

**Strategic options for the forest sector in
Canada with focus on economic
optimization, energy and sustainability**
- Motives for integration in a global project

Presentation at the Canadian Embassy in Stockholm, Sweden, Monday 2009-08-17

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Umea, Sweden

<http://www.Lohmander.com>

The global project

**Rational and sustainable international policy
for the forest sector**

***- with consideration of energy, global warming,
risk, and regional development***

Preliminary Plan 2009-08-05

Contact:

Project Coordinator: Professor Peter Lohmander,
SLU, SE-901 83 Umea, Sweden,

Peter@Lohmander.com

Objectives:

- The project should develop a rational and sustainable international policy for the forest sector with consideration of energy, global warming, risk, and regional development.
- Specific national issues and conditions should be considered in this process.

Motivation:

- The project group will investigate several central decision problems of extraordinary importance to companies, individuals and nations within the global community and develop optimal solutions.
- These decision problems are highly relevant to forestry and forest industry, global energy supply and production, global warming, financial, technical and other risks of many kinds and general development in different regions around the globe. (continues...)

Motivation (cont.):

- It is not possible to find rational solutions to these problems if they are studied separately, since they are linked in many ways.
- The project team has the methodological and interdisciplinary expertise needed to derive more relevant and qualified solutions to these complex problems of global importance than any other groups, organizations or individuals.
- Furthermore, there is an enormous public interest in the objectives of this project.

Methodology:

- Quantitative methods from the field of operations research in combination with economics, logistics, relevant natural sciences and technology.

Methodology (cont.):

- We will develop a system that integrates the best available science from the forest sector and connected sectors into a logical framework.
- This framework will integrate information from a wide range of sources, including several already existing sources, and enable logical support for real policy development and decision making.

Methodology (cont.):

- The framework will use the principles of Decision Sciences, Management Science and Operations Research to integrate the most relevant information into a form useable by policy decision makers.

Regions and Partners

- The project organization design process is still going on. Many constructive suggestions have already been obtained and regional coordinators defined for several parts of our planet.

National and regional coordinators

(The list will most likely be expanded)

Ethiopia

Ass. Professor, Dr. Tarekegn Abebe Kebede

Germany:

Prof. Dr. Marc Hanewinkel

Iran

Ass. Prof. Dr. Soleiman Mohammadi L.

Nepal

M.Sc. Ram Asheshwar Mandal, Dr. Indra Sapkota

National and regional coordinators (cont.)

P.R. China

Professor Dr., Chair Fadian Lu

Russian Federation: *Saint Petersburg (Federal City)*

Vice Rector, Professor Dr. Alexander Alekseev,
Saint-Petersburg State Forest Technical Academy

Russian Federation: *Komi Republic*

Dean, Dr. Nikolay Klimushev

National and regional coordinators (cont.)

South Korea

Professor Dr. Joosang Chung

Spain

Dean, Prof. Dr. Eduardo Rojas Briaies

Sweden

Professor Dr. Peter Lohmander

National and regional coordinators (cont.)

- **Switzerland**

Prof. em. Dr. Jean-Philippe Schütz
(Chairman of Prosilva Europe)

USA

Professor Dr. Joseph Roise

Project plan

A preliminary project plan with national perspectives on the global project can be downloaded here:

<http://www.lohmander.com/ip090805.pdf>

**Organization in each
participating country:**

National (or regional) research leader and coordinator	1
Reserachers (or PhD students)	3-5

Funding:

First priority:

Funding from international funds.

Second priority:

National sources.

Year 1

2010 (August) – 2011 (July)

- Development of first generation analysis and planning methods
- Pilot studies of relevant activities and conditions in small regions in the different countries.
- Excursions to the investigated small regions. Project discussions with involved parties.
- Methodological education within the research project.
- Conference 1 with report

Year 2

2011 (August) – 2012 (July)

- Development of “second generation” general and country specific analysis and planning methods, suited for the project family.
- Studies of activities and conditions in large regions in the different countries.
- Model analysis of rational coordination of activities in the large regions in the different countries.
- Excursions to the investigated large regions. Project discussions with involved parties.
- Methodological education within the research project.
- Conference 2 with report

Year 3

2012 (August) – 2013 (July)

- Development of “third generation” general and country specific analysis and planning methods, suited for the project family.
- Studies of activities and conditions at national levels in the different countries. Explicit consideration of interregional trade and exchange of different kinds. Explicit consideration of system effects on greenhouse gases and risk. Model analysis of rational coordination of activities at the national levels. Excursions to the investigated countries. Project discussions with involved parties. Methodological education within the research project.
- Conference 3 with report

Year 4

2013 (August) – 2014 (July)

- Development of “fourth generation” international analysis and planning methods, suited for the project family.
- Studies of activities and conditions at the international level and the connections to the activities in the different countries. Explicit consideration of international trade and exchange of different kinds. Explicit consideration of international system effects on greenhouse gases and risk. Model analysis of rational coordination of activities at the international level. Meetings with international organizations and EC. Project discussions with involved parties. Methodological education within the research project.
- Conference 4 with report

Canada in the global project:
- *Motivation*

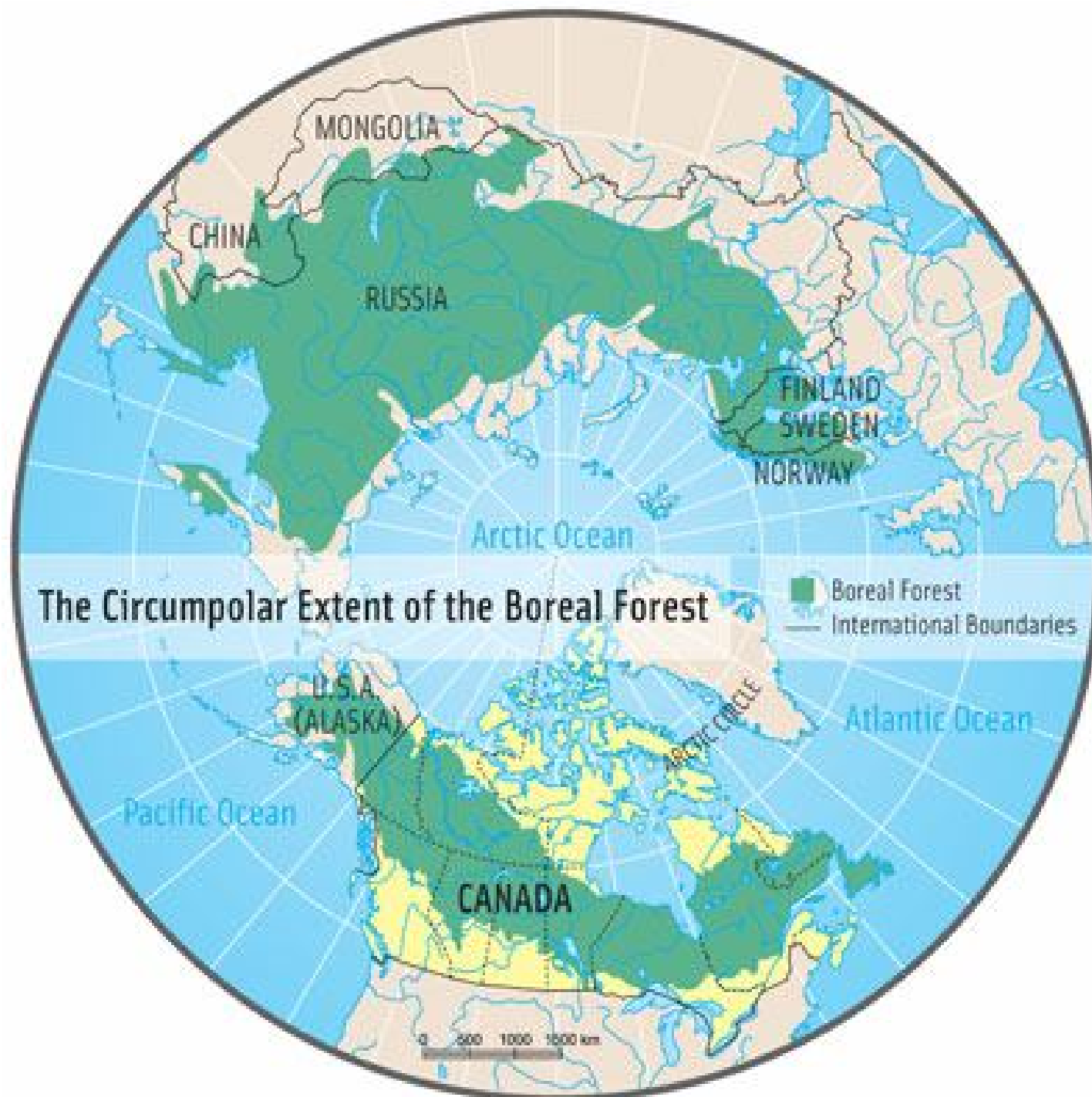
Objectives:

- The project should develop a rational and sustainable international policy for the forest sector with consideration of energy, global warming, risk, and regional development.
- Specific national issues and conditions should be considered in this process.

Canada is of special interest in this context.

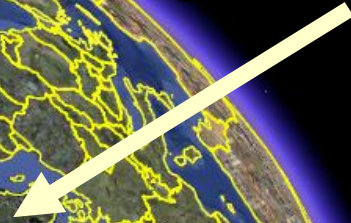
In Canada, we find:

- An already large forest sector that could be *very much* expanded.
- Large options to produce much more renewable energy
- Real options to significantly reduce global warming.
- Real options to integrate rational national forest and energy planning with infrastructure investments because of the dominating public forest ownership.



Russian Fed.

Sweden



Canada



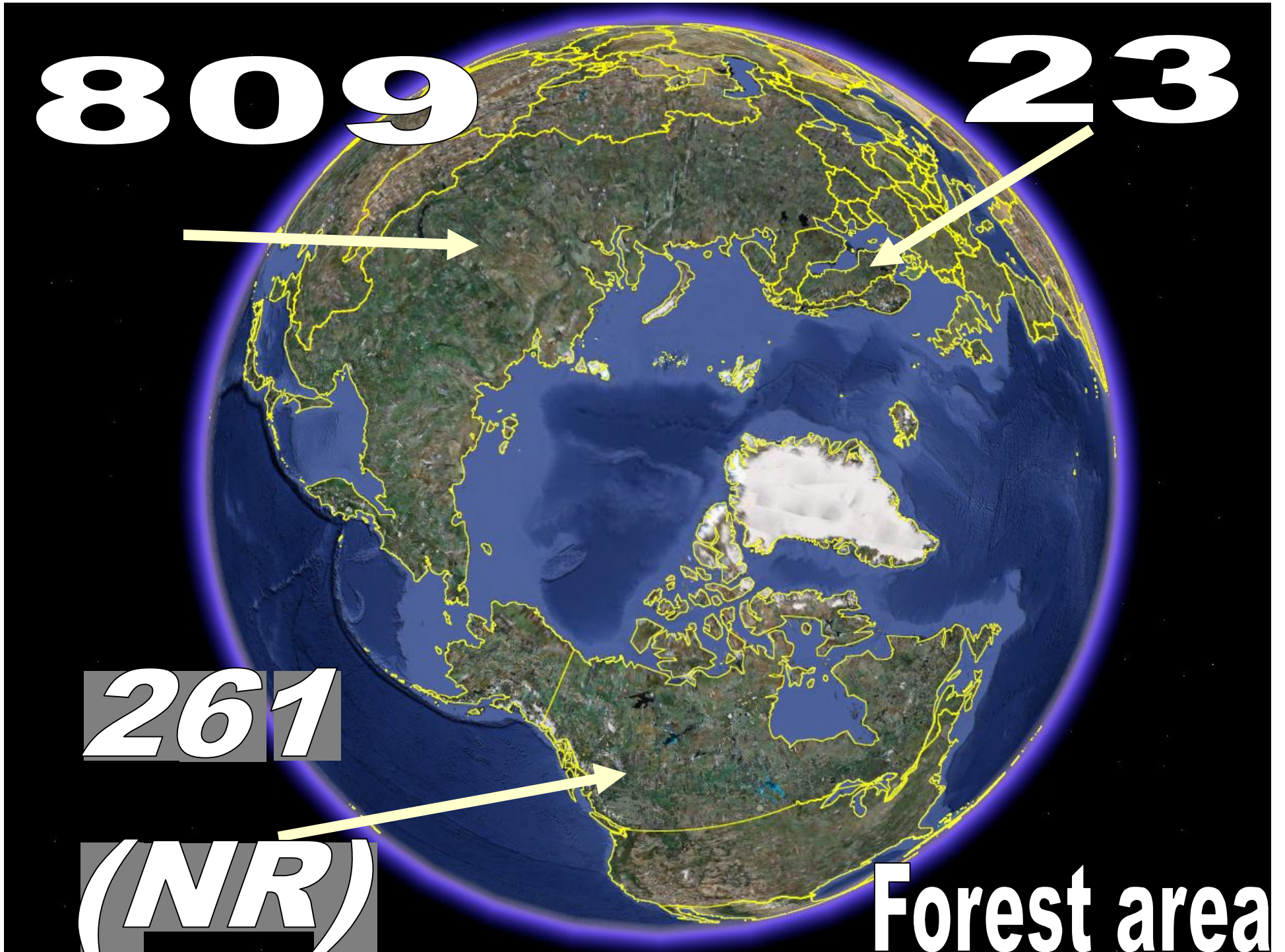
809

23

261

(NR)

Forest area



Forest area (million hectares):

- Sweden: 23.000 (SVO, 2009)
- Russian Federation: 808.790 (FAO, 2005)
- Canada: non res. = 260.643. (Canfi 2001)

80.5

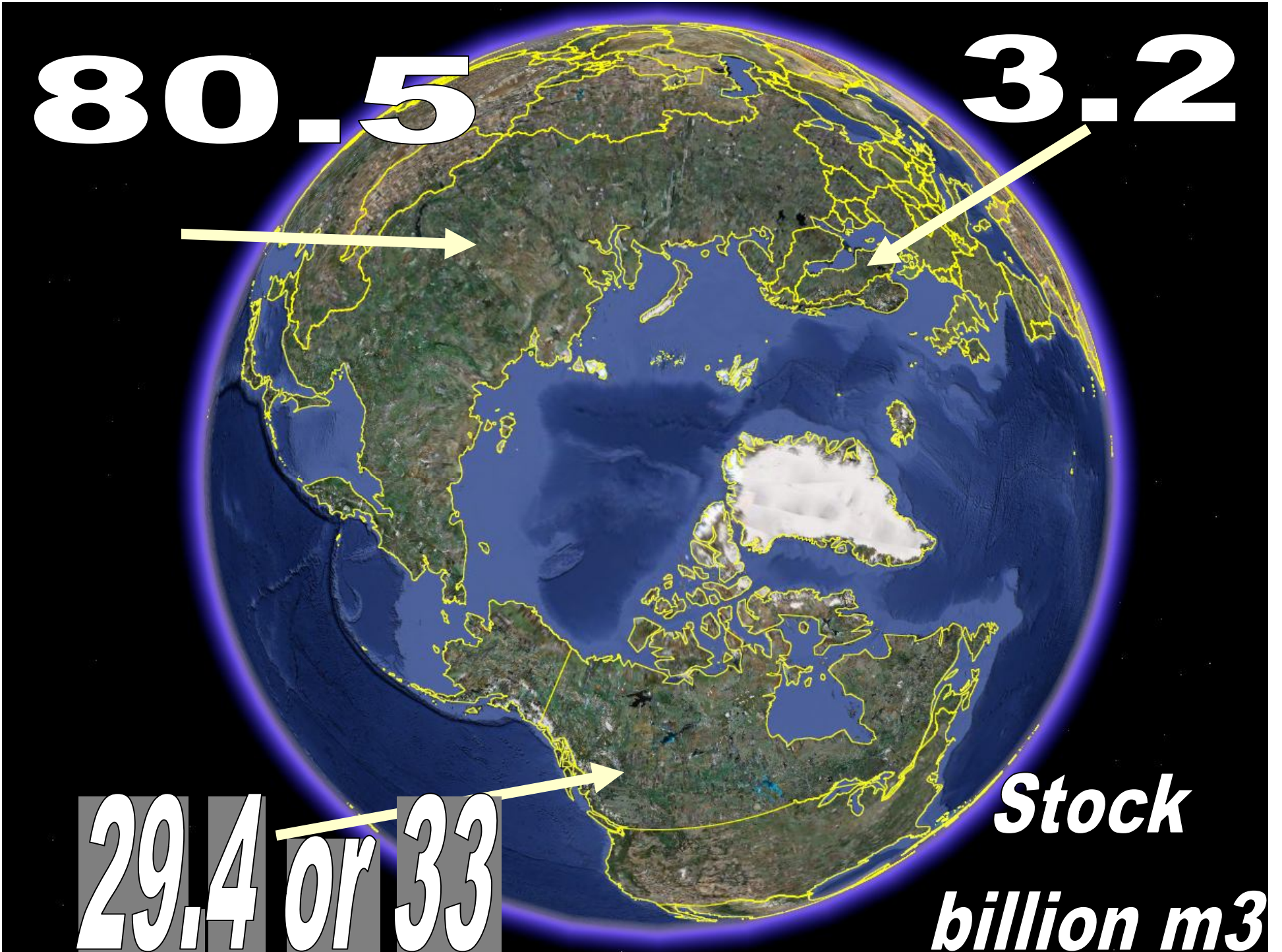
3.2



29.4 or 33



***Stock
billion m³***

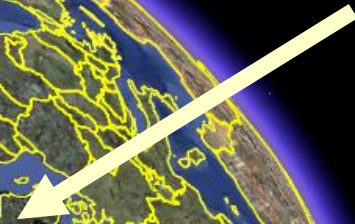


Forest stock (million cubic metres):

Sweden:	3 155	(SVO, 2008)
Russian Federation:	80 479	(FAO, 2005)
Canada:	29 384	(Canfi 2001)
Canada	32 983	(FAO 2005)

25.5

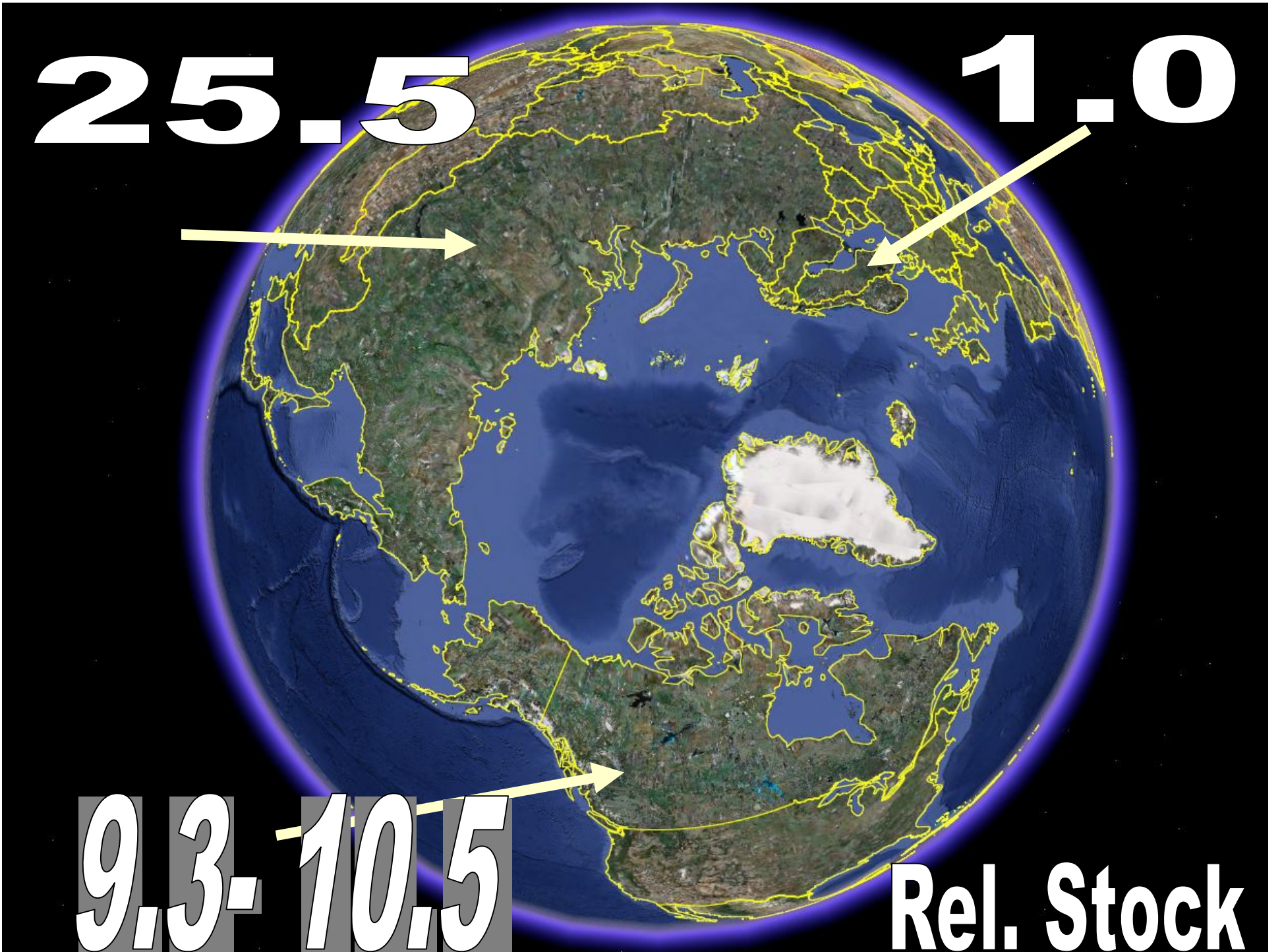
1.0



9.3-10.5

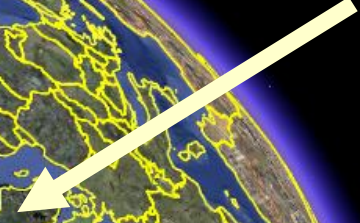


Rel. Stock



236

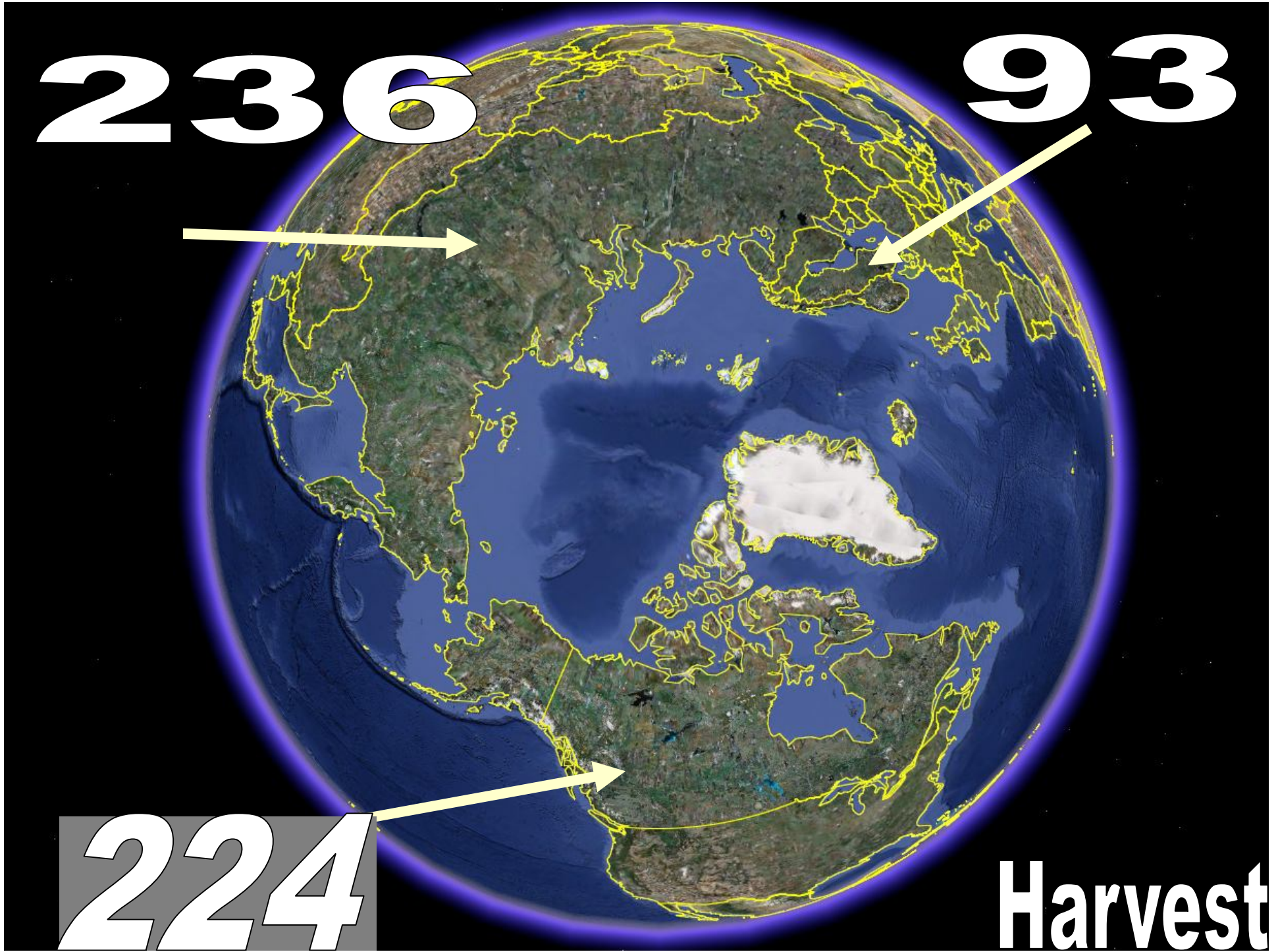
93



224



Harvest



Forest harvest (*million cubic metres*) (FAO, 2005):

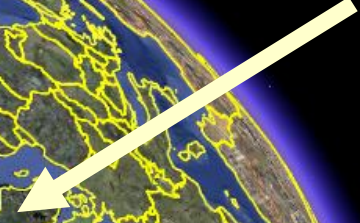
- Sweden: 92.8 (Roundwood + pulpwood)
- Russian Federation: 236 (Roundwood + pulpwood)
- Canada: 223.5 (Industrial roundwood 219.5 + woodfuel 4)

Russian site index tables give:

- *Total growth 2919 million cubic metres on 645 million hectares (the best soils) gives 4.53 m³/ha.*
- *Total growth 2919 million cubic metres per 809 million hectares (total forest area) gives 3.608 m³/ha.*
- http://www.lohmander.com/RuMa09/Lohmander_Presentation.ppt
- http://www.iiasa.ac.at/Research/FOR/forest_cdrom/english/for_fund_en.html

2918

83



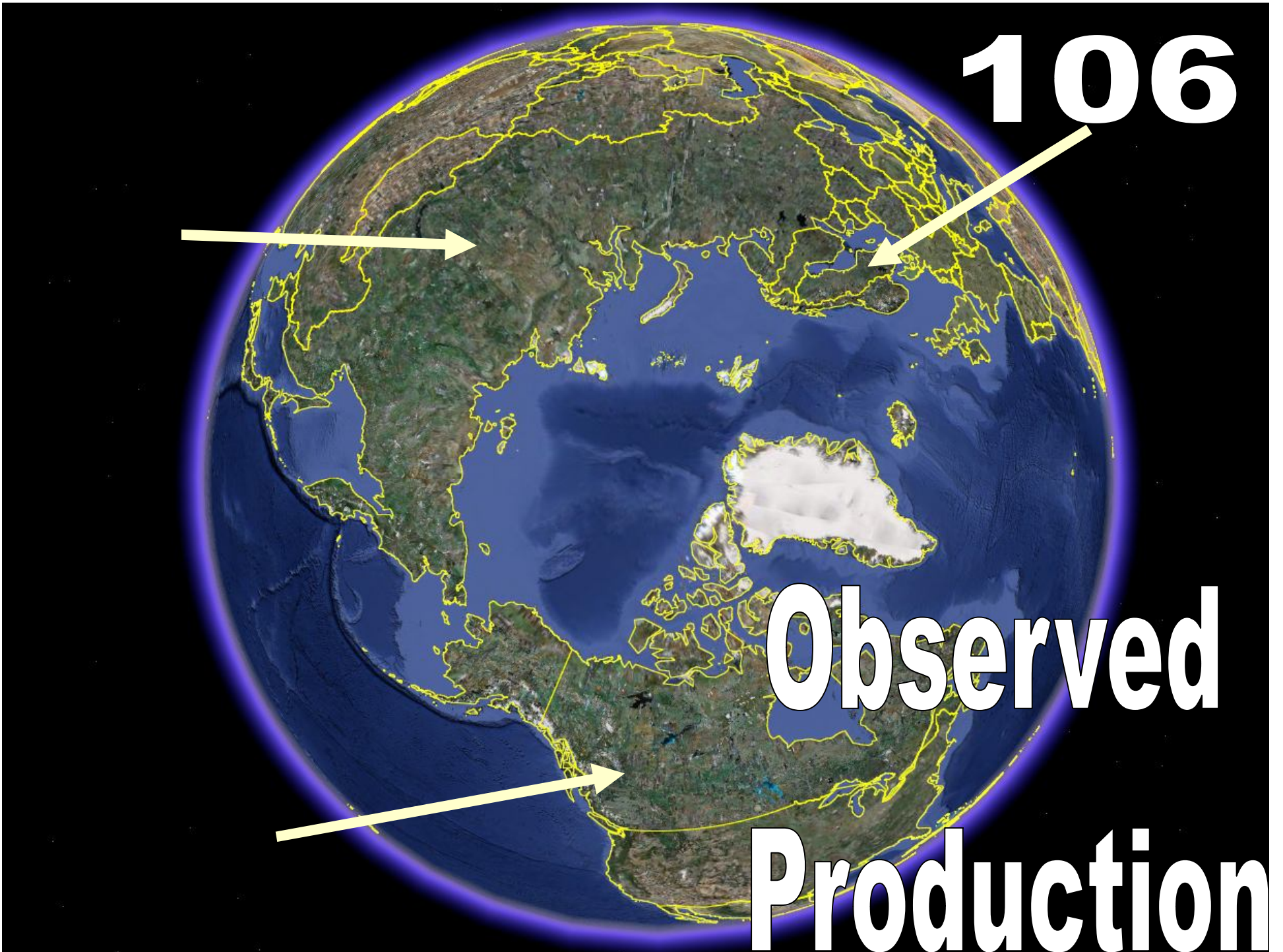
940

**Prod Potential
via Russian data**



Forest production potential (using Russian figures per hectare) (million cubic metres per year):

- Sweden: $23.000 \times 3.608 = \underline{83}$ (Observed growth = 106 000, SVO, 2008)
- Russian Federation: $808.790\ 000 \times 3.608 = \underline{2\ 918}$
- Canada: (non reserved land): $260.642 \times 3.608 = \underline{940}$



0.0809

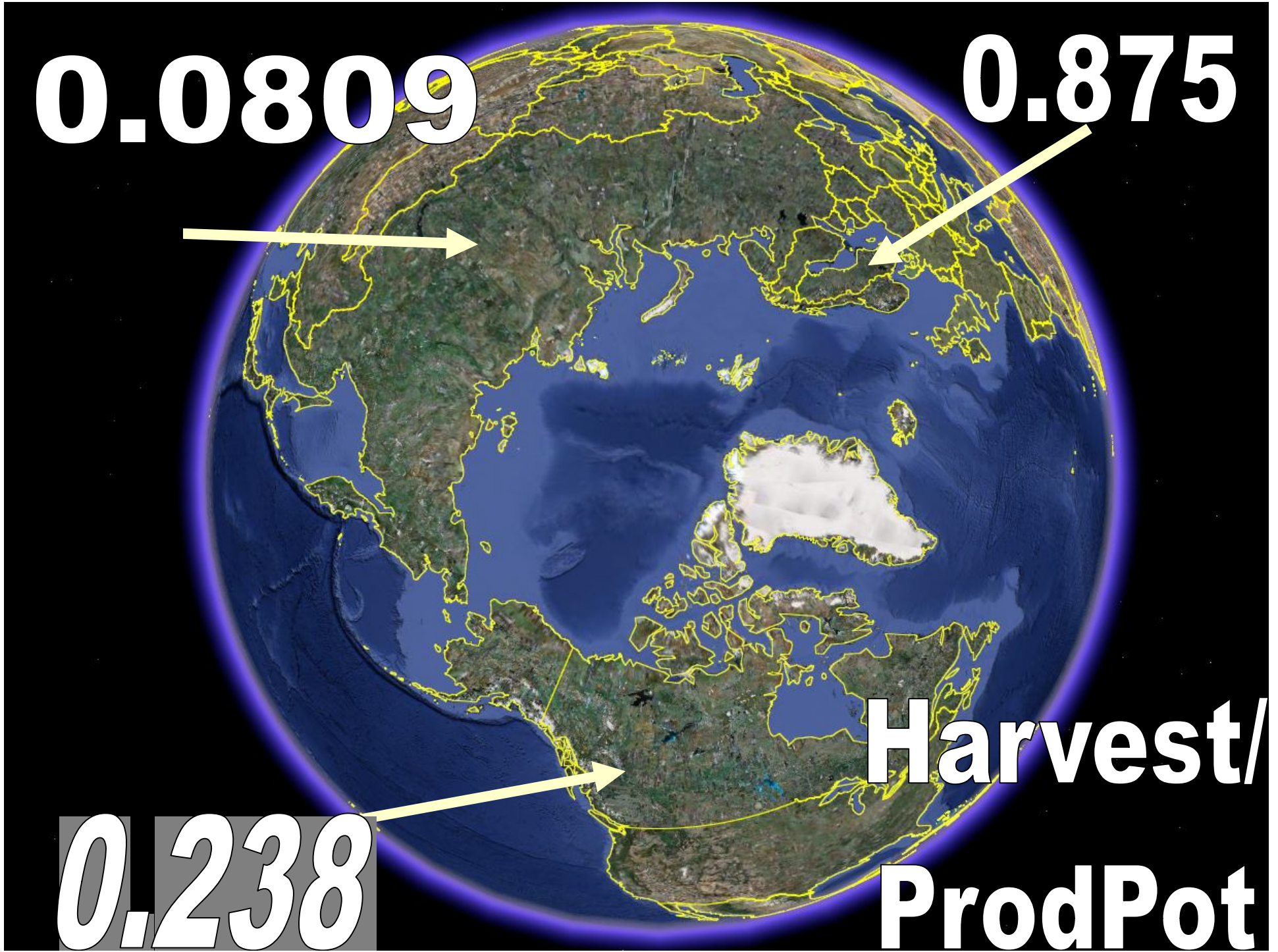
0.875



0.238



**Harvest/
ProdPot**



Harvest in relation to observed growth and in relation to potential growth:

- Sweden (estimated): $92.8/83 = 1.12$
- Sweden (observed): $92.8/106 = 0.875$
- Russian Federation: $236/2918 = 0.0809$
- Canada: $223.5/940 = 0.238$

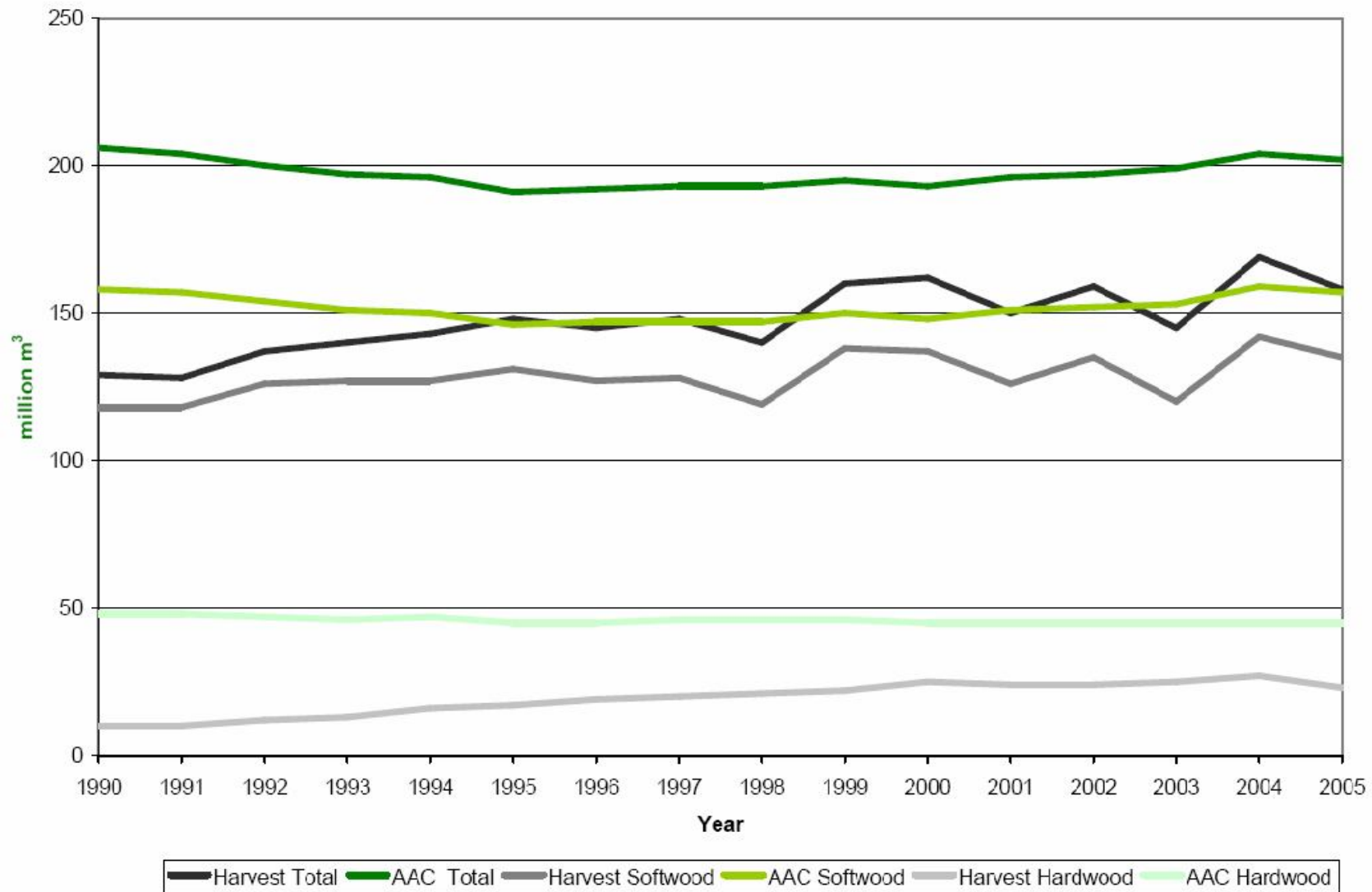


Figure 5.3a Allowable annual cut versus actual harvest (provincial crown land), 1990–2005 (million m³) (CCFM, 2008).

Criteria and Indicators of Sustainable Forest Management in Canada: National Status 2005

Data updated: January 2008

© Canadian Council of Forest Ministers

<http://www.ccfm.org/ci/rprt2005/English/pdf/5.3a.pdf>



Natural Resources
Canada

Ressources naturelles
Canada

<http://www.canadaforests.nrcan.gc.ca/articletopic/14>

A global endowment

Article Date: 2005-09-01

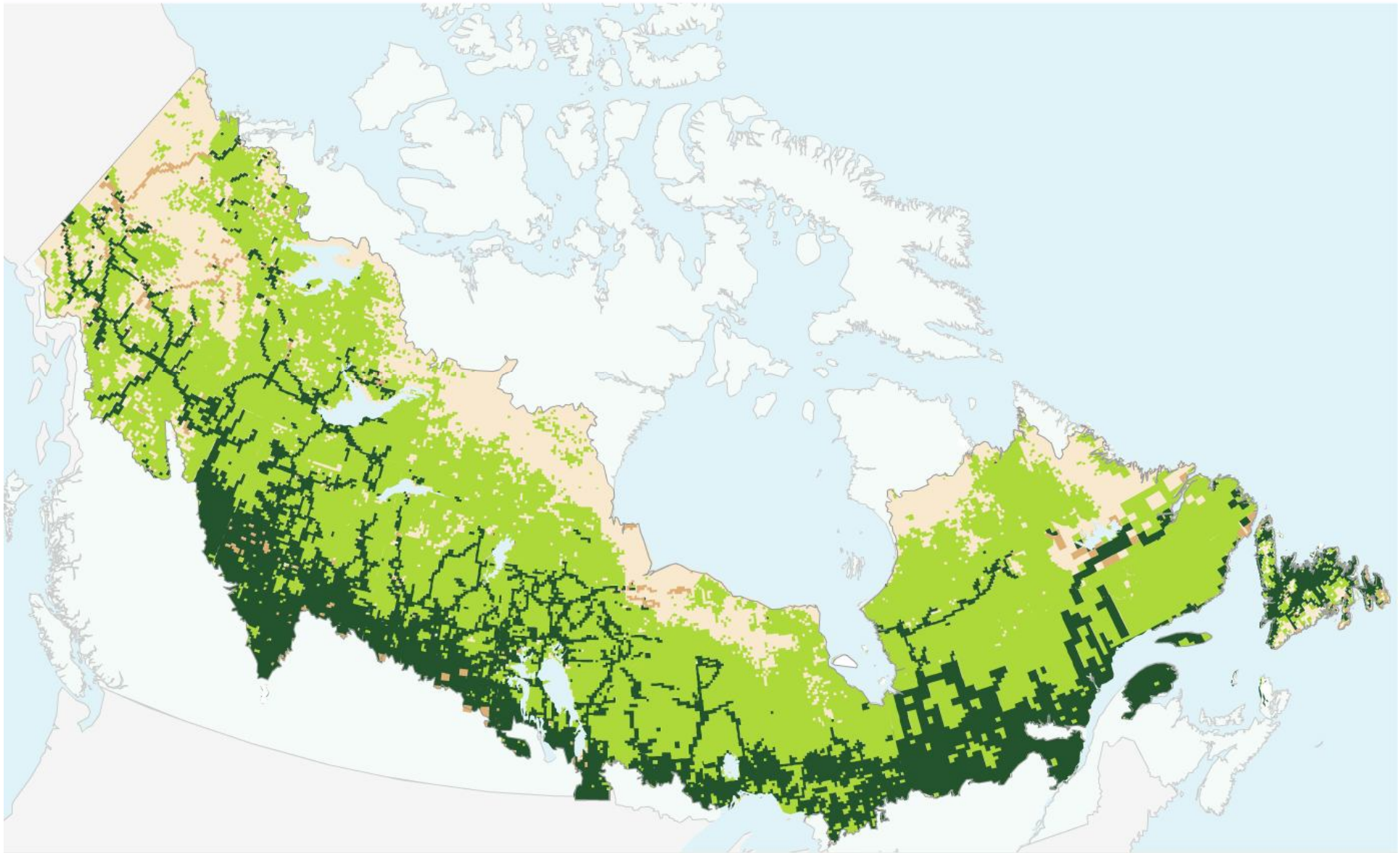
**About 750 000 hectares—or 0.2 percent of the total boreal forest
—are harvested each year.**

**The part not managed for timber production is either
unavailable because it has been designated as
protected areas and reserves,
or currently considered inaccessible.**

**Unlike the forests of the United States, Scandinavia and the
majority of other nations,
most of Canada's forests (93 percent) are publicly owned.
The remaining 7 percent are held by private owners.**

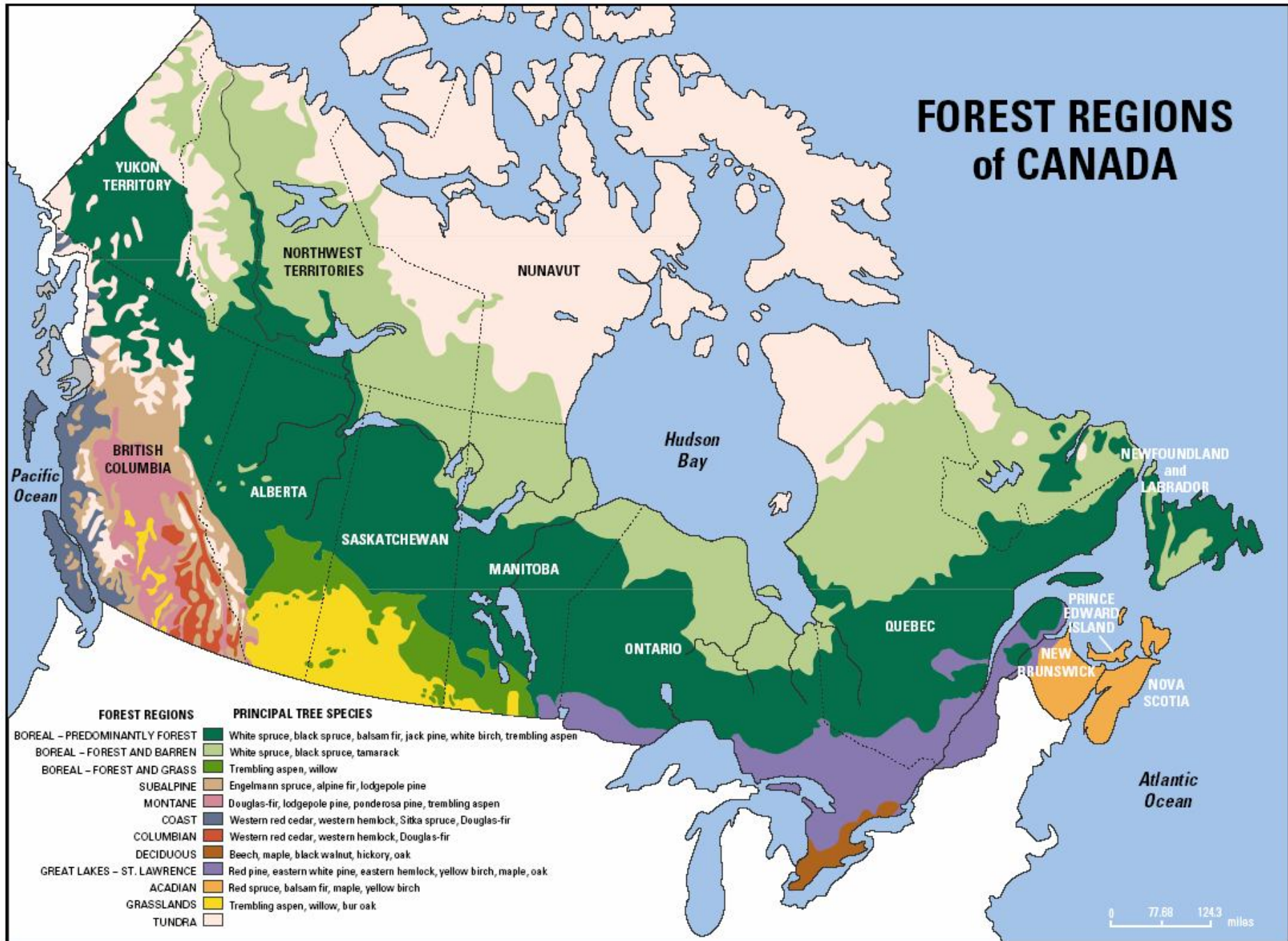
Access by Road to Canada's Boreal Region

OTHER



<http://www.sfmcanada.org/english/im-accessbyroad.asp>

FOREST REGIONS of CANADA





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Learning Resources

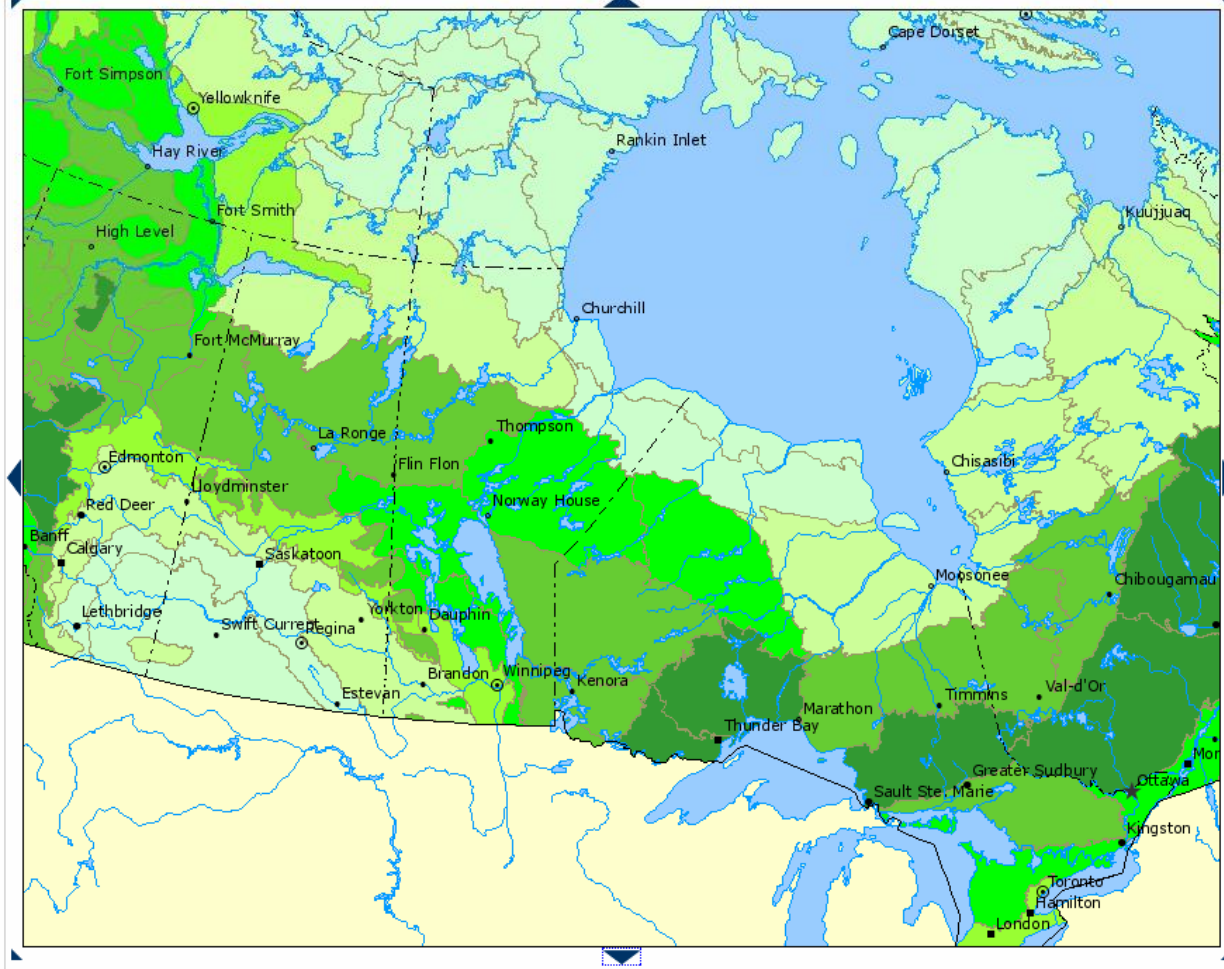
- Lesson Plans
- Facts About Canada
- All Resources

Data & Services

- Wall Maps
- Free Data
- Web Services

Productive Forest Land Use

Map Size: S M L XL



Percentage of productive forest

- < 1%
- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 75%
- 75% - 98%

Populated Places

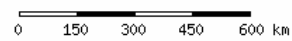
- 1 - 4999
- 5 000 - 49 999
- 50 000 - 99 999
- 100 000 and greater
- ⊙ Provincial and Territorial Capital
- ★ National Capital

Boundaries

- International
- Provincial / Territorial
- Canada / Kalaallit Nunaat dividing line
- EEZ (200 mile)

Other Features

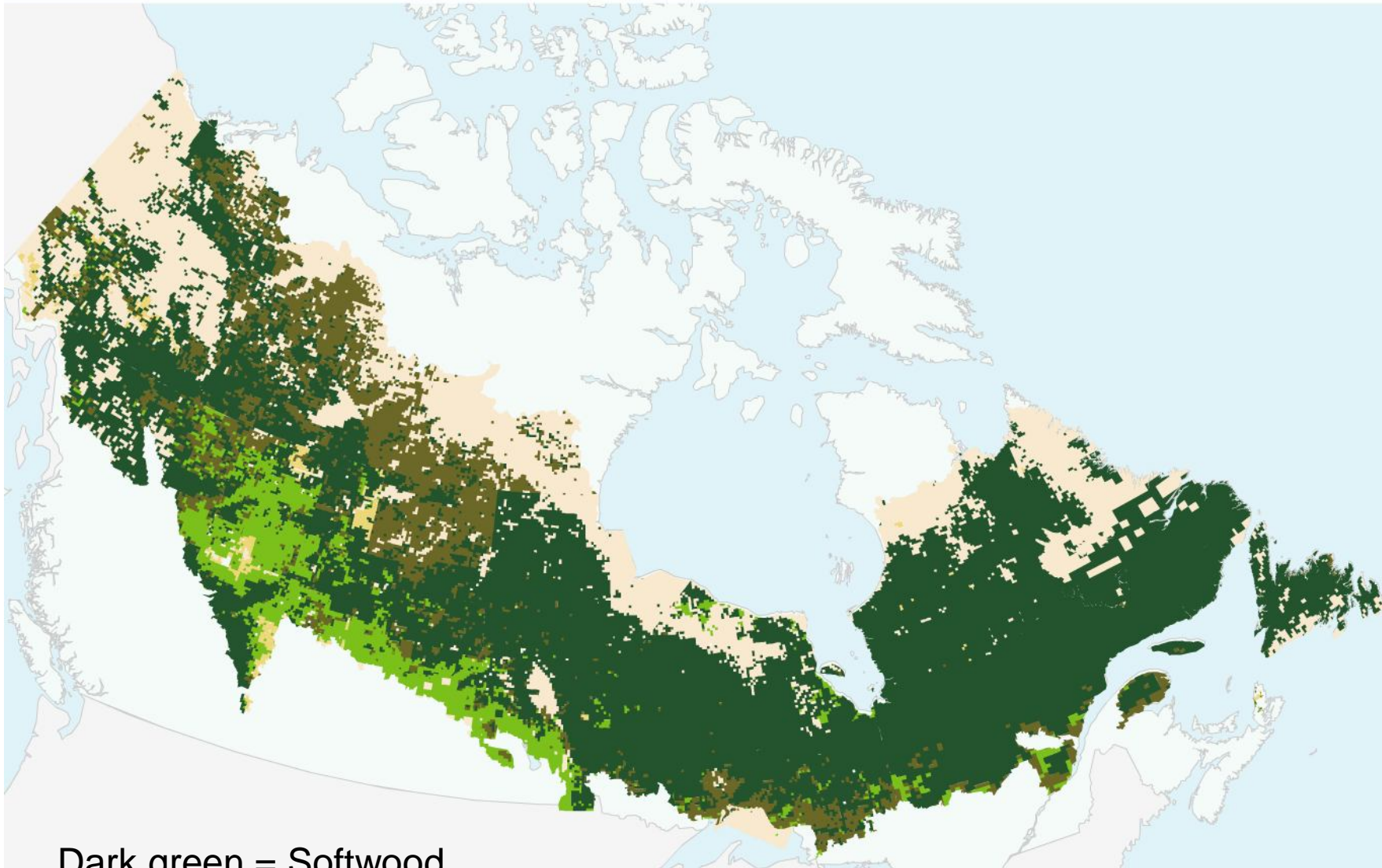
- Water area
- Regions outside Canada



[Map Sources](#)

Forest Types in Canada's Boreal Region

OTHER



Dark green = Softwood

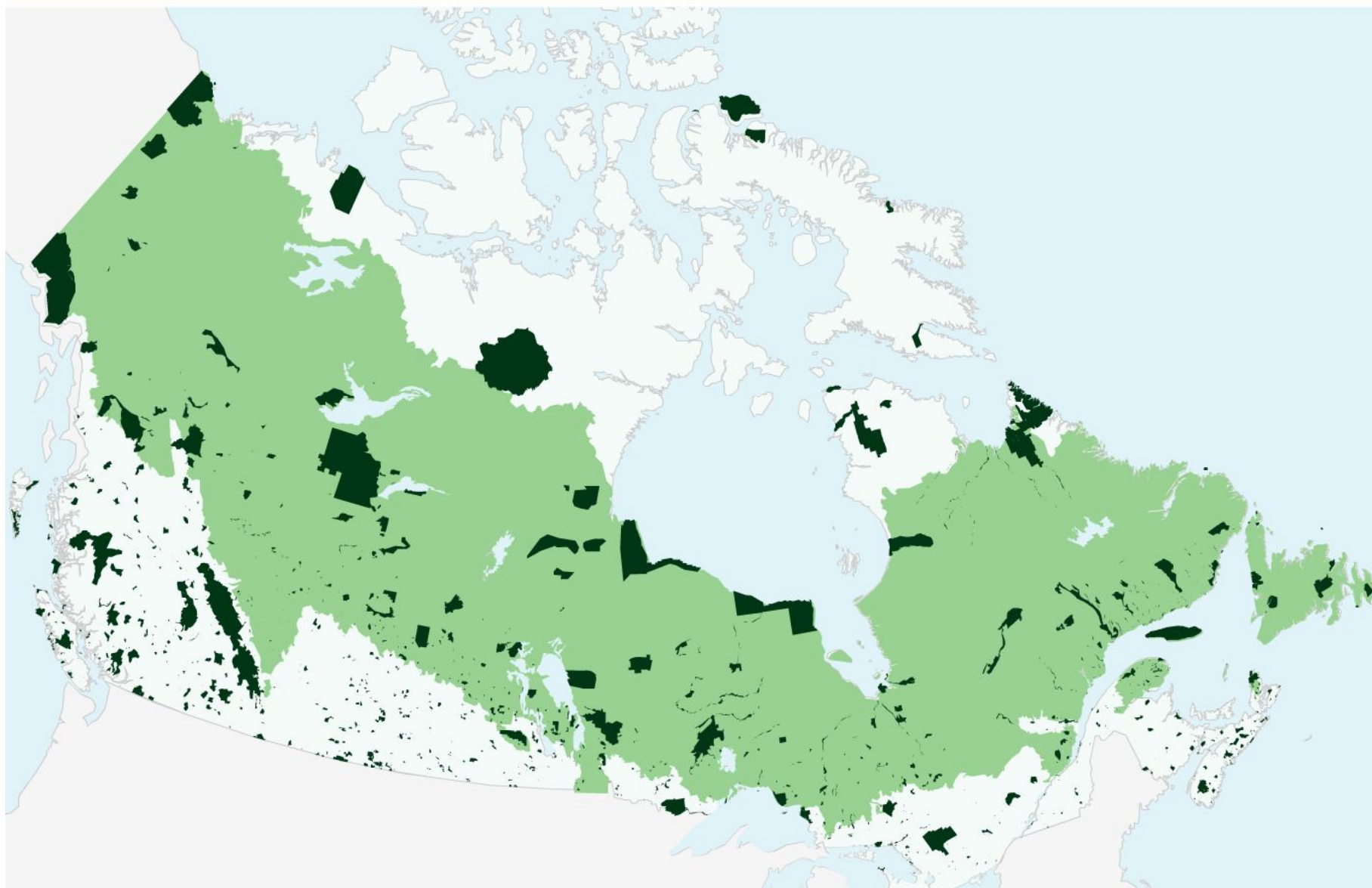
Light green = Hardwood

Brown = Mixed

<http://www.sfmcanada.org/english/im-foresttype.asp>

Protected Areas and Canada's Boreal Region

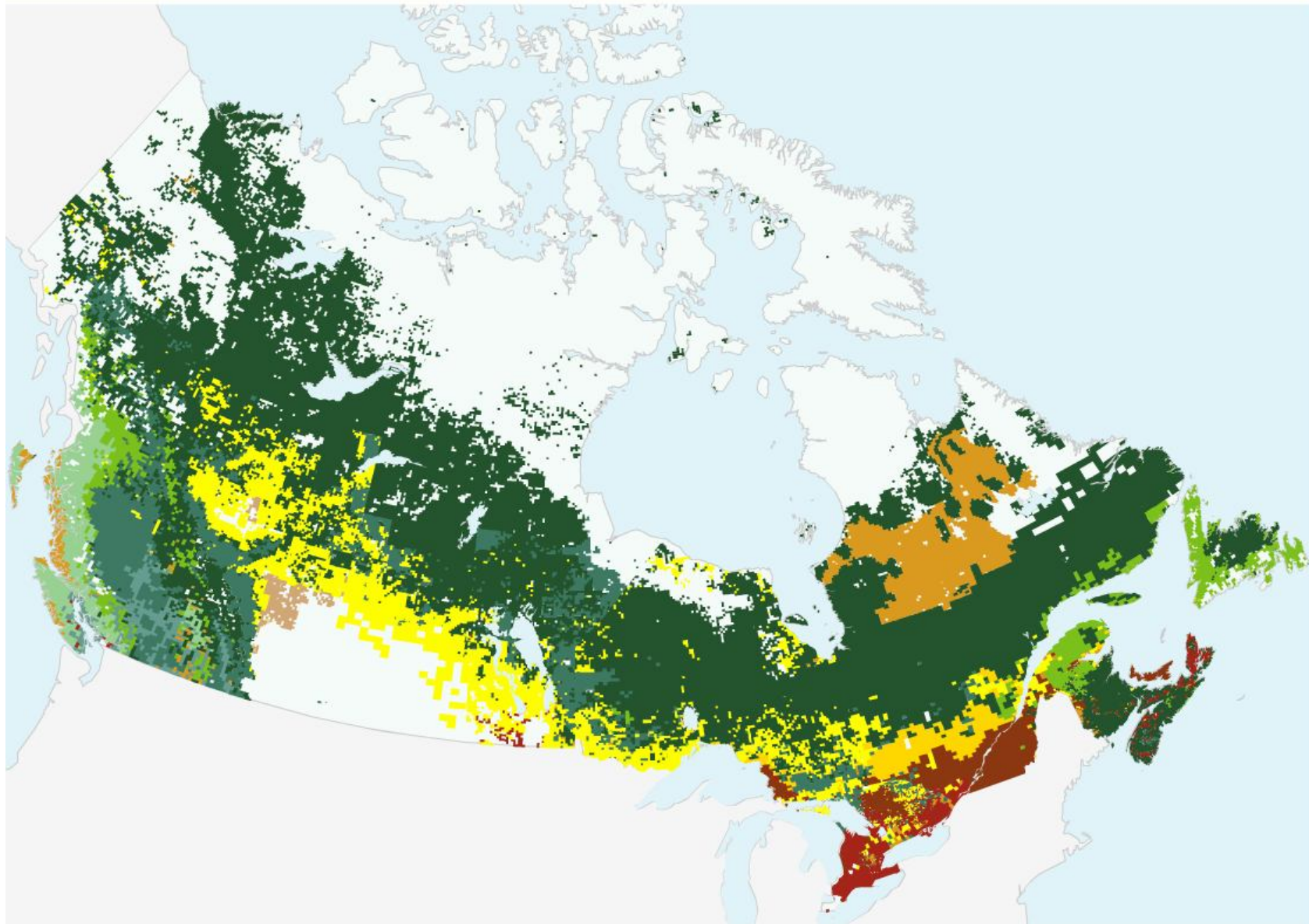
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<http://www.sfmcanada.org/english/im-protectedareas.asp>

Predominant Species in Canada's Forests

OTHER I



<http://www.sfmcanada.org/english/im-predominantspecies.asp>



Home > Canada's Forest Inventory 2001

- Canadian Forest Service (CFS)
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- Home
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- Canadian Forest Inventory Committee
- Related sites
- Staff and partners

Proactive Disclosure
Proactive Disclosure



Canfi data summaries

1. Area classification, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)
2. Treed Land by Class, Ownership, and Status
 - [Canada](#)
 - [By Province/Territory](#) (full version)
3. Forest Land by Status, Stocking Class and Maturity Class, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)
4. Area and Gross Merchantable Volume on Nonreserved Stocked Forest Land, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)
5. Statistics on Terrestrial Ecozones, 2001
 - [Canada](#)
6. Area classification by terrestrial ecozone, 2001 (Thousands of hectares)
 - [Canada](#)
 - [By Province/Territory](#) (full version)
7. Volume classification by terrestrial ecozone, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)
8. Statistics on Forest Regions, 2001
 - [Canada](#)
9. Area classification by forest region, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)
10. Volume classification by forest region, 2001
 - [Canada](#)
 - [By Province/Territory](#) (full version)

<http://cfs.nrcan.gc.ca/subsite/canfi/data-summaries>



Volume classification by forest region, 2001

- 1.10 Volume classification by forest region, 2001 (Millions of cubic metres)
- 1.10 Volume classification by forest region and province/territory, 2001 (Millions of cubic metres)

1.10 Volume classification by forest region, 2001 (Millions of cubic metres)

	Canada ^a
A. Volume on stocked forest land	
Boreal - predominantly forest	13 625
Boreal - forest and grassland	137
Boreal - forest and barren	1 599
Subalpine	3 078
Montane	2 008
Coast	2 647
Columbia	776
Deciduous	40
Great Lakes - St. Lawrence	3 394
Acadian	827
Grassland	164
Tundra	1 089
Canada	29 384

B. Volume on nonreserved stocked forest land	
Boreal - predominantly forest	12 969
Boreal - forest and grassland	132
Boreal - forest and barren	1 567
Subalpine	2 751
Montane	1 835
Coast	2 439
Columbia	679
Deciduous	40
Great Lakes - St. Lawrence	3 183
Acadian	797
Grassland	157
Tundra	953
Canada	27 502

^a 1 hectare (ha) = 10 000 m², 1 km² = 100 ha, 1 ha = 2.470 966 acres
Source: Canada's Forest Inventory 2001.



Area and gross merchantable volume on nonreserved stocked forest land, 2001

- 1.4 Area and gross merchantable volume on nonreserved stocked forest land, 2001
- [1.4 Area and Gross Merchantable Volume on Nonreserved Stocked Forest Land by Province/Territory, 2001](#)

1.4 Area and gross merchantable volume on nonreserved stocked forest land, 2001

	Canada ^a
A. Area by maturity class (000 ha)	
Regeneration	16 751
Immature	66 305
Mature	79 553
Overmature	16 674
Uneven-aged	3 983
Unclassified	77 378
Total	260 643

B. Total volume by maturity class (000 000 m³)

Regeneration	155
Immature	6 787
Mature	14 358
Overmature	2 775
Uneven-aged	530
Unclassified	2 896
Total	27 502

Forest Region	Stocked Forest Land							
	Area (000 ha)	Area (000 ha) with Volume ^d	Volume by forest type (000 000 m ³)					Average Volume (m ³ /ha)
			Softwood	Mixedwood	Hardwood	Unknown	Total	
Boreal - predominantly forest	138 419	137 434	8 278	3 149	2 173	23	13 624	99.13
Boreal - forest & grassland	2 041	1 875	8	10	93	25	137	73.03
Boreal - forest & barren	55 876	55 405	1 305	236	59	-	1 599	28.87
Subalpine	14 447	13 440	2 900	158	20	-	3 078	229.01
Montane	11 188	10 410	1 797	183	28	-	2 008	192.88
Coast	7 000	5 882	2 427	198	22	-	2 647	449.95
Columbia	3 586	3 319	728	43	6	-	776	233.93
Deciduous	299	299	4	6	30	-	40	134.34
Great Lakes - St. Lawrence	23 749	23 599	653	1 358	1 384	-	3 395	143.86
Acadian	8 812	8 656	426	247	155	-	827	95.55
Grassland	1 380	1 319	133	9	20	1	164	124.20
Tundra	8 122	7 425	1 032	52	6	-	1 089	146.71
Canada	274 918	269 064	19 690	5 648	3 997	50	29 384	109.21



Evert F. Forestry Cronicle growth Canada

Sök

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Nätet

Menade du: [Evert F. Forestry *Chronicle* growth Canada](#)

[PDF] [Predicting Growth of Canada's Forests: A Plan Action](#) - [[Översätt den här sidan](#)]

Filtyp: PDF/Adobe Acrobat - [Se som HTML-version](#)

Evert, F. 1970. Black spruce **growth** and yield at variou ... For. Serv. In. Rep. FMR-X-102. viii. +.

F. Eve1. 136 June 1978 The **Forestry Chronicle**.

[article.pubs.nrc-cnrc.gc.ca/ppv/RPViewDoc?_handler...](#) - [Liknande](#) -   

av CBR Base - [Relaterade artiklar](#) - [Alla 2 versionerna](#)

**Evert, F., Predicting Growth of Canada's Forests: A Plan for Action,
The Forestry Cronicle, June 1978**

[http://article.pubs.nrc-cnrc.gc.ca/RPAS/rpv?hm=HInit&afpf=tfc54135-3.pdf
&journal=tfc&volume=54](http://article.pubs.nrc-cnrc.gc.ca/RPAS/rpv?hm=HInit&afpf=tfc54135-3.pdf&journal=tfc&volume=54)

**Evert, F., Predicting Growth of Canada's Forests: A Plan for Action,
The Forestry Chronicle, June 1978**

**Table 1. Canada: and Area and Mean Annual Increment
as Reported by F.L.C. Reed and Associates Ltd. (1978)**

Province	Land Area (1 000 ha)	Mean Annual Increment (m³/ha)
British Columbia	25 652***	2.03 +
Alberta	16 398*	1.75 +
Saskatchewan	7 854*	.99 +
Manitoba	1 966**	1.54 +
Ontario	39 944*	1.26 +
Quebec	45 808*	1.26 +
New Brunswick	5 713*	1.19
Nova Scotia	4 355*	1.75
Prince Edward Island	247*	1.05
Newfoundland	3 787*	1.47
Labrador	3 612****	1.36

- * Productive forest land
- ** Productive accessible forest land
- *** Area of mature timber
- **** Better forests only
- + All species at rotation age

**Evert, F., Predicting Growth of Canada's Forests: A Plan for Action,
The Forestry Chronicle, June 1978**

Unfortunately, the available growth data of the type required are extremely limited in Canada because of, first, the inventory procedures used which are mostly exploitation-oriented, second, failure to integrate yield prediction methods of volume determination of existing stands with those of inventory methods, and, third, problems associated with data storage and retrieval. The kind of growth information available in Canada is simply that presented in Table 1 — mean annual increments in m^3/ha by provinces. It is obviously quite inadequate for forest management planning — the tabular information pertains to past growth, is for all species combined, and does not discriminate between site qualities and stand densities.

It cannot be overemphasized that the technical requirements for the collection and interpretation of growth data as outlined must be met to satisfy the needs of ever-increasing complexity of forest management planning.



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Forest Industry Generating Stations, 1997



Forest-based Industry Generating Stations, 1997: By Fuel Type

- Hydro-electric
- Natural Gas
- Petroleum Products
- Forest-waste Fuels

Populated Places

- 1 - 4999
- 5 000 - 49 999
- 50 000 - 99 999
- 100 000 and greater
- Provincial and Territorial Capital
- National Capital

Road network

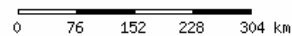
- Road network
- Ferry route

Boundaries

- International
- Provincial / Territorial
- Canada / Kalaallit Nunaat dividing line
- EEZ (200 mile)

Other Features

- Water area
- Regions outside Canada



Map Sources

Forest-based Industry Generating Stations, 1997: By Fuel Type

- Hydro-electric
- Natural Gas
- Petroleum Products
- Forest-waste Fuels

Boundaries

- International
- - - Provincial / Territorial
- - - Canada / Kalaallit Nunaat
dividing line
- - - EEZ (200 mile)

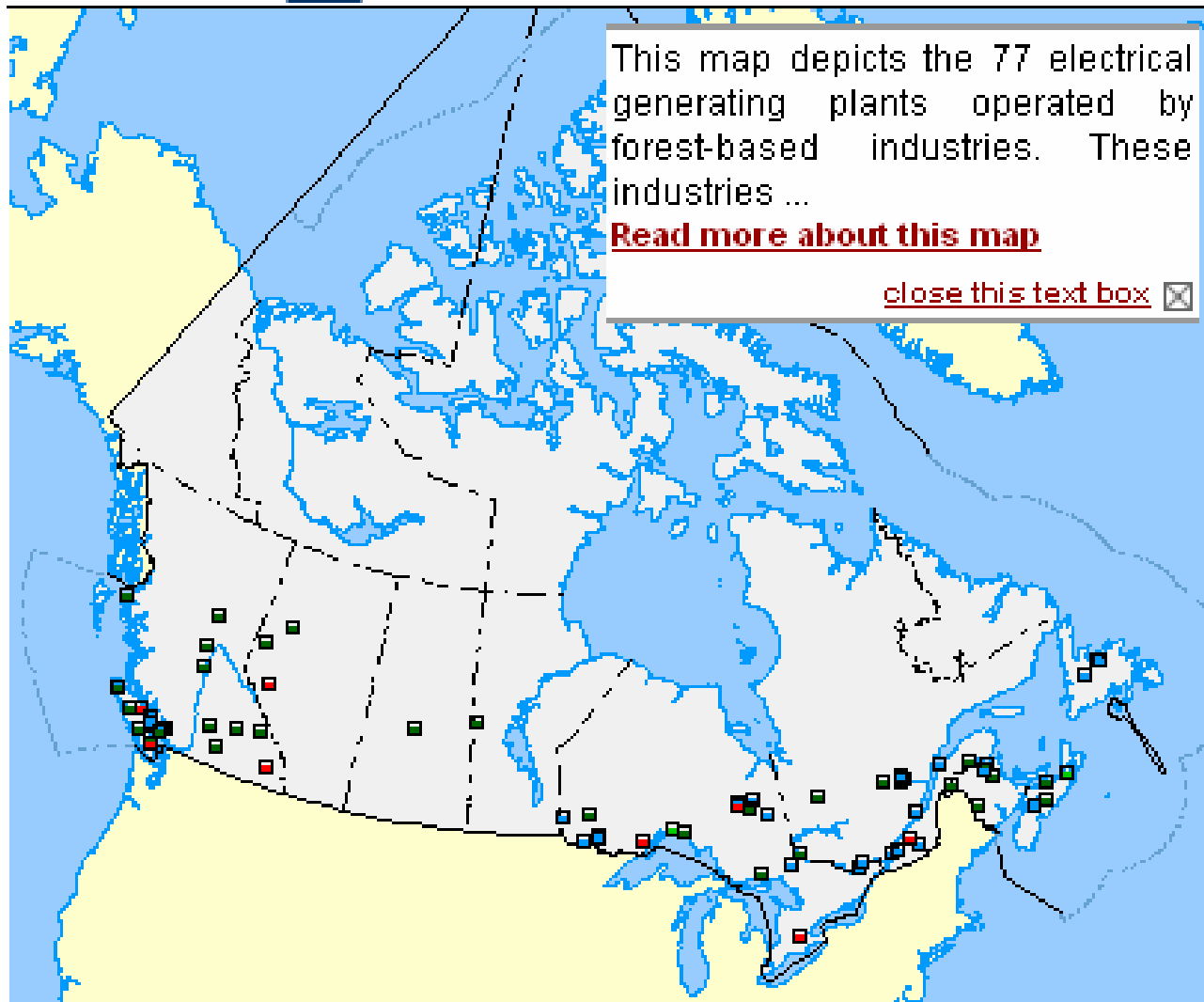
Other Features

- Water area
- Regions outside Canada

This map depicts the 77 electrical generating plants operated by forest-based industries. These industries ...

[Read more about this map](#)

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Canada is a necessary

**partner in the
global project!**

Peter Lohmander