

Annual Report (2019) to Nunavut Research Institute – Cambridge Bay Observatory
(Scientific research license #: 04 007 17R-M)

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This document reports on 2019 activity under the above scientific research license and requests renewal for 2020 to support continuing operation of the Cambridge Bay Observatory and related research.

Background – Infrastructure and Research Activities

Ocean Networks Canada (ONC) has been operating an underwater observatory in Cambridge Bay since September 2012. Underwater, various sensors and a camera provide continuous information on seawater properties, ice thickness and marine organism activity to a shore station on the Cambridge Bay wharf. On the wharf, a weather station and webcam are also connected to the shore station. Data from all instruments and cameras are transmitted by a WIFI link to a server in the Kitikmeot Regional Government building. An antenna on the government building receives Automatic Identification System transmissions from ocean going vessels, and sends these signals to the server. All observatory data are relayed via satellite to the ONC data centre at the University of Victoria where they are freely available over the Internet (www.oceannetworks.ca). In 2016 the Cambridge Bay observatory became a component of the Safe Passage program, a research program funded by Polar Knowledge Canada to further ability to predict sea ice freeze-up and break-up and ice thickness, in a future warming Arctic. A further grant from Polar Knowledge Canada (*Enhancing Capacity for Northern-led Monitoring of Snow, Ice and Ocean Conditions*) 2017-2019, supported community engagement and education activities in Cambridge Bay, Kugluktuk, and Gjoa Haven. The objectives of this project aim to enhance northern capacity and participation in collection, analysis, and use of scientific ocean data and to understand connections to local and Indigenous Knowledge. The five-year (2012-2017) Scientific Research Licence (#04 064 12N-M) for the facility was replaced in 2017 by the new license cited above (#04 007 17R-M). A further proposal for continued engagement work in all three communities has been submitted to Polar Knowledge Canada 2020-2023 competition and is currently awaiting decision by the review committee.

The observatory has been providing valuable data for researchers and for public outreach. Results from the first 7 years of operations have been presented at several high profile research conferences including the 2013 Arctic Observing Summit in Vancouver, BC, the 2013, 2014 and 2018 annual conferences of the Canadian Meteorological and Oceanographic Society, and ArcticNet Annual Scientific Meetings in 2013, 2015, 2016, 2017, 2018 and 2019. ONC has also held several user workshops to teach scientists and graduate students how to access data from the Cambridge Bay Observatory, using online tools available on the ONC website (<http://oceannetworks.ca>). In addition, five graduate students from three Canadian universities have used data from the Cambridge Bay Observatory for their research.

Supported Graduate Students

- i) Julie-Anne Dorval, a Master's student in Oceanography at the Université du Québec à Rimouski, completed her thesis in January 2017. She worked with Ocean Networks Canada team in Cambridge Bay to study seafloor fauna spatial patterns in the subtidal zone near the observatory platform, and used video records from the platform camera to study seasonal changes in the seabed ecosystem.
- ii) Lucianne Marshall, a Master's student at the University of Victoria, completed her thesis in September 2018. She used water samples and observatory sensor data to study plankton blooms in Cambridge Bay. Luci has been hired for full time work at ONC in the role of Community Support Specialist.
- iii) Patrick Duke, completed his Master's at the University of Calgary in spring 2019, studying the time series of biogeochemical data produced by the ONC underwater observatory in Cambridge Bay. He is now a PhD student at the University of Victoria.
- iv) Laura Eerkes-Medrano, a PhD student at the University of Victoria, is conducting interviews with knowledge holders around changing sea-ice in order to develop an understanding of how Indigenous knowledge relates to data collected by the observatory and other sources. She started her PhD in January 2017.
- v) Jeannette Bedard, completed her PhD at the University of Victoria in 2019, using the Cambridge Bay data to understand acoustic tracking effectiveness in varying environmental conditions. Jeannette has been hired for full time work at ONC in the role of Scientific Data Specialist.

2019 Activities in Cambridge Bay

ONC Youth Science Ambassador Program – In May 2016 Ocean Networks Canada hired Cambridge Bay resident Mia Otokiak as an Arctic Youth Science Ambassador to further ONC's community engagement program in the Arctic. Mia conducted regular ocean science activities at Kiilnik High School and also supported ONC's Safe Passage program by conducting youth-led snow depth measurements which were used as inputs to scientific modelling of sea-ice formation. This community engagement experience contributed to Mia being hired by the Nunavut Impact Review Board in Summer 2017. Since 2016, the program has been extended to 12 communities: Kugluktuk, Cambridge Bay, and Gjoa Haven, Iqaluit, Nunatsiavut, and 7 communities on the BC coast. The Youth Science Ambassadors attend yearly in-person training at Ocean Networks Canada in Victoria, BC and conduct youth activities throughout the year in their communities. A new Youth Science Ambassador has been recruited for Cambridge Bay but training has been postponed because of COVID-19 travel restrictions.

Observatory Servicing

A 4-member team from Ocean Networks Canada was in Cambridge Bay from July 26-August 4, 2019. ONC engineers recovered and serviced the underwater instrument platform, added new sensors and redeployed at the same location, 200 metres to the west of the Cambridge Bay wharf. Community engagement activities, including a public

meeting and workshop accompanied the deployment. Following the Cambridge Bay visit, 2 members of the team continued to Kugluktuk to meet with the local Oversight Committee, conduct community engagement activities, recruit a Youth Science Ambassador, and launch a vessel monitoring program in collaboration with the Kugluktuk Hunters and Trappers Organization, Nunavut Tunngavik Inc, and the Marine Institute of Memorial University.

Planned 2020 Activities in Cambridge Bay

Observatory Maintenance - The field team will return to Cambridge Bay in late July-early August 2020. Plans for 2020 include servicing the underwater instrument platform and replacing some of the existing instruments with new or recently calibrated sensors. Water samples will be collected in the area around the sensor platforms for sensor calibration and additional characterization of seawater properties. The eDNA sampler (McLane PPS) deployed in 2019 to monitoring plankton biodiversity will be recovered and returned to Victoria, and collected samples will be sent to the Université Laval for analysis. Community engagement opportunities, including a public meeting and youth involvement will be planned during the maintenance visit.