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# Rescaling the Past through Mosaic Historical Cartography

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## Abstract

Researchers of our past have long used historical maps to place events and to uncover the physical form of an area. A series of maps may be employed to understand a region beyond the extent of a single map. However, rarely are these maps included in publications of research findings. At best, a modern cartographic reproduction will be created to depict the research area. Our maps, created for a historical atlas of Sandwich, Ontario, Canada, are noteworthy for their use of original historical maps in a mosaic to recreate the past. Our objective was to overcome the international boundary between Canada and the United States, a borderland that has succumbed to vast generalizations on the part of the cartographers of the nineteenth and early twentieth centuries. Through the use of ArcGIS, we georectified and fixed the extent of our maps, creating a series of maps that depict the changing urban growth of Sandwich over 200 years. This methodology can be extended to allow for the cartographic visualization of economic, political, social and spatial relationships that exist beyond a single map.

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## 1. Introduction

Urban historical researchers have relied on historical maps as a basis for determining the spatial extent and physical form of a city at a given time. Historical maps have been used as cultural artifacts to help reconstruct urban landscapes and better understand political and economic relationships in particular periods. Historical maps have also been used to place events, people, and infrastructure. To accomplish these purposes, researchers have often relied on a series of single historical maps, each depicting a different period in time, scale, or extent. However, there are often spatial relationships influencing our understanding of history that are beyond the extent represented on a single map.

We experienced first-hand the constraints of relying on single maps during the creation of an atlas depicting the historical geography of Sandwich, Ontario, Canada. Our atlas examined the impact of changing transportation systems on the growth and decline of Sandwich, once the capital of a district that extended from Detroit almost to Toronto. Sandwich was examined from its founding in the year 1797 through its current status as a declining neighbourhood in the City of Windsor. During our initial archival search, we found no single historical map that accurately and completely represented the extent and situational relationship of this settlement, which straddles the Canadian/US border. Early Detroit River cartographers often ignored the regional perspective and situational relationships with nearby settlements. Maps in which the British (later Canadian) side of the river was the focal point often did not depict the American side. Similarly, American cartographers drew the Detroit side of the river with an amazing level of detail and sophistication, but fell short in mapping the British side of the river (Figure 1).

The series of maps we created and present here seeks to overcome the unique challenge presented by the international boundary by combining multiple historical maps into a mosaic to re-project Sandwich at various times in history. Using modern computer-aided cartography, we answer [Wiberley's \(1980\)](#) call to "edit" original historical maps rather than producing facsimiles or placing historical data on modern base maps. However, we respect [Wallace and Van Den Heuvel's \(2005\)](#) argument for a need to maintain truth in how we visualize geographic and historical processes in cartography. When employing the commonly adopted approach of redrawing the past on a backdated modern base map, we run the risk of misrepresenting reality. By making a mosaic with several historic maps that all represent the same time period, a new map can be created that depicts an urban place at a greater extent and detail, all the while maintaining the original cartographers' historical perspectives.

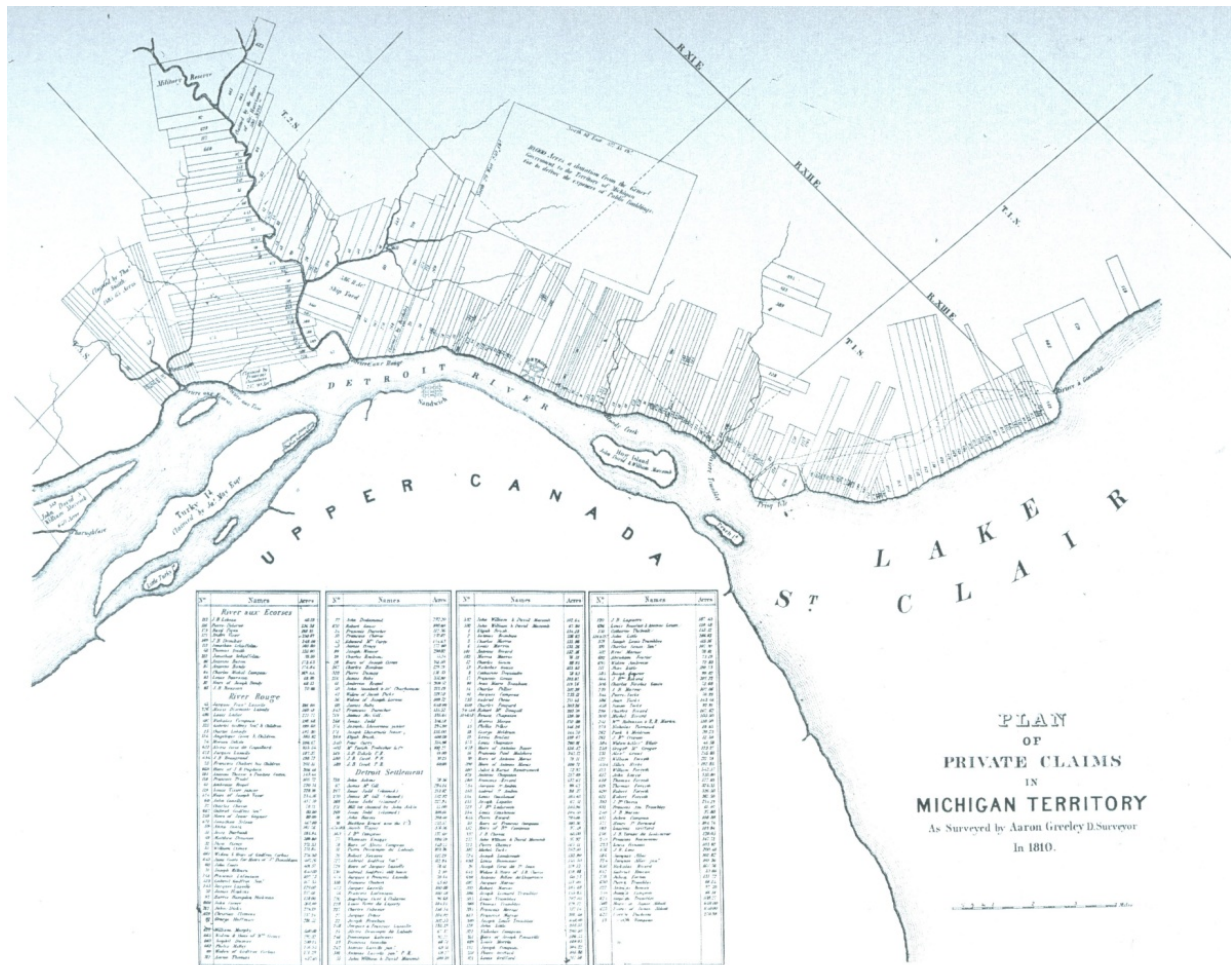


Figure 1. Map of American side of the Detroit River, c.1810.

## 2. Methods

To more accurately represent this region historically, we devised a methodology of mosaic historical cartography, in which parts of individual georectified historical maps were combined to overcome the limitations of the region's single maps. An extensive archival search located, on average, three suitable maps for each time period of interest. The original maps were first digitally scanned or photographed and then imported into Adobe Photoshop CS2 for enhancement. Unwanted artifacts from the digitization process, such as specks of dust, were removed with this software. The background of the historical map was removed where necessary. For example, cartographers who drew the city in the 1910s used deep, rich colours to show different political jurisdictions; we removed this deep colour to improve readability. However, care was taken not to remove cartographic elements found on the historical maps, such as lines denoting ward

boundaries or symbols for tourist attractions (for example, the green circles on map 7). The digital maps were imported into ArcGIS and georectified, then two or three historical maps were pieced together to create a mosaic. The Detroit River was used as the seam between the maps, as it is the common geographic feature found throughout the maps as well as the boundary where sophisticated details provided by each nation's cartographers concluded. The maps were then scaled so that each completed mosaic map would show the same extent, making it easier to see change in the settlements over time.

To ensure accurate spatial characteristics, extensive fieldwork was completed to georectify the historical maps. A Garmin GPS III was used to acquire 84 ground control points, or geographical coordinates, of stable historical features such as churches and rear lot lines, which were used to rectify the maps in ArcGIS. The georeferencing toolset within ArcGIS was used to stretch and skew each historical map to create a spatially accurate georectified historical map. To verify accuracy, a georectified Ontario Road File, provided by Statistics Canada, was placed over the map and a visual check between the Road File and the georectified historical map was completed. The entire map was exported into Adobe Photoshop CS2, where we touched up the seams between the maps and removed any by-products created from the removal of the background. Historical artifacts embedded within the maps, such as advertisements, fading, and map wear, were maintained as much as possible.

The completed mosaic historical maps can be used to portray historical processes and spatial relationships that would be difficult to show using a single historical map. Our atlas focuses on three core themes in Sandwich's urban history: transportation, migration, and the movement of social, economic, and political institutions. We utilised Adobe Illustrator CS2 to cartographically represent these processes. Colours were standardised throughout the series of maps to aid in identifying change over time. Transportation systems were symbolised in green, using a unique size and design for each distinctive system. Residential migration of people to, from, or around the region was symbolised using red arrows, each weighted in size based on the number of people migrating. The movements of social, economic, and political institutions were symbolised with purple arrows, showing the reader the locations of development and regional importance. The earliest periods of Sandwich's urban growth display the extent of development of individual building lots.

### 3. Discussion and Conclusions

There are a number of considerations for a researcher who wishes to attempt mosaic historical cartography. As with all attempts to recreate the past, this methodology is



inherently limited by the quality and quantity of historical sources available. Finding suitable maps to accurately represent the time period, extent, and detail of the place being researched can be a significant challenge. Due to technological limitations, few maps were created and fewer still survive for the earliest periods of development in North America's small and medium-sized cities.

Digitization is the most difficult and costly aspect of applying this methodology. Consideration must be given to map scale, extent of the settlement, and colour, especially as early 20<sup>th</sup> century cartographers began to experiment with using a heavy amount of colour. Archival maps may be fragile and difficult to handle. They are sometimes encased in Mylar or laminate for purposes of preservation; this can make scanning or photographing them challenging due to glare from the material in which they are preserved. The large size and format of some historic maps may also require expensive digital scanners or cameras to capture the entire scope of the maps.

Revisiting an important source such as historic maps in a new and innovative way may shed new light on our past places and spaces. The overcoming of the US/Canada border and the representation of an urban development over time are only the beginning of possible uses. While historians and geographers were first attracted to historic maps as a tool for determining the size and physical form of a city, coupling them with the spatial power of GIS allows historians to remap the city to fit their research using primary sources (for examples, see [Rumsey and Williams, 2002](#); [Parmenter, 2007](#); [Gilliland and Novak, 2006](#)). The georectification of historic maps may also call into question the historiography of the settlement of our earliest cities as it increases the spatial accuracy of people and places. A mosaic of several contemporaneous historical maps "offers a depiction of historical geographical reality that cannot be attained as easily by any other means" ([Wiberley, 1980](#)). To our knowledge, no one has combined historical maps in this way before. We hope this innovative methodology will aid urban historical researchers by providing a tool that can be used to examine the external relationships of an urban settlement beyond the extent of a single historical map.

## Software

ESRI ArcGIS v9.2 with the MapLex extension was used for georectification, colour mapping and digitization of building lots. The georectified historical maps were cleaned and cropped using Adobe Photoshop CS2 and the final cartography completed in Adobe Illustrator CS2.

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