Arctic Regional Hydrographic Commission 8th Conference

National Report

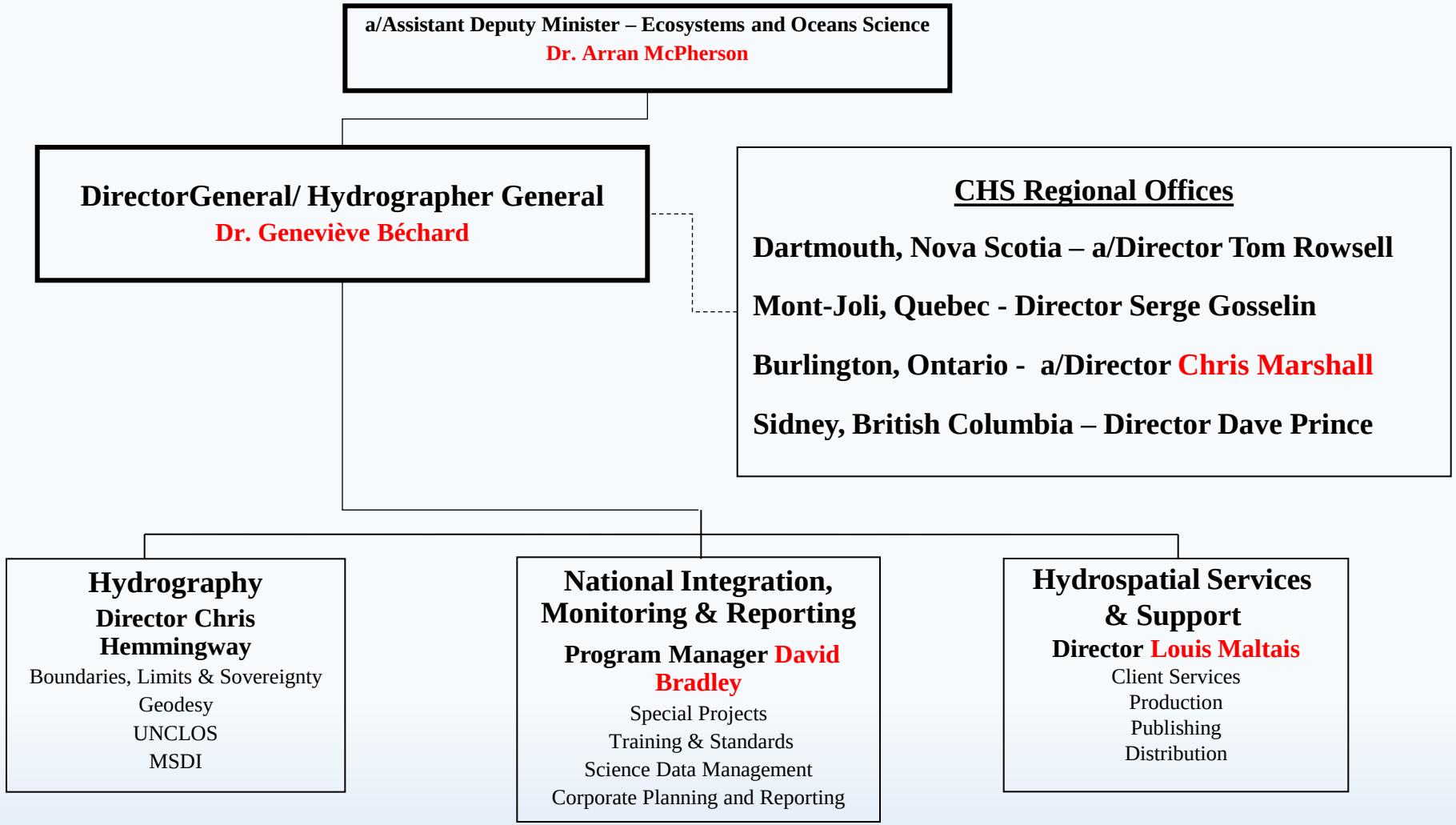
CANADA

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

Topics

- CHS Organization
- Activities in the Arctic
- Oceans Protection Plan
- CHS's S-100 Business Plan
- Royal Canadian Navy Update
- Other developments and activities of interest

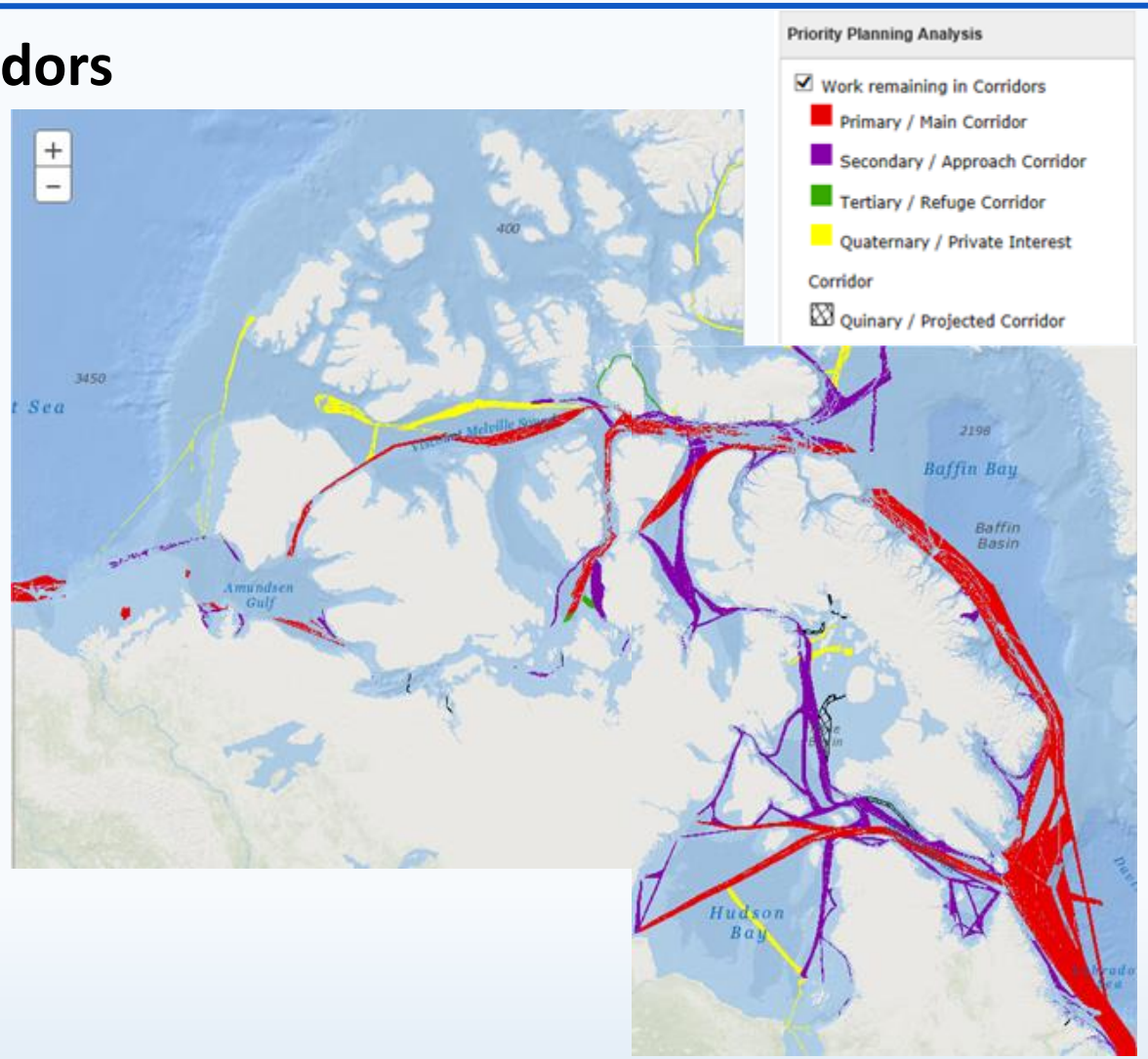
Hydrographic Office –Fisheries and Oceans Canada



Surveying in Arctic Waters –The Need

Proposed Low Impact Shipping Corridors

- Graphic illustrates areas in corridors that are not surveyed to modern standards
- At present, 28% of the combined areas of the Primary and Secondary Draft Low Impact Shipping Corridors[1] are adequately surveyed (surveyed to '*adequate*' or '*modern*' standards).
- Many areas within corridors are covered with either spot soundings, track lines (recon.), or unsurveyed.
- Client consultations are a significant driver



Surveying in Arctic Waters –The Assets

Multi-beam sonars in icebreakers

- Equipping the remaining icebreaking fleet with state-of-the-art multi-beam sonar systems will significantly accelerate the government's capacity to collect much needed hydrographic data in key areas.
  - 2017/2018 –MBES for *CCGS Des Groseilliers, Pierre Radisson* and *Henry Larsen* procured
  - 2018/2019 – VLE *Des Groseilliers*, MBES installed during dry-dock period May - July
  - 2018/2019 – MBES install *CCGS Henry Larsen* anticipated to be operational for 2019 field season
  - Although no timetable has been established for the MBES install on *CCGS Pierre Radisson* at this time, the installation is anticipated during the Spring of 2019.
  - 2019/2020: first operation field season for *CCGS Des Groseilliers*
  - 2020/2021 field season: all three ships operational

Surveying in Arctic Waters –The Assets (con't)

CCGS Sir Wilfrid Laurier

CCGS Pierre Radisson
CCGS Des Groseilliers

CCGS Amundsen, CCGS Henry Larsen

CCGS Louis S St. Laurent

… by 2020

Surveying in Arctic Waters –The Plan

CHS Survey Plan for the Arctic during the 2018 Season

General Location	Data Acquisition Agency	Rationale for Survey
SW King William Is.	DFO (CHS)	- Priority areas per CCGS-industry led Arctic Marine Advisory Board meetings - expansion of Secondary Low Impact Shipping Corridor - coincident area with CCG Aids Maintenance operations - Alignment with CHS Priority Planning Tool
Approaches to Repulse Bay and Kangirsuk	DFO (CHS)	- Priority areas per CCGS-industry led Arctic Marine Advisory Board meetings - Repulse Bay chart poor quality – requires new bathymetry - Alignment with regional production plan - Kangirsuk priority area #7 for CCG Aids to Navigation Unit
NE / SE Baffin Is.	DFO (CHS)	- Alignment with CHS Priority Planning Tool - expansion of Primary Low Impact Shipping Corridor - depths best utility of sonar on CCGS LSSL - data for NE Baffin Island will support DFO's Oceans agenda (MPA)
Ungava Bay Corridors - 2017 contract extension	McGregor Geoscience Ltd.	- Priority for ship operators (supports community resupply) - Priority areas per CCGS-industry led Arctic Marine Advisory Board meetings - Alignment with regional production plan
Ungava Bay Corridors	Seaforth Geosurveys Inc.	- Priority for ship operators (supports community resupply) - Priority areas per CCGS-industry led Arctic Marine Advisory Board meetings - Alignment with regional production plan

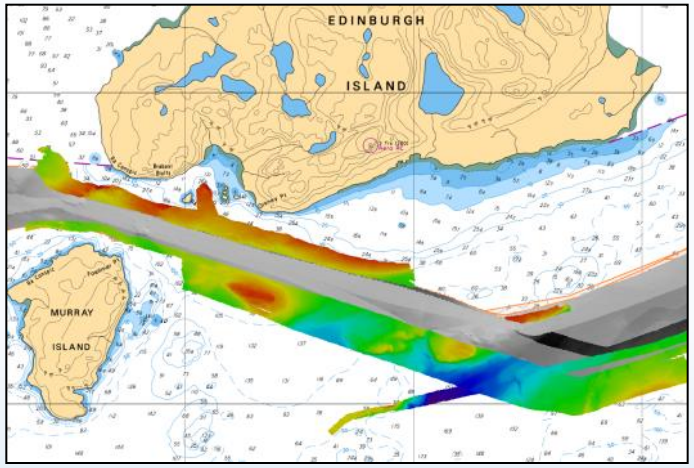
Surveying in Arctic Waters –The Plan con't

CCGS SIR WILFRID LAURIER		
LEG 1 (18 DAYS) - Opportunity	LEG 2 (42 DAYS)- 21 Primary, 21 Secondary	LEG 3 (12 DAYS) - Opportunity
28-JUL to 14-AUG	14-AUG to 25-SEP	25-SEP to 05-OCT
5 CHS Personnel	10 CHS Personnel	3 CHS Personnel
	8H HELO TIME	
	2 CCG DED-04 COXSWAIN	

CSL *Whisky Jack*
CSL *True North*
CCGS *SWL*

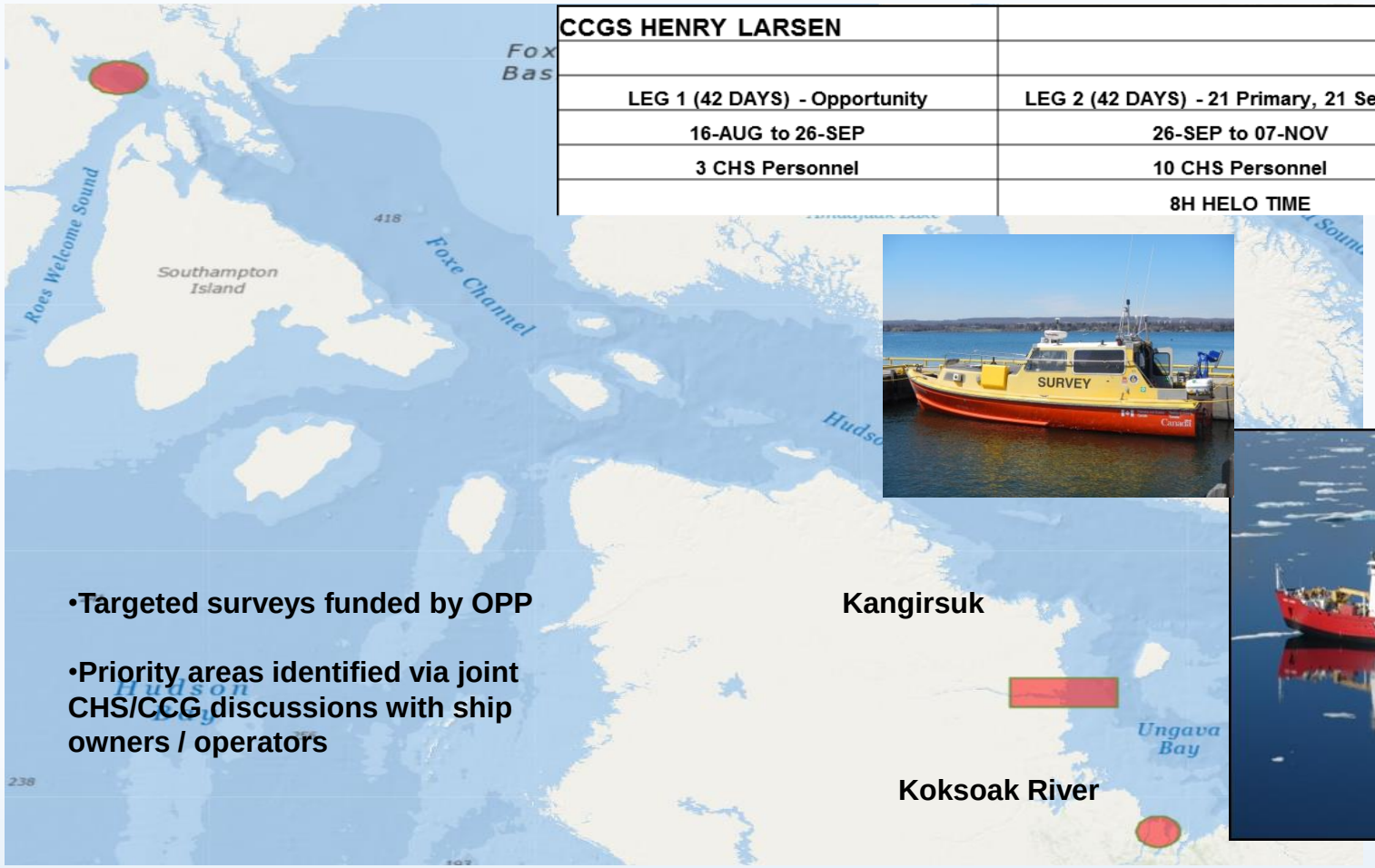
- **Opportunistic and targeted surveys funded by OPP**

- **Icebreaker multi-beam program, Kugluktuk to Beaufort Sea**



Surveying in Arctic Waters –The Plan con't

CCGS HENRY LARSEN		
LEG 1 (42 DAYS) - Opportunity	LEG 2 (42 DAYS) - 21 Primary, 21 Secondary	LEG 3 (14 DAYS) - Opportunity
16-AUG to 26-SEP	26-SEP to 07-NOV	07-NOV to 20-NOV
3 CHS Personnel	10 CHS Personnel	3 CHS Personnel
	8H HELO TIME	



CSL *Pintail*
CSL *Petrel*
CCGS *Henry Larsen*

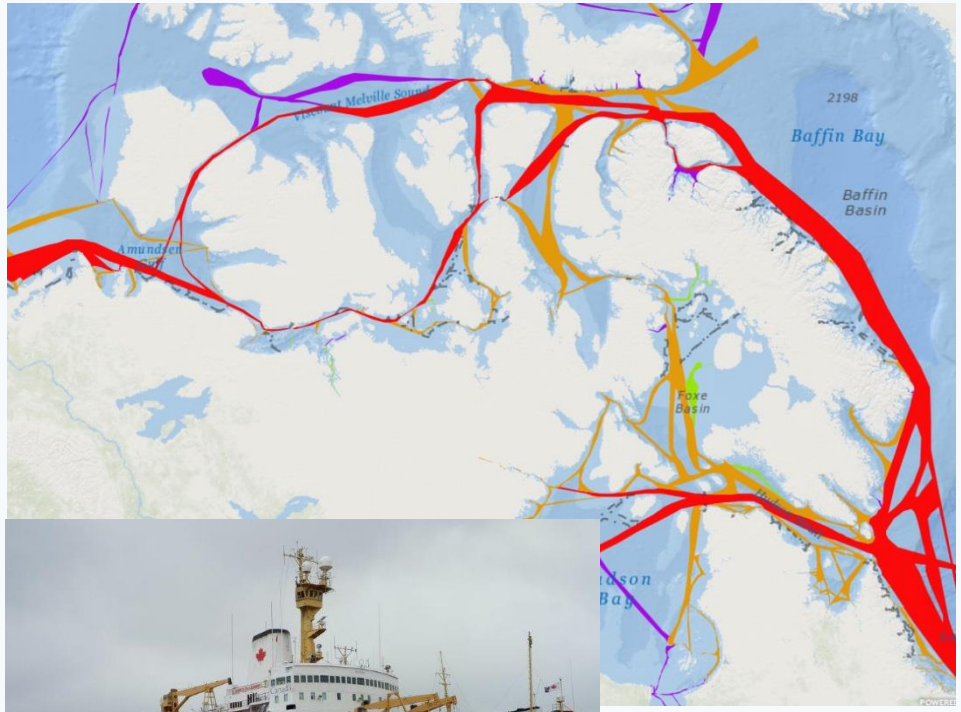
- **Targeted surveys funded by OPP**
- **Priority areas identified via joint CHS/CCG discussions with ship owners / operators**

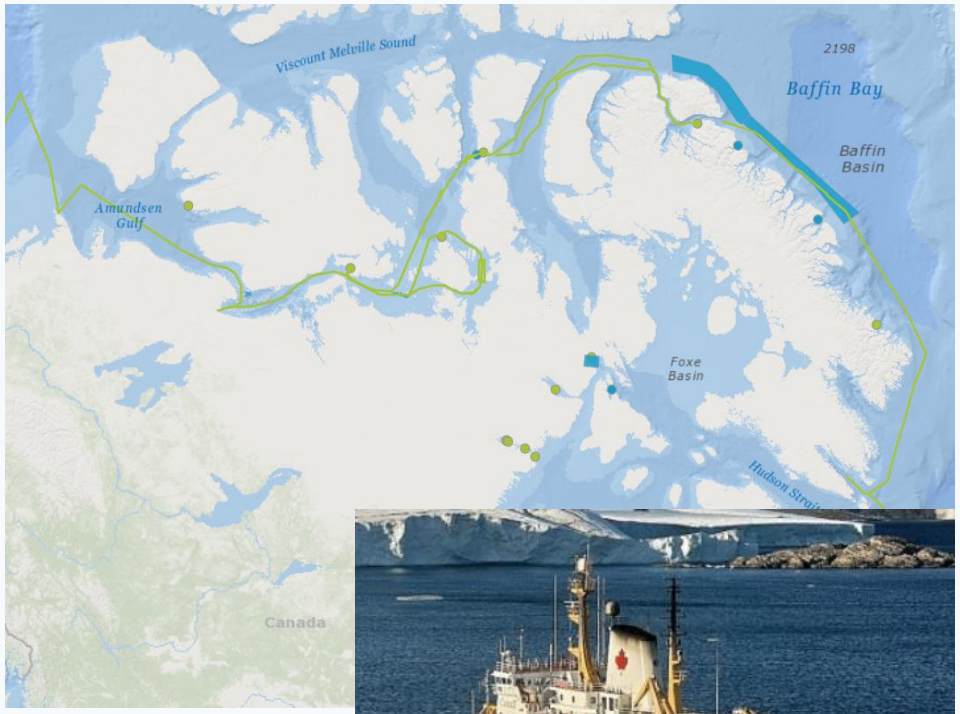
Kangirsuk

Koksoak River

Surveying in Arctic Waters –The Plan con't

Low Impact Shipping Corridors Expansion (funded by OPP)





- **CCGS *Louis S St. Laurent***
- **NGCC *Amundsen***

Vertical Datum Enhancements in Arctic Waters

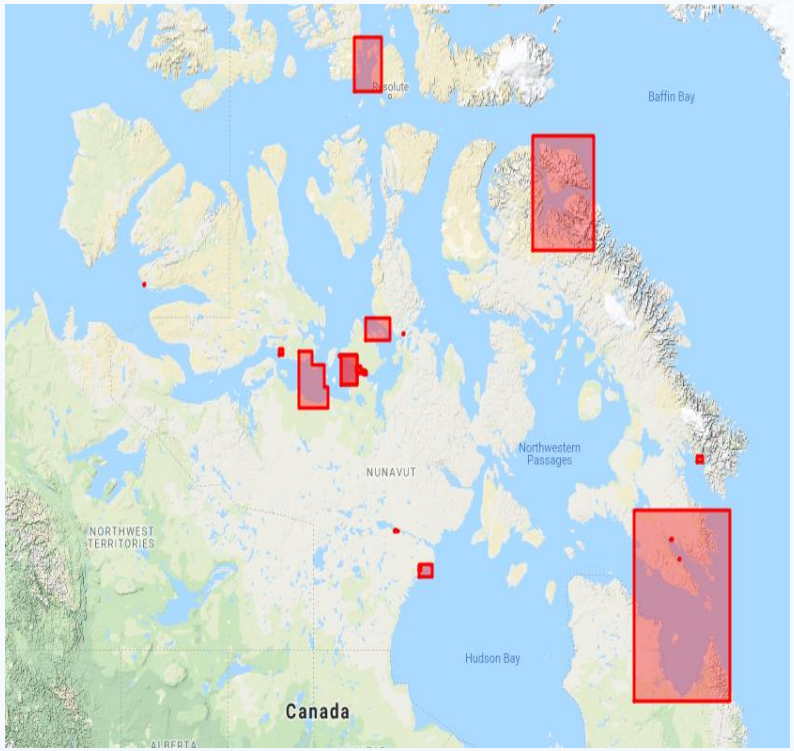
CHS Vertical Datum Activities in the Arctic during the 2018 Season

- 5 permanent gauges provide can provide only general understanding of localized tidal effects in other parts of the Arctic Basin.
- Permanent gauges are costly to install and maintain.
- CHS adopted a 'submerged tide-gauge approach:
- Gauges are deployed in key areas and retrieved one year later.
- The data is analyzed to update local chart datum and to further refine (densify) CHS's continuous separation surface.

Charting in Arctic Waters

CHS ENC Charting Activity Since ARHC7 (4 New; 11 NE; 8 updates)

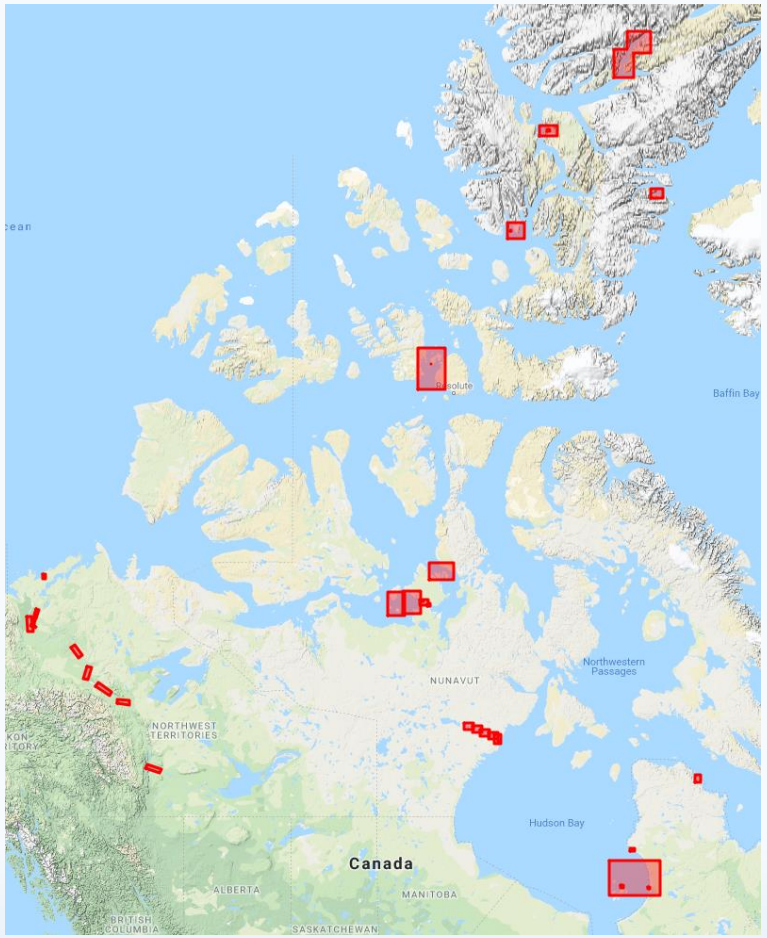
#	ENC #	Chart	Edition	Release Date	Last Notice	Product Title	Eqv PC Scale (1:n)
1	CA573452	5625	4	2018-08-01		Ice Hunter Rock to/a Chesterfield Narrows	20000
2	CA373325	5629	4.001	2018-06-19	20180713	Marble Island to/à Rankin Inlet	60000
3	CA573301	5628	3.001	2018-06-19	20180713	Rankin Inlet Including / Y Compris Melvin Bay And/ Et Prairie Bay	15000
4	CA273422	7212	2	2018-05-15		Bylot Island and Adjacent Channels	250000
5	CA373463	7738	6.001	2018-05-14	20180608	Simpson Strait to/à Storis Passage	80000
6	CA573487	7668	1	2018-04-17		Ulukhaktok	10000
7	CA573470	7127	1	2018-02-23		Koojesse Inlet	12000
8	CA573471	7121	1	2018-02-23		Daniel Island Harbour	18000
9	CA173369	5450	1.003	2018-02-16	20180316	Hudson Strait/Détroit d'Hudson - East	1000000
10	CA373267	7783	7.001	2018-02-12	20180316	Queen Maud Gulf Eastern Portion	150000
11	CA573393	7770	3	2017-12-07		Taloyoak	20000
12	CA373128	7935	8	2017-12-06		Crozier Strait and/et Pullen Strait	100000
13	CA573395	7150	2	2017-11-28		Pangnirtung	20000
14	CA473332	7750	4.003	2017-10-02	20160708	Cambridge Bay	30000
15	CA473317	7736	6.001	2017-09-22	20171020	Simpson Strait	25000
16	CA473476	5471	1	2017-09-15		Inukjuak et les Approches and Approaches	25000
17	CA373394	7739	3.001	2017-09-14	20171013	James Ross Strait	80000



Charting in Arctic Waters

CHS Paper Charting Activity Since ARHC7 (3 NC; 20 NE)

Chart	Title	Type	Release Date	Scale
5390	Wakeham Bay and Fisher Bay et les Approches/and Approaches	NE	29-Sep-17	37500
5471	Inukjuak et les Approches and Approaches	NE	04-Jul-18	25000
5505	Bélanger Island À /to Cotter Island	NE	01-Mar-18	250000
5620	Entrance to/Entré À Chesterfield Inlet (Fairway Island to/À Ellis Island)	NE	27-Jul-18	15000
5621	Rockhouse Island to/À Centre Island	NE	27-Jul-18	40000
5622	Centre Island to/À Farther Hope Point	NE	27-Jul-18	40000
5623	Farther Hope Point to/À Terror Point	NE	27-Jul-18	40000
5624	Terror Point to/À Schooner Harbour	NE	27-Jul-18	40000
6411	Trail River to/À Camsell Bend Kilometre 390 / Kilometre 460	NE	26-Apr-18	50000
6417	Tulita (Fort Norman), Police Island to/aux Halfway Islands Kilometre 810 / kilometre 860	NE	04-May-18	50000
6419	Norman Wells to/À Carcajou Ridge Kilometre 910 / Kilomètre 980	NE	04-May-18	50000
6421	Hardie Island to/À Fort Good Hope Kilometre 1040 / Kilometre 1100	NE	26-Apr-18	50000
6423	Askew Islands to/À Bryan Island Kilometre 1180 / Kilometre 1240	NE	04-May-18	50000
6427	Point Separation to/au Aklavik Channel Kilometre 1480 / Kilomètre 1540	NE	04-May-18	50000
6432	Kilometre/Kilomètre 1500 to/À Inuvik East Channel	NE	04-May-18	50000
7371	Alexandra Fiord	NE	25-Jan-18	25000
7685	Tuktoyaktuk Harbour and Approaches/et les approches	NE	27-Jun-18	15000
7736	Simpson Strait	NE	23-Jul-18	15000
7737	Storis Passage to/À Requisite Channel	NC	17-Oct-17	80000
7738	Simpson Strait to/À Storis Passage	NC	03-Oct-17	80000
7739	James Ross Strait	NC	28-Aug-17	80000
7920	Tanquary, Slidre and Glacier Fiords	NE	31-Oct-17	100000
7935	Crozier Strait and/et Pullen Strait	NE	27-Jul-18	100000



Charting in Arctic Waters

CHS ENC Charting Activity Planned for 2018

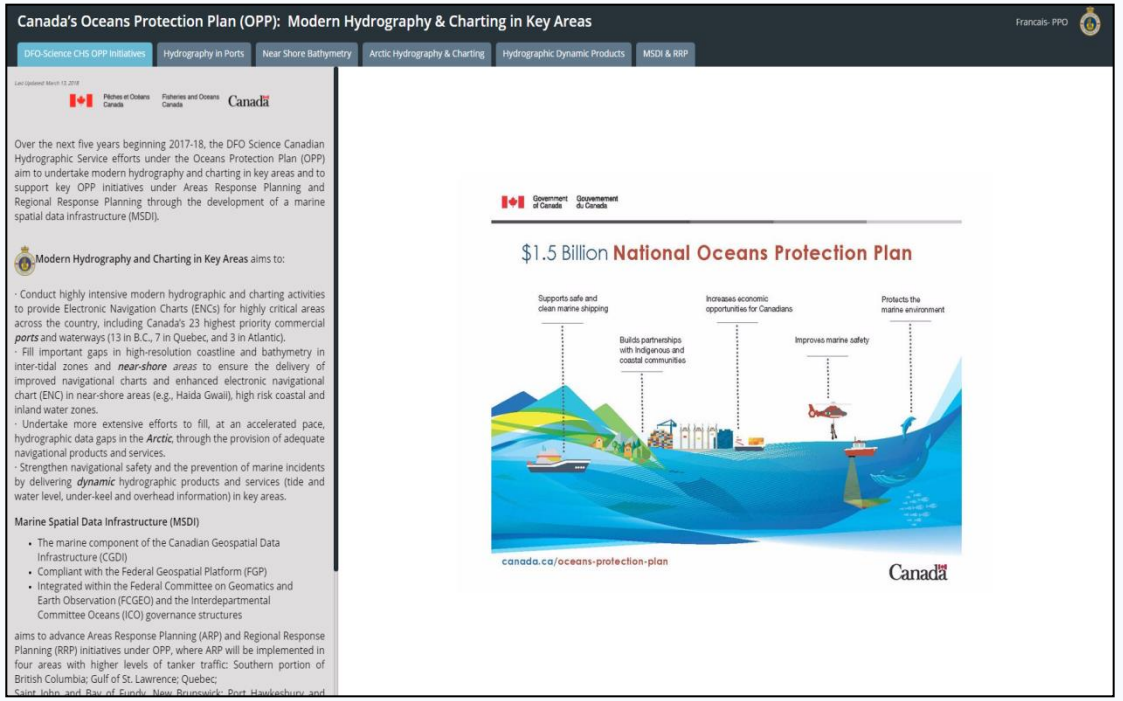
- Goal of Arctic sub-initiative of the Oceans Protection Plan (OPP) is to increase the ENC coverage in the Arctic.
- Effort on this OPP sub-initiative will be spread across all offices.
- Expected deliverables for 2018 are:
  - 15 Paper charts
  - 22 ENCs
  - 1 Paper patch

2018 OPP Arctic Production Work (*italicized deliverables* to be completed from the 2017/18 Work Plan)						
Office	**Summary of Plan**	**Annual expectation**	**# FTE assigned**	**Deliverables**	**Results**	**Comments**
PACIFIC	Digitize NAD83 metric charts, load into HPD, add new source data (if available) and sign-off in CHSDir. Then create New Editions/New Charts of the ENCs and Paper Charts and release the new products to the	Convert 3 non-HPD charts to up-to-date HPD products, then release corresponding ENCs / Paper Charts to the public.	2.0 EG-05 0.1 ENSUR-03 (to QC work)	**Paper Charts**: 7552, 7575, 5373, *5338* **ENCs**: CA473493, CA473492, CA273257, CA373500, *CA473499*	100% complete by FYE	
QUEBEC	Integrate data into BDB/HPD, add new source data (if available) and sign-off in CHSDir. Then create New Editions/New Charts of the ENCs / Paper Charts and release	Integrate data for 2-3 products, then produce (may involve recompilation of some products) / release corresponding updated ENCs / Paper	2.0 EG-05 0.1 ENSUR-03 (to QC work)	**Paper Charts**: 2017, 1439, 2018, *5410* **ENCs**: CA573118, CA473036, CA573479, CA473276, *CA473497* , *CA473498*	100% complete by FYE	Additional chart work assigned this year due to cancellation of a portion of Arctic field work which implicated Hydrographers from
ATLANTIC	Metricize 3 imperial charts using ATL's direct conversion process, add new source data (if available) and sign-off in CHSDir. Then create New Editions/New Charts of the ENCs and Paper Charts and release the new products to the	Metricize 3 imperial charts, then release corresponding updated ENCs / Paper Charts to the public.	2.0 EG-05 0.1 ENSUR-03 (to QC work)	**Paper Charts**: 2043, 2058, 2060, *5458* **ENCs**: CA573520, CA373064, CA373071, *CA473485*	100% complete by FYE	
CENTRAL & ARCTIC	Create new Electronic Navigational Charts and Paper Charts based on new bathymetric surveys and existing bathymetric data.	Integrate data for products, then product ENC / Paper Charts to release to the public.	4.0 EG-05 1.0 ENSUR-03 (to QC work and coordinate other region's work)	**Paper Charts:** 5510, 7150, 7668 patch, 7770 **ENCs:** CA473490, CA373489, CA473477, CA573487, CA373464, CA373472, CA473456	100% complete by FYE	

Canada's Oceans Protection Plan

OPP sub-initiative ***Modern Hydrography and Charting in Key Areas*** is directed at CHS specifically

- 5 inter-related pillars:
  - 23 Ports and waterways
  - Arctic
  - Near-shore bathymetry – filling gaps
  - Dynamic hydrographic products and services
  - Regional response planning / MSDI
- Success hinges on the rapid processing and throughput of high volumes data into accessible information, services, and products (to a lesser extent).
- Opportunity for CHS to transform to a data-centric organization and to prepare for S-100 implementation



CHS 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 proposed across all specifications:
  - 1 degree x 1 degree
  - 0.1 degree x 0.1 degree
  - 0.02 degree x 0.02 degree
- Service-oriented (from product to services, e.g. Spotify)

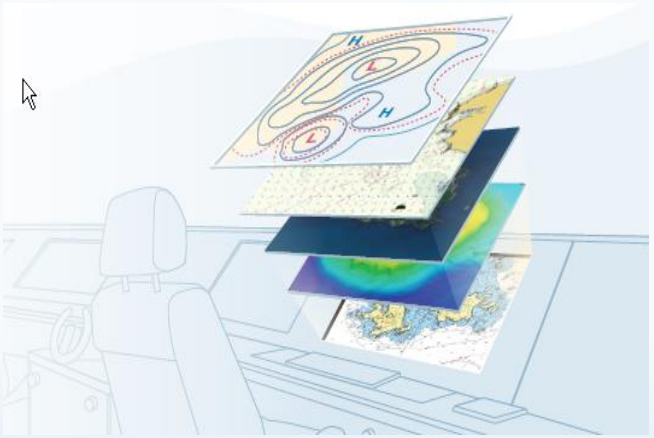
CHS S-100 Business Plan (continued)

Ongoing Discussion Points

- Path from products to services
- Multiple access points including use of the RENC approach for distribution
- Pricing model to increase affordability of CHS vector data and increase usage
- The future of the paper chart and other paper-based nautical publications
- Determine cost of services versus potential revenue gain/loss

S-101/S-102

- S-101 flexible packaging and pricing (service 'bundles')
- S-101 'value-add' compared to S-57 ENCs
- S-102 level 2 (approx 100 m) Free and open licence
- S-102 level 5 and 6 (approx 10m, 2m) licenced



S-104/S-111

- Water levels and surface current information free (Historic reasons, difficult to change)
- RENC model vs CHS direct vs other distribution models (ice, meteorology)
- 24/7 objective

Royal Canadian Navy update –LCdr James Zuliani

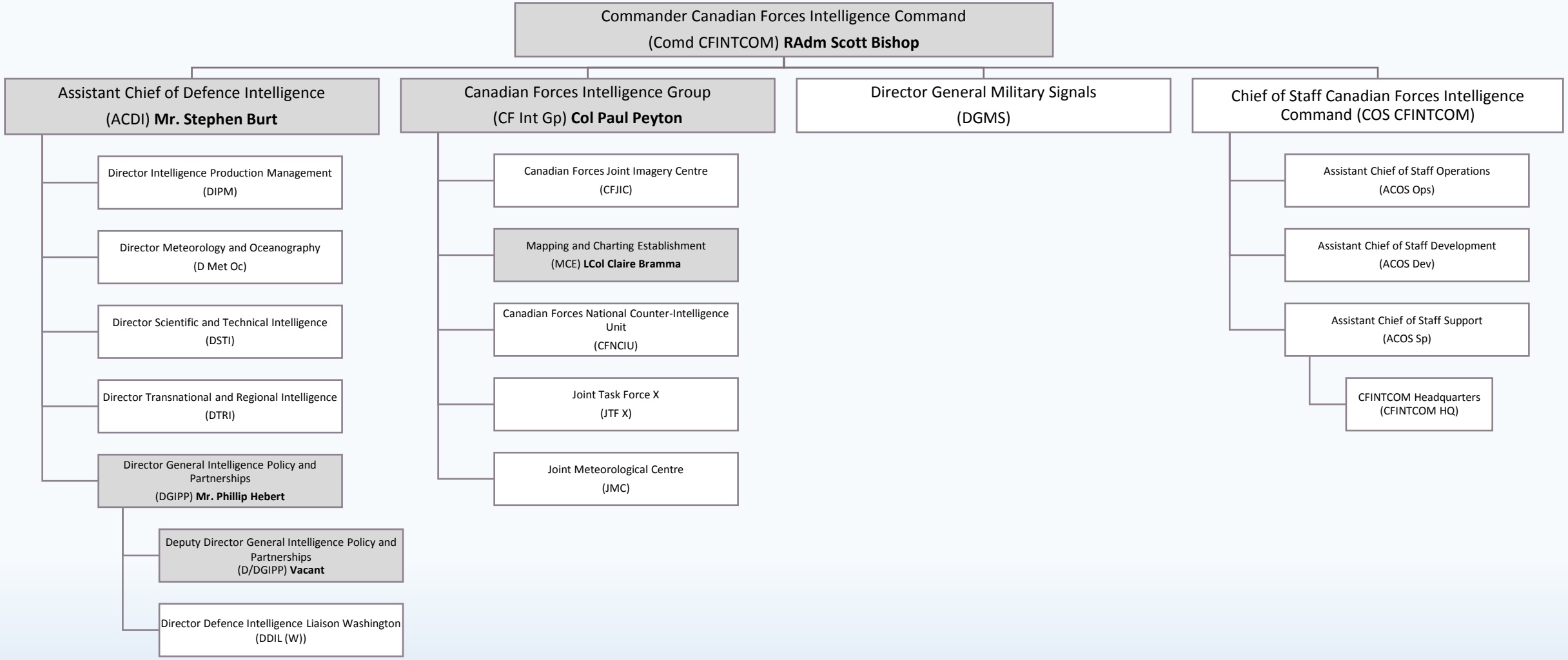
DND Update to ARHC 8

12 Sept 18

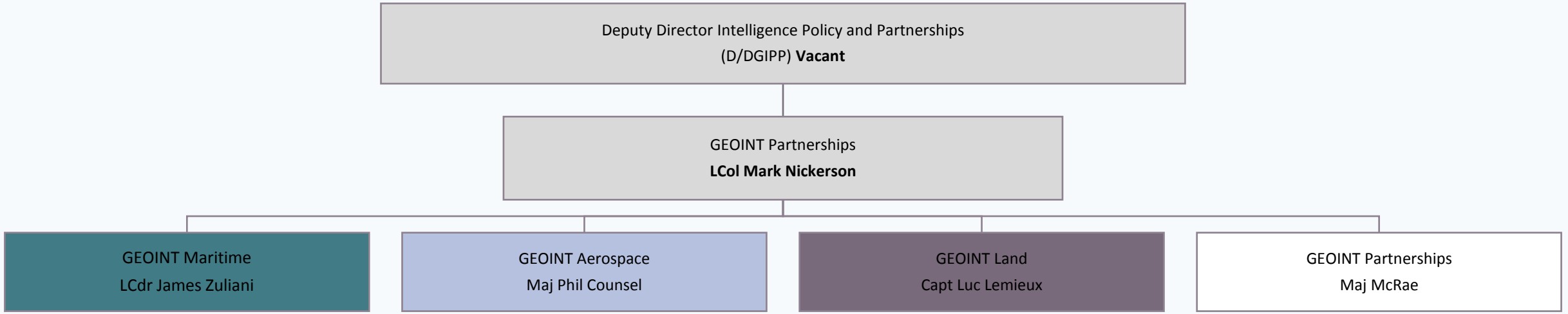
- LCdr James Zuliani
- GEOINT Maritime, Directorate General of Intelligence Policy and Partnerships
- James.Zuliani@forces.gc.ca

- Mr. Andy Muir
- Superintendent, Hydrographic Services Office
- Andy.Muir@forces.gc.ca

CFINTCOM Org Chart

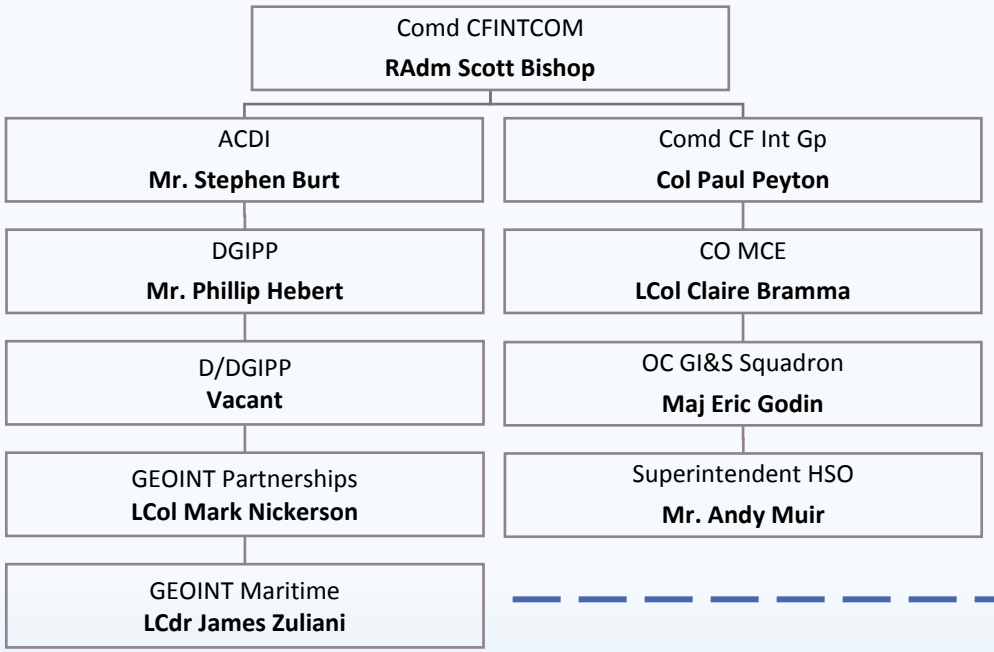


DDGIPP Org Chart

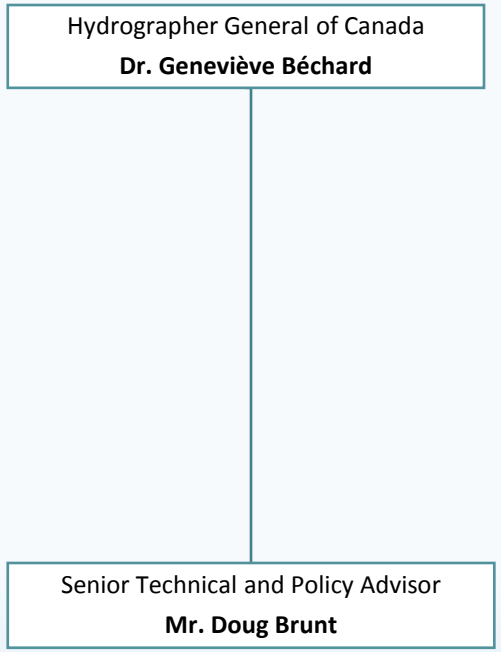


Canadian Maritime GEOINT Structure

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

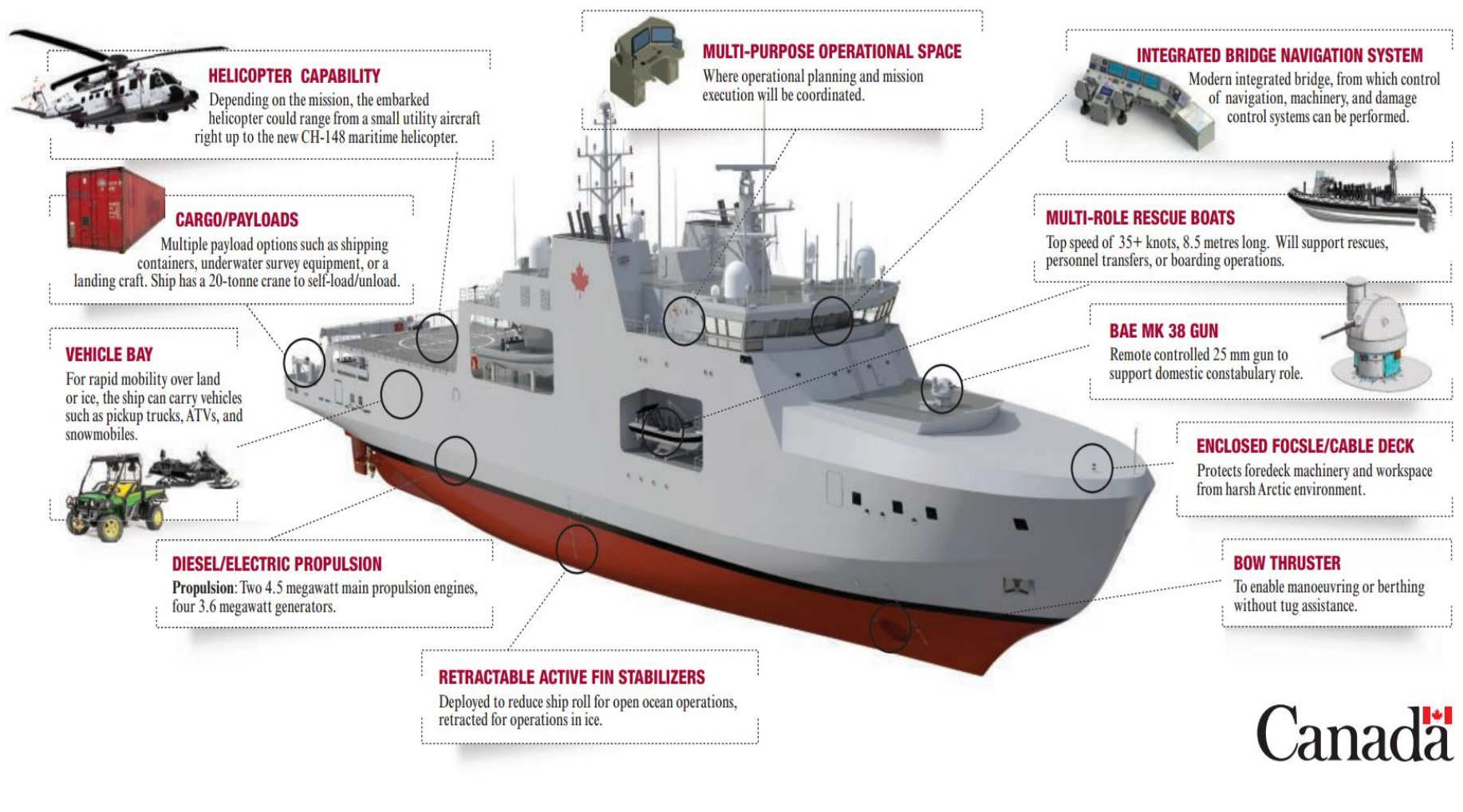
- Custom Digital Products – 43 new
- POD – 10,500 (CHS, NOAA, UKHO)
- Safety of Navigation CANHYDRO/LANT or PAC – 332
- National AMLs – 6
- NACPP AMLs – 0
- DNC – 2
- Client Orders Processed – 6, 334

Current Maritime Geo Priority

- Arctic charting in cooperation with CHS onboard RCN vessels
  - Did not occur during Summer 2018
  - Planning for 2019 underway

- 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

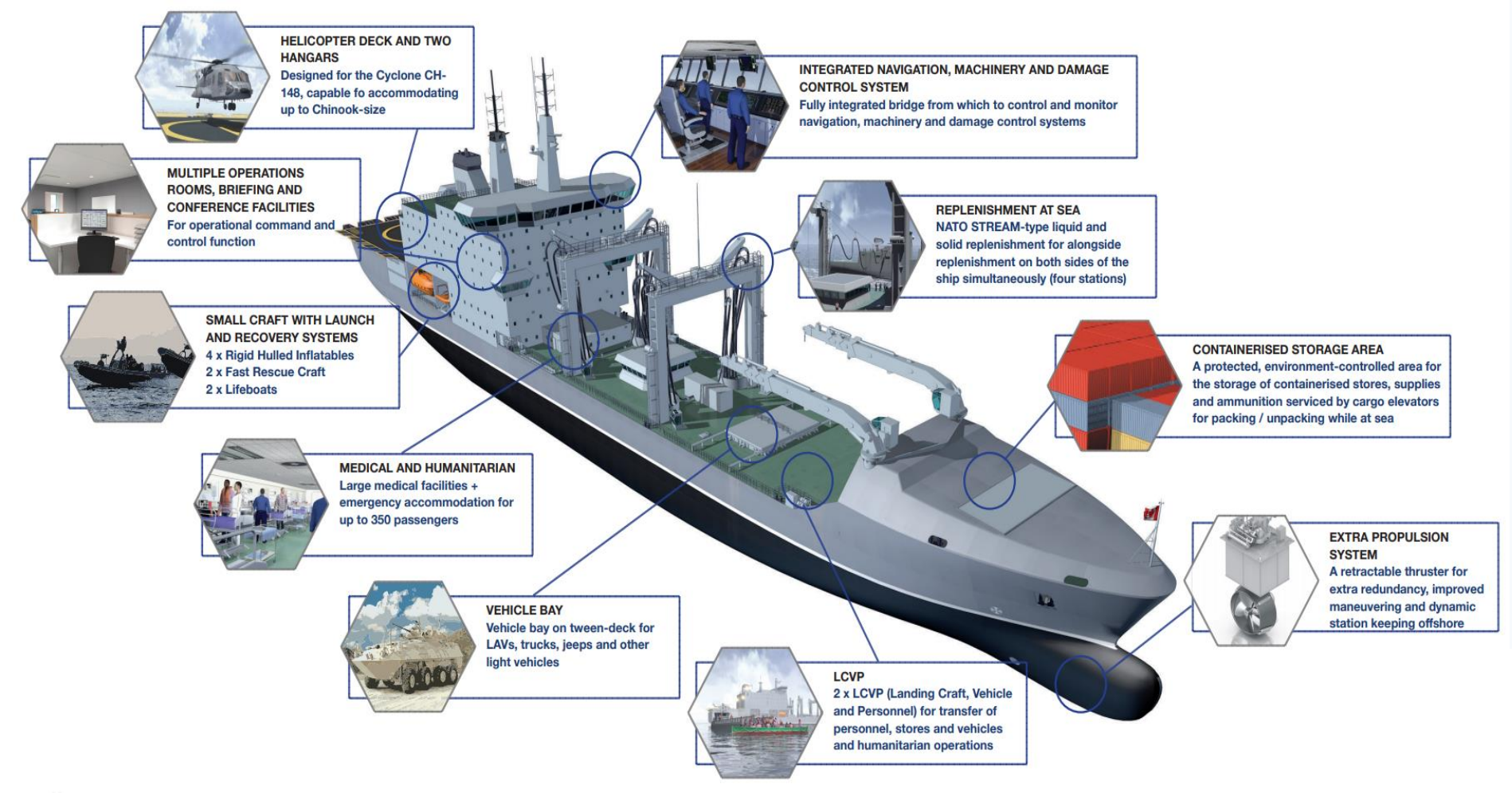
Harry DeWolf-class (Offshore Patrol Vessels)



Harry DeWolf

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

Asterix (Federal Fleet Services)



Asterix

- Converted merchant ship with mixed civilian crew / military specialists. Interim solution during RCN AOR procurement

Other Activities and Developments of Interest

- Data access
  - Canada-wide 100m bathymetric surface
    - Available through GEBCO
  - UNCLOS Arctic survey data
    - Available through IBCAO (500m)
  - CA AVPG is being updated
    - http://dfonk1awvort001:8086/eng/Maps/Viewer/20#fc
- Crowd-sourced bathymetry and community science in the North
- International hydrographic remote sensing workshop (hosted with SHOM/NOAA) 18-20 September in Ottawa
- Automated Hydrographic Surface Vehicle (AHSV) video
  - https://www.youtube.com/watch?v=gihlUYY7TjY
- Sustainable Blue Economy conference
  - 26-28 November Nairobi, Kenya
  - [insert link to conference flyer]

Questions?

THANK YOU!

Dr Geneviève Béchard

genevieve.bechard@dfo-mpo.gc.ca