The background is a nautical chart showing a coastal region. Key features include 'WELCOME I LT' with 'Fl 10s 10 St M', 'Schwitzer Shoal', 'Thompson I', 'ISLE ROYALE LT', 'BATTLE I LT', 'GAG S J', 'Braed Rock', 'Cape Victor', 'Mortimer I', 'Sunday Harbour', and 'Superior Shoal'. Depth soundings and various navigational symbols are scattered throughout the map.

# Considering a requirement to subcontract hydrographic work from the Canadian Hydrographic Service

Presentation by: Brian Carroll

April 15, 2014



# Acknowledgements

\*\*\*\*\*

Supervisor: Dr. Dominique St-Hilaire

Facilitator: Prof. Christopher McCulloch

\*\*\*\*\*



# Outline

- Introduction
- Hydrographic Surveying During Periods of Fiscal Restraint
- Contracting
- Standards for Hydrographic Surveys
- Conclusion & Recommendations



# Introduction

## Purpose:

- The main objective of this presentation is to address whether the Canadian Hydrographic Services (CHS) should contract out to the private sector parts of its hydrographic work.
- Secondly, this presentation will speak to the type of work that could be contracted into private sectors.
- Finally, it will explore how CHS can continue the same quality assurance with a newly-established relationship with the private sector, and how to best combine the work of a public-private entity into a coherent final product.





# Introduction

## Background:

- Canada has 243,792 km of coastline, 6.55 million square km of continental shelf and territorial waters, and extensive inland and coastal waterways and ports.
- CHS currently has in excess of 900 charts available, covering the three major coastlines as well as the inland waters of Canada.
- Each year CHS distributes more than 300,000 charts, tide tables, and other nautical publications.



# Introduction

- **The Issue...**
- Fiscal restraint poses fewer opportunities to collect hydrographic data (naturally leads to fewer field surveys).
- Demand for hydrographic products remain unchanged or in some cases increase; however, fewer resources are available to maintain the same level of service.

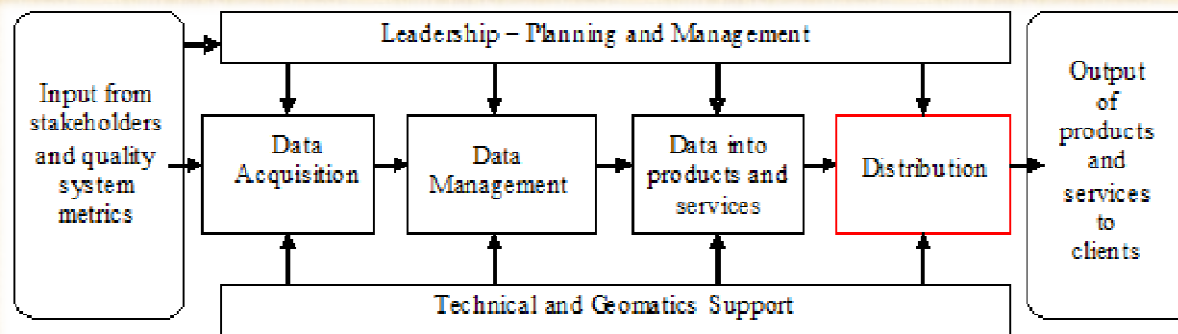




# Hydrographic Activity Flow

## Survey Procedures:

- Data Acquisition
- Data Management
- Products and Services
- Distribution



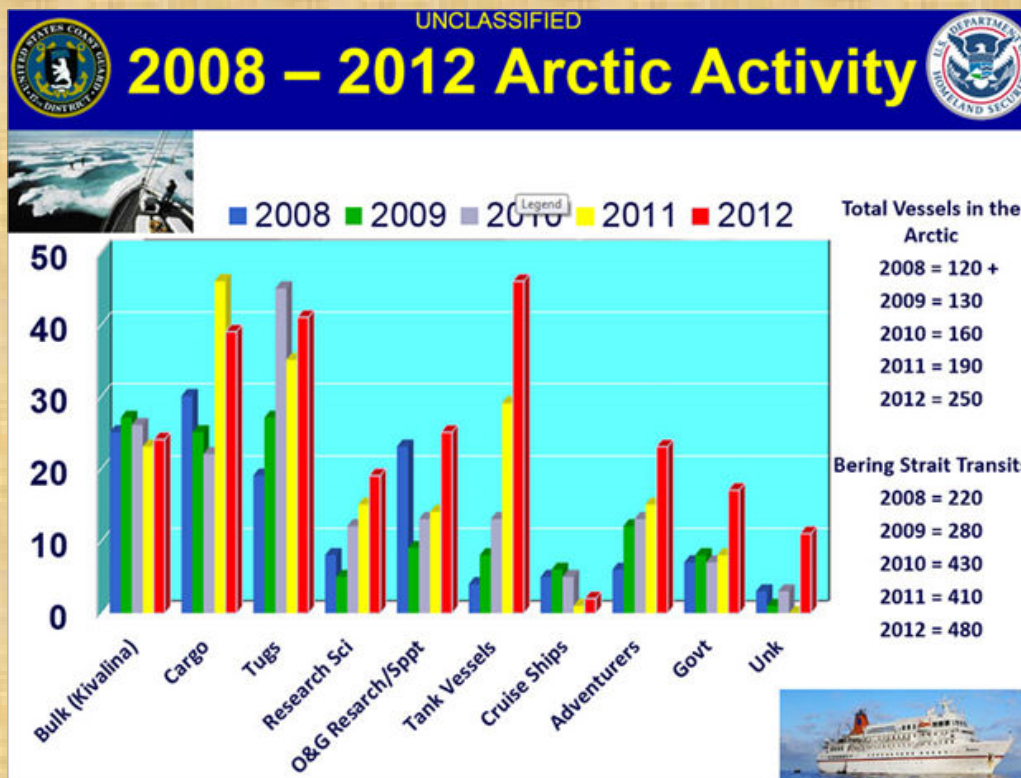
(Source: DFO, 2011)



# Product Driving Forces

- Marine transportation - accounts for over 80% of the world's merchandise trade (Gross Domestic Product).
  - this amount is expected to increase substantially by 2020.
- Climate Change - for example ... especially in the Canadian Arctic.
  - the total vessel activity in the Arctic during 2008 was just over 120.
  - due to ice receding, that figure rose to 250 in 2012.

# Product Driving Forces



(United States Coast Guard, 2013)

# CHS Budget Reductions

## Budget:

- According to news articles, the department faces up to an additional \$100 million in cuts over three years beginning 2015 – 2016 which will ultimately affect the CCG and the science sectors within that government department.
- CHS holds considerably less resources compared to what it held in the last decade (currently has less than 300 employees' nationwide).

(\$M)	2006 - 07	2007 - 08	2008 - 09	2009 - 10	2010 - 11
<u>Budget</u>	<u>\$43.6</u>	<u>\$27.2</u>	<u>\$27.4</u>	<u>\$27.9</u>	<u>\$26.5</u>
<u>Expenditures</u>	<u>\$42.0</u>	<u>\$25.9</u>	<u>\$26.1</u>	<u>\$27.8</u>	<u>\$27.3</u>
<u>Revenue</u>	<u>\$2.5</u>	<u>\$3.0</u>	<u>\$3.1</u>	<u>\$3.6</u>	<u>\$3.6</u>

(DFO, 2013)





# Vessels Available to CHS

## Fleet:

- Previous to the DFO / CCG merger in the early 90's, science operated its own fleet of vessels separate from CCG.
- Presently, there are seventeen vessels equipped nationwide with the technology necessary for science work (five of which are dedicated to CHS).
- The total number of operational days available to science vessels in 2006 – 07 was 4,000 – 4,250, but by 2010 – 11, that figure had been reduced to 3,500 – 3,750 days. CHS activity accounts for 10.47% of these figures.

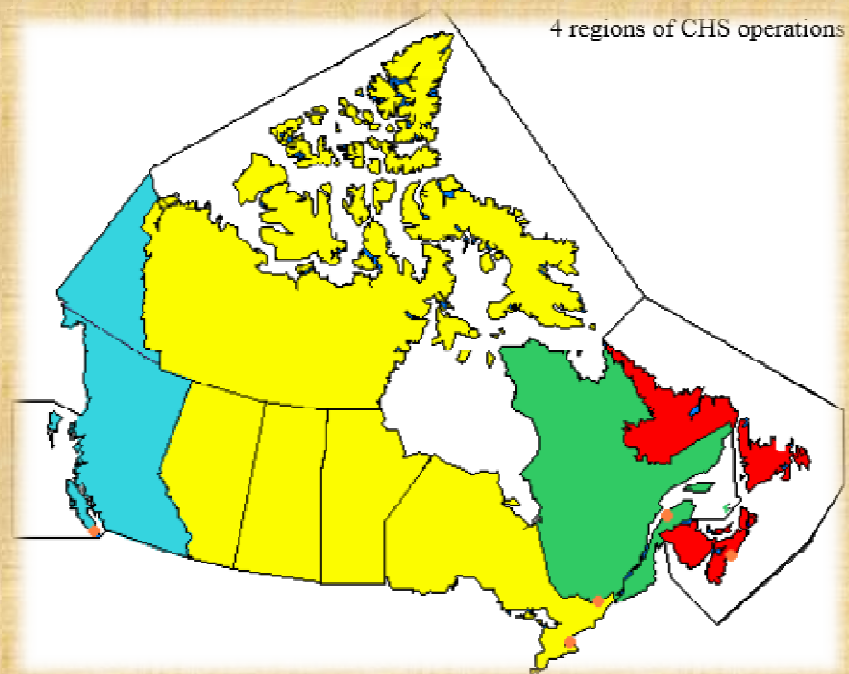
# Vessels Equipped with Standard Hydrographic Tools





# Regions of Operation

- Four regions of CHS operations:
  - Atlantic Region (**Red**)
  - Quebec Region (**Green**)
  - Central / Arctic Region (**Yellow**)
  - Pacific Region (**Blue**)
  - Headquarters (Ottawa) – Upper Management & Limited Production



(Source: IHO, 2010)





# Contracting & Other Alternatives

## Data Acquisition:

- CHS presently does not routinely contract out.
- Opting to contract certain stages of the hydrographic process would allow CHS to continue core activity.
- In doing so, this may allow CHS to accomplish more through public-private relationships.
- A suggestion may be for CHS to focus on larger scale harbor charts & private sectors to work on smaller scales such as coastal charts.

# Contracting

## Data Processing:

- The possibility for contracting only the data processing is much more limited.
- This is due to the fact that processing data is much more beneficial when performed alongside of data acquisition.

# Contracting

## Chart Production:

- CHS is the primary organization in Canada with the mandate to create and distribute nautical charts; therefore, chart production should remain in house.
- Whenever a chart has priority and resources (staff) required for immediate production, experienced hydrographers may be contracted.



# Standards for Hydrographic Surveys

## Bathymetry & Seafloor Coverage

<u>Order</u>	<u>Typical Areas</u>	<u>Horizontal Accuracy (95% Confidence)</u>	<u>Vertical Accuracy - Reduced Depth (95% Confidence)</u>
<u>Exclusive</u>	Areas with minimal under-keel clearances such as shallow harbors and critical channels.	1m	a = 0.15m b = 0.0075m
<u>Special</u>	Harbors and critical channels.	2m	a = 0.25m b = 0.0075m
<u>1a</u>	Areas with depth < 100m where oceanic features may cause concern for clearance.	5m + 5% of depth	a = 0.5m b = 0.013m
<u>1b</u>	Areas with depth < 100m where oceanic features are not as much concern for clearance.	5m + 5% of depth	a = 0.5m b = 0.013m
<u>2</u>	Areas with depth > 100m. A general depiction of the seafloor is substantial.	20m + 10% of depth	a = 1.0m b = 0.023m
<u>3</u>	All other areas which do not meet requirements of other orders.	> 20m + 10% of depth	a = 1.0m b = 0.023m



# Conclusion & Recommendations

- Nautical charts are critical navigational tools for safe navigation at sea. With budget constraints reducing the amount of staff, hydrographic vessels, and survey time the CHS are is pressured with higher demands for published nautical charts with fewer resources at their disposal.
- Four of Canada's regions were explored for the possibility to contract segments of hydrographic surveys and chart development.
- It's mainly the Arctic region that requires extensive work. By allowing contractors to survey smaller charts (coastal) for the other regions, CHS can focus more resources to the Arctic.

Questions?

