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9th Meeting of the

Arctic Regional Hydrographic Commission

Arctic Hydrographic Adequacy

CANADA

Murmansk, Russia
17-19 September 2019

Canada

Measuring Arctic Hydrographic Adequacy

- Drivers in CA
  - Need for better planning/prioritization for better allocation of resources
  - Need for better reporting
  - These requirements highlighted in 2014 Office of the Auditor General (OAG) of Canada report
    - That report recommended that CHS “should identify the areas of the Arctic region that need to be surveyed and charted, and prioritize them on the basis of needs across the country”

- Methodology evolved from the ARHC Arctic Hydrographic Adequacy risk assessment work

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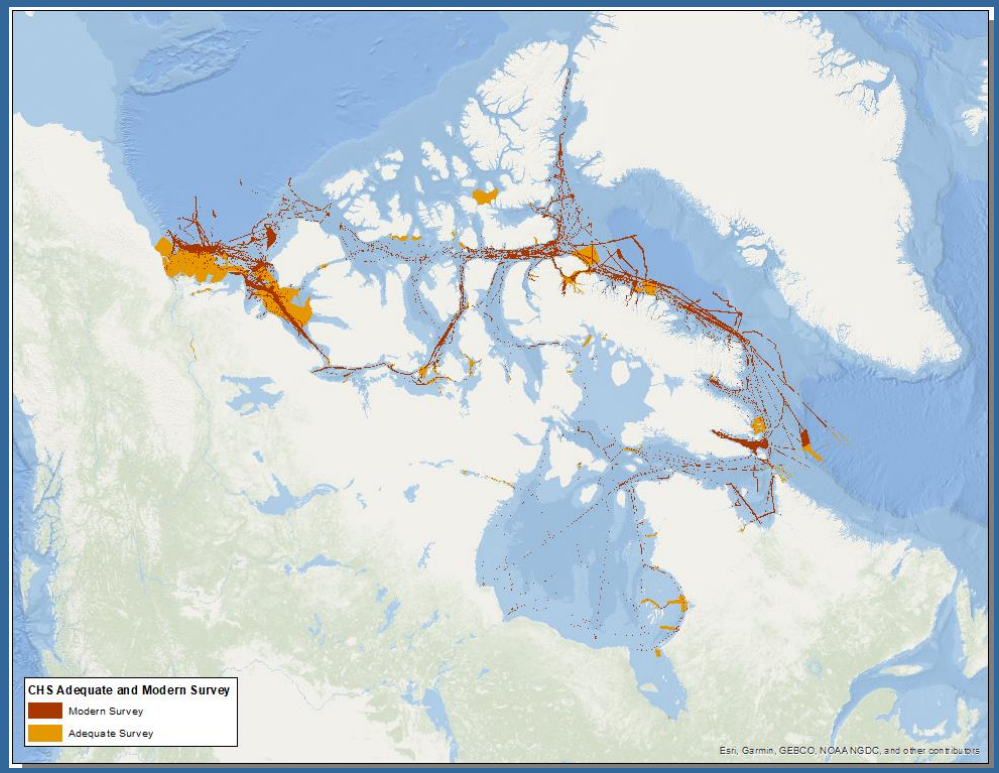
Selection of survey types, defined as acceptable

- Based on the OAG recommendation, CHS adopted corridor approach (based largely on AIS data).
- For the calculation of % of survey data that are considered acceptable CHS uses CATZOC A1, A2 and B.
- CHS considers areas that are classified as CATZOC A1 and A2 to be modern hydrography, and those areas coded as CATZOC B as adequate hydrography



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Description of Approach

Used to report on acquired survey- A GIS solution

A GIS solution was created to extract the percentage of survey in the Arctic
Two GIS systems are used to query and calculate the Geostatistics

1- CARIS BDB (Base Editor)

All CHS survey that are validated ready for chart production are stored in BDB

2- ESRI ArcGIS Desktop

ArcGIS is the GIS that is used to perform the calculations needed

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Extraction of survey coverage from our Database (CARIS BDB)

- CARIS Bathy DataBase Suite (BDB) is used in CHS for data management of Bathymetric data.
- CHS follows **ISO processes** for loading, quality checking, quality assuring, and validating all data that is entered into the database
- HQ uses a standard query to pull the valid surveys from the BDB
- Once the coverage is extracted from BDB, we analyze the data in **ArcGIS Desktop**

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GIS – ESRI Processing Steps

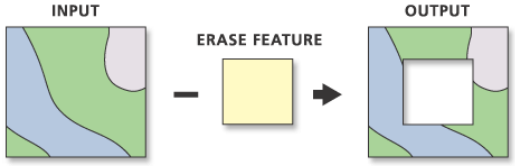
1. Clipping the Data to the Canadian NORDREG Zone
2. Separation of the CATZOC Levels to have 3 separate files (CATZOC A1, CATZOC A2, and CATZOC B)
1. Dissolve tool in ESRI ArcGIS to ensure there are no overlapping data
2. Erase Tool to ensure there is no overlap, and that area is calculated for the best possible survey type

Title Erase (Analysis)

Summary

Creates a feature class by overlaying the Input Features with the polygons of the Erase Features. Only those portions of the input features falling outside the erase features outside boundaries are copied to the output feature class.

Illustration



http://desktop.arcgis.com/en/arcmap/10.5/tools/coverage-toolbox/erase.htm

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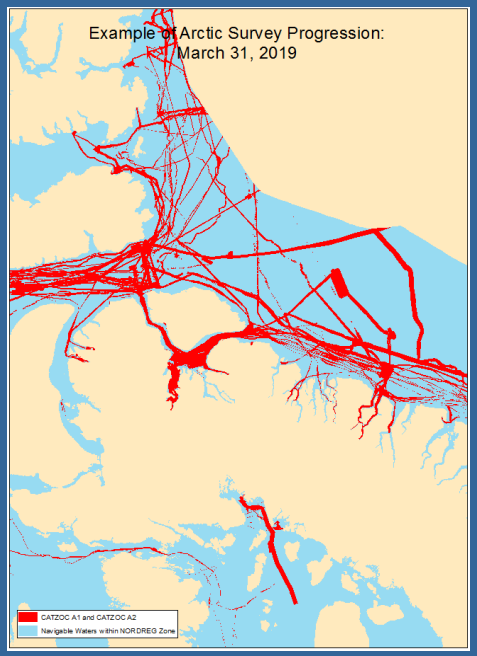
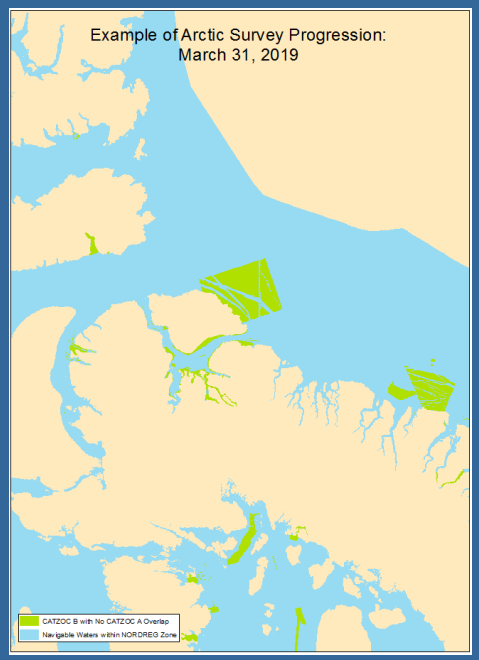
Erase Function example:

The example below shows that CATZOC B is erased in areas that have a modern survey (CATZOC A1 and/or CATZOC A2) - The Erase function is important as CHS does not want to double-count survey areas

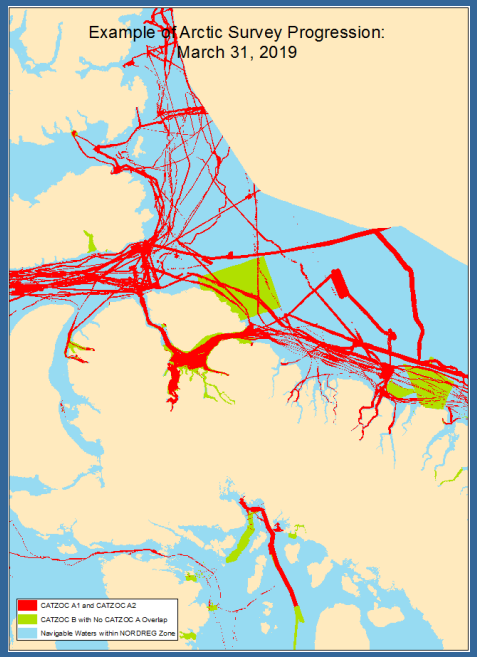
CATZOC A



CATZOC B



CATZOC A and B



Report on Canadian Arctic survey and progress

CHS has used Canada Lambert Conformal Conic projection to preform analysis.

Mar. 31 of Year	ARCTIC'S NORDREG AREA		
	Modern Standard	Adequate Standard	Modern or Adequate Standards
	area CATZOC A1 and A2 (km^2)	area CATZOC B (km^2)	area CATZOC A1, A2 and B (km^2)
2014	155355.49	233227.21	388582.7
2019	262831.64	234558.90	497390.54

Mar. 31 of Year	ARCTIC'S NORDREG AREA		
	% area CATZOC A1 and A2	% area CATZOC B	% area CATZOC A1, A2 and B
2014	4.36	6.55	10.91
2019	7.38	6.59	13.97

The final step is creating a CHS ISO 19115 Process

In the future the use of **Canada Albers Equal Area Conic** could be implemented to better calculate the areas

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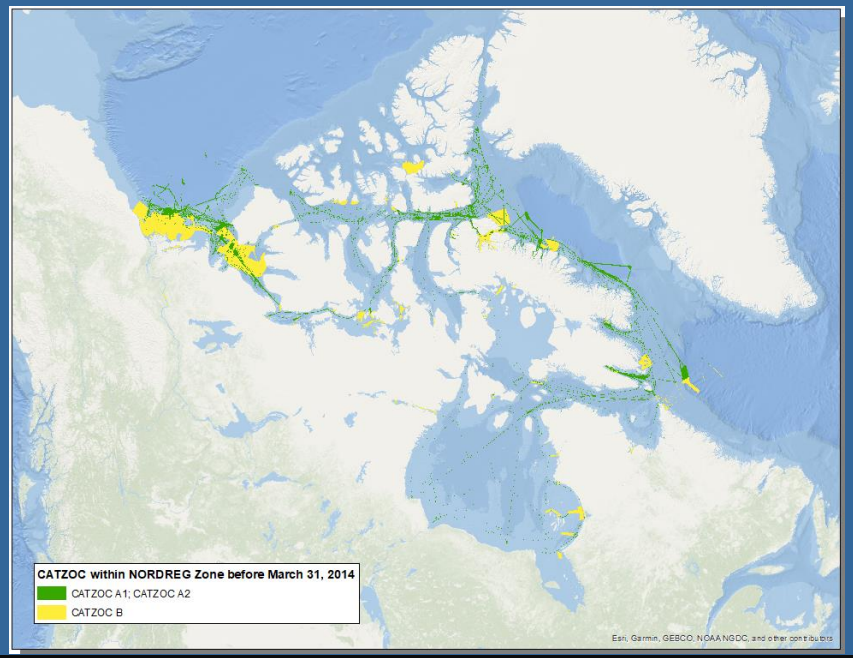
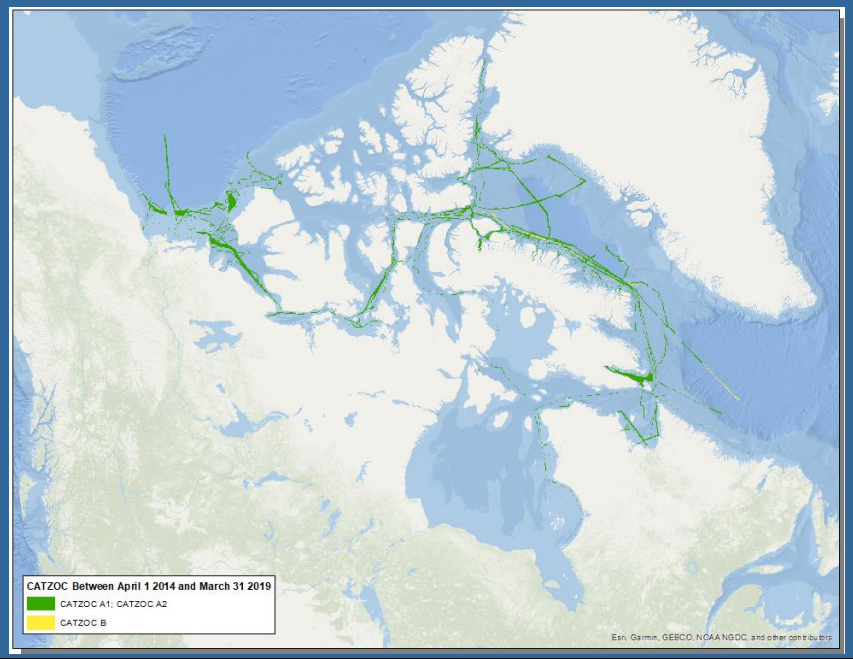
Monitoring our Survey progress in the Arctic

7.9 % increase of acceptable hydrography since 2014 within primary and secondary corridors.

CATZOC A and B before 2014



CATZOC A and B from 2014 to 2019



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Analyzing the data

- Due to the varying methodologies, definitions/terminologies, and selection of input data, there are obvious differences in the results given by the analyses for C-55, OTWG, and CHS (internal) regarding adequacy.
- On the positive side, with GIS being employed to do each of this spatial analyses, there are opportunities to continually improve the approaches.

Recommendation

- Given the pan-Arctic nature of the issue of hydrographic adequacy, CA suggests ARHC attempt to converge these approaches toward a single GIS-based method for indicating the status of surveying and nautical charting.
- Ideally, C-55 and INToGIS would fulfill this requirement.

Request of ARHC

- Provide feedback on this methodology to CA
- Consider the way forward for a collective reporting


QUESTIONS?