



# Community Hydrography



## Empowering Coastal Communities

Community Hydrography Program  
Canadian Hydrographic Service (CHS)

» 2024



Fisheries and Oceans  
Canada

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From left to right. Front row : Angus Green, Waylon Green, Mathieu Rondeau, Jérémie Lemarchand. Second row: Joel McDonald, Mik Atkey, Yan Bilodeau, Brian Johnson, Matthew Roszmann, Karl Wilson.



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Captions: Top image: Ulukhaktok, NT; Middle left: Waylon Green, Brent Falkins and Angus Green; Middle-center: Jérémie Lemarchand.

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This report provides information on the Community Hydrography Program, a five-year initiative (2022-2027) funded by the Government of Canada under the Ocean Protection Plan program. While the report is scientific or technical in nature, it has not undergone formal scientific peer review.



# Table of contents

Introduction .....	<b>2</b>
Hydrographic Sustainability: Bathymetric Data Loggers in Action (2024-2025) .....	<b>3</b>
DFO Ecosystems and Oceans Science Contribution Framework .....	<b>4</b>
Data Processing Made Easy: Tools for Every Community .....	<b>5</b>
Community Hydrography in Focus: Canadian Hydrographic Conference 2024 Recap .....	<b>6</b>
Essipit Innu First Nation Band Council Leads the Way: Advancing Bathymetric Data Collection .....	<b>7</b>
Navigating the Depths: Rivière-du-Loup's Bathymetric Survey .....	<b>8</b>
Sanikiluaq's Ocean Secrets: The Role of Polynyas .....	<b>9</b>
Community-Driven Surveys in the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA) .....	<b>10</b>
Community Hydrography Workshop .....	<b>11</b>
Ka:yu:'k't'h' / Che:k'tles7et'h (Kyuquot and Checleseth) .....	<b>12</b>
Conclusion .....	<b>13</b>
Acknowledgements .....	<b>14</b>

## Introduction

On behalf of the Community Hydrography Program (CHP), the Canadian Hydrographic Service (CHS), is proud to release the latest highlight publication. The CHP is a DFO initiative (2022-2027) under the Oceans Protection Plan, aimed at empowering coastal communities to collect and use bathymetric data.

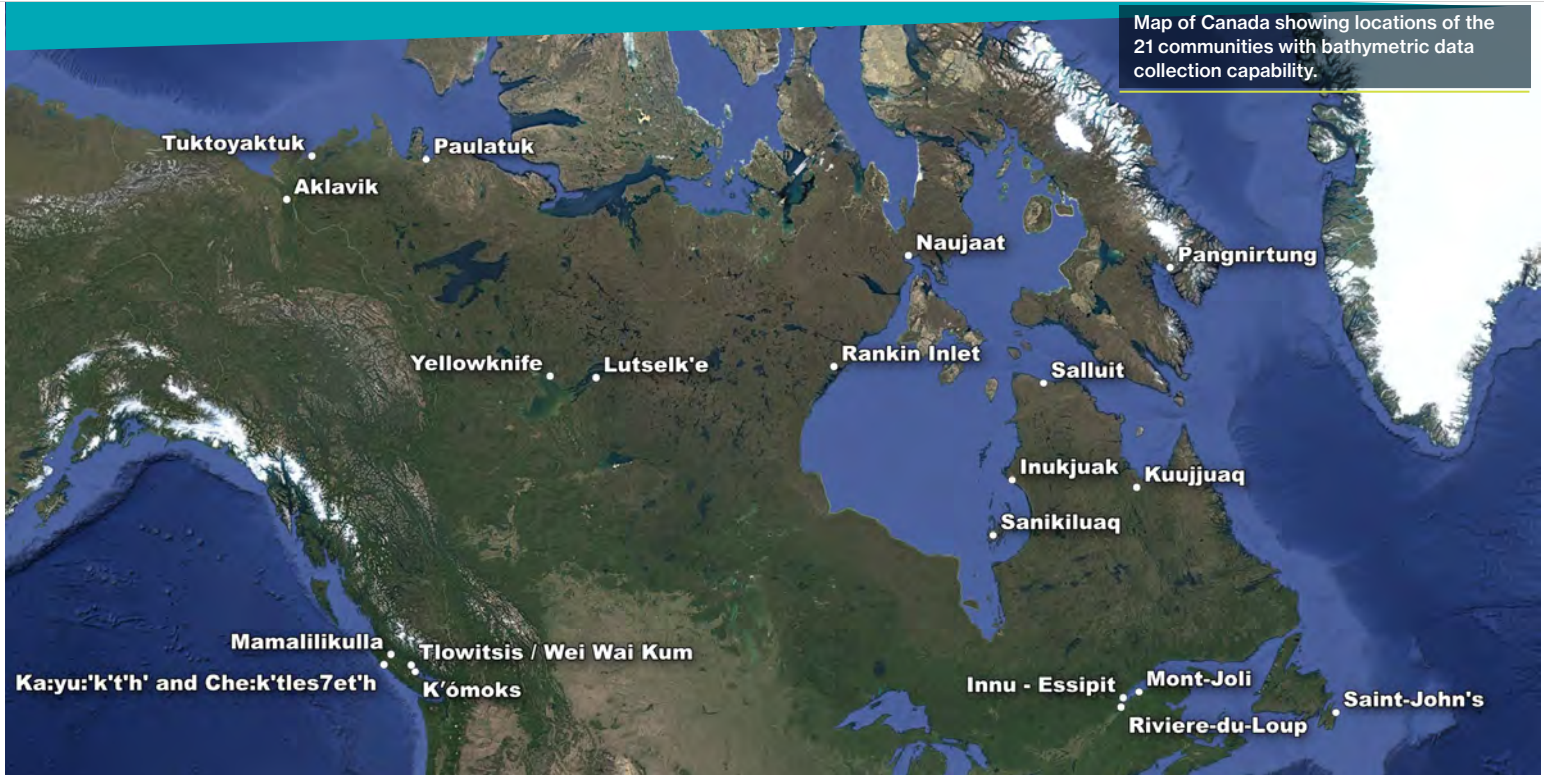
This year was filled with successes: new communities joined the program and learned how to collect bathymetric data and, we worked with communities in the Inuvialuit Settlement Region (ISR) to increase data coverage around the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA).

This success helped us to replicate the experience in Sanikiluaq, where we collected high-resolution bathymetric data. This data provided detailed and accurate information about the seafloor, which is essential for safe navigation within the community. In keeping with OCAP (Ownership, Control, Access, and Possession) principles, this data will be included in official nautical publications to enhance safety at sea in Canadian waters.

Data processing also played a key role in this year's success. The team supported communities in processing their own data and made these tools available on GitHub, an open-source platform. Additionally, we held the first Community Hydrography Workshop to share successes among communities and stakeholders.

There is much more! I invite you to read the publication to discover all the details. Please share widely to help sustain community hydrography efforts across Canada.

**Community Hydrography Program**  
**Michel Breton, Manager,**

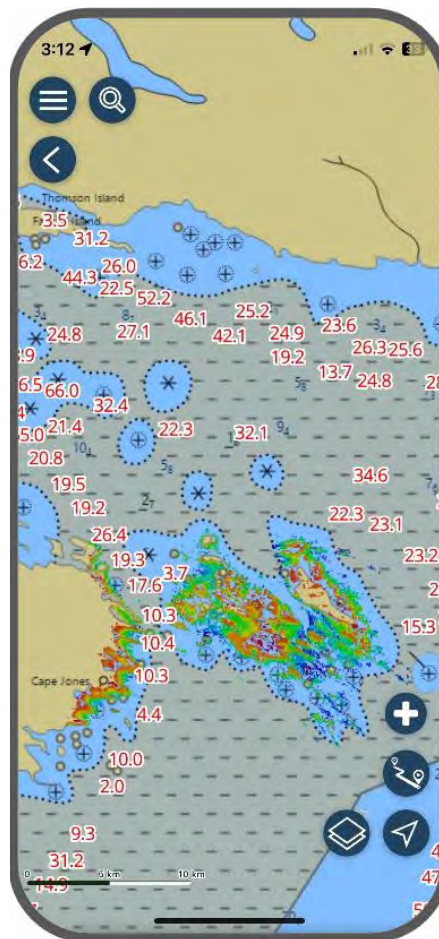


Map of Canada showing locations of the 21 communities with bathymetric data collection capability.

## Hydrographic Sustainability: Bathymetric Data Loggers in Action (2024-2025)

Developing and strengthening hydrographic skills and knowledge in communities is a key aspect of the program. To continue reinforcing the capacity to collect bathymetric data, the CHP uses simple, low-maintenance tools known as bathymetric data loggers. These user-friendly devices are perfect for beginners in hydrography as once installed, these small but effective devices automatically record position, depth, and time data from a vessel's GPS receiver and echosounder (sonar) while the vessel is on the move.

In 2024, the team supported 12 additional communities with installation, data acquisition and processing, bringing the total to 21 communities equipped for data collection.



“That map you created looks awesome! Thanks for sharing. It will certainly give us more confidence while traveling through the uncharted waters. Using this in combination with the tracks we have in our charts will give us a better idea of where the safe water is. The mobile app is especially handy to take out on the boats with us.”

Lane Weislein  
Coxswain – Rankin Inlet Arctic Marine Response Station  
Canadian Coast Guard (CCG) | Arctic Region.

Community map, Rankin Inlet, NU, displayed in the Enhanced Maritime Situational Awareness (EMSA) App.

# DFO Ecosystems and Oceans Science Contribution Framework

Through DFO's Ecosystems and Oceans Science Contribution Framework, the CHP funded three new projects in 2024. Two provided funding and resources directly to communities to support with the collection and use of bathymetric data and the third will enable communities to visualize their data on the Indigenous Knowledge App, SIKU platform.

Projects	Timeframe	Funding
Community hydrographic data for Indigenous Communities through data access, visualization, and mobilization with SIKU: The Indigenous Knowledge Social Network  <b>Recipient:</b> <i>Arctic Eider Society - SIKU</i>	2024-2026	\$100,000
Community driven bathymetric mapping: Inukjuak Marine Region .  <b>Recipient:</b> <i>Northern Village of Inukjuak</i>	2024-2026	\$100,000
Community-based bathymetric data acquisition in the Eeyou Istchee marine region  <b>Recipient:</b> <i>Niskamoon Corporation</i>	2024-2026	\$100,000



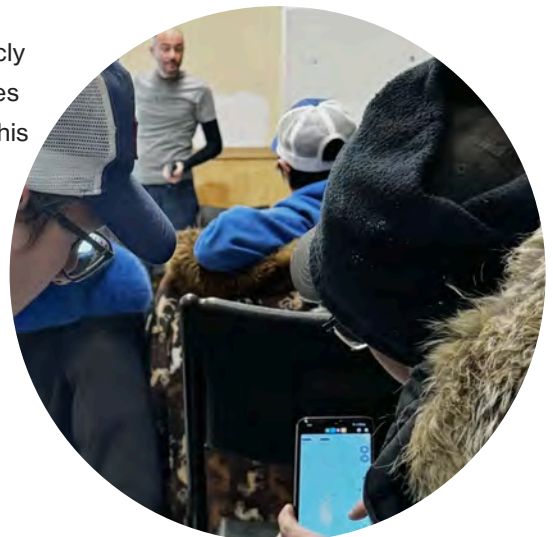
Photo by Jef, courtesy of Adobe Stock.

## Data Processing Made Easy: Tools for Every Community

The first version of our processing tool was introduced in the [previous highlights report](#). This tool automates water level reduction, an essential step to making bathymetric data usable by aligning them to same vertical reference, the lowest normal tide. The principle and methodology were detailed in an article published in the May 2024 edition of [the International Hydrographic Review \(available in English only\)](#).

This year, we developed a second version of the tool, now publicly available on [GitHub link](#). Any developer working with communities wishing to process its own data can now download this tool at this following [link](#).

The new version supports collaborative code development and accommodates several data formats, including the one used by the International Hydrographic Organization (IHO) Data Centre for Digital Bathymetry. Water level reduction is based on predictions and observations automatically extracted from the CHS Integrated Water Level System.



Two participants at the Ulukhaktok's open house looking at the SIKU App. Credit: [Krystal Woodard](#)

# Community Hydrography in Focus: Canadian Hydrographic Conference 2024 Recap

At the end of May 2024, the CHP team attended the Canadian Hydrographic Conference in St. John's, Newfoundland. The event featured a panel discussion on Community Hydrography, hosted by Laura Trethewey, author of *The Deepest Map*. Panelists included Barbara Dinning (Nanwakolas Society Council), Ian Church (University of New Brunswick), Joel Heath (Arctic Eider Society), Rachel Malcove (Transport Canada), Tyrone Raddi (Tuktoyaktuk Hunters and Trappers Committee), and Dustin Whalen (Natural Resources Canada).

The discussion highlighted gaps in bathymetric data coverage along Canada's coastlines and emphasized the potential of community-led data collection to contribute to updates of navigational products at the Canadian Hydrographic Service (CHS). Prior to the panel, participants presented on platforms widely used by communities to share and visualize bathymetric data, including SIKU, and Transport Canada's Enhanced Maritime Situational Awareness (EMSA) portal.

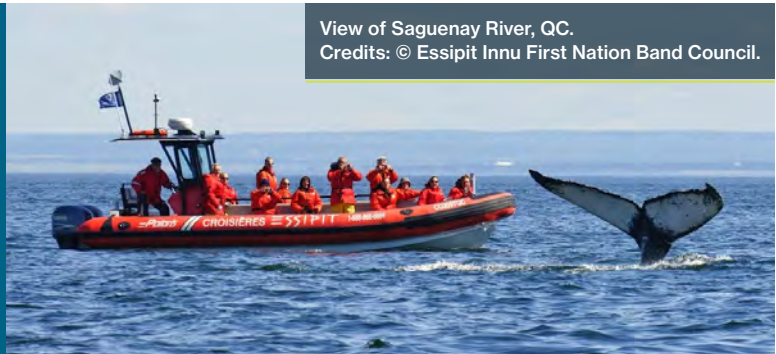


Panel members from left to right, Ian Church, Barbara Dinning, Sean Galway, Laura Trethewey, Rachel Malcove, Dustin Whalen, Joel Heath, Michel Breton.

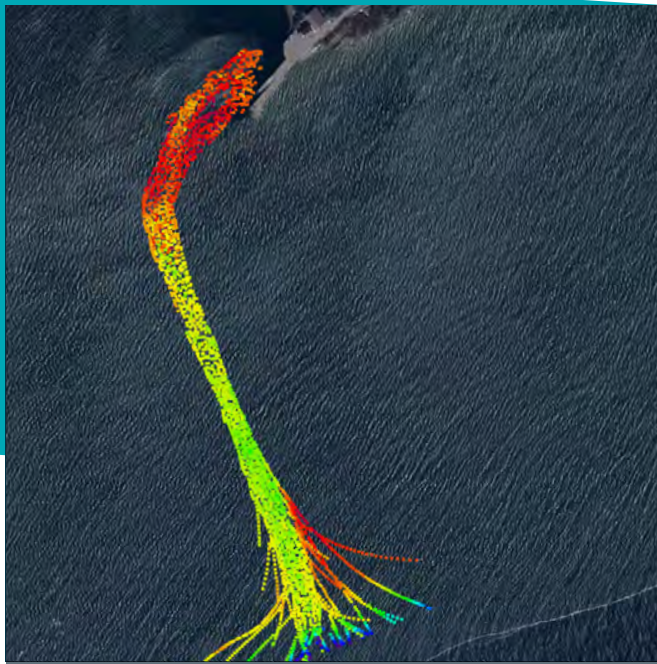
# Essipit Innu First Nation Band Council Leads the Way: Advancing Bathymetric Data Collection

In early spring 2024, a representative from the Essipit Innu First Nation Band Council contacted the CHP with two objectives:

- 1 To explore new, accessible technologies for autonomous bathymetric data collection by coastal communities,
- 2 Determine if these technologies could support decision-making for their maritime infrastructure.



These are common challenges for small coastal communities that rely on accurate depth data to manage marina access channels. Escalating surveying and dredging costs could significantly impact community activities. By early June 2024, the Essipit Innu community installed a bathymetric datalogger on their whale-watching vessel, Aventure 09. From June to October, the vessel made daily trips from the marina to the whale pods in the Saint Lawrence River. Throughout the summer, the community collected over 500,000 depth measurements, achieving their first objective. This important achievement also showed other communities that accessible technology exists to enable autonomous bathymetric data collection.



Depths collected in Grandes-Bergeronnes marina channel by the Essipit Aventure 09 team, summer 2024.

The second objective consisted in assessing the ability to detect sedimentation accumulation with “off-the-shelf” sonar and GPS equipment. For that purpose, the CHP staff, analyzed the marina channel data. The results showed that the use of accessible recreational grade navigation systems (e.g. Lowrance, Simrad, Raymarine, Garmin, etc.) lack the necessary accuracy to monitor any sediment accumulation or erosion above or under 50cm.

These findings will enable the Essipit Innu community to continue collecting bathymetric data and equip the Aventure 09 with more precise navigation sensors. Accurate sensors are crucial as sediment can accumulate and impact water depth and navigation in marine channels. This successful project led by Essipit aims to develop an accessible methodology to assist small marina managers in better serving their users.

# Navigating the Depths: Rivière-du-Loup's Bathymetric Survey

In late May 2024, at the request of the Rivière-du-Loup Yacht Club, CHP installed a bathymetric data logger on a Rigid Hull Inflatable Boat to collect depths at the river's mouth in Rivière-du-Loup, where silting changing depths make it difficult to navigate in this area.

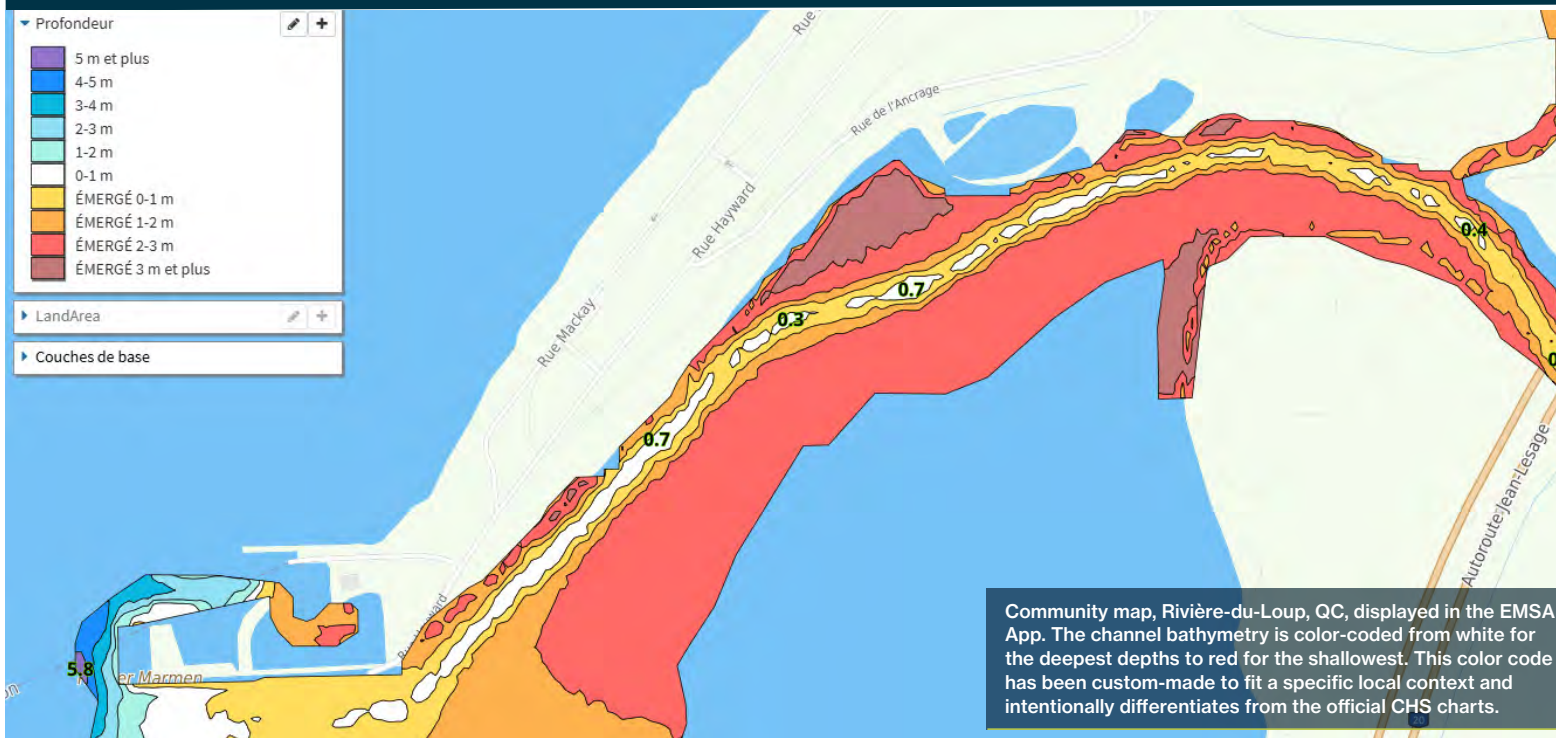
Denis Carrière, a member of the Rivière-du-Loup Yacht Club, collected data using a dense line pattern, starting from the river's mouth and extending 1.4 miles into the channel. This detailed approach was crucial for accurately mapping the narrow natural channel. By doing so, it ensured safe navigation and helped avoid hazards outside the channel.



Denis Carrière surveying on the Rivière-du-Loup. Credits: Michel Sacco.

“The logger acts as a simple gateway between networks NMEA 2000 and Wi-Fi. The connected device on the onboard NMEA 2000 network records geographic coordinates via GPS and the depths through the sounder. Once the day is over, we retrieve the data via a web link on a mobile device or computer. It's really easy to use.”

» A community map is created by and for a specific community to support a better understanding of the seafloor topography in an area. It is mostly constructed from open data (for example, leveraging data from the Non-Navigational (NONNA) bathymetric data portal in Canadian waters), and can also incorporate data collected by the community. It is important to mention that a community map is not an official navigational product and should not be used as such.



Community map, Rivière-du-Loup, QC, displayed in the EMSA App. The channel bathymetry is color-coded from white for the deepest depths to red for the shallowest. This color code has been custom-made to fit a specific local context and intentionally differentiates from the official CHS charts.

# Sanikiluaq's Ocean Secrets: The Role of Polynyas

From late July to mid-August 2024, the CHP staff conducted multibeam coastal surveys in collaboration with the Arctic Eider Society and the Sanikiluaq Hunter's and Trapper's Association in the proposed marine protected area of Qikiqtait (Belcher Islands), Nunavut. The use of multibeam technology was crucial to accurately outline an interesting oceanographic feature, a polynya. A polynya is an area of open water surrounded by sea ice that remains open throughout the winter due to strong currents. The winter occurrence of these polynyas is crucial for the life cycle of the eider duck populations in Hudson Bay, which are integral to the culture and traditions of the local Inuit community.

Jérémie Lemarchand and Davidee Kudluarok – Belcher Islands, NU, 2024.



The collaborative multibeam surveys collected essential bathymetric data for updating official navigational products. The newly acquired data significantly enhanced local navigational safety in previously unsurveyed areas. Satellite-derived bathymetry (SDB) supplemented multibeam data in shallow depths (0-10m). SDB is invaluable for reconnaissance surveys to identify hazards and complements multibeam data in shallow areas.

Johnny Ippak - Belcher Islands, NU, 2024.



This collaboration showcased the effectiveness of community-based surveys in acquiring high-resolution bathymetric data in the nearshore areas of the Canadian Arctic. The community was involved throughout the entire process – from deciding survey areas to collecting data and making data-sharing decisions. This approach aligns with fundamental OCAP and CHP principles.

Fig 1: Satellite image (Sentinel-2) showing a polynya formed in Omarolluk Sound during winter 2018.

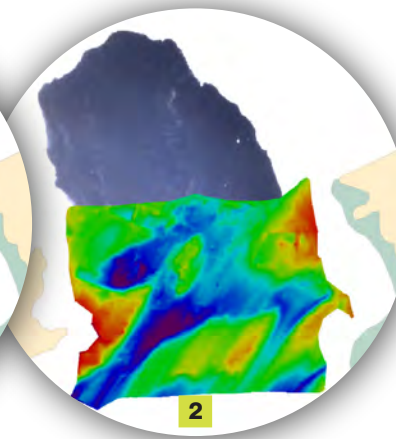


Fig 2: multibeam survey showing a deeper corridor in the seafloor (in dark blue) where currents are favorable to the presence of polynya in the winter. This narrow geological feature impacts local current dynamics which is a known cause of polynyas' formation.

# Community-Driven Surveys in the Anguniaqvia niqiqyuam Marine Protected Area (ANMPA)

Results presentation at the Paulatuk, NT, HTC Board Meeting.



Sachs Harbour's, NT "Open House."



From May 9 to 12, 2024, we joined the Canadian Beaufort Sea Marine Ecosystem Assessment team at DFO for a community tour of the Western Arctic, visiting Sachs Harbour, Paulatuk, and Ulukhaktok.

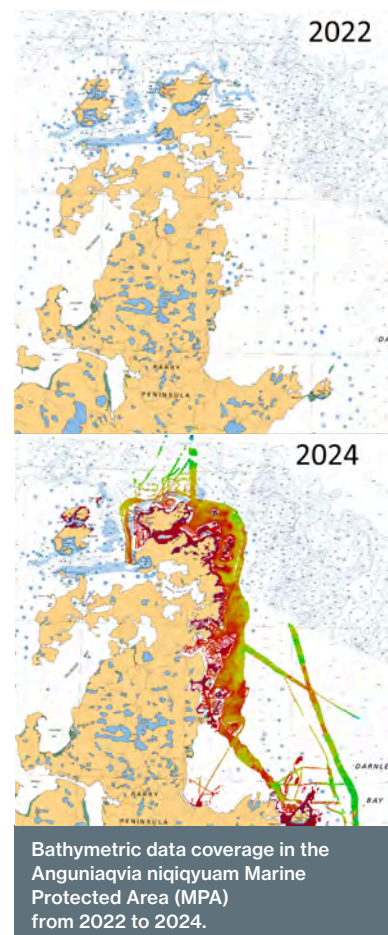
We adopted an "open house" approach, inviting community members to learn about the CHP, ask questions, and discuss potential future activities in their areas of interest.

In Paulatuk, the tour also provided an opportunity to report on current results and plan upcoming community and multibeam surveys.

Regarding the survey missions in the ANMPA, Satellite Derived Bathymetry (SDB) proved invaluable for identifying numerous shoals before deploying at sea. This tool is frequently used in the program to provide crucial information in uncharted areas.

Following the SDB reconnaissance survey, the multibeam missions were conducted in two legs. The first survey leg took place from August 16 to 21, 2025, and the second leg from September 2 to 12, 2025. Both missions were led by Angus Green and Waylon Green, representing the Paulatuk Hunters & Trappers Committee (PHTC), whose contributions have been fundamental in previous surveys. Two portable survey systems (Norbit iWBMS) were deployed from the FV Frosti and its rapid research and rescue vessel.

By 2024, after three years of data collection, we now have a comprehensive understanding of the nearshore seabed of the ANMPA, which was previously unknown. The bathymetric data collected comes from multiple sources, including MultiBeam EchoSounder (MBES), SingleBeam EchoSounder (SBES), community boats' fishing sonars, and SDB. Together, these datasets contribute for approximately 35% of the ANMPA bathymetric coverage.



# Community Hydrography Workshop

On December 9, 2024, the first hybrid Community Hydrography Workshop was held in Ottawa. 23 attendees joined in person, and eight participated online for the three-hour event. Participants included representatives from coastal communities across Canada, the Canadian Coast Guard, Natural Resources Canada, Parks Canada, and academia.

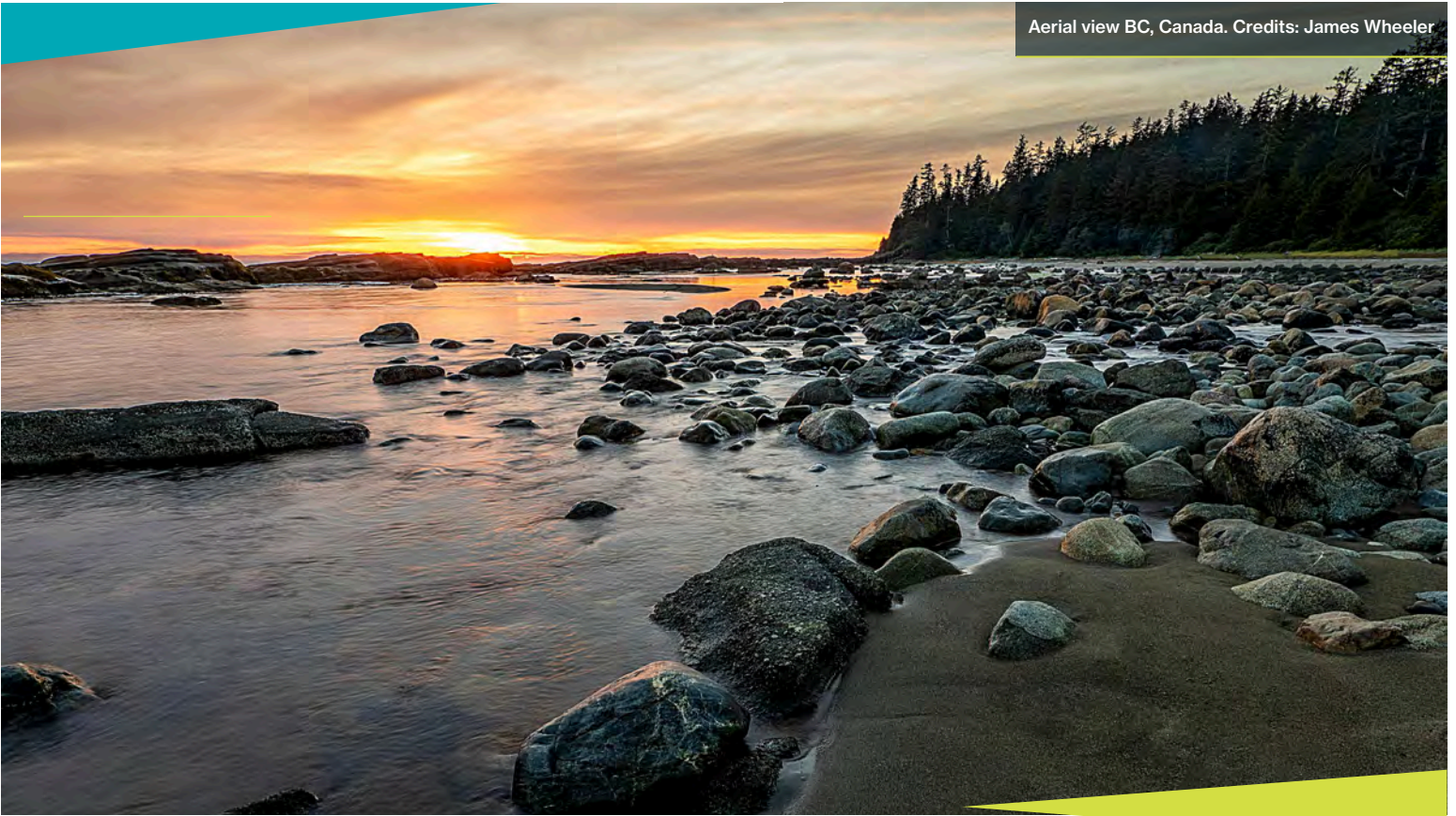
This inaugural workshop brought together community members and stakeholders to:

- 1 Identify and address key lessons learned before the program sunsets in 2027.
- 2 Establish a sustainable path forward for community hydrography beyond the program's end.

Key findings highlighted the willingness of communities to share collected bathymetric data, the crucial role and interest of the Canadian Coast Guard Auxiliary Units in seafloor mapping, the importance of involving youth as future leaders, and the need for community-relevant training.



From left to right: Ciera Lee-Kooneeluisie (CCG), Erin Pigott (CCG), Dustin Whalen (NRCAN), Brenda Panipakoocho (CCG), Gabriel Partington (TC), Becky Segal (AES), Michel Breton (CHS), Tianna Gordon-Ruben (Tuktoyaktuk Hamlet), Rachel Malcove (TC), Terry Noah (Kugluktuk), Kirk Regular (Marine Institute), Samuel Binette (UQAR), Mathieu Rondeau (CHS), Tyrone Raddi (Tuktoyaktuk Hamlet), Davie Krengnektak (THTC), Angus Green (PHTC), Billy Nicol (AES), Brian Burke (QC), Madeline Wood (CCG), Ian Church (UNB), Ruben Ruben (PHTC), Gabriel Montpetit-Allard (CHS). Absent from photo: Annie Biron (CHS).



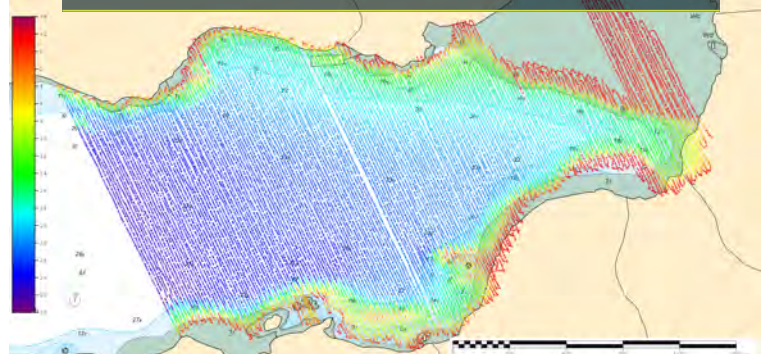
## Ka:yu:'k't'h' / Che:k'tles7et'h (Kyuquot and Checleseth)

From late October 2024 to mid-March 2025, the Ka:yu:'k't'h' / Che:k'tles7et'h First Nation, also known as Kyuquot and Checleseth, led a project to collect bathymetric data in Malksope Inlet on the West Coast of Vancouver Island. The primary goals were to enhance navigation safety and support local studies on eelgrass meadows and the impact of wave activities on traditional shellfish harvesting areas.

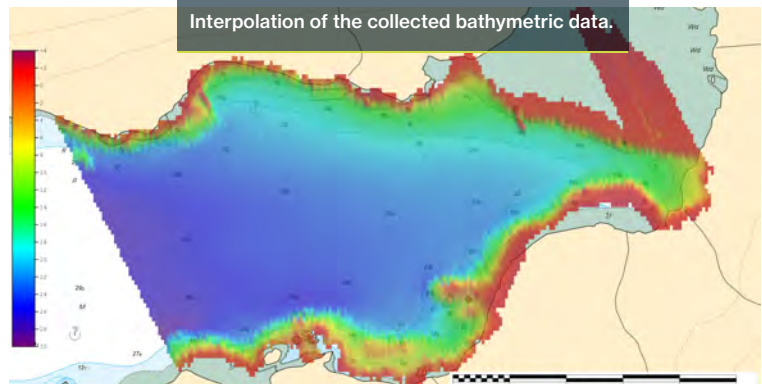
Using a community launch equipped with a Lowrance recreational chart plotter, community representatives outlined their objectives and demonstrated their capacity to gather data independently. CHS provided technical and financial support, including a service contract covering salaries and vessel expenses.

The KCFN survey team followed a systematic line pattern and maintained a speed of less than 15 knots to ensure high-quality data collection. They successfully met their objectives, gathering valuable bathymetric data. This project highlights the importance of supporting the self-determination and autonomy of partners in an evolving capacity-building process.

Bathymetric data gathered by KCFN survey team using a systematic line pattern of 10m.



Interpolation of the collected bathymetric data.



## Conclusion

The momentum of the CHP acquired over the first three years will continue in 2025-2026 with data collection planned in Rankin Inlet, Kuujuaq, in the Western Arctic, and around Vancouver Island, on the West Coast. The Community Hydrography Team will continue to support coastal communities to collect bathymetric data this year but will see the final year, 2026-2027, shifting towards the closing of the program, to leave coastal communities with a final report and tools that should help them to keep collecting bathymetric data beyond the end of the program. In that sense, there will be a lot less data collection in the final year.

CHS will hold the second Community Hydrography Workshop this year. These workshops serve to share lessons learned among communities and the input collected will be used to develop a sustainable vision for bathymetric data collection and use by coastal communities, beyond the end of the program, in March 2027. At this point, it is to be determined if this second workshop will be virtual or hybrid.

Stay Tuned!

## » Acknowledgements

This year, we have maintained and developed a working relationship with many people from Communities, Governments, Universities, Private sectors, And NGOs. The Community Hydrography team at the CHS extends our kind thanks to all of them.



### In alphabetical order, they are:

- › Arctic Eider Society/SIKU
- › Arqviiliit IPCA
- › Canadian Coast Guard Arctic Marine Response Station of Rankin Inlet
- › Canadian Coast Guard Auxiliary Search and Rescue units in Kuujuaq, Naujaat, Pangnirtung, and Salluit
- › Center for Coastal Ocean Mapping of University of New Hampshire
- › CIDCO: Interdisciplinary Centre for the Development of Ocean Mapping
- › Community of Sanikiluaq
- › Cree Nation Government
- › EOMAP: Earth Observation & Environmental Services
- › Essipit Innu First Nation Band Council
- › Ka:yu:'k't'h' / Che:k'tles7et'h First Nations
- › K'ómoks First Nation
- › Mamalilikulla First Nation
- › Marine Institute of Memorial Newfoundland University
- › Nanwakolas Council Society
- › Niskamoon Corporation
- › Northern Village of Inukjuak
- › Ocean Mapping Group at the University of New Brunswick
- › Orange Force Marine
- › Paulatuk Hunters and Trappers Committee (PHTC) Qikiqtaaluk Corporation
- › Tlowitsis Nation
- › Transport Canada, EMSA and CEMS
- › Tuktoyaktuk Hunters and Trappers Committee (THTC)
- › Wei Wai Kum First Nation

We also extend thanks to our colleagues:

- › From the DFO Ecosystems and Oceans Science sector Winnipeg and Yellowknife
- › From the Canadian Coast Guard, Burlington, ON
- › From Parks Canada
- › From the Royal Canadian Mounted Police
- › From the Natural Resources Canada, Dartmouth, NS
- › Everyone at the CHS across the country.

Back cover credits: All photos are from Community Hydrography team:

Top: Joel McDonald and Angus Green, Paulatuk, NT; Middle-right: Angus Green on mission survey, Paulatuk, NT; Middle-center: Ulukhaktok, NT; Middle-left: Brent Falkins and Waylon Green; Bottom: Qikiqtaic center, Sanikiluaq, NU.



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