_YEAR	The four-digit (YYYY) date representing the year when a field survey was completed for the mapped area (used generally before the 1950s).	Survey Year	Survey Year	/metadata/dataqual/lineage/procstep/<procdate>
DATUM	A mathematical model that approximates the size and shape of the Earth. This field is used to identify the specific datum used to create the map.	Datum	Datum	/metadata/spref/horizsys/geodetic/<horizdn>

Table C–1. Historical Topographic Map Collection (HTMC) database metadata field names and corresponding field names in HTMC metadata reports.—Continued

[HTML, hypertext markup language; CSV, comma-separated variable; FGDC, Federal Geographic Data Committee; --, metadata field is not included in the metadata report]

HTMC database metadata field name	HTMC database metadata field definition	HTMC HTML metadata report field name	HTMC CSV downloadable metadata field name	FGDC compliant metadata tag name[1] (/tag hierarchical path/<tag name>)
PROJECTION	A mathematical model used to represent the spherical shape of the Earth's surface on a flat surface (paper map). This field is used to identify the specific projection used to create the map.	Projection	Projection	/metadata/spref/horizsys/planar/mapproj/<mapprojn>
ADVANCE	A flag that identifies the map as an advance copy or sheet.	Advance	Advance	/metadata/idinfo/keywords/theme/<themekey>
PRELIMINARY	A flag that identifies the map as a preliminary sheet or edition.	Preliminary	Preliminary	/metadata/idinfo/keywords/theme/<themekey>
PROVISIONAL	A flag that identifies the map as a provisional copy or sheet.	Provisional	Provisional	/metadata/idinfo/keywords/theme/<themekey>
INTERIM	A flag that identifies the map as an interim edition.	Interim	Interim	/metadata/idinfo/keywords/theme/<themekey>
PLANIMETRIC	A flag that identifies the map as one that has no elevation contours.	Planimetric	Planimetric	/metadata/idinfo/keywords/theme/<themekey>
SPECIAL_PRINTING	A flag that identifies the map as one that has no woodland tint and no elevation contours for that press run.	Special Printing	Special Printing	/metadata/idinfo/keywords/theme/<themekey>
SPECIAL_MAP	A flag that identifies the map as an oddly sized or off-grid map that was created for a special purpose.	Special Map	Special Map	/metadata/idinfo/keywords/theme/<themekey>
SHADED_RELIEF	A flag that identifies the map as one that includes a three-dimensional shadow effect enhancing visualization of terrain relief.	Shaded Relief	Shaded Relief	/metadata/idinfo/keywords/theme/<themekey>
ORTHOPHOTO	A flag that identifies the map as one that includes an orthophoto.	Orthophoto	Orthophoto	/metadata/idinfo/keywords/theme/<themekey>
PUB_USGS	A flag that identifies the U.S. Geological Survey as the Federal agency that produced or cooperated in the production of the map.	USGS	Pub USGS	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_ARMY_CORPS_ENG	A flag that identifies the U.S. Army Corps of Engineers as the Federal agency that produced or cooperated in the production of the map.	Corps of Engineers	Pub Army Corps Eng	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_ARMY_MAP	A flag that identifies the U.S. Army Map Service as the Federal agency that produced or cooperated in the production of the map.	Army Map Service	Pub Army Map	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_WAR_DEPT	A flag that identifies the U.S. War Department as the Federal agency that produced or cooperated in the production of the map.	War Department	Pub War Dept	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_MILITARY_OTHER	A flag that identifies Other Military Agencies as the Federal agency that produced or cooperated in the production of the map.	Other Military	Pub Military Other	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_FOREST_SERV	A flag that identifies the U.S. Forest Service as the Federal agency that produced or cooperated in the production of the map.	US Forest Service	Pub Forest Serv	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_RECLAMATION	A flag that identifies the Bureau of Reclamation as the Federal agency that produced or cooperated in the production of the map.	Bureau of Reclamation	Pub Reclamation	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_BUR_LAND_MAN	A flag that identifies the Bureau of Land Management as the Federal agency that produced or cooperated in the production of the map.	Bureau of Land Management	Pub Bur Land Mgmt	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_NATL_PARK_SERV	A flag that identifies the National Park Service as the Federal agency that produced or cooperated in the production of the map.	National Park Service	Pub Natl Park Serv	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>

Table C–1. Historical Topographic Map Collection (HTMC) database metadata field names and corresponding field names in HTMC metadata reports.—Continued

[HTML, hypertext markup language; CSV, comma-separated variable; FGDC, Federal Geographic Data Committee; --, metadata field is not included in the metadata report]

HTMC database metadata field name	HTMC database metadata field definition	HTMC HTML metadata report field name	HTMC CSV downloadable metadata field name	FGDC compliant metadata tag name[1] (/tag hierarchical path/<tag name>)
PUB_INDIAN_AFFAIRS	A flag that identifies the Bureau of Indian Affairs as the Federal agency that produced or cooperated in the production of the map.	Bureau of Indian Affairs	Pub Bur Indian Affairs	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_EPA	A flag that identifies the U.S. Environmental Protection Agency as the Federal agency that produced or cooperated in the production of the map.	Environmental Protection Agency	Pub EPA	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_TENN_VALLEY_AUTH	A flag that identifies the Tennessee Valley Authority as the Federal agency that produced or cooperated in the production of the map.	Tennessee Valley Authority	Pub Tenn Valley Auth	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
PUB_USCOMMERCE	A flag that identifies the U.S. Department of Commerce as the Federal agency that produced or cooperated in the production of the map.	US Commerce Department	Pub US Commerce	/metadata/dataqual/lineage/srcinfo/srccite/citeinfo/<origin>
MAP_LANGUAGE	The language of the map text.	Map Language	Map Language	--
SCAN_COMMENTS	Free-form text field for noting internal process issues and (or) items with no current HTMC scanning menu choice.	--	--	--
SCAN_RESOLUTION	The optical resolution used to scan the map. This is the number of pixels per inch that the scanning hardware samples.	--	Scanner Resolution	/metadata/idinfo/descript/<supplinf>
VISUAL_VERSION_NUMBER	A sequential number code given to maps having visible printed differences but the same metadata elements that typically identify unique maps.	--	Visual Version Number	--
GNIS_CELL_ID	The Geographic Names Information System permanent, unique identifier for geographic quadrangles.	--	Cell ID	/metadata/idinfo/descript/<supplinf>
N_LAT	The maximum north latitude included in the map extent.	--	N Lat	/metadata/idinfo/spdom/bounding/<northbc>
S_LAT	The maximum south latitude included in the map extent.	--	S Lat	/metadata/idinfo/spdom/bounding/<southbc>
W_LONG	The maximum west longitude included in the map extent.	--	W Long	/metadata/idinfo/spdom/bounding/<westbc>
E_LONG	The maximum east longitude included in the map extent.	--	E Long	/metadata/idinfo/spdom/bounding/<eastbc>
GEOPDF_FILENAME	The name of the GeoPDF file of the scanned historical map.	--	--	/metadata/idinfo/descript/<supplinf>

[1]Note: The HTMC database field may be used to populate more than one FGDC metadata tag. The most relevant tag is shown in table C–1.

Appendix D. Example CSV Downloadable Metadata File

This appendix contains an example of the content in a .csv formatted file with metadata for multiple HTMC digital maps. This example contains 11 metadata records (rows) with information in 56 columns for maps in the HTMC with “Newburyport West” in the map name.

Table D–1. Example .CSV file content (columns 1–16).

[CSV, comma-separated variable; MA, Massachusetts; ID, identification; N, no; Y, yes; Pub, publisher; Reclamation, Bureau of Reclamation; Bur Land Mgmt, Bureau of Land Management; Natl Park Serv, National Park Service; Tenn, Tennessee; DPI, dots per inch; N lat, north latitude; W long, west longitude; S lat, south latitude; E long, east longitude (latitude and longitude in degrees); HTMC, Historical Topographic Map Collection; GeoPDF, georeferenced portable document format; FGDC, Federal Geographic Data Committee; XML, extensible markup language; GDA, geospatial data architecture (a National Geospatial Program database that manages cell- and tile-based products)]

Series	Version	Cell ID	Map name	Primary State	Scale	Date on map	Imprint year	Visual version number	Photo inspection year	Photo revision year	Aerial photo year	Edit year	Field check year	Survey year
HTMC	Historical	31933	Newburyport West	MA	24000	1968	1988	Y			1979	1977	1979	1968
HTMC	Historical	31933	Newburyport West	MA	24000	1968	1975	Y				1966		1968
HTMC	Historical	31933	Newburyport West	MA	24000	1968	1970	Y				1966		1968
HTMC	Historical	31933	Newburyport West	MA	24000	1952	1962	Y					1952	
HTMC	Historical	31933	Newburyport West	MA	24000	1952	1958	Y					1952	
HTMC	Historical	31933	Newburyport West	MA	25000	1977	1981	N				1977		
HTMC	Historical	31933	Newburyport West	MA	25000	1968	1979	Y			1979	1977	1979	1968
HTMC	Historical	31933	Newburyport West	MA	31680	1952	1953	Y					1952	
HTMC	Historical	31933	Newburyport West	MA	31680	1944		N	2					
HTMC	Historical	31933	Newburyport West	MA	31680	1944		Y						
HTMC	Historical	31933	Newburyport West	MA	31680	1944		Y	1					

Table D–1. Example .CSV file content (columns 17–31).

Datum	Projection	Advance	Prelimi- nary	Provi- sional	Interim	Plani- metric	Special printing	Special map	Shaded relief	Ortho- photo	Pub USGS	Pub Army Corp Eng	Pub Army map	Pub Forest Serv
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Lambert Conformal Conic	N	N	N	N	N	N	N	N	Quad	Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N
NAD27	Polyconic	N	N	N	N	N	N	N	N		Y	N	N	N

Table D–1. Example .CSV file content (columns 32–45).

Pub Military other	Pub Recla- mation	Pub War Dept	Pub Bur Land Mgmt	Pub Natl Park Serv	Pub Indian Affairs	Pub EPA	Pub Tenn Valley Authority	Pub U.S. Commerce	Keywords	Map language	Scanner resolution (DPI)	Cell name	Primary State name
N	N	N	N	N	N	N	N	N		English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N		English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N		English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N		English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Overedge	English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Non-standard Press Run	English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N		English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Overedge	English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Overedge	English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Overedge	English	600	Newburyport West	Massachusetts
N	N	N	N	N	N	N	N	N	Overedge	English	600	Newburyport West	Massachusetts

Table D–1. Example .CSV file content (columns 46–51).

[CSV, comma-separated variable; MA, Massachusetts; ID, identification; N, no; Y, yes; Pub, publisher; Reclamation, Bureau of Reclamation; Bur Land Mgmt, Bureau of Land Management; Natl Park Serv, National Park Service; Tenn, Tennessee; DPI, dots per inch; N lat, north latitude; W long, west longitude; S lat, south latitude; E long, east longitude (latitude and longitude in degrees); HTMC, Historical Topographic Map Collection; GeoPDF, georeferenced portable document format; FGDC, Federal Geographic Data Committee; XML, extensible markup language; GDA, geospatial data architecture (an NGP database that manages cell- and tile-based products)]

N Lat	W Long	S Lat	E Long	Link to HTMC Metadata	Download GeoPDF
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5632061
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5632067
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5632065
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5632063
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5647989
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5633147
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5633149
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5647995
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5634577
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5647991
42.875	–71	42.75	–70.875	<img alt=”Link to HTMC Metadata” src=”/i/edit_big.gif” border=”0”>	http://ims.er.usgs.gov/gda_services/download?item_id=5647993

Table D–1. Example .CSV file content (columns 52–56).

View FGDC Metadata XML	View Thumbnail Image	Scan ID	GDA Item ID	Create Date
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/24000/MA_Newburyport%20West_350367_1968_24000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/24000/MA_Newburyport%20West_350367_1968_24000_tn.jpg	350367	5632061	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/24000/MA_Newburyport%20West_350371_1968_24000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/24000/MA_Newburyport%20West_350371_1968_24000_tn.jpg	350371	5632067	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/24000/MA_Newburyport%20West_350370_1968_24000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/24000/MA_Newburyport%20West_350370_1968_24000_tn.jpg	350370	5632065	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/24000/MA_Newburyport%20West_350369_1952_24000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/24000/MA_Newburyport%20West_350369_1952_24000_tn.jpg	350369	5632063	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/24000/MA_Newburyport%20West_350368_1952_24000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/24000/MA_Newburyport%20West_350368_1952_24000_tn.jpg	350368	5647989	7/2/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/25000/MA_Newburyport%20West_351152_1977_25000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/25000/MA_Newburyport%20West_351152_1977_25000_tn.jpg	351152	5633147	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/25000/MA_Newburyport%20West_351154_1968_25000_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/25000/MA_Newburyport%20West_351154_1968_25000_tn.jpg	351154	5633149	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/31680/MA_Newburyport%20West_351980_1952_31680_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/31680/MA_Newburyport%20West_351980_1952_31680_tn.jpg	351980	5647995	7/2/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/31680/MA_Newburyport%20West_351978_1944_31680_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/31680/MA_Newburyport%20West_351978_1944_31680_tn.jpg	351978	5634577	4/10/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/31680/MA_Newburyport%20West_351976_1944_31680_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/31680/MA_Newburyport%20West_351976_1944_31680_tn.jpg	351976	5647991	7/2/2012
http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/MA/31680/MA_Newburyport%20West_351977_1944_31680_geo.xml	http://thor-f5.er.usgs.gov/ngtoc/metadata/htmc/thumbnails/MA/31680/MA_Newburyport%20West_351977_1944_31680_tn.jpg	351977	5647993	7/2/2012

Appendix E. FGDC Compliant Metadata Example

This appendix contains an example FGDC (1998) compliant metadata file for the 1890 Newburyport topographic map.


```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE metadata SYSTEM "http://thor-f5.er.usgs.gov/ngtoc/metadata/fgdc-std-001-1998.dtd">
<metadata>
  <idinfo>
    <citation>
      <citeinfo>
        <origin>U.S. Geological Survey</origin>
        <pubdate>1890</pubdate>
        <title>USGS 1:62500-scale Quadrangle for Newburyport, MA 1890</title>
        <geoform>Scanned Map in GeoPDF</geoform>
        <pubinfo>
          <pubplace>Reston, Virginia</pubplace>
          <publish>U.S. Geological Survey</publish>
        </pubinfo>
        <onlink>http://store.usgs.gov</onlink>
      </citeinfo>
    </citation>
    <descript>
      <abstract>USGS Historical Quadrangle in GeoPDF.</abstract>
      <purpose>The USGS Historical Quadrangle Scanning Project (HQSP) is scanning all scales and all editions of topo-
      graphic maps published by the U.S. Geological Survey (USGS) since the inception of the topographic mapping program
      in 1884. This map is provided as a general purpose map in GeoPDF for users who are not GIS experts.</purpose>
      <supplinf>Map Name: Newburyport, MA; Scan Filename: MA_Newburyport_352890_1890_62500_geo.pdf;
      Scanner Resolution: 600 PPI; Woodland Tint = N; NOTE: Bounding Coordinates identified in FGDC metadata
      are associated with the GNIS Cell ID; GNIS Cell ID = 53998</supplinf>
    </descript>
    <status>
      <progress>Complete</progress>
      <update>None planned</update>
    </status>
    <spdom>
      <bounding>
        <westbc>-71</westbc>
        <eastbc>-70.75</eastbc>
        <northbc>43</northbc>
        <southbc>42.75</southbc>
      </bounding>
    </spdom>
    <keywords>
      <theme>
        <themekt>ISO 19115 Topic Category</themekt>
        <themekey>imageryBaseMapsEarthCover</themekey>
      </theme>
      <place>
        <placekt>Geographic Names Information System</placekt>
        <placekey>MA</placekey>
        <placekey>Newburyport</placekey>
      </place>
    </keywords>
    <accconst>None</accconst>
    <useconst>None. However, users should be aware that temporal changes may have occurred since this map was origi-
```

```
nally produced and that some parts of this data may no longer represent actual surface conditions. Users should not use
this data for critical applications without a full awareness of its limitations.</useconst>
<ptcontac>
  <cntinfo>
    <cntorgp>
      <cntorg>U.S. Geological Survey</cntorg>
      <cntper>Not Provided</cntper>
    </cntorgp>
    <cntaddr>
      <addrtype>physical</addrtype>
      <address>12201 Sunrise Valley Drive</address>
      <city>Reston</city>
      <state>Virginia</state>
      <postal>20192</postal>
      <country>USA</country>
    </cntaddr>
    <cntvoice>1-888-ASK-USGS (1-888-275-8747)</cntvoice>
    <hours>Monday through Friday 8:00 AM to 4:00 PM Eastern Time Zone USA</hours>
    <cntinst>Please visit http://www.usgs.gov/ask/ to contact us.</cntinst>
</cntinfo>
    </ptcontac>
    <datacred>Acknowledgment of the U.S. Geological Survey is expected for products derived from these data.</datacred>
  </idinfo>
  <dataqual>
    <logic>This product is a GeoPDF file. GeoPDF is a copyright format with implementation rights held exclusively by TerraGo
    Technologies. This design is based on use of specific commercial software systems therefore any changes to the software
    specifications and dependencies will be followed by the USGS and codified in the product standard.</logic>
    <posacc>
      <horizpa>
        <horizpar>The digital GeoPDF version of the historical map was georeferenced with a methodology that preserves,
        but does not exceed, the accuracy of the original map. The historical map product was compiled to meet National
        Map Accuracy Standards (NMAS) of the era when the map was originally published.</horizpar>
      </horizpa>
    </posacc>
    <lineage>
      <srcinfo>
        <srccite>
          <citeinfo>
            <origin>USGS</origin>
            <title>Original Paper Map</title>
            <othercit>Newburyport, MA; U.S. Department of the Interior, USGS Scanned Historical Quadrangle Standard,
            Version 1.0.</othercit>
          </citeinfo>
        </srccite>
        <srcscale>62500</srcscale>
        <typesrc>paper</typesrc>
        <srccontr>USGS provided the scanned copy of the historical quadrangle.</srccontr>
      </srcinfo>
      <procstep>
        <procdesc>The GeoPDFs for the scanned Historical Quadrangles are produced using the following steps. Historical
        Quadrangles are scanned typically at 600 PPI (minimum of 400 PPI). Metadata is collected from the information printed
        in the map collar. Scanned TIFF images are georeferenced to the original map datum and reprojected to the original
        map projection. The final GeoPDF file is generated using TerraGo Publisher for Raster software. To support the use of
        the GeoPDF file in the U.S. Army Geospatial Center GeoPDF seamless viewing tool, neatline coordinates are added
        to the GeoPDF header file. Last, an FGDC compliant XML metadata file is generated and attached to the GeoPDF.
        Note that GeoPDF is a copyrighted format, with implementation rights held exclusively by TerraGo Technologies.
```

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.</procdesc>
</procstep>
<procstep>
<procdesc>Date on Map</procdesc>
<procdate>1890</procdate>
</procstep>
<procstep>
<procdesc>Survey Year</procdesc>
<procdate>1888</procdate>
</procstep>
</lineage>
</dataqual>
<spref>
<horizsys>
<geodetic>
<horizdn>Unstated</horizdn>
</geodetic>
<planar>
<mapproj>
<mapprojn>Unstated</mapprojn>
</mapproj>
</planar>
</horizsys>
</spref>
<distinfo>
<distrib>
<cntinfo>
<cntorgp>
<cntorg>U.S. Geological Survey</cntorg>
<cntper>Not Provided</cntper>

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