Science-based management in the context of a changing environment in the Canadian Arctic – a Fisheries and Oceans perspective

Marie-Claude Fortin
Aquatic Climate Change Adaptation Program (ACCASP)
Fisheries and Oceans Canada

Targeted climate change program (DFO):

Aquatic Climate Change Adaptation Services Program (ACCASP)

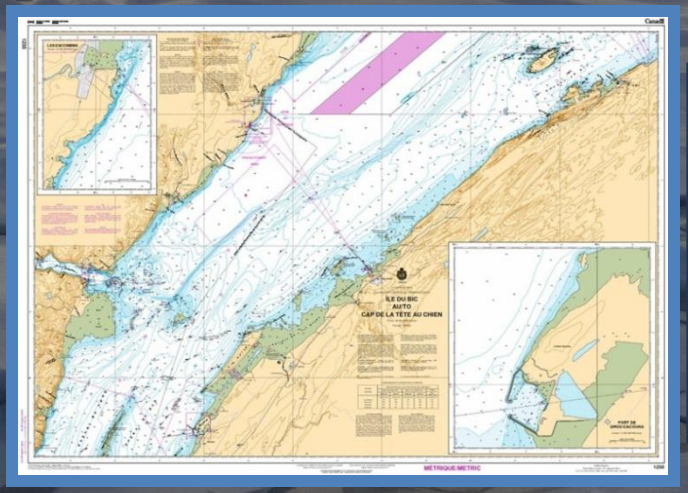
Ongoing DFO research, monitoring and consultations

Collaboration

Sample of **other Federal Department's Arctic work**

Fisheries and Oceans Canada's – What we do

1. **Economically Prosperous Maritime Sectors and Fisheries**
2. **Sustainable Aquatic Ecosystems**
3. **Safe and Secure Waters**



Working with northern partners

Fishery co-management is the basis of conservation and sustainable use of the fish and marine mammal resources in much of Arctic Canada, bringing together local hunters and fishermen, government agencies and public management boards to share management responsibility for fishery resources

Sustainable use of the Arctic fishery resources so that present and future generations can enjoy these traditional sources of food

DFO's six regions and three coasts

DFO's responsibilities and activities in the Canadian Arctic

DFO's mandate is the **same across the 3 coasts**

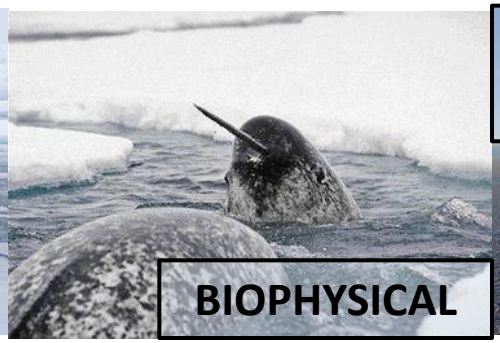
Delivery of its programs remains **unique in the Arctic**

MONITORING

CONSULTATIONS

RESEARCH

PHYSICAL



BIOPHYSICAL

SAFE SECURE WATERS

things are changing …

Aquatic Climate Change Adaptation Services Program (ACCASP) DFO

Federal Adaptation Strategy

- share knowledge between departments regarding impacts of climate change and build federal adaptive capacity
  - $149M over 5 years - $16.5M to DFO

Objective of ACCASP is to mainstream climate change adaptation considerations into decision making at DFO

Integrated climate change risk assessment in the Canadian Arctic (ACCASP)

Under DFO's **Aquatic Climate Change Adaptation Services Program (ACCASP)** an integrated climate change impact risk assessment was conducted in the Canadian Arctic Large Aquatic Basin to assess the risks that climate change poses to DFO's mandate

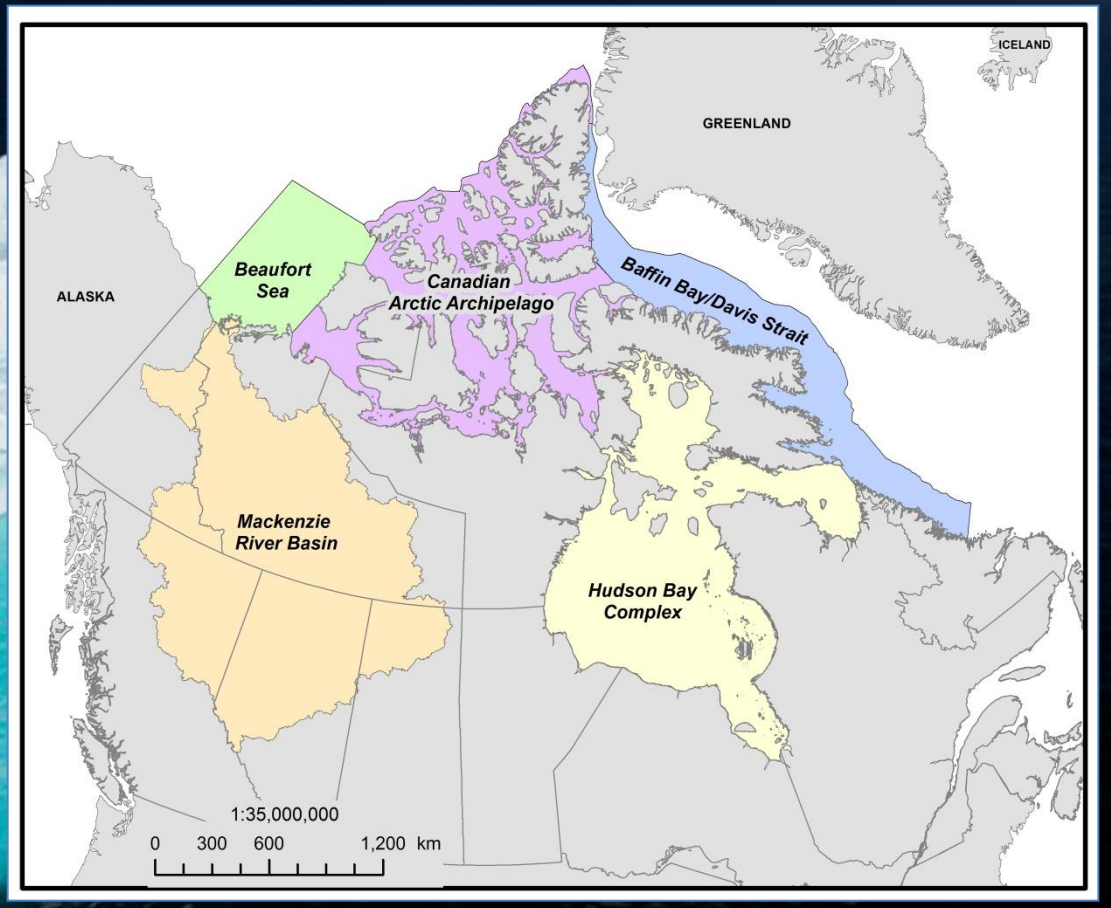


Figure 1. Map of the Arctic Large Aquatic Basin (LAB) as defined by the ACCASP. The Arctic LAB is divided into five sub basins: Beaufort Sea, Canadian Arctic Archipelago, Baffin Bay/ Davis Strait, Hudson Bay Complex, and Mackenzie River Basin.

Integrated climate change risk assessment in the Canadian Arctic (ACCASP)

- **Factors such as water/air temperature, sea ice thickness, water pH were projected** on a 10 and 50 year timeframe across the Arctic, which includes the Beaufort Sea sub basin;
- The potential **future impacts** of these changes on the **aquatic biological systems and DFO infrastructur**e were then assessed;
- The **Socio-Economic Implications** and **Policy Consideration** associated with these impacts were identified;
- An **Integrated Risk Assessment**, incorporating the Science, Socio-Economic and Policy considerations identified the greatest vulnerability in the Arctic

Integrated climate change risk assessment in the Canadian Arctic (ACCASP)

GREATEST RISK ACROSS ARCTIC

Changes in biological resources

management of fisheries resources

Changes in access and navigability of waterways

Canadian Hydrographic Services, Canadian Coast Guard

Increase demand to provide emergency response

Search and Rescue, Environmental Response and other Coast Guard activities

POTENTIAL OPPORTUNITIES:

- *New and emerging fisheries*
- *Longer fishing season*
- *Increased tourism*
- *Increased revenue*

Development of new climate change knowledge and adaptation tools (ACCASP)

Competitive funds available to develop:

1. **New Knowledge of Climate Change Impacts** on Canada's Oceans and Inland Waters, and;
2. Applied science-based **Adaptation Tools**

Arctic marine and freshwater ecosystems has remained one of three funding priorities

Development of new climate change knowledge and adaptation tools (ACCASP)

- **Colonizing Fish Species as Threats to, and Indicators of, Ecosystem-Level Changes in the Western Arctic - James D. Reist**
- **Climate-Related Changes in Marine Invertebrate Communities and Aquatic Invasive Species (AIS) Risk in the North -Kimberly Howland**

Japanese skeleton shrimp

DFO's ongoing research and monitoring and collaboration

Understanding the physical and biophysical picture

DFO research and monitoring

Understanding the physical picture

Physical oceanography research to study:

- Ocean acidification
- Change in water temperatures
- Sea ice parameters (thickness, concentration, extent)
- Currents and other oceanographic features (e.g. gyres, polynyas)
- And so many more!

Serves as the foundation for DFO's ecosystem based work

DFO research and monitoring

Understanding the biophysical picture

Monitoring stocks/populations:

- Marine mammals
- Fish / invertebrate stock
- Species at Risk
- Aquatic Invasive Species

Assessing ecosystems

- Ecologically and Biologically Significant Areas

DFO Arctic Science strategy

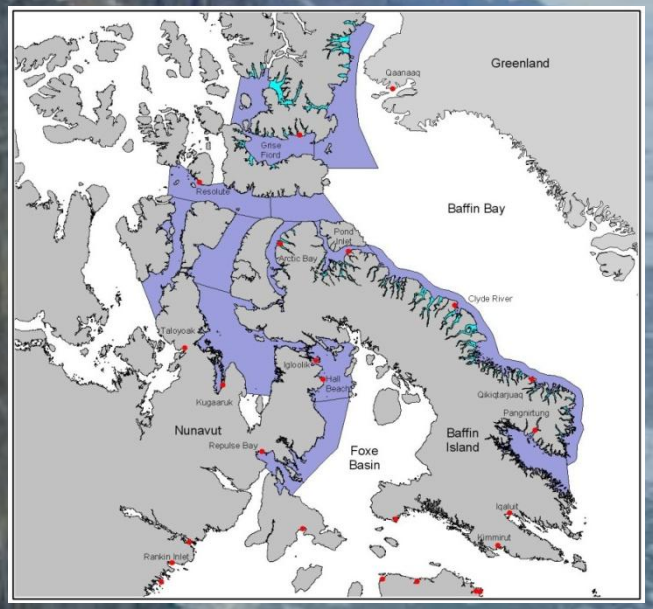
Arctic Marine Mammal Surveys

Species/stock	COSEWIC Status	Year last surveyed	~Frequency of surveys
High Arctic beluga	Special Concern	*1996	>10 years
Cumberland Sound beluga	Threatened	*2009	5-10 years
Baffin Bay narwhal	Special Concern	*many stocks, variable survey schedule/frequency	
ECA bowhead	Special Concern	*2004	10 years
Beaufort sea bowhead	Special Concern	2009	10 years
Walrus	Special Concern	no previous large scale population surveys	
Ringed seals	not at risk	2000	>10 years
Bearded seals	not at risk	2000	>10 years
Hooded seals	not at risk	2005	>10 years

* These will be surveyed in summer, 2013.
COSEWIC: Committee on the Status of Endangered Wildlife in Canada

High Arctic Cetacean Survey Summer 2013

- Comprehensive survey of **narwhal, beluga and bowhead** in the eastern Canadian arctic
- Killer whales data also collected opportunistically
- Collaboration between DFO and Inuit experts and leaders



Fish and community level surveys

Multispecies Marine Fish and Invertebrate annual survey

- Annual surveys are conducted in Baffin Bay and Davis Strait to support stock assessments for Greenland Halibut and Shrimp
- Also provides information on other groundfish and invertebrates

Arctic Char fisheries monitoring

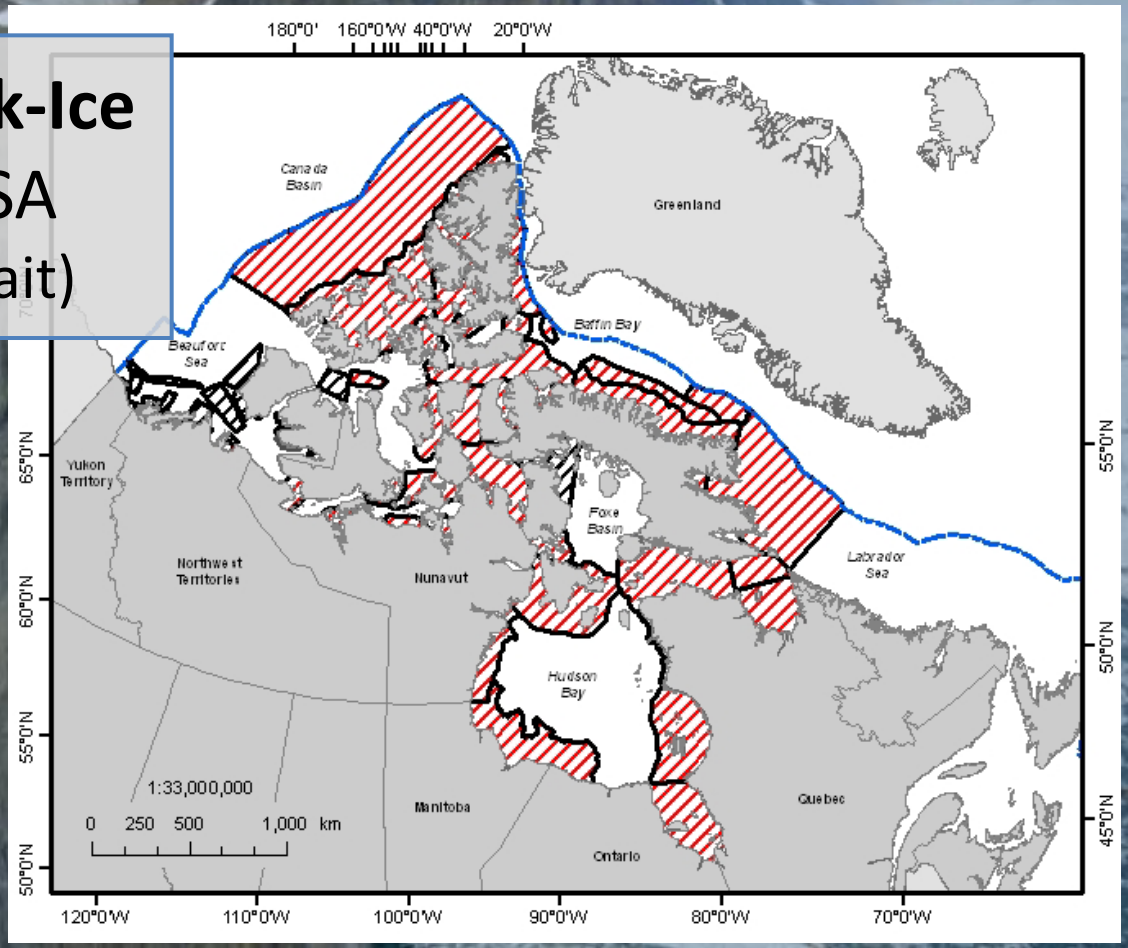
On-going community based activity conducted throughout the Arctic

Benthic and Sea Ice Community Monitoring

Research conducted and monitoring stations established to support Arctic Council and International Arctic Science Committee biodiversity monitoring activities

Ecologically and Biologically Significant Areas in the Arctic

Arctic Multi-year Pack-Ice identified as an EBSA (M'Clure and Nares Strait)



DFO collaboration with partners

Co-management boards
(e.g. Fisheries Joint Management Committee, Gwich'in Renewable Resources Board

International/ Canadian research operations
(PEARL, CHARS)

Academics networks
(e.g. Arctic Net, Canadian Aquatic Invasive Species Network)

International councils
(e.g. Arctic Council AMAP, CAFF, PAME)

Other Federal Depts
(e.g.Transport Canada, Env.Canada, Aboriginal Affairs &Northern Dev.Canada, …)

Non government organisations
(e.g. WWF)

Safety First, Service Always

Safe and Secure Waters

Safety First, Service Always

Safe and Secure Waters

Canadian Hydrographic Services & Canadian Coast Guard

Provide safe access and navigation in Canadian waterways

- Ice breaking
- Dredging
- Charting

Provide emergency response

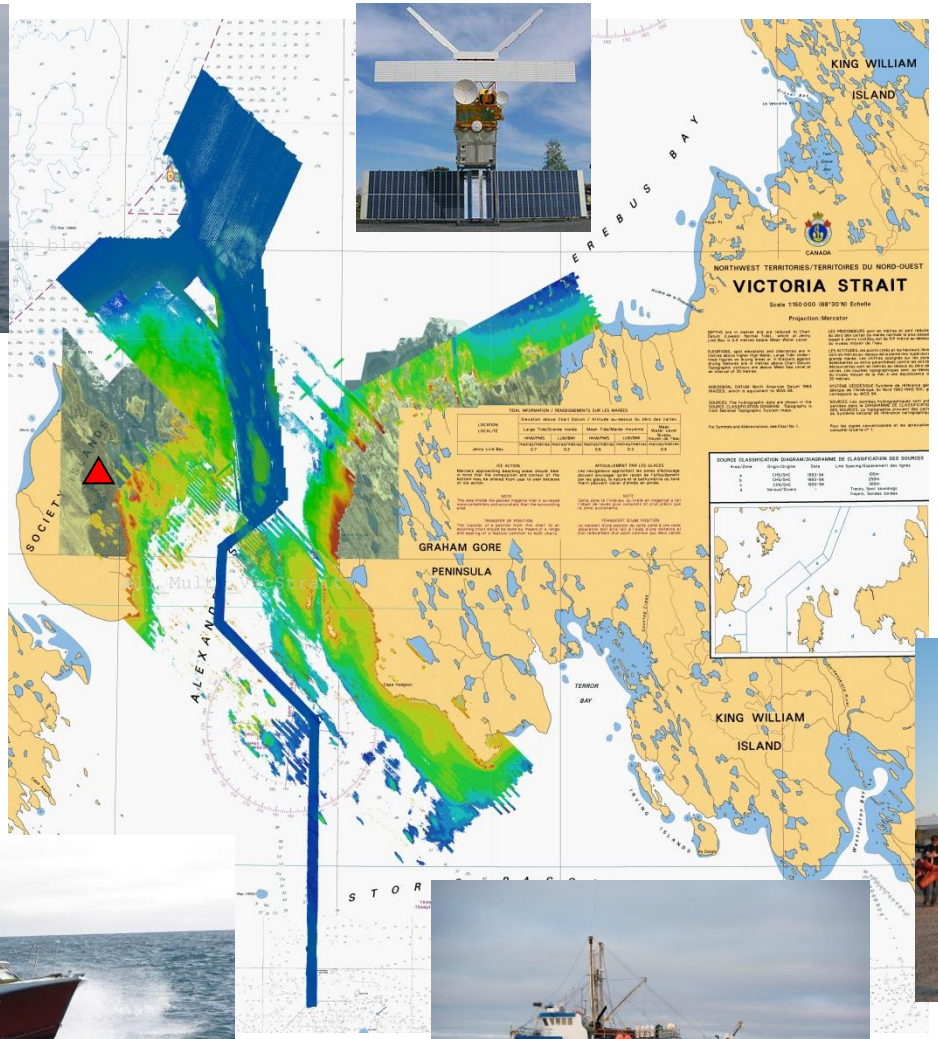
- Search and Rescue
- Environmental/emergency response
- Work collaboratively with other departments (DND)

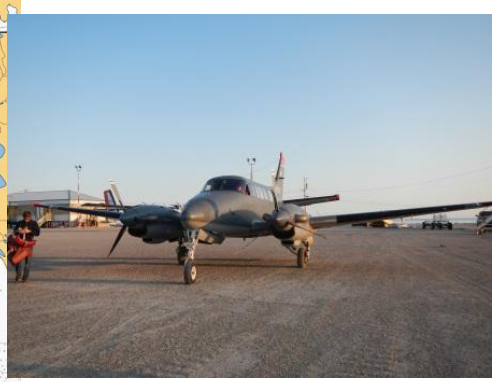
Canadian Hydrographic Services (CHS)- what they do

- **Deals with the measurement and description of the physical features** of the navigable portion of the Earth's surface
- **Hydrography is foundational to safe navigation**, coastal engineering, resource development, marine science research etc.
- **Changes in shipping patterns in the North** and increased interest for tourism and economic development is increasing pressure for modern hydrography and charting;

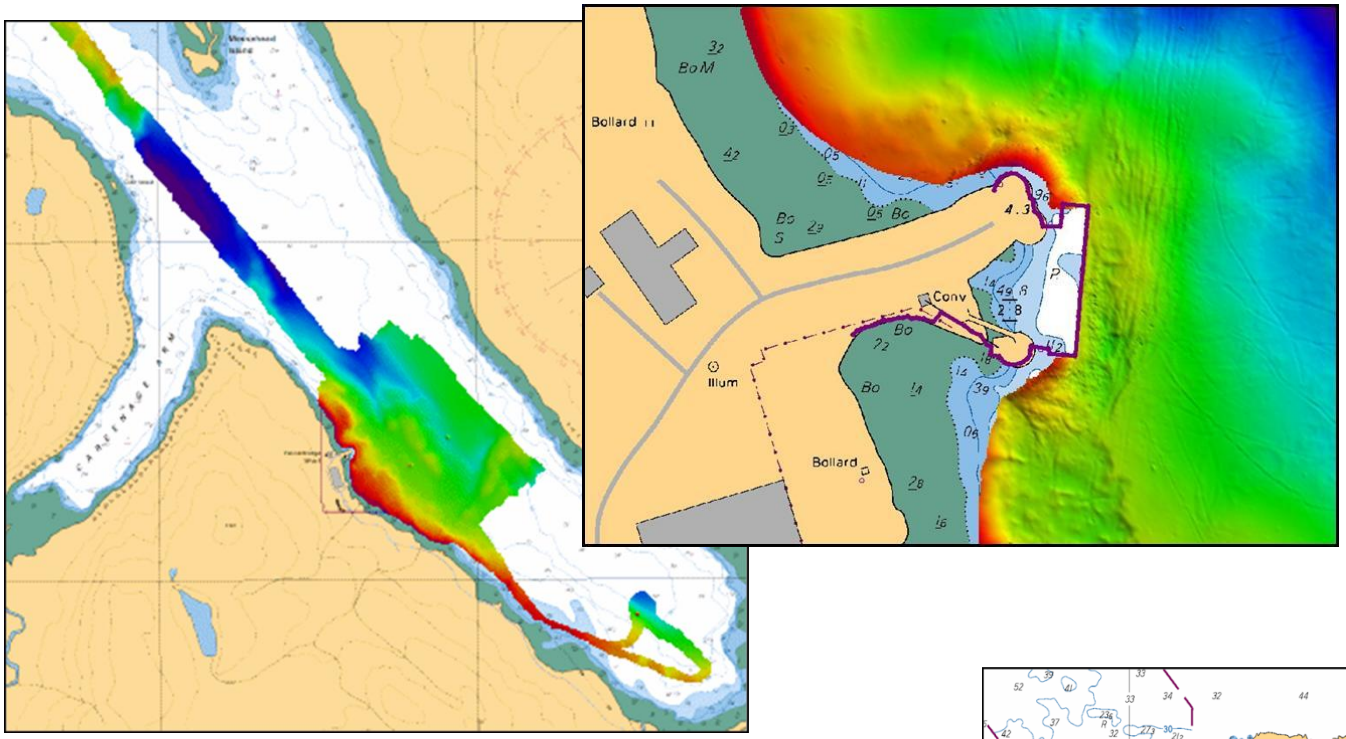
Arctic hydrography is a challenge due to cost, complex logistics, and short seasons – new technologies and collaborations are being explored

2012 Arctic Pilot Project
Innovation in technology and partnerships



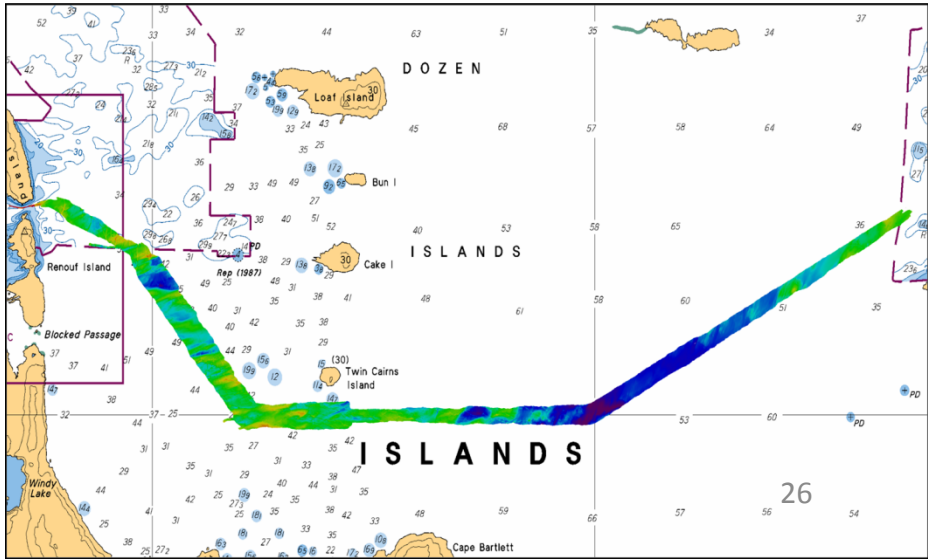


CHS Charting Strategy



Update Deception Bay ENC with 2012 data.

In addition to surveying harbours and landings, complete hydrography along corridors linking first communities to deeper water channels such as is the case in 2012 with hydrographic surveys in the waters around Sanikiluag



Arctic Voyage Planning Guide

Interactive strategic planning tool for national and international vessels traveling the Canadian Arctic

http://geoportal.gc.ca/eng/Gallery/MapProfile/5

Canadian Coast Guard (CCG) – What they do

- CCG has legislative authority over navigation, shipping, beacons, buoys, and lighthouses in all of Canada's oceans, including the Arctic
- The Oceans Act provides CCG the authority to deliver support to other government departments, boards, agencies, through the provision of ships, aircraft and other services
- Coast Guard icebreakers are critical to delivering federal programs and to exercising sovereignty in Canadian waters.

Key CCG Arctic Initiatives

In addition to the services provided in the Arctic, the Canadian Coast Guard has moved forward on the following key initiatives:

1. NAVAREAs
2. Polar Icebreaker
3. Environmental Response
4. Search and Rescue
5. Preparing for Canada's Arctic Council Chairship

Other Federal Departments' Arctic Initiatives – a few examples

Aboriginal Affairs and Northern Development Canada (AANDC)
Beaufort Regional Environmental Assessment (BREA 2010-2015)

A partnership among Inuvialuit, industry, governments, regulators and academia to prepare for oil and gas activity in the offshore part of the Beaufort Sea

- Produce regional scientific and socio-economic information to simplify project-level environmental assessments
- Strengthen integrated management
- Engage communities and advance their priorities for oil and gas preparedness

AANDC – Climate Change Adaptation Program

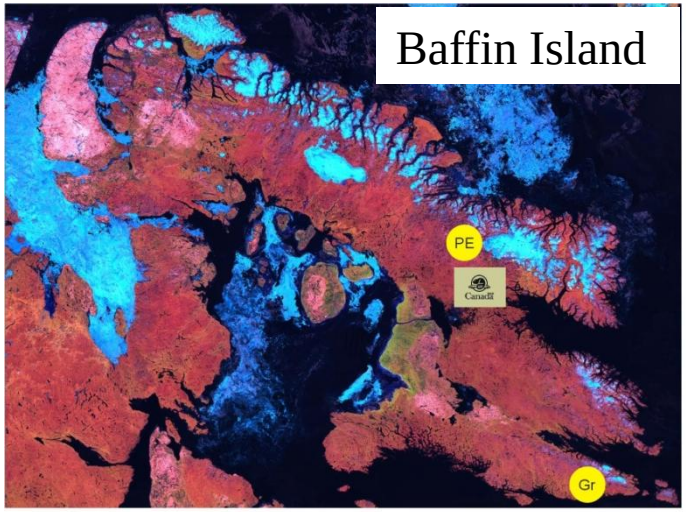
To support Aboriginal and northern communities to address risks and challenges posed by climate change impacts and to become more resilient.

To date the program has funded over 90 projects and 80 communities, contributing to enhancing resilience in some of Canada's most vulnerable communities, as well as increasing interest in the implementation of climate change adaptation initiatives in Aboriginal and northern communities across the country

Geological Survey of Canada

Provides scientific knowledge and technology that enable Canadians to grow their economy, protect the environment and ensure public safety in order to improve the quality of life of Canadians

- Map the Geology of the North
- Changes in permafrost
- Study glacier melt – signal of climate change
- Addressing the growing need for transportation by sea - Coastal stability, and ports



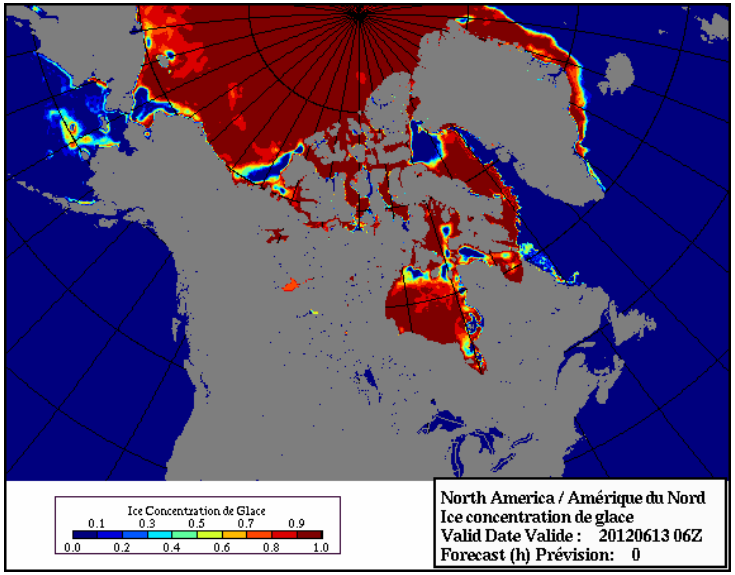
Canadian Ice Services – Meteorological Services Canada

- The leading authority for information about ice in Canadian navigable waters.
- Provide timely and accurate information about sea ice, lake/river ice and icebergs
- Maintain the Canadian Ice Service Digital Archive of ice climatological data used for both policy/regulation development and research
- Integrated Satellite Tracking of Pollution (ISTOP): uses satellite imagery to support spill confirmation, tracking and evidence procurement

David Jackson, Director, Canadian Ice Service

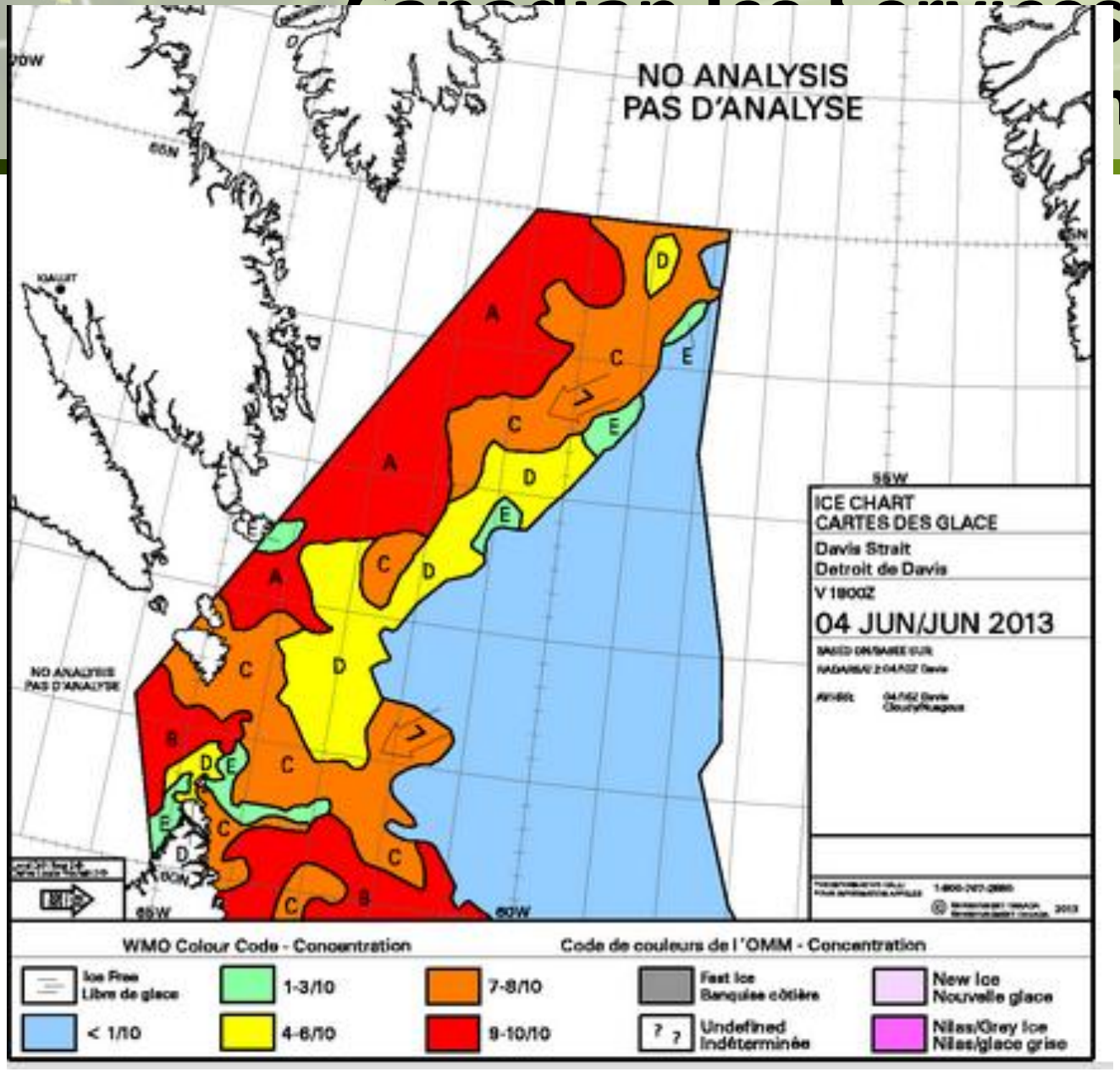
Canadian Ice Services – Meteorological Services Canada

- Regional Ice Prediction System
- Automated Sea Ice Tracking System (summer 2013)
- Ice Hazard Detection and Forecasting



David Jackson, Director, Canadian Ice Service

Canadian Ice Services – nada



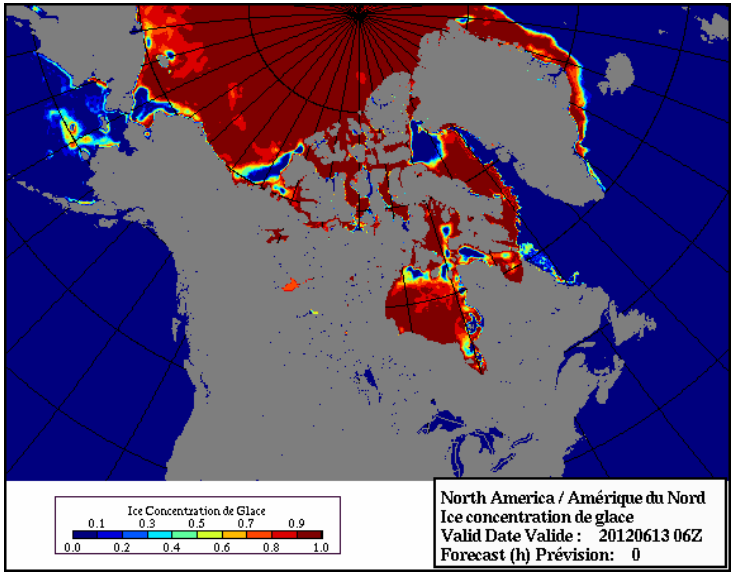
[Daily Ice Chart Concentration]

[Davis Strait - WIS33CT]

2013-06-04 18:00:00

Canadian Ice Services – Meteorological Services Canada

- Regional Ice Prediction System
- Automated Sea Ice Tracking System (summer 2013)
- Ice Hazard Detection and Forecasting



David Jackson, Director, Canadian Ice Service

Science-Based Management in a changing Arctic environment

- Arctic is not a project or a program; it's a geographic region where full mandate applies
- Knowledge of Arctic aquatic environment is still emerging compared to the south
- Task is 1) complicated by ecosystem changes; and 2) made more essential by these changes
- DFO, and other federal departments, are working hard to tackle these issues in a prioritized fashion
- Collaboration and co-management is primordial to progress

THANK YOU

Marie-Claude Fortin
Aquatic Climate Change Adaptation Program (ACCASP)
Fisheries and Oceans Canada, Ottawa
Marie-Claude.Fortin@dfo-mpo.gc.ca
613-998-9115