Food and Agriculture Organization of the United Nations

Global Forest Resources Assessment 2020

Report

Canada

Rome, 2020

FAO has been monitoring the world's forests at 5 to 10 year intervals since 1946. The Global Forest Resources Assessments (FRA) are now produced every five years in an attempt to provide a consistent approach to describing the world's forests and how they are changing. The FRA is a country-driven process and the assessments are based on reports prepared by officially nominated National Correspondents. If a report is not available, the FRA Secretariat prepares a desk study using earlier reports, existing information and/or remote sensing based analysis.

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Introduction

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Introductory text

Canadian governments engage in forest management, monitoring and reporting at multiple levels. The Canadian Forest Service of Natural Resources Canada prepares a national State of the Forest report that is tabled in Parliament each year. This report is an important resource; its data and analyses are complementary to the data presented in this data reporting package for CFRQ and FRA. Detailed forest statistics and inventory data may also be obtained at several online information resources. While this CFRQ and FRA reporting package provides data that have been tailored to meet international forest assessment information needs, interested stakeholders are encouraged to pursue additional and more detailed data and information provided by Canada in our State of the Forest and online information resources. Canadian Provincial and Territorial governments also provide detailed data and information products.

1 Forest extent, characteristics and changes

1a Extent of forest and other wooded land

National data

Data sources

1990	**References**	Canada’s National Forest Inventory (documentation available at nfi.nfis.org); Canada’s National Deforestation Monitoring System (system description available at https://cfs.nrcan.gc.ca/publications?id=36042 ; Canada's National Afforestation Inventory (best available documentation available at https://cfs.nrcan.gc.ca/publications?id=25528)
	Methods used	National Forest Inventory, Sample-based remote sensing assessment, Registers/questionnaires
	Additional comments	

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2005	**References**	Canada’s National Forest Inventory (nfi.nfis.org; Stinson et al, 2017, ENFIN chapter)
	Methods used	National Forest Inventory, Sample-based remote sensing assessment, Registers/questionnaires
	Additional comments	Estimates directly from Canada's National Forest Inventory, revised 2006 baseline (version 3, December 2013) Standard Report Table 4.0.

2010	**References**	Canada’s National Forest Inventory (documentation available at nfi.nfis.org); Canada’s National Deforestation Monitoring System (system description available at https://cfs.nrcan.gc.ca/publications?id=36042 ; Canada's National Afforestation Inventory (best available documentation available at https://cfs.nrcan.gc.ca/publications?id=25528)
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	Additional comments	Canada's NFI baseline estimates (see data point for 2005) adjusted for known deforestation and afforestation using data from Canada's National Deforestation Monitoring System and Canada's National Afforestation Inventory, respectively. No data are available on change in areas of other wooded land or other land with tree cover, so NFI baseline estimates are carried forward.

2015	**References**	Canada’s National Forest Inventory (NFI); Canada’s National Deforestation Monitoring System;
	Methods used	National Forest Inventory, Sample-based remote sensing assessment, Registers/questionnaires
	Additional comments	Canada's NFI baseline estimates (see data point for 2005) adjusted for known deforestation using data from Canada's National Deforestation Monitoring System. No data are available on change in areas of other wooded land or other land with tree cover, so NFI baseline estimates are carried forward.

2016	References	Canada’s National Forest Inventory (NFI); Canada’s National Deforestation Monitoring System;
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Classifications and definitions

	National class	Definition
1990	Forest area	National Forest Inventory: Land at least 10 percent occupied (by crown cover) by tree species of any size, including young natural stands and all plantations that have yet to reach the minimum crown density. Temporarily non-stocked areas (e.g., recent harvests, burn scars) expected to revert to forests (as defined) are included. The trees must be capable of reaching a mature height of 5 m in situ Deforestation and afforestation monitoring: 25% crown closure or greater with the potential to reach tree height of at least 5 m at maturity in situ and covering an area of 1 ha or greater (having a minimum width of 20 m)
	Other wooded land	The land that is either (i) 5 to 10 percent occupied (by crown cover or stocking level) by tree species capable of reaching a mature height of 5 m, or (ii) more than 10 percent occupied (by crown cover or stocking level) by tree species not capable of reaching a mature height of 5 m
	Other land with tree cover	Land that has tree cover but is not classified as Forest or Other wooded land.

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	Forest area	

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Original data and reclassification

	Classifications and definitions		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
1990	Forest area	348 272.93	100.00 %	%	**%**
	Other wooded land	40 865.66	0.00 %	100.00 %	**0.00 %**
	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**397 637.55**	**348 272.93**	**40 865.66**	**8 498.96**

2000	**Classifications and definitions**		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
	Forest area	347 801.97	100.00 %	%	**%**
	Other wooded land	40 865.66	0.00 %	100.00 %	**0.00 %**

	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**397 166.59**	**347 801.97**	**40 865.66**	**8 498.96**

2005	**Classifications and definitions**		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
	Forest area	347 575.76	100.00 %	%	**%**
	Other wooded land	40 865.66	%	100.00 %	**%**
	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**396 940.38**	**347 575.76**	**40 865.66**	**8 498.96**

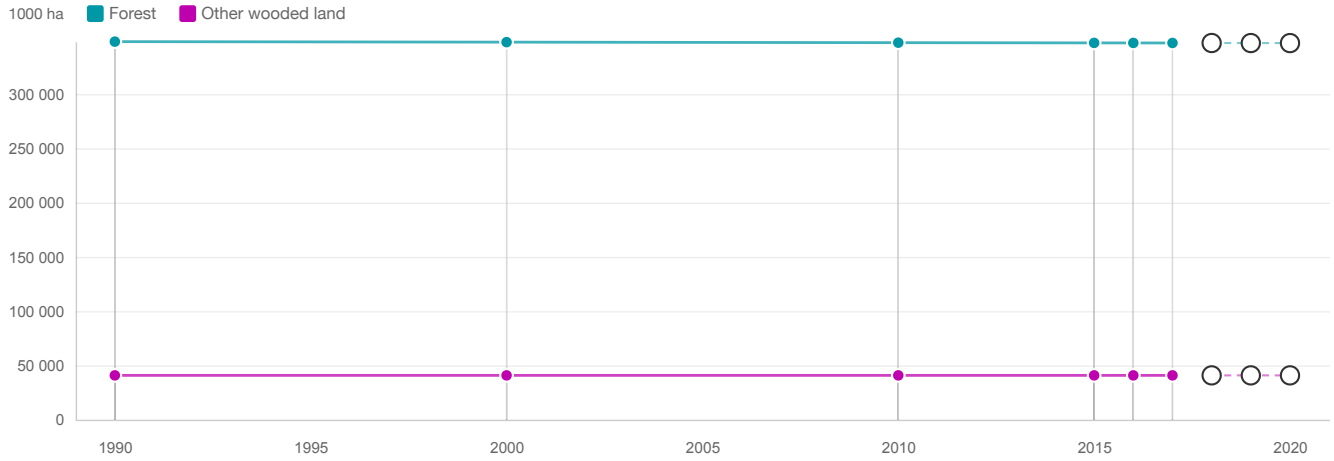
2010	**Classifications and definitions**		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
	Forest area	347 322.21	100.00 %	%	**%**
	Other wooded land	40 865.66	%	100.00 %	**%**
	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**396 686.83**	**347 322.21**	**40 865.66**	**8 498.96**

2015	**Classifications and definitions**		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
	Forest area	347 115.71	100.00 %	%	**%**
	Other wooded land	40 865.66	%	100.00 %	**%**
	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**396 480.33**	**347 115.71**	**40 865.66**	**8 498.96**

2016	**Classifications and definitions**		**FRA classes**		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
	Forest area	347 076.04	100.00 %	%	**%**
	Other wooded land	40 865.66	%	100.00 %	**%**

	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**396 440.66**	**347 076.04**	**40 865.66**	**8 498.96**

	Classifications and definitions		FRA classes		
	Class	**Area (1000 ha)**	**Forest**	**Other wooded land**	**Other land**
2017	Forest area	347 039.05	100.00 %	%	**%**
	Other wooded land	40 865.66	%	100.00 %	**%**
	Other land with tree cover	8 498.96	0.00 %	0.00 %	**100.00 %**
	Total	**396 403.67**	**347 039.05**	**40 865.66**	**8 498.96**


1000 ha
Forest
Other wooded land
300 000
250 000
200 000
150 000
100 000
50 000
0
1990
1995
2000
2005
2010
2015
2020

FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest (a)	348 272.93	347 801.97	347 322.21	347 115.71	347 076.04	347 039.05	347 002.07	346 965.08	346 928.10
Other wooded land (a)	40 865.66	40 865.66	40 865.66	40 865.66	40 865.66	40 865.66	40 865.66	40 865.66	40 865.66
Other land (c-a-b)	**520 212.41**	**520 683.37**	**521 163.13**	**521 369.63**	**521 409.30**	**521 446.29**	**521 483.27**	**521 520.26**	**521 557.24**
Total land area (c)	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**	**909 351.00**

The FAOSTAT land area figure for the year 2015 is used for all reference years

Climatic domain	% of forest area 2015	Override value
Boreal	**76.00**	77.00
Temperate	**24.00**	23.00
Sub-tropical	**0.00**	0.00
Tropical	**0.00**	0.00

Comments

National Forest Inventory (NFI) revised 2006 baseline data (collected between 2000 and 2006) are reported into the 2005 reporting year for *forest* and *other wooded land* areas in Table 1a. Canada's NFI uses a remote sensing survey to monitor Canada's forests. This remote sensing survey is complemented by a ground plot survey. Refer to Stinson et al. (2017) Chapter 12: Canada, in Vidal et al. (eds) *National Forest Inventories: Assessment of Wood Availability and Use*. ISBN 978-3-319-44015-6 for overview of Canada's NFI. Refer to https://nfi.nfis.org for detailed documentation of the NFI data collection, compilation and statistical estimation procedures.

Forest area for the 1990, 2000, 2010, 2015, 2016 and 2017 reporting years was calculated by treating the 2005 forest area as a base, and adjusting using our national data on forest areas lost (deforestation) and gained (afforestation). The National Deforestation Monitoring System uses a remote sensing survey. The National Afforestation Inventory used surveys to collect data on afforestation until 2008, when the program was cancelled. Annual areas deforested and afforested are provided in Original Data for Table 1c. Area afforested after 2008 is treated as 0 ha/year. The actual area afforested annually since 2008 is almost certainly greater than 0 ha/year and very likely similar to the annual areas prior to 2008, but Canada reports 0 ha/year in national greenhouse gas inventory reporting (UNFCCC) and zero is therefore reported here also, for consistency. The likely non-zero area of afforestation in Canada annually since 2008 is very small relative to the national total forest area.

Equation 1 shows how forest area in 2010 was calculated by subtracting the area deforested between 2005 and 2010 and adding the area known to have been afforested during this period to the forest area estimated for circa 2005. Equation 2 shows the analogous, reverse calculation for forest area in 2000. This approach is used for all reporting years.

(Equation 1) $F_{2010} = F_{2005} - D_{(2005,2006,2007,2008,2009)} + A_{(2005,2006,2007,2008,2009)}$

(Equation 2) $F_{2000} = F_{2005} + D_{(2004,2003,2002,2001,2000)} - A_{(2004,2003,2002,2001,2000)}$

Insufficient information is available at this time on natural forest expansions and losses at the national level.

Forest area gains and losses are assumed to involve corresponding gains and losses in *other land* because our information is about land-use change. In the absence of information, no net change in the area of *other wooded land* or *other land with tree cover* was assumed.

Values for 2017 are the most recent values available as data points because 2016 is the most recent year for which deforestation area estimates are available (the value reported for 2017 may be treated as the value at the start of the calendar year). The 2016 deforestation rate was imputed forward through 2020 for reporting forest area in 2018, 2019 and 2020; these must be treated as inputed values, not data.

Note that net forest area changes reported here differ from those derived from tree cover gain/loss maps (such as Hansen et al. 2013; DOI: 10.1126/science.1244693). Forest, as defined by FAO, "includes areas with young trees that have not yet reached but which are expected to reach a canopy cover of 10 percent and tree height of 5 meters. It also includes areas that are temporarily unstocked due to clear-cutting as part of a forest management practice or natural disasters, and which are expected to be regenerated within 5 years. Local conditions may, in exceptional cases, justify that a longer time frame is used." Tree cover losses do not always involve forest area loss. In Canada, most tree cover losses are caused by wild fire or harvesting as part of a forest management practice. Additionaly, current large area remote sensing methodologies can fail to detect post-disturbance tree cover recovery in low-productivity forests, such as those found in Canada's boreal zone (see Guindon et al. 2017; https://doi.org/10.1002/ecs2.2094).

1b Forest characteristics

National Data

Data sources + type of data source eg NFI, etc

Original data are from Canada's National Forest Inventory (accessible online at nfi.nfis.org) and National Forestry Database (accessible online at http://nfdp.ccfm.org/).

National Forestry Database. Data - Regeneration. Table 6.2 Area of direct seeding by jurisditcion, tenure and application method. 1990 - 2016. http://nfdp.ccfm.org/en/data/regeneration.php (accessed July 30, 2018).

National Forestry Database. Data - Regeneration. Table 6.2.2 Area planted by jurisdiction, tenure and species group. 1990 - 2016. http://nfdp.ccfm.org/en/data/regeneration.php (accessed July 30, 2018).

National classification and definitions

Four types of stand regeneration are recognized in Canada's National Forest Inventory: (i) natural regeneration, (ii) natural regeneration with supplementary planting (<50%), (iii) planted regeneration and (iv) seeded regeneration.

Data on forest regeneration are collected and summarized in Canada's National Forestry Database, including (i) area of site preparation (chemical treatment, mechanical treatment, prescribed burning), (ii) area of direct seeding, (iii) number of seedlings planted, (iv) area planted and (v) area of stand tending.

Original data

Original forest regeneration data from National Forestry Database are provided here for the period 1975-2016. The same data for the period 1990-2016 is also presented in Table 1d - Annual reforestation.

Area planted, area seeded and total area reforested per year (ha)

Year	Area seeded (ha)	Area planted (ha)	Total area regenerated (1000 ha)
1975	37106	128105	165.211
1976	37835	120665	158.5
1977	42584	120664	163.248
1978	38249	126629	164.878
1979	40731	141986	182.717
1980	66060	153106	219.166
1981	45109	167362	212.471
1982	50377	190956	241.333
1983	46860	219595	266.455
1984	32820	248897	281.717
1985	28350	274767	303.117
1986	29561	312233	341.794
1987	40455	383564	424.019
1988	46222	431676	477.898
1989	49660	444061	493.721
1990	40708	481292	522
1991	47309	469011	516.32
1992	36268	434434	470.702
1993	28882	419338	448.22

1994	30218	445928	476.146
1995	26303	434360	460.663
1996	32644	432415	465.059
1997	26039	454753	480.792
1998	31522	453440	484.962
1999	25642	460269	485.911
2000	20056	459029	479.085
2001	21260	470772	492.032
2002	18903	450886	469.789
2003	46050	435381	481.431
2004	21928	431581	453.509
2005	19661	448338	467.999
2006	20550	465779	486.329
2007	34546	475794	510.34
2008	20597	440669	461.266
2009	15937	395075	411.012
2010	12061	383877	395.938
2011	11202	367588	378.79
2012	10540	348730	359.27
2013	11197	420494	431.691
2014	11906	403006	414.912
2015	13050	415264	428.314
2016	15790	410221	426.011

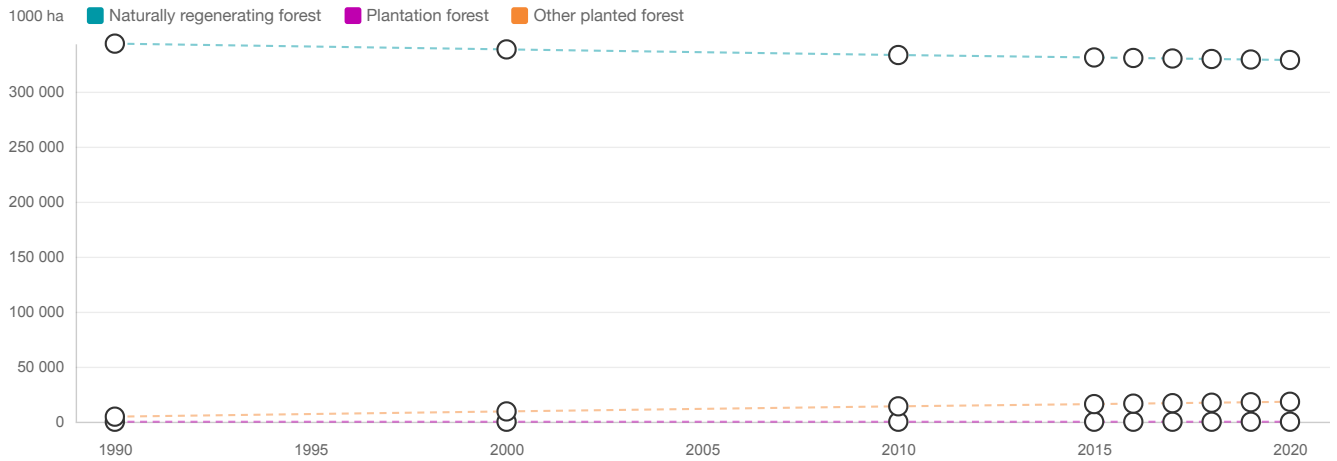
Analysis and processing of national data

Estimation and forecasting

Data on stand regeneration are lacking for many plots in the NFI's baseline data (collected during 2000-2006) and the NFI therefore cannot be used to provide statistics on the area of natural or planted forest. National Forestry Database statistics on forest area planted or directly seeded annually were used instead to calculate the area of planted forest. Annual statistics were treated as additive, assuming that no areas were planted twice during the statistical record, which dates back to 1975. Certainly forest areas were planted in Canada earlier than this, so the reported values are under-estimates. Current data is available to 2016; data reported for 2017 through 2020 are estimated by applying the annual average rate of planting for the 2015 - 2020 period, as reported in Table 1d - Annual reforestation.

Reclassification into FRA 2020 categories

Plantations do exist in Canada but are relatively unusual and the data do not make it possible to distinguish plantations from other planted forests. All planted forests are reported in the Other planted forest category. All remaining forests are reported in the Naturally regenerating forest category.


1000 ha
Naturally regenerating forest
Plantation forest
Other planted forest
300 000
250 000
200 000
150 000
100 000
50 000
0
1990
1995
2000
2005
2010
2015
2020

FRA categories	Forest area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest (a)	343 654.68	338 415.86	333 306.46	331 086.98	330 621.30	330 157.15	329 693.01	329 228.85	328 764.71
Planted forest (b)	**4 618.25**	**9 386.11**	**14 015.75**	**16 028.73**	**16 454.74**	**16 881.90**	**17 309.06**	**17 736.23**	**18 163.39**
Plantation forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
…of which introduced species	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other planted forest	4 618.25	9 386.11	14 015.75	16 028.73	16 454.74	16 881.90	17 309.06	17 736.23	18 163.39
Total (a+b)	**348 272.93**	**347 801.97**	**347 322.21**	**347 115.71**	**347 076.04**	**347 039.05**	**347 002.07**	**346 965.08**	**346 928.10**
Total forest area	**348 272.93**	**347 801.97**	**347 322.21**	**347 115.71**	**347 076.04**	**347 039.05**	**347 002.07**	**346 965.08**	**346 928.10**

Comments

“Other planted forest” may include some plantations, but data are not available to report separately on these.

1c Primary forest and special forest categories

National Data

Data sources + type of data source eg NFI, etc

Canada's NFI was used to estimate the area of temporarily unstocked and/or recently regenerated forest and the area of primary forest. For primary forest, NFI data were overlaid in GIS with available human access mapping datasets, listed below. Human access mapping datasets were originally accessed for assessing primary forest area for FRA 2015. Updated versions of human access mapping datasets were not accessed for FRA 2020 because the forest area data are based NFI baseline measurements taken during 2000-2006. Using different human access mapping datasets with different comprehensiveness of mapping for different time periods would result in spurious trends. Using the most comprehensive collection possible for one time period and applying this across all FRA 2020 reporting years almost certainly provides an underestimate of trend. We therefore cannot have high confidence in the reported primary forest area trend.

Sources:

Canada's National Forest Inventory, revised 2006 baseline (Version 3, December 2013) (https://nfi.nfis.org)

National Road Network. Available at http://www.geobase.ca/geobase/en/data/nrn/index.html (accessed 2013)

BC Digital Road Atlas. Available at http://archive.ilmb.gov.bc.ca/crgb/products/mapdata/digital_road_atlas_products.htm (accessed 2013). Current link: https://catalogue.data.gov.bc.ca/dataset/digital-road-atlas-dra-demographic-partially-attributed-roads

BC consolidated cutblocks. Data compiled in 2013 by the Province of British Columbia subsequent to NFI establishment; used to supplement NFI information about anthropogenic stand origin.

Boreal ecosystem anthropogenic disturbance vector data (1). Available at https://open.canada.ca/data/en/dataset/afd0ce47-17c3-445c-b823-2f86409da2e0 (accessed 2013)

(1) Pasher et al. (2013) Development of boreal ecosystem anthropogenic disturbance layers for Canada based on 2008 to 2010 Landsat imagery. Canadian Journal of Remote Sensing, 39(1):42-58.

National classification and definitions

Canada does not have areas with bamboo, mangroves or rubber.

Canada does not track the area of temporarily unstocked or recently regenerated forest, per se, at the national level. A national estimate of forest area where tree height does not exceed 1.3 m was generated to serve as a proxy.

Canada does not have a national definition of primary forest. A proxy definition was developed and reported directly into the FRA platform.

Original data

The estimated area of forest where tree height does not exceed 1.3 m, based on NFI establishment data (collected during 2000-2006) is 25,249.43 thousand ha.

Canada does not have original data on primary forest. Estimates developed for FRA are reported directly into the FRA platform.

Analysis and processing of national data

Estimation and forecasting

The NFI baseline estimate of temporarily unstocked and/or recently regenerated forest area was used directly to report for 2000. No forecasting or back-casting was done. The area of temporarily unstocked and/or recently regenerated forest in Canada is dynamic, with trends driven by interannual variability in the area affected by natural disturbance (mostly wild fire) and variations in regeneration rates, but with only one completed NFI measurement, it is possible to report area of temporarily unstocked and/or recently regenerated forest for one reporting year only. However, the NFI estimate was compared with a rolling sum of area disturbed by wildfire in the previous 10 years plus the area harvested in the previous 5 years. We found this rolling sum to be similar to the NFI estimate (25 million ha) in 2005. The area burned between 1995 and 2005 plus the area harvested between 2000 and 2005 is 29 million ha. We should expect the rolling sum to be higher than the area of temporarily unstocked and/or recently regenerated forest calculated using NFI because the reported burned area is a total burned area (forest and non-forest lands burned by wild fires).

The area of primary forest was estimated using information about human activities, human access, and protection status as proxy indicators. Forests having no record of human activities were identified by interrogating the attributes of every forest stand sampled in the NFI to confirm the absence of anthropogenic treatment or origin in the stand's recorded history. Proximity to human influence was used as a proxy indicator of ecological process disturbance. Proximity to human settlement, development or road access was evaluated by classifying every NFI 2 x 2 km photo-plot as either accessed or non-accessed. The entire photo-plot was classified as accessed when presence of human settlement or non-forest land use or road access was found in the plot. Non-accessed forest stands that have no record of human activity were classified as primary forest. Once all stands sampled by NFI were classified according to the above indicators, the standard NFI statistical procedures were used to estimate the area of primary forest . Refer to https://nfi.nfis.org for detailed documentation of the NFI data collection, compilation and statistical estimation procedures. The proportion of total forest area that is estimated to be primary forest was used to estimate primary forest area in each of the FRA reporting years because we do not have data on changes in primary forest area. The rate of change in primary forest in our FRA reporting therefore is simply the overall forest area change rate.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Primary forest	205 838.13	205 559.78	205 276.23	205 154.18	205 130.73
Temporarily unstocked and/or recently regenerated		25 249.43			
Bamboos	0.00	0.00	0.00	0.00	0.00
Mangroves	0.00	0.00	0.00	0.00	0.00
Rubber wood	0.00	0.00	0.00	0.00	0.00

Comments

Canada does not have areas with bamboo, mangroves or rubber.

There was a minor change in the way Canada estimated primary forest area here relative to FRA2015. In FRA2015, all protected forest stands were classified as primary forest, even when they have human access. It was assumed that protection status precludes the types of human activities that leave clearly visible impacts or cause ecological processes to be significantly disturbed, even when there is human access. This assumption is no longer made. Protected forests that have roads going through them, for example, are not classified as primary forests along the road. In FRA2015, these would have been classified as primary forest. This change resulted in a slight downward adjustment to the estimated area of primary forest.

1d Annual forest expansion, deforestation and net change

National Data

Data sources + type of data source eg NFI, etc

Deforestation is monitored nationally in Canada by Natural Resources Canada, Canadian Forest Service using the National Deforestation Monitoring System. This system is described in reference (1).

Canada's National Afforestation Inventory (NAI) collected data on afforestation until 2008 and there has been no national source of data on area of afforestation since 2008. The NAI data and collection methods are described in reference (2).

No national data are available on natural forest expansion.

References:

(1) Dyk A, Leckie DG, Tinis S, Ortlepp SM (2015) Canada's National Deforestation Monitoring System: System Description. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, BC. Information Report BC-X-439. Available online at https://cfs.nrcan.gc.ca/authors/read/16767

(2) White and Kurz (2005) Afforestation on private land in Canada from 1990 to 2002 estimated from historical records. The Forestry Chronicle, 81:491-497

National classification and definitions

UNFCCC definitions of afforestation and deforestation are used in Canada.

Deforestation is the direct, human-induced conversion of forest to non-forest land. It does not include temporary forest cover loss such as harvest that is followed by regeneration or forest cover loss resulting from natural disturbances such as wild fires, insect epidemics or wind storms.

Afforestation is the direct, human-induced conversion of land that has not been forested for a period of at least 50 years to forest land through planting, seeding, and/or promotion of natural seed sources.

Original data

Deforestation		Afforestation
Area (000 ha)		Area (ha)
1988	70.63	8664
1989	68.24	8664
1990	64.038	9714
1991	62.587	8137
1992	58.040	8157
1993	85.930	8605
1994	46.949	7562
1995	42.104	7184
1996	43.145	6572
1997	43.544	6460
1998	47.477	6088
1999	50.433	4807
2000	44.650	5855
2001	44.532	5411

2002	55.287	3644
2003	48.826	64
2004	50.496	2612
2005	49.056	4816
2006	75.152	283
2007	46.979	676
2008	47.549	1377
2009	41.971	
2010	40.766	
2011	38.586	
2012	37.943	
2013	44.537	
2014	44.661	
2015	39.676	
2016	36.985	

Analysis and processing of national data

Estimation and forecasting

Deforestation area in the most recent year (2016) was imputed to 2017-2020 in order to provide a 5-year deforestation rate for the 2015-2020 reporting period.

Afforestation area in the most recent year (2008) was not imputed. The area of afforestation in Canada since 2008 is not tracked or known at the national scale, and is presumed here to be zero for the purposes of reporting. This is certainly an underestimate. Several provincial governments, private organizations and municipal governments run successfull tree planting programs in Canada on previously non-forest land, and while many of these track the number of trees planted, few track the area planted. A subset of these planting activities likely involve land use change (from non-forest to forest) but others likely result in increased tree cover on non-forest land.

Reclassification into FRA 2020 categories

To avoid confusion and ensure consistency with UNFCCC reporting, original deforestation data are used directly, with no reclassification to the FRA definition of deforestation.

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Forest expansion (a)	7.32	2.47	0.00	0.00
…of which afforestation	7.33	2.47		
…of which natural expansion				
Deforestation (b)	54.42	50.45	41.30	37.52
Forest area net change (a-b)	**-47.10**	**-47.98**	**-41.30**	**-37.52**

Comments

Afforestation data available until 2008 when National Afforestation Inventory program was cancelled. No data available for 2009 onward.

No data available on area of natural forest expansion.

Deforestation data available until 2016. The 2016 value was used for 2017 through 2020 here and in Table 1a - Extent of forest and other wooded land.

If curious about why forest expansion and deforestation areas reported here differ from tree cover loss/gain reported in the scientific literature, please refer to comments under section 1a (Extent of forest and other wooded land).

1e Annual reforestation

National Data

Data sources + type of data source eg NFI, etc

Data are from the National Forestry Database (NFD). The NFD serves as Canada's credible, accurate, and reliable source of national information on forest management and its impact on the forest resource. The NFD is a partnership mandated through the Canadian Council of Forest Ministers and composed of fourteen federal, provincial, and territorial ministers. The Canadian Forest Service at Natural Resources Canada collects data from provincial and territorial resource management organizations and is responsible for the dissemination of national forestry statistics.

National Forestry Database. Data - Regeneration. Table 6.2 Area of direct seeding by jurisdiction, tenure and application method. 1990 - 2016. http://nfdp.ccfm.org/en/data/regeneration.php (accessed July 30, 2018).

National Forestry Database. Data - Regeneration. Table 6.2.2 Area planted by jurisdiction, tenure and species group. 1990 - 2016. http://nfdp.ccfm.org/en/data/regeneration.php (accessed July 30, 2018).

National classification and definitions

The area of reforestation in Canada is the sum of the area of direct seeding and area planted. Direct seeding is the artificial systematic sowing of seeds by manual or mechanical means in an area on which a forest stand is to be raised. Planting is a mechanism for establishing a forest by setting out seedlings, transplants, or cuttings in an area.

Native trees are predominantly used in planting and seeding programs to regenerate harvested forest lands. Some jurisdictions explicitly exclude the use of exotic species for regeneration of forest land, while other jurisdictions have elected to use selected species in certain circumstances. The area of harvested land planted with exotics across Canada accounts for less than 1% in most years.

Original data

Area planted, area seeded and total area reforested per year (hectares)

Year	Area (ha) planted	Area (ha) seeded	Total area (ha) reforested
1990	481292	40708	522000
1991	469011	47309	516320
1992	434434	36268	470702
1993	419338	28882	448220
1994	445928	30218	476146
1995	434360	26303	460663
1996	432415	32644	465059
1997	454753	26039	480792
1998	453440	31522	484962
1999	460269	25642	485911
2000	459029	20056	479085
2001	470772	21260	492032
2002	450886	18903	469789
2003	435381	46050	481431
2004	431581	21928	453509
2005	448338	19661	467999
2006	465779	20550	486329
2007	475794	34546	510340

2008	440669	20597	461266
2009	395075	15937	411012
2010	383877	12061	395938
2011	367588	11202	378790
2012	348730	10540	359270
2013	420494	11197	431691
2014	403006	11906	414912
2015	415264	13050	428314
2016	410221	15790	426011

Analysis and processing of national data

Estimation and forecasting

The annual reforestation rate reported for the 2015 - 2020 period is the average of the area reforested in 2015 and 2016, which are the latest data available at this time. No forecasting has been done to estimate the total reforestation for the years 2017 through 2020.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Reforestation	481.08	471.28	396.12	427.16

Comments

Reforestation rates - through planting and seeding (artificial regeneration) - tend to lag behind harvest rates because of the time that may be required for planning, production of seedlings, and site preparation.

Natural regeneration is often the most efficient approach for regenerating harvested areas when there is abundant existing understorey regeneration and a plentiful seed supply (e.g. lowland black spruce and tolerant hardwoods, respectively), or when tree species that can resprout from established root systems are present and desired (e.g. trembling aspen).

Artificial regeneration is suitable for sites where there is insufficient desired natural regeneration and where the objective is to achieve species composition targets required for sustainable forest management objectives

1f Other land with tree cover

National Data

Data sources + type of data source eg NFI, etc

Data are from Statistics Canada. Statistics Canada is the federal agency that is responsible for producing statistics to help better understand Canada, its population, resources, economy, society, and culture.

Tree orchards: Statistics Canada. Table 32-10-0417-01. Fruits, berries, and nuts. Accessed August 13, 2018 https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210041701

Urban tree cover: Statistics Canada. Human activity and the environment (16-201-X2018001) Forests in Canada, 2017. Table 2-8 (March 14, 2018). https://www150.statcan.gc.ca/n1/pub/16-201-x/16-201-x2018001-eng.htm

Additional data sources for Table 2-8 can be found at Statistics Canada, 2018, Environment, Energy and Transportation Statistics Division special tabulation from Agriculture and Agri-Food Canada (AAFC), 2013, *AAFC Crop Inventiry 2011* (accessed August 10, 2015); AAFC, 2015, *Land Use 1990, 2000 and 2010* (accessed September 16, 2015); and the Census of Population, 2011.

National classification and definitions

Data reported for the area cultivated with fruit, berries and nuts encompasses both tree and non-tree crops; crops that typically produce fruit from a tree are reported here.

Urban tree cover was estimated by summing the land cover classes 210–Coniferous, 220–Deciduous and 230–Mixedwood from AAFC Crop Inventory, 2011 (30 metres) for all land that was not otherwise categorized as built-up, arable or water. Urban areas are defined by the 2011 census metropilitan areas.

Original data

Tree orchards

Fruits, berries and nuts	Unit of measure	2011	2016
Apples total area	Hectares	18,243	17,657
Pears total area	Hectares	944	895
Plums and prunes total area	Hectares	684	651
Cherries (sweet) total area	Hectares	1,951	2,193
Cherries (sour) total area	Hectares	1,147	1,053
Peaches total area	Hectares	3,154	2,667
Apricots total area	Hectares	136	149
Total	**Hectares**	**26,259**	**25,265**

Urban tree cover

	Land area	Tree cover
Census metropolitan area	km2	km2
Abbotsford–Mission	605	258
Barrie	898	195
Brantford	1,073	206
Calgary	5,108	319
Edmonton	9,427	1,216
Greater Sudbury	3,411	1,710
Guelph	594	152

Halifax	5,496	3,959
Hamilton	1,372	241
Kelowna	2,905	2,252
Kingston	1,939	659
Kitchener–Cambridge–Waterloo	827	114
London	2,666	265
Moncton	2,406	1,661
Montréal	4,258	842
Oshawa	904	166
Ottawa–Gatineau (Ont.)	3,287	979
Ottawa–Gatineau (Que.)	3,000	2,207
Peterborough	1,507	508
Québec	3,349	2,112
Regina	3,408	93
Saguenay	2,564	1,803
Saint John	3,363	2,597
Saskatoon	5,215	103
Sherbrooke	1,460	767
St. Catharines–Niagara	1,398	253
St. John's	805	472
Thunder Bay	2,556	1,342
Toronto	5,906	941
Trois-Rivières	1,041	357
Vancouver	2,883	1,383
Victoria	696	413
Windsor	1,022	29
Winnipeg	5,303	467
Total	**92652**	**31041**

Analysis and processing of national data

Estimation and forecasting

No forecasting was done.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Palms (a)	0.00	0.00	0.00	0.00	0.00
Tree orchards (b)			26.26	25.26	
Agroforestry (c)					
Trees in urban settings (d)			3 104.10		
Other (specify in comments) (e)					
Total (a+b+c+d+e)	**0.00**	**0.00**	**3 130.36**	**25.26**	**0.00**
Other land area	**520 212.41**	**520 683.37**	**521 163.13**	**521 369.63**	**521 557.24**

Comments

Data on the area of fruits, berries and nuts are collected on a 5 year cycle as part of the Census of Agriculture; this reporting cycle is offset from the GFRA by one year, and thus 2011 data are reported for 2010 here, and 2016 data are reported for 2015 here. Statistics Canada conducts the Census of Agriculture to develop a statistical portrait of Canada's farms and its agricultural operators. The data provide users with a comprehensive picture of the major commodities of the agriculture industry while also supplying information on new or less common crops, livestock, finances and use of technology.

Data on the total area of agroforestry is unavailable.

Data for trees in urban settings are based on a special report from Statistics Canada for the year 2011; this analysis has not been applied to other years of data, and the 2011 values have been reported for 2010.

2 Forest growing stock, biomass and carbon

2a Growing stock

National Data

Data sources + type of data source eg NFI, etc

Canada's National Forest Inventory (NFI) Standard Report Table 15.0. Total tree volume (million m^3) on forest land by forest type and age class in Canada.

Canada's National Forest Inventory (NFI) Standard Report Table 16.0. Total tree volume (million m^3) by species group and age class in Canada.

Canada's National Forest Inventory (NFI) Standard Report Table 14.0. Area (1000 ha) of forest land by species group and age class in Canada.

Source: Canada's National Forest Inventory, revised 2006 baseline (Version 3, December 2013) (https://nfi.nfis.org)

National classification and definitions

Total volume inside bark of the main stem for living trees >1.3m tall including stump and top as well as defective and decayed wood.

Original data

Available online at https://nfi.nfis.org/en/standardreports

Analysis and processing of national data

Estimation and forecasting

Canada's NFI is still in the process of completing the data processing, quality control, compilation and estimation for its first re-measurement cycle (2008-2017). Canada is therefore in a position to report national forest growing stock estimates for only one time period using NFI data. NFI baseline data collection was completed during 2000-2006 and growing stock estimate based on these data is reported here in the 2000 reporting year.

Forecasting and backcasting from 2000 was done using the original above-ground biomass carbon stock from Canada's National Forest Carbon Monitoring Accounting and Reporting System (NFCMARS) that are the source data for Tables 2c and 2d. Changes in forest growing stock should be closely related to changes in above-ground forest biomass and above-ground forest biomass carbon. Growing stock in 2000 was used to calculate growing stock in all other reporting years using above-ground biomass carbon stock change relative to 2000, as follows:

Growing stock in [year] = (growing stock in 2000) * (above-ground biomass in [year] / above-ground biomass in 2000)

This approach was used for forest growing stock in the top portion of Table 2a and the FRA Platform automatically filled the bottom portion of the table.

Growing stock data are typically used to derive above-ground biomass and carbon data, but here we did the opposite. We did this because the NFI only has one complete measurement cycle whereas NFCMARS has a complete time series 1990-2016. Inside NFCMARS, the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) uses merchantable wood volume growth increment data and converts these to biomass and then carbon, but this all happens internally during model runtime and CBM-CFS3 outputs are all in units of carbon (Kurz et al. 2009; doi:10.1016/j.ecolmodel.2008.10.018).

Note that NFCMARS does not provide data for all of Canada's forests; therefore, we are assuming here that the above-ground biomass carbon stock trend in Canada's managed forests is a good predictor of growing stock trend for Canada's entire forest (managed and unmanaged).

Reclassification into FRA 2020 categories

Canada's NFI baseline dataset does not have sufficient data on forest regeneration type to reliably distinguish naturally regenerating forest from planted forest. Many baseline plot establishments did not provide data on stand regeneration type. We used NFI baseline data (collected during 2000-2006) on forest area by age class and volume by age class to calculate a proxy value for planted forest total growing stock, as follows:

First, we assumed that all planted forest is 40 years old or younger, consistent with the data used to report in Table 1b - Forest characteristics.

Second, we calculated per ha growing stock for these forests using NFI data as the sum of total tree volume in all stands aged 0-40 years divided by the sum of area of all stands aged 0-40 years = 54.98 m^3/ha. For this calculation, we used NFI Standard Report Tables 14.0 and 16.0. This value was entered in the top portion of Table 2a and let FRA Platform fill the bottom portion of the table. The same value (54.98) was used for all years.

Third, we calculated total growing stock for naturally regenerating forest by subtracting the total growing stock for planted forest from the total growing stock for forest, and entered these values in the bottom portion of Table 2a and let FRA Platform fill the top portion of the table.

FRA categories	Growing stock m³/ha (over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest	137.85	138.30	134.23	133.69	133.70	133.81	133.93	134.05	134.17
Planted forest	54.98	54.98	54.98	54.98	54.98	54.98	54.98	54.98	54.98
…of which plantation forest									
…of which other planted forest	54.98	54.98	54.98	54.98	54.98	54.98	54.98	54.98	54.98
Forest	136.75	136.06	131.03	130.05	129.96	129.98	129.99	130.01	130.02
Other wooded land									

FRA categories	Total growing stock (million m³ over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest	47 371.47	46 804.42	44 738.83	44 262.58	44 202.91	44 179.42	44 155.94	44 132.45	44 108.97
Planted forest	253.91	516.05	770.59	881.26	904.68	928.17	951.65	975.14	998.62
…of which plantation forest	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
…of which other planted forest	253.91	516.05	770.59	881.26	904.68	928.17	951.65	975.14	998.62
Forest	47 625.38	47 320.47	45 509.42	45 143.84	45 107.59	45 107.59	45 107.59	45 107.59	45 107.59
Other wooded land									

Comments

Growing stock deline since 1990 is primarily due to natural disturbances. See Tables 5a and 5b for data on areas affected by insect disturbances and fires. The way we calculated values in Table 2a means that we don't see trends between 2016 and 2020 yet. It is likely that growing stock declined during this period because large areas were affected by wild fire. Original data on areas disturbed by insects and fires may be accessed online at the National Forestry Database website (http://www.nfdp.ccfm.org). The State of Canada's Forests Reports contain additional information (https://www.nrcan.gc.ca/forests/report/16496).

Subnational trends in total forest growing stock are closely monitored and forecasted by provincial and territorial government agencies for forests managed for wood supply. These cannot be summed to produce national estimates, however, because there are large areas of forest that are not managed for wood supply; the NFI is our only source for these areas.

If comparing values reported here to those reported in FRA 2015, note that in FRA 2015, Canada reported its NFI baseline estimate of forest growing stock in the 2005 reporting year. Since there is no 2005 reporting year in FRA 2020 and no new data for Canada, we report this same value now in the 2000 reporting year. The NFI baseline data were collected during 2000-2006.

2b Growing stock composition

National Data

Data sources + type of data source eg NFI, etc

Data sources for growing stock composition are

Canada’s National Forest Inventory (NFI) Standard Report Table 29.1 Area (1000 ha), total tree volume (million m^3), and total above-ground biomass (million tonnes) on forest land by individual species and terrestrial ecozone in Canada.

Source: Canada's National Forest Inventory, revised 2006 baseline (Version 3, December 2013) (https://nfi.nfis.org)

National classification and definitions

-

Original data

-

Analysis and processing of national data

Estimation and forecasting

Original data in NFI Standard Report Table 29.1 provide volume estimates based on data for the first two species in each stand only. The grand total in Table 29.1 is 43.607 billion m^3. The grand total estimated volume accounting for all species (reported in NFI Standard Report Table 16.0, for example) is 47.320 billion m^3, as reported in 2a. The difference of 3.713 billion billion m^3 is the volume of 3rd through nth species in each stand. In Canada's forests, therefore, the first two species in each stand account for 92% of total stand volume on average nationally. Indeed, forest composition in Canadian forest is generally very simple, with only one or two tree species dominating the stand, but this is exaggerated (to some unquantified degree) in Canada's NFI because of how the survey is done (stereo photo interpretation rather than ground plots where the species of every individual tree is recorded). The 3.713 billion billion m^3 difference cannot be broken down by species. We included this in the value reported for remaining native tree species so that the values reported for native tree species are consistent with the values reported in NFI Table 29.1.

No forecasting or back-casting was done. Canada’s NFI is still in the process of completing the data processing, quality control, compilation and estimation for its first re-measurement cycle (2008-2017). Canada is therefore in a position to report national growing stock estimates for only one time period. NFI baseline data collection was completed during 2000-2006 and growing stock estimate based on these data is reported here in the 2000 reporting year.

The volume of black spruce is almost certainly over-estimated due to imputation of Landsat-derived data used to fill gaps in the baseline survey across northern Canada. Some unquantified proportion of what's reported as black spruce volume here is volume of other boreal tree species. Nevertheless, we can say with confidence that black spruce is the number one ranked species in terms of volume in Canada.

Reclassification into FRA 2020 categories

There are certainly more than three introduced tree species present in Canada's forests, but only the three listed below have sufficient growing stock to be estimated reliably by the NFI. All other introduced species present in Canada's forests can be considered to have negligable growing stock in the national context.

FRA categories	Scientific name	Common name	Growing stock in forest (million m³ over bark)				
			1990	2000	2010	2015	2020
Native tree species							
#1 Ranked in terms of volume	Picea mariana	black spruce		14 819.65			
#2 Ranked in terms of volume	Populus tremuloides	trembling aspen		4 148.63			
#3 Ranked in terms of volume	Pinus contorta	lodgepole pine		3 210.09			
#4 Ranked in terms of volume	Picea glauca	white spruce		2 689.95			
#5 Ranked in terms of volume	Pinus banksiana	jack pine		2 041.52			
#6 Ranked in terms of volume	Picea	unspecified spruce		1 612.70			
#7 Ranked in terms of volume	Abies balsamea	balsam fir		1 546.57			
#8 Ranked in terms of volume	Pseudotsuga menziesii	Douglas fir		1 382.68			
#9 Ranked in terms of volume	Populus	unspecified poplar		1 256.36			
#10 Ranked in terms of volume	Abies lasiocarpa	subalpine fir		1 223.09			
Remaining native tree species				13 383.07			
Total volume of native tree species			–	**47 314.31**	–	–	–
Introduced tree species							
#1 Ranked in terms of volume	Picea abies	Norway spruce		3.96			
#2 Ranked in terms of volume	Pinus sylvestris	Scots pine		2.19			
#3 Ranked in terms of volume	Larix kaempferi	Japanese larch		0.01			

FRA categories	Scientific name	Common name	Growing stock in forest (million m³ over bark)				
			1990	2000	2010	2015	2020
Native tree species							
#4 Ranked in terms of volume							
#5 Ranked in terms of volume							
Remaining introduced tree species							
Total volume of introduced tree species			–	**6.16**	–	–	–
Total growing stock			–	**47 320.47**	–	–	–

Comments

2c Biomass stock

National Data

Data sources + type of data source eg NFI, etc

Canada's National Forest Carbon Monitoring Accounting and Reporting System (NFCMARS), NIR 2018 version.

National classification and definitions

Above-ground biomass (NFCMARS definition): Total above-ground biomass of living trees above the soil including stem, stump, branches, bark, and foliage. Does not include understory vegetation.

Below-ground biomass (NFCMARS definition): Total below-ground biomass of living trees including coarse (5+ mm diameter) and fine (<5 mm diameter) roots.

Dead wood (NFCMARS definition): Dead standing stemwood of merchantable size including bark; dead branches, stumps and small trees including bark; coarse woody debris on the ground.

Reference: Kurz et al. (2009) CBM-CFS3: A model of carbon-dynamics in forestry and land-use change implementing IPCC standards. Ecological Modelling 220:480-504. doi:10.1016/j.ecolmodel.2008.10.018

Canada defined a "managed forest" area for UNFCCC national greenhouse gas inventory reporting purposes. It includes the forest areas potentially available for harvesting, the forest areas managed for other purposes (such as parks), and the forest areas subject to fire suppression. The table below shows the total forest area from 1a, the UNFCCC "managed forest" area accounted for in Canada's National Forest Carbon Monitoring Accounting and Reporting System (NFCMARS) and the residual forest area, which is typically referred to as the "unmanaged forest".

Forest areas (000 ha)	1990	2000	2010	2015	2016
Forest	348,273	347,802	347,322	347,116	347,076
UNFCCC "managed" forest	226,698	226,305	225,946	225,795	225,767
"unmanaged" forest	121,575	121,497	121,377	121,320	121,309

Biomass stock data are available from the NFI for the overall forest area, but only for one time period (2000-2006). Since biomass stock data are needed for SDG reporting, we do not use the NFI biomass stock data here. Instead, we use biomass stock data from the NFCMARS, which are available for all reporting years, but only for the "managed forest" area.

Original data

	1990	2000	2010	2015	2016
AGBio_tc	10777846807	10708843741	10298995619	10216263357	10208059482
BGBio_tc	2660103650	2641064563	2549462971	2527348155	2525503629
DeadWood_tc	4687178423	4521571664	4619066159	4546077280	4525460820
Litter_tc	10847274535	10954244972	11010850419	10950036238	10942916516
Soil_tc	18637981468	18669926541	18706206682	18726675130	18730062195
Ha	226698067	226305156	225945699	225795323	225766544.6

Analysis and processing of national data

Estimation and forecasting

Forest carbon stock data from Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS) were multiplied by 2 to calculate biomass stocks and then divided by forest area to calculate per hectare biomass stocks. The forest area, in this case, is the area included in NFCMARS, which is a subset of the total forest area in Canada. This subset corresponds to the "managed forest" as defined by Canada for UNFCCC reporting purposes.

NFCMARS data are only available for 1990-2016, so we used the data for 2016 to complete the table for 2017, 2018, 2019 and 2020.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Forest biomass (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass	95.09	94.64	91.16	90.49	90.43	90.43	90.43	90.43	90.43
Below-ground biomass	23.47	23.34	22.57	22.39	22.37	22.37	22.37	22.37	22.37
Dead wood	41.35	39.96	40.89	40.27	40.09	40.09	40.09	40.09	40.09

Comments

Biomass stocks declined since 1990 primarily due to natural disturbances. See Tables 5a and 5b for data on areas affected by insect disturbances and fires. Original data on areas disturbed by insects and fires may be accessed online at the National Forestry Database website (http://www.nfdp.ccfm.org). The State of Canada's Forests Reports contain additional information (https://www.nrcan.gc.ca/forests/report/16496).

2d Carbon stock

National Data

Data sources + type of data source eg NFI, etc

Canada's National Forest Carbon Monitoring Accounting and Reporting System (NFCMARS), NIR 2018 version.

National classification and definitions

Carbon in above-ground biomass (NFCMARS definition): Carbon in total above-ground biomass of living trees above the soil including stem, stump, branches, bark, and foliage. Does not include understory vegetation.

Carbon in below-ground biomass (NFCMARS definition): Carbon in total below-ground biomass of living trees including coarse (>=5 mm diameter) and fine (<5 mm diameter) roots.

Carbon in dead wood (NFCMARS definition): Carbon in dead standing trees including stems, bark, branches and stumps; coarse woody debris on the ground approximately > 75 mm diameter; and dead coarse roots in the mineral soil approximately > 5 mm diameter

Carbon in litter (NFCMARS definition): Carbon in fine and small woody debris plus dead coarse roots in the forest floor, approximately #5 and <75 mm diameter; the L horizon comprised of foliar litter plus dead fine roots approximately <5 mm diameter; plus the F, H and O horizons

Soil carbon (NFCMARS definition): All organic carbon in soils to a depth of 55 cm, excluding live fine roots and excluding peat

Reference: Kurz et al. (2009) CBM-CFS3: A model of carbon-dynamics in forestry and land-use change implementing IPCC standards. Ecological Modelling 220:480-504. doi:10.1016/j.ecolmodel.2008.10.018

Canada defined a "managed forest" area for UNFCCC national greenhouse gas inventory reporting purposes. It includes the forest areas potentially available for harvesting, the forest areas managed for other purposes (such as parks), and the forest areas subject to fire suppression. The table below shows the total forest area from 1a, the UNFCCC "managed forest" area accounted for in NFCMARS and the residual forest area, which is typically referred to as the "unmanaged forest".

Forest areas (000 ha)	1990	2000	2010	2015	2016
Forest	348,273	347,802	347,322	347,116	347,076
UNFCCC "managed" forest	226,698	226,305	225,946	225,795	225,767
"unmanaged" forest	121,575	121,497	121,377	121,320	121,309

Carbon stock data are available from the NFI for the overall forest area, but only for one time period (2000-2006). For consistency with UNFCCC reporting, we use carbon stock data from the NFCMARS, which are available for all reporting years, but only for the "managed forest" area, rather than the NFI data which are available for the entire forest, but only one reporting year

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Original data

	1990	2000	2010	2015	2016
AGBio_tc	10777846807	10708843741	10298995619	10216263357	10208059482
BGBio_tc	2660103650	2641064563	2549462971	2527348155	2525503629
DeadWood_tc	4687178423	4521571664	4619066159	4546077280	4525460820
Litter_tc	10847274535	10954244972	11010850419	10950036238	10942916516
Soil_tc	18637981468	18669926541	18706206682	18726675130	18730062195
Ha	226698067	226305156	225945699	225795323	225766544.6

Analysis and processing of national data

Estimation and forecasting

Forest carbon stock data from Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS) were divided by forest area to calculate per hectare carbon stocks. The forest area, in this case, is the area included in NFCMARS, which is a subset of the total forest area in Canada. This subset corresponds to the "managed forest" as defined by Canada for UNFCCC reporting purposes.

NFCMARS data are only available for 1990-2016, so we used the data for 2016 to complete the table for 2017, 2018, 2019 and 2020.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Forest carbon (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Carbon in above-ground biomass	47.54	47.32	45.58	45.25	45.22	45.22	45.22	45.22	45.22
Carbon in below-ground biomass	11.73	11.67	11.28	11.19	11.19	11.19	11.19	11.19	11.19
Carbon in dead wood	20.68	19.98	20.44	20.13	20.04	20.04	20.04	20.04	20.04
Carbon in litter	47.85	48.40	48.73	48.50	48.47	48.47	48.47	48.47	48.47
Soil carbon	82.21	82.50	82.79	82.94	82.96	82.96	82.96	82.96	82.96

Soil depth (cm) used for soil carbon estimates	55.00

Comments

Biomass carbon stocks declined since 1990 primarily due to natural disturbances. See Tables 5a and 5b for data on areas affected by insect disturbances and fires. Original data on areas disturbed by insects and fires may be accessed online at the National Forestry Database website (http://www.nfdp.ccfm.org). The State of Canada's Forests Reports contain additional information (https://www.nrcan.gc.ca/forests/report/16496). Biomass carbon stock decline caused by natural disturbances is typically accompanied by carbon accumulation in dead wood, litter and soils followed by subsequent decay.

Note that 55 cm is the soil depth used in the NFI, which was used to validate CBM-CFS3 (Shaw et al. 2013) which is the core modelling engine in the NFCMARS, but the CBM-CFS3 itself models all soil C to a theoretical depth rather than a measured depth per se (Kurz et al. 2009)

References:

Kurz WA, Dymond CC, White TM, Stinson G, Shaw CH, Rampley GJ, Smyth C, Simpson BN, Neilson ET, Trofymow JA, Metsaranta J, Apps MJ (2009) CBM-CFS3: a model of carbon-dynamics in forestry and landuse change implementing IPCC standards. Ecological Modelling 220: 480-504.

Shaw CH, AB Hilger, J Metsaranta, WA Kurz, G Russo, F Eichel, G Stinson, C Smyth, M Filiatrault (2013) Evaluation of simulated estimates of forest ecosystem carbon stocks using ground plot data from Canada’s National Forest Inventory. Ecological Modelling 272:323– 347.

3 Forest designation and management

3a Designated management objective

National Data

Data sources + type of data source eg NFI, etc

Data are from a questionnaire prepared by the Canadian Forest Service to Provincial and Territorial governments. Data were not available for all years, so missing values have been imputed where necessary. The totals reported blow are therefore an estimate of the total values for Canada, and may be amended.

National classification and definitions

Forests provide spiritual and cultural value to all Canadians in the form of treasured intrinsic ecological, cultural and spiritual values, as evident in our national art and literature. The social license to practice forestry on public lands is conditional on maintenance of these values through sustainable forest management. All public forest lands with the exception of military lands are accessible to the public for recreation purposes, but only trace areas relative to the overall national forest land area are designated or managed *primarily* for this purpose.

There are areas of forest that are classified as having a primary designated management function of "none/unkown". These areas are often in the far north of the provinces and territories, and are located where there are no roads and very few settlements. Since few people access these forests, and no developments are currently planned for these areas, these areas can be considered to have no designated management plan, beyond that which might be specified in provincial or territorial legislation regarding Crown forests.

In some cases, multiple use areas may include areas for which there is a plan (land use or otherwise), or for which there are settled or unsettled land claims. For areas with claims, there is either work under way or planned to develop plans or work with Indigenous Peoples to provide some form of management where there are specified objectives and where no one objective is more important than others (i.e. multiple use). Furthermore, because there are land claims and the government is committed to considering the claims and working with First Nations, it is not the same as crown lands for which no one is considering objectives and which are covered by general legislation but for which there is no management objective.

Original data

Originial data were collected form provinces and territories and were rolled up into a national total.

		Forest area (1000 ha)				
		Primary designated management objective				
	FRA 2020 categories	**1990**	**2000**	**2010**	**2015**	**2020**
Total	Production	130876	131380	131732	130504	130855
Total	Protection of soil and water	15009	15178	13879	15099	15143
Total	Conservation of biodiversity	19902	21550	24415	28174	29361
Total	Social Services	14614	14685	14692	14703	14727
Total	Multiple use	115023	114708	112710	110375	108769
Total	Other (specify)	936	936	936	947	947
Total	None/unknown	51217	49140	49212	47774	47774
Total	Total forest area	347576	347576	347576	347576	347576

		Forest area (1000 ha)				
		Total area with designated management objective				
	FRA 2020 categories	**1990**	**2000**	**2010**	**2015**	**2020**
Total	**Production**	169764	169801	169599	169288	169067
Total	**Protection of soil and water**	92644	94643	96719	99360	100522

Total	**Conservation of biodiversity**	78340	79790	81540	84870	86034
Total	**Social Services**	71381	70244	71839	74951	76110
Total	**Other (specify)**	38014	38011	38015	38026	38026

Analysis and processing of national data

Estimation and forecasting

Values reported for 2020 are informed by the 2016 and 2017 reporting years, and by planned management activities in certain jurisdictions. Values for 2020 are likely to change.

Reclassification into FRA 2020 categories

Data were collected from the provinces and territories of Canada and were adjusted to align with national totals from Canada's National Forest Inventory. The original data as reported here reflect the total forest area as reported in the NFI revised 2006 baseline data, which are used for the 2005 reporting year. The orignal data have been adjusted to align with the total forest area, as reported in section 1a - Extent of forest and other wooded land. The numbers reported in this section were calculated using Equation 1.

(Equation 1) (Total value for the category/total NFI adjusted baseline) * total forest area adjusted for deforestation

Primary designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production (a)	131 139.00	131 465.00	131 636.00	130 331.00	130 611.00
Protection of soil and water (b)	15 039.00	15 188.00	15 165.00	15 079.00	15 115.00
Conservation of biodiversity (c)	19 942.00	21 564.00	24 397.00	28 137.00	29 306.00
Social Services (d)	14 643.00	14 694.00	14 682.00	14 683.00	14 700.00
Multiple use (e)	115 254.00	114 782.00	112 627.00	110 229.00	108 566.00
Other (specify in comments) (f)	937.00	937.00	936.00	946.00	945.00
None/unknown (g)	**51 318.93**	**49 171.97**	**47 879.21**	**47 710.71**	**47 685.10**
Total forest area	**348 272.93**	**347 801.97**	**347 322.21**	**347 115.71**	**346 928.10**

Total area with designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production	170 105.00	169 911.00	169 475.00	169 064.00	168 751.00
Protection of soil and water	92 830.00	94 704.00	96 648.00	99 229.00	100 334.00
Conservation of biodiversity	78 497.00	79 842.00	81 481.00	84 758.00	85 874.00
Social Services	71 524.00	70 290.00	71 787.00	74 852.00	75 968.00
Other (specify in comments)	38 090.00	38 036.00	37 987.00	37 975.00	37 955.00

Comments

Many jurisdications in Canada report overlapping management objectives for the categories of protection of soil and water; conservation of biodiversity, and social services.

The other category refers to land that is managed by military instillations; a subset of first nations reserves (when data are available); land that is zoned for agriculture, but is forested; and other unspecified management objectives.

3b Forest area within protected areas and forest area with long-term management plans

National Data

Data sources + type of data source eg NFI, etc

Geographic boundaries of legally established protected areas are from the Conservation Areas Reporting and Tracking System (CARTS), published and maintained by the Canadian Council on Ecological Areas (CCEA) (http://www.ccea.org).

Data on forest area are from Canada's National Forest Inventory (http://nfi.nfis.org).

Data for area with a long-term forest management plan are from a questionnaire prepared by the Canadian Forest Service to Provincial and Territorial governments. Data were not available for all provinces and all years, so missing values have been imputed where necessary. The totals reported blow are therefore an estimate of the total values for Canada, and may be amended.

National classification and definitions

N/A

Original data

Originial data were collected form provinces and territories and were rolled up into a national total.

Jurisdiction	FRA 2020 categories	1990	2000	2010	2015	2016	2017	2018	2019	2020
Total	Forest area within legally established protected areas	13546	18174	28206	29507	29507	29507	29507	29507	29507
Total	Forest area with long-term forest management plan	184643	187981	187981	188906	200460	200460	211114	211504	211504
Total	...of which in protected areas									

Analysis and processing of national data

Estimation and forecasting

Canada presently has only one complete National Forest Inventory (NFI) survey. Data from this NFI baseline survey, completed during 2000-2006, provide information on forest area. NFI survey data were overlaid with the geographic boundaries of legally established protected areas, from CARTS, and classified according to IUCN code. NFI statistical estimation procedures where used to estimate the area of forest in legally established protected areas by summing across IUCN codes, consistent with FRA 2020 definition of legally protected. Estimates were calculated for 1990, 2000, 2010 and 2016 in this manner, using protected areas established as of 1990, 2000, 2010 and 2016, respectively. For simplicity, the estimate for 2016 is also reported in 2015. Values for 2017 - 2020 have been carried over from 2016. No forecasting was done for this section. No adjustments were made to account for changes in forest area. It is assumed that negligible land-use change ocurred in legally established protected areas.

Reclassification into FRA 2020 categories

Data for the total forest area with a long-term management plan were collected from the provinces and territories of Canada and were adjusted to align with values reported in Canada's National Forest Inventory. The original data as reported here reflect the total forest area as reported in the NFI revised 2006 baseline data, which are used for the 2005 reporting year. The original data have been adjusted to align with the total forest area, as reported in section 1a - Extent of forest and other wooded land. The numbers reported in this section were calculated using Equation 1.

(Equation 1) (Total value for the category/total NFI adjusted baseline) * total forest area adjusted for deforestation

FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest area within protected areas	13 546.00	18 174.00	28 206.00	29 507.00	29 507.00	29 507.00	29 507.00	29 507.00	29 507.00
Forest area with long-term forest management plan	185 013.00	188 103.00	187 844.00	188 656.00	200 086.00	200 086.00	210 720.00	211 110.00	211 110.00
...of which in protected areas									

Comments

4 Forest ownership and management rights

4a Forest ownership

National Data

Data sources + type of data source eg NFI, etc

Data source for forest ownership is Canada's National Forest Inventory (NFI) Standard Report Table 12.0. Area (1000 ha) of forest land by ownership in Canada.

Source: Canada's National Forest Inventory, revised 2006 baseline (Version 3, December 2013) (https://nfi.nfis.org)

National classification and definitions

NFI ownership categories include the following:

Federal (land owned by the federal government)

Aboriginal* (land owned by First Nations, Metis or Inuit)

Provincial (land owned by a provincial government)

Territorial (land owned by a territorial government)

Municipal (land owned by a municipal government)

Private (privately owned land)

Other (ownership information missing or unavailable)

* Note that Canada now prefers to use the term "Indigenous" but the NFI data dictionary has not yet been updated.

Original data

Available online at https://nfi.nfis.org/en/standardreports

Analysis and processing of national data

Estimation and forecasting

NFI revised 2006 baseline data (collected between 2000 and 2006) are treated as representing 2005 for consistency with Canada's reporting in FRA2015 Table 18a. Areas for the FRA2020 reporting years were calculated by applying the proportions from 2005 to the total forest areas reported in Table 1a for 1990, 2000, 2010 and 2015. For example, the NFI baseline estimate of publicly owned forest area in Canada is 317,651.91 ha. This value is treated as the publicly owned forest area in 2005. To calculate an estimated publicly owned forest area in 2015, this value divided by the total forest area in 2005 (347,575.76 ha) and then multiplied by the total forest area in 2015 (347,115.71 ha).

Reclassification into FRA 2020 categories

NFI federal, provincial, territorial and municipal ownership categories are all reclassified as public ownership for FRA.

Original data do not distinguish between private ownership by individuals versus private ownership by business entities or institutions, so only total privately owned areas are reported.

NFI "Aboriginal" (now more commonly referred to in Canada as Indigenous) ownership is reclassified as private ownership for FRA. It is not reported seperately, however, because there are insufficient data on changes since 1990. There have been important changes in Canada since 1990 but these are not reflected yet in NFI data. Since 1973, Canada has completed 20 comprehensive land claim agreements. Nine of these are termed "modern treaty agreements" because they include self-government provisions within a single, final agreement. Several categories of lands are involved in modern treaties, final agreements and settlements, including fee simple title lands (Indigenous ownership) and larger public land areas with particular rights or joint management.

NFI other ownership (missing or unavailable) is reported as Unknown/other for FRA.

FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Private ownership (a)	28 524.59	28 486.02	28 446.72	28 429.81
…of which owned by individuals				
…of which owned by private business entities and institutions				
…of which owned by local, tribal and indigenous communities				
Public ownership (b)	318 289.05	317 858.64	317 420.18	317 231.47
Unknown/other (specify in comments) (c)	**1 459.29**	**1 457.31**	**1 455.31**	**1 454.43**
Total forest area	**348 272.93**	**347 801.97**	**347 322.21**	**347 115.71**

Comments

Unknown/other ownership includes all areas where ownership information is missing or unavailable.

4b Holder of management rights of public forests

National Data

Data sources + type of data source eg NFI, etc

Data are from a questionnaire prepared by the Canadian Forest Service to Provincial and Territorial governments. Data were unavailable for all provinces and all years, so missing values have been imputed where necessary. The totals reported below are therefore an estimate of the total values for Canada, and may be amended.

National classification and definitions

N/A

Original data

Original data were collected form provinces and territories and were rolled up into a national total. Data were not available for all provinces and all years, so missing values have been imputed where necessary. The totals reported below are therefore an estimate of the total values for Canada, and may be amended.

		Forest area (1000 ha)			
	FRA 2020 categories	**1990**	**2000**	**2010**	**2015**
Total	Public Administration	266128	255026	255383	254682
Total	Individuals	0	0	0	0
Total	Private business entities and institutions	46046	57133	55133	54810
Total	Local, tribal and indigenous communities	1984	2129	3768	5548
Total	Other (specify)	3525	3395	3400	2644
Total	Total public ownership	317684	317684	317683	317685

Analysis and processing of national data

Estimation and forecasting

Data were collected from the provinces and territories of Canada and were adjusted to align with values reported in Canada's National Forest Inventory for the total public ownership. The original data as reported here reflect the total public ownserhip data as reported in the NFI revised 2006 baseline data, which are used for the 2005 reporting year. The orignal data have been adjusted to correspond with the total forest area, as repoted in section 1a - Extent of forest and other wooded land. The numbers reported in this section were calculated using Equation 1.

(Equation 1) (Total value for the category / total NFI adjusted baseline for public ownserhip) * total forest area adjusted for deforestation

Reclassification into FRA 2020 categories

No reclassification was done.

FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Public Administration (a)	266 635.00	255 167.00	255 172.00	254 319.00
Individuals (b)	0.00	0.00	0.00	0.00
Private business entities and institutions (c)	46 133.00	57 165.00	55 087.00	54 732.00
Local, tribal and indigenous communities (d)	1 988.00	2 130.00	3 764.00	5 540.00
Unknown/other (specify in comments) (e)	**3 533.05**	**3 396.64**	**3 397.18**	**2 640.47**
Total public ownership	**318 289.05**	**317 858.64**	**317 420.18**	**317 231.47**

Comments

"Unknown/Other" includes publicly owned land where the holder of the management rights cannot be clearly distinguished, but may include individuals, private business entities and institutions, and local, tribal and indigenous communities.

The reported increase in area with Local, tribal and indigenous community held management rights reflects growth in indigenous held tenures. A good source for information on Indigenous-held forest tenures in Canada is NAFA (2018) *Fourth Report On Indigenous Held Forest Tenures in Canada 2018*. National Aboriginal Forestry Association, available online at www.nafaforestry.org

Note that both volume-based and area-based tenure arrangements are used in Canada.

5 Forest disturbances

5a Disturbances

National Data

Data sources + type of data source eg NFI, etc

Data are from the National Forestry Database (NFD). The NFD serves as Canada's credible, accurate, and reliable source of national information on forest management and its impact on the forest resource. The NFD is a partnership mandated through the Canadian Council of Forest Ministers and composed of fourteen federal, provincial, and territorial ministers. The Canadian Forest Service at Natural Resources Canada collects data from provincial and territorial resource management organizations and is responsible for the dissemination of national forestry statistics.

National Foresry Database. Data - Forest Insects Table 4.1 Area of moderate to severe defoliation (including beetle-killed trees) by insects, 1975-2016. http://nfdp.ccfm.org/en/data/insects.php. (Accessed July 30, 2018)

National classification and definitions

Major insects in Canada's forests are the eastern hemlock looper (*Lambdina fiscellaria fiscellaria*), eastern spruce budworm (*Choristoneura fumiferana*), forest tent catepillar (*Malacosoma disstria)*, gypsy moth (*Lymantria dispar*), jack pine budworm (*Choristoneura pinus pinus*), and the mountain pine beetle (*Dendroctonus ponderosae*). Trees that suffer moderate to severe defoliation are those on which 30% or more of the current foliage has been removed. Trees that suffer moderate to severe bark beetle-caused mortality are those areas where more than 10% of the trees have been killed.

http://nfdp.ccfm.org/en/glossary.php

Original data

Year	**Total defoliated area and area with moderate beetle kill (hectares)**
2000	15631904
2001	24542909
2002	20649575
2003	20492665
2004	13145378
2005	16324973
2006	19942151
2007	18680921
2008	13895745
2009	15072580
2010	12979758
2011	8989916
2012	8796129
2013	20129334
2014	20391494
2015	15730947
2016	15489117

Analysis and processing of national data

Estimation and forecasting

No forecasting has been done for this section due to the high interannual variability in the area affected by insects.

Reclassification into FRA 2020 categories

No reclassifications were done.

FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Insects (a)	15 631.90	24 542.91	20 649.58	20 492.67	13 145.38	16 324.97	19 942.15	18 680.92	13 895.75	15 072.58	12 979.76	8 989.92	8 796.13	20 129.33	20 391.49	15 730.95	15 489.12	
Diseases (b)																		
Severe weather events (c)																		
Other (specify in comments) (d)																		
Total (a+b+c+d)	**15 631.90**	**24 542.91**	**20 649.58**	**20 492.67**	**13 145.38**	**16 324.97**	**19 942.15**	**18 680.92**	**13 895.75**	**15 072.58**	**12 979.76**	**8 989.92**	**8 796.13**	**20 129.33**	**20 391.49**	**15 730.95**	**15 489.12**	–
Total forest area	**347 801.97**	–	–	–	–	**347 575.76**	–	–	–	–	**347 322.21**	–	–	–	–	**347 115.71**	**347 076.04**	**347 039.05**

Comments

Forest area disturbed by defoliators includes only areas with tree mortality and moderate to severe defoliation. Defoliation does not always imply mortality; for example, stands with moderate defloliation often recover and may not lose much growth.

Defoliation is mapped on an insect species basis and a given area may be affected by more than one species at a time; this may result in double or triple counting in areas affected by more than one species, exagerating the extent of the total area defoliated.

Areas affected by diseases are not easily measured, especially during aerial overview surveys. These areas are therefore not reported in Table 5a - Disturbances. Although root diseases are among the most widespread pathology problems in Canada’s forests, the symptoms and damage they cause are difficult to detect and measure. For example, even though Armillaria root disease is thought to affect, to varying degrees, approximately 200 million hectares of Canada’s forested lands each year, the measurable impacts are greatly underestimated. Other forest diseases causing significant damage to Canada’s forests include white pine blister rust and Annosus root and butt rot.

Severe weather events also affect forest health and structure in Canada, but are not reported in this table due to insuffcient data.

5b Area affected by fire

National Data

Data sources + type of data source eg NFI, etc

Data are from the National Forestry Database (NFD). The NFD serves as Canada's credible, accurate, and reliable source of national information on forest management and its impact on the forest resource. The NFD is a partnership mandated through the Canadian Council of Forest Ministers and composed of fourteen federal, provincial, and territorial ministers. The Canadian Forest Service at Natural Resources Canada collects data from provincial and territorial resource management organizations and is responsible for the dissemination of national forestry statistics.

National Forestry Database. Data - Forest Fires. Table 3.1.2 Area burned by jurisdiction, cause class, response category and protection zone. 1990 - 2016. http://nfdp.ccfm.org/en/data/fires.php (accessed July 30, 2018).

Area burned data for 2017 are from the National Wildland Fire Situation Report dated December 31, 2017 and published by the Canadian Interagency Forest Fire Centre at http://www.ciffc.ca.

National classification and definitions

Total land area burned is based on the forest area burned only, as reported in the National Forestry Database. Wildland fires do occur outside of forested areas (e.g. grasslands, native prairie), however the area is thought to be small relative to the area of forest disturbed by fire. For the purposes of reporting to the GFRA, Canada considers the total land area affected by fire to be the same as the total forest area affected by fire.

Canada collects detailed information on fires and reports the area burned and the total number of fires. Data are reported by: cause class, which is broken down into human (seven subcategories), lightning and unknown; two levels of protection; six levels of forest maturity classes; month of ignition; fire size class; response category (full, modificed, or none); and stocking class. Additional details and specific definitions of these classes can be found on the National Forestry Database site: http://nfdp.ccfm.org/en/glossary.php

Original data

Year	Area (hectares)
2000	665331
2001	626420
2002	2770408
2003	1743436
2004	3183814
2005	1671524
2006	2250815
2007	1542202
2008	1712056
2009	775025
2010	3052473
2011	2428798
2012	2003270
2013	4210137
2014	4563327
2015	3861647
2016	1416053
2017	3371833

Analysis and processing of national data

Estimation and forecasting

No forecasting has been done for this section due to high interannual variability in the area affected by fire.

Reclassification into FRA 2020 categories

No reclassifciations were done.

FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total land area affected by fire	665.33	626.42	2 770.41	1 743.44	3 183.81	1 671.52	2 250.82	1 542.20	1 712.06	775.03	3 052.47	2 428.80	2 003.27	4 210.14	4 563.33	3 861.65	1 416.05	3 371.83
…of which on forest	665.33	626.42	2 770.41	1 743.44	3 183.81	1 671.52	2 250.82	1 542.20	1 712.06	775.03	3 052.47	2 428.80	2 003.27	4 210.14	4 563.33	3 861.65	1 416.05	3 371.83

Comments

Fire data as reported here includes fires located on forest land, timber-productive land, timber-unproductive land, and other forest land, as defined under the "Forest fires" section of http://nfdp.ccfm.org/en/glossary.php

Data for the total land area affected by fires in Canada are not available and is thought to be small relative to the area of forests disturbed by fires. For the purposes of the GFRA, Canada considers the total land area affected by fires to be the same as the total forest area affected by fire.

5c Degraded forest

Does your country monitor area of degraded forest		No
If "yes"	What is the national definition of "Degraded forest"?	
	Describe the monitoring process and results	

Comments

6 Forest policy and legislation

6a Policies, Legislation and national platform for stakeholder participation in forest policy

National Data

Data sources + type of data source eg NFI, etc

Information on policies, legislation and national platforms for public participation comes form the Sustainable Forest Management in Canada website published by the Canadian Council of Forest Ministers. https://www.sfmcanada.org/en/forest-products/legal-forest-products (accessed May 10, 2018).

Information on tracibility systems for wood products comes from the Certification Canada website published by the Forest Products Association of Canada. http://certificationcanada.org/en/buyers-corner (accessed May 10, 2018).

National classification and definitions

Certification of good forest management in Canada can be obtained through one of three major, credible standards associations recognized in Canada: the Canadian Standards Association, the Forest Stewardship Council and the Sustainable Forestry Initiative. All three certification bodies set high thresholds for sustainable forest management, and these are above and beyond Canada's tough regulatory requirements. The independently certified forest area is calculated using the area of the forest management units, which include streams, lakes, rivers and roads.

Original data

Detailed policies and legislations supporting sustainable forest management in Canada can be found on the websites of each of the provinces and territores in Canada. A list of these jurisdictions can be accessed through the Sustainable Forest Management in Canada website https://www.sfmcanada.org/en/partners

Original data on third party certification in Canada can be found through Certification Canada http://certificationcanada.org/en/home/

Indicate the existence of	Boolean (Yes/No)	
	National	Sub-national
Policies supporting SFM	Yes	Yes
Legislations and regulations supporting SFM	Yes	Yes
Platform that promotes or allows for stakeholder participation in forest policy development	Yes	Yes
Traceability system(s) for wood products	Yes	Yes

Comments

Each province and territory develops its own set of forestry legislation and policy. Specific laws may differ between provinces and territories, but all are focused on the same goal: sustainable forest management (SFM) that considers a wide range of values, including communities, wildlife, biodiversity, soils, water and scenery. Governments support SFM with laws, regulations and policies that address land-use planning, forest practices, forest regeneration, Indigenous interests, public consultation, biodiversity, protected areas, natural disturbances and more. Forestry operations are also bound by some national legislation. The comprehensive laws and regulations enforced by the provinces and territories are designed to address the requirements of federal legislation relevant to forests, such as the Species at Risk Act, the Fisheries Act and the Canadian Environmental Assessment Act. Forestry activities must also comply with international agreements to which Canada is a signatory, such as the Convention on Biological Diversity and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Forest management on private lands is supported by both provincial and municipal regulations, guidelines and partnership programs. Many private landowners use forest management plans and take advantage of government programs to guide their stewardship and harvesting activities. Some provinces have laws that set standards for forest management practices on private lands. Most provinces have regulatory mechanisms in place to track timber harvested from private lands so that it can be differentiated from public timber (for which royalties must be paid). These mechanisms include regulations for timber scaling, timber marking and transportation. A comprehensive description of policies, strategies, legislation and regulations related to SFM as well as information about compliance monitoring, enforcement and penalties can be found at https://www.sfmcanada.org/en/forest-products/legal-forest-products

The three major, credible, forest management certification programs in Canada provide chain-of-custody certification that tracks sustainably produced forest products through the supply chain. This chain-of-cutody certification provides the ability to label products as sustainable, and to communicate to consumers exactly what they are buying. Canada's national trade association (Forest Products Association of Canada) makes third-party verified sustainable forest certification a condition of membership. http://certificationcanada.org/en/certification/forest-management-certification/

6b Area of permanent forest estate

National Data

Data sources + type of data source eg NFI, etc

Ownership and protection status data from the NFI establishment dataset were summarized to produce estimates of forest area by ownership category and protection status (by overlaying NFI baseline data with CARTS protected areas GIS dataset)

Sources:

Canada's National Forest Inventory, revised 2006 baseline (Version 3, December 2013) (https://nfi.nfis.org)

Conservation Areas Reporting and Tracking System (CARTS), published and maintained by the Canadian Council on Ecological Areas (CCEA) (http://www.ccea.org)

National classification and definitions

Canada does not have officially designated permanent forest estate areas, but publicly owned forest areas and Indigenous and privately owned forest areas that have legally established protection status are effectively a permanent forest estate. The sale or conversion of publicly owned forest land occurs very rarely.

All publicly owned forest areas (federal, provincial, territorial and municipal) plus aboriginal (Indigenous) and privately owned forest areas having protection status (IUCN I-VI) are reclassified as area of permanent forest estate for FRA.

NFI revised 2006 baseline data (collected between 2000 and 2006) are treated as representing 2005 for consistency with FRA2015 and other tables in FRA2020. Areas for the FRA2020 reporting years were calculated by applying the proportions from 2005 to the total forest areas reported in Table 1a - Extent of forest and other wooded land for 1990, 2000, 2010, 2015 and 2020. The area of permanent forest estate calculated using NFI baseline data, reclassified as described above, is 317,728.38 ha. This value, divided by the total forest area according to NFI baseline (347,575.76 ha) then multiplied by the total forest area in 2010 (347,322.21 ha; from Table 1a) gives the estimated area of permanent forest estate in 2010 = 317,496.60 ha.

Original data

Area (1000 ha) of forest land by CARTS IUCN category and NFI ownership category.

	Ownership							
IUCN protection status	Federal	Provincial	Territorial	Municipal	Aboriginal	Private	Other	Subtotal
IA	17	315				10	15	357
IB	0	6468	148		0	8	0	6624
II	4504	9598	351	0	0	26	31	14510
III		1529	101			7	3	1641
IV		321	173		0	17	14	525
V		65	7				2	73
VI	0	104				8	5	117
Other		37	154			2	0	194
NA	876	247953	44000	930	6802	21586	1386	323535
Subtotal	5397	266390	44935	930	6802	21665	1456	347576

FRA 2020 categories	Forest area (1000 ha)					
	Applicable?	1990	2000	2010	2015	2020
Area of permanent forest estate	Yes	318 365.68	317 935.16	317 496.60	317 307.84	317 271.57

Comments

All public forests lands and protected forest lands are expected to be retained as forest and highly unlikely to be converted to other land use. Exceptions occur in the event of land use change activities, but these activities affect less than 0.02% of the overall forest area in Canada per year.

7 Employment, education and NWFP

7a Employment in forestry and logging

National Data

Data sources + type of data source eg NFI, etc

Data are from Statistics Canada. Statistics Canada is the federal agency that is responsible for producing statistics to help better understand Canada, its population, resources, economy, society, and culture. Three data tables were used to construct the employment history in Canada dating back to 1990.

Data for 1990 are from Statistics Canada. Table 36-10-0305-01 Indexes of labour productivity and related variables, by industry according to the Canadian System of National Accounts. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610030501 (Accessed July 10, 2018)

Data for 2000, 2010, and 2015 are from Statistics Canada. Table 36-10-0489-01 (formerly CANSIM 383-0031) - Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS), annual data 1997 - present. (Accessed May 23, 2018). https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3610048901#timeframe

Data on the gender breakdown in employment are from the Statistics Canada, Labour Force Survey, custom tabulation (Accessed February 9, 2018)

National classification and definitions

Canada reports employment data on the logging and forestry (North American Industry Classification System 113) and support activities for logging and forestry (North American Industry Classification System 1153) categories. The other categories listed in this table are a source of employment in Canada, however data is not available at that level of detail. Data for 1990 are from a different classification system, and only the total employment in forestry is reported here.

Original data

Data used for reporting for 1990, from Statistics Canada Table 36-10-0305-01 (in thousands)

Total number of jobs by category	1989	1990	1991
Logging and forestry industries, M-level aggregation	111.1	104.4	105.9
Logging and forestry industries, S-level aggregation	111.1	104.4	105.9
Other service industries, S-level aggregation	97.6	99.5	99.7

Data used for reporting for 2000 - 2015 ; Statistics Canada Table 36-10-0489-01 (formerly CANSIM 383-0031) (in thousands)

Total number of jobs	1999	2000	2001	2009	2010	2011	2014	2015	2016
Forestry and logging (113)	63.315	60.55	57.29	35.425	35.43	36.25	32.44	32.535	32.63
Support activities for forestry (1153)	23.235	21.33	19.68	21.005	20.545	20.605	19.785	20.25	21.505

Gender breakdown of employment calculated from Labour Force Survey. Values shown are based on three-year averages. Values shown for the year 1990 are based on an average of the values for the years 1990, 1991 and 1992. Values shown for the years 2000, 2010 and 2015 are based on a three year average spanning the period from one year prior to one year after the year in question. Values have been rounded and adjusted to ensure categories total to 100%

Sexes	Industries	**1990**	**2000**	**2010**	**2015**
Men	Total % (1133 + 1153)	**88%**	**87%**	**85%**	**82%**
	% in 1133	**89%**	**89%**	**90%**	**88%**
	% in 1153	**84%**	**82%**	**78%**	**75%**
Women	Total % (1133 + 1153)	**12%**	**13%**	**15%**	**18%**
	% in 1133	**11%**	**11%**	**10%**	**12%**
	% in 1153	**16%**	**18%**	**22%**	**25%**

FRA 2020 categories	Full-time equivalents (1000 FTE)											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Employment in forestry and logging	107.13	12.86	94.28	81.80	10.63	71.17	56.42	8.46	47.96	53.05	9.55	43.50
…of which silviculture and other forestry activities												
…of which logging												
…of which gathering of non wood forest products												
…of which support services to forestry				21.42	3.85	17.56	20.72	4.56	16.16	20.51	5.13	15.39

Comments

Three data sources were used to complete this table. Employment data prior to 1997 is not available at the same granularity as data from after 1997, so only the total employment for 1990 is reported. Data on the gender breakdown of employment is only available after 1990; the years 1990, 1991, and 1992 were used to calculate the three year average for 1990.

The two tables (36-10-0489-01 (formerly CANSIM 383-0031) and 36-10-0305-01) that are used to report on the total employment in forestry are based on the System of National Accounts (SNA); a new industry classification system (NAICS) was adopted in 1997, and this necessitated the creation of a new method for reporting employment data by industry. The statistical activity of these two tables are based on the Canadian System of Macroeconomic Accounts, however the detailed estimations of these statistics, and the industry classifications that these statistics are reported for, do not fully align. Further details outlining the data sources and estimation criteria for these two tables can be found at Statistics Canada, Table 36-10-0305-01 and Table 36-10-0489-01 (formerly CANSIM 383-0031).

A third table was used for the gender breakdown of employment. The Labour Force Survey (LFS) estimates are not used for the total employment values in this section because the total numbers reported through the LFS survey have been found to be highly variable, particularly for smaller industry groupings, such as forestry and support activities for forestry. Despite the variability in reporting, LFS has been found to be useful to report the proportional breakdowns between categories. The percent breakdown by gender from the LFS was applied to the total employment from the System of National Accounts, and this calculated number is reported.

For the table "Employment in forestry and logging (3 year average), some values for 1990 and 2000 have been adjusted slightly to ensure that the number of female and male FTEs sum to the Total FTEs.

7b Graduation of students in forest-related education

National Data

Data sources + type of data source eg NFI, etc

Data are from Statistics Canada. Statistics Canada is the federal agency that is responsible for producing statistics to help better understand Canada, its population, resources, economy, society, and culture. Statistics Canada Table: 37-10-0020-01 Postsecondary graduates by institution type, sex and student status. (Accessed May 30, 2018) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3710002001&request_locale=en

National classification and definitions

Statistics Canada provides graduation numbers by field of study. We have reported on graduation from the agriculture, natural resources and conservation field. Field of study is defined by the Primary Groups of the Classification of Instructional Programs for Enrolments and Graduates and are adapted from the 2011 Classification of Instructional Programs (CIP), Statistics Canada's standard for the classification of instructional programs. The level of education at graduation is defined by UNESCO's International Standard Classification of Education (ISCED), which is the reference classification for organising education programmes and related qualifications by education levels and fields. The basic concepts and definitions of ISCED are intended to be internationally valid and comprehensive of the full range of education systems. Data in this table are based on ISCED 2011.

Original data

	1992			1993			1994			1999			2000			2001		
Field of study with degree level	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**
Agriculture, natural resources and conservation	**30561**	**10149**	**20412**	**31983**	**10932**	**21057**	**35910**	**12558**	**23334**	**48873**	**22884**	**25986**	**56883**	**25518**	**31281**	**58329**	**26958**	**30540**
Bachelor's or equivalent	5118	1974	3150	5136	2106	3024	5598	2412	3180	9840	5238	4602	10296	5298	4986	10251	5658	4539
Doctoral or equivalent	528	102	420	522	126	396	588	102	492	552	210	348	678	240	432	606	198	414
Master's or equivalent	2172	912	1260	2304	978	1332	2550	972	1584	2772	1500	1266	3072	1638	1422	3216	1632	1584
Post-secondary non-tertiary education	6216	1752	4461	6522	1803	4722	7602	2178	5415	9180	3642	5532	5835	2439	3366	6180	2523	3375
Short-cycle tertiary education	1242	324	924	1506	456	1050	1614	612	996	2097	852	1248	8565	3138	5424	8913	3465	5361
Total, International Standard Classification of Education (ISCED)	15285	5085	10197	15993	5463	10533	17958	6282	11667	24432	11442	12990	28437	12765	15651	29163	13482	15267

	2009			2010			2011			2013			2014			2015		
Field of study with degree level	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**	**Both sexes**	**Females**	**Males**
Agriculture, natural resources and conservation	**57387**	**28863**	**28434**	**58203**	**29277**	**28812**	**65568**	**31986**	**33336**	**74079**	**37512**	**36525**	**73191**	**37707**	**35481**	**73740**	**38649**	**35076**
Bachelor's or equivalent	9561	5376	4182	9414	5319	4092	10335	5802	4533	11640	6861	4773	12357	7110	5250	12255	7320	4932
Doctoral or equivalent	768	348	420	750	324	426	804	348	462	930	456	474	882	420	468	936	420	516
Master's or equivalent	4374	2700	1680	4758	2880	1872	4560	2724	1824	5142	3156	1986	5316	3228	2088	5502	3300	2208
Post-secondary non-tertiary education	4995	2076	2874	5232	2169	3024	6909	2862	4032	8154	3471	4665	6894	2907	3987	6825	3012	3804
Short-cycle tertiary education	8952	3903	5037	8895	3912	4971	10131	4245	5796	11130	4785	6342	11124	5178	5937	11307	5250	6060
Total, International Standard Classification of Education (ISCED)	28689	14424	14229	29106	14637	14415	32793	15993	16677	37041	18753	18261	36594	18852	17739	36879	19323	17544

Upper secondary education	48	36	12	48	36	12	36	12	12	42	30	24	24	12	12	36	24	12

FRA 2020 categories	Number of graduated students											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Doctoral degree	546.00	110.00	436.00	612.00	216.00	398.00	774.00	340.00	436.00	916.00	432.00	486.00
Master's degree	2 342.00	954.00	1 392.00	3 020.00	1 590.00	1 424.00	4 564.00	2 768.00	1 792.00	5 320.00	3 228.00	2 094.00
Bachelor's degree	5 284.00	2 164.00	3 118.00	10 129.00	5 398.00	4 709.00	9 770.00	5 499.00	4 269.00	12 084.00	7 097.00	4 985.00
Technician certificate / diploma	8 234.00	2 375.00	5 856.00	13 590.00	5 353.00	8 102.00	15 038.00	6 389.00	8 578.00	18 478.00	8 201.00	10 265.00
Total	16 406.00	5 603.00	10 802.00	27 351.00	12 557.00	14 633.00	30 146.00	14 996.00	15 075.00	36 798.00	18 958.00	17 830.00

Comments

Data on post-secondary graduation in Canada by field is available from 1992 to 2015; data reported here for 1990 are an average of the years 1992, 1993, and 1994, as these were the closest available years of data. Data for 2000 are an average of 1999, 2000 and 2001; 2010 is an average of 2009, 2010 and 2011; and 2015 is an average of 2013, 2014 and 2015. The technician certificate / diploma category is the sum of the post-seconday non-tertiary education and the short-cycle tertiary education categories, as reported in the original data.

Graduation data are presented for individulas who have graduated from the primary grouping of agricultural, natural resources and conservation fields. Further breakdown of this data is not available. The primary grouping reported here includes 01. Agriculture, agriculture operations and related sciences and 03. Natural resources and conservation, as defined in the Classification of Instructional Programs (CIP) Canada 2011. The Natural resources and conservation field encompasses natural resources conservation and research (03.01), Natural resources management and policy (03.02), Fishing and fisheries sciences and management (03.03), Forestry (03.05), Wildlife and wildlands science and management (03.06), and Natural resources and conservation, other (03.99). The agriculture, agricultural operations and related sciences field encompasses a variety of agricultural and animal sciences, and includes soil sciences (01.12), plant sciences (01.11), and applied horticulture/horticultural business services (01.06). The agricultural, natural resources and conservation CIP does not fully align with the definition of forest-related education, additionally, other forest-related education may be encompassed by CIP categories that are overall less aligned with forest-related fields, and are therefore not reported here. Data are reported by aggregate categories, and further breakdown into more specific groupings is unavailable.

7c Non wood forest products removals and value 2015

National Data

Data sources + type of data source eg NFI, etc

Data are from Statistics Canada. Statistics Canada is the federal agency that is responsible for producing statistics to help better understand Canada, its population, resources, economy, society, and culture. All data are for 2015 except where noted in the comments.

Maple products: Statistics Canada. Table 32-10-0354-01 Production and value of maple products (x 1,000). (Accessed July 10, 2018). https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210035401

Christmas trees: Statistics Canada. Table 32-10-0045-01 Farm cash receipts, annual (x 1,000). Cash receipts for Christmas trees. (Accessed August 13, 2018). https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210004501

Pelts: Statistics Canada. Table 32-10-0293-01 Number and value of pelts produced (2009) Special tabulation for wild pelts. (Accessed July 10, 2018). https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210029301

Blueberries: Statistics Canada. Table 32-10-0364-01 Estimates, production and farm gate value of fresh and processed fruits. (Accessed August 14, 2018). https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3210036401

National classification and definitions

Maple products includes all maple syrup, maple sap, maple sugar, maple taffy, and maple butter that is produced.

Christmas trees are trees produced on land specificlly designated for Christmas tree production. Common Christmas tree species in Canada are *Pseudotsuga menziesii, Picea pungens, Pice glauca, Pinus strobus, Pinus sylvestris*, *Abies fraseri*, and *Abies balsamea*

Low bush blueberries (*Vaccinium angustifolium, V. angustifolium f. nigrum, V. myrtilloides*) are commonly known as “wild” blueberries. Low bush blueberries are not planted; they spread via rhizomes or underground runners which produce new shoots and stems.

Wild pelts are those derived from terrestrial animals that have been harvested in the wild. A full species list can be found in the original data, as listed below.

Original data

Maple Products

Maple products - Year	2015
	Gallons (x 1000)
Maple products expressed as syrup, total	8,908
	Dollars (x 1000)
Gross value of maple products	358,242

Christmas trees

	Canada
Year	2015
Dollars (x 1000)	78,442

Low-bush blueberry

	2015	
	Marketed production	
Commodity	Tons	Dollars (x 1,000)
Blueberries, low bush	104,706	112,126

Wild pelts

Type of pelts	2009	2009
	Number	Dollars
Wild pelts, total (excluding seals)	727,412	14,676,729
Badger	512	25,321
Black or brown bear	2,055	153,653
Grizzly bear	8	14,615
White bear	259	665,816
Beaver	139,220	2,313,263
Cougar	0	0
Coyote or prairie wolf	47,340	1,341,807
Ermine	28,183	102,915
Fisher	16,373	793,403
Blue fox	1	21
Cross and red fox	19,959	463,422
Silver or black fox	150	3,863
White fox	1,002	29,747
Not specified fox	0	0
Lynx	7,490	729,150
Marten	92,959	4,335,153
Mink	20,019	271,873
Muskrat	265,071	1,885,577
Otter	9,405	436,968
Rabbit	0	0
Raccoon	32,072	384,838
Skunk	729	1,801
Squirrel	39,257	52,759
Wildcat or bobcat	1,770	185,421
Wolf	2,867	356,000
Wolverine	559	129,018
Other pelts	152	325

	Name of NWFP product	Key species	Quantity	Unit	Value (1000 local currency)	NWFP category
#1	Maple products	Acer saccharum	8 908 000	Gallons	358 242	1 Food
#2	Blueberries	Vaccinnium sp	104 706	Tons	112 126	1 Food
#3	Christmas Trees	Abies sp.; Psedotsuga menziesii; Pinus sp.; Picea sp			78 442	6 Ornamental plants
#4	Wild pelts	See the original data for a full species listing	727 412	Number	14 677	10 Hides skins and trophies
#5						
#6						
#7						
#8						
#9						
#10						
All other plant products						
All other animal products						
Total					**563 487**	

Name of currency	Canadian dollar

Comments

Data on the quantity of Christmas trees produced are not available and are therefore not reported in Table 7c.

Canada has not reported the sales of wild pelts since 2009; data include all terrestrial wild pelts; seal pelts are excluded.

8 Sustainable Development Goal 15

8a Sustainable Development Goal 15

SDG Indicator 15.1.1 Forest area as proportion of total land area 2015

Indicator	Percent							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area as proportion of total land area 2015	38.25	38.19	38.17	38.17	38.16	38.16	38.16	38.15

Name of agency responsible	Natural Resources Canada and Statistics Canada

SDG Indicator 15.2.1 Progress towards sustainable forest management

Sub-Indicator 1	Percent						
	2000-2010	2010-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Forest area annual net change rate	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01

Name of agency responsible	Natural Resources Canada and Statistics Canada

Sub-Indicator 2	Forest biomass (tonnes/ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass stock in forest	94.64	91.16	90.49	90.43	90.43	90.43	90.43	90.43

Name of agency responsible	Natural Resources Canada and Statistics Canada

Sub-Indicator 3	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area located within legally established protected areas	5.24	8.13	8.50	8.50	8.50	8.50	8.50	8.50

Name of agency responsible	Natural Resources Canada and Statistics Canada

Sub-Indicator 4	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area under long-term forest management plan	54.19	54.12	54.35	57.64	57.64	60.71	60.82	60.82

Name of agency responsible	Natural Resources Canada and Statistics Canada

Sub-Indicator 5	Forest area (1000 ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area under independently verified forest management certification schemes	33.28	154 283.39	159 726.66	166 481.57	169 279.30	170 985.03	–	–