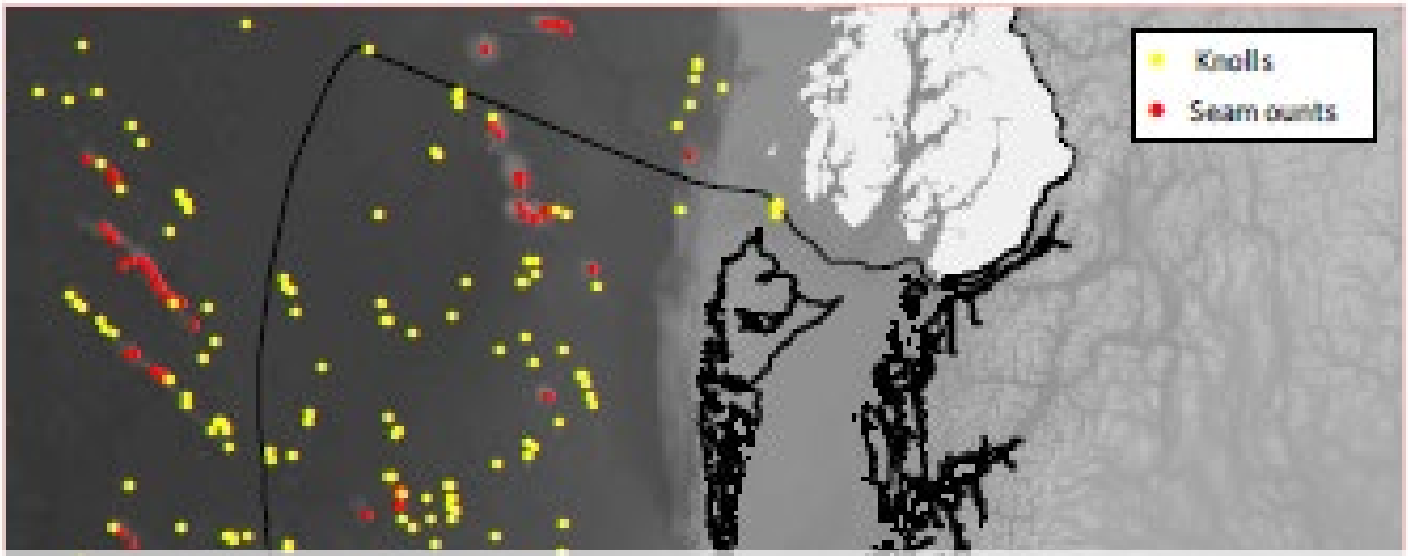
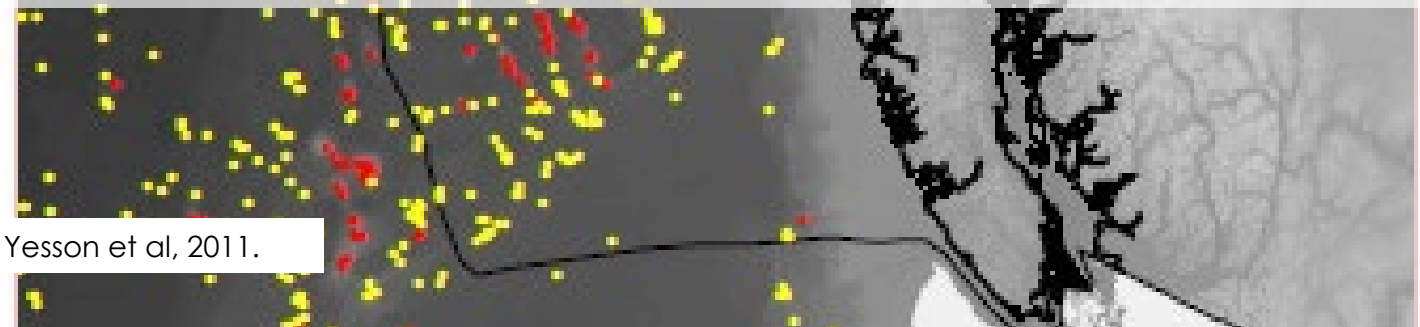


Ocean Accounts for Canada

PICES 2019
Gisele Magnusson, Fisheries and Oceans Canada (DFO)



Yesson et al, 2011.

Canada

Background

- National Economic Accounts
  - A simplified picture of a complex system
  - Using System of National Accounts (SNA) allows international comparisons
  - Focus on production, incomes, consumption, savings, investment, financing and wealth
  - Provide multiple macroeconomic indicators – e.g. Gross Domestic Product (GDP)
  - Change vs. total

Marine Economy

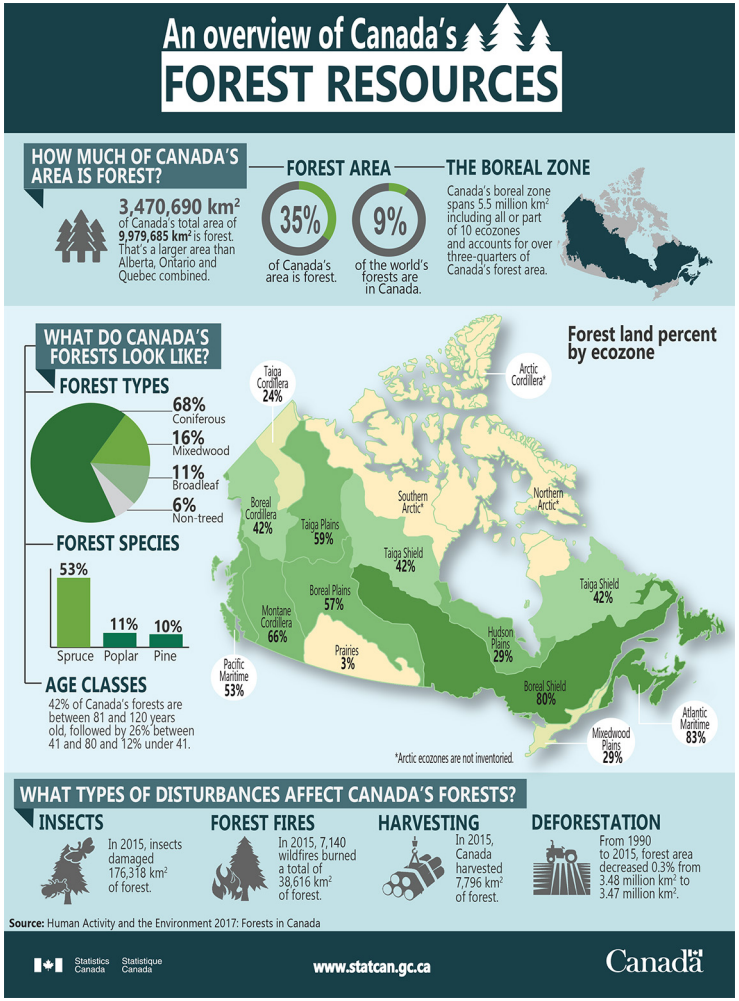
- Satellite accounts using underlying concepts
- Provide additional detail and expand perspective on a sector

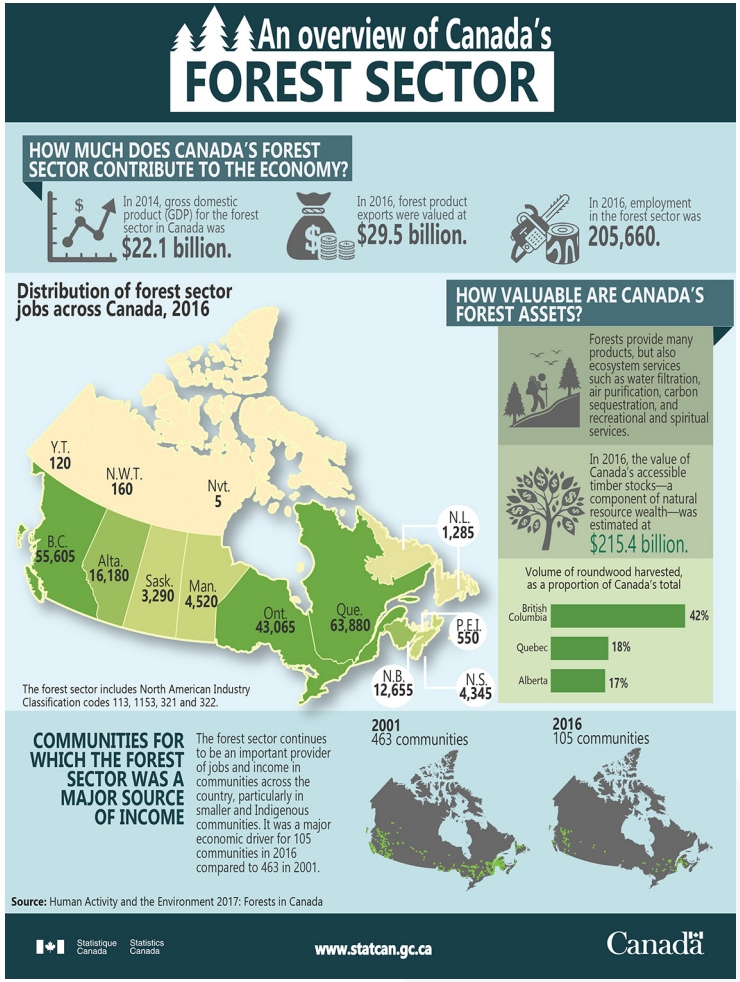
- Update "Economic Impact of Marine Related Activities in Canada"
  - First report in 2006, last updated 2015
  - Included private sector activity plus national defense, plus public sector and research
  - Used existing Input-Output model to estimate impacts

Canada's Ocean Accounts Pilot

- Satellite account that change underlying concepts
  - System of Environmental-Economic Accounts (SEEA) Experimental Ecosystem Accounts
  - Ecosystem accounts systematically group information for assessing the capacity of ecosystems to deliver services to present and future generations and to monitor and value the flows of services
- Measuring Ecosystem Goods and Services in Canada (MEGS, 2013)

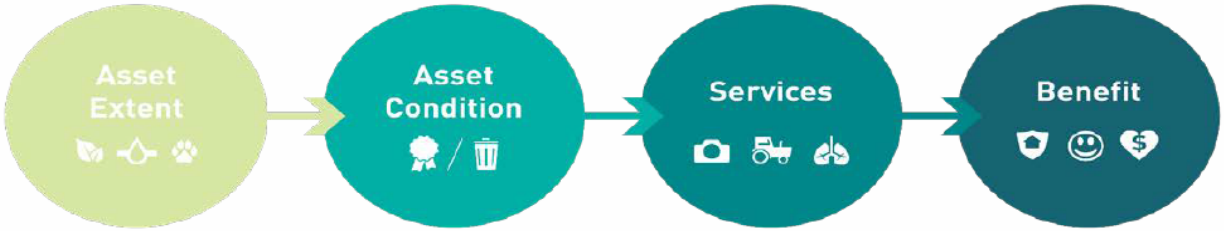
Canada's Ocean Accounts Pilot





Ocean Accounts Pilot

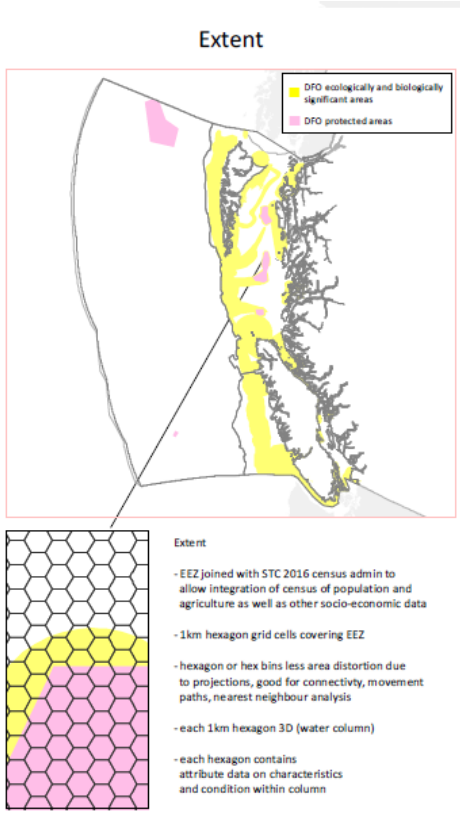
Ecosystem Accounting: Four Accounts



- Single asset framework applied to different landscapes and ecosystem types
- Assess impact of human activity on asset extent and condition
- Asset condition influences the production of ecosystem services
- Ecosystem services provide economic and social-wellbeing benefits

Ocean Accounts Pilot

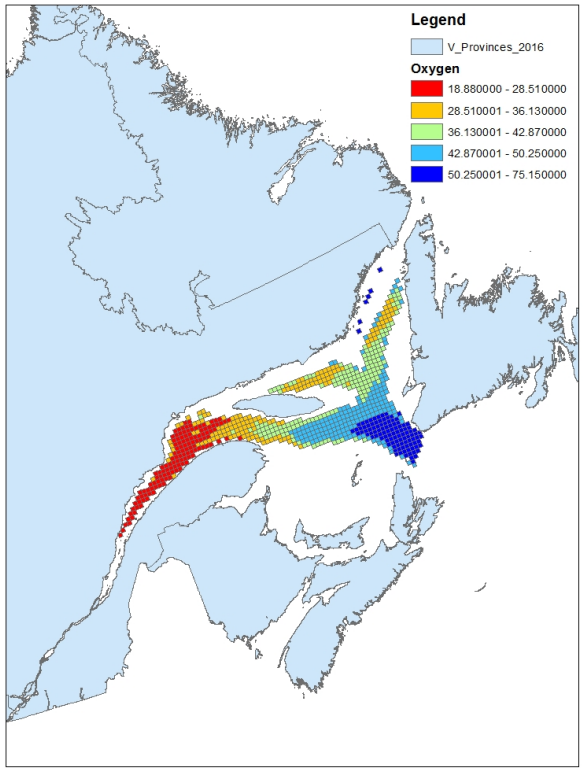
Extent



Marine Ecoregion (e.g. Northern Shelf)	Ecosystem Type 1 (e.g. Kelp Forest)	Ecosystem Type 2 (e.g. seagrass)	Ecosystem Type 3 (Coldwater Coral)
Opening stock	432.28		
+ Additions to stock			
Managed expansion			
Natural expansion			
Reclassifications			
Discoveries			
Reappraisals (+)			
TOTAL additions to stock			
– Reductions in stock			
Managed regression			
Managed expansion			
Reclassifications			
Extractions			
Reappraisals (-)			
TOTAL reductions in stock			
= Closing stock			

Ocean Accounts Pilot

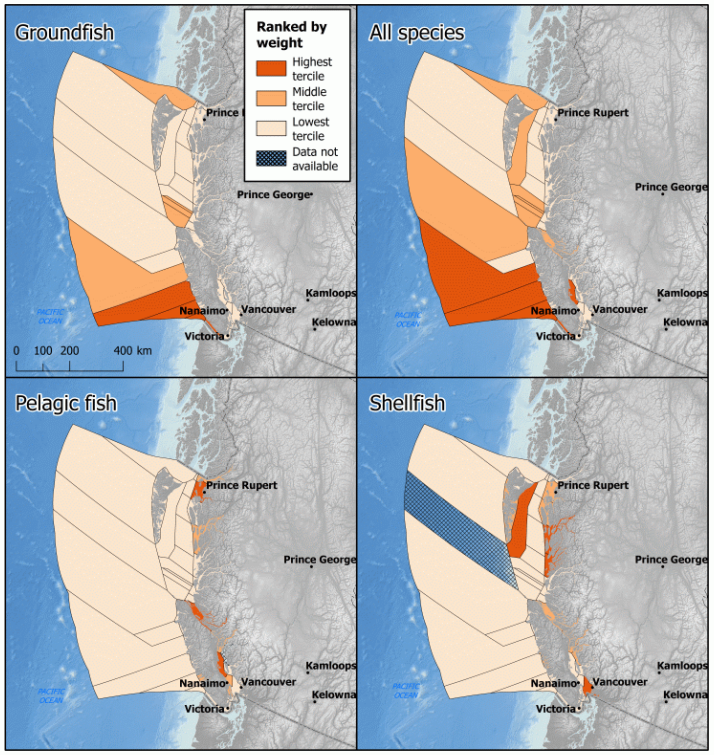
Condition



Marine Ecoregion (e.g. Gulf of St Lawrence)		Ecosystem Type 1 (e.g. Kelp Forest)	Ecosystem Type 2 (e.g. seagrass)	Ecosyste 3 (Coldw Coral)
Area	Opening			
	Closing			
Temperature	Opening			
	Closing			
Acidification	Opening			
	Closing			
Plastics	Opening			
	Closing			
Biodiversity	Opening			
	Closing			
Eutrophication	Opening			
	Closing			
Summer Sea Ice Extent	Opening			
	Closing			

Ocean Accounts Pilot

Services

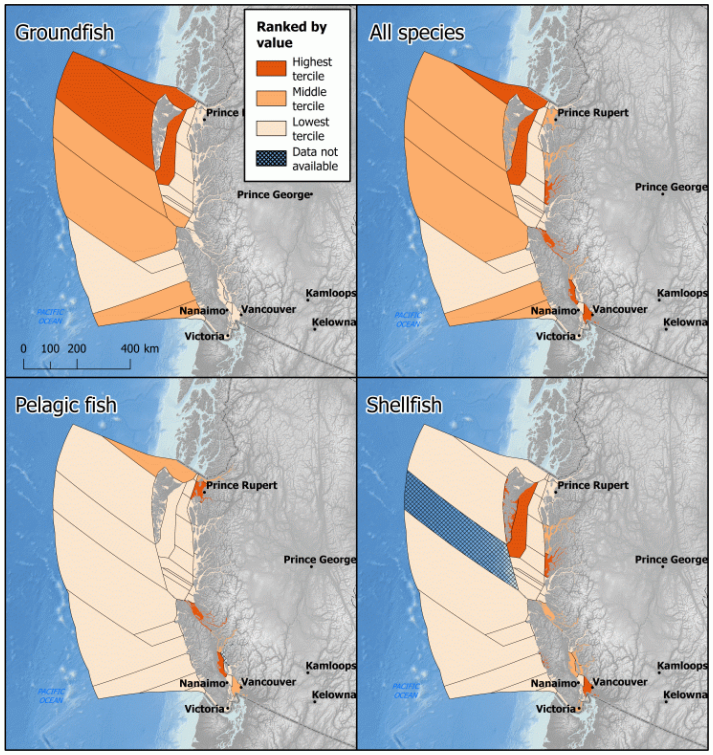


Source(s): Fisheries and Oceans Canada, Economic Analysis and Statistics, Strategic Policy Sector, 2012. Statistics Canada, Environment Accounts and Statistics Division, 2013, special tabulation.

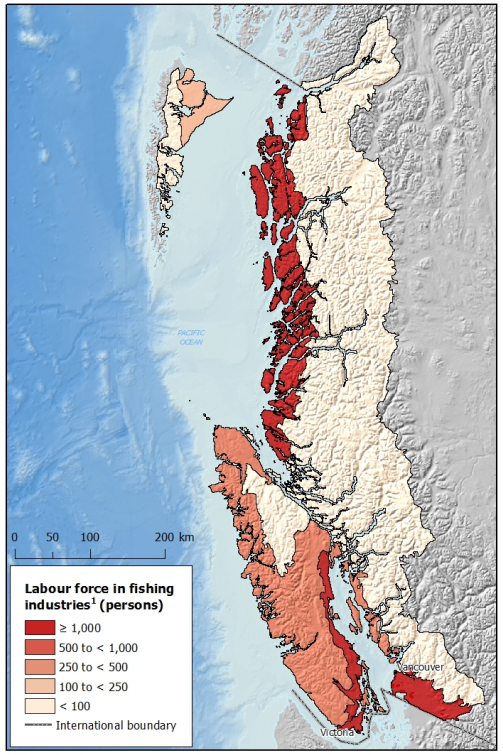
Marine Ecoregion	Ecosystem type 1	Ecosystem type 2
Provisioning		
Fish		
Seaweed		
Regulating service		
Carbon Sequestration		
Abiotic		
Petroleum		

Ocean Accounts Pilot

Benefits



Source(s): Fisheries and Oceans Canada, Economic Analysis and Statistics, Strategic Policy Sector, 2012. Statistics Canada, Environment Accounts and Statistics Division, 2013, special tabulation.



1. Fishing industries include: the Fishing industry (NAICS 1141), the Seafood Product Preparation and Packaging industry (NAICS 3117) and the Aquaculture industry (NAICS 1125).

Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2013, special tabulation of data from the 2006 Census of Population.

Ocean Accounts Pilot

- Part of Global Ocean Accounts Partnership (GOAP)
  - Global Dialogue in November (Australia) to review pilots
  - Work on Technical Guidance
  - Contribute to SEEA-Experimental Ecosystem Accounts revisions

Ocean Accounts (GOAP)

Ocean accounts – Table view

SEEA-CF Mineral and Energy Assets; Aquatic resources

Drivers

Specific units	Industry		% to ocean
SEEA Air emissions			
SEEA Effluents[1]			
SEEA Solid wastes[1]			

[1.] would benefit from spatial disaggregation

Ocean governance

Specific units	Industry		
Policies, plans and regulations			
Institutions			
Management practices			
Technologies			
SEEA Protection Expenditures			
- research			
- enforcement			
SEEA Goods and Services			
- technologies			

Note: This is a stylistic representation of the SEEA-EEA with additional components required for including sources of land-based pollution, abiotic services (such as minerals, energy and medium for transport), expenditures and governance. This is not as comprehensive as described in the text. Much of the data on flows of land-based pollution, ecosystem types, and condition would be derived from detailed maps and aggregated as shown in the tables for reporting.

Ocean Assets:

Ocean Extent

hectares	Ecosystem Type[2]			Minerals (T)	Energy (MToE)	Fish stocks (T)
Beginning of period						
+ additions						
- reductions						
End of period						

Ocean Conditions

Specific units	Ecosystem Type[2]			Minerals (T)	Energy (MToE)	Fish stocks (T)
Acidification (pH)						
Eutrophication (BOD)						
Plastics (T)						
Carbon[3]						
Biodiversity[3]						
Temperature (°C)						
Accessibility/quality						

[2.] Including critical natural capital areas, settlements, coastal infrastructure, protected areas, fishing zones, designated tourist areas, coral reefs, mangroves, coastal beaches…

[3] As in the SEEA-EEA, Carbon and Biodiversity could be full accounts.

SNA for some services[6]

[6.] Would benefit from disaggregation by large/small enterprise and linkage to employment by beneficiary type.

Ocean Services Supply (physical)

Service (specific units)	Ecosystem Type		
Provisioning			
Regulating and maintenance			
Cultural			
Abiotic: Minerals, energy, medium for transport			

Ocean Services Use (physical)

Service (specific units)	Beneficiary type[4]		
Provisioning			
Regulating and maintenance			
Cultural			
Abiotic: Minerals, energy, medium for transport			

[4.] Disaggregated by coastal/urban/rural, high/low income, male/female

Ocean Services Supply (Monetary[5])

Service (monetary unit)	Ecosystem Type		
Provisioning			
Regulating and maintenance			
Cultural			
Abiotic: Minerals, energy, medium for transport			

[5.] Only some services can be valued in monetary terms.

Ocean Services Use (Monetary[4])

Service (monetary unit)	Beneficiary type		
Provisioning			
Regulating and maintenance			
Cultural			
Abiotic: Minerals, energy, medium for transport			

Data Gaps

- Most challenges have been related to data
  - Access, timeliness, confidentiality
  - Spatial resolution/granularity
  - Limited times series to measure condition
  - Nationally consistent data may be lacking

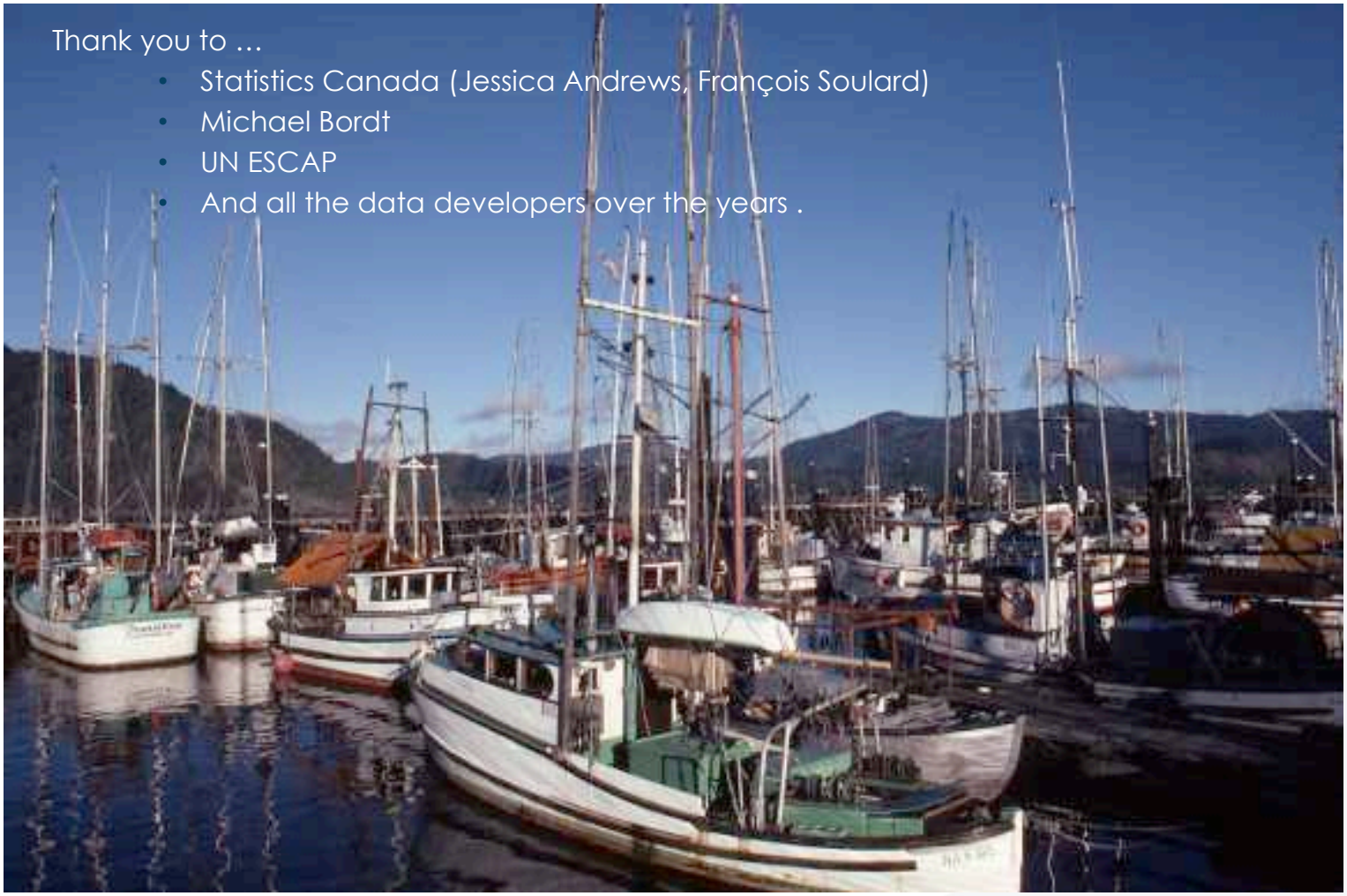
- Support for development of nationally consistent data
  - E.g. Carbon sequestration potential of eelgrass beds along Canada's Pacific, Atlantic, and sub-Arctic coasts

Challenges are many ….

- Clarify and agree on definitions
  - Ocean vs. coastal vs. marine
  - Ecosystem classification
  - Ecosystem service classification

- Valuation
  - Accounts use exchange value
  - Simulating “non-market” exchange values
  - Links to welfare measures

Questions?


Thank you to …
• Statistics Canada (Jessica Andrews, François Soulard)
• Michael Bordt
• UN ESCAP
• And all the data developers over the years .

References (in order of appearance)

Slide 1: Yesson C, Clark MR, Taylor M, Rogers AD (2011). The global distribution of seamounts based on 30-second bathymetry data. Deep Sea Research Part I: Oceanographic Research Papers 58: 442-453. doi: 10.1016/j.dsr.2011.02.004. Data URL: http://data.unep-wcmc.org/datasets/41

Slide 3: Economic Impact of Marine Related Activities in Canada (2009) http://www.dfo-mpo.gc.ca/ea-ae/cat1/no1-1/no1-1-eng.htm & Maritime Sector in Canada. http://www.dfo-mpo.gc.ca/stats/maritime-eng.htm

Slide 4: MEGS, 2013. https://www150.statcan.gc.ca/n1/pub/16-201-x/16-201-x2013000-eng.htm

Slide 5: https://www150.statcan.gc.ca/n1/pub/16-201-x/16-201-x2018001-eng.htm

Slide 7: EBSA: https://open.canada.ca/data/en/dataset/d2d6057f-d7c4-45d9-9fd9-0a58370577e0 & Protected Areas: https://open.canada.ca/data/en/dataset/a1e18963-25dd-4219-a33f-1a38c4971250

Slide 9: Pacific- weight https://www150.statcan.gc.ca/n1/pub/16-201-x/2013000/m008-eng.htm

Slide 10: Pacific – value https://www150.statcan.gc.ca/n1/pub/16-201-x/2013000/m010-eng.htm