



Inuit Nunangat Coastline Length and Land Area Calculations



About Inuit Tapiriit Kanatami

Inuit Tapiriit Kanatami (ITK) is the national representative organization for the 65,000 Inuit in Canada, the majority of whom live in Inuit Nunangat, the Inuit home land encompassing 51 communities across the Inuvialuit Settlement Region (Northwest Territories), Nunavut, Nunavik (Northern Québec), and Nunatsiavut (Northern Labrador). Inuit Nunangat makes up more than 40 percent of Canada's land area and more than 72 percent of its coastline. ITK represents the rights and interests of Inuit at the national level through a democratic governance structure that represents all Inuit regions. ITK advocates for policies, programs, and services to address the social, cultural, political, and environmental issues facing our people.

ITK's Board of Directors are as follows:

- Chair and CEO, Inuvialuit Regional Corporation
- President, Makivik Corporation
- President, Nunavut Tunngavik Incorporated
- President, Nunatsiavut Government

In addition to voting members, the following non-voting Permanent Participant Representatives also sit on the Board:

- President, Inuit Circumpolar Council Canada
- President, Pauktuutit Inuit Women of Canada
- President, National Inuit Youth Council

Vision

Canadian Inuit are prospering through unity and self-determination.

Mission

Inuit Tapiriit Kanatami is the national voice for protecting and advancing the rights and interests of Inuit in Canada.

Executive Summary

The majority of Inuit in Canada reside in Inuit Nunangat, the Inuit homeland encompassing 51 communities across the Inuvialuit Settlement Region (Northwest Territories and Yukon), Nunavut, Nunavik (Northern Quebec), and Nunatsiavut (Northern Labrador). Inuit Nunangat is also home to land, water, wildlife, flora, and thousands of kilometers of coastline.

For many Inuit communities, land and coastline – where land and ocean meet – are integral to life and survival. Most Inuit communities are located on a coastline to access marine wildlife and plants for hunting and gathering, including whales, beluga, seal, fish, mussels, and kelp. Being on the land is a core part of Inuit cultural practices, hunting and survival, knowledge transfer, and environmental stewardship.

Coastline is both a valuable and threatened part of the Canadian ecosystem. Coasts provide a home for many unique plants and animals, are a means of transportation, and are an early warning system for natural disasters and weather events. However, they are delicate – threatened by spills and marine pollution, increased marine traffic, permafrost thaw, climate change, erosion, and more. An accurate measurement of the length of the coastline of Inuit Nunangat is useful to understand the breadth of Inuit coastline stewardship, and to more effectively advocate for Inuit needs to support marine preservation and initiatives in Inuit Nunangat. Until now, there has been no calculation of the coastline length in Inuit Nunangat. A common heuristic is that half to two-thirds of Canada’s coastline lies within Inuit Nunangat.¹ The figure is likely higher.

Inuit Nunangat also spans a vast area of land. This land, along with coastline, is threatened by environmental phenomena including climate change and permafrost thaw, and is a place of competing geopolitical and economic interests. Many numbers have been used to describe the land area of Inuit Nunangat. Most commonly, documents will refer to Inuit Nunangat comprising one third, or 35% of Canada’s total land mass, though this figure is likely higher.²

This report documents the Inuit Tapiriit Kanatami’s efforts to finalize the calculations for the length of Canada’s coastline and land area located in Inuit Nunangat.

¹ National Inuit Strategy on Research - Inuit Tapiriit Kanatami. Inuit Tapiriit Kanatami, 2018, https://www.itk.ca/wp-content/uploads/2018/04/ITK_NISR-Report_English_low_res.pdf.

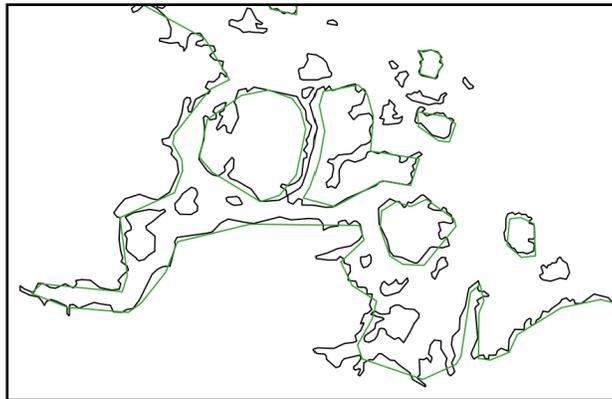
² National Inuit Strategy on Research - Inuit Tapiriit Kanatami. Inuit Tapiriit Kanatami, 2018, https://www.itk.ca/wp-content/uploads/2018/04/ITK_NISR-Report_English_low_res.pdf.

Coastline:

Background to Coastline Length

Coastline length is difficult to calculate exactly, as the calculated length will depend on the resolution of the map being used. For example, Figure 1 shows the coastline of part of Nunatsiavut. The green line shows a coastline map at a lower resolution, while black shows the same coastline map in a higher, more detailed resolution.

Figure 1: Nunatsiavut coastline at 5M (green) and 1M (black) scales



As the black, more detailed map has more islands and curves, the total coastline length will be longer than the green map. Coastline length will continue to increase as maps get more and more detailed.

The Government of Canada does not have specific scales or standards that are used to calculate coastline lengths in Canada. However, Statistics Canada's published estimate of the Canada coastline length is 243,042km, which can be used to determine the scale at which this estimate was created.³

Coastline Methodology

Government of Canada official geographic datasets can be found in the CanVec Topographic Data of Canada series.⁴ The CanVec Land Features dataset was used in this initiative because it includes shoreline data. The CanVec Land Features dataset contains shoreline data at five map scales: 15M, 5M, 1M, 250k, and 50k. 15M is the lowest resolution and 50k is the highest. The geographic information systems software QGIS was used for all visualizations and analysis.⁵

For the 5M, 1M, 250k, and 50k scales the shoreline data were modified by filtering the attribute table to remove freshwater shorelines, leaving only coastline (where land meets ocean). Data for other countries including the USA, Greenland (Denmark), Iceland, and Russia were also removed.

³ "International Perspective." Statistics Canada: Canada's national statistical agency / Statistique Canada : Organisme statistique national du Canada. October 7, 2016. <https://www150.statcan.gc.ca/n1/pub/11-402-x/2012000/chap/geo/geo01-eng.htm>

⁴ "Topographic Data of Canada - CANVEC Series." Open Government Portal. Government of Canada. <https://open.canada.ca/data/en/dataset/8ba2aa2a-7bb9-4448-b4d7-f164409fe056>.

⁵ "QGIS – A Free and Open Source Geographic Information System." QGIS. <https://qgis.org/en/site/>

Figure 2: Canada (grey) and Inuit Nunangat (coloured) coastlines at 5M scale



Geographic data can be accessed in QGIS in a table format, called attribute tables. Each row in the table represents a data point, or one piece of shoreline, such as a small island or a few kilometers of a river or coastline. The tables also provide metadata for each data point, including a unique identifier, the type of shoreline, and the province/territory associated with each datum. The type of shoreline column was used to separate coastline from other types of shorelines such as the edges of lakes and rivers. The province/territory column was used to split the data into coastline for Nunavut, the Yukon, Northwest Territories, Quebec, Newfoundland and Labrador, and the rest of Canada. Coastline for the Yukon and Northwest Territories was combined to create the Inuvialuit Settlement Region coastline. To create the Nunavik dataset, the Quebec dataset was split at the 55th latitude line and the southern portion facing the Atlantic Ocean taken away (shown in Figure 3). To create the Nunatsiavut dataset, the Newfoundland & Labrador dataset was manually modified, using a visual comparison with a map of Nunatsiavut (shown in Figure 4).⁶ Due to manual modification, some minor errors may be present.

⁶ Fugmann, Gerlis. "Land Claim Settlements and Their Impacts : Regional Dynamics and Bottom-up Economic Development in Nunavik and Nunatsiavut (Canada)." GEB. University of Giessen, March 2011. <http://geb.uni-giessen.de/geb/volltexte/2011/8182/>.

Figure 4: Nunavik coastline (red) at 5M scale

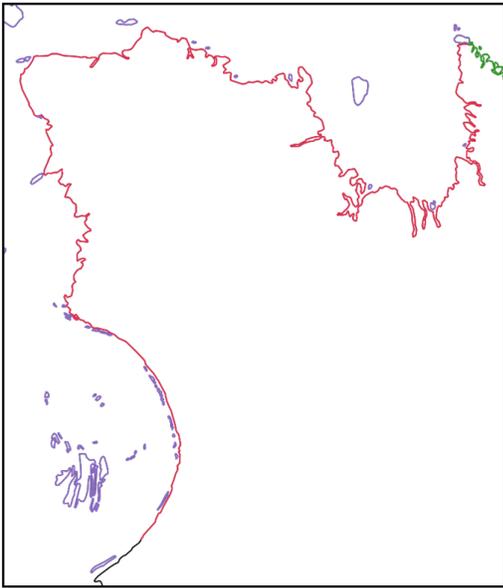
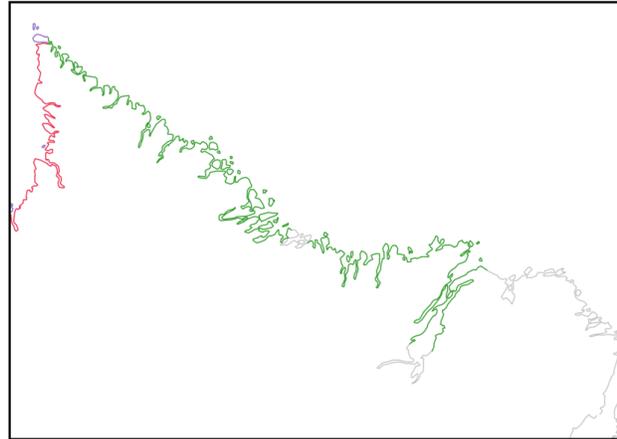


Figure 5: Nunatsiavut coastline (green) at 5M scale



In the higher resolution maps, there were several pieces of data—mostly islands in Hudson Bay and James Bay—that were not associated with a province or territory. From a visual inspection it was determined that these islands were all part of Nunavut, and so they were added to the Nunavut dataset. Several of the higher resolution maps also had significant overlaps between datasets of different regions. These overlaps were manually found and deleted to ensure the total Canada and Inuit Nunangat coastline lengths were accurate. In the 50k dataset, the St. Lawrence seaway was not considered coastline, and so the St. Lawrence seaway coastline was identified manually.

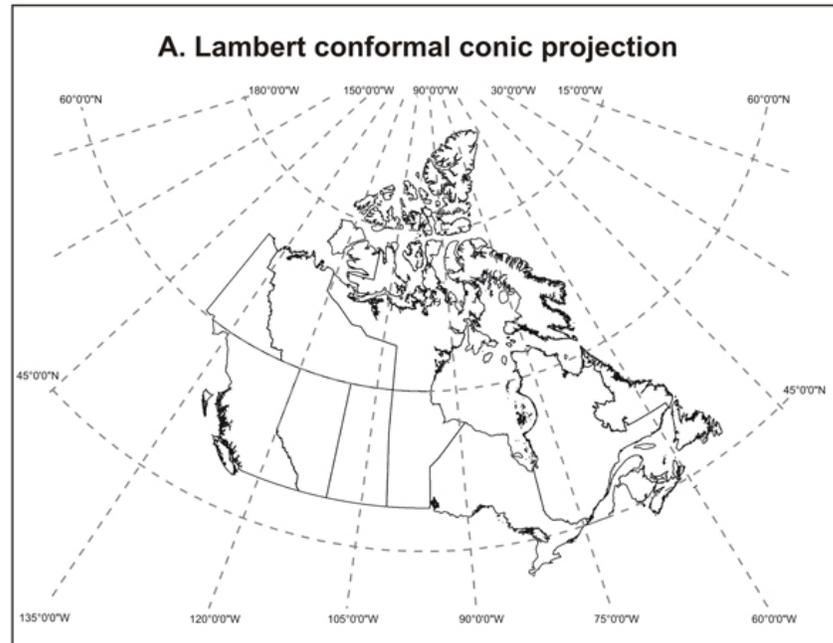
Once the datasets were separated by Inuit region, the Field Calculator function was used to calculate the length of each line in each region in kilometers. Then, the Basic Statistics function in QGIS was used to sum the coastline length of each region, and the whole of Canada, in kilometers.

The ‘projection’, or how a map is displayed, will affect the coastline length. Since the world is in three dimensions, representing it in two dimensions will always result in some inaccuracies. For example, the most common map projection, called Mercator, shows the world as a rectangle, grossly distorting the size of land around the northern and southern poles. Other map projections, such as the azimuthal equidistant projection used in the United Nations logo, distort land shapes, becoming increasingly inaccurate as you move further south.

A Lambert conformal conical projection centered on North America, shown in Figure 5, was used for all maps in this initiative as it is the most common projection used by Statistics Canada when creating maps that cover all of Canada.⁷

⁷ “Map Projection.” Statistics Canada, 2011. <https://www150.statcan.gc.ca/n1/pub/92-195-x/2011001/other-autre/mapproj-projcarte/m-c-eng.htm>

Figure 5: Lambert conformal conic projection of Canada



Coastline Length Results

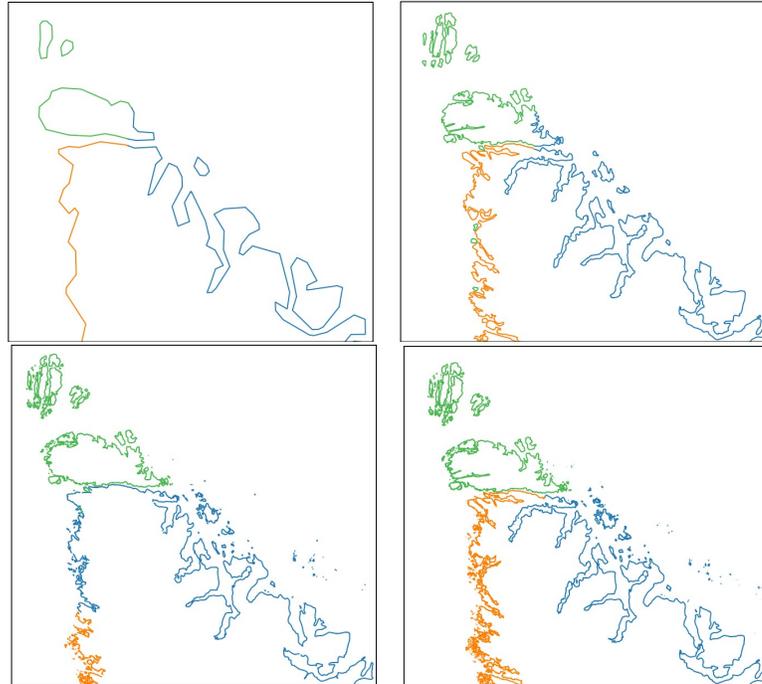
Coastline lengths were calculated at the five map scales provided in the CanVec database – 15M, 5M, 1M, 250k, and 50k. The total length of the Canadian coastline, the Inuit Nunangat coastline, and the resulting percentage of the Canadian coastline covered by Inuit Nunangat are shown at each of these five scales in the table below.

Table 1: Coastline calculations at different scales

Scale	Canada Coastline (km)	Inuit Nunangat Coastline (km)	Proportion of Coastline (%)
15M	64,400	48,944	76
5M	119,850	88,781	74.08
1M	207,306	150,732	72.71
250k	278,031	201,537	72.49
50k	327,027	240,420	73.46

Figure 6 shows snapshots of the Torngat Mountains National Park area at the 5M, 1M, 250k, and 50k resolutions (clockwise from top left), displayed here to illustrate why the coastline lengths differ at different scales. Nunavut is in green, Nunavik in orange, and Nunatsiavut in blue. The CanVec data did not always accurately portray provincial/territorial boundaries, which can be seen in these figures, particularly the 250k image. As this initiative sought to find the total Inuit Nunangat coastline, the boundaries within Inuit Nunangat did not need to be accurate so long as there were no overlaps and the outer boundaries of Inuit Nunangat were correct.

Figure 6: Torngat Mountains National Park at 5M, 1M, 250k, 50k scales



The Statistics Canada published estimate of Canada's coastline is 243,042km, which means it was calculated in between the 1M and 250k scales. The calculated percentages at these scales are 72.71% and 72.49%, respectively. As there may be some inaccuracies in the data or calculations to arrive at these figures, the recommended percentage for communications is 72%.

Land Area:

Land Area Methodology

Unlike coastline, land area calculations will not change drastically depending on the scale or resolution of the data. Land area calculations will continue to get more accurate as the resolution becomes higher. For the land area calculations for Inuit Nunangat, the area for each region was calculated separately or found from existing official figures.

The Inuvialuit Regional Corporation's subsidiary Inuvialuit Land Corporation's official figure for the total land area in Inuvialuit is 1,172,749 square kilometers, as found on their website.⁸

Nunavut's official figure for total land area, calculated by Statistics Canada, is 1,877,787.62 square kilometers, as found in the 2011 Focus on Geography calculations through the national census.⁹

Nunatsiavut's land area was calculated using figures from the Government of Newfoundland and Labrador. The Labrador Inuit Settlement Area, Labrador Inuit Lands, and Torngat Mountains National Park areas were added

⁸ Inuvialuit Regional Corporation. "Inuvialuit Land Corporation." Inuvialuit Regional Corporation. InuvialuitCorp. <https://irc.inuvialuit.com/business/inuvialuit-land-corporation>.

⁹ Government of Canada, Statistics Canada. "Focus on Geography Series, 2011 Census." Nunavut, March 26, 2019. <https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-pr-eng.cfm?Lang=eng&GC=62>.

together to obtain a total area of 101,020 square kilometers.¹⁰

There is no official figure for the total land area in Nunavik. The land area for Nunavik was calculated using the CanVec Inuit Regions dataset¹¹ with corrections from the CanVec Administrative Boundaries in Canada dataset.¹² The total land area of Nunavik was calculated to be 514,304 square kilometers.

The official figure for the total land area in Canada is 8,965,121.42 square kilometers, a figure developed by Statistics Canada through the 2011 Census.¹³

Land Area Results

Table 2: Land area in square kilometers by region

Region	Land Area (square kilometers)
Inuvialuit Settlement Region	1,172,749
Nunavut	1,877,787.62
Nunavik	514,304
Nunatsiavut	101,020
Total Inuit Nunangat	3,665,860.62
Canada	8,965,121.42

The percentage of Canada's land area in Inuit Nunangat, is then $3,665,860.62 / 8,965,121.41$, which is 40.89%. As there may be small errors in the figures and calculations, the recommended percentage for communications is 40%.

¹⁰ Government of Newfoundland and Labrador. "Labrador Inuit Land Claims Agreement." 2022-23 Hunting and Trapping Guide, n.d. <https://www.gov.nl.ca/hunting-trapping-guide/2022-23/labrador-inuit-land-claims-agreement/>.

¹¹ "Inuit Regions (Inuit Nunangat)." Open Government Portal, n.d. <https://open.canada.ca/data/en/dataset/f242b881-75e3-40bb-a148-63410b4ce2af>.

¹² "Administrative Boundaries in Canada - Canvec Series - Administrative Features." Open Government Portal, n.d. <https://open.canada.ca/data/en/dataset/306e5004-534b-4110-9feb-58e3a5c3fd97>.

¹³ Government of Canada, Statistics Canada. "Focus on Geography Series, 2011 Census." Nunavut, March 26, 2019. <https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-pr-eng.cfm?Lang=eng&GC=62>.

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Fugmann, Gerlis. “Land Claim Settlements and Their Impacts : Regional Dynamics and Bottom-up Economic Development in Nunavik and Nunatsiavut (Canada).” GEB. University of Giessen, March 2011. <http://geb.uni-giessen.de/geb/volltexte/2011/8182/>.

Government of Canada, Statistics Canada. “Focus on Geography Series, 2011 Census.” Nunavut, March 26, 2019. <https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-pr-eng.cfm?Lang=eng&GC=62>.

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