Abstract
Cambridge Bay is being heavily influenced by anthropogenic stressors, including indirect impacts associated with climate change and direct through local human activities. In the current study, we will examine the impact of wastewater effluent on local primary production through a comparison of regional versus local variability in phytoplankton production and biomass in Dease Strait. Data from annual summer cruises aboard the R/V Martin Bergmann, spanning 2013-2017, are presented in support of the analysis.

Objectives & Methods
Objectives
1) Quantify regional versus local wastewater outflow nutrient budgets of Cambridge Bay; and
2) Assess the impact of wastewater associated with nutrient enrichment on primary production and taxonomic composition relative to the regional observations.

Methods
• A 5-year dataset of nutrient concentrations and phytoplankton standing stocks in Dease Strait near Cambridge Bay is being compiled and analyzed.
• Nutrient concentrations, phytoplankton biomass and composition, and primary production in the Bay will be determined.

Analysis Tools
Nutrient Analyzer: NO3, NO2-N, Si(OH)4 and NH4
High Performance Liquid Chromatography (HPLC): The concentrations of photosynthetic pigments
CHEMTAX Program: The contribution of phytoplankton groups to total chlorophyll a
The 14C method: Local primary production

Table 1. Analysis methods for nutrients, phytoplankton biomass and composition, and local primary production

• Elevated NO3+N2O within Cambridge Bay (a).
• N:P (b) and N:Si (c) ratios averaged 1.29 and 0.21, respectively (does not include Cambridge Bay stations).
  ➔ Suggests N-depleted system.
• N:P (b) and N:Si (c) ratios were an average 7 times greater within Cambridge Bay.
  ➔ Suggests N-enhanced system.

Figure 1. Map of water column averaged (2013-2015): (a) NO3+N2O concentration [µmol/L]; (b) NO3+N2O/Po4 ratio; (c) NO3+N2O/Si(OH)4 ratio

Figure 2. Nutrient Concentrations (Cambridge Bay - Dease Strait): (a) 2013 NO3, NO2, PO4, and Si(OH)4 concentrations; (b) 2014 PO4, NO3, NO2, and Si(OH)4 concentrations; (c) 2015 PO4, NO3, NO2, and Si(OH)4 concentrations

Conclusion
• A strong nitrogen source is apparent within Cambridge Bay relative to the surrounding region.
  ➔ Evidence supports anthropogenic sources.
• Enhanced production is likely trapped within the Bay, which could exacerbate the anthropogenic influence on the local system.

Future Research
• Collect samples twice each year both before wastewater discharge and during wastewater discharge, from 2018 to 2019.
• Measure nutrient concentrations, phytoplankton biomass and composition, and primary production.
• Determine the impact of nutrient effluent on microbial community composition and primary production.

References

Acknowledgements
Laura Saltman, Lisa Mathies, Dr. Aurelio Delattre, Dr. He, Sun-Yong, The R/V Martin Bergmann crew, Nicole Pogorzelec, CEOE, and University of Manitoba