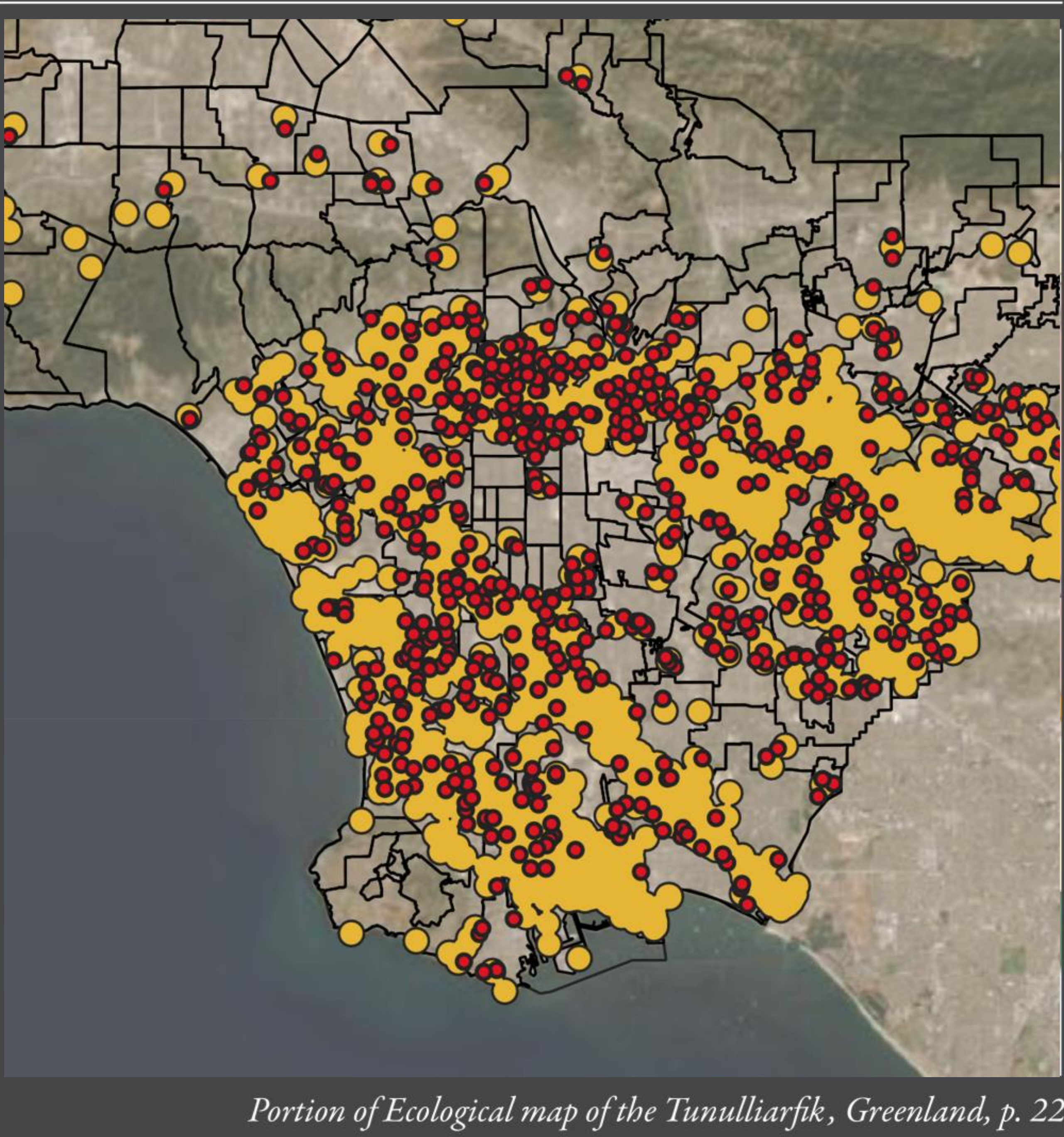
CALAFIA

THE JOURNAL OF THE CALIFORNIA MAP SOCIETY

SEPTEMBER 2023



Portion of Ecological map of the Tunulliarfik, Greenland, p. 22

ISSUE THEME

Environmental Maps

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President's Letter

Ronald S. Gibbs, MD

Dear Society Members and Friends,

In cartography, the term *terra incognita* has been applied to regions that have not been mapped or documented. From Latin, it means "unknown land," and its first use is attributed to Ptolemy nearly a thousand years ago. Much later, the term "Parts Unknown" appeared on English maps to depict these unknown lands[1]. One fine example is in Herman Moll's magnificent "Codfish map" of North America (c. 1709), (*Fig. 1*) where nearly the entire northwest quadrant of the present United States is labeled as "PARTS UNKNOWN."

Figure 1. Note the area labeled "PARTS UNKNOWN" in the northwest quadrant of the present-day United States. Detail from the map entitled, "This map of North America, according to ye newest and most exact observations is most humbly dedicated by your Lordship's most humble servant Herman Moll, geographer," known as the Codfish map. Image source: Library of Congress https://www.loc.gov/item/gm71005445/

Several years ago, I wondered why and when these unknown parts became known. My hypothesis was that discovery, in whatever field, happens when there is the convergence of four elements—curiosity, technology, benefactors, and leadership[2]. For much of human existence, geographic discovery was initiated when the bold and curious asked: What is beyond the horizon? Yet, curiosity was never enough, and it had to be augmented by technology. For correct cartographic discovery, that meant devices for accurately determining longitude and latitude and sailing vessels to withstand years-long voyages. And even that was not sufficient for extensive resources had to be marshaled. In the 18th Century, for example, the benefactor was most likely a royal treasury. Today's sources for discovery include national governments, foundations, and industry. Finally, discovery requires leadership, an individual or a group to take on tough problems, to show determination and persistence, and to make correct decisions.

Think about discoveries in your own area of cartographic interest—or in your professional or business world. Put my hypothesis to the test. Have these four elements been critical in your fields? The term *terra incognita* now has a meaning much broader than the original geographical application. Today, *terra incognita* is applied to an unknown in any field or endeavor. I'd be very interested in hearing your thoughts. If you'd like, email me: ronaldsgibbs@gmail.com

Once more, I express my gratitude to the members, officers, and presenters for their great contributions to the Society's programs and operations. We are experiencing a graying of our leadership and will soon need new members to lead the Society. These positions offer wide gratification and meaningful relationships. I hope some readers will get in touch with me.

Best wishes,
Ronald S. Gibbs, MD

Endnotes

[1] "Terra incognita," Wikipedia, accessed July 9, 2023.

[2] Gibbs, Ronald S. Presidential Address: The Art of Discovery. Amer J Obstet Gynecol (2006) 194:1078-87.

Our next regional meeting is our 94th! Email notices will arrive later this year!

Editor's Note

We are most pleased to bring our readers a fascinating variety of articles in this Fall 2023 edition of our *Calafia*. The theme for this issue focuses on mapping the environment. Brian Fredrickson takes us on a trip to northern Montana to explore water resource management, and Joseph Kolko maps biohazards potentially affecting students at schools in the Los Angeles area, a subject that is sure to be of great interest! I have personally been fascinated by the wind cherubs decorating maps and have explored their history and function, and Chad Witko of the Audubon Society tracks the passage of birds around the world with the changes in weather over the course of the seasons.

Our articles span the globe, and include a variety of other areas of cartography as well. Heiko Muhr shares maps of

Ukraine's Borderlands, sure to be of great interest at this moment of border disputes and concerns between Ukraine and Russia. Bill Eaton takes us on a journey over roads built by Romans during the time of their presence in Britain, while Brian Buma invites us to explore Practical Mapsmaps used for special projects by planners and workers in a variety of fields. Leonard Rothman introduces us to a very special map—one with a very unusual projection, and which includes polar bears in Antarctica, a place where they have never been! Much closer to home, JoAnn Semones introduces us to Pigeon Point Lighthouse, a special marker for navigators, noted on early maps during the period of exploration of the west coast.

We also include four interesting Part II's of special articles from our Spring edition: Paul Hughes's history of the Cape Cod Meridian, Luis Macias' consideration of size and proportion, Ken Habeeb's exploration of the search for Timbuktu and the Niger River, and David Smollar's discussion of Road Map Censorship during the Second World War.

This edition's Meet Our Member features our wonderful and very dedicated publisher, Fred DeJarlais. It has been both an honor and a pleasure to work with him on our journal, and I'm delighted to share a bit of his life and experiences with our readers. I had asked Wesley Brown to write our My Favorite Map article. He did—but objects to the "My Favorite" title—he says he has many favorites, and so titles his article "A Favorite Map"! Our book reviewer for this issue, Cherie Northon, takes us on an adventure through *A California Atlas*, giving us a taste of a very unusual presentation of California, which we may each want to explore personally.

Courtney Spikes' Apps for Maps is truly cutting edge, as she explores the brand new world of Artificial Intelligence to see how this new technology can affect both the creation of maps and their practical use. Fred DeJarlais challenges us, as always, with his Carto-Quiz. Jon Jablonski presents the Society's sponsorship of the first student map curation project, held at the David Rumsey Map Center, which was won by Arjun Maheshwari, and is on exhibit at the Center. Emily Yang invites us to the wonderful presentations given during the spring BAM meeting. We share details of upcoming meetings as well.

As always, we warmly welcome articles on any map-related subject by our members and readers, and by all interested cartographic enthusiasts. One of our treasured values is the presentation of a wide variety of map-related subjects, from the earliest to the most current, from maps of neighborhoods to maps of the universe, from hand-written trail maps to AI creations. Our Spring 2024 issue's theme will include 3-4 articles on the subject of maps on stamps as well. Please consider sharing your own special interests and insights into maps with us!

Juliet Rothman
Editor

CMS EDUCATION FUND

The California Map Society Education Fund was established in 2014 by the Society to sponsor programming at the David Rumsey Map Center at Stanford University. As part of our second 5-year funding drive, the Fund will sponsor a guest curatorial program at the Rumsey Center. The first exhibition, "Segmented Cities: Tracking Inter-Group Conflict and Co-Existence," was presented during the summer and fall of 2023. Stanford third-year undergraduate Arjun Maheshwari was the winning student curator.

We are two-thirds towards our fundraising goal for this new five-year term. Several major donors have contributed. We encourage other Society members to extend their generosity and help us to continue this worthy program. We hope that members who have yet to contribute to the Fund will make a financial commitment to the program.

Sponsors of the Education Fund include:

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The Society is grateful for our contributor's support of this important program. Please consider adding your name to this very special list by making a donation to the Fund!

POLAR BEARS ON ANTARCTICA?

MACDONALD GILL's "HIGHWAYS OF EMPIRE" MAP

LEONARD A. ROTHMAN, M.D.

Leslie MacDonald Gill (1884- 1947), commonly known as MacDonald Gill, has been described as one of the foremost graphic artists of the 20th century[1], and the most original British mapmaker of the 20th century.[2] Yet, his unique pictorial poster maps were not always accepted as serious cartography. Rather, they were recognized primarily as political, economic, and historical messages, overshadowing their cartographic significance according to accepted standards of the early 20th century. Maps are generally considered scientifically significant if they show new discoveries, production techniques, or geographic designs. They are also functionally significant when they show elevations and depressions, boundaries, air, water, and land routes, human habitats, and many other areas and information of interest. Gills' maps also included these qualities in a varied, colorful pictorial manner that was very popular in the general community. Today, like the graphic novel, pictorial maps have become universally popular, reminding us that a reappraisal of his work is warranted.

MacDonald was born October 4, 1884, the fourth of 13 siblings, in Brighton, England. He was raised in a religious Victorian family, and was known to have a sense of humor and be artistically gifted, even as a child.[3] He moved to London in 1904 after training as an architect, and began his career as an architect, creating architectural drawings in pen and ink, communion cards, certificates of honor, and color paintings of buildings, then moving on to mural painting, calligraphy, lettering of military tombstones, interior design, teaching, and pictorial map making. He also made wind dial maps and clock maps, and, by 1914, he had created his famous pictorial "Wonderground" map for the London Electric Underground Railway.[4] This map, and a series of London posters by Macdonald, were hung in every station, attracting the interest of families traveling the railways for pleasure.[5]

In 1926, Britain was suffering financially from the expense of the Great War (WWI) and established a goal of stimulating free trade and self-sufficiency within the 40 million members of the Commonwealth without creating protectionist tariffs. The Empire Marketing Board (EMB) was established for this purpose, and initiated a massive poster propaganda campaign, costing one million British pounds for the first year. Gill was selected as the chief artist, and his "Highways of Empire" map (*Fig, 1*) was the first of eight pictorial poster maps of the EMB's 7-year history. Over 1800 post-

Figure 1. *Highways Of Empire: Old British Empire World Map*, 1933, by MacDonald Gill. Permission for copying & publication of images and inserts granted by: "The Unique Maps Company" www.uniquemaps.com

er sites were chosen in the United Kingdom, as well as many other sites throughout the Commonwealth.[6]

The "Highways of Empire" poster was to be rectangular, measuring horizontally 7m (20ft), and vertically 3.5m (10ft), and composed of 48 joined sheets. For printing efficiency, they were reduced in number photographically to 16 paper sheets, to be lithographed in color. On January 1, 1927, the poster was first displayed in London on Charing Cross Road, near Trafalgar Square, and was thought to be the largest billboard poster yet erected in Britain.[7] In the original poster, and its early copies, the British lands are pink, and the rest yellow, while the ocean is gray, and the polar lands are white.[8]

The world map within the poster is an oceanic hemispheric lunette. The sky has six round wind faces, starting with Zephyrus, opposite Chile, and then proceeding clockwise to Boreus, Corus, Aquillo, Eurus, and finally Auster, opposite Australia. The moon, stars, and a possible sketch of the big dipper, fill the rest of the night sky on one side, and Gill's signature radiating sun appears on the other side. The projection of the land masses appears to have been inspired by a 1903 map created by Stephen Smith, and published in the "*The Geographical Teacher*."[9] The lands are drawn as if the spherical Earth has been unfolded and laid flat in order to retain the individual distances and positions of the Commonwealth states and dominions from one another. The unfolding procedure has resulted in North America and Russia appearing turned 90 degrees on their sides, with the Arctic below Alaska. South America and Africa are rotated 45 degrees and 20 degrees, respectively, and appear to the west, while India, the Indies, Australia, and New Zealand are placed 20 degrees to the East. The map indicates both air routes, with one airplane over western Canada, and multiple ships in the sea lanes. The currents are evident in both the southern Pacific and Atlantic oceans. In this copy, the lands of the British Empire are red, while the rest of the lands are tan, and the polar regions are snow-white.

The southern part of the map shows Antarctica twice, one in each corner. Antarctica at 9 o'clock (*Fig. 2*) has a colony of penguins on land, and an iceberg with penguins and sea

Figure 2. In Anarctica, penquins, polar bears and sea lions.

Figure 3. Two polar bears on an iceberg, enlarged from Fig. 2.

lions. Surprisingly, another iceberg has two polar bears. (Fig. 3) There is also a sea monster and a fish between the ice floes. Antarctica at 3 o'clock (*Fig. 4 & Fig. 5, next page*) has two polar bears on land, penguins and a sea lion on an iceberg, and a sea monster and a fish between those ice floes. Caroline Walker, Gill's grandniece and the author of the book "MacDonald Gill, Charting a Life", considered the polar bears in Antarctica to be an error, first discovered at the proof stage, and then,

Figure 4. Polar bears on land, penguins and a sea lion on an iceberg, and a sea monster and a fish between those ice floes.

instead of being removed at that late stage of production, was then humorously described in the legend attached to the 3 o'clock larger polar bear's nose saying "Why are we here? We belong in the North Pole."[10] The personnel at The British Library were more deferential, simply describing the polar bears as appearing confused, and the entire scene as evidence of Gill's well-known sense of humor .[11] Whatever the reason, this is a unique scene in the history of decorative cartography.

Figure 5. Detail from Fig. 4.

MacDonald also created colored murals, ceiling panels, and various plaques in many British churches and other buildings. He produced community maps, country maps, individual Arctic and Antarctic polar maps, steamship routes, post office, telegraph, tea, and North Atlantic Ocean maps, as well as a poster of the Queen Mary ocean liner. His life history and range of production are extensively detailed in Caroline Walker's book. Gill's versatility made him a very popular artist, in high demand. His pictorial map style is a genre that continues to be very popular, and is emulated in city maps throughout the world, while his "Highways of Empire" poster is an unusual and stunning presentation of a world map.

Endnotes

[1] https://macdonaldgill.com/

[2] Walker, C. (2020) MacDonald Gill: Charting a Life. London: Unicorn Publishing Group Llp, p. 7

[3] Ibid, p. 13, 17-18

[4] Ibid, p. 48

[5] Ibid, p. 106-111

[6] Barron Maps, Highways of Empire Archives https://barronmaps.com/tag/highways-of-empire/

[7] Ibid

[8] Victoria and Albert Museum, London, https://collections.vam.ac.uk/item/O693249/highways-of-empire-poster-macdonald-gil/

[9] Smith, Stephen *A New Map of the British Empire*, The Geographical Teacher Vol. 2:3, October 1903, p. 121-122

[10] Walker, C. (2020) Macdonald Gill: Charting A Life. London: Unicorn Publishing Group Llp, p. 171-178

[11] The British Library, *The Life and Legacy of MacDonald Gill* https://www.bl.uk/maps/articles/the-life-and-legacy-of-macdonald-gill

Apps for Maps: Transforming Map Creation with AI

Courtney Spikes

The field of artificial intelligence is rapidly changing the world as we know it, and one area where its impact is particularly remarkable is map creation. Traditional methods of designing maps involve extensive manual labor, time-consuming data processing, and expert cartographic skills. However, with the advent of ChatGPT, an advanced language model developed by OpenAI (https://openai.com/chatgpt), map creation has taken a significant leap forward. Let's explore how artificial intelligence can be harnessed to streamline and enhance the process of map-making.

Creating a base map is the foundation of any cartographic endeavor. By training AI on existing map data, it can learn patterns and styles to initiate map design. These maps can then serve as starting points for further customization and refinement by human cartographers, reducing their workload and providing a head start to the map creation process.[1] Additionally, apps like ChatGPT can be prompted to write programming code that assimilates data, to later generate the map's visual representation.[2]

Speaking of data, one of the main challenges that mapmakers face is gathering accurate and up-to-date facts. ChatGPT can streamline this process with its rapid-fire processing capabilities, which can gather information from multiple sources at the same time. Extracting data from text-based platforms, official databases, satellite imagery, and even social media feeds, makes AI a particularly efficient tool for collecting and quickly analyzing large quantities of geospatial data.

The power of artificial intelligence for maps extends beyond individual use. It can also facilitate collaborative map creation by enabling real-time interaction between multiple users. This functionality allows teams of cartographers, urban planners, and researchers to work together seamlessly, sharing ideas, discussing modifications, and collectively building dynamic maps. AI acts as a virtual assistant, synthesizing inputs from different contributors, leading to more comprehensive and accurate map creation.

This ability to generate maps quickly, and at a low cost, has helped cities like Lusaka, the capital of Zambia, to better manage its infrastructure for services and urban development. (*Fig. 1, next page*) According to Lusaka's City Council, the capital city has tripled its population in the last twenty years.[3] However, the time and expense of creating an up-to-date map limited the government's ability to effectively respond to this rapid urbanization.[4] With AI, officials can now accurately

Figure 1. AI generated base map of Lusaka, Zambia.[4]

ascertain the transportation needs of their citizenry before spending funds on new public transport plans. For more detailed information on Lusaka's use of this technology, please view the YouTube video "Tackling Urbanization with detailed data in Lusaka, Zambia."[5]

For map lovers everywhere, cartography is not just the static representation of geographic features, it also conveys meaningful information. This contextualization of physical features, points of interest, artwork, and history enriches the user experience and enhances the map's functionality. As cartographers have done for centuries, artificial intelligence can now be leveraged to describe all the pertinent information depicted on a map. For example, labels for landmarks, explanations of important locations, and even insights about historical or cultural significance can be generated with this new technology and then easily customized by the cartographer.

One app for making maps with AI is Proxi, which defines itself as a "creator-centric mapping technology for the casual cartographer."[6] Proxi's integration with ChatGPT-4 offers the new MapsGPT app (https://www.mapsgpt.com/) where users can type in a few bits of information to have the app's AI beta feature make a map for any topic or place. (*Fig. 2*) For users who want to create their own map, Proxi offers

Figure 2. Screen shot of MapsGPT app.

several templates that cover a range of topics, from Local Eateries to Volunteering Opportunities or Group Travel Planning. *Figure 3* shows my first attempt to have their AI suggest map-related businesses and organizations in San Francisco, and then assign labels with AI assembled detailed information. The program offered multiple options for me to select what to include and the whole process took less than three minutes.

The capabilities of artificial intelligence map apps have opened up new frontiers in the field of map creation. The ability to generate base maps, automate data collection, contextual-

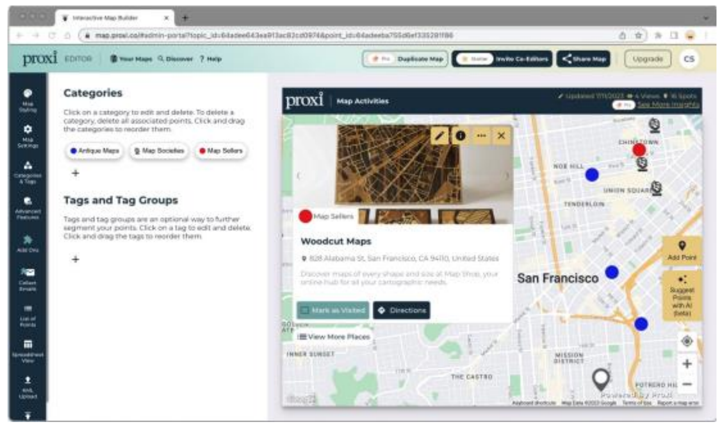


Figure 3. Detail from the Proxi map-generator results.

ize geographical information, and support collaborative efforts makes AI a valuable tool for cartographers, businesses, governments, and individual map users like us. While human expertise remains crucial in map design, AI serves as a powerful assistant, augmenting productivity and fostering innovation in this domain. As technology advances, we can anticipate even greater integration of these types of apps in the future, revolutionizing the way we visualize and interact with maps.

Endnotes

[1] John Loewen, Ph.D., "Turbocharge with ChatGPT and Python: Interactive Maps In No Time Flat," *Medium: Data And Beyond*, April 18, 2023, https://medium.com/data-and-beyond/dash-ing-maps-with-chatgpt-and-python-interactive-maps-in-no-time-flat-bf418566b71d.
[2] "ChatGPT Made Me a Map!" YouTube video, 15:11, GeoDelta Labs, January 29, 2023, https://youtu.be/iNHQgLw7qZc.
[3] Lusaka City Council, "About Lusaka," https://www.lcc.gov.zm/about-lusaka-2/.
[4] "Informing nationwide development through new AI land mapping," Ordnance Survey, October 14, 2022, https://www.ordnancesurvey.co.uk/insights/informing-nationwide-development-through-new-ai-land-mapping.
[5] "Tackling urbanization with detailed data in Lusaka, Zambia," YouTube video, 5:16, July 6, 2021, https://youtu.be/4VDTQMrnj-w.
[6] Proxi Templates, June 1, 2023, https://www.proxi.co/templates.

Road Map Censorship, Part II

David Smollar

Last issue's Part 1 discussed WWII domestic map censorship in California, focusing on maps from the Automobile Club of Southern California. Part II looks at censorship nationally through the experience of Rand McNally, the largest U.S. mapmaker at the time.

On January 15, 1942, five weeks after Pearl Harbor, the U.S. Office of Censorship (OOC) distributed its initial code. While the regulations philosophically were self-policing, in practice the OOC worked closely with military authorities to encourage pre-publication scrutiny, and map censorship often fell to Army and Navy officers, whose recommendations could differ regarding what map locations to remove for security reasons. These military reviews were necessary even when the OOC reached peak strength, as a dozen civilian office employees oversaw a large number of newspaper, radio, and postal issues in addition to cartography. The result was an inconsistent pastiche of maps as to which, if any, airfields, military bases, ports, and related facilities disappeared.

When the December 7 attack jolted America, the nation's three major cartographers were finalizing 1942 products. They soon understood that war meant paper shortages, gasoline rationing, and a crimped market for touring maps. H. M. Gousha and General Drafting hurried to complete their 1942 oil company commitments and turned exclusively to military work; neither produced road maps again until late 1945. Rand McNally, with the largest and most varied client portfolio, continued with a reduced number of non-military maps and atlases for oil companies, corporations, hotels, airlines, railroads, and those under its own imprint. Its special Union Pacific Railroad brochures (*Fig. 1*) displayed military posts nationwide and their nearby train stations, and were regularly updated and widely distributed. The company's interactions with OOC best illustrate wartime inconsistencies, and are the only records preserved at the National Archives.[1]

With a chaotic schedule of producing maps for its clients while scrambling to fulfill newly required military assignments, the extent of masking used on Rand McNally's 1942 road maps depended on timing:

- Maps distributed until March went largely uncensored, having been printed by January without review, before the OOC got underway. They included imprints for major oil companies Texaco, Gulf, and Standard Oil of Indiana (SOI).
- A second tranche of maps, reviewed from January through early March under the initial code, were distributed from late March through late April. The masking varied, depending on the code's interpretation by a particular military censor. Major imprints Sinclair and Sunoco appeared within this period. Some maps deleted airports, but not Navy and Army airfields, others deleted airports and Naval bases, but not Army camps.
- Maps distributed from May onwards generally, but not always, followed consistent censorship guidelines, as they were reviewed after the OOC had promulgated more detailed regulations in March. Some one-third of Texaco's early 1942 uncensored maps were reissued with masking, and featured covers exhorting paper conservation and the purchase of war bonds. (Texaco's California map, though distributed in February, was masked because it had been submitted to the Army's Western Defense Command in late December, under the Command's martial law powers invoked after Pearl Harbor, which included the vetting of West Coast maps as detailed in Part I.) Union Oil maps, which covered much of the West, were censored by the Defense Command for both airports and bases.
- This chronological pattern also generally held for Gousha's 1942 maps. Among its largest clients, Conoco, Phillips, and DX maps were unmasked, except for the

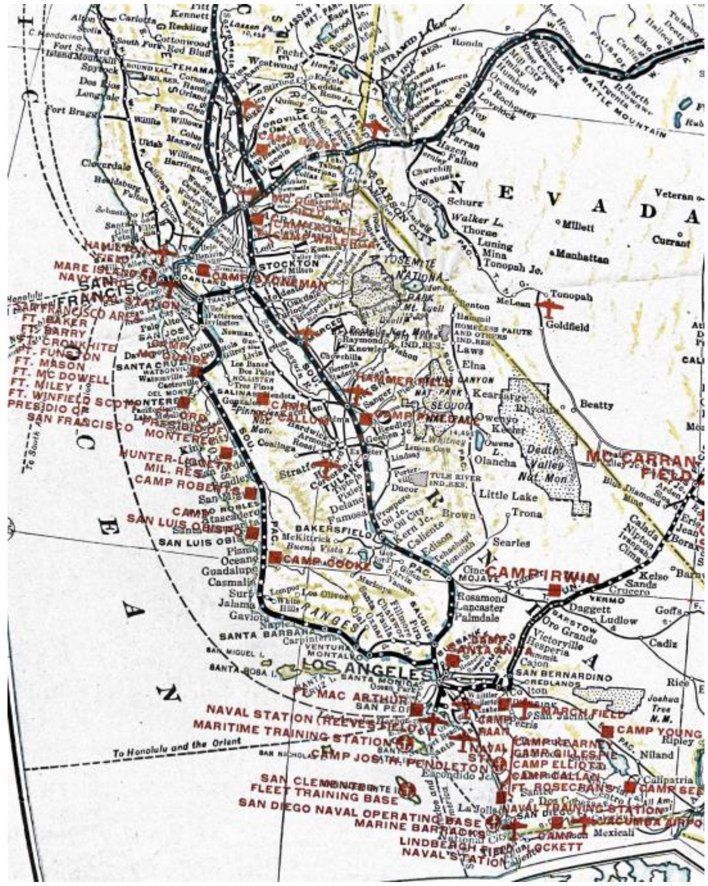


Figure 1. Image from 1943 edition of Rand McNally' Military Map of the United States for the Union Pacific Railroad.

West Coast; maps for Shell, Associated/Tidewater, and Cities Service were censored. General Drafting, the smallest of the national publishers, completed contracts for Esso and Standard Oil of Ohio by early February, and masked only a single army arsenal location on a New Jersey map.

All this certainly led to motorist confusion by May, when every dealer possessed 1942 map issues. In Illinois, for example, drivers could find six unmasked and four masked maps of the state and Chicago, depending upon which gas station they utilized. The Pure Oil map included the state's airports and military bases, while the Johnson Oil map showed airports but not bases. In Michigan, Detroit maps for SOI and Gulf displayed airports, bases, and industrial sites. The Shell map censored everything. Sinclair inset maps for Detroit masked airports and bases, but identified auto factories converted to tank and truck production. Pure Oil's Michigan map was uncensored, but the insets for Chicago and Detroit were scrubbed for airports, indicating how inconsistencies could be found even on the same map in a rapidly changing wartime environment.

National Archives documents show that Rand McNally had stationed two full-time agents in Washington, DC, to liaison with the War and Navy departments and the OOC. They were often frustrated in the early months by confusion over the number of Army camps cleared for inclusion. On February 14, 1942, Army Col. Falkner Heard warned Rand McNally to limit information about pre-war Army camps to their geographical location, and to delete all airfield symbols, even if previously approved. The Rand McNally agents complained to the OOC that maps reviewed by Heard, in the Army's Review Branch, were more rigorously scrutinized than those handled by the Army's Quartermaster General's office. Agent William Tufts pleaded with OOC for consistent guidance, writing that the company "has taken great pains to consult in advance with the War and Navy departments, and we shall continue the same policy with your office."[2]

In 1943, Rand McNally's limited issues for Texaco, Gulf, and Union (*Fig.'s 2 & 3*) showed the full effects of censorship. Whether new maps or 1942 reprints, these issues were masked for airports and Naval bases, and for many Army camps. However, conflicts persisted over maps and atlases for several insurance and transportation companies, and especially for the Union Pacific. The OOC jurisdictionally retained final approval authority over military reviews. In April 1943, Rand McNally's Helmut Bay lamented that, despite a code revision expanding identifiable locations, the military had again restricted the naming of several Army camps and facilities previously approved. This was particularly problematic for the Union Pacific map, which families of service personnel depended upon to plan visits. The OOC's

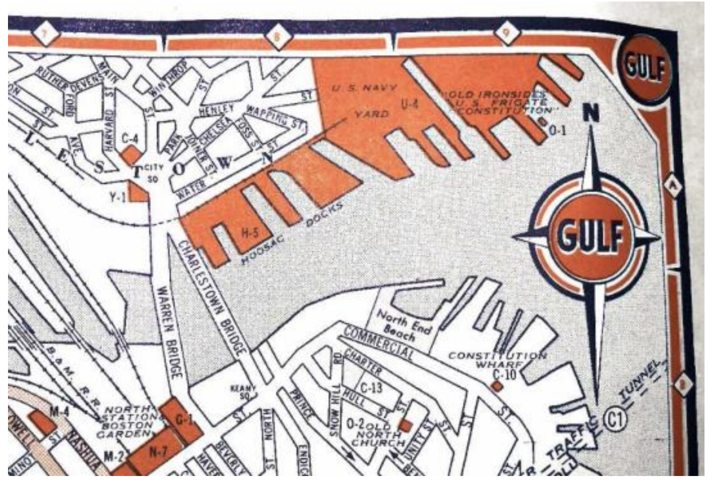


Figure 2. Early 1942 downtown Boston inset northwest of the compass rose showing unmasked U.S. Navy Yard in Charlestown.

Figure 3. 1943 downtown Boston inset showing the Navy Yard location masked as unlabeled white space.

Bill Steven wrote a follow-up memo to colleagues, saying that "this [Army edict] seemed to be silly and I doubt this office would find objection to locating, in a general way, camps and industrial plants already announced by the War Department. I told Mr. Bay that this office would be the final judges of security in such matters." Steven added that Bay seemed "a little timid" about sparring directly with military authorities.[3]

One glaring exception to masking was the "Special War Edition" 1943 road atlas for the State Farm Insurance Co., in which airports and military facilities accompanied every state and city map. The atlas was perhaps reprinted from an early 1942 edition, as it featured pre-Pearl Harbor military photos and civil defense information, and included copyrights for both years. Even a reprint, though, fails to explain the lack of any censorship, given that all similar 1943 Rand McNally products were masked.

Only two WWII maps from any cartographer specifically cited government censorship on the maps themselves, as opposed to the "voluntary" removal statements printed on Gousha's Shell and Chevron covers. Rand McNally's 1943

Texaco dual city map (*Fig. 4*) of Houston and San Antonio outlined Fort Sam Houston's acreage in San Antonio, but showed no base streets or buildings. Rather, there was a text box in the blank space that read, "Details deleted by order of War Department." (In contrast, in the same year censors had

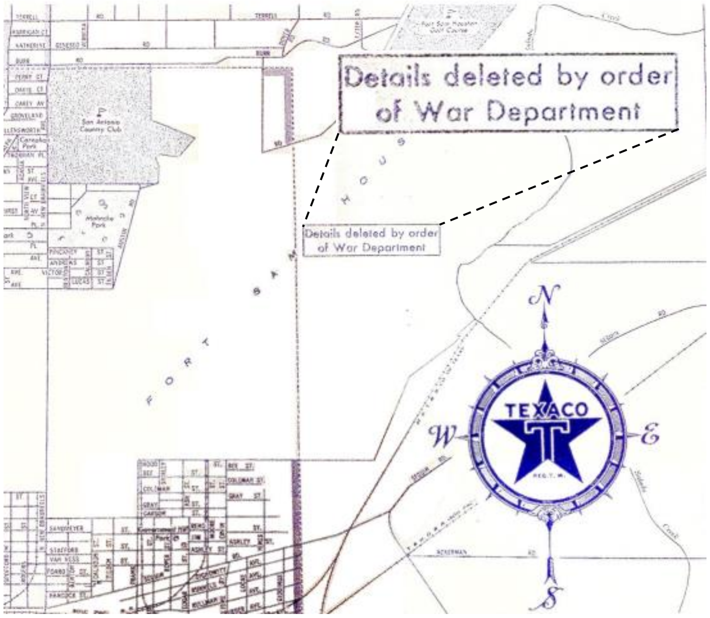


Figure 4. Rand McNally's 1943 Texaco Houston-San Antonio map showing deletion statement overlaid on area of Ft. Sam Houston in San Antonio. Note War Department restrictions statement.

recommended Gousha scrub the U.S. Naval Academy name from the Annapolis inset of its Shell Baltimore issue, but allowed the map to retain Navy-themed streets that crisscrossed the campus.) A 1942 Detroit street map booklet from the regional cartographer, Sauer Brothers, stated, "In compliance with the Federal Censorship, the publishers have deleted the location of all docks, depots and industrial sites from the map for the duration"—yet the booklet's index listed addresses for hundreds of these locations, big and small. A competing 1942 Detroit street guide by Barnes Press masked no maps, referenced no censorship, and included addresses. The city's October 1942 official Detroit transportation map exquisitely detailed locations of war plants, railroad yards, shipping docks, and airports. The Barnes and City transit items are examples of the many regional products that were probably never submitted for review.

By mid-1944, guidelines had been loosened considerably, and the military/OOC had approved public identification of a greater number of domestic camps and bases, although facilities with atomic bomb activity were not identified until after the war. Rand McNally issued 20 new multi-state unmasked Texaco maps in late 1944, and, along with other cartographers, resumed production on a large scale with the war's end in summer 1945.

The pell-mell nature of Rand McNally's WWII production apparently resulted in a failure to document its wartime mapping activities. In 1978, a Wisconsin map collector wrote to company archivist Mary A. Severson-Tris about wartime maps. She replied that longtime employees had told her that "no road maps were produced in 1943, 1944, or 1945 as work centered on military maps. I feel quite sure this information is accurate, but if you should ever come across a Rand McNally road map produced during those years, please let me know."[4]

Referenced maps are found in the David Smollar Collection at the Stanford University Branner Earth Sciences Library and Map Collections and/or Newberry Library in Chicago. Documents referenced are held in the Newberry and/or in the National Archives in College Park, Maryland.

Endnotes

[1] Cooke, A. *The American Homefront 1941-1942,* illustrates Cooke's vexation with map shortages, and recalls a Georgia gas attendant searching in vain for a map, telling Cooke, "They're hard to get a hold to. Can't hardly get."

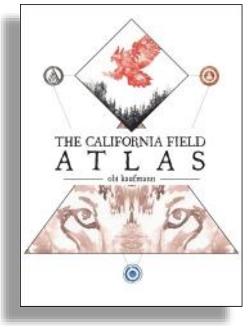
[2] Tufts, W.O., letter to Theodore F. Koop, Assistant to the Director of Office of Censorship, January 23, 1942; and Heard, Col. F., Chief, Army Review Branch, to William O. Tufts, February 14, 1942. National Archives and Records Administration (NARA) in College Park, Md.: Record Group (R.G.) 216, Entry 3, Box 1086, Office of Censorship, Administrative Division - Service Section, File folder Rand McNally and Company (1/23/1942 and 2/14/1942)

[3] Steven, B., Office of Censorship interoffice memo, April 27, 1943, to N.R. Howard. National Archives and Records Administration (NARA):
Record Group (R.G.) 216, Entry 3, Box 1086, Office of Censorship, Administrative Division - Service Section, File folder Rand McNally and Company. (4/27/1943)

[4] Severson-Tris, M. A., Archivist, and Rand McNally Map Librarian, letter to David Prentice. Newberry Library, Chicago: Wing MMS RMcN Series 3, Box 13, Folder 182 (12/8/1978)

San Diego native **David Smollar** is a lifelong map collector and a former staff writer for the Los Angeles Times. He now tutors K-12 students in the social sciences and humanities, and writes about maps, history, transportation and education.

Book Review



The California Field Atlas. Obi Kaufmann. Published by Heyday Books, 2017. Paperback, 5.5 x 7.5, 608 pages. $45
ISBN: 9781597144025

Reviewed by Cherie Northon, Ph.D.

"This is a love story," declares Obi Kaufmann in the introduction of his 2017 The California Field Atlas; certainly an odd description for an atlas! Characterizing it as a 'story' suggests that it is something other than an atlas normally used for reference, or for information on how to get somewhere, or to describe where things are located. Calling it a "love" story is simply intriguing.

After selecting the Atlas to review, I jumped into it by reading (and rereading) the introduction. I then systematically read through the ten chapters, trying to do one a day, which is way too fast to absorb the information Kaufmann presents. Initially, I was bothered by the map scales. None of the state maps in the Atlas have a distance scale, and the larger-scale area vignettes are accompanied by a separate small California outline map with a single scale bar and a mileage number above it. (*Fig. 1*) I went back to Kaufmann's introduction, and, finding no explanation, tried a few different approaches. Finally, I took the measurement of the scale bar, which was 7/8", and applied it to a distance segment on the map. The resulting number fared pretty well when checked with Google Earth! I wrote to Kaufmann for confirmation of my method, and he responded, "[c]artographically, the book is challenging in regards to scale...thank you for hanging in there and cracking my code ...For something calling itself an atlas, I actually have very little interest in the 'where' of things in any true specificity. I don't tell you how to get anywhere. I'm more interested in the 'how' of things."[1]

Figure 1. Map scale for the San Francisco: Seven Hills and Seven Ecologies, p. 443

Besides the distance scale being a bit unorthodox, each map is also devoid of a compass rose and magnetic declination information. Kaufmann initially states that all maps are oriented with North at the top and leaving the declination off, "is forgivable because it does not alter the quality of the inherent, elemental information in any one map."[2] I see no issue here.

In regard to the colors that appear on his maps, Kaufmann reminds the reader that he is an artist and a poet, and that each map is a painting. The choice of information portrayed on the maps was derived from decades of walking California, as he desired to convey contrasts that he perceived in the landscape. Constructed features, such as highways, appear as faint lines, and urban centers are relegated to faint red spots, while trails are a robust red. Kaufmann outright admits that he makes more reference to major walking trails than he does roads, because they are made for getting into "deep wilderness" as opposed to the "concrete monstrosities" that are useful only to the automobile[3]. Human-made features also contrast with the "resplendent green waves of marching forests,"[4] which depict his emphasis on highlighting California's natural beauty.

Here are a couple of things I found that may make reading the Atlas a bit easier. Begin by reading his discussion of the eleven map symbols (*Fig. 2*) he has designed, which are the only ones used. While most of the symbol names clearly indicate what they represent, a few encompass more diverse items than their names might suggest. For example, Kauffman uses the word "Trail" for "named trail, road, and highway." Few among us would call U.S. Highway 101 a trail, but it is referred to as such in his Atlas. Likewise, "Lake" stands for a "body of water" or an "ocean feature," two very different features. Lastly, the symbol designs are not very intuitive, such as that used for "Main Rivers" (*Fig 2 & inset*). Second, I would suggest making a color copy of the symbols, in order to avoid having to constantly refer back to the introduction for this information.

Figure 2. Kaufmann's devised map icons, p. xx, wth inset.

The bibliography has over 125 sources in addition to Kaufmann's own intimate knowledge, which is deep and profound from his years immersed in California's "back country."The 527 pages of the Atlas are chock-full of an amazing amount of information, providing the reader with myriad interpretations of California's nature and natural history. The Atlas is sprinkled with over 100 watercolors of fish, wildlife, plants, trees, landscapes, and more. True to Kaufmann's style, they range from their true colors to the unconventional, such as a red ponderosa pine (*Fig. 4, next page*).

Kaufmann chose "Trails" for his opening chapter because he sees them as the way to California's ecological treasures, which will stand long after "our concrete jungles have returned to the dust from which they were formed."[5] His ninth chapter focuses on counties, which appear to be his least favorite topic due to their bureaucratic and political delineations. This reminds me of the person who eats dessert first, and saves the Brussels sprouts until last (no offense to Brussels sprouts—I love 'em). Even so, he devotes one-third of his book to an in-depth aggregation of features found within each county's political boundaries, and even rates them according to their natural potential.[6]

I decided that delving into the San Francisco City/County map would resonate best with the *Calafia* audience, and provide a good glimpse of Kaufmann's mapping treatise. The map (*Fig. 3*) covers one page, and the thirty-two symbol annotations are spread over the next two pages, along with its map scale (*Fig. 1*). At the bottom of each county map, Kaufmann provides three elevation

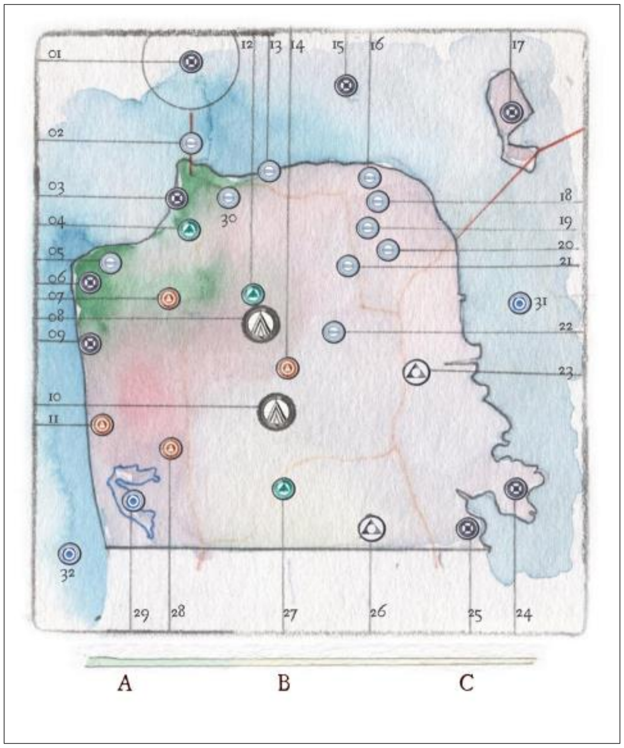


Figure 3. Kaufmann's map of San Francisco City and County. p. 442

measurements, taken along the horizontal axis at the widest part of the county, which is curious to me. For San Francisco, these are Lake Merced (21 feet) in the far western (A) portion, Mount Sutro (908 feet) in the center (B), and Visitacion Knob (525 feet) in the east (C). The three icons on the map are represented using these symbol names: a Lake, a Named Peak, and a Mountain Range.

My first approach to the San Francisco map was to read the thirty-two symbol annotations, and to categorize them. Accordingly, I put the Palace of Fine Arts and the Legion of Honor into a "Cultural" category. I worked through most of the annotations, and then returned to the map and its symbols. Oops, that did not work, because Kaufmann does not use a "Cultural" icon. Rather, these two items are listed under "Camps," a category that includes the Golden Gate Bridge as well!

I scrapped that idea, and decided instead to start with the map's icon names, to see how he had classified its thirty-two map features. Most, such as "Named Peak," had features that matched the icon name, although many were not easy for me to reconcile, such as "Camps," the most difficult one for me (see *Fig. 2*). All this means is that I either need to memorize his icon definitions, (not popular as I age) or keep my color copy close by. Easy enough to do.

I am, however, a creature of my academic and professional life, which follows cartographic convention, and this type of work stretches me—which is good. What I have found particularly pleasing about the county maps is that each annotation has a tie to nature. Wildflowers and grasses, insects, birds, mammals, forests, hydrology, green space, topography, views, and more are called out so that the reader can find the "wild" and "nature" in an urban environment. Did you know that North Beach is a habitat for the western tiger swallowtail butterfly? This is an example of the way Kaufmann assists the reader in moving beyond the concreted and built urban areas through his Atlas.

Figure 4. Ponderosa Pine, p. 201

Yes, this is a "love story," but readers must put much of their cartographic background "on hold" in order to appreciate the book and to solve the "puzzles," as Kaufmann calls his maps. "It's not an easy read," I told Fred DeJarlais early on, but it is a fascinating, eye-opening, enjoyable, and challenging book.

Endnotes

[1] Personal Communication June 20, 2023

[2] Kaufmann, O. (2017) The California Field Atlas, Berkeley: Heyday Press. p. xv

[3] Ibid, p. xv

[4] Ibid, p. xiv

[5] Ibid, p. 3

[6] California is far from pristine, but Kaufmann has hopes that rewilding can still be accomplished by future generations, as he notes on page 332.

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The Roman Underground

Bill Eaton

"Before the Roman came to Rye or out to Severn strode,
The rolling English drunkard made the rolling English road.
A reeling road, a rolling road, that rambles round the shire,
And after him the parson ran, the sexton and the squire;
A merry road, a mazy road, and such as we did tread
The night we went to Birmingham by way of Beachy Head"

So wrote the English poet and author G.K. Chesterton in 1913 to describe the erratic, meandering English road system, with the exception of the Roman roads, which, although some 2000 years old, were "straight and true."

Pre-Roman roads in Britain were basically narrow, single -file pathways of mud or dust intended for foot traffic, as horses and cavalry were rare.

These followed iso-contours and avoided slopes where possible. There was no English army—only undisciplined and uncoordinated groups of tribesmen from different tribes. In contrast, the Roman army was superbly organized and well equipped, with both trained infantry and cavalry, requiring well-signposted routes for rapid transport to known destinations.

Consequently, Roman roads in Britain were a network of highways linking the cities and forts during the Roman occupation, from AD 43 to AD 410, and played a vital role in the conquest of the country, allowing the Romans to transport goods, troops, and information effectively. Still today, many modern British roads follow the same routes, a tribute to the legacy of the Roman occupation.

These roads were usually built on a foundation of subterranean logs covered with aggregate and a surface of stone slabs. They included a "camber," a slight convexity or curvature, to avoid puddles, as well as drainage channels alongside. Roman chariots were usually two horsepower models with a 4'8½" wheel gauge to accommodate the side-by-side horses. Even today, many Roman roads show these tracks as ruts worn into the surface from centuries of use. George Stephenson, inventor of the first railed locomotive in the nineteenth century, chose the same gauge for his "rocket" engine, deriving the size from a Roman road near his home. This has become the standard rail gauge for most countries in Europe and has an interesting connection with the space shuttle.[1]

The straight direct lines of the roads were accomplished by surveyors, who were a regular part of the Roman forces. Starting with a signal fire at the origin city, signal fires were set at the horizon in the estimated direction of travel. These were followed by more fires at every horizon point until the destination was reached. Surveyors then used a "groma"—a sort of primitive theodolite at signal fire "2" to ensure a true line between signal fires "1" and "3", advancing each time to alternate fires until the whole route was corrected and complete.

While many of these roads have been incorporated into modern highways, occasionally resulting in finds of historic artifacts during upgrade work, others disappeared during the dark ages that followed the fall of Rome. Recently, aerial photography, satellite scans, and even drone photography, often by amateur archaeologists, have revealed traces of previously unknown roads, buildings, and even forts and towns built by the Romans. (*Fig. 1*)

Figure 1. An English Roman road after 2000 years of wear and 1500 years of neglect. Image source: https://www.romanobritain.org/12_innovations/inv_roads.php

Fast forward some 2000 years to where I, at age 7, wearing my centurion's cloak with 100 Roman legionnaires behind me, proudly led my elite troops to subdue a horde of rebellious British tribesmen dressed in their woad (a la Mel Gibson), driving them back into the hills of Rome's newest province.

Of course, my sword was plastic, my helmet cardboard, my cloak a bath towel, and both legionnaires and rebels purely imaginary, but the Roman road we marched down was real, albeit somewhat worse for wear after 2000 years of use. At the time, I was living in Northwest England, almost at the periphery of Julius Caesar's empire, and an ancient Roman road ran through the hills not far from my childhood home. It was the start of my fascination with the ancient Roman Empire.

Several years later, my job in London required me to commute to an office on the Underground (tube/subway), and I often passed the time on my journeys staring at the fascinating straight-line maps of the various tracks, never thinking to connect the British and Roman transport systems.

Until… I recently came across the work of Sasha Trubetskoy, a University of Chicago graduate, cartographer, and self-confessed data nerd, with a yen to improve subway maps. Instead, he discovered the 50,000-mile Roman road system, which covered Europe from Scotland in the north to south of Cairo, and Lisbon to Istanbul. The result was a stunning map of the main Roman roads throughout Europe, designed in London Underground style. Sasha has also done several other intriguing map projects, which are available on his website www.sashamaps.net.

Intrigued. I started to look further into this anomaly. The original maps of the London Underground were scaled to the true distance between stations until a technical draughtsman, Henry Charles Beck, took a different view in the 1920s. He believed the true distances were largely irrelevant, as passengers were more interested in getting from station to station, and he created a new map to reflect this. After a trial run in 1932, 700,000 copies of the map were distributed, receiving such a positive reaction that reprints were needed only one month later.

Beck went on to create transport maps of the whole London area, the nationwide British Railways Network, and the Paris Metro. In 2006, visitors to London's Design Museum voted Beck's Tube map as their second-favorite British design of the 20th century. (*Fig. 2*)

One can visualize the Roman roads in Britain by taking the London Underground map as a template. The different route lines of the map can be replaced by the major Roman roads that existed in Europe, creating an easily understood representation of the road network. (*Fig. 3*)

Visualizing the Roman roads in Britain in this way shows how they connected different parts of the country, which allowed the Romans to maintain control over their vast empire. Even today, driving along the M1 (London to Birmingham) freeway, you might catch an occasional glimpse of Julius Caesar in his chariot, heading north to subdue the Brexiteers.

Figure 2. Beck's memorial plaque at Finchley Central (Underground) Station.

"Hoofnote"

[1] The space shuttle was built by many different contractors based across the USA, requiring transport to final assembly at Cape Canaveral. The external fuel tanks had to be transported from a distant location through a railway tunnel. At some stage, it was discovered that the planned diameter of the tanks was too large to fit through the tunnel, which was based on the standard rail gauge of 4'-8½", and that they had to be "slimmed" to fit the tunnel. So, we can claim the space shuttle was planned, at least partially, by a horse's arse. That's the gist of the story, and many true words are spoken in gist.

References

European/Roman subway map: Sasha Trubetskoy: https://sashamaps.net/docs/maps/roman-roads-index/

London Underground map: Transport for London [https://tfl.gov.uk/*maps*/track/*tube*](https://tfl.gov.uk/maps/track/tube)

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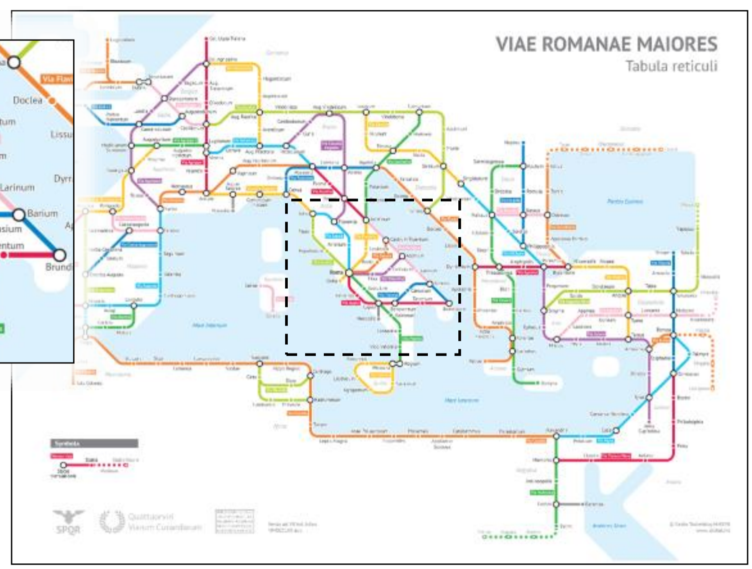
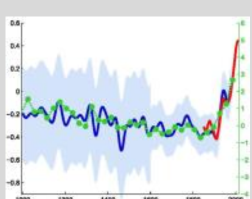


Figure 3. (with detail). Image courtesy of Sasha Trubetskoy sasha@sashamaps.net. Detail extracted by publisher.

CARTO-QUIZ

What do these charts/ maps describe?



THE HISTORICAL ROLE OF PIGEON POINT LIGHTHOUSE IN WEST COAST NAVIGATION

JoAnn Semones, Ph.D.

Geographic Orientation

Originally, Pigeon Point was known as Whale Point. In the 1600s, Spanish mariners began charting the area and named it "Punta de las Balenas." Some early land grant maps, such as Fig.1, show the site as "Punta de la Ballena," which adjoins Año Nuevo. Pigeon Point and Año Nuevo share geographic borders, which were established under a land grant in 1842. Called Rancho Punta del Año Nuevo, the tract consisted of 17,000 prime acres along San Mateo County shores and included the land at Whale Point.

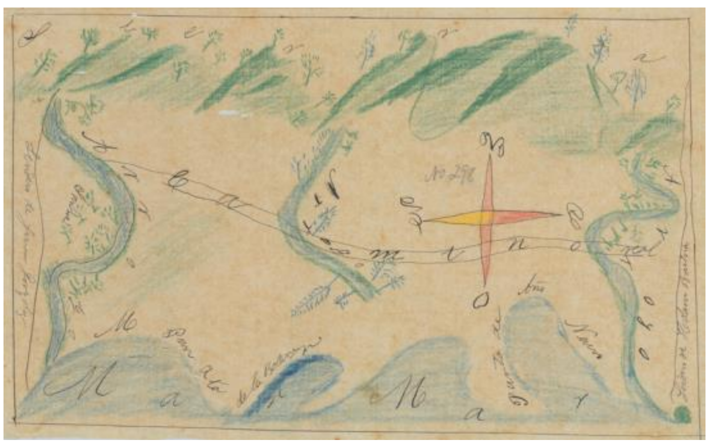


Figure 1. Rancho Punta del Año Nuevo. Courtesy of California State Archives, Image: diseno_exp298_vol1_pg788img287.jpg https://www.sos.ca.gov/archives/collections/disenos-collection

In 1853, the clipper ship *Carrier Pigeon* became lost in a blanket of fog at Whale Point, and snagged on a ledge of rocks just 500 feet from shore. All hands were saved, but the ship broke apart and sank slowly from sight. Nearby settlers found the incident unforgettable, and before long they began to call the site Pigeon Point.

California Gold Rush

The California gold rush of 1848 was one of America's most significant maritime events. Far more emigrants seeking their fortunes as miners and merchants, came by sea than over land. Hordes of adventurers traveled from East Coast ports to San Francisco, braving the winds and waves of Cape Horn at the tip of South America. Although rounding Cape Horn was an arduous voyage of more than 15,000 miles, it was the key natural passage between the Atlantic and Pacific oceans.

The Isthmus of Panama was an important alternate route between the Atlantic and Pacific. Passengers sailed from Atlantic ports, crossed the Isthmus of Panama by wagon, on mules, and on foot, and then took another ship to California. In 1855, a 47-mile railroad was built across the isthmus, eliminating many of the difficulties. The journey was shortened to less than 6,000 miles in 1914, when the Panama Canal was completed.

The trip around "Cape Stiff," as sailors called it, was treacherous. Sudden squalls of winds and fog dashed fiercely over the seas. For hours, mountainous waves and hundred-mile-an-hour gales pounded ships, plunging them into deep chasms of turbulent water. The average time for the journey was a grueling 160 days.

Once in the Pacific, most vessels sailed toward Hawaii, to catch the trade winds, and follow them to California. These winds, which blow from a northeast or east-north-east direction, became known as "trade winds" hundreds of years ago, as the cargo-laden trade ships depended on these easterly winds for speedy passages. The route could bring vessels to within twenty miles of Pigeon Point, making its light the first sign of land, and a welcome symbol to mariners that the long journey was nearly over.

Throughout the voyage, a ship's captain and navigator would adjust the course. Primary instruments included a sextant, a compass and a chronometer. Instead of maps, nautical almanacs containing detailed charts and tables on ocean winds and currents were used to identify any given location.

Utilizing two reflecting mirrors, a sextant allows a navigator to measure the angle between the horizon and an astronomical body (sun, moon or star) for purposes of determining longitude and latitude. A compass is used to determine direction on a ship. The needle always pointed north, so a ship was always able to navigate, using that as a point of reference.

A chronometer was a portable marine timekeeping device that helped determine longitude at sea. To use one, outbound sailors would set their timepieces to the time of a known port's longitude. Once at sea, mariners calculated their position east or west of that place by converting the difference in time on the chronometer and local ship time into distance.

In poor weather, skies could be obscured for long durations. Mariners would then resort to using "dead reckoning." This is the process of estimating a ship's current position by

Figure 2. Twelfth L.H. District (California with insets of San Francisco, San Diego, San Pedro and Humboldt Harbors) Andrew B. Graham, Washington, D.C. 1903

using a previously determined position, or fix. Then, the position is advanced based on known speed and elapsed time. As the ship sailed, new positions had to be continually calculated.

Increased Need for Aids to Navigation

With the surge in shipping activity caused by the gold rush came increased numbers of shipwrecks. Many types of vessels, bearing heavy loads of cargo, sank and numerous passengers perished. This intensified the need for aids to navigation. As a result, lighthouses became a necessity along the Pacific coast.

Lighthouses served as "daymarks," visible to ships at sea during daylight hours and known by their geographic location, size and color. They were also identified by their fog signals, each of which had its own distinctive sound and pattern. In addition, lighthouses were recognized at night by their tower light. Just as every person has their own signature, each lighthouse has its own special light signal, or "flash characteristic," the pattern of a series of on-off flashes unique to that lighthouse that was used to identify that light and, therefore, the ship's location.

In 1851, Congress ordered the Secretary of the Treasury, Thomas Corwin, to conduct a full-scale investigation of the Lighthouse Establishment, the organization responsible for the upkeep and maintenance of lighthouses in the United States. Based on a subsequent report, the ineffective Lighthouse Establishment was abolished and replaced with the Lighthouse Board. The country was divided into twelve districts, each represented by an inspector. As Fig. 2 shows, the California coast was the Twelfth District, which included Pigeon Point Lighthouse after 1871.

A priority for the new Lighthouse Board was to locate potential sites on which to place additional aids to navigation. Congress appropriated funds for the construction of lighthouses at strategic points along the California coast, and near the entrances to important harbors. Initially, a series of six lighthouses were built in the 1850s. To assist mariners, the Lighthouse Board published booklets with light list characteristics and audible fog signals. These served as "maps" to guide ships at sea.

Beginning in the 1850s, the Office of the Coast Survey conducted a series of surveys to establish accurate charts for the navigation of American ports and coastal regions on the Pacific coast. Prior to the construction of lighthouses, maps generated by the surveys relied on coastal topography as well as on latitude and longitude to assist mariners in navigating the California coast. As lighthouses were built, they were added to the maps. Fig. 3 shows Pigeon Point across from the third topographic view. (*Detail A*) A box to the right is a "Light House" list which includes the latitude and longitude of Pigeon Point. (*Detail B*)

Figure 2 Detail. *Map of 12th Lighthouse District, vicinity of Pigeon Pt. Lighthouse*

In September of 1871, a fog signal went into service at Pigeon Point Lighthouse as part of the post-Civil War expansion of West Coast lights. The first fog signal was a steam whistle. Operating from 1871 to 1911, it was similar to the whistles used on ships and locomotives. The original fog signal pattern was whistle blasts four seconds in duration, separated alternately by seven and forty-five seconds of silence.

The fog signal equipment changed over the years. In recent times, radar, radio direction finders, Loran and Global Positioning Systems (GPS) have become standard equipment even on small vessels. These new aids to navigation led to the discontinuation of Pigeon Point's audible fog signal.

Of the twenty-six lighthouse towers constructed in California after 1856, Pigeon Point was one of only four to be made of brick. Double-wall construction with an airspace in between insulates interior ironwork against corrosion. Over 500,000 locally-made bricks were used to ensure that the tower would be sturdy and durable.

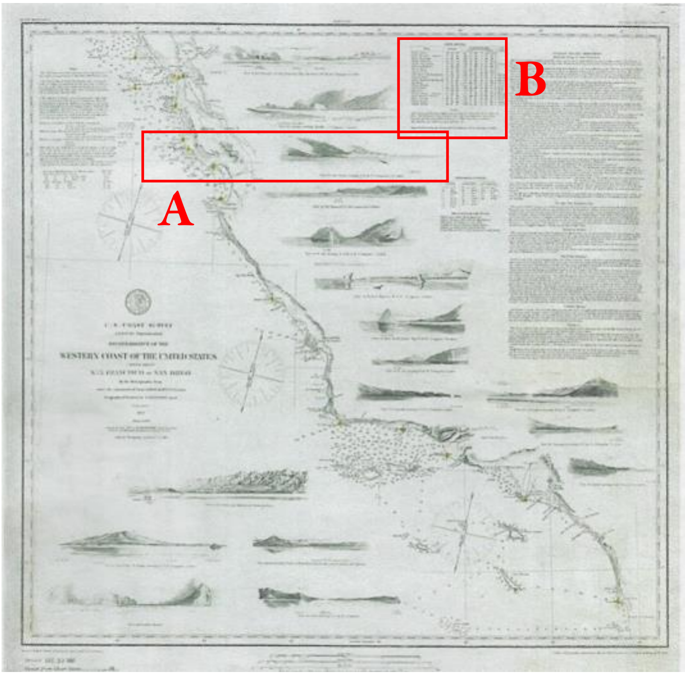


Figure 3. California Coast Survey. *Report of the Superintendent of the U.S. Coast Survey*. Washington, D.C.: U.S. Coast and Geodetic Survey, 1887.

LIGHT HOUSES

Name	Latitude	Longitude West from Greenwich Observatory: In arc	Longitude West from Greenwich Observatory: In time	Fog Signal
Point Loma	32° 40' 13"	117° 14' 39"	7h 48m 58s.6	
Point Fermin *(approx)*	33 42 14	118 17 41	7 53 10.7	
Point Hueneme	34 08 38	119 12 40	7 56 50.7	
Santa Barbara	34 23 45	119 43 22	7 58 53.5	
Point Conception	34 26 49	120 28 18	8 01 53.2	*Whistle*
Piedras Blancas	35 39 50	121 17 06	8 05 08.4	
Point Pinos	36 37 55	121 56 02	8 07 44.1	
Santa Cruz	36 57 02	122 01 37	8 08 06.5	
Año Nuevo Id. *Fog Sig. only*	37 06 44	122 19 51	8 09 19.4	*Whistle*
Pigeon Point	37 10 49	122 23 39	8 09 34.6	*Whistle*
Point Montara *Fog Sig. only*	37 32 04	122 31 09	8 10 04.6	*Whistle*
Farallon	37 41 51	123 00 07	8 12 00.5	*Siren*
Point Bonita	37 48 51	122 31 47	8 10 07.1	*Siren*
Fort Point	37 48 32	122 28 39	8 09 54.6	*Bell*
Alcatraz	37 49 29	122 25 21	8 09 41.4	*Bell*
Yerba Buena *(approx)*	37 48 21	122 21 45	8 09 27.0	*Whistle*
East Brother Island	37 57 42	122 26 01	8 09 44.1	*Whistle*
Mare Island	38 04 19	122 15 19	8 09 01.3	*Bell*
Point Reyes	37 59 38	123 01 21	8 12 05.4	*Siren*
Point Arena	38 57 17	123 44 19	8 14 57.3	*Whistle*

NOTE.

The Courses and Bearings without the brackets are Magnetic, those within are True. The Distances are in Nautical miles. The Soundings are expressed in fathoms and show the depth at Mean Low Water the plane of reference. 100 *Signifies no bottom at 100 fathoms, &c.*

Deep Sea Soundings by Commander P. C. Johnson U.S.N. Assistant in 1874.

Figure 3, Detail B.

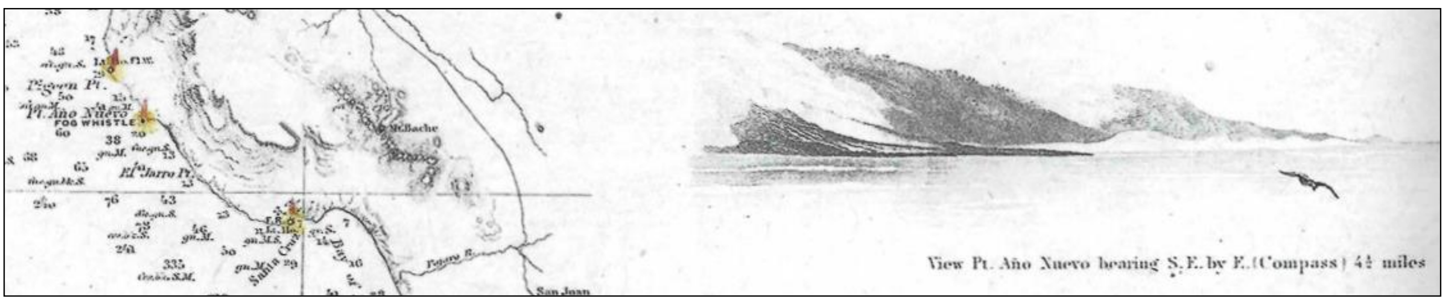


Figure 3, Detail A.

The Innovative Fresnel Lens

Another priority for the Lighthouse Board was installing the superior Fresnel lenses, using the technology developed by French physicist Augustin Fresnel (pronounced fre-nel), in U.S. lighthouses.

Fresnel's revolutionary "beehive" design used glass prisms to surround a single light source. When a lighthouse was lit, magnifying circles called "bulls-eyes" in the center of large panels bent or "refracted" the light. On November 15, 1872, Pigeon Point's tower was first lit enabling it to be seen as far as twenty-two miles out to sea.

The 115-foot sentinel and its surrounding grounds have been preserved as the Pigeon Point Light Station State Historic Park, a California state park. The lighthouse was listed on the National Register of Historic Places in 1977, and in 1990 was designated as a California Historical Landmark.

Today, the tower is still being appreciated. According to a recent historic structures report by California State Parks, "Pigeon Point has long been considered the most beautiful and best architectural lighthouse structure on the Pacific Coast. It is a superb example of the mid-nineteenth century traditional, classic lighthouse and an impressive landmark."

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Ukraine
The Borderland
Heiko Mühr

In Central and Eastern Europe, nation-states were latecomers. Many only appeared on maps at the end of the First World War (1918-1919). Some of those countries disappeared again, when the Soviet Union revealed its imperial ambitions. Ukraine, after its disastrous War of Independence (1917-1921), was one of those states. Historian Timothy Snyder has argued that in order "To see Ukraine as a subject in history, we have to understand how others have seen it as an object" (Snyder, 2023). And indeed, for centuries, the colonial and imperial ambitions of others—Russians, Poles, Swedes, Austrians, Germans, and Ottoman Turks, primarily defined what Ukraine was. These powers saw Ukraine as a borderland, situated at the edge of empires, a contested space which they sought to divide, dominate and incorporate.

Imperial powerbrokers prevented Ukrainians from achieving an independent historical path, relegated them to the sidelines, and denied their historical agency. Some of the essential building blocks of Ukrainian history are therefore connected to the histories of the multiethnic empires that long dominated Central and Eastern Europe. A key event in Ukrainian history was the dismemberment of the Polish-Lithuanian Commonwealth in the late 18th century. Three dynastic empires, Czarist Russia, the Austrian Habsburg Empire, and the Kingdom of Prussia, carved up the Kingdom of Poland and the Grand Duchy of Lithuania in the process of three partitions, in 1772, 1793, and 1795. In *Mapping Europe's Borderlands,* cartographic historian Steven Seegel shows how these events set in motion competing imperial mapping efforts, each providing a knowledge base to their empire's administrators and military men in Saint Petersburg, Vienna, and Berlin (Seegel, 2012).

The Napoleonic Wars greatly accelerated mapping efforts, because they underlined the value of cartographic resources as essential planning tools. In "The Irony of Imperial Mapping," Matthew H. Edney argued that an older cartographic tradition that extracted, combined, and integrated information from various available disparate sources like travel itineraries fell by the wayside around 1800. Going forward, mapping was primarily based on "the directly observed and measured survey," the result of extensive fieldwork, a systematic sustained effort that entailed major commitments of both staff and financial resources (Edney, 2009). Mapping agencies, government-funded mapping machines, cranked out large numbers of quadrangles. Maps created in this context should be interpreted as expressions of imperial power and knowledge. The increasingly detailed mapping of the territory of Ukraine did not occur for the benefit of its own inhabitants. It took place because decision-makers, working at distant seats of power, sought to understand their vast imperial holdings. And their imperial gaze regularly hovered over parts of Ukraine.

The decisions made at the Congress of Vienna (1815) at the end of the Napoleonic Wars left most of the Ukrainian lands under Czarist Russian control. Russian cartographers played an important role in mapping Ukraine, a process that began in the 18th century. Czar Peter the Great was interested in cartography, particularly its scientific foundations, and Petrine mapmaking very much laid the groundwork for the progress Russian cartography would make during subsequent centuries. It also established some broad principles which would continue to define it: 1. Published maps had functional and practical purposes; they generally were produced as tools for administrative and military decision-makers. 2. Russian cartography operated under the highly centralized control of the government. Drastic restrictions were imposed on compiling, publishing, and using large-scale maps (Seegel, 2012).

A larger military mapping establishment did not emerge until 1763, when the General Staff of the Russian Imperial Army was set up. The organization, in 1797, of Saint Petersburg's Depot of Maps provided an institutional base for these military mapping activities. The Map Depot also served as a state cartographic archive. In 1800, the Geographical Department of the Russian Academy of Sciences merged with the Map Depot. This represented a major break in Russia's cartographic tradition. Up to that point, civilian cartographic production had been overseen by the Land Survey Department, which was responsible for the maps of Catherine II's General Land Survey, but also issued thematic maps, including some which surveyed the distribution of natural resources (Davis, 2021).

Between 1801 and 1804, Map Depot staff produced its first map series, the twenty-verst map, also known as the hundred-sheet map series, which mapped the entire Russian Empire at a scale of 1:840,000 (13.25 miles to an inch). In 1812, the Map Depot was reorganized and renamed the Russian Military Topographic Depot (VTD). A Russian military topographic service, known as the Corps of Military Topographers, was established in 1822. Its officers worked under the direction of the leadership of the Military Topographic Depot. The more advanced technical training of the officers of the Corps laid the basis for systematic and sophisticated topographic surveys. The first head of this military topographic service, the geodesist and cartographer Fyodor Fyodorovich Schubert, (*Fig. 1, next page*) was the defining figure of this Russian mapping effort. He directed extensive trigonometric and topographic surveys and also compiled the manual, which set the standards for this work. In 1832, Schubert was finally appointed director of the Military Topographic Depot (Davis, 2021).

By 1840 the Depot began publication of a ten-verst map series (1:420,000), which ultimately covered much of the western part of the Russian Empire on 60 sheets. In 1846, cartographers working under Schubert's direction started to produce sheets of the larger-scale three-verst map series (approximately 2 miles to an inch, 1:126,000), which utilized the Bonne projection. (*Fig. 2*) It was oriented to the Pulkovo meridian, the longitude of the Pulkovo Observatory, located near Saint Petersburg, which had been established in 1839. The westernmost provinces, including Ukraine, were the clear focus of this effort to impose order and control. Some larger-scale quadrangles, 1:84,000 and 1:42,000 sheets, were also published, chiefly for Ukrainian territory designated as the "Western Boundary Expanse." (Davis, 2021).

Figure 1. General Fyodor Fyodorovich Schubert (1789-1865), frequently identified as F.F. Shubert or Friedrich von Schubert. Source: Wikipedia. https://en.wikipedia.org/wiki/Friedrich_von_Schubert#/media/File:ShubertFF.jpg

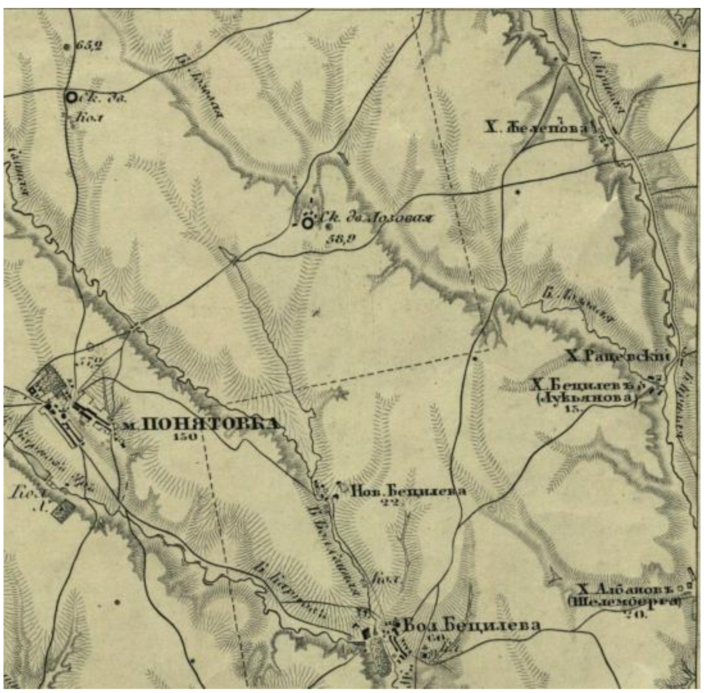

Figure 2. Topographic quadrangle XXX-8 issued 1863, part of the Russian three-verst map series (scale 1:126,000), which is to this day commonly identified as "F.F. Shubert's map." Shows the Vesele area (in Ukrainian: Веселе), today located in Zaporizhzhia Oblast, southern Ukraine. Source: https://commons.wikimedia.org/wiki/File:Russian_Empire_Map_%283_versty%29_30 08_Becilev.jpg

From the early days of Petrine cartography, a strong trajectory had existed that reached all the way to the reign of Catherine II and the Napoleonic Wars: Maps were viewed as tools for planning and visualizing the modernization of the Czarist Empire. In a way, they were expressions of enlightened governance. This rationalist Enlightenment impulse gradually weakened, as Russian nationalism asserted itself more and more strongly during the 19th century. Pan-Slavist ideas also gained currency among decision-makers, beginning in the 1860s. After the Polish November Uprising (1830-1831), Czar Nicholas I took increasingly direct control of the "Western Boundary Expanse" and worked hard to undermine local institutions. This gradually triggered a response as the 19th century progressed.

The British geographer Brian Harley famously stated that maps were useful to imperial administrators because maps claimed lands "before they were effectively occupied" (Harley, 2001). The Czarist Empire's mapping programs in its western borderlands asserted claims of control, ownership, and power. This, of course, invited counter-claims by its colonial subjects. The nascent national movements in Central and Eastern Europe fought and resisted Russian imperial expansion. Steven Seegel has shown that maps were important in the formation of identities and institutions in Central and Eastern Europe, including in Ukraine. Seegel also examined subversive efforts of counter-mapping by cartographers who challenged Russian imperial claims (Seegel, 2012).

The geographer Stepan Rudnytsky (*Fig. 3*) was one such counter-mapper who saw Ukrainians as agents of their own destiny. His maps have been essential parts of the Ukrainian nation-building project. Born in the Austrian province of Galicia, Rudnytsky studied at the universities of Lviv and Vienna. He was a specialist in geomorphology. In 1926, Rudnytsky was invited to the University of Kharkiv by the Soviet government of Ukraine to serve as a professor of geography. There Rudnytsky established the Ukrainian Scientific Research Institute

Figure 3. Stepan Rudnytsky (1877-1937), often credited as the Father of Ukrainian geography. Source: Ukrainian Institute of National Memory (UINM), Kyiv, Ukraine.

of Geography and Cartography, and was soon appointed as the first holder of the Chair of Geography at the All-Ukrainian Academy of Sciences (VUAN). Like many other Ukrainian intellectuals, he was arrested by the Stalinist regime in 1933, and ultimately executed by the NKVD in a penal colony on the Solovetsky Islands in the White Sea, in 1937.

Two of Rudnytsky's maps are especially important. Published in 1917, toward the end of World War I, they hung in Ukrainian classrooms, and helped Ukrainians visualize their new nation-state: A political map identified Ukraine's administrative regions and the locations of hundreds of cities and towns. A second map highlighted Ukraine's physical geography, and showed numerous physical features, hilly terrain, mountain ranges, rivers, and also features on the Black Sea coast. These maps (*Fig. 4*) were powerful visualizations of what Ukraine was, and affirmed the reality of its existence. Ihor Stebelsky called them "mental maps," which helped Ukrainians visualize their country (Strebelsky, 2014).

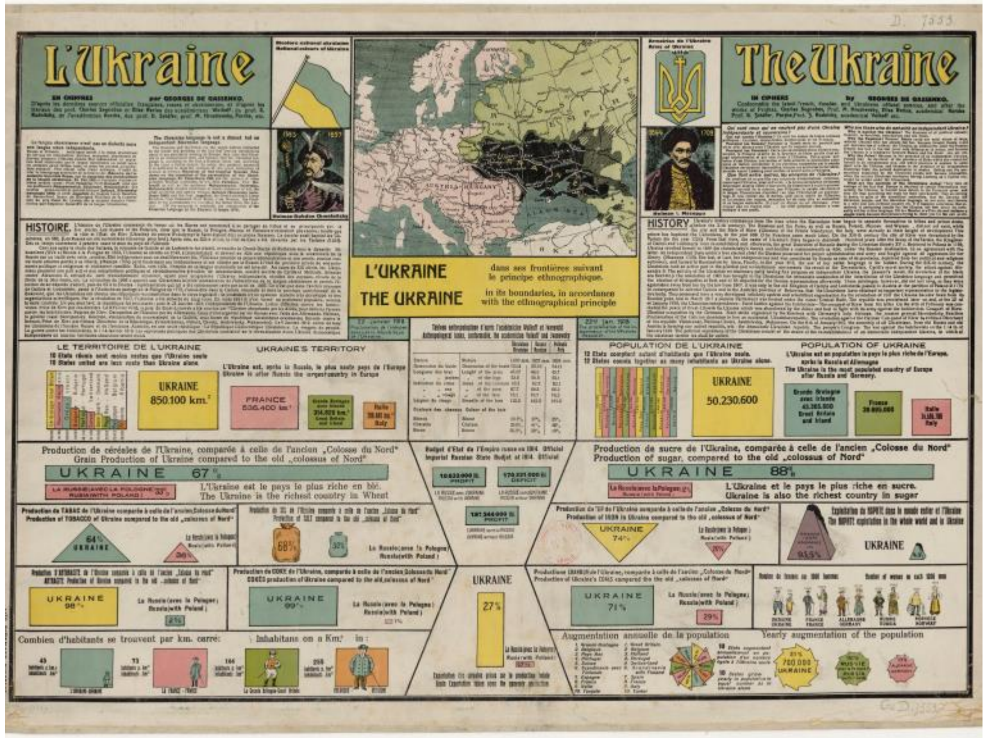

Figure 4. Infographic *The Ukraine in Its Boundaries, in Accordance with the Ethnographical Principle,* published in 1919. Persuasive cartography by Rudnytsky, an infographic with an integrated map, which targeted a French-speaking and English-speaking audience. It was probably primarily directed at decision makers at the Paris Peace Conferences which imposed the settlements that ended World War I. Source: Wikipedia. https://commons.wikimedia.org/wiki/Category:Stepan_Rudnytsky#/media/File:L'Ukraine_dans_ses_fronti%C3%A8res_suivant_le_principe_ethnographique_1919.jpg

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Heiko Mühr is the Map Metadata & Curatorial Specialist at UC Berkeley's Earth Sciences & Map Library. He taught European and U.S. history, and also worked at Indiana University's Oral History Research Center during much of the 1990s. For the last 25 years, Heiko earned his keep in the Special Collections departments of U.S. research libraries, working with maps, archival resources, government documents, and German-language publications.

Schools and Oil Wells: An Unhealthy Proximity

Joseph Kolko

Los Angeles is the most productive urban oil field in the United States. While most "Angelenos" are not aware of the pervasiveness of the oil industry, it is essential to consider its negative environmental impact on the general health and well-being of people who live and work in the city. As a native Angeleno especially interested in environmental issues, this writer has found the topic both interesting and essential to explore, and also believes it is his duty to inform others about the status of domestic oil and gas well drilling in the city, and its potential effect on residents. Preliminary exploration did not reveal any prior research on this topic, and, hopefully, the information presented here will stimulate concern and interest in further exploration and assessment of risk factors. In order to address potential environmental and human impact, this article will explore three essential questions: Is the accumulation of toxic substances and carcinogens an issue for Los Angeles' citizens? Are children, whose development might be negatively affected by proximity, near these active oil wells? And what is the city planning to do to regulate and potentially ban continued oil drilling?

The history of oil wells in Los Angeles dates back to the late 19th century, when the city experienced a significant population boom, and the demand for oil increased. In 1892, the first successful oil well in Los Angeles was drilled in the Echo Park neighborhood, and, soon after, oil companies began drilling throughout the city. By the early 1900s, Los Angeles had become one of the largest oil-producing regions in the world, with over 1,500 wells operating within the city limits. While the oil boom brought significant economic growth and employment opportunities to the city, it also had strong negative impacts, including environmental pollution and urban sprawl. Many Angelenos are unaware that there are still many active oil, and also gas, wells in Los Angeles today. The presence of these wells has raised concerns about the health impacts of exposure to both toxic substances and air pollution.

As we are all aware, living in proximity to oil wells can have a significant negative neurological impact, due to chronic exposure to toxic substances, and to the gasses used in the extraction process. Multiple research studies have demonstrated that these chemicals are linked to an increased risk of neurological disorders, such as Parkinson's disease and cognitive impairment (National Institutes of Health, 2020). Additionally, it has been found that the noise pollution generated by oil wells can lead to long-term changes in brain structure and function, causing stress, anxiety, sleep disturbances, and an increased risk of depression and other mental health issues (WHO Regional Office for Europe, 2011). It is crucial that measures are taken to minimize these risks, including the implementation of safety regulations to reduce exposure to harmful substances and the minimization of noise pollution.

An essential consideration is the potential effect of oil and gas wells on the development of children who are growing up in Los Angeles, and whose days are spent in city schools located in areas which may be negatively affected by the proximity of wells. To explore and document specific potential impacts, a set of maps has been created delineating the distance between oil wells and public schools in Los Angeles County. "ArcGIS" software, along with a publicly available vector data set (NAD83 / California zone), and The Los Angeles GeoHub has been used to create the maps that accompany this article.

The technical methodology utilized in the creation of these maps in ArcGIS mapping software follows a process in which a map of Los Angeles serves as the original ground, and several layers are created over it, using the following process:

1. All data sets required for the project were found in the GeoHub for the city of Los Angeles. The vectorization map was provided by the National Oceanic and Atmospheric Administration (NOAA) .
2. Before mapping, it was necessary to develop a special filter to exclude any non-oil and gas wells from the Los Angeles wells data set. The filter was created using symbology to only include Oil and Gas wells from the dataset ("Type" LIKE '%OG%'). The original number of wells noted on the GeoHub, 21,259, was thus reduced to 18,782, comprising only oil wells within Los Angeles.
3. This filter, with the selected feature containing only oil and gas wells, was then exported as its own new layer, and a print layout was created over the original map.
4. Next, a layer was added to the map indicating the location of all public schools in the Los Angeles area.
5. A 1000 ft, 1/2 mile, and 1-mile buffer layer around the wells were developed utilizing the buffer tool in ArcGIS, and the distance layers were added to the original map. (*Fig.'s 1, 2, & 3, next page*)
6. Only the public schools within each buffer distance layer were now selected, and added as an additional layer. This provided the ability to calculate how many schools were in a given proximity to each well

This mapping process then revealed that:

- 256, or 13% of total LAUSD Public Schools were located within 1000 feet of oil and gas wells
- 730, or 37% of total LAUSD Public Schools were located within ½ mile of oil and gas wells
- 1218, or 62% of total LAUSD Public Schools were located within 1 mile of oil and gas wells.

The findings of this study, as seen on the resultant map, indicate that many students in the Los Angeles Unified School District are exposed to the negative effects of oil and gas wells during the hours that they are in school, and at after-school activities daily, and clearly indicates the alarming fact that over half of LAUSD students are affected.

It is hoped that this article will help to raise awareness of this important issue, which affects so many students over long periods of time. Further analysis and observation of the average test scores of students in schools located closest to oil and gas wells, compared to a control group, would provide further exploration of the wells' impact on the physical, mental, and emotional development of children, and it is hoped that attention to this essential issue will increase with awareness of the results of this first study.

On the bright side, there has been a growing movement to phase out oil production in California due to general concerns about the negative health and environmental impacts of drilling in such densely populated areas. In recent California news, a committee in San Francisco backed by environmentalists and community groups—launched with $500,000 in seed funding by ex-Google CEO Eric Schmidt—is fighting a November 2024 ballot measure backed by fossil fuel companies, that would overturn a 2022 law banning drilling within a half-mile of schools and hospitals. Additionally, in March 2021, the Los Angeles City Council voted to phase out oil drilling within city limits by 2030. This decision was hailed by environmental groups and community activists, who had long been advocating for such a move. The decision to phase out oil drilling was seen as a significant step towards achieving the city's goal of becoming carbon neutral by 2050. However, the transition away from oil production will be a complex process, and there are concerns about how it will impact the local economy, and jobs in the oil industry.

While the decision to phase out oil drilling in Los Angeles is a positive step towards reducing the negative impacts of oil production, as we have seen here, there are still many active oil and gas wells in the city, and these continue to pose health risks to nearby residents. This article has focused on children as an especially vulnerable group, but many of these wells are located in low-income communities of color, where residents are already especially vulnerable to environmental pollution and health disparities. Currently, there are ongoing efforts to monitor and regulate oil production in Los Angeles, including implementing stronger emission regulations, and conducting health assessments of communities near oil and gas wells. However, some community activists argue that more needs to be done to protect the health and well-being of those who live in close proximity to oil and gas wells, and that the transition to

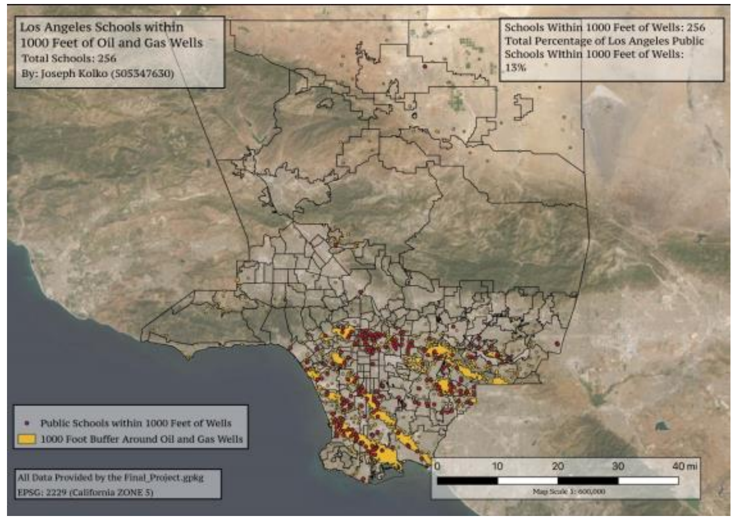

Figure 1. Los Angeles Schools within 1000 feet of Oil and Gas Wells. Image source: Joseph Kolko.

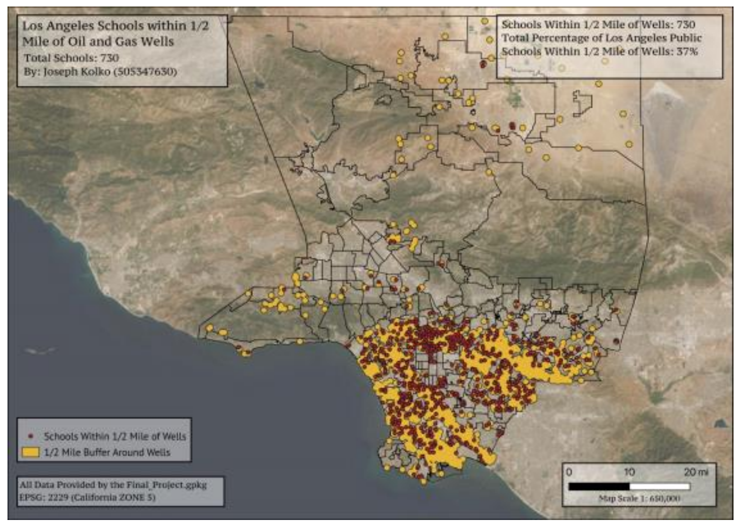

Figure 2. Los Angeles Schools within 1/2 mile of Oil and Gas Wells. Image source: Joseph Kolko.

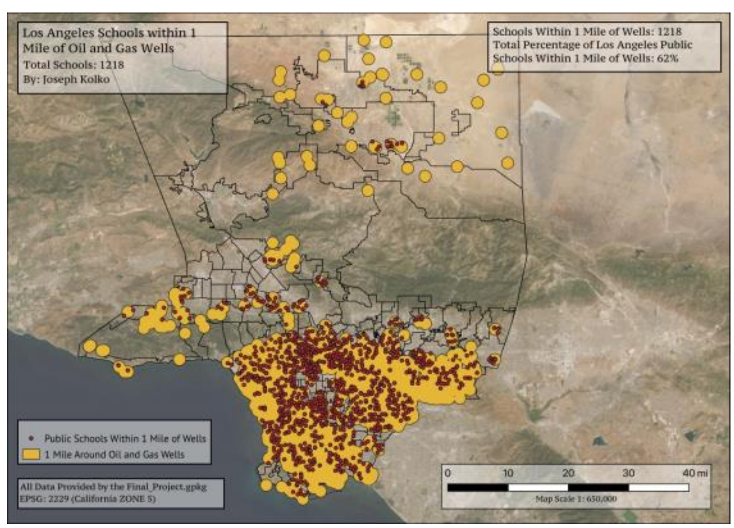

Figure 3. Los Angeles Schools within 1 mile of Oil and Gas Wells. Image source: Joseph Kolko.

cleaner energy sources must be just and equitable for all ages, and in all communities.

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Joseph Kolko has had a long-term interest in environmental pollution and its potential negative effects, and he has been actively involved in defining and addressing these issues in the Los Angeles area. A graduate of UCLA, Joseph studied both Geography and Environmental Sciences, and his current project illustrates the crucial intersection of these two fields. Joseph currently works in the technology and data analytics sector where he assists Fortune 500 companies in assessing large sets of data in order to make informed business decisions.

Practical Maps

Brian Buma, Ph.D.

I'm a climate change scientist. I focus on global issues at broad scales—big-picture science. Global warming, and the upheavals that it brings, are inherently spatial—as global temperatures rise, maps become cherry red at the poles; as the sea laps higher and higher on beaches, sea level projections ring poor Florida and northern Europe with contour lines indicating that their fate is sealed. It is impossible to convey the expansive sense necessary to grasp climate change without seeing it laid out on the whole globe. You can't get your hands on it otherwise. These maps have a vast purpose—to provide a global vision.

All-encompassing as they are, such views offer a crystalline, high-view perspective which is also limiting, because it is abstracted. To the extent that they catalyze action, they are at the global level of policy statements, national interests, and "awareness." But the feelings they engender are mostly intellectual. There is no grit, no sore back, no sense of the risk and reward and uncertainty that is our lives. They make a clear problem statement—the earth is warming, the seas are rising—but rarely show solutions playing out. They just have too broad a perspective.

So, let's turn to simpler maps. Down-to-earth maps. Practical maps, let's call them, to contrast with the pretty glossies: simple sheets of paper and GIS files that get handled every day on truck dashboards and in industrial parks. They are connected to life on earth in a direct-to-the-bone way that many broader-scale cartographic triumphs are not, because maps are tools for action, first and foremost.

The first map shown here is almost crude—a US Forest Service partial quad, in bleached-out brown and green. (*Fig. 1*) It is a map meant to be handled: you can easily imagine the brownish smudges from fingers wet with rain, the folding and refolding of the map on the hood of a pickup until squared-off, grey-dirt creases with little holes in each corner begin to appear. It shows a middling-sized glacial valley, forested, with a large river flowing from the Herbert Glacier into the Lynn Canal, just north of Juneau, Alaska. There's no global scale inset map to orient the reader, no handy landmarks: if you are using this map, you know where you are.

I've worked this landscape intimately. It is a flat, alluvial plain, with 50m-tall Sitka spruce with spiked, crenelated tops. They are so tall that eagles, perched in branches midway up trunks, fish in the groundwater and overflow ponds where salmon get stuck in high water.

The Herbert Glacier advanced during the 1700s, the little ice age, and then retreated, leaving concentric circles of rock piled onto the landscape like waves from a stone, a footprint visible from space. In the 20th century, the glacier's retreat stalled, and it settled quietly, easily recognizable as an extension of the broader Juneau icefield, one of the largest icecaps in North America (again, not noted on this map, because that's not the purpose of this tool).

Like nearly all glaciers and ice caps around the world, retreat has begun again, and this is where the map comes in. It shows mining claims—square blocks of mineral rights. The Herbert Glacier valley is in the "Juneau gold belt," a highly productive strip of geology (gold and other metals), a slice of stone ascending from the deeps to the surface at a 60-degree angle. The belt is the result of the accretion of terranes on the edge of the North American plate over many millions of years. (* A "*terrane"* is made of geological chunks of stone that have chunked themselves together via tectonic plate movement, not to be confused with "*terrain*,"—though terranes create terrain!). In the late 1800s and early 1900s, mining claims were made all over this area. They are played out, but this map, in its workmanlike fashion, indicates that things are heating up again. Claims are being made in advance of the expected glacial retreat, (*Fig. 2, next page*) following the geology that trends southeast to northwest.

A slight digression: The science of environmental mapping owes a large debt to mining. It's not easy to sample bedrock. Geologists roam rocky outcrops like chickens, pecking and scraping at exposed escarpments and dry rock. Good points are scattered; solid rock is usually buried under deep soils, water, and rockslides, so those few good points must be connected. Geologists are fairly good at this: from the general shape of geological formations they infer a bit about the landscape that surrounds them. "Kriging," for example, is a widely used technique, first developed for mapping gold deposits in the Witwatersrand complex in South Africa, a 60km long scarp, with rivers cascading over its vertical edge (hence the Witwatersrand name, meaning "white water ridge"). Kriging, named after its creator, Daniel Krige, is a statistical method for taking a map with limited measurements and creating new estimated values for every other place that wasn't measured, using the weighted average of points from near and far. There are other methods also, but the end goal is the same—taking a few known points, extrapolating, and in the process, finding new places to mine.

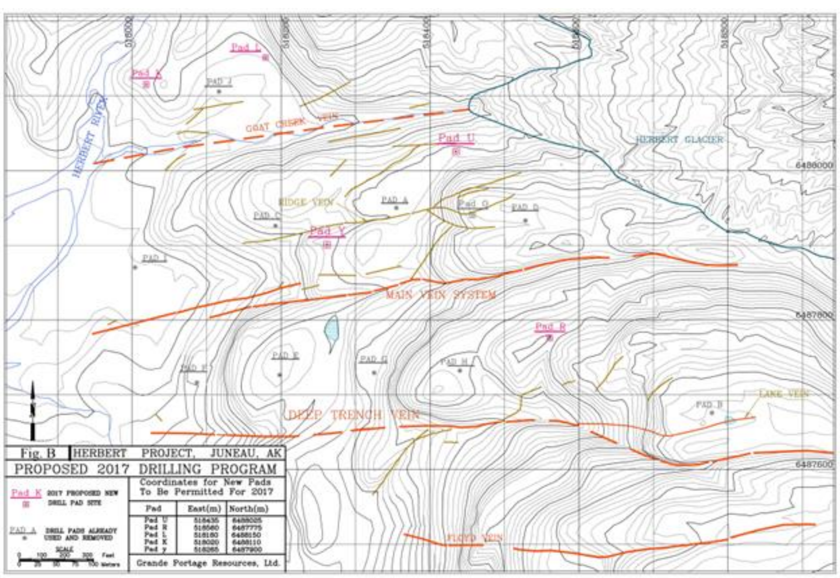

Figure 1. Portion of a US Forest Quad Map in the Herbert Glacier area, north of Juneau, Alaska. Sourse: https://usfs-public.app.box.com/v/PinyonPublic/file/933917730735

There is a strong suspicion that the melt of the Herbert Glacier will expose excellent mineral deposits. Connecting the dots between old mines and samples of rock exposed in the last ten years have led to claims being filed on fresh land, earth recently, or soon-to-be exposed by the melting glacier.

Mapping—the science of connecting dots—makes this possible, and putting the claims on a map makes them actionable.

The third map (*Fig. 3*) takes us to southern Greenland, where tongues of glaciers poke into the ocean, and pack ice rims the shoreline. The scanty vegetation makes the shore a bonanza for geological exploration. Here, also, climate change is leading individuals and companies to set their sights on resources soon-to-be-available, and, in many cases, specifically on the resources needed for many green technologies: critical minerals in the global transition from fossil fuels to batteries and smart grids and electrolyzers, which need lithium, beryllium, and copper by the container load, among other metals. Often known as rare earths, finding large deposits within economically viable landscapes is critical to energy transition. And—it all starts with mapping.

The story is complex. There is little that humans do which creates as indelible an imprint as a new mine. The process involves excavation, of course, but also generates tailing piles laden with heavy metals, alphabet soups of chemicals for on-site refinement, new roads, trucks, and planes—not to mention the fossil fuels burnt, as well as leaks and water quality issues which occur during the process. Mines are essentially permanent on the human timescale. The maps, juxtaposing resources with pristine environments and intact local communities, implicitly show this too.

Along Tunulliarfik fjord is the Ilimaussaq complex, a large sheet of rocks dated to over 1,000,000,000 years ago, and originally pumped up as magma enriched in a variety of rare earth elements. The rocks are "syenites" and resemble an exotic granite. The map, displaying which flavor of syenite is found where, looks like a Jackson Pollock canvas sliced into a topographic perspective (or perhaps a Rorschach test, reflecting how one feels about the potential activities the map enables). The colors indicate the particular provenances of the syenites, the various heats, pressures, and other insults the rock has undergone through its billion-year-plus lifespan, and the various elemental compositions. Salient to the climate change conversation, this complex contains highly enriched deposits of niobium (Nb), a key piece of emerging battery technology. Finds like these are being claimed around the rim of Greenland, from the south end of Tunulliarfik, with its melting glaciers, to north of 83 degrees, the northern tip of the island, at Citronen fjord, where the sea ice is thawing for longer periods each summer, making mineral extraction via ship possible.

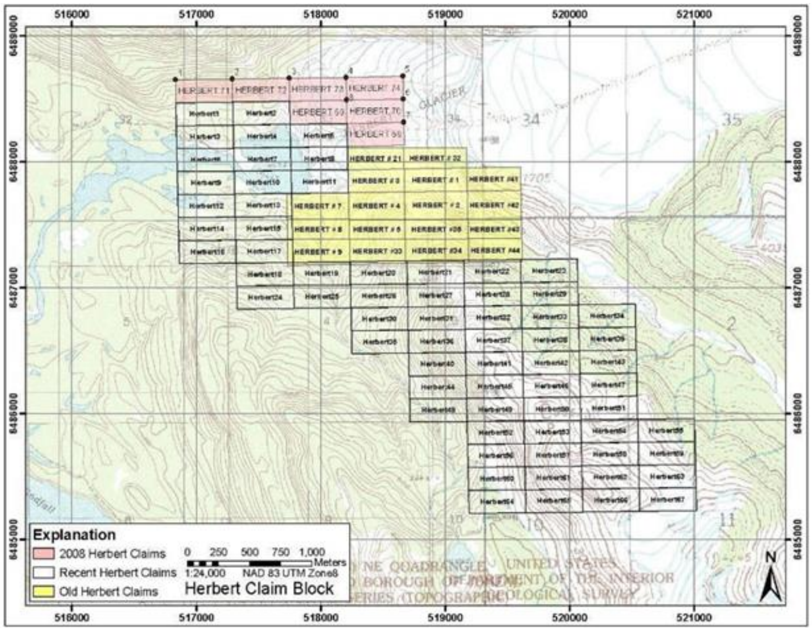

Figure 2. Mining claims around the Herbert Glacier region, north of Juneau, Alaska. Claims have greatly expanded in recent years, primarily for gold, based on drilling programs that began in 2017, and inferred enriched gold deposit geology from those lines and samples. Source: https://usfs-public.app.box.com/v/PinyonPublic/file/933917013094

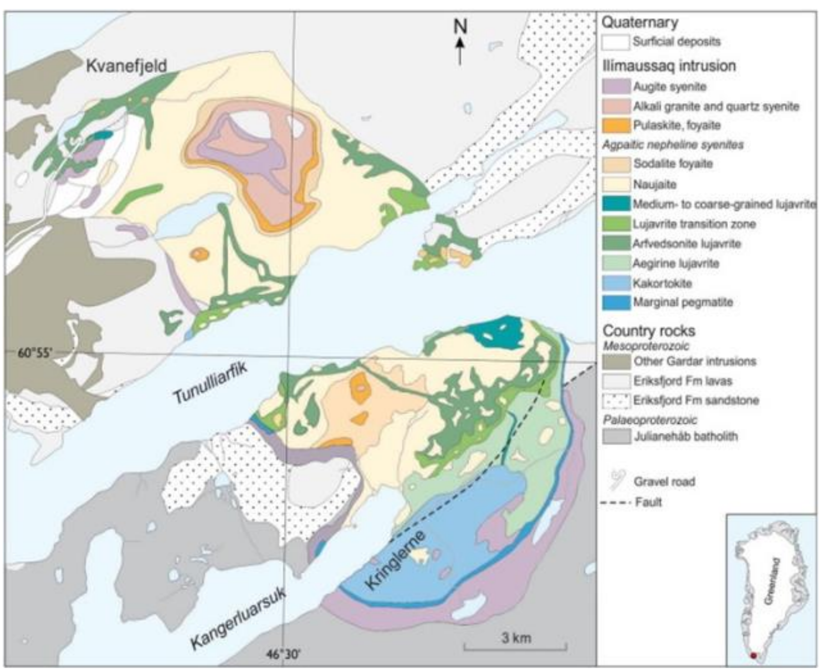

Figure 3. Ecological map of the Tunulliarfik area in southern Greenland, a recently identified hot spot for rare earth minerals of value to a variety of clean energy technologies. Colors show different mineral deposits. Fjords are in light blue. Source: https://www.sciencedirect.com/science/article/pii/S0169136815300755#f0030 (Fig. 6 in the referenced article)

Perhaps the global story—the melting ice, increasing mining, mineral access, and clean energy materials—is better met and addressed with glossy, national and global scale maps showing flows of energy and goods. That perspective is needed to assess the global tradeoffs. But where work actually gets done is determined by these splotches of colors that guide actual drills, actual roads, actual work, and actual damage. People plan their livelihoods, invest their money, and move their families based on these papers. Communities and lives are entangled, for better, or worse, or both, by the implications of these lines. It is a difficult choice: the technologies emerging to replace fossil fuels are innovative and impressive, but create an insatiable appetite for rare earth and riches, whose access is often entangled with the problem that created the need.

Comprehending climate change requires the global view, the synthetic and all-encompassing perspective. But doing something about climate change requires action, and action inevitably comes down to the human scale, so we need these grittier, functional pieces too. Once we move into that sphere, the story becomes less crystalline, more nuanced, and filled with tradeoffs; progress in one place, challenges in another, plusses and minuses. These may be obscured if we only see the problem from a far distance, without encompassing the entire system, from problem statement to action. To plan for the future, the world needs both global and practical maps.

Brian Buma is a global climate scientist, explorer, and author of the recent book "The Atlas of a Changing Climate." His work focuses on the resilience and challenges faced by our natural world, and ways we can do something about it.

The Management of Freshwater in the Land of 10,000 Lakes

Brian Fredrickson

Minnesota is a state whose Sioux Indian name translates into the place "where the waters reflect the sky." Besides a license plate advertising it as the "Land of 10,000 lakes, many of the state's place names are descriptions for water taken from Native American tribes that inhabited Minnesota. Minneapolis, the state's largest city, is an amalgamation of the Dakota Indian word for water and mini, which is the Greek name for metropolis.[1] A smaller city outside Minneapolis called Anoka is a combination of the Dakota name, "a-no-ka-tan-han," referring to both sides of the river, and the Anishinaabe Indian name, "on-o-kay," which refers to working river.[2]

Minnesota's water-rich legacy was created through successive periods of glaciation and retreat. Melting ice left a landscape dotted with lakes, rivers, and wetlands. It is also responsible for the Great Lakes, the largest series of freshwater seas in the world. Lake Superior is the largest of these lakes at 31,700 mi^2, or slightly larger than the entire State of Maine.[3] Unlike few places in North America, three continental divides converge in northern Minnesota at the Laurentian Divide, where water drains north to Hudson Bay, east to the Atlantic Ocean, and south to the Gulf of Mexico. (*Fig. 1*)

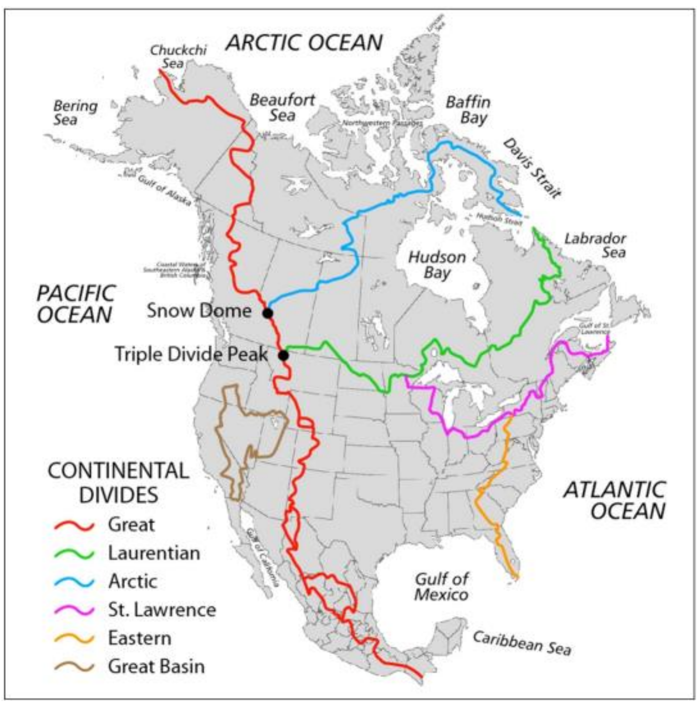

Figure 1. Continental Drainage Divides in North America. Source: https://commons.wikimedia.org/wiki/File:NorthAmerica-WaterDivides.png

Minnesota's abundance of freshwater has always been considered both a blessing and a curse. Throughout history, economic progress led to rivers and streams that were rerouted, straightened, buried, and used as waste conduits. Lakes were pumped, dissected by roadways, and filled. (*Fig. 2*) Efforts to create farmland from waterlogged soils have resulted in the loss of approximately 42% of the state's estimated 16 million acres of wetlands.[4] As in many other states, these cumulative impacts propelled some of the region's leaders to act. In the 1970s, Congressman John Blatnik joined others in the US. House of Representatives to create the Federal Water Pollution Control Act, the precursor to the modern-day Clean Water Act (CWA).[5] The purpose of the CWA is unfulfilled in Minnesota and throughout the nation.

However, it serves as the key federal companion to Minnesota's own Clean Water, Land, and Legacy Amendment (Legacy Act). The Legacy Act dedicates a small portion of the

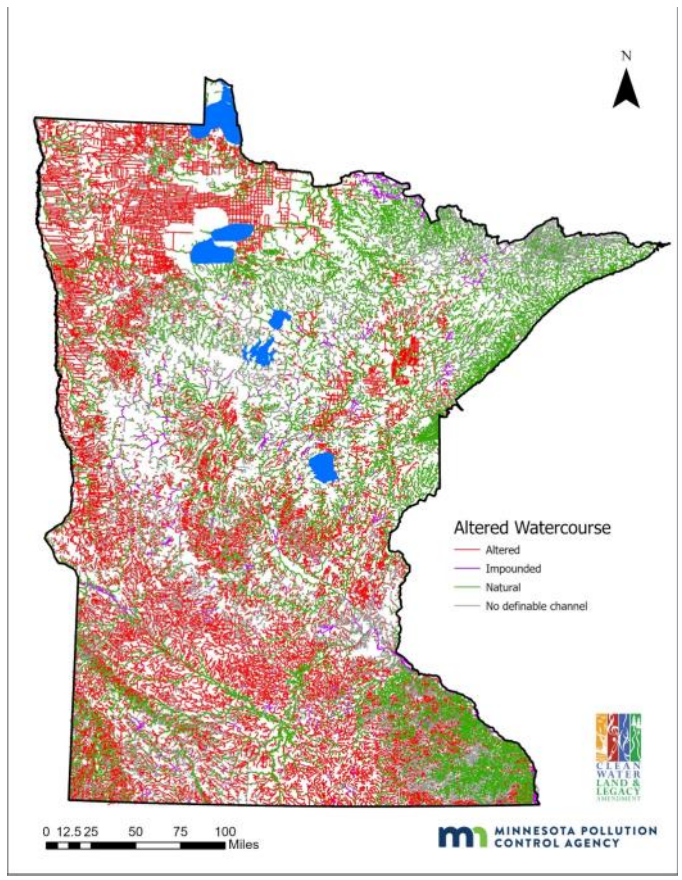

Figure 2. Altered Watercourses in Minnesota is a State-wide Inventory of Streams Hydrologically Changed by Humans. Source: Minnesota Pollution Control Agency and Minnesota Geospatial Information Office. 2019. https://www.pca.state.mn.us/air-water-land-climate/the-impact-of-altered-watercourses

state's sales tax to clean water, outdoor projects, the arts, and cultural heritage. Since its inception in 2008, the fund has paid out $1.36 billion dollars for clean water projects.[6]

Water is called the "universal solvent" because more substances dissolve in it than in any other liquid on Earth.[7] As a result, protecting water quality is a challenge under the best of circumstances.

Minnesota's current state-wide water quality management approach focuses on a rotating cycle of major watershed plans, accompanied by the CWA's requirement to develop Total Maximum Daily Load (TMDL) pollutant allocations for impaired waterbodies. The watershed planning approach is supplemented by state and non-profit organizations engaged in restoration projects ranging from stream realignments to dam removals, lake and wetland restoration, and runoff reduction. The sheer level of water resource project activity is impressive. However, it is difficult to determine if this work is sufficient to offset losses to development, climate change, and programs that appear to work at cross purposes. The Minnesota Department of Natural Resources (MDNR) provides millions of dollars in Legacy Act funds to groups that acquire land and easements for fish and wildlife habitat. At the same time, the Minnesota legislature created the Office of School Trust Lands, whose mission is to sell and produce revenue from the state's remaining 2.5 million acres of trust lands.[8] These lands provide the same habitat and water quality benefits being purchased through the Legacy Act.

The Minnesota Pollution Control Agency (MPCA) has a multipronged approach to water resource restoration and protection. On the restoration front, the MPCA uses a standardized process to produce plans designed to restore water quality in impaired waterbodies. This process involves using flow duration curves to generate TMDL pollutant load calculations. Once calculations are agreed upon, reductions and implementation strategies become the responsibility of major contributors. The process of achieving water quality improvements relies on a combination of tools that involve permits, grant money, and good faith commitments by private and public entities. While the jury is still out on its effectiveness, the Minnesota Legislature has been reticent to provide any additional legal authority to compel cleanup action.

Figure 4. Minnesota Slip Clean Up of Contaminated Sediments (Duluth, MN). Source: Minnesota Pollution Control Agency, 2020

The adage that an "ounce of prevention is worth a pound of cure" undergirds a companion approach by the MPCA, referred to as Watershed Restoration and Protection plans (WRAPS). These standardized plans are built around the state's eighty-one major watersheds. They tend to have a list of prioritized recommendations which are both pragmatic and aspirational. The major route for implementation is through collective action by agencies using state, federal, and local funds for project implementation. The Legacy Act is a distinct advantage for Minnesota since it provides cost-share funds leveraging greater federal financial support.

Figure 3. US and Canadian Designated Great Lakes Areas of Concern. Source: Environment Canada and the International Joint Commission. https://www.ijc.org/en/what/glwq-aoc [Pub. note: Legend has been enlarged]

Minnesota is one of eight states that share the Great Lakes with Canada. The Great Lakes have a unique governance structure because they are shared between the United States and Canada. As a response to pollution, the US and Canada signed the Boundary Waters Treaty in 1909, which set the stage for the creation of the International Joint Commission (IJC) and the 1972 Great Lakes Water Quality Agreement.[9] The Water Quality Agreement is the principal tool both countries employ to restore bays and harbors impacted by the legacy of industrial pollution. Forty-two of the most highly polluted areas are classified by IJC and the federal governments of the United States and Canada as Areas of Concern (AOC). (*Fig. 3*) There are eight AOCs on Lake Superior, one of which is the St. Louis River, a waterway shared by Minnesota and Wisconsin.

The cleanup and ecosystem restoration of the St. Louis River has accelerated since the US government passed the Great Lakes Restoration Initiative (GLRI) in 2010. The GLRI came out of the recognition that the Great Lakes were both plundered and heavily impacted during the industrial revolution. Over 7400 conservation and restoration projects have been funded by GLRI since its inception. Projects undertaken in the St. Louis River AOC include sediment cleanup and removal near the site of the US Steel Duluth Works and behind a network of dams where pulp and paper companies formerly discharged untreated wastes to the river. One particularly noteworthy project removed 154,000 tons of contaminated sediment in a Duluth slip occupied by the William A. Irvin, a retired ore carrier and former flagship of the US Steel Great Lakes fleet.[10] Sediment cleanup necessitated moving the Irvin between a pedestrian lift bridge, where the clearance was measured in inches. An ArcGIS storybook (AOC Consequences and Projects) describes this slip cleanup project in detail and outlines the plethora of habitat and restoration projects completed or underway.

What makes the protection of rivers, lakes, and wetlands so challenging is managing the myriad of human activities that cumulatively impact water. Clearly, the largest and most challenging impact is the changing climate. Lake Superior has lost an average of two months of annual ice cover since observations were first collected in 1857.[11] Loss of ice cover exposes the lake to higher rates of evaporation and to more rapid seasonal warming. The first documented case of cyanobacteria, or blue-green algae, ever observed on Lake Superior occurred in 2018.[12] While recreationists might welcome a warmer Lake Superior, this change could portend a future with recurrent and toxic algae blooms. Similarly, even subtle changes in precipitation patterns and drainage will fundamentally reshape Lake Superior's water levels and shorelines. Between 2017 and 2019, the City of Duluth experienced four large wind-driven storms that caused between 25-30 million dollars of damage to its shoreline-hugging walkway.[13]

While Minnesota often goes its own way in protecting its environment and water resources, Chesapeake Bay provides an instructive national lesson on the challenge of restoring watersheds undergoing rapid development. While citizens and government have been working to restore the Chesapeake Bay for years, a contingent of scientists and policymakers stated that "After decades of effort, the voluntary, collaborative approach to restoring the health and vitality of the Chesapeake Bay—the largest estuary in the United States—has not worked and, in fact, is failing".[14] Humanity's lesson in the Chesapeake Bay parable is that no program, or set of restoration projects, can compensate for the continuing loss of nature's ability to naturally cleanse and sustain water in the mid-Atlantic states, Minnesota, or anywhere else in the world.

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Where The Wind Cherubs Blow

Juliet Rothman

We tend to think of maps as depicting and describing the earth from a physical standpoint: mountains, rivers, lakes and oceans, deserts—very concrete, clearly visible, and tangible features, which, except for natural occurrences such as earthquakes and volcanic activity, remain generally stable over time. Although air is also a physical phenomenon, its general invisibility and intangibility tend to exclude it from physical depictions. However, as any sailor or navigator knows, air, which often manifests as winds, is an extremely vital element to consider in navigation.

Recognizing this, many early creators of sea charts, portolans, and maps of areas of the world found it vital to develop a method for communicating information about winds and directions. Indeed, until the 15th century, when the magnetic compass was developed, navigators relied on winds to determine directions at sea.[1] Classical maps and charts often included wind roses, illustrating the names of the winds and the directions in which they blew. These generally had 12 points of direction, but sometimes varied between 8 and 24 points. Each point of direction carried the name of a wind.[2]

Winds as symbols for directions were first used on world maps in the 10th century.[3] By the Middle Ages, some mapmakers had replaced the compass rose with the faces of cherubs, or wind gods, generally numbering 12, placed in a circle or an oval, depending upon the shape of the map, with wind names either nearby or blowing from their mouths, often surrounded by clouds. Baumgartner notes that wind blowers added to maps were often “personifications deeply rooted in cultural memory.”[4] Wind heads on maps were depicted as adult males, as contemporaries of the cartographers, or as cherubs.[5] While maps with wind heads began with 8-12 heads, this number increased with the expansion of mapping to a wider global perspective, as the known reaches of the earth expanded.[6] Each wind head was portrayed as unique, with its own expression, hair, and facial features, and it is thought that the manner in which they were portrayed also informed viewers about the nature of the winds.[7]

Aeolus, the Greek god of the wind, appears in Homer’s *Odyssey* and *Iliad.* and Virgil’s Aeneid describes winds as having major roles. Both authors use specific names for the winds, such as Boreas, Eurus, Notus, and Zephyrus, names that persisted on maps for centuries. Winds and wind directions became more technical with Aristotle’s *Meteorology*, which both names and gives direction to 12 winds. Wind gods and wind names continued into Roman times and, by the Middle Ages, began to appear on maps as a part of the "medieval concept of the universe."[8] Winds were attributed to a variety of causes: the stirrings of air, exhalations, the sun and planets, air expansions or contractions, caves, and clouds.[9]

But, why cherubs? While certainty is not possible, several interesting theories may be considered. Jewish, Christian, and Islamic religions all include angels, who have a very special relationship with the Deity. Cherubs, as part of the angel hierarchy, are one of the forms angels may take in each of these religious traditions. The word "cherub" itself may be derived from the Akkadian *karibu,* meaning to pray or to bless.[10] It may have been considered possible that a religious connection between cherubs and the higher powers could be manifested as winds, blowing in from the vast unknown above, perhaps bringing messages.

In the ancient Greek religions, wind gods known as *anemoi* blew in a specific direction. *Anemoi* were the children of the goddess Dawn, *Eos*, and her husband, *Astreus*, the astrological Deity[11]. As children, their cherubic faces seem an appropriate rendering! They were given names: *Boreas* (N), *Notus* (S), *Euros* (E), and *Zephyrus* (W), and appear in Homer’s works. Aristotle’s 12 wind names were also used by Ptolemy, and appear as wind cherubs on his maps. Roman mythology equated the Greek *anemoi* with the Roman *venti*, and named the 12 winds as *Septentrio* (N), *Aquilo* (NNE), *Vulturnus* (NE), *Subsolanus* (E), *Euros* (SE), *Euroauster* (SSE), *Austeronotus* (S), *Eurotonus* (SSW), *Africus* (SW), *Zerphirus* (W), *Euros* (NW), and *Circius* (NNW).[12] The names of winds and wind cherubs also changed with time and culture: Charlemagne, Arab scholars, Italians, English, and the Portuguese also had names for winds which differed from each other.[13]

It is interesting to explore three maps that prominently feature wind cherubs: two of Munster’s maps—a Ptolemaic map, and one based on 16th-century knowledge, and Agnese’s world map.

Claudius Ptolemy (ce100-170), a Greco-Roman living in Alexandria, created a historical geography, the *Geographia*, in the 1st century, which listed the coordinates of 8000 places on earth.[14] While no maps possibly created directly by Ptolemy exist today, several cartographers have utilized Ptolemy’s features and directions, including the wind cherubs based on Aristotle’s work, which Ptolemy had incorporated.

Sebastian Munster (1489-1552) was the most important cartographer/geographer of the 16th century, with approximately 35 editions of his atlases. His ground-breaking *Cosmographia* of 1550 is a geographic description of the world, published posthumously in 1552.[15] His 1540 version of Ptolemy’s *Geographia* was most influential in disseminating Ptolemy’s information changes throughout 16th-century Europe.

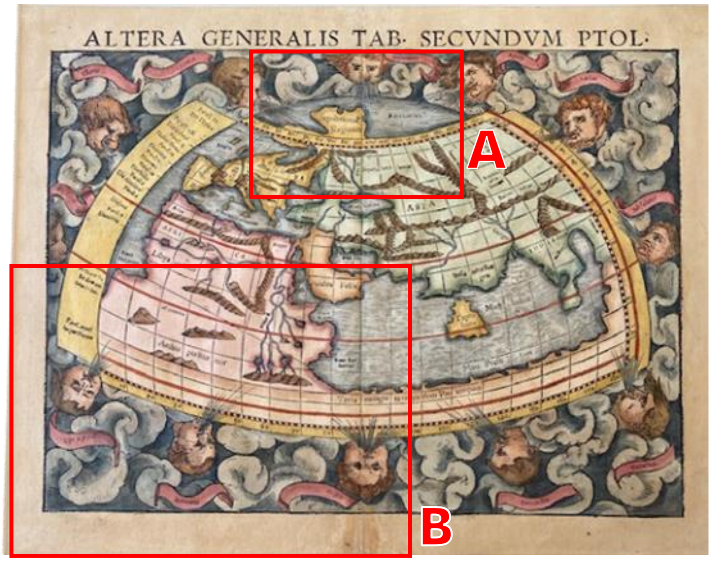

Figure 1. Sebastian Munster's 1540 second Ptolemaic woodcut of the world printed by Heinrich Petri, This map appears to be a derivative of the Ulm 1486 woodcut of the known world by Johanne Schnitzer. Source: Map collection of Juliet and Leonard Rothman)

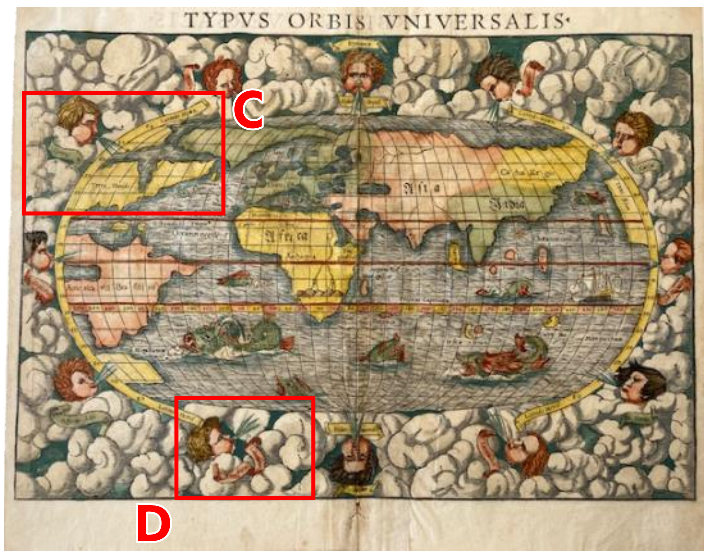

Figure 2. Sebastian Munster's 1540 elliptical modern world woodcut, engraved by David Kandel and printed by Heinrich Petri appears to be structurally based on Benedetto Bordone's world map of 1528. Source: Map collection of Juliet and Leonard Rothman)

The atlas included two world maps, one grounded in Ptolemy's knowledge and descriptions of geography, and one, more "modern", of his original creation. Both of these maps included cherubs. (*Fig. 1 & Fig. 2*)

As there were no maps in Ptolemy's *Geographia,* Munster's rendition of Ptolemy's map includes the wind cherubs as originally designated and named by Aristotle. The cherub heads, placed in an oval surrounding the map itself, differ slightly in several ways: hair varies in density, is curled or straight, includes various shades of reddish to brownish, eyes may be open or closed, the shape of the face varies markedly,

Figure 3. Inset A

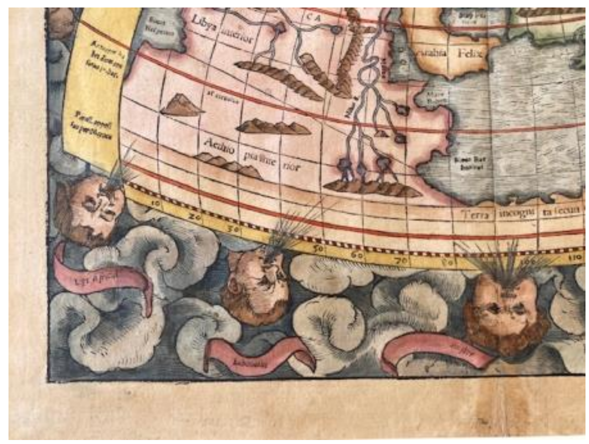

Figure 4. Inset B

the angle of the head to the map itself varies, and the amount and angle of the wind, indicated by straight lines from the mouth of the cherub to the map, varies. Only the southerly-placed winds, Vulturnus, Euroauster, Auster, Libonotus, and Lips Africus cross the border, and enter the lower aspect of the map labeled terra incognita, while the other winds remain along the edges, with the exception of the northernmost wind, Septentrio, which blows directly on the Regiones Septentrional. The outer edges, beyond the oval of the map, also include clouds, curled around the heads and each other, with a darker blue background. (*Fig. 3 & Fig. 4*)

Munster's 1540 version of the map of the world, created that same year, followed by others in 1542, 1545, and 1552, is designed within a complete oval. His colors appear brighter and denser, and the clouds, also denser in quantity, appear much more dramatic. The wind cherubs on this map continue the variations in hair color and style, face shape and angle, and all but Subsolanus' have wide-open eyes. Munster included another name for the wind AustroAfricus, Libonius, and kept both together on his map. (*Fig. 5, next page*) He replaced the Ptolemaic name Vulturnus with Euros.

The black lines emanating from the cherubs' mouths all cross into the map itself, with the exception of Euroauster,

Figure 5, Insert C (*see Fig., prior page*)

Figure 6. Inset D (*see Fig. 2, prior page*)

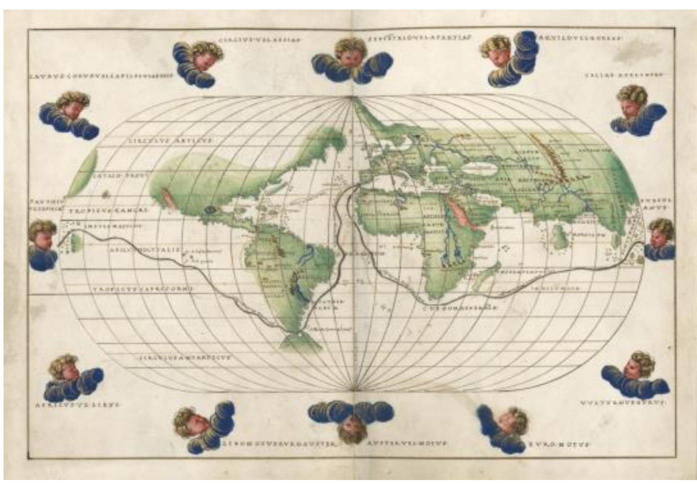

Figure 7. Agnese, Battista, World map depicted from *Portolan Atlas of 9 Charts and a World Map, Etc*. (1544). https://www.loc.gov/item/98687206/.

whose lines end right at the border. This colorful map also includes various sea monsters, mostly in the southern oceans, and it is obvious that explorations had provided additional details about the American continents not known in Ptolemy's time. Interestingly, the North American continent is named "Florida"! (*Fig. 5*)

In researching mid-16th century wind cherubs on maps, Battista Agnese's name was always noted as a cartographer who included cherubs in his manuscript maps. He worked primarily in Venice, where he designed and created 77 atlases, each of which included a series of beautifully ornamented maps, decorated with gold, for royalty and high government officials.[16] He also created a portolan atlas with 12 wind faces, using the Italian names for the winds rather than the classic Greek or Roman names. On his *mappa mundi*, his world map, both the Latin and the Greek wind names for each cherub are clearly and carefully written above their heads. It is interesting to note that the west wind, on the left side of the map, is named *Favoniuve Zephyr, Favoniuve* after one of the original *anemoi* of Roman mythology[17], and Zephyr, the commonly used Greek name.

Agnese may also have ascribed a double meaning to his wind cherubs—they both provided a sense of direction and orientation, and seemed to be personifications.[18] It is interesting to note that, on Agnese's world map, unlike the winds in the previous two maps, the winds are colored blue with gold, and painted tightly around the cherubs, seeming to hug them! (*Fig. 7*) The map also illustrates Magellan's route, which is "inscribed in pure silver" but "later tarnished" with the passage of time.[19]

With time, the popularity of cherub faces on maps faded, but it is well to remember that cherub faces, and other wind heads, created the directions used in the modern 12-point compass directions still today!

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Winds of Italy ceramic

Bird Migration Explorer

Chad J. Witko & Erika J. Knight

Birds beautifully symbolize our planet's rich biodiversity, spanning every continent and nearly every habitat. However, beneath their captivating beauty lies an alarming reality: bird populations are rapidly declining. Reports from leading ornithological organizations highlight the severity of this crisis, with nearly half of all bird species globally facing a decline, and one in eight at risk of extinction (BirdLife International 2022). In addition to the loss of 3 billion breeding birds in North America since 1970 (Rosenberg et al. 2019), rising global temperatures also pose a significant threat, with two-thirds of North American birds at an increased risk of extinction (Bateman et al. 2020). These findings underscore the immediate need for action to safeguard avian biodiversity. Mapping birds' movements and migratory behaviors throughout their annual cycle is crucial to addressing this decline. Tracking their journeys provides valuable insights into their full annual cycle, including migratory connectivity, key stopover sites, and specific ecological needs during different migration phases. By mapping migratory patterns, we gain invaluable knowledge to guide better-targeted conservation actions and uncover hidden scientific discoveries.

The National Audubon Society launched the Migratory Bird Initiative in 2018 to compile the best-available research on migratory birds and their movements in order to address the decline of their populations in North and South America. The Initiative incorporates hundreds of contributed tracking datasets from researchers and institutions, and collaborates with scientific, conservation, and policy partners to address conservation challenges and identify critical habitats. Beginning with 458 migratory bird species that breed in the United States and Canada, the Migratory Bird Initiative provides a data-driven foundation for informed decision-making and targeted conservation strategies.

With nine founding partners, Audubon launched the Bird Migration Explorer (Smith et al., 2022) in September 2022, the cornerstone public-facing product of the Migratory Bird Initiative. This free online geospatial platform, available in English (birdmigrationexplorer.org) and Spanish (exploraves.org), allows users to view the epic journeys of hundreds of bird species, gaining critical and sometimes novel insights into their annual migrations and subsequent challenges, all while helping the user understand the significance of their location within the Western Hemisphere and its fabric of interconnected habitats and migratory pathways. Integrating a wealth of bird tracking data (e.g., satellite tags, light-level geolocator), connectivity data (e.g., banding records, automated radio telemetry, genetic sampling), and abundance and range data, the Bird Migration Explorer offers a captivating and educational experience unlike any other. With species migration maps, location connection maps, and maps illustrating conservation challenges, users can explore the intricate movements of migratory birds, understand how birds connect the hemisphere, and learn about conservation efforts that protect birds and the places they need year-round.

On the Bird Migration Explorer's homepage, users arrive at a colorful, interactive "Migration Journeys" map showcasing the routes of nearly 10,000 birds from 187 species based on tracking data from over 400 studies. The map provides a striking visual representation of the migration routes undertaken by five taxonomic groupings of birds: landbirds, raptors, shorebirds, waterbirds, and waterfowl. From the northernmost regions of North America to the southern latitudes of South America, the equal-area map allows vivid displays of the awe-inspiring scale and scope of bird migrations across major flyways, as bird tracks trace out coastlines, river valleys, mountains, and oceans across the hemisphere.

From the homepage, the Bird Migration Explorer offers visitors three primary user journeys. First, Species Migration Maps for 458 species, which are the arguable flagship feature, provide a comprehensive visualization of migrations for each species, enhancing our understanding of the complete annual cycle, and including areas of high abundance, the timing of arrival on breeding and wintering grounds, and pathways taken during migration. Users will find an information panel presenting life-history details, conservation statistics, access to three available species-specific maps, and relevant links. These time-enabled, animated maps combine individual tracking data with abundance information and up-to-date species range maps, providing an immersive and informative experience. The user can control the map timeline, view abundance data across multiple weeks, or zoom into an area of interest to reveal a finer resolution of the data presented. Furthermore, clicking the Data Providers panel reveals a dynamic list of data sources that is unique to each migration map in the Explorer.

Second, the Bird Migration Explorer offers Location Connection Maps, highlighting the critical places that local birds rely on and demonstrating the hemispheric impact of local conservation efforts. Based on over 4 million place-to-place connections, users can explore pre-selected hotspots or choose specific locations of interest to understand the connections between their location and other places, revealing the hemispheric linkages between different habitats. Additionally, by selecting a secondary location on the map, users can learn which species were tracked between the two locations, and see a list conservation sites in each location, enriching our understanding of the interconnectedness of bird habitats across the Western Hemisphere

Third, the Bird Migration Explorer features maps illustrating 19 Hemispheric Conservation Challenges, ranging from light pollution to drought to power lines. These hemi-

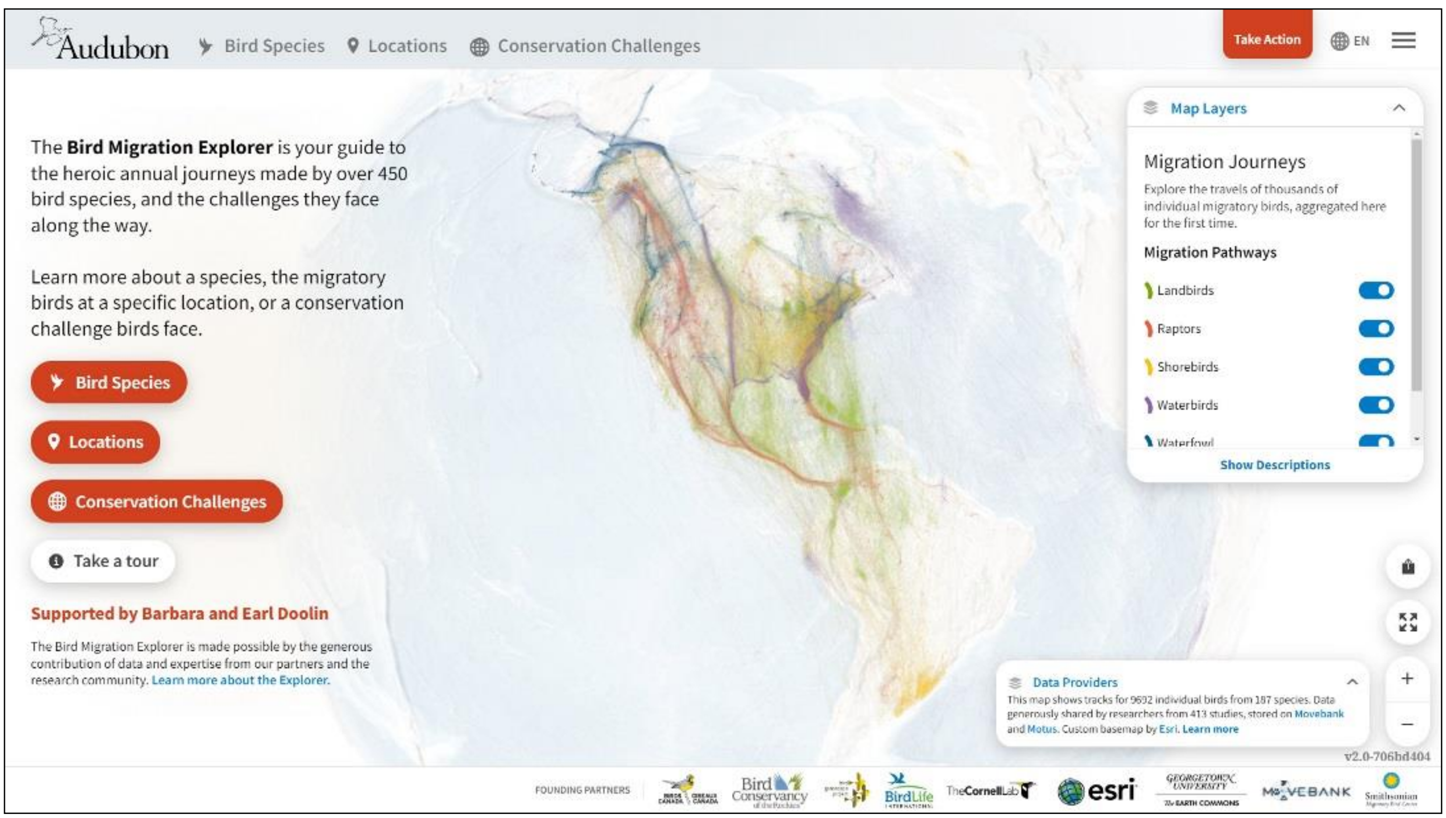

Figure 1. The Migration Journeys map shows the annual migrations of nearly 10,000 individually tracked birds.

Figure 2. Swainson's Hawks fly south during fall migration from California and the western US to Central and South America.

Figure 3. Birds connect Sacramento, CA to much of the Western Hemisphere.

spheric maps show the location and intensity of the challenges that birds face. By choosing a hexagon on the map, a location-based list of species facing the challenge appears in the sidebar. Selecting a species from the list leads to the Species Conservation Challenges map. By combining data on species migration and conservation challenges, these animated, time-enabled maps depict the exposure of a given species to a particular conservation challenge throughout the year to show where and when birds may be impacted. A histogram on the bottom of the screen summarizes exposure patterns over the course of the year. Bivariate map symbology conveys information about species abundance and exposure within summary hexagons for each week. Zooming into the map reveals a finer resolution of these data. The Bird Migration Explorer offers a comprehensive understanding of the conservation landscape by highlighting specific challenges and their co-occurrence with different bird species. This information empowers practitioners to prioritize and address the most urgent issues, aiding in effective conservation efforts.

This powerful resource would not have been possible without the generous contributions of partners, researchers, and institutions. Like the body of migratory bird science, the Bird Migration Explorer is ever-growing and updating with the most recent research available. Audubon's Migratory Bird Initiative invites data-holders from across the globe who may be interested in being part of this hemispheric effort to reach out and learn more about how to contribute.

Ultimately, the future survival of our migratory birds will depend on the actions we take today across the entire hemisphere. Resources like the Bird Migration Explorer, through their unique ability to localize the majestic and impressive feats of migratory birds, educate and inspire birders, conservationists, and advocates to protect these birds and the places they need today and tomorrow.

Acknowledgements
Audubon's Bird Migration Explorer was made possible by the contributions of data and expertise of a large scientific community, especially our founding partners: Birds Canada, Bird Conservancy of the Rockies, Bird Genoscape Project, BirdLife International, Cornell Lab of Ornithology, Esri, The Earth Commons at Georgetown University's Institute for Environ-

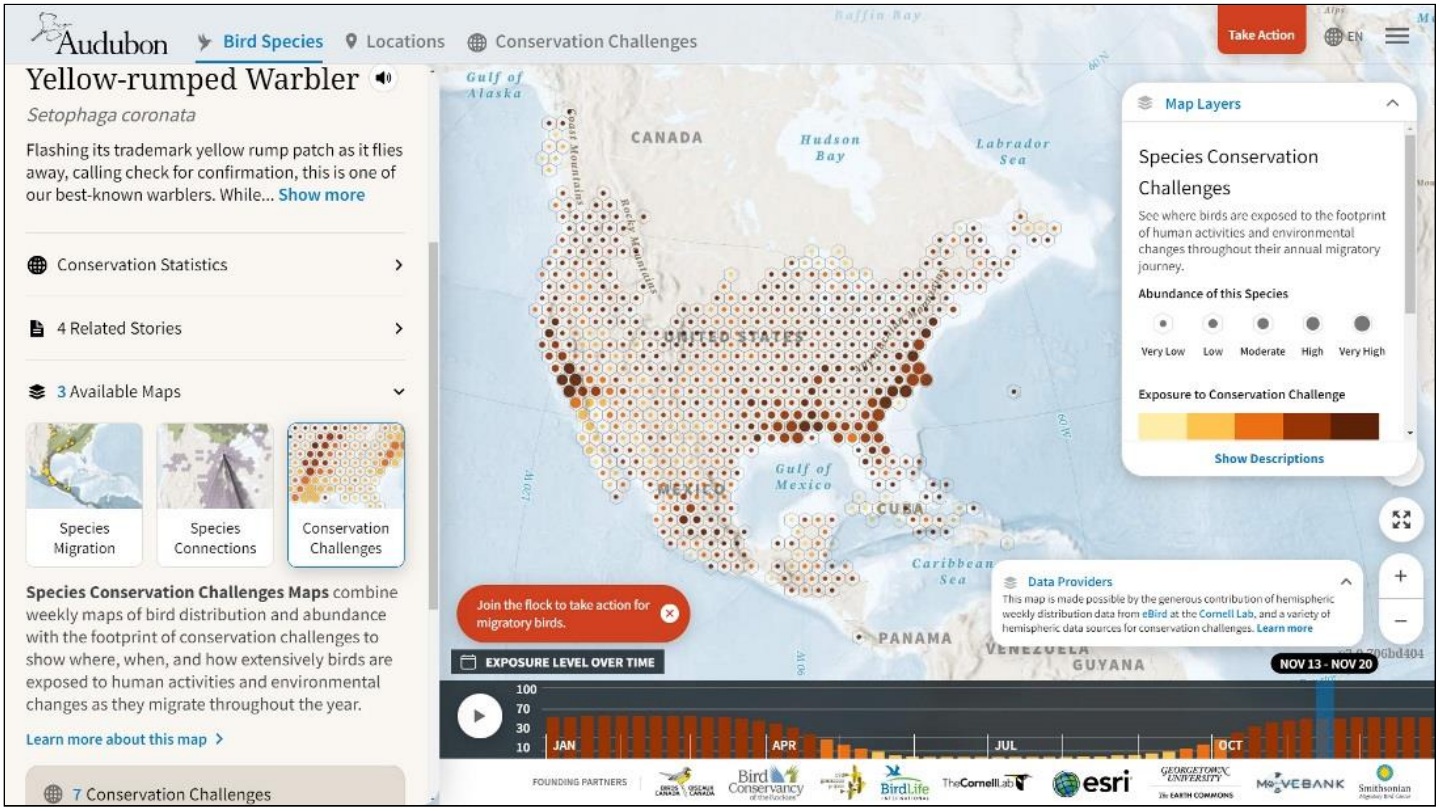

Figure 4. Light pollution is a concern for Yellow-rumped Warblers during migration.

ment & Sustainability, Movebank, Smithsonian Migratory Bird Center and the Migratory Connectivity Project. Financial support was provided by Barbara and Earl Doolin, and Joe Ellis. For more information about the Bird Migration Explorer's supporters, partners, and data providers, visit https://explorer.audubon.org/about.

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Spring issue: Maps on Stamps!

Did size matter?
The Aegean Sea on portolan charts of different resolutions
Part II
Luis A. Robles Macías

Part 1, published in the latest issue of Calafia, introduced the question of how the Aegean Sea's depiction varied on portolan charts and atlases of different sizes. This second and last part discusses the impact of those variations.

Did size matter?

At first sight, it could seem obvious that a large map must contain more detail than a smaller one of the same geographical area. However, past mapmakers did not necessarily saturate available space with data (nor do they today). The type and amount of geographical information displayed on a map depends not only on the map's size but also on its purpose, on the available sources, and on the mapmaker's skills and technologies.

I have surveyed the maps presented in Part 1 of this article to quantify their geographical information. First, the number of identifiable islands in the Aegean Sea has been counted. "Identifiable" means here islands that are labeled with a toponym or that at least are drawn with a defined shape. Simple dots that may represent navigational dangers rather than islands are excluded. Results are plotted versus map area in Figure 4.

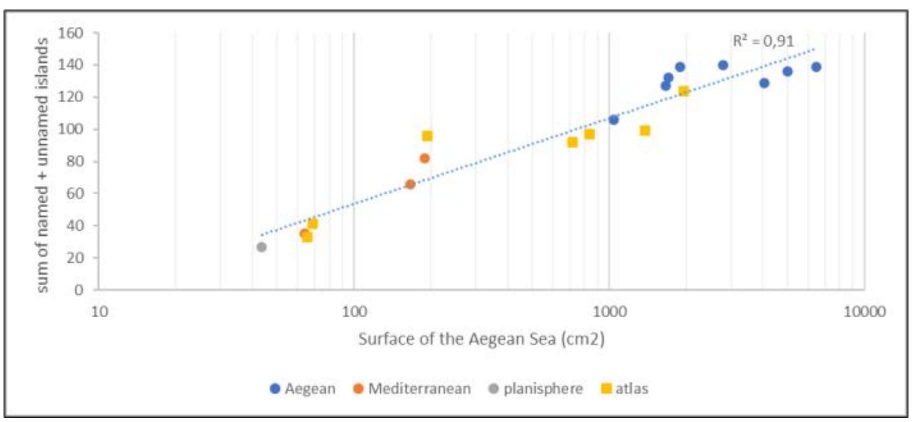

Figure 4. Number of recognizable islands vs map area (horizontal axis is in log scale).

A correlation appears: the larger the map's surface, the higher the number of islands. The relationship is logarithmic, which means that the effect is very strong for small map surfaces and then levels off for large maps. The quite high value of the correlation coefficient (R2 = 0.91) gives statistical credibility to the result.

Looking at the trend more closely, a ceiling is apparent. It seems that, once mapmakers had a section of parchment of around 1 500—2 000 cm2 at their disposal, they were able to draw around 140 islands, but increasing map size did not lead to a further addition of islands. This makes sense because, although it is often said that the Aegean contains several thousands of islands, Wikipedia's List of Aegean Islands only numbers 146 items.[1] It can be deduced that the rest are too insignificant to bother, both nowadays and in past centuries.

When pilots plot their routes across the Aegean, they have to be careful to avoid islands and navigational hazards. Using low-resolution maps for this, in which numerous islands are omitted, could put ships in danger of running aground. To test this hypothesis, I plotted the routes between Istambul and Crete and between Salonica and Chios on a small and large map of the Aegean. The tortuosity of each route, defined as the number of rhumb changes required to get to a destination without hitting an island, has been computed and is given in Table 3 on the next page.

As can be seen, a pilot using Vespucci's chart would have plotted simplistic routes with barely half the number of turns that would be evident on a high-resolution map. It can be concluded that many general portolan charts of the Mediterranean were not suitable for navigational use in the Aegean. This does not prove, nevertheless, that large maps of the Aegean in charts and atlases were necessarily intended for navigation.

Beyond the mere number of islands, it is also worth looking at how islands are depicted. Tony Campbell studied the shape of Aegean islands on portolan charts and detected the existence of pictorial conventions for their representation. Chart makers often approximated island contours by stylized shapes that would be easier to memorize, reproduce and identify. Coloring likewise tended to be standardized, with a certain island always drawn in blue, red, or gold in numerous unrelated charts.[2] The question here is: did island shapes change with map resolution?

Two specific islands, Limnos and Skyros, on which Campbell particularly focused, have been compared across selected maps of the Aegean (*Fig. 5 and Fig. 6, next pages*). General charts of the Mediterranean, such as Aguiar's, and small atlases, such as Viegas's continue to represent the two islands in the ways already characterized by Campbell, i.e., Limnos with multiple "lollipop"-like protrusions and always in blue color, and Skyros as "a space rocket." Very low-resolution charts and planispheres such as Vespucci's and Al-Sharqi's simplify the islands' contours so much that they become identifiable only by their location and, for Limnos, by their blue color.

High-resolution stand-alone charts, on the other hand, depart from this tradition. They represent Limnos with various colors and a more precise contour, sometimes exaggerating and other times understating its indentations and headlands. These highly detailed shapes match real geography more accurately than traditional representations. For Skyros, on the other hand, the enhancement of coastal details does not necessarily translate into higher accuracy. In many high-resolution maps, Skyros's shape looks like a detailed version of traditional "space rockets", rather than the actual shape of the island. What is the reason for this difference? Did early modern mapmakers have access to accurate maps of Limnos but not of Skyros? A more detailed study encompassing other types of maps, such as *isolarii*, would be necessary to answer these questions.

Chart	Aegean surface (cm^2)	Rhumb changes from Istambul to Crete	Rhumb changes from Salonika to Chios
Juan Vespucci, Seville, 1520	64	5	3
BNF, Res. Ge. AA. 567	6685	9	5

Table 3. Tortuosity of routes across the Aegean Sea on selected high -resolution and low-resolution maps.

Figure 5. Limnos in different cartographic works (relative sizes have not been preserved).

Finally, I have counted coastal toponyms on surveyed maps to determine whether their number increases with map size or not. For convenience, the count has been limited to the stretch of coast between Salonika and Gallipoli. Results are plotted in Figure 7, next page.

In this case, there is no statistical correlation to speak of. Maps as small as 200 cm2 already accommodate equal or higher numbers of toponyms than stand-alone charts twenty times larger. Only the authors of truly tiny maps of the Aegean saw

Figure 6. Skyros in different cartographic works (relative sizes have not been preserved).

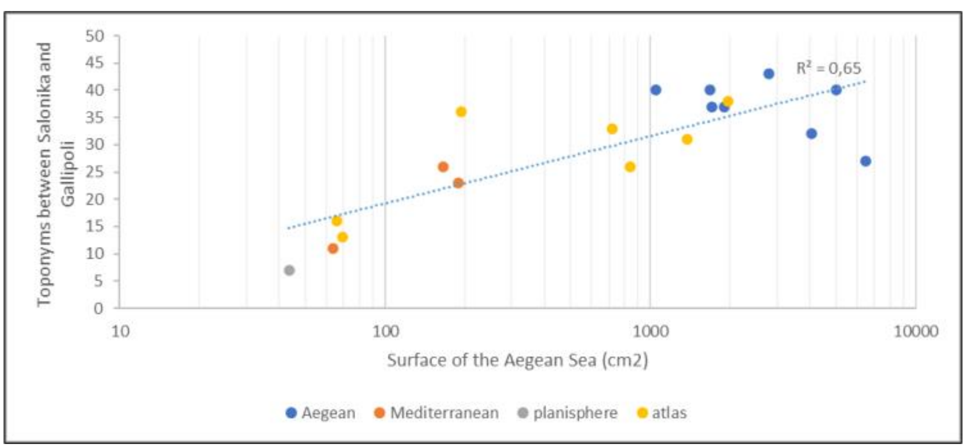

Figure 7. Number of toponyms between Salonika and Gallipoli vs map area (horizontal axis is in logarithmic scale).

themselves forced to curtail the number of place names. The maximum number of toponyms in this data set is 43. This is nowhere close to the 77 that Tony Campbell's database of portolan chart toponyms records for that stretch of coast.[3] It can be concluded that the authors of high-resolution maps did not run out of place names to add, as seems to have been the case for islands, but deliberately chose clarity, precision and reproducibility over quantity as far as toponyms were concerned. This concurs with the observations already made by Tony Campbell four decades ago for the Mediterranean in general.[4] It is at odds, on the contrary, with the late Corradino Astengo's finding that a high-resolution map of the Adriatic contained many more toponyms than a low-resolution one by the same author (278 vs. 126).[5] An explanation could be that Astengo worked with too small a sample to draw general conclusions (N=2), whereas this study surveyed 19 maps.

Conclusion

So, did map size matter? We can conclude that in the Aegean, it did, at least to a certain degree. A surface of 1 500 or 2 000 cm2 (i.e., around three standard sheets of paper) was required to draw all the important islands of the Aegean Sea. Smaller maps were, for this reason, hazardous for plotting sailing routes. Island contours were more detailed (but not necessarily more geographically accurate) in large charts than in smaller ones, which resorted to conventional shapes. Size mattered less for toponyms; only in very small maps did mapmakers have to sacrifice place names.

From the user's point of view, map size had other practical implications. Large planispheres were unwieldy and therefore unsuitable for ships—and even for certain libraries nowadays. On the other hand, nautical atlases, often seen as luxury items ordered exclusively by armchair travelers, may have been more sought after by pilots than stand-alone charts due to the higher resolution they provided for complicated geographies such as the Aegean.

Acknowledgements
I thank Dick Pflederer and Greg Macintosh for their constructive suggestions and the BNCF staff for their kind and efficient help.

Endnotes

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[2] Tony Campbell, 'Why the Artificial Shapes for the Smaller Islands on the Portolan Charts (1330-1600) Help to Clarify Their Navigational Use', *CFC*, no. 216 (2013): 47–65.

[3] Tony Campbell, 'Listing and Analysis of Portolan Chart Toponyms along the Continuous Coastline from Dunkirk to Mogador (Early 14th to Late 17th Century)', *Map History* (blog), December 2016, http://www.maphistory.info/PortolanChartToponymyFullTableREVISED.xls. A century earlier, Krestchmer had only listed 36 toponyms in that region. Konrad Kretschmer, *Die Italienischen Portolane des Mittelalters: Ein Beitrag zur Geschichte der Kartographie und Nautik* (Berlin: E. S. Mittler und Sohn, 1909), 638–39, https://iiif.lib.harvard.edu/manifests/view/drs:46828924$1i.

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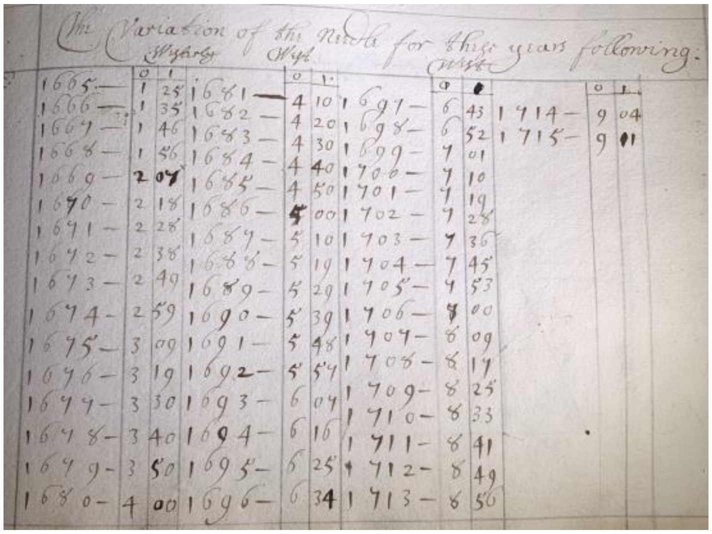
The Cape Cod meridian and Old Henry Bond
Part II

Paul Hughes

Richard Norwood's eight-page magnetic variation cover extends to secular change, and how to determine variation's value. Lacking variation's mention initially, that was not the case with Britain's primitive nautical almanac. However, improvement came as that almanac's maintenance passed into Bond's, and then later hands.[1] Bond's prediction that magnetic variation at London would fall to zero in 1657 received little immediate attention. Yet reporting in the respective year's almanac, that Bond's prediction was realised, not only attracted the newly formed Royal Society's attention, but his elevation to its magnetism committee. The manuscript figures run in a 1665 -1715 series of predictions, including the table's three extra points, that Legge wrote out before publication (*Fig. 3, next page*). What Bond published, are also predictions, but run in a 1668-1716 series.[2] Finally, Bond alluded to John Wood (d.1681) having taken Strait of Magellan magnetic observations.[3] Instead, they are more likely to have come from John Narbrough (c.1640-1688), that voyage's commander, where Wood was his mate and not the captain as Wood inflated himself to be.[4] Wood brought back only a casual observation, whereas Narbrough preserved five careful ones.[5]

In contrast to the eastern Atlantic islands' lack, Bermuda's firmament gained Norwood's observation and measurement.[6] The orthodox view of counting longitude from a prime meridian only eastwards to 360°, in imitation of right ascension, was under challenge.[7] Bond counted out longitude from London, both east and westwards.[8] By the early seventeenth century, a London longitude origin became ordinary within prose works. While Norwood referred to that same origin, his prose rose to cartographic inclusion.[9] Narbrough, Wood, and Legge successively led crews, that included the surveyor Greenvill Collins (1643-1694). Collins evolved a chart series through summer 1676, until settling upon one with a London prime meridian. The strong cartographic interaction between Seller and Collins is significant to this paper in Seller's evocation of that same cartographic London meridian dated that year, even though that period's dated mapping was notoriously unreliable. Seller passed another prime meridian through Cape Cod in *A chart of the West Indies From Cape Cod to the River Oronoque* (*Fig. 4, next page*). This undated, second or third state chart under that title is set within a library binding of indeterminate age. Placenames and contextual publications begin narrowing that chart's creation to Seller's last twenty years. Rather than in a conventional circle, he set this chart's eight rhumb points rectangular-



The Variation of the Needle for these years following:

Westerly	°	'	West	°	'	West	°	'		°	'
1665—	1	25	1681—	4	10	1697—	6	43	1714—	9	04
1666—	1	35	1682—	4	20	1698—	6	52	1715—	9	[illegible]1
1667—	1	46	1683—	4	30	1699—	7	01			
1668—	1	56	1684—	4	40	1700—	7	10			
1669—	2	07	1685—	4	50	1701—	7	19			
1670—	2	18	1686—	5	00	1702—	7	28			
1671—	2	28	1687—	5	10	1703—	7	36			
1672—	2	38	1688—	5	19	1704—	7	45			
1673—	2	49	1689—	5	29	1705—	7	53			
1674—	2	59	1690—	5	39	1706—	8	00			
1675—	3	09	1691—	5	48	1707—	8	09			
1676—	3	19	1692—	5	57	1708—	8	17			
1677—	3	30	1693—	6	07	1709—	8	25			
						1710—	8	33			
1678—	3	40	1694—	6	16	1711—	8	41			
1679—	3	50	1695—	6	25	1712—	8	49			
1680—	4	00	1696—	6	34	1713—	8	56			

Figure 3. Legge's prior manuscript to Bond's publication reproduced by Courtesy of the Earl of Dartmouth

ly. This quadratic chart's grid squares have eighty league sides aligned to a linear latitude scale, measuring out longitude from Cape Cod both east and westward. Carolina's Lord Proprietors required quadratic charts, of which the Blathwayt atlas features several for those shores and northward.[10] Seller was haphazard in naming sources. Not known to have ever left England, in 1676 he republished, without citation, an earlier traveller's account 'of Boston in particular and New England in general.' There he advertised eight New World almanacs.[11] Each title page claimed almanac calculation respective to their meridian. Instead, New England's almanac gives Boston sunrise and sunset in solar time, respecting its parallel rather than meridian, with Boston standing only thirty-four miles west of Cape Cod's meridian. New England settlers communicated with Old World natural philosophers, yet the Boston Almanac's tidal data gaining no contemporary external attention still stands needful of appraisal. The Cape Cod prime meridian and surrounding longitude array remains local, isolated from extensive families of related longitude. Yet departure along Cape Cod's datum parallel out to Bermuda's meridian converts to 2°10′ d'long (a navigation term for "difference of meridians"), improving upon Norwood and reaching out toward actuality.

This investigation has not identified who, or what, drove Seller to his unusual Cape Cod meridian. However, a possibility is the Harvard College administrator, Thomas Brattle (1658-1713), who supplied data to Newton's *Principia Mathematica*.[12] Covering the *Principia's* publication period, Brattle spent seven years among European astronomers. Four years after his return from Europe his glimpse of *Principia* indicates the book's previously unrecognised earlier New World appearance.[13] He measured longitude in equatorial arc to the minute and time to the second, but discriminated neither between Cambridge and Boston in Massachusetts, nor in Britain between London and Greenwich Observatory. Brattle expressed "difference of Meridians," which, because of Greenwich's emergent eminence, equates here to absolute longitude. Previous astronomers assigned Massachusetts' longitude to 69° 20'W, which his eclipse observations initially improved to 70°00'W. Any potential association on his part to Seller's isolated meridian idea, should have been earlier than the high rigour of Brattle's longitude refinement.

Secant latitude arithmetical summation originally explained the mercator chart. With an addendum to Norwood's *Epitome*, Bond went further. He saw that such summation was also 'analogous to a scale of logarithmick tangents of half the complements of the latitudes.' (The sight nowadays is that their differences are equal.) Edmund Halley (1656-1742), the astronomer, overcame such demonstrable modesty by drawing

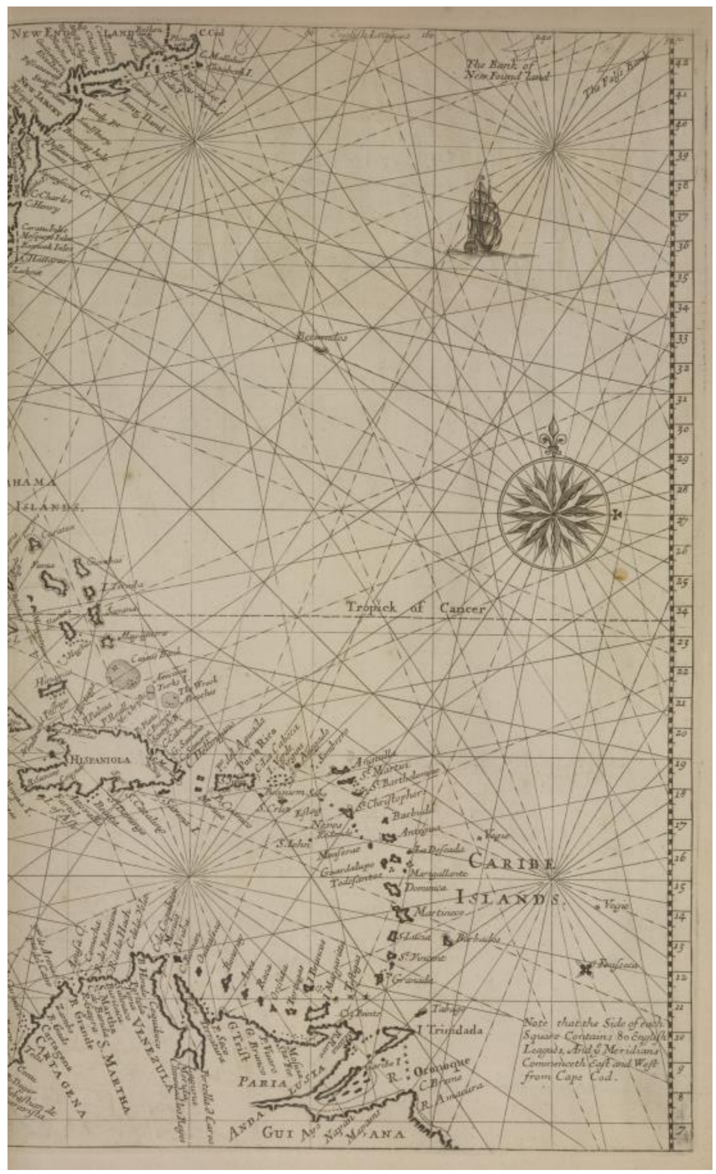


Figure 4. Seller's Cape Cod Prime Meridian detail. Reproduced by courtesy of the British Library

attention to Bond's insight.[14] Halley had nursed *Principia* through the press. Coming only ten years later, his attention languished in old mathematical expression, without uplift from *Principia's* infinitesimal calculus. He also shows that Bond's tutoring, illustrated in Legge's duplicate meridional parts by secant calculation, was still in some mathematical vanguard—an intellectually deeper connection between tutor and student than mere heuristics. Legge demonstrates regular, early facility with radix, sine, cosine, tangent, cotangent, secant, and logarithm. More mundanely, instead of copying work without acknowledgement, plagiarism, Seller sunk to prior publication of Halley's newest contribution. Halley observed the southern stars from St Helena in the South Atlantic.[15] Two months after Halley returned from the South, Seller published that resulting Southern star catalogue with due acknowledgement, but under his own name.[16] Only the following year did Halley publish. However, if Seller's Cape Cod meridian had little influence, the present Prime Meridian has its own secular change and likely eventual demise. British astronomers wielded their quadrants at Greenwich, exactly where the present prime meridian stood until some time between 1900 and 1905, from which epoch that man-made zero longitude began to drift away.[17] From an opposite viewpoint, Greenwich's own longitude then began to accelerate in value, somewhat similar to the conventional variation of natural magnetism.

Endnotes

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The Perilous Search for Timbuktu and Africa's Niger River – Part II

Kenneth Habeeb

As we learned in Part I of this story, any earnest effort to explore west central Africa to advance trade, or to put an end to slavery, would be costly. After a few aborted attempts to locate the vital Niger River following American John Ledyard's untimely death in January of 1789, the African Association (The Association for Promoting the Discovery of the Interior Parts of Africa), appointed fifty-year-old Major Daniel Houghton, who spoke fluent Arabic, to lead the exploration. He was to start from a trading post on the Gambia River in 1791. This was fortuitous. Disputing Leo Africanus, Houghton sent back the sensational report that he had seen sailing ships headed down the Niger in an easterly direction. Moreover, he wrote, the source of the Niger, was in the mountains south of Gambia. This was all revelatory news for the Association, and its members keenly awaited more information. However, despite having been robbed of all of his possessions en route, the tough and optimistic Houghton decided to set off for the fabled Timbuktu instead, and the African Association would never hear from him again.[1]

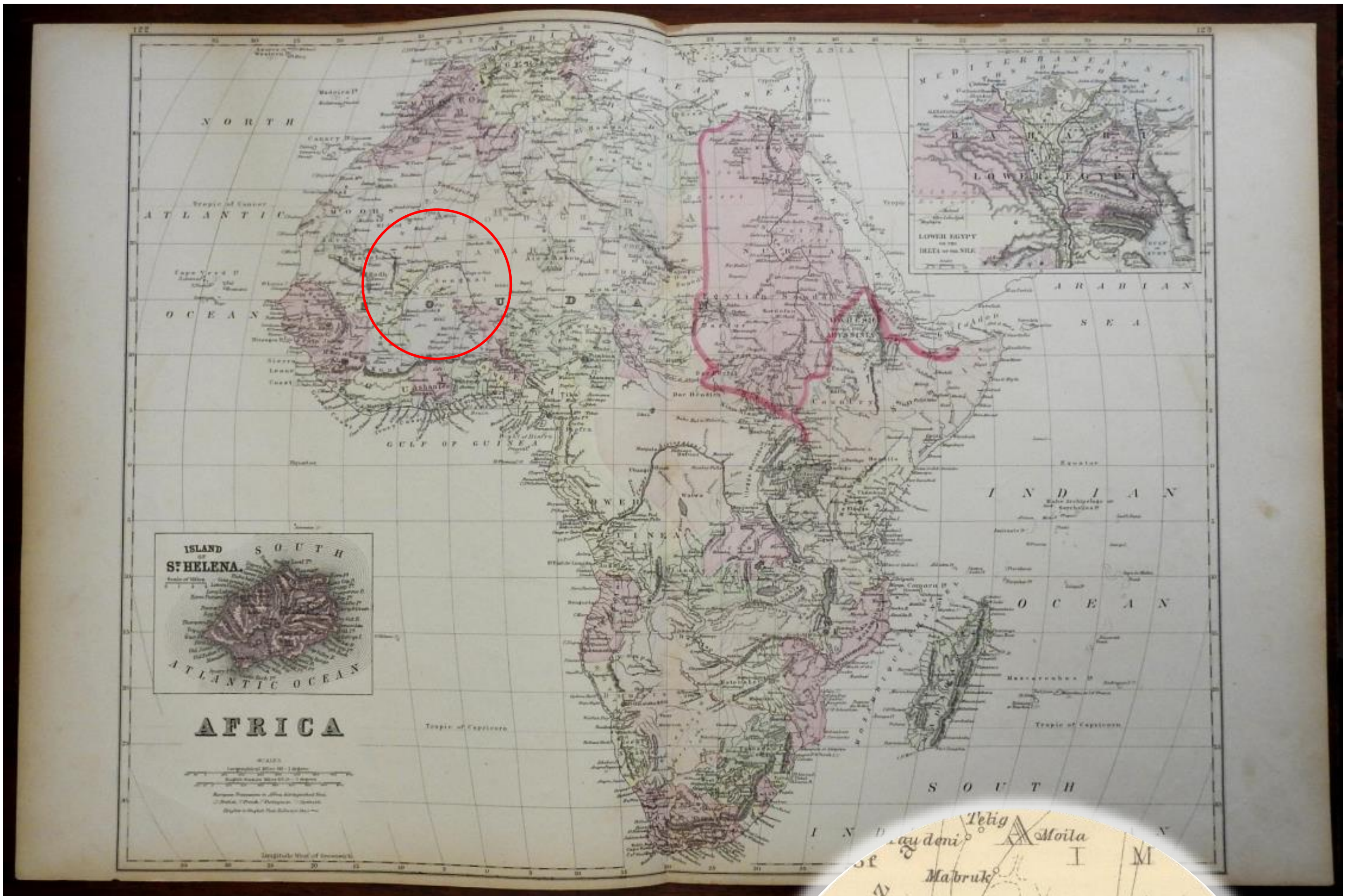
Joseph Banks, the Association's celebrity and driving force, was the patron of a 23-year-old Scottish doctor named Mungo Park, who would become one of the most celebrated adventurers in British history. Park offered to succeed Houghton, and the Association readily accepted. After acclimatizing himself in Africa and getting sick in the process, Park followed Houghton's trail, and like Houghton, he was repeatedly forced to pay tribute to tribal chiefs as he went. Just as he had been warned at the outset by coastal Africans, his whiteness and his Christianity would be the source of both native curiosity and possible plunder.

Once closer to the land of the Moors, Park's guide abandoned him, and his situation quickly deteriorated. After being treated with respect in one African kingdom, he was taken prisoner in the next, with life and limb repeatedly threatened. Only after some phenomenal luck, he was released, but then robbed soon after and left to die in the desert. Saved by a rare, surprise thunderstorm that directly followed a short sandstorm, Park was able to recover, and to resume his journey. He verified Houghton's discoveries, and after yet another bout of malaria made his way back to the coast barely alive, some two and a half years after he had begun his exploration. It would remain for someone else to reach Timbuktu (or Tombuctoo as Park called it). Upon his return to London, he published a journal of his experiences for an eager public. The book quickly sold out, he was feted, and he was asked to speak about his "adventure".[2]

But Mungo Park soon tired of the lecture circuit; returning to Scotland to start a family. Within a few years, however, he became uncertain that he could provide for them on the earnings of a country doctor. When the Association asked him to make a second trip to the African continent, Park accepted, especially because the British government had by then entered the exploration picture, and it offered good money. Park was, in addition, given the rank of Captain, with forty-four soldiers under his command. His departure, in 1805, was coincidentally within months of the date that Lewis and Clark began their odyssey to the west coast of North America.[3]

A few years prior to Park's commitment to a second expedition, Joseph Banks had dispatched two other volunteers for the job, Friedrich Hornemann and Henry Nicholls. Both men tried and failed in their missions to add to the African Association's knowledge base. Like Houghton before him, Hornemann had learned Arabic and had, moreover, converted to the Muslim faith before leaving England. He was able to reach the middle of the Niger River within 300 miles of its flow into the Gulf of Guinea, before succumbing to dysentery. Henry Nicholls began his exploration at the Gulf, setting out to find the river's confluence and follow it northward. Proving once again the peril of interior travel, Nicholls was dead of fever within four months.

Before beginning his second tour, Mungo Park told the Association that he believed that the Congo and Niger rivers were one and the same. British cartographer James Rennell disagreed and warned Park not to take the dangerous planned route from the Gambia. The British Secretary of State, Lord Camden, meanwhile told Banks that Park was embarking too late in the year, but Park shoved off to his second expedition with bravado. He soon reached the Niger, but the soldiers at his disposal were unaccustomed to the weather and insects of the oppressive monsoon season. Park relied on his own experience, and some amount of personal immunity to help with tasks that many of his soldiers were becoming too sick to perform. He found food for them and used his medical skills to attend to their infirmities. Despite these extra efforts, after just a short time on the Niger he had lost many of his pack mules and thirty-three of his men. Heroically, Park pressed on, but he had made local enemies by refusing to pay tribute as he took his boat down river. Fighting aggressive hippos and hostile tribesmen all along the way, he was finally ambushed as the boat squeezed through a narrow channel, and he drowned trying to escape a flurry of arrows.



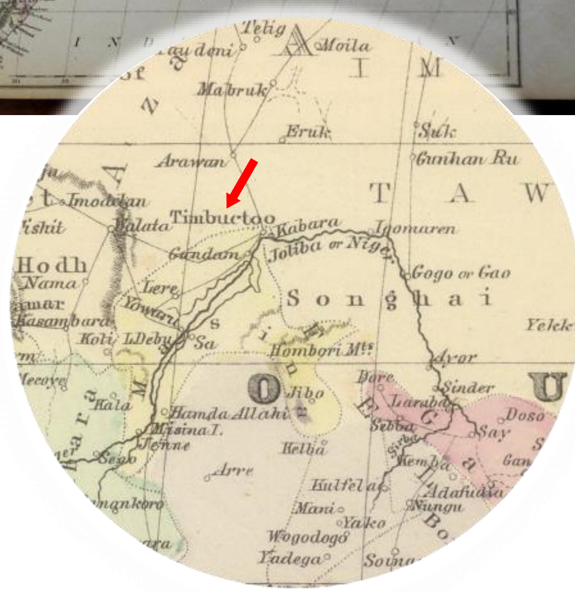


Figure 1. Samuel Agustus Mitchell, Jr., Wm M. Bradley & Bro., Publisher, *The African Continent* issued 1884 in Philadelphia. It took at least 100 years, but the Niger River is here finally mapped in its entirety, from its amorphous beginning in the Guinea Highlands near Sierra Leone, thence heading northward in an arc, before descending toward its tendril-like end in the Gulf of Guinea. Inset: Note the arc of the Niger just over the "O" in the large letters of Soudan.

The interest of the general public in the exploration of the so-called "dark continent" only increased after Park's death, and the torch passed to others both well-known and lesser known. Books have been written by and about the quarreling Scottish pair, Dixon Denham and Hugh Clapperton. Denham, a hardy and talented man, fought with the more amiable Clapperton, but discovered Lake Chad for the Association.[4] Both men confirmed that the river emptied into the Gulf of Guinea. Following soon after, Richard Lander, then just 22, and his younger brother, John, reached the Niger at Bussa and followed it all the way to the sea (*Fig. 1 & Inset*). And, after years of preparation and hardship, a young Frenchman named Rene Caillie used subterfuge and disguise to reach Timbuktu, becoming the first European to document this accomplishment. Memorialized there by a plaque, Caillie returned to France, where he collected a 10,000-franc reward. Of Timbuktu, he disappointingly reported, he saw only a collection of clay buildings in the desert, without all the apocryphal gold.[5]

For more than 100 years, up to the time of Henry Morton Stanley, and others beyond him, each in the succession of African explorers brought skills, grit, and singular dedication to their individual missions. All suffered illness or injury, and most persevered far beyond the point where others would have given up. Nearly all died in the course of their travel, and the lives of the few who did survive were shortened from the stress of travel, and/or from lingering symptoms of contracted disease. That said, their explorations resulted in a steady accumulation of knowledge about a hitherto great and mysterious continent. Multiple rivers, lakes, and indigenous tribes were discovered. The question of the location of the Niger was resolved, and the legend of Timbuktu put to rest. Left to us today are the remarkable stories of more than a century of exploration.

Late in the 19th century, several women joined the ranks of the above-mentioned male explorers. Of particular note are Mary Kingsley and Mary Slessor, both of whom lived with tribes in west central Africa during the latter part of the 19th century, and then wrote about their experiences for scientific publication. Kingsley's time in Africa included research into some interior Cannibal tribes.

The Niger story prompts a question: Was it racism or distrust that prevented the African Association from what may seem to be the obvious move of hiring a native West African to explore his own place of birth? Wouldn't an English-speaking man born in the African interior, with immunity to some diseases, and a clearer understanding of seasonal and other challenges, have been better suited to the task at hand?

The Niger River wasn't fully navigated from its source to its terminus in the Atlantic, at least by Westerners, until two Frenchmen, former civil servants in the African French colonies, successfully rafted it in 1946.[6]

Endnotes

[1] *Records of the African Association 1788-1831*, for the Royal Geographic Society, London, Thomas Nelson and Sons Ltd. 1964 pgs 120 - 140.
[2] Park's journal is called *Travels in the Interior Districts of Africa*
[3] Elliot West, *The Essential West*, 2012 See chap. 1: Lewis and Park
[4] Dixon Denham and Hugh Clapperton, *Narrative of Travels & Discoveries in Northern and Central Africa in the Years 1822, 1823, & 1824,* New York, W.W. Norton & Co., 1982
[5] Caillie's story is covered in Hibbert's *Africa Explored*, pgs 162 -177
[6] Jean Sauvy and Pierre Ponty. Sauvy's "*Descente du Niger*" L'Harmattan, 2001

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Records of the African Association 1788-1831, for the Royal Geographic Society, Thomas Nelson and Sons Ltd. 1964
Africa Explored by Christopher Hibbert, W.W. Norton & Co. 1982
The Essential West, by Elliot West, The Univ. of Oklahoma Press, 2012
The Last Blank Spaces by Dane Kennedy, Harvard Univ. Press 2013

For zoomable maps of Africa posted by the author to Pixeum—The Digital Gallery click on https://bit.ly/42MKATj or scan the QR code.

Bay Area Map Group (BAM) Meetings

BAM—March 4, 2023
Juliet Rothman

This gathering was a hybrid meeting at the home of Tom Paper, who hosted both the in-person meeting and the Zoom attendees. There were 17 in-person and 8 Zoom participants, and, following a lovely coffee-and-desert, six presented to the group.

Tom began the presentation by sharing some of his current map-related projects. He had just taught a winter class at Williams College, and had given the students an assignment: to locate both an old and a new map of interest to them. Tom had placed these together in a fascinating and colorful arrangement. It was interesting, he shared, to see the kinds of maps and locations that were of interest to college students. He also took the group on an interesting tour of his studio (*Fig. 1*) set-up in his garage via webcam, and shared that his digital gallery, produced in the studio, now contains 12,000 images. He will also be featuring prints for sale in the gallery.

Figure 1. Tom tours his studio.

Larry Lusk shared his map of Fire Island, (*Fig. 2*) a 32-mile barrier beach off the coast of Long Island, NY. Fire Island is one of several islands, from Rockaway Beach to Long Beach, Jones Beach, Fire Island, and then on to the Hamptons, with shifting sands that change their shapes over the years. Between the islands and the mainland, the depth of the

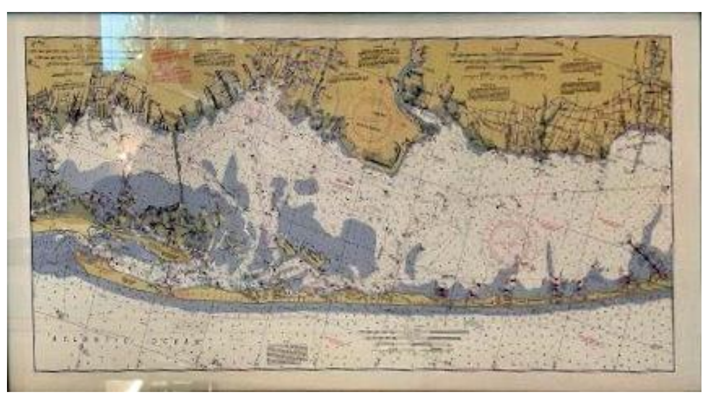


Figure 2. Fire Island NY topographic map. Screenshot from presentation.

Bay is shown on the map as very shallow, and Larry shared that "some people say it's possible to walk across the Bay!" This island's human history begins as a hunting and fishing resource for Native Americans, then moves through the Colonial period with whaling and shellfishing. It then became a popular vacation spot, a liquor port during Prohibition, and finally, a bohemian gathering spot, which it still is today. A lighthouse was built on the island in 1826, shown on the map. Fire Island has no cars and 17 communities, numbering 4,500 people in summer and 300 year-round, all connected by one often very sandy road. The principal challenge for cartographers is it's very long, very narrow shape—32 miles by less than half a mile of land is quite challenging to place on a map!

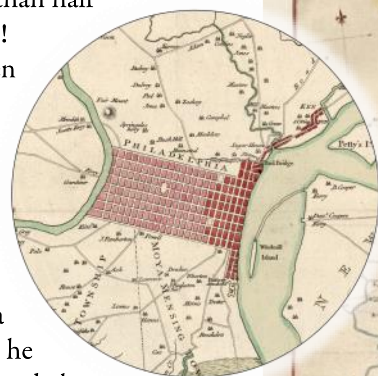
The next presenter, Chuck Sellman, has been interested in maps since making topo maps with the Boy Scouts. He read Kubla Khan, by Samuel Taylor Coleridge, in 10th grade, and made a topographical map of the imaginary kingdom. Later, in the Navy, he used maps in the Mediterranean, where his ship once went 60 miles off course, trying to locate themselves very close to a fold in the map they were using! Eight years ago, he joined an adventurous self-guiding hiking group, and the poor quality of the maps the group was using spurred him to launch into digital mapping for river trips. He has since expanded, and uses the *CalTopa* tool to design maps that can be both overlaid and printed. He begins with the topographical information, and then overlays descriptions, history, trails, and other details, then has his map printed and waterproofed. He shared his large topographical map of Alaska in the area of Kotzebuc with the group. (*Fig. 3*)

Figure 3. Chuck Sellman discusses a topo map he created using the CalTopa app.

Blaeu's 1646 map of Wiltonia, a county in England, was presented by Ken Habeeb. This beautiful, hand-colored map is from the Atlas Novus, printed in 1646, showing all of the counties in England. John Speed had previously mapped Wiltonia County in 1611. Although Blaeu used Speed's map as a reference, there are differences between the two. Ken had brought a print of Speed's map, and showed the large inset that illustrated Stonehenge, one of Wiltonia's most important sites. Blaeu, however, created his map during the English Civil War, and his cartouches illustrate his attitude toward that war, and indicate the side he favors. Blaeu's Stonehenge (*Fig. 4*) is very tiny, and delicately placed in its location within the map.

Figure 4. Portion of the map Wiltonia showing Stonehenge.

Ron Gibbs shared a 1777 map of Philadelphia, (*Fig. 5*) the city where he was raised, that still has a very special place in his heart. The city was founded in the 1680s by William Penn. The original map was by William Faden, but these were the days before copyrights, and the map was "pirated" by Matthew Albert Lotter. The map includes both downtown and the suburbs of the city, with the downtown carefully shown with the grid of city streets, numbered in one direction, and names for trees in the other, and Ron shared that the grid is "remarkably like modern Philadelphia!" The map also illustrates some defenses built by the locals to stop the British during the Revolutionary War. There is an illustration of City Hall, which stretches the length of the map, and occupies about a third of the height as well. It was the site of the legislature in 1753, and in 1774 hosted the first Continental Con-



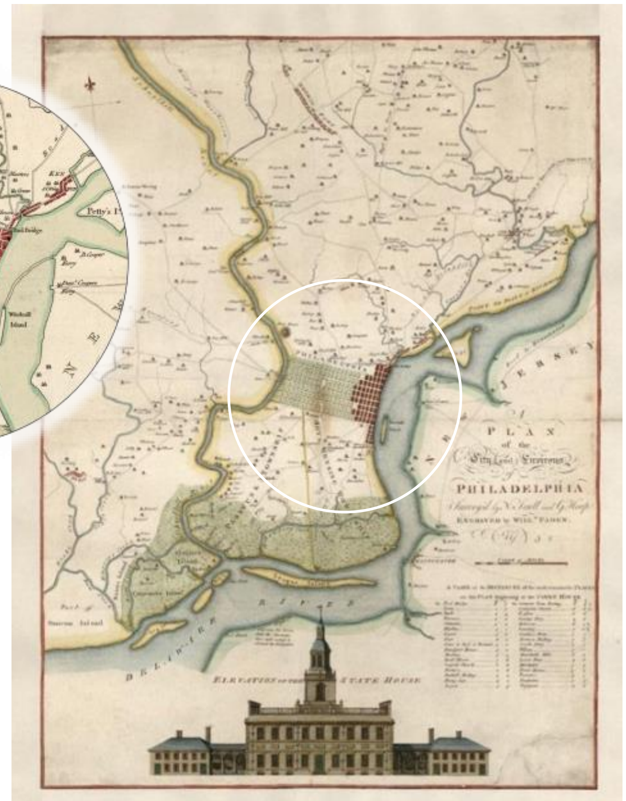


Figure 5. Matthew Albert Lotter map of Philadelphia. Image courtesy of the Library of Congress: Lotter, Matthäus Albrecht A Plan of the City and Environs of Philadelphia. [Augsburg?, 1777] https://www.loc.gov/item/74692108/.

gress. The Declaration of Independence was signed there in 1776.

Three-dimensional maps, Leonard Rothman shared, have been known and used since Neolithic times, showing details of shelters and homes. Leonard shared a map of the United States by Joseph Schedler, cartographer, historian, and teacher, who emigrated to the United States in 1850 and had a shop in New York. Schedler specialized in globes, and also made three-dimensional maps. Leonard's map (*Fig. 6, next page*) is one of only two existing maps of the United States by Schedler, the other is held by the Library of Congress. Leonard said it was challenging to learn anything about Joseph Schedler—little information is available through traditional sources. He finally located a book about him online, which had been photocopied by the Smithsonian, and was able to use the information to learn more about the cartographer. He had the book printed. An article about this map is in the Spring issue of Calafia—just turn a few pages to find pictures and learn more!

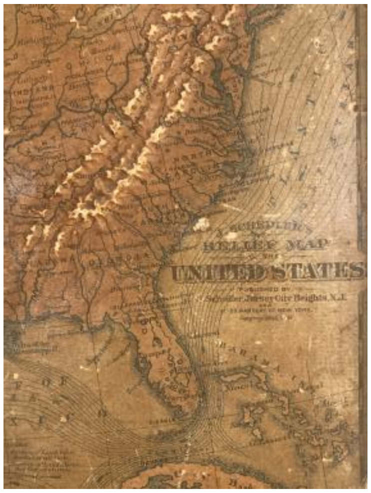


Figure 6. Southeastern section of the Schedler 3-D map.

BAM—June 17, 2023
Emily Yang

Tom Paper and **Eleanor Bigelow** welcomed us into their lovely San Francisco home for a hybrid meeting of the Bay Area Map Group (BAM).

The meeting opened with a Collaborative Annotation of John Wyld II's "Map of Africa with the Latest Discoveries, " a showpiece from **Ken Habeeb's** personal collection that was originally published in London circa 1863 and was recently photographed by **Tom Paper** in his "map cave." Thanks to Pixeum, an "adventure in education" created by Tom to "help people learn through the power of maps, art, stories, and collaboration," participants had the pleasure of not only viewing but also annotating the map using Pixeum's innovative "dot" feature. The map twinkled with blue dots as participants discovered more and more points of interest: the legendary Mountains of Kong, Null Island, Lake Chad (an example of a tautological toponym), (*Fig. 2*) and many more delightful details. To see a map steeped in so much history and mythology come to life thanks to digital technology and collaborative study was an awe-inspiring and novel experience for our members. Both the map itself and our annotations can be viewed at www.pixeum.org


Figure 1. Our gracious hosts, Tom Paper and Eleanor Bigelow.

Figure 2. Africa's Lake Chad.

The next speaker was **Patrick McGranaghan**, joining virtually from Denver to teach us about the Mosaic Map of Madaba. (*Fig. 3)* A self-described "carto-tourist," Patrick traveled to the Church of Saint George in Jordan to view this sixth-century floor mosaic, which depicts the Middle East at


Figure 3. The Madaba Map, a historically significant sixth-century mosaic map. Presenter Patrick McGranaghan traveled to Jordan to see the map in person. This photo was taken by Flickr user LEO-ONE.

the height of the Byzantine period. We learned that the map is estimated to consist of 1.1 million tiles, with an average of 12,000 tiles per square meter. Citing the scholar Herbert Donner, Patrick shared the amazing observation that "it would take a team of three craftsmen working 10-hour days about 186 days to finish the map, not including the time to lay out the design of the map or to cut out the tiles." Surprisingly, the Church of Saint George, which was built over the ruins of an ancient Byzantine church, was constructed with a column running right through part of the map! Fortunately, Patrick assured us that the map was largely undisturbed by this construction. A fun fact about Patrick is that he founded the "MapPorn" Reddit community, an online forum where people around the world can post and comment on a variety of uploaded maps. The community has grown to 2.4 million members and can be visited at MapPorn.

The third speaker, **Thom Bryant**, presented his vision of California 2.0, (*Fig. 4*) in which the state's 58 existing counties would be merged into "19 regional counties that more closely align with today's population clusters, economies, and infrastructure." Thom's proposed methodology for delineating these 19 new counties considers regional economic linkages, equal distance defined by transportation networks, environmental boundaries, and existing county borders in cases when none of the other criteria apply. You can read more about Thom's thought-provoking vision and methodology at california2o.com.

Figure 4. Presenter Thom Bryant shares his vision for California 2.0.

Last but not least, **Gray Brechin** shared his experience with the 1940 Works Progress Administration Scale Model of San Francisco. The magnificent wooden model (*Fig. 5*) measures 41 feet by 37 feet and does not yet have a permanent home, prompting a humorous but serious question: "Is there room in San Francisco for San Francisco?" Gray and several professors at the City College of San Francisco hope that the model can be permanently housed at the colleges student union, close to where Diego Rivera's Pan American Unity Mural will live once it is returned to the college. Together, they can be thought of as a memorial to architect Tim Flueger's civic imagination. Gray is excited for multimedia interpretations of the model and would like to see the hydrology of San Francisco projected on it. He is a founder and project scholar of the Living New Deal, which you can read more about at https://livingnewdeal.org/

Figure 5. Portion of the 1940 WPA scale model of San Francisco.

We had a wonderful time learning from Tom, Ken, Patrick, Thom, and Gray. The Society looks forward to our next BAM meetup!

A Favorite Map: The Seven-Sheet Map of the Oregon Trail Created by Charles Preuss

Wesley A. Brown

I have too many favorite maps—hence "A" Favorite Map.

In 1843, pioneers began leaving the United States via the Oregon Trail for the rich Oregon Country on the west coast. More than 350,000 emigrants had made the trek by 1869, when the Transcontinental Railroad began ferrying many western travelers. Imagine what a difficult decision it was for the typical eastern farming family: moving to the promised land in the West, but leaving behind virtually all their possessions, relatives, friends, and comforts they had accumulated over a lifetime. In addition, there was the terrifying trip characterized by storms, scorching heat, and long stretches often devoid of water, where many faced starvation, disease, and even death. It is estimated that one in ten emigrants did not survive the trip. In the early years, the terrain was very confusing, and finding the route was itself a life-and-death prospect.

In light of the burgeoning traffic on the trail, and the U.S. government's desire to populate the Oregon country with Americans (its status was still in dispute with Britain), Missouri Senator David Atchison requested a detailed map be prepared to guide the pioneers in January 1846. Congress quickly approved the plan. The essential question was: Who could produce such a map?

Captain John Charles Frémont, along with topographer Charles Preuss, had explored the route west to the middle of the Rocky Mountains, as far as South Pass, during an 1842 expedition, resulting in the publication of a fine map by Preuss in 1843. South Pass was the gentle crossing point through the Rocky Mountains that was a key feature of the Oregon Trail. On May 29, 1843, Frémont launched his second expedition with a much larger company of 39, including Preuss. They passed through the same area, continued to Oregon, and then south along the Sierra Nevada Mountains to southern California (then part of Mexico), before returning east to publish their celebrated journal and renowned map of 1845.[1] By the conclusion of this second western expedition, the information known by Frémont and Preuss of the terrain along what was becoming the Oregon Trail was second to none. Therefore, Charles Preuss, armed with the maps, field notes, and his own sketches from these two expeditions, was directed to prepare the map for the emigrants ordered by Congress. As a result, Preuss missed Frémont's third expedition and remained in Washington, D.C., where he began work in April 1846.

Figure 1. Charles Preuss, topographer on three of Frémont's expeditions and maker of his maps and the seven-sheet map of the Oregon Trail. Source: Wikipedia.

George Karl Ludwig (Charles) Preuss (1803—1854), a tall, blond-haired, Prussian-trained, highly skilled cartographer and artist, was hired by Frémont to accompany his first, second, and fourth explorations as topographer. (*Fig.1*) Frémont, who was ten years younger than Preuss, relied on Preuss for critical astronomical observations, terrain details, and field sketches, which were provided with "extraordinary skill," according to a note in Frémont's journal.[2] No less an authority than Lieutenant G.K. Warren of the Army's Corps of Topographical Engineers, who produced the definitive map of the West for the U.S. government in 1857, praises Preuss: his "skill in sketching topography in the field and in representing it on the map has probably never been surpassed in this country."[3] Yet, despite all his talent, Preuss' memoirs indicate that he had disdain for the hardships encountered during the expeditions in the field. Remaining in the civilized comforts of Washington, D.C., to prepare the maps of the Oregon Trail must have pleased Herr Preuss very much!

Preuss envisioned a map that would be of practical use by travelers along the trail. His map began at Westport (Kansas City), on the Missouri River, and ended 1,670 miles later at Fort Wallah-Wallah, where the Snake River joins the Columbia. (*Fig.2, next page*) This was an extraordinary production, in seven sheets, or sections, as Preuss named them, on a scale of 10 miles to the inch, or 1:633,600. No map of the West had previously appeared at this detailed scale. Ten thousand copies of the seven-sheet maps were printed and distributed without a cover, or in a volume: the sheets were simply sewn together along one edge, forming a connected bundle. Thus, most were destroyed by emigrant use, and the map is now rare. It was published again in 1849, on a slightly smaller scale. The 1846 first edition is easily identified by the presence of "Lithorg. by E. Weber & Co. Baltimore" in the title.

Figure 2. Track of 1,670 miles of the Oregon Trail illustrated on Charles Preuss' 1846 seven-sheet map. Source: Author's collection.

Each map sheet covers about 240 miles of the route. Figure 3 illustrates Section IV, the middle section and highest point of the trip over the Continental Divide. The map's primary route is positioned horizontally, and oriented so that the maximum distance can be included on the sheet, necessitating that full-degree lines of longitude and latitude be shown at angles. Hachuring illustrates the terrain. The map's scale and format proved extremely useful to both greenhorns and experienced trail bosses. Each evening's camping spot from the Frémont expedition is illustrated with an image of a tent and the date. The location for "Noon halt" was included as well, providing travelers with an idea of the distance that could be covered for the given terrain, and suitable stopping points. The running total of miles from Westport is shown on the map about every 25 miles. If travelers followed the indicated route of the prior Frémont expedition, they would have averaged 17 miles a day, yet 15 miles a day was the more common daily distance traveled.

In Section IV, just west of Independence Rock, the dating of the map for the evening camp switches from the first expedition, noted as "2—3 August 1842," to the second expedition, "9—10 August 1843." At this point, the first expedition began a slower pace of exploration, including the Wind River Mountains, to the northwest of where Frémont famously unfurled his American flag, atop what he thought was North America's highest mountain. Subsequently named Frémont Peak, it is actually the third-highest peak in Wyoming. To provide the traveler with a continuous accurate estimate of daily travel, the mapmaker appropriately converted to the dates of the second expedition that traversed this area.

A table of "Remarks" was provided on each section of the map with information about the availability of game, fuel,

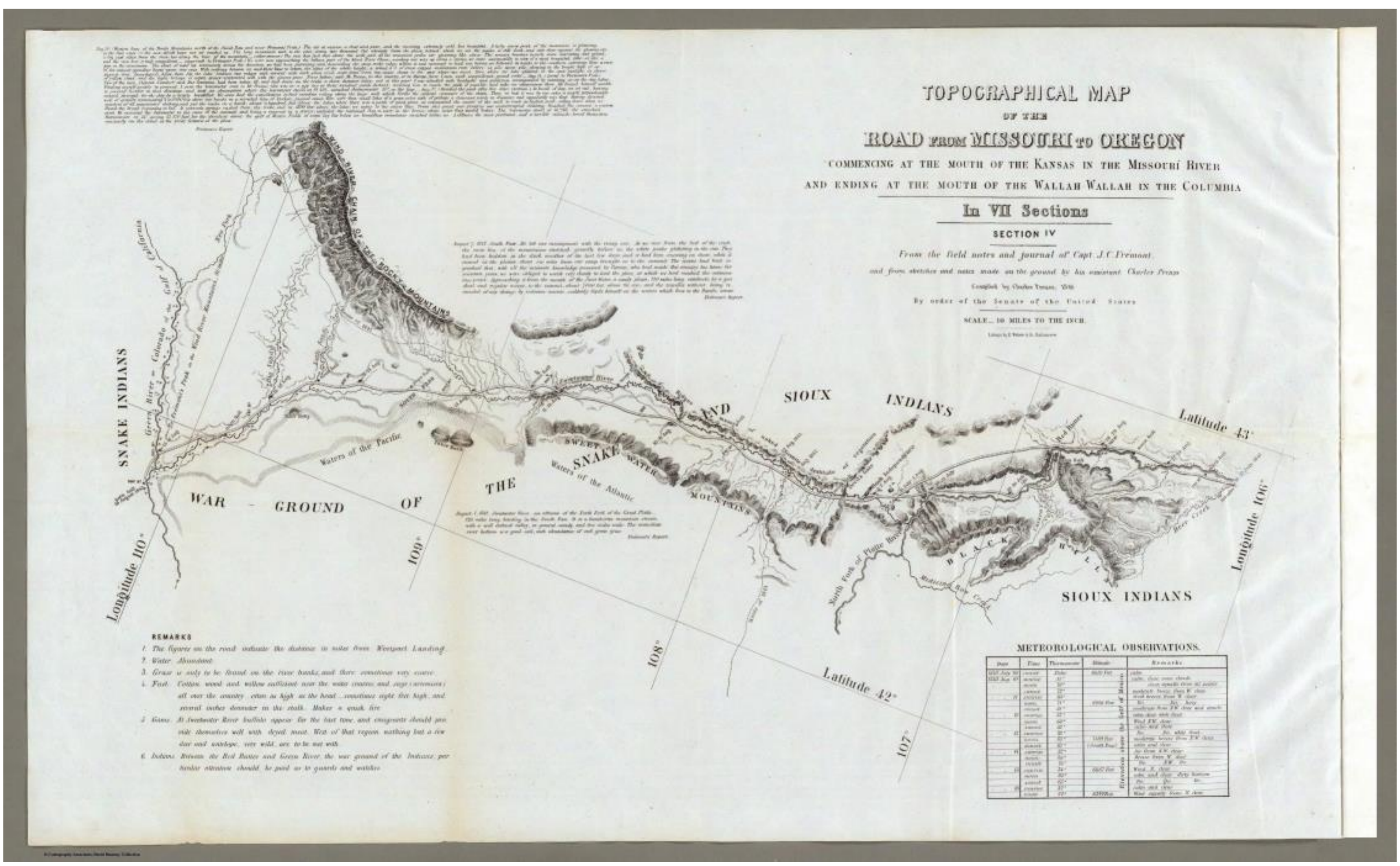
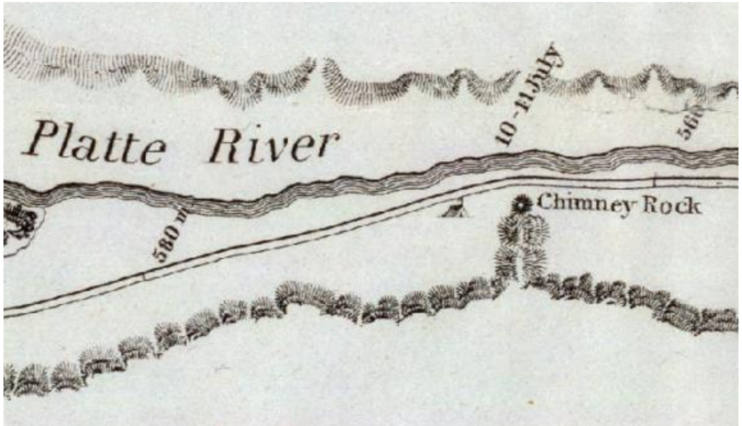
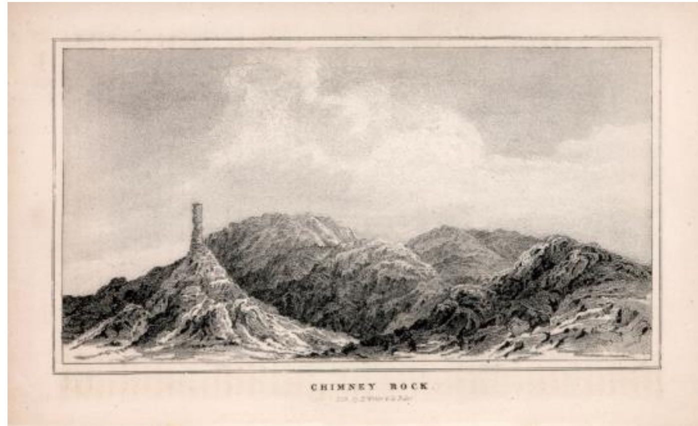


Figure 3. Section IV from "Topographical Map of the Road From Missouri to Oregon," illustrating the highest section, where the Oregon Trail leaves the South Platte River, progresses west along the Sweetwater River, crosses the gentle South Pass through the Continental Divide, and descends the headwaters of the Green River. Source: David Rumsey Map Collection 2773.004.





Figures 4a & 4b. Chimney Rock indicated on Section III of the map and illustrated next to page 38 in the popular Frémont Journal of 1845. Source: David Rumsey Map Collection 13406.006.

grass, water, and the presence of Indians. The remarks in each section would have been useful for travelers and reveal a great deal. In Section II, the note on Indians reads: "Good guard ought to be kept. Pawnees, if they do not kill, will at least take what they can from the travelers by force if they are strong enough, and by stealth if too weak to act openly." As for fuel, travelers were informed that: "Timber is extremely scarce, except on the islands. Some driftwood and buffalo excrement makes the fuel, as that of the camels does in the desert of Arabia."

The seven-sheet map ties to Frémont's popular 1845 journal, carried by many emigrants. Six of the sections include one or more lengthy quotes from the journal, printed in blank spaces. In Section II is written: "June 30th first view of buffalo ... The air was keen the next morning at sunrise, the thermometer standing at 44°, and it was sufficiently cold to make overcoats very comfortable. A few miles brought us into the midst of the buffalo swarming in immense numbers over the plains, where they had left scarcely a blade of grass standing. Mr. Preuss, who was sketching at a little distance, had first noted them as large groves of timber. In the sight of such a mass of life, the traveler feels a strange emotion of grandeur. We had heard from a distance a dull and confused murmuring, and when we came in view of their dark masses, there was not one among us who did not feel his heart beat quicker."

Useful hints for the traveler abound. For example, this note is printed where the trail leaves the Little Blue River: "Crossing to Platte River 25 miles without water." The seven-sheet map mentions noteworthy images and major landmarks that also tie to Frémont's journal. Thus, in Section III we see an indication for "Chimney Rock" on the map and in the journal; next to page 38, is a fine engraved lithograph reproducing Preuss's sketch of the scene made during the second expedition. (*Fig. 4a & 4b*) Each section also has a table of Meteorological Observations for the dates of measurement of temperature, altitude, and technical remarks from Frémont's original 1842 and 1843 expeditions.

Today, the seven sections of Preuss's map allow the reader to become an armchair traveler crossing the great expanse of the West as if on foot, alongside wagons loaded with all their belongings and trudging 17 miles a day. But of more importance, consider the profound benefit that this "excellent map for travelers"[4] provided to the thousands of confused and nervous pioneers as they made their way westward to a new home near the Pacific.

Endnotes

[1] Brevet Captain J.C. Frémont, *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843-44.* (Washington: Gales and Seaton, 1845).

[2] Frémont. 5.

[3] Lieut. Gouverneur K. Warren, *Memoir to Accompany the Map Of The Territory Of The United States From The Mississippi River To The Pacific Ocean.* (War Department, 1859), 45.

[4] Warren, 46.

Wes Brown has been a collector of old maps for forty years with special interest in the exploration and settlement of the West and Colorado. A Denver resident, he co-founded the Rocky Mountain Map Society in 1991 and is now, or has served, on the board of several other maps societies. He is a frequent speaker at map and history conferences and has published many papers on maps. Wes fell in love with maps at age 16 using U.S. Geological Survey maps for climbing mountains.

For zoomable images of the Preuss maps posted to Pixeum—The Digital Gallery, click on https://www.thedigitalgallery.org/exhibits/390 or scan the QR code.

Well-Attended August CMS Conference

Walter Schwartz

The well-attended and richly programmed California Map Society Conference of August 19, 2023, was held at the David Rumsey Map Center, in Stanford University's Green Library. About 50 attentive attendees enjoyed the venue, and peppered the speakers with questions, supplemented by additional questions via Zoom.

Tom Paper launched the Conference by expressing appreciation for the many people and organizations who made the meeting possible. He gave special thanks to the North American Cartographic Information Society, and introduced David Rumsey to the group as a prolific map collector with eclectic life experiences. **David Rumsey** reported progress on numerous fronts for his eponymous Map Center. He noted:

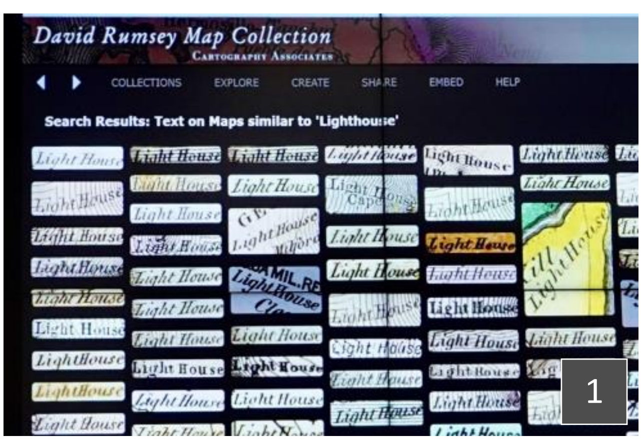
▸ Since Julie Sweetkind Singer helped put the first map online in 1999, the Map Center has grown, as of this meeting day, to 125,001 online maps, and continues to add both physical and digital maps.

▸ Large-scale, precision-made Bellerby Globes have been acquired. They include a wall model of an Urbana globe (the gore is flattened), and a variety of historic globes. Visitors are encouraged to handle the Bellerby globe on the floor of the Map Center.

▸ Evan Thornberry will become Head and Curator of the Rumsey Center in November. Evan has been the geospatial librarian at Boston's Leventhal Map Center, and also GIS Librarian at the University of British Columbia. Stace Maples's support as interim head was appreciated and acknowledged.

▸ A new 8K touch screen in the library now provides state-of-the-art, high-resolution access to the collection.

▸ While current searches are limited to off-map metadata, a major search enhancement will be coming to the Rumsey site in mid-September. Map text, including town names and even obscure descriptors, will become searchable, initially on 60,000 georeferenced maps with 100 million text words. (Current searches are limited to off-map metadata.) For example, a search for "lighthouse" gave 19 results on metadata but 1,500 results on map text. (*Fig. 1*) A yellow dot on a map will highlight each reference. This AI feature will enable a panoply of new types of questions. Cyrillic, Chinese, Arabic, and more languages are coming.



1

▸ "Preservation containers" are planned next year for digital maps. This concept enables visualization and analysis to continue even after the access tools are discontinued. The Internet Archive is a project partner.

The conference continued with an impressive list of speakers presenting a wide variety of fascinating topics:

Visualizing Place

José Adrián Barragán-Álvarez, Curator of Latin Americana at UC Berkeley Bancroft Library, shared a perspective of the "Visualizing Place" exhibit currently at the Bancroft Gallery (open weekdays 10-4). He presented a variety of map formats, from free-form hand-drawn to digitized, that show how we can "visualize the familiar through a different lens." Sources include Bancroft Library's collection of the original California land grant documents, often handmade by landowners. (*Fig. 2*) All are digitized on the university's website.

2

One map on exhibit was comprised primarily of hand drawings of points used by surveyors as references, such as trees. Another exhibit compared a historic Mexico City map made by indigenous people with a modern cartographic map, and still another showed a time sequence of California-as-an-island maps, including a reference to (Queen) Calafia, the namesake of this publication.

Indigenous Features in Apple Maps

Brad Herried is an Apple Maps Cartographer, and James Irwin is an Apple Engineering Product Manager. Together, they outlined an ambitious and ongoing project to update Apple Maps in order to enable the representation of a range of indigenous features, from sovereign boundaries to topographical enhancements.

James noted that extensive input by indigenous communities is essential to accurate mapping. He reported that hundreds of cars and planes were used to add and update data on indigenous lands and boundaries, defining countries, regions, and territories. Locally, map additions included 7,155 land

3

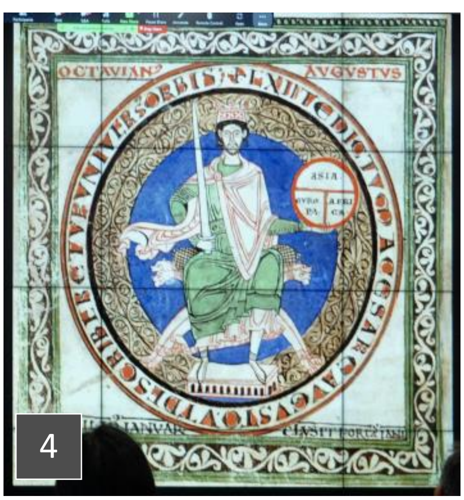
features within 102 California reservations and rancherias. Topographic enhancements ranged from glaciers to neighborhoods.

Brad explained that maps can now represent borders as sovereign, as historically represented national borders have been. He presented before-and-after examples that clarified locations for the Navajo Nation, Hopi, Zuni, and other tribal areas. He showed examples where checkered railroad grants, that ignored indigenous rights, are now mapped with both outer and semi-transparent inner borders. The level of detail extends even to villages of less than 100 people in Alaska. Dual language labels now support Apple "Place Cards" (place descriptions with visuals) in native languages (*Fig. 3*), and describe destinations useful to indigenous citizens. Contributors who want to add information may contact maps-outreach@apple.com.

Maps and Power

Chet Van Duzer is a board member of the Lazarus Project at the University of Rochester, which uses spectral imaging to restore previously inaccessible texts. He holds multiple fellowships, and is the author of well-received books on the history of cartography and of the sources used by cartographers.

His presentation was a wide-ranging historical tour of how maps were essential to power, beginning with an image of Emperor Augustus holding a map and sword and the words, "All the world should be registered." (*Fig. 4*) He followed this with a "V-in-Square" map, showing Europeans as all-human, while Asia and Africa included monster-like inhabitants, thus projecting power and superiority. (*Fig. 5*) Later (1580), Pope Gregory's huge Vatican Hall of Maps was used to manage government control of Italy. He further noted how the placement of Portuguese flags at trading posts and factory locations implied greater pre-colonial control, and how "To Conquer by Sword and Compass" was used as a Spanish map-focused guide on how to conquer Chile.



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5

Another method of achieving power was the imposition of colonial place names, as when John Smith consulted with Prince Charles to replace "barbarous" indigenous place names with English names. Chet noted that perhaps the most dramatic example of maps giving power occurred in 1681 when the English pirate Bartholomew Sharpe captured an entire atlas of the west coast of the Americas from a Spanish ship. Recognizing the loss of power, the Spanish captain said, "Fare well, South Sea" (Pacific).

Other significant references included an image of Russia's expansionist Catherine the Great stitching a Black Sea map onto the existing Russian empire map, references to Napoleon expressing that maps were essential to victory, and the revolution in aerial maps for strategic advantage produced during World War II

Pixeum—A Digital Gallery

Ron Gibbs is a physician and CMS President, and Tom Paper is the Managing Partner of Webster Pacific, a geocomputational-oriented consulting company. They gave a very hands-on presentation on the benefits and functionality of Pixeum, "a digital gallery of maps, art, science, and history." With Pixeum, users can collaborate by annotating maps. Much as with Wikipedia, Pixeum users can add to the site's digital knowledge base. During the presenters' live demo, audience members were encouraged to sign in. Many did, and contributed comments by zooming in, and then adding a location pin and comments to an historical map (*Fig. 6, next page*) of the northeastern U.S. This writer added a pin on Greenbush, New York, noting that it was renamed Rensselaer, leaving today's orphaned town names of North Greenbush and East Greenbush.

Pixeum is in an experimental phase, and has great potential for growth in several dimensions. Readers are encouraged to explore and contribute to it at:
https://www.pixeum.org.

6

Dutch Waterways

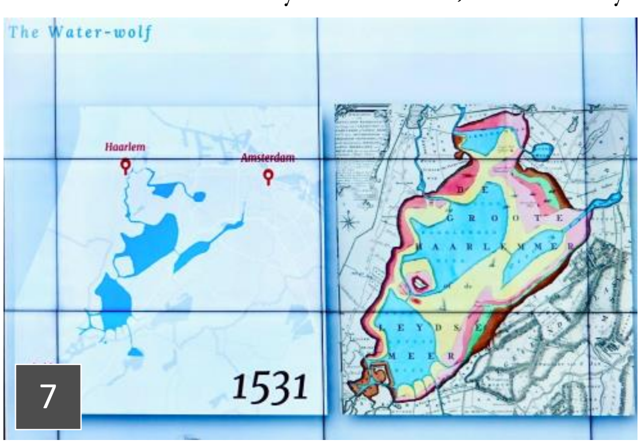
Brynn Kramer is the project manager for “The Conrad Collection on Dutch Waterways” at Stanford.

Purchased in the early 1900s, the 2,500-sheet collection was hidden for over 100 years in Stanford archives. It was "rescued" to the Branner Earth Sciences Library in 2018, and is being cataloged and digitized. The collection reflects the efforts of generations of the Conrads, a family of engineers, which include Dutch Inspector General FW Conrad (1769-1808), his son Frederik W. Conrad, Jr. (1800-1869) who was President of the first telegraph company and Chairman of the Suez Canal Commission, and prolific contributor Jan Frederik W Conrad (1825-1902).

Brynn pointed out that the collection "reveals human ingenuity." The maps' array of types and formats cover disparate topics, from railroads and waterways to topography. One remarkable example, from 1800, contains 32 sheets, and is over seven feet long. Another tells a story of engineering marvels and land management through a series of maps that show the growth, and then the permanent draining, of the Sea of Haarlem (the Water-wolf). (*Fig. 7*) Three cities disappeared as the Water-wolf grew. By 1686, windmills were proposed to drain it, but the project was not completed until 1884.

San Francisco Airport Museum

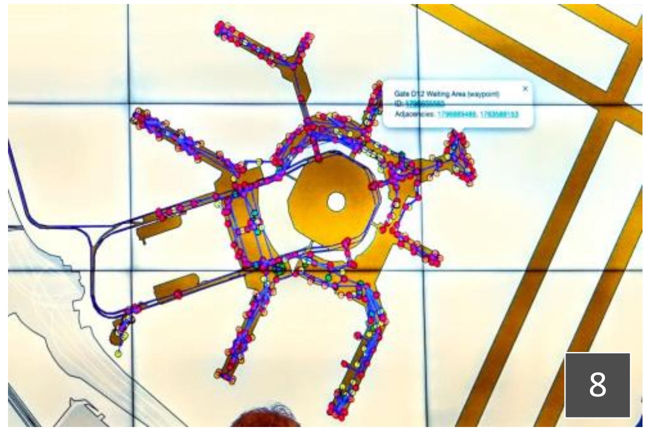
Aaron Cope is Head of Internet Typing at the San Francisco Airport Museum. He referred to the museum as "the world's busiest museum that nobody knows about", since as many as



7

58 million people pass through SFO in a year, and the artifacts displayed throughout the airport are from its 150,000-object collection. For people who are in the airport, the Wayfinding App makes it easy to find museum exhibits nearby. (*Fig. 8*)

Aaron pointed out that, unlike other museums that may view their exhibits as accessible only within the physical confines of museum buildings, a goal of the Wayfinding app is to continue the museum experience even after users have left the


8

airport. The app features 250 waypoints, 150 exhibit locations, and 26 galleries. It can geolocate the visitor and draw a path to all items within 50 meters. Give it a flight number, or scan a boarding pass (with privacy protected), and it can draw a route using the flight number, even if you don't know your location, with exhibits highlighted along the way. A savable guide can be created for later reading.

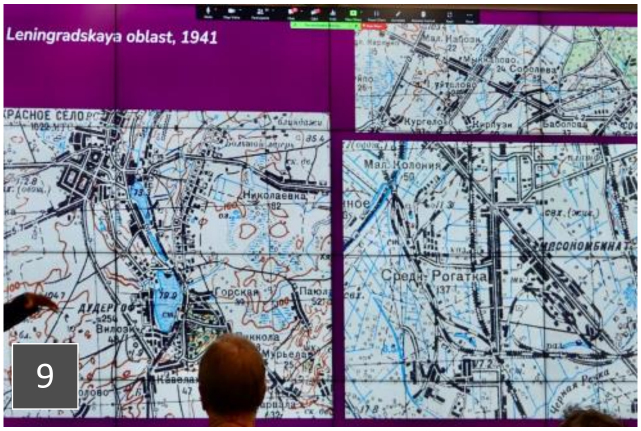
Student Award—Maps and Scarcity

Arjun Maheshwari, Stanford 2025, is the winner of the David Rumsey/California Map Society Map Curation Contest.

After discovering free 1902-1905 maps in Stanford's Brenner Library, Arjun considered that maps show how humans handled land scarcity, and he became curious about how scarcity problems are handled. He addressed "Heterogeneous Harmony," "Conflict-induced Co-Existence," "Foreign Incursions," "Snapshot in Time," and "Differing Interpretations," interlinked topics that show how scarcity of space is influenced by human behavior.

A worldwide set of city maps, ranging from a 1912 map of British-controlled Calcutta (now Kolkata) to a 1941 German map of Leningrad, illustrated “Foreign Incursion”. (*Fig. 9, next page*) A 1951 map showed Johannesburg's Sophiatown when blacks could own property prior to apartheid's forced removal policy. The map indicated locations of importance to British interests without showing population and heavy militarization. The district was renamed Triomph by the apartheid government and is an example of "Conflict-induced Co-Existence."

Arjun concluded by saying: "If there are other opportunities in cartography, I'd love to learn about those."



San Francisco Scale Model

Gray Brechin, who has taught at U.C. Berkeley for over 20 years, is a visiting scholar in the Department of Geography, and founder and project scholar of the Living New Deal, which interprets the legacy of the New Deal.

Gray explored the history and value of the San Francisco Scale Model, a 37 by 41-foot modular scale model of the city. It was a WPA project, completed in 1940, with occasionally updated sections, and the area included ranges from San Bruno Mountain to Yerba Buena Island to the Presidio. The initial concept, by Tim Pfleuger, was developed in 1935 as the Golden Gate and Bay Bridges were in the process of construction. It languished in storage for decades, even after a glowing 2011 San Francisco Chronicle article appeared.

In 2018, through the efforts of Stella Lochman and others, it was moved to a San Francisco Public Library warehouse, where it was cleaned of decades of dust. (*Fig. 10*) Liesbeth Bik and Jos van der Pol then arranged for neighborhood sections to be installed in related neighborhood libraries, where the models empowered residents to develop an interest in their roles in the city's development and curiosity to see their own houses.

Gray enumerated cities worldwide that exhibit their scale models publicly, fascinating and educating children and adults alike.

Open Historical Map

Jeff Meyer**,** founder of Open Historical Map, refers to himself as an "amateur historical map maker," and co-presenter Minh Nguyen has been a contributor to the similarly named OpenStreetMap since 2008.

Inspired in 2004 by a "time map" created by Lewis Lancaster, Jeff conceptualized a map time machine. This required not only mapping software but also "unencumbered" data, e.g., data without copyright restrictions. Steve Coast's OpenStreetMap offered the software, but the geographic data had to come from other sources. After a gradual beginning, a time slider was added, and contributions to the project accelerated.

Open Historical Map relies upon mappers and historians of all types to contribute and maintain the data. By adding historical maps, a layered world history is being developed. (*Fig. 11*) An example compared a map of the San Francisco area by indigenous people with a 1906 street map. Minh is adding to the San Jose mapping daily.

OHP is intended to be a flexible system that anyone can build upon and edit, even by tracing. There are no formal layers but start and end dates are essential. Locations can be tagged with information if sources are cited. Layers are georeferenced, can be uniquely styled, and can be processed by third-party tools such as AllMaps or IIIF. Queries can be done with Overpass or custom software, allowing research such as "what changed in a community on this day in history?" At this point in its development, no conflicts have arisen over competing interests and entries. In summary, a goal is to "give them data and they will come."

Overall, the conference showcased a variety of perspectives on maps and their significance, from historical power dynamics to innovative digital platforms. The event provided attendees with a deeper understanding of the role of maps in shaping our perception of the world.

Rumsey Center News

FRED DEJARLAIS

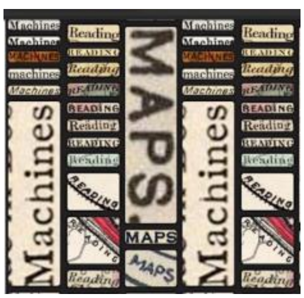
Evan Thornberry has been engaged as the new Head & Curator of the David Rumsey Map Center starting this fall. Evan joins Stanford Libraries from the University of British Columbia Library, where he serves as the Geographic Information Systems Librarian. He has previously worked at the Norman B. Leventhal Map Center at the Boston Public Library.

Scan code for more on Evan's extensive background

PAST AND UPCOMING 2023 EVENTS

April 20-21
Machines Reading Maps Summit

The Machines Reading Maps team came together at Stanford University for two days of conference events dedicated to charting the future of historical cartography as data. See page 51 for a discussion regarding this emerging technology



March 1—May 31
Seeing Cities: 10 Maps over 200 Years

Cartographers face particular challenges in accurately depicting the complex nature of urban spaces, balancing many layers of information to convey human and natural activity in one moment of time. The exhibit featured 10 maps that provided a unique perspective on the forces that shaped the urban world.

June 9—September 6
Conflict & Co-existence: Mapping Shared Spaces and Divided

Arjun Maheshwari, the inaugural winner of the first curation contest co-sponsored by CMS and Stanford, explored how city maps reflect complex interactions between different ethnic and cultural groups. Often these interactions appear as lines of demarcation between competing interests.

August 19
CMS Regional Conference

See article in this issue, page 51

September 1
CMS Student Exhibition Competition Finalists Announced!

The three students include Muhammad Dhafer & Mikayla Teller, Stanford Univ & Tess Megginson, UNC, Chapel Hill.

October 20-22
Fourth Biennial Barry Lawrence Ruderman Conference on Cartography

Speakers from a variety of disciplinary backgrounds and specializations will share their expertise about historical, design, and digital applications of data visualization. Attendees will examine examples of maps that share information in a variety of ways and discuss the potential and limitations of the medium in the past, present, and for the future.

Keynote speakers include **Michael Friendly** (York University, Canada), who will discuss the history of data visualization, and **Karen Lewis** (the Ohio State University), who will share the mapping methodology and design behind the recovery of Underground Railway routes and stories.

Scan code for Conference registration

CMS IS A **FOUNDING FRIEND** OF THE DAVID RUMSEY MAP CENTER

Meet Our Member
Fred DeJarlais

This issue of *Calafia* features an essential member of the Map Society: our publisher, Fred DeJarlais, whose efforts have brought us issue after issue of *Calafia,* our special Journal.

Fred comes from what he describes as a "little village" where his "next-door neighbors were cows"—Champlin, in rural Hennepin County, Minnesota, 20 miles northwest of Minneapolis. His first job, at 18, was as an engineering tech for the city of Anoka, across the river from Champlin, locating, accessing, and drawing maps and engineering plans and preparing urban planning exhibits used at city council meetings. It was there that he first met his beloved wife, Nan. He attended St. John's University, a Catholic college in central Minnesota, for a year and a half until separation became intolerable and, in 1964, he married Nan, enrolled part-time at the University of Minnesota, and began working for the Hennepin County Highway Department, doing route surveys in winter. It was freezing, and Nan convinced him that they needed to move somewhere warm. They packed up a U-Haul and headed west for the sunshine and the Pacific Ocean.

They found themselves in San Leandro and then in Daly City, where Fred occasionally worked for the city planner, who convinced him to leave engineering and complete his studies at SFSU, where he majored in Urban Studies. The DeJarlais have 3 three children, a son who currently lives in Washington state, a daughter living in Omaha, and the youngest, another daughter, who is a San Francisco firefighter. In the '70s, Fred left his job in Daly City and, with his wife and daughters, took off for Europe, where they camped in various countries for 14 months, with a final stretch in England, where Fred was a site engineer for a housing project.

Upon returning to the Bay area, the family lived in Walnut Creek. Fred was hired by KCA Engineers in San Francisco, where he worked for 30 years as a planner and project manager. KCA's major project was the development of Mission Bay. Fred was the firm's infrastructure and entitlement manager for the project and noted that it took 19 years and much research to gain final approval from the city.

Urban planning maps were always an essential part of Fred's work, and he has enjoyed working with them since his first job in the field. However, during the years of the Mission Bay project, his focus began to shift. He worked with numerous agencies, including the State Lands Commission, which had jurisdiction over the Public Trust Lands. The Trust had been imposed over large areas of the Mission Bay project, and because the Trust had numerous land use restrictions, the developer needed to convince the State Lands Commission to reconfigure Trust Lands to enable the rational development of Mission Bay. It became necessary to trace land ownership and the location of the historic shoreline back to the 1850s to achieve this goal. This task required locating and utilizing historic maps and surveys of the area. Fred became interested in these early maps and broadened his map focus first to historic maps of San Francisco and then to maps from all periods.

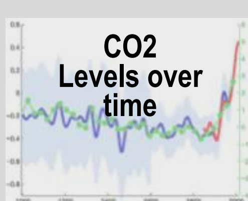
In 2002, he joined the Map Society and loves both sharing his interests and learning about those of other members.

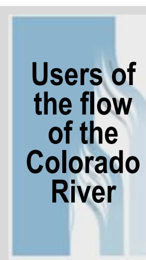
Music is another strong interest of Fred's. He enjoys orchestra music and is on the Board of Espressivo, a Santa Cruz chamber orchestra, where he has also served as President and current Treasurer. He provides audio-visual assistance to the Santa Cruz Opera Society as well. Fred has also served as President of the Osher Lifelong Learning Institute at UC Santa Cruz. When he retired in 2010, he and Nan moved to Capitola and sought land to design and build their retirement home, which they completed in 2014.

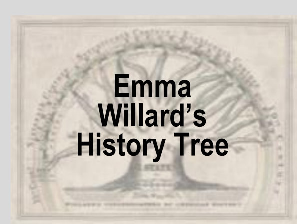
Fred has enjoyed his membership in the Map Society very much. He is a Life Member and an Education Fund Gold Member. He has served as President of the Society from 2011 to 2013 and has also been VP for Membership. He presently serves on the Board and is the publisher of our Journal, having developed it from a newsletter to its current glossy, 60-page bound format, with its formal name of *Calafia*. We are all most appreciative of his work!

CARTO-QUIZ

Answers







Phil Hoehn at the California Historical Society, 2020. Photograph: Frances Kaplan.

Phil Hoehn
1941-2023

We bid farewell to Raymond Philip Hoehn, Jr., known to many as Phil Hoehn, a prominent figure in the world of cartographic librarianship. Phil's illustrious career spanned decades, during which he left an indelible mark on map collections and services at various institutions. Born on October 23, 1941, in Cape Girardeau, Missouri, Phil's passion for maps began early in life, leading him to major in geography at UCLA. His journey continued at UC Berkeley, where he earned an MLS in 1967 and eventually assumed the role of Map Librarian at the Bancroft Library in 1969. With great sadness, we share that Phil passed away on February 6, 2023, at the age of 81, after battling complications of colon cancer.

Remarkable achievements marked Phil's tenure at UC Berkeley. Notable among them was the development and management of the ambitious California Maps Project, supported by a grant from the U.S. Department of Education. This project cataloged and reclassified over 21,000 maps from UC Berkeley and UCLA collections. Phil's foresight in including geographic location data in California Land Case Maps records laid the groundwork for their subsequent digitization and research applications. The longitude and latitude data proved invaluable for researchers using Geographic Information Systems (GIS) to explore California's historical cartography.

Beyond his work at UC Berkeley, Phil's journey continued with roles at Stanford University's Branner Earth Sciences Library & Map Collections and the David Rumsey Map Collection. He made significant contributions to each institution, diligently cataloging and preserving digitized maps and expanding awareness of map collections and services.

Phil's passion for cartography extended into his retirement, where he found fulfillment as a volunteer map cataloger at the California Genealogical Society and the California Historical Society. His tireless efforts organized and documented over 4,000 maps, including rare titles spanning California's history. Phil's work inspired the California Historical Society's map exhibit, "Mapping a Changing California: From the Seventeenth to the Twentieth Century," a testament to his enduring legacy.

Throughout his career, Phil was an active Western Association of Map Libraries (WAML) member, contributing significantly to the community. His dedication to both fostering scholarly pursuits and sharing his vast knowledge of cartography with others engaged him in the process of actually founding our Society. Together with Diane M.T. North, then a Ph.D. Candidate at UC Davis, he co-convened a meeting at the Bancroft Library in May 1978, which then became the first inaugural meeting of the California Map Society. North recalled her long relationship with Phil: "Phil's knowledge of, and deep enthusiasm for, maps, all maps, seemed boundless. Anyone privileged to have the opportunity to be guided by him and work alongside him benefitted from his professionalism, patience, generosity, and quiet sense of humor."

Phil's impact extended beyond his professional accomplishments. Colleagues remember him as a mentor, collaborator, and friend. His kindness and willingness to share his expertise enriched the lives of those fortunate enough to work alongside him. His knowledge of fire insurance maps and his publications, including the "Union List of Sanborn Fire Insurance Maps Held by Institutions in the United States and Canada," solidified his place as an esteemed resource for map librarians and researchers.

As the cartographic community mourns the loss of Phil Hoehn, we remember a trailblazing librarian whose passion for maps and earth sciences guided him throughout his life. We will cherish his enduring contributions to cartography and his impact on countless individuals he mentored. Phil's work laid the foundation for a stronger and more connected community of map enthusiasts, and his legacy will continue to inspire future generations of cartographers.

Publisher's Note: Due to space limitations, we could not include the entirety of a comprehensive obituary prepared by Randal S. Brandt, Bancroft Library, Heiko Mühr, Earth Sciences & Map Library, and Susan Powell, Earth Sciences & Map Library, soon after Phil's death in February. This memorial borrows heavily from their excellent work.

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Email ad copy to Fred DeJarlais, Publisher, fred.dejarlais@gmail.com

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Fred DeJarlais
Caleb Finch
John Fleming
Gregory Gajda
Robert Garfinkle
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Wally Jansen
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Grade
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R.....ROLLING
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