Statistics Canada
www.statcan.gc.ca

Measuring Ecosystem Services in Canada

Regional Training Workshop on the System of Environmental-Economic Accounting with a Focus on Water Accounting

September 26-30, 2016, Putrajaya, Malaysia

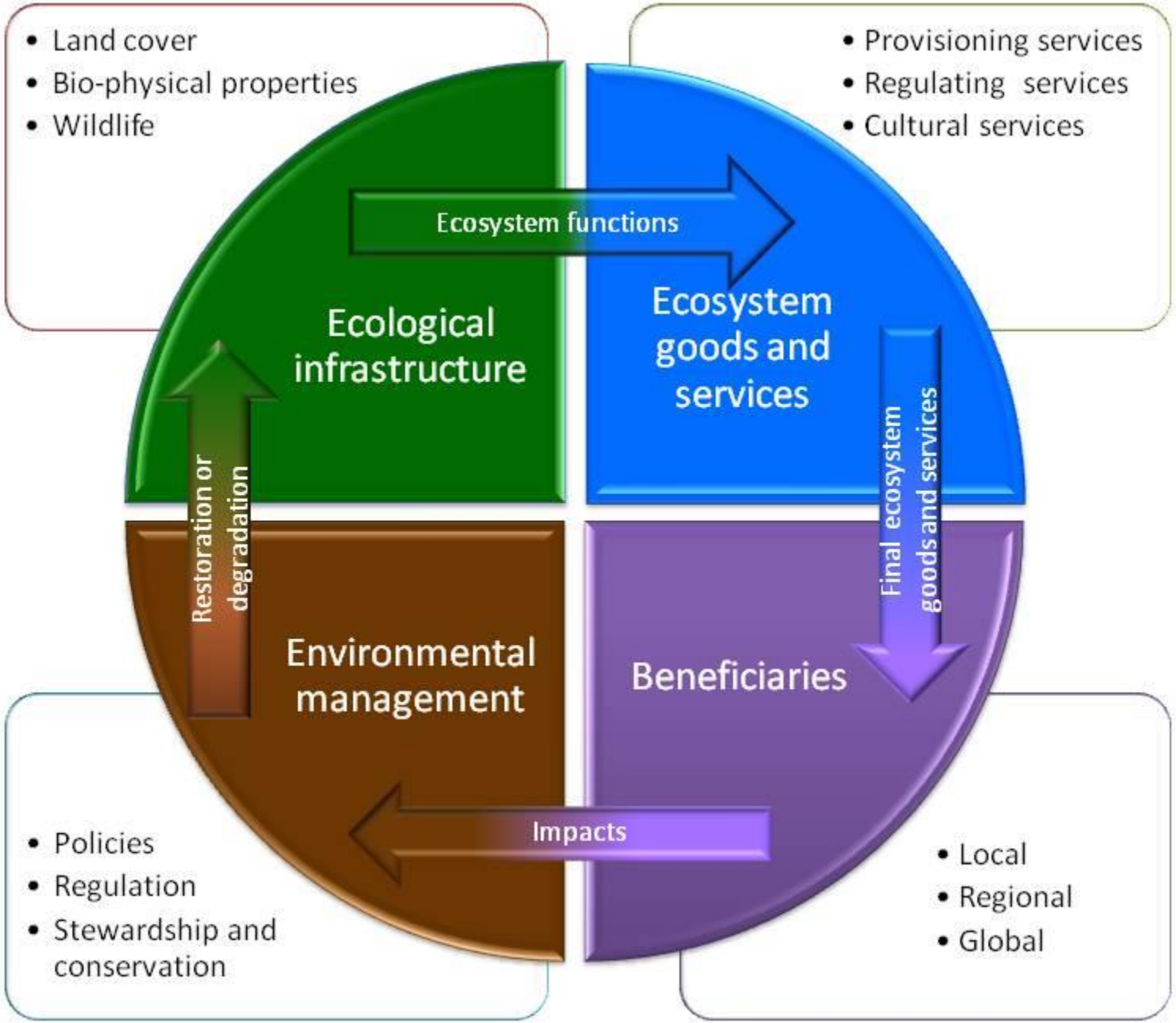
François Soulard, Ph.D.

Environment, Energy and Transportation Statistics Division

Statistics Canada

Statistics Canada Statistique Canada

Canada


• Land cover
• Bio-physical properties
• Wildlife
• Provisioning services
• Regulating services
• Cultural services
Ecosystem functions
Ecological infrastructure
Ecosystem goods and services
Restoration or degradation
Final ecosystem goods and services
Environmental management
Beneficiaries
Impacts
• Policies
• Regulation
• Stewardship and conservation
• Local
• Regional
• Global

Why Ecosystem accounts?

Many demands from resource departments:

1. Monetary values of ecosystems and their services to support discussions of protection, conservation, climate change, sustainability, pollution prevention, land cover / use change...

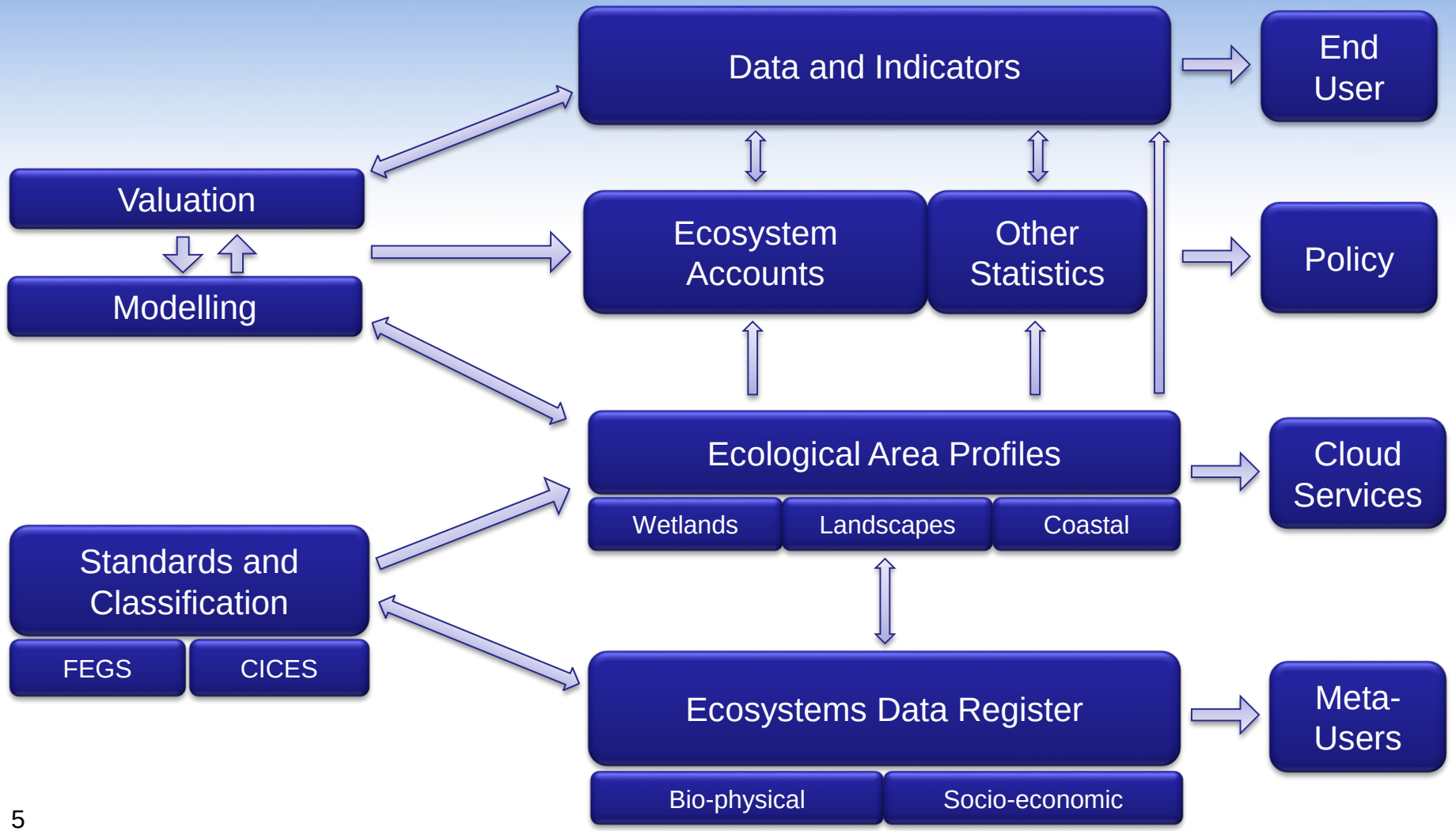
2. Opportunity to raise argument beyond “environment” versus “economy” to understand the real contribution of ecosystems to human well being, sustainability and “green growth”

M.E.G.S. Overview and objectives

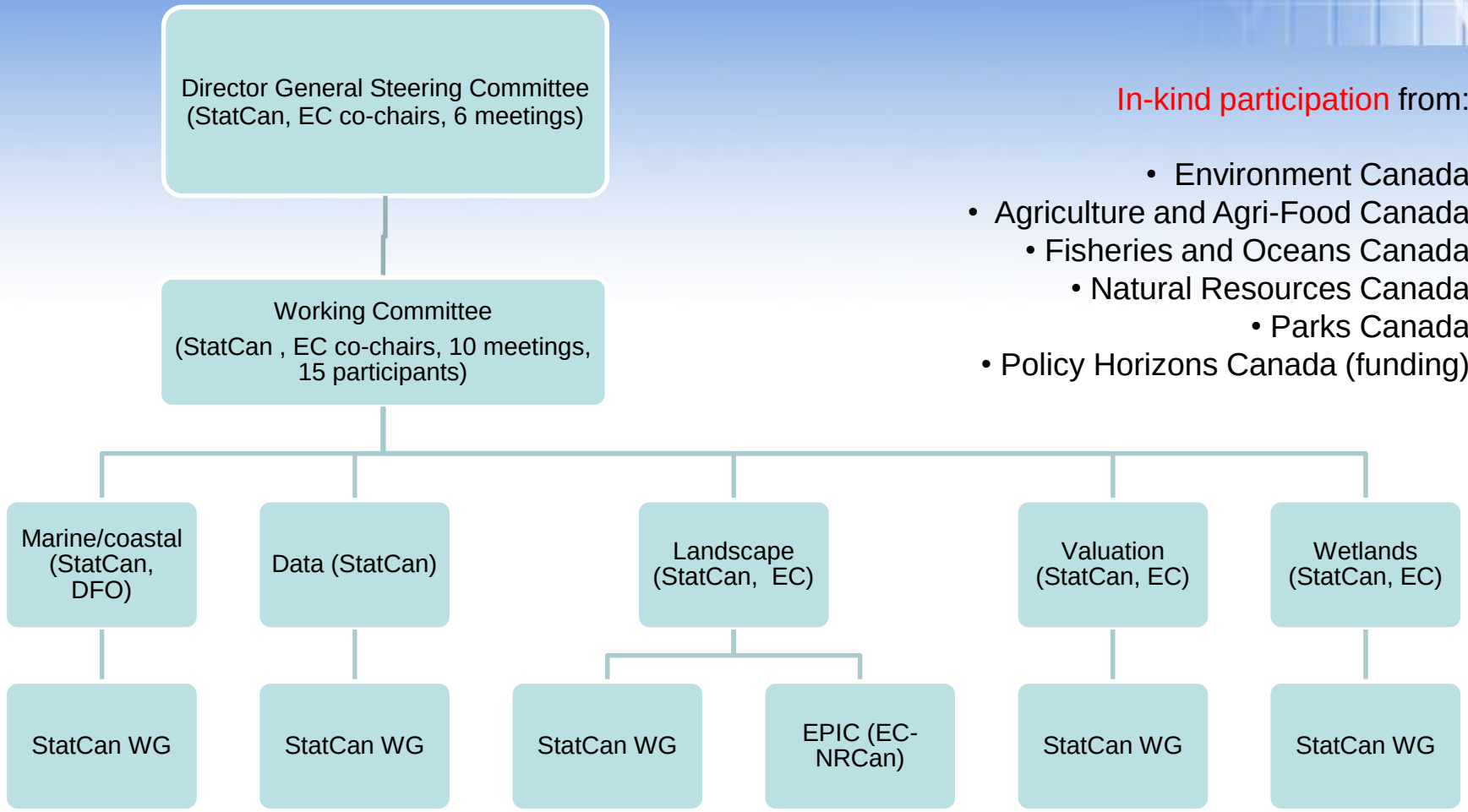
- Two-year project involving five federal departments
  - 60 (a dozen) experts in various domains involved
  - Statistics Canada co-leading with Environment Canada

- Objective: Develop the statistical infrastructure for ecosystem accounting
  1. Identify and acquire data sources
     - E.g. remotely sensed data, raw and interpreted
  2. Refine concepts, standards and classifications
     - E.g. Natural patches, biomass, land cover ecosystem unit, land cover classification
  3. Investigate methods for valuation of ecosystem goods and services
     - Test non monetary, and market and non-market monetary approaches
  4. Develop community of practice
     - Agree on results and next step

Census of the Environment: Proposed Statistical Infrastructure



M.E.G.S. – Project governance

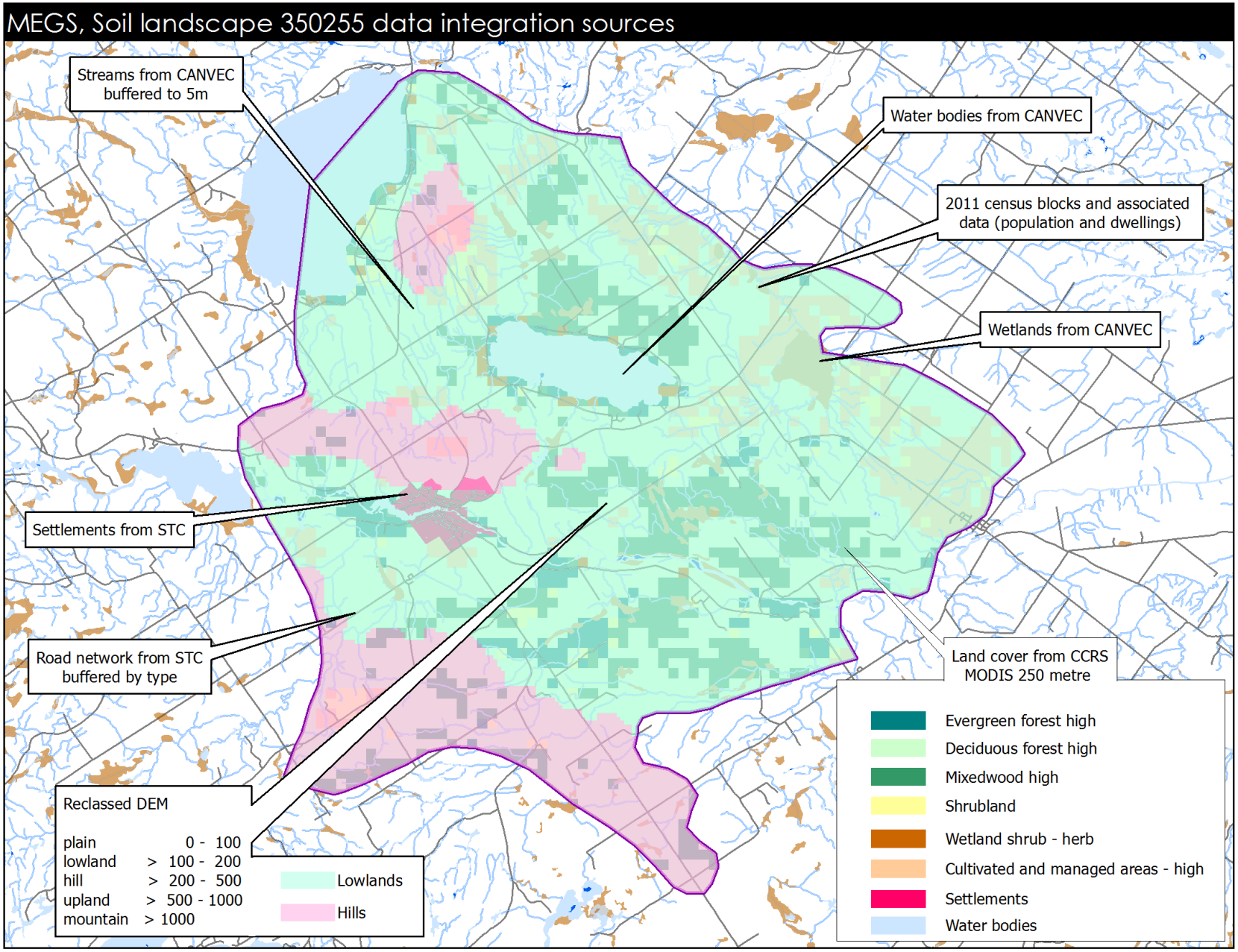


In-kind participation from:

- Environment Canada
- Agriculture and Agri-Food Canada
- Fisheries and Oceans Canada
- Natural Resources Canada
- Parks Canada
- Policy Horizons Canada (funding)

M.E.G.S . – The Outcome

1. Developed or adapted E.G.S. concepts
2. Created* a M.E.G.S. geobatabase
3. Produced E.G.S. analysis
    1. Provisioning – Marine, biomass
    2. Regulation – Wetlands, fragmentation
    3. Cultural – Park study
4. Explored valuation
    - Monetary and contextual variables
5. Community of practice
6. Identified a (ever growing) research agenda
7. Produced a "Teachers Kit"


MEGS, Soil landscape 350255 data integration sources
Streams from CANVEC buffered to 5m
Water bodies from CANVEC
2011 census blocks and associated data (population and dwellings)
Wetlands from CANVEC
Settlements from STC
Road network from STC buffered by type
Land cover from CCRS MODIS 250 metre
Evergreen forest high
Deciduous forest high
Mixedwood high
Shrubland
Wetland shrub - herb
Cultivated and managed areas - high
Settlements
Water bodies
Reclassed DEM
plain 0 - 100
lowland > 100 - 200
hill > 200 - 500
upland > 500 - 1000
mountain > 1000
Lowlands
Hills

Progress on valuation

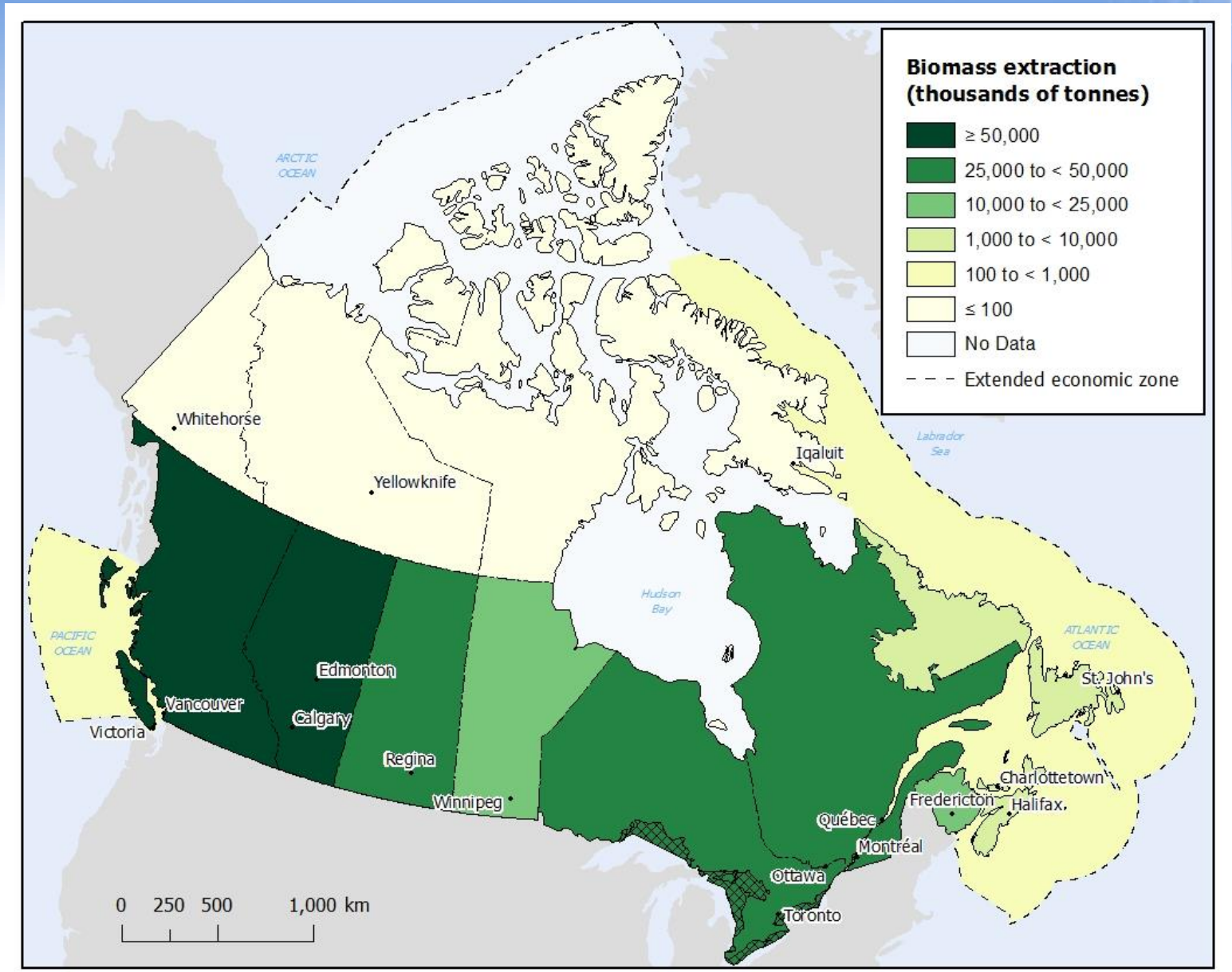
Produced data on

1. Market value of selected provisioning service

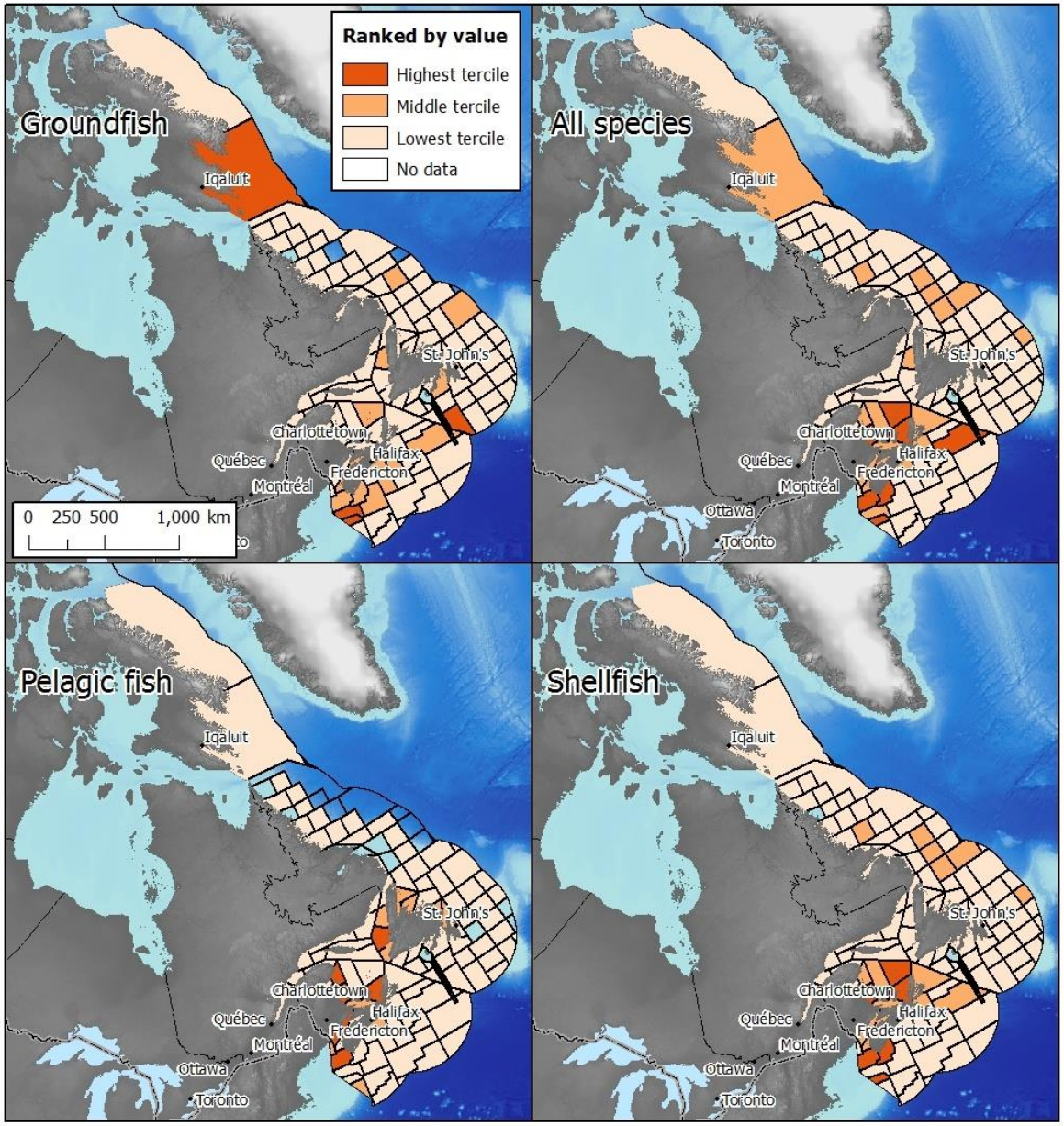
2. Non-monetary values of wetlands and other contextual values

3. Impact of source data on non-market monetary valuation

Ecosystem productivity: national biomass extraction

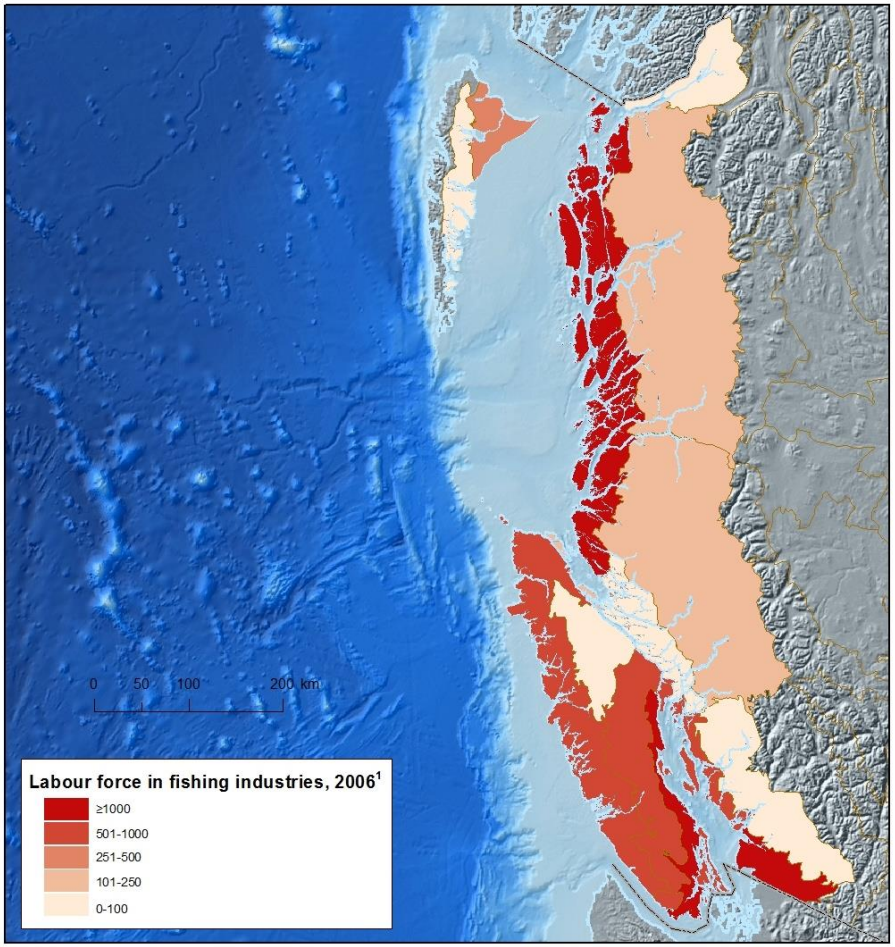


Value of commercial fisheries landings



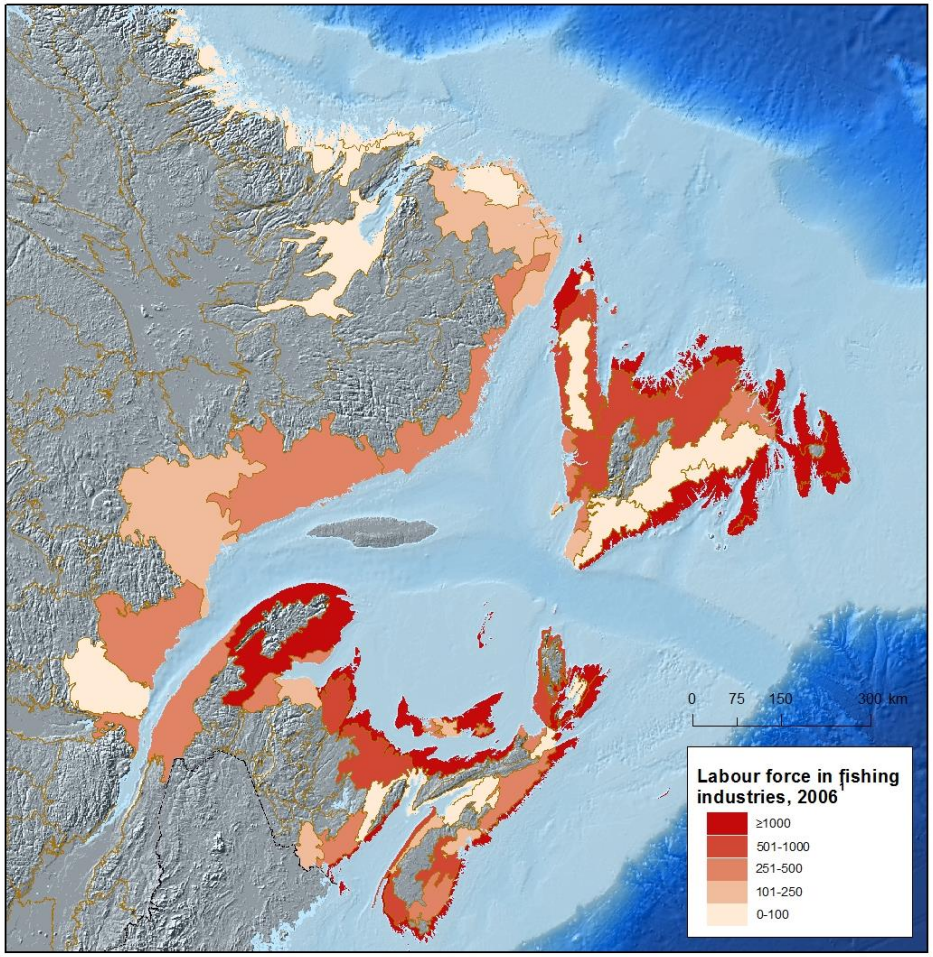
Source(s): Fisheries and Oceans Canada, Economic Analysis and Statistics, Strategic Policy Sector, 2012, Statistics Canada, Environment Accounts and

Marine coastal fisheries ecumene



Note(s): [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, 2013, 2006 Census of population, special tabulation.

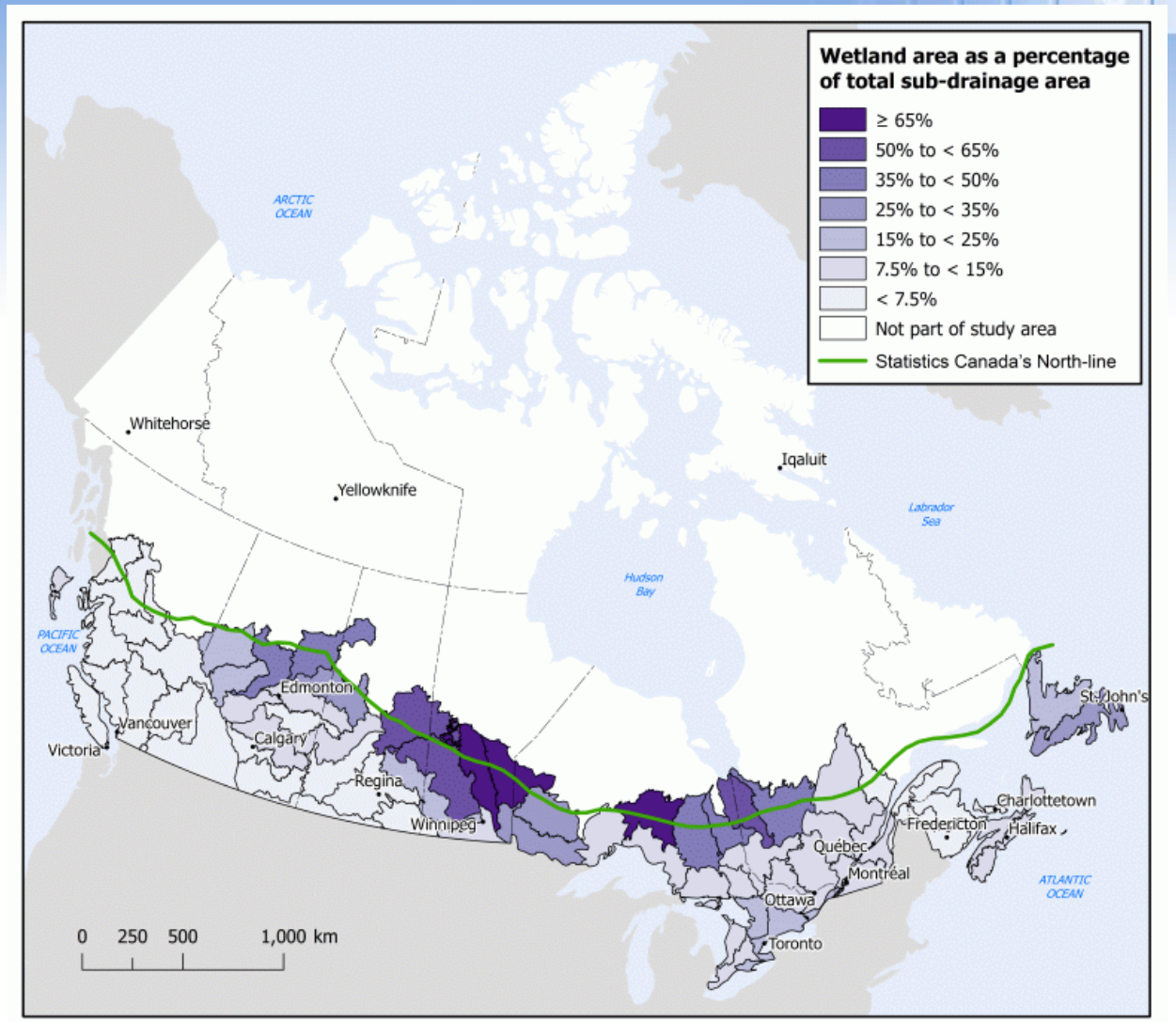


Note(s): [1] Fishing Industries include: the Fishing industry (NAICS 1141), the Seafood Product Preparation and Packaging industry (NAICS 3117) and the Aquaculture industry (NAICS 1125).

Source(s): Statistics Canada, 2013, 2006 Census of population, special tabulation.

Distribution of freshwater wetlands, southern Canada

- Waste assimilation
- Flood attenuation
- Habitat
- Biodiversity
- …



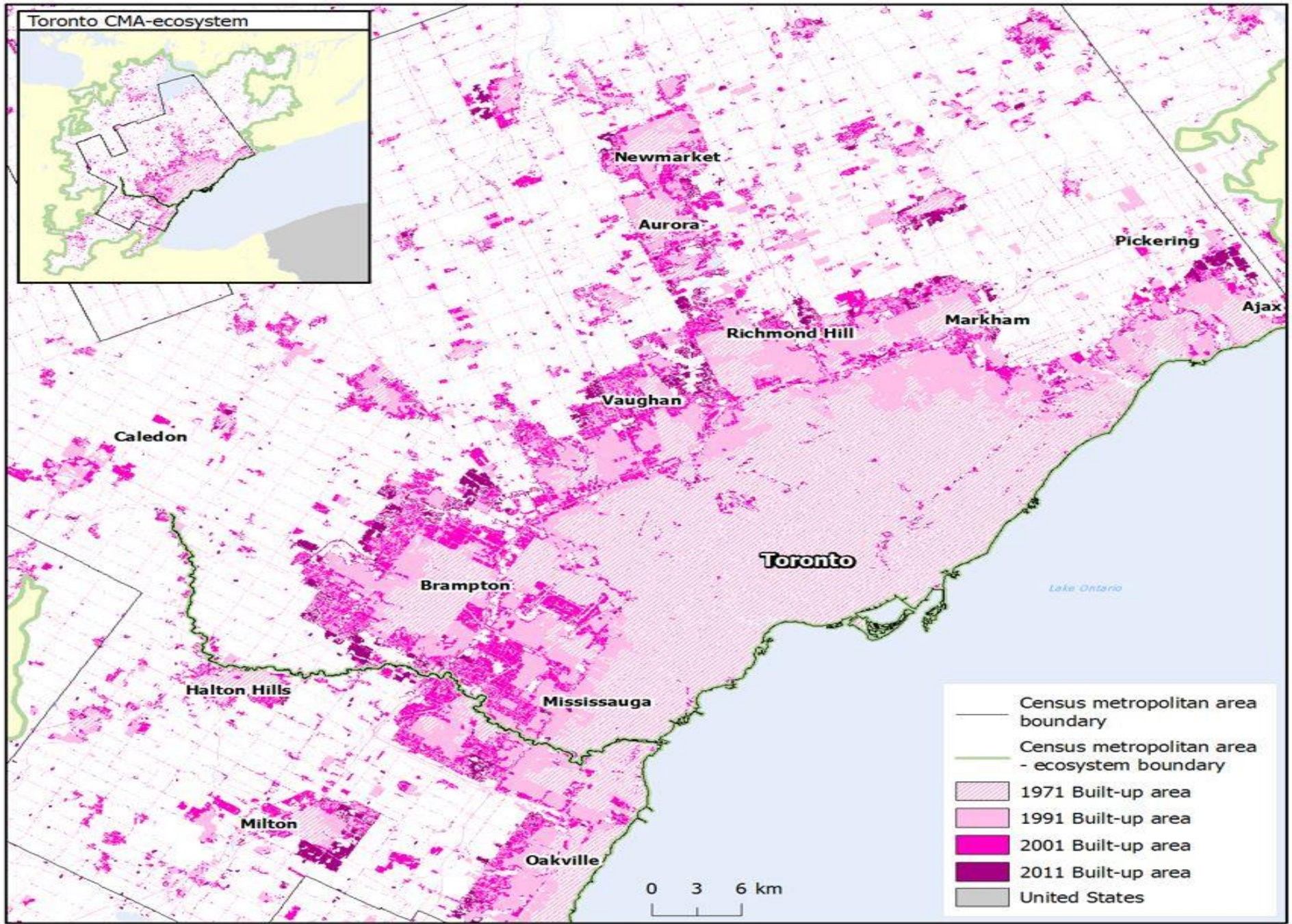
Note(s): Wetland estimates were calculated using coefficients derived from high resolution wetland datasets from the provinces of Prince Edward Island, Nova Scotia, New Brunswick, Ontario, Quebec and Alberta and Environment Canada. Agriculture and Agri-Food Canada's 30 m land cover product was also used as a base layer reference. Wetland datasets represented full or partial coverage of the provinces.

Source(s): Prince Edward Island Department of Environment, Energy and Forestry. 2009. 2009 *PEI Wetland Inventory*

Thousand Islands National Park case study – results of monetary valuation studies

- This study explores the use of “benefits transfer”, a monetary valuation method to estimate the annual value of EGS flows
- The annual value of EGS flows assessed for the park is estimated to be between $12.5 million and $14.7 million (2012 dollars).
- The annual value of recreational services is estimated at $3.9 million (2012 dollars)

Map 3.29 Built-up area, Toronto census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



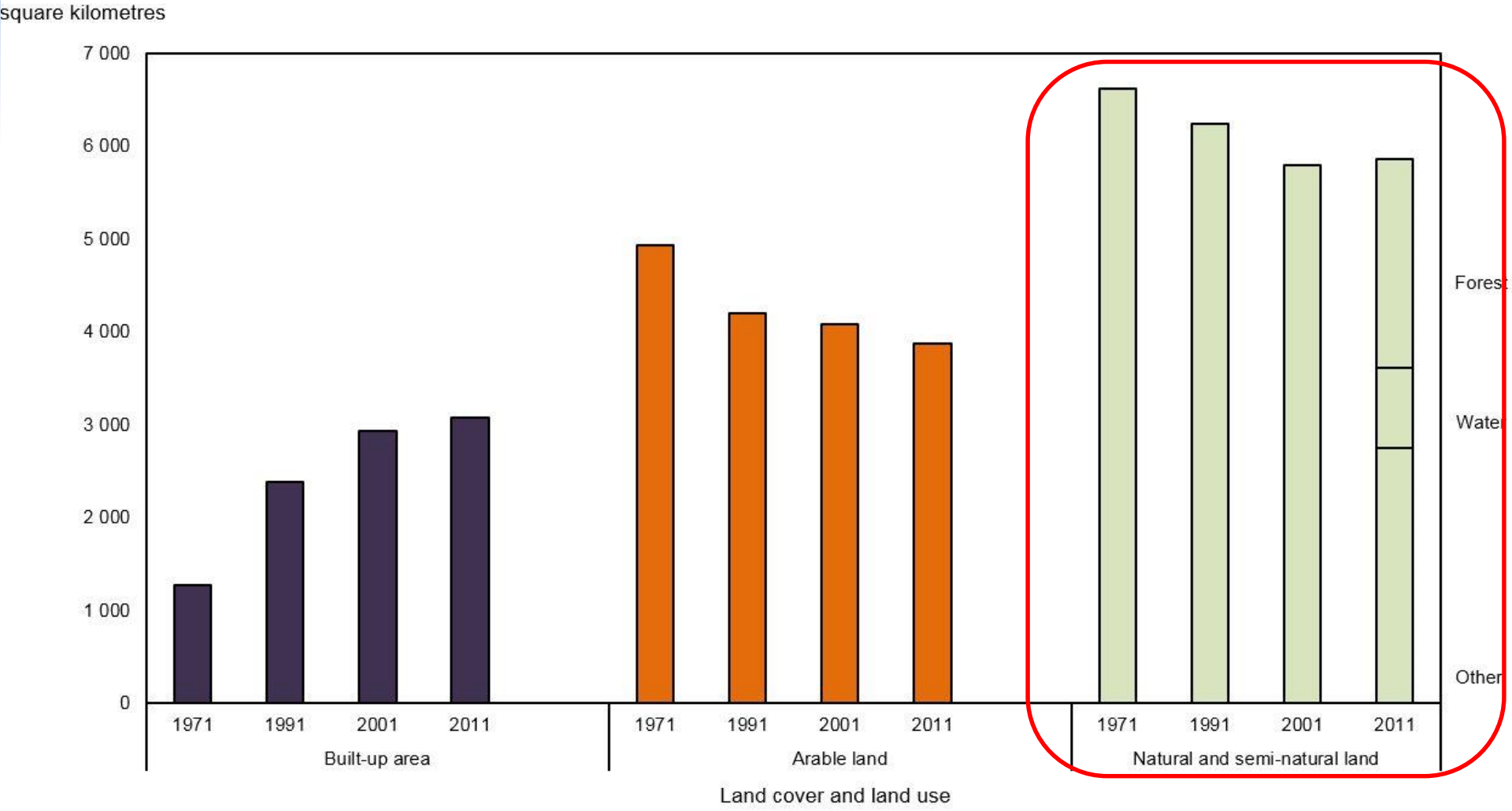
Human activity and the environment 2015: The atlas

Ecosystem asset account, Toronto census metropolitan area-ecosystem , 1971 to 2011

	Total built-up area[1]		Arable[2]	Natural and semi-natural[3]
	Settled	Roads		
	square kilometres			
Opening stock 1971	850	418	4 930	6 615
Land lost to settled area	...	...	-961	-448
Balance of change[4]	1 409	403	-102	-300
Closing stock 2011	2 260	821	3 867	5 866

Human activity and the environment 2015: The atlas

Land cover and land use, Toronto census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



Conclusion : Ecosystem accounting in Canada

1. Ecosystem accounting is a process as well as an objective
   - Requires multidisciplinary, multi-departmental cooperation

2. Small successes lead to further funding:
   - We received funds to further Investigate
     - freshwater ecosystems
     - Produce an annual land cover change matrix
     - Produce annual water yield

3. Making the data available is a challenge
   - Large data sets
   - Complex subject-matter

Measuring Ecosystem Services in Canada

Thank you for your attention

François Soulard , Ph.D.

Chief, R&D section

Environment Statistics and Accounts Program

SEEA-W Workshop

Malaysia, September 2016