Second, visualization and representation issues are barely addressed. To give a simple example, the Web poses a number of specific hurdles to 'optimal' representation, not the least being the heterogeneity of browsers and platforms that map viewers may be using. In that situation, how do you insure that what a given user sees optimally represents the data? No doubt the authors could argue that these issues were not within the mandate of the book, but Peterson's *Maps and the Internet* strikes me as a model for a more interesting approach to the subject.

If the book does not offer a critical approach, neither does it function as a technical manual. There is just enough information for someone not familiar with the technology to know that there is a lot to know. One could decide to do research on any number of acronyms that may be encountered in the text, but there is not nearly enough information to attempt an actual implementation. The book does give a sense of the hardware and software configurations for most of the implementations, but not of the amount of time and energy involved in creating the applications. In addition, WebGIS is a volatile technology. Very likely the descriptions of some of the technical specs were out of date at the publication date and are more outdated now. Of course, this is a common issue for all books that discuss the technical implementation of a rapidly developing technology.

A last observation, an issue that is common to most ESRI Press books is the fact that all the described applications involve ESRI software in one way or another. Neither the approaches of other commercial vendors nor the battle between Open Source and proprietary software are mentioned.

Overall the, book is well produced and reasonably well written, but targeted to a very narrow audience, the manager. It introduces a sufficient range of WebGIS applications to give the reader a sense of the field. It gives a technical overview of each application, so that a manager could make a rough estimate of implementation costs. Concise explanations of relevant geographic concepts are interspersed throughout. The book could conceivably convince a manager that their organization could benefit from WebGIS. For academics, however, there is insufficient critical analysis or discussion of visualization. For technical people, there is only sketchy technical information. There is little in *Connecting Our World* to appeal to the NACIS audience.

A Railroad Atlas of the United States in 1946: Volume 1: The Mid-Atlantic States.
Richard C. Carpenter. The John Hopkins University Press, Baltimore, MD. 2003. 297 pages, numerous maps, hardcover (ISBN 0-8018-7331-2).

Reviewed by Fritz C. Kessler, Frostburg State University.

This atlas presents a unique perspective on the state of railroading in the United States during 1946, when railroads were the dominant form of travel and commercial transportation. In a dense hardbound volume, 177 color maps covering the Mid-Atlantic States illustrate, among other items, the location of each railroad's line, the towns through which the line passed, mile posts, signal towers, coaling stations, and passenger stations during 1946. The considerable amount of information presented throughout this atlas makes it possible for anyone with an interest in railroad history to gain an appreciation for the enormous and complex network of rail lines that at one time wove their way across the Mid-Atlantic States.

The atlas is divided into five sections. The first presents a brief history of railroading in the United States, the author's justification and enthusiasm for undertaking such a work, as well as a synopsis of each Mid-Atlantic State's (PA, WV, DC, MD, DE, NJ, and VA) railroad composition in 1946. Carpenter explains that his reasons for producing this atlas stem from three points. First, this atlas serves to graphically document "one of the most glorious episodes of our transportation history" (p. viii). Beginning in 1950, the 137 Class I operating railroads in the United States would, by 2001, merge into seven Class I railroads. Second, Carpenter notes that some of the oldest railroad lines in the United States originated in the Mid-Atlantic States region. Third, Carpenter, recalling fondly his own memories of railroading in 1946, seems nostalgic in his description of life and scenes along the railroad and paints an idyllic setting for the atlas' content. Unfortunately, Carpenter is not clear on who his intended audience is or where his atlas fits within the numerous railroading atlases that are in publication.

The second section of the atlas begins with an index map that aids in locating individual atlas maps. The index map is followed by an explanation of symbols, and then the 177 maps are presented. As indicated by Carpenter, the USGS 1:250,000 map series of this region was utilized to compile the atlas' base information. All atlas maps are produced in color, are entirely hand-drawn (including all text), and contain the same base information: shorelines, rivers (with flow direction indicated), canals, towns along rail lines, and boundaries (national, state/provincial, county, and city). The amount of base information included is pur-

posefully kept scare to reduce each map's complexity, allowing for the important railroad information to emerge. In compiling the base information, it appears as though Carpenter took a series of colored markers and traced the relevant information directly from the various base map sources. Individual railroads that were in service and abandoned in 1946 are identified by one of nine colors. Carpenter states that the colors to illustrate each rail line were chosen according to any historical association to a particular railroad logo. For example, the color chosen to illustrate the Baltimore & Ohio railroad was blue (the color scheme of the B&O was royal blue and grey). The corresponding railroad name is shown in black text attached to the rail line. Symbols for passenger and non-passenger stations located along each line are shown in the same color as the owning railroad. Mile post values, names for tunnels, viaducts, coaling stations, and track pans are shown in black text. Names of interlocking towers are shown in purple text. The adjoining map numbers are listed in the margins of each page facilitating the location of adjacent maps in the atlas.

Each map covers 30 minutes of longitude and latitude (values are shown at each map corner), which facilitates comparing the atlas maps not only to the original 1:250,000 series but also to other widely published maps. Where appropriate, tic marks for 15 minute divisions are included inside each map. The atlas maps are presented at an approximate scale of 1:270,000. Each atlas map is named according to a prominent railroad station found on each map. This naming convention permits the map user to quickly find a specific atlas map on the index map. The maps are arranged from west to east and from north to south and are also numbered sequentially in this fashion. Thus, the first map in the atlas is Erie, PA while the last map (numbered 177) is Norfolk, VA. In several instances, more detailed coverage of congested railroad networks, usually around metropolitan areas, are included as separate maps. For instance, Pittsburgh, PA (map 57) is mapped at the normal 30 degrees of latitude and longitude, but a more detailed map of the greater Pittsburgh region (map 57A) is shown covering 7.5 minutes of latitude and longitude and at a reduced scale (a scale bar is included on each detailed map). Note, however, that this same 7.5 minutes of latitude and longitude extent is not universally applied to the more detailed maps found throughout the atlas.

The third section is an appendix, which presents an alphabetized inventory of the abbreviated railroad names (e.g., B&O) used in the atlas. A quick perusal of the appendix reveals common railroad abbreviations such as the C&O (Chesapeake and Ohio Railway), PRR (Pennsylvania Railroad), and N&W (Norfolk & Western Railway). However, lesser important railroads are also listed such as the W&OD (Washington & Old Dominion Railway) and IRN (Ironton Railroad). Thus, the appendix is useful in identifying the railroad abbreviations and subsequent railroad lines that are illustrated throughout the atlas.

The fourth section details interesting notes with respect to the various maps and the rail lines found within as well as a list of references used in compiling the atlas. I found myself spending considerable time reading through the notes section learning fascinating railroad lore. One such intriguing note, for example, indicates that along the B&O line that ran through Cairo WV, "there were no fewer than 14 tunnels in 35 miles (p. 216)" while another note signals the "Big Bend" tunnel, near Hinton, WV as the setting for the popular folk ballad "John Henry" (p. 219). The notes section helps us see how railroads have contributed much to the geography, history, and culture of the United States.

The fifth section includes a very lengthy index containing six separate alphabetized lists detailing the location of coaling stations, interlocking stations, passenger and non-passenger stations, track pans, tunnels, and viaducts. Coaling stations were necessary on some railroad lines to re-supply steam locomotives with coal. Interlocking stations, or signal towers, were relied upon to maintain control of the daily operations of railroad traffic. Track pans were ingenious devices that were designed to re-supply steam locomotives with water without actually having to stop the train. Names of coaling stations, interlocking stations (and their one or two-letter abbreviation), track pans, tunnels, and viaducts are listed along with the owning railroad, the state in which each feature was located, and the atlas page on which each feature can be found. Passenger and non-passenger stations are listed in a slightly different format and include only the station name, state, and atlas page on which these stations can be located.

It is apparent that Mr. Carpenter has put forth a tremendous effort in creating this atlas. The amount of time that it must have taken him to trace the linework and print all the text is beyond my comprehension. Having said that, I am bothered by the lack of cartographic excellence I expect from an atlas.

In many cases, the color marker approach taken in this atlas does not come across well. In all cases, the ink flow is noticeably inconsistent, and because of this, on some maps it is difficult to distinguish each railroad line. For example, the map of Westfield, NY (map 2) shows the New York Central line running along the shores of

Lake Erie in a light brown. But due to the uneven ink flow, the line fades in and out and at times almost disappears (you can even tell where Carpenter stopped and started tracing most line segments). In a similar light, the map of Scranton, PA (map 35) uses an orange ink to highlight the rail lines of Lehigh Valley. Again, due to the inconsistency of ink flow, the orange line becomes washed out and faded and in the more congested areas on the map it becomes difficult to distinguish the Lehigh Valley line from the Delaware and Hudson line (shown in brown) and the Pennsylvania Railroad line (shown in red). The poorly drawn linework carries over into other linear features. For instance, on the map of Newark, NJ, (map 53) some of the county boundary lines are smudged, vary in their thickness, and the dashes are not of the same length. In the inset map of Newark, NJ (map 53A), the Lehigh Valley line running parallel to the Pennsylvania Railroad on the far right side of the page simply fades away.

The maps also demonstrate examples of inconsistently produced linework. For, instance, the shorelines representing Newark Bay shown on the Newark, NJ map (map 53) have gaps along some stretches and are erratically drawn. In another part of this same map, there are errant blue lines drawn on the left side of the page. Inconsistent linework is also found on the Philadelphia, PA map (map 82A). Examining map 82A, one is struck by the variations in line thickness for the rail lines. As an example, sections of the Pennsylvania Railroad are drawn using a thinner line. I assume that the thinner linework represents sidings or rail yards, but I am uncertain as to my assertion. Unfortunately, examining the explanation of map symbol page, one finds no clues as to the significance of variation in this linework. In short, the hand drawn execution of maps in this atlas is poorly rendered.

Another significant problem is the fact that the maps show no variation in text variables such as serif/sans serif, type face, type family, etc. While variation in type size and a mix of upper and lower case letters is present on the maps, their execution is inconsistent and poorly presented. A casual overview of the atlas maps reveals violations of cartographic text placement 'rules'. Several of the violations include text being positioned on a slant and resting along an inconsistent baseline. On many maps, especially those covering denser portions of the Mid-Atlantic States, text overlaps linework making readability a challenge. Other maps display text that is smudged, has inconsistent stroke thickness, poorly hand-printed, or too small to be seen.

The map design concept is very simple, in fact too simple. Examining the maps one is struck by the absence of figure-ground. For instance, on maps where a thin light blue stroke delineates shorelines, water bodies have no fill color applied to contrast with the landmasses (which also have no fill). Because of this basic design flaw, the map reader will have difficulty not only differentiating between land and water and but also in orienting the map with the local environment unless they are familiar with the mapped area. I will note that Carpenter did try to create some contrast with the linework. Active rail lines are shown with a solid stroke while abandoned lines are represented with a dashed line. As mentioned earlier, each rail line is represented with one of nine colors. However, on some maps where there are several rail lines (e.g., map number 53, Newark, NJ), identical colors are used for more than one railroad, which can cause confusion unless the reader carefully inspects the text identifying each rail line's owner. Other linework on the map does exhibit some contrast. Lines delineating various boundaries are shown using a thin black stroke with varying forms of dashes (e.g., state boundaries use a long – short dash while city limits incorporate only short dashes) and water features are illustrated with a light blue stroke having the same thickness as the boundaries. Thus, while there are attempts to create visual contrast with linear features, maps that are particularly complex ultimately confuse the map reader as they try to mentally categorize the different linear features.

While the sheer volume of text and maps included in this atlas is impressive, Carpenter's manual approach is a major shortcoming. I hope that future volumes would be prepared in a digital environment, which would open up many opportunities to improve upon cartographic design. Enhancing figure-ground and visual contrast would be foremost in my suggestions on areas to improve. The digital environment would also provide opportunities to manipulate text variables that would enhance the overall readability of the atlas. As an additional suggestion, shaded relief would be welcomed and a very appropriate addition to this atlas. As the atlas stands, unless the reader is familiar with the local landscape of a specific area, there is no evidence to suggest why the rail lines bend and curve as they do. Through the addition of shaded relief, the tie between geography of the landscape and positioning of the rail lines would be immediate.

In spite of these cartographic limitations, I can recommend the atlas to anyone with an interest in the greatest railroading era in the history of the United States as the text is a valuable reference tool. Specifically, I can envision

railroad historians relying upon the atlas to provide a condensed reference for visualizing the rail network as it existed in 1946 or researching individual railroads as they existed during this time period. On the other hand, coupled with a modern map of a specific region in the Mid-Atlantic States, rail-fans would enjoy tracing where their favorite railroad line traveled. Even model railroaders, who might want to model a section of their favorite railroad line as it existed during 1946, would benefit perusing this atlas. However, cartographers seeking well designed maps in a railroad atlas would be advised to look elsewhere.