"My Duty to Provide": An Analysis of Government-Funded Geologic Research in Mississippi, 1858-1866

INTRODUCTION

In 1860, the Mississippi Geological Survey (MGS) printed the first large-scale geologic report of the state of Mississippi. Six years later, these printings remained in limbo, created but unbound and undistributed—a representation of the Civil War's impact on geologic research and a stark difference to the previous decade of field work and publications.

The Mississippi Geological Survey (MGS) was formed in 1850 and remained in its early stages when the Civil War broke out in 1861. As the Confederacy rallied troops and gathered supplies for battle, legislative turmoil was simultaneously generated over the funding and future of the Survey. Despite its youth, the MGS showed promise, having already produced three geologic reports regarding state agriculture, soil profiles, and geologic history. Thus, on Aug. 7, 1861, the state legislature passed a law to suspend the Survey throughout wartime, but provided a stipend of $1,250 to the State Geologist, Eugene Hilgard, to make it his "duty to provide during the war:" the "preservation of the collections and records of the Survey," and the continuation of "chemical and office work, to the exclusion of field work."[1]

Although Hilgard described the Survey's wartime work as "necessari-ly slow," government-funded geologic research on a greater scale did not cease.[2] The Confederacy entered the Civil War with an inadequate amount of gunpower and mineral resources, resulting in the creation of the Confederate Bureau of Niter and Mining (BNM). The Bureau sought to identify and utilize applicable natural resources in the Southern States, focusing heavily on the mining of copper, iron, saltpeter, and lead—key ingredients in gunpowder. For a few months in 1862, the BNM recruited Hilgard to study salt resources, which placed his personal research for the Survey on hold.[3]

---

[1] Eugene W. Hilgard to Governor Charles Clark, July 18, 1864, Civil War and Reconstruction Governors of Mississippi Project (hence known as CWRGM), Mississippi Department of Archives and History (hence known as MDAH).
[2] Ibid.
[3] Ibid.

Scholars have previously examined the history of the Mississippi Geological Survey and compiled general annotated bibliographies of geologic work in Mississippi before the Survey's formation. While some of these studies describe the Survey's work during the Civil War and Reconstruction, they often do so briefly and from a geologist's perspective. These works emphasize the research done before the War in the 1850s under Eugene W. Hilgard's leadership that culminated in the prominent 1860 state geologic report.[4] As a result, most historical analyses have overlooked the cultural, economic, and political trends that influenced wartime decisions regarding the Survey. Similarly, general studies of scientific research during the Civil War often neglect the South and Mississippi in lieu of focusing on advancements in engineering technology.[5]

As such, it is integral to emphasize the integrity and evolution in geological work in Mississippi during the Civil War and Reconstruction. Due to the leadership of Eugene W. Hilgard, research continued throughout the War, though it shifted its focus to best support the general population of Mississippi. The work moved from general geologic work to nitre for wartime research and eventually to new soil science research for agriculture. Even before the War, legal battles over funding limited Hilgard's ability to complete his personal research goals and restricted the resources available for large-scale fieldwork. This research, hence, seeks to elaborate on this pattern to fill the current gap in the literature through the utilization of newly digitized letters housed by the Civil War and Reconstruction Governors of Mississippi Project.

HISTORIOGRAPHY

Concerning the Mississippi Geological Survey and Eugene Hilgard

Much of the literature on geologic research during the Civil War was written by scientists and members of geologic organizations. This trend appears most clearly in the first biographical memoir of Eugene

[4]Albert Foster Crider, and Edwin Clarence Eckel. *Geology and Mineral Resources of Mississipp*i. Mississippi Geologic Survey, 1906.
[5]John Patrick Daly. "Science in the Civil War and Reconstruction" in The Routledge History of American Science, 74–83. Routledge, 2022.

Hilgard, written in 1919 by his colleague, physicist Frederick Slate. Slate's memoir depicts Hilgard's work during the war, including his research on saline waters, but presents a biased view of the man, as Slate offers that Hilgard should have "earned a vacation" for conducting research in a "belt of desolation."[6] He draws no correlation between Hilgard's research before, during, and after the war, nor does he focus on Mississippian research. The memoir is the only book written on Hilgard, though the Geological Society of America featured a presentation in 2010 that described his Civil War-era work. However, this presentation focused on Hilgard in the context of the Confederacy to depict his actions as the "first trained scientist" employed by the Southern cause, while negating his work in the Mississippi Geological Survey.[7]

Although other articles, such as historian John Patrick Daly's "Science in the Civil War and Reconstruction," address science at this time, they omit both geology and the South.[8] As such, only publications from the Mississippi Geological Survey itself offer a comprehensive history of the Mississippi Geological Survey. Although this authorship creates a cohesive connection between the Survey's work and its geologic findings, it also presents a consistent institutional bias.

The bias becomes particularly relevant in the Survey's 1963 publication celebrating the centennial of the Mississippi Geological Survey. In it, State Geologist Ephraim N. Lowe contributed an article on the history of the survey. Although published in 1962, Lowe wrote the article before his death in 1933, so it excludes any history after the 1906 State Report.[9] Nonetheless, Lowe's work is one of the most comprehensive histories of the time, specifying locations of research conducted under each State Geologist, detailing of their personal lives, and tracing the work done by each person after leaving the

---

[6]Frederick Slate and Robert Hills Loughridge. *Biographical Memoir of Eugene Woldemar Hilgard, 1833-1916*. 1919, 118.
[7] Walter E. Pittman, "EUGENE W. HILGARD, a CONFEDERATE SCIENTIST," in Geological Society of America, 2010, https://gsa.confex.com/gsa/2010NC/webprogram/Paper171620.html.
[8] Daly, "Science in the Civil War and Reconstruction,"
[9]Ephraim N. Lowe, "History of the Mississippi Geologic Survey (1850 - 1906)." In The Mississippi Geological Survey: A Centennial, 37–50. Jackson, Mississippi: Mississippi Geological Survey, 1963.

Survey. Despite the thoroughness, Lowe displays a Southern bias. He describes the Civil War as being a "terrible stress of the hour," and does not include the full depth of Hilgard's work for the Confederacy.[10]

State Geologist Michael B. E. Bograd continued this trend in his 1988 article "History of the Mississippi Geological Survey." Bograd divides the Survey into three different periods: The Early Years (1850-1872), which includes Hilgard's tenure; The Conventional Years (1903-1970); and The Service Years (1870-1988).[11] Like Lowe, Bograd offers a comprehensive history, but overemphasizes certain aspects of the Survey, depicting its creation as "almost inevitable" due to its "importance and necessity."[12] In contrast to earlier reports, Bograd also addresses the internal conflicts within the Survey. He includes geologists' "expressions of displeasure" over their work being "mutilated" in the state reports, portraying a new image of a survey that survived both external challenges and internal strife.[13] Similarly to earlier articles, Bograd follows the pattern of omission by excluding Hilgard's work for the Confederacy.

Concerning Confederate Scientific Research

In contrast to the histories of the Mississippi Geological Survey and Eugene Hilgard, current literature on scientific research in the Confederacy is robust and written from a non-scientific perspective. Historians have primarily focused on the products created by the Confederate Niter and Mining Bureau (NMB) and the Bureau's organizational development.

This may be seen in Frank E. Vandiver's 1951 article "Makeshifts of Confederate Ordnance," in which he connects the NMB to the Confederate Bureau by analyzing general orders. However, Vandiver centers his discussion on governmental and artillery matters, making no mention of the specific scientists who completed research within the Confederacy, and overlooking the utilization of their work outside of a purely arms-based perspective.[14]

---

[10] Lowe, "History of Mississippi Geologic Survey (1850-1906)," 45.
[11] Michael B. E. Bograd, "History of the Mississippi Geologic Survey." In The State Geological Surveys, edited by Arthur A. Socolow, 245–54. Association of American State Geologists, 1988.
[12] Bograd, "History of the Mississippi Geologic Survey," 246.
[13] Bograd, "History of the Mississippi Geologic Survey," 246, 248.
[14] Frank E. Vandiver, "Makeshifts of Confederate Ordnance," The Journal of Southern History 17, no. 2 (1951): 180–93, https://doi.org/10.2307/2198263.

To fill this gap, Ralph W. Donnelly's 1956 "Scientists of the Confederate Niter and Mining Bureau" sought to depict the people who directly contributed to the mining successes of the Confederacy.[15] While Donnelly identifies certain trends among these scientists—such as their race and unsuitability for military service—he does not mention any scientist from Mississippi. Instead, he emphasizes leadership in the NMB, narrowing the gap in the literature, but not closing it.

In the following decades, scholars shifted toward state-specific analyses of the Bureau's work. For instance, Glenna R. Schroeder's 1986 article in the *Georgia Historical Quarterly* focuses purely on the Augusta office of the Bureau.[16] Like Vandiver, she describes the procurement of niter, but the state-specific focus excludes broader Confederate research. This is again seen in James J. Johnson's 1990 article "Bullets for Johnny Reb: Confederate Niter and Mining Bureau in Arkansas," where he argues the importance of Arkansas mining for the NMB.[17] There is nothing in the current literature on Mississippi-specific work for the NMB.

By 2001, the NMB came under renewed scrutiny in Michael E. Lynch's thesis "Confederate War Industry: The Niter and Mining Bureau."[18] Lynch explores how the Confederacy resources to create gunpower, shifting focus away from the manufacturing process itself. However, he restricts his study to NMB District 7, or the Appalachian areas in Virginia, Tennessee, and Alabama. Thus, it cannot be generalized to all Southern states, especially those on the coast with distinct geologic backgrounds.

Overall, though the current literature has a wide scope in terms of coverage, researchers have consistently ignored Mississippi's contributions. Scholars outside the geological community have largely overlooked the Mississippi Geological Survey's role. In contrast, geology-focused texts have either downplayed or heroized Hilgard's work during the Civil War, depending on the author's bias. As such,

---

[15] Ralph W Donnelly, "Scientists of the Confederate Niter and Mining Bureau," Civil War History 2, no. 4 (January 1, 1956): 69–92, https://doi.org/10.1353/cwh.1956.0037.
[16] Glenna R Schroeder, ""We Will Support the Govt. To the Bitter End": The Augusta Office of the Confederate Niter and Mining Bureau," The Georgia Historical Quarterly 70, no. 2 (1986): 288–305, https://doi.org/10.2307/40581506.
[17] James J. Johnston and James J. Johnson, "Bullets for Johnny Reb: Confederate Niter and Mining Bureau in Arkansas," The Arkansas Historical Quarterly 49, no. 2 (1990): 124, https://doi.org/10.2307/40027817.
[18] Michael E. Lynch, "Confederate War Industry: The Niter and Mining Bureau" (2001).

this paper will seek to close this gap by detailing the changes in government-funded geologic research, including who conducted the research, what was done, and what outcomes can be seen.

METHODOLOGY

This study is an analysis and compilation of letters derived from the Civil War and Reconstruction Mississippi Governors Project (CRWGM). These letters serve as the primary source base for examining government-funded geologic research in Mississippi. Information was supplemented from historic state geologic reports available through the Mississippi Department of Environmental Quality.

The geologic reports were then utilized to create a map in QGIS. The 1860 geologic report was uploaded to Voyant, a word processing application, to determine the number of times each county was mentioned. After the initial counts were processed, the context surrounding the county names was checked to confirm that the name was utilized as a county. For instance, the initial count for Jackson was 145 mentions. However, after removing instances of Jackson when used in the context of the Jackson Group, the count dropped to 108.

After cleaning the data, it was uploaded to QGIS and mapped to create a gradient map. The census data regarding race was also uploaded to QGIS to complete the analysis. A bivariate map was developed to determine the correlation between the geologic county mentions and race demographics. The statistics of the correlations were then graphed in Microsoft Excel to determine the coefficient of determination (R2) and line of best fit.

Research was conducted from May to July 2025, in a span of 8 weeks.

RESULTS

Pre-War, 1858-May 1861

On March 5, 1850, a state legislative act authorized the Agricultural and Geological Survey of the State of Mississippi, emphasizing the development of geologic research to best benefit the people in the state. The legislature tied the Survey to the University of Mississippi, establishing Oxford as the primary site for

collections and research. The act also required the State Geologist, in collaboration with the University, to serve as a professor at the university, though the subject they taught varied.

The public supported the Survey, and the state government provided funding, yet the production of research slowly crept forward. Early reports prioritized scientific information but offered little application or practicality for everyday Mississippians. For instance, the first state report, published in 1854 under State Geologist B. L. C. Wailes, contained only 90 pages of geologic research, compared with the 370 pages of state history, culture, and biology.[19] The next report, published in 1857 by State Geologist Lewis Harper, skewed data collected from Assistant Geologist Eugene Hilgard to such a degree that Hilgard later depicted it as "a literary, linguistic, and scientific curiosity."[20] In response to widespread criticism, Harper was quickly forced to resign, and the state began to scrutinize the Survey more closely.

When state officials offered Eugene Hilgard of Professor and State Geologist in April 1858, he implemented immediate changes. In contrast to Harper's administration, Hilgard relocated the Survey from the penitentiary in Jackson, back to its original home at the University of Mississippi in Oxford.[21] In a November 1859 letter to Governor John J. Pettus, Hilgard proved his adherence to strict scientific protocol. He reported his "forty four ^quantitative^ analyses of soils, subsoils, marls, limestones, and other materials," described his chemical testing, and outlined his plans for the State Geologic Report that he sought to publish.[22]

Still, Harper's failures followed Hilgard. The inaccuracies in the 1857 report had led to legal action against the Survey, even as the organization aimed to support the "development of the agri-cultural resources of the State."[23] The dwindling confidence in the Survey led the legislature to allocate a mere $1,000 annually, forcing in Hilgard to pay many of his research expenses out of pocket. The underfunding slowed publication efforts, which Hilgard described as making it "impossible to make any real progress,

---

[19] B.L.C. Wailes, *Report on the Agriculture and Geology of Mississippi Embracing a Sketch of the Social and Natural History of the State* (Mississippi Geologic Survey, 1854).
[20] Ephraim N. Lowe, "History of the Mississippi Geologic Survey (1850 - 1906)," in *The Mississippi Geological Survey: A Centennial* (Jackson, Mississippi: Mississippi Geological Survey, 1963), 43.
[21] Ibid.
[22] Eugene W. Hilgard to John J. Pettus, November 29, 1859, CWRGM, MDAH.
[23] Ibid.

and to obtain any decisive and tangible results."[24] The Survey itself remained in limbo: it had to produce research to prove its usefulness, but it lacked resources to conduct said research. To mitigate these pitfalls, Hilgard requested funding for a part-time chemist to help with analyses, a chemical laboratory in which to conduct said analyses, and a new Assistant Geologist in his letter to Pettus.[25] The state legislature quickly heard and approved these requests during the 1859-60 Legislative Session.

Although Hilgard was not born or raised in Mississippi, he recognized the state's deep reliance on agriculture and a pressing need for soil science. In his aforementioned request to Pettus, he stressed the importance of continued research into "the deterioration of our soils by an irrational and exhaustive cultivation," urging not only the geologic and chemical explanations of the deterioration, but also that of "the experience of those who live on the spot."[26] However, Hilgard's interpretation of "experience" reflected a narrow viewpoint, as he relied on testimonies of plantation owners and farmers, overlooking the large enslaved population across the state. His actions toward enslaved people, from his appointment as State Geologist to his death, can be explained through his later 1912 account of his views of the Civil War. Although he would oppose the later Confederacy, Hilgard still argued for "the inability of negroes to become anything but a servile race, even if set free."[27]

Despite the constant funding challenges, Hilgard successfully presented his 1860 report at the legislature at the 1859-60 session. Lawmakers passed the bill "with little difficulty" according to Hilgard, and met his calls to appoint an assistant geologist while also increasing the Survey's annual budget.[28] The total funds, including Hilgard's salary and the wages for any new hires, jumped to $4,500.[29] The 1860 report presented was preliminary, and Hilgard continued his research with the received benefits.

---

[24] Ibid.
[25] Ibid.
[26] Ibid.
[27] Eugene W. Hilgard, "A Confederate Scientist at War," ed. Walter E. Pittman, *Civil War Times Illustrated*, March 1986.
[28] Frederick Slate and Robert Hills Loughridge, *Biographical Memoir of Eugene Woldemar Hilgard, 1833-1916* (The National Academy of Sciences, 1919), 116.
[29] Eugene W. Hilgard to William L. Sharkey, August 2, 1865, CWRGM, MDAH.

In a subsequent letter to Governor Pettus, Hilgard submitted the Account of Expenditures of the Geological Survey, which detailed expenses from August 16, 1860, to March 15, 1861. The Survey's costs totaled $695.62, including a variety of laboratory items, travel costs, and room and board. Although Hilgard had not hired an Assistant Geologist, he noted the "Hire of [a] negro servant, for 8 months," along with a reimbursement received for "hiring out [the] servant."[30] There is no further information on the enslaved man, nor is there any note of what he specifically did. However, because Hilgard included the expense alongside laboratory equipment while the Survey operated in Oxford, it may be assumed that the man assisted with basic work pertaining to scientific research, such as cleaning of collections. The historical record otherwise omits this individual, yet his mention confirms that enslaved labor directly supported state-sponsored geologic research.

Slavery and states' rights bled into other aspects of the Survey's work. During the same 1860 act that granted a funding raise for the Survey, lawmakers granted Hilgard an additional $3,500 for the printing of his 1860 Geologic Report.[31] This large grant came with the stipulation "that the work should be done at the South, if it could be done at an advance of 10 pr. A. on northern rates," as Governor Pettus "refused to let the job go north under any circumstances."[32] Although Hilgard complained that it was "impossible," he eventually located a printer in Jackson who agreed to complete the job with the promise of an extra relief bill.[33] The printing was completed in 1860. However, before the pages could be bound—after already been shipped to St. Louis—the Civil War broke out.

During War, April 1861-1865

In the first few months of the Civil War, the Mississippi Geological Survey saw slight change in its operations. Two receipts from the earliest weeks of the War, preserved in the CWRGM archive, document purchases for matches bought in late April and sweet oil (low sulfur crude oil) bought in

[30] Account of expenditures from Mississippi State Geologist Eugene W. Hilgard, March 16, 1861, CWRGM, MDAH.
[31] Eugene W. Hilgard to William L. Sharkey, August 2, 1865, CWGRM, MDAH.
[32] Ibid.
[33]Eugene W. Hilgard to William L. Sharkey, August 2, 1865CWRGM, MDAH.

May.[34,35] These receipts confirm that Hilgard continued laboratory-based scientific research during the early war period, evidenced by his late 1862 report on Southern replacements for coal oil—another name for kerosene, a product of sweet oil.

Although research was being conducted, Hilgard soon realized that funding was unstable. By August 7, 1861, the Mississippi Legislature passed a new law that, in Hilgard's interpretation, made it his "duty to provide, during the war, for the preservation of the collections and records of the Survey, and to continue the chemical and office work, to the exclusion of field work" for a salary of $1,250 per annum.[36] These funds remained throughout the war, allowing Hilgard to continue his scaled-down work. Biographer and physicist Frederick Slate later described this maintenance of the appropriation as a reflection of lawmakers' "enlightened confidence in the director and his work."[37] To better justify continued state support and better the chances of continual funding, Hilgard began to shift the focus of geologic research away from agriculture. No longer was there a focus on crop production. Instead, the Survey prioritized ordnance surveys and salt mining to serve the Confederate war effort directly.

Topographical research grew increasingly vital, especially for military positioning for battle. In July 1861, General Charles G. Dahlgren wrote to Governor Pettus to request "a skilful officer of Ordnance… of Topo-graphical Corps," be added to his brigade to aid in the survey of the Mississippi coast.[38] Such a specific survey would have produced maps, identified plantations and population location, and created new strategies for battle that utilized the surrounding environment—all of which would have led to an easier method to guide large battalions across terrain.

Furthermore, topography aided in the fortification of important sites, such as Vicksburg. In December 1861, Chief of Ordnance Edward Fontaine wrote Governor Pettus after conducting a "careful recon-naissance of the topography of Vicksburg." Fontaine advised using the rivers, hills, and overall

---

[34] Receipt from Owens and Brother to Eugene W. Hilgard, April 25, 1861, CWRGM, MDAH.
[35] Burton N. Harrison to Eugene W. Hilgard, May 14, 1861, CWRGM, MDAH.
[36] Eugene W. Hilgard to Charles Clark, July 18, 1864, CWGRM, MDAH.
[37] Slate, *Biographical Memoir of Eugene Woldemar Hilgard, 1833-1916*.
[38] Charles G. Dahlgren to John J. Pettus, July 24, 1861, CWRGM, MDAH.

environment to "make it impregnable against an attack by land and water."[39] Although Union forces eventually captured Vicksburg during the 1863 siege, Confederate authorities had clearly recognized geological research as a critical component of their defensive strategy.

By spring 1862, the Ordnance Department could no longer meet the demand for mineral resources. In response, the Confederate government established the Niter and Mining Bureau to oversee the production of niter, iron, lead, and copper and remedy the Confederacy's lack of gunpowder and Earth materials.[40] This production included domestic mining, foreign purchases, and the purchase or impressment of mineral stocks.[41] While the NMB expanded geologic research, it gained limited traction in Mississippi due to the state's less-developed mining sector. Conscription records underscore this imbalance: from December 1863 to March 1864, Mississippi provided 13 men to the NMB, while Georgia provided 611, North Carolina provided 2,098, and Virginia provided 5,673.[42] Even so, 49% of all Confederate conscripted men were assigned to the NMB, revealing the Confederacy's urgent need for mineral resources.[43]

Although Mississippi did not play an influential role in the NMB, officials still turned to the state for other sites of research. In 1862, the NMB commissioned Hilgard "for the examination of salt licks & springs; of salt petre caves, and to aid in the construction of niter beds at Jackson".[44] Confederate leaders had hoped to establish Mississippi as a location of salt production due to the high salinity lakes in the south. However, Hilgard's investigations showed that production output would not be viable against the cost of production. Still, this research highlighted Hilgard's expertise, leading to his exemption from the military draft later that year.

Exemption requests from Hilgard provide further detail into government-funding of research, as Hilgard how he had "been constantly pressed for months past," for his "examinations of salts, brines,

---

[39] Edward Fontaine to John J. Pettus, December 20, 1861, CWRGM, MDAH.
[40] J.P. Benjamin to the President, March 12, 1862, Ordnance series IV, vol. I, 988.
[41] General Order No. 85 (series 1863), Adjutant and Inspector General's Office, June 16, 1863, Ordnance series IV, vol. II, 594-595.
[42] Ibid.
[43] Ibid.
[44] Eugene W. Hilgard to Charles Clark, July 18, 1864, CWRGM, MDAH.

coppers & other ores" due to his commission in the NMB.[45] Superintendent D. R. Lemman also wrote a request for Hilgard's exemption, highlighting his "essential Service" and future work to be done in Arkansas "to Make examinations in mining Lead."[46] Governor Pettus quickly accepted these two requests, recognizing the value of the continuation of mineral examinations, especially in times of war.

During most of the Confederacy, Hilgard continued his collection care for the Geological Survey in Oxford, Mississippi. However, military activity frequently disrupted his work, as armies from both sides passed through the University grounds and disturbed the peace. When the Northern forces settled in Oxford, the Union army and hospital impressed or stole equipment, which Hilgard later described as "burglariously abstracted during…the enemy's occupation."[47]

At other times, the Confederacy called Hilgard away to apply his geologic and chemistry knowledge elsewhere. In 1863, he received orders to construct Drummond Lights, oxygen-hydrogen lamps, at Vicksburg to allow the fleet "to run the blockade."[48] Unfortunately, Hilgard did not complete the lights in time for the siege, which Hilgard witnessed from a nearby hill.[49]

In the moments of relative calm, Hilgard resumed research unrelated to artillery use. Instead, he focused on "the making of salt in the State, and the prevention of the use of deletucious [dangerous] compounds."[50] This research was beneficial outside of a military standpoint, as Hilgard attempted to publish the results to benefit the general public and enable them to mine their own salt and utilize their environment. However, he encountered major obstacles, including "frequent inter-ruption of the mails" and a "scanty means at [his] disposal," that led to a drawn-out and ultimately incomplete process.[51]

Similarly, Hilgard's "un-lucky, printed, but unpublished [1860] Report" remained in limbo, although he assured that "so long as the collections and records remain, there is little lost."[52] By the end of

---

[45] Eugene W. Hilgard to John J. Pettus, November 29, 1862, CWRGM, MDAH.
[46] D. R. Lemman to John J. Pettus; Undated, CWRGM, MDAH.
[47] Eugene W. Hilgard to Charles Clark, July 18, 1864, CWRGM, MDAH.
[48] Hilgard, "A Confederate Scientist at War," 24.
[49] Ibid.
[50] Eugene W. Hilgard to Charles Clark, July 18, 1864, CWRGM, MDAH.
[51] Ibid.
[52] Ibid.

the War in 1865, the report had 2,000 copies bound, though the binder was "unable to do anything in the premises for a time," leaving the length of work undistributed.[53] It was at this point that Hilgard, "unwilling lightly to abandon half finished, a work" that he had "bestowed so much time, labor and interest," wrote to the Governor that he had "no choice but to retire" unless the report may be distributed. His ultimatum made one fact clear: while state leaders had praised geological research, they rarely matched those words with adequate resources or timely action.[54]

Post-War, 1865-66

The end of the war, unfortunately, did not immediately release the information stored within the report. Instead, financial issues steadily worsened and peaked during post-war Reconstruction, further burdening the state-funded geologic research. Just as he had at the start of the Survey, Hilgard once again had to "put into their [the legislature's] hands the proof of the impor-tance and utility" of the organization to secure support and funding.[55] In particular, he pushed to publish the 1860 report—five years after it had been printed printing—by advocating for changes in legislative appropriations.

The wartime law of 1861 granted the appropriation of $1,250, but its provisions were set to expire in May 1866, setting a strict schedule for the Survey to negotiate a new deal with the legislature. Issues continued to build, as chemical stores for laboratory work ran low, salaries went unpaid, and the infamous report remained unbound.[56] Hilgard continued to push for funding from Governor Benjamin G. Humphreys, under increasing pressure. The insistence on printing and binding the report in the South—before, during, and after the war—resulted in a flood of correspondence as receipts that "ought to be on file… may not now exist," which resulted in unpaid wages to every person involved.[57] With no urgent demand for mineral resources, post-war funding slowed once again.

---

[53] Eugene W. Hilgard to William L. Sharkey, August 2, 1865, CWRGM, MDAH.
[54] Eugene W. Hilgard to William L. Sharkey, August 2, 1865, CWRGM, MDAH.
[55] Eugene W. Hilgard to William L. Sharkey, August 30, 1865, CWRGM, MDAH.
[56] Ibid.
[57] Eugene W. Hilgard to Benjamin G. Humphreys, March 23, 1866, CWRGM, MDAH.

As a result, priorities in research again began to shift. Hilgard relented on the "immediate redemption of the fieldwork," which delayed the collection of new paleontological or soil samples and forced the Survey to rely on existing ones.[58] Instead, he redirected funding toward travel so he could hold a "personal discussion" with the Governor regarding the future of the Survey with the Governor.[59]

The discussion went exceedingly well. Hilgard's next written conversation to Humphreys reflected a small grant for expenditures and the appointment of Dr. George Little as Assistant Geologist to expand field and laboratory research.[60] In contrast to pre-war expenditures, the report made no mention of Black servants or enslaved people as expenses, displaying the shift in the labor force following Emancipation. Nevertheless, the grant allowed the survey to publish a circular on the capabilities of practical agriculture, keeping extra copies for later distribution.[61] These materials were implemented immediately by agricultural schools, once again demonstrating the Geological Survey's value to the public. After years of minimal research dissemination, Hilgard proudly "proved that the cost of such publications from time to time, is well repaid," setting an important precedent for the remainder of his term as a State Geologist.[62]

In August 1866, the legislature convened an extra session to discuss the future of the Geological Survey—the first time Hilgard was "glad to see an extra session called" as he believed it "will be the means of straightening out what is crooked."[63] Despite this progress, the report remained unpublished to an "utterly distressing" degree, and the public's "constant…and impossible to answer" inquiries only intensified.[64] To mitigate the situation, Hilgard sent copies of earlier (pre-war) circulars to "every newspaper in the State," with forwarded an additional two dozen copies to the Executive office.[65] After

[58] Eugene W. Hilgard to Benjamin G. Humphreys; April 30, 1866, CWRGM, MDAH.
[59] Ibid.
[60] Eugene W. Hilgard to Mississippi Governor Benjamin G. Humphreys, July 27, 1866, CWRGM, MDAH.
[61] Ibid.
[62] Ibid.
[63] Eugene W. Hilgard to Benjamin G. Humphreys, August 20, 1866, CWRGM, MDAH.
[64] Ibid.
[65] Ibid.

the success of the practical agricultural circular, the Survey's focus shifted away from directly aiding the military and government, instead working to help individuals who could directly apply the knowledge.

The increased public support and legislative session did not make immediate changes. By late August 1866, bookbinder James Hogan wrote to Hilgard, about the Report, stating the "amount [is] as near as possible due me for work done & accrued expenses therein."[66] Hilgard promptly forwarded the letter to the governor, making a final plea for the final balance of $800-1,000 to publish the report and prevent "so serious a pecuniary loss" to the state.[67] However, Hilgard believed that "judging by the numeous applications… receive[d] for the book, the money could have been raised by public appeal."[68]

Regardless of public interest, the instability of Hilgard's position as State Geologist, combined with the constant funding changes, state-wide governmental issues, and constant degradation of large-scale research, led him to resign from his position in October 1866. He remained at the University of Mississippi as a professor and continued his geological and agricultural research until 1873 when he accepted a professorship in California.

Implications of Geologic Research

The 1860 Geologic Report was utilized to create the following map that displays the number of times each county was mentioned, to best determine where research occurred:

[66] James Hogan to Eugene W. Hilgard, August 28, 1866, CWRGM, MDAH.
[67] Eugene W. Hilgard to Benjamin G. Humphreys, September 1, 1866, CWRGM, MDAH.
[68] Ibid.

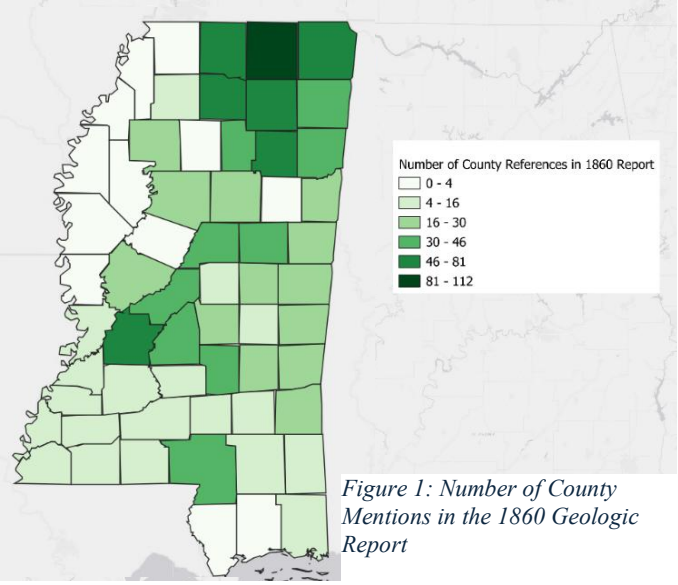


Figure 1: Number of County Mentions in the 1860 Geologic Report

The frequency of county mentions in the 1860 report displays two primary clusters of geologic research: one centered around Jackson, Mississippi, and one surrounding Oxford. Between 1854 to 1858, the Geological Survey was located in Jackson, which explains the substantial amounts of field work in the surrounding areas. After Hilgard moved the Survey back to Oxford in mid-1858, the research locations shifted accordingly.

Hilgard emphasized integrating geology with "the experience of those who live on the spot,"[69] leading to the need to examine whether his research locations correlated with areas of large enslaved populations. Hilgard's specialization in soil science leads to the assumption that research would be centered around plantations and locations with a greater enslaved population, as a majority of enslaved people in Mississippi worked in the agricultural sector at this time.

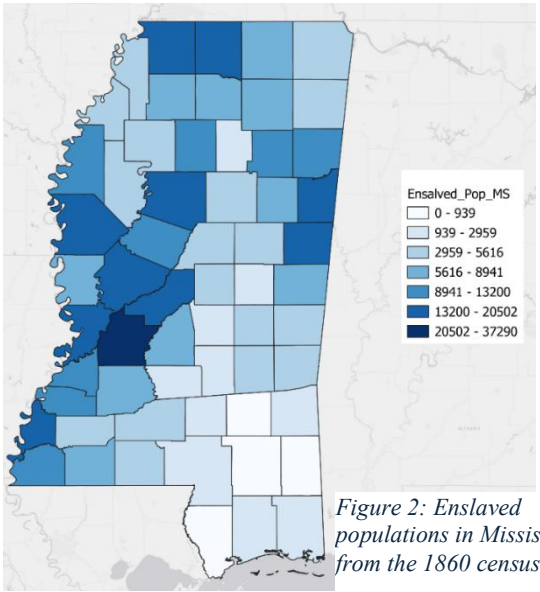
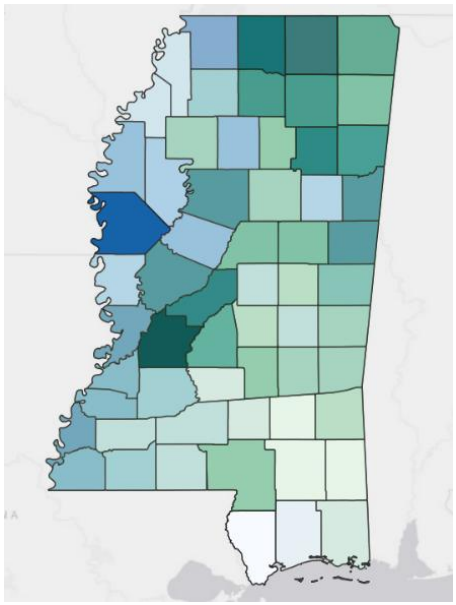


Figure 2: Enslaved populations in Mississippi, from the 1860 census report

The two aforementioned maps were then combined into a bivariate map that displays the correlation between geologic research and enslaved populations:

[69] Eugene W. Hilgard to Mississippi Governor John J. Pettus, November 29, 1859, CWRGM, MDAH.



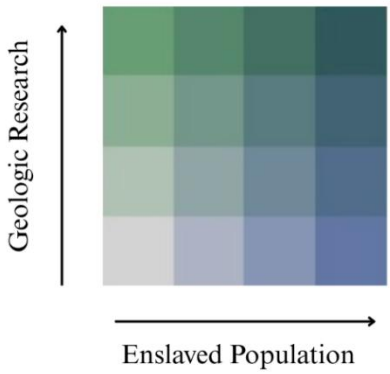
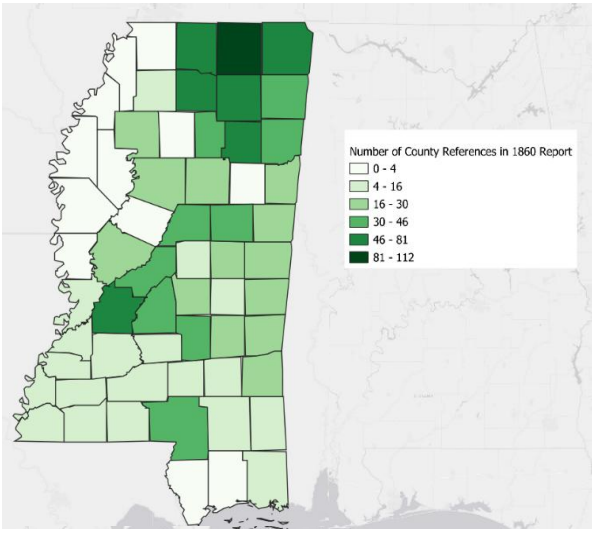
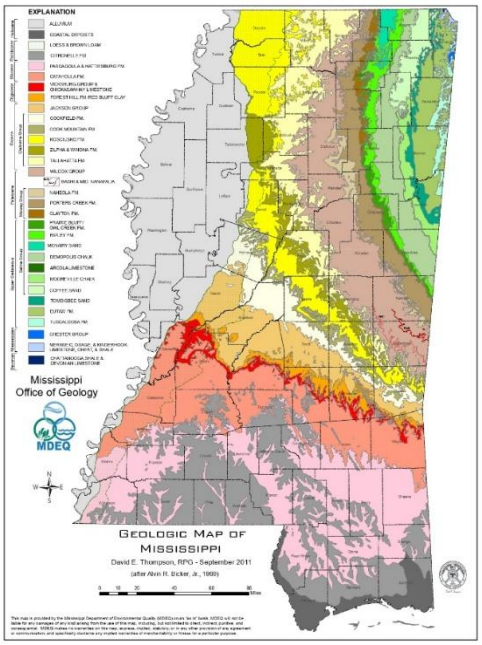


Figure 3: Correlation of Geologic Research and Enslaved Population

However, despite the strong clusters near Jackson and Oxford, the data provides minimal evidence of a relationship between enslaved population and location selection. Statistical analysis shows a minuscule positive correlation of an increase of .0004 counties per enslaved person in a county. The coefficient of determination (R^2) is .0081, and when outliers are removed, the coefficient increases to .0146—too small to be statistically significant.

The distribution of research was then compared with the geologic regions of Mississippi.[70]





Re: Figure 1 (Left). Figure 5: Geologic Map of Mississippi (Right).

[70] David E. Thompson. Geologic Map of Mississippi. Mississippi Office of Geology, 2011.

In stark contrast, counties in the delta region along the Mississippi River received little-to-no attention in the 1860 report. This area contains wide diversity of alluvial sediments and holds significant modern geologic interest. The intentional exclusion of these counties may have been for a variety of reasons: Hilgard may have had limited personal interest in the delta, or he may have chosen other locations that served the best interests of the state. At the time, only one major study had examined the delta, with the research described in a chapter in Sir Charles Lyell's 1847 *Principles of Geology: Or The Modern Changes of the Earth and Its Inhabitants Considered as Illustrative of Geology*.[71] The area was not researched again until the 1930s, in Richard J. Russel's fieldwork on alluvial morphology, which suggests that Hilgard may have set a precedent for neglecting this geologically diverse region.

As a geochemist, Hilgard may have prioritized transition areas of ecoregions, which may be mapped throughout the state moving in a northeast direction. This pattern is clearly seen in the locations of geologic research. Given limited funding, it made economic sense to concentrate fieldwork in diverse areas that offered a broad overview of soil variation with minimal travel. Although enslaved populations aided in the pre-war research itself as servants, they had negligible impact on location.

Hilgard's post-war research in practical agriculture eventually benefited newly freed people, though it was years after his publications and the end of the Civil War. He remained a staunch advocate for the integration of geologic principles in agriculture, positively influencing the curriculum of the newly created—and segregated—agricultural colleges throughout the state. Although Hilgard maintained racial views consistent with his era, his beloved 1860 report continued his influence long after his leave from the state of Mississippi.

CONCLUSION

The results of this project display clear patterns of change in geologic research, based primarily on the availability of government funding and public support. This led to changes in what part of geology was studied, going from agricultural knowledge that would empower the literate population, to the location of

[71] Sir Charles Lyell, *Principles of Geology; Or, the Modern Changes of the Earth and Its Inhabitants Considered as Illustrative of Geology*, 1847.

resources utilized for war. With more time, the results may be expanded to include other states, Confederate or Union, as a source of comparison. Additional letters from the CWRGM archive may be utilized with more time, most especially in terms of those in the Reconstruction Era.

The letters exchanged during this period display a complex interplay of forces between the public, state government, and geological researchers, outlining a pattern in how the government created, treated, and released geological research. Before the Civil War, research reflected the personal interests and training of the State Geologist's interests. Hilgard was trained as a chemist and focused on soil science and chemistry, while his predecessor, Benjamin Wailes, was trained as a naturalist and focused on agriculture. Although the government funding came with stipulations, particularly in the terms of the creation of a state geological report, it allowed leeway in how, when, and where research was conducted.

However, the failures surrounding the 1857 report led to long-term funding issues, setting a precedent that created years of strife between the Survey and the State Legislature. This rivalry cast a shadow over what work was completed by the survey, particularly as the Civil War broke out. On the meager salary, Hilgard barely supported the bare minimum of collection work, negating any need for a working laboratory, field work, or assistant.

During the war, the Confederate government called upon Hilgard to research mineral resources for the war in southern Mississippi, an area little mentioned in his 1860 report. Though he occasionally continued his personal geochemistry work, it was far and few between. The wartime period solidified a stronger relationship between the government, Survey, and public, as officials realized the importance of geologic research, whether it be for military, agricultural, or other use.

After the War, the Survey's focus of study quickly shifted once more. Although the state never published the 1860 Geologic Report, Hilgard continually pushed for the publication pf smaller circulars, benefiting literate people outside of the government. Public awareness of their surrounding environment continued to grow, granting greater agency in the Reconstruction era.

Although the War's effect in increasing public support for the Survey, the government remained skeptical. Funding returned to its pre-war levels, but the instability of state funding contributed directly to

the resignation of Hilgard as State Geologist. His departure again disrupted government-funded research as the Survey transitioned once more to a new era with a new director.

Although the research locations could not be fully correlated with enslaved populations, the letters provide evidence that enslaved people contributed to the Survey, adding an aspect that the current literature overlooks. The absence of any mention of these individuals after the war suggests they may have been freed, though existing archival records do not offer definitive confirmation.

Additionally, the geospatial analysis of 1860 research provided conclusions that were completely untouched upon in the literature. The lack of field work in the delta region was an untapped source of information, creating implications for future research delving into the reasoning behind such choices. The spatial mapping further revealed correlations between major hubs of academia, particularly colleges that housed laboratories and collection repositories.

Geology played a key role in the Civil War, from the production of niter, salt, and iron to the creation of maps with topographical research. Yet, historians have largely excluded it from traditional Civil War narratives. At the same time geological research histories have neglected the impact of the War. This project bridges that divide by integrating both bodies of scholarship to offer new insights and provide a comprehensive timeline and map that details the overlooked intersection in the historical record.