Canadian Hydrographic Service

41st United States – Canada Hydrographic Commission Meeting

Dr Geneviève Béchard

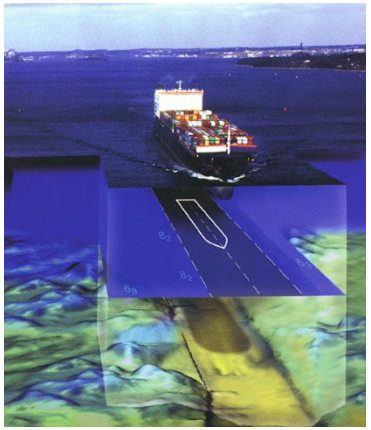
Director General Canadian Hydrographic Service (CHS) and Hydrographer General of Canada

March 26, 2018 Victoria, BC

Canada

Overview

- CHS Organization
- Canada's Ocean Protection Plan
- CHS' s S-100 Business Plan
- Royal Canadian Navy update



DFO Science - Canadian Hydrographic Service (CHS)

Deputy Minister Fisheries & Oceans Canada
Ms. Catherine Blewett

a/Assistant Deputy Minister – Ecosystems and Oceans Science
Ms Arran McPherson

DirectorGeneral/ Hydrographer General
Dr. Geneviève Béchard

CHS Regional Offices

Dartmouth, Nova Scotia - Director Jacinthe Cormier

Mont-Joli, Quebec - Director Serge Gosselin

Burlington, Ontario - a/Director Chris Marshall

Sidney, British Columbia – Director Dave Prince

Hydrography
Director Chris Hemmingway
Boundaries, Limits & Sovereignty
Geodesy
UNCLOS

Strategic and Hydrographic Policy
Director Rowena Orok
Special Projects
Career Development and Training Standards
Corporate Planning and Reporting

Products & Services
Director Louis Maltais
Client Services
Production
Publishing
Distribution

http://fgp-pgf.maps.arcgis.com/home/index.html

Canada's Oceans Protection Plan (OPP): Modern Hydrography & Charting in Key Areas

Francais- PPO

DFO-Science CHS OPP Initiatives | Hydrography in Ports | Near Shore Bathymetry | Arctic Hydrography & Charting | Hydrographic Dynamic Products | MSDI & RRP

Last Updated: March 13, 2018

Pêches et Océans Canada | Fisheries and Oceans Canada | Canada

Over the next five years beginning 2017-18, the DFO Science Canadian Hydrographic Service efforts under the Oceans Protection Plan (OPP) aim to undertake modern hydrography and charting in key areas and to support key OPP initiatives under Areas Response Planning and Regional Response Planning through the development of a marine spatial data infrastructure (MSDI).

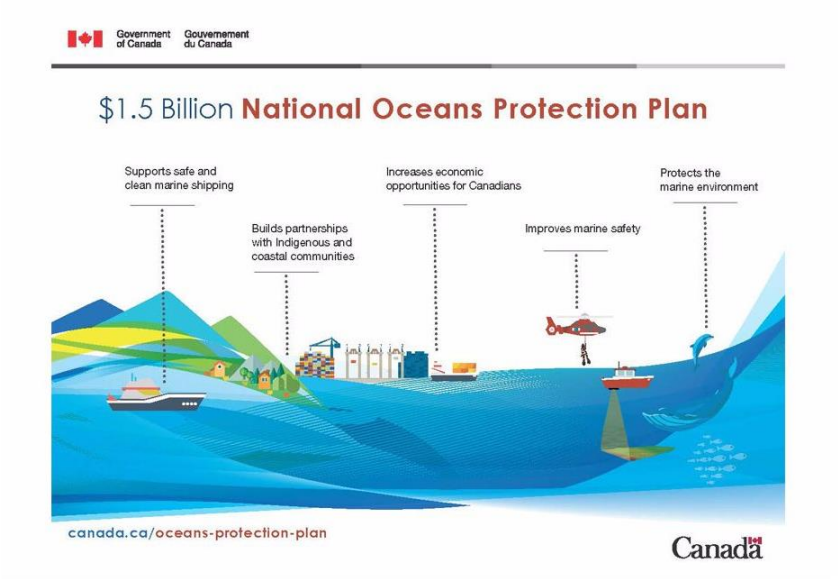
Modern Hydrography and Charting in Key Areas aims to:

· Conduct highly intensive modern hydrographic and charting activities to provide Electronic Navigation Charts (ENCs) for highly critical areas across the country, including Canada's 23 highest priority commercial ***ports*** and waterways (13 in B.C., 7 in Quebec, and 3 in Atlantic).
· Fill important gaps in high-resolution coastline and bathymetry in inter-tidal zones and ***near-shore*** *areas* to ensure the delivery of improved navigational charts and enhanced electronic navigational chart (ENC) in near-shore areas (e.g., Haida Gwaii), high risk coastal and inland water zones.
· Undertake more extensive efforts to fill, at an accelerated pace, hydrographic data gaps in the ***Arctic***, through the provision of adequate navigational products and services.
· Strengthen navigational safety and the prevention of marine incidents by delivering ***dynamic*** hydrographic products and services (tide and water level, under-keel and overhead information) in key areas.

Marine Spatial Data Infrastructure (MSDI)

- The marine component of the Canadian Geospatial Data Infrastructure (CGDI)
- Compliant with the Federal Geospatial Platform (FGP)
- Integrated within the Federal Committee on Geomatics and Earth Observation (FCGEO) and the Interdepartmental Committee Oceans (ICO) governance structures

aims to advance Areas Response Planning (ARP) and Regional Response Planning (RRP) initiatives under OPP, where ARP will be implemented in four areas with higher levels of tanker traffic: Southern portion of British Columbia; Gulf of St. Lawrence; Quebec; Saint John and Bay of Fundy, New Brunswick; Port Hawkesbury and



Canada

Canada's Oceans Protection Plan (OPP): Modern Hydrography & Charting in Key Areas

DFO-Science CHS OPP Initiatives | Hydrography in Ports | Near Shore Bathymetry | Arctic Hydrography & Charting | Hydrographic Dynamic Products | MSDI & RRP

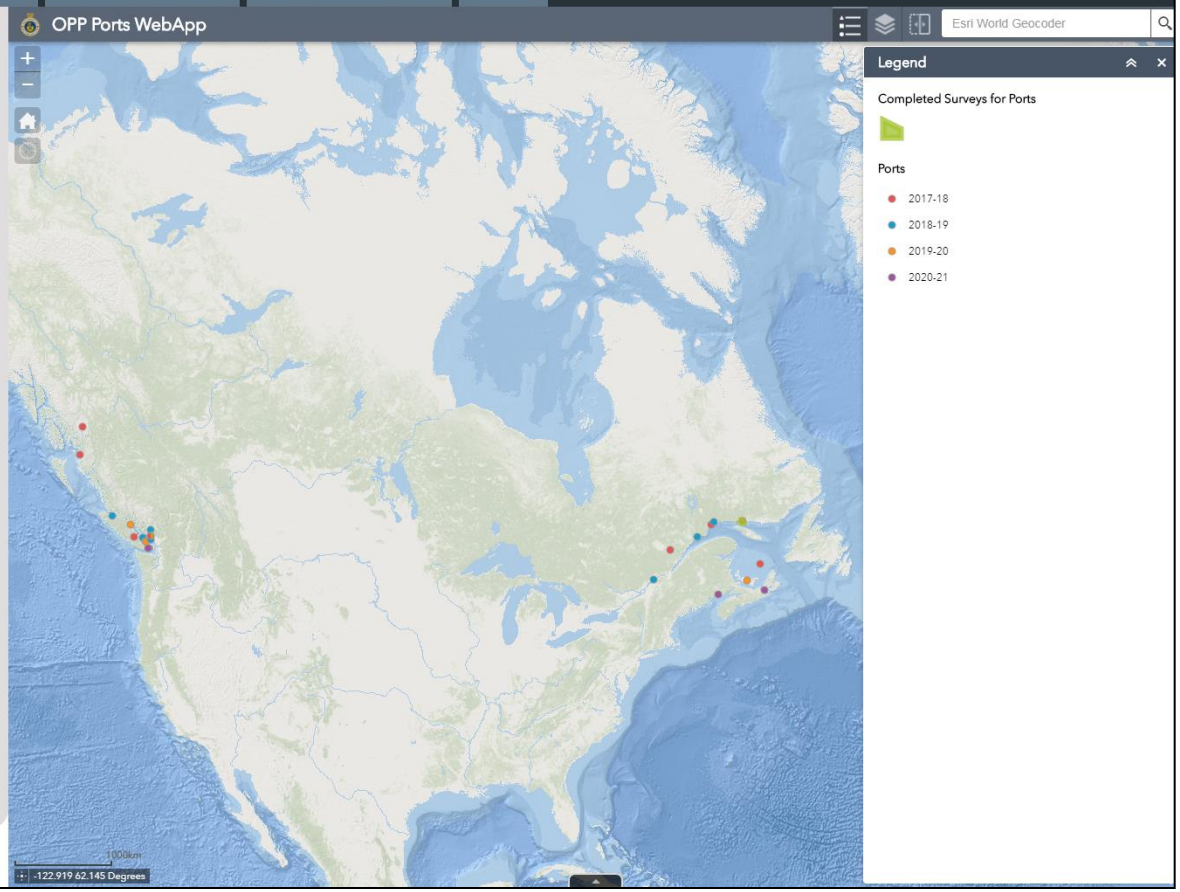
Last Updated: March 1, 2018

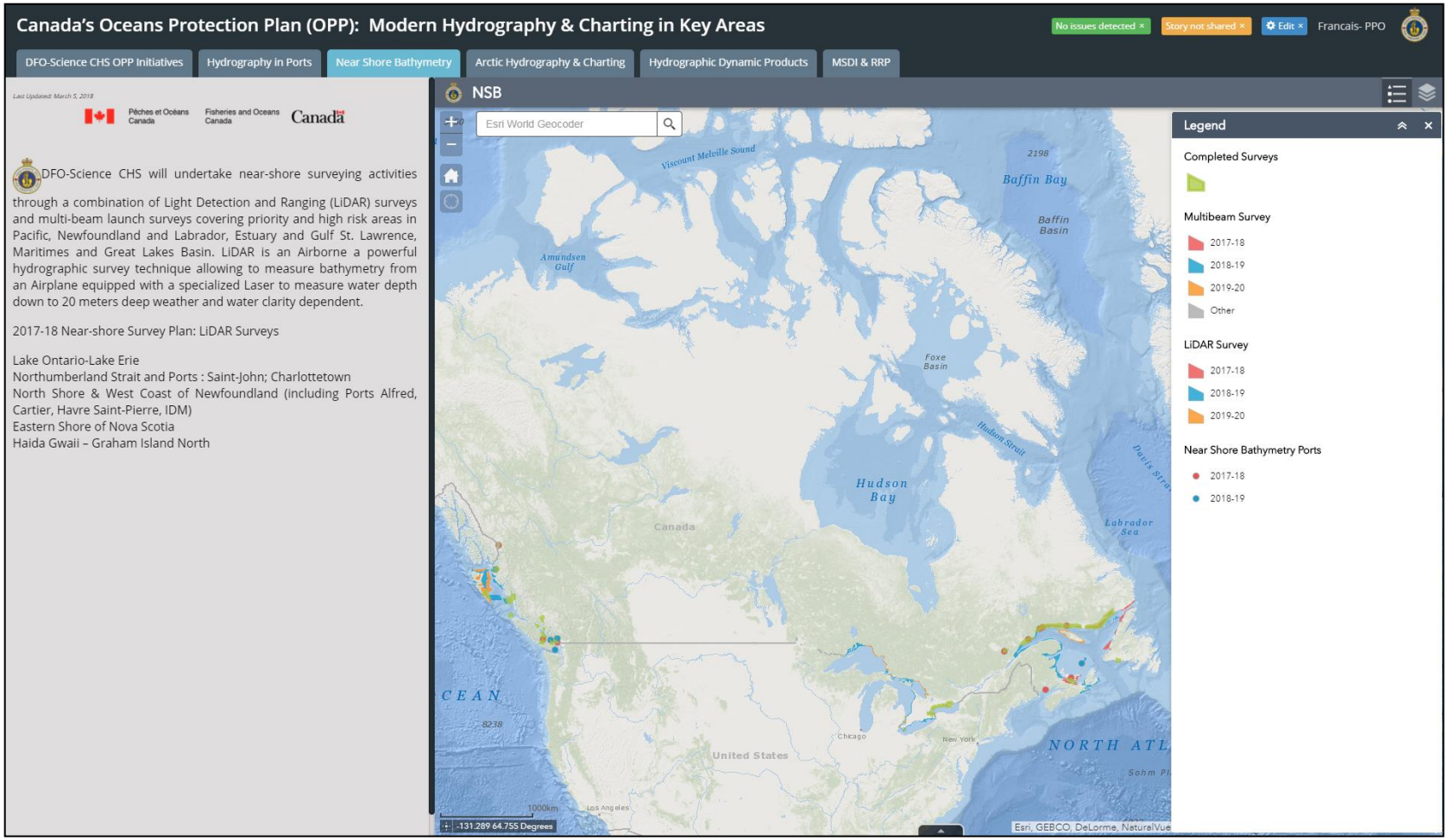
Pêches et Océans Canada Fisheries and Oceans Canada Canada

Modern hydrographic surveying of 23 priority commercial ports will start in 2017-18 with a goal to complete the surveying of 15 ports by 2018-19. This sub-element continue to build on the initial efforts under the World Class Tanker Safety System initiatives. Ports were assessed based on size/traffic (current and potential growth in both size and traffic flow), gaps in hydrography and ENC coverage, risk potential (e.g. recent marine incident/grounding), stakeholder feedback (e.g., port authorities) and information identifying high risk approaches to ports.

Name of port / Nom du port	Province	Date of survey/de levés	Date of/de production
Iles de la Madeleine	Que./Qc	2017-19	2019-20
Havre St Pierre	Que./Qc	2017-18	2018-19
Port Alfred (La Baie)	Que./Qc	2017-18	2018-19
Port Cartier	Que./Qc	2017-18	2018-19
Vancouver Anchorage (English Bay)	B.C./C.-B.	2017-18	2018-19
Prince Rupert	B.C./C.-B.	2017-18	2018-19
Port Alberni	B.C./C.-B.	2017-18	2019-20
Stewart	B.C./C.-B.	2017-18	2019-20
Sept-Iles (Pointe-Noire)	Que./Qc	2018-19	2021-20
Baie-Comeau	Que./Qc	2018-19	2019-20
Trois-Rivières	Que./Qc	2018-19	2019-20
Squamish	B.C./C.-B.	2018-19	2020-21
Port Mcneill	B.C./C.-B.	2018-19	2020-21
Nanaimo Harbour	B.C./C.-B.	2018-19	2019-20
Deltaport	B.C./C.-B.	2018-19	2019-20
Charlottetown	P.E.I./Î.-P.-É.	2019-20	2020-21
Campbell River	B.C./C.-B.	2019-20	2020-21
Crofton	B.C./C.-B.	2019-20	2021-22
Chemainus	B.C./C.-B.	2019-20	2020-21
Saint John	N.B./N.-B.	2020-21	2021-22
Port Hawkesbury	N.S./N.-É.	2020-21	2021-22
Esquimalt	B.C./C.-B.	2020-21	2021-22
Victoria Harbour	B.C./C.-B.	2020-21	2021-22

Darker shade indicates completion.




Canada's Oceans Protection Plan (OPP): Modern Hydrography & Charting in Key Areas
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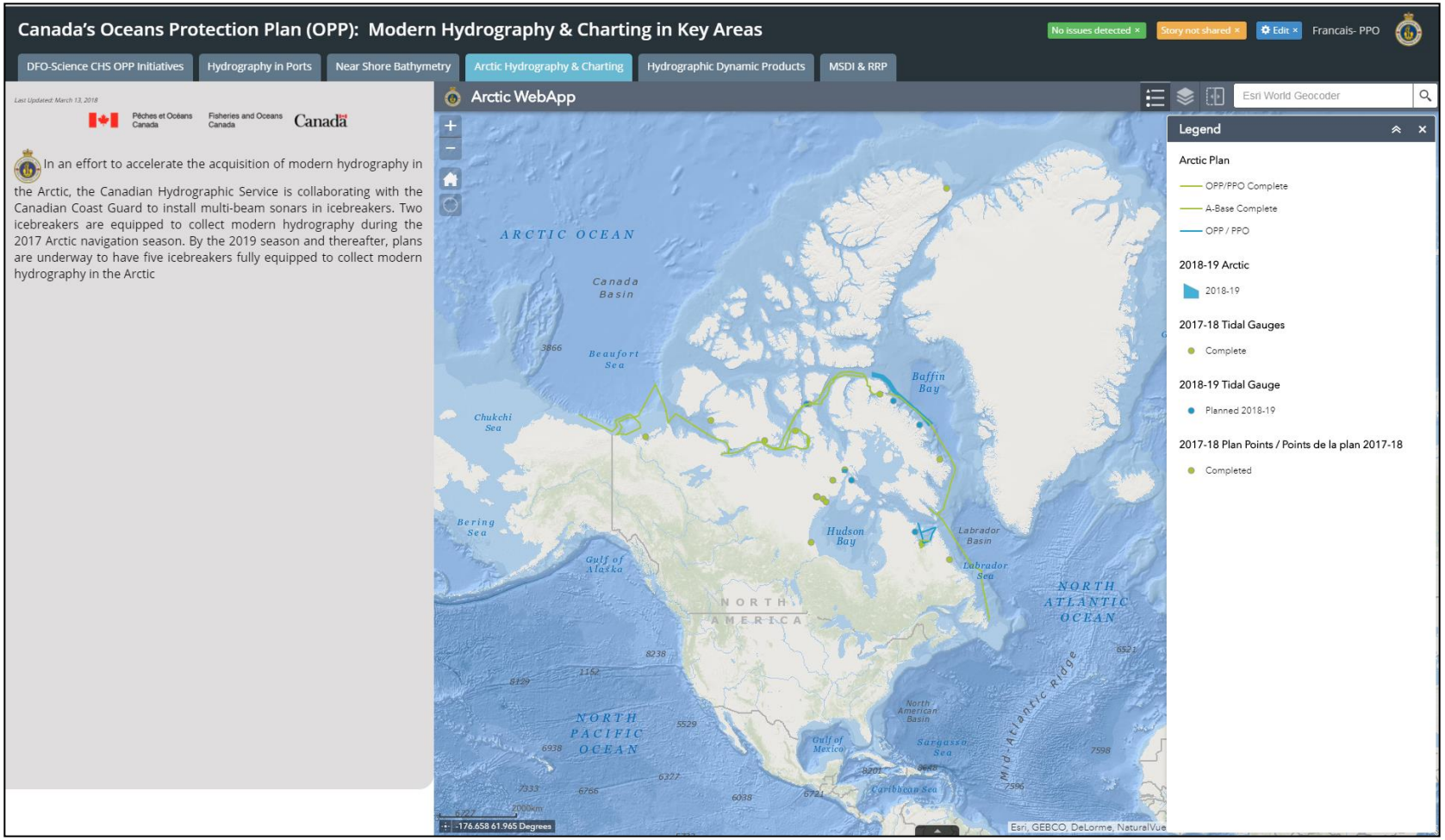
Francais- PPO
DFO-Science CHS OPP Initiatives
Hydrography in Ports
Near Shore Bathymetry
Arctic Hydrography & Charting
Hydrographic Dynamic Products
MSDI & RRP
Last Updated: March 5, 2018
Pêches et Océans Canada
Fisheries and Oceans Canada
Canada
DFO-Science CHS will undertake near-shore surveying activities through a combination of Light Detection and Ranging (LiDAR) surveys and multi-beam launch surveys covering priority and high risk areas in Pacific, Newfoundland and Labrador, Estuary and Gulf St. Lawrence, Maritimes and Great Lakes Basin. LiDAR is an Airborne a powerful hydrographic survey technique allowing to measure bathymetry from an Airplane equipped with a specialized Laser to measure water depth down to 20 meters deep weather and water clarity dependent.
2017-18 Near-shore Survey Plan: LiDAR Surveys
Lake Ontario-Lake Erie
Northumberland Strait and Ports : Saint-John; Charlottetown
North Shore & West Coast of Newfoundland (including Ports Alfred, Cartier, Havre Saint-Pierre, IDM)
Eastern Shore of Nova Scotia
Haida Gwaii – Graham Island North
NSB
Esri World Geocoder
Viscount Melville Sound
Baffin Bay
Baffin Basin
Amundsen Gulf
Foxe Basin
Hudson Strait
Davis Strait
Hudson Bay
Canada
Labrador Sea
United States
Chicago
New York
Los Angeles
1000km
-131.289 64.755 Degrees
Esri, GEBCO, DeLorme, NaturalVue
Legend
Completed Surveys
Multibeam Survey
2017-18
2018-19
2019-20
Other
LiDAR Survey
2017-18
2018-19
2019-20
Near Shore Bathymetry Ports
2017-18
2018-19

Canada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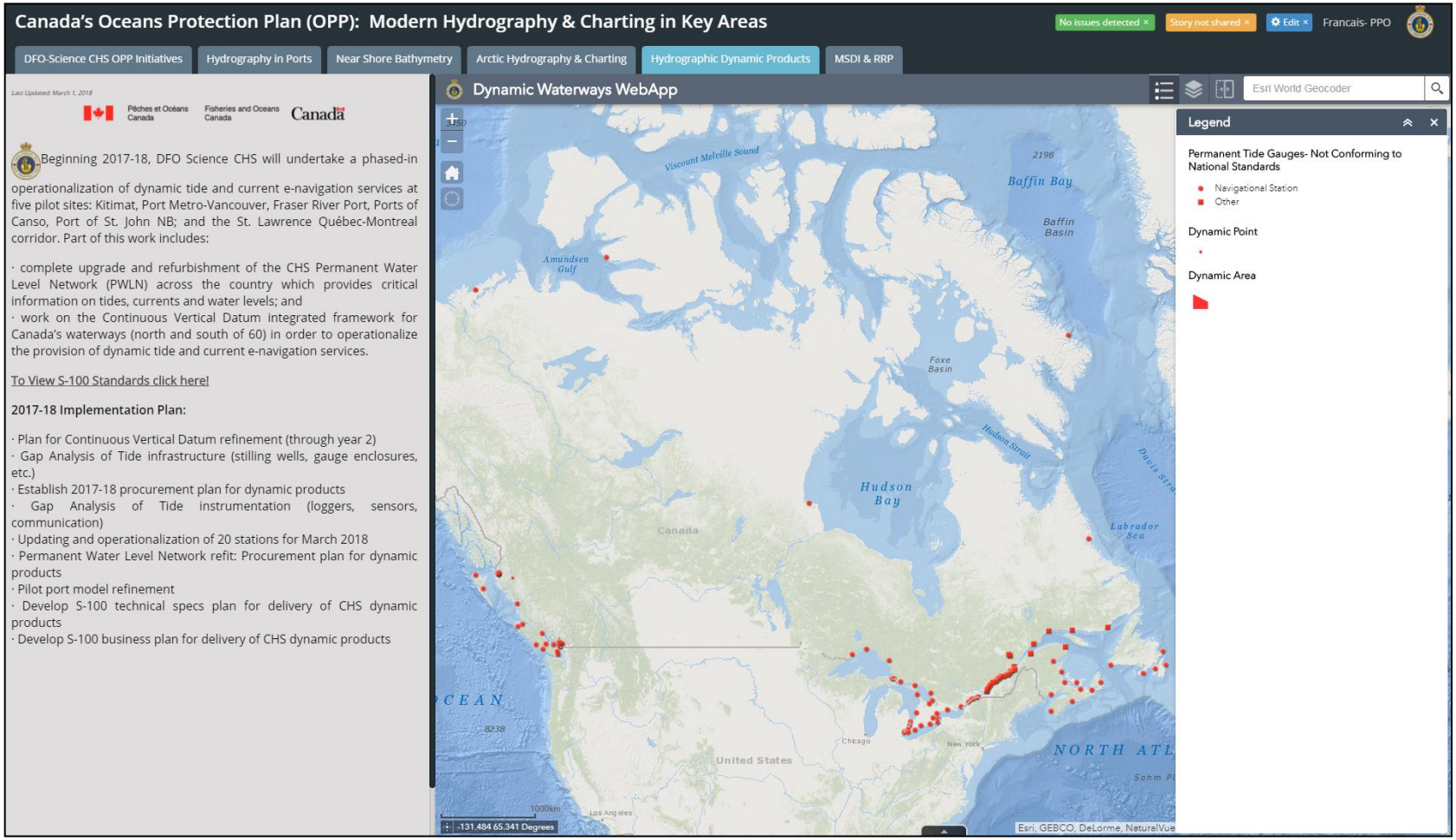
In an effort to accelerate the acquisition of modern hydrography in the Arctic, the Canadian Hydrographic Service is collaborating with the Canadian Coast Guard to install multi-beam sonars in icebreakers. Two icebreakers are equipped to collect modern hydrography during the 2017 Arctic navigation season. By the 2019 season and thereafter, plans are underway to have five icebreakers fully equipped to collect modern hydrography in the Arctic
Arctic WebApp
Esri World Geocoder
Legend
Arctic Plan
OPP/PPO Complete
A-Base Complete
OPP / PPO
2018-19 Arctic
2018-19
2017-18 Tidal Gauges
Complete
2018-19 Tidal Gauge
Planned 2018-19
2017-18 Plan Points / Points de la plan 2017-18
Completed
ARCTIC OCEAN
Canada Basin
Beaufort Sea
Chukchi Sea
Bering Sea
Gulf of Alaska
Baffin Bay
Hudson Bay
Labrador Basin
Labrador Sea
NORTH AMERICA
NORTH ATLANTIC OCEAN
NORTH PACIFIC OCEAN
North American Basin
Gulf of Mexico
Sargasso Sea
Caribbean Sea
Mid-Atlantic Ridge
-176.658 61.965 Degrees
Esri, GEBCO, DeLorme, NaturalVue

Canada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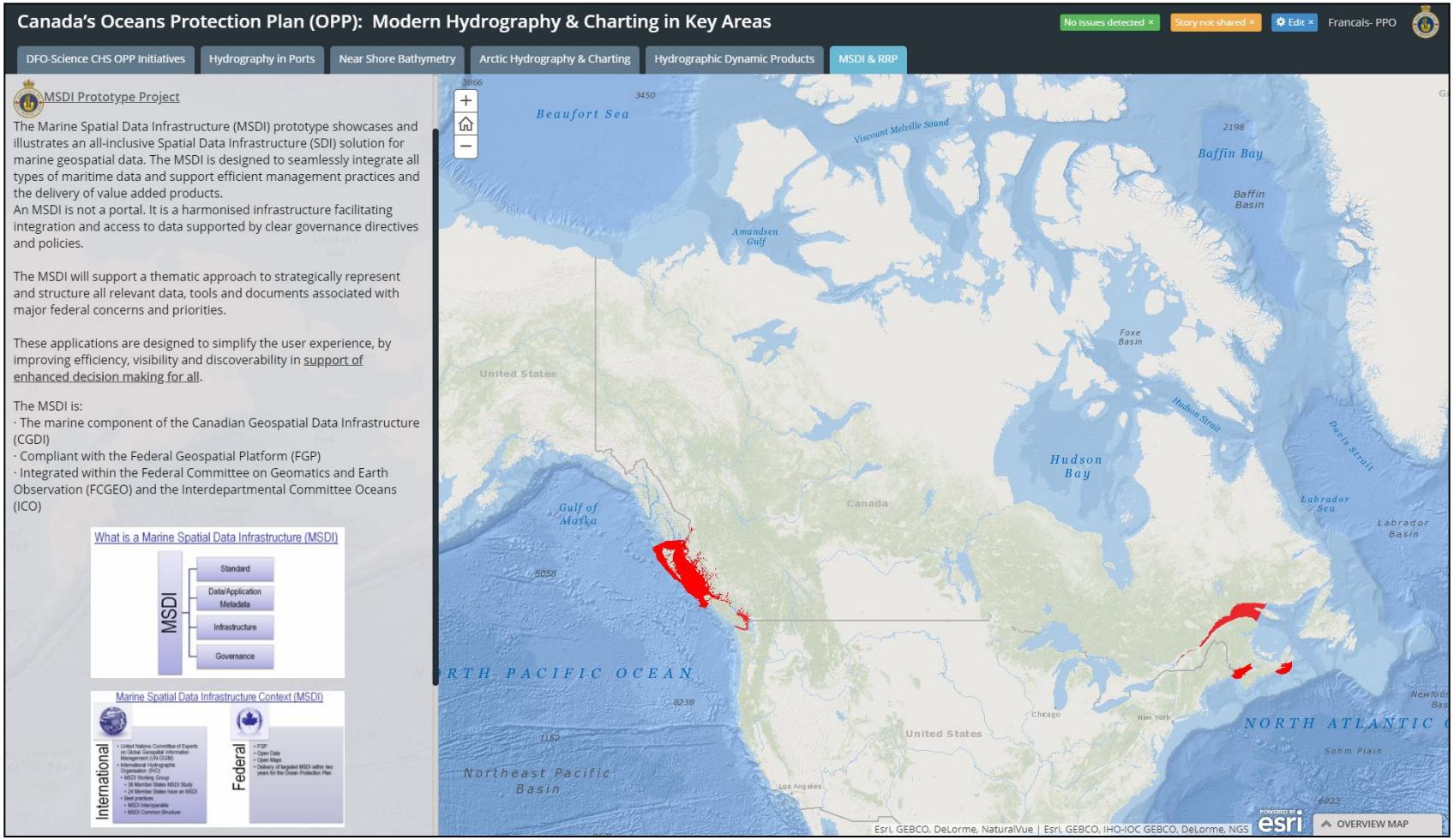
Fisheries and Oceans Canada
Canada
Beginning 2017-18, DFO Science CHS will undertake a phased-in operationalization of dynamic tide and current e-navigation services at five pilot sites: Kitimat, Port Metro-Vancouver, Fraser River Port, Ports of Canso, Port of St. John NB; and the St. Lawrence Québec-Montreal corridor. Part of this work includes:
· complete upgrade and refurbishment of the CHS Permanent Water Level Network (PWLN) across the country which provides critical information on tides, currents and water levels; and
· work on the Continuous Vertical Datum integrated framework for Canada's waterways (north and south of 60) in order to operationalize the provision of dynamic tide and current e-navigation services.
To View S-100 Standards click here!
2017-18 Implementation Plan:
· Plan for Continuous Vertical Datum refinement (through year 2)
· Gap Analysis of Tide infrastructure (stilling wells, gauge enclosures, etc.)
· Establish 2017-18 procurement plan for dynamic products
· Gap Analysis of Tide instrumentation (loggers, sensors, communication)
· Updating and operationalization of 20 stations for March 2018
· Permanent Water Level Network refit: Procurement plan for dynamic products
· Pilot port model refinement
· Develop S-100 technical specs plan for delivery of CHS dynamic products
· Develop S-100 business plan for delivery of CHS dynamic products
Dynamic Waterways WebApp
Esri World Geocoder
Legend
Permanent Tide Gauges- Not Conforming to National Standards
Navigational Station
Other
Dynamic Point
Dynamic Area
Viscount Melville Sound
Baffin Bay
Baffin Basin
Amundsen Gulf
Foxe Basin
Hudson Strait
Hudson Bay
Canada
Labrador Sea
United States
Chicago
New York
Los Angeles
1000km
-131.484 65.341 Degrees
Esri, GEBCO, DeLorme, NaturalVue

Canada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MSDI Prototype Project
The Marine Spatial Data Infrastructure (MSDI) prototype showcases and illustrates an all-inclusive Spatial Data Infrastructure (SDI) solution for marine geospatial data. The MSDI is designed to seamlessly integrate all types of maritime data and support efficient management practices and the delivery of value added products.
An MSDI is not a portal. It is a harmonised infrastructure facilitating integration and access to data supported by clear governance directives and policies.
The MSDI will support a thematic approach to strategically represent and structure all relevant data, tools and documents associated with major federal concerns and priorities.
These applications are designed to simplify the user experience, by improving efficiency, visibility and discoverability in support of enhanced decision making for all.
The MSDI is:
· The marine component of the Canadian Geospatial Data Infrastructure (CGDI)
· Compliant with the Federal Geospatial Platform (FGP)
· Integrated within the Federal Committee on Geomatics and Earth Observation (FCGEO) and the Interdepartmental Committee Oceans (ICO)
What is a Marine Spatial Data Infrastructure (MSDI)
MSDI
Standard
Data/Application Metadata
Infrastructure
Governance
Marine Spatial Data Infrastructure Context (MSDI)
International
Federal
Beaufort Sea
Viscount Melville Sound
Baffin Bay
Baffin Basin
Amundsen Gulf
Foxe Basin
Hudson Strait
Hudson Bay
Davis Strait
Labrador Sea
Labrador Basin
Gulf of Alaska
United States
Canada
Chicago
New York
Los Angeles
Northeast Pacific Basin
Sohm Plain
NORTH ATLANTIC
Esri, GEBCO, DeLorme, NaturalVue | Esri, GEBCO, IHO-IOC GEBCO, DeLorme, NGS
OVERVIEW MAP

OCEANS PROTECTION PLAN

CHS draft S-100 Business plan

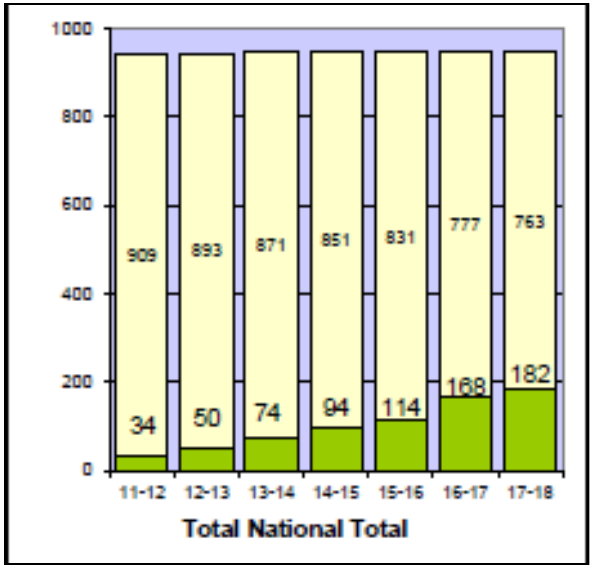
USCHC input

Element of Context

- OPP framework, objectives
- CHS Mission, Vision, Statement.
- Emerging international standards, IHO S-100, IMO MSP…
- HO's are investigating what is the future of paper chart / Raster charts.
- Modern business don't sell products anymore, they sell services(Netflix, spotify…)
- Investing in ENC's seems to be way to go.

More Context (internal)

- ENC coverage gaps
- Imperial to metric
- Paper chart based on vector based from HPD (182/945)
- Raster format used by CHS not supported/developped anymore (maptech not in business anymore)
- Leveraging millions with private sector to boost surveys (Lidar and multibeam contracts)
- IT issues prevent leveraging private sector for data management and chart production
- Internal training issues, a lot of people to train with limited expertise on paper chart
- **OPP is a golden opportunity for CHS to regain control of it's portfolio, start and lead S-100 implementation.**



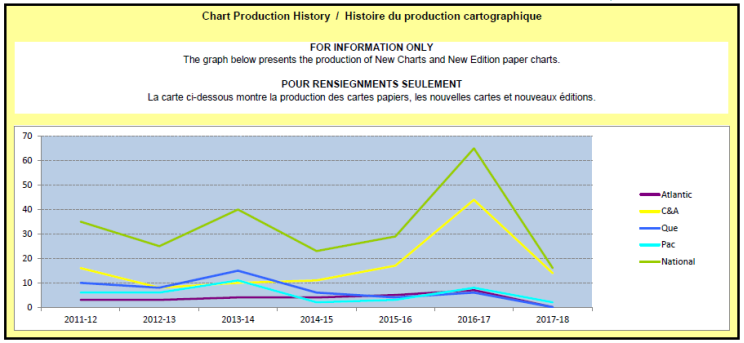
Challenges

- **Modern hydrographic surveys for high priority commercial ports across the country (surveys for 15 ports to be completed in the first two years of OPP).** **15 X 2 > approx 30 new editions / New Charts**
- **Modern near-shore hydrography in priority and high risk areas in BC coast, Newfoundland and Labrador, Gulf of St. Lawrence and Great Lakes Basin.** **Near Shore > approx 100 New editions / New Charts**
- **Modern Arctic hydrographic surveys for enhanced ENC coverage of lesser than sufficiently surveyed areas within the primary Northern Marine Transportation Corridors.** **approx 30 New editions/ New Charts**

Over last 5 years(2011-2016), 168 new edition/new charts >> average **32 charts per year**

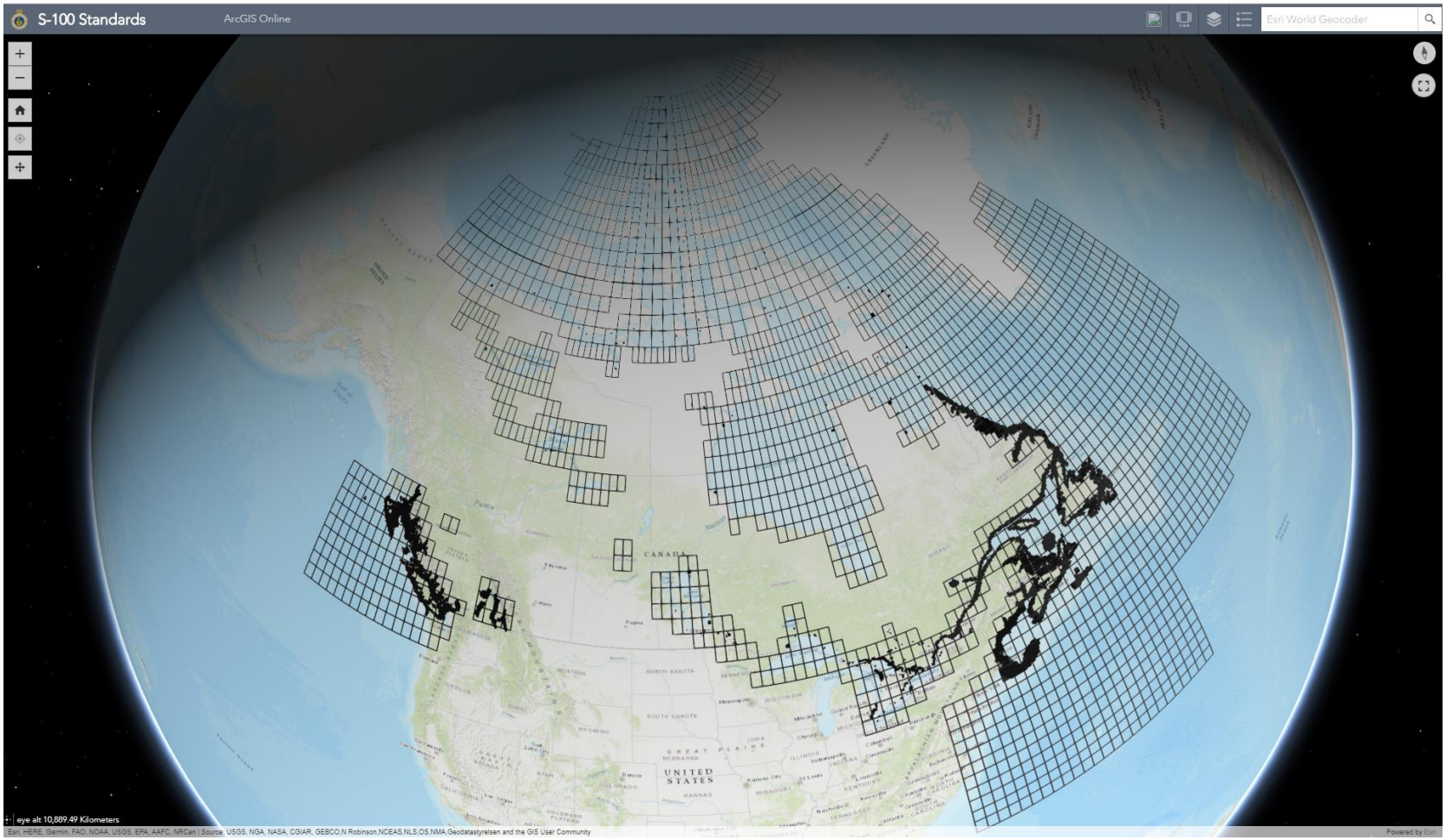
OPP will generate 160 charts of work load for the last 4 years of OPP and this is on top of average production (30 charts X 4 years) 120 charts.
Total workload = 280 charts in 4 years = **70 charts per year**

Output of CHS needs to multiply by more than 2.



S-100 Business plan

- S-100 standards under CHS mandate
  - (S-101 Electronic Chart / S-102 Bathymetry / S-104 Water Levels / S-111 Surface Currents)
- Common Grid based Schema, 3 scales bands
- Service Oriented (From product to services)
- Use the RENC approach for distribution ?
- Competitive pricing model to increase affordability of CHS vector data
- S-102 level 2 (approx 100 m) Free and open licence
- S-102 level 5 and 6 (approx 10m, 2m) licenced
- S-111 and S-104 , 24/7 objective (Obs, forecasts, predictions)


S-100 Standards
ArcGIS Online
Esri World Geocoder
CANADA
UNITED STATES
eye alt 10,889.49 Kilometers

Migration plan

- Grid schema for the Arctic now
- Put a hold of all paper/raster production for next 5 years, maintenance only. > Fast track Paper Chart 2.0
- Focus on ENC coverage and integrate OPP data in ENC's (OPP indicator)

Modern Hydrography and Charting in Key Areas aims to:

- Strengthen navigational *safety and the prevention of marine incidents by delivering, in collaboration with DFO Ocean Science Program,* ***dynamic*** *hydrographic products and* ***services (tide and water level, under-keel and overhead information) in key areas.***
- *Fill important gaps in high-resolution coastline and bathymetry in inter-tidal zones and* ***near-shore*** *areas to ensure the delivery of* ***improved navigational charts and enhanced electronic navigational chart (ENC) in near-shore areas*** *(e.g., Haida Gwaii), high risk coastal and inland water zones.*
- *Conduct highly intensive modern hydrographic and charting activities to* ***provide Electronic Navigation Charts (ENCs) for highly critical areas across the country****, including 23 of the highest priority commercial* ***ports*** *and waterways (13 in B.C., 7 in Quebec, and 3 in Atlantic).*
- *Undertake more extensive efforts, in collaboration with CCG and involvement of academia and private sector, to fill, at an accelerated pace, hydrographic data gaps in the* ***Arctic****, through the* ***provision of new and updated navigational products and services****.*

Next steps

- Discussions with neighbors countries for possible alignment of S-100 grid cells.
- Paper Chart 2.0 Request for information to industry
- Pilot Project on S-102 with Caris and RENC to refine and validate CHS S-100 business plan ideas.
  - Concept (From CHS databases to Clients)
  - Technical
  - Revenue model
  - Revenue forecasts.
  - Prototype system

https://www.youtube.com/watch?v=xknM7g9a7-g

DND Update

USCHC 41

26 Mar 18

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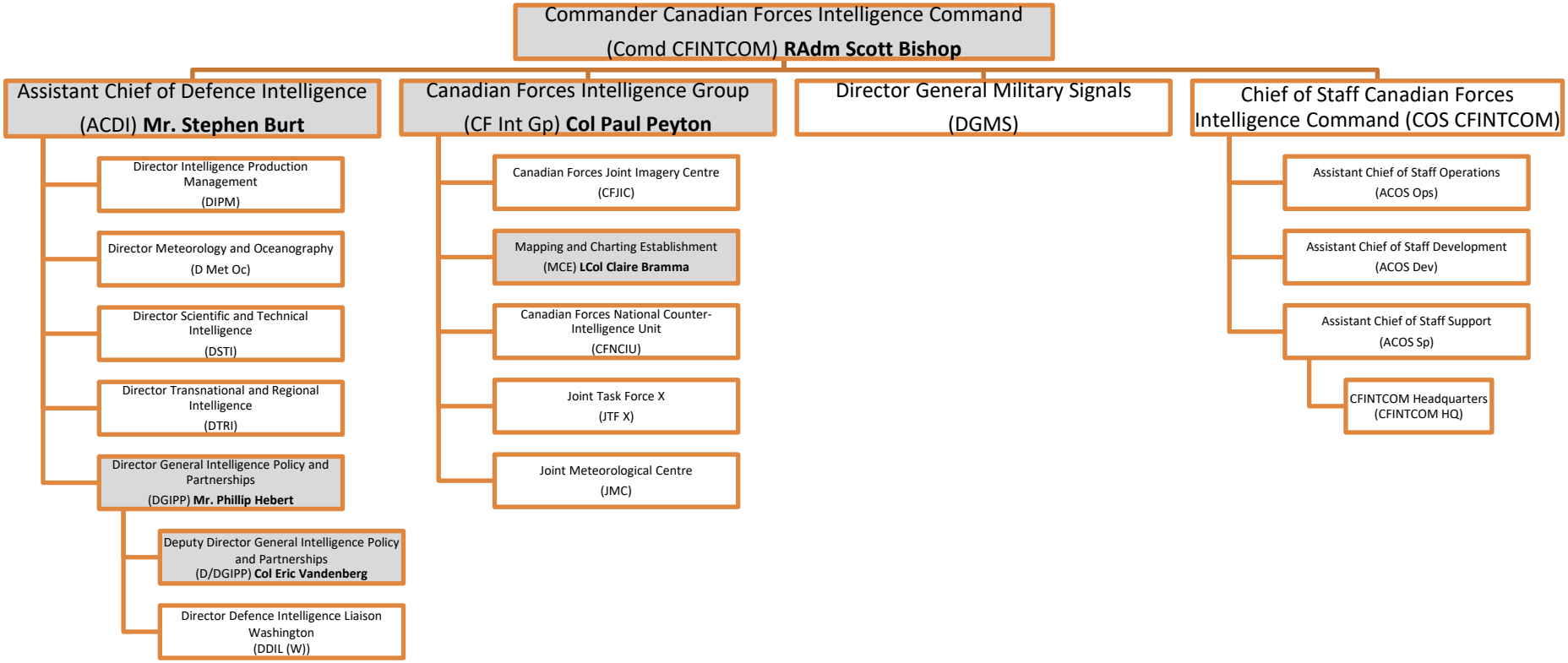
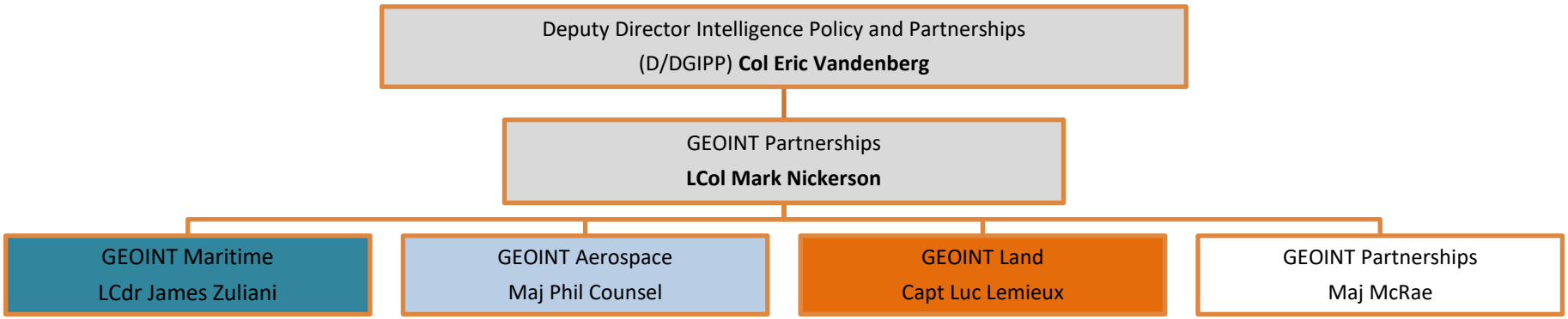
CFINTCOM Org Chart

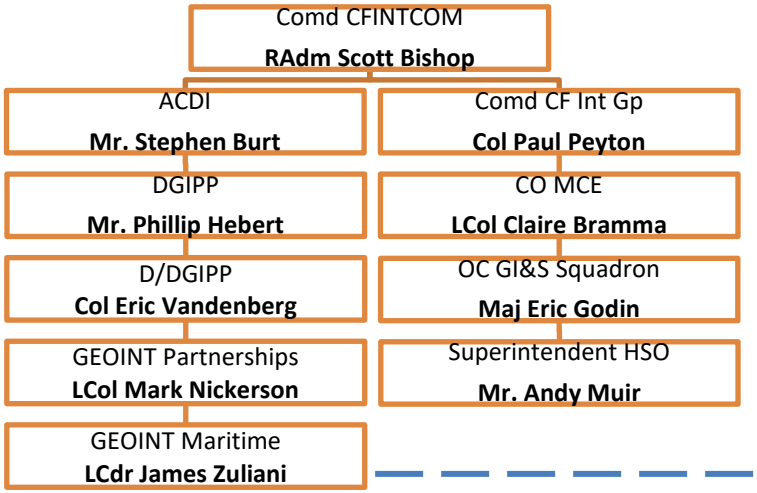


DDGIPP Org Chart



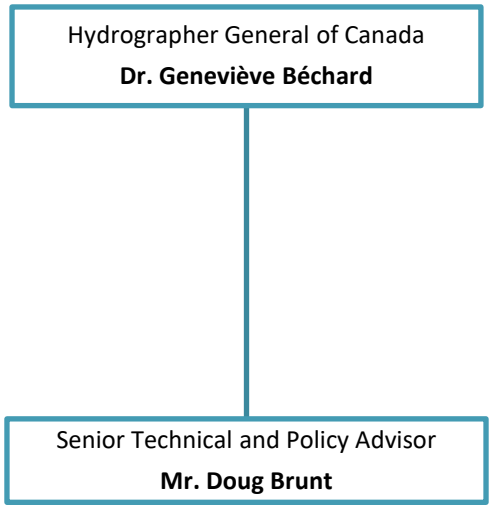
Canadian Maritime GEOINT Structure

Department of National Defence



Department of Fisheries and Oceans

Canadian Hydrographic Services



HSO Production Capabilities

- Robust catalogue (approx. 150) of national AML covering “near world-wide” territorial waters, op areas, environmentally sensitive areas, detailed contour line bathymetry, small bottom objects. Ongoing maintenance on about 25 per year.
- Deployment folios created in late 2017 for “named” operations which contain op-specific image maps, op areas, enhanced bathy products, available in hardcopy, geopdf and geotiff. Deploying units receive full folio rather than previous piece-meal method of distribution.

FY 17/18 Maritime GEO Products

- Custom Digital Products – 43 new
- POD – 10,500 (CHS, NOAA, UKHO)
- Safety of Navigation CANHYDRO/LANT or PAC – 332
- National AMLs – 6
- NACPP AMLs – 0
- DNC – 2
- Client Orders Processed – 6, 334

Current Maritime Geo Priority

- Arctic charting in cooperation with CHS onboard RCN vessels
  - Not likely during Summer 2018
- NACPP Phase 2 production to commence in mid-2018 (GIUK gap, North Sea, Baltic Sea); Canada has committed to 40 AML products in support of NATO MARCOM

Harry DeWolf-class (Offshore Patrol Vessels)

HELICOPTER CAPABILITY

Depending on the mission, the embarked helicopter could range from a small utility aircraft right up to the new CH-148 maritime helicopter.

CARGO/PAYLOADS

Multiple payload options such as shipping containers, underwater survey equipment, or a landing craft. Ship has a 20-tonne crane to self-load/unload.

VEHICLE BAY

For rapid mobility over land or ice, the ship can carry vehicles such as pickup trucks, ATVs, and snowmobiles.

DIESEL/ELECTRIC PROPULSION

Propulsion: Two 4.5 megawatt main propulsion engines, four 3.6 megawatt generators.

MULTI-PURPOSE OPERATIONAL SPACE

Where operational planning and mission execution will be coordinated.

RETRACTABLE ACTIVE FIN STABILIZERS

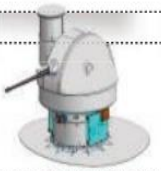
Deployed to reduce ship roll for open ocean operations, retracted for operations in ice.

INTEGRATED BRIDGE NAVIGATION SYSTEM

Modern integrated bridge, from which control of navigation, machinery, and damage control systems can be performed.

MULTI-ROLE RESCUE BOATS

Top speed of 35+ knots, 8.5 metres long. Will support rescues, personnel transfers, or boarding operations.



BAE MK 38 GUN

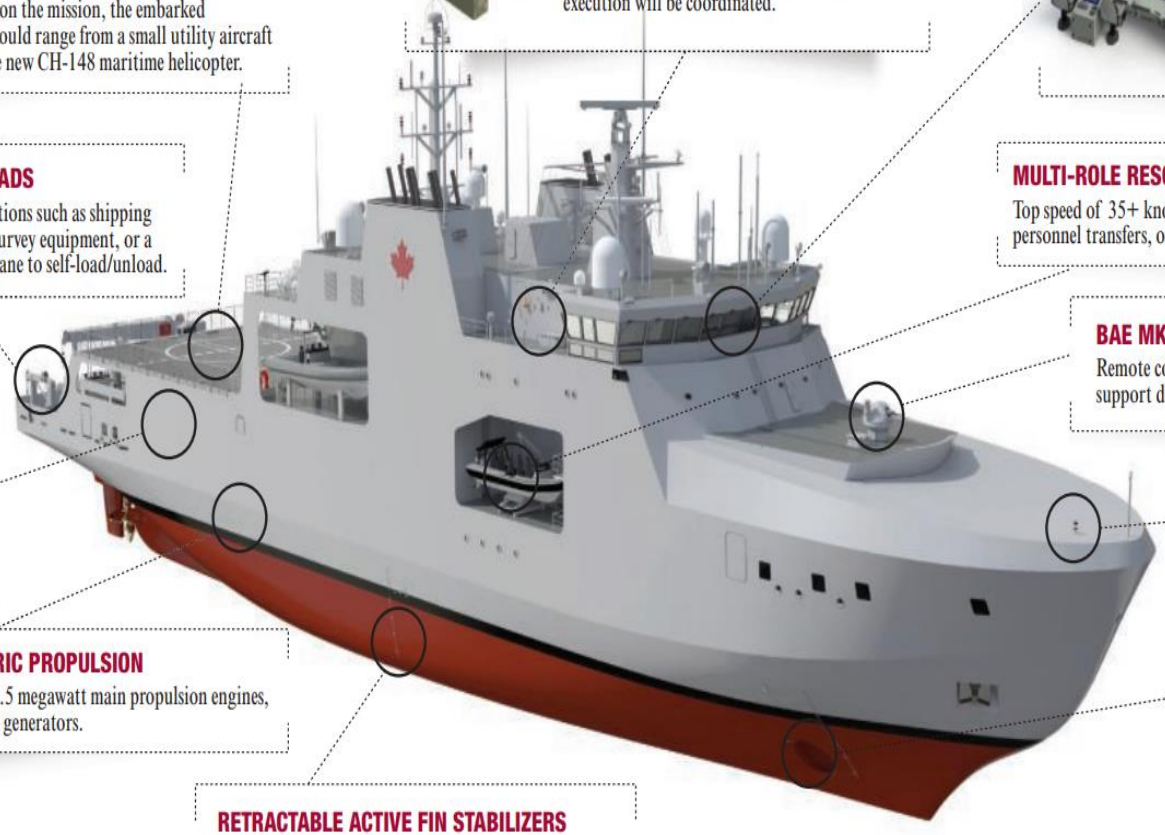
Remote controlled 25 mm gun to support domestic constabulary role.

ENCLOSED FOCSLE/CABLE DECK

Protects foredeck machinery and workspace from harsh Arctic environment.

BOW THRUSTER

To enable manoeuvring or berthing without tug assistance.

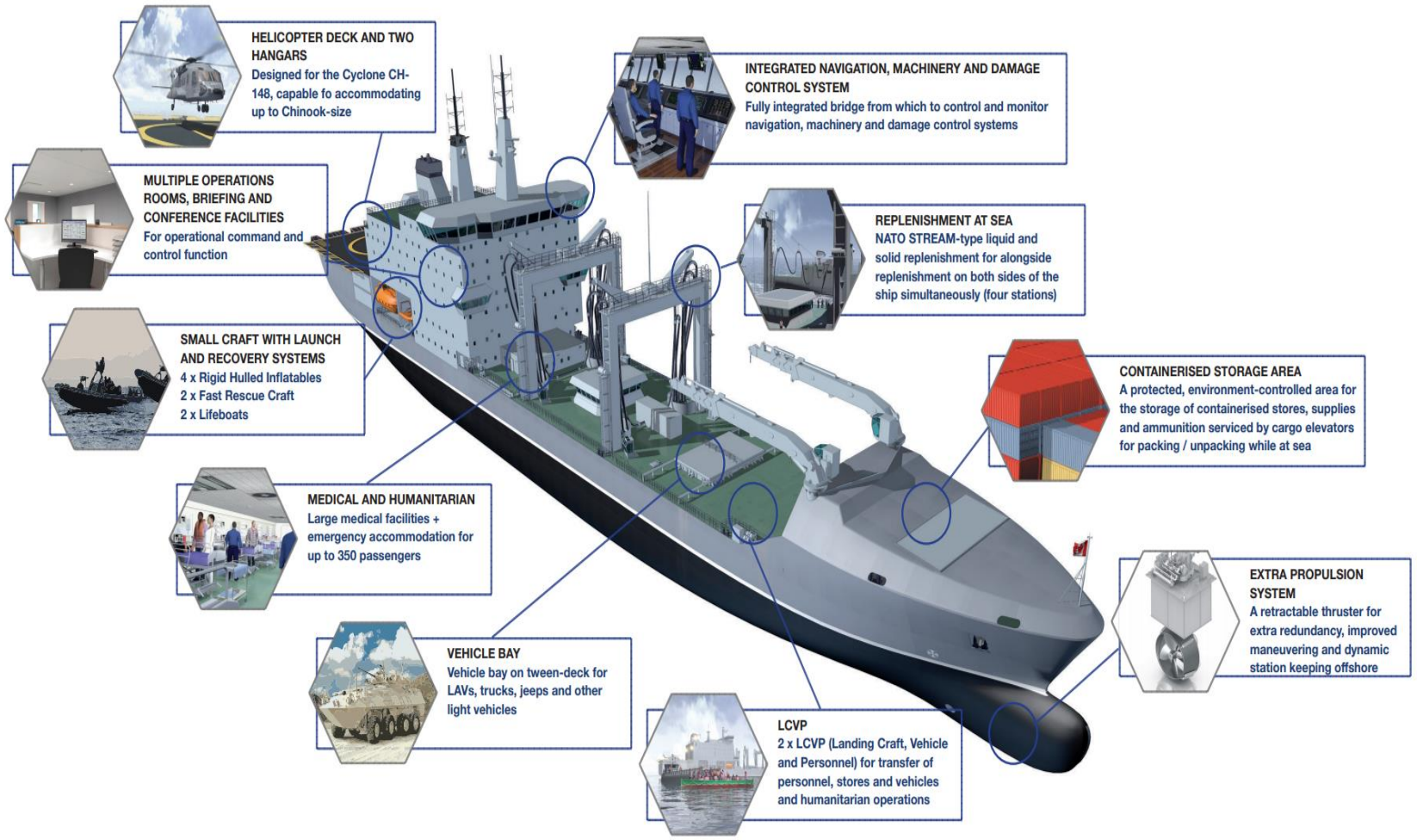


Canada

Harry DeWolf

- Final “mega block” joined to the first two “mega blocks” in early 2018. Expected launch Summer 2018.

Asterix (Federal Fleet Services)



Asterix

- Converted merchant ship with mixed civilian crew / military specialists. Interim solution during RCN AOR procurement
- Homeported in Esquimalt, BC.

Thank you!