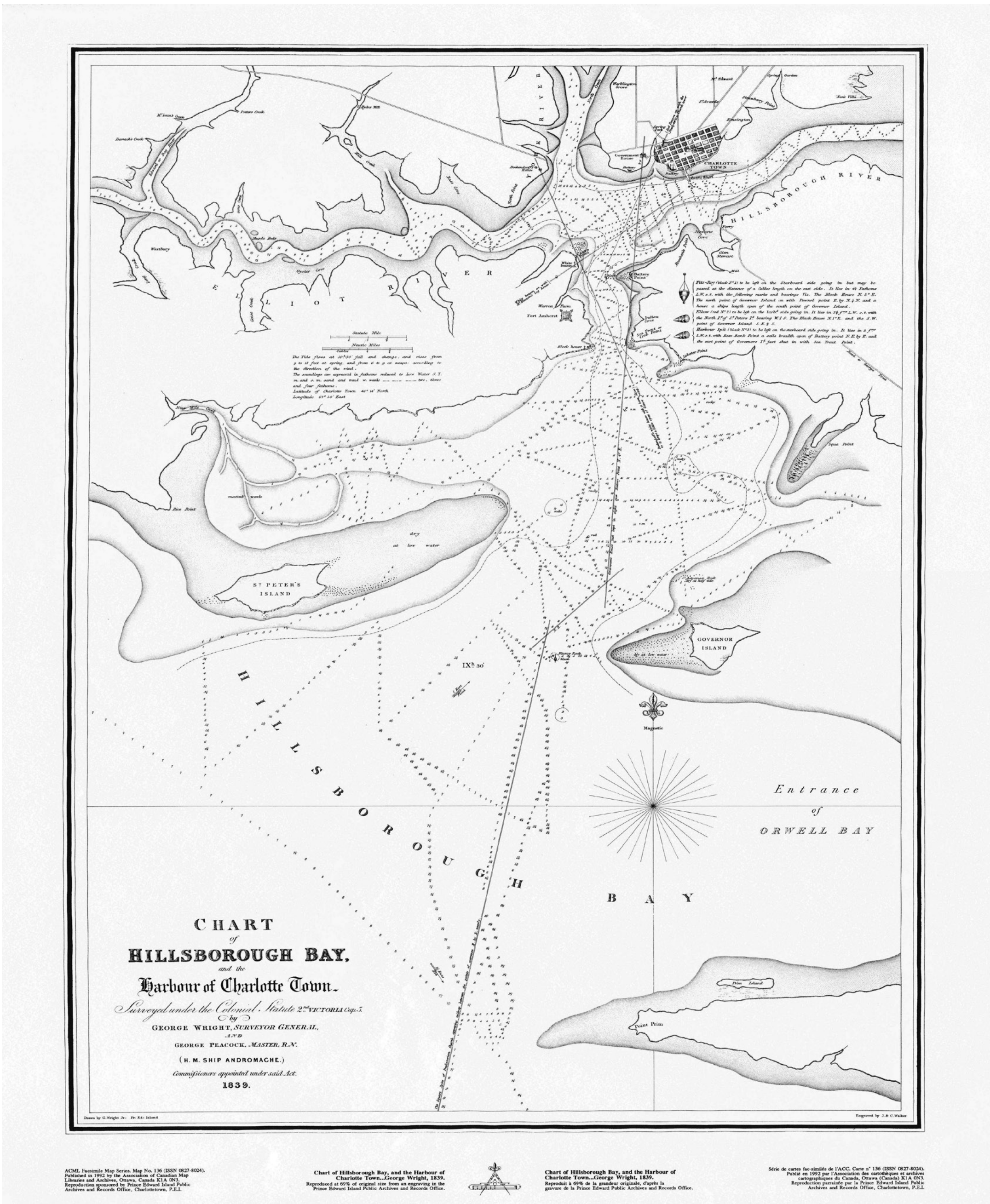
ASSOCIATION OF CANADIAN MAP LIBRARIES AND ARCHIVES

# BULLETIN

ASSOCIATION DES CARTOTHÈQUES ET ARCHIVES CARTOGRAPHIQUES DU CANADA




NUMBER 152 / WINTER 2016

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## ASSOCIATION OF CANADIAN MAP LIBRARIES AND ARCHIVES / ASSOCIATION DES CARTOTHÈQUES ET ARCHIVES CARTOGRAPHIQUES DU CANADA

MEMBERSHIP in the Association of Canadian Map Libraries and Archives is open to both individuals and institutions having an interest in maps and the aims and objectives of the Association. Membership dues are for the calendar year and are as follows:

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ON THE COVER...

Chart of Hillsborough Bay, and the Harbour of Charlotte Town, 1839.

Published in 1992 by ACMLA. Reproduced by Prince Edward Island Public Archives and Records Office, Charlottetown, P.E.I.

# PRESIDENT'S MESSAGE

**New Structure of the Executive Board**

As the first president of the ACMLA/ACACC to be serving under the new organizational structure, I am pleased to report that for the most part, the transition has been smooth. For those who are interested in what committees and appointed positions might have changed, below is a brief review. I would like to thank everyone who has served as a chair or committee member under the former structure and welcome all newcomers to their new roles.

| Committee/Duty - Active | Reporting Structure |
|---|---|
| Awards Cte | Past President (chair) |
| Communications Cte (new) | VP Communications & Outreach |
| Conference Cte | VP Professional Development |
| Mentoring Program | President & VP/President-Elect |
| Nominating Cte | President (chair) |
| Membership Discussion List | VP CO |
| Conference/travel funding | Past President |
| Membership Officer | VP/P-E |
| Publications Officer | VP CO |
| Bulletin Editor | VP CO |
| Webmaster | VP CO |
| Regional Reps (new) | VP/P-E |

| Committee/Duty - Defunct | |
|---|---|
| Bibliographic Control Cte | officially defunct as of 2014 |
| Copyright Cte (not ad hoc cte) | officially defunct as of 2014 |
| Geospatial Data Access Cte | officially defunct as of 2014 |
| Historical Maps Cte | officially defunct as of 2014 |
| Membership Cte | officially defunct as of 2014 |
| Web Cte | officially defunct as of 2014 |

**Election of Officers**

Under the new Rules of Procedure (http://acmla-acacc.ca/docs/ACMLA_rules_of_procedure.pdf), our Vice President/President Elect serves for one year, becomes our President the following year, and the Past President the year after this. As a result, every year we must elect a new Vice President/President-Elect. If you are interested in serving, I would encourage you to let your name stand.

**Carto 2016**

The annual conference and AGM of the Association of Canadian Map Libraries and Archives/Association des cartothèques et archives cartographiques du Canada will be hosted by the University of New Brunswick, NB, 14-17 June 2016. Our theme this year, "50 years: Mapping our past; Navigating our future," celebrates the important contributions made by map collections, archives, and the ACMLA and invites considerations of our roles in preserving and providing cartographic and geospatial information in the future. The Program Committee and Local Arrangements Committees are looking forward to seeing you all in Fredericton, NB.

**Conclusion**

As I finish my last President's Message, I would like to thank my fellow executive board members who have all been wonderful colleagues. I look forward to working again with Deena Yonofsky (Vice President/ President-Elect), who will be our new President, as well Marilyn Andrew (Secretary), Rebecca Bartlett (Treasurer), Jay Brodeur (VP professional Development), Tracy Sallaway (VP Communications and Outreach), and our new Vice President/President-Elect (TBD). Our (current) Past President, Rosa Orlandini, will be leaving the executive after many years of serving in a variety of roles. Rosa has dedicated a considerable amount of time and effort to the Association, and her dedication has been greatly appreciated by all.

*Siobhan Hanratty*

# ACMLA BULLETIN SPECIAL SECTION

## Peer-Reviewed Articles

Since the appearance of the first scientific journals more than 300 years ago, peer review has been a formal part of scientific communication. Today, the peer review system results in an estimated 1.5 million scholarly articles published each year and is fundamental to the appropriate validation of scientific findings. Not insignificant is also the intention that peer review signals; because it indicates that research has been evaluated by an independent panel of experts in the field, peer review is also an important consideration for membership in the scholarly community.

Drawing inspiration from well-established peer review journals in library and information sciences, we hope that this special section of the ACMLA Bulletin will be the first step to establishing the association's scholarly journal as a viable venue for members of our community to share their valuable contributions in a recognized, peer-review publication.

I would like to extend a very special thank you to the authors, peer reviewers, and editors who volunteered their time and expertise to making this inaugural section come together.

*Deena Yanofsky*
*VP/President-Elect, ACMLA*
*Associate Librarian, McGill University*

PEER-REVIEWED ARTICLE

# NEW TOOLS FOR MILITARY HISTORIANS: HOW GIS CAN HELP UNDERSTAND CANADA'S NORTH-WEST EUROPE CAMPAIGN

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The use of geographical information systems (GIS) has exploded both in the private and public sectors. Not surprisingly, librarians and archivists have staked out a large role with GIS in the public sector through their efforts to preserve and maintain geospatial data collections. Their efforts have had cross-disciplinary ramifications which include the use of geospatial data collections in military history. In the Canadian context, military histories have in the past been heavily reliant on traditional sources such as interviews, diaries, and official transcripts of events without any real thought given to geographical information beyond the odd topographical map. This oversight is not due to lack of historical geographic data, but more so because of its perceived lack of importance.[1] This paper intends to highlight how GIS can significantly add to the study of military history and the potential value of GIS projects to the discipline.

For many post- Second World War Canadian historians, Canada's North-West Europe front has tended to highlight the failure of an ill equipped and poorly led Canadian army against a battle-hardened and ferocious German military. In the years immediately after the war, Canadian historians were quite critical of the army's performance. Even Canada's official war historian, Colonel C. P. Stacey, confirmed the Canadian's failure against the German army stating that the initial invasion of Normandy in France was a classic example of their performance, writing that "man for man and unit for unit, it cannot be said that it was by tactical superiority that we won the Battle of Normandy."[2]

In fact, Stacey believed that it was simply a matter of overwhelming numbers that led the Allies (Americans, British and Canadians) to victory over the *Wehrmacht* in Normandy – a common theme persistent until the end of the war.[3]

Stacey's first impression of Canadians' battlefield abilities in his 1960 official history *The Victory Campaign* has persevered among others. Historians

[1]When the Official History of the Canadian Army in the Second World War was released in 1960 the main focus for sources used were war diaries, operational reports and personal officer notes. This "top-down" type history that many other later histories would also come to use was not uncommon for its time but it overlooks a variety of sources such as geographic data. An excellent indicator of this is the use of actual topographical maps in the official histories themselves. For the *Official history of the Canadian Army in the Second World War, Vol II The Canadians in Italy, 1943-1945* only 25 topographical maps are used in a book of over 700 pages in length. In the *Official History of the Canadian Army in the Second World War, Vol III The Victory Campaign: The Operations in Northwest Europe, 1944-45*, which is again over 700 pages, only 14 maps are used. Of the maps that are examined, they are more so focused on formation movement than terrain analysis. The lack of overall use of geographical data in Canada's official histories is indicative to the perceived role of perspective geographic tools were to early military historians.

[2]Colonel C. P. Stacey, Official History of the Canadian Army in the Second World War, Volume III, The Victory Campaign: The Opera*tions in North-West Europe, 1944-1945* (Ottawa: Queen's Printer, 1960), p. 274.

[3]*Wehrmacht* is the German word for the united armed forces of Nazi Germany – this included both regular army units and the Waffen SS both of which faced off against the Canadians in Normandy and beyond. Stacey's belief in the "overwhelming the enemy theory" comes across repeatedly in his works and other scholars have taken note. See Terry Copp's, *Cinderella Army: The Canadians in Northwest Europe, 1944-1945* (Toronto: University of Toronto Press, 2007), p. 83 for a detailed account of Stacey's beliefs.

Figure 1. Canadian soldiers fire into a battered house during the battle for Caen, France, June 10, 1994.

*Source: LCMSDS Photo Archive – LMH-P09878*

have tended to focus, as Stacey had, on the recollections of both senior, and to a lesser extent, junior officers in the Canadian army and their British counterparts. Thus, history has not been kind to the Canadian soldiers who fought in Europe during the Second World War. This began to change in the early 1990s.[4] Historians began to reassess individual narratives of soldiers and take account of terrain and geography. Historian Terry Copp was perhaps the most inclined to take the latter into account in his seminal book Fields of Fire: The Canadian's in Normandy. His biggest contribution was taking into account what a small gradient in slope could have in a battle in his aptly titled book: *Fields of Fire* - which highlights how inclines can affect fire ratios of artillery and small arms, potentially giving an entrenched defender a massive tactical advantage. Copp stated that "it would be difficult to write about this or any other military campaign without a detailed knowledge of the ground."[5]

It is from Terry Copp's appreciation of terrain and geographical features, including craters, that historians, particularly military historians, can build on their understanding of the past by integrating GIS into basic historical work. As stated above, historians tend to focus on more traditional sources such as paper and oral testimony. Military historians have been particularly these sources when explaining military campaigns.[6] Although extreme geographic changes (and in Copp's case terrain analysis) are acknowledged, GIS has yet to be implemented as a scholarly source. Although using basic sources are proven to be beneficial and is a step in the right direction, military historians should move on from geo-referenced maps and terrain analysis. By its very nature, GIS collects a variety of intangible data such as air photos and defence overprints that, by themselves, do not offer much, but combined, they can expand our understandings immensely. This complex data goes far beyond any simple geographic exploration because the collected intangibles are invaluable to military historians looking to examine an engagement where a shell, mortar crater, or shifted trench line could prove decisive in understanding the outcome. This can only be done with the accuracy of GIS.

As of 2015, the Laurier Centre for Military Strategic and Disarmament Studies (LCMSDS) at Wilfrid Laurier University began a partnership with the University of Waterloo's geospatial centre in hopes of creating a geographic information system that explores the First Canadian Army's

[4]John A. English published a monograph on the Normandy campaign that questions Stacey's argument. He is arguably one of the first to take a different tone on the abilities of the Canadian soldiers fighting in Europe, however, his work solely focused on the soldier's point of view with very little terrain analysis or other geographic exploration. See John A. English's *The Canadian Army and the Normandy Campaign* (Westport: Greenwood Publishing Group, 1991). For a complete historiography on those who have written on Canada in the Second World War see Tim Cook, *Clio's Warriors: Canadian historians and the Writing of the World Wars* (Vancouver: University of British Columbia Press, 2006).

[5]Terry Copp, *Fields of Fire: The Canadian in Normandy* (Toronto: University of Toronto Press, 2003), p. XIV.

[6]Military historians usually prefer to stay on the operational or strategic level of analysis. This history typically sticks to what the commanders and the overall higher chain of command decided and carried out. Unfortunately, historians of this trade have been accused by social historians of overlooking more important content from the tactical level where the lower rank soldiers were, this includes tactical level maps and geography. See John Keegan's *The Face of Battle: A Study of Agincourt, Waterloo and the Somme* (New York: Viking Books., 1976). Keegan was arguably one of the first military historians to argue for the need to move beyond great men and examine other sources of interest.

Figure 2. C. P. Stacey
*Source: Library and Archives Canada – PA-501025*

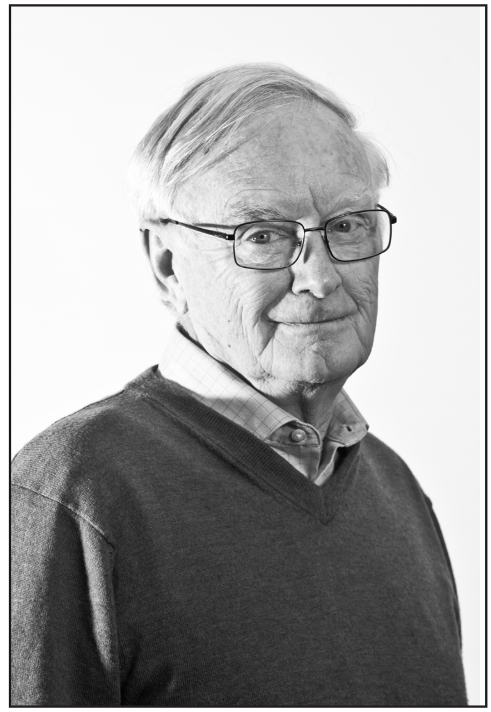

Figure 3. Terry Copp
*Source: LCMSDS Photo Archive – LMH-P05142*

advance through North-West Europe during the Second World War. The project members include Eva Dodsworth, Dr. Geoffrey Hayes, and Trevor Ford. Dodsworth, who heads the Geospatial Centre at the University of Waterloo, has been instrumental in starting the project and supplied the services of her centre to this project. Dr. Hayes, also at the University of Waterloo, has been the visionary for what uses can be gleamed out of the project while Trevor Ford, a PhD Candidate and Archival Manager at LCMSDS, has provided the archival materials (maps and air photos).

From the beginning, the goals of the project were simple. Using source maps and photos from LCMSDS' collection and along with the Geospatial Centre's expertise of Google Earth and georeferencing, a GIS platform is being built to catalogue Canadian battles. In using GIS for each military engagement and reassessing traditional historical records, a spatial data infrastructure is being created. It is the team's hope that this data arrangement will be made available to both academics and the public alike; therefore, creating a system with few restrictive boundaries, while also providing a layered map system that can be manipulated by individuals to better understand the campaign.

What makes this GIS project original are the sources used to create the layered map. Over the course of the past thirty years, LCMSDS has been collecting thousands of maps, which include hundreds of defence overprints.[7] These overprints are 1:25,000 scale topographical maps that have had known enemy positions printed onto the map itself.[8]

These positions came from aerial observation flights conducted from 1944-1945 by the Royal Canadian Air Force and other allied air forces.[9] These overprints were vital for the soldiers on the ground during the war, as they typically planned their operations around these maps.[10]

7Currently LCMSDS has over 3,000 maps of which approximately 213 are defence overprints.
8There are some scaled to 1:50,000 but they focus solely on the Italian Front.
9Edgar F. Raines Jr., *Eyes of Artillery: The Origins of Modern U.S. Army Aviation in World War II* (Washington D.C.: Center of Military History United States Army, 2000), p. 11.
10Interestingly enough these Defence Overprints have been largely overlooked by military historians because they focus too heavily on the tactical level – which as stated above tend to be of little interest to those who prefer to stay on the operational or strategic level.

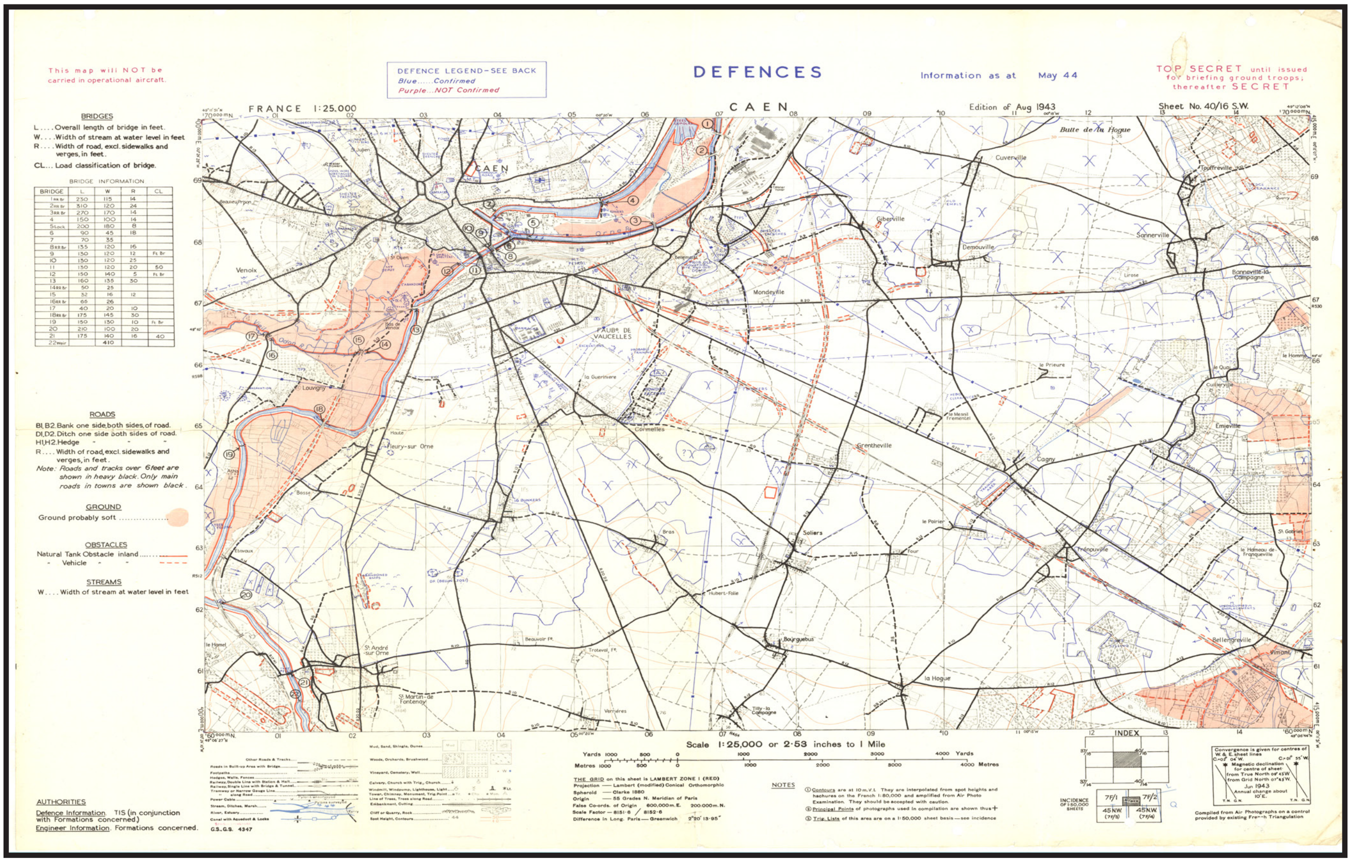


Figure 4. Defence Overprint: Caen Defences, 1944; *Source: LCMSDS Map Archive – LMH-M00343*

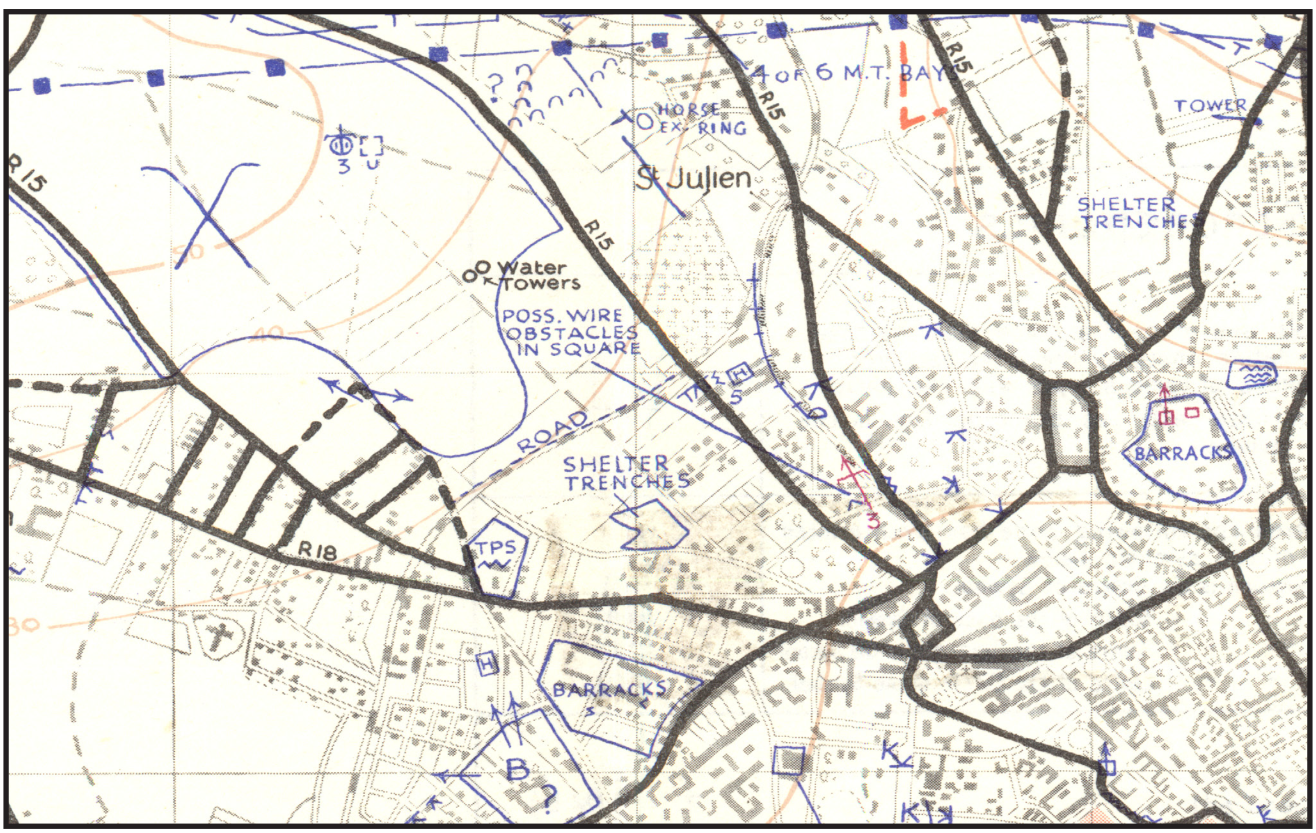


Figure 5. Section of 'Defence Overprint: Caen Defences, 1944' that details gun positions, machine gun nests, and artillery pits; *Source: LCMSDS Map Archive – LMH-M00343*

The idea of defence overprints was not new in Second World War. During the First World War, observation balloons marked enemy trenches and artillery positions on a map. These maps, which military historians now call trench maps, were used in both small operational plans and large strategic aims. As the war continued, the air war brought forth fighter pilots on both sides in an attempt to control the skies so the observers could mark out targets.[11] Because entire operations were decided on the accuracy of the trench maps, military commanders came to view air observation as key to any successful campaign. This lesson was taken in by many during the Second World War. The Allies used a more refined version of the trench map – the Defence Overprint.

After the war, most of the maps were sent back to Ottawa and given to the Historical Section under Colonel Stacey. Eventually, after years of gathering dust, they were discarded and LCMSDS accepted them into their collection in the early 1990s. Since then, they have proved invaluable in assessing the obstacles that advancing units faced albeit enemy positions or geographical hurdles. What further makes these overprints practical for historians is that they match up exactly with air photos taken during the war.

LCMSDS has the largest collection of Second World War air photos in Canada. These photos, as with the defence overprints, follow the First Canadian Army from 1944-1945. Reconnaissance flights would fly steadily at a certain height snapping photos of the Earth at small time intervals. The idea was that entrenched enemy units and geological deformities such as flooding of the land, something the Germans did regularly to impede the Canadian's advance, would be noted and relayed to the ground forces. The photos taken were handled by the Air Photo Interpretation Section of the First Canadian Army in order to plot out advance routes and enemy positions for the mapping section. After the war, the photographs were sent to the air photo interpretation school at Rivers, Manitoba. When the Canadian Forces closed the base in 1971, the collection was sent to the Canadian War Museum in Ottawa. Unable to find adequate storage for the photos (as they number over 130,000), the War Museum allowed LCMSDS to acquire them.[12] All 130,000 have since been digitized and cataloged by flight number, location and date.[13]

With these two excellent sources, LCMSDS and the Geospatial Centre at University of Waterloo have been constructing an online geospatial map visualization tool. After considering a number of online GIS products, it was quickly realized that ease of access to the platform was of the utmost importance. Two of the most popular online mapping tools include Google Maps and Google Earth - both of which offer free online access to the programs and support organizing and hosting the map images and metadata. Google Maps will act as a repository for the metadata, while highlighting troop paths, and offering KML map files for download. The KML files can then be viewed in Google Earth. Once the project is complete, it will be listed within the Google Maps Gallery section.


Figure 5. Sample Air Photo 3079, Sept 11, 1944 – Netherlands

*Source: LCMSDS Air Photo Archive – LMH-A111-3079*

[11]Lee Kennett, *The First Air War: 1914-1918*, (New York: Free Press, 1999), p. 42.
[12]Terry Copp was then Director of LCMSDS at the time and gladly took them on for preservation. This was an added bonus too as they significantly furthered his research with *Fields of Fire.*
[13]Beginning in 2011 LCMSDS with the support of a number of private donors began a systematic process of cataloging and digitizing the photographs. A team of dedicated student employees and volunteers at LCMSDS have not only scanned all of the photos but also created a preliminary inventory and a basic finding aid. This preservation phase of the project was completed in August of 2013 with minor work continuing to present.

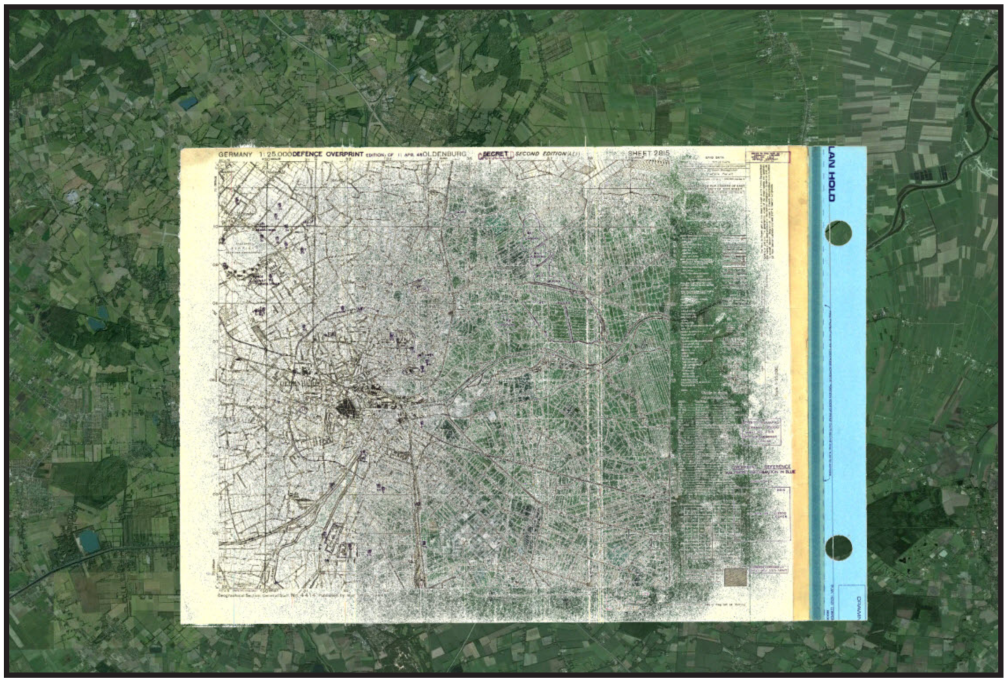

Figure 7. Sample Defence Overprint georeferenced and layered onto Google Earth
*Source: University of Waterloo Geospatial Centre; Google Earth*

In order to enable viewing of the maps in Google Earth, each defence overprint map and corresponding aerial photograph was scanned and georeferenced. ArcGIS was used to georeference each image and Google Earth was used to create the image KML outputs. Shapefiles were created to indicate map coverage, which were then also converted into KML format and uploaded into Google Maps. Each coverage polygon has a map associated with it, and once users click on the polygon, a link to download the map in KML format becomes available.

Each image includes a description, and with the troop paths drawn out, a working platform was created to allow for manipulation by the user to garner a greater understanding of the Canadian war effort in North-West Europe by allowing historians the ability to reassess with a new tool. In many ways, historical reassessments are critical to our understanding of the past. More importantly, this project should be seen as a first attempt to use GIS with military history as future project from other campaigns and wars could greatly benefit from the application of GIS.

Although this project is in its early stages, Google mapping products are being used to demonstrate the potential of these visualization tools. The most time consuming component of this project was the georeferencing of the maps; which took just over three months to do. Developing the final map project lasted only several weeks. Moving forward, however, the team would like to incorporate these maps into a more sophisticated GIS program where searching for maps and viewing the maps can be done together. Creating a mapping interface, similar to the Scholars GeoPortal would be ideal and is something the Geospatial Centre is currently considering. Furthermore, this project has the potential to expand itself from simply the Canadian North-West Campaign. For Canadian military history an examination on other conflicts based on the GIS system we are proposing could expand pre-existing historiography. Good examples of this could include the First World War, the Second World's Italian Campaign and even Canada's involvement in Afghanistan.

Another avenue this project has potentiality with is with modern-day bomb disposal. Over the past two years, LCMSDS has had relations with bomb disposal groups in the Netherlands and Germany, which use both its archival maps and air photos to help identify possible unexploded ordinance. Unfortunately, only individual air photos and defence overprints are used. A manipulated GIS platform would only help further this effort, as the database would focus on certain tell-tale signs of live explosives from both air photos and maps along the Canadian campaign route. If this project was made available to the bomb hunters, having both air photos and overprints layered in a Geographic Information System, the end result would be invaluable. Other HGIS research could also be carried out using this project's approach. Both University of Toronto Mississauga and McGill University Libraries have extensive air photo collections.[14] These air photos, which cover most of Ontario and Quebec, could be combined with like area topographical maps to create a GIS system similar to the project highlighted in this paper.

Ultimately, it is the hope of this project's team that the creation of a comprehensive geographic information system, matched by easy access and manipulation, will allow the public and scholars to better understand Canadian's actions in the Second World War. Battles throughout Canada's North-West Europe Campaign should be re-assessed to highlight changes in terrain and elevations. This is not to say that previous scholarship of the Canadian campaign done with GIS is faulty. Instead, a database like this should be seen simply as an additional tool, albeit a vital one, in the historian's arsenal to better understand an already misunderstood campaign.

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**Trevor Ford** *is a third year PhD Candidate at Wilfrid Laurier University. Having started his doctorate at Memorial University of Newfoundland in 2013 under the supervision of Dr. Mark Humphries, Trevor was offered the chance to come to WLU with Mark in order to continue his studies and join the Laurier Centre for Military Strategic Disarmament Studies in 2014 as Archival Manager. Since his arrival, Trevor has completely reorganized and catalogued LCMSDS' holdings, including a year-long scanning project that digitized all of the Centre's maps. He has just finished setting up LCMSDS' new website waterlooatwar.ca, which chronicles the Waterloo County based 118th Battalion during the First World War. Trevor is currently working on several different projects, including one that is a joint venture with the University of Waterloo's Geospatial Centre, where LCMSDS' maps are being geo-referenced and added to Google Maps.*

*With help from the Social Sciences and Humanities Research Council of Canada (SSHRC) Joseph-Bombardier Research Scholarship and under the supervision of Dr. Humphries, Trevor's doctoral research covers the role of the Canadian military's intelligence units and their domestic activities during the First World War. Trevor specifically examines the Military Intelligence Branch and their conduct against real and perceived enemies during and immediately after the war. This subject is not only unexplored but is also highly relevant to today's national security apparatus and the wider concept of state security in Canada. Trevor has published three articles on this subject and is currently working on a book of collected letters.*

[14] Dodsworth, Eva H, and Andrew Nicholson, *Using Google Earth in Libraries: A Practical Guide for Librarians* (New York: Rowman & Littlefield Inc., 2015), p. 26.

PEER-REVIEWED ARTICLE

# HISTORICAL MAP DIGITIZATION IN LIBRARIES: COLLABORATIVE APPROACHES FOR LARGE MAP SERIES

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## 1 Introduction

Academic libraries are playing a role in the digitization of Canadian government documents[1,2,3] but maps tend to be excluded from these activities due to their unique dimensions and display requirements. Using a topographic map digitization project as a case study, this paper presents a collaborative approach to map scanning, georeferencing, and metadata creation across several Ontario universities.

Collectively, the 21 institutions making up the Ontario Council of University Libraries (OCUL) possess and maintain large volumes of Canadian topographic maps. However, few OCUL universities hold complete sets of these map series. While the Canadian government's most recent topographic maps are now available online, older editions of these maps have not been digitized. This project, currently underway at several participating universities, will enable us to share digital versions of some of our most-requested historical map series with the public at large.

Topographic maps are commonly used by researchers interested in examining changes over time (urban sprawl, transportation patterns, diminishing woodlots, shoreline erosion, etc.) and we believe that digitizing, georeferencing, and publishing the maps online will augment their use in teaching, research, and public use applications. In addition, since many of the maps were published prior to 1966, a majority are considered to be in the public domain (meaning that the copyright term of protection has expired) and they may be reproduced without permission; hence, they are shareable with the wider public. Providing online access to these historical map collections will be a valuable addition to the Canadian historical GIS resources that are currently available on the web.

In this paper, we describe and discuss the collaborative approach that OCUL member institutions are currently undertaking to digitize all of Ontario's public-domain historical topographic maps at the 1:25,000 and 1:63,360

[1]Accessed at https://archive.org/details/governmentpublications
[2]Accessed at https://agiig.wordpress.com/noteable-digitization-projects
[3]Accessed at http://govinforegistry.blogspot.ca

scales. Additionally, we document our process for establishing scanning and georeferencing guidelines for the project. It is our hope that this paper will serve as a useful reference for other institutions undertaking map digitization projects.

### 1.1 Project Origins

The OCUL Geo Community (formerly the OCUL Map Group) is a forum for the exchange of information and ideas pertaining to maps, geospatial data, and other cartographic resources, both print and digital, within the wider Ontario Council of University Libraries. For a number of years, the community has discussed priorities for map digitization (Trimble et al., 2015). In August 2012, community members identified the Canadian topographic series holdings within their collections, and after further discussion, two series emerged as a priority for digitization: 1:25,000 and 1:63,360. By spring 2014, members agreed to proceed with a formal budget proposal to OCUL for a three-year funded project (January 2015-April 2017). A draft proposal was completed in early September 2014 by the project managers (Cheryl Woods, Western University; Jason Brodeur, McMaster University; Sarah Simpkin, University of Ottawa) and community members were asked to provide feedback.

One of the top priorities for the group was to align the project's objectives with OCUL's commitment to enhancing information services in Ontario. Specifically, the project supports the following OCUL strategic plan goals:

- Ensuring maximum discoverability of digital library resources;
- Contributing to building world-class digital library services for Ontario students; and,
- Providing and preserving academic resources essential for teaching, learning and research.

The community's proposal was successful and the team received CAD $32,000.00 to focus on digitizing and georeferencing topographic maps of Ontario that were not already digitized and publicly available. Two primary examples meet these criteria and are included in this project: the Ontario sheets in the 1:63,360 national topographic series (published between 1904 and 1949), and those in the 1:25,000 series that are greater than 50 years old (published between 1956 and 1967). Over 800 maps are included: 627 map sheets from the 1:63,360 national topographic map series and 233 map sheets from the 1:25,000 national topographic map series.

The OCUL Geo Community is well-positioned to leverage the expertise and equipment already available at member institutions. The project managers made an open call to community members, who volunteered to participate in various capacities, such as supplying maps from their collections, scanning, testing, creating metadata, and georeferencing.

Original maps are currently being scanned to specifications that are standardized for format and resolution (600 ppi). Georeferencing and metadata creation are then carried out to enhance the usability of the digital files, in accordance with a digitization plan that was developed for the project. The project also involves hiring student staff members at a number of OCUL schools, who are tasked with digitizing, georeferencing, and metadata creation under the supervision of community members at participating institutions. A majority of the project's funding supports the hiring of student employees, and supervisors contribute their time in-kind.

### 1.2 The 1:25,000 and 1:63,360 Map Series

As mentioned above, the Government of Canada's 1:25,000 and 1:63,360 scale map series were prioritized for this project as they are both commonly requested from our users and had not been digitized by other parties. The 1:25,000 maps produced by the Army Survey Establishment (and then in 1966 by the Mapping and Charting Establishment) are the most detailed of any federally-produced series. These maps were originally intended for military use and were produced for military training areas (camps) during the First World War. In 1959, the Government of Canada's attention turned to the protection of Canadian cities in the event of an atomic attack. Canada's 17 largest cities were mapped immediately, with the resulting series becoming known as the

the military city plans. By 1970, there was enough public demand for a civilian version of these maps. A redesign of the military city plans was undertaken, and work on the NTS (National Topographic System) 1:25,000 series continued until 1978, when it was stopped for two reasons: first, demand for new maps of the Canadian Arctic shifted attention toward map production using the emerging 1:50,000 standard; second, some provincial mapping agencies had begun publishing their own map series at 1:10,000 and 1:20,000 scales (Nicholson & Sebert, 1981, p. 119).

L.M. Sebert, the former Head of the Mapping Programme, Topographical Survey Directorate, Surveys and Mapping Branch, Ottawa, stated that "[t]he 1:63,360 series and its successor the 1:50,000 are the most important series in Canadian mapping. The 1:50,000 scale is the largest scale at which large areas of Canada have been mapped, and it is the largest scale for which complete coverage of the country has been programmed" (Nicholson & Sebert, 1981). The 1:63,360 series, first produced by the Department of Militia and Defence (representing at a scale of one inch to one mile), began in 1904 and ended in 1949 when it was converted to the 1:50,000 series. According to Sebert (1976):

"The detail shown on these early sheets was remarkable. In addition to the differentiation of the construction materials for buildings (red for stone and brick), there was a similar differentiation of bridges into stone, iron and wooden construction. Rural industries were depicted by symbol and initials, and these included saw mills, grist mills and flour mills, factories, blacksmith shops, hotels and taverns, all being further defined as being of stone or wood construction. Woods were depicted by coniferous or deciduous tree symbols, and as these were drawn by hand the density of the woods was indicated, by the density of the symbols, into open, medium or close growth. Fenced roads were differentiated from unfenced; telephone lines were shown; telephone offices were identified."

This amount of detail for cultural features (Figure 1) was not maintained in the 1:50,000 series.

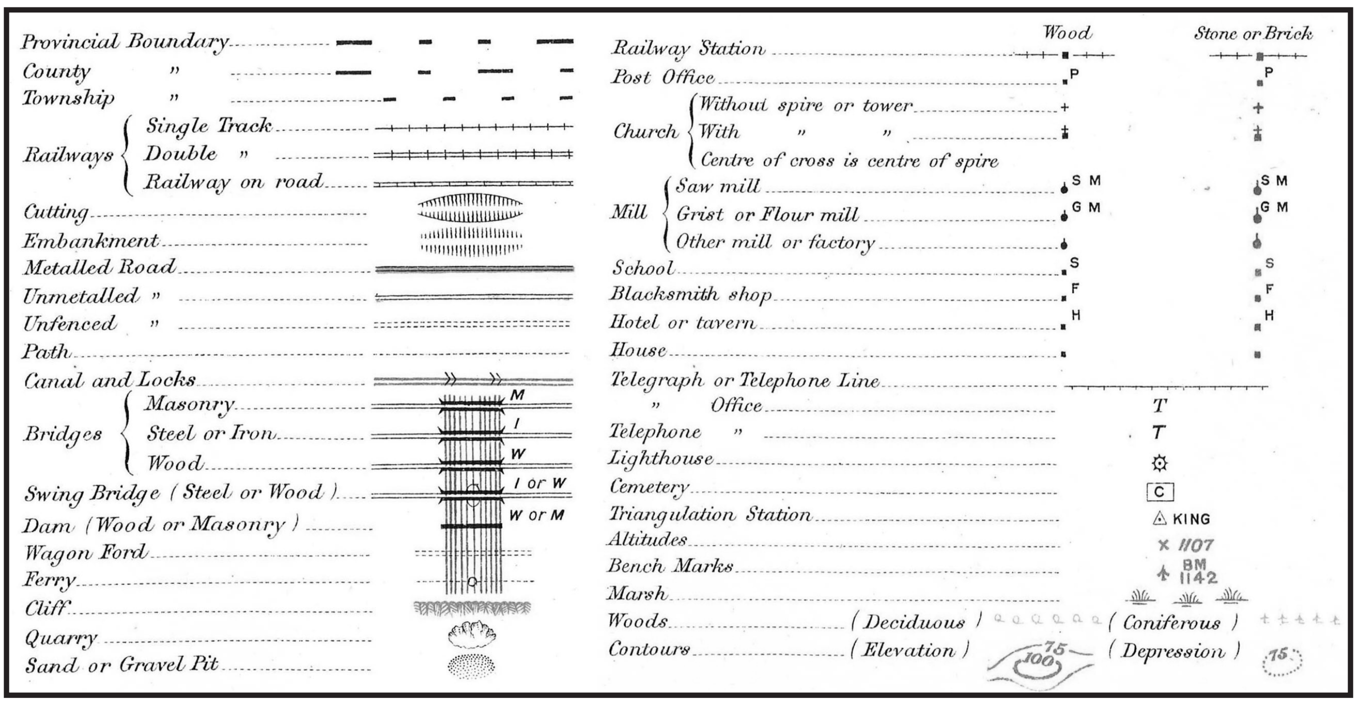


*Figure 1: Cropped legend of Port Burwell sheet (040 I10) from 1922 showing symbology details typical of the 1:63,360 series maps.*

## 2 Organizing and Enabling Collaboration Among Distributed Partners

With participating universities located across southern Ontario, the topographic map digitization project is by nature a distributed one and requires considerable coordination. Map collections, digitization equipment, and project staff are not typically located under the same roof. For these reasons, the project has relied on collaborative tools and shared storage for the scanned images, which at high resolutions can each require as many as 900 megabytes of storage.

### 2.1 Inventory Creation

The team started by building an inventory of our collective holdings and the status of each map. Between April 2014 and August 2015, community members reported the maps that were held at their respective institutions, while project managers worked to identify any gaps. As the team could not locate a complete inventory of published maps in the two series, project managers assembled a working inventory of known maps from various sources, incorporating holdings lists from Canadian map libraries, the Archives of Ontario, Library and Archives Canada, Natural Resources Canada, and the Toronto Reference Library.

Projects of this nature typically rely on spreadsheets for managing inventories, updating statuses, and inputting metadata about each map sheet. To overcome the duplication and versioning challenges of sharing local copies of files across multiple institutions, the group chose to use Google Sheets (with local backup copies).

The team built and standardized the initial map inventory using one worksheet for each series and one row for each map and map edition. Maps that will be fully in the public domain by the end of the project were then identified. Individual maps are being tracked throughout the process, from “Have - not scanned” to “Scanned” to “Georeferenced”. Project leaders monitor the worksheets to keep track of progress and send notices to individuals at participating libraries when it is time to send maps to be scanned.

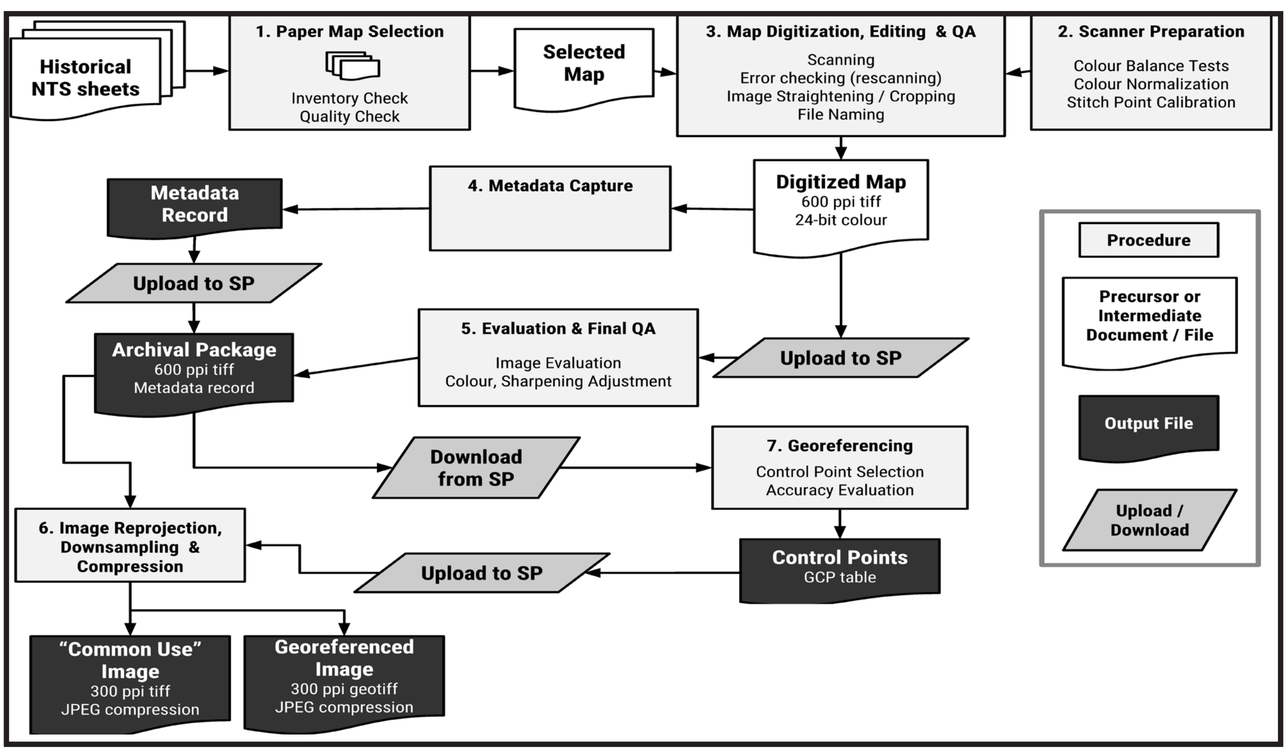


*Figure 2: Project workflow schematic showing procedures, files, and file transfer steps.*

The project workflow (Figure 2) begins with the map selection phase. Participating institutions are invited to record their holdings of 1:25,000 and 1:63,360 scale maps into a shared Google spreadsheet. Map sheets included in this master list should be of acceptable quality for digitization purposes. Notes about the condition of each map and other variables (for example, whether the map has any overprinting and whether or not it has been encapsulated) may be included in this phase. For this project, we determined that where multiple copies of a map exist, preference should be given to non-encapsulated maps to improve the quality of the scans.

Once maps have been selected, they move through the digitization, metadata capture, and georeferencing portions of the workflow, which are described in more detail in later sections of the paper. Our final goal, once quality checks have been completed, is to display the georeferenced maps on OCUL's Scholars GeoPortal platform, where they will be available for public viewing and downloading.

As of November 2015, 650 of 860 known maps have been scanned. The majority of the scanning is being completed at three (McMaster University, University of Waterloo, Western University) of the institutions because they have the same make and model of large format scanner, which ensures consistency. One terabyte of FTP storage has been supplied by Scholars Portal, the service arm of OCUL, to store the files that will then be retrieved for georeferencing. We are currently investigating options for digitizing the remaining known maps in these series that are not held at OCUL schools. This may include contracting out the scanning work to organizations such as Library and Archives Canada, whose map collections cannot be loaned to other institutions.

## 3 Standards for Map Digitization and Georeferencing

The process of establishing standards for map digitization and georeferencing activities reflects the project's overarching goal to produce consistent, complete, and high-quality products, while also using a collaborative model that enables contributions from as many interested OCUL institutions as possible. Acknowledging that satisfying these objectives would require careful coordination and perhaps strategic compromises, we sought to develop standards by synthesizing documented general best practices with findings from a number of preliminary digitization and georeferencing tests.

Map digitization tests were conducted to assess the performance of various map digitization systems available at OCUL institutions, compare the quality of previously-digitized maps at others, and develop standards and procedures to guide project digitization activities. Georeferencing tests were conducted in order to establish methodologies and standards that would balance our need for accurate georeferenced outputs and time efficiency to keep within the project's resources.

### 3.1 Map Scanning : Comparing Scanner Output and Developing Standards

Stated generally, the process of digitization involves the conversion of information from analog to digital formats. In the case of cartographic material such as topographic map sheets, digitizing these resources allows their information to be shared more broadly, and enables new forms of analyses and knowledge dissemination. Due to the typically large dimensions of topographic map sheets, digitization requires specialized equipment; this requirement is usually met through the use of an overhead camera system or large-format sheetfed scanner.

In overhead camera systems, the large-format item is kept stationary on a copy stand, while an elevated camera captures an image from a fixed position, or a series of overlapping images from multiple positions above the item. In sheetfed scanner systems, the item is guided across a stationary camera array, which recursively samples narrow strips of the item. Each system type possesses advantages and disadvantages relative to the other, and the most appropriate equipment for a task is often determined by both the characteristics of the items to be digitized, and the requirements for the resulting images. For example, light levels can be more easily controlled by sheetfed scanners, but passing items through their rollers can be damaging to sensitive or fragile materials.

Regardless of method, comparable standards for map digitization have been developed by various organizations and project groups (Table 1). These published values suggest that map sheets should be digitized in TIFF format, using 24-bit colour depth, and at a minimum resolution of 300 points per inch (ppi), with a preference for higher resolution images where achievable.

Prior to beginning map scanning activities, we conducted a comparison of scanned maps from a number of OCUL institutions that were identified as potential contributors to the digitization stage of the project, since they either had facilities available for map scanning, or possessed previously-digitized historical topographic map sheets as a result of contracted work from a commercial provider. The objectives of this comparison were to 1) evaluate variation in scan quality and appearance (e.g., sharpness, colouration, and consistency) across digitized products available from various OCUL institutions, and 2) use these findings to develop map scanning standards and procedures that would achieve the project goals of producing high quality products while enabling collaboration across partner institutions.

### 3.1.1 Methods

For the comparison test, groups from six institutions were asked to submit digitized images of a selected map sheet (sheet 30L/13, Dunnville, 1938); some of the images were created at the time of request, while others had been previously digitized. The submitted map images were generated using a variety of equipment and methods, as both sheetfed scanners and overhead camera systems were used to create images that varied in resolution between 300 and 600 ppi (Table 2). Given the variety of equipment being compared, each group was required to use equipment-specific methods for image colour and quality calibration. The submitted images were inspected at zoom levels ranging from full-extent to 1:1 scales, in order to assess their brightness, contrast, saturation, internal consistency, and sharpness, as well as to identify artifacts and errors introduced to the images as a result of the digitization process.

| Source | Required image specifications for digitized maps |
|---|---|
| Federal Agencies Digitization Initiative - Still Image Working Group (2016) | TIFF format; 400 ppi resolution (minimum); 24-bit RGB colour |
| Banach, Shelburne, Shepherd, & Rubenstein (2011) | TIFF format; 300 - 400 ppi resolution; 24-bit RGB colour |
| Dale, Leech, Bogus, Mathews, & Blood (2013) | TIFF format; 300 - 600 ppi resolution (minimum); 24-bit RGB colour |
| Allord, Fishburn, & Walter (2014) | TIFF format; 400 ppi resolution (minimum); 600 ppi resolution (recommended); 24-bit RGB colour |

*Table 1: Image specification requirements for digitized maps, as published for comprehensive digitization projects.*

| Label | Digitization Equipment Type | Image Resolution (ppi) |
|---|---|---|
| A | feed-through scanner | 300 |
| B | overhead photography (fixed) | 400 |
| C | overhead photography (fixed) | 300 |
| D | feed-through scanner[1] | 600 |
| E | feed-through scanner[1] | 600 |
| F | feed-through scanner[1] | 600 |

*Table 2. Digitization equipment type and scanning resolution for each scanned map that was compared. 1 indicates equivalent equipment*

### 3.1.2 Results

A comparison of the map images obtained from the six participating groups (Figure 3) showed substantial colour variation between the digitized sheets in terms of their contrast, brightness, and colour saturation. Although some variation was attributed to condition of the source maps used at each institution, further tests and analyses revealed inherent differences in the colour characteristics of scanned images produced by the different methods. In the case of the photographed maps (Figure 3, panels B and C), such variation is likely to have resulted from the use of different camera equipment and settings, as well as differing ambient lighting conditions in the imaging environment.

Considerable colour differences were also observed across images that were collected using comparable feed-through scanning equipment (Figure 3, panels D, E, F). A small amount of the variation was attributed to differing scanner calibration coefficients, which arises from the equipment's lack of automated colour calibration procedures (equipment is normalized against a white target only). A more substantial contrast variation in the case of one of the images (Figure 3, panel E), was found to result from the application of post-scan contrast adjustment filters, which were applied latently within a 'map-specific' preset in the scanning software.

Investigating each digitized sheet at a larger scale (Figure 4) revealed considerable discrepancies in image sharpness. While much of this variability was explained by image resolution, the improving effect of post-scan image sharpening filters applied to images was also noted. While an image sharpening filter was not applied to the images shown in panels B and C of Figure 4 (400 and 300 ppi resolution, respectively), its use in the 300 ppi image in panel A demonstrates substantial sharpness improvement. This sharpness improvement, however, is achieved at the cost of increased image noise and a resulting 'grainy' appearance. Results of this comparison indicated that while high (600 ppi) resolution images (such as in panels D, E, and F of Figure 4) are most desirable for this project, it may be acceptable to use sharpened images from lower resolution (300 - 400 ppi) scans, in isolated cases where higher resolution products cannot be created. Such cases may arise when rare map sheets are too fragile to be used in a feed-through scanner, and instead must be photographed.

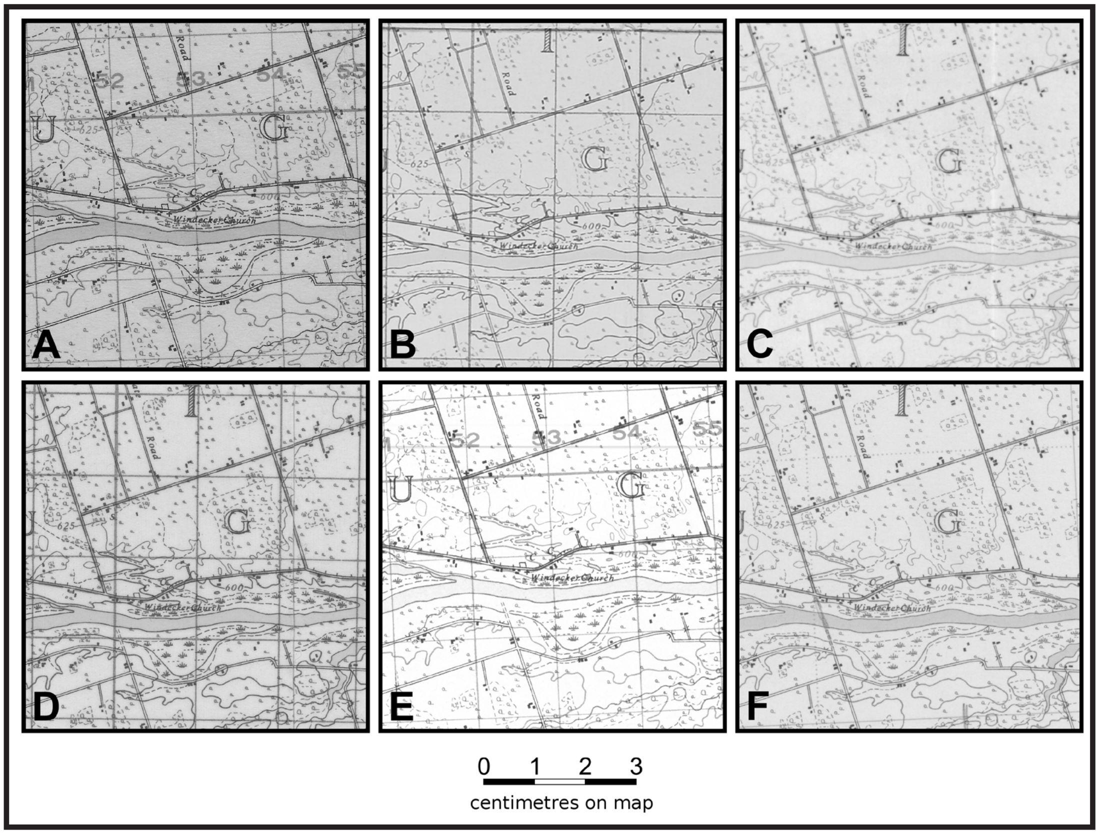


*Figure 3. Colouration comparison of equivalent regions for digitized maps created at six different OCUL institutions. Panel labels correspond to information given in Table 2.*

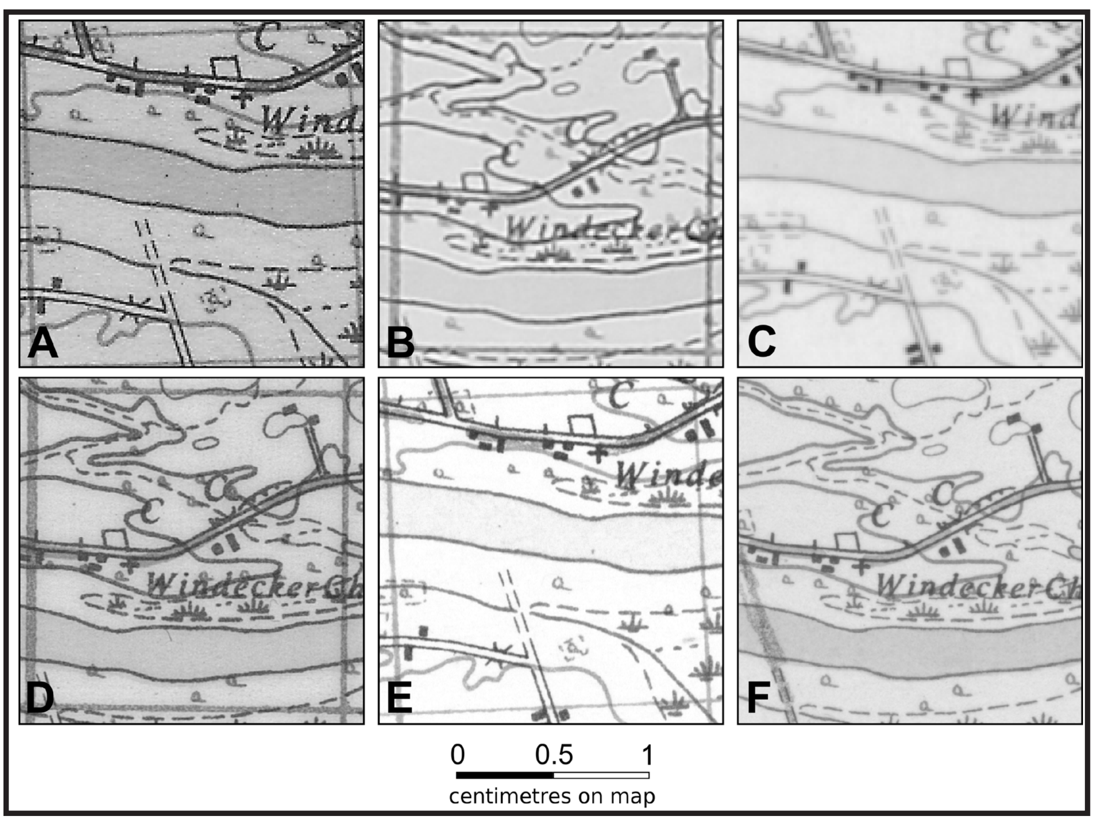


*Figure 4. Sharpness comparison of equivalent areas for digitized maps produced at six different OCUL institutions. Panel labels correspond to information given in Table 2. Image resolution is 300 ppi in panels A and C, 400 ppi in panel B, and 600 ppi in panels D, E, and F.*

For some of the digitized sheets, a close investigation revealed the presence of artifacts and errors that were inserted into the images by the scanning equipment. Most notably, the images created using feed-through scanners commonly contained 'stitching' errors—image offsets that are produced as a result of mis- or poorly-aligned camera arrays on the scanning equipment (Figure 5). In most cases, calibration software and procedures can be applied to mitigate these offsets completely, or at least diminish them to the internal precision limits of the device. In other cases, physical irregularities of the map itself—such as creases and lamination ridges—create sporadic, localized artifacts, which may or may not be avoidable by careful rescanning of the material.

### 3.1.3 Recommended Standards for Map Digitization

Project standards for map digitization were developed in consideration of the digitized image comparison results, as well as the project's stated objectives of producing high quality, consistent materials while enabling community-wide participation. Generally, the digitization standards set for this project meet or exceed those set for comparable historical map digitization projects (e.g., Allord, Fishburn, & Walter, 2014). Recommended activities and standards for digitization are as follows:

- In cases where a given map sheet is held by multiple institutions, every effort is made to digitize the sheet that is in the best physical condition—both in terms of its physical integrity and its appearance.
- Map sheets are digitized at 600 ppi resolution and 24-bit colour. Lower resolution (300 or 400 ppi) images may be accepted, in special situations.
- Standard colour calibration and quality control processes are implemented, including the use of a common colour calibration target to assess the colour characteristics of output from digitization equipment, and the implementation of standardized equipment settings where possible.
- Common procedures are used with feed-through scanners to minimize stitching errors through calibration, and to detect such errors during post-scan quality assurance methods.

### 3.2 Recommended Standards for Map Digitization

Georeferencing is a procedure whereby phenomena and information are associated with geographic locations, as specified within a defined spatial reference system (Hill, 2009). In the context of digitized maps, this process involves associating pixels of the raster image with geographic

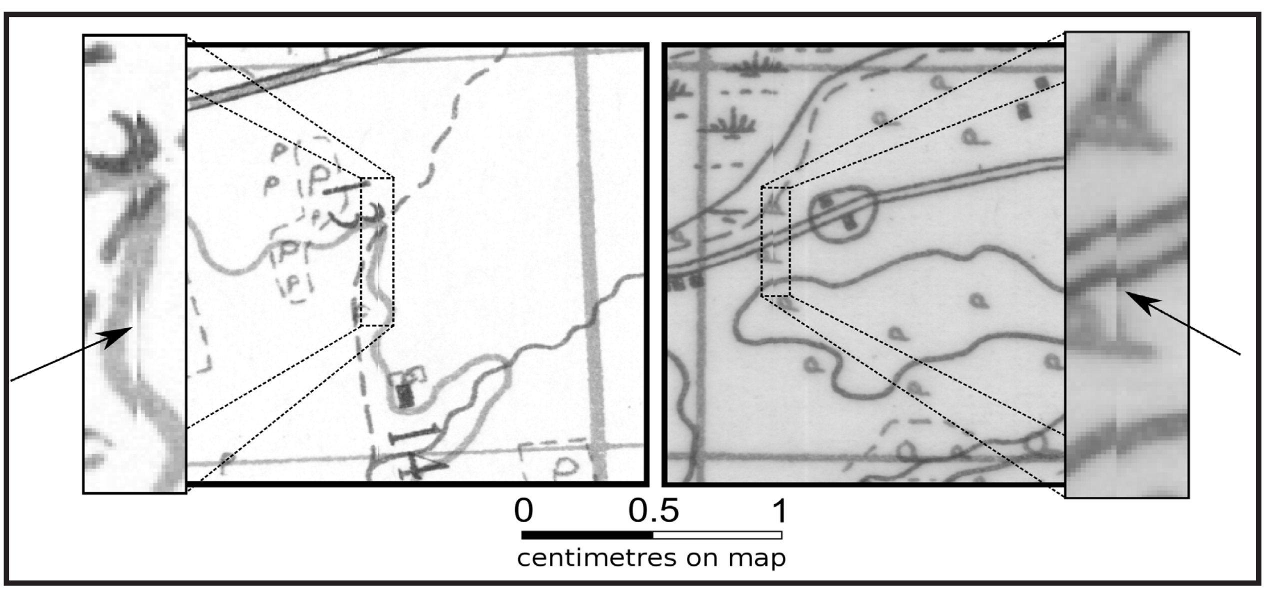


*Figure 5. Stitching errors observed in map sheets that were digitized using feed-through scanners. A 'right-left' stitching error is illustrated in the left pane, while the right pane demonstrates a 'front-back' stitching error.*

coordinates (Hackeloeer, Klasing, Krisp, & Meng, 2014). Georeferencing digitized geographic material, such as topographic maps, enables their information to be transformed into any desired projection, and displayed alongside other georeferenced digital data, whether in a Geographic Information System or other analysis and dissemination software. Therefore, the production and provision of georeferenced digital collections builds upon digitization efforts to promote new and interesting uses of geospatial information for analysis, visualization, and dissemination (Knowles & Hillier, 2008).

In common practice, an image is georeferenced by an operator, who identifies in the image a number of ground control points (GCPs) where coordinates (in a desired reference system) are known to a reasonable precision (Hackeloeer, Klasing, Krisp, & Meng, 2014). When an appropriate number of GCPs have been inserted, a transformation model is then applied to the points in order to 'warp' the image to fit the projection of the target (desired) reference system. Depending on accuracy requirements and the nature of image warping that is necessary, a variety of transformation models may be used. Polynomial transformation models use a least-squares minimization procedure to fit GCPs to coordinates in the target reference system using polynomial expressions of varying order (e.g., first-, second-, third-order, etc.). Using such models, the image is warped globally to find a general best-fit for all GCPs, and the degree to which the image may be 'warped' increases with order. In comparison, spline and adjust transformation models warp the image locally to minimize error around all GCPs—a desirable approach when local accuracy is important or when spatial accuracy varies throughout an image.

In the case of digitized maps, the accuracy of the resulting georeferenced and transformed image (i.e., the alignment of features in the image with their true location on the earth) depends upon a number of factors, including:

- the accuracy with which the map sheet is digitized;
- the quality and quantity of inserted GCPs;
- the appropriateness of the transformation model used;
- the accuracy of information contained within the map; and
- the validity of reference data used in the georeferencing process.

Though georeferencing may be accomplished with a minimum of three orthogonal GCPs, the accuracy of the resulting image typically increases as more are inserted. Determining an appropriate number of GCPs requires compromising between the benefits of increased accuracy and the detriments of additional time and effort requirements. Therefore, the desired number of GCPs for georeferencing operations will depend upon the accuracy needed for the resulting georeferenced image, the type of transformation function that is used to reproject it, the ability of the operator to identify high-accuracy GCPs in the image, and the time, resources, and expertise available. Guidelines established by a similar map digitization project undertaken by the U.S. Geological Survey Historical Topographic Map Collection have suggested that 16 GCPs (and an absolute minimum of 7) should be used to georeference images of both 1:25,000 and 1:63,360 scale maps (Allord, Walter, Fishburn, & Shea, 2014).

Recently, a number of automated georeferencing methods have been developed, where image detection algorithms and additional contextual information are used to automatically register GCPs into the target raster. For example, QUAD-G software (Burt, White, & Allord, 2012; 2014) was used to automatically georeference maps in the U.S. Geological Survey Historical Topographic Map Collection (Allord, Walter, Fishburn, & Shea, 2014). While such an approach is promising for cases where digitized maps are highly standardized, the lack of such standardization in our collection—particularly in early edition maps—precluded the use of this software for our purposes.

Alternatively, we sought to develop requirements, documentation, and standards that would allow georeferencing to be carried out by members of various OCUL institutions, in order to develop georeferenced products of an acceptable accuracy and quality. To do so, we conducted a series of georeferencing tests to better characterize the uncertainty and time requirements associated with georeferencing operations on our digitized topographic maps. The objectives of these tests were to:

1. Determine a reasonable expectation for georeferencing accuracy by establishing a corresponding tolerance level for error.
2. Identify the sources of georeferencing errors and develop methods for detecting and mitigating these errors.
3. Develop recommendations for the georeferencing process, which define the requirements for GCP quantity and distribution, as well the transformation model used in the reprojection process.

### 3.2.1 Methods

Tests were conducted using four digitized map sheets (1:63,360 scale; 600 ppi resolution), which covered disparate areas of the province and spanned a range of publication years. To improve the consistency of test results, sheets were selected for areas without significant bodies of water in their coverage, as they allowed GCPs to be spread evenly throughout the entire map area.

In each test, the first four GCPs were placed at the neatline corners, since the precise coordinates of these points were known for all sheets. Considering that many of the 1:63,360 scale maps lack a graticule that is usable for inserting GCPs, we decided to add additional GCPs exclusively through the identification of corresponding landmarks on the target map and modern reference geospatial data layers, which included a vector road layer (2014 Routefile, DMTI Spatial Inc.) and tiled raster base maps. Given the temporal discrepancy between the target and reference information, care was taken to select only landmarks (intersections, railway crossings, etc.) where confidence was high that the location was consistent between the periods. GCPs were manually added to the map image in a uniformly distributed pattern, in order to maximize the spacing between all points and the GCP coverage throughout the map (Figure 6). Preliminary tests indicated that a total number of 24 GCPs was sufficient to provide accurate error estimates for each map sheet.

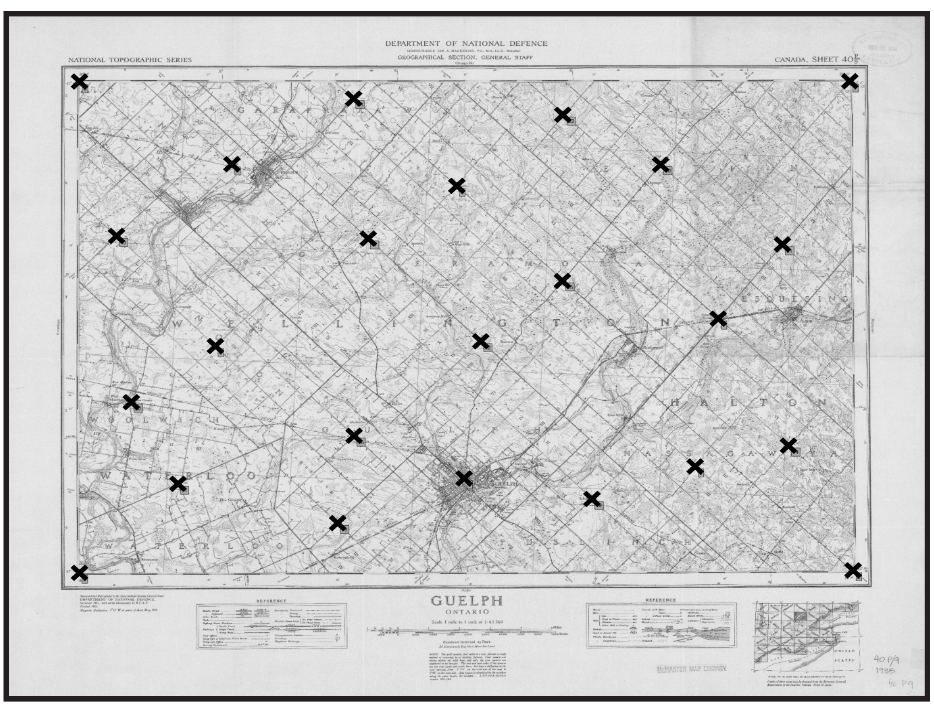


*Figure 6. Distribution of 24 ground control points used for georeferencing error tests conducted on 1:63360 map sheet 40P/9 (1935).*

All tests were carried out using the Georeferencer tool in QGIS (QGIS Development Team, 2015), which uses the Geospatial Data Abstraction Library (GDAL). The accuracy of each GCP was evaluated using the residual error reported by the Georeferencer tool, which measures the degree to which the location of a given GCP on the transformed image deviates from the original reference coordinates entered for this point during the manual georeferencing process. For a given test, total map georeferencing error was summarized and reported as the mean absolute error (MAE) for all GCPs used to parameterize the transformation model as:

$$MAE = \sqrt{\left[\frac{1}{N}\sum_{i=1}^{N}|\hat{x}-x|\right]^2 + \left[\frac{1}{N}\sum_{i=1}^{N}|\hat{y}-y|\right]^2}$$

where $\hat{x}$ and $\hat{y}$ denote the coordinates of the GCP in the transformed image, and xand yindicate coordinates of the original, reference GCP. MAE was calculated in units of image pixels, as well as metres on the Earth's surface. While root mean squared error (RMSE) may be used as an alternative measure of georeferencing error to MAE, internal tests showed MAE and RMSE to be very highly correlated ($r = 0.93$), indicating that the two measures were essentially equivalent for the purposes of our investigations.

We investigated the effects of GCP quantity and transformation model type on georeferencing error through the following procedure: All 24 GCPs were added to the original map image and a first-order polynomial transformation model was selected. Initially only the GCPs at the four corners, corners of the image were 'enabled', meaning that the transformation model was parameterized using just these four selected GCPs. All other 'disabled' GCPs were hidden from the transformation model when creating the 'best-fit'; however, their residuals were still measured within the software and were recorded to assess total MAE throughout the image. Following this, we systematically increased the number of 'enabled' GCPs and recorded residuals for all GCPs. The process described above was repeated using second- and third-order polynomial transformation models, though a greater initial number of minimum 'enabled' GCPs were required—6 for the second-order polynomial and 10 for the third-order.

Given that residual error will regularly be smaller for 'enabled' GCPs than for those that are disabled (since the transformation model is fit to only the 'enabled' points), we assessed georeferencing error for the entire map sheet using two different measures: a) MAE calculated using all 24 GCPs (enabled and disabled; denoted as $MAE_A$), and b) MAE calculated using only the disabled GCPs ($MAE_D$). Analyses of these two measures indicated that $MAE_D$ provided a less-biased estimate of georeferencing error, which was more representative of areas in the images where 'enabled' GCPs were not present (see Figure 7).

### 3.2.2 Results and Recommendations for Georeferencing

Results from georeferencing tests showed that, generally for all polynomial transformation models tested, $MAE_D$ decreased with increasing numbers of GCPs, until 12 GCPs were added (Figure 7). Beyond this point, adding more GCPs resulted in no further reduction in $MAE_D$ and, in many cases, error increased slightly. While a rise in error beyond 12 GCPs was not anticipated, such an increase might occur from the selection of less ideal points as more GCPs are inserted—a consequence of georeferencing these images using reference data layers (and not graticule).

Among the three polynomial models tested, the second-order polynomial consistently produced the lowest overall value of georeferencing error, though its improvement over the third-order polynomial was insignificant beyond 10 GCPs. Given that the 1:63,360 map sheets use a polyconic projection (with a central meridian at the centre of the quadrangle), the increased degree of freedom offered by the second-order polynomial transformation demonstrated clear advantages to the first-order polynomial. While generalized results suggested that error was effectively minimized with the insertion of 12 GCPs, examination of errors for individual digitized sheets (not shown) indicated that the specific number of GCPs required to achieve this varied across sheets between 8 and 12 GCPs. The resulting recommendation of these tests

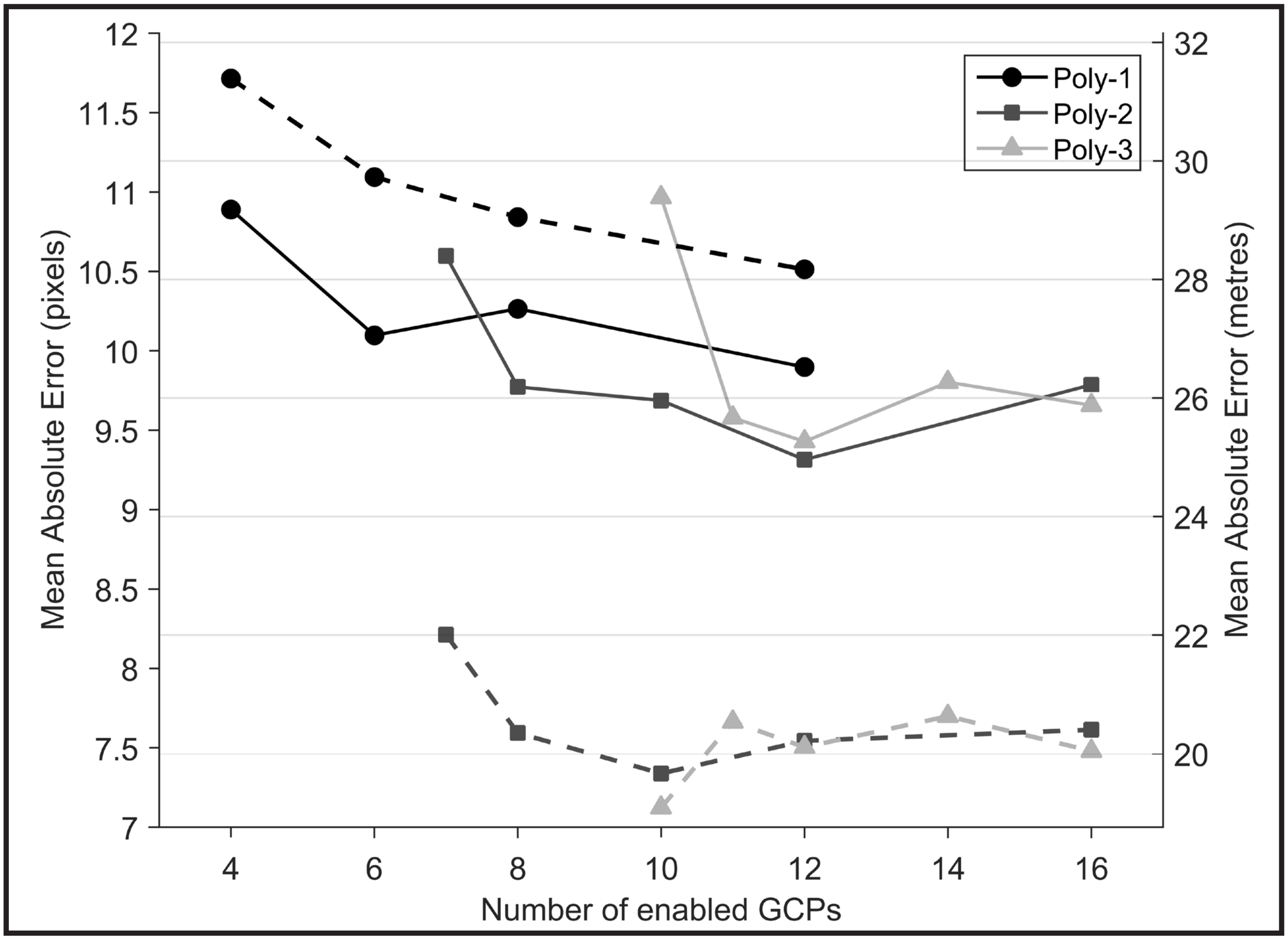


*Figure 7. Averaged mean absolute error (MAE)—presented in units of map pixels and metres on the Earth's surface—for varying quantities of enabled GCPs and orders of polynomial transformation models used. Dashed lines indicate values obtained when error from all GCPs was considered ($MAE_A$), while solid lines indicate values obtained when only error from non-enabled GCPs was considered ($MAE_D$).*

(to insert 8 to 12 GCPs and use a second-order polynomial) is consistent with findings and recommendations from the U.S. Geological Survey Historical Topographic Map Collection digitization project (Allord, Walter, Fishburn, & Shea, 2014), where 7 to 16 GCPs are inserted and a second-order polynomial used.

Given that georeferencing for this project will be carried out manually, the amount of time required to complete this process for the entire collection was important to consider prior to issuing georeferencing standards for the project. For this purpose, the time to complete each GCP was recorded throughout the entirety of the tests. Evaluation showed that the time required to georeference a map image increased linearly with the number of GCPs added, at a rate of approximately 110 seconds per GCP. Assuming that an average of 10 GCPs would be placed per map image (as per requirements to minimize error), we estimated that the entire digitized collection could be appropriately georeferenced in around 250 hours—a value that is manageable within the project's budget.

## 4 Cataloguing and Metadata Practices

Early topographic maps of Canada, especially map series produced before the introduction of the NTS numbering, are not well standardized (Dubreuil, 1992). The early topographic map series do not cover the whole country, nor do they adhere to similar production standards (Dubreuil, 1992; Sebert, 1976), making library collections of early map series scarce and incomplete across Canada. Access to these series in libraries is not always available, and users often rely on digital catalogue records, found online through the library's catalogue, and paper (or scanned) indexes to discover whether maps exist for a given geography. Typically, web access to digital map collections varies in complexity, ranging from lists of links (sometimes with thumbnails) to interactive web maps. Enhancements, such as the ability to zoom, pan, and view scanned maps as overlays on top of an existing basemap, offer a more desirable user experience for researchers.

Libraries and map collectors have often struggled with maintaining efficient storage and retrieval methods for large map series such as the national topographic maps (Andrew & Lamont, 1998). Organizing and accessing a series of hundreds or even thousands of maps, which often include historic editions and multiple versions of individual sheets, can easily become a monumental task (Andrew & Lamont, 1998). The early and modern Canadian NTS map series are considered large national map series and few libraries (if any) in Canada catalogue individual sheets from the NTS.

Some libraries in the United States, including Penn State Libraries, have undertaken individual map sheet cataloguing for select national mapping series, including the U.S. Geological Survey's 7.5-minute topographic quadrangles (Andrew & Lamont, 1998). There are also some individual sheets catalogued from the early NTS, including the set of Canada's Militia and Defence Maps, 1905-1931, that have been published by Lorraine Dubreuil at McGill Libraries (Dubreuil, 1992). However, by no means is there a complete set of catalogue records or metadata describing these early topographic map series in Ontario libraries, which represents quite a challenge for those trying to find and access these maps online.

Cataloguing at this level of detail is costly and difficult to maintain. Most libraries typically have series-level catalogue records which direct the user to the map library's physical map cabinets. Sometimes, large map series are catalogued at the state or provincial level, to assist with identification and retrieval by geography, but this varies across libraries (Andrew & Lamont, 1998). Typically, a paper or digital index is provided to users, and this acts as the primary finding aid and retrieval mechanism for large map series.

With the OCUL historical map digitization project, the project inventory of maps covering Ontario will become instrumental for understanding the totality of the series as well as the distribution of map holdings across the province. The inventory is also helpful for data collection, in that member libraries that are participating in digitization work can also collect consistent descriptive information from the individual map sheets that can be used to generate standardized metadata for the digital images. The inventory to date has tracked information such as map sheet title, subtitle, edition (which is very important because there are several editions of the same sheets), year published, source library collection (whether or not the sheet was held by a particular library, and if it was scanned, georeferenced, etc.), survey date, publisher, grid presence (some of the maps contain grid lines), and more.

Overall, the transition from cataloguing to metadata represents a change for how libraries manage, describe, and provide access to digital maps and data online. In addition to a metadata format and standards change, technological advances in web-based GIS offer libraries the option of adopting new techniques for storage, enhanced identification, and access, through online catalogues and portals designed specifically for geographic information. The creation of standard metadata for the digital images and data being created by the libraries is critical to digitization work, since it has a direct impact on the granularity of access and the preservation of original map content in digital form. Metadata for digital objects, including geospatial data and digital maps, is essential for understanding the scope and content of the digitized work. Metadata provide descriptive information about the resource in a structured, standard, and transferable format (e.g., XML). GIS tools require metadata in machine-readable formats in order to read and process data and information that is useful for end users.

Today, the most common metadata standard for the description of digital geospatial data, including georeferenced map images, is the International Standards Organization (ISO) 19115 for Geographic Information. The North American Profile (NAP) of the ISO 19115, which is a set of fields specific to North America, is heavily used by government and data producers, with the Government of Canada formally adopting the standard in 2012.

The creation of standard metadata for this collection will largely be accomplished through the development of a metadata crosswalk, which will map structured information contained in the project's inventory spreadsheet to fields in the metadata standard that we are using to describe these maps. It was decided early on that individual map sheets will be described as datasets using the ISO 19115 NAP standard, since this is the standard that is used on OCUL's Scholars GeoPortal platform. The structure of the mapping and information is still under consideration; however, a significant amount of the metadata mapping work has been completed already.

In the development of the mapping, we consulted some major map libraries and online geospatial data repositories, including the Harvard Map Collection, Harvard College Library[4], and the University of Ottawa's digital map collection.[5] These collections describe similar digital geospatial data and scanned historical maps. As part of the project, an example of a sheet-level metadata record and mapping is provided for the Map of Peterborough, Ontario, 1932 [1:63,630].[6]

## 5 Accessing the Collection Online

One of the options the team is considering for online access to the collection is to present the images as one seamless image mosaic. Brock University's Map, Data & GIS Library has achieved some success using this approach. Georeferenced topographic maps are stored in a mosaic dataset, which is a data model within the geodatabase used to manage a collection of raster images. More precisely, a mosaic is a collection of raster datasets stored as a catalogue of individual maps and viewed as a mosaicked image that is dynamic, where the properties of the original imagery are maintained (Childs, 2010). The processes involved in creating a mosaic dataset using ArcMap are briefly described below.

First, a mosaic dataset is created within a new or targeted geodatabase. Prior to adding the raster images, the coordinate system is set to 'Web Mercator Auxiliary Sphere', which is compatible with other web map interfaces. A mosaic dataset consists of a footprint feature class that acts as a type of index. The process of building footprints involves defining a boundary on each map to the extent of the displayed image, such as the neatline. This is considered a 'virtual' crop. It is not necessary to permanently remove the margins of the map, or map collar, to create a seamless display. This footprint method preserves the map in its entirety, but displays only the content defined by the footprint (in this case, all information within the neatline). Although this process can be done manually, automating the footprint creation using a general-purpose language (like Python) is preferred.[7] Another option, although not yet tested on topographic maps, involves the use of the Image Boundary tool in QGIS. These processes require further exploration.

[4]Accessed at Geodata at Tufts http://geodata.tufts.edu/
[5]Accessed at http://gsg.uottawa.ca/geo/indexes/hist_topo_maps.htm
[6]Map of Peterborough, Sheet No. 031D08, 1932 [1:63,360] http://gsg.uottawa.ca/geo/ocul/test.xml
[7]Accessed at gis.stackexchange.com, or the *ArcGIS Online Group: ArcGIS Image Management Workflows www.arcgis.com/home/item.html?id=bdb45bdcf20f4b7d83f2975727858b33.*

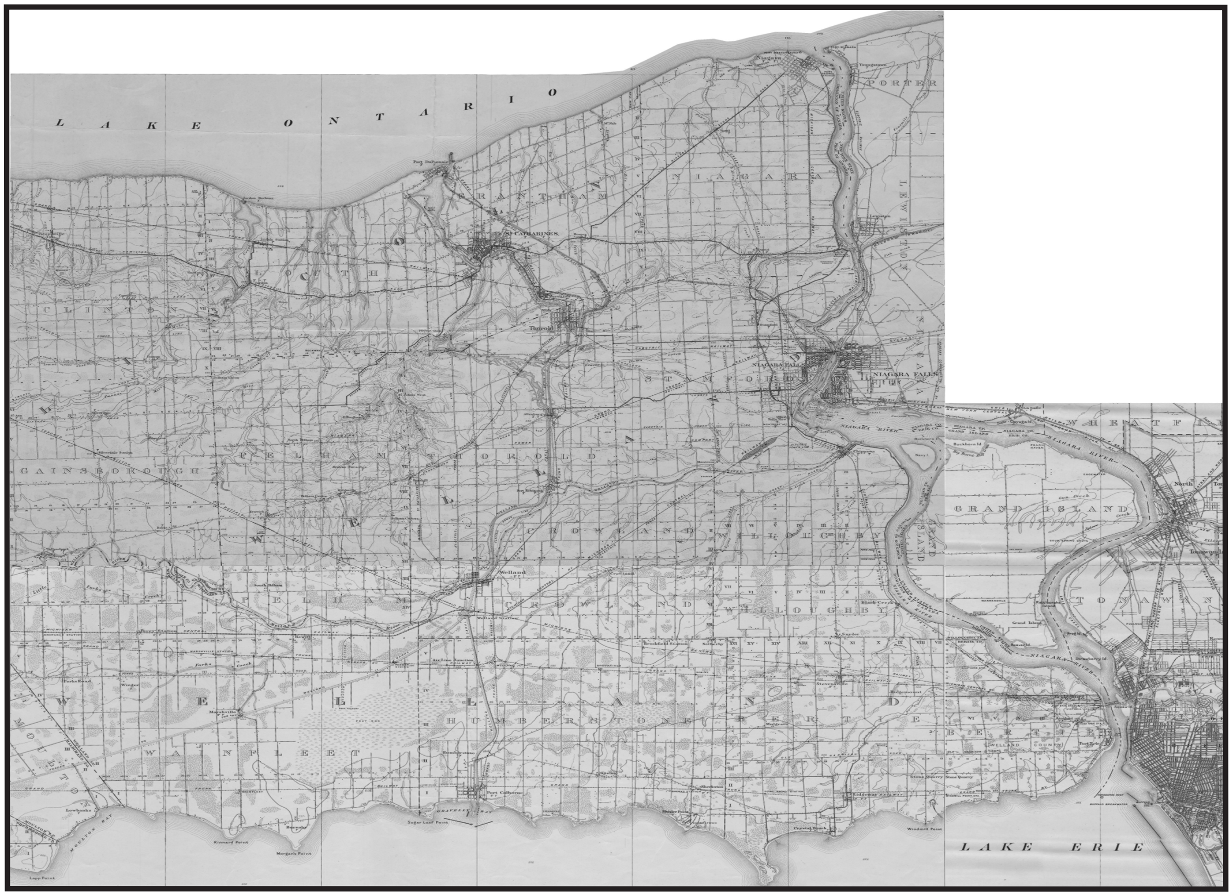


*Figure 8. Mosaicked dataset of NTS maps of the Niagara Region produced by Brock University.*

A recommended procedure for working with mosaic datasets is the creation of overviews. This process is similar to the building of pyramids, where a set of reduced-resolution datasets are generated in order to optimize the performance of a mosaic dataset and increase display speeds at various scales. Unlike pyramids, overviews are not produced for individual rasters. Instead, they are derived by mosaicking multiple rasters (Woo, 2012). A seamless display can be achieved by creating a mosaic of images that are fused together to create one large image. We are currently testing this technique for the display and visualization of the digitized historical topographic maps produced for the OCUL project.

Using a platform that provides an underlying basemap on which to overlay historical images is a useful enhancement, enabling users to situate themselves using both contemporary and historical features as reference points. Platforms such as Google Earth, ArcGIS Online, and OCUL's own Scholars GeoPortal (built on ArcGIS Server) provide these options. Yet, not all users want to use a georeferenced image in a GIS environment. For this reason, we are exploring options for making the images available for download at a high resolution in both georeferenced and non-georeferenced versions. Digital map files can be produced in several formats, including GeoTIFF, JPEG, KMZ, and GeoPDF. Each vary in file size and resolution depending on the scanning and georeferencing processes applied in the preparation of the images.

In reviewing current practices for the display of these large map series online, two website examples that display U.S. topographic maps are of particular interest and differ in display and download options. The U*SGS Historical Topographic Map Explorer*[8] designed by Esri provides a seamless

[8]Accessed at http://historicalmaps.arcgis.com/usgs.

map overlay with transparency. Another example, the *USGS TopoView*[9], offers multiple file formats for download (JPEG, KMZ, GeoPDF, and GeoTIFF) and enhanced search options, but no seamless map display or transparency functionality. It functions more as an online index to all USGS topographic maps, rather than as an interactive viewer. A portal that integrates a combination of options from both these sites, while respecting web accessibility guidelines, is ideal, and this kind of functionality is being explored for our current project.

Our intent is that Scholars GeoPortal, mentioned earlier, will house the digital images, mosaic services, and metadata, and provide access to this collection openly for anyone to discover and use. The GeoPortal will provide access to the lower resolution (300 ppi) scans (originally stored in TIFF format) and georeferenced data, while the original high quality (600 ppi) scans and georeferenced points will be archived for long-term preservation and reuse should the need arise.

## 6 Looking Forward

At the time of writing (12 months into the 28 months allotted), the project is well underway. A majority of the maps have been scanned and are currently being georeferenced. Team members have been turning their attention toward how materials will be displayed on Scholars GeoPortal and the logistics of making the files available for download. Projects undertaken at OCUL member institutions, such as the topographic map mosaicking at Brock University, have also provided us with insight to carry forward into the next phase of the project.

The group is closely watching the work of the Canadian Historical GIS Partnership initiative, whose forthcoming white paper on data and information visualization for online Historical GIS (HGIS) applications should offer insight into the current state of these technologies (Roy, 2015). We anticipate that the digitization of historical maps in libraries will facilitate historical GIS applications in research across a variety of disciplines.

Our process for achieving a web display for the Ontario historical topographic maps that meets our desired criteria is still being explored. However, providing access to the georeferenced images, in addition to the non-georeferenced scans, at a manageable file size on the Scholars GeoPortal platform is our current intention.

## 7 Conclusions

Managing a map digitization project across several institutions can be a daunting task. However, this distributed configuration has allowed us to expand our access to map collections, staff expertise, and existing equipment, as well as provide job opportunities for students at multiple universities. Collaborative platforms such as Google Sheets have enabled us to manage inventories and status updates from any location, which has greatly assisted the coordination of activities around this distributed project.

Canada's historical topographic map series provide unparalleled detail about the past. These early map series are not being digitized and archived elsewhere, and are therefore the focus of digitization efforts in OCUL libraries today. We hope that by digitizing and providing access to the 1:25,000 and 1:63,360 maps of Ontario, other provinces will follow suit and we will begin to see a national collection of these digital maps emerge and evolve.

Another significant outcome of this project has been the development of best practices and specifications that can be reused by libraries across Ontario, and even throughout Canada. Recognizing the importance of standards and best practices in libraries for map digitization, georeferencing, and metadata provides a foundation for ensuring access to these collections well into the future.

*The authors would like to thank Michel Castagné for his copy editing assistance.*

[9]Accessed at http://ngmdb.usgs.gov/maps/TopoView/viewer.

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# CARTO 2016

50th Annual Conference of the Association of Canadian Map Libraries and Archives (ACMLA)

***50 years: Mapping our past; Navigating our future***

Conference organized by University of New Brunswick
14-17 June, 2016
Fredericton, New Brunswick

## CALL FOR PAPERS

The conference organizers invite librarians, library staff, archivists, geographic information specialists and other interested individuals to submit proposals for papers and workshops celebrating the important contributions made by map collections, archives, and the ACMLA, and consider their role in preserving and providing cartographic and geospatial information in the future.

As the ACMLA celebrates its 50th anniversary, a 'golden' opportunity exists to reflect upon the ways in which the Association and its members have supported changing needs across Canada, and celebrate the contributions that have increased awareness, understanding, and value of geospatial and cartographic materials. While embracing lessons learned from the past, we look towards the future to anticipate changing needs, new opportunities, and new strategies for success.

Topics of interest include (but are not limited to):
• The history of the ACMLA-ACACC and its role in improving awareness, understanding, and use of geographic information across Canada.
• The changing role of map collections and archives in supporting the needs of research, teaching and public engagement over the past half century.
• Digitizing collections to improve access and enable new forms of scholarship.
• Approaches and strategies for creating value-added products from digitized material.
• Linking and integrating digitized geographic collections with other items containing geographic information (letters, postcards, diaries, official records, etc.)
• Integrating physical and digitized map collections into undergraduate education.
• Collaborative approaches to expand the variety of, and access to geographic information found within collections and archives.

Please submit an abstract (250 words) of your proposal in either French or English and brief biography to programme@acmla-acacc.ca. If you do not receive an acknowledgement of your submission or if you have any questions about the conference, please contact a member of the program committee.

The members of the program committee are:

Sarah Simpkin, University of Ottawa
Tracy Sallaway, Trent University
Joël Rivard, Carleton University
Jay Brodeur, McMaster University

# CARTO 2016

## 50e colloque annuel de l'Association des cartothèques et archives cartographiques du Canada (ACACC)

***50 ans : Cartographier notre passé ; naviguer notre avenir***

Colloque organisé par l'Université du Nouveau-Brunswick
Du 14 au 17 juin 2016
Fredericton, Nouveau-Brunswick

### APPEL À COMMUNICATIONS

Les organisateurs du colloque invitent les bibliothécaires, archivistes et autres spécialistes de l'information géographique à soumettre des propositions de présentations et d'ateliers célébrant les contributions importantes apportées par les archives, les collections de cartes et de l'ACACC, ainsi de considérer leur rôle dans la préservation et la distribution de matériels cartographiques et l'information géospatiale dans l'avenir.

Puisque l'ACACC célèbre son 50e anniversaire, ceci est une occasion pour réfléchir à la façon dans laquelle l'Association et ses membres ont soutenu les besoins changeants partout au Canada et de célébrer les contributions qui ont augmenté la sensibilisation, la compréhension et la valeur de l'information géospatiale et de matériels cartographiques. Tout en prenant compte des leçons tirées du passé, nous regardons vers l'avenir pour anticiper l'évolution des besoins, de nouvelles possibilités et de nouvelles stratégies de réussite.

Quelques sujets d'intérêt incluent (mais ne sont pas limités à) :
- L'histoire de l'ACACC-ACMLA et son rôle dans l'accroissement de la sensibilisation, la compréhension et l'utilisation de l'information géographique à travers le Canada.
- L'évolution du rôle des collections de cartes et archives dans le support des besoins de recherche, d'enseignement et de la participation du public au cours du demi-siècle passé.
- Numérisation des collections pour améliorer l'accès qui permettent de nouvelles formes de recherche.
- Approches et stratégies pour la création de produits à valeur ajoutée du matériel numérisé.
- Intégration de collections géographiques numérisées avec d'autres articles contenant de l'information géographique (lettres, cartes postales, journaux intimes, documents officiels, etc.).
- Intégration de collections de cartes physiques et numérisées dans l'éducation au premier cycle.
- Approches collaboratives pour élargir l'éventail et l'accès à l'information géographique située dans les collections et les archives.

Veuillez faire parvenir un résumé (250 mots) de votre proposition en français ou en anglais ainsi qu'une biographie courte en indiquant votre numéro de téléphone et votre adresse courriel à programme@acmla-acacc.ca. Si vous ne recevez pas d'accusé de réception à la suite de votre envoi ou pour toute question au sujet du colloque, veuillez communiquer avec l'un des membres de la comité de programmation.

Les membres de la comité de programmation sont :

Sarah Simpkin, Université d'Ottawa
Tracy Sallaway, Trent University
Joël Rivard, Carleton University
Jay Brodeur, McMaster University

Association of Canadian Map Libraries and Archives

Association des cartothèques et des archives cartographiques du Canada

# Assocation of Canadian Map Libraries and Archives

## STUDENT PAPER AWARD

The Association of Canadian Map Libraries and Archives encourages and supports activities which further the awareness, use and understanding of geographic information by Canadians. To this end, post-secondary students are encouraged to submit a paper for the ACMLA Student Paper Award competition.

### ELIGIBILITY

A student from Canada or studying in Canada currently enrolled in a post-secondary institution (college or university) is eligible to apply to enter the contest. All papers shall be prepared during the current school year.

### THE ESSAY

The essay shall be original and unpublished and of no more than 3,000 words. Illustrative or graphic material is welcomed. The essay itself shall be in electronic format (PDF, MS Word or .rtf only, please).

### DATES

Electronic copies must be received by the Committee by April 15, 2016:

Subject: "ACMLA student paper award."

The decision will be announced on or before the Association's annual conference.

### CRITERIA

Primary consideration will be given to the essay's originality and its contribution to new knowledge and insights. Other considerations will be the author's demonstration of the relevance of the subject, the quality of presentation and documentation, and the literary merits of the essay.

### JUDGING

Members of the ACMLA Awards Committee will judge each submitted essay based on the defined criteria. The decision of the judges is final.

If no essay is judged to be appropriate in a given year, the right to make no award is reserved.

### THE AWARD

The winner will receive a prize of $250 and free membership in the Association for one year. The award includes an invitation to present the paper at the ACMLA annual conference held end of May/early June. If the winner chooses to attend the conference, the Association will waive registration fees and provide a travel stipend up to $250 with receipts. The essay will be considered for publication in the Association's *Bulletin*.

Association of Canadian Map Libraries and Archives

Association des cartothèques et des archives cartographiques du Canada

# ASSOCIATION DES CARTOTHÉQUES ET ARCHIVES CARTOGRAPHIQUES DU CANADA

## Prix Annuel de l'ACACC pour Article Étudiant

L'Association des cartothèques et archives cartographiques du Canada (ACACC) encourage et soutient les activites qui contribuent a ameliore l'usage et la comprehension de l'information geographiques par les canadiens.  À cette fin, les étudiants postsecondaires sont encouragés à soumettre un article pour la compétition du prix annuel pour article étudiant de l'ACAAC

**ADMISSIBILITÉ**
Le concours est admissible à toute personne originaire du Canada ou qui étudie au Canada et qui est présentement inscrite à un etablissement post-secondaire (collège ou université). Les articles doivent être rédigés durant l'année scolaire en cours.

**DISSERTATION**
L'article doit être original et ne jamais avoir été publié. Il doit comporter moins de 3 000 mots. Le document doit être soumis soit en copie papier (dactylographié, double-espaces et imprimé seulement sur un coté) ou soit en format électronique (pdf, MS Word ou .rtf seulement).

**DATE LIMITE**
Les soumissions électroniques doivent être reçus au plus tard le 15 avril 2016, par le Comité à cette date à l'adresse suivante

Adresse: past.president@acmla-acacc.ca
Sujet: Prix annuel de l'ACACC pour article étudiant

Le nom du récipiendaire sera annoncé durant ou avant la conférence annuelle de l'association qui est normalement tenue autour du 1er juin.

**CRITÈRES**
Les juges porteront attention en premier lieu sur l'originalité du sujet et sur son apport en nouvelles connaissances et idées innovatrices. L'article sera également jugé sur la façon dont l'auteur démontre la pertinence du sujet, sur la qualité générale de la présentation et de la documentation, ainsi que sur la qualité littéraire du texte.

Les articles soumis seront jugés sur les critères définis par les membres du comité de recompenses de l'ACAAC et le rédacteur du « ACMLA Bulletin ».  Si aucun des articles soumis pour cette compétition rencontrent les critères définis, l'association réserve le droit de ne pas accordé le prix.

**PRIX**

Le récipiendaire recevra un montant de 250.00 $ et les droits d'adhésion à l'Association pour une année. Le prix inclus également une invitation à présenter la communication lors de la conférence annuelle de l'ACACC tenue à la fin mai ou au début juin.  Si le récipiendaire répond à cette invitation, il sera dispensé des frais d'inscription au congrès et l'Association lui allouera un montant jusqu' à 250.00 $ (avec recettes) pour couvrir les frais de voyage. L'article sera consideré pour publication dans le *bulletin* de l'association.

# POWER LINE EXPLORER:

# USING HISTORICAL TOPOGRAPHICAL MAPS TO LOCATE EARLY POWER LINES

Ted Wilush

## Preface

*Jay Brodeur*
*McMaster University Library*

*Over the past year and a half, the Ontario Council of University Libraries' Geo community has been undertaking a project to digitize, georeference and make publicly accessible all of Ontario's public-domain topographic maps at 1:25000 and 1:63360 scales. It is envisioned that the products of this project will provide a valuable resource to researchers, students and the general public, alike. While project work is still ongoing, we are already witnessing examples that demonstrate the innovative and interesting ways in which these digitized materials may be used. One such application is described in the following article by Ted Wilush, who has been using some of our digitized 1:63360 topographic maps in his exploration of historical artifacts from the early 20th century.*

For a considerable time I've been an avid collector of early high voltage power line insulators. These are the porcelain or glass objects that hold the wires on the crossarms of a power/telegraph pole and prevent electrical leakage, allowing for successful transmission of energy or communications. My interest centres on the earliest, historically significant, pioneering lines from the beginning of the 20th century that represented new accomplishments in transmission technology. These lines were also the necessary building blocks towards the high voltage grid we have today and the lifestyle/economy that it has permitted.


While many of these lines ran to populous urban centres, most were based on the needs of industry. Early lines were built to take advantage of hydro-electric resources to power remote mines or the long distance transmission of power to industrial centres, such as the early development of hydro power at Niagara Falls. While the famous Niagara transmission lines are relatively well known in collectors' circles in terms of route and insulator type, many of the lines to long-abandoned and forgotten mines in Northern Ontario are unknown.

Usually, once I select a target location to research, I will consult period resources such as electrical journals (which often detailed new developments in this period of rapid advancement), Department of Mines reports, Ontario Hydro annual reports, historical photo collections; anything that will give a clue as to the route of the line. However, with remote northern mines, often there is little more than a paragraph mention, a photograph of the site and little else. While sometimes I get lucky and period documents will describe a powerline's route in great detail or even provide a map, this is very rare. Once the property is abandoned, often after a short production history, the powerline is abandoned and allowed to fall victim to the elements, and the right-of- way to re-vegetate. After 80-100 years of growth, little to nothing of a cut-line remains visible from satellite images or from the ground. Usually, I will study the satellite image of the area using Google Earth, make some educated guesses based on past experience, produce an estimated projection and transfer that projection to a handheld GPS for use in the field. While this can be effective for use in areas where it was fairly obvious where the line went, often the Northern Ontario topography of rock outcrops, hills and muskeg make the exact route unpredictable and difficult to follow on the ground.

This is where the historical 1:63360 (one inch to one mile) scale topographic map sheets are extremely valuable. These maps allow me to determine and plot the exact routes of the lines for my GPS and result in highly effective field trips with a minimum of wasted time looking where the line never ran. I also cannot overstate the appreciation I have for the high quality and accessible digital versions of these maps, which have been made available through the Ontario Council of University Libaries' historical topographic map digitization project. These allow me to have a full view of the map area (usually I would have to visit a library that may or may not have a useful sheet and then photograph small parts) and also bring the scan with me in the field for further reference if needed. In addition, the future availability of these maps for online browsing and download will allow me to conduct quick and effective research on lines I'm looking for, and will also likely reveal ones I did not know about.

An excellent example is the map on the previous page. The powerline at the centre of the image shows an early distribution line that ran from the main HEPC distribution station in Dundas to the old Tile Works in Aldershot. This line was built in 1910 to take advantage of the new Hydro Electric Power Commission (now Hydro One) main transmission line from Niagara Falls to Dundas that provided cheap, abundant power for local industries. While research showed that this section of the line remained in-service until the 1940's, it was abandoned and dismantled not long thereafter. The original insulators used were grey two-part multipart porcelain insulators manufactured by R. Thomas & Sons. These insulators were probably replaced around 1920 and by virtue of the line travelling overland, rather than along a road, many of the replaced units where simply discarded near the poles along the right of way. While previous collectors had worked parts of this line successfully in the past, the digitized maps have added valuable information by revealing the point where the transmission line ceases to travel parallel with the concessions, making an abrupt 90 degree turn toward the tile works site. It is this spot that had previously fooled other collectors and it was there where I was able to locate several undisturbed original pole sites and a pair of intact insulators for my collection. This style and colour combination is very scarce and the odd greenish pink variant is rare (pictured below). Above you can see the line transferred to Google Earth with the locations of GPS marked poles plotted on it. I have also overlain a period air photo to assist.

I think that my uses of these maps, though obscure, illustrates the wide array of potential uses the public will have for this valuable resource. For me, they allow me to rewrite the long forgotten history of some of the early days of electrical transmission development in Canada, whose building blocks are those on which all our modern systems stand. They allow me to recover and preserve specimens for my collection that to me are not just new additions to my shelf, but physical manifestations of that history and valuable cultural artifacts. I eagerly anticipate the release of the entire set of digitized historical maps online – undoubtedly, the effort expended to make this resource available will be much appreciated.

*Remains from of an original pole site with cross-arm and broken insulator on the Tile Works line referenced in the text.*

*Recovered M-2255 Thomas 2 part multipart insulator from the Tile Works line in an uncommon green glaze with pink undertones.*

*Example of a early 3 part porcelain mulitpart insulator as found on a remote Northern Ontario line dating to 1906.*

*Three Thomas M-2255s remain in service for well over 100 years on Toronto's antiquated downtown street side distribution lines.*

*Ted Wilush is a McMaster University Commerce graduate currently employed by a major rail service provider. Ted has a strong interest in the the development of early electrical transmission systems in Ontario and has travelled throughout the province to map and recover insulators from these long abandoned lines. When he is not walking lines or scouring old maps, he also prolifically photographs Great Lakes ships with his images being published in company literature and several periodic publications.*

# GIS DAY : A SUMMARY ACROSS UNIVERSITY LIBRARIES

Compiled by Eva Dodsworth

GIS Day is an international grassroots effort founded by Esri's Jack Redmond as an initiative for people to learn about geography and GIS. For years now many organizations, K-12 schools and universities have been celebrating GIS Day in an effort to teach about geography and GIS, as well as promote services and products. Through the years, university libraries have also been involved in the planning and delivery of GIS Day events. From poster contests, to lightning talks, to workshops and contests, library staff have been creative in encouraging student, faculty and staff participation. The following report is a compilation of GIS Day 2015 activities that several university libraries have hosted. I would like to thank all contributors for their efforts and for willing to share their events.

**Pennsylvania State University GIS Day: Advances the Power of Maps**
*Tara LaLonde*

During Geography Awareness Week (November 15-21, 2015), multiple events at Pennsylvania State University provided students, faculty, staff, and community members the opportunity to explore maps. GIS Day events were co-sponsored by the University Libraries and the Department of Geography. The planning committee for GIS Day was comprised of members from the University Libraries, Geography, Geodesign, and Online Geospatial programs. This group was able to leverage contacts, resources, and time for the preparation of GIS Day events. This committee began developing an event schedule from the Spring 2015 timeframe to allow enough time to plan events, communicate to potential speakers, secure event locations, and create publicity materials. The GIS Day events followed National Geographic's theme for Geography Awareness Week "Explore! The Power of Maps." This theme enabled maps and geospatial thinking to apply across disciplines and attracted participants across fields. GIS Day elevated the presence of geospatial information and analysis occurring on Penn State campus and beyond.

The coordination of the GIS Day committee and the University Libraries' Public Relations and Marketing unit for publicity of GIS Day began in the Fall 2015. Marketing utilized resources from the gisday.com website for event hosts, such as logos and posters, which were adapted to include specific events. Materials included two large vertical banners, medium posters, half-sheet posters, digital signage, press release, and social media announcements. Many events were cross-listed with Global Entrepreneurship Week, providing greater awareness to those interested in maps, geospatial information, and spatial thinking. Global Entrepreneurship week at Penn State was also being held during the mid-November timeframe. This was an opportunity to reach many different majors where maps and geospatial information play an important role in decisions.

**Highlights of Activities included:**
A mapping applications workshop, "Getting to know SimplyMap, PolicyMap, and Social Explorer", was held on Monday, November 16, 2015, which demonstrated to students the many datasets available from these applications. Participants explored the differences and similarities of options for map design and output from these library subscribed applications.

Over 100 participants engaged with one another on GIS Day, November 18, 2015 at the library during an information fair, a poster display, two sessions of lightning talks, and three speaker sessions. Penn State geospatial groups participating in the information fair included: University Libraries, Department of Geography, Geodesign graduate degree programs, Online Geospatial Programs, Office of the Physical Plant, Geographic Information Analysis (GIA) Core of the Social Science Research Institute (SSRI), Envirobotics Research Group, and PASDA. Multiple groups outside of Pennsylvania State University also participated. The National Weather Service (State College, PA), HERE Maps, and Esri joined as participants in the information fair and provided valuable information to visitors.

Throughout the day, faculty, staff and students from across campus displayed their research representing a wide range of geospatial applications on the main floor of the library. Two sessions of five minute lightning talks provided an opportunity for participants to hear first-hand as to the many possibilities of working with geospatial information. There were ten lightning talk participants that included topics such as, historic geography and digital humanities, geodesign, unmanned aerial vehicles (UAV), remote sensing, and disease mapping. These topics provided the audience with insights into the broad use of geospatial technology. The range of speakers included undergraduates, graduate students, faculty and staff. Representatives from HERE Maps spoke about the many uses of their maps and how their maps stay up-to-date. Representatives from the National Weather Service (State College, PA) provided an update on the use of geospatial applications in their organization. Joseph Kerski, Esri Education Manager, gave two engaging talks focused on relevant geospatial topics. Joseph Kerski's first talk focused on why geotechnologies matter, and his second talk focused on Esri story map applications using ArcGIS Online. Speakers were transmitted live. Following speaker presentations, a reception with refreshments was held to learn more about each other's geospatial interests, and included a gift card prize drawing contributed by Geographic Research Inc.

On Thursday, November 19, 2015, an OpenStreetMap Mapathon was held at the University Libraries, which enabled participants to learn how they could map to benefit a community. Participants digitized outlines of buildings for a portion of Dar es Salaam, Tanzania and experienced mapping in a hands-on environment. A student from the Department of Geography coordinated this OpenStreetMap Mapathon.

The GIS Day 2015 events helped to foster greater awareness of the many GIS activities at Pennsylvania State University to the broader student, staff, and faculty community. This was the second year in recent years that the GIS Day events were hosted by the Penn State University Libraries. These events provided opportunities for the library to connect with key geospatial stakeholders and facilitate connections on campus. We look forward to having future GIS Day events and widening the reach of geospatial information at Pennsylvania State University.

**Univeristy of Waterloo GIS Day**
*Eva Dodsworth*

Since 2004, the Geospatial Centre (then University Map Library), and the Faculty of Environment have been collaborating on promoting and teaching GIS on GIS Day. Every year, GIS Day consisted of poster contests, presentations and workshops. With less and less interest in printing posters, 2015 marked the first year where posters were not part of the special day.

GIS Day 2015 was held in the Dana Porter Library, in both the Geospatial Centre and the adjacent Flex Lab. The Centre dispalyed its historical maps and air photos, while the Flex Lab hosted a series of lightning talks by students and faculty. Students were encouraged to browse through selected historical local maps as well as to take a photo 'anywhere in the world' using a green screen "photo booth". Ballots were made available for students to enter a draw for two $50 Amazon.ca gift cards, donated by SimplyMap. Students were required to answer two Geospatial Centre related questions to be eligible to win the prize. Esri giveaways were also made available, consisting of notepads, bracelets and USB keys. Cake and coffee were available in the Geospatial Centre, and spring rolls in the Flex Lab.

The following was the day's agenda:

12:30-1:00
• Meet attendees in the Geospatial Centre / light refreshments

1:00-1:30
• Welcome from the GIS Day team
• Geographers Without Borders: Think Globally, Act Locally
1:30- 2:20
• Presentations from Geog/Plan 481 students:

• *Exploring the association between walkability and diabetes*
• *Discovering Ontario Agriculture through GIS*
• *A GIS-based Flood Susceptibility Analysis and Risk Area Assessment: A Study of Morris in 2015*
• *Wind Turbine Suitability*

• *Sports and Recreation Facility Evaluation and Development: A Case study in Waterloo Region*

2:30 - 3:00
• Lightning talks (5 minutes each):
• Hongjing Chen, *GIS and Trail Analysis*

• Shadman Chowdhury, *Exploring trends in nutrient and solute export across watersheds in Ontario*

• Ian Evans, *Suitability Analysis for Ideal Honey Bee Apiary Locations in Southern Ontario*

• Carolyn McCormick, *Data Collection Tool for Fear of Crime Research*

• Trevor Ford, *Military Mapping*

3:00 – 3:30
• Thank you from the GIS Day Team
• Networking and Discussions among participants

It is estimated that approximately 200 people participated in the event. It was wonderful to see that most people stayed for all of the presentations. Afterwards, many stayed around to discuss GIS research amongst each other. There was also a lot of interest in the historical map display and photo postcard activity. The venue was a real hit, making it very convenient for attendees to visit both the Geospatial Centre and the Flex Lab. Students appreciated the refreshments, and for many it was what brought them in.

**Benefits of GIS Day at uWaterloo**

GIS Day provides students, staff, and researchers with opportunities to present publically, and to share and discuss their work with others. The event also attracts students, faculty and staff from across campus who have never used GIS but would like to learn more about it. Exposure to and training in GIS for those taking non-GIS courses has always been the Geospatial Centre's priority and objective, so it is with great satisfaction to see that the event attracted students from departments like math, earth science and engineering. Once made aware of the technology, the student GIS work on campus, and the types of services made available at the Geospatial Centre, there is great potential for these students to return in the near future.

**University of Manitoba**

*Cynthia Dietz*

For GISDay 2015, four students and nine professionals from within the University and across the Winnipeg metropolitan area presented. This was the first time that constant and extended networking occurred. About 85 people attended, with students representing about half of the audience. Topics across several disciplines were presented. Professionals were told it would be a good venue to meet students who are very proficient in GIS. Students were told it would be a great opportunity to build on their portfolio needed in job searching. Many of our speakers were later asked to present at the Manitoba GIS User Group annual meeting.

• Introductions

• Award of Excellence: Dr. Greg McCullough
• Christopher Green, Winnipeg Reg. Health Authority
*Using GIS to Address Emerging Public Health Issues Through Place Based Analyses*

• Greg Carlson, GeoManitoba
*Geospatial Data and GIS Technology-An Overview and Application With the Government of Manitoba*

• Victoria Grima, University of Manitoba (student)
*GIS Tools for Traditional Knowledge Keepers*

• Rob Gerry, Manitoba Hydro
*Using Historical Air Photos and Topographical Mapping for Determining Change of Waterways*

• Jacques Marcoux & Inayat Singh, CBC Manitoba & Winnipeg Free Press
*Mapping and Data in Journalism*

• Andrew Kaufman, University of Winnipeg, (student at University of Manitoba)
*The Divided Prairie City: Income Inequality Among Winnipeg's Neighbourhoods*

• Jim Silver & Darren Lezubski, University of Winnipeg & UltraInsights
*Neighbourhood Population Change: Winnipeg's Inner City*

• Adrian Werner, University of Winnipeg
*Rooster Town, the Métis, and Fringe Settlement in Southwest Winnipeg 1880-1960*

• Grant Wiseman, Stantec
*Change Detection through Satellite Imagery*

• Stephen Oberlin, University of Manitoba (student)
*Unmanned Aerial Imaging and Mapping*

• Michelle Ewacha, University of Manitoba (student)
*Using ArcMap 10.2 and Geospatial Modelling Environment to Quantify Disturbances and Habitat Types within Woodland Caribou Ranges*

• John Iacozza, University of Manitoba
*Changes to the Marine Cryosphere in the Arctic*

• Claire Herbert, University of Manitoba
*Lake Winnipeg Basin Data Network*

• Jeremy Sewell, Manitoba Municipal Government
*The Changing Landscape of Land-Use Planning*

**Ryerson University**
*Dan Jakubek*

The Department of Geography and Environmental Studies, and the Geospatial Map and Data Centre worked together to host GIS Day 2015 which included posters, live demos and keynote presentations

**Schedule and keynote presentations:**

1:00 pm Kick-off and welcome address (1:25 pm)

1:30 pm Dr. Namrata Shrestha, Senior Landscape Ecologist, Toronto & Region Conservation Authority

2:00 pm Posters and demos

2:30 pm Andrew Lyszkiewicz, Program Manager, Information & Technology Division, City of Toronto
3:00 pm Posters and demos

3:30 pm Matthew Cole, Manager, Business Geomatics, and William Davis, Cartographer and Data Analyst, The Toronto Star

4:00 pm GIS Day cake

**Research & project exhibits included:**

*Live demos* - The Neptis Geoweb (Neptis Foundation)

Augmented-reality sandbox (Digital Media Experience lab)

Scholars GeoPortal and Simply Map Canada (Geospatial Map and Data Centre)

Geovisualization projects (Master of Spatial Analysis students)

*Posters* - A selection of recent conference posters by Ryerson faculty and students

GIS application examples in the Toronto area

Geography Awareness Week and the BA in Geographic Analysis

*Coffee/tea and snacks were available throughout the afternoon.*

**Trent University**
*Barbara Znamirowski*

Trent University Library Maps, Data & Government Information Centre had fun organizing GIS Day and Geography Awareness week events, including a half day of research talks and an exhibit. Events were open to the university community and public. Talks were given by the Trent Community (faculty, graduate students, MaDGIC and adjunct faculty from the Ontario Ministry of Natural Resources and Forestry). We were also pleased to welcome Peter McLaren from Esri Canada who was on hand for discussions and presented Trent's Esri Scholarship certificate.

"Drawing Lines: spatial behaviours reveal two ecotypes of woodland caribou", "Paleoshorelines and wetland of the Early Kawartha lakes – implications for historical human ecology", "The Spatial distribution of sawn lumber production in Peterborough County: mapping historic census data (1851-1901), "Unmanned aerial vehicle geomatics solutions to support precision agriculture and forestry operations in Canada", and "Building research partnerships: MaDGIC Services and recent projects" are a few examples of the talks presented. Talks were interdisciplinary but linked by the common theme of showing the possibilities of using GIS and related technologies and techniques in research. Our exhibit was mounted for two weeks at the entrance to the main library and included posters and maps created by faculty, students, and MaDGIC. And, of course, there was GIS Day Cake! Further information is provided at: http://www.trentu.ca/library/madgic/trentgisday.

# SVEN HEDIN'S SURVEY METHODS IN CANADA?

David Malaher
david@malaher.org

Do any of our ACMLA institutions hold maps produced by Sven Hedin (b. 1865 d. 1952)?

Hedin was born in Sweden and studied geography, military and social history . He had an enduring interest in archaeology of western-central Asia. With post-graduate studies in Germany and exploration support from the Royal Geographical Society in Britain, Hedin travelled deep into Afghanistan, Tibet, Kazakhstan and the Taklamakan desert in search of artifacts from periods before and after the Silk Road era. He was one of the first Europeans to enter western China in the 19th century with scientific skills in travel logistics, history, archaeology, surveying and cartography. His popular speeches and extensive writing were controversial attracting both admirers and detractors. The question about maps arises from Hedin's surveying methods that were remarkably accurate while based on rapid movement across the ground using course and direction measurements coupled with astronomical observations for latitude and longitude plus his own artistic skill in making panoramic sketches.

Hedin's method for rapid surveying was essentially the same as that used by Philip Turnor (b. c. 1751; d. 1799 or 1800), Alexander Mackenzie, David Thompson, Peter Fidler and many others doing exploratory surveying in Canada in the 18th and 19th centuries. Sadly for Canadian cartographic history, the rapid survey method was poorly recorded and today only piecemeal evidence is known about actual practice by early exploration surveyors. The alternative method to using course and distance surveying is to use a network of triangulation such as was the case in India during the Great Trigonometrical Survey which discovered Mt. Everest in 1865. While undeniably highly accurate, trigonometrical surveying, is slow and expensive to perform, and not suited to the remoteness and thin population of early North America.

Technically, the rapid survey method could be called "field cartography", a term that suggests doing a near-final map in the field by the person doing the survey, instead of the surveyor passing his field notes along to an unseen cartographer in Europe months or years after the survey. In Hedin's case his field notes were both numerical and graphical. He was an accomplished artist who could make detailed panorama sketches of the landscape to coordinate with his land measurements and astronomical observations. His use of accurate sketches made field cartography feasible.

In asking our ACMLA members to look for Sven Hedin's maps of Asia, the hope is to locate enough of his maps in Canada to initiate a comprehensive, close study of them here rather than having to travel to Stockholm, Berlin or London at considerable cost in time and travel. By seeing Hedin's work in the finished form and at the same time knowing how he worked in the mountains and deserts of central Asia, we may be able to "reverse engineer" a more complete sense of how most of our earliest Canadian maps were produced in a country of rivers and lakes.

At this time, the question raised is aimed at establishing an initial catalog of Hedin's cartographic holdings in Canada along with a network of researchers interested in following up whether the equivalent of Hedin's "field cartography" methods were used in Canada from the 17th to 20th century.

Persons interested in these topics are invited to contact David Malaher by e-mail at david@malaher.org.

March 21, 2016

# CATCHING UP ON MAGIRT

Paige Andrew
Librarian, Pennsylvania State University

Ever wonder what your cartographic colleagues south of the border are up to? You will find below an accounting of Map and Geospatial Information Round Table activities (MAGIRT, of the American Library Association; http://www.ala.org/magirt/) – spanning backwards several months but also looking ahead to the upcoming ALA annual conference and beyond. We are always keen to work with map librarian colleagues no matter where they reside so feel free to connect with me directly or contact the current MAGIRT leaders via magirtbd@ala.org. And of course we would love to see you in person at the next ALA Annual Conference, to be held in Orlando, Florida, June 23-28, 2016.

The last time I shared MAGIRT news via the ACMLA *Bulletin* I was serving as Chair and we were in final preparations for delivering two exciting formal programs at the ALA annual conference in San Francisco in June 2015 (both of which were very successful, especially the data visualization program that drew over 200 ALA attendees). We also were wrapping up a very busy year of providing educational webinars on a number of geospatial topics, as well as continuing normal business on several fronts.

**Recent Activities**

Starting with the aforementioned 2015 ALA annual conference here's a quick summary of other successful MAGIRT efforts.

We visited the map collection at the University of California-Berkeley thanks to the collection's head, Susan Powell, who hosted a tour of her fantastic and growing collection. About 25 mostly MAGIRT members attended, after which we walked to a nearby family-owned/run Thai restaurant (awesome food!) for our annual "dutch treat" dinner organized by Chair-elect Beth Cox, and we also held our annual MAGIRT Honors Award ceremony, lead by Kathleen Weessies.

On Saturday were the two formal programs mentioned in last year's *Bulletin*. "Open Context and its Role in Research Data and Publication" was held in the morning and sponsored by MAGIRT's GIS Committee. It was delivered by Eric Kansa, from Italy (kind of – we had serious Skype problems so Anne did the majority of presenting) and Anne Austin of Stanford University. "Data Visualization in the Library" was a 2 1/2 hour session presented by Justin Joque of the University of Michigan and Angela Zoss of Duke University and this session was cosponsored with the Government Documents Round Table of ALA (GODORT).

The remainder of Saturday and Sunday were committed to a range of committee and Discussion Group meetings/programs. We concluded the conference with a 3-hour Executive Board meeting Sunday afternoon, which ended with a passing of the Chair's gavel from myself to Beth Cox, who has been serving as MAGIRT's chair since.

Beyond the 2015 annual conference MAGIRT has been busily focusing on both "usual" and new things. The usual includes keeping ongoing committee work and the MAGIRT newsletter, *base line*, moving forward; pushing activity on the new online edition of the *Guide to U.S. Map Resources* to the next step; establishing a new budget for the 2016-2017 fiscal year; seeking nominations for new officers and other leaders, and organizing for and carrying out activities at the recent ALA Midwinter Meeting held in Boston.

New initiatives include finalizing details for an ALA Preconference workshop that follows from the data visualization program noted above, more on that in a moment. In addition our Chair-elect, Louise Ratliff of UCLA, is laying the foundation for a formal program or two to be given at the 2017 ALA Annual Conference in Chicago. We also successfully established a new officer position during fall 2015, that of Assistant Treasurer, and will fill it by means of the upcoming ALA election for officers. This means current Treasurer Susan Moore, of Northern Iowa University, as well as two past Treasurers will be "training up" this new person during the rest of this year so that they are capable of both handling various financial duties but also then training the next Assistant Treasurer to follow. And finally, we have been seeking nominations for the annual MAGIRT Honors Award and will be making a decision between now and June in preparation for the formal ceremony to be held in Orlando.

**Current/Near Future Activities**

As I write this missive key MAGIRT activities are focused primarily on the upcoming ALA annual conference in June but other things are afoot as well.

We are currently hosting a new ALA Emerging Leaders group of four individuals who are working on a project to "…design and implement an archiving program for MAGIRT using ALAIR, the American Library Association Institutional Repository", mentored by our chair-elect, Louise Ratliff. They got off to a great start at the 2016 Midwinter Meeting and we look forward to not only a set of action-oriented recommendations but a detailed guide on what resources must or should go into ALA's new Institutional Repository, ALAIR. In addition, we hope that they will develop an online "how to" video that not only MAGIRT members can use but other ALA units as well. They will deliver to us, at minimum, a written report but may also provide a presentation of results at the Executive Board meeting or similar function during the annual conference.

The ALA-wide elections for officers will occur April 15 – March 22 and once they are concluded we will be busy preparing three individuals to step into their new roles as well as finalizing filling vacancies for committee chairs, discussion group leaders, and liaison positions. New officers will be Vice Chair/Chair-elect, Secretary, and the aforementioned Assistant Treasurer.

And as mentioned above, there is much excitement about delivering a preconference workshop the day before the annual conference kicks off. This will be a hands-on opportunity to learn a range of data visualization techniques. The preconference will be held at the University of Central Florida on Thursday, June 23, and is titled "Making Sense of Data through Visualization" (you're invited!), cosponsored with GODORT. A description of the workshop and details about cost, transportation, etc. are available at http://2016.alaannual.org/ticketed-events#MAGIRT.

**MAGIRT's Plans from July 2016 and Beyond**

Two major efforts will remain a focus of this group of map librarians for the remainder of this year and into 2017.

First is to take the results of the Emerging Leaders efforts and put them into action related to identifying MAGIRT documents of all kinds to be dropped into ALAIR. This will not be an easy task as it will be a culture shift for MAGIRT. And second is to see that the online edition of the *Guide to U.S. Map Resources* ramps up into construction mode.

One final initiative to highlight is that we are re-visiting the 2008 Core Competencies manual to either update it to today's standards related to dealing with digital resources, institutional repositories, etc. or to write a new one. This resource can be found here: http://www.ala.org/magirt/sites/ala.org.magirt/files/content/publicationsab/MAGERTCoreComp2008.pdf. These core competencies for map librarianship were formally adopted by ALA in 2009 and reside with similar ALA competencies for other types of librarians in our profession.

I hope that what you have read is useful to you even if it is simply shared information. We welcome your questions and participation in our activities, so once again feel free to reach out to me or any of MAGIRT's leaders.

*Mr. Paige G. Andrew*
Past Chair, Map and Geospatial Information Round Table (through June 2016)
Cartographic Resources Cataloging Librarian, Pennsylvania State University
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Co-editor/co-founder, *Journal of Map & Geography Libraries*

# REVIEWS

Edited by Sarah Simpkin

## Abstract Machine: Humanities GIS

*Reviewed by Tomasz Mrozewski*

Travis, Charles B. *Abstract Machine: Humanities GIS*. 1st edition. Redlands, CA: Esri Press, 2015. xiii + 136 pages. $52.99 US. ISBN 9781589483682.

Charles B. Travis' *Abstract Machine* is perhaps the newest entry into the nascent body of literature on humanities GIS. Unlike its predecessors - namely, Bodenhamer et al.'s' *The Spatial Humanities* (Indiana University Press, 2010) and Gregory and Geddes' *Toward Spatial Humanities* (Indiana University Press, 2014) - *Abstract Machine* is noteworthy for opening the door into GIS and literary studies. Despite its promise, *Abstract Machine* is an odd and disappointing read.

The book is divided into three parts: (I) "GIS and the digital humanities," (II) "Writers, texts, and mapping," and (III) "Towards a humanities GIS." Part I includes an introduction and a theoretical discussion, as well as a case study of the author's historical GIS work on Oliver Cromwell's conquest of Ireland in the 17th century. Part II features case studies of humanities GIS applications in the literary field, consisting of the author's work on Irish writers Patrick Kavanagh, James Joyce, Flann O' Brien and Samuel Beckett. Part III consists of a single, short chapter on future directions in humanities GIS.

The real strength of *Abstract Machine* is its first two chapters that effectively bridge the discursive gap between GIS and humanities scholarship. The book's title is taken from a quote by French thinkers Gilles Deleuze and Felix Guattari, who state that "when one writes, the only question is which other machine the literary machine can be plugged into… in order to work" (p. xi). Taking this as our lead, we could say that the purpose of this book is to plug the machine of GIS technology into the machine of literary scholarship. However, couched as it is in the language of Deleuze and Guattari - a revolutionary, anti-fascist and anti-psychiatric discourse born of the Spirit of '68 but since assimilated as a genre of academic writing - Abstract Machine is needlessly opaque and may only work properly when plugged into the machine of postmodern critical theory.

With respect to the work of humanities GIS, Travis suggests that, "by adopting postmodern approaches… we can use GIS technology to create unique opportunities to construct alternate constructions of history and culture that embrace multiplicity, simultaneity, complexity, and subjectivity" (p. 17). In other words, his approach offers opportunities to transcend the "Cartesianism… Euclidean geometry [and] positivist methodologies" of GIS (p. 5) - in the tradition of Deleuze and Guattari, this project is framed as an emancipatory and creative one.

However, the case studies in Part II show only simplistic georeferencing of the authors' lives and writings. For example, Chapter 5 plots the peregrinations of Stephen Daedalus and Leopold Bloom's from six chapters of Ulysses onto a georectified 1904 Thom's directory map of Dublin and juxtaposes them with word clouds from the text. The other chapters describe similar methods with the works of the other authors. Travis makes questionable use of ArcScene in several illustrations, using the Z axis as a tropological space to chart Ulysses' movement through three levels of Dante's Inferno (figure 5.10) or to locate the four epochs of Giambattista Vico's historical arcs above the Dublin of O'Brien's *At Swim-Two-Birds* (figures 6.2-6.4). In both cases, the resulting visualizations are difficult to parse and add little to the two-dimensional illustrations.

Most glaringly, none of the literary case studies in Abstract Machine make a strong argument for using GIS to generate datasets from literary or biographical sources. At no time does Travis suggest synthesizing data from the different projects. In fact, I was never quite sure why Travis chose to employ ArcGIS rather than using image editing software to mark up reference maps. The case studies are disappointing and actually undermine a key part of Travis' argument: that "[i]n this new world, GIS can be configured for use beyond positivistic endeavors and applied with innovation and imagination to the terrae *incognitae* of the humanities" (p.5). Ignoring Travis' straw-man caricature of non-humanities GIS work, the examples that he provides in Abstract Machine do more to reduce humanities scholarship to positivist abstraction than they do to elevate GIS to loftier heights. The failure to go beyond simple georeferencing and inability to leverage the unique capabilities of GIS technology are the most frustrating shortcomings of the book.

*Abstract Machine* promises radically transformative uses of GIS but ultimately delivers lackluster and unpersuasive examples.

*Tomasz Mrozewski*
*Data, GIS and Government Documents Librarian*
*Laurentian University*
*Sudbury, Ontario*

## Discovering and Using Historical Geographic Resources on the Web: A Practical Guide for Librarians

*Reviewed by Lindsay Bontje*

Dodsworth, Eva H. and Laliberté, L.W., *Discovering and Using Historical Geographic Resources on the Web: A Practical Guide for Librarians*. Lanham, Maryland: Rowman & Littlefield, 2014. 119 p. 9780810891449.

*Discovering and Using Historical Geographic Resources on the Web: A Practical Guide for Librarians* outlines various cartographic resources freely available on the internet and discusses what these resources are and how they may be accessed and interpreted. There is a strong focus on resources available from Canadian and American academic libraries. The authors of this book, Eva Dodsworth and L.W. Laliberté, have an extensive background in accessing, using, and interpreting historical geographic resources. Dodsworth is the Geospatial Data Services Librarian at the University of Waterloo Library. Laliberté is the Geographic Information Sciences Librarian at the University of Alberta.

The book is well organized and divided into five chapters:

Chapter 1: Map Basics and the Research Process explores spatial literacy, copyright, and citation.

Chapter 2: Historical Maps outlines discovery and exploration maps, topographic maps, county, city and cadastral maps, transportation maps, and conservation and environmental maps.

Chapter 3: Historical Plans and Surveys provides information on fire insurance plans, public land surveys, nautical charts, and panoramic maps.

Chapter 4: Historical Photographic Image Resources details the use of photographs, postcards, and aerial photography.

Chapter 5: Historical Online Textual, Visual and Audio Resources outlines gazetteers, city directories, newspapers, literature, journals, travel writings, sound recordings, and ephemera and how they can be used for historical geographic research.

Each profile of a particular resource includes its history, how to understand the information contained within it, and what types of research patrons might be using the resource for. The listings of available online sources of each resource are well organized, thorough and comprehensive. This makes the book easy to use for both quick reference and more in depth reading. The book contains a handful of black and white images. While it may be beneficial if these images were in colour, in a book outlining where these resources are available online, it is simple to find numerous high quality colour examples if the included images do not provide sufficient information.

As someone new to the field, I found this book incredibly helpful in contextualizing what kinds of geographic resources are available for research and how they might be used and interpreted. This book would be useful to new staff in map libraries or archives assisting patrons with historical geographic research, experienced staff looking for more resources online, or library students looking to familiarize themselves with the use and availability of historical geographic resources on the web. This book may also provide a useful baseline of where users may begin their research on certain resources or for certain geographic areas.

*Discovering and Using Historical Geographic Resources on the Web* is a highly practical book written in a crisp, clear and succinct manner making it ideal for quick reference. It offers a broad overview of a variety of resources.

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### Historical Atlas of Canada: Canada's History Illustrated with Original Maps

*Reviewed by Courtney Lundrigan*

Hayes, Derek. *Historical Atlas of Canada: Canada's History Illustrated with Original Maps.* Douglas & McIntyre: Madeira Park, 2015. 272 pp. $34.95 CDN. ISBN: 978-1-77162-079-6.

Derek Hayes' latest work is a distinct publication, much like his lengthy list of previously published historical atlases. In his comprehensive introduction, Hayes outlines a number of distinguishing characteristics that make this volume a must-have for both geography and history collections. Perhaps most importantly, it is the first publication of its kind to use only historical maps and not updated or edited versions of historical maps.

The author acknowledges the challenge of covering Canada's history in detail in the introductory paragraphs. Indeed, few works can effectively and comprehensively consider Canadian history in a single volume. Instead, Hayes took the opportunity to set up the scope of the book and discusses the parameters and limitations. For example, he notes that he featured fewer Aboriginal maps because of their ephemeral nature. These maps were not created to last a long time, so few remain, explaining their scarcity in the book.

The maps are sourced from various places: public libraries, academic libraries, rare and special collections, as well as a number of national library collections. In addition to featuring many items from Library and Archives Canada, the book showcases maps from around the world. Each map is referenced. Scales and notes about projection are present on maps where appropriate. There is a detailed index of people and place names.

It is thoroughly researched within its scope using extensive endnotes and contains a wide variety of maps from a range of sources. It is a fitting testament to the European influence on Canadian history, and includes maps of major explorers, such as Champlain and Cook. The featured maps are from many different creators, providing a variety of perspectives, including (but not limited to) British, French, and Aboriginal maps.

Hayes has taken an interesting approach to presenting Canadian history. The book contains a little more text than is typical of many atlases, but this is an indication of its prime significance being a work of history, rather than a traditional atlas. Most surveys of history highlight some maps and images to support large amounts of text, but using maps as the sole visual to construct a narrative of Canadian history is telling of the increasing importance of maps and geographic information. This type of visualization of Canadian history would make a great alternative to a textbook and challenge students/readers to consider our history in a new light.

The most interesting part of the book is the bird's eye view maps. Hayes has reproduced them beautifully. He has included bird's eye views of many major Canadian cities, such as Vancouver, Toronto, Winnipeg, London, Halifax, and Montréal. Most of them contain intricate details and some even profile businesses and economic landmarks from the cities.

The book's inherent value is in its near flawless reproduction of an excellent selection of maps that depict Canadian history. If readers accept the major limitation that it is challenging to cover much of Canadian history in less than 300 pages using mostly visual sources, which Hayes himself addressed in the introduction, it is quickly apparent that the work is significant for both the study of history and historical maps. Hayes has produced a history through maps, rather than a series of maps through history. While it is not quite a traditional atlas, the book remains an essential addition to any map or library collection.

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### The Map Design Toolbox

*Reviewed by Sarah Simpkin*

Tibelius, Alexander. *The Map Design Toolbox*. Berlin: Gestalten, 2014. 224p. $49.95 USD. ISBN 978-3-89955-541-7.

Authored with graphic designers in mind, this 224 page, full-colour volume is a printed collection of the 640 vector files included on the accompanying DVD. Readers are supplied with several stylized "basemaps" of various continents, countries, and major cities, along with icons and graphic elements that can be used to create custom maps in programs such as Adobe Illustrator.

Buildings, landmarks, natural features, and map elements are presented in a bright, compelling visual style that stands out from the usual default icons that appear in desktop GIS software. However, the inclusion of stereotypical caricatures of people from different cultures was disheartening and detracts from the book's otherwise charming digital assets. The Map Design Toolbox is ultimately a clip-art collection intended for non-GIS users.

*Sarah Simpkin*
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*University of Ottawa*
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### Using Google Earth in Libraries: A Practical Guide for Librarians

*Brian Jackson*

Dodsworth, Eva H. and Nicholson, Andrew. *Using Google Earth in Libraries: A Practical Guide for Librarians.* Lanham, Maryland: Rowman & Littlefield, 2015. 109p. $65 USD pbk. ISBN 978-1-4422-5504-3.

*Using Google Earth in Libraries* is part of Roman & Littlefield's Practical Guides for Librarians series of monographs intended to provide introductory and practical information on library services and programs. As such, the book is written primarily for librarians with little or no experience using GIS technologies but who may be interested in incorporating a spatial perspective into library services or teaching. It is a big topic for a relatively small book, but the authors do a good job of introducing novice users to the software and illustrating the broad applicability of Google Earth to library services.

The book begins with a clear overview of Google Earth's basic functions, options, and native layers. Peppered throughout the chapter are examples describing specific uses of some of Earth's features in a wide variety of contexts, from emergency management to infrastructure maintenance to historical research.

The next two chapters delve into applications of Google Earth in library services, as a discovery and access tool and as a teaching and learning tool. Both chapters lean heavily on examples of real-world uses to illustrate the variety of ways in which Google Earth has been employed to enhance library services. Given the purpose of the book, the large volume of examples works; most readers will be able to relate at least some of the presented uses of Google Earth to their own work. As the authors did within one section on K-12 teaching resources, the use of additional tables summarizing the disparate content across the chapters would have been helpful to the reader.

The chapter on teaching and learning would have benefited further from some discussion of the theoretical basis for some of the content. With the recognition that the book is designed to be practice-based, explicit links between the teaching practices and lesson plans presented in the book and current thinking about information literacy would have more fully conveyed the potential contribution that spatial perspectives can bring to information literacy outcomes. With that said, the sections on Bloom's Taxonomy and trends in higher education are helpful to the practitioner attempting to incorporate concepts related to spatial literacy into the larger curriculum.

In the final two chapters, the authors return to the nuts and bolts of using Google Earth. The fourth chapter provides an introduction to the more intricate aspects of the software – KML file structure and conversion tools, georeferencing, advanced functions such as video tours, and Google Earth Pro. The final chapter consists of self-guided tutorials that walk the reader through a handful of basic and intermediate functions of Google Earth. These sections are designed to push the librarian unfamiliar with GIS technology into a more nuanced understanding of the software and to provide effective hand-holding exercises to get even the least experienced users comfortable with Google Earth. Both chapters achieve these goals well.

The strengths of Using Google Earth in Libraries lay in the way it presents introductory information for new users and in its potential to generate ideas for services and teaching practices for experienced GIS librarians. Readers won't find instructions detailing the step-by-step development of new services, but the authors provide ample references to additional sources of information for those wanting to explore the content further. The book is a worthwhile investment for librarians wishing to investigate potential applications of spatial tools in library services and teaching, but in order to make full use of the extensive references and tutorials, interested readers should look to the electronic version.

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**From the Reviews Editor:**

Thanks to those who submitted book reviews and to all who have expressed interest in reviewing! I'll continue to request review copies from publishers - but please let me know if you have read a book of interest to the ACMLA and would like to submit a review, and if you have any suggestions for titles/sources. Here are the review guidelines:

**Review Format**

**1. Bibliographic Citation**
This should include: author, title, edition, place of publication, publisher, date, number of pages, price (if known) and ISBN. Example:

> Bussey, Ben and Spudis, Paul D. The Clementine Atlas of the Moon. Cambridge: Cambridge University Press, 2004. 316p. $80.00 US. ISBN 0-521-81528-2.

**2. Content**
The review should describe and critically evaluate the work. Typical review elements include: scope, purpose and content of the work; intended audience; writing style; background and authority of the author; how the work compares with other titles on the same subject; its usefulness as a research tool; any unique features; and its suitability for library collections.

The length of the review is at the reviewer's discretion, but should normally reflect the importance of the work. A typical review is about 500 words.

**3. Your name, title, institutional affiliation, city and province/state**

**Editorial Policy**

Opinions expressed in reviews are those of the reviewer, not of the ACMLA. The Reviews Editor may make minor edits, without communicating with the reviewer. Should the Editor determine that a major revision is required, she will contact the reviewer for discussion.

# REGIONAL NEWS

Compiled by Tomasz Mrozewski

## Alberta

**Edmonton Map Society**
**David Jones**

The Edmonton Map Society's winter meeting was held on Monday, March 14th 2016 and attended by 25 + members. We received three presentations and lively discussion followed.

Ron Kelland, Historic Places Research Officer, Alberta Culture and Community Services, spoke about the AB/BC Interprovincial Boundary Survey and First World War Commemorative Place Names. Many of the peaks in the Alberta Rockies carry names honouring World War I personalities, war ships, etc. Some of these are persons now otherwise forgotten, and some whose heroic nature has been tarnished since the naming.

Jonathan Schaeffer, Computing Science and Dean of Science, discussed the history of the discovery of the fabled Northwest Passage. For many centuries, finding a navigable path through the Arctic labyrinth of islands proved to be a dangerous, daunting (and expensive) challenge. Jonathan's talk, illustrated with early maps, introduced us to the (mis)information provided by maps and the serious consequences.

John Huck, Metadata Librarian and Map Cataloguer, University of Alberta Libraries, gave a brief report on a meeting he attended at Stanford University called Geo4Libcamp. The 'unconference'-style event saw representatives from 21 research libraries meet to discuss ways to work together on repository and discovery infrastructure for geospatial data, with a special focus on GeoBlacklight, largely developed at Stanford. Details of the unconference are at http://stanford.io/254uBhw.

The Edmonton Map Society's next meeting will be in early May.

## Ontario

**Brock University**
**Colleen Beard**

Many students, faculty and staff came out to help celebrate GIS on Wednesday, November 18th. The day featured the annual Esri $1000 GIS Scholarship Competition which proved to be a challenge for the judges. Presentations featured last year's Brock 2015 Esri recipient, Zach Harmer, on "Using ArcGIS and Python Programming to Identify Lakes Impacted by Forest Fires [in Northwest Territories]". Five students competed for the 2016 award with the winner, Michael Daleo's, "Visualizing Niagara's changing land-use, past, present, and future, using web mapping technologies". A judging committee is formed by MDGL staff and Geography faculty who invite audience participants to also judge the candidates on several criteria.

The day attracts several from across campus with its pizza lunch coordinated by the students group BUGS (Brock University Geographical Society), door and trivia prizes, and of course, CAKE! Students post to "Put your map on display for GIS Day!", and teams compete in our popular Google Earth Amazing Race and ArcGIS Jeopardy contests for the 'big prize' titles. Even our university mascot, Boomer, joined in the festivities! http://bit.ly/1TTX2uM.

Other news from the MDGL includes our extensive use of AGOL (ArcGIS Online). Our complete Niagara air photo graphical indexes, and 1934 and 1955 GeoTIFF mosaics, are accessible through AGOL (the 1934 mosaic is also in Scholars GeoPortal). JPG image download is available for series 1921 – 1948. Staff have completed georeferencing and creating metadata for 50 historical maps of Niagara and the Welland Canals. Several TIFF images were purchased from LAC. Options for web accessibility are being explored, including AGOL, D-space, and ArcGIS Server.

Sharon has been working with Library Systems staff and their new 3D printers converting campus floor plans into 3D objects. A small replica of the Brock campus has attracted lots of attention.

Colleen is starting a year sabbatical July 1, 2016. She will be maneuvering through the HGIS process with a focus on the historic Welland Canals. GIS processes will be used to build a digital spatial inventory of historical evidence that will help identify, map, and assess the historic Welland Canal remains with respect to their environmental surroundings in the current landscape. The environmental and cultural changes that have occurred over many years have masked much of the historic canals, and as a result their significance to local heritage is often overlooked. Enhancing the existing project with additional content, and creating new GIS data from it, will create a more comprehensive visualization tool as well as provide new resources for which other researchers can build upon.

**Laurentian University**
**Tomasz Mrozewski**

For the second year in a row, GIS librarian Tomasz Mrozewski and library assistant Léo Larivere taught a module on using GIS software and accessing data to the Architecture & Ecology course. Although this goes beyond the call of our usual GIS duties, it's a great opportunity to promote GIS and geospatial thinking to our new School of Architecture. Furthermore, the City of Greater Sudbury's Planning Department – which owns the City's GIS data – provides a great deal of support and provides datasets beyond what are normally available through the Open Data portal (http://bit.ly/1RmM3Dz). As with the previous year, we were challenged when it came to teaching the fundamentals of GIS in a short time period and to a large class with varied degrees of technical literacy. If we teach the module again next year, we will investigate teaching with less powerful but easier-to-learn platforms such as CartoDB. This year's Architecture & Ecology students present their GIS-based posters on Tuesday, March 22.

**University of Waterloo**
**Eva Dodsworth**

This past term the staff at the Geospatial Centre worked on a number of projects and instruction sessions. Three workshops were offered on GIS – *Introduction to ArcGIS*, *Spatial Analysis in ArcGIS,* and a new workshop, *Introduction to Cartography.* This workshop covered the use of colour, placement, target audience and symbology. The idea behind this session was to demystify map creation and create confidence using GIS software.

Although there are several on-going projects, one worth mentioning is the georeferencing of Fire Insurance Plans for the Region of Waterloo. The end goal is to create a historical road network, as well as building footprint data. Historical roads have been created in the past using 1955 aerial photography, but with the older Fire Insurance Plans, we will be creating a street file from the early 1900s. The Geospatial Centre continues to digitize air photos as well, with the 1965 photos being currently scanned and georeferenced. These will be mounted online with the others (1930s-1955).

The Geospatial Centre has started a new and interesting collaboration with the Pharmacy faculty. This came about when a pharmacy staff researcher had a spatial question but didn't realize it. The staff member came by the Centre looking for fairly straight forward specific data, something that didn't actually exist in a final form but the Geospatial Centre had the software and the building blocks for the solution. By using analysis and normalization techniques on the available data the resultant table was the perfect amalgam of how many of what is located where. Thus, forming a new relationship with a faculty that didn't initially realize that they had a geospatial problem leading to new forays of data analysis for the school of pharmacy.

Along the same grain, the Centre is developing relationships with other faculty members as well. One particular professor was interested in gathering field data every semester with no way of presenting it other than in tabular form. It was felt that the studies of a particular creek would be better served if there was a visual component to encourage research on correlation of chemical concentrations. This is an ongoing project that will progress from static maps to animated maps with psudo-realtime updates.

Finally, the Geospatial Centre is participating in UN Water: World Water Day 2016 with a very colourful display showing bathymetry and other examples of how any collected data can be used in water studies. The exhibit will be up in the Dana Porter Library for the month of March. The display highlights the basis of most GIS studies, elevation, which usually reveals interesting things in of itself, and moving on to the interpolation of field researcher gathered data.

### Western University
### Cheryl Woods

The new Colortrac 56" wide large format scanner, that was delivered last summer, has been in high use for internal projects. One project is the OCUL-funded map digitization project for Ontario topographic maps at 1:25,000 and 1:63,360 scales that are in the public domain. In addition to that project, the Geodetic map set for London dated 1926 and revised 1957 has been scanned and will soon appear on our website powered by Leaflet, similar to the 1926 topographic set (http://bit.ly/1XuBrbp). A third digitization project is for a London local history map webpage which will show scans of maps from our collection and metadata for about 40 early important maps of the city dated between 1800 and 1900.

Meghan Miller has been hired on a 6 month contract in the library assistant 4 position which was vacated by Brent LaRue, who was here on a 2 year contract. Those who attended CARTO 2015 may have seen Meg and Teresa Lewitzky's presentation on Twine. Two graduate students from the Master of Library and Information Science program have joined the Map and Data Centre team on a part-time basis to work 7 hours each per week for this term. As well as, an undergraduate student who is georeferencing London 1945 air photos, which will be hosted on our website.

GIS Workshops during November, January, and February focused on specific subjects. Interested faculty members from the Ivey Business School were introduced to Esri's Business Analyst Online (BAO) application. Master's students in the Public History program attended an in-class GIS workshop as part of their Digital History course. Lastly, the Schulich School of Medicine and Dentistry offered an Introduction to GIS for Health Care course for the Continuing Professional Development program.

The Department of Statistical and Actuarial Sciences runs a Data Analytics Help Service, in cooperation with Western Libraries. This service provides statistical consulting for 16 hours per week, in the Map and Data Centre area.

## Québec

### Université Laval
### Stéfano Biondo

Le lundi 16 novembre 2015, lors de la Journée SIG (GIS Day) de l'Université Laval, la Bibliothèque a invité la communauté à découvrir un univers géospatial des plus fascinants. L'équipe du Centre GéoStat et le comité organisateur de cette journée ont proposé un programme varié présentant une série d'activités spéciales qui se sont tenues au pavillon Alphonse-Desjardins de l'Université Laval. Les participants ont assisté à une série de conférences sur des thèmes variés: de la géomorphologie des fonds marins à la navigation d'un robot mobile tout-terrain, en passant par l'imagerie des drones civils en géomatique.

Un parcours de treize stations a entre autres permis aux participants de plonger dans un monde virtuel, de voir les applications impressionnantes de la réalité augmentée et plus encore. L'exposition d'affiches de projets d'étudiants de l'Université Laval de 2e et 3e cycles, ayant eu recours dans leur recherche aux systèmes d'information géographique ou ayant intégré une composante spatiale, a attiré de nombreux visiteurs. Pendant le cocktail de réseautage, les candidats du Concours «Ma thèse en 360°», étudiants de 2e et 3e cycles, ont présenté en 3 minutes un exposé clair et convaincant de leur projet de recherche qui devait comporter une composante géospatiale ou avoir recours à un système d'information géographique.

Page web de la Journée SIG (GIS Day) 2015 de l'Université Laval : http://bit.ly/1jOtCPo

# NEW MAPS

Compiled by Cheryl Woods

Chile, 9th edition
Scale: 1:1,600,000
Publisher: Reise Know-How
Year of Publication: 2016

Azerbaijan
Scale: 1:400,000
Publisher: Reise Know-How
Year of Publication: 2016

Bhutan
Scale: 1:250,000
Publisher: Reise Know-How
Year of Publication: 2016

Bosnia-Herzegovina, Montenegro
Scale: 1:350,000
Publisher: Reise Know-How
Year of Publication: 2016

Breslau 1932
Scale: 1:12,000
Publisher: Blochplan
Year of Publication: 2016

Kaliningrad 1931
Scale: 1:10,000
Publisher: Blochplan
Year of Publication: [2016]

Morpho-Bathymetry of the Eastern Mediterranean Sea
Scale: 1:1,650,000
Publisher: CGMW / CCGM
Year of Publication: 2015

Alberta Fast Track Road Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

New Brunswick Fast Track Road Map
Scale: NA
Publisher: Map Art
Year of Publication: 2015

Edmonton Fast Track City Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

Nova Scotia Fast Track Road Map
Scale: NA
Publisher: Map Art
Year of Publication: 2015

Halifax Fast Track City Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

Saskatoon Fast Track City Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

Quebec City Street Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

Ontario Southwest Road Map
Scale: NA
Publisher: Map Art
Year of Publication: 2016

Flagstaff/Prescott/Sedona
Scale: 1:32,000
Publisher: GM Johnson Maps
Year of Publication: 2015

Lithuania Road Map
Scale: 1:500,000
Publisher: Jana Seta
Year of Publication: 2015

Lake Tahoe/Carson City
Scale: 1:36,000
Publisher: GM Johnson Maps
Year of Publication: 2015

Michigan – Upper Peninsula
Scale: 1:384,000
Publisher: GM Johnson Maps
Year of Publication: 2015

Western Kentucky/Mammoth Cave NP
Scale: 1:250,000
Publisher: GM Johnson Maps
Year of Publication: 2016

Kazakhstan Political Map
Scale: 1:3,000,000
Publisher: Gizi Map
Year of Publication: 2015

Namibia Adventure Map
Scale: 1:1,200,000
Publisher: National Geographic Maps
Year of Publication: 2015

Blue Ridge Parkway Destination Map
Scale: 1:800,000
Publisher: National Geographic Maps
Year of Publication: 2015

Jamaica Adventure Map
Scale: 1:150,000
Publisher: National Geographic Maps
Year of Publication: 2015

Province of Quebec
Scale: 1:1,100,000
Publisher: Michelin
Year of Publication: 2016

France - Administrative
Scale: 1:1,700,000
Publisher: Michelin
Year of Publication: 2016

Benelux
Scale: NA
Publisher: Michelin
Year of Publication: 2016

South America, The Andes
Scale: 1:4,500,000
Publisher: Nelles Verlag
Year of Publication: 2016

South Africa, Namibia, Botswana, Zimbabwe
Scale: 1:2,500,000
Publisher: Nelles Verlag
Year of Publication: 2016

Hong Kong
Scale: 1:22,500
Publisher: Nelles Verlag
Year of Publication: 2016

Sri Lanka
Scale: 1:500,000
Publisher: Nelles Verlag
Year of Publication: 2016

Myanmar
Scale: 1:1,500,000
Publisher: Nelles Verlag
Year of Publication: 2016

Seattle
Scale: 1:32,000
Publisher: GM Johnson Maps
Year of Publication: 2015

Cleveland/Northeast Ohio
Scale: 1:160,000
Publisher: GM Johnson Maps
Year of Publication: 2015

# GEOSPATIAL DATA AND SOFTWARE REVIEWS

Edited by Andrew Nicholson

## Sources of Canadian Business Point Data

*Reviewed by Lucia Gambetti-Bracco, Master of Information student, University of Toronto, and Leanne Trimble, Data & Statistics Librarian, University of Toronto Libraries*

### Introduction

In 2014, institutions participating in the DMTI Data Consortium[1] learned that the data bundle would no longer include the Enhanced Points of Interest (EPOI) product. While this loss turned out to be short-lived (since the product was reintroduced in 2015), the news prompted some discussion and research among the members of the OCUL Geo Community about alternative sources for geospatial business point data. As a result, the University of Toronto Map & Data Library decided to undertake a comparison project which would investigate a number of known sources and compare their contents.

Two of the five data sources we investigated are web-based tools that bundle business point data with a range of other data (e.g. demographic, market segment) and web mapping functionality. Because these two products have features of interest above and beyond the business points, we have included a separate section reviewing the general functionality of these two web-based platforms. We then review all five sources of business point data in the next section.

### Web-based platforms

***Platforms overview***

*Business Analyst Online (BAO).* Business Analyst Online (BAO) < https://bao.arcgis.com/esriBAO/> is an Esri product providing access to easily mapped demographic and business data, which can also be formatted into reports or exported for further analysis. In order to access BAO, academic users must be affiliated with a university holding an Esri site license, and they must have set up an ArcGIS Online account. The institution must then invite them to BAO, and their use of BAO will consume service credits. BAO is accessible on the latest versions of Internet Explorer, Chrome, Firefox, and Safari, although some features are limited in Internet Explorer. A mobile app is also available for interconnected use with the web-based platform, however it was not included in this product review.

This platform offers significant data on the USA, but also provides general demographic data on over 130 countries. Although the US data are by far the most comprehensive, advanced data is also available for several other countries, including Canada. There is a significant difference in the breadth and depth of data available for the remaining countries, with most only providing basic variables such as population, income, age, and households. Canada and the USA are the only countries for which business point data are available.

*SimplyMap Canada.* SimplyMap, < http://simplymap.com/login.html > created by Geographic Research Inc., allows users to manipulate and map demographic and business data. The product is compatible with Chrome, Safari, Firefox, and Internet Explorer 7+. SimplyMap is available to academic institutions by subscription. SimplyMap only provides data for Canada, but the data available is comprehensive and specific (a US version is also available for a separate subscription fee, but was not reviewed for this study). Information on Canadian businesses is also available, including as NAICS and SIC codes, sales volume, number of employees, and year established. SimplyMap provides far more consumer behaviour

[1]The DMTI Data Consortium is open to academic institutions http://mdl.library.utoronto.ca/services/dmti-data-consortium.

and demographic data for Canada than BAO, such as a survey on digital technology use as well as the Canadian Community Health Survey.

### *Comparison of web-based platforms*

Since both BAO and SimplyMap are geared towards location-based business and market analysis, they are less focused on providing advanced mapping functions, such as the ability to select the projection. Instead, these platforms streamline the map production process, limiting users' options for customization but allowing for a simpler interface and workflow.

BAO is best suited for creating maps and reports, which have a professional appearance; the maps and reports are attractive and presentation-ready. Users have the ability to add text, shapes, and images directly onto maps, which reduces the amount of time for editing exported map images. BAO also allows users to choose from a small selection of base maps for different visual effects, such as satellite imagery, topographic details, or emphasizing streets.

BAO and SimplyMap allow users to manipulate the organization and display of data, whether by creating choropleth maps, maps of business points, or combinations of the two. In both platforms, users are given the ability to alter the classification method, number of categories, and fine tune colour selections. Both platforms allow users to easily export maps as images or PDFs, and to export tables as excel files. SimplyMap offers more flexibility in exporting, providing users with more control in selecting colour schemes, better customization of map layouts (including adding north arrows and scale bars), and more data export formats. The export as shapefile feature is a particularly valuable feature of SimplyMap.

In terms of usability, both BAO and SimplyMap provide extensive help documentation and wizards to support users. SimplyMap offers the useful feature of multiple work tabs, allowing for up to 20 work tabs to be open simultaneously. In contrast, BAO allows users to save maps, reports, and data layers, but the interface for this function is less intuitive than SimplyMap's recognizable tab approach. While both BAO and SimplyMap display details on business points when selected, BAO provides a greater level of interactivity with area-based mapped data than SimplyMap. For example, defined areas can be highlighted to quickly display the data on the selected area.

## Business Point Data

### *Data products overview*

*BAO - Business Listings 2015.* This data is available through the BAO platform described above. The underlying data source is Infogroup, and Esri performs a range of data cleanup tasks on the data for inclusion in BAO.[2] Esri Canada staff reported that there are approximately 1.7 million Canadian points in the dataset. BAO business point data can be exported to Excel (250 points max per export), included on an exported map image, or published on a map to ArcGIS Online.

*SimplyMap - Business Directory.* This data is available to any academic institution with a subscription to SimplyMap Canada. The underlying business point data included in SimplyMap comes from Dun & Bradstreet. Documentation about SimplyMap data sources was found within the Help menus of the SimplyMap tool. SimplyMap business point data can be exported to Excel, DBF, or CSV, or included on an exported map image.

*Environics Analytics - Businesses 2015.* This data can be licensed directly from Environics Analytics.[3] Institutions licensing the data can choose to access it through Environics' own online platform, Envision, or as a standalone data file. It is important to note that the Businesses 2015 product was reviewed based based on a variable listing and other information provided to us by Environics,

[2] http://downloads.esri.com/esri_content_doc/dbl/us/2015_USA_ESRI_Business_Data_Methodology.pdf
[3] http://www.environicsanalytics.ca/data/locationware

not based on an examination of the dataset directly, and the Envision platform was not reviewed. The underlying data source is Infogroup's InfoCanada database, with data cleanup performed by Environics.

*Pitney Bowes Software Inc. - Canada Business Points 2010.* This data can be licensed directly from Pitney Bowes; data is in the form of a geodatabase. The University of Toronto has a license for this data for the 2010 year, so that was the version examined in this review. The underlying data source is Infogroup's InfoCanada database, with data cleanup performed by Pitney Bowes Software Canada. This data source remained unchanged in 2015, and the number of variables had changed only slightly, so it was felt that reviewing the 2010 data was sufficient for the current exercise. However, the documentation for the December 2015 version of the data was also reviewed.[4]

*DMTI Spatial - Enhanced Points of Interest (EPOI) 2015.* This data is available as part of the DMTI Data Consortium. In 2015, this data was included as part of the CanMap Content Suite product, and is delivered as a series of feature layers and tables within a geodatabase. The University of Toronto has a license for this data, and the 2015 edition was examined for this review. The underlying data source is not described in the documentation except to say that data are either DMTI-sourced, or from "other sourcing". DMTI Spatial documentation is only available to subscribing institutions or upon request.

***Comparison of business point data products***

All of the business point products contained basic information about the name and location of the business as well as industry classification information. From there, there was some variation in terms of the specific variables included, which is outlined in detail in *Table 1*. Overall, however, the differences between the included variables was not astounding. While Esri's BAO point data and DMTI's EPOI product both had the most points, they also included the fewest variables. In the case of BAO, data exports are also limited to 250 points at a time, and cannot be exported in a spatial format.

Some of the products had extensive variable listings going beyond what was included in this review, but it was noted that some fields were left empty in a large majority of cases. Variables were included under "other variables of interest" in *Table 1* only if there were frequently values in those fields.

In this review, we did not attempt to assess the quality of the data cleanup performed by each vendor, but this would be an interesting question for further research.

## Conclusions

For institutions looking for a web-based tool that brings a range of useful demographic and business data together, BAO and SimplyMap both have much to offer. BAO is more readily available to many academic institutions, which already have an Esri site license, though its credit system can be awkward to manage. Overall, it was felt that BAO produced more attractive, presentation-ready maps and reports, but that SimplyMap provided richer Canadian data sources and more robust export options.

For institutions looking specifically for business point data, in some cases the web-based platform might actually hinder experienced GIS users from readily accessing the needed data, though SimplyMap did a good job of offering customizable reports that can be downloaded with lat/long information. Among non web-based products evaluated, the Pitney Bowes data provided the largest number of variables.

The full spreadsheet of our variable-by-variable comparison is available online.[5] This spreadsheet includes a detailed comparison of all the demographic variables included in BAO and SimplyMap, which were not discussed in detail in this review.

[4]http://reference.mapinfo.com/Data/Business%20Data/Canada/2015-12/CanBusinessData_2015.12_ProductGuide.pdf
[5]http://hdl.handle.net/10864/11526

| | Vendor | | | | |
|---|---|---|---|---|---|
| | Esri | Geographic Research | Environics | Pitney Bowes | DMTI |
| Product name | Business Listings 2015 (part of BAO) | Business Directory (part of SimplyMap) | Businesses 2015 | Canadian Business Points 2010 | Enhanced Points of Interest 2015 |
| Data source | Infogroup | Dun & Bradstreet | Infogroup | Infogroup | Unknown |
| Number of points | 1.7 million | 1.1 million | 1.3 million | 1.45 million (2010); 1.35 million (2015) | 1.7 million |
| Variables | | | | | |
| Basic contact information (company name, city, province, postal code) | Yes | Yes | Yes | Yes | Yes |
| SIC & NAICS codes | Yes, primary SIC & NAICS code only | Yes, primary & additional SIC & NAICS | Yes, primary & additional SIC, primary NAICS | Yes, primary & additional SIC, primary NAICS. Includes Canadian equivalent of US primary SIC. | Yes, primary & additional SIC & NAICS. |
| Spatial location of businesses | Yes, but can't export this, can only produce maps within BAO tool | Yes | Yes | Yes | Yes |
| Number of employees | Yes, exact number | Yes, exact number | Yes, ranges | Yes, exact number | No |
| Sales volume | Yes | Yes | Yes | Yes | No |
| Other variables of interest | | Single location/ branch status; Year started; DUNS number | | French flag; Census geography (Country, Province, CD, CSD, CMA, CT, FSA, FED); Status code | Common address flag; Special attributes unique to certain types of points |

*Table 1: Business Point Data Product Comparison*

# GIS TRENDS

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## STORY MAPS

Through the ages gifted cartographers have created maps that not only situate us in a specific space but enable us to encounter a particular experience. In writing this article I spent (too long) looking at some examples: enchanting sea monsters on early nautical maps, David Rumsey's historical map collections (such as the beautiful illustrations of flora, animals and people in Fullarton's Royal Illustrated Atlas of 1872), the illustrations of country life in my local county atlas, and my library's collection of maps on placemats. These all tell their own stories, drawing us in to a particular place, time and experience.

GIS technologies also provide us with tools to tell stories using maps. A leading trend within GIS is the growth of web applications (apps) specifically designed to facilitate making these resources available over the web. These applications range in complexity and purpose, but together, they make available geographic information to new communities of users. They may be open source or proprietary. A range of hybrid products – in which source code or other features of a proprietary product are made available – are also becoming more popular, providing new opportunities for development and communication of GIS products. There are numerous excellent tools that have distinctive roles to play with respect to offering spatial content on the web, such as Carto DB, Google Mapping Products, Mapbox, Leaflet, Open Layers and others. This article looks at one of these products, Esri Story Maps, describing its functions, templates, and relevance to different user communities.

**Description and Purpose**

Esri Story Maps are web applications designed to bring together diverse forms of information (such as maps, text, images, video, or audio) using geography as the basis for their organization and presentation. This is achieved by selecting from a range of customised template web apps, each of which uses a distinctive story-telling technique.[1] The template can, in effect, provide the basis for creating a mini-web site that tells a specific story about a particular place, event, issue, trend or pattern.

A key feature of this product is that it can accommodate users with different levels of technical experience. Beginners can tell their story without having to write code. If you are a developer, source code can be freely downloaded from GitHub, modified, and then shared back to GitHub. Developers can also create their own custom story maps, making use of the developer APIs and tools in ArcGIS for Developers.[2] If you fall somewhere in between these levels – the templates will give you a place to start or base, but you can also experiment and modify code so as to achieve your own objectives.

Most templates are built to run via ArcGIS Online – an important feature for those not able or wanting to run a web server. To publish story maps members of the public can sign up for a free non-commercial ArcGIS Online Public Account or sign in with a Facebook or Google account. [3] Not everything within the ArcGIS Online is free. Story Maps and other web templates are free, as are ArcGIS Online foundation

[1]Esri Canada, Products and Services, http://www.esri.ca/en/content/story-maps ( derived, March 29, 2016)
[2]Story Maps – Frequently Asked Questions, https://storymaps.arcgis.com/en/faq/#question1 (derived, March 29, 2016)
[3]Story Maps – Frequently Asked Questions, https://storymaps.arcgis.com/en/faq/ (derived: March 29, 2016)

maps and data. However, some workflows and maps involve costs as do storing features and photos. Organizational accounts also have more options (for example, restricted sharing and authentication options). Organization with ArcGIS Online accounts are given certain number of credits to take advantage of priced services. Having an organizational account with sufficient credits is therefore an important consideration when adopting or promoting this product. As are local policy decisions regarding what gets done within the ArcGIS Online Cloud and what gets linked or hosted locally.[4]

**Getting Started: Story-making templates[5]**

The first and most essential requirement of the story-building and web design process is having a good story and appropriate supporting materials. In conceptualizing one's story and determining how to show it, it also helps to understand the variety of templates available. There are templates designed for map-based tours, collections of points of interest, in-depth narratives, presentation of multiple maps, comparisons of two maps, and more. The Story Maps Apps web site explains the options well, and provides links to sample story maps and source code for each category.

New templates are continually being developed. Figure 1 lists some of the key available template apps.

| *Template Types* | *Features* | | |
|---|---|---|---|
| | *Builder* | *Hosted* | *Responsive* |
| *Sequential, Place-Based Narratives* | | | |
| o *Story Map Tour℠* | ✓ | ✓ | ✓ |
| o *Story Map Journal℠* | ✓ | ✓ | ✓ |
| o | | | |
| *Presenting a Series of Maps* | | | |
| o *Story Map Series℠ - Tabbed Layout* | ✓ | ✓ | ✓ |
| o *Story Map Series℠ – Side Accordion* | ✓ | ✓ | ✓ |
| o *Story Map Series℠ – Bulleted Layout* | ✓ | ✓ | ✓ |
| o | | | |
| *Comparing Two Maps* | | | |
| o *Story Map Swipe℠* | ✓ | ✓ | ✓ |
| o *Story Map Spy Glass℠* | ✓ | ✓ | ✓ |
| *Presenting One Map* | | | |
| o *Story Map Basic* | ✓ | ✓ | |
| *A Curated List of Points of Interest* | | | |
| o *Story Map Shortlist* | ✓ | | |
| *Custom Story Map Design* | | | |

*Builder= This app has a "builder" for easy interactive story map creation*

*Hosted= This app is available hosted on ArcGIS Online*

*Responsive=This app has a responsive design for viewing on mobile devices*

*Figure 1: Key Templates Apps[6]*

[4]For further information see: https://storymaps.arcgis.com/en/faq/, http://www.esri.com/software/arcgis/arcgisonline/credits, and https://blogs.esri.com/esri/arcgis/2015/12/29/choosing-the-right-story-map-app/

[5]Descriptions and template information have been summarized from the following web sites: http://storymaps.arcgis.com/en/app-list/ and http://www.esri.ca/en/content/story-maps, derived March 2016

[6]Information for this chart has been taken directly from: https://storymaps.arcgis.com/en/app-list/, March 25, 2016

**Examples of Story Maps**

The Esri Story Map Gallery offers many examples of story maps created by the Esri Story Map team or by other divisions of Esri in various countries, as well as by the user community. These story maps are divided by template type, subject, and format (for example: embedded, full-screen, linked, customized, or collections).

Here are a few examples that I found effective and interesting. Each uses a different template app:

Title: The Uprooted
Location: http://storymaps.esri.com/stories/2016/the-uprooted/http://storymaps.esri.com/stories/2016/the-uprooted/
Template: Cascading App (to be released by Esri Story Map Team later this year)

Title: The Struggle to Save Elephants from a Devastating Wave of Ivory Poaching
Location: http://elephantstory.wcs.org/
Template: Map Journal App

Title: Devastation in Nepal: Katmandu Before and After the April 2015 Earthquake
Location: http://story.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=97ab135daee04ee7bac9dac34f65277f
Template: Storytelling Swipe App

Title: Smithsonian: The World of Circles
Location: http://www.smithsonianmag.com/travel/world-full-circles-180954529/
Template: Map Series – Bulleted

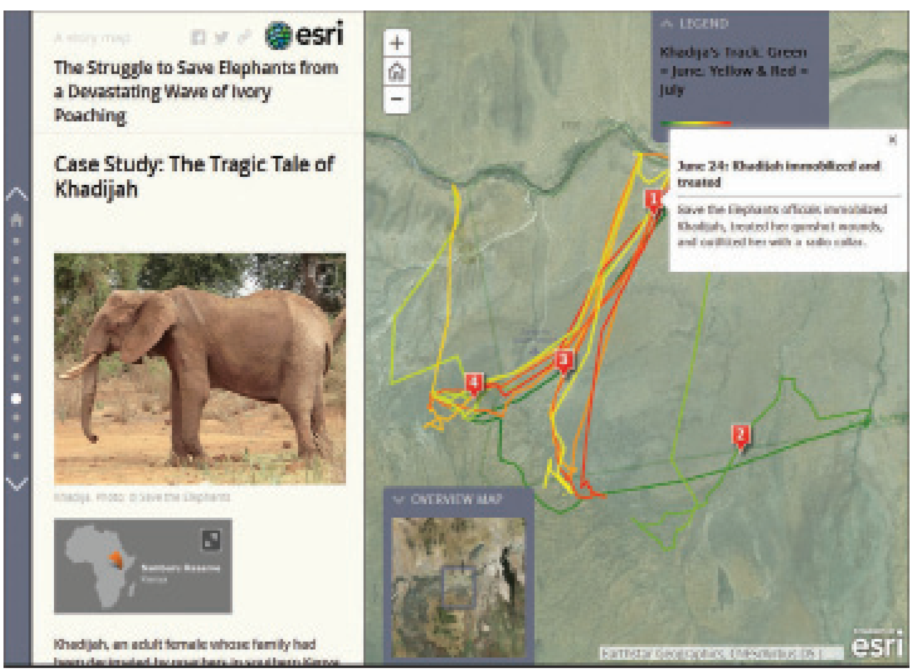


***Figure 2. Esri Story Map*** **– The Struggle to Save Elephants from a Devastating Wave of Ivory Poaching (Story Map Journal)**

*Source*: Snapshot from "The Struggle to Save Elephants from a Devastating Wave of Ivory Poaching", WCS_Mapping and Esri Story Map Team, http://wcs-global.maps.arcgis.com/apps/MapJournal/index.html?appid=6d920df507b5430fbd2c69c74ed21c6f, derived from internet March 29, 2016.

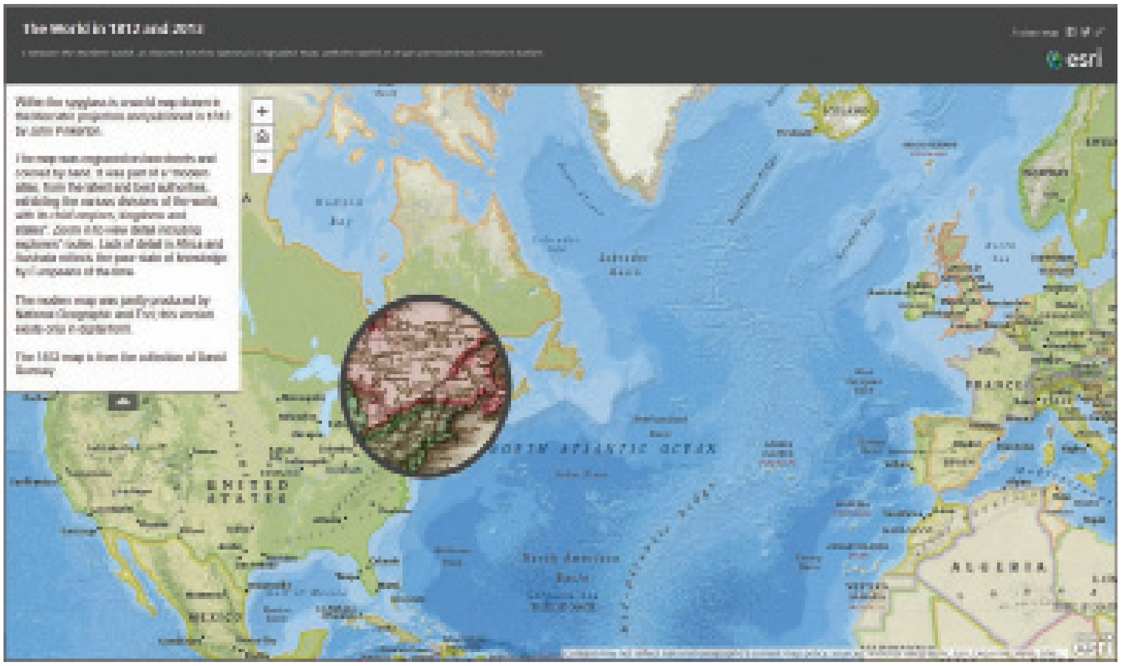


***Figure 3. Esri Story Map*** **– The Work in 1812 and 2013 (Story Map Spyglass)**

*Source*: Snapshot for "The World in 1812 and 2013" Esri Story Maps Team" http://story.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=b8ece5952db443858442f122984602ba&webmap=8ea34ba9a4f843e08a468595d8d91188#, derived from internet: March 29, 2016

**Blogs and Twitter**

Esri Story Maps are active on twitter (@EsriStoryMaps) offering frequent tweets about new story maps.

You can also monitor Esri's Story Map blogs[7] which are an excellent source of information about new products and offer short features about particular options. For example the March 2016 blogs "What's New in Story Maps" and "Using Story Map Autoplay mode" provide information about new developments such as Story Maps' new autoplay functionality and the new Facebook and Google sign-in features.

**Evaluation**

Esri's Story Maps provide effective ways of telling stories: presenting not just information that is tied to specific geographic locations, but enabling users to tell something about the experiences associated with those places – whether these experiences are, for example, tied to an historical or current event, a research project, or a tour of a site. Within the academic sector Story Maps present opportunities for engaging all disciplines – sciences, humanities, business administration and others – providing new opportunities for spatial and GIS literacy, and continuing the dialogue regarding how best to integrate narratives and tell our stories.

**Disclaimer**

All inaccuracies or omissions within this article are the responsibility of the author.

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[7]See: https://blogs.esri.com/esri/arcgis/category/story-maps/