

The Tale of Lost Fishing Gear

Abandoned, Lost and Discarded Fishing Gear in Southwest Nova Scotia

Leah Fulton, MMM, Dalhousie University

October 15, 2021

[What is ALDFG?](#) [Impacts](#) [Untangling the Problem](#) [Gear Detection](#) [Gear Retrieval](#) [Research at-sea](#) [Sustainable Solutions](#)

Leah Fulton earned her Masters (in Marine Management) from Dalhousie in 2022. She created this [ArcGIS StoryMap](#) to highlight a problem that is not unique to the maritime marine environment. It features several local collaborative activities that are reducing the abandoned, lost and discarded fishing gear in coastal Nova Scotia. Leah was recognized as an Esri Storyteller of 2021, winning first place in Track 2, for students and young professionals. We're so proud of her accomplishments!

A Dalhousie newsletter about Data & GIS



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IN THIS ISSUE

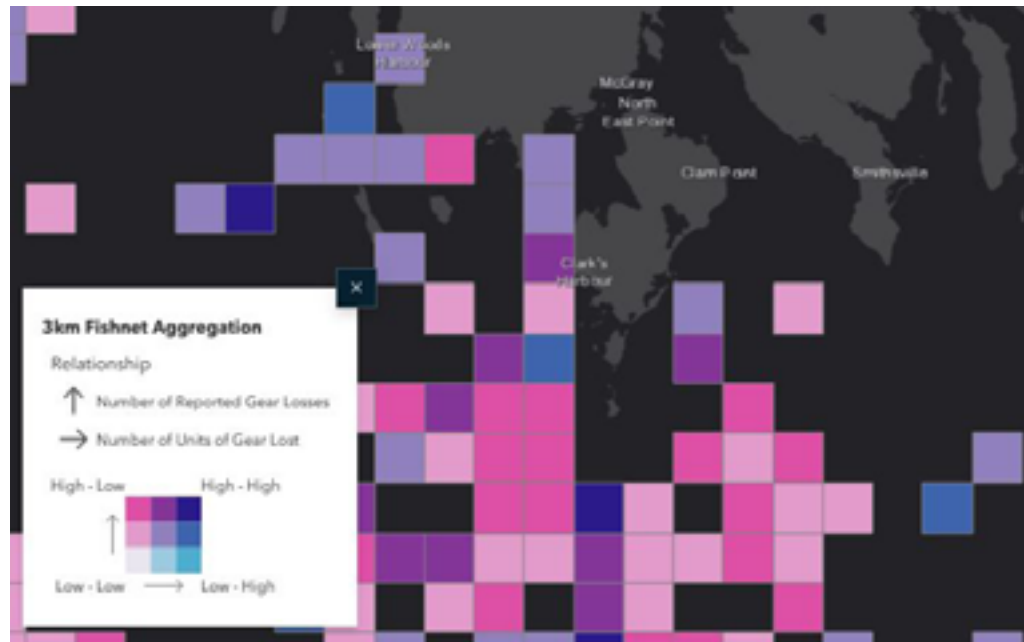


Ghost Gear StoryMap

We're talking about traps, netting, ropes and cables. Ghost gear in our coastal ocean has negative environmental, social, and economic impacts. This award-winning storymap was created by Leah Fulton (MMM, 2022) and highlights an adverse side effect of the fishing industry.

Self-reported data from local fishers was used to help identify search areas. Next, spatial analysis of the geographic locations can help identify lost gear hotspots.

In collaboration with the Ocean Tracking Network, the at-sea research team conducted 12 days of data collection in Clark's Harbour, Nova Scotia, which was then used to inform lost gear retrieval missions.



Reported lost fishing gear as of June 2021 aggregated to 3km x 3km cells. Using a bivariate colour scheme, the results highlight cells where a high number of reported gear losses and a high number of gear lost exist. (Data obtained by Fisheries and Oceans Canada.)

Retrieval missions require a network of individuals working towards the same goal. Without collaborations between local fishers, industry leaders, and government agencies, the gear retrieved would still be sitting

on the bottom of the seafloor.

Note: The goal of this project is to reduce, assess, and prevent ghost gear in the region. This ongoing project is part of the larger “Collaborative Remedi-

Ghost Gear StoryMap (continued)

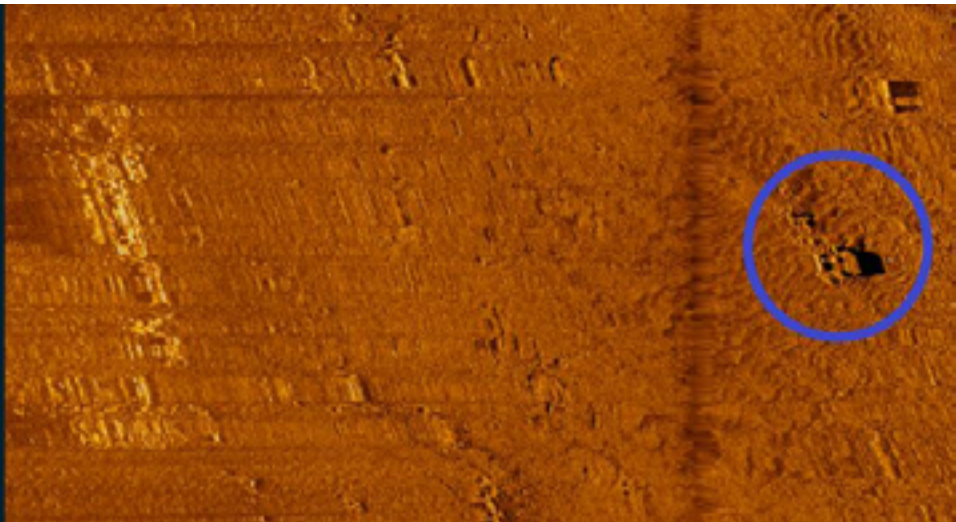
Layers

09

November 2022

Location Matters

GPS positioning and [Chesapeake SonarWiz](#) acquisition and mosaic software allows the creation of high-resolution imagery to geo-reference representations of the seafloor. The information such as locations of ghost gear and seafloor conditions, including habitat type and bottom roughness, provides greater detail in focusing our searches for retrieval.



Pictured in the centre of the image is a lobster trap, embedded in the soft, muddy bottom.

ation of Abandoned, Lost and Discarded Fishing Gear (ALDFG) in Southwest Nova Scotia” led by [Coastal Action](#), and funded by [Fisheries and Oceans Canada \(DFO\)](#) through the [Sustainable Fisheries Solutions & Retrieval Support Contribution Program](#) (Ghost Gear Fund).

We have featured StoryMaps that highlight interesting research projects in past issues of this newsletter. The research paper

that accompanies this Story-Map was published in the *Marine Pollution Bulletin*. It documents that local fishers “conducted 60 retrieval trips, searched approximately 1,523 km² of the seafloor and removed 7,064 kg of ALDFG (comprising 66% lobster traps and 22% dragger cable).”

Goodman AJ, McIntyre J, Smith A, Fulton L, Walker TR, Brown CJ. 2021. Retrieval of abandoned, lost, and discarded fishing gear in

Southwest Nova Scotia, Canada: Preliminary environmental and economic impacts to the commercial lobster industry. *Marine Pollution Bulletin*. 171:e112766. <https://doi.org/10.1016/j.marpolbul.2021.112766>

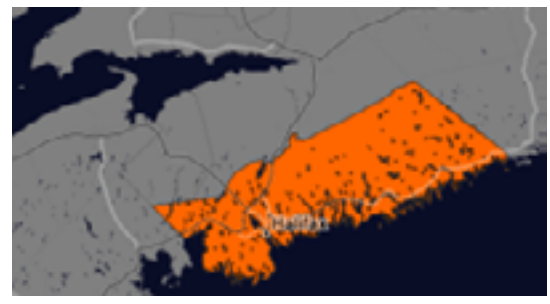
If making a Dalhousie StoryMap interests you, please contact us at gis@dal.ca

CMA's Expand in Atlantic Canada

Statistics Canada recognizes urban areas in our country as Census Metropolitan Areas or CMA's. In the 2021 Census there were more than 40 designated metropolitan areas across Canada. In terms of population, Halifax is twelfth on the overall list. This is important to know because the data collected in urban areas is more comprehensive than data collected in rural areas.

For the 2021 Census, Atlantic Canada contained 5 CMA's (Halifax, St. John's, Moncton, Saint John, and Fredericton). Next in the population hierarchy are Census Agglomerations or CAs. Atlantic Canada currently has 13 CAs (Cape Breton, Charlottetown, Truro, New Glasgow, Bathurst, Corner Brook, Miramichi, Kentville, Edmundston, Summerside, Grand Falls-Windsor, Gander, and Campbellton).

DEFINITIONS: A CMA must have a total population of at



The Halifax CMA in 2016 (on left) matched the HRM boundary. The Halifax CMA in 2021 (on right) was expanded beyond the HRM boundary and now includes East Hants County.

least 100,000 of which 50,000 or more must live in the core, based on adjusted data from the previous Census of Population Program. A CA must have a core population of at least 10,000 also based on data from the previous Census of Population Program.

CMA's will change over time. For example, Fredericton is a CMA in 2021, but was not one in 2016. Other metropolitan areas are known to expand. Sometimes this expansion includes adding a CA to a CMA and other times it is simply an expansion of physical area (representing spatial

growth). Recognizing growth is very helpful for planning purposes (e.g. transportation and food security).

FACT: Between the census taken in 2016 and then more recently in 2021, the population of the Halifax CMA increased from 426,932 (2016) to 465,703 (2021) – this represents a 9.1% population increase.

The boundaries of the Halifax County and Halifax Regional Municipality (HRM) have been the same since 1996. From then until 2016, the Census boundary of the Halifax CMA matched

CMAAs Expand in Atlantic Canada (continued)

the administrative boundary of HRM. Digging deeper into the data reveals that in 2021, Statistics Canada has expanded the Halifax CMA to include not only all of Halifax County but all of East Hants County. The reason provided by StatCan is based on data from the 2016 census, that “more than 50 per cent of the labour force in East Hants commutes to the HRM for work”.

QUESTION: Does blending together characteristics of HRM commuters who regularly use the 100-series highways and the Bay of Fundy community residents support a more robust model for making data-based decisions?

You are our research community and most of the 2021 Census data is ready for use. The final themed release will take place on November 30, 2022. It will feature the changing dynamics of the Canadian labour force and how people get to work.

Atlantic CMA	2016 Census of Population	2021 Census of Population	Change
Halifax	426,932	465,703	+9.1%
St. John's	208,418	212,579	+2.0%
Moncton	144,810	157,717	+8.9%
Saint John	126,202	130,613	+3.5%
Fredericton	102,690	108,610	+5.8%
Atlantic CA			
Cape Breton	98,722	98,318	-0.4%
Charlottetown	71,821	78,858	+9.8%
Truro	45,753	46,157	+0.9%
New Glasgow	34,487	34,397	-0.3%
Bathurst	31,110	31,387	+0.9%
Corner Brook	30,969	29,762	-3.9%
Miramichi	27,518	27,593	+0.3%
Kentville	26,222	26,929	+2.7%
Edmundston	21,955	22,144	+0.9%
Summerside	16,831	18,157	+7.9%
Grand Falls-Windsor	14,171	13,853	-2.2%
Gander	13,234	13,414	+1.4%
Campbellton	14,679	13,330	-9.2%

Every five years, population growth in Canada is collected and disseminated by Statistics Canada.

Data Linkages in Research Data Centres

Data linkages make it possible to connect Statistics Canada surveys to clinical or administrative datasets. This new feature provides researchers with access to additional variables of possible interest for their analysis, but they are only available within the Research Data Centres (RDCs).

Example: [The Survey of Household Spending – Cancer Cost linkage](#) allows researchers to explore financial barriers to cancer treatment and care by linking data from the Survey of Household Spending with several other surveys including the Canadian Cancer registry, the Discharge Abstract Database, the National Ambulatory Care Reporting System, the Canadian Vital Statistics' Death Database, and the T1 Family file.

Finding Data Linkages

Search for "linkage" on the [Canadian Research Data Centre Network's data page](#). You might also want to search for

Data

The microdata used by CRDCN researchers come primarily from Statistics Canada Survey Master files. Increasingly, the Research Data Centres (RDCs) are repositories of administrative records from a variety of sources including tax, employment insurance, social assistance, and hospitalization records. To find out more, visit our [Understanding Microdata](#) page. If you would like to have access to the data in the RDCs please visit the [Accessing RDC Data](#) page.



Search for "linkage" on the Canadian Research Data Centre Network's data page. You might also want to search for "administrative" to view datasets available in the RDC's microdata collection that aren't typically available through other sources.

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The [Atlantic Research Data Centre \(ARDC\)](#) is located in the Killam Library. The Academic Director is Dr. Casey Warman (Department of Economics), the Analyst is Dr. Theresa Kim and the Project Administrator is Monique Comeau.

Administrative Data

Statistics Canada defines [Administrative data](#) as "information collected by government or private sector organizations as part

of their ongoing operations. Examples include records of births and deaths, taxation records, records about the flow of goods and people across borders, and data collected by satellites." Statistics Canada regularly uses administrative data to enhance our official statistics. You can read about it and find examples at the bottom of their [Using data from public and private sector sources to produce statistics](#) page.

Examples: Statistics Canada collects [Cannabis sales and inventory data](#) from provincial and territorial governments to en-

hance the [Monthly Retail Trade Survey](#); and the [Land registries and property assessment data](#) is used to enrich the [New Housing Price Index](#).

Educational Resources

Statistics Canada occasionally produces [resources for use by students or educators](#). For example, the [2021 Census Postsecondary Research Kit](#) goes over topics covered by the Census of Population, how researchers have used census data, census resources for students, what type of resources are available, and how to cite census data.

A separate product, the [Data Literacy Learning Catalogue](#), provides a sequence of interesting videos and related resources that demonstrate the data journey from start to finish. Keep in mind that you can also reach out to Data Librarian Julie Marcoux (Julie.Marcoux@dal.ca) with your data questions, or to request in-class workshops on various data topics including the Canadian Census.

From Data to Map Series

The Dalhousie Data Librarian's [From Data to Map](#) series of slides and screen recordings has been updated for the 2021 census. It uses Halifax Census Tracts as an example to demonstrate how to download census data from Statistics Canada and shape it in Beyond 20/20, how to manipulate data in Excel to prepare it for use in GIS Software, how to download boundary files compatible with GIS software from Statistics Canada, and how to put it all together in ArcGIS Pro to visualize census data in a map.

2021 Census of Population Data Releases

The [2021 themed releases](#) are still ongoing. The latest release on October 26 covered the topics of citizenship, immigration, ethnocultural and religious composition of the population, and mobility and migration. The



A visualization of the data journey, from start to finish.

next release on November 30 will cover the topics of education, Canada's labour force, people's journey to work, and instruction in the minority official language.

ArcGIS after the Windows .NET Update

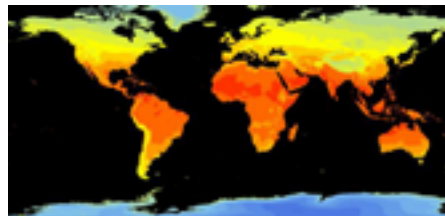
Using ArcGIS Pro (versions 2.8 and 2.9) with the most recent .NET update causes the GIS software to crash when changing symbology. This problem has no impact on computer lab workstations or the virtual implementation, where both programs are images, representing a time period before the Windows update. However, if you are running a stand-alone ArcGIS Pro application, you may have already encountered the problem. A patch has been generated and needs to be installed on individual computers to fix the problem. If this applies to you, the patch can be obtained from the [GIS Centre](#). Expect a better solution for the winter term. We hope to re-image all machines, incorporating the fix, while also enabling us to support all users at the same level. Our goal is to move from ArcGIS Pro 2.9.4 to ArcGIS Pro 2.9.5. For more information, consult [Esri's blog post](#).

Datasets to Explore

The GIS Centre continues to send you data links for a wide range of topics for use with GIS software. Please bookmark them for your use now and in the future!

WorldClim

Worldwide historic and future climate raster data in multiple resolutions (10 min, 5 min, 2.5 min, 30 sec). Variables



include temperature, precipitation, solar radiation, and wind speed.

Two Countries One Forest

These datasets highlight the Northern Appalachian/Acadian Ecoregion. The data covers a wide range of topics important to conservation. Various datasets are in either raster or vector data formats.



Marine Vessel Traffic

Vessel traffic data in U.S. and international waters are collected by the U.S. Coast Guard in real time. Users can access this Automatic Identification System (AIS) data of marine traffic as .csv files. This data can easily be brought into various GIS programs including ArcGIS Pro. Contains links to other tools that can be used to access other U.S. marine-based datasets like marine boundaries, shipwrecks, oil and gas leases (also in a GIS format).



Educational Resources

Pardon the cliché, but education and research have always been in flux. The pandemic has exacerbated this and there is certain to be much more said about the changes we've had to deal with, and more pedagogical research is just starting to tackle the good, bad, and ugly of what happened and what may happen.

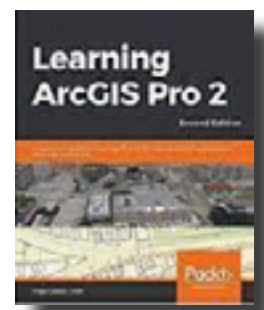
Dealing with change requires communication, whether that be informally amongst peers, with colleagues at conferences, or more formally in the literature. Here are some resources highlighting opinions for teaching and research within the broad domain of spatial sciences. As Dalhousie moves forward with deeper and broader spatial research, this may be a good time to see what others are doing.

Books

[Learning](#)

[ArcGIS Pro 2](#)
Tripp Corbin.
(2020)

Learn how to create 2D maps and 3D scenes, ana-



lyze GIS data, and share your results with the GIS community.

[New Thinking in GIScience](#)

Li B, Shi X, Zhu A-X, Wang C, Lin H (Editors).
(2022)

From the Springer Series: Advances in Geographic Information Science



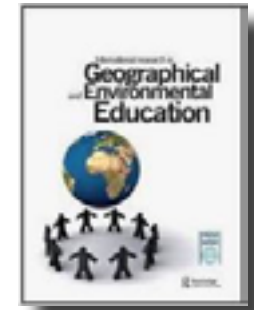
Journals

Here are two journals that support the ideas and efforts of the International Network for Learning and Teaching Geography (INLT).

[Journal of Geography in Higher Education](#)



[International Research in Geographical and Environmental Education](#)



Websites

[Royal Geographical Society](#)
Higher education resources for geography

[Canadian Association of Geographers](#)
Geographic Education Study Group

[American Association of Geographers](#)
National Center for Research in Geography Education

As with anything, these are only a few examples of relevant sources. There are some in remote sensing, geodesy, GIS, spatial statistics, and others in closely allied disciplines (such as planning or epidemiology). Reach out if you want more suggestions because we're here to help, as we all continue to live, work, and cope with flux.

Layers

09

November 2022

Dates & Events

Open Workshop

Wednesday, November 9

Creating Satellite Mosaic Imagery in ArcGIS Pro vs. Catalyst

This 90-minute workshop was held by Dr. Chris Greene in the GIS Lab. It featured a walk through on how you mosaic satellite imagery in ArcGIS Pro (for which we have a site license) and Catalyst (the remote sensing package used in ERTH4530). The focus was on Landsat and Sentinel multispectral optical imagery.

Esri Canada - GIS Day in Canada - Tech Talks

Tuesday, November 15

- *Data Engineering: Drive to Analyze*
1–1:30 p.m. (AST)
- *ArcGIS Field Maps: smarter forms for map-based mobile data collection*
2–2:30 p.m. (AST)
- *How Did They do That? ArcGIS StoryMaps Edition*
3–3:30 p.m. (AST)
- *How to do Analysis with no Data!?*
4–4:30 p.m. (AST)

Thursday, November 17

- *Deep Learning in ArcGIS Pro*
1–1:30 p.m. (AST)
- *Empowering Your Digital Twin with 3D*
2–2:30 p.m. (AST)
- *Configuring an Indoor Positioning System*
3–3:30 p.m. (AST)
- *Storytelling with Maps: Then and Now*
4–4:30 p.m. (AST)

Acenet Workshops

Wednesday, November 16

- [Introduction to Regular Expressions](#)
1–4 p.m. (AST)

Wednesday, November 23

- [OpenRefine](#)
1–4 p.m. (AST)

Wednesday, November 30

- [Introduction to Research Data Management](#)
1–4 p.m. (AST)



Gwen visiting the Pyramids of Giza, where time stands still and geometry greets the desert sand.

Saying Goodbye

Gwendolyn has been the Coordinator of Data & GIS Services since 2016, when the role was created by the Dal Libraries. Her retirement date is approaching and her last day with us will be on Friday, November 18. Our team of specialists works with students, staff and faculty members on all campuses. We support teaching and learning activities and research projects. Our service model supports both virtual and in-person activities. Future support will come from all team members, James Boxall, Jen Strang, Thomas Zuberbuehler and Sai (Choi) Chua; plus our new Coordinator of Data & GIS Services, Julie Marcoux.

Layers

09

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Find past issues of *Layers*



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