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Spreading the Maps

U.S. Army Engineers, State-building and Capitalism in the North-American Great Lakes, 1850–1880

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Abstract

This article deals with the nautical charts of the Great Lakes, made by the U.S. Army Corps of Engineers in the second half of the 19th century. It explores the role of these documents in the capitalist transformation of this risky border region from 1850 to 1882. As army engineers needed support to distribute their charts more widely to captains, they connected with insurance companies, whose control over ships and trade was getting stronger. On the one hand, government charts became major tools for the insurers' financial activities. On the other hand, army engineers benefited from insurers to develop their distribution policy. This study suggests to what extent state-building and capitalism went hand in hand on the U.S. maritime borders.

Keywords: State; Cartography; Insurance; Borders; Engineers.

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1 Introduction

> For years the commerce of this region was carried on at great risk without charts of any kind (…) This condition of affairs no longer exists. It would be hard now to find a master who does not consult his charts, or who is willing to be without them. They are supplied without charge, as far as published, to all vessels plying on these waters, and the demand is urgent for a full set covering the entire chain of lakes. The time is not now far distant when this demand can be met if the requisite appropriations are made.[1]

In 1870, Brevet Brigadier General William Franklin Raynolds, a United States Army engineer, in charge of the federal survey of the Great Lakes, was pleased to note the outcome of many decades of chart distribution.[2] Several thousand governmental charts, the specific name for the maps used in marine navigation, were distributed annually at the "Lake Survey" office, located in Detroit, Michigan, to U.S. and Canadian citizens of the Great Lakes region (fig. 1).

This surveying program, voted by the U.S. Congress and run by the U.S. Army Corps of Topographical Engineers, aimed to survey systematically the Great Lakes in order to make nautical charts, and to distribute them in this borderland—a region then undergoing rapid economic and geopolitical changes. The fur trade and the frontier economy, operating since the 17th century in the area, were gradually upended by the "market revolution" brought by sailing trade in the first half of the 19th century. Above all, lake schooners revolutionized the transportation of passengers, grain, lumber, grocery goods and bulk freight, between Buffalo, the Erie Canal, and the West, with the colonization of Michigan, Illinois or Wisconsin. The ascent of Chicago as the greatest grain port of the world in 1856 coincided with the iron and "copper boom" in the Lake Superior. In the Great Lakes, the Northern and Southern sides of the "permeable border" were becoming more and more integrated through flows of migrants, goods, and capital, with the free-trade policy of the Reciprocity Treaty, signed by the United States and British Canada (1854-1866). This maritime commerce contributed intimately to the rise of the Midwest as a major economic region in the second half of the 19th century.[3] Yet, in this thriving context, a handful of army officers like Raynolds, who were far from Washington DC, claimed they met the enormous challenge of distributing thousands of charts each year to almost all Great Lakes vessels, in order to meet their need for safety, always at stake on the inland seas.[4] Not to be taken for granted, such a statement still raises the broader question of how this distribution by the U.S. military directly helped the development of the shipping business, and, ultimately, how the federal government and capitalism came to intertwine at the core of the continent, in this "age of commerce."[5]

Understanding this requires to rethink the historical relations between the U.S. Army Corps of Topographical Engineers and the economy. Army engineers have long been shown to be a major

1. United States Army Corps of Engineers, *Report of the Chief of Engineers* (U.S. Government Printing Office, 1870), 541.

2. These charts are all visible on this website https://digital.library.wisc.edu/1711.dl/4D2Q3HT3SGIJB8X. Click on U.S. Lake Survey (next to "creator," below the chart's title) to see the other charts.

3. On the dynamics reshaping the Great Lakes economy during the nineteenth century, see William B. Gates, *Michigan Copper and Boston Dollars: an Economic History of The Michigan Copper Mining Industry* (Harvard University Press, 1951); David R. Meyer, "Midwestern Industrialization and the American Manufacturing Belt in the Nineteenth Century," *The Journal of Economic History* 49, no. 4 (December 1989): 921–937; Andrew R. L. Cayton and Peter S. Onuf, *The Midwest and the Nation: Rethinking the History of an American Region* (Indiana University Press, 1990); Charles Sellers, *The Market Revolution: Jacksonian America, 1815-1846* (Oxford University Press, 1991); William Cronon, *Nature's Metropolis: Chicago and the Great West* (Norton, 1991); Theodore J. Karamanski, *Schooner Passage: Sailing Ships and the Lake Michigan Frontier* (Wayne State University Press, 2001), 19; John J. Bukowczyk, ed., *Permeable Border: The Great Lakes Basin As Transnational Region, 1650-1990* (University of Pittsburgh Press, 2005); Noam Maggor, *Brahmin Capitalism. Frontiers of Wealth and Populism in America's First Gilded Age* (Harvard University Press, 2017).

4. Karamanski, *Schooner Passage*, 213.

5. Existing before the "age of the factory" or "of the industry," the "age of commerce" takes place until 1860 (according to historian Jonathan Levy), or until 1880 (according to Claire Lemercier and Pierre François). See: Jonathan Levy, *Ages of American Capitalism: A History of the United States* (Random House, 2021); Pierre François and Claire Lemercier, *Sociologie historique du capitalisme* (Éditions La Découverte, 2021), 14–16.

tool of the United States since the early 19th century, a "developmental capitalist state" in the making.[6] They had to locate and improve roads and waterways that were deemed essential for both the military and commerce. Yet, this article does not deal with the field surveys of the Lakes by the engineers, nor with the infrastructure they built. It focuses instead on the social and political issues at the heart of their chart distribution, thereby joining recent trends in the history of cartography.[7] What might be considered a secondary, administrative aspect of the federal government allows us, on the contrary, to shed light on major, but little-known, issues that uncover a process of cross-construction between the U.S. government and U.S. capitalism. Steered at the heart of lake trade, chart distribution fostered the development of capitalism, understood as a social order based on the exploitation of humanity and the environment.[8] In the mid-19th century Great Lakes, such a process was epitomized by insurance companies. These financial institutions were, then, becoming "determined champions of economic control."[9] Often linked to financial places in New York, they were spreading across the Great Lakes region, investing capital, bringing risk coverage for diverse business ventures. In particular, they had to keep up the "seaworthiness of the American shipping," in order to maximize safety and financial profit for ship owners and insurers.[10] Yet, their connections to the federal government in framing trade still need to be explored: how did army engineers contribute, with their charts, to shape these companies' activities and profit?

Following the charts from the Lake Survey, and the social links this institution developed, provides the opportunity to show how government charts helped enterprises, such as insurance companies, consolidate their business at a regional scale. To explain this, the article builds mainly on a widely unexplored large archival corpus: the Lake Survey office correspondence.[11] Its content provides a wealth of information about the social life of a small federal office, whose activities comprised the large-scale distribution of charts under the authority of army engineers. This task was carried out from the early 1850s until its closure in 1882, a period characterized as the heyday of sail on the Great Lakes.[12] Analyzing letters from the Lake Survey allows us to understand, first, which transportation

6. We borrow the expression "developmental capitalist state" from Charles Sellers, *The Market Revolution*, 33. On the traditional historiography of the U.S. Army engineers, see: Forest G. Hill, *Roads, Rails & Waterways. The Army Engineers and Early Transportation* (University of Oklahoma Press, 1957); William H. Goetzmann, *Army Exploration in the American West, 1803-1863* (Texas State Historical Association, 1991); William D. Adler, *Engineering Expansion: The U.S. Army and Economic Development, 1787-1860* (University of Pennsylvania Press, 2021).

7. On this new history of cartography, see: Mary Sponberg Pedley, *The Commerce of Cartography: Making and Marketing Maps in Eighteenth-Century France and England* (University of Chicago Press, 2005); Isabelle Laboulais, ed., *Les usages des cartes (XVIIIe-XIXe siècle): Pour une approche pragmatique des productions cartographiques* (Presses universitaires de Strasbourg, 2019); Matthew H. Edney, *Cartography: The Ideal and Its History* (University of Chicago Press, 2019); Martin Brückner, *The Social Life of Maps in America, 1750-1860* (Omohundro Institute and The University of North Carolina Press, 2017).

8. On this "New History of Capitalism," see notably: Jonathan Levy, *Freaks of Fortune: the Emerging World of Capitalism and Risk in America* (Harvard University Press, 2014); Michael Zakim and Gary John Kornblith, eds., *Capitalism Takes Command: The Social Transformation of Nineteenth-Century America* (The University of Chicago Press, 2012); James Parisot, "Introduction: The Intersections of Capitalism and American Empire," *Journal of Historical Sociology* 33, no. 1 (2020): 2–9; Nicolas Barreyre and Alexia Blin, "À la redécouverte du capitalisme américain," *Revue d'histoire du XIXe siècle*, no. 54 (2017): 135–148; Michael Ralph, "Value of Life. Insurance, Slavery, and Expertise," in Sven Beckert and Christine Desan, eds., *American Capitalism: New Histories* (Columbia University Press, 2018); Caitlin Rosenthal, *Accounting for Slavery: Masters and Management* (Harvard University Press, 2019), 295; John Lauritz Larson, "Engaging Historiography. The Genie and the Troll: Capitalism in the Early American Republic," *Journal of the Early Republic* 42, no. 4 (2022): 616.

9. Daniel Immerwahr, "All That Is Solid Bursts into Flame: Capitalism and Fire in the Nineteenth-Century United States," *Past & Present* 265, no. 1 (November 2024): 125.

10. The expression "seaworthiness of the American shipping" is from: *The Underwriter. A Monthly Journal Devoted to the Subject of Insurance* (Geo. Cohen, Manager and Editor, 1879), 150. Bibliography on insurance is very abundant. See notably: Peter L. Bernstein, *Against the Gods: The Remarkable Story of Risk* (Hoboken: Wiley, 2012), 615; Levy, *Freaks of fortune*; Viviana A. Rotman Zelizer, *Morals and Markets: the Development of Life Insurance in the United States* (Columbia University Press, 2017); Ralph, "Value of Life;" Immerwahr, "All That Is Solid Bursts into Flame." For the Great Lakes, see also: Karamanski, *Schooner Passage*, 199–208; Benjamin Ioset, "Before a Failing Breeze: Sailing Labor in the Final Years of Sail on the Great Lakes," *The Northern Mariner / Le marin du nord*, 32, no. 2 (2022): 175–200.

11. U.S. Lake Survey, Letters Sent and Received 1839-1882, Record Group 77.5.1, National Archives and Records Administration, Chicago (Illinois).

12. Ioset, "Before a Failing Breeze"; Arthur M. Woodford, *Charting the Inland Seas: A History of the U.S. Lake Survey* (Wayne State University Press, 1994).

and insurance companies would ask the engineers for these charts. Some of them would even be hired by the engineers to help them distribute those, in a mixed public-private combination, that I suggest to call a "space of favors."[13] Secondly, identifying why and how these actors used the charts from the Lake Survey can help us stress the importance of these navigational tools in the capitalist transformation. It helps emphasize, in particular, how these charts were essential to risk and profit management. Overall, chart distribution highlights the social and cultural process through which state and capitalism fertilized each other across the Great Lakes. In other words, how, on the one hand, it extended the scope of the federal engineers onto the mariners' world; and, on the other, how it improved some merchants' financial management and profit.

2 Governmental Charts at the Heart of Lake trade

Unlike infrastructure projects, for which they are well known, the role of the army engineers in distributing huge quantities of printed documents to the business sector has been overlooked. Over the course of thirty years, between 3,000 and 7,000 nautical charts were handed out yearly in the Great Lakes, where the number of vessels and sailors was growing rapidly (fig. 1).

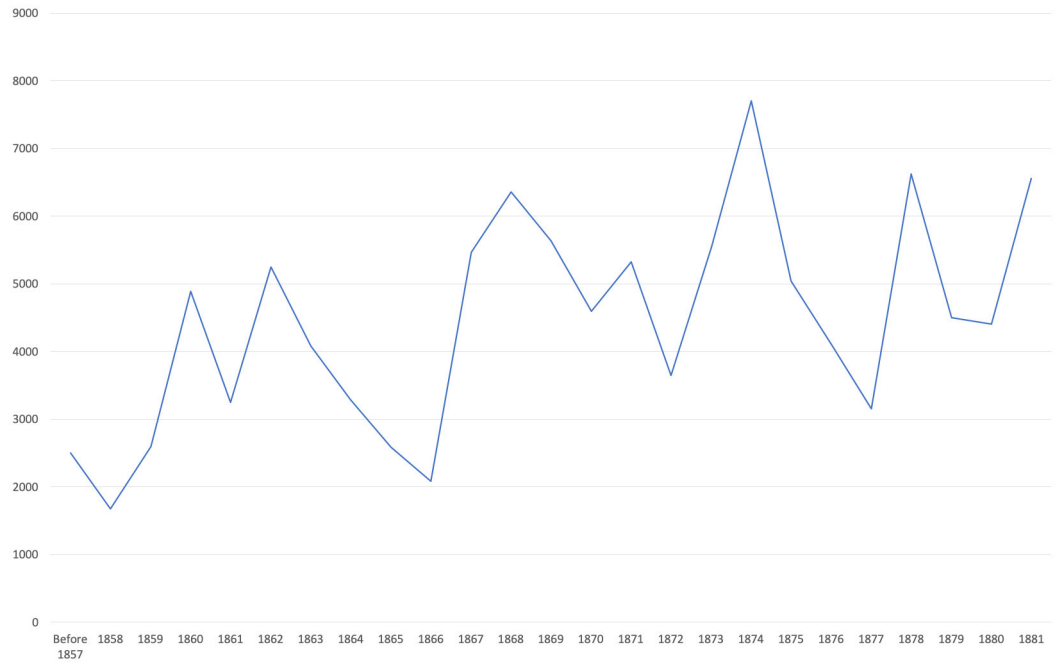

Figure 1. Number of charts distributed (in thousands), 1852-1882. Source: Cyrus Ballou Comstock, Report Upon the Primary Triangulation of The United States Lake Survey. By Lieut.-Col. C.B. Comstock, Corps of engineers... aided by the assistants on the survey., Washington D.C., Gov't print. off., 1882, p. 47.

Between 1845 and 1865, the number increased from around 1,000 ships and 10,000 sailors, to around 2,500 ships and 21,000 sailors.[14] In this context, the very irregular number of charts issued

13. On recent trends in the history of the U.S. government in the 19th century, see, for instance: Richard R. John, "Governmental Institutions as Agents of Change: Rethinking American Political Development in the Early Republic, 1787–1835," *Studies in American Political Development*, 11, no. 2 (1997): 347–380; Gautham Rao, *National Duties: Custom Houses and the Making of the American State* (The University of Chicago Press, 2016); Ariel Ron and Gautham Rao, "Introduction: Taking Stock of the State in Nineteenth-Century America," *Journal of the Early Republic* 38, no. 1 (2018): 61–66; Nicolas Barreyre and Claire Lemercier, "The Unexceptional State: Rethinking the State in the Nineteenth Century (France, United States)," *The American Historical Review* 126, no. 2 (2021): 481–503.

14. For these orders of magnitude, see for instance: United States Army Corps of Topographical Engineers, *Commerce of the*

over the period can be explained by the growing number of places surveyed and charted by the Lake Survey engineers and their assistants, and by events such as the U.S. Civil War (1861-1865). Yet, the precise method through which the Lake Survey charts would be distributed to the shipping sector remained uncertain for a long time. The first charts being published in 1848, three years later, Colonel John Abert, chief of the Corps of Topographical Engineers based in Washington D.C., suggested that the charts would be distributed gratuitously.[15] Validated by Congress, this free distribution method started in 1852. The Lake Survey charts were to be "distributed systematically to all mariners," and free of charge, whether they were U.S. or British citizens.[16]

This distribution policy would soon link the U.S. army engineers to the social order capitalism was remaking along the U.S.-Canada liquid border. Army engineers and members of the shipping economy would connect for charts on various occasions. First of all, the Lake Survey vessels were anchored in busy Detroit's docks. But the engineers and their surveying parties would sometimes be transported by Detroit navigators, such as Eber Ward, who was the first one to build a "steamship empire" in the Great Lakes.[17] Some of his ships were sometimes used by the engineers to check the depth of a channel they were surveying, for instance. Furthermore, as the engineers sent charts and reports to the *Detroit Free Press*, this newspaper would frequently inform its readers about the Lake Survey progress, and the publication of fresh new charts. But most encounters were informal, and navigators interested in charts would come and take them to the Lake Survey office in Detroit. Yet, some of them would send the Lake Survey information about uncharted reefs or obstacles in the lakes.[18] So, chart distribution was the occasion of frequent interactions between engineers and sailors, whether on the ground or through written correspondence.

But, since the 1840s, army engineers also interacted with some of these mariners' bosses. These were people such as major Buffalo merchants: James L. Barton, George Tifft and Dean Richmond, men who were planning business at a regional scale. Besides grain shipping on the Lakes, they were connected to banking, insurance and railroads activities.[19] Historically, marine trade, banks and insurances had been the trident of capitalism since the Mediterranean in the Middle Ages.[20] Three centuries later, these interests would unite in the Great Lakes' emerging Boards of Trade, in Detroit, Chicago or Quebec (Canada). They were built to organize regional commerce, provide lists of vessels, various business statistics, and help local companies to integrate the market. These Boards of Trade would occasionally inform their members about the Lake Survey progress and new charts published.[21] Army engineers sometimes asked these new Great Lakes capitalists for commercial statistics so as to

Lakes and Western Rivers: Letter from the Secretary of War (1848) 31; Edward S. Warner and Colleen Oihus Warner, "Lives and Times in the Great Lakes Commercial Trade under Sail," *Hayes Historical Review* 11, no. 1 (Fall 1991); Walter Lewis, "Transition from Sail to Steam on the Great Lakes in the Nineteenth Century," *The Northern Mariner / Le marin du nord* 25, no. 4 (2015): 345–374.

15. United States War Department, *Report of the Secretary of War, which Accompanied the Annual Message of the President of the United States, to Both Houses of the ... Congress* (The Department, 1850), 386; United States Congress et al., *The Congressional Globe* (Blair & Rives, 1854), 2352.

16. Cyrus Ballou Comstock, *Report Upon The Primary Triangulation of The United States Lake Survey. By Lieut.-Col. C.B. Comstock, Corps of engineers ... aided by the assistants on the survey* (Government Printing Office, 1882).

17. Michael W. Nagle, *The Forgotten Iron King of the Great Lakes: Eber Brock Ward, 1811–1875* (Wayne State University Press, 2024), 67.

18. On the *Detroit Free Press*, see for instance the article from June 25, 1859. On such information sent to the Lake Survey, see the case of captain George H. Clarke on lake Michigan in 1861, in J.B. Mansfield, *History of the Great Lakes*, vol. II (J.H. Beers & Company, 1899), 108–111.

19. James L. Barton is mentioned by army officer W.G. Williams as his economic informant in Buffalo, in a letter from January 3rd, 1842, to colonel John J. Abert. For its part, Dean Richmond applied for charts, appearing in a letter of October 10th, 1860, from army captain George Meade to E. P. Dorr. Both letters are, respectively, in U.S. Lake Survey Letters Sent, Block 1, box 1, and Block 4, box 2, NARA, RG 77.5.1. At the time when G. Meade was head of the Lake Survey, the Tifft Company of Buffalo, owned by transportation magnate George W. Tifft, wanted a survey to develop the channel between Lake Michigan and Lake Betsie, which would lead to the development of the port of Frankfort. Meade asked engineer Orlando Poe to conduct the survey in a letter dated 1859. Meade asked him to come to the area and start work as soon as possible: http://www.michiganinletters.org/2010/05/orlando-poe-and-united-states-lake.html.

20. Peter L. Bernstein, *Against the Gods: The Remarkable Story of Risk* (Wiley, 2012), 92–95.

21. See for instance: Buffalo Board of Trade, *Annual Statement of the Trade and Commerce of Buffalo* (1870), 14.

identify localities to improve. But the latter, as their letters to the Lake Survey show, were deeply interested in the charts as they wanted to equip their massive fleet on the Lakes in the 1850s with up-to-date navigational tools. However, all business actors who applied for charts had to comply with the distribution policy at the Lake Survey office in Detroit, by showing a duly completed custom-house certificate. Voted by the federal congress in 1796, the existence of this document certified a mariner's identity and citizenship.[22] By demanding this certificate, the army engineers made sure that a candidate for charts conformed to U.S. laws. When that was the case, the navigators were sometimes given the said charts by the customs officers themselves.[23] As a consequence, since the start of the process in the early 1850s, the distribution policy put the charts at the heart of the lake trade. Yet, engineers were also trying to gain better control over their chart distribution. This is when new players, underwriters, came into play.

3 When a Private Underwriter Handled Government Charts

At the end of the 1850s, army engineers were still relying on some customs officers for the certificates, but not for chart distribution anymore. Indeed, Captain George Meade, in charge of the Lake Survey from 1857 to 1861, explained: "it being found impracticable to obtain regular returns of the issues made, or to ascertain who received the charts, or what became of them, the practice was abandoned."[24] Thereby, chart deliverance was limited for some time to the Lake Survey office in Detroit. But a sole venue quickly happened to be too limited to satisfy the growing appetite for nautical charts. Thus, Meade explained that

> the great demand for the charts, and the fact that many vessels do not come to Detroit, and others do not remain there long enough to go up the office and draw charts, renders it reasonable that there should be other points for distribution besides the office of the Survey. In this view, authority was obtained from the Bureau to establish a sub-office for distribution at Buffalo, N.Y., where Capt. E. P. Dorr, well known for his long connection with the commerce and navigation of the lakes, has kindly consented to take charge of the charts, and distribute them under the rules of the Survey, making monthly returns to the office at Detroit, where the returns will be embodied in those made from the office to the Bureau.[25]

Tracing the history of the convergence of views between engineers and underwriters is fundamental to understand Meade's decision to hire Ebenezer P. Dorr. Born in 1817 in Vermont, E.P. Dorr was a mariner on the Atlantic coast, before moving to the Great Lakes. In the 1840s, he became a well-known captain during this period of flourishing trade. But this phase coincided with the growth of the insurance sector in the region, linked with the rise of commerce and urbanization. The 1840s were thus marked by the opening of several companies: the Mutual, the Farmer's Mutual, the Merchant's Mutual, all encouraged by an influent local businessman: Lewis F. Allen.[26] E.P. Dorr connected with Lewis, and then became maritime inspector for the Buffalo Mutual Insurance Company in 1855. This was before he was recruited as agent for the Aetna, a private company which had an office on the Buffalo waterfront. But the Aetna's headquarters were located in Hartford, Connecticut, which was nicknamed "insurance capital of the world," because this city would host a great number of U.S. insurance companies in the aftermath of New York's Great Fire in 1835.[27] From the Aetna office in Buffalo,

22. Nathan Perl-Rosenthal, *Citizen Sailors: Becoming American in the Age of Revolution* (Harvard University Press, 2015), 222.

23. George Gordon Meade and United States, *Report of The Survey of The North and Northwest Lakes* (Daily Free Press Steam Printing House, 1859), 10.

24. Meade and United States, *Report of The Survey of The North and Northwest Lakes*, 10.

25. Meade and United States, *Report of The Survey of The North and Northwest Lakes*, 11.

26. Henry Perry Smith, *History of the City of Buffalo and Erie County: With ... Biographical Sketches of Some of Its Prominent Men and Pioneers* (D. Mason & Company, 1884), 269–275.

27. Louis P. Masur, "Opinion, Hartford's Glory Day," *The New York Times*, October 14, 2007.

Dorr started his ascent, joining the New York Board of Underwriters for all the "Northwest" (the Great Lakes region from a U.S. Atlantic seaboard point of view). This institution brought together at least twenty-five of the biggest insurance companies of the lake region, which gives an idea of the growth of this type of business in the lake region at the time.[28] With this new responsibility, Dorr reached a nodal position in the Great Lakes' thriving economy.

Notably, Dorr was directly participating in strengthening the hold of the insurance sector over a region where ships became essential "profit-making" enterprises.[29] Schooners in particular, were built in several ports across the Great Lakes, and used to carry lucrative cargo, like grain. But, a lot of these boats were built too lightly to carry increasingly heavy cargoes, and, therefore, often sank or ran aground. In order to stay insured at a low fee, and profitable for masters and for insurers, they had to remain up and running for the longest time. This is why, in the absence of federal regulations on this matter at the time, insurance companies were establishing numerous regulations.[30] For instance, Dorr was part of the Board of Marine Inspectors of The Association of Lake Underwriters. In August 1856 in Buffalo, its executive committee established several rules to reform shipbuilding. This meant frames, sister keelsons, bilge strakes, transom, breast hooks, arches, clamps, ceiling, outside plank, butt bolts, mast steps, etc., respective to the tonnage of the boats.[31] To verify their implementation, ships were yearly examined, at least in the major lake ports. On this basis, insurance inspectors gave them ratings (from A to C). Boats with the lowest grades were not insured, a means for insurance companies to protect their capital.[32] But besides these rules, underwriters also decided the length of the navigation season. In the late 19th century, historian J.B. Mansfield claimed that "the general navigation of the lakes [opened] with the opening of the straits of Mackinac. These straits [opened] on the average around the 20th day of April. The close of navigation [was] largely influenced by the practices of insurance companies."[33] Furthermore, E.P. Dorr was one of the many underwriters who pushed for a cross-border integration of the insurance system, especially to create devices that facilitated the removal of shipwrecks, and obtained for that some concessions from British authorities in Canada.[34] This boat control was, thus, multifaceted, and enabled insurance companies to optimize navigation security and profit across the region.

From there, it only took a few years for E.P. Dorr's views and those of the army engineers regarding risk management to converge. The two parties already produced, separately, reports about shipwrecks in the lakes that involved loss of cargo and lives. Dorr's name thus appeared in a report next to Lake Survey Captain Macomb's. It was in a section of a 1856 report, relating to the deployment of a buoy used to mark reefs near an island in western Lake Erie.[35] The following year, Dorr was asked by Captain Amiel W. Whipple, of the Army Corps of Engineers, to forward a construction project to some Buffalo leaders who could be interested in the building of a canal in the St. Clair Flats (a marshy delta located between lakes Erie and Huron).[36] These two occurrences testify to the growing relationship between E. P. Dorr and the Lake Survey engineers. The Buffalo underwriter increasingly became a key person for the engineers, as they used him as a relay for their projects in the lake community. But this convergence of interests materialized even more clearly during a joint mobilization in the U.S. Congress in 1858. It concerned a request for an increase in the Lake Survey appropriations. In this view, George Meade sent a letter to Dorr at the end of January 1858, asking the insurer to go

28. Letter from Meade to Abert, November 23, 1859, U.S. Lake Survey, Letters Received, block 4, box 2, NARA, RG 77.5.1.

29. Ioset, "Before a Failing Breeze," 178.

30. Karamanski, *Schooner Passage*; Ioset, "Before a Failing Breeze," 178.

31. *The United States Insurance Almanac and Statistical Register for the Year* (G.E. Currie, 1856), 338–344.

32. Karamanski, *Schooner Passage*, 202–208.

33. John Brandt Mansfield, *History of the Great Lakes* (J.H. Beers & Co., 1899), 508. This is confirmed in Erik D. Craft, "The Value of Weather Information Services for Nineteenth-Century Great Lakes Shipping," *The American Economic Review* 88, no. 5 (1998): 1059, 1073.

34. See Dorr's necrology in *The Insurance Times* (English & Wilmshurst, 1881), 207.

35. *Report of the Secretary of the Treasury on the State of the Finances for the Fiscal Year Ended June 30, 1855 and 1856* (1856), 391.

36. United States War Department, *Annual Reports of the War Department* (U.S. Government Printing Office, 1857), 364.

with him to Washington D.C., to plead the cause of the Lake Survey.[37] A friendship started upon this cooperation between the military and the insurer, which also resulted in significant financial gains for the Lake Survey.[38] This series of converging interests regarding the hazards of navigation and risk management, as well as Dorr's network in the business world, informed the cultural and social construction of capitalism in the area.

But it also clarifies the army engineers' choice to hire the Buffalo insurer to help the government with the chart distribution. After field surveys in various Great Lakes localities, engineers would send their mapping data to Washington D.C. There, the charts were engraved and printed in the requested number of copies. From that point, the same number of copies was sent in boxes to the Lake Survey office in Detroit and to E. P. Dorr's office in Buffalo.[39] At each office, a distributing employee had to complete a register containing the number of charts delivered each month and calculate the number of charts remaining in the office. So, at the end of each month, Dorr had to send his report likewise.[40] As a consequence, he was increasingly associated with the federal government—and some would later remember him in Buffalo as the man "who handled the government charts."[41] But, filling distribution registers, he suddenly had access to the thousands of masters that applied for charts. He might have used this as a resource to chase more customers for his insurance company. From his Aetna office on the Buffalo waterfront, Dorr also brought to the army engineers his networks, his knowledge of lake commerce. He even contributed, while delivering Lake Survey charts, to the administrative growth of the federal government in the borderland. Indeed, it is possible that Dorr was hired as a side distributor because the engineers needed up-to-date distribution registers. Dorr could certainly satisfy this request with his clerk in his Buffalo office, Mr. King, and thus respect the centrality of the registers in the distribution process. The administrative "know-how" of private companies would then tally that of the Lake Survey. All these reasons lead us to believe that the two agencies, Aetna and the Army Corps of engineers, fertilized each other through the relationships between their respective clerks and the registers they filled out and exchanged.

4 Essential Charts for Insurers' Profits

However, the responsibility taken up by E. P. Dorr was quickly negotiated. The Buffalo insurer didn't simply hand out charts without asking for anything in return. He agreed to help the army engineers to connect to more mariners. But he took, at the same time, the opportunity to communicate charts to insurance companies. Indeed, the Lake Survey correspondence is filled with applications for nautical charts from such firms, whether they were from the United States or Canada. Initially, Meade was not opposed to this kind of use. But he explained to Dorr that he was not authorized, according to regulation at the time, to issue charts to such companies, and therefore refused several of their demands. Since he did not have full autonomy in this matter, Meade asked his chief, Colonel John Abert, permission to distribute charts to companies that took part to the Board of Lake Underwriters. Abert seemed to approve. Meade thus allowed Dorr to deliver charts to aforesaid companies, but only to those whose names were transmitted.[42] Accordingly, the Buffalo insurer sent Meade the list including the names of these companies, while respecting the distribution protocol. This confirms the

37. Letter from Meade to Dorr, January 28, 1858, U.S. Lake Survey, Letters Sent, block 3, box 1, NARA, RG 77.5.1.

38. Starting from 1858, the annual budget of the agency went from $50,000 to $75,000 and didn't stop increasing until the end of the Civil War in 1865: Comstock, *Report Upon The Primary Triangulation of The US Lake Survey*, 43.

39. Letter from March 27, 1862, U.S. Lake Survey, Letters Received, block 8, box 1/3, NARA, RG 77.5.1.

40. On these several stages of chart-making: Comstock, *Report Upon The Primary Triangulation of The US Lake Survey*, 25. On the distribution at the sub-office at Buffalo: U.S. President, *Message of the President of the United States Communicated to the Two Houses of Congress*, 710, and the letter from August 29, 1859 in which G. Meade explains to E.P. Dorr all that he has to do for distribution: U.S. Lake Survey, Letters Sent, block 4, box 2, NARA, RG 77.5.1.

41. Mansfield, *History of the Great Lakes*, 111.

42. Letters from Meade to Dorr and Abert of November, 8, 17, and 23, 1859, U.S. Lake Survey, Letters Sent, block 4, box 2, NARA, RG 77.5.1.

exchange of favors between Dorr and the army engineers, buttressing a lasting cooperation between the private and the public sector, regarding the use and distribution of charts.

As a consequence, with Dorr as an insurance magnet, applications for charts from individual insurers flocked the distributing offices in Detroit and Buffalo. This was the case of Alfred Edwards, of the Pacific Mutual Insurance, located in Broadway (New York), of G. Anderson from Sandusky (Ohio), of a certain M. Walker, insurer, or of the Security Fire Insurance Company of New York, located in Buffalo.[43] Thus, nautical charts of the Lake Survey circulated in a second circle, firmly connected to that of the navigators, because insurers protected the lake trade. While in his office with his friend John C. Estes, a well-known ship owner and master of the brick E. S. J. Bemis, G. Anderson, a Sandusky insurer, wrote a letter to Dorr asking him for charts for his office, also mentioning that J. Estes wanted some for his ship. Whereas Lake Survey charts usually ended up in vessels, they were also hung to walls. In a letter addressed to Meade, Dorr wrote: "the Buffalo Mutual has a set of charts framed, that he has seen in its office." Then, sometime later, he warned Meade that the U.S. Steamboat inspectors had asked him a set of charts to "hang in their office."[44] This was a time when insurance companies were trying to expand their business and clientele over the Great Lakes. In an advertisement for the Aetna in the *Buffalo Courier Express* in 1859, E. P. Dorr himself wrote: «having assumed the agency of the above well-known company, would respectfully ask from its patrons their attention to the above statement of its finances and prosperity, and would solicit from the citizens of Buffalo and those interested in Lake commerce, a continuation of their confidence and patronage».[45] In total, the exact number of insurance companies that asked for Lake Survey charts is difficult to establish, but, from the Lake Survey correspondence, it amounts at least to several dozen, maybe a hundred, from both sides of the border.[46]

Numerous insurers hung Lake Survey charts on their offices' walls, but it wasn't exactly for decoration. Such documents were essential work tools for their profit, as the above-mentioned letter, sent to the Lake Survey by G. Anderson and his friend J. Estes, respectively insurer and ship master, might suggest. Insurers were indeed involved in the business of protecting people and businesses against Great Lakes navigational hazards. This means the probability that a dangerous event occurred: strong gales, reefs, etc. In order to make profit, insurance companies, whose growth was linked to the region's booming trade, needed to identify and forecast hazards that threatened vessels, and on this basis, to propose a rate, or a fee. In exchange for that, they committed to take the captain's risk upon themselves. This is why, according to historian Jonathan Levy, the risk was not so much the threat that a hazard would pose to human and material stakes, but more precisely the hazard's financial dimension. In other words, in order to help navigators deal with marine uncertainties, insurance companies sold risk, which means that they covered the financial consequences caused by an unforeseen event.[47]

This is why charts more and more emerged as essential financial tools for insurance companies. In order not to deplete the companies' capital, the damages caused by the aforesaid hazards needed to be financially manageable. As a consequence, all the strategy consisted, for an insurance company, in accumulating customers and their fees on one side, and in avoiding as much as possible to pay for coverage in case of shipwrecks on the other. Therefore, to succeed, underwriters spent much of their time calculating statistics related to the number of hazards of the same type, at the same time and place, that would involve similar financial coverage from their company. On that basis, they tended to gather their risk coverage on certain spots they knew better, and to avoid the ones considered too risky, whose coverage would threaten the company's capital.[48] In this systematic work of hazards prediction,

43. Letters from E. P. Dorr to G. Meade, May 30, 1860 (block *5*, box 3), February 18, 1861, and May 21, 1861 (both letters are in block 6, box 2/3), U.S. Lake Survey, Letters Received, NARA, RG 77.5.1.

44. Letters from February 18, 1861 (block 6, box 2/3), November 29, 1859 and April 17, 1860 (all two in block 5, box 3). U.S. Lake Survey, Letters Received, NARA, RG 77.5.1.

45. "Fire, Lake Marine, Canal and River Insurance," *Buffalo Courier Express*, September 26, 1859.

46. Letter from Dorr to Meade, May 5, 1860. Dorr just received an application for a set of charts from a Canadian captain of the Alice Grover. Dorr also informs Meade that he frequently receives applications from Canada and asks him if he can give them charts, U.S. Lake Survey, Letters Received, block 5 (1859-1860), box 3.

47. Levy, *Freaks of fortune*, 3–10.

48. On these insurances strategies, see: Winter William D., *Marine Insurance Its Principles and Practice* (McGraw Hill Book Com-

nautical charts were essential instruments. In the mid-19th century Great Lakes, they helped insurers to better locate dangerous spots. Thus, they could extend their financial strategy to more spaces in the Great Lakes, as new locations were surveyed by the U.S. Army engineers over time.

Besides this preventive work, charts helped insurers to locate where insured property sunk or ran aground in the lakes. This was essential, in order to determine who had to pay in case of a shipwreck. Depending on the location of the event, coverage was not the same and could be null if the accident was not on a route the vessel was insured for. In this case, a nautical chart did not help to locate the shipwreck but to check if the pilot had not deviated from the route for which the vessel was insured. This was the legal principle of "deviation." A ship was indeed insured for a precise type of cargo and route the insurer and the ship owner agreed upon. If it went off the said direction, it was not financially covered anymore by the insurance company.[49] Captain Meade referred to this point in a letter written to his friend E. P. Dorr, when he recognized that the nautical chart might be of great use for the insurance companies, "in their litigations about wrecked property." And months later, when he asked John Abert's permission to give charts to twenty-five insurance companies that were part of the Board of Lake Underwriters, he hoped to convince him by underlining the fact that they would be useful for "settling losses."[50]

Thus, charts were not only necessary to insurers to predict the most frequent hazards, but also to control sailing directions of insured vessels. Therefore, nautical charts supported capitalism as a socio-cultural system exploiting both the labor of sailors, and a lake environment that was cartographically represented as more orderly and predictable than before. In this sense, exploiting nautical charts as an insurer amounted to commodifying nature and its hazards, in order to sell risk. As a result, chart distribution highlights the convergence between cartographic and insurance interests. From there, the Great Lakes can be envisioned as a laboratory for their encounter at the core of the North American continent. Just like the federal government had its Bureau of Printing and Engraving, insurance companies were enjoying the same technique to reproduce maps: lithography. This industrial device to print sheets began in the United States in 1846: first drawn on paper, charts and maps were then graved on stone plaques, before being printed in thousands of copies. As a consequence, when E.P. Dorr sent charts to companies in the state of New York, some of them had been making their own city-maps for about a decade. So, these companies were already marked by a cartographic culture. Aetna even had its own surveyors to map several northeast U.S. cities.[51] But if "nothing expressed insurers' quest for control better than their maps," what most insurance companies did lack was nautical charts of the Great Lakes.[52] Unlike the federal government, they did not have the technical and financial means to do maritime surveys. So, by obtaining those from the Lake Survey, they were finally able to complete their map coverage, thereby consolidating their business in the region.

5 Conclusion

The chart distribution policy that army engineers started in the 1850s sheds light on the cross-fertilization processes between U.S. government and capitalism during the age of sail. From the standpoint of the Lake Survey, handling a large enough distribution service to the benefit of mariners could not fully work without the system of favors created with E. P. Dorr. It allowed the army engineers to handle a federal mission far from Washington D.C., and without significant means. At the same time, the Lake Survey letters suggest that numerous insurance companies of the region could increase their profit using these charts. Government charts thus joined regulations and inspections as insurance tools to control ships, essential profit-making enterprises across the region. Thus, the

pany, 1919) 96; Bernstein, *Against the Gods*, 93.

49. *The Insurance Cyclopaedia* (1873), 284; Levy, *Freaks of fortune*, 34.

50. Letters from November 8 and 23, 1859, U.S. Lake Survey, Letters Sent, block 4, box 2, NARA, RG 77.5.1.

51. Walter W. Ristow, "United States Fire Insurance and Underwriters Maps, 1852-1968," *The Quarterly Journal of the Library of Congress* 25, no. 3 (1968): 197–201; Immerwahr, "All That Is Solid Bursts into Flame," 125.

52. Immerwahr, "All That Is Solid Bursts into Flame," 126.

Lake Survey, through the use of its charts, was involved in the capitalist transformation of the Great Lakes, a change embedded in the sail maritime culture of the period between 1850 and 1880. Yet this convergence occurred in a contingent manner and was built on social relations between army engineers and merchants. But over the same period, the Lake Survey also helped other economic ventures. They allowed local lumber and mining factories, and a number of other economic actors, to better locate resources and consolidate their businesses through charts. These local merchants sent meterological data to the army engineers. In exchange, the latter would mention their properties on Lake Survey charts, with precise sailing instructions to help ships reach their establishments often located on the lake shores. These examples invite us to keep on exploring the manifold roles played by federal maps in capitalist transformation in other North-American border regions, in the second half of the 19th century.