Statistics Canada
www.statcan.gc.ca

Ecosystem Accounting in Canada

François Soulard

Environment, Energy and Transportation Statistics Division

Statistics Canada

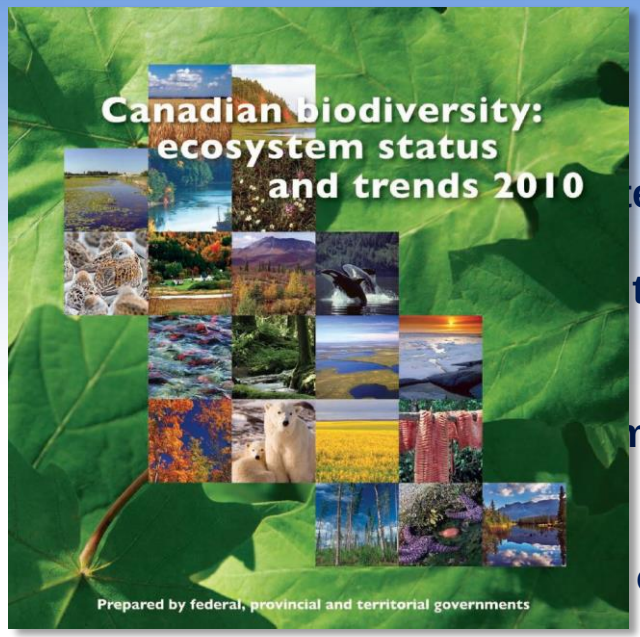
A Community on Ecosystem Services:
Linking Science, Practice and Decision Making
Washington, D.C.

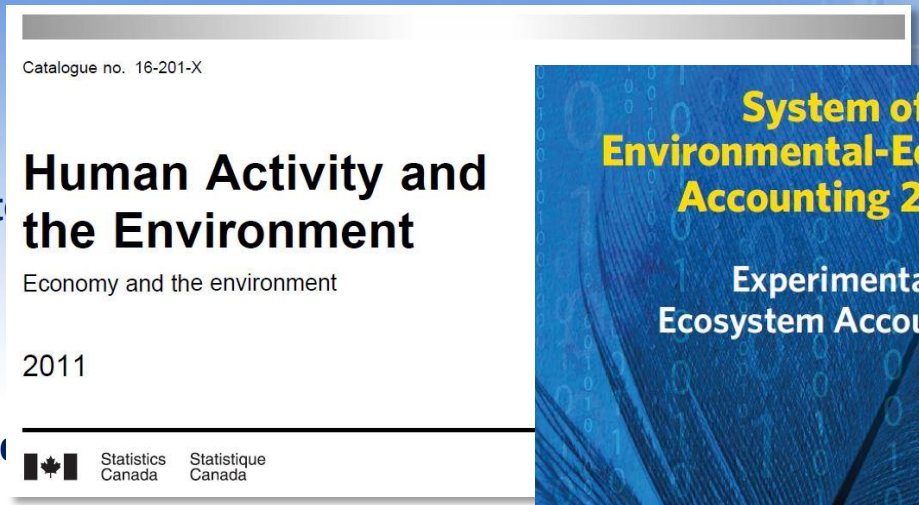
December 8-12, 2014

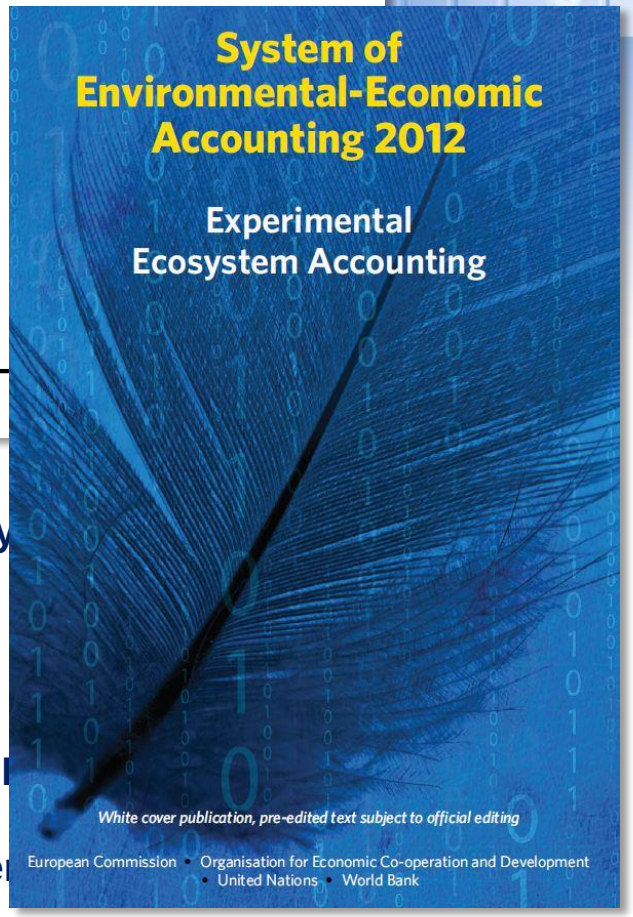
Statistics Canada Statistique Canada

Canada

Context for Ecosystem Accounting







ellit

the

men

of Ecosystems and Biodiversity

2009

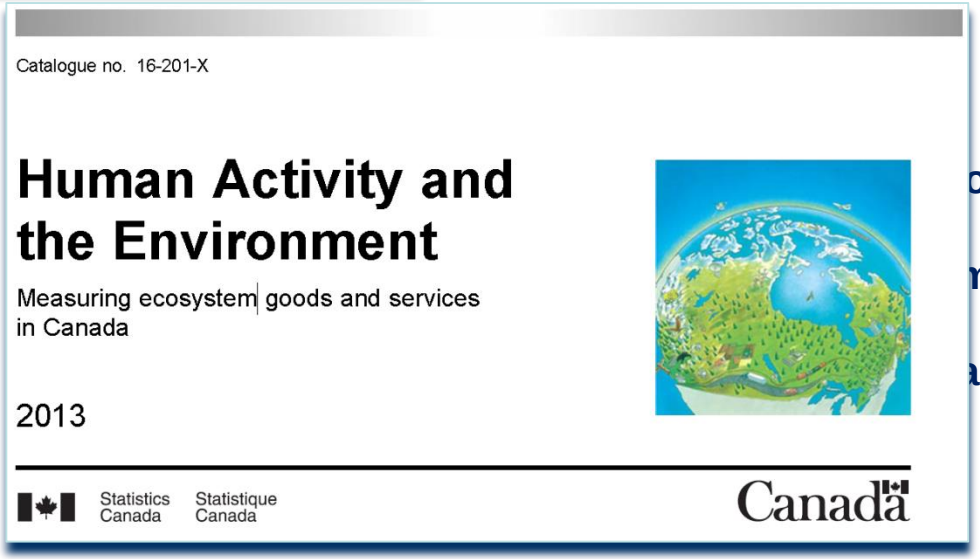
2011

of E

me

2012

ard.



Outputs of the M.E.G.S. project

1. Developed or adapted concepts
2. Created* a E.E.A. geodatabase
3. Produced E.G.S. analysis
    1. Provisioning – Marine, biomass
    2. Regulation – Wetlands, natural areas fragmentation
    3. Cultural – Park study
4. Explored valuation
    - Monetary and contextual variables
5. Community of practice
6. Produced an E.G.S. “Teachers Kit”

A few conclusions..

1) *Land cover / land use is a three dimensional affair*

2) *Requires to have a nested hiearchy of statistical units*

3) *Need to keep it simple*

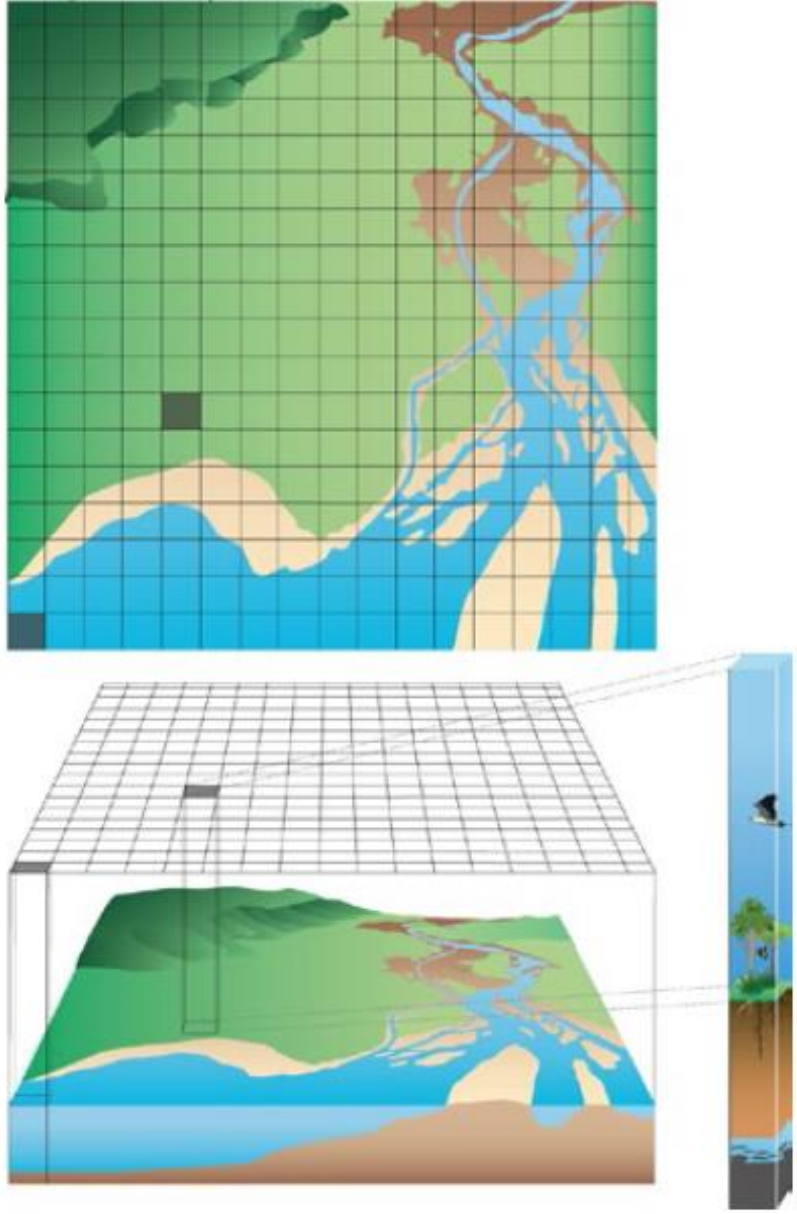
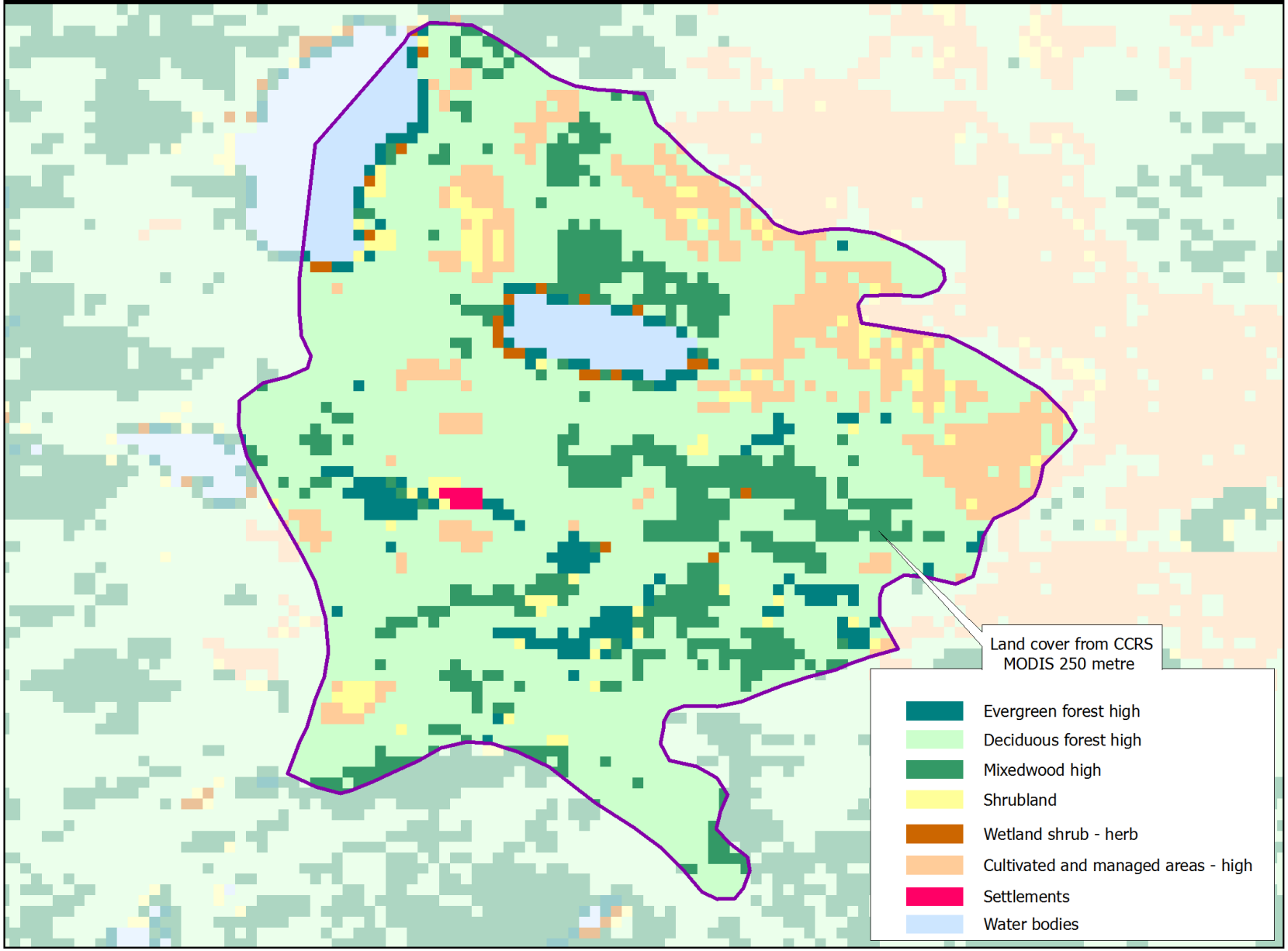
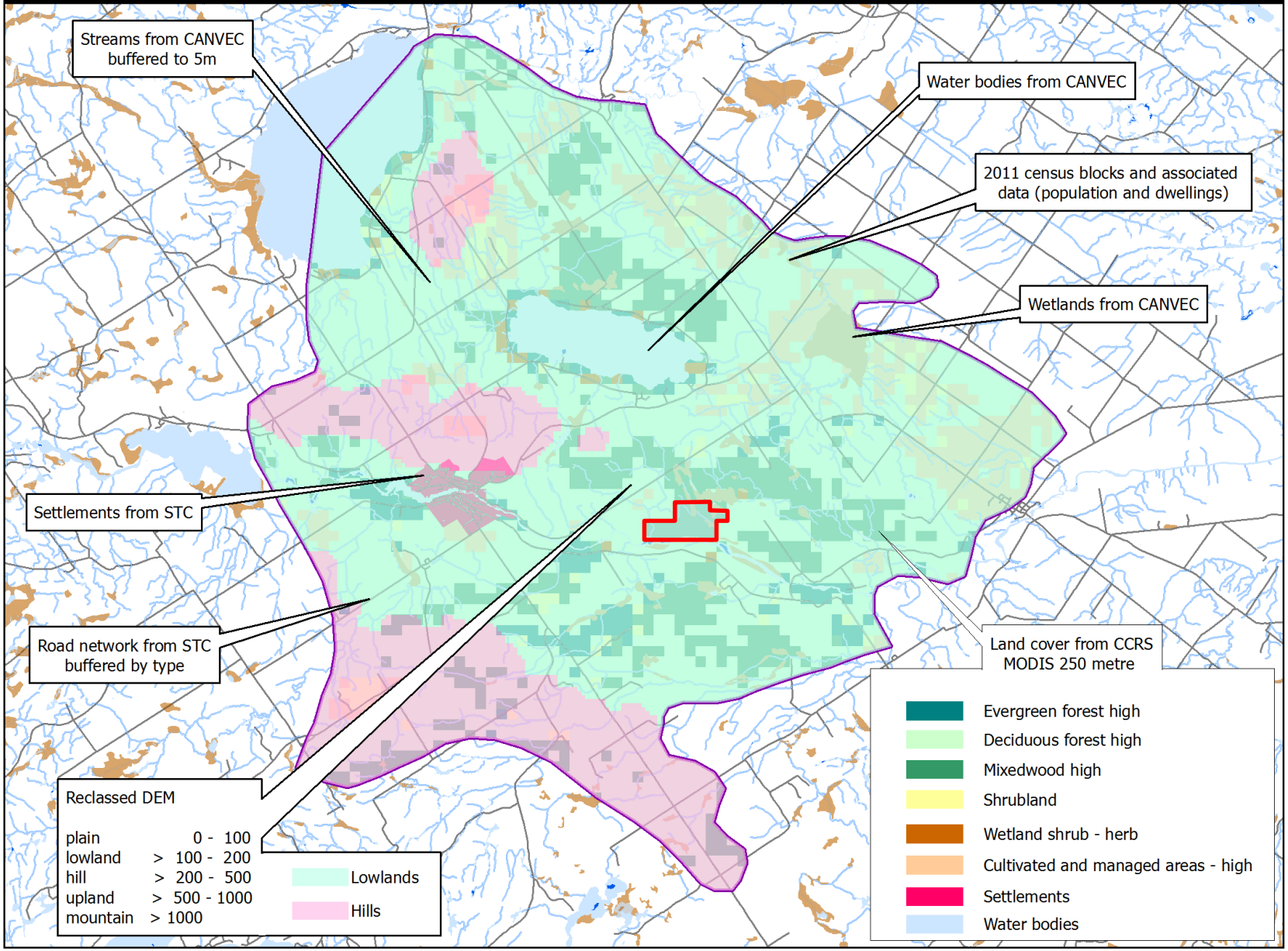


Image taken from : Guide to environmental accounting in Australia, Environmental Information Programme Publication Series, no. 3, Environmental Information Programme, Bureau of Meteorology, Australia.

MEGS, Soil landscape 350255 data integration sources



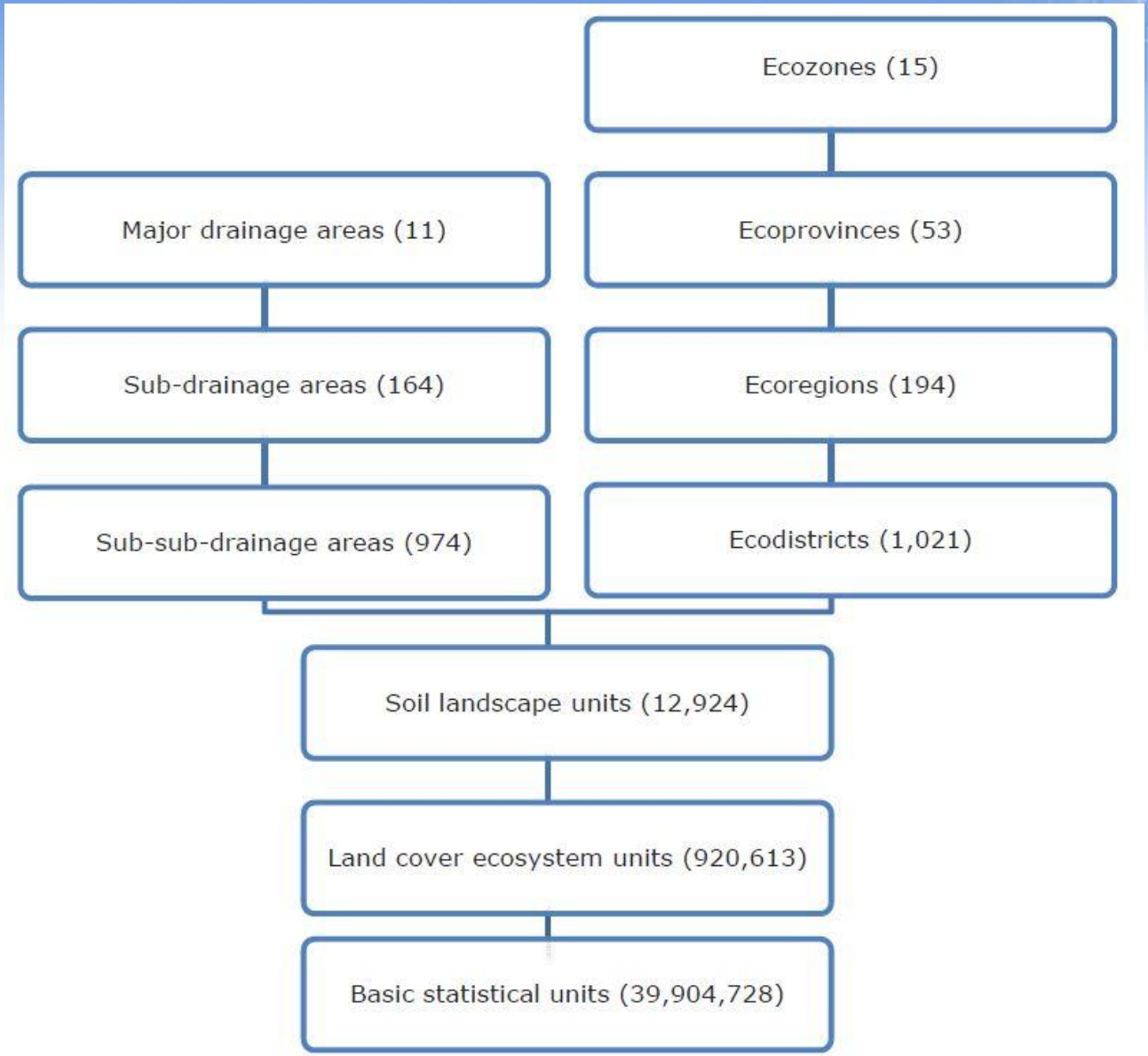
MEGS, Soil landscape 350255 data integration sources



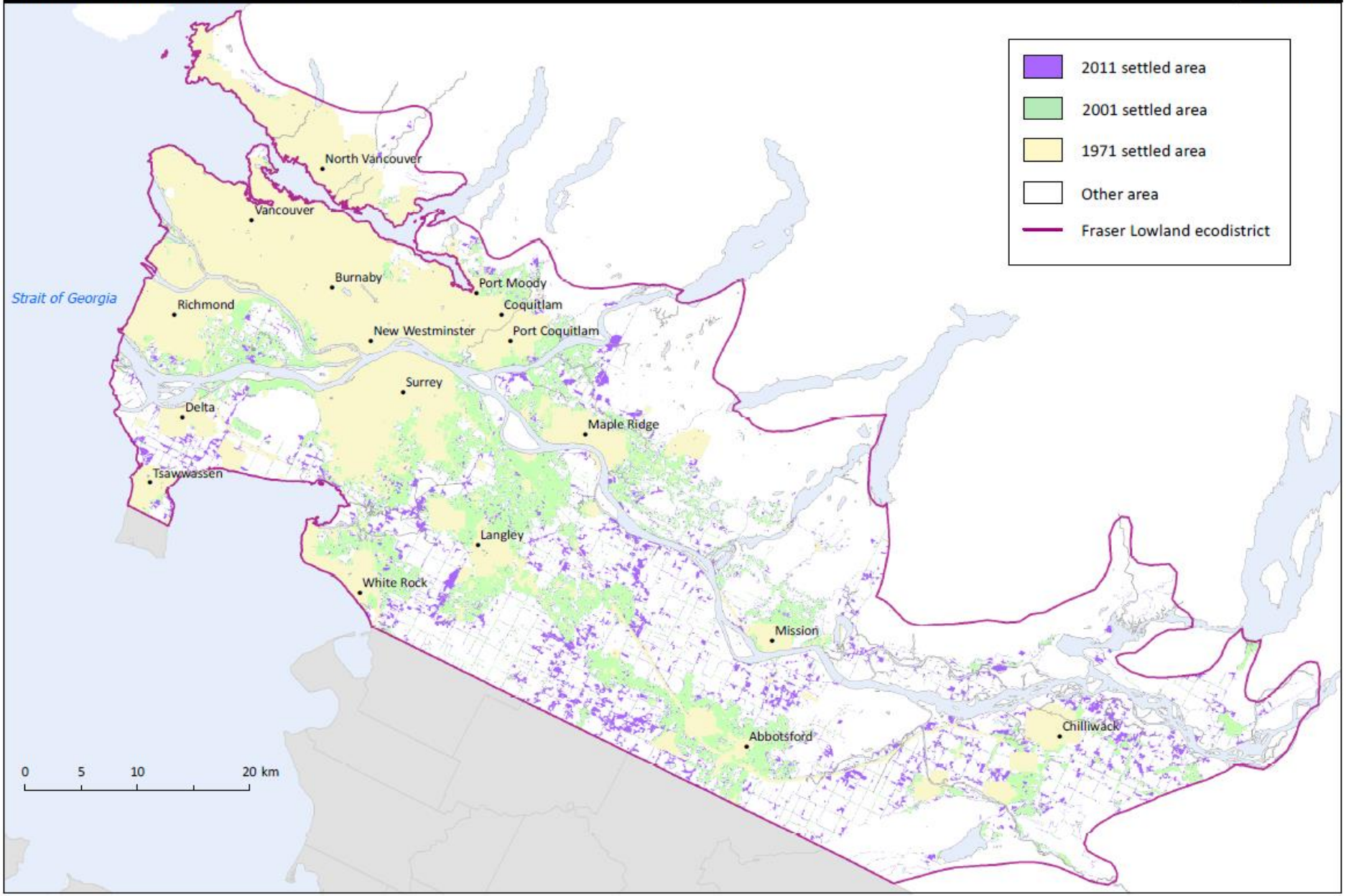
Top 20 land cover ecosystem units

	Count	Land cover	Elevation	Terrain ruggedness index	Area (km^2)	Percent
1	13,215	Water natural and artificial	Plain	Moderately rugged surface	104,902.6	1.1
2	12,438	Water natural and artificial	Plain	Extremely rugged surface	68,196.3	0.7
3	12,154	Water natural and artificial	Plain	Highly rugged surface	54,511.0	0.6
4	11,425	Water natural and artificial	Lowland	Moderately rugged surface	100,814.1	1.0
5	11,082	Water natural and artificial	Plain	Intermediately rugged surface	66,329.1	0.7
6	10,869	Water natural and artificial	Lowland	Highly rugged surface	58,217.6	0.6
7	10,648	Water natural and artificial	Lowland	Extremely rugged surface	37,206.0	0.4
8	9,741	Water natural and artificial	Lowland	Intermediately rugged surface	53,631.4	0.5
9	9,617	Water natural and artificial	Plain	Slightly rugged surface	52,258.9	0.5
10	9,563	Wetland	Plain	Moderately rugged surface	48,421.0	0.5
11	9,045	Evergreen forest	Hill	Extremely rugged surface	368,372.2	3.7
12	8,813	Wetland	Lowland	Moderately rugged surface	63,733.6	0.7
13	8,743	Water natural and artificial	Plain	Level terrain surface	271,280.9	2.8
14	8,694	Water natural and artificial	Lowland	Slightly rugged surface	37,255.8	0.4
15	8,657	Water natural and artificial	Plain	Nearly level surface	49,254.3	0.5
16	8,375	Water natural and artificial	Hill	Extremely rugged surface	26,964.3	0.3
17	8,288	Evergreen forest	Lowland	Moderately rugged surface	181,858.8	1.8
18	8,244	Evergreen forest	Lowland	Extremely rugged surface	152,162.2	1.5
19	8,123	Wetland	Plain	Intermediately rugged surface	50,428.9	0.5
20	7,742	Water natural and artificial	Lowland	Nearly level surface	31,743.2	0.3

Accounting units



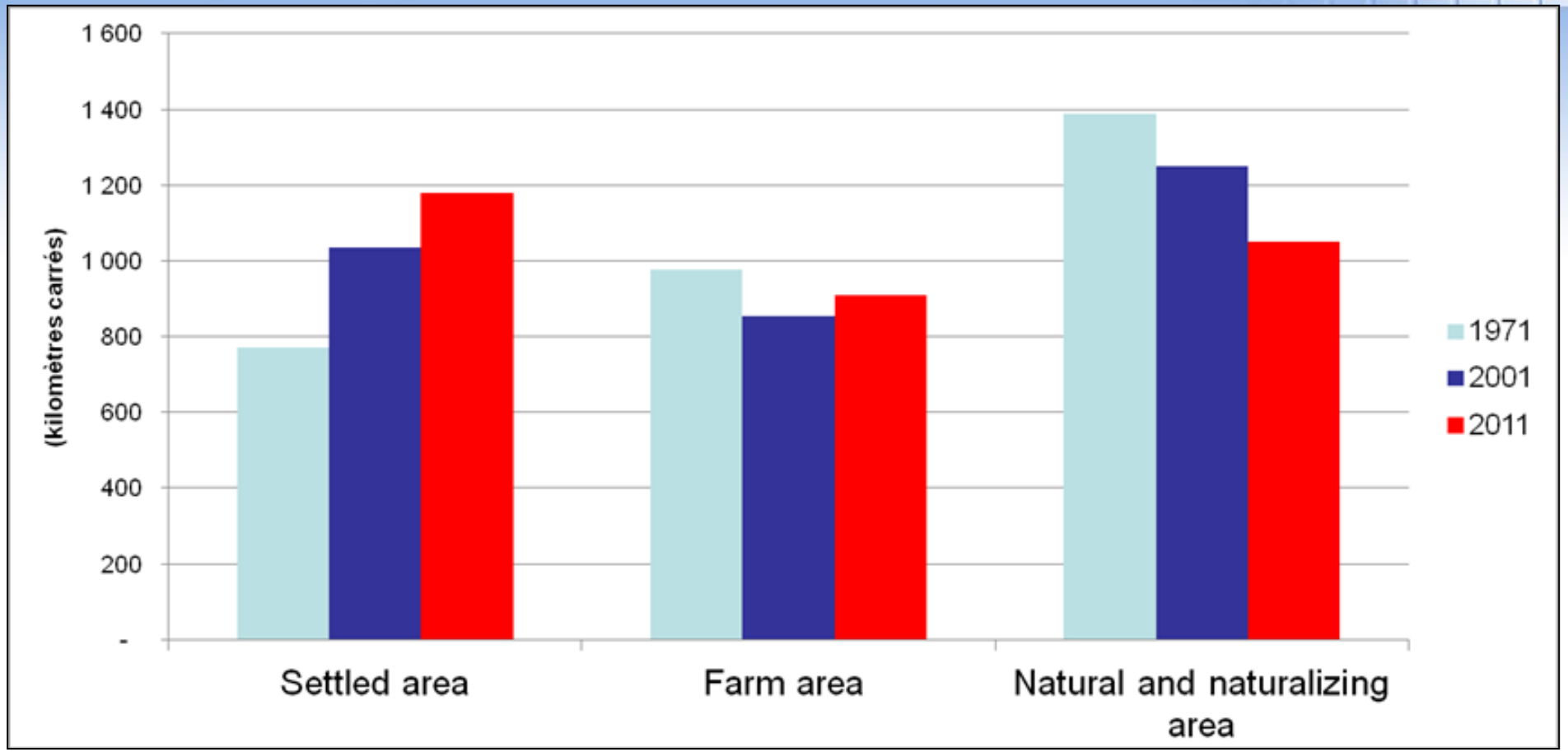
Fraser Lowland ecodistrict



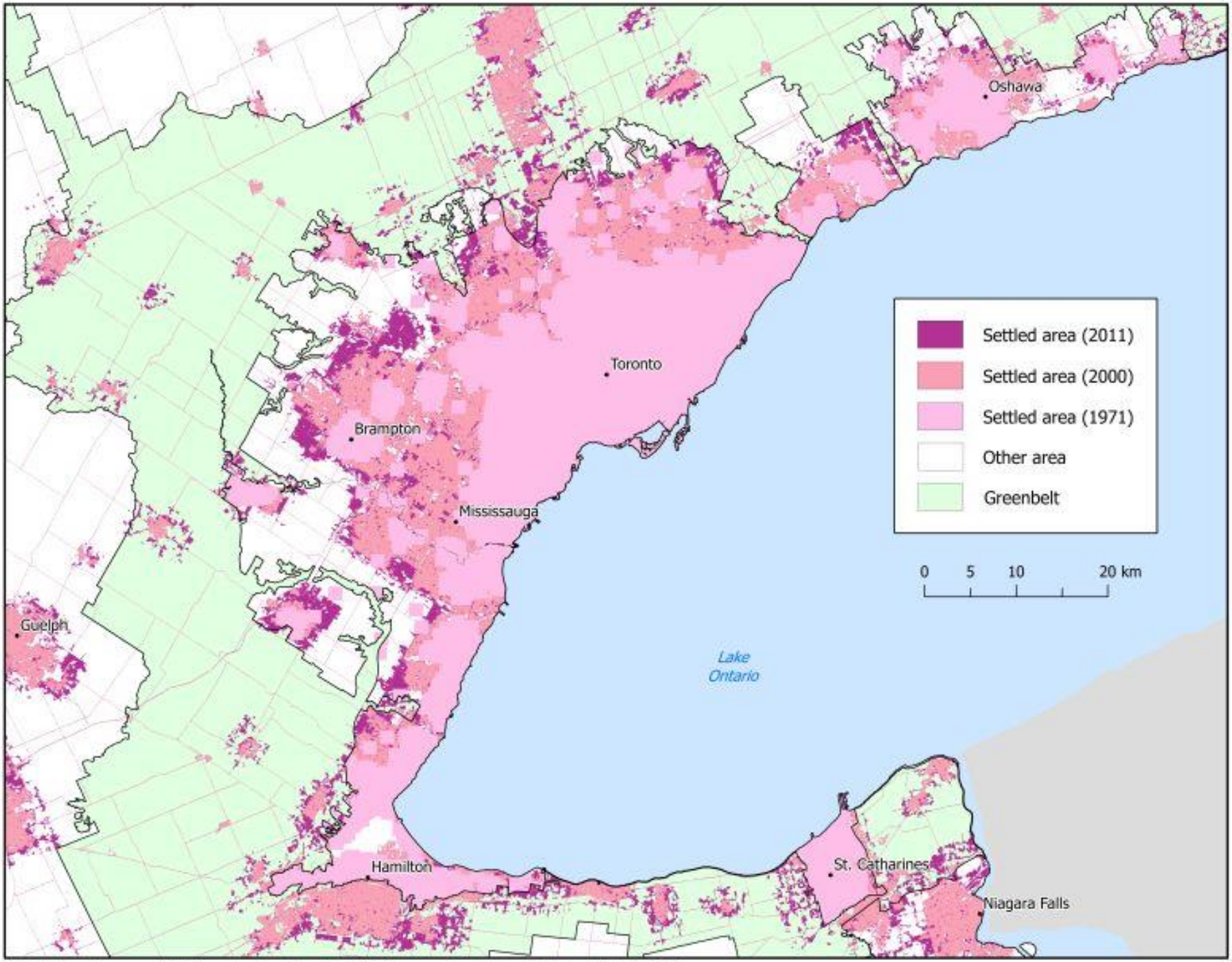
Note(s): For demonstration purposes only.
Please note that 1971 settled area uses different data sources.

Source: Environment, Energy and Transportation Statistics Division, Statistics Canada, 2014, special tabulation.

Land cover change for the Fraser Lowland ecodistrict



Note: Settled area for 1971 is preliminary. The 2001 estimate was derived from 2000 AAFC 30 m satellite imagery.
Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, special tabulation



Note(s): The greenbelt boundary is defined by the Government of Ontario's *Greenbelt Act, 2005*.

Table 3.4

Land cover, Greater Golden Horseshoe, 2000 and 2011

Symbols | Next table | Previous table

	Outside greenbelt				Greenbelt				Inside greenbelt			
	Settled area [1]	Agricultural land area [2]	Natural or naturalizing area [3]	Water [4]	Settled area [1]	Agricultural land area [2]	Natural or naturalizing area [3]	Water [4]	Settled area [1]	Agricultural land area [2]	Natural or naturalizing area [3]	Water [4]
	square kilometres											
2000	914	10,985	8,525	1,671	382	4,266	2,642	77	1,676	1,399	620	42
2011	1,209	10,950	8,392	1,543	622	4,172	2,515	57	1,976	1,193	535	34
Change 2000 to 2011	295	-35	-132	-128	240	-94	-126	-20	299	-206	-85	-8

1. Settled area is based on Agriculture and Agri-Food Canada's 30 m land cover code for developed areas.
2. Agricultural land area is based on the Census of Agriculture variable total farm area.
3. Natural and naturalizing area is based on the residual landscape of a sub-drainage area that is not settled or used for agriculture. It also excludes large bodies of water.
4. Water area derived from satellite imagery is influenced by climatic conditions at the time the images were taken. This should be considered when interpreting the data.

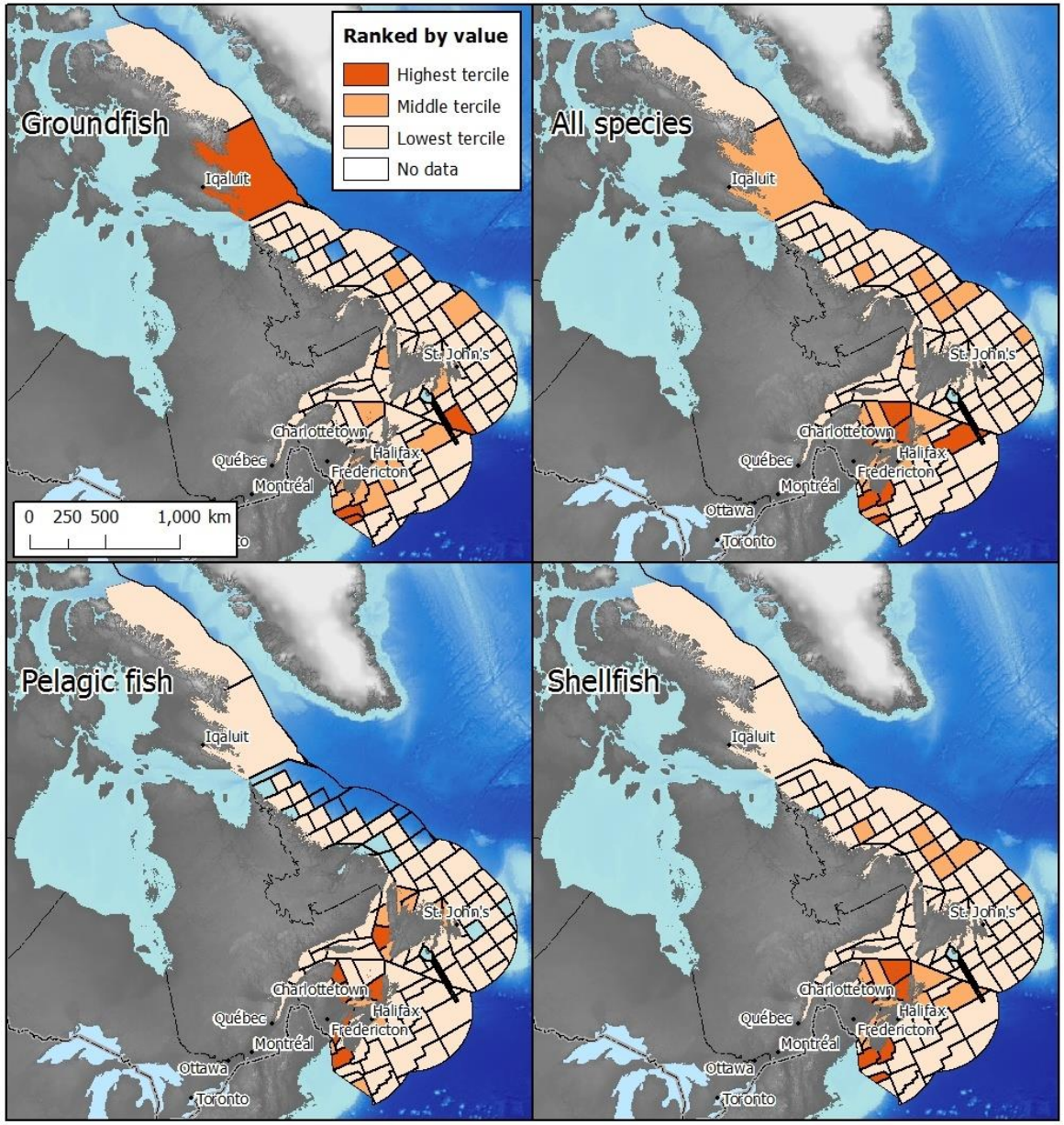
Note(s): Measuring land cover categories is subject to certain limitations due to difficulties in distinguishing between different land cover types. This land cover change data was derived from 30 m resolution land cover; results in this table are more precise than other land cover tabulations using Canada Centre for Remote Sensing (CCRS) 250 m land cover.

Source(s): Agriculture and Agri-Food Canada, 2009, *Land Cover for Agricultural Regions of Canada (circa 2000),* version 12, http://data.gc.ca/data/en/dataset/f5ded3b0-a5b4-4599-95d6-d853a825792b (accessed October 9, 2012). Agriculture and Agri-Food Canada, 2012, *2011 AAFC Crop Type Map of Canada,*ftp://ftp.agr.gc.ca/pub/outgoing/aesb-eos-gg/Crop_Inventory/2011/ (October 9, 2012). Statistics Canada, Environment Accounts and Statistics Division, 2013, special tabulation.

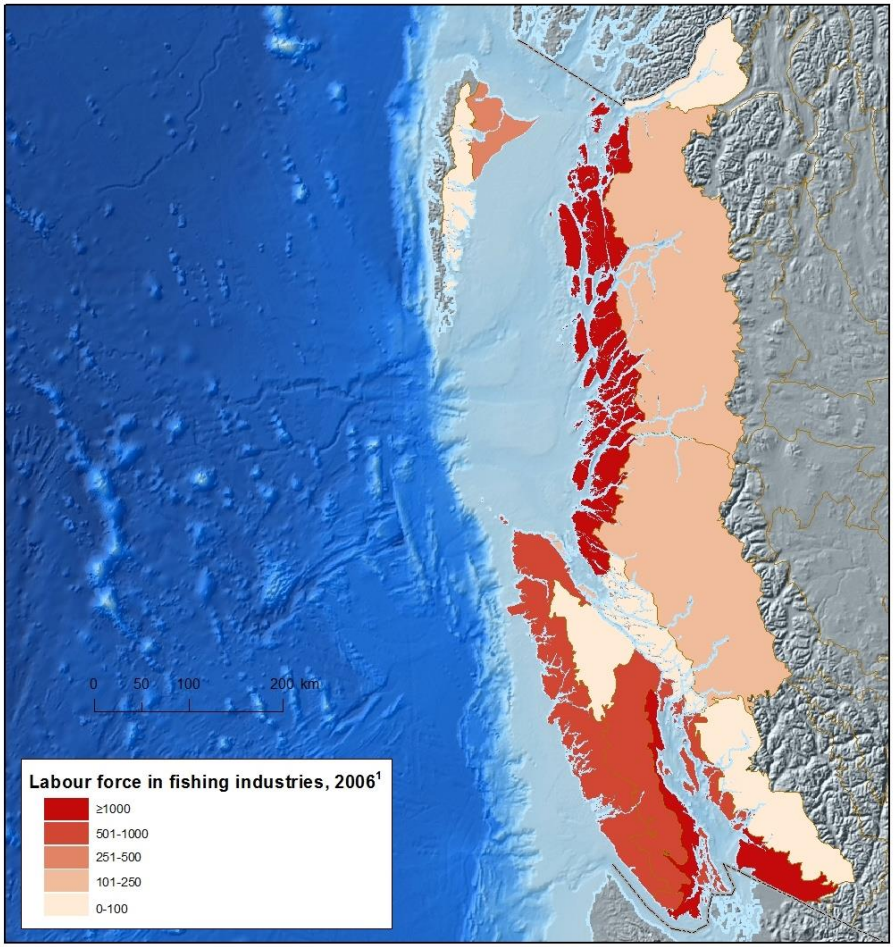
Progress on valuation

1. Market value of selected ecosystem goods
2. Non-monetary values
3. Non-market monetary valuation

1: Value of commercial landings

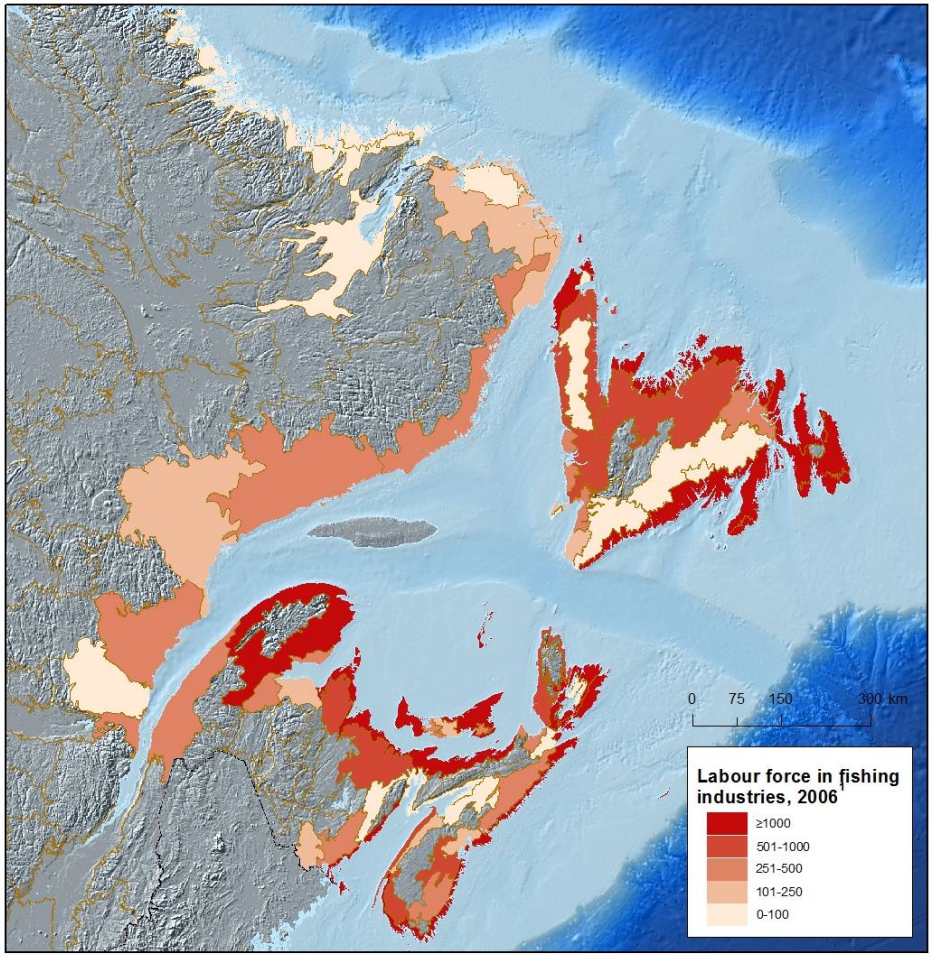


1: Marine coastal fisheries ecumene



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.

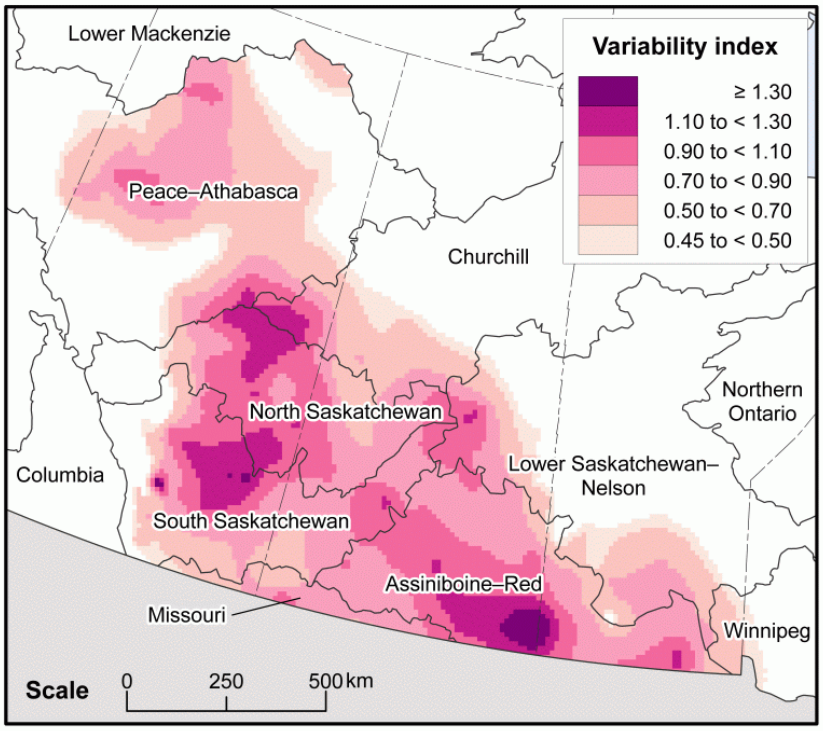


Note(s): [1] Fishing Industries include: the Fishing industry (NAICS 1141), the Seafood Product Preparation and Packaging industry (NAICS 3117) and the Aquaculture industry (NAICS 1125).

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

2 Variability and trend in water yield

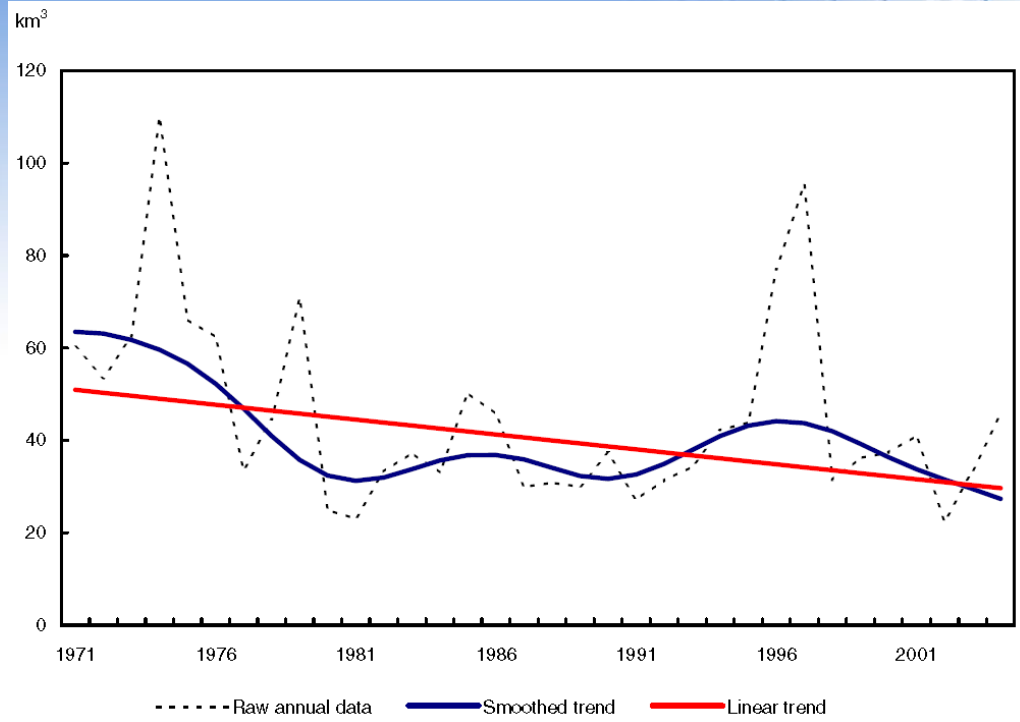
1971-2004 Variability (Prairies)



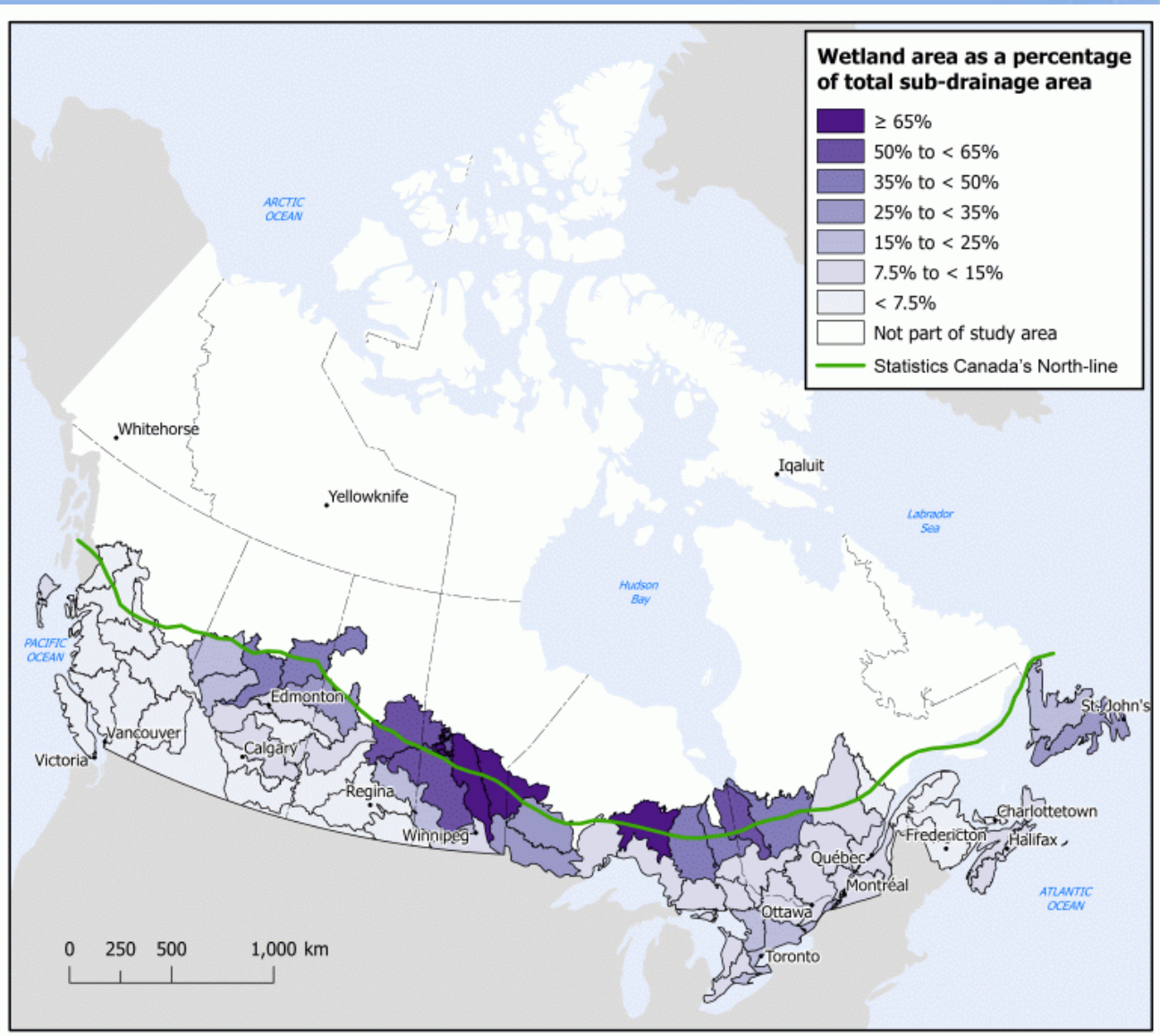
Note(s): Includes all or part of drainage regions 6, 9, 10, 11, and 12, the Peace–Athabasca, Missouri, North Saskatchewan, South Saskatchewan, and Assiniboine–Red.

Sources(s): Statistics Canada, Environment Accounts and Statistics Division, 2010, special tabulation.

1971-2004 Trend (Prairies)



Distribution of freshwater wetlands, southern Canada



Thousand Islands National Park case study

- Partners were interested in a case studies: Parks Canada proposed the Thousand Islands National Park.
  - Although it is one of the smallest national parks in Canada at 22.3 km^2, it faces many pressures affecting the state of its environment.
- Worked with Parks Canada to:
  - Identify pressures on the landscape surrounding the park
  - Used two methods to produce experimental monetary valuation for EGS flows from the park.

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)

Conclusion : Ecosystem accounting in Canada

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

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

3. We received funding to :
   - Investigate freshwater ecosystems
   - Produce an annual land cover / land use change matrix
   - Produce annual water yield statistics

4. We are continuing to contribute to the development of international guidelines