

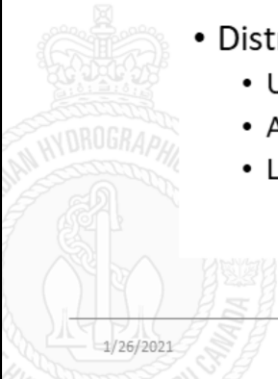
Maritime Limits and Boundaries for MSDI: IHO S-121 and OGC Pilot Project



Hydrography and the Marine Spatial Data Infrastructure Division
Fisheries and Oceans Canada/Canadian Hydrographic Service
February 18-19, 2021

Canada's Maritime Limits & Boundaries (MLB)

- United Nations Convention on the Law of the Sea (UNCLOS)
- Oceans Act 1996
 - Global Affairs Canada (GAC)
 - Oversees & approves changes to MLBs: Legal authority
 - Fisheries and Oceans Canada (DFO)
 - CHS, Division of Hydrography and the MSDI is custodian of MLB: Technical experts
- Distribution of MLB by CHS
 - Under signed Intellectual Property agreement with users
 - As geographical coordinates in shape files and other standalone formats
 - Legislative information is not part of the MLB dataset



1/26/2021

2

Maritime Limits and Boundaries are legislated entities. They hold a legal dimension.

Their definition is found in the United Nations Convention on the Law of the Sea, UNCLOS.

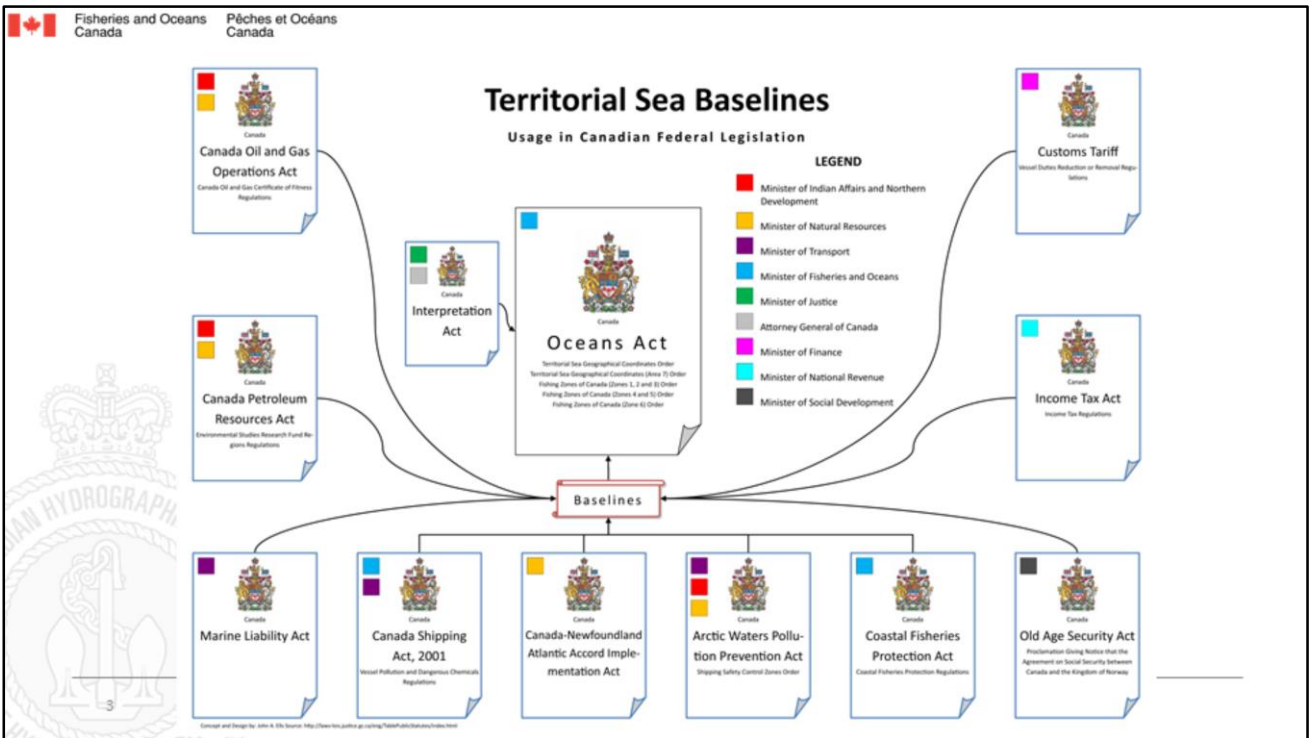
They are enacted in Canada by the Oceans Act

CHS is custodian of the MLB for Canada, overseen by Global Affairs Canada (GAC).

CHS distributes the official MLBs of Canada

To better manage the MLBs, their legislative component needs to be part of the data and they need to be part of a database solution.

This will be achieved with the Law of the Sea Data Architecture in MSDI



- This is an example of the impact that just one component of the maritime limits and boundaries has on many Canadian Departments' legislations (**Acts and Regulations**).
- The Acts shown here use the baseline to define their jurisdiction.
- Baselines are a simple case of a maritime limit or boundary, the territorial sea is part of a much larger number of acts and regulations

HYDROGRAPHY S-100 STANDARD: MUCH MORE THAN JUST NAUTICAL CHARTS



<https://iho.int/en/>



Graphic courtesy of the
International Hydrographic
Organization (IHO)

&

Korea Hydrographic &
Oceanographic Agency (KHOA),
Republic of Korea

The International Hydrographic Organisation (IHO) is an organisation that develops standards for the marine sector's data.

The S-100 is the IHO's Universal Hydrographic Data Model. It extends the marine standards beyond navigation requirements to sustain the needs of other marine space users (for example the Marine Spatial Data Infrastructure)

The S-121 standard is part of the IHO S-100 family of standards and is non-navigational. It aims to facilitate

- The digital deposit of States official Maritime Limits and Boundaries with the Secretary General of the United Nations.
- The administration of legislative information along with its geospatial objects (**enhancing MSDI and the Marine Cadastre**)

Canada is a member of an international project team which is developing this

standard



OGC MLB pilot project

Under the agreement IHO/Open Geospatial Consortium

Goals:

- Complete the last components of the IHO's S121
- Operationalise and test S-121 in commercial and open source software: interoperability
- Explore extendibility of S-121 for Marine Cadastre and Fisheries



1/26/2021

5

Open Geospatial Consortium is a not-for-profit organisation for the development of interoperable standards for geospatial data. Its members include more than 500 organisations from government, academic and private sectors.

The resources and technical knowledge necessary to finish the IHO's S-121 standard were accessible through OGC.

Operationalisation and interoperability could be achieved and tested by a grouping of OGC members: commercial software companies with knowledge of S-100 and the marine sector.




This pilot project represented the first project under the agreement between OGC and the IHO to develop a non-OGC standard.



OGC MLB pilot project

Sponsors (OGC Members only)

- Canada

- DFO/Canadian Hydrographic Service  Fisheries and Oceans Canada / Pêches et Océans Canada 
- Natural Resources Canada/GeoConnections & Surveyor General Branch  Natural Resources Canada / Ressources naturelles Canada

- Australia

- Geoscience Australia 

- Great Britain/United Kingdom

- UKHO 



All sponsors of an OGC pilot must be OGC members.

In 2019-2020, Natural Resources Canada gave an OGC membership to CHS as an associate member.

The Government of Canada, through the collaboration between DFO and NRCan, was the main financial contributor to the pilot project.

The other project sponsors were Geoscience Australia (Australia) and UK Hydrographic Office (Great Britain/United Kingdom).

Sponsor roles:

- Specify requirements and deliverables
- Act as Domain experts
- Provide example data
- Make sure that the project remains on track

OGC MLB pilot project



Participants (OGC Members only)

- Great Britain/United Kingdom

- IIC Technologies
- Oceanwise



- Canada

- ESRI Canada
- Teledyne CARIS



- France

- Geomatys



Observer (OGC Members only):

- Canada

- Safe Software: FME (Canada)



Each participant submitted a proposal based on the requirements and Statement of Work given to OGC by Canada. All participants are high caliber experts in their domain.

Although it had an observer role, Safe SW has been of incredible help to bridge the gaps between the different technologies. Safe SW provided licenses to all the participants and bug fixes as well as upgrades adapted to the needs of the project.

Maritime Limits and Boundaries: Legislative documents

Governance/legislative information

General

3 (1) The lists of geographical coordinates of points set out in Schedules I, II and III are hereby issued as lists of geographical coordinates of points from which baselines may be determined pursuant to the Act in respect of Area 7.

(2) For the purposes of subsection (1), the geographical coordinates of points set out in columns II and III of an item of the schedules are those determined from the chart and edition set out in column IV of that item.

4 (1) In respect of the portion of Area 7 for which the geographical coordinates of points are listed in Schedule I, the baselines are straight lines joining the points so listed.

(2) In respect of the portion of Area 7 for which the geographical coordinates of points are listed in Schedule II, the baseline is the low-water line along the coast joining the points so listed.



CONSOIDATION / CODIFICATION

Administrative Unit

Territorial Sea Geographical Coordinates (Area 7) Order / Décret sur les coordonnées géographiques pour la mer territoriale (région 7)

SCHEDULE I Subsection 4(1))

AREA 7

Canadian Arctic Islands and Mainland Geospatial data

Item	Column I Locality	Column II Latitude	Column III Longitude	Column IV C.H.S. Chart and Edition
1. *	Nuneluk Spit	69°36'54"N.	139°54'10"W.	7601 (1979)
2. *	Herschel Island	69°38'30"N.	139°07'24"W.	7601 (1979)
3. *	Collinson Head	69°34'40"N.	138°50'25"W.	7601 (1979)
4	Kay Point	69°17'54"N.	138°23'20"W.	7602 (1981)
5	Pitt Island	69°10'55"N.	136°16'00"W.	7602 (1981)
6	Garry Island	69°29'55"N.	135°49'03"W.	7602 (1981)

Canada's Maritime Limits and Boundaries (MLB) are defined in **legislative documents** relating to an administrative unit (here the territorial sea in the Arctic).

- This is an example of an order in council (OiC)
- Inside this type of document, the MLB are broken into schedules and areas where the geospatial data consists of geographical coordinates.
- Descriptive text gives the information necessary to interpret the data in the schedules' tables. The S-121 model refer to this as governance.

S-121 STANDARD FOR MARITIME LIMITS AND BOUNDARIES (MLB)

Geospatial components

Legislative components

Standards

Interoperability

S-121 standard



Maritime limits and boundaries are geospatial features.

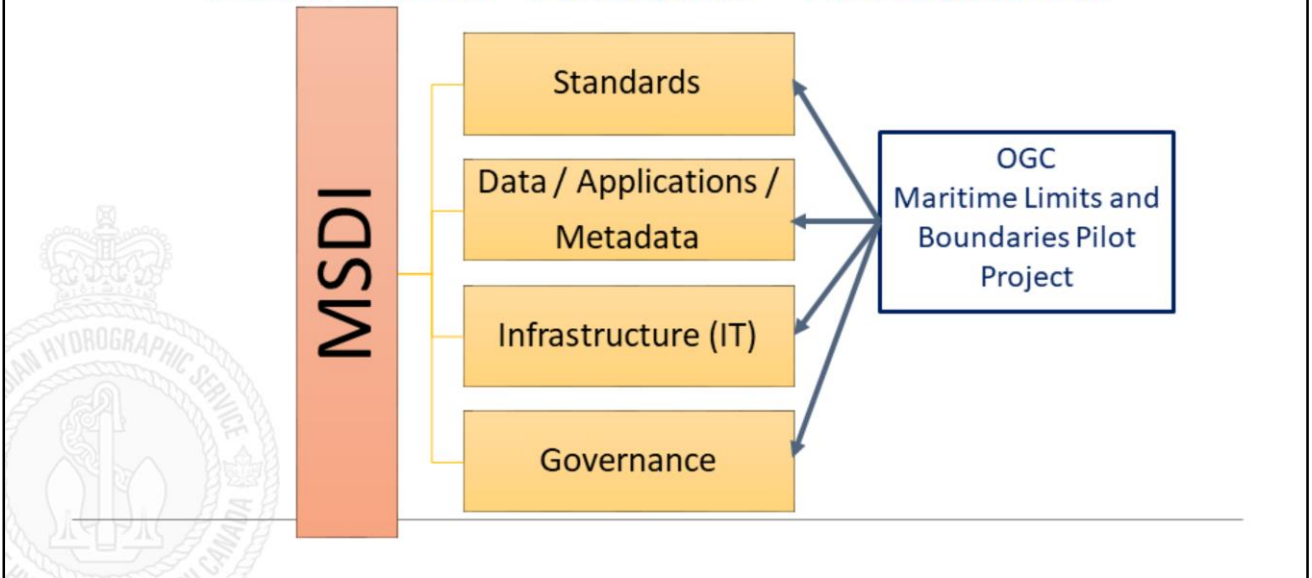
They consist in geospatial components and in legislative components.

The MLB can be represented geographically in a GIS.

- The IHO's S-100 Universal Hydrographic Data Model can handle the geospatial geometries and the MLB features

Maritime Limits and Boundaries also have a legislative dimension that can use parts of the Land Administration Domain Model (ISO 19152). These cover the rights, restrictions and responsibilities and use a basic administrative unit.

What a Marine Spatial Data Infrastructure (MSDI) is built on: *“Authoritative – Accessible – Accurate Data”*



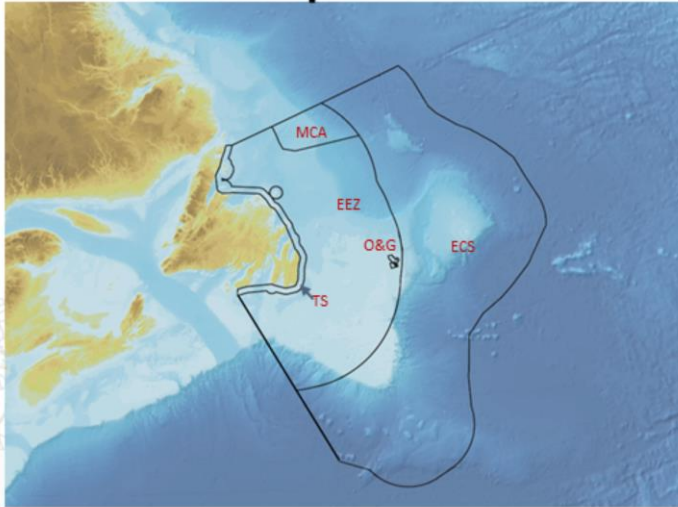
The MLB are a foundational layer of the MSDI.

They are needed and will benefit from the S-121 structure in their management and use inside a MSDI.

We can link the OGC MLB pilot project to the 4 pillars of the MSDI.

- **Standards:** Establish Functional Skeleton Focusing on Interoperability:
- **Data/Applications/metadata:** Organised delivery of added value supporting decision making
- **Infrastructure:** Harmonize the technical solution for access, use, and management:
- **Governance:** Establish collaborations and enables the realisation of the other pillars:

Canadian example: Grand Banks of Newfoundland



Joint example

Fisheries and Oceans Canada
& Natural Resources Canada

Maritime Zones

TS: Territorial Sea
EEZ: Exclusive Economic Zone
ECS: Extended Continental Shelf

Extension: marine applications

MCA: Marine Conservation Area
(hypothetical zone)
O&G: Oil & Gas offshore blocks

DISCLAIMER: This dataset is for demonstration purposes only. It does not necessarily represent Canada's maritime boundaries, zones or the outer limits of its continental shelf, nor does it necessarily represent actual areas, zones or regimes established by Canada for resource exploration or exploitation, or for the protection or preservation of the marine environment.

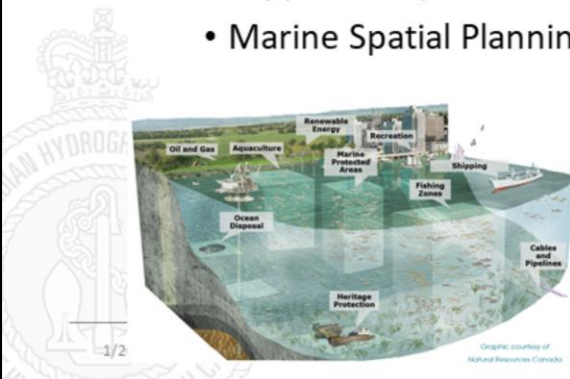
This is the Canadian example used by the OGC pilot project (collaboration between NRCAN and DFO as sponsors)

O&G and MCA data aim at testing as a proof of concept, the extensibility of the S-121 standard to include other data relevant to Marine Cadastre

These results will potentially lead to further standards developments.

Future

- MLB management: Law of the Sea Data Architecture in MSDI
- Extension of S-121 and ISO 19152 LADM standards to include georegulations
- Interoperable geospatial marine regulations in MSDI supported by standards
- Marine Spatial Planning: Georegulations, MLB and Marine Cadastre



Questions ?



For any questions please contact S-121 & MSDI team:

- Chris Hemmingway, DFO-Science-CHS, Director of Hydrography & MSDI
 - Chris.Hemmingway@dfo-mpo.gc.ca, (613) 291-2278
- Serge Lévesque, DFO-Science-CHS, Technical Advisor/Geomatics
 - Serge.Levesque@dfo-mpo.gc.ca, (613) 291-8084
- Rob Morrison, DFO-Science-CHS, Multidisciplinary Hydrographer
 - Rob.Morrison@dfo-mpo.gc.ca, (613) 462-6403
- Claude Guay, DFO-Science-CHS, Project manager for FGP and MSDI at DFO
 - Claude.Guay@dfo-mpo.gc.ca, (613) 462-8193
- Olivier Sabourin, DFO-Science-CHS, Senior Data Specialist
 - Olivier.Sabourin@dfo-mpo.gc.ca, (613) 301-9870
- MSDI Team generic email
 - DFO.MSDI-IDSM.MPO@dfo-mpo.gc.ca