

## SUBMISSION BY THE GOVERNMENT OF CANADA

### FOREST MANAGEMENT REFERENCE LEVEL

MARCH 2011

#### I. Introduction

1. There is a general recognition among Parties to the United Nations Framework Convention on Climate Change (UNFCCC) that current accounting rules on land use, land-use change and forestry (LULUCF) do not fairly accommodate diverse national forest circumstances, do not focus accounting on the effects of current and future management, and do not provide incentives for mitigation action.

2. In particular, in the case of Canada, emissions from the managed forest are strongly influenced by variable fire and insect infestations over which Canada has no control. As the rules under the Kyoto Protocol related to LULUCF in the first commitment period did not factor out emissions from such natural disturbances, Canada opted not to elect forest management (FM) in its emissions accounting under the first commitment period.

3. In this context, Canada is encouraged by Parties' resolve to enhance LULUCF accounting rules post-2012. Canada believes that improvements to these rules should be guided by three overarching objectives:

- 1) An improved incentive structure for sustainable land management;
- 2) An accurate estimation of emissions to and removals from the atmosphere; and
- 3) A focus on anthropogenic emissions and removals within the control of the Party.

The new rules must accommodate the diversity of national LULUCF characteristics and ensure environmental effectiveness. FM accounting using reference levels will help to fulfill these objectives.

4. If such rules are not established, Canada could not accept mandatory accounting for FM. In that case, the reference level described in this submission would not be valid.

5. In accordance with the request in Cancun Decision 2/CMP.6 (*Land use, land-use change and forestry*) (FCCC/KP/CMP/2010/12/Add.1), Canada is pleased to provide this submission on its FM reference level for 2013-2020 (paragraph 4 of the Decision) and strongly supports the technical assessment process agreed in Cancun (paragraphs 5 and 6). Transparent information on reference levels in Party submissions and a rigorous review process will ensure that reference levels submitted by Parties are constructed in accordance with the guidelines agreed in Cancun. Canada believes that the submissions and review process should provide sufficient information to increase Parties' level of

comfort with the reference level approach so as to allow swift agreement on FM accounting in 2011.

6. Provision of the reference level in this submission is without prejudice to the final legal form of any agreed outcome to be adopted under the Convention.

7. As allowed by Decision 2/CMP.6 (*Land use, land-use change and forestry*), Canada wishes to update its FM reference level inscribed in the appendix to Annex I to the decision, to reflect new data and methodological improvements, as described in this submission. This submission explains in detail how Canada's FM reference level for 2013-2020 has been constructed. The submission is organized according to the structure of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*). Much of this information was previously provided in Canada's informal submission of November 2009, which described the construction of the reference level currently inscribed in the appendix to Annex I to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

8. In Decision 2/CMP.6 (*Land use, land-use change and forestry*), Parties were requested to provide reference levels both including and excluding *force majeure* (paragraph 4, footnote 1). Canada notes that this is difficult as the definition of *force majeure* has yet to be agreed. Moreover, natural disturbance events that could constitute *force majeure* are extremely variable and unpredictable in Canada. This means that any historic average of natural disturbance impacts is very unlikely to reflect what actually happens in the future. For this reason, including an historical average of *force majeure* in the reference level will have a perverse accounting outcome as debits or credits relative to the reference level would occur not simply as a result of human activities but also due to the arbitrary difference between the average historical impact of *force majeure* and the actual impact in any given year of the accounting period. This outcome is clearly not consistent with the accounting objectives noted above.

9. Canada believes significant progress was made in Cancun toward agreement on LULUCF rules. Parties reached informal agreement on the general accounting treatment of emissions from harvested wood products (HWP) (paragraphs 27-28, page 34, FCCC/KP/AWG/2010/18/Add.1). However, the treatment of emissions from the pool of HWP was not agreed (paragraph 15 *sexies*, page 31, FCCC/KP/AWG/2010/18/Add.1); therefore, how it should be treated in the reference level remains unclear.

10. As a result, for the purposes of this submission, Canada presents two reference levels (Table 1). They differ only in how the emissions from the HWP pool have been estimated, as described in Section V. Note that the emissions from the HWP pool included in a projected reference level will generally cancel the emissions from the HWP pool included in the actual emissions and removals at the end of the accounting period when the two are compared for the purpose of accounting. This is because the emissions from the HWP pool will appear in both the projected reference level and in the actual

emissions used in the accounting. Thus, the choice of starting year for the HWP pool does not have an impact on the accounting.

**Table 1:** Proposed reference level using different approaches for the pool of harvested wood products (Mt CO<sub>2</sub>eq/year).

HWP pool starts in 1900	HWP pool starts in 1990
-102.81	-114.36

## II. General description of reference level

11. This section addresses paragraphs 4 and 5 of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

12. Canada’s reference level is based on historic emissions and removals from 1990 to 2009, including the impact of natural disturbances, plus a projection for the period 2010-2020. The 1990-2009 values are those reported in Canada’s 2011 National Inventory Report. These historical values were derived using the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3 – see Section IV) and reflect the carbon stock changes on lands subject to FM activities over this time period. They form the basis for then projecting the emissions/removals for the period 2010-2020, taking into account the age-class structure at the end of the 2009 inventory year, expected future harvests and other management activities, and assuming that starting in 2010 only a “background” constant level of natural disturbance occurs annually in the projection period (see Section V). Like the historical values, the projection includes the net balance of emissions and removals occurring in the managed forest each year.

13. Table 2 provides a description on how each element contained in footnote 1 in paragraph 4 of Decision 2/CMP.6 (*Land use, land-use change and forestry*) was taken into account in the construction of Canada’s forest management reference level. More details are provided in subsequent sections.

**Table 2:** Description of how each element contained in footnote 1, paragraph 4 was taken into account in Canada’s forest management reference level

Element of footnote 1	Description
(a) Removals or emissions from forest management as shown in greenhouse gas inventories and relevant historical data.	The reference level was derived using exactly the same approach, definitions, input data, and parameters as described in Annex 3.4 of Canada’s 2011 National Inventory Report. Historical data were taken into account in projecting harvesting volumes. See Section V.
(b) Age-class structure.	The age-class structure of Canada’s FM area is reflected in the forest inventory data input into the CBM-CFS3. The impacts of age-class structure are taken into account by including them in the same way in both the reference level and the accounting period. See Section V.
(c) Forest management activities already undertaken.	FM activities already undertaken are used in producing annual GHG inventory estimates, for example, harvesting, pre-commercial thinning

<b>Element of footnote 1</b>	<b>Description</b>
	and slash-burning activities. The delayed CO <sub>2</sub> emissions and removals due to decay and forest regeneration over time that follow these activities are included in the reference level. See Section V.
(d) Projected forest management activities under a business as usual scenario.	The reference level is based on projections of expected business as usual harvesting and other management activities. Projections were also made of production of harvested wood products. See Section V.
(e) Continuity with the treatment of forest management in the first commitment period.	Continuity with the treatment of FM in the first commitment period was not taken into account in the reference level as Canada did not elect FM in its first commitment period accounting. However, FM estimates are based on the same approach, definitions, input data and assumptions as those used for Forest Land remaining Forest Land under the Convention.
(f) The need to exclude removals from accounting in accordance with Decision 16/CMP.1, paragraph 1.	The impacts of elevated CO <sub>2</sub> concentrations above pre-industrial levels and indirect nitrogen deposition were not explicitly addressed in the construction of the reference level. However, any such effects are treated consistently in both the reference level and inventory estimates so that when the reference level is compared to inventory estimates in the accounting, these effects cancel out. See Section V.
The need for consistency with the inclusion of carbon pools.	The reference level includes all carbon pools as do Canada's forest-related estimates in its National Inventory Report. See Section III.

### **III. Pools and gases**

14. This section addresses paragraphs 6 and 7 of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

15. The treatment of pools and gases used in the construction of the reference level is consistent with Canada's annual greenhouse gas (GHG) inventory. No pools or gases have been excluded. In addition to inclusion of the five standard carbon pools (above-ground biomass, below-ground biomass, deadwood, litter and soil organic matter), Canada's reference level includes emissions of the carbon stored in harvested wood products (see Section V below). Greenhouse gases included in the reference level are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). The emissions of CH<sub>4</sub> and N<sub>2</sub>O occur as a result of projected controlled burning activities following harvesting and from the background level of wildfire included in the reference level (see Section V).

### **IV. Approaches, methods and models used**

16. This section addresses paragraph 8 of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

17. As stated above, Canada's reference level was derived using exactly the same data, parameters and methodologies described in Canada's 2011 GHG inventory

submission and used to calculate estimates for Forest Land remaining Forest Land (FL-FL). For further details on these basic methods, please refer to Canada's most recent National Inventory Report, which will be available on the UNFCCC website ([http://unfccc.int/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/items/5888.php](http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/5888.php)). The values in the 2011 National Inventory Report have been supplemented by projections of harvests to 2020, and methods to remove the impact of natural disturbances as described in Section V.

18. Canada applies a Tier 3 methodology to estimate emissions and removals from its Forest Land. Canada's National Forest Carbon Monitoring, Accounting and Reporting System (NFCMARS - Kurz and Apps 2006) includes the CBM-CFS3 (Kull et al. 2006, Kurz et al. 2009, Stinson et al. 2011). This model integrates forest inventory and yield curves with spatially-referenced activity data on FM and natural disturbances (fires, insect infestations) to estimate forest carbon stocks, carbon stock changes, CO<sub>2</sub> emissions and removals and CH<sub>4</sub> and N<sub>2</sub>O emissions. The model uses regional ecological and climate parameters to simulate carbon transfers among pools, to the forest products sector and to the atmosphere.

19. The conceptual approach is that recommended by the Intergovernmental Panel on Climate Change (IPCC 2003), in which net removals or emissions are calculated as the difference between CO<sub>2</sub> uptake by growing trees and emissions from natural decay, FM activities and natural disturbances. Forest Land estimates developed using this approach have been reviewed by several Expert Review Teams, starting in 2007 with an in-country review of Canada's Initial Report under the Kyoto Protocol, and in all subsequent years through centralized reviews. The model and methods used also have completed scientific peer-review through a series of publications describing the underlying science, the model and its application to regional and national case studies both in Canada and internationally.

20. The CBM-CFS3 tracks emissions and removals as they actually occur over time. Harvesting and natural disturbance result in significant transfers of dead biomass carbon to the litter and dead organic matter pools. The model simulates the subsequent slow decay of the biomass that results in emissions for years or decades following the harvesting or natural disturbance, depending on the decay rates, as well as the removals that occur as forest stands regenerate after the disturbance.

21. As a result of this approach, which aims to reflect actual emissions and removals when they occur, the model is able to more accurately estimate the long-term impact of disturbances and provide accurate projections, as is required in the construction of a projected reference level. For further detail, see Chapter 7 and Annex 3.4 of Canada's 2010 and 2011 National Inventory Reports. One implication is that delayed emissions from forest stands that were subject to natural disturbances prior to 2010, and which result from the slow decay of dead organic matter left after natural disturbance, are included in the reference level, as are the removals that occur as forest regenerates. As these delayed emissions and removals will also be captured in actual estimates for 2013-20, they will cancel out when the reference level is used in the accounting.

## V. Description of construction of reference levels

22. This section addresses paragraphs 9 and 10 of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

### *Area under forest management*

23. Canada's area under FM (229 million hectares) covers about 66% of the country's forests and spans all provinces and territories except Nunavut. The area subject to FM is defined using an area-based approach as outlined by the IPCC (IPCC 2003) and includes:

- (i) Lands managed for the sustainable harvest of wood fibre,
- (ii) Lands under intensive protection from natural disturbances (e.g., fire suppression to protect forest resources), and
- (iii) Protected areas, such as national and provincial parks that are managed to conserve forest ecological values.

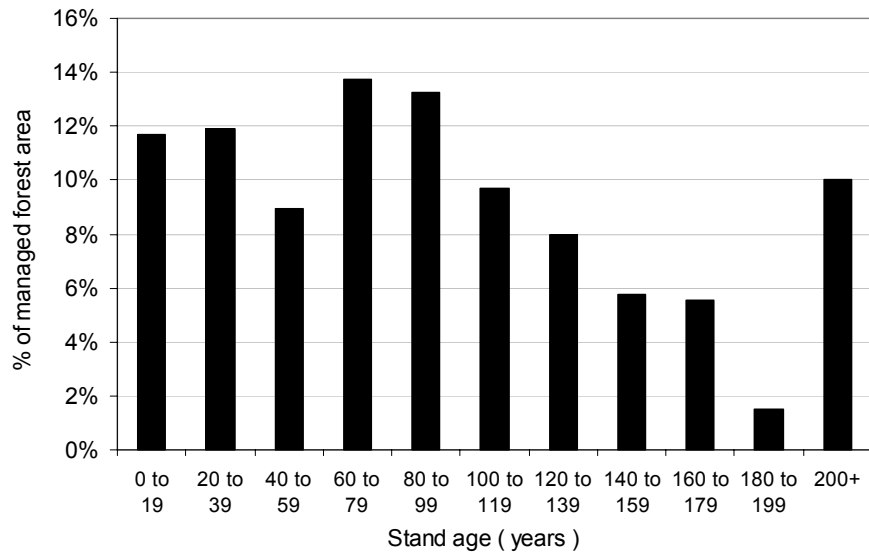
### *Relationship between FM and FL-FL*

24. In Canada, the managed forest is the same as the area subject to FM, where managed forests are those managed for timber and non-timber resources (including parks) or subject to fire protection. GHG estimates for FM in Canada are nearly identical to the estimates Canada provides in its GHG inventory for FL-FL plus Land converted to Forest Land (L-FL), except that L-FL in 1990 and onwards is not included (this is considered afforestation/reforestation). Future deforestation will result in small annual reductions in Canada's FM area. However, these area reductions (0.03% or less per year) have a negligible effect on projections of FM emissions and removals. Therefore, projections of future deforestation areas were not taken into account in constructing the reference level.

### *Forest characteristics*

25. Age-class: The reference level accurately reflects the current age-class structure and its evolution under the assumed future management activities. The age-class distribution of the managed forest is captured by the forest inventory data and annual change information (due to harvesting, fire and insect infestations) used in the CBM-CFS3 (see Figure 1). The managed forest is composed of relatively old stands, with over half being 80 years or older in 2009. This age-class structure reflects past natural disturbances and management.

**FIGURE 1: Age-Class Structure of Canada’s Managed Forest, 2009.**



26. Increments: The input data for the CBM-CFS3 include information about forest growth rates for different forest types, site classes and regions. A description of how growth data by species and region are represented in the model and the source of the information can be found in Canada’s 2010 and 2011 National Inventory Reports (Chapter 7 and Annex 3.4), Kurz et al. (2009), and Stinson et al. (2011). The same growth and yield curves are used for both projected removals and for estimates of actual removals.

27. Rotation length: Rotation length was not directly used in the construction of the reference level. This is because Canada’s managed forest is composed of substantial slow-growing and relatively old stands: harvesting often involves stands that have never been harvested before. Moreover, rotation lengths are considerably longer in Canada than in countries that have faster-growing forests meaning that, once harvested, a stand typically would not be harvested again for 60 or more years. Harvesting decisions are determined according to provincial and territorial policies and regulations, taking into account the age of the forest, proximity to processing facilities, environmental considerations and other factors. Based on provincial and territorial input, CBM-CFS3 simulates harvesting at the appropriate age which varies by species and region and can include salvage logging of stands previously disturbed by fire or insects.

28. “Business as usual” FM activities: The reference level includes the following projected management activities: clear-cut harvesting, selection harvesting, salvage harvesting, shelterwood harvesting, commercial thinning and slash burning. The proportion of the total harvest accounted for by the various harvesting methods was projected using the recent average proportion of harvest method to total harvest. The impacts of other silvicultural activities, such as tree planting, fertilization, and pre-commercial thinning are not accounted for explicitly because these activities are rarely

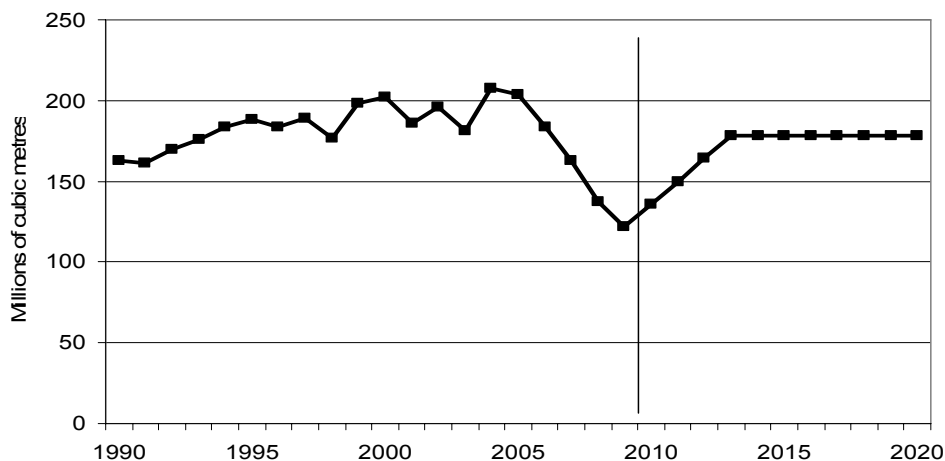
implemented (fertilization, pre-commercial thinning) or their impacts are implicitly accounted for in the growth and yield data used in CBM-CFS3.

*Historical and assumed harvest rates*

29. The Annex Table and Figure 2 below shows historical harvest rates for 1990-2009 and projections for 2010-20. The historical harvest volume information is publicly available in the National Forestry Database ([www.nfdp.ccfm.org](http://www.nfdp.ccfm.org)) and is the same information used in the CBM-CFS3 and Canada's 2011 National Inventory Report, thus ensuring that the reference level is consistent with the historic time series data.

30. Projecting future harvests in Canada is complicated by the fact that Canada's forest sector has suffered a recent dramatic contraction. The annual harvest volume declined to a 35-year low in 2009 from its record peak in 2004, due to a combination of competitiveness issues and the global recession, most notably the marked decline in housing markets in the United States. While recovery of the forest sector started in 2010, there is uncertainty over the recovery trajectory. Given this uncertainty, Canada has developed a projection of the future business as usual harvest rate that is consistent with historical data. The reference level reflects the assumption that business as usual harvest rates will continue to recover after 2010, and by 2013 will reach the average level observed for 1990 to 2009. Harvest rates are projected to remain at that level from 2013 to 2020.

**FIGURE 2: Canada's Harvest Volume, Historical (1990-2009) and Projected (2010-2020).**



*Harvested Wood Products (HWP)*

31. Significant progress was made in Cancun toward agreement on HWP rules (paragraphs 27 and 28, page 34, FCCC/KP/AWG/2010/18/Add.1). Parties informally agreed that emissions from domestically produced and exported HWP should be accounted using a first-order decay function as specified in the IPCC 2006 Guidelines for



National Greenhouse Gas Inventories (IPCC 2006), and that three categories of HWP should be used, with specified half-lives (sawnwood, 35 years; wood panels, 25 years; paper 2 years). Parties agreed that this approach should also apply, as a default, to domestically produced and consumed HWP. Parties also agreed that if CO<sub>2</sub> emissions from solid waste disposal sites are accounted separately, this should be on the basis of instantaneous oxidation, and that wood harvested for bioenergy should also be accounted on the basis of instantaneous oxidation.

32. Accordingly, Canada used the approach informally agreed in Cancun, along with data from the Food and Agriculture (FAO) and country-specific density factors. This was then converted to carbon using Tier 2 estimates of emissions from both exported and domestically produced and consumed HWP and included in the reference level. This approach is different than the one Canada has used to report on its HWP emissions as described in its 2011 and previous National Inventory Reports.

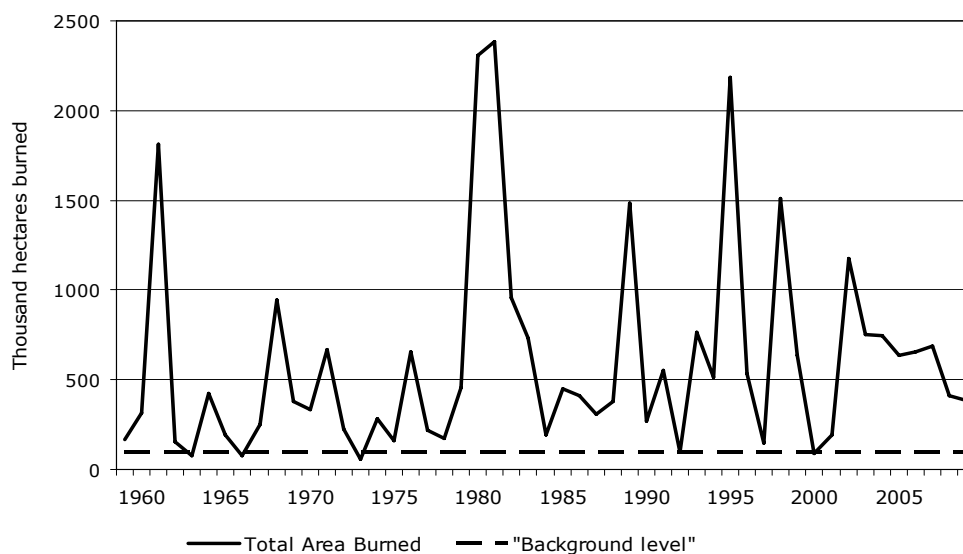
33. As the treatment of emissions from the existing pool of HWP was not agreed in Cancun, how it should be treated in the reference level remains unclear (see paragraph 15 sexes, page 31, FCCC/KP/AWG/2010/18/Add.1). Therefore, for the purposes of this submission, Canada presents reference levels using two options for the treatment of the HWP pool: having the pool start in 1900 or 1990. In Canada, all harvests come from the area subject to FM – any harvests from deforested or afforested areas are extremely small and assumed to be instantaneously oxidized. Note also that Canada did not elect to include FM in its Kyoto Protocol 2008-2012 accounting. When the pool starts in 1900, the reference level includes emissions in 2013-2020 from commodities produced since 1900. When the pool starts in 1990, the reference level includes emissions in 2013-2020 from commodities produced since 1990. In both cases, the reference level also includes emissions from HWP biomass used for bioenergy or remaining as waste after mill processing, based on the instant oxidation approach.

34. The Annex table shows historical (1990-2009) and projected (2010-2020) HWP data for Canada's exports and domestically produced and consumed HWP. The historical data back to 1961 are from the Food and Agriculture Organization FAOStat database (downloaded February 2011). Domestically produced and consumed HWP are calculated as the difference between production and exports as shown in the FAO database. Canadian data for years prior to 1961 were used to extrapolate the FAO data back to 1900. HWP for each category and the domestic and export markets were projected for 2010-2020 based on recent historical data. Specifically, the average proportion of harvest that is converted to HWP, the average shares of total HWP commodity production held by each category of HWP, and the average shares of each category that is exported were calculated for the 2000-2009 period. These averages were then used with the projected total harvest (see the Annex table and Figure 2) to calculate the projected volume of HWP in each category/market combination. The period of 2000-2009 was chosen for the averages as it was regarded as the best representation of the likely production structure of the Canadian forest products industry through to 2020.

*Disturbances in the context of force majeure*

35. Canada's forest is continental in scale: a forest of this size means that almost every year some portion of the forest is affected by severe natural disturbances. Since 1990, the only natural disturbances with significant national impact in Canada have been wildfire and insect infestations. It is impossible to predict with confidence how future natural disturbances will affect Canada's managed forest (see Figure 3 below for the case of wildfire). However, it is possible to predict with a high degree of confidence the minimum level of wildfire that will occur every year. This constant "background" level is included in the reference level. The background value of 95,000 hectares of managed forest burned each year is based on data from the past 51 years (1959-2009) (see Figure 3), which shows that at least this amount burned during 90 percent of the years. The probability that at least this area will burn each year in the future is even higher than 90 percent when a warming climate is taken into consideration. The reference level also accounts for the effects of background endemic insect infestations, which are captured in forest inventory and increment data. Canada's reference level includes the impact of this background level of natural disturbance for each year of the 2013 to 2020 period. Emissions from the background level of wildfire were calculated using a direct wildfire emissions factor of 0.132 kt CO<sub>2</sub>e per hectare burned. This factor is derived from data underlying Canada's 2011 National Inventory Report, and is the average emissions factor for wildfires in the managed forest during 1990-2009. Non-CO<sub>2</sub> emissions are substantial, amounting to 19 percent of the direct fire emissions.

**FIGURE 3: Area burned in the managed forest, 1959-2009.**



36. As explained above, the reference level was derived from a projection of net emissions and removals for 2010 to 2020, using the assumption that only a background level of natural disturbance occurs each year. When accounting occurs (for example, in 2022), the actual natural disturbances, harvest rates and other management practices will

be known for the period the accounting covers. To derive an estimate comparable to the reference level for use in accounting, the FM emissions/removals would be re-modeled from 2010 onward using the actual harvest rates and other management practices but with only the background level of natural disturbances included (the agreed treatment of *force majeure* would also need to be taken into account). This will ensure that accounting focuses on emissions and removals that result from harvest rates and other management practices relative to the reference level. The effects of the background level of natural disturbances would be reflected in both the reference level and the estimates for accounting, meaning that these effects would cancel out.

*Factoring out 1(h) (i) and (ii) of 16/CMP.1*

37. The putative impacts of elevated CO<sub>2</sub> concentrations above pre-industrial levels and indirect nitrogen deposition were not explicitly addressed in the construction of the reference level, and will not be explicitly addressed in the estimates of actual emissions and removals in 2013-2020 during the accounting. However, to the extent that elevated CO<sub>2</sub> concentrations and nitrogen deposition have affected forest growth and are reflected in forest growth and yield data, the CBM-CFS3 will capture these effects in both the reference level and the inventory estimates of actual emissions and removals. As a result the effects will be factored out of the accounting.

*Other relevant elements*

38. The reference levels presented in this submission differ from that inscribed in Annex I to Decision 2/CMP.6 (*Land use, land-use change and forestry*) for a number of reasons. One is the recalculation of estimates and the addition of another year of data in Canada's National Inventory Report. Estimates prepared for Canada's 2010 inventory submission were used in the construction of the reference level shown in Annex I to Decision 2/CMP.6 (*Land use, land-use change and forestry*). However, a number of revisions and updates to these estimates have been made for the 2011 inventory submission, which was used to calculate the reference levels presented in this submission. These revisions, all documented in the 2011 National Inventory Report, are primarily a result of updated forest monitoring information for:

- The area burned by wildfire in 2009, and updated monitoring information from higher resolution Earth Observation sensors for 2007 and 2008;
- The area affected by insects in 2009, and updated monitoring information from resource management agencies for areas affected prior to 2009; and
- Harvest information based on revised provincial/territorial harvest statistics.

39. As well, the reference levels in this submission differ from the previous version because of a number of additional changes not directly related to the updating of the National Inventory Report. One is an improved projection of business as usual harvesting, as described above. As well, the direct emission factor for wildfires was updated to include 2009 data. Finally, estimates of emissions from HWP were improved and made consistent with the informal agreement in Cancun, as described above.

## **VI. Policies included**

40. This section addresses paragraphs 11 and 12 of the *Guidelines for the submission of information on forest management reference levels* contained in Annex II to Decision 2/CMP.6 (*Land use, land-use change and forestry*).

41. As described above, Canada's reference level was constructed using the assumption that average historical harvest rates from 1990 to 2009 are the best projection of business as usual harvests for 2013-2020. Using historical data to 2009 as the basis for projecting future harvests means that Canada's reference level reflects only those policies that were adopted and implemented prior to 2010. In Canada most managed forests are owned and managed by provincial/territorial governments so that FM policy is predominantly within their jurisdiction. Detailed information on provincial FM policies, regulation and legislation is publicly available through the respective provincial government agencies.

42. Canada confirms that the construction of its FM reference level neither includes assumptions about changes to domestic policies adopted and implemented after December 2009, nor takes into account impacts from new domestic policies adopted and implemented after December 2009.

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**Annex: Harvest and harvested wood products data, historical 1990-2009 and projected 2010-2020<sup>1</sup>**

	Harvest 000m3	HWP Produced and Consumed Domestically			HWP Produced and Exported			HWP Total Production		
		Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)	Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)	Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)
1990	162,568	15,381	3,918	5,379	27,192	2,440	17,524	42,573	6,358	22,903
1991	160,881	14,728	3,607	5,222	26,421	1,941	18,262	41,149	5,548	23,484
1992	170,131	14,467	3,589	5,041	28,771	2,979	18,814	43,238	6,568	23,854
1993	176,001	14,293	3,350	5,253	31,581	3,898	19,505	45,874	7,248	24,758
1994	183,261	14,752	3,021	5,297	33,162	4,634	21,698	47,914	7,655	26,995
1995	188,495	13,603	2,561	6,033	35,029	5,797	21,780	48,632	8,358	27,813
1996	183,375	13,614	3,103	5,779	36,599	6,860	21,493	50,213	9,963	27,272
1997	188,751	15,502	3,362	5,020	35,351	7,986	23,201	50,853	11,348	28,221
1998	176,958	15,782	3,092	5,329	35,160	9,324	22,312	50,942	12,416	27,641
1999	198,259	17,369	3,936	6,590	36,191	10,664	23,266	53,561	14,600	29,856
2000	201,842	17,574	4,206	6,341	36,456	10,834	24,636	54,030	15,040	30,977
2001	185,854	22,788	3,433	5,867	36,369	11,838	22,592	59,157	15,271	28,459
2002	196,127	24,423	4,039	5,388	37,357	12,054	23,671	61,779	16,093	29,060
2003	181,054	22,224	3,752	5,481	37,983	12,739	23,840	60,207	16,491	29,320
2004	207,919	23,434	3,236	5,037	41,100	13,383	24,907	64,534	16,619	29,944
2005	203,323	23,328	4,114	4,680	41,185	13,467	24,545	64,513	17,581	29,225
2006	184,010	23,510	4,616	4,459	38,984	13,017	22,983	62,493	17,633	27,442
2007	162,794	20,989	5,394	6,557	33,190	12,243	20,120	54,179	17,637	26,678
2008	136,969	18,991	6,067	4,181	24,219	6,153	20,187	43,210	12,220	24,369
2009	121,572	15,140	6,385	3,283	19,001	4,649	16,642	34,141	11,034	19,925
2010	135,806	16,299	3,645	3,933	26,126	8,289	17,256	42,426	11,935	21,189
2011	150,040	18,008	4,028	4,345	28,865	9,158	19,065	46,873	13,186	23,410
2012	164,273	19,716	4,410	4,758	31,603	10,027	20,873	51,319	14,437	25,631
2013	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2014	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2015	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852

	Harvest 000m3	HWP Produced and Consumed Domestically			HWP Produced and Exported			HWP Total Production		
		Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)	Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)	Sawn Wood <sup>2</sup> 000m3	Wood-based Panels 000m3	Paper and Paperboard <sup>3</sup> kt (oven dry)
2016	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2017	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2018	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2019	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852
2020	178,507	21,425	4,792	5,170	34,342	10,896	22,682	55,767	15,688	27,852

**Notes:**

1. Sources and projection methodologies are described in the text.
2. Sawn wood includes Other Industrial Roundwood (e.g. poles, posts). This category is quite small.
3. Paper and Paperboard includes Market Pulp, almost all of which is exported.