



**Canadian Hydrographic Service Report to the
4th meeting of the Arctic Regional Hydrographic Commission
January 29-30, 2014
Portsmouth, New Hampshire, USA**

This report addresses the Arctic-related activities of the Canadian Hydrographic Service since last ARHC meeting.

1. Organizational Updates

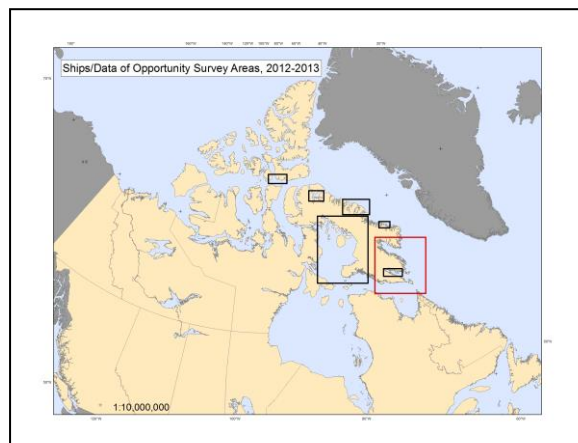
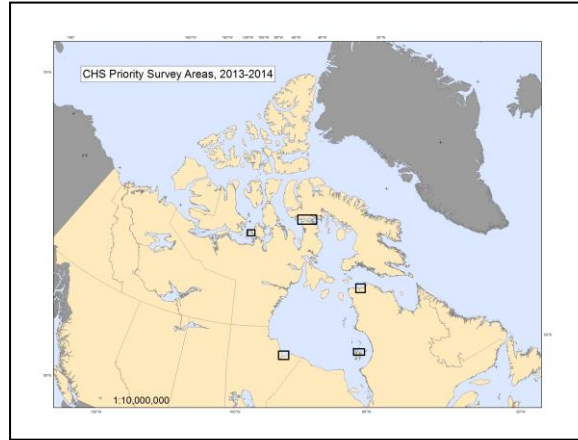
Dr. Savithri Narayanan retired from the Canadian Hydrographic Service in November 2014. Dr. Kian Fadaie has taken the role of Acting Director General until a permanent replacement is identified. A special note of appreciation is made here to Savi Narayanan who was a catalyst in the creation of the Arctic Regional Hydrographic Commission (ARHC) and was its Chair during the 201 and 2011 meetings of the ARHC.

The Canadian Hydrographic Service is a branch of the Ecosystems and Oceans Science Sector of Fisheries and Oceans Canada, with offices in Ottawa; Sidney, British Columbia; Burlington, Ontario; Mont-Joli, Quebec; Dartmouth, Nova Scotia; and St. John's, Newfoundland and Labrador.

National coordination is expected to be achieved through a governance structure, with the Dominion Hydrographer as the functional head of the organization, a Senior management Committee consisting of the directors managing each of offices and key functions, and a suite of national committees and working groups. CHS had been using the Canadian Coast Guard (CCG) vessels as its primary platform for hydrographic surveys, but recently, it has been expanding its survey coverage through use of vessels-of-opportunity, partnerships and AUV, aerial and satellite platforms to enhance data collection coverage and test new approaches.

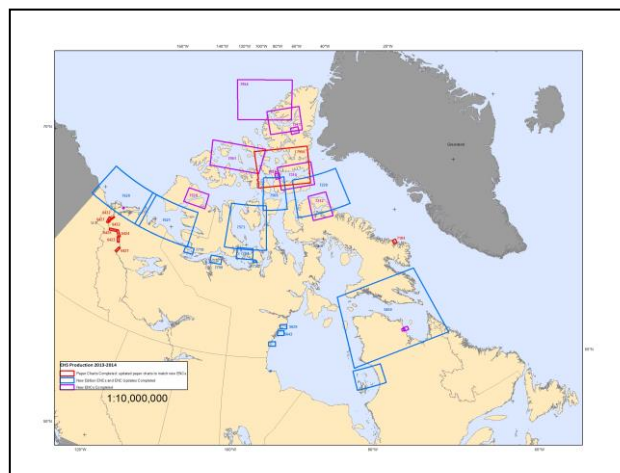
2. Surveys

During the past two survey seasons since ARHC3 the CHS has continued its work on non-dedicated CCG vessels to collect data in priority areas on an opportunity basis. In addition, CHS is expanding its collaboration efforts to seek data collection from the Royal Canadian Navy Arctic vessel deployments, academia, other federal departments, the Nunavut territorial government and supporting the resource development sector surveys when chart quality information is being obtained. During the past two seasons some alternative technologies were also deployed including the use of LiDAR, satellite imagery and Unmanned Underwater Vehicles.



3. New Charts and New Editions in the Canadian Arctic

Nautical products production in the last two years has focused primarily on the creation of berthing scale Electronic Navigational Charts. This production priority is frequently requested by shipping clients who do community re-supply under less than optimal conditions given very few communities have traditional southern harbour infrastructure. This is also complimentary with the CHS non-dedicated-vessel priority on areas where the survey work can be focused on tight locations and completed in short duration.



The Mackenzie River system in Canada's North-west Territories is a shallow water river more than 1,500 kilometre long. It is a key re-supply route linking southern communities to the western Arctic communities. Its annual silting and shifting has created difficulties to maintain accurate bathymetry. In an effort to provide mariners with confident navigational product CHS has begun to experiment with using satellite imagery to detect areas prone to silting and shifting. With this imagery it is considered possible to correct shoreline on an annual basis and to identify areas where bathymetry can be confidently maintained. This has been year one of producing 5 preliminary paper products in order to have mariner feedback on their use and suitability.

See www.charts.gc.ca

5. MSI in the Canadian Arctic

The Canadian Coast Guard, of Fisheries and Oceans Canada, is responsible for MSI activities in Canadian Waters.

The Canadian Coast Guard provides details of the broadcast schedule (and content) for maritime safety information (weather and navigational warnings) for all 21 MCTS (Marine Communications and Traffic Services) Centres in the publication "Radio Aids to Marine Navigation". This publication includes diagrams of the locations of the transmitting antennas (infrastructure) and MCTS Centre locations.

MSI broadcast services in the Canadian Arctic, are currently provided by Iqaluit MCTS on VHF, MF and HF using broadcast mediums such as radiotelephony, radiofacsimile, HF Narrow Band Direct Printing (HF-NBDP) and NAVTEX.

In accordance with the GMDSS Master Plan, for Arctic NAVAREAs/METAREAs XVII and XVIII:

1. The Canadian Coast Guard is the registered provider of navigational warning information to be disseminated (scheduled 2x daily) via the Inmarsat-C SafetyNET service. Both NAVAREAs are operated from a single location at MCTS Prescott. Equipment is fully redundant and a business continuity plan is in place.
2. NAVAREA XVII and XVIII navigational warnings and meteorological/ice information is broadcast twice daily, on a seasonal basis, by Iqaluit MCTS using HF-NBDP (8416.5 kHz) to provide maritime safety information to those areas outside of the Inmarsat-C SafetyNET service.
3. NAVAREA XVII and XVIII navigational warnings are available year round on the Canadian Coast Guard website: <http://www.ccg-gcc.gc.ca/e0004476?todo=warning>

The Canadian Coast Guard NAVAREA XVII XVIII SafetyNET service has been fully operational since June 2011 with no problems noted.

Environment Canada is the registered issuer of weather and ice information for METAREA XVII and XVIII. Winds, waves and ice information is disseminated via the Inmarsat-C SafetyNET service for areas south of 75°N and by the Canadian Coast Guard using HF telex for areas north of 75°N. The service has been operational since July 2010. Bulletins are issued twice daily from about June to December, then weekly from January to May, when the Iqaluit MCTS office is not operational.

6. IHO C-55 Status of Surveying and Charting

The CHS hopeful that its current direction to using more GIS applications to manage its spatial survey coverage and its charting coverage will prove helpful in better updating an IHO C-55 solution for world-wide status of charts and surveys.

7. Capacity Building

Not Applicable

8. Oceanography

a) Tide Gauge Network

CHS operates six permanent tide gauges in the Canadian Arctic: Alert on the Lincoln Sea, Qikiqtarjuaq on Davis Strait, Uluhaktok on the Amundsen Gulf, Tuktoyaktuk on the Beaufort Sea, Churchill on Hudson Bay and Nain on the Labrador Sea; the underwater infrastructure at Tuktoyaktuk was upgraded with stronger components in 2013, submersible gauges were moored on the sea floor at Uluhaktok and Alert. In future years CHS plans to strengthen the underwater installations for Uluhaktok and Alert permanent gauges to limit ice damage.

This year CHS also retrieved three current metres that had been in place for a year at Alert and year-long tide gauges from Gjoa Haven (Rasmussen Basin), Sanikiluaq (Belcher Islands) and Quaqtaq (Hudson Strait), the data from these will be used to improve tidal constituents, update/improve chart datum and improve the Continuous Vertical Datum modelling. Seven year-long tide gauges were deployed at Igloolik and Hall Beach (Foxe Basin), Pike Resor Channel and Iqaluit (Frobisher Bay), Acadia Cove (Resolution Island), Imilit Island and Pangnirtung Fiord (Cumberland Sound); CHS is using new Aanderaa SeaGuard submersible gauges at these sites. In addition at all year long tide gauge sites and several sites in Fury and Hecla Strait, GPS occupations/data were completed/collected for deriving chart datum to ellipsoid separation, for use in the Continuous Vertical Datum modelling.

See www.tides.gc.ca

Continuous Vertical Datum for Canadian Waters

The goal of the CVDCW is to develop a surface connecting Chart Datum to the GRS80 ellipsoid in the NAD83(CSRS) reference frame which captures the relevant spatial variability as modeled by integrating ocean models, gauge data (water levels and GPS observations), sea level trends, satellite altimetry, and a geoid model.

In 2013, the first cut of the Continuous Vertical Datum model was calculated for the Canadian Arctic and has been used successfully in bathymetry reduction for hydrographic surveys. The first version also highlighted areas where additional work is required, and will be the focus in the coming years for new data acquisition. In 2014, new station data (tidal constituents, GPS observations, and new Geoid) along with more advanced interpolation/extrapolation techniques will lead to version 2.

9. Other Activities

The Canadian Government has announced its intention to support a World Class Tanker Safety System. This effort will include broad studies directed in areas of prevention, preparedness and response to oil spill incidents. Transport Canada is the lead department overall for this initiative. In addition to the federal departmental efforts, Transport Canada has established an Expert Panel who will study and make recommendations as an independent body.

This effort includes the review and considerations for a Modern and Charted Navigation System south of 60⁰. In addition, there is work underway to assess needs of the navigational system in the North. The Northern study is underway with results and recommendations expected to be final in 2014 or 2015.

For more information see <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>

10. Conclusions

Canada is attempting to enhance its focus in the Arctic through the leveraging of collaborative projects and ships/data of opportunity.