2024 LOGGING EMISSIONS UPDATE

Reported greenhouse gas (GHG) emissions from logging in Canada double after revision to government data

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Summary: Logging in Canada is a significant driver of climate change

For many years, the federal government has failed to transparently report the contribution of the logging sector to Canada's annual reported greenhouse gas (GHG) emissions. In its annual *Greenhouse Gas Emissions: National Inventory Report (GHG Inventory)*[ii] submitted to the United Nations (UN), the government has employed an approach to accounting for forestry emissions that obfuscates the impact of industrial logging, fueling the mischaracterization of logging as carbon neutral or even a carbon sink. As shown in previous editions of this report, logging's climate impact rivals emissions from other high-emitting sectors.

In a meaningful shift, largely attributable to recalculations of the historic area that has been logged[iii], the federal government reported in this year's *GHG Inventory* that human activities on managed forest lands were, in 2022 (the latest year reported in 2024's *GHG Inventory*) and historically, a significant source of greenhouse gas emissions. The 2024 GHG Inventory states that anthropogenic (human-caused) net flux on forest lands ranged between 24 and 85 megatonnes (Mt) of carbon dioxide equivalent (CO2e) annually over the period of 2005 to 2022.[iv] In contrast, last year's *GHG Inventory* stated that the "net flux from managed forests" categorized as anthropogenic averaged -5 Mt CO2e over the period 2005-2021.[v]

This revision, however, did not address the fundamental flaws that obfuscate the logging industry's true climate impact. In fact, the government's latest numbers show an even bigger discrepancy between the figure Canada reports for the forestry sector generally and the carbon footprint specifically attributable to logging.

THE GOVERNMENT'S NEW DATA PLACES NET ANNUAL EMISSIONS FROM LOGGING AS ALMOST TWICE AS HIGH AS THOSE WE CALCULATED FROM GOVERNMENT FIGURES IN PRIOR YEARS.

Specifically, we found that:

- In 2022, net logging emissions were 147 Mt, making logging the third-highest emitting sector of the Canadian economy after oil and gas (217 Mt) and transport (156 Mt), and a significantly higher emitter than the agriculture (70 Mt) and electricity (47 Mt) sectors.[vi]
- When averaged over the period 2005-2022, logging emissions (at 189 Mt/year) were less than average oil and gas emissions (214 Mt), but higher than average transport emissions (161 Mt).
- In 2022, the difference between Canada's reported emissions for forestry (24 Mt)[vii] and the net emissions we calculated as specifically attributable to industrial logging (147 Mt) was more than 120 Mt.

In addition, we found that emissions from the forest in the years following logging exceeded removals from post-logging regrowth. In other words, previously logged forests, as a whole, are in and of themselves (i.e. even excluding harvested wood products) a net source of emissions.[viii]

Our calculations employ the same methodology used in a 2024 peer-reviewed paper estimating logging emissions in Canada.[ix] That paper found that the average annual GHG emissions from logging between 2005 and 2021 (latest data available at the time) were approximately 100 Mt higher than what was reported by the government.

This discrepancy, which is now more than 120 Mt under the latest data, is due to Canada's use of a biased approach to classifying anthropogenic versus natural emissions. The government deems GHG

emissions from wildfires to be natural, and excludes these emissions from its top-line calculations for the forestry sector. On the other hand, the government counts as anthropogenic GHG removals (i.e. carbon sequestration) by forests that, following a natural disturbance, have regrown and reached what is deemed the age of "commercial maturity"--even though their role as an emissions sink is largely attributable to natural, not human-caused, processes (and many may have never even been previously industrially logged). The use of "commercial maturity" to determine when removals are deemed anthropogenic (and counted) is itself arbitrary and industry-centric, as the term refers to the age at which forests "are eligible to be scheduled for harvest."[x] In essence, Canada is crediting the logging sector for carbon removals from forests it could–but has not yet—cut.

Numerous experts and observers have raised concerns about Canada's approach to estimating and reporting forestry emissions.

In April 2023, Canada's Commissioner of the Environment and Sustainable Development found that "Environment and Climate Change was not transparent in its reporting on the effects that human activities on forest land have on greenhouse gas emissions."[xi]

In December 2023, 29 Members of Parliament and Senators called on the government to "advance effective action to tackle climate change by committing to separately and transparently report GHG emissions attributable to logging."[xii]

Both the report and open letter emphasize the importance of clear reporting from federal and provincial governments on the climate impact of industrial logging as a standalone sector. As they highlight, effective climate policy requires transparency around the human-caused drivers of climate change. The obfuscation of emissions attributable to logging under a broader category of "forestry," defined to unjustifiably include a large, naturally derived carbon sink, prevents this transparency.

The 2024 GHG Inventory's recalculation of forestry as an emissions source demonstrates the wide variability in government calculations from year to year and the significant impact of certain accounting choices. It is, therefore, a sector that demands maximum transparency and clarity, most critically through separate reporting on emissions from logging. Ultimately, when transparently calculated, the logging sector is revealed as a high-emitting sector that, like others, demands government action to promote mitigation.

METHODOLOGY

The methodology used to calculate net logging emissions is described in detail in Bysouth et al.'s peer-review publication.[xiii] In brief, the calculation derives from three key variables:

- **Item #1: Carbon in harvested wood (in CO_2e).** We start with the emissions that would occur if all the carbon in the wood extracted from the forest in a given year were released immediately.
- **Item #2: Net carbon added to long-lived wood products pool (in CO_2e).** Some of the carbon in Item #1, rather than being immediately released, is deferred into the future because it is stored in the form of long-lived products (e.g. lumber). So we subtracted from Item #1 the net amount of deferred emissions (i.e. carbon added to the long-lived wood product pool minus CO_2 released from wood in that pool reaching its end of life).
- **Item #3: Net carbon flux from forest emissions and re-growth removals after logging (in CO_2e).** Following industrial logging, the forest acts as a carbon source for a number of years, emitting carbon from soil and forest debris. We combine these emissions with the totality of the carbon captured across the managed forest by stands that, following initial years of emissions post-logging, are regenerating and acting as net carbon sinks.

Net Logging Emissions are the sum of items 1 to 3 (item 2 is negative meaning it is a net carbon sink).

Data was sourced exclusively from the accompanying tables of Canada's GHG Inventory (1990-2022).[xiv] See Appendix A for further details on data sources.

All figures exclude emissions associated with the conversion of forest land to other uses (16 Mt CO_2e in 2022) and with the creation of new forest land, i.e., afforestation (0.17 Mt CO_2e).[xv] Deforestation, resulting from processes such as the expansion of agriculture, oil and gas operations, and urban areas, is arguably more reasonably attributed to the sectors driving it than to the logging industry. As a result, we restricted our estimates to "forest land remaining forest land" – land on which trees are replanted or allowed to naturally regenerate after logging.

Our estimate of logging emissions is conservative in several ways.

First, our estimates do not include emissions from the logging industry's use of fossil fuels, notably from transportation and pulp and paper production. Arguably, pulp and paper production is an integral part of the logging industry, but at present it is treated as a separate economic sector. The GHG Inventory estimates 8 Mt CO_2e of emissions from the use of fossil fuels in pulp and paper production in 2022.

In addition, there are a number of limitations of the data in Canada's GHG Inventory that cause our figures to be further underestimated.[xvi] This includes the fact that the monitoring data Canada uses does not include the impact of "logging scars," areas where forest cover has failed to meaningful regrow, even decades following logging.[xxiv] These areas of failed regrowth are not currently captured in government data.

FINDINGS

Using the methodology described in the previous section, we calculated net logging emissions for 2022 to be 147 Mt CO_2e.

All values for 2022 emissions can be found in Table 1, and the values for previous years (2005-2021) can be found in Appendix B.

Net logging emissions fell slightly from 2021, and have, in general, fallen since 2005 due to a reduction in area logged. (ECCC recalculates historic forestry emissions each year, so past emissions numbers presented in this report differ from our previous report.)

For illustrative purposes, we compared the 2022 net logging emissions value to emissions from other economic sectors described in the GHG Inventory (Figure 2). We found that in 2022 logging emissions were more than double emissions from the agriculture and electricity sectors, and slightly less than emissions from the oil and gas and transport sectors(See Table B2 and Figure 2).[xvii]

Table 1. 2022 values for Items 1-3 and net logging emissions. Values in this table have been rounded. Negative values indicate a carbon sink, while positive values show a carbon source.

Item	Description	Value (Mt CO2e)
1	Carbon in harvested wood	141
2	Net carbon added to long-lived products	-16
3	Net carbon flux from re-growth after logging	22
Net Logging Emissions	Sum of three components above	147

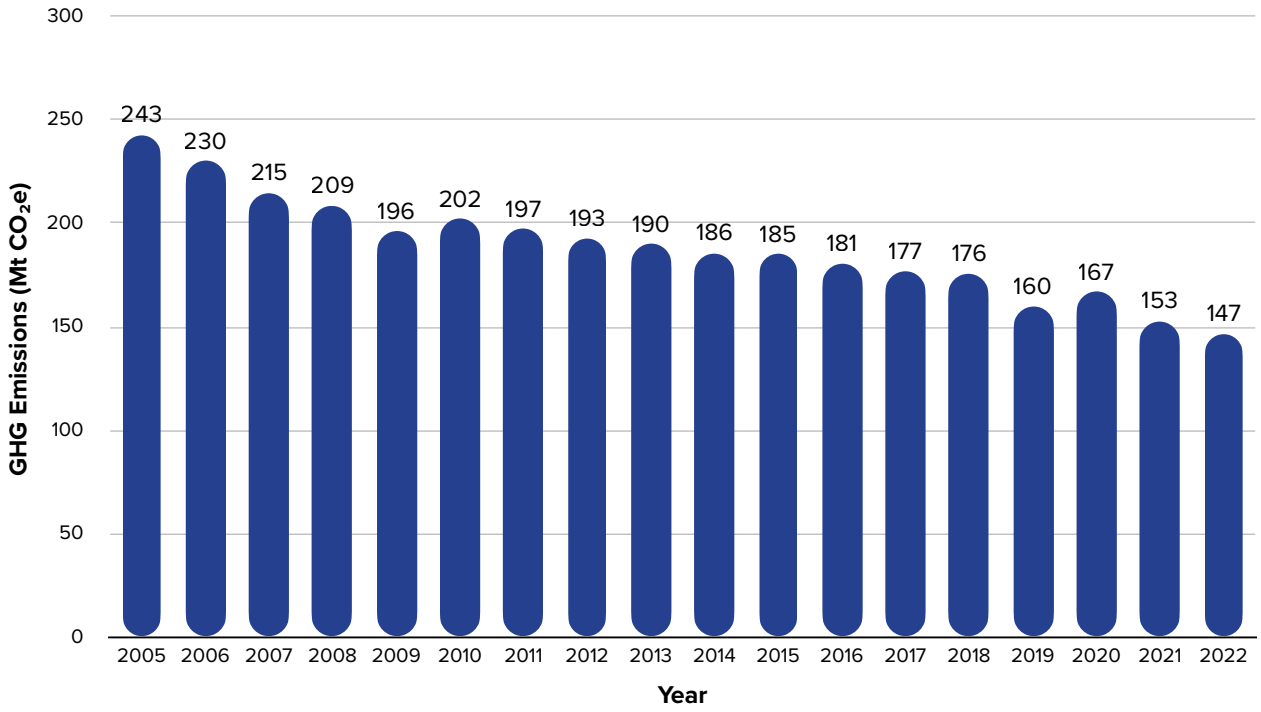

Figure 1. Values for net logging emissions. The 2022 value is the most recent year available.

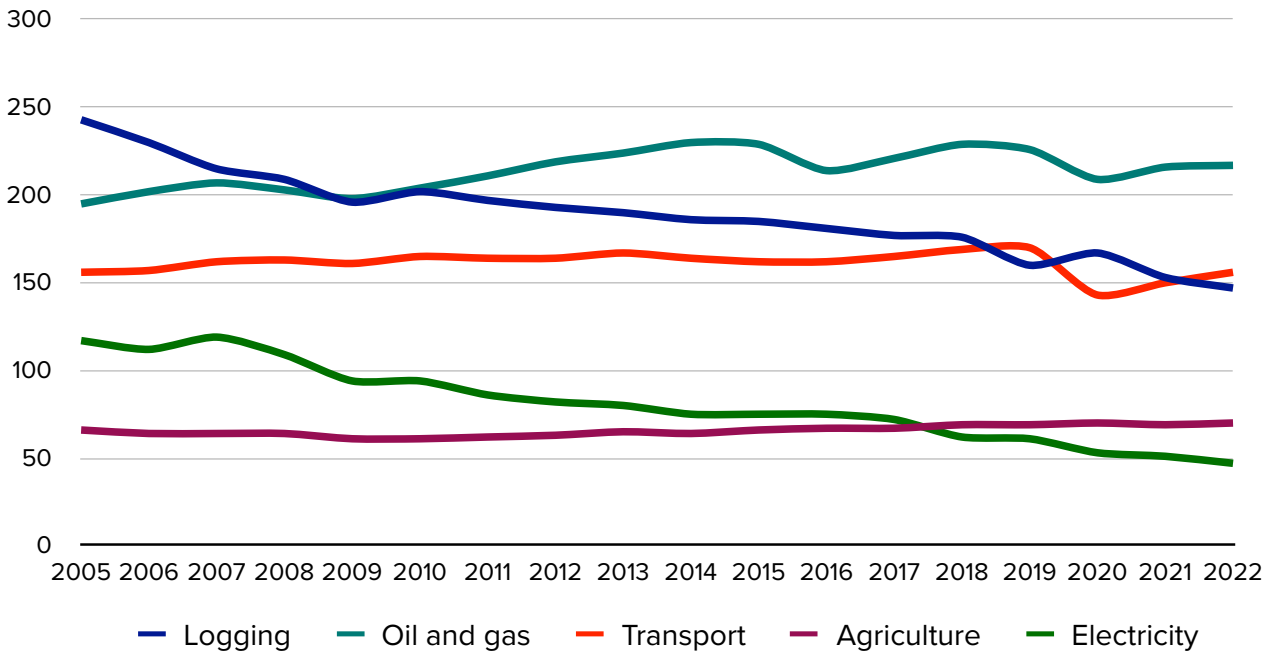

Figure 2. Comparison between net logging emissions and emissions from other economic sectors, as reported in Canada's GHG Inventory (2005-2022).

ADDITIONAL FINDINGS

Due largely to recalculations in the historic area logged[xviii], this year's GHG Inventory, in contrast to past years, found that human activities on managed forest lands were, in 2022 and historically, a significant source of greenhouse gas emissions. The 2024 GHG Inventory states that anthropogenic (human-caused) net flux on forest lands ranged between 24 and 85 Mt of CO2e annually over the period of 2005 to 2022.[xix]

With this adjustment, the discrepancy between the government's topline forestry emissions figure and our logging emissions calculations grew. It now exceeds 120 Mt, in contrast to the 100 Mt emissions gap we found last year. This is due to the fact that the government's calculations of removals from commercially mature forests that regrew following wildfires–the main cause of the discrepancy– was also larger than in past years.

In addition, there was a significant shift in the numbers behind Item #3 in our methodology. In past years, item #3 has been a negative figure, reflecting the fact that, on previously logged land, removals from regrowing forests exceeded emissions released in the years following harvest (from debris and soils). That flipped this year, meaning previously logged land, in aggregate, switched from a carbon sink to a carbon source.

CONCLUSIONS

Six main conclusions can be drawn from this updated calculation of net logging emissions.

1. **GHG emissions from industrial logging remain large.** Logging is one of the highest emitting sectors in Canada, contributing more than 21% of Canada's total annual GHG emissions in 2022.

2. **Canada does not transparently report logging emissions.** While Canada clearly reports emissions from "harvested wood products" in its GHG Inventory (i.e. emissions released when harvested wood is burned or reaches the end of its lifespan), its topline "forestry" figure combines this number, as well as net post-logging forest emissions, with a massive "forest land" sink, which includes carbon removals from "commercially mature" trees that have regrown following wildfires and therefore are not reasonably attributable to the logging industry (see point 4 below). As a result, it is difficult, without extensive data compilation and calculations, to determine net emissions by the logging sector.

3. **For the first time, Canada is reporting industrial logging as a significant source of emissions.** Canada's top-line reported number for the forestry sector, "net flux from managed forests and resulting harvested wood products", was 24 Mt in 2022.[xx] After many years of portraying logging in Canada as carbon-neutral or a net sink, the federal government has recognized the sector as a net source of emissions.

4. **Canada continues to understate the level of emissions from logging due to a biased treatment of emissions and removals from natural disturbances.** In 2022, Canada categorized as anthropogenic 129 Mt of carbon dioxide removals from trees that have regrown to a "commercially mature" age following a wildfire[xxi], even though the tree growth creating this sink is attributable to natural, not human, causes. At the same time, Canada does not count emissions from wildfires (reported as 85 Mt in 2022)[xxii] in its country total because it deems these fires to be out of the control of human activity. The result is that the "net flux" Canada reports vastly overrepresents removals from forest land, obfuscating the true anthropogenic impacts.[xxiii]

5. **The understatement of emissions from logging is leading to counterproductive policy decisions.** By failing to accurately and transparently report the GHG emissions from industrial logging, Canada is allowing one sector of the economy to freely pollute the atmosphere, thereby increasing the burden of emissions reductions on other sectors and externalizing

costs to future generations. The lack of clear and accurate reporting of logging emissions is also distorting climate policy-making, as officials currently lack the data around industrial's logging impact required to advance science-driven, effective solutions. It also leads to the counterproductive subsidizing of the forestry sector valued at of hundreds of millions of dollars a year. Finally, this lack of transparent reporting is hindering the necessary transition of the logging industry to a lower-carbon, climate-safe sector that can compete in a marketplace that increasingly demands sustainable practices and products.

APPENDIX A. DATA SOURCES

Table A1. Data and sources for item #1: Carbon in harvested wood (in CO_2e)

operation	Component	Source
(none)	Carbon in all wood harvested in a given year	NIR Part 1, Table 6-7, Carbon Stock inputs line, row 1
minus	Carbon in wood from forest conversion (deforestation)	NIR Part 1, Table 6–7, sum of Forest conversion lines, rows 3–5
minus	Carbon in residential firewood taken from crop agricultural and urban (non-forest) land	NIR Part 1, Table 6–7, sum of Cropland and Settlements lines, rows 7–8
multiply by 44/12	Sum of three components above, multiplied to convert mass of carbon to mass of CO_2	44 is the molecular weight of CO_2; 12 is the atomic weight of carbon

Table A2. Data and sources for item #2: Net carbon added to long-lived products (in CO_2e)

operation	Component	Source
(none)	Total emissions from harvested wood products	NIR Part 1, Table 6-7, Emissions line, row 11
minus	Emissions from harvested wood products originating from forest conversion (deforestation)	NIR Part 1, Table 6–8, (forest conversion line, row 1 for each year)
minus	Carbon in residential firewood taken from agricultural and urban (non-forest) land, multiplied by 44/12 to convert to CO_2	NIR Part 1, Table 6–7, sum of Residential Firewood, Croplands and Settlements lines, rows 7–8
minus	Carbon in harvested wood from FLFL (in CO_2)	This is item #1, calculated above

Table A3. Data source for item #3: Net carbon flux from re-growth after logging (CO_2e)

operation	Item	Source
(none)	Net emissions on forest land, combining removals from tree regrowth after logging on FLFL with post-logging emissions	NIR Figure 6–3, "Anthropogenic Component, past forest management activities"

Table A4. Data sources for comparison of emissions between sectors (CO_2e)

Component	Source
Oil and gas production emissions	NIR Part 1, Table 2-12, Oil and Gas
Transport emissions	NIR Part 1, Table 2-12, Transport
Agriculture emissions	NIR Part 1, Table 2-12, Agriculture
Electricity emissions	NIR Part 1, Table 2-12, Electricity

APPENDIX B. FULL RESULTS

Table B1. Annual net logging GHG emissions, Mt CO_2e (with past emissions updated to reflect the 2023 NIR)

Year: 20	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Carbon in Harvested Wood	200	182	164	142	120	142	149	153	156	156	159	159	156	160	141	141	141	141
Net Carbon Added to Long-Lived Products pool	-54	-46	-37	-16	6	-6	-13	-17	-20	-20	-24	-23	-20	-24	-16	-5	-15	-16
Net flux from Forest Emissions and Regrowth	96	94	89	83	70	66	61	56	54	50	49	45	42	40	34	31	26	22
Net Logging Emissions	243	230	215	209	196	202	197	193	190	186	185	181	177	176	160	167	153	147

Note: negative numbers in row 2 represent positive amounts of carbon added to long-lived-products.

Table B2. Annual GHG emissions from logging (net), oil and gas, and transport, Mt CO_2e)

Year: 20	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Logging	243	230	215	209	196	202	197	193	190	186	185	181	177	176	160	167	153	147
Oil and gas	195	202	207	203	198	204	211	219	224	230	229	214	221	229	226	209	216	217
Transport	156	157	162	163	161	165	164	164	167	164	162	162	165	169	170	143	150	156
Agriculture	66	64	64	64	61	61	62	63	65	64	66	67	67	69	69	70	69	70
Electricity	117	112	119	109	94	94	86	82	80	75	75	75	72	62	61	53	51	47

Table B3. Annual net logging GHG emissions, Mt CO_2e (as presented in 2023 report, before recalculation):

Year: 20	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
Carbon in harvested wood	200	182	164	142	120	142	149	153	156	156	159	159	155	160	141	141	141
Net carbon added to long-lived products pool	-54	-46	-37	-16	6	-6	-13	-17	-20	-20	-23	-24	-20	-24	-16	-16	-15
Net Flux From Forest Emissions and Regrowth	-25	-26	-28	-32	-44	-40	-43	-45	-46	-48	-44	-46	-47	-47	-52	-50	-53
Net logging emissions	121	110	99	94	83	96	94	91	90	88	91	89	88	88	73	76	73

Note: negative numbers in rows 2 and 3 represent, respectively, positive amounts of (i) carbon added to long-lived-products and (ii) CO_2 removed from the atmosphere.

ENDNOTES

i The authors would like to thank David Bysouth for data analysis support, and Julee Boan of NRDC for valuable input and contributions to the analysis.

ii Environment and Climate Change Canada (2024). National Inventory Report 1990–2022: Greenhouse Gas Sources And Sinks In Canada. Canada's Submission To The United Nations Framework Convention On Climate Change, Part 1.

iii Ibid, p. 14.

iv Ibid, Figure 6-6, p. 193.

v Environment and Climate Change Canada (2023). National Inventory Report 1990–2021: Greenhouse Gas Sources And Sinks In Canada. Canada's Submission To The United Nations Framework Convention On Climate Change.

vi Oil and gas includes emissions from production from frontier, light and heavy oil fields, combustion and fugitive emissions from refined petroleum products and distribution to consumers, and oil, natural gas and transmission emissions. This does not include downstream emissions from consumption. Transport includes emissions from passenger vehicles and freight (rail, aviation and marine). Agriculture emissions include crop and animal production. Electricity includes emissions from combustion-based electricity generation (e.g. coal, natural gas). See Canadian Environmental Sustainability Indicators: Greenhouse Gas Emissions, May 2024, p. 9-14.

vii Environment and Climate Change Canada (2024), p. 57.

viii This is evidenced by the fact that "net carbon flux from re-growth after logging" (item 3, described below) is a positive number (i.e. a source of emissions) every year from 2005 to 2022.

ix Bysouth D, Boan JJ, Malcolm JR and Taylor AR (2024). High emissions or carbon neutral? Inclusion of "anthropogenic" forest sinks leads to underreporting of forestry emissions. Front. For. Glob. Change. 6:1297301. doi: 10.3389/ffgc.2023.1297301

x Environment and Climate Change Canada (2024), p. 189.

xi Office of the Auditor General of Canada (2023). Reports of the Commissioner of the Environment and Sustainable Development to the Parliament of Canada. Report 1: Forests and Climate Change.

xii Aldag et al. (2023). Letter to Ministers Wilkinson and Guilbeault, December 6, 2023.

xiii Bysouth et al (2024).

xiv Environment and Climate Change Canada (2024), Tables 6-7 and 6-8, and Figure 6-3 with underlying data.

xv Environment and Climate Change Canada (2024), Table 6-1.

xvi Wildlands League has shown that significant and permanent loss of forest is caused by logging roads and landings, however Canada does not report those emissions. See Bramley, M. (2021), Canada's Approach to Forest Carbon Quantification and Accounting: Key Concerns, p. 7-8.

xvii We compared the logging sector to other GHG Inventory sectors as a means of illustrating the scale of logging sector emissions), and the fact that the logging sector's emissions are on par with other sectors Canada separately reports. Canada's GHG inventory includes downstream emissions from harvested wood products in the LULUCF (Land Use, Land Use Change and Forestry) category, so we included those in our emissions estimate.

xviii Environment and Climate Change Canada (2023), Part 1, p. 191-193.

xix Ibid, p. 192.

xx Ibid.

xxi Ibid, Figure 6-3, underlying data.

xxii Ibid.

xxiii The bias involved in Canada's accounting approach is described in detail in Bramley, M (2021), Canada's Approach to Forest Carbon Quantification and Accounting: Key Concerns, p. 9-13.

xxiv Hesselink T (2019). Boreal Logging Scars. Wildlands League. https://loggingscars.wpengine.com/wp-content/uploads/MyUploads/Summary-for-Decision-Makers.pdf