



Canadian Marine Spatial Data Infrastructure

Chris Hemmingway
Canadian Hydrographic Service



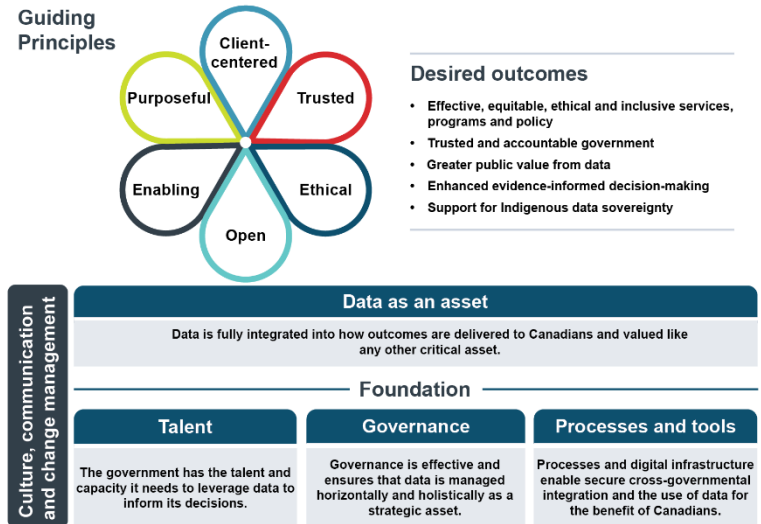
Outline

- Policy / governance / data / standards
- Canadian MSDI
- Federated MSDI
- Marine Spatial Planning
- Challenges & Ways Forward

Government of Canada Policies

- Open science policies demonstrate commitment openness in scientific research. They promote transparency and accountability within the scientific community.
- Open data policies promote data sharing and research, making it easier for others to build upon existing research. Sharing leads to greater innovation, collaboration, and scientific progress.
- By making scientific research and data publicly available and accessible, the government can foster greater trust and engagement with the public.
- [Open Government | Open Government - Government of Canada](#)









Data Strategy Framework for the Federal Public Service



MSDI in Canada

- Many departments and agencies in Canada at both the Federal and Provincial levels have mandates and activities related to the marine domain.
- Data often not open and accessible
- Governance is complex
- Since Fisheries and Oceans Canada (DFO) has a large interest in the marine environment, our focus has been on making data accessible and creating value-added applications.

Examples of Federal responsibilities for data holdings

	<p>Ports</p>	<p>Transport Canada & Public Service and Procurement Canada</p>
	<p>Small Craft Harbours</p>	<p>Fisheries and Oceans Canada</p>
	<p>Marine Protected Areas</p>	<p>Environment and Climate Change Canada, Natural Resources Canada, Fisheries and Oceans Canada, Parks Canada</p>
	<p>Bathymetry</p>	<p>Fisheries and Oceans Canada, National Defense, Public Service and Procurement Canada, Parks Canada, Natural Resources Canada</p>
	<p>Offshore Oil & Gas</p>	<p>Crown-Indigenous Relations and Northern Affairs Canada, Natural Resources Canada, Petroleum Boards of Canada</p>
	<p>Maritime Limits & Boundaries</p>	<p>Fisheries and Oceans Canada, Natural Resources Canada, Global Affairs Canada</p>
	<p>Wrecks</p>	<p>Fisheries and Oceans Canada, National Defense</p>
	<p>Undersea Cables</p>	<p>Innovation, Science and Economic Development Canada, Natural Resources Canada, Public Services and Procurement Canada</p>

MSDI in DFO

Three main groups involved in MSDI:

- Canadian Hydrographic Service
 - Coordination for development of business requirements
 - Data management and publishing
- Chief Data Steward's Office
 - Governance
 - Policies and strategies related to:
 - Data stewardship
 - Data quality
 - Artificial Intelligence
 - Data literacy
- Chief Digital Officer Sector
 - Infrastructure, including hardware and software
 - New Enterprise Data Hub - A common way for digital assets to be discoverable, shareable and useable across DFO
 - Enables data to be “published” via APIs to external sites

DFO contribution to Canadian MSDI

- Geographic Information System (GIS) solution for customized, value added and decision-making applications with four main objectives:



Data Discovery

Enable discovery of marine geospatial data by visualizing location and content



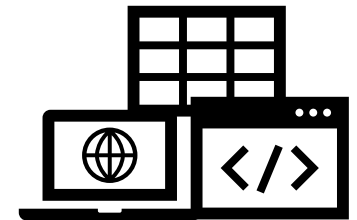
Accurate & Complete

Metadata is accurate, complete, and compliant to standards



Visualization

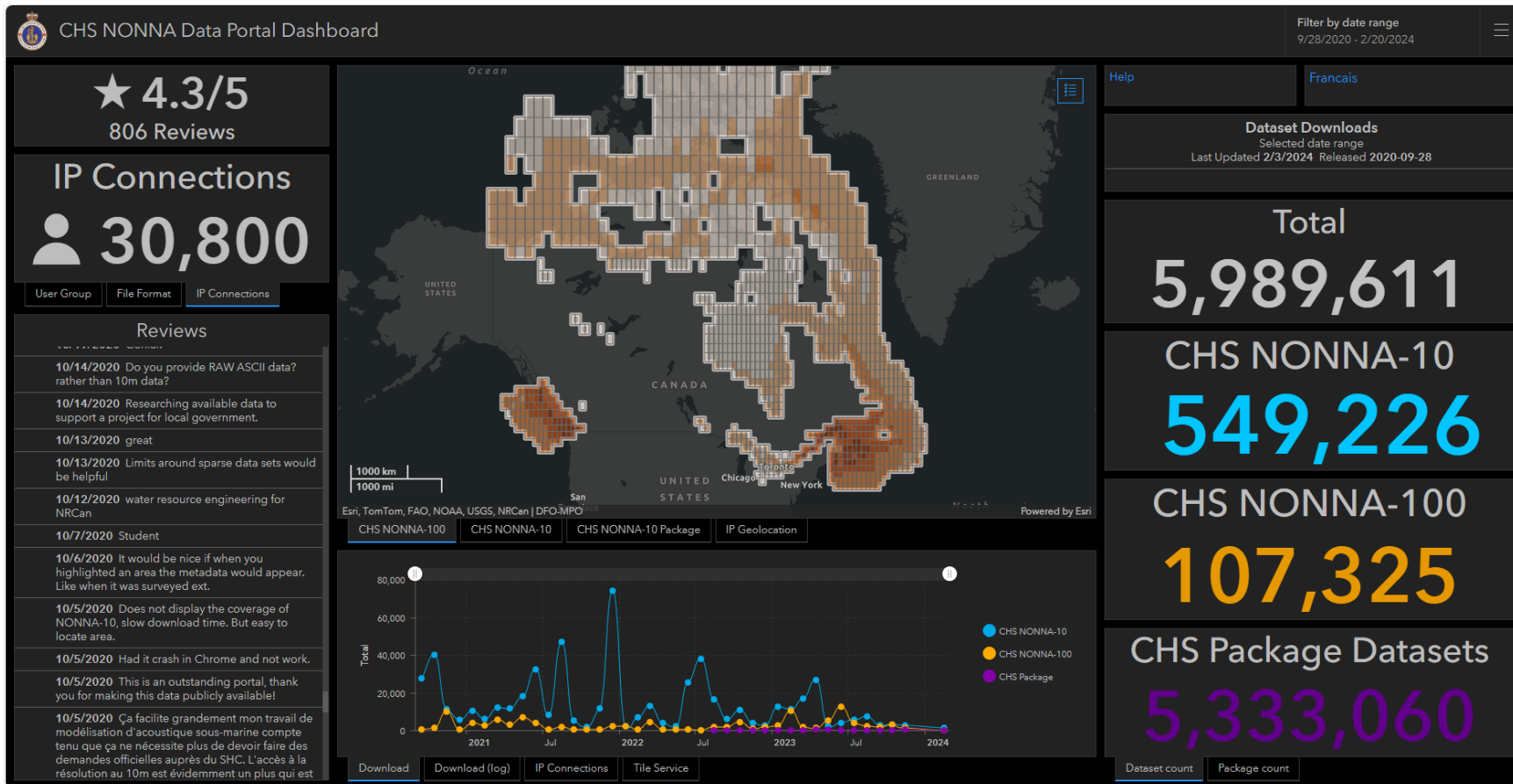
Providing data visualization and querying mechanisms



Applications

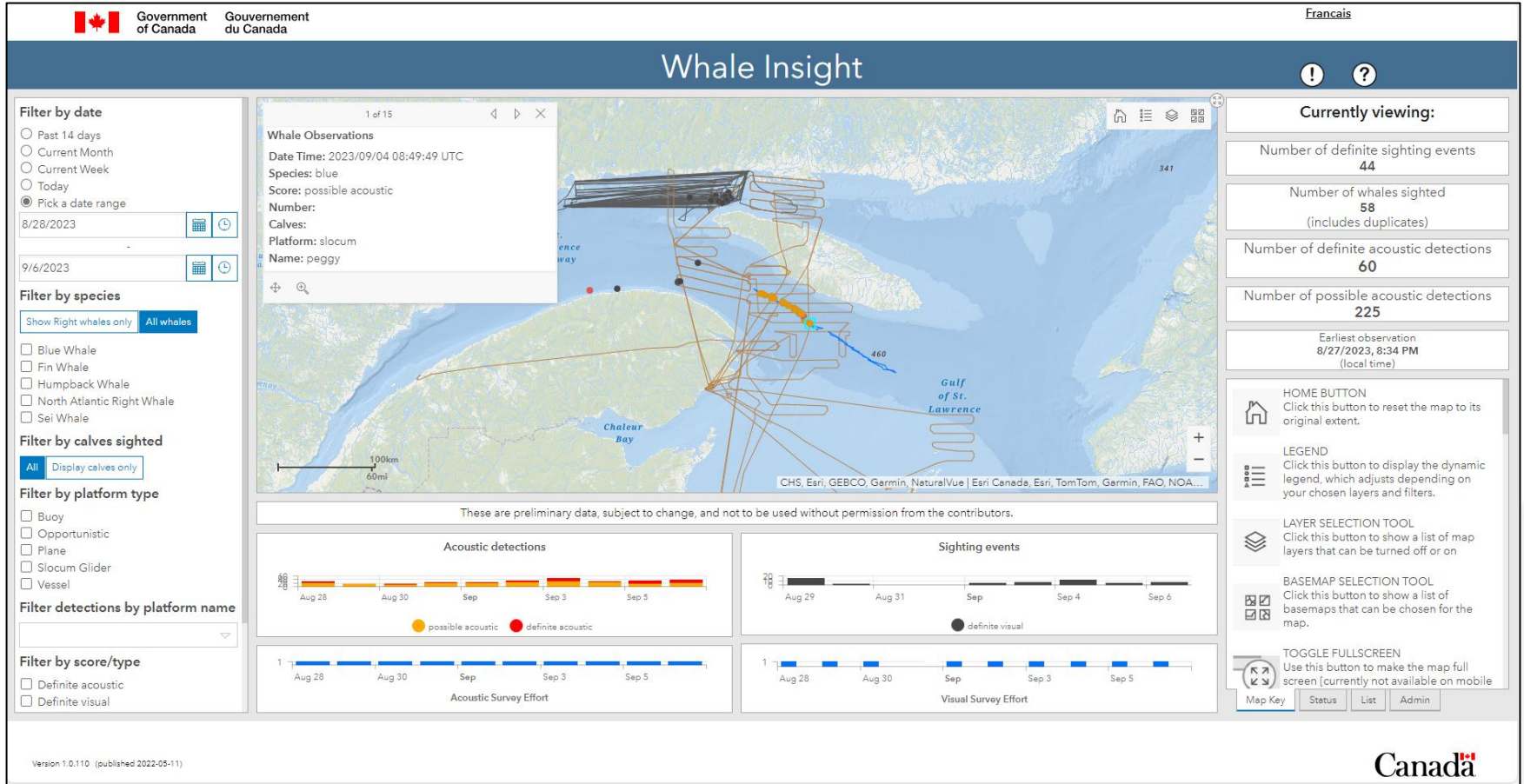
Populating web applications with metadata and data

Canadian Hydrographic Service Non-Navigational (NONNA) Bathymetric Data



[Canadian Hydrographic Service Non-Navigational \(NONNA\) Bathymetric Data - Open Government Portal \(canada.ca\)](https://canada.ca)

Whale Insight



This map displays North Atlantic right whale detections in eastern Canadian waters

Shellfish harvesting map

- Real-time map of openings and closures of Canadian harvesting areas for bivalve shellfish (mussels, oysters, clams and scallops).

Home

Check the map and Prohibition Orders before harvesting!

Anyone harvesting bivalve shellfish, i.e. shellfish with two shells, including all clam species, oysters, cockles, mussels and scallops, is responsible for ensuring that an area is designated as safe for harvesting. Eating contaminated shellfish can cause serious illness or be fatal.

Shellfish **must not** be harvested within 125 metres (410 feet) of a wharf, a marina, an finfish aquaculture operation or a floating house. Shellfish **should not** be harvested in unmonitored areas.

Unless clearly stated otherwise, all closures extend to the coastline.

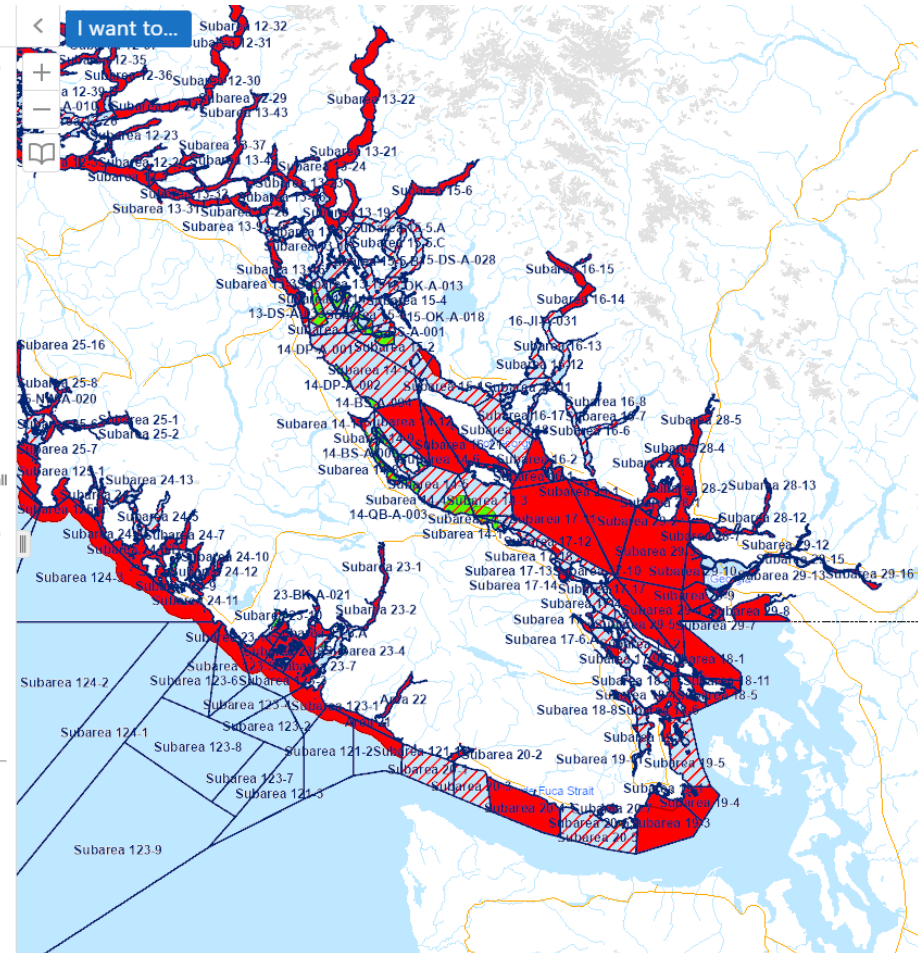
For fishing seasons, size and quota limits refer to the Regulations and Variation Orders under the [Fisheries Act](#). Contact your local DFO office for details

Legend

- Green areas are **approved** for harvesting of all species of bivalve molluscs
- Red areas are **closed** for all species of bivalve molluscs
- Red hatching are areas where harvesting of only some species of bivalve molluscs is **closed**
- Blue indicates that areas are unmonitored. Shellfish **should not** be harvested in these areas.

Zoom in and click on an area for more information

[Shellfish harvesting and safety](#)



DFO Data Viewer

The screenshot shows the DFO Data Viewer interface. On the left, a 'Layer List' panel contains several layers, with 'Oceans Act Marine Protected Areas: Fisheries and Oceans Canada', 'Marine Refuges: Fisheries and Oceans Canada', and 'Other Federal, Provincial, Territorial or Private marine conservation areas: Canadian Protected and Conserved Areas Database (CPCAD)' checked. The main map area displays a satellite-style map of the Hudson Bay region, with several red rectangular overlays indicating specific areas of interest. A pop-up window titled 'Other Federal, Provincial, Territorial or Private marine conservation areas: Canadian Protected and Conserved Areas Database (CPCAD)' is open, showing details for the 'Ikattueq Bird Sanctuary'. The pop-up window contains the following information:

Name	Ikattueq Bird Sanctuary
ha	19,088.50
Type	Migratory Bird Sanctuary
Jurisdiction	Canadian Wildlife Service, Northern Region

At the bottom of the map, there is a scale bar (60km) and a coordinate display (63.509 -86.385 Degrees). A warning message at the bottom right states 'No time-aware layers are visible.' The footer of the application includes the text 'All rights reserved' and 'Esri, GEBCO, Garmin, NaturalVue | This layer was created by the Marine Planning and Conservation Directorate at ...'.

This application is a discovery tool for available geospatial data layers across DFO.

Marine Spatial Planning- Data and Knowledge Products



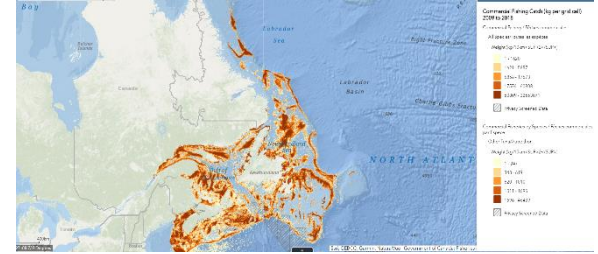
Canada Marine Planning Atlas

- Interactive web mapping tool populated with published data to support transparency of the planning process
- Supplies decision-makers with MSP-relevant ocean information
- A place for Canadians to discover, explore, visualize and download data on Canada's marine spatial planning areas



Data Management

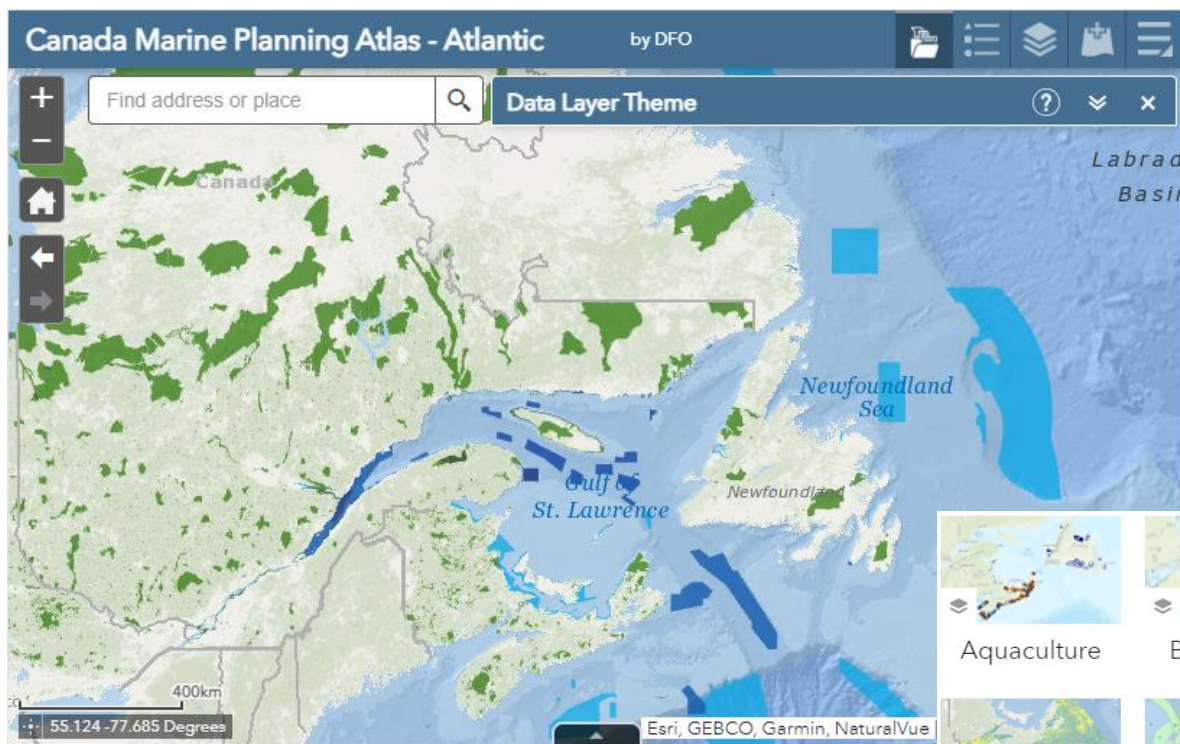
- Data inventory and analytical tools to identify data gaps for MSP (e.g. scientific, socio-cultural and economic data; and Indigenous and traditional knowledge) then track and prioritize data acquisition to allow:
 - development of knowledge product
 - inclusion of additional priority data sets in the Atlas and other data holdings
- Currently includes over 1,200 datasets



Knowledge Products

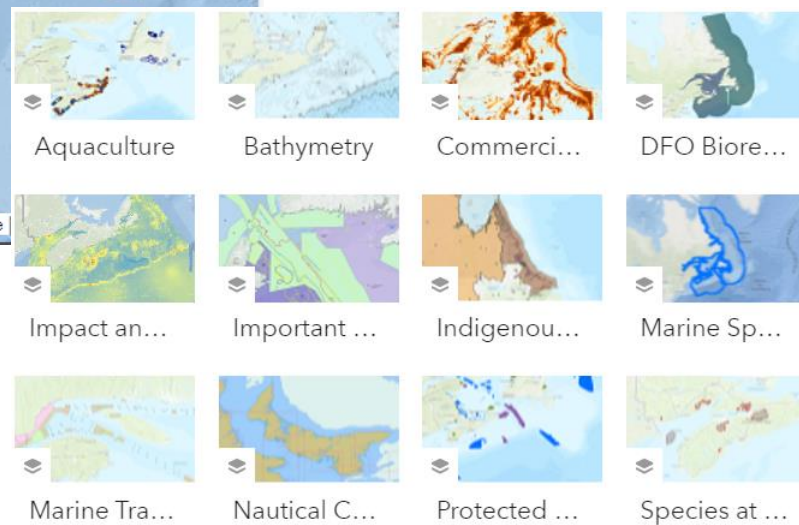
- Create insights regarding the marine environment and its users by transforming diverse information into a user-friendly format
- Leverage data and analysis to ensure accurate representation and interpretation of data layers (e.g. What are current ocean uses? Where are ecologically important areas?)

Canada Marine Planning Atlas



Above: Canada Marine Planning Atlas – showing Marine Protected Areas and Conservation Areas

Right: a selection of available layers



CIOOS

CANADIAN INTEGRATED OCEAN
OBSERVING SYSTEM



SIOOC

SYSTÈME INTÉGRÉ D'OBSERVATION
DES OCÉANS DU CANADA

- Collaboration in the ocean observing community in Canada – including government, Indigenous communities, industries, coastal communities, non-governmental organizations, and academia
- Aim is to efficiently and effectively observe the ocean and make ocean science data available
- Enables information and ocean data sharing, as well as provision of historical and real-time data on ocean conditions and climate change.
- Includes over 1500 marine-related data sets from over 40 organizations

Challenges & Ways Forward

- Constraints / Roadblocks:
 - Different levels of the government (federal, provincial and municipal) have different policies and practices for publishing data
 - Cloud Migration for architecture and storage
 - Publishing large data sets
 - Culture change to open data mindset and official publishing pathways
- Next Steps:
 - FAIR[ER] Principles & data quality
 - Themed approach to MSDI Applications
 - Considering adoption of Persistent identifiers
 - IGIF-MSDI Maturity Road Mapping



Questions?

Chris Hemmingway
Canadian Hydrographic Service
Chris.Hemmingway@dfo-mpo.gc.ca

Marine Spatial Data Infrastructure Team
DFO.MSDI-IDSM.MPO@dfo-mpo.gc.ca