

# **Aggregating and Georeferencing 1860 U.S. Census Data in GIS: Some Preliminary Conclusions from the Valley of the Shadow Project**

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In 1870 Jedediah Hotchkiss published a detailed survey and map of Augusta County, Virginia. Hotchkiss was an experienced mapmaker. He served on Gen. Thomas J. "Stonewall" Jackson's staff as a cartographic engineer, and became so renowned for the quality and accuracy of his work that he earned the nickname, "Mapmaker of the Confederacy." He was originally from New York, but had moved to Staunton, Virginia in 1852 to start a school, Mossy Creek Academy. After the war Hotchkiss became a career engineer and cartographer. He drew maps and wrote reports for developers, mostly railroads and coal companies. His 1870 map of Augusta is one of a series of county level maps in the western parts of Virginia and southern parts of West Virginia. Hotchkiss drew these maps under the direction of Robert E. Lee, who was president of Washington College. In 1868 the Board of Trustees of the College established a Board of Survey to gather geographic information on Virginia's mineral and natural resources and to publish it. The Board selected Hotchkiss to lead the project and he began with the 1870 map of Augusta County. He had more detailed information on Augusta than any other county, and his note on the bottom of the published version of the map states clearly that the surveys were based on maps of Augusta drawn during the Civil War years. Eventually, Hotchkiss published a series of county maps, titled "Maps of the Counties of Virginia," all as part of the larger effort to spark rail, coal, timber, and other mineral development in the immediate aftermath of the war.<sup>1</sup>

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<sup>1</sup> For biographical material on Hotchkiss, see Peter W. Roper, Jedediah Hotchkiss: Rebel Mapmaker and Virginia Businessman (White Mane Publishing Company, Inc., 1992) and William J. Miller, Mapping for Stonewall: The Civil War Service of Jed

The map contains 2,371 named points. Most of the named points on the map are residences, but Hotchkiss also located churches, mills, foundries, distilleries, schools, even ancient historic sites, such as "Indian mounds." The map in its published form rests in twenty-four separate paper sections on a canvas backing. So that the map could be folded easily into one packet, a half inch spacing separated the paper sections. When folded out fully, the map is approximately four feet in width by eight feet in length. The original scale of the 1870 map was 1 inch to 1 mile and the map contains a detailed subsection on the city of Staunton.

The Hotchkiss map represents an opportunity for the historians working on the Valley of the Shadow Project to make connections between data in the U.S. Census and geographic locations of individuals and households. The Valley of the Shadow Project at The Center for Digital History at the University of Virginia compares two communities in the era of the American Civil War: Franklin County, Pennsylvania, and Augusta County, Virginia.<sup>2</sup> The project is a freely accessible, online electronic archive. Visitors to the Valley Project archive can search for people, explore trends in data, find everything from baptismal and confirmation records to military service records. Franklin County and Augusta County lie two hundred miles apart and on separate sides of the Mason-Dixon line, yet they were connected by the bonds of commerce, family, and history. The Valley Project electronic archive includes every mention of local citizens of Augusta and Franklin in those counties' four newspapers for a run of nearly eight years in the era of the Civil War--if they won office, they are noted in the archive, if they gave a lecture, got married, died, did not pay their taxes, or grew the largest beet at the county fair, their names and notes are recorded in the archive. The idea behind the Project is to include in its history everyone from these two communities--soldiers as well as civilians, generals and privates, merchants and farmers, blacks and whites, men and women. The project's aims are to create an inclusive history of the coming, fighting, and aftermath of the Civil War, gathering as much evidence as possible about these two places and putting it into an electronic

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Hotchkiss (Elliot & Clark Publishing, 1993). See also Hotchkiss' magnificent diary of the Civil War, Make Me a Map of the Valley: The Civil War Journal of Stonewall Jackson's Topographer, ed. by Archie McDonald (Southern Methodist University Press, 1973).

<sup>2</sup> Edward L. Ayers, Anne S. Rubin, and William G. Thomas, "Valley of the Shadow Project: Two Communities in the American Civil War," <http://valley.vcdh.virginia.edu>. For the Center for Digital History, see [www.vcdh.virginia.edu](http://www.vcdh.virginia.edu)

archive for use by people all over the world. Organized in searchable database format, the U.S. census data can open up some of the most important questions about these places: was the Northern community more industrial, were Northern black citizens richer than free blacks in the Southern community, what kinds of occupations did each have, and what were the structures of the households in each?<sup>3</sup>

The Hotchkiss map presents a level of detail for Augusta County that makes possible direct connections between individual places--churches, schools, farms, and manufacturing establishments for example--and data in the manuscript U.S. Census. Our goal in working with the map was to make as many connections as possible between named points on the map and relevant data about them. We used U.S. Census data for all points, but achieved a finer level of detail in the city of Staunton through the use of city tax and fire insurance company records. In Staunton, we were able to link the features on the map to a variety of kinds of data: including physical descriptions of the structures, multiple story occupants (tenants and owners), multiple uses, and insurance values. In the city records, then, we were able more often to distinguish between owners and occupants, and we operated on the assumption that named points on the map were owners not occupants. In the county we made the same assumption, since Hotchkiss often used the possessive on multiple dwellings to indicate that an owner lived in one place but possessed several others.

Initially, we set out to establish a fixed georeference for the map. We made links to county boundary and hydrology vector line coverages from the U.S. Census (Tiger/Line data) and reasonable results were obtained. Better results were achieved by establishing links between the Augusta Co. image and georeferenced TIF files of 1:24000 scale USGS quadrangle maps (Digital Raster Graphics (DRGs), as numerous stable points such as churches, road intersections, etc. could be located on both target (Hotchkiss) and source (USGS) maps. Perfect geo-referencing of the Hotchkiss image was not possible due to various factors. First, as mentioned, the original paper map appears to have been stretched and distorted significantly. Second, distortions were undoubtedly compounded both during photography and subsequent editing,

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<sup>3</sup> For an overview of the Valley Project and its goals in Civil War history, see William G. Thomas III, "In the Valley of the Shadow: Communities and History in the American Civil War," Virginia Magazine of History and Biography 106 (Summer, 1998). For an overview of the Valley Project's web site traffic, see William G. Thomas, "Fax Me Everything You Have on the Civil War!" A Look at Web Audiences in the Valley of the Shadow Project," AHA Perspectives (February 1999).

edge-matching, and joining of map sections and blocks. Third, the cartographic precision of the original Hotchkiss map appears to be less than that of modern maps of the county. This is particularly notable along the northwestern and southeastern borders of the county, both of which lie in mountainous terrain. The most significant departures in the actual contours of the county's boundary between the Hotchkiss map and modern maps occur at the southwestern and southeastern corners of the county.

Approximately twenty links were established between the DRG source images and the Hotchkiss image and included a number of points along the county's boundary and throughout the internal area of the county. Links were added and deleted until the RMS error of all links was less than 500 meters. Lower average RMS errors could not be achieved despite much experimentation. In the main, then, points on the geo-referenced Hotchkiss image (as indicated by their x,y coordinates) lie no more than 500 meters from their "actual" locations and often are significantly closer.

Once the map was georeferenced, we took three passes with different teams of researchers at connecting the named places with U.S. Census data, making connections only where we were able to determine a clear and direct match. Out of 2,371 named points on the map, we made links to the population and/or agricultural censuses for 819 of them. According to the aggregate U.S. Census schedules, Augusta County has 3,740 families and an average family size of 5.92 persons. Using SPSS we ran cross tabs and frequencies for several variables on the 819 linked points on the map: household size (excluding slaves), farm value, farm size, number of slaves in household, and total wealth (real and personal).

We wanted to examine the place of slavery in Augusta County, compare slaveowners to nonslaveowners in several areas, and assess the extent to which slavery was embedded in the county's social structure. Frank Owsley in his landmark 1949 study of the Old South, Plain Folk of the Old South, first used statistical methods to address the question of class. Owsley used manuscript census returns for several counties from Alabama, Mississippi, Georgia, and Tennessee and linked individuals and households in the population (Schedule I) slave owners (Schedule II) and agricultural (Schedule IV) censuses. Owsley's work challenged the idea that the Old South was dominated by a planter elite and instead suggested that a plain folk democracy characterized the region. His emphasis on the middle class farmers who

prospered in the 1850s contrasted with earlier interpretations of a dormant middle class and a dominant elite.<sup>4</sup>

Scholars continue to offer explanations about the extent of class friction in the Old South and leading up to secession. While Eugene Genovese pointed to the "hegemony of the slaveholders" in a precapitalist economy, Forrest McDonald and Grady McWhiney looked to ethnocultural characteristics of the yeoman class and suggested that the plain folk's Celtic ethnicity explained their contented position in Southern society. Others, such as George Frederickson, have called the Old South a "Herrenvolk democracy," in which racial difference helped shove class aside and protect a hard-earned democratic equality among plain folk and planters.<sup>5</sup>

Studies of the Old South social structure since Frank Owsley's work have concentrated on the place of slavery in the region and its effect on white class relations. As a group slaveholders were extremely wealthy in the South. Their average wealth in 1860 was \$24,748, almost fourteen times greater than that of nonslaveholders (\$1,781). They accounted for 26 percent of the white population in 1860 and they owned 93 percent of "agricultural wealth." Historians have emphasized the growing concentration of slaves in the possession of the largest

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<sup>4</sup> See Frank L. Owsley, Plain Folk of the Old South (Baton Rouge: Louisiana State University Press, 1949). For a review of Owsley and his students' work, see James C. Bonner, "Plantation and Farm: The Agricultural South," in Arthur S. Link and Rembert W. Patrick (eds.), Writing Southern History: Essays in Historiography in Honor of Fletcher M. Green (Baton Rouge: Louisiana State University Press, 1965), 147-56. For a thorough explanation of Owsley's methods in linking the census schedules, see Owsley, Plain Folk of the Old South, 150-229.

<sup>5</sup> Eugene D. Genovese, The Political Economy of Slavery: Studies in the Economy and Society of the Slave South (New York: Pantheon, 1965), Forrest McDonald and Grady McWhiney, "The Antebellum Southern Herdsman: A Reinterpretation," Journal of Southern History XLI (May, 1975): 147-166, and George M. Frederickson, The Black Image in the White Mind: The Debate on Afro-American Character and Destiny, 1817-1914 (New York: Harper & Row, 1971). For a review of the literature on plain folk, see Randolph B. Campbell, "Planters and Plain Folks: The Social Structure of the Antebellum South," in Interpreting Southern History: Historiographical Essays in Honor of Sanford W. Higginbotham ed. by John B. Boles and Evelyn Thomas Nolen (Baton Rouge: Louisiana State University Press, 1987): 48-78.

slaveholders. John Boles pointed out that between 1850 and 1860 slaveholders with more than 20 slaves increased from 10 percent of the total slaveholding group to 12 percent. William J. Cooper and Thomas E. Terrill pointed out that these elite 12 percent owned 48 percent of the slaves in the South. So, historians have focused on the elite slaveholders and concluded that their power was not only substantial but also increasing.<sup>6</sup>

Some historians have begun to use geographic information to render more subtle interpretations of the Old South. One of the most effective uses county level voting lists of individuals to map the secession crisis. Even in the most careful histories of Southern communities, however, scholars do not use geographic information systems (GIS).<sup>7</sup>

Augusta County, Virginia, appears in many respects typical of the South as a whole in its patterns of household size and demographics, but in some respects quite different. Slavery was a large presence there, after all approximately twenty percent of the population was enslaved. Of the 819 points on the Hotchkiss map we have linked to data, 28.1 percent owned one or more slaves and 71.9 percent did not own any slaves. In the South as a whole, according to Peter Kolchin, 26 percent owned slaves and 74 % did not own slaves. Of the 819 linked points only .8 percent owned more than 20 slaves (compared to 12 percent for the South as a whole). The aggregate census shows more than 20 individuals who owned over 20 slaves, but not all of them have been linked and identified. Still, of the 811 slaveholders in Augusta less than 3 percent owned over 20 slaves and we have identified and linked data for a

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<sup>6</sup> Peter Kolchin, American Slavery: 1619-1877 (New York: Hill and Wang, 1993): 180. See also Gavin Wright, The Political Economy of the Cotton South (New York: W. W. Norton & Co., 1978): 34-36. John Boles, The South Through Time: A History of an American Region, Volume I (Upper Saddle River, New Jersey: Prentice Hall, 1999): 221; and William J. Cooper and Thomas E. Terrill, The American South: A History (New York: Alfred A. Knopf, 1990): 207. Other elite-focused studies have centered on the plantation household, for example, Elizabeth Fox-Genovese, Within the Plantation Household: Black and White Women in the Old South (Chapel Hill: University of North Carolina Press, 1988).

<sup>7</sup> See especially, Vernon Orville Burton, In my Father's house are many mansions : family and community in Edgefield, South Carolina (Chapel Hill: University of North Carolina Press, 1985) and Daniel W. Crofts, Old Southampton: Politics and Society in a Virginia County (Charlottesville: University Press of Virginia, 1992).

third of them. Augusta, then, appears to have fewer large slaveholders and more middling slaveholders, and it appears otherwise typical of the South as a whole.

Comparing slaveholders and nonslaveholders in the areas of farm size, farm value, household size, and wealth indicates some important contours of change in Augusta. Some preliminary conclusions of the cross-tabs and frequencies on the 819 linked points include:

1. Persons in household: Across all slaveholding categories (0-31+), including nonslaveholding, roughly 60-68 percent of the population lived in households of 3-7 people.
2. Farm Value and Farm Size: In both cases it appears that slaveholders with fewer than 10 slaves shared similar farm values and acreage with nonslaveholders. Households with greater than 10 slaves distinguished themselves with a significant increase in values. Almost 50 percent of nonslaveholders had a farm value of between \$3,000 and \$10,000, while almost 85 percent of those who owned more than 10 slaves had a farm value over \$10,000. It appears, then, that ownership of 10 slaves in Augusta County constituted a class dividing line, at which those who could aggressively obtain wealth were separated from those who might own slaves but still produce in a manner similar to the broad yeoman class.
3. Household wealth: The difference between slaveholders and nonslaveholders appears sharp, perhaps because slaves were counted as personal property and a part of overall household wealth. Almost 60 percent of the slaveholders were valued at more than \$10,000 in household wealth, while nearly the same percentage of nonslaveholders were valued at less than \$10,000. Other patterns, however, deserve attention. Some nonslaveholders managed to acquire significant wealth: 31.1 percent of them owned between \$2,000 and \$4,999; 28.1 percent owned between \$5,000 and \$9,999; 22.4 percent owned between \$10,000 and \$19,999; and 18.4 percent owned more than \$20,000. We have routinely assumed that such large aggregations of wealth must represent the high valuations of personal property in slaves, but this data might make us look more closely at the kind of wealth and property that nonslaveholders accumulated. (Some of these points might be eventually connected to the slaveholders census and might change the data analysis) Other forms of wealth must have existed in greater concentration than expected. In particular, financial instruments, such as bonds and debt agreements, accounted for some individual's personal property wealth. In addition, large holdings of cash may also explain high figures for personal property. Widows with large cash holdings, town professionals--lawyers,

merchants, even barbers--accumulated cash and other financial instruments as assets.

4. GIS display of the 1860 census data in Augusta reveals different patterns of settlement and structure in the economy, including the clear presence of cattle as a form of plantation enterprise to which slavery adapted, the complete absence of tobacco as a cash crop, the wide distribution of slavery in the county, and the predominance of a cattle-wheat economy. GIS also shows the patterns of settlement intimately bound with the landscape, raising questions that the data cannot answer, such as the presence of a settlement "hole" in the middle of the county.











