Cartouche

Number 92, Summer/Autumn 2016 ***Numéro 92 été/automne 2016***

Cartography by Marcel Morin (Lost Art Cartography), Grand Pré Nova Scotia

The above basemap is featured in the book *"The Landscapes of Grand Pré - images, maps, past and present"* co-authored by Marcel Morin & Jamie Robertson of the Grand Pré Trails Society. Read more about Marcel's design and cartographic work in the Feature Article section of this edition of Cartouche.

Newsletter of the
Canadian Cartographic Association

www.cca-acc.org

Bulletin de
l'Association canadienne de cartographie

www.cca-acc.org

PRESIDENT'S MESSAGE

Julia Siemer
University of Regina

Julia Siemer is the President of the Canadian Cartographic Association and an associate professor of Geography at the University of Regina.

This Issue / *Sommaire*

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"Maps codify the miracle of existence."
— Nicholas Crane, Mercator: The Man Who Mapped the Planet

At this year's meeting at the University of Winnipeg in June, I officially took over as the new president of the CCA. After serving two years as Vice President, I am excited to take this next step and lead the association during challenging times as we experience a decline in membership. Similar to other professional associations, we face the problem of attracting new, young members. The younger generation of cartographers is no exception, many simply don't see the value of membership in professional associations such as the CCA. One of the benefits we offer is the significant networking that occurs at our annual meetings. A student presenter at the meeting in Winnipeg told me about an engaged conversation with one of our members that led her to discover the importance of networking with members of the association. Although society and ways of communicating have obviously changed drastically over the years, this doesn't really seem to be a new problem. I remember very well how uninterested I was when I was told by my supervisor to join the German Cartographic Society in 1988 after starting my apprenticeship as cartographer in Hamburg, Germany. Nevertheless, I joined the society and have never regretted it. There have been times when I was not very engaged but I always saw a benefit in being connected to people who share the same passion.

I hope to be able to contribute to stabilizing the CCA and help it survive. This might sound alarmist to some, but some CCA members have questioned the association's continued existence given the steady loss of members and flagging commitment to the association. I strongly believe in the need for the CCA and I urge all of you to consider becoming more involved with our organization. We are always in need of members who are interested in serving in various positions on the executive committee, who will present their work at the annual meetings, or who will simply keep discussions on cartographic issues alive.

I would like to thank Chris Storie for his leadership as president of the CCA during the past two years and for organizing this year's joint meeting with the Canadian Remote Sensing Society in Winnipeg. Additionally, I would like to thank all other members of the executive committee with whom it has been a real pleasure to work over the past two years. I hope to continue the excellent work of the executive committee during the upcoming year.

Joining me in my new role is Monica Lloyd from COGS as the new Vice President of the CCA. Monica has also taken over responsibilities for publishing this newsletter and serving as webmaster of CCA's website. A big THANK-YOU in the name of all CCA members for this huge commitment!

You will note that this edition of the Cartouche honours two very exceptional members of our association that we lost in 2016. The significant accomplishments of Dr Clifford Wood and Donna Williams and their contributions to our discipline and to our association are a legacy to us all. They will be sadly missed.

Next year will be an important year for Canada as we celebrate its 150th anniversary. The CCA will join the festivities in Ottawa by holding its annual conference at Carleton University from May 31 to June 2, 2017 (for more information see the announcement page 24). Please mark your calendar, consider presenting your theoretical and/or practical work, offering a hands-on workshop, or simply plan to attend and join in the festivities.

I hope to reconnect with many of you in Ottawa in Spring 2017!
Julia Siemer

VICE PRESIDENT'S MESSAGE

Monica Lloyd
Centre of Geographic Sciences,
Nova Scotia Community College

Back in 1996 I was a travelling exchange student planning out my future studies, living abroad solidified my passion for exploration, travel and geography. It was here that I made my decision to attend what we now refer to as the Centre of Geographic Sciences better known as COGS. I completed my two-year Cartography Digital Mapping Diploma where we were the last class taught manual drafting, scribing and dark room cartographic processes. This was a period of time where efforts were focused on building spatial data infrastructure and the beginnings of making solid Geographic Information Systems (GIS). From a cartographer's perspective, this was a time where we either made our data or purchased it and relied on basic GIS applications like ArcEditor and the command prompt to update topology before taking clean data to a preferred graphics package for map creation.

Twenty years ago, upon graduation many of my classmates took jobs as GIS Technicians, Drafting Illustration Technicians, worked in data acquisition or became freelance Cartographers. Today the positions are still very similar and our COGS graduates are getting jobs in similar positions.

Reflecting over my years as a cartographer and now educator, it is clear that the cartographer's toolset has not changed by leaps and bounds. At the heart of what we do the spatial component remains the core with branches of relationships to features branching from this. Our skillset is much more than making an informative map that is well balanced, has clear symbology and interesting graphics. The cartographer is also able to quickly link the pieces together and bring the interested parties together – engineers, scientists, community members, interest groups and is able to quickly decipher the necessary information worth sharing in a cartographic medium.

At the root of this profession, the data being portrayed and the message relayed to our audience remains the sole focus of a cartographer. Have the tools changed? Yes, and no. We are still using GIS applications albeit desktop or cloud based to perform analysis, build topology and prepare data for presentation. GIS applications have improved tremendously over the years to the point that it may be unnecessary effort to take data out of a GIS to make the final map. Graphics packages now have integrated spatial components and are able to export out code for web mapping purposes. Spatial data and location information is embedded in everything we do. This is an exciting time for anyone interested in making maps, but also where we as cartographers are needed even more to step up and help others share their stories with maps.

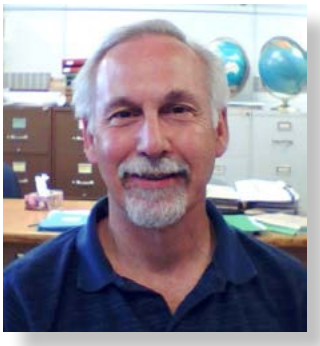
As technology and new methods of making maps expands to many different branches, it becomes more important for us to stay connected with other cartographers and GIS professionals. It is easy for us to loose our creative spark under all the new technology and noise of "big data". Being active with the CCA executive is giving me the opportunity to connect with other cartographers from across the Canada and is helping to re-ignite that creative spark. Since my first presentation at the 2015 CCA conference in Prince Edward Island, I have seen many benefits to becoming a member of the CCA. Membership has given me opportunities to network and consult with other spatial gurus and people who share a passion for maps and all things spatial. The wealth of experience in our membership is invaluable to making better maps and is the future of Cartography in Canada.

Please continue to support the CCA or consider joining our association. Your contribution to this cartographic knowledge base is invaluable and cannot be taught in the classroom. Share your experiences by contributing articles or presenting your work, interesting projects or cartographic techniques at our upcoming conference in Ottawa. I look forward to meeting, learning and with this friendly group of map lovers.

Seasons Greetings and a Mappy New Year!
~Monica

Monica Lloyd is the Vice-President of the Canadian Cartographic Association and faculty at the Centre of Geographic Sciences (COGS) campus of the Nova Scotia Community College. She teaches in the two year Diploma in Geographic Sciences Program focusing in Cartography and GIS.

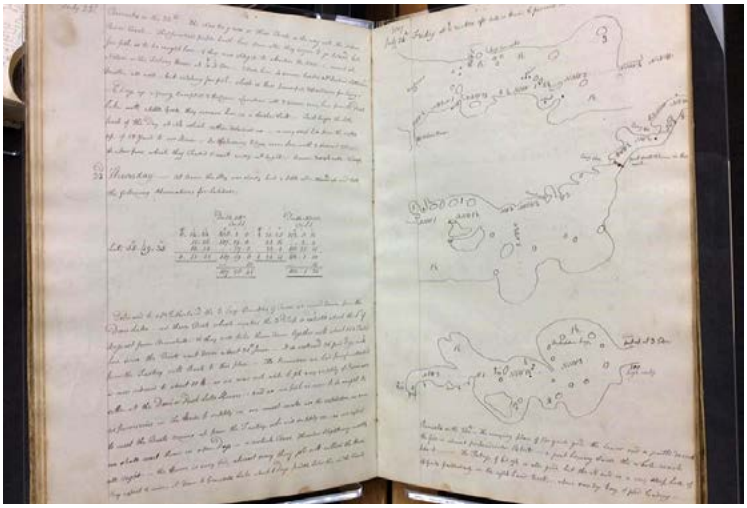
HISTORY of CARTOGRAPHY INTEREST GROUP
Byron Moldofsky
University of Toronto



Report on Historical Cartography Activities at CCA 2016, Winnipeg

Historical Cartography had a high profile at the CCA annual conference in Winnipeg this year. We were able to organize a visit to the Manitoba provincial Archives, located within walking distance of the UW's Richardson College for the Environment, where the meetings took place. Immediately on returning, most participants attended our session on Historical Cartography and GIS, with four diverse and interesting presentations.

Caption: Peter Fidler's manuscript journal notes and maps of his explorations. (Hudson's Bay Company Archives, Archives of Manitoba, Peter Fidler journals of exploration and survey, 1790-1809, E.3/3.)



Caption: Participants browsing selected manuscript and printed maps from the HBC Archives Collection.

TOUR OF ARCHIVES OF MANITOBA

Thursday June 9 was a scorcher in downtown Winnipeg, but about 20 participants from the CCA and the Canadian Remote Sensing Society met in the lobby of Richardson College at 9:30 am, and headed over on foot (trying to stay in the shade as much as possible) to the Archives of Manitoba. Lisa Friesen and her staff had kindly arranged to give us a tour of the Archives reading room, and a viewing of some of the gems of the map collection from the Hudson's Bay Company Archives (Canadian section), a which is housed within Manitoba's. Some of you may know of the collection through Richard Ruggles' book "A Country So Interesting: The Hudson's Bay Company and Two Centuries of Mapping, 1670-1870." [1] Dick Ruggles was a prof at Queen's University for many years and one of the founding members of the CCA. We were fortunate to see some of the maps he based his work on, first-hand! Accompanied by Lisa's expert commentary, which added to the experience immensely.

HISTORICAL CARTOGRAPHY AND GIS PRESENTATIONS

The theme of the conference "Imagery to Map", does not only reflect the relationship between remote sensing and cartography. It is also appropriate in the context of historical GIS, as illustrated in several of our session presentations.

Daniel Brendle-Moczuk, from the University of Victoria Map Library, started us off with his presentation using historical imagery and maps from before 1970 to reconstruct the impact

on the BC landscape of two major open pit mining operations: Brenda Mines (1970-1990) and Vancouver Island Copper mine, (1974-1986). As these case studies demonstrated, even in this day of modern digital imagery it is essential to retain historical imagery to be able to visualize the landscape history of the areas around the mines, or other similar large-scale environmental disruptions, in order to assist in the process of reclamation.

Brian McGregor, on home turf here at UW, provided us with a quick look at work he has done in conjunction with Prof. Jock Lehr, plotting the historical appearance (and sometimes disappearance) of schools across Manitoba to map the settlement frontier. Using the dates of school establishment from territorial and provincial records, a series of GIS maps showing the occupation of land on an annual basis from 1870 to 1950 was created. These appear to support the authors' contention that community institutions such as schools can provide a better and more seamless picture of historical settlement than the conventional one provided by census data. Look for a forthcoming publication in Prairie Perspectives (See: http://pcag.uwinnipeg.ca/prairie-perspectives.html).

Larry Laliberte is the GIS Librarian at the University of Edmonton, but he used to work in Winnipeg at the University of Manitoba Map Archives, so it was something of a homecoming for him too. In that context he helped create the digital Manitoba HIstorical Maps collection, housed on Flickr [2]. Larry's presentation, however, described more recent work done with the University of Alberta Libraries Peel Prairie Postcard collection. Siphoning the metadata records into a combined file and linking these records to a geonames database allows locational mapping of the collection. The plan is eventually to create a prairie postcard corpus for text mining and use a spatially enabled postcard layer to help detail the history of the prairies within HGIS.

In the final presentation, I provided an update on the The Canadian Historical GIS Partnership Development project, which is led by Marcel Fortin at the University of Toronto, and partners from across the country. This SSHRC-funded project has enabled us to reach out to the larger historical GIS community, in Canada and beyond, to try to build consensus about what kinds of resources would be most useful for historians, librarians, geographers trying to do historical GIS in Canada: a historical Geodata portal? Best practices for building and mapping historical data? New tools for designing websites specifically for these kinds of projects? A User Needs survey was sent out last year, and I was able to present some preliminary findings. You can find out more on the project website, at: www.geohist.ca. [3]

References and Web pages:

[1] Web site, http://www.mqup.ca/country-so-interesting--a-products-9780773538856.php
[2] Manitoba Historical Maps, Web site, https://www.flickr.com/photos/manitobamaps/
[3] Geohistory-Géohistoire Canada, Web site, www.geohist.ca

Calendar 2017

CCA2017:
"150 Years of Cartography: Past, Present and Future"
42nd Annual Conference of the Canadian Cartographic Association,
Carleton University, Ottawa, ON
Wednesday 31 May - Friday 2 June, 2017
Contact: Steve Prashker **sprashker@gmail.com**
http://cca-acc.org

Carto2017:
51st Annual Conference of the Association of Canadian Map Libraries and Archives (ACMLA)
Simon Fraser University, Vancouver, BC
June 20-23
http://acmla-acacc.ca

ICC2017: 28th International Cartographic Conference
Washington, D.C
July 2-7
Contact: **roger.wheate@unbc.ca**
http://icc2017.org/

MAPPING TECHNOLOGIES & SPATIAL DATA INTEREST GROUP

Margaret Schweitzer
Hamilton Archaeological Consulting

Mapping Crime

Thematic maps are used to analyze and display spatial data in many different social and economic situations. Some of these applications include demographic data, disease spread, floods and forest fire damage, to name a few. With the proliferation of mobile device mapping apps, data can be uploaded and displayed "on the fly" within seconds of its collection. It can be argued that all maps hold significance for both their authors and for their intended audiences, especially under these circumstances.

One of the more common uses of thematic maps is crime mapping. Because digital data is readily available for police incident calls, arrest records, and calls for service, this type of map is critical to law enforcement. Comparisons and analysis can also be done with external data, such as urban planning, property assessment, and transportation corridors, for example. By using factual data rather than anecdotal evidence, policy decisions can be made that have long-reaching and beneficial consequences to communities at large.

Early on, GIS was recognized as a valuable tool in the fight against crime. By combining geographic point data with other attributes (related to specific incidents), spatial analysis was possible in a new way. Trends and patterns became visible much more quickly in some instances, particularly regarding serial crime. To expand on this topic more fully, crime mapping can be referred to as mapping movement throughout a given spatial area. Humans carry cognitive maps within their own minds; physical maps include factors such as familiarity with certain routes, barriers encountered, and the attractiveness of places of origin and destination. It is these characteristics put together that challenge the investigative powers of police.

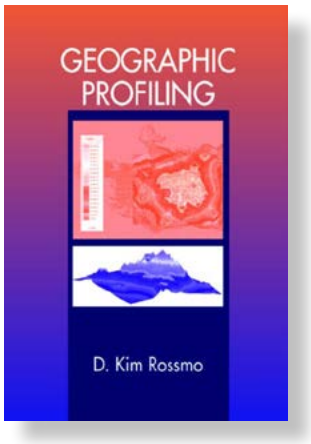
In the case of a potential serial killer, the obvious thrust of an investigation is to prevent further occurrences by the same individual. One can imagine the stress that police work under at times (notwithstanding Hollywood movie scripts) in attempting to predict both when and where a crime may take place. Weather, time of day or week, and unknown behaviour patterns all fit into the mix. Spatial mean and a standard distance to crime sites in a connected series are used to determine the most likely region for another offense; however, the actual success of any prediction or predictive theory is fraught with difficulty. Media reports occasionally highlight the "dumb luck" of a killer being apprehended for a different reason altogether, such as a traffic stop violation.

During the process of mapping criminal activity, factors such as traffic flow and road network complexity serve to illustrate the permeability of certain urban neighbourhoods. This refers to how many connecting streets to any one block then lead to arterial routes. Studies have shown that places near highway exits carry a higher risk of crime related activity (think of the quick getaway). Conversely, a crime that takes place in a remote location generally indicates that the perpetrator has knowledge of the local area. Any person's distance perception is influenced by his or her own assessment of separate certain points, or nodes, and by the actual physical distances involved between them. At times we cannot say how well we truly know even those who are close to us, nor are we able to decipher what is going on inside someone's mind, and this adds yet another layer to the hard work of trying to ascertain what behaviours led to the crime scene, both in a physical as well as a psychological sense.

GIS has proven its capability and capacity in providing an essential tool for police forces around the world. As analytic tools, maps play a critical role in displaying spatial data, yet they may also mislead by showing average areal tendencies while obscuring important variations within areal units. Criminal offenders tend to move about in a predictable and routine manner, the same as other non-criminal individuals. Models that can predict where crime is more likely to take place, based upon a broader social backdrop of activity nodes, provide a means of prioritizing leads by investigators.

By representing possible correlations between spatial data and acts of human behaviour, crime mapping since its beginnings has demonstrated the need to develop rules that commute: statements of relationships that may predict both directions across a function. In other words, equations can be algebraically manipulated that result in correct predictions much of the time. Detectives must have the tools that they can use with confidence in trying to solve investigations, especially when events may initially appear unrelated. GIS makes this process both faster and more efficient than was ever possible before.

*Material for this article was taken from D. Kim Rossmo's Geographic Profiling, © 2000 by CRC Press.



CCA Position Openings

The CCA has several openings on our executive, which include:

1. Education

For information on any of these openings you can consult the executive tasks list page on the CCA website or contact Julia Siemer at president@cca-acc.org.

Imagery to Map
Roger Wheate
University of Northern British Columbia

Imagery to Map: 37th Canadian symposium on remote sensing and 41st CCA conference

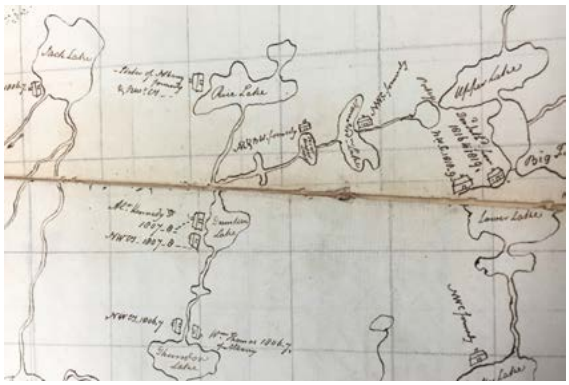
June 7-9 2016

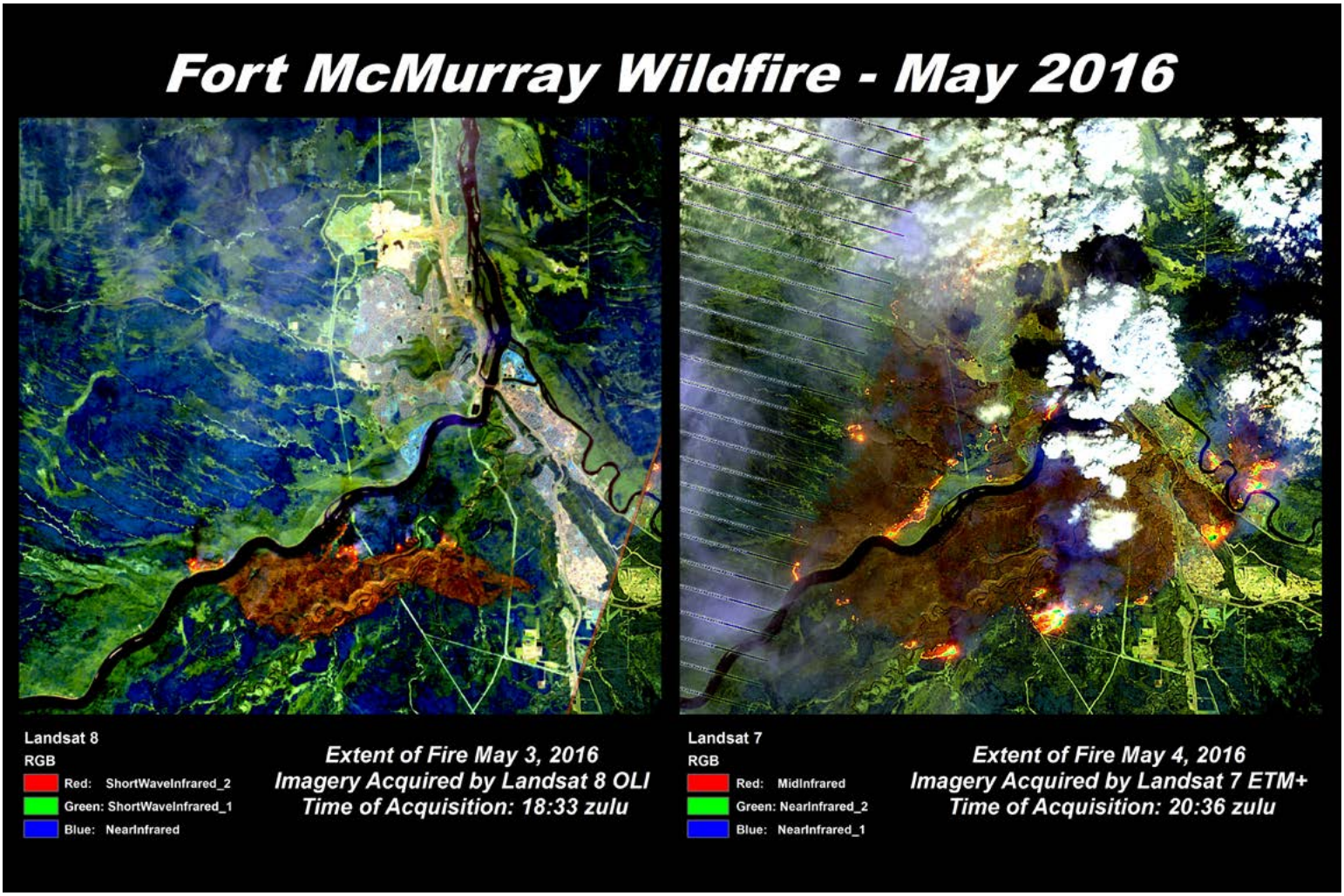
The 2016 annual meeting assembled national members and interested parties from the geomatics disciplines incorporating cartography and remote sensing, at the University of Winnipeg's Richardson College for the Environment. The program featured combined sessions from the two groups, often highlighting their integration as per the conference theme. Continuing technological developments in remote sensing included demonstration of high resolution 'thermos flask' sized satellites managed by Planet Labs (pictured with this column author). Each of the three days commenced with a keynote speaker, dominated by remote sensing: David Henry (CCRS) on 'From satellite to handheld'; Ed Cloutis (Univeristy of Winnipeg) on 'Remote sensing exploration of Mars'; and Olaf Niemann (University of Victoria) on 'Hyperspectral remote sensing: a 30 year perspective', along with a second keynote on the last day by Prasad Thenkabail (USGS) on 'Remote sensing and Mapping in global agriculture'.

The social program was highlighted by an awards banquet at the beautiful Qualico Family Centre in Assiniboine Park, which also features the sharpest peaks in the City (pictured). The setting alone was worth the excursion and an outstanding location for such events. The next evening saw a more informal gathering at Peg City Brewing, where we sampled ales from elsewhere as Manitoba lags behind the other provinces in this regard.

Cartographic highlights of the conference centred on sessions on Historical cartography, GIS and mapping, with talks on Accuracy of GIS Data with Smartphone GPS by Jackie O'Neil (University of Regina); Sun Glare Road Hazard Mapping by Derek Peddle (University of Lethbridge); The Widening Gap Between Image and Map by Dion Wiseman (University of Brandon). BC Mines and their historical landscape by Daniel Brendle-Moczuk (University of Victoria); GIS in Historical Geography by Brian McGregor (University of Winnipeg), The Canadian Historical GIS Partnership Development Project by Byron Moldofsky (University of Toronto); and Historical GIS and the Postcards of the Prairies by Larry Laliberte (University of Alberta).
A further highlight was a lunch time tour of the Hudson Bay Company map collection in the Manitoba Museum , organised by Byron Moldofsky, and featured some astounding 17th to 19th century maps and watercolours, which were warmly appreciated by participants. Many thanks to Chris and Joni Storie for their excellent organisation of the overall event, along with an enthusiastic team of U.Winnipeg students, welcoming us back to Manitoba after 25 years.

Roger Wheate, UNBC





Infrared energy, due to its longer wavelength, is able to penetrate atmospheric conditions, and even smoke to a degree, making it ideal for monitoring burn areas during a fire.

The Landsat 8 imagery is a 765 composite using only the infrared bands (no visible). Landsat 7 imagery is a 754 composite, also using only infrared bands.

Data source:
USGS Earth Explorer (http://earthexplorer.usgs.gov/)

Landsat 8 OLI sensor, acquired May 3rd, 2016
WRS_PATH = 43 WRS_ROW = 2

Landsat 7 ETM+ sensor, acquired May 4th, 2016
WRS_PATH = 42WRS_ROW = 20

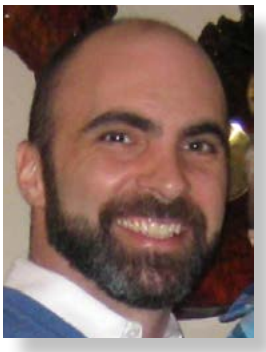
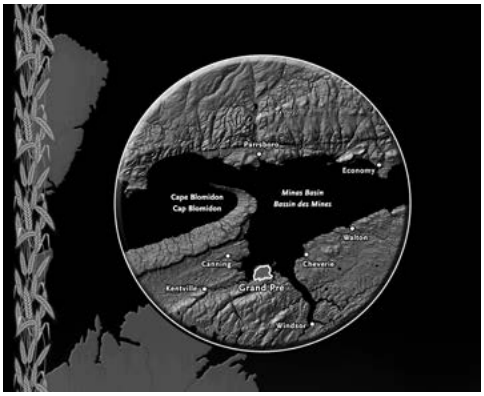


Image provided by Rob Hodder,
Faculty Remote Sensing
Centre of Geographic Sciences

FEATURE ARTICLE

Marcel Morin
Lost Art Cartography, Grand Pré Nova Scotia



The Lost Art of Greyscale Mapping

There was a time when greyscale mapping was a cheap and economical way of making maps. Pre-digital, full-colour map making involved specialized equipment, darkrooms, large horizontal cameras, plate makers and a lot of money, space and time. With the advent of personal computers and colour printing, greyscale maps are relegated to just some academic papers; even newspapers print in colour. So large elaborate, greyscale maps are rarely done today.

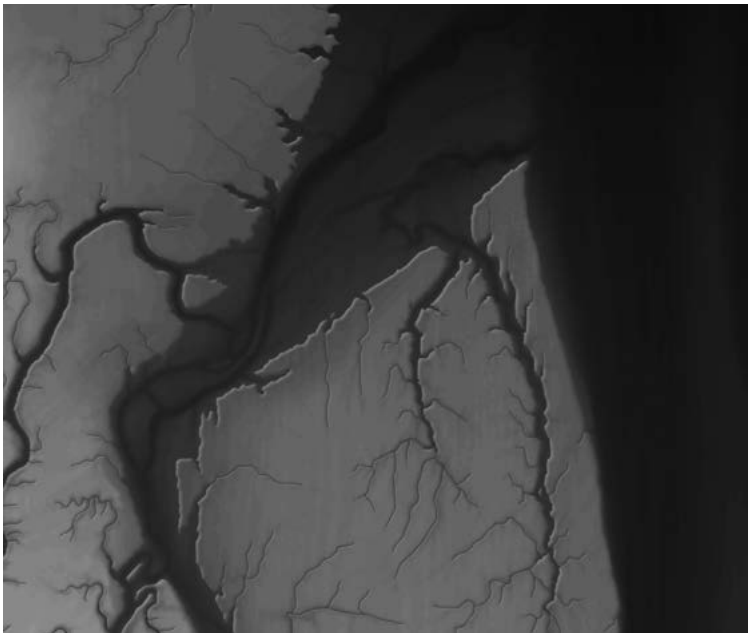
In June of 2012 the Landscape of Grand Pré in Nova Scotia became Canada's 16th UNESCO World Heritage Site. Around the same time a community-based initiative to raise funds, purchase and donate land to Parks Canada was successfully completed. Today the property is the Landscape of Grand Pré View Park, located in the village of Grand Pré.

Landscape of Grand Pré View Park, Drone Photo: Jamie Robertson

The View Park provided a special opportunity to resolve a particular challenge of the UNESCO site to ensure that tourists would be able to view the landscape without interfering in ongoing farming activity. One of the key attributes for the UNESCO designation was it being actively farmed since the 1680s. Farmers felt the landscape was worth celebrating, but they wanted to ensure that their livelihoods would not be negatively impacted. Most of UNESCO site can now be safely viewed throughout the year from the View Park or via the internet (http://bit.ly/1U7jal7).

The idea of a harvest celebration of agriculture was always considered for the park. The 2012 Canadian Chefs' Congress determined that their legacy project would be a permanent harvest table.

The Harvest Table design was a collaboration between myself, landscape architect Angela Morin and designer Doug Murley of Heritage Memorials in Windsor, Nova Scotia. The granite table is 4.9 metres long and 1.5 metres wide and seats 20. The table top consists of three large slabs of polished granite 6.35 centimetres thick, the two end pieces are grey granite and center piece is made of black granite which forms the black component of the greyscale map.



Grand Pré LIDAR


Grand Pré Harvest Table Installation


Grand Pré Harvest Table Installation

The map is 150 cm by 106 cm and uses LIDAR (5 metre pixel) and greyscale ortho imagery; all of the components for the map originate in ArcMap. To simply convert a colour map to greyscale would not work, in order to control foreground and background, black & white adjustment layers were applied to all colour images. Over 25 vector layers were created, processed in Illustrator and rasterized in Photoshop; 11 tiff images were generated, processed and layered in Photoshop. The final Photoshop file contains 80+ layers, over 200 hours went into the creation of the map, hand smoothing and shaping of certain layers, the intricate drainage patterns in the tidal mud flats were hand drawn.


Grand Pré LIDAR layered with 80+ layers in Photoshop

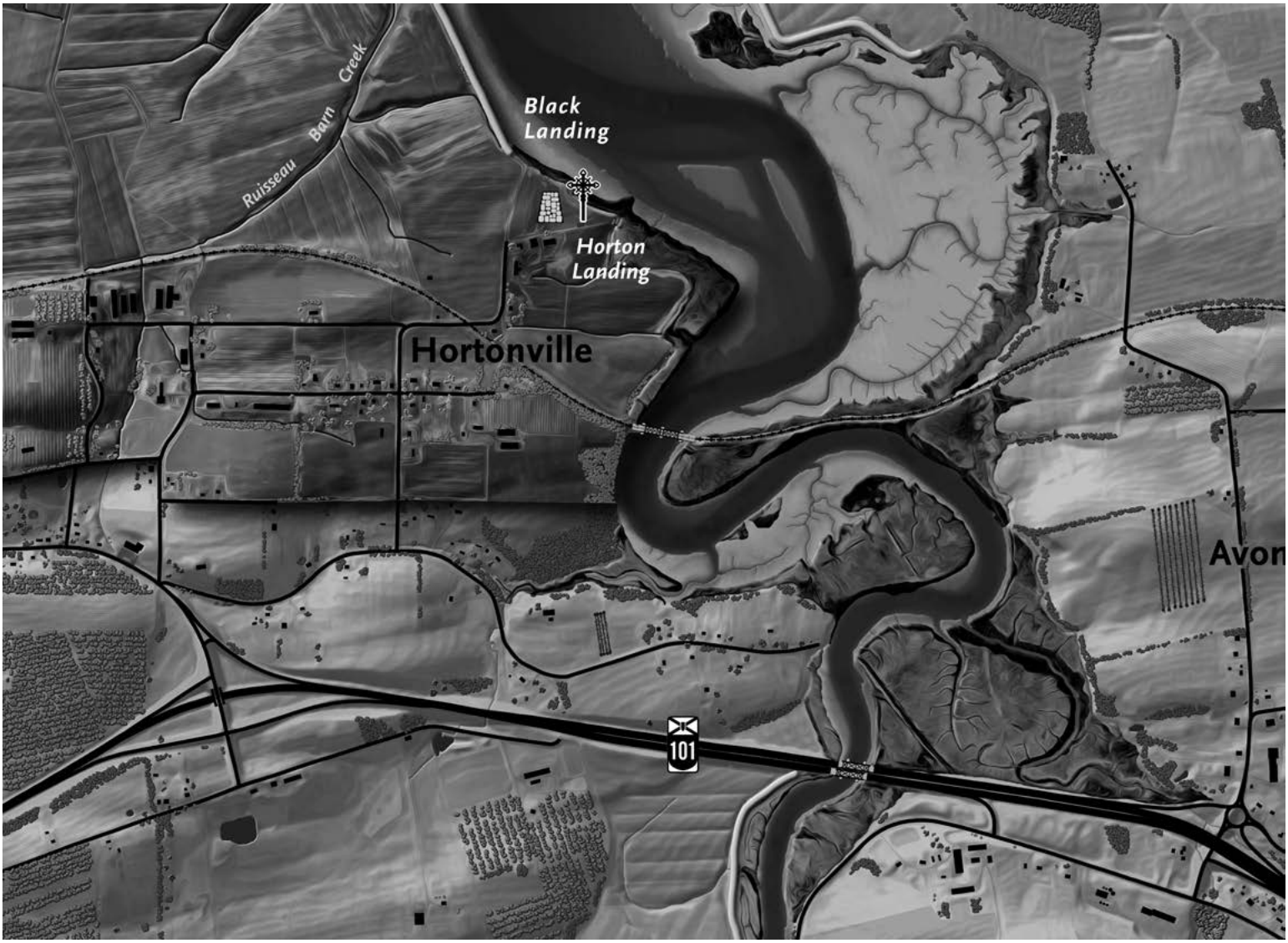
To understand the limitations of the laser etching process, test samples were created, line weights, text sizes and text masks were exaggerated along with contrast/brightness. Preparing the black granite for the big burn took a couple of hours; the slab had to be level and parallel to the laser track. The image burn took over 7 hours and had to be supervised the entire time. If the power went out during the burn the entire process would have to be started over due to the fact that there was no accurate way of realigning the laser with the X, Y start point, the granite would have to be re-polished and the whole process started over. The final table assembly took the better part of the day; the four installers from Heritage Memorials made the whole process look easy.

Grand Pré Harvest Table Completed

Overall the Harvest Table is a great addition to the Grand Pré View Park, apart from the great view it has become a centerpiece for discussion, contemplation and interaction, a cartographic legacy etched in stone.

Facebook video of the laser burn http://bit.ly/2bJLYBO

Facebook drone footage of table http://bit.ly/2bZPgNQ



Grand Pré Harvest Table Greyscale Map - Carography by Marcel Morin (Lost Art Cartography), Grand Pré Nova Scotia

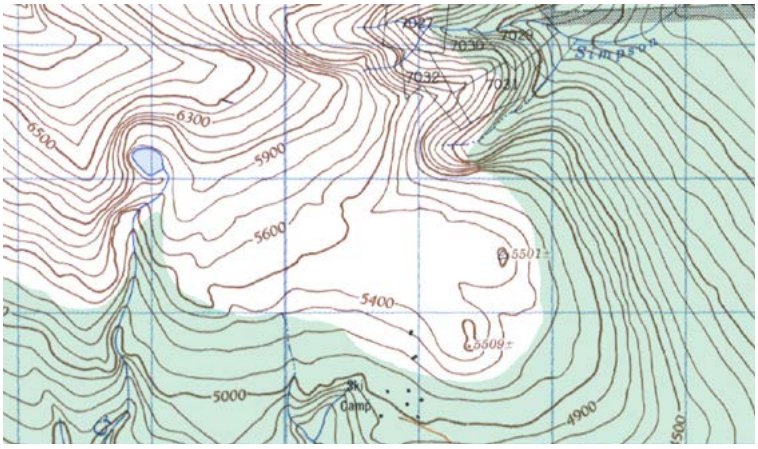
FEATURE ARTICLE
Morgan Hite,
Hesperus Arts, Smithers, BC

Representing Timberline

When I taught map reading in the U.S., there was a piece of folklore that we used to tell our students: that the green areas on the USGS topographic map indicated there was a sufficiently dense forest there that you could hide a platoon of soldiers (about 40 people) per acre. It was a good way to explain why small clumps of trees (or "tree islands") didn't appear on the map.

This story lives on on the Internet, but there's no evidence that it's really true. I like the implied subtext -- cartographers producing the maps for military officers involved in some kind of domestic war, and needing to know where they could hide their men from aircraft –- but it doesn't take much reflection to realize that the U.S. Geological Survey never could have visited all those places, looked at the tree cover, and decided where you could or couldn't hide 40 guys. Or even how to divide it up into suitable one acre blocks.

In Canada, the green area on the topographic maps has a specific definition. According to Natural Resources Canada it's "An area at least 35 per cent covered by perennial vegetation of a minimum height of 2 m." And they probably estimate that 35% coverage from air photos.



Colour NRCan topo

So, when you're ascending a mountain and the green ends on the map, is that *treeline*, or is it *timberline*? I'd always thought these were just variant terms for the same thing, but then I read Jim Pojar's book *Alpine Plants of British Columbia*. In the Introduction to this photo-rich handbook of all the plants you're likely to see up there, I learned that treeline and timberline are different:

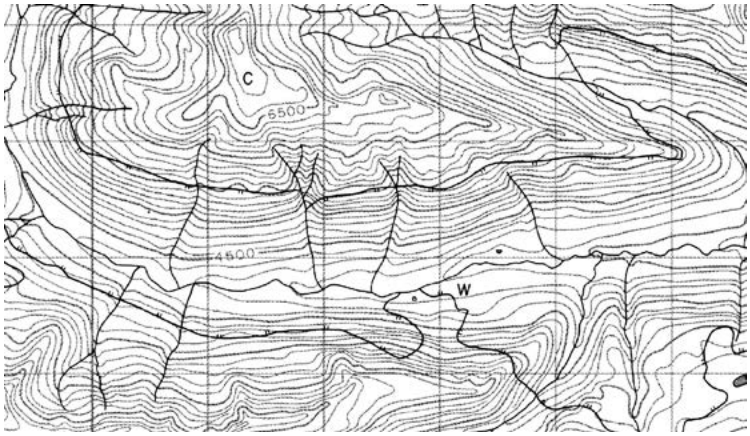
> The term **treeline** designates the upper limit of the occurrence of tree species, regardless of their stature, whereas **timberline** refers to the upper limit of forest, of continuous cover of upright trees 3 m or more in height.

So timberline, being where the solid forest ends, is the end of green on our classic NRCan topos. *Treeline* is the last little, twisted, stunted tree.

Neither, of course, is really a line. As map scale decreases and you zoom in, the timberline becomes impossibly complex, and has to be generalized somehow. And no map, I think it's fair to say, tries to represent treeline, since this would somehow be defined by many isolated clumps of krummholtz ("twisted-wood", the bonzai-like tree clumps also known affectionately as *shintangle*) that you see after ascending past timberline. And just to make things a bit more complicated, as the climate changes it has become easy (in northern BC at least) to find areas above treeline where dozens of tiny seedlings are coming up and now surviving. How big would they have to be before one moves treeline?

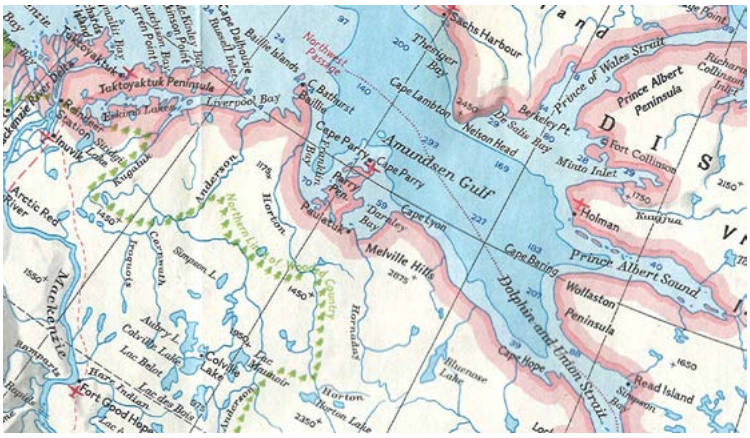
Timberline however is a very important landmark for hikers and skiers, and how to represent it is a question that comes up frequently in topographic mapping. Of course using using generalized green and white is not the only option. I first learned this when I was bushwhacking across a 1:50,000 scale "provisional" series, black-and-white topographic map in northern BC. On these there is actually a *black line* that snakes across the

elevation contours. It has "F" on one side of it (for *forest*) and "C" on the other (for *clear*). It was hard enough to read that I took a pencil crayon and shaded in some green on the F side.



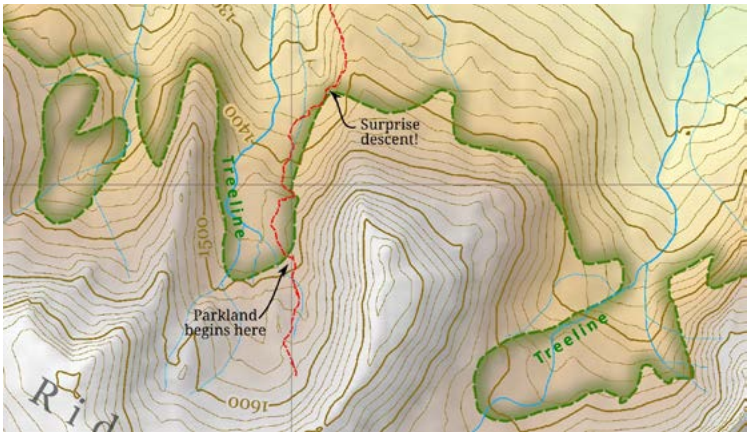
Timberline from a provisional map

There's also the solution that National Geographic used years ago in mapping northern Canada; the *northern limit of trees* is represented by a line of tiny tree symbols.



Old National Geographic map

Sometimes using green is just out of the question. If you want to use a range of colours to represent elevation (hypsographic tinting), having green forest is going to be quite confusing. In these cases I have I tried a technique of having a bold green line at timberline, bordered by some fill on the downhill side, fill that quickly fades out. You can do this in QGIS by using shapeburst fill, fading to transparent over a few millimetres.



McDonell Lake trail map

I have also played around with not marking timberline at all, and just putting a note beside the trail at the point when one would clear the trees.

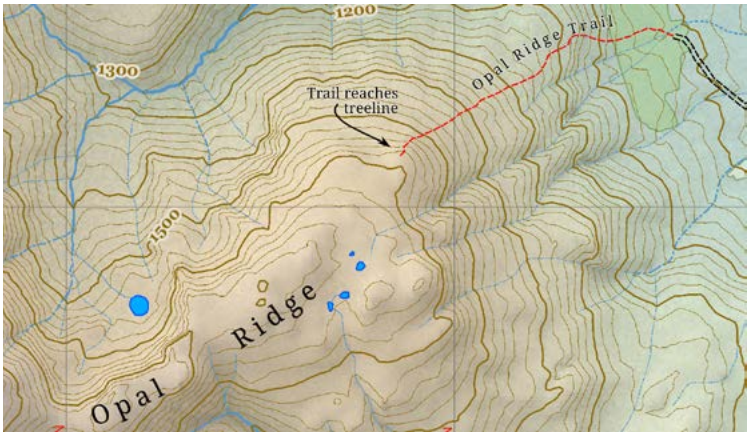


Image from Opal Ridge or Moonlight Mountain map

Another option available to you if you have access to landcover data, is to give map-readers more information about how the forest makes that complicated transition to grassy tundra. In this case I used the *Land Cover, circa 2000-Vector* data available at Geogratis, and assigned progressively lighter colours to "coniferous dense" (which captures the main forest of spruce and fir), "coniferous open" and "broadleaf open" (which captures willow).

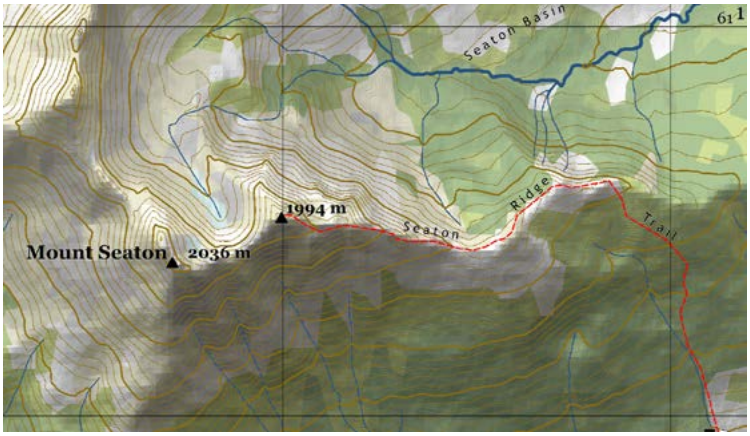


Image from Hankin Lookout or Seaton Ridge map

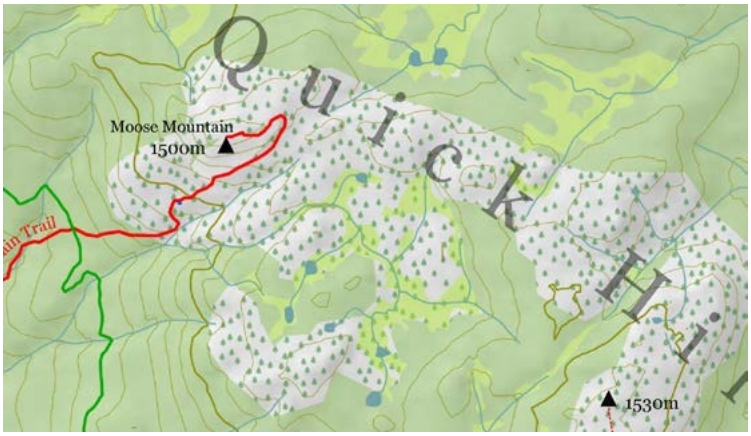


Image from Quick Hills map

If timberline is something you just want to suggest, but don't really need to accurately show, a method that can still look good is to style the digital elevation model in a series of fading greens. Have it become completely white at the elevation where timberline is typically encountered in the area. You get a the effect of the "naked" mountains rising above forested slopes without introducing the complexity of avalanche tracks and the differences in where trees grow between north- and south-facing slopes.

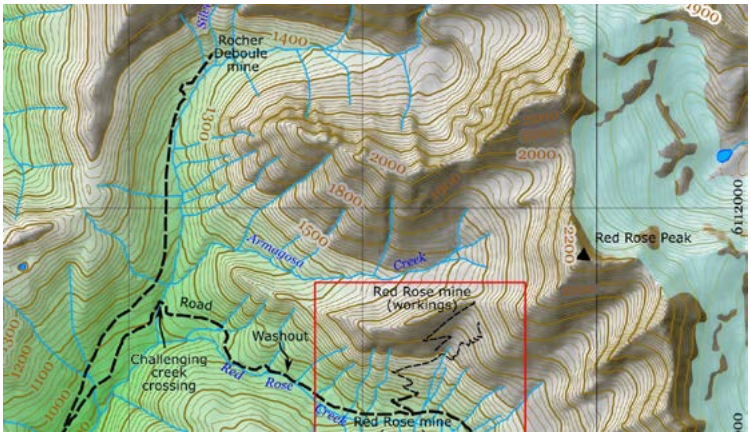
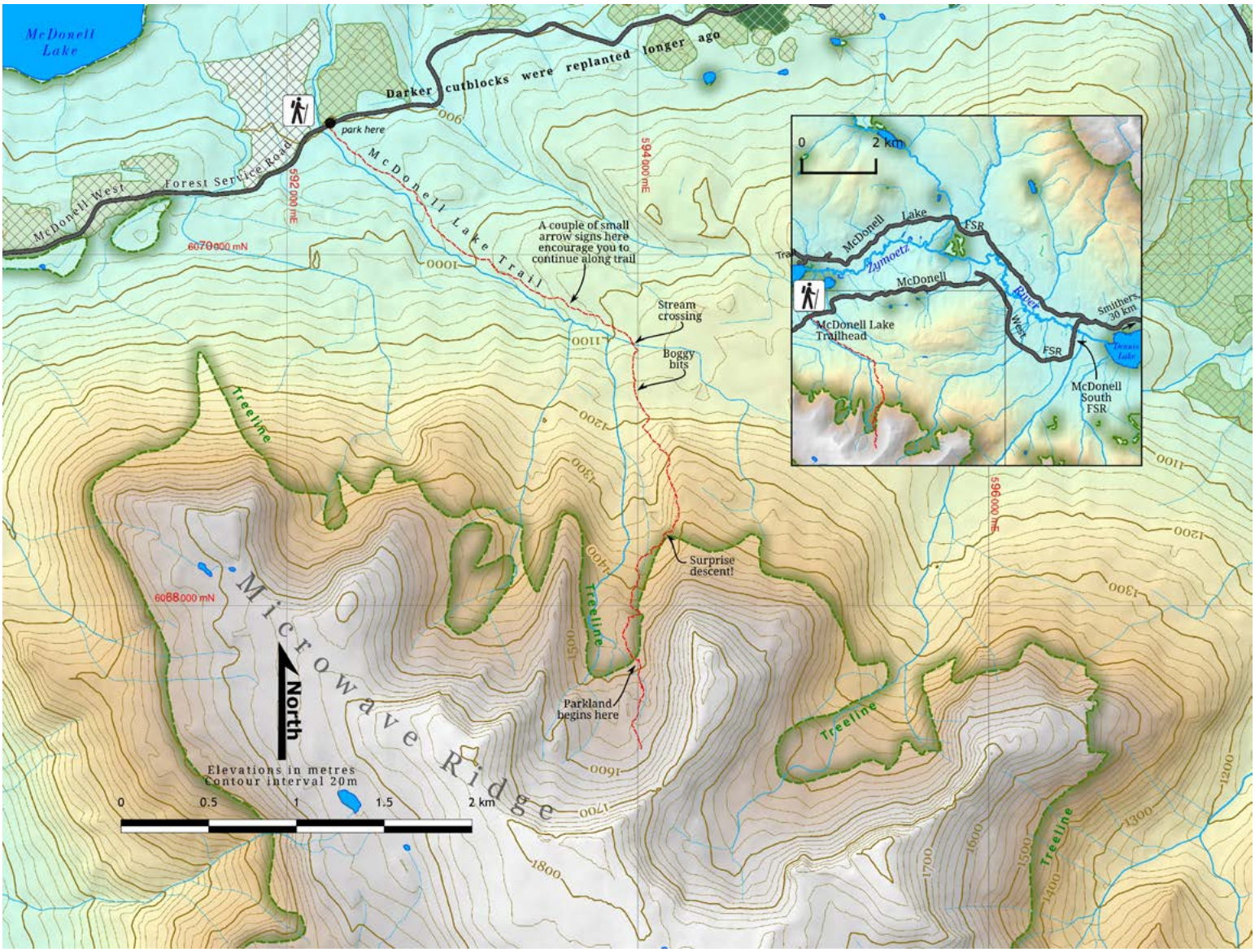


Image from Skilokis Ridge or Red Rose map

Sometimes the highest elevations on the map just touch timberline, in which case there can be a large zone where small meadows alternate with clumps of diminutive trees, an ecology often called *parkland*. I've tried representing this by scattering a host of little tree shapes, sort of trying to show how trees are still there, but not connected to the "mainland" of the forest.

And this is just scratching the surface! The more you study timberline, the more you realize the folly of trying to show it accurately, yet the importance of indicating where we see it!



Representing Timberline
Morgan Hite - Hesperus Arts
morgan@hesperus-wild.org

FEATURE ARTICLE
by Jackie O'Neil
Graduate BGISc, University or Regina

Jackie O'Neil is a recent graduate of the Bachelor of Geographic Information Science (BGISc) program at the University of Regina. A similar version of this article has been presented at the 2016 annual meeting in Winnipeg.

The Accuracy of GIS Data Collection With a Smartphone GPS

Geographic information systems (GIS) are constantly evolving and changing, therefore it makes sense that methods of collecting GIS data should as well. Many new applications are developed to collect spatial data using smartphones and tablets, instead of the traditional way of using a GPS standalone handheld device. Time and money spent on training employees on the use of Global Positioning System (GPS) devices could be saved if the same job could be done with a device that everyone is already familiar with, their smartphone. Additionally, it is common that employers already supply smartphones and data plans to employees.

How are the accuracy, data integrity and overall ease of performance of a smartphone compared to that of standalone GPS units?

EQUIPMENT

To test the GPS capabilities of a smartphone, two popular GPS devices were used to compare the recorded waypoints and tracks (GIS data). The devices used for data collection were an iPhone 5s, a Garmin Rino 650 handheld GPS, and a Trimble Juno SA Series handheld GPS. [1]

The Garmin Rino uses a Wide Area Augmentation System (WAAS) of satellites and ground stations that provide GPS signal corrections for higher accuracy.

The Trimble Juno connects to the WAAS of satellites and ground stations as well and additionally obtains benefits from Differential Corrections by using a reference receiver called a base station, which allows for GPS post-processing (which achieves higher accuracy). Although an iPhone does not connect to the WAAS satellites, it does contain a transmitter to communicate to cellular towers. To determine the location of a smartphone, the cell towers monitor the strength of the sent and received radio signals from the phone to the towers. Essentially a smartphone is an advanced two-way radio. To add to the capabilities of location services, most smartphones have GPS receivers built in.

METHODOLOGY

In order to test the effectiveness of the three GPS devices, and get well-rounded readings, the following four variables were considered:

Canopy: tracks were recorded in a dense forest, where no direct line of sight was available between satellites and GPS antennas, so that the signal was weak.

Figure 1: Recorded measurements taken from open sky, clear sight to satellites

Open-sky: most desired conditions for using GPS devices. Very clear line of sight to satellites.

Moving Performance: using the GPS devices while traveling at 50km/hr. to determine if the tracks collected were affected by the speed of traveling.

Multipath Interference: data was collected walking alongside large buildings so that the signal was reflected and diffracted before arriving at the GPS antenna.

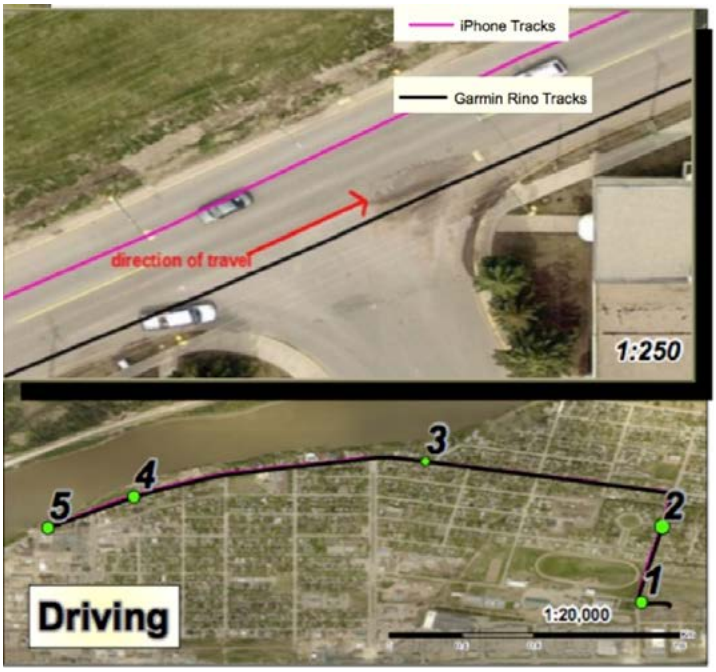


Figure 2: Recorded track measurements from driving, speed variable

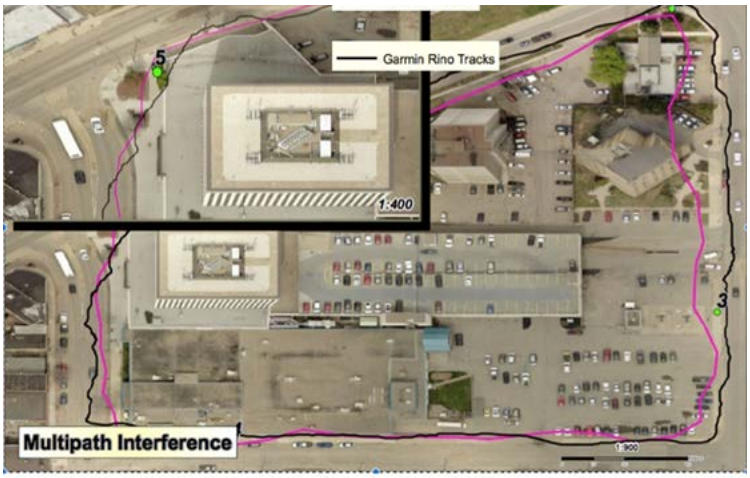


Figure 3: Recorded track measurements from inner city, with multipath interference of satellites

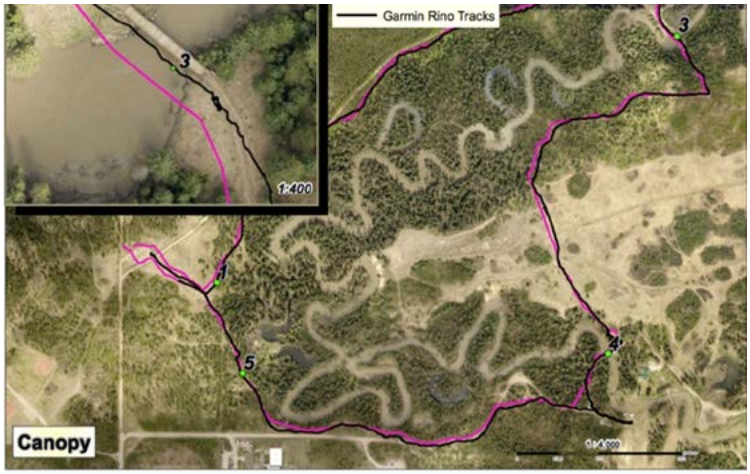


Figure 4- Recorded measurements from a forest canopy, no direct sight of satellites

It was important to record data using as many different conditions as possible to get documentation of errors, in order to see where each device exhibits high and low precision and accuracy readings.

GPS SURVEY PLANNING

Before heading out to collect the data, the Dilution of Precision (DOP) of that date, time and location had to be calculated. This was done to determine the accuracy of the receivers, the number of satellites available and their signal quality. GPS is more accurate at specific hours, and dependent on atmospheric conditions, due to the satellite position and the rate the GPS signals travel through the Earth's atmosphere. See figure 5 for example of DOP application, showing signals are stronger when satellites are directly overhead, versus satellites that are near the horizon.

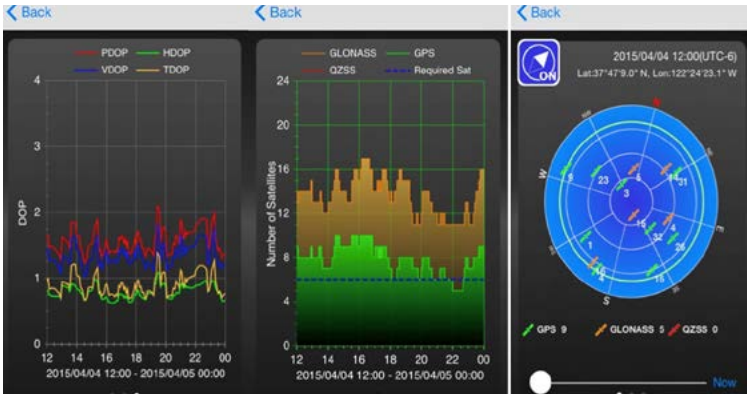


Figure 5: Example of DOP application on the iPhone.

Many free applications are available for the iPhone to calculate and display the total DOP. Including the Position DOP (PDOP, measurement in 3D position), the Horizontal DOP (HDOP, measurement in Latitude and Longitude), Vertical DOP (VDOP, measurements in position and elevation), and the Time DOP (TDOP, measurement in accuracy of time). For each day that the data were collected the DOP ranged between the values of two to four, with any DOP value less than four resulting in a good to excellent reading. Only the iPhone had the application available to measure the DOP, the other standalone devices would have to rely on tablets or other devices to measure the satellite positions . [2]

ERRORS AND CORRECTIONS

The errors that occur within this project and GPS data collection fall into these categories:

Propagation errors: atmospheric conditions (ionosphere, troposphere) - Ionized particles cause the signal to alter its normal path

Single multipath: messy signal that bounces and refracts off objects

Error modeling: mathematical models to predict the errors caused by the atmosphere, angles will determine the length of the signal trip

Satellite/Receiver clocks: noise in the satellite clocks, and inaccuracy of the receiver clock in unison to the satellite clocks
Orbit errors: ephemeris errors will translate into GPS receiver position errors (navigation messages)

Receiver noise: range error to the measurement, or thermal noise

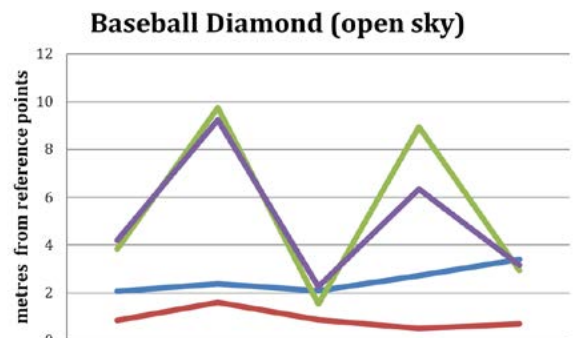
All these errors were corrected with Differential GPS techniques available during post processing using software that was only compatible with the Trimble Juno.

RESULTS

The Saskatchewan Geospatial Imagery Collaborative (FlySask) provides Ortho Imagery with a pixel resolution of 0.6 metre and positional accuracy of 3 metres, which is available free to the public as a web map tile service.

This imagery was used as ground reference points and to measure the distance of the recorded tracks and waypoints taken from all three GPS devices. Measurements were taken from five random points along the tracks being recorded, in each different condition and analyzed using ESRI ArcMap.

The results showed that the Trimble Juno with post corrections had the most accurate results with only +/- 0.9 metres away from the ground reference point, or 2.53 metres off without Differential Corrections, second came the Garmin Rino with averaging +/- 2.49 metres off, and last was the iPhone resulting in +/- 5.19 metres in accuracy . [3] See figure 6 for example of one of the measurement result charts from the open sky variable.



	1	2	3	4	5
Trimble Juno	2.07	2.38	2.08	2.72	3.41
Trimble Juno Post Correction	0.84	1.6	0.88	0.5	0.7
iPhone	3.84	9.75	1.53	8.95	2.94
Garmin	4.2	9.25	2.25	6.35	3.15

Figure 6- Recorded measurement chart, results taken from open sky variable

The iPhone scored the lowest accuracy when all locations and conditions were averaged. But in cases with multipath interference and no direct line of sight to satellites (i.e. indoors), the iPhone had better accuracy combined with precision. This is due to how smartphones not only use satellites to record location, but also access cellular services (i.e. cell towers) regarding the angle the signal reaches the towers, the time it takes the signal to travel to multiple towers, and the strength of the signal when it reaches the towers. Secondly, the GPS is assisted with the operation of a cellular network, combined with Wi-Fi and networking positioning, to create a hybrid approach to an "indoor positioning system" . [4]

The Trimble Juno includes the possibility of using software to export the data in many different GIS and CAD formats using the data collected in a base station. These post corrections changed the results to become 35% more accurate . [5]

Overall, the iPhone was the most effective device to use, regarding the time saved with getting to know the interface of the device. If the iPhone had the capability to network with differential correction software, or connect with the WAAS satellites, then this device and other smartphones could easily replace most GPS units. It really is just a matter of time until the available technology will catch up to demand.

Footnotes

[1] The other two GPS units are used as controls; but more focus was placed on the Trimble as a control due to its known high accuracy
[2] For this study, the date and time of data collected were recorded simultaneously using the measurements from the iPhone application.
[3] All the results are taken from an overall average of five measurements taken from each of the four locations.
[4] An indoor positioning system (IPS): location of objects or people inside a building from the use of numerous of radio waves, magnetic fields, acoustic signals; collected by smartphones.
[5] On average 1.5 to 2 metres more accurate to ground reference points.

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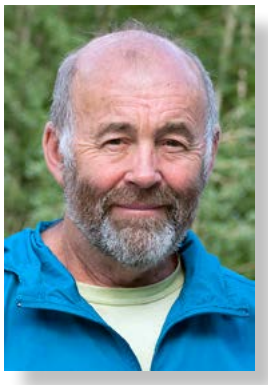
SoC - BCS Conference 2016, Cheltenham UK
Roger Wheate
University of Northern British Columbia



Mapping at the Edge,
6-8 September

This was a joint conference between the British Cartographic Society and the Society of Cartographers . The BCS founded in 1963 is/was largely government/industry based, while the SoC (formerly SUC) was created in 1964 mainly by University cartographic technicians. Both have loyal members, and many joint members, though some question whether two groups are needed and the recent trend to joint meetings is popular. The banquet perhaps highlighted one of the contrasts between the two groups – BCS members showing up in dinner jackets and bow ties, and the odd kilt, while SoC members wore comfortable trews and shirts, as did the one casual canuck colonial.

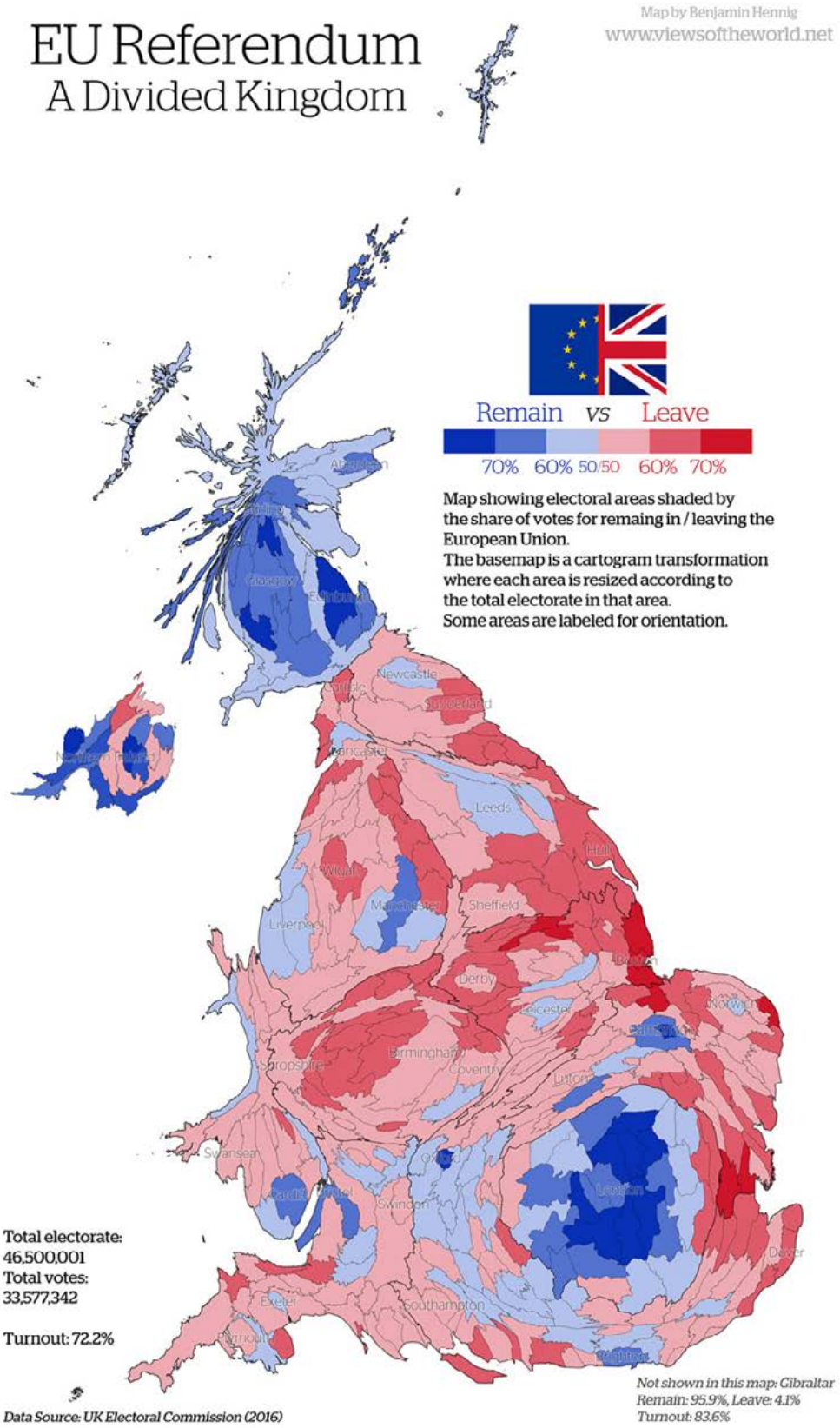
Cheltenham is a great location, at the foot of the Cotswold Hills, and also contains the Government Communications Headquarters – the UK equivalent of the Pentagon, but shaped like a donut .... If I told you any more I'd have to kill you.... https://www.gchq.gov.uk/ The first day featured a full day workshop by Ken Field (esri) on better mapping with ArcGIS, followed by an evening icebreaker and quiz night. I was much embarrassed as a cartographer, not to get the answer to 'the only anagram you can form from the word 'crouton'.

The next two days had five three-paper sessions (I like 3 versus 4) on map tools, mapping on the edge, paper maps, visualisation, and citizen mapping. In between, were three sessions devoted to one hour workshop demonstrations, each with a choice of two options: Adobe clinic: 'a body of knowledge for cartography', introduction to the MapBox toolset: creating hillshading using blender 3D, and 'come to the dArc side': Can an app be a map? One additional session 'Two good, two bad – a Map Critique' by Ken Field and Steve Chilton featured examples of good and bad maps, including 'bad maps' selected by one but made by the other. This session generated the most audience participation and might be an interesting feature at future CCA meetings, along with more in-program workshop demonstrations.

The conference included a sizeable map exhibit for several award categories, along with company exhibits, books and journals. Both groups displayed 50 year special publications for sale commemorating their recent anniversaries. The BCS publication is a book of colour maps, two for each year, where the pair illustrates one event in the UK and one overseas. For example 1963 shows maps of the Beeching railway cuts and the JFK assassination. The SoC book 'Cartography: A Reader' is much larger and features articles reproduced from the Bulletin over six decades. Each decade has a summary by Steve Chilton (SoC chair) or Alex Kent (BSC President). It is a thorough record of the changes that have occurred through the pen and ink -> scribing -> digital eras, and would also make an excellent addition to libraries and cartographer/educators' bookshelves.

You can learn more about either publication on the societies' websites, and you can also contact me if we might want to make a group order across the Atlantic.

The conference details are at: www.mapedge.tk
Roger Wheate, wheate@unbc.ca


EU Referendum
A Divided Kingdom
Map by Benjamin Hennig
www.viewsoftheworld.net
Remain vs Leave
70% 60% 50/50 60% 70%
Map showing electoral areas shaded by the share of votes for remaing in / leaving the European Union.
The basemap is a cartogram transformation where each area is resized according to the total electorate in that area.
Some areas are labeled for orientation.
Aberdeen
Glasgow
Edinburgh
Newcastle
Sunderland
Manchester
Leeds
Hull
Wigan
Manchester
Sheffield
Liverpool
Derby
Leicester
Norwich
Birmingham
Coventry
Luton
Swansea
Oxford
Cardiff
Bristol
Swindon
London
Dover
Exeter
Southampton
Total electorate:
46,500,001
Total votes:
33,577,342
Turnout: 72.2%
Data Source: UK Electoral Commission (2016)
Not shown in this map: Gibraltar
Remain: 95.9%, Leave: 4.1%
Turnout: 83.6%

42nd CCA Conference and Annual General Meeting

Location: Carleton University, Ottawa, ON - River Building
Date: Wednesday, May 31 - Friday, June 2, 2017

This conference will celebrate 150 years of Canada and its maps, organised by the Canadian Cartographic Association (CCA). Anyone interested in maps / cartography is welcome to attend; it is a gathering of practitioners, educators, researchers from public and private sectors and the community at large. Applications range from traditional topographic and thematic mapping to online viewers and applications such as Google Earth / Maps, as well as mobile apps on hand-held devices. Mapping today is for everyone.

Cette conference célébrera les 150 ans du Canada et de ses cartes, organisés par l'Association canadienne de cartographie (ACC). Toute personne intéressée par les cartes / cartographie est invité à y assister ; Il s'agit d'un rassemblement de praticiens, enseignants, chercheurs du public et du secteur privé et la Communauté dans son ensemble. Les applications vont de la cartographie topographique et thématique traditionnelle aux visionneurs en ligne et des applications telles que Google Earth / Maps, ainsi que des applications mobiles sur les dispositifs portatifs. La cartographie est aujourd'hui pour tout le monde.

River Building Carleton University

The conference will be hosted by the Department of Geography and Environmental Studies at Carleton University. Notable events will include a Cartographic display prepared by the Carleton University library, several geomatics/cartographic companies and government agency exhibitors (tentatively ESRI, PCI, DM Solutions Group, NRCan etc) showcasing their mapping products, and various other events and celebrations associated with Canada's 150th anniversary of confederation and Carleton's 75th anniversary as an educational institution. There will be a conference opening reception sponsored by the Department of Geography and Environmental Studies in the River Building Atrium/Patio as well as an evening of celestial viewing on the River Building patio or the Physics Building's observatory if clear skies prevail!

Ottawa is celebrating in grand style with a year's worth of special events.

To help with your Ottawa visit planning, visit:

http://www.ottawa2017.ca/

Carleton University is celebrating its 75th anniversary with special events being held throughout campus all year long. Peruse the various events here:

http://carleton.ca/cu75/events/

See http://cca-acc.org/ for conference details, to be posted shortly.

The CCA and Carleton University look forward to seeing you at CCA 2017 in Ottawa!

Carleton UNIVERSITY
Canada's Capital University

CANADA 150

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Canadian Cartographic Association
l'Association canadienne de cartographie

150

Years of Cartography:
Past, Present & Future

Honorary Member

The CCA were proud and pleased to make the following nomination for honorary member, according to Section 2 in the Constitution, in April 2016.

Section 2 HONORARY MEMBERS. Individuals who have rendered outstanding service in the field of cartography, or other distinguished persons upon whom the Association has conferred honorary membership.

Dr. Clifford H. Wood

Dr. Wood (Cliff) came to Canada in 1977 when he accepted a professorial position at Memorial University of Newfoundland (MUN), and subsequently directed the Cartographic Laboratory. He quickly assumed a leadership role within the CCA, standing as Interest Group Chair, Secretary, and then President in 1985. For the next two decades, the MUN Cartographic Laboratory played a national role in cartographic excellence and he encouraged the staff to also play a leading role in the Association, with one becoming President and another Treasurer.

Following his presidency, Cliff recognised the need for more central organisation within the CCA as membership numbers increased with the growing interest in GIS and mapping, and proposed and then designed the position of Office Manager, which he himself filled for the first two years. In 1993, he was elected President of the Canadian Institute of Surveying and Mapping (CISM), where he oversaw their renaming to the Canadian Institute of Geomatics (CIG). During his presidency, he organised a Memorandum of Understanding with the CCA whereby, the CCA would nominate the Canadian delegate to the International Cartographic Association, upon approval by the CIG, for whom the delegate would also fill the position of Technical Councillor for Cartography. After his term as President and Past-President, Cliff was elected to this position. Canada hosted the International Cartographic Association (ICA) Congress in Ottawa in 1999, where Cliff was co-chair. The ICA awarded him a special medal in appreciation for the quality of the meeting. ICA attendees still remark on that 1999 meeting as being the best ever.

In 2006, Cliff boldly went where no CCA past-president had gone before and ran for a second term as president. His experience and guiding hand was much appreciated by the younger executive for those three years (VP, President, past-president). In 2008, when the elected VP was unable to take the presidency the next year, Cliff filled the position again, for his third term. We can safely say that this record will never be equalled.
Cliff's breadth of achievements and service to Cartography and the Association made him a clear choice for nomination for Honorary Member in the CCA. Indeed, this was long overdue ...

Sadly, Cliff passed away only six months later; part of his obituary is reprinted on the following page:

By Roger Wheate
University of Northern British Columbia

Clifford Harlow Wood

April 15, 1940 – September 15, 2016

Passed away peacefully at Middlesex Terrace in Middlesex Centre, Ontario, on 15 September 2016 at 76 years and 5 months old. Loving husband of Alberta G. Auringer Wood.

Clifford graduated from the University of Idaho in 1968 (B.S.) and 1972 (M.S.) and the University of Wisconsin in 1992 (PhD) all in geography. He served in the US Air Force from 1963 to 1966, primarily as a weather observer at the Aviano Air Base in Italy. His career post-military and university focused on maps, including as a cartographer for the U.S. Federal Government from 1968-1970 and from 1977 to retirement in 2005 in the Department of Geography of Memorial University of Newfoundland teaching cartography and map design. He participated in professional cartographic associations, especially the Canadian Cartographic Association (CCA) where he served three terms as President, as well as in other capacities. He wrote or edited articles and books in the field of cartography. He received a distinguished service award from the CCA and in April 2016, he was made an Honorary Member of the CCA.

Memorial Donations in Clifford Harlow Wood's name may be made to the St. Joseph's Health Care Foundation (550 Wellington Road, Parkwood Institute, Main Building, Room B2-147, London, ON, N6C 0A7) 519-646-6085 (Please make cheques/checks payable to St. Joseph's Health Care Foundation and note that you would like the donation to be directed to the Centre for Cognitive Vitality & Brain Health in memory of Clifford Harlow Wood) Donations may also be made online at: https://www.sjhcfoundation.org/donate/dedication

Memorials were held for Cliff on October 27 in Ilderton, Ontario, and on November 10 in Meridian, Idaho, thus spanning two countries as did his career. From a personal perspective, Cliff was both the face and for me anyway, the father figure for the CCA since I first joined the executive in the mid-1980s. He was always the first to congratulate me on each issue I published as the newsletter editor (before it was renamed Cartouche), and was generally concerned with everyone's wellbeing. He was president both in the start of the GIS era, and later consolidation. I was fortunate to follow in his steps, as CCA Manager and CIG Technical Councillor for Cartography, both positions he himself created. He will be much missed, but will live on in the inspiration of those who knew him.

Roger Wheate

Donna Williams

May 11, 1961 – April 6, 2016

On behalf of the **Canadian Cartographic Association**, I would like to share a moment of reflection on the life and contributions of **Donna Williams**, who passed away on April 6th 2016. Donna was a long-time member of both the CCA and the Canadian Association of Geographers (CAG) where she was very active in all capacities in support of the subjects she loved – geography and mapping. Her career was almost entirely served working for the previously named Department of Energy, Mines and Resources and then Natural Resources Canada. It was her love of maps that steered her towards work on the 5th and 6th editions of the Atlas of Canada. As the Program Manager for the Atlas of Canada for several years, and through her leadership in rethinking the design and delivery of the Atlas, she promoted the advantages of new online techniques, which resulted in an innovative online Atlas as a tool for Canadians. She was so influenced by the many applications of geographic information that she integrated her own life experiences with her academic pursuits which led to her most recent research on the spatial and temporal impacts of competitive youth sports on family dynamics. Due to the numerous contributions she made to the discipline of mapping and geography, she received the National Award for Geography in the Service of Government or Business in 2012, presented to her by the CAG.

Her husband and CCA/CAG member, Bill Crumplin, has been able to work with Health Sciences North to establish a fund in her memory, an idea which stemmed from her own wishes to support the hospital to ensure that future patients would have the necessary medical care which may indeed have supported her health at the time of her illness. The "Donna Williams MRI Fund" can be found on the Health Sciences North Foundation website, www.hsnfoundation.com.

Donna was a dedicated CAG/CCA member, a dynamic co-worker, an academic, an artist, a volunteer for many causes, a mother of three wonderful children, the soulmate and much loved wife of Bill Crumplin and my best friend. She continues to be missed by us all.

Anna Jasiak

Canadian Cartographic Association
Association canadienne de cartographie

Awards, Prizes and Scholarships Entry Form 2017

The Canadian Cartographic Association would like to draw your attention to this year's student mapping competitions

The President's Prize

The CCA President's Prize recognizes excellence in student map design and production and is open to all post-secondary students who have completed and produced a cartographic project in the preceding school year. The year's President's Prize Competition will consist of two prizes of $250, one for entries from college-level or CEGEP students, and one for entries from university-level students in the thematic map category:

> A thematic map is a map that is meant to communicate a specific single subject matter within a particular geographic area. They are often defined as special purpose maps and can be either quantitative or qualitative in nature. The International Cartographic Association (ICA) defines the thematic map this way: "A map designed to demonstrate particular features or concepts. In conventional use this term excludes topographic maps" (Dent 1999, 8).

The Carto-Québec Prize

The Carto-Quebec prize is a special annual competition for the best student-authored cartographic product created in French. The award has been established through a gift from the former Association Carto-Québec to promote and recognize excellence in map design. The competition is open to all post-secondary students in Canada who have completed and produced a cartographic project in the preceding school year. The Carto-Québec Prize will consist of two awards of $500, one for entries from college-level or CEGEP students, and one for entries from university-level students.

Entry Guidelines

The cartographic project will consist of a single map. There are no restrictions on size but the project must have been completed and produced during the school year preceding the competition. Cartographic projects will consist of a map or a map series forming a coherent whole and may be submitted in any finished form (on paper or other medium). Entries submitted in electronic media, whether GIS or internet mapping applications, should not require specialized software for viewing. There are no restrictions on the size of the map project or subject but the project must have been completed and produced during the school year preceding the competition. The Carto-Quebec prize must be in French.

Each entry must be accompanied by a clear and succinct statement of design objectives that will weigh heavily in the judges' decision. In addition, entries will be judged on the basis of creativity and overall effectiveness in communication as well as excellence in compilation, design, and layout.

Entries for 2017 are invited from all Canadian post-secondary students. An official entry form found on the next page must accompany all entries received.

Note: For both competitions, all students enrolled at a Canadian university or college are eligible to submit their maps made in the 2016/17 academic year. Deadline for submission is May 19 2017.

2017 Student Mapping Competitions Entry Form

Award

❑ President's Prize/Prix du Presidént ❑ Carto-Quebec Prize/Prix Carto Québec

Entrant's Name	
Map Title	
Permanent Mailing Address	
Telephone Number	
E-mail	

Post secondary Category

❑ College or CEGEP Year or Level: ❑1 ❑2 ❑3 ❑4 ❑5

❑ University

Instructor's Name	
Course Number	
Institution	

In a clear and concise manner in no more than one double spaced typed page, state the design objectives of your project and provide a rationale for your design choices. In order to be eligible, this form along with your design objectives (see above) must be submitted with your printed map as well as a digital copy of your map (or link to your electronic map). Entries must be received no later than May 26, 2017.

Send this entry form, your design objectives and printed map to

CCA President's Prize or Carto-Quebec Prize
c/o Secretary, Canadian Cartographic Association
Claire Gosson
38 Ridgeburn Gate
Ottawa ON K1B 4C3

Send your digital file to

secretary@cca-acc.org

Canadian Cartographic Association (CCA)
L'Association Canadienne de Cartographie (ACC)

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Renouvellement d'adhesion 2017

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☐ Education
Éducation

☐ Design and Geovisualization
Cartographie analytique et conception

Please Return to / Veuillez expédier à:

Byron Moldofsky
177 Brookdale Avenue
Toronto, ON
M5M 1P4

Tel / Tél: (416)978-3378
treasurer@cca-acc.org

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