

# Surface water quality in Northern Canada: Examining waterborne *Giardia* and *Cryptosporidium* in Iqaluit, Nunavut

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City of Iqaluit and Erobisher Bay



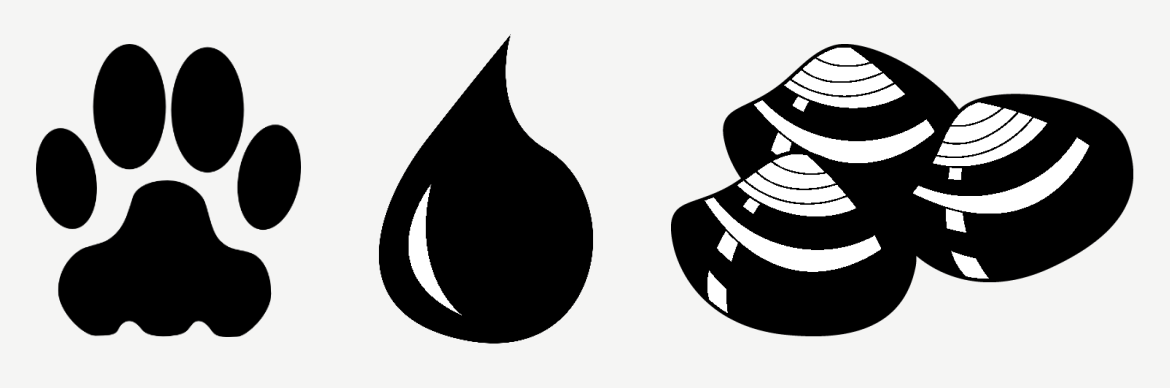
PAWS team at the Nunavut Research Institute. Photo credit: Anika Bychok.



Map of Iqaluit, Nunavut, Canada.

## Introduction

- Challenges often exist in accessing **safe drinking water** in remote, Northern Canadian communities.<sup>1</sup>
- These challenges have important human health implications, particularly in terms of **waterborne diseases**.
- Specifically, **acute gastrointestinal illness** including diarrhea and/or vomiting, can be acquired via environmental sources such as food and water.<sup>2</sup>
- One of the highest rates of self-reported acute gastrointestinal illness was in **Iqaluit, Nunavut**.<sup>3</sup>
- The **People, Animals, Water, and Sustenance (PAWS) Project** was developed to create a participatory, community-based monitoring system to identify potential sources of pathogens that may cause acute gastrointestinal illness in Iqaluit.



## Research Goals

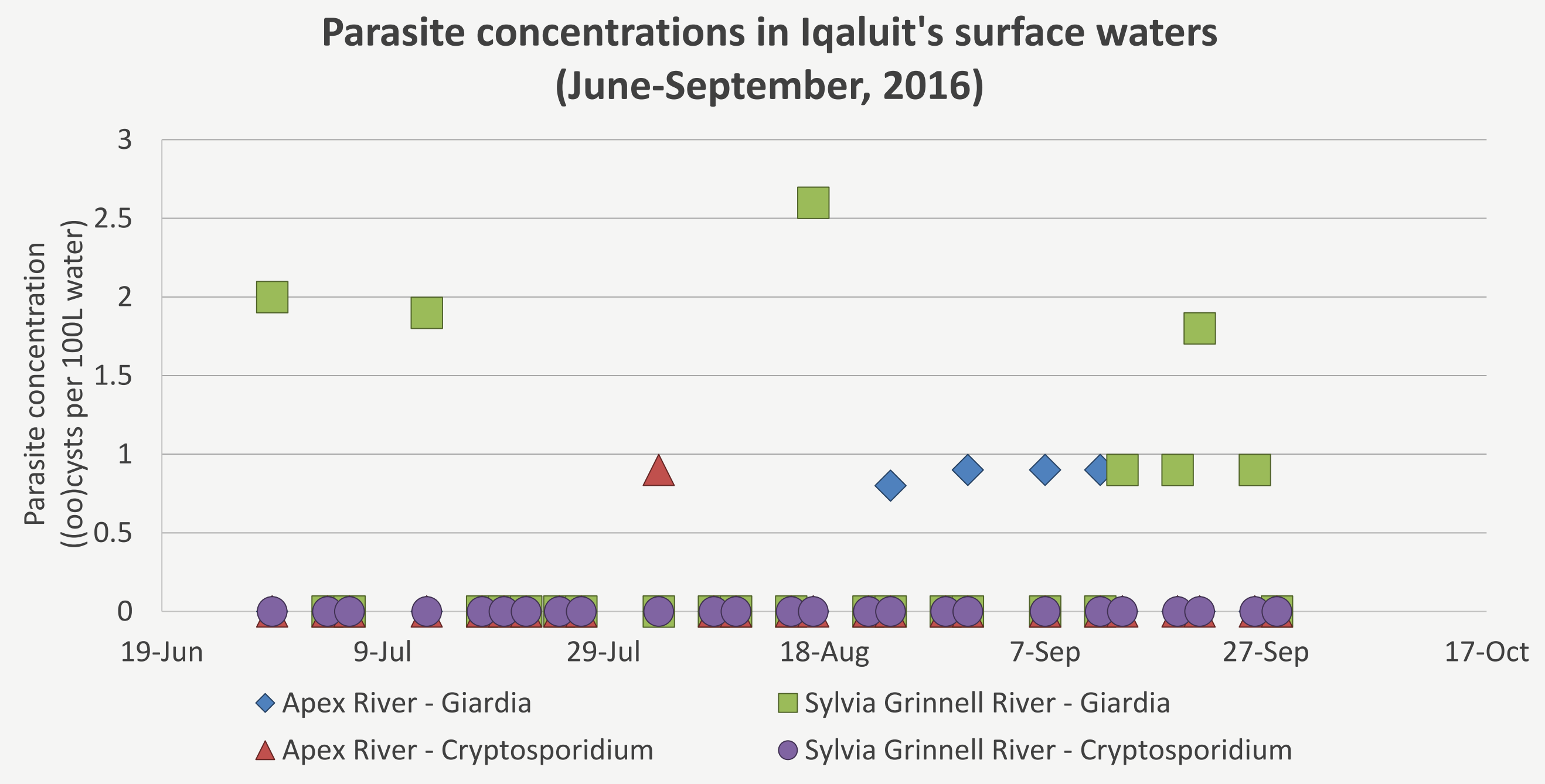
- The water portion of this project explored potential **waterborne disease transmission** in Iqaluit by:
  - Estimating the prevalence and concentrations of ***Giardia* and *Cryptosporidium*** parasites in untreated surface water that community members often collect for drinking;
  - Examining relationships between **indicator bacteria** and parasite presence in these surface waters; and
  - Identifying potential associations of parasites in surface water with **weather conditions** and **water quality parameters**.

## Methods

- Water samples** (n=55) were collected from June to September 2016, from two rivers commonly used as sources of untreated drinking water.
- Samples were filtered in Iqaluit to **concentrate sample material**, and tested by Hyperion Research Ltd. for **parasite presence** using microscopy and polymerase chain reaction (PCR).
- Statistical associations** were examined between parasite presence and environmental conditions.

## Results

- Using microscopy, **20.0%** of samples tested positive for *Giardia* and **1.8%** of samples tested positive for *Cryptosporidium*.
- Using PCR, parasites were not detected in any of the water samples, so we could not determine the species or sources of parasites.



- There were no significant associations between parasites and indicator bacteria.
- The odds of detecting parasites in water were **4 times greater** with lower air ( $p=0.041$ ) and water ( $p=0.047$ ) temperatures compared to higher temperatures.

## Discussion

- Surface water contamination with *Giardia* and *Cryptosporidium* may be lower in Iqaluit compared to other regions of Canada,<sup>4</sup> particularly with lower temperatures, but the human health risk is unclear.
- E. coli* and total coliforms may not be appropriate indicators for *Giardia* and *Cryptosporidium* in Iqaluit's surface waters.
- Future research should examine the molecular characterization of these waterborne parasites to evaluate the potential human health implications in Iqaluit.

## References

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<sup>2</sup>Roy S, et al. (2006). The rate of acute gastrointestinal illness in developed countries. *Journal of Water and Health*, 4(2): 31-70.  
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<sup>4</sup>Roach P, et al. (1993). Waterborne *Giardia* cysts and *Cryptosporidium* oocysts in the Yukon, Canada. *Applied and Environmental Microbiology*, 59(1): 67-73.

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