

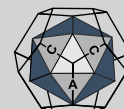
# COMMUNITY MAPPING: PLACE-MAKING THROUGH MAPS

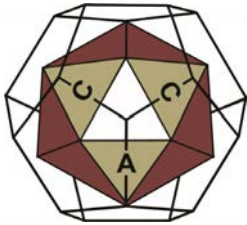
43rd Annual Canadian Cartographic Association Conference

NSCC - CENTRE OF GEOGRAPHIC SCIENCES | 50 Elliott Road - Lawrencetown, Nova Scotia

COGS | **nscc**

May 30 – June 2, 2018





Canadian Cartographic  
Association

[www.cca-acc.org](http://www.cca-acc.org)

## CCA 2018

## Welcome to COGS

### Welcome from the President of the CCA

On behalf of the executive committee of the Canadian Cartographic Association, I am pleased to welcome all new and existing CCA members, industry partners, and students to our annual meeting. The CCA is thankful to the Centre of Geographic Sciences (COGS) in Lawrencetown, Nova Scotia, for hosting the 43<sup>rd</sup> meeting of the association. This year's conference will be focused on **'Community Mapping: Place-Making Through Maps'**. I would like to extend special thanks to Monica Lloyd and her team at COGS for organizing the conference, including putting together the program, practical workshops, and social events.

All conference attendees are invited to a complimentary icebreaker reception at Lunn's Mill Beer Co. on May 30 from 4:30 to 6:00 pm. Other social events during the four-day conference include the not-to-be-missed orienteering event (May 31, from 5:00 to 6:00 pm) followed by the banquet at Temple on Queen in Bridgetown (May 31, from 6:00 to 11:00 pm), and various walks and talks in the Annapolis Valley area on Saturday (June 2). Among many presentations, the conference will feature three keynote presentations, starting with 'Fake maps! The cartography of elections' by Kenneth Field on Wednesday, May 30, followed by 'Place, maps, and GIS' by Michael Goodchild on Thursday, May 31. Marcel Morin will offer the third keynote presentation on Friday, June 1.

This year's conference will also include two workshops on ArcGIS Pro and ArcGIS Maps for Adobe Creative Cloud, respectively. Both workshops are scheduled for Wednesday, May 30.

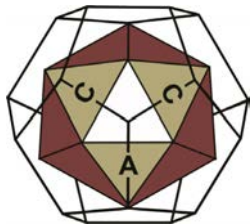
The Annual General Meeting of the CCA is scheduled for Friday, June 1 from 12:30 to 2:00 pm. Please consider attending as we rely on your knowledge, input, and participation for a successful meeting and the future of the CCA.

Enjoy the conference and please feel free to share your experiences with myself or with incoming President Monica Lloyd.

Julia Siemer

*President, CCA  
Canadian Cartographic Association*





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## CCA 2018

## Welcome from CCA

The 43<sup>rd</sup> Annual Conference of the Canadian Cartographic Association has been two years in the making. When the Centre of Geographic Sciences (COGS) was first offered up as a location to hold this conference, it was uncertain that anyone would want to come to rural Nova Scotia to talk about mapping. But in conversations with cartographers across the country, it became evident that people want to visit this small technical community college, just to see what it is all about.

COGS alumni can be found across Canada and beyond working not only as cartographers but in all aspects of the Geomatics industry. Our reputation carried by the successes of its graduates is that of hard working individuals who are well prepared to take on any challenge. Our cartography graduates have moved on to great adventures in making award-winning published maps, writing books, volunteering in our communities, teaching, and even developing applications to make beautiful maps.

The 2018 theme **‘Community Mapping: Place Making Through Maps’** comes from the idea that COGS is known for providing mapping work for our local communities. You will hear from our MapANNAPOLIS community group which brings together students, locals, and stories into one community mapping repository. This project helps to improve our quality of life by understanding and learning about place.

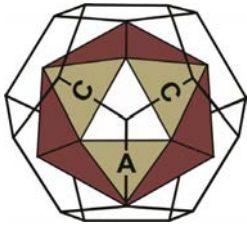
We will also highlight different views of the landscape: Mi’kma’ki, Acadien and today (UNESCO Biosphere Reserve). As you look around at the map displays, take note of the various maps created to help increase our local prosperity and to capture the rich history this area has to offer. We will enjoy the special map collection donated by cartographer and former faculty Walter K. Morrison. We also have in attendance this week several generations of COGS cartography faculty – John Wightman, John Belbin, David Raymond, Ada Cheung and taking up the torch Piers Churchill, Monica Lloyd and Martha Bostwick. Let’s join together to tell stories from the past and look forward to the future of cartography. I invite you to share your thoughts on cartography, technology and community mapping on our Ideas Wall throughout the week.

On behalf of the faculty and staff of the Nova Scotia Community College’s Centre of Geographic Sciences we welcome you to our campus. Enjoy the conference, social activities we have planned for you, and take time to explore the beautiful Annapolis Valley.

Monica Lloyd

*Conference Coordinator &  
Vice President,  
Canadian Cartographic Association*





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## CCA 2018

Many Thanks!

### Thank-you from the Organizing Committee

Taking on organizing this conference was much like preparing for three days of teaching classes at COGS. It required careful thought and planning, networking, and asking for help.

I would like to take this opportunity to thank the Canadian Cartographic Association executive for their guidance and pointers while planning this conference. I would encourage you all to get involved with associations such as the CCA. You will learn so much and your involvement will challenge you to learn new things and will help to grow the association.

#### CCA Executive

Julia Siemer, Byron Moldofsky, Roger Wheate, Claire Gosson, Christopher Storie

This would not be possible without the guidance & assistance from my colleague Martha Bostwick who has a wealth of experience volunteering with the North American Cartographic Information Society (NACIS). Martha along with my COGS organizing committee have been so supportive in taking on many tasks to make this conference happen. A special shout out to Bob Maher for his encouragement to pursue those “big ideas” and for helping pull together our conference theme, promotion, and blogging for this event.

#### COGS Organizing Committee

Bob Maher, Martha Bostwick, Piers Churchill, Trish LeBlanc, Monica Rivers, Marcel Morin, Ada Cheung, David Raymond, Myra MacLean

#### Student Volunteers

Johnny Eaton (GeoTrivia), Tanner Kaunisviita (GeoTrivia & Poster), Breanna Parks (Orienteering Map & Registraion)

#### Workshop Facilitators

Edie Punt, Clint Loveman; Esri Inc.

#### Keynote Speakers

Thank-you for taking time out of your busy schedules to be here.

Dr. Kenneth Field,  
Dr. Michael Goodchild,  
Marcel Morin

Thank-you to all our conference presenters. It is with your contributions that we have such a diverse conference.

#### Centre of Geographic Sciences

Wayne St-Amour, AVC Principal; Michael Purcell, Academic Chair COGS; Cathy Mailman; Patti Hung, Catering; Trish Leblanc, Campus Librarian; Natalie Catto, Campus Librarian; Andrew Hannam, Library Technician; David MacLean, Faculty; Doug Crowell, IT Service; Nathan Langille & the facilities staff.

#### NSCC Applied Research

Applied Geomatics Research Group (AGRG)  
Environment and Agriculture Technology Lab

#### Special Thanks to our Sponsors

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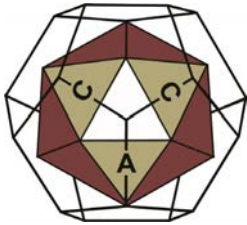
#### Center for Advanced Numerical Mapping Applications (CANMAP)

 Centre of Geographic Sciences  
COGS | NSCC

#### Conference Swag:

Esri Press, Avenza, Grand-Pré Trails Society, Valley Regional Enterprise Network (ValleyREN), Winery Association of NS, Annapolis County, GeoNOVA, NSCC, NSCC Alumni, NSCC Make Way

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**CCA 2018**

Conference Proceedings

## Day 1: Carto Tech Day: Wednesday, May 30<sup>th</sup>

**08:00 – 08:45**

Registration Opens

**08:45 – 09:00**

Welcome address: CCA President, Conference Chair, Principal, Academic Chair,

**09:00 – 09:45**

**Keynote 1: Dr. Kenneth Field, Esri Inc.: Fake maps! The cartography of elections**



**09:45 – 10:00**

**Break**

**10:00 – 11:00**

**Presentations**

Talk 1: Kevin McGuigan, AGRG: Coastal Mapping

Talk 2: Claus Rinner, Ryerson: Applications of 3D Printing In Physical Geography  
Education and Urban Visualization

Talk 3: Nathan Crowell, AGRG: 3D Mapping & Visualization

**11:00 – 11:15**

**Break**

**11:15 – 12:00**

Talk 4: Jeff McKenna, Gateway Geomatics: OsGeo & Google Code-In

**12:00– 13:00**

**Lunch - Cafeteria open**

**13:00 – 14:30**

**Workshop Sessions - see ticket in name tag for times**

Edie Punt, Clint Loveman, Esri Inc.: ArcGIS Pro / ArcGIS Maps for Adobe Creative Cloud;  
W.K. Morrison Special Collection Tour with Trish LeBlanc

**14:30 – 14:45**

**Break**

**14:45 – 16:15**

Workshops Edie Punt, Clint Loveman, Esri Inc.: ArcGIS Pro / ArcGIS Maps for Adobe  
Creative Cloud; W.K. Morrison Special Collection Tour with Trish LeBlanc

**16:15 – 16:30**

*Day 1 Wrap-up*

**16:30 – 18:00**

Scoiables & GeoTrivia: Lunn's Mill Beer Co. sponsored by  **esri** Canada

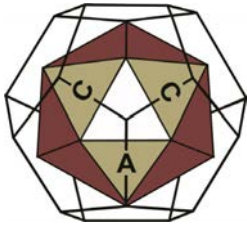
**18:00 – 19:30**

Lobster Dinner: Port George Community Hall, Port George

**19:30 – 22:00**

Geology talk, sunset walk, beach bonfire, Cape and Sand Beach, Port George





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**08:15 – 08:45**

Registration Opens

**08:45 – 09:00**

Good Morning & Welcome

**09:00 – 09:45**

**Keynote 2: Dr. Michael Goodchild: PLACE, MAPS, AND GIS**  **esri** Canada

**09:45 – 10:00**

**Break**

**10:00 – 11:00**

**Presentations**

Talk 5: Bob Maher & Ed Wedler: Conversations on Map Geography

Talk 6: Monica Beaton, Municipality of the County of Kings: Cartographic Tools for Public Engagement

Talk 7: Daniel Brendle-Moczuk, UVic: Well beyond the beach: Plastics pollution and web maps as a form of community engagement

Talk 8: Paul Heersink, Esri Canada: Esri's Community Maps Program

**11:00 – 11:15**

**Break**

**11:15 – 12:30**

Talk 9: Ed Symons, Heather LeBlanc, Monica Rivers, MapANNAPOLIS: Community Mapping in Annapolis County

Talk 10: MapANNAPOLIS: Garrison Graveyard Community Map

Talk 11: Ben Symons, Student, MapANNAPOLIS: The Honour Roll: Mapping the Nova Scotia Overseas Highland Brigade's Fallen & Wounded, WWI

Talk 12: Philip Bailey, CartographMe: An artistic approach to place making

**12:30 – 13:30**

**Lunch - Cafeteria open**

**13:30 – 14:45**

Talk 13: Claudio Aporta, Dalhousie University: Inuit mobility: Reflections on building a Pan-Arctic Map of trails

Talk 14: Susan Kingdon & Monica Wachowicz, UNB: Unveiling tourist experiences through cognitive mapping and the Explorer Quotient

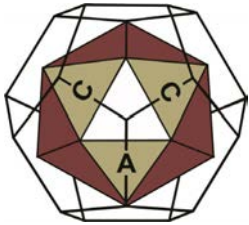
Talk 15: Johnny Eaton, Student COGS: The Cartographer's Way: Practical Paths To Geographic Creativity

Talk 16: Dr. Konrad Dramowicz, COGS: Mapping Internet Tabular Data

**14:45 – 15:00**

**Break**





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**CCA 2018**

Conference Proceedings

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**Day 2: Thursday, May 31<sup>st</sup> - continued**

**15:00 – 16:15**

Talk 17: Ian Spooner, Acadia: A Biography of Robert Bell: On the Trail of the Great Stone Chief

Talk 18: Candace MacDonald, AGRG: Applying LiDAR and GIS in the Search for Lunenburg's 18th and 19th Century Fortifications

Talk 20: Monica Lloyd, Faculty COGS: Orienteering Mapping Project Using Esri Applications

**16:15 – 16:30**

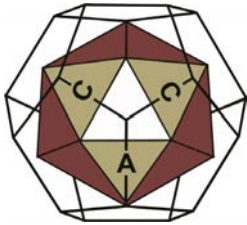
*Day 2 Wrap-up*

**17:00 – 18:00**

Orienteering Event Bridgetown

**18:00 – 22:00**

Pecha Kucha, Dinner & Entertainment: Temple on Queen, Bridgetown



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**08:15 – 08:45**

**08:45 – 09:00**

**09:00 – 09:45**

**09:45 – 10:00**

**10:00 – 11:00**

**11:00 – 11:15**

**11:15 – 12:30**

**12:30 – 14:00**

## CCA 2018

## Conference Proceedings

### Day 3: Friday, June 1<sup>st</sup>

Registration Opens  
Good Morning & Welcome

**Keynote 3: Marcel Morin: GIS, Adobe and Creative Cartographic Design**



**Break**

#### **Presentations**

Talk 21: Scott Emmons, UNBC: First Nations Web Application Portal  
Talk 22: Thomas Herbreteau: Wolastoqey Nation in New Brunswick  
Talk 23: Tim Bernard, Confederacy of Mainland Mi'kmaq: Ta'n Weji-sqalia'tiek: Mi'kmaw Place Names Digital Atlas and Web Site  
Talk 24: Melanie MacDonald, Student Ryerson: Geovisualizing "Informality" using OpenStreetMap (OSM) & Esri's Story Maps

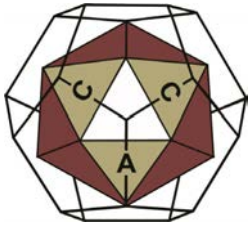
**Break**

Talk 25: Anatolijs Venovcevs, Town of Happy Valley-Goose Bay: Mapping for Community, the Making of a Digital Place: First Municipal GIS in Labrador  
Talk 26: James Bornemann, Southeast Regional Service Commission: Mapping Natural Assets in Southeast New Brunswick  
Talk 27: Ian Holmes, GeoNOVA: GeoPDFs  
Talk 28: Sylvain Gagnon, TomTom: Regional Mapping with GIS in Today's World

**Lunch & CCA Annual General Meeting - Room 120**







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**Day 3: Friday, June 1<sup>st</sup> - continued**

**14:00 – 15:15**

Talk 29: Ian Manning, NSCC Applied Research: Southwest Nova Biosphere Reserve (SNBR) Interactive Science Atlas

Talk 30: Chris Storie, UWinnipeg: Deep Learning and Map Production: From Raw Data to 'Finished' Product

Talk 31: Joni Storie, UWinnipeg: Time series Sentinel-1 SAR Analysis for Forest Structure and Biomass Detection

Talk 32: David Colville, COGS: Mapping the ever-changing landscapes of Sable Island, Nova Scotia

Talk 33: Roger Wheate, UNBC: Cold as Ice / Glacier mapping in Canada from space and LiDAR

**15:15 – 15:30**

**Break**

**15:30 – 16:15**

Talk 34: Jim Todd, TODD Graphic: Maps and Processes using QGIS and Graphics Applications

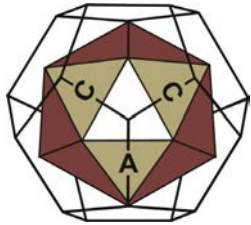
Talk 35: Byron Moldofsky, BMMaps GIS and Cartographic Consulting: Lives in Motion: How mapping migration in Southern Ontario between 1861 and 1871 can help us understand the nature of settler society.

Talk 36: Paul Illsley, NSCC Applied Research: Introduction to Close Range Terrestrial Photogrammetry

**16:15 – 16:30**

*Day 3 Wrap-up Conference Official Closing*

*Open Evening*



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# CCA 2018 Saturday, June 2nd Events & Opportunities

## Saturday Morning Tour Map

It is CCA tradition to take at least one field trip during the conference. This year, we will explore points of interest in Grand-Pré. Tour stops can be seen below on the map created by Marcel Morin (Lost Art Cartography). Detailed descriptions of each location can be found in the pages to follow as well as links to help you plan your afternoon.



**10:15 – 10:30 am**

**1. The Guzzle - Dr. Roy Bishop**

**10:30 – 10:45 am**

**2. New England Planter Home Tour  
The Jeremiah Calkin House circa 1768**

**10:45 – 11:00 am**

**3. View Park, Grand-Pré**

**11:00 – 11:30 am**

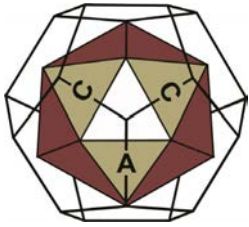
**4. Hike Harvest Moon Trail Grand-Pré to Wolfville**

**11:30 am – 1:00 pm**

**5. Lunch at Troy, Wolfville**

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*Please note there is no organized transportation for the morning tour.  
Lunch is optional and not covered by CCA conference registration.*



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# CCA 2018 Saturday, June 2nd Events & Opportunities

**10:15 – 10:30 am**  
**I. The Guzzle**

Dr. Roy Bishop, world renowned astronomer and tidal expert, will discuss the Fundy tides & this intricate ecosystem.

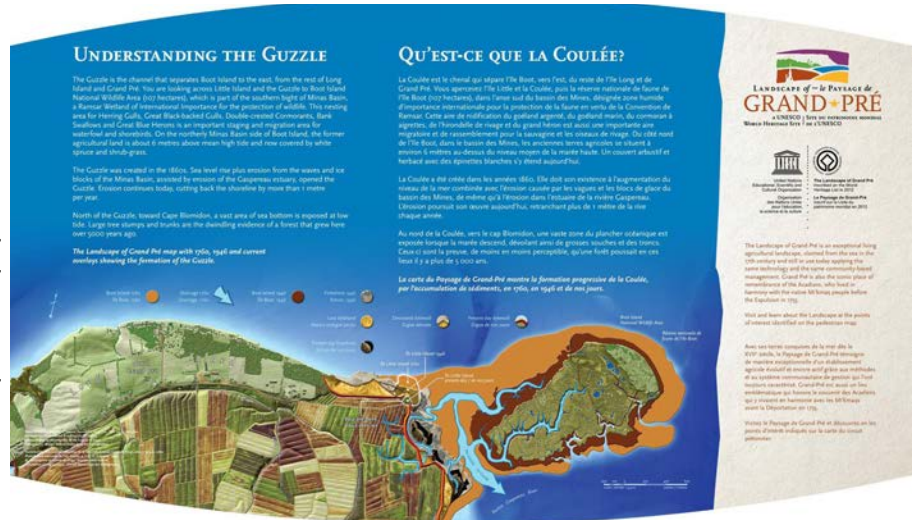
The Guzzle is the channel that separates Boot Island to the east from the rest of Long Island and Grand-Pré. You are looking across Little Island and the Guzzle to Boot Island National Wildlife Area (107 hectares), which is part of the southern bight of Minas Basin, a Ramsar Wetland of International Importance for the protection of wildlife. This nesting area for Herring Gulls, Great Black-backed Gulls, Double-crested Cormorants, Bank Swallows and Great Blue Herons is an important staging and migration area for waterfowl and

shorebirds. On the northerly Minas Basin side of Boot Island, the former agricultural land is about 6 metres above mean high tide and now covered by white spruce and shrub-grass.

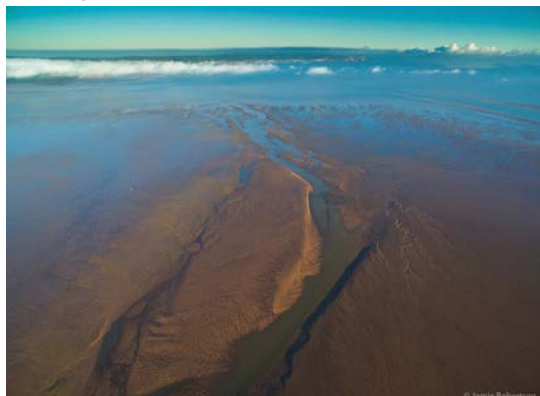
The Guzzle was created in the 1860s. Sea level rise plus erosion from the waves and ice blocks of the Minas Basin, assisted by erosion of the Gaspereau estuary, opened the Guzzle. Erosion continues today, cutting back the shoreline by more than 1 metre per year.

North of the Guzzle, toward Cape Blomidon, a vast area of sea bottom is exposed at low tide. Large tree stumps and trunks are the dwindling evidence of a forest that grew here over 5000 years ago.

Interpretive Display: Marcel Morin



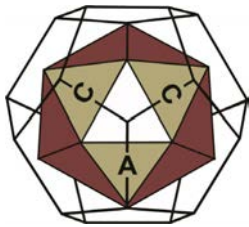
Photos: Jamie Robertson



The Guzzle - low tide



Boot Island - low tide



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# CCA 2018 Saturday, June 2nd Events & Opportunities

## 10:30 – 10:45 am 2. New England Planter Home Tour The Jeremiah Calkin House circa 1768

Tour Angela & Marcel Morin’s restored 18th century home. Hear about how the New England Planters settled in this area and how previous owners had a special connection to Boot Island.

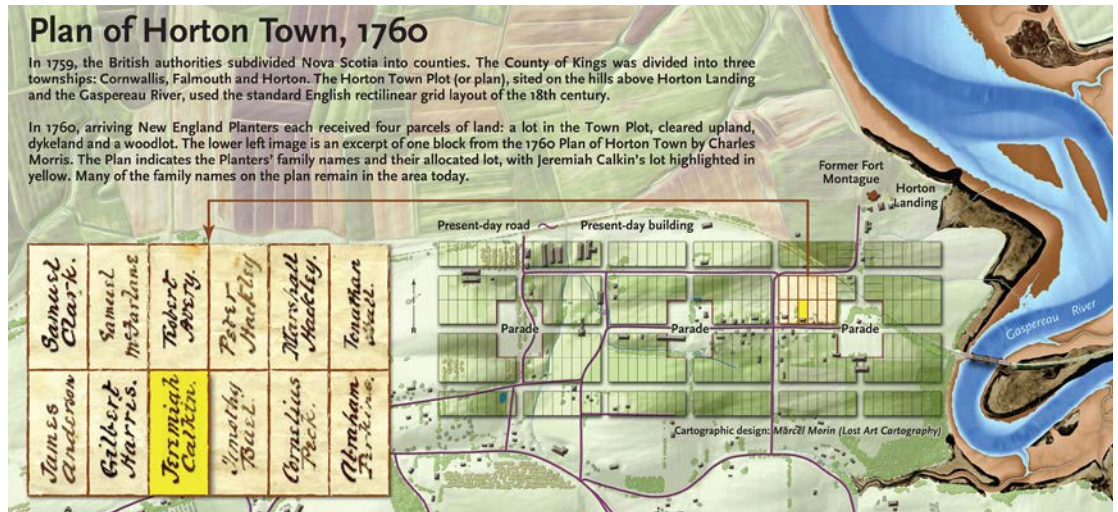


Photo: Jamie Robertson

### Plan of Horton Town, 1760

In 1759, the British authorities subdivided Nova Scotia into counties. The County of Kings was divided into three townships: Cornwallis, Falmouth and Horton. The Horton Town Plot (or plan), sited on the hills above Horton Landing and the Gaspeau River, used the standard English rectilinear grid layout of the 18th century.

In 1760, arriving New England Planters each received four parcels of land: a lot in the Town Plot, cleared upland, dykeland and a woodlot. The lower left image is an excerpt of one block from the 1760 Plan of Horton Town by Charles Morris. The Plan indicates the Planters’ family names and their allocated lot, with Jeremiah Calkin’s lot highlighted in yellow. Many of the family names on the plan remain in the area today.



## 10:45 – 11:00 am 3. View Park, Grand-Pré

The full expanse of the Landscape of Grand-Pré can be best appreciated from the View Park on Old Post Road. The dykelands, fields, and settlement on the hills, first established by the Acadians in the 1680s, have been maintained and expanded over centuries by farmers of New England Planter descent, and later immigrants - including English and Scottish who came in the 19th and 20th centuries and Dutch who arrived after the Second World War.

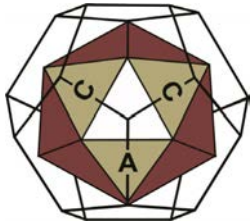
Marcel will discuss the granite map embedded at the centre of the [harvest table](#).



Photo: Marcel Morin



Photo: Jamie Robertson



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**CCA 2018**

**Saturday, June 2nd Events & Opportunities**

**11:00 – 11:30 am**

**4. Hike Harvest Moon Trail Grand-Pré to Wolfville**

Experience the magnificent view of the Acadian dykes from the Harvest Moon Trail. Park at the Grand-Pré National Historic Site and walk the easy trail to Wolfville (approximately 5 km).



**11:30 am – 1:00 pm**

**5. Lunch at TROY, Wolfville**

<https://www.troyrestaurant.ca/>

Enjoy a delicious Mediterranean meal at TROY restaurant in Wolfville. A group reservation will be made for those interested.

**Afternoon Possibilities**



**Magic Winery Bus**

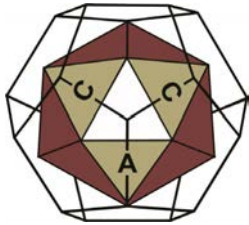
<https://wolfvillemagicwinerybus.ca/pages/home-wolfville>



**Experience Wolfville**

<https://www.wolfville.ca/experiencing-wolfville.html>

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## CCA 2018 Saturday, June 2nd Events & Opportunities

### Afternoon Possibilities, continued



#### Hike Cape Split

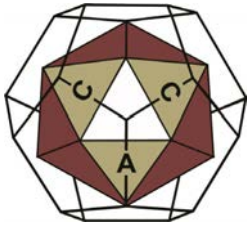
<https://bit.ly/2jMNEvA>



#### Lightfoot & Wolfville

<https://lightfootandwolfville.com/culinary/>

Reconvene at the end of the day for a sociable  
approximately 3 pm.



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## Day I: CCA Tech Day

### Keynote I: Fake maps! The cartography of elections Dr. Kenneth Field, Esri Inc

Quoting former British Prime Minister Harold Wilson: “a week is a long time in politics.” The same might be said about electoral cartography. For many, elections provide a fascinating sideshow in seeing how the results are handled cartographically.

Using recent United Kingdom elections, I review shifts in cartographic style and the emergence of a fascinating consensus in terms of map type, style and functionality. A new default appears to be emerging. I compare these to maps of the 2016 U.S. Presidential election where greater cartographic diversity exists. The geographies of two massively different countries account for some of this but consumer preference also creates different demands in the map reader.

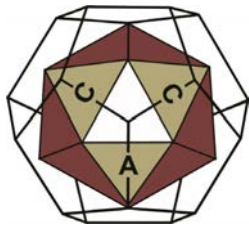
This all translates into fascinating questions and options for the cartographer. Approaches range from the purely functional to beautifully imaginative and innovative artistic representations. While the focus here is on electoral cartography, we can see how techniques can be used in population-based thematic cartography more generally. I’ll finish by sharing some of my own attempts to map recent political events; artistically; technically; and to challenge and extend the palette of political thematic cartography.

#### Keywords

election cartography, map design, thematic

**Bio:** A self-confessed ‘cartonerd’ with a personal and professional passion for mapping. Ken gained his BSc in Cartography at Oxford Polytechnic and PhD in GIS at Leicester University and fell into academia. He spent 20 years in key positions in UK universities before ditching the bureaucracy and admin for the no-brainer move to sunny California to join Esri in 2011. He has presented and published an awful lot. He blogs ([cartonerd.com](http://cartonerd.com)), tweets (@kennethfield), is past Editor of The Cartographic Journal (2005–2014), and Chair of the ICA Map Design Commission (2011–2019). He co-founded the Journal of Maps, is on the advisory board of the International Journal of Cartography, is a Fellow of both the British Cartographic Society and Royal Geographic Society, is a Chartered Geographer (GIS), and only the second Honorary Member of the New Zealand Cartographic Society.

Ken is in love with maps, makes maps, collects maps, writes about maps, has a tattoo of his favourite map and is devoted to encouraging others to see the value in quality cartography and helping them make better maps. He attempts to push the boundaries of cartography, and he has received numerous awards for his maps, writing and pedagogy (though he’s most proud of an award for a kitchen tile design!). He’s in demand as a panellist and keynote speaker and has curated and judged numerous map galleries. He is author of the soon-to-be-best-selling book CARTOGRAPHY ([esriurl.com/14091](http://esriurl.com/14091)) which provides a compendium of design advice for mapmakers. He is also guilty of having the idea to develop a MOOC on Cartography ([www.esri.com/mooc](http://www.esri.com/mooc)) and roping in his talented colleagues to help bring it to fruition. Despite evidence to the contrary, life’s not all about maps, and Ken can also be found on a snowboard, behind a drum kit, building Lego, walking @wisley\_dog, being in awe of his far more talented better half @lindabeale, or supporting his hometown football team, Nottingham Forest. You can view his maps at [carto.maps.arcgis.com](http://carto.maps.arcgis.com).



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## Presentations - Carto Tech Day

### Talk 1: Coastal Mapping

**Kevin McGuigan, Applied Geomatics Research Group (AGRG)**

The coastline is complex - an ever changing and challenging boundary. Sea levels are going up and down, erosion is not widely understood, and coastal ecosystems are, as ever, critical and stressed. Now greater than ever is our ability and our imperative to observe and understand this fundamental and dynamic environment. The nearshore zone between the land and deeper water is highly productive, energetic and is yet difficult to map using traditional land or marine based techniques alone. The Applied Geomatics Research Group (AGRG) within the Nova Scotia Community College (NSCC) acquired a shallow water airborne topo-bathymetric LiDAR sensor, the Chiroptera II, and has flown missions since Sept 2014 in the Atlantic Region. Topo-bathymetric LiDAR sensors are well suited to survey this land-sea boundary and provide seamless elevation and imagery across it. Additional technologies including satellite, drones and GPS can be effective coastal mapping tools as well. Though, beyond the geography itself and the relatively simple and controlled systems of an airborne laser mapping platform, there exists a much more complex and wide obstacle along the coastline - governance and accountability. This talk will spur the imperative and illustrate some key techniques and considerations for ensuring an effective coastal mapping approach, from the experiences of AGRG to support flood mapping, aquaculture development, environmental monitoring and more.

**Bio:** Kevin K. McGuigan is a Research Associate who began working at NSCC's AGRG in 2010 after obtaining an Advanced Diploma in Remote Sensing from the Centre of Geographic Sciences. He specializes in aerial LiDAR data research, low altitude aerial photography, and hydrodynamic modeling. He has completed research projects involving high-resolution 1D-2D hydrodynamic flood modelling for various coastal and inland regions throughout the Maritimes. Kevin has a B.Sc. in Earth Sciences from St Francis Xavier University. His recent research involves aerial bathymetric LiDAR feature recognition, waveform visualization, and hydrological network mapping automation.

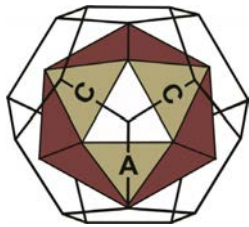
### Talk 2: Applications of 3D Printing In Physical Geography Education and Urban Visualization

**Claire Oswald, Claus Rinner\*, Alexis Robinson (\*presenter), Department of Geography and Environmental Studies, Ryerson University**

Through decreasing hardware costs and novel areas of application, 3D printing has become exceedingly popular in recent years. Starting with a project focused on public education about urban hydrology, we explored the use of 3D-printed landscape models in a number of regional applications. We also examined the use of 3D-printed city models to engage users through urban visualization. Our goal was to examine the role of GIS in processing geospatial data for 3D printing and to explore novel applications in physical and urban geography education and outreach.

Following a brief review of related literature, the paper outlines our data sources for digital elevation models, boundary datasets, and building footprints with height information, and the processes used to transform these into 3D-printable data files. We outline applications focused on urban watersheds and landforms in the area of Toronto, Canada, and illustrate city models for different neighbourhoods of Toronto. We found that the 3D models were favourably received by different types of users, from hydrology experts to environmental studies students





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to the general public. The physical 3D models consistently engaged viewers more than 2D maps or on-screen visualizations did. We also found that the viewers gained a deeper understanding of the underlying data, for example, a watershed drainage network, after handling the 3D models. The overwhelmingly positive feedback generated by this project suggests that 3D printed landscape and city models are a worthwhile strategy for improving physical and urban geography education and outreach.

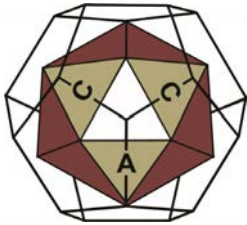
**Bio:** Dr. Claus Rinner is a Professor and Chair of the Department of Geography and Environmental Studies. His research and teaching expertise is in the areas of Geographic Information Systems (GIS), cartography, and decision support, with applications in public health, social policy, and environmental planning. Dr. Rinner holds a 2016-2021 NSERC Discovery Grant, is a co-investigator in a 2013-2019 SSHRC Partnership Grant, and has participated in research funded by CIHR and the Network of Centres of Excellence. His scholarly research is widely cited with an h-index of 25 and six publications with over 100 citations (Google Scholar as of May 2018).

### **Talk 3: 3D Data Collection and Visualization** **Nathan Crowell, Applied Geomatics Research Group (AGRG)**

The Nova Scotia Community College – Applied Geomatics Research Group (NSCC-AGRG) have been collecting high resolution data for several years with a focus on the coastal zone. The collection of data has traditionally focused on utilizing both aerial and terrestrial laser scanners to produce survey point-clouds used to derive higher order products such as elevation models and mesh objects. With more recent advances in photogrammetric techniques NSCC-AGRG have spent considerable time developing point clouds from large format aerial cameras and drone surveys. NSCC-AGRG have also invested in high density laser scanners designed to survey building interiors and objects. These high density scanners and photogrammetric techniques are capable of producing much higher data volumes than traditional aerial LiDAR data collections. NSCC-AGRG have been investing time in data visualization, distribution, and interpretation in new mediums such as web platforms and mixed reality headsets to effectively account for the increase in data volume while exploiting the additional information.

This talk will focus on best practices for data collection, and techniques to efficiently interpret complex 3D data and manage large data volumes to produce products that are focused less on interpretation and more on interaction.

**Bio:** Nathan Crowell is a Research Associate who has been with AGRG since 2009. Nathan has an MSc in Applied Geomatics from Acadia University, an advanced diploma in Remote Sensing from NSCC's Centre of Geographic Sciences, and a BSc in Biology from Acadia University. He specializes in mission planning and data collection with a focus on LiDAR and high resolution imagery to support hydrodynamic modelling and ecosystem management.



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### **Talk 4: OsGeo & Google Code-In** **Jeff McKenna, Gateway Geomatics**

The Open Source geospatial community, suddenly receiving widespread attention, has entered a new phase in its growth; this talk will be given by one of the global leaders of the Open Source geospatial community, to discuss the stability of the sharing ecosystem, the impact of the Open Source Geospatial Foundation (OSGeo) and its recent initiatives, the spread of the Free and Open Source Software for Geospatial (FOSS4G) event around the world, and getting involved at the community level, where all the real work happens. Learn, share, and have fun.

**Bio:** Jeff McKenna has been in the spatial field for 20 years, and has been focusing on sharing geospatial information through the Internet using Open Source since the year 1998. Highly regarded internationally for his promotion of Open Source mapping software, Jeff is the co-founder of the FOSS4G (Free and Open Source Software for Geospatial) annual global conference, and has been involved in the OSGeo foundation since its inception. Jeff is the President Emeritus of the OSGeo foundation, and currently sits on its Board of Directors. He is heavily involved in the MapServer project, and is an active member of the MapServer Project Steering Committee. Jeff operates a consulting company, Gateway Geomatics, along the beautiful coast in Lunenburg, Nova Scotia, Canada.

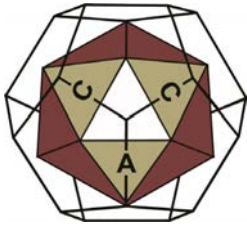
### **Workshops**

#### **Workshop 1: Get started with maps in ArcGIS Pro (Lab 153)** **Edie Punt, Esri Inc**

Come learn how to make a map in ArcGIS Pro. You'll learn how to migrate your maps from ArcMap to ArcGIS Pro and we'll cover the basic components of the ArcGIS Pro application. You'll create a map, learning how to display data and work with symbols and styles. We'll cover labelling and layouts and even take a deep-dive into multi-scale mapping.

#### **Workshop 2: Getting Started with ArcGIS Maps for Adobe Creative Cloud (Lab 152)** **Clint Loveman, Esri Inc**

Create a presentation style static map in Adobe Illustrator using data from the ArcGIS Living Atlas of the World, ArcGIS Online and the new ArcGIS Maps for Adobe Creative Cloud app.



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## Day 2: Community Mapping: Place Making Through Maps

### Keynote 2: PLACE, MAPS, AND GIS

**Dr. Michael Goodchild**

While geographers have long explored the concept of place, GIS has focused more on concepts of space, demanding geometric accuracy in the interests of deriving such properties as distance and direction, and of integrating data based on the location key. Places on the other hand are often unbounded, subject to varying interpretations, and yet allow data to be integrated based on placename. Humans are very rich sources of information about places, but the lack of a place-based technology comparable to GIS makes this information difficult to share and curate. Recently the balance between space and place has shifted significantly because of the importance of place in social media and route guidance.

**Bio:** Michael F. Goodchild is Professor Emeritus of Geography at the University of California, Santa Barbara. Until 2012 he held the Jack and Laura Dangermond Chair of Geography and was Director of UCSB's Center for Spatial Studies. He received his BA degree from Cambridge University in Physics in 1965 and his PhD in Geography from McMaster University in 1969. His research and teaching interests focus on issues in geographic information science, including uncertainty in geographic information, discrete global grids, and volunteered geographic information. He has directed or co-directed several large funded projects, including the National Center for Geographic Information and Analysis, the Alexandria Digital Library, and the Center for Spatially Integrated Social Science. He was elected member of the US National Academy of Sciences in 2002, and Foreign Member of the Royal Society and Corresponding Fellow of the British Academy in 2010; and in 2007 he received the Prix Vautrin Lud. He has published over 550 books and articles. He moved to Seattle upon retirement in 2012, and currently holds part-time positions as Research Professor at Arizona State University and as Distinguished Chair Professor at Hong Kong Polytechnic University. His full CV is at [www.geog.ucsb.edu/~good](http://www.geog.ucsb.edu/~good).

## Presentations – Community Mapping – Public Engagement

### Talk 5: Conversations on Map Geography

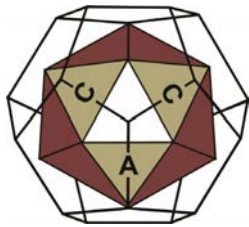
**Bob Maher & Ed Wedler**

The presenters have two qualities in common. In the 1980's they were both employed as instructors at COGS (NSLSI). Maher was teaching GIS, and Wedler was teaching Remote Sensing. In the last decade, they have collaborated on a number of projects related to economic development in rural Nova Scotia.

The presentation looks at the stories behind three different projects. It uses the lens of geography, and the relationship between the story and the map.

- 1) Ride the Lobster
- 2) Road to Georgetown
- 3) Halifax Urban Sketchers Project 150

The format is a conversation between the project leader and the citizen. From these three projects, we will attempt to draw some observations on what we have learned about the collaborative process, and the future challenges for current map-makers.



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**Bio:** Dr. Bob Maher received his Ph.D in Biogeography from the University of Western Ontario in 1976. He has taught Geography and Computer Mapping at Memorial University of Newfoundland, the College of Geographic Sciences and Royal Roads University. He was an instructor at COGS from 1980-88, and Senior Research Scientist at AGRG from 2000-2011. Today, he writes at the blog site, [ernestblairexperiment.wordpress.com](http://ernestblairexperiment.wordpress.com)

**Bio:** Edward Wedler received his M.A.Sc. in engineering at the University of Toronto in 1973. Since then, he has worked at C-CORE, Newfoundland, as a satellite oceanographer, as a research engineer at the Ontario Centre for Remote Sensing, and as an instructor at COGS. He then entered the business world as co-owner of Annapolis Valley's The Inside Story. These days, he challenges his right brain in the art world, publishing his watercolours at [www.dootdootdaddy.blogspot.ca](http://www.dootdootdaddy.blogspot.ca), while still adapting geomatics to his interests.

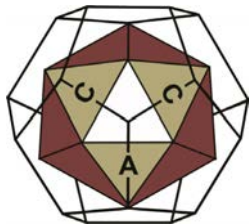
### **Talk 6: Cartographic Tools for Public Engagement** **Monica Beaton, Municipality of the County of Kings**

The Municipality of the County of Kings has partnered with neighboring municipal units and stakeholders in an initiative to guide the long-term sustainable development of the area. The deliverables will steer a future shared vision and goals through updates and amendments to the Municipal Planning Strategy, related policies and bylaws. Early stages of this project included an enormous amount of GIS mapping, creation of static maps and online cartographic tools designed to educate and gather feedback from all interested parties. This presentation is a walk through the process and provides an in-depth look at how cartography was found to be crucial to the success of all stages of the "Kings 2050" project thus far.

**Bio:** Monica has worked with the Municipality of the County of Kings for the past 10 years in a number of different positions and departments. From Planning Technician, Civic Addressing Coordinator and Engineering GIS Technician to her current post as Geoinformatics Specialist, Monica has run the gamut in terms of gaining experience with what GIS means to local, municipal government.

Supervising a team of 3 technicians, she acts as geodatabase administrator and data custodian. Current projects for Kings include migrating to ArcGIS Pro software, creating an Open Data Portal and also implementing ArcGIS Online web applications for all staff (and the public) to utilize.

Prior and also during her tenure with Kings, Monica has taught courses as Auxiliary Faculty with COGS/NSCC in the Geomatics programs. She also had past employment with Heritage Gas of Dartmouth, NS as a GIS Technician and CAD Draftsperson. Monica also delves in freelance cartographic work. Recent publications include maps incorporated into local interest books including historical research and even a few cookbooks.



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### Talk 7: Well beyond the beach: Plastics pollution and web maps as a form of community engagement

**Daniel Brendle-Moczuk, MLIS; Geospatial Librarian  
UVic Libraries, University of Victoria**

After initially finding pre-consumer plastic polymer pellets (nurdles) on one Victoria beachfront, a research project was devised to determine how widespread these nurdles are on the southwest BC coast and islands.

**Questions:** What plastic polymer are the nurdles made of, where did the nurdles come from, and do the locally found nurdles have any pollutants? Webmaps were constructed to detail the location of found nurdles and local community groups and governments are involved.

#### Methods:

Nurdles were found at more than 65 beaches and waterfronts. Nurdles were quantified at 5 sites. Chemical analysis was utilised to ascertain the type of plastic polymer the locally found nurdles were made from and whether they had any pollutants. Numerous return visits to the same sites have occurred over the past two years.

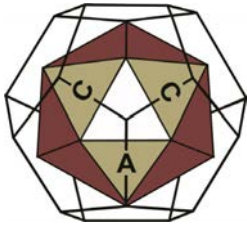
#### Results:

Nurdles appear to be throughout beaches and waterfronts of SW BC. Whether they are found on a beach has to do with local nearshore currents and debris accumulation zones. The majority of locally found nurdles are low density polypropylene. Tests for toxicity of the Victoria nurdles were inconclusive. Numerous community groups asked for presentations, are actively involved and started their own projects.

#### Conclusions:

Plastics do not readily break down, they are known to soak up contaminants, and marine animals sometimes mistake them as food, causing plastics to move up the food chain. The presence of nurdles on SW BC shorelines is a concern as plastics pollution impacts our environment and society. Community groups continue to be involved and further research to trawl the water of the coasts is planned.

**Bio:** Daniel has always been a Habs fan, (but currently that is a lost cause), even when he was growing up in the 'Peg so he also hopes for the Jets. Meanwhile he is the geospatial librarian at UVic in Victoria, BC where he can only play hockey indoors, sigh.



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### **Talk 8: Esri's Community Maps Program** **Paul Heersink, Esri Canada**

Esri's Community Maps Program takes spatial data provided by authoritative providers and builds a seamless raster and vector base map of the world for public use. In Canada there are about 200 contributors to the program from all levels of government as well as colleges, universities, airports, parks and First Nations. This session will cover some of the successes and challenges of the program in Canada, as well as its current technical process and future directions.

**Bio:** Paul Heersink is currently the production manager of the Community Maps Program in Canada. He has a B.A. in Psychology from the University of Alberta and has a diploma in Cartographic Technology from Sir Sandford Fleming College. He has worked as a cartographer for the Ontario Ministry of Natural Resources, as a freelance cartographer and as the manager of the mapping department with what was used to be Rand McNally Canada. With his wife, he has written and published a book *Maps and Mapping for Canadian Kids*.

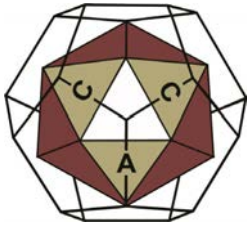
### **Talk 9: Community Maps in Annapolis County** **Ed Symons, Chair, Heather LeBlanc, Project Manager,** **Monica Rivers, Community Mapping Technician**

Community-created asset maps are based on the premise that residents possess expert knowledge of their local environment which can be expressed in a geographic framework that is easily understandable and universally recognized. Participatory maps often represent a culturally distinct understanding of landscape and include information that is excluded from mainstream maps.

Since 2012, the Annapolis Community Mapping Project has brought students and instructors of NSCC/COGS, and their knowledge of Esri Canada technology, together with Annapolis County residents in an intergenerational and reciprocal learning environment.

Multiple layers added to a base map have been suggested, researched, drafted and uploaded by various self-organizing interest communities in Annapolis County. From the mapping of 3,200 pre and post Confederation houses and structures to trails and canoe routes predating European settlement, it has been volunteers realizing their passion through [MAPANNAPOLIS.CA](http://MAPANNAPOLIS.CA) that is the heart of the project.

**Bio:** Heather Leblanc is currently the project manager working for the Age Advantage Association. She has worked tirelessly to promote the work of the group over the past seven years. Heather's background in business, heritage and consulting have allowed her to nurture the collaboration with COGS instructors and students in mapping community assets and emerging Association projects where their skills and competencies will be of benefit to themselves and Annapolis County communities. Their work takes place in a series of informal intergenerational learning sessions involving students and dedicated community volunteers.



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**Bio:** Ed Symons began his role as a COGS instructor in 2001 and has taught a variety of courses primarily in the Community and Environmental Planning Concentration at COGS. Eight years ago Ed helped introduce a community mapping elective and five years ago he began collaborating with a newly formed non-profit group called The Age Advantage Association. They have worked in collaboration to initiate and grow a community mapping presence in the local area. Thus far, more than a dozen local map layers and thousands of community assets have been created, primarily related to culture and heritage and to a lesser extent, local amenities, trails and recreation, and, most recently, investigating how to map a local food system.

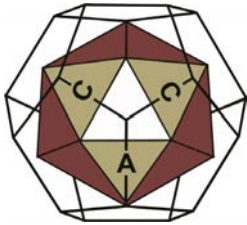
**Bio:** Monica Rivers is a Community Mapping Technician who works for the Age Advantage Association with a goal to promote and facilitate community asset mapping for residents in Annapolis County. Monica holds a diploma in Geographic Sciences with a concentration in Cartography from the Centre of Geographic Sciences.

**Talk 10: Garrison Graveyard Community Map**  
**Ed Symons, Chair, Heather LeBlanc, Project Manager,**  
**Monica Rivers, Community Mapping Technician**

Since 2012, the Age Advantage Association, its funders at the federal, provincial and municipal government levels, and instructors and students from the Centre of Geographic Sciences, have made possible an extraordinary experiment in community mapping. Annapolis County residents, with access to a digital platform, a few tools and a few rules, created map layers which express their view of where they live, their pride of place. [MAPPANNAPOLIS.ca](http://MAPPANNAPOLIS.ca) is a web-based online community asset map, created by diverse interest groups, and reflecting a broad spectrum of entirely new data sets. We continue to explore ways that community mapping can be seen as a tool in re-imagining economic rural growth. Our hope is to make it possible for the maps created by our volunteers to be continually updated and so be a useful tool in furthering the Annapolis County's economic development.

Our dedicated team of volunteers have worked diligently to develop web-based community asset maps. The association has accomplished, for example: community maps of Annapolis County, Annapolis Royal, and the Village of Bear River; heritage properties; cemeteries; churches; business and commercial properties, wharves, cultural assets, and recreation maps showing shared-use trails and cycling trails.

Currently, in partnership with Parks Canada, we are undertaking a detailed mapping project of the Garrison Graveyard in Annapolis Royal on the grounds of Fort Anne. Initially used as a burial ground for French military forces, it has since been used by Acadians, the British military and the local Roman Catholic parish. One of the grave markers it contains is the oldest English gravestone in Canada. There are no original signs of this cemetery visible. When the British took the fort in 1710, they established a cemetery. This burial ground served the garrison and the Town of Annapolis Royal from 1710 until 1940. Rose Fortune (1774–1864), a Black Loyalist and the first female police officer in what is now Canada is buried here.



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### **Talk 11: The Honour Roll: Mapping the Nova Scotia Overseas Highland Brigade's Fallen & Wounded, WWI**

**Ben Symons, student and MapANNAPOLIS volunteer**

Together; Ben Symons and his friend Sebastian Conyers worked to develop a web map that helps readers visualize the information contained in a book written by local historian W. James MacDonald entitled Honour Roll of the Nova Scotia Overseas Highland Brigade. This book catalogues information about members of the Highland Brigade (85th, 185th, 193rd, and 219th Battalions) killed or mortally wounded in action during World War I. A tremendous amount of digital literacy skills were woven into the project.

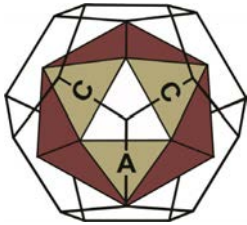
**Bio:** Ben Symons is a home-schooled youth from Port Williams, Nova Scotia, currently completing grade 8. He has a fondness for biology, wilderness survival skills, speed skating, violin music and maps. Ben enjoyed working with his best friend, another home-schooled youth, Sebastian Conyers, to learn to create a web-based local history map. Together the two enjoyed working with a neat group of their elders in an informal learning environment.

### **Talk 12: An artistic approach to place making** **Philip Bailey, CartographMe**

Using fact and imagination, artist Phillip Bailey creates hand-drawn maps that combine information in ways that is innovative, challenging and mind-bending. The map is the canvas for creative interpretations of biographical, historical and geographical information. In this session, Phillip will explain and display the creative process from conceptualization to finished product. Uses for these maps and their role in both artistic expression and community development will be discussed.

**Bio:** Phillip Bailey was born and raised in Lequille, a recognized African Canadian community just outside of Annapolis Royal, Nova Scotia. From an early age, Phillip showed not only an aptitude but a passion for both geography and art. With an almost three decade career in youth corrections, these gifts simmered until recently when the creative process has been allowed to become priority. Phillip combines reality with fantasy, pushing the viewer to consider reality in a different way.





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### **Talk 13: Inuit mobility: Reflections on building a Pan-Arctic Map of trails**

**Claudio Aporta, Associate Professor and Director,  
Marine Affairs Program, Dalhousie University**

For over 18 years the author has worked with several Inuit communities and organizations to map traditional mobility systems across all the regions of the Canadian Arctic. The result is an evolving Pan-Arctic map that presently links most Inuit communities from Nunatsiavut (Labrador) to the Inuvialuit region (western Arctic). In the process, numerous datasets have been created and linked, using different methods, from GPS to participatory mapping, as well as digitizing historical material. The outcome shows an interconnected system of mobility which has both spatial and temporal dimensions. The presenter will elaborate on local and regional similarities and differences, reflect on the methodological complexity of mapping oral knowledge, and explore some of the implications that this map may have as a political instrument, as an educational artifact to younger generations, and as a negotiating tool.

**Bio:** Claudio Aporta received his PhD in Anthropology from the University of Alberta in 2003. Originally from Argentina, he has worked with Inuit communities since 1998, documenting their environmental and geographic knowledge, and exploring the ways in which Inuit travelers relate to space.

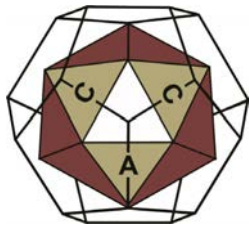
### **Talk 14: Unveiling tourist experiences through cognitive mapping and the Explorer Quotient**

**Susan Kingdon\* and Monica Wachowicz**

**University of New Brunswick, People in Motion Lab, Fredericton NB, CANADA**

Smart Tourism relies on recommender systems designed with a deep understanding of tourist experiences. This paper aims to explore a number of data sources in order to build a predictive model based on the Explorer Quotient (EQ) classification and cognitive mapping. Our proposed approach combines the study of social and travel values, previously defined in the EQ classification, with the symbolic values of tourists' perceptions of a travel destination found in cognitive maps. Towards this goal, a decision table model is used to predict two types of tourism experiences described as explorer and guided. An explorer tourist seeks for a full experience in local culture and for the true essence of a city, often including POIs aside from the typical tourist attractions. A guided tourist values a simple and convenient experience; they tend to travel with others, and delegate decision-making to another member of their group. The city of Saint John was used as a case study where a questionnaire and cognitive maps were used to collect data for 31 attributes describing the social, travel, and symbolic values from 35 tourists. The predictive model was implemented in the Weka software and accurately predicts 71% of the instances using 10-fold stratified cross-validation. The outcomes have revealed that the most significant attributes in the prediction were the purpose of the visit combined with their cognitive maps. These findings reveal the potential of using tourism experience to build richer tourist profiles in recommender systems rather than the current use of demographics alone.

**Bio:** Susan Kingdon is a Research Assistant at the People in Motion Laboratory at the University of New Brunswick (UNB), Canada. She has a Bachelor degree in Arts (World Literature and Culture studies) and a Bachelor degree in Sciences (Geology) from UNB. She received her Master's degree in Earth Sciences from Carleton University, Ottawa before she returned to UNB. Her research interests include smart tourism, big data analytics, cognitive mapping, and recommender systems. She is currently being funded under the ACOA Project on Smart Connected Communities.



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**Bio:** Dr. Monica Wachowicz is Full Professor in Data Science and the NSERC/Cisco Industrial Research Chair in Big Data Analytics at the University of New Brunswick, Canada. She is also the Director of the People in Motion Laboratory, a centre of expertise in the application of Internet of Mobile Things (IoMT) for the purposes of improving quality of life, reducing carbon footprint, and increasing safety in smart cities. Her research interests include fog/edge analytics, graph analytics, mobility analytics and IoMT analytics. She works at the intersection of (1) Streaming Analytics for a world in which geospatial 'data' will be generated in real-time from virtually everything around us; and (2) Designing maps for a world in which 'intelligence' will be embedded in virtually everything around us. Founding member of the IEEE Big Data Initiative and the International Journal of Big Data Intelligence, she has over 250 publications and her pioneering work in multidisciplinary teams from government, industry and research organizations is fostering the next generation of data scientists for innovation.

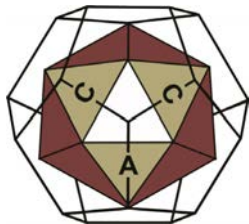
### **Talk 15: The Cartographer's Way: Practical Paths to Geographic Creativity** **Johnny Eaton, Student COGS**

Following up on the mythical success of his fictional self-help satire, Johnny Eaton will be presenting projects in which he has experimented with merging fine art with the graphical elements of cartography. This will include illustrations of specific tools and techniques that were used in their making, particularly in the Adobe Creative Suite environment, though the potentials of other products may be touched on as well.

**Bio:** Johnny Eaton is a graduate of the Cartography Concentration of the Geographic Sciences program at COGS. He grew up drawing treasure maps for his Granddad in Nova Scotia, who would (maybe) dig where X marked the spot and (sometimes) send Johnny his findings by the Canada Post, or write about them. Johnny currently works at CartoVista in Gatineau, QC, designing digital tile basemaps and custom print maps for clients.

### **Talk 16: Mapping Internet Tabular Data** **Dr. Konrad Dramowicz, COGS**

The Internet is a major source of information for cartography and its role is growing fast. The vast part of this information is in the form of online tables, scattered over millions of websites and often containing geo-referenced attributes. There are numerous problems with accessing this information, resulting from data protection, data quality, and data extraction. There are commercially available tools for extracting online data, some of them very efficient but costly and some of them free but basic. This paper proposes another solution by combining Python scripting with GIS. The necessary steps, perceived problems and examples of successful mapping are provided. In order to map data from online tables, they should be linked with reference maps containing corresponding geographical features. The process of grabbing the entire webpage with Python script is relatively simple. One webpage may contain multiple tables, so the table of interest should be identified and extracted. The most time-consuming task is of string processing, where appropriate field values are extracted and stored. This stored information fills a newly created GIS attribute table. The table is then joined to a reference map using a geographical name as a key field. Editing is necessary to match names from online tables with names used in a reference map. The final step is to use an appropriate mapping method corresponding to a theme from an online table. The entire process is fully automated but customized for a particular website.



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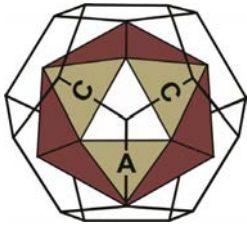
**Bio:** Dr. Konrad Dramowicz obtained his PhD in economic geography from the Institute of Geography and Spatial Organization, Polish Academy of Sciences, and GIS diploma from the College of Geographic Sciences. He is the author of numerous publications (including books) and a frequent presenter of papers and workshops at national and international conferences. His professional interests include GIS, spatial analysis, economic and human geography, philosophy and methodology of science. Dr. Dramowicz is focusing on integrating two powerful computer technologies: GIS and data analytics. He has worked as faculty at the Centre of Geographic Sciences (COGS) in Lawrencetown since 1989.

**Talk 17: A Biography of Robert Bell: On the Trail of the Great Stone Chief  
IAN SPOONER\*, ROB RAESIDE, DAVID DUKE AND ANTONY BERGER,  
Department of Earth and Environmental Science, Acadia University**

Robert Bell (1841-1917) likely explored more of Canada than any other person. Mostly as an employee of the Geological Survey of Canada, but at times on private ventures, Bell collected details on the geology, natural history, forestry, and ethnography from Newfoundland to Yukon. He was a charter member of the Royal Society of Canada, and was honoured at home and abroad. Bell's story is being written as a book, based on earlier research by Ian Brookes, much of Bell's materials were saved from the debris of a house fire in 1962 and are now housed in the National Archives.

The main focus of his mapping was the rivers draining into Hudson Bay, but he also completed comprehensive studies of the Paleozoic of Ontario, gold fields of Nova Scotia, the Appalachian thrust belt of the Gaspé, the Red River Valley of Manitoba, and routes from the Metis heartland in Saskatchewan to Great Bear Lake and the Klondike. Bell was responsible for naming over 3000 geographic features in Canada, and his later explorations resulted in the naming of the Bell River, downstream from Matagami, Quebec, after him. Serving as geologist, naturalist, medical doctor and linguist, he pioneered canoe-based excursions of all the large rivers entering Hudson Bay and James Bay east from Churchill, and provided both navigational and medical support in three expeditions from St. John's to Hudson Bay through Hudson Strait. He interacted with aboriginal peoples, and was given the title "Great Stone Chief" by the Inuit of the Ungava Peninsula.

**Bio:** Ian Spooner (P. Geo, Ph.D.) has been a professor at Acadia in the Earth and Environmental Science Department for the past 21 years. He has supervised 28 masters and 49 honours theses to date. His primary research interest is investigating environmental change and he has active research programs in northwestern British Columbia, Nova Scotia and Newfoundland. He also has consulted in the areas of Environmental and Risk Assessment, groundwater and surface water contamination, coastal erosion and has been involved in environmental risk assessments for resource companies in Nova Scotia, British Columbia and the Northwest Territories. He has served with a number of professional organizations and was recently awarded the Distinguished Service Award by the Atlantic Geoscience Society.



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### **Talk 18: Applying LiDAR and GIS in the Search for Lunenburg's 18th and 19th Century Fortifications**

**Candace MacDonald, Research Associate, AGRG**

Hillshade analysis and perspective rendering of high resolution LiDAR data was used to identify potential archaeological features and recreate historic paintings, ending the search for a lost blockhouse in Lunenburg, NS.

**Bio:** Candace has been part of AGRG's Coastal Research Team since 2010. Candace's responsibilities include multispectral satellite and aerial imagery interpretation and analysis; survey grade GPS mission planning, execution, and post-processing; and LiDAR acquisition, post-processing and analysis for widely varied purposes such as flood risk mapping, seaweed mapping, and detection of forgotten archaeological features. Candace is an expert in complex raster and spatial GIS analysis, and uses the remotely acquired data she and other members of the Coastal Research Team collect using a wide range of high-tech equipment such as a shallow water bathymetric LiDAR system, a 3D mobile mapping LiDAR unit, a multibeam echosounder, and several drones for multispectral aerial photography. Candace is an expert in the construction of maps and other visual products, and regularly presents project results at well-known conferences around Atlantic Canada.

### **Talk 19: Construction of an Orienteering Map**

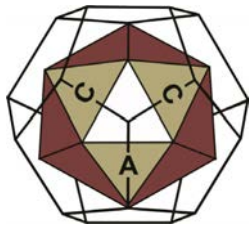
**Jim Blanchard, ONS**

The construction of an orienteering map is the product of understanding the components of map construction which to a large degree are the same aspects as creating a map in a GIS world. The orienteering competition map is a detailed representation of the selected area's topography, vegetation, water features and other natural and man-made objects. The purpose is to provide a good test of navigation – at speed. The map must absolutely;

- Be accurate and up to date,
- Contain a level of detail suitable for precise navigation but also readable,
- Meet ISOM/ISSOM standards set by the International Orienteering Federation (IOF) for symbol sizes and colours,
- Be consistent in it's representation of the detailed objects over the whole map.

The presentation will briefly deal with building a base map, creating the map on a CAD (Computer Assisted Drawing) file, costs, performance of field checking and adding details to the base map.

The final section will again briefly, cover final map production including print quality. The presentation will be linked with the idea of working with staff and students at COGS in one of their second-year project assignments.



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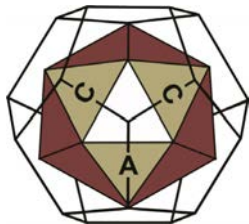
**Bio:** Jim Blanchard taught for thirty-six years as an elementary and middle school teacher. Completing his Master of Education with his wife's support he taught in a number of schools in Kings County, NS and Lahr, Germany in a DND school. Presently, he is working part time with St Francis Xavier University in their Education Department with the Continuing and Distance Education Program teaching their Wilderness Navigation and Orienteering in Public Schools course.

He is heavily involved with Orienteering Canada, as a volunteer with their Board of Directors and the Chair of the Officials Committee and sits on two other national committees. He has volunteered with Halifax Search and Rescue for the past 11 years as their course planner for the E2C, an eight and twenty-four hour adventure race. He has created a number of orienteering maps as a hobby and enjoys reading, gardening, fishing, canoeing, kayaking and cross country skiing as well as gourmet cooking with his wife, who does the cooking!

### **Talk 20: Orienteering Mapping with Esri Applications** **Monica Lloyd, Faculty COGS**

Orienteering maps are typically created using a Swiss mapping application called OCAD or with Open Orienteer Mapper (OOM). On an annual basis, Jim Blanchard from Orienteering Nova Scotia tries to persuade Monica to purchase and teach OCAD in the cartography program. Jim sees the potential for COGS students to gain employment in this niche mapping market. Monica knows that purchasing another mapping application for the COGS software image would not be an easy sell to management. As a result, Monica developed an orienteering mapping project using Esri applications for everything from database creation to data collection to editing and final map authoring. Cartography students over the past two years have created an orienteering map for Valleyview Provincial Park as part of their Map Production using GIS course. Monica will discuss details on this collaborative mapping project with Jim Blanchard to make orienteering maps and teach map-making skills from the ground up.

**Bio:** Monica Lloyd is a Cartographer with a diploma in Cartography: Digital Mapping from the Nova Scotia Community College's (NSCC) Centre of Geographic Sciences (COGS - 1999). She has worked in both public and private sectors in Nova Scotia with experience in property mapping, land registration, offshore boundary mapping, site plans, and various local cultural mapping projects. Along her career path, she had an opportunity to teach in the Geographic Sciences program at COGS (2008-2010) and discovered a passion for teaching. After briefly returning to industry, she accepted a permanent faculty position at COGS in 2013. She is enthusiastic about technology, design and helping others discover and develop their own passions in Geomatics.



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## Day 3: Community Mapping: Place Making Through Maps

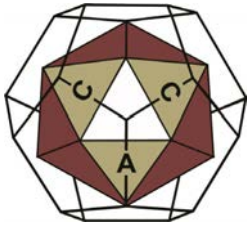
### Keynote 3: GIS, Adobe and Creative Cartographic Design Marcel Morin, Lost Art Cartography

Marcel will share his experiences working with Pikangikum First Nation and the Whitefeather Forest Initiative, representing 16 years of dialogue, planning, and collaboration between Pikangikum First Nation, the Ontario Ministry of Natural Resources, and Whitefeather Forest Management Corporation. Good cartographic design, Indigenous Knowledge and western forestry science were key components in “Keeping the Land” – A Land Use Strategy, the first community-based Land Use Plan approved in Ontario. Marcel will also talk about his involvement with Pimachiowin Aki and the Pimachiowin Aki Cultural Landscape Atlas. This UNESCO nomination formed by the First Nations and provincial governments, have been working to have 29,040 square kilometers of boreal forest that straddles the Manitoba-Ontario border in Canada recognized as a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site.

Marcel will also discuss his involvement with EcoPlan International and the Metis Settlements General Council of Alberta. From 2004 to 2017, the Metis Settlements General Council has been conducting research, guided by the Powley decision, on the Metis Settlements Traditional Land Use and Oral History Project. All eight Metis Settlements of Alberta were included in this research: Peavine, Buffalo Lake, East Prairie, Gift Lake, Kikino, Elizabeth, Fishing Lake, and Paddle Prairie. The research comprised of 415 interviews with current Settlement members about traditional land use (TLU) and historical communities (HC), over 17,000 fully attributed geographic features were digitized, supported by GPS field verification, and then followed by archival research to both confirm and supplement participant interviews relating to historical Metis communities and movement across the land.

The remainder of his talk will focus on various Cartographic design initiatives, collaborations, publications and interpretative panel designs ranging from his Summit Series Mountaineering maps, large design projects for New York design firms Ralph Appelbaum Associates and C&G Partners, the Landscape of Grand Pré UNESCO World Heritage Site, Beaubassin & Fort Lawrence National Historic Site, Mc Nabs Island, Wines of Nova Scotia, Explore the Annapolis Valley, the Harvest Moon Trailway and the Grand Pré Trails Society’s book “The Landscapes of Grand Pré – Images Maps Past and Present” where he will deconstruct the front cover map design showing all of the elements that went into this detailed map.

**Bio:** Marcel Morin studied Cartography at the College of Geographic Sciences in Lawrencetown graduating in 1992. For 15 years he lived in Vancouver, British Columbia where he worked for Timberline Forest Inventory Consultants as a Cartographer/GIS analyst. He quickly established himself as an innovative cartographer designing complex forestry, tourism and mountaineering maps. His map designs have appeared in the ESRI Map Book Volumes 17, 21, 22 and 30, Designed Maps – A Sourcebook for GIS Users by Cynthia Brewer and Adobe Illustrator’s WOW! by Sharon Steuer. For the past 20 years he has worked with First Nations and the Métis General Council of Alberta specializing in Indigenous Knowledge, Ecological Values and Historical Communities mapping including Pimachiowin Aki, a UNESCO Nomination in Manitoba/Ontario. Since moving back to Nova Scotia in 2006 he has worked on large map related architectural installations for New York design firms Ralph Appelbaum and C&G Design, large interpretative panels for the Landscape of Grand Pré UNESCO World Heritage Site, Parks Canada, the Friends of McNabs Island Society, the Wine Association of Nova Scotia and Annapolis Valley REN.



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### **Talk 21: A First Nation design for managing web mapping data** **Scott Emmons, UNBC**

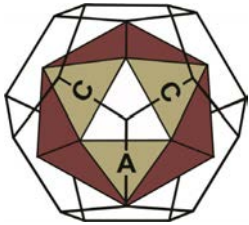
There has been development of a web-based information management Open Source software that has been designed by a group of BC First Nations. This interface relies heavily on web mapping and the associated standards, protocols and common practices used by those serving up spatial data through the Internet. This presentation offers a quick look at how mapping data can be protected through user permission's and still be served up in a variety of ways and forms.

**Bio:** Scott Emmons is a Senior Lab Instructor at the University of Northern British Columbia in Prince George BC. Scott manages the GIS Lab at UNBC as well as teaches courses in GIS and Remote Sensing. He has a particular interest in helping people manage and share their information through web based mapping platforms. This has lead to a relatively significant knowledge of IT as well GeoSpatial technologies.

### **Talk 22: Wolastoqey Nation in New Brunswick** **Thomas Herbreteau, Wolastoqey Nation**

Indigenous Peoples have inhabited the North American continent for thousands of years, but the colonization that happened in the recent centuries have caused a lot of damage and loss to their culture, history and language. Mapping is a powerful tool to prove aboriginal title and ownership rights to fight the Crown and Canadian Law. Occupancy and Use is evidence of how First Nations govern the land. Mapping, when done right, is used in litigation, negotiation and enforcement of rights to get out of the "unfair Canadian regime". We believe that people must understand the Indigenous people's point of view to open their mind to a new perspective on political aspects of cartography.

**Bio:** Thomas was born in France and moved to Nova Scotia with his family when he was young. After high school he attended COGS to study GIS and cartography. Once graduated, in 2014 he headed to Northern BC to work for McElhanney Land Surveying for 2 years as a GIS and Mapping Technician. Thomas left BC behind in 2016 to travel around the world and then moved to New Brunswick in 2017 for new employment. He worked as a Mapping and Research Officer for the Crown Lands Branch of the Government of New Brunswick for a few months in Fredericton until he found his current job as the GIS Technician for the Wolastoqey Nation in New Brunswick (WNNB) - which consists of the consultation body for the Maliseet Chiefs in New Brunswick. He loves what he does and everyday he puts his passion in his GIS work for the Wolastoqey Nation.



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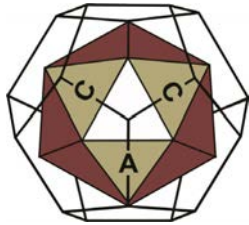
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**Talk 23: Ta'n Weji-sqalia'tiek: Mi'kmaw Place Names Digital Atlas and Web Site  
Tim Bernard, Confederacy of Mainland Mi'kmaq**

Ta'n Weji-sqalia'tiek: Mi'kmaw Place Names Digital Atlas and Web Site was created to raise awareness of the deep connection the Mi'kmaq have to the landscape of Eastern Canada they call Mi'kma'ki, the place of the Mi'kmaq. Mi'kmaw presence has been continuous for approximately 13,000 years B.P., and continues to the present day, as can be seen by the place names and archaeological information presented throughout this site. According to Bernie Francis, Mi'kmaw linguist and Elder, the Mi'kmaw verb infinitive, weji-sqalia'timk, is a concept deeply engrained within the Mi'kmaw language, a language that grew from within the ancient landscape of Mi'kma'ki. Weji-sqalia'timk expresses the Mi'kmaw understanding of the origin of its people as rooted in the landscape of Eastern North America. The "we exclusive" form, weji-sqalia'tiek, means "we sprouted from" much like a plant sprouts from the earth. The Mi'kmaq sprouted or emerged from this landscape and nowhere else; their cultural memory resides here... Ta'n Weji-sqalia'tiekis about a dynamic inter-relationship between the Mi'kmaq and their ancestral landscape—a landscape integral to the cultural and spiritual psyche of the people and their language (Sable and Francis, 2012:17).

**Bio:** Tim Bernard is well known beyond his own community of the Millbrook First Nation as the Manager/Editor of the Mi'kmaq Maliseet Nations News and Eastern Woodland Print Communications. Tim has been the driving force behind the development and success of these important First Nation companies. He now brings his love of Mi'kmaw history and culture and his management expertise to the The Confederacy of Mainland Mi'kmaq as the Director of History and Culture. As a member of the Millbrook Mi'kmaw Community, Tim was born and raised just outside Truro, NS. After attending the local school system from primary to grade 12, Tim knows first-hand how little Mi'kmaw history and culture is part of the school system. After graduating from high school and attending Saint Mary's University for a short period, it was his judgment that the best place to learn Mi'kmaw history and culture was from within his own community. To meet these ends, he became Assistant Research Director from 1988-1994, where he gained extensive historical knowledge under the direction of Dr. Donald Julien. It was during this time that across Mi'kma'ki, new efforts were emerging to piece together a poorly documented past and to gain a true appreciation for the experiences that his ancestors that have ensured his survival today. The most significant career research for Tim are those efforts that allow for the next generation to know who they are. He thinks of his work as simply filling the gaps between the generations. The gaps were created for various reasons—residential school, lost teachers, disease and illness, economic hardship—and they are filled from various knowledges. In his own words, Tim says that he "puts things out there that our people can latch on to—whether they read it, write or live it to remind them that we are different and have a very special history. People wanted us to be somebody else, but we can only be who we are. We come from a different back ground, we come from a different culture.





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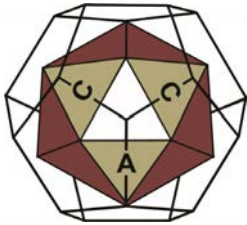
### **Talk 24: Geovisualizing “Informality” using OpenStreetMap (OSM) & Esri’s Story Maps** **Melanie MacDonald, Student Ryerson**

Data about individual buildings in informal settlements (or “slums”) are difficult to generate and/or find. If data exists, it is prohibitively expensive and therefore inaccessible to most. The goal of this poster, then, is to demonstrate that open geospatial technology plays an important role in data creation in this context, particularly when it is collaborative and made to be openly accessible, unrestricted, and for anyone to use.

To achieve this goal, I ran a small mapping campaign in November, 2017, to generate building data in Kibera (Nairobi, Kenya). Based on its participatory foundations and aim (to create a free, editable ‘world map’ for anyone to use), I chose to use OpenStreetMap (OSM) for this exercise. Overall, this project resulted in the contribution of 6770 buildings generated from known contributors and 1101 from ‘unknown’ sources.

To communicate the results, I used Esri’s ‘Story Maps’ technology, which allowed me to link the OSM map as a basemap. This Story Map can assist people unfamiliar with OSM tools and how they can be used/useful, particularly in the context of missing data in informal settlements (or “slums”) and could therefore serve as an educational tool regarding both the infrastructure in Kibera itself, and how to use OSM, in general. This work also includes personal photographs from prior research/work in Kibera, further adding to the “story” of infrastructure in the community. The Story Map is available at <http://arcg.is/2AHibS2>.

Melanie has over a decade of experience as an international development and education professional. She has a Master of Arts (Geography) from McGill University with a focus on participatory community development and environmental management and is currently pursuing a second graduate degree in Spatial Analysis at Ryerson University. Her present research looks at the role GIS can play in ensuring environmental and social justice and, in the future, she hopes to use her past and present graduate work as a policy analyst. Originally from the Annapolis Valley, she is currently based in Toronto, Ontario.



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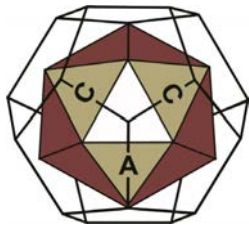
### **Talk 25: Mapping for Community, the Making of a Digital Place: First Municipal GIS in Labrador Anatolijs Venovcevs, GIS Technician, Town of Happy Valley-Goose Bay**

One of the best ways to explain the isolation of Happy Valley-Goose Bay to an outsider is to say that its nearest Wal Mart is a six-hour drive away. With a population of barely over 8,100, the town lies in the center of Labrador – a territory that is larger than all other Atlantic regions combined. In 2016, the town hired its first GIS technician to begin the onerous task of building a geographical information system from scratch and help tackle the massive developmental and infrastructure challenges brought on by a large hydroelectric project happening next door. Since its inception, the GIS project has built data layers regarding civic addresses, road networks, water and sewer infrastructure, and property boundaries among other things. With a combination of proprietary and open source software and high-tech and low-tech tools, the work touched upon every aspect of town operations including planning and development, municipal services, recreation, tourism, public engagement, and emergency response. Through it all, the work is continuing to transform how civic leaders and administrators are thinking about information, communication, data management, and place of the community they are from. This presentation will explore all of the aspects, challenges, and potentials of getting a municipal geographical information system off the ground and running in a remote, northern community through constant engagement with the people who make it their home.

**Bio:** Anatolijs Venovcevs received his Bachelor of Arts (Honours) from Wilfrid Laurier University in 2010, GIS-Application Specialist certificate from Sir Sandford Fleming College in 2013, and a Masters of Arts from Memorial University of Newfoundland in 2017. He is the first and only municipal GIS Technician in Labrador, a position he has held since April 2016.

### **Talk 26: Mapping Natural Assets in Southeast New Brunswick James Bornemann, Geomatics Analyst, Southeast Regional Service Commission**

Nature provides multiple services to municipalities such as storm water regulation, water purification, and recreational opportunities. However, natural assets are rarely considered as an asset in the same way as engineered assets even though they can provide equivalent services at a fraction of the cost, are resilient to climate change and natural areas can provide multiple services. One historical barrier to incorporate natural assets in the same way as engineered assets in municipal servicing, were the lack of accurate methods to quantify the services provided by nature. Recent advances in such methods are being used by pioneering municipalities across Canada to make informed decisions about evaluating the trade-offs between maintaining natural assets or replacing them with engineered alternatives. Methods to identify natural assets of importance for regulation storm water have been conducted in southeast New Brunswick through a spatial risk analysis. These methods consisted of (1) creating a database of natural assets (2) identifying the location of beneficiaries of the service, (3) identifying threats to the service and (4) estimating the risk considering the impact and likelihood of loss of the service. Over the next year, the Southeast Regional Service Commission has partnered with the Municipal Natural Assets Initiative to then conduct an in-depth analysis to better of understand the services of those natural assets. These methods provide the evidence required to make investments in natural assets, and strategies will be developed to protect and manage those natural assets overtime.



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**Bio:** James Bornemann is a geomatics analytics with the Southeast Regional Service Commission in NB. He began his GIS and cartography education at the University of Northern BC before completing a B.Sc. in Geodesy and Geomatics Engineering and M.Sc. at the University of NB. In addition to his day-to-day job of supporting land planning, James is currently involved in several initiatives including: coastal and inland flood mapping considering climate change, mapping and modelling ecosystem services, asset management and delivery of various services using web maps. He sits on various committees, enjoys mentoring students and is always interested in working with others to find geomatics solutions to every day problems, especially if it involves LiDAR.

### **Talk 27: GeoPDFs Ian Holmes, GeoNOVA**

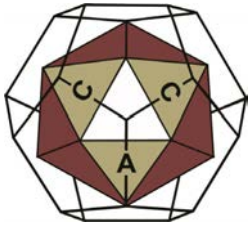
GeoPDFs are a combination of both the orthophoto and topographic maps from the Nova Scotia Resource Mapping Series into a high resolution interactive PDF that can perform basic GIS operations.

This product was created using the TerraGo Publisher extension inside a dynamic mxd, which was assembled using the Data Driven Pages extension. To give the user the ability to view and print the Orthophoto and Topographic maps separately inside of adobe, the legend was displayed as map features inside a separate data frame and both the map features and legend features were separated into Orthophoto and Topographic group layers.

The final product gives the user the ability to turn layers on and off, view coordinates, measure features and import shapefiles inside of Adobe.

There are currently 354 Geo PDF's available in the Annapolis, Kings and Colchester areas.

**Bio:** Ian Holmes has been the Coordinator of Topographic Mapping at the Nova Scotia Geomatics Centre since 2006. Ian leads a team of seven technicians who are responsible for the update and maintenance of the Nova Scotia Topographic data base, aerial imagery and, more recently, the procurement of LiDAR data. Ian is a graduate of the Surveys and Mapping Program, Algonquin College, Ottawa, and has worked in the mapping industry for the last thirty years across Canada and in the Middle East. In his free time, Ian plays guitar in a local country band.



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### **Talk 28: Regional Mapping with GIS in Today's World** **Sylvain Gagnon, TomTom**

This presentation gives an overview of Sylvain's GIS projects at TomTom which are focused on the North America Region.

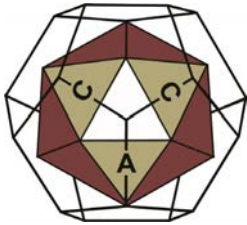
**Bio:** Sylvain is a 2013 graduate of the Diploma in Geographic Sciences – GIS Concentration. Following his GIS studies at COGS, Sylvain pursued an Undergraduate Degree in Geography from Saint Mary's University and graduated in 2015. Sylvain was then hired by TomTom and started out as a Geographic Sourcing Analyst, where his main responsibility was to maintain the Regional map data attributes for Atlantic Canada. Following that, Sylvain has been progressing in his career with working on larger projects including the Canada Census Project in 2017, which resulted in a trip to India to the TomTom Map Production Unit. As of 2018, Sylvain is an Associate GIS Engineer and focuses on Map Data process improvement, geoprocessing task automation and problem solving.

### **Talk 29: Southwest Nova Biosphere Reserve (SNBR) Interactive Science Atlas** **Ian Manning, Research Associate, Environment and Agriculture Technology Lab** **(NSCC Applied Research)**

The Southwest Nova Biosphere Reserve (SNBR) Interactive Science Atlas is a web-based atlas created for the UNESCO Southwest Nova Biosphere Reserve. The atlas provides a centralized access for information about southwest Nova Scotia, scientific datasets, and ongoing/historic research activities. The atlas is a learning tool for students and landowners, and provides a location for NGO's/Universities/Researchers to share research outcomes.

The Southwest Nova Biosphere Reserve (SNBR) Interactive Science Atlas is a web-based atlas created for southwest Nova Scotia. The atlas provides freely available current information describing the Southwest Nova Scotia Region and interactive content to create an engaging learning experience. The atlas is designed for high school, post-secondary students and landowners to support learning and best practices surrounding land management in the region. The atlas will be a useful tool for researchers/research groups to spread their work to a wider more diverse audience and increasing awareness of the regions scientific richness and globally recognized UNESCO designation.

**Bio:** Ian Manning grew-up in Canning, a small-town in the Annapolis Valley. With a background in forestry/wildlife management, Ian graduated from COGS with an Advanced Diploma in Geographic Sciences and a MSc in Applied Geomatics from Acadia University. Ian works at NSCC Applied Research in Middleton. His research interests include: UAV remote sensing, image processing, data visualization, and GIS as a communication tool. In his spare time Ian enjoys sports, nature and coaching badminton.



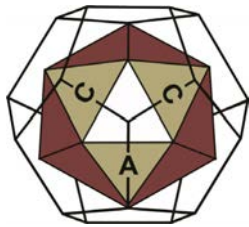
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### **Talk 30: Deep Learning and Map Production: From Raw Data to 'Finished' Product** **\*Dr. Christopher D. Storie, Department of Geography, the University of Winnipeg** **Dr. Christopher Henry, P. Eng., Department of Applied Computer Science,** **the University of Winnipeg**

The importance of accurate and timely information describing the nature and extent of land resources and changes over time is increasing. Consequently the accurate production of these land use/land cover maps (LULC) is of critical importance in satisfying this need. The creation of thematic maps, such as those depicting LULC, using an image classification approach is one of the most common applications of remote sensing, however, the accuracy and consistency of the maps can vary over time and between different analysts. As such, the automation of LULC map production is of particular interest to a variety of different stakeholders. Since 2012, deep learning neural networks (DLNN) have made great strides in the area of image segmentation, our work builds on these advances and adapts them to the application of per-pixel classification of satellite imagery. When properly trained, a neural network can classify data at remarkable speeds and more importantly the same way each time. This presentation details the development of a customized DLNN for the analysis of Landsat satellite imagery to produce provincial LULC maps for Manitoba. The talk will focus on three key areas: data preprocessing, the background and development of the DLNN, and data post processing. The benefits as well as the challenges to the development of this approach will be highlighted.

**Bio:** Chris is an Associate Professor in the Department of Geography at the University of Winnipeg. His research focusses on the analysis of big data within the field of remote sensing. He uses high performance computing to assist in the training and development of deep learning neural networks. His current research focuses on the semantic segmentation of satellite imagery into land use/land cover classes. He also is the Chair of the Board of Directors of the Churchill Northern Studies Centre where he is constantly trying to take pictures of polar bears.



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### **Talk 31: Time series Sentinel-1 SAR Analysis for Forest Structure and Biomass Detection**

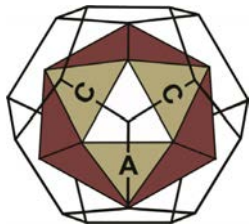
**Authors: Joni Storie1\* and Neil Sims2**

**1. Associate Professor, Department of Geography, University of Winnipeg**

**2. Commonwealth Scientific and Industrial Research Organisation (CSIRO)  
Land & Water, Clayton, VIC**

The purpose of this research was to analyze a time series of SAR image data (C-band, dual-polarization HH, HV acquired using Sentinel-1 satellite) to extract forest structure and biomass characteristics. This project, conducted within the context of the Global Forest Observation Initiative (GFOI.org), focusses on improving assessments of forest degradation, which is a reduction in forest biomass in areas that remain forest (as opposed to being converted to agriculture, for instance). Forest degradation can be difficult to measure from satellite images, and often occurs in the understory while the canopy remains intact. The study area is Robson Creek (Queensland, Australia) which supports some of Australia's highest forest biomass. This analysis was conducted in the European Space Agency's (ESA) open source Sentinel Application Platform (SNAP) software. A time series of Sentinel-1 data that had been terrain corrected using a Digital Terrain Model (from LiDAR). Dobson et al., (1992) showed that HH- and HV-polarization provide a greater sensitivity to Above Ground Biomass (AGB) than VV-polarization but saturation of the signal reduces AGB discrimination potential (Kellendorfer et al., 2014). However, Santoro et al. (2011) demonstrated that accurate estimates of forest growing stock volume (GSV) can be retrieved from C-band backscatter data if a long-time series is available. Potential information extracted from the SAR time-series includes canopy profiles and condition (health matrix including Leaf Area Index, Normalized Difference Vegetation Indices, etc).

**Bio:** Joni is an Associate Professor at the University of Winnipeg. Her research is focused on remote sensing for vegetation mapping and spatial analysis of food. Joni's passion for travelling resulted in this collaboration from Australia.



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### **Talk 32: Mapping the ever-changing landscapes of Sable Island, Nova Scotia** **David Colville, Faculty, COGS**

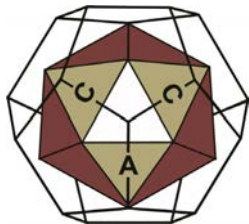
Sable Island, a crescent-shaped sandbar ~45km long located ~300km southeast of Halifax, became a National Park Reserve in 2013. By that time, COGS-AGRG had already completed two aerial surveys to map the island, one in 2002 and another in 2009. In 2014, in conjunction with Parks Canada, a third survey was conducted. The 2002 survey collected 0.5m resolution photography while the 2009 and 2014 surveys collected 0.15m photography and LiDAR. Each survey was supported with a ground campaign to sample the vegetation and topography, which was used in mapping the vegetation communities from the island-wide image mosaics that were created; the latter two surveys additionally produced digital surface models to support topographic analyses. This year, work with Parks Canada has continued with the creation of image mosaics from 1959, 1963, 1972, and 1996 aerial photography, and Landsat-based classifications from 1972 to 2017. The overall focus of these mapping efforts has been to better understand the ever-changing topographic and vegetation landscapes of Sable Island. This presentation will highlight some of these efforts and corresponding results.

**Bio:** David has been teaching and practicing geospatial analytics for more than 30 years at the NSCC's Centre of Geographic Sciences (COGS) and Applied Geomatics Research Group (AGRG). A graduate of the Scientific Computer Programming diploma program (NSLSI) with a Bachelor of Science in Biology (Acadia) and a Master of Environmental Studies (Dalhousie), David has focused his efforts on the application of geomatics technology to the understanding of environmental landscapes. He has led numerous projects focused on meteorological monitoring and modeling, agricultural site selection, topographic and land cover mapping, and habitat change analysis. As an Adjunct Professor with Acadia University, David supervises students in the Master of Science in Applied Geomatics program (a joint program offered by the NSCC and Acadia University).

### **Talk 33: Cold as Ice / Glacier mapping in Canada from space and LiDAR** **Roger Wheate, UNBC**

The topographic community has a continuing tradition of glacier mapping commencing with the Canadian technique of photo-topography from 1885 to 1950, followed by specialty products in the following decades. From the mid-1980s we can utilise satellite imagery to monitor glacier extents and more infrequently glacier elevations. In the new millennium, LiDAR data have become increasingly available to map glacier surfaces and show change where multiple datasets are captured. This presentation will briefly review historic glacier mapping and then focus on selected glaciers - in the Rocky Mountains, closest to Prince George, BC - and the subject of a targeted LiDAR mission to establish ice elevation in summer 2017. Data processing incorporates digital image processing, GIS and of course cartography and visualisation. Results show ongoing glacier retreat and downwasting, although not necessarily at an increasing rate.

**Bio:** Roger Wheate teaches cartography, GIS and remote sensing at the University of Northern BC. Over the last 20 years, his research has focussed on mapping glacier change in western Canada using remotely sensed and historic data. He is a past-president of the CCA and current Canadian delegate to the ICA.



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### Talk 34: QGIS and Graphics Applications Jim Todd, TODD Graphic

Trained originally as a mechanical draftsman, Jim worked as a piping specialist with Canadian-British Engineering Consultants in Halifax, NS. At a time before computer use, AutoCad or Arc, all plans were drawn on Mylar with technical pens, compasses, railroad pens, ellipse and curve templates. The drawings were printed on ammonia-sensitive paper to create “white prints”. Jim eventually took an opportunity to return to the Annapolis Valley to work as a mapping technician for Municipal Affairs in the Annapolis-Digby Region. The transition to cartography from engineering drafting was an easy one, as production methods were the same, requiring the same hand-drawn skills.

After a number of years, and with the Region’s property mapping complete, Nova Scotia undertook the “Initial Lift”, where the hand-drawn mapping was digitized, becoming the basis of the Nova Scotia Property Layer we now have.

Having worked himself out of a job, Jim struck out on his own for the next few years, drawing editorial cartoons for national syndication with Southam News, Toronto. When the syndication business proved less than dependable, Jim began supplementing his income with graphic design work, and for the first time started working with computers and related graphic design software.

Demand for cartographic products has since become a significant component of his graphic business, thanks to open-source QGIS and its functionality with Corel and other graphic software.

**Bio:** TODD Graphic offers over 30 years of experience in graphic design, working in PC format - compatible with clients’ most popular software applications and industry output processes. TODD Graphic supports CorelDraw Graphic Suite; Dreamweaver; Illustrator; PhotoShop; QGIS and other related GIS/GPS software.

For 12 years, Jim was an internationally syndicated cartoonist and illustrator with Southam News Syndicate, Ottawa. His work has appeared in most major Canadian daily newspapers, including the Montreal Gazette, Globe and Mail, Ottawa Citizen, and the Vancouver Sun.

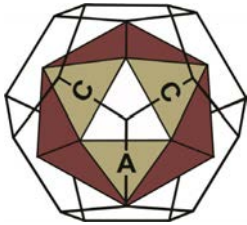
His work has been reprinted internationally in a variety of editorial cartoon anthologies including “Portfolio: The Year in Canadian Caricature”, MacMillan, and the “Best Editorial Cartoons of the Year”, (USA) Pelican.. His work was published in “POLL CATS - A Collection of Political Cartoons by J.F. Todd”, Lancelot Press, 1993.

His illustrations have appeared in a variety of internationally published magazines. He is a member of the American Association of Editorial Cartoonists, the Association of Canadian Editorial Cartoonists, and served on the latter’s Advisory Board to the National Archives as Vice-President. He was the winner of the 1991 Atlantic Journalism Award for Editorial Cartooning.

He was employed as a contract instructor of MultiMedia Graphic Design and Aerial Photography Interpretation at the Centre of Geographic Sciences, Lawrencetown, NS, and has an extensive background in cartography, property law, survey and GIS/GPS principles.

He is an avid canoeist and outdoorsman, and has traveled extensively through the back country of western Nova Scotia. He is a founding member of the Tobeatic Wilderness Committee and is active in that group’s continuing efforts to protect this area.





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### **Talk 35: Lives in Motion: How mapping migration in Southern Ontario between 1861 and 1871 can help us understand the nature of settler society**

**Gordon Darroch, Byron Moldofsky (presenter), Haydi Wong  
Byron Moldofsky, BMMaps GIS and Cartographic Consulting**

Local and regional migration remain largely absent from the central narratives of Canadian history and of the historical social science of settler societies. The most deep-seated and influential assumption is that the people of the past were stuck in place. Currently for nineteenth-century Ontario we have no clear answers to core migration questions: how much, who, why and with what consequences? This project explores ways of mapping the movements of a sample of individuals and families who researchers were able to link between the 1861 and 1871 Canadian Census records. Using cartographic methods to untangle the movements of actors over space and time is one of the ongoing challenges of historical GIS, and several approaches are investigated here.

**Bio:** Byron Moldofsky acquired a diploma in Cartographic Techniques from Seneca College in 1977, an MA in Geography and Cartography from Queen's University in 1989, and worked as a Cartographer, GIS analyst, lecturer, project manager and web-mapper in the Department of Geography at University of Toronto for 37 years, until last November. Projects include the Historical Atlas of Canada, Historical Atlas of Central Europe, Records of Early English Drama web-mapping, and the Canadian Historical GIS Partnership. He is now working as a freelance consultant for all things mapping.

### **Talk 36: Introduction to Close Range Terrestrial Photogrammetry Paul Illsley, Research Associate, Environment and Agriculture Technology Lab (NSCC Applied Research)**

With recent developments in advanced digital photogrammetric software we are now able to create accurate maps and 3D models of local landmarks and objects using off the shelf digital cameras. We will explore the techniques and best practices necessary to record digital imagery for the purpose of generating high quality 3D digital models from a terrestrial perspective.

Paul possesses over 35 years of photographic experience with a specialty in research imaging, photomicrography, and airborne imaging. Paul's images have been published by National Geographic, used by The Royal Canadian Mint in the form of a coin and by Canada Post in the form of a stamp. His images have been featured in international publications, used by Parks Canada as well as other national and international government organizations.

**Bio:** Paul has served as imaging specialist on a NASA and National Geographic sponsored airborne laser mapping (LiDAR) project in the Peruvian Andes and as an instructor of Cartography, Remote Sensing, and Research Imaging on the Juneau Icefield Research Program (JIRP) in Alaska. Paul is an award winning graduate and former Instructor of Remote Sensing and Digital Mapping in the Cartography department at the Centre of Geographic Sciences (COGS) in Nova Scotia, Canada where he specialized in digital cartography as well as aerial imaging and remote sensing, he has experience developing compact airborne imaging systems and has been a cartographic consultant for the Discovery Channel and underwater imaging consultant for the History Channel.