

MAY 2012

Caren C. Dymond
B.C. Ministry of Forests, Lands
and Natural Resource Operations
1520 Blanshard Street
Victoria BC V8W 9C2

Our Logs' Story from Truck to Product

Background

Industry and government agencies are looking to diversify the mix of products from British Columbia's timber harvest as part of industry renewal and to improve sector competitiveness. To get the greatest value from every tree, we need to understand the current and historical use of logs, the supply and demand dynamics of different products, and the supply of wood fibre for potential new uses. However, there are conflicting estimates of the amount of fibre available from mill or harvest residues.

There is one estimate of 6.5 million tonnes production of mill residues in 2004, with 1.8 million tonnes per year surplus.¹ A different study estimated 9.3 million tonnes per year production of mill residues in British Columbia.² An older study estimated 7.9 million tonnes of wood and pulp residues, of which 2.2 million was surplus.³

Traditionally, trees, logs, and different products have been measured in unique units, such as board feet for lumber, square feet for plywood, or gigajoules (GJ) for energy. In this report, we include the traditional units and a common metric of tonnes of oven-dry biomass. Biomass is the weight of organic material, be it wood or paper.

It varies for different volumes of wood depending on the density and moisture content. Price provides a good example of a common metric that allows comparison across product lines.

By using biomass as a common metric, we can follow the fibre in a log from the hauling truck through different types of mills and into various products. We can use this information to assess efficiency and opportunities for higher-value or longer-lived products. We can also attribute a value (e.g., price per tonne of biomass) to help inform us on the optimal use of wood. For example, does an increase in the total value of forest products indicate that more biomass was used or that the price of one or several products increased?

Because we know how much biomass is harvested from British Columbia's forests each year, the sum total of the products and waste should add up to the same amount. If they do not add up, then we can use that information to identify gaps in our data and opportunities to improve our knowledge of the forestry sector.

The Flow of Wood

Top-grade logs are called peelers because they can be peeled into

1 BW McCloy & Associates (2006)
2 Wood and Layzell (2003)
3 BW McCloy & Associates (1999)

thin layers to make valuable veneers and furniture-grade plywood. Construction-grade plywood and laminated veneer lumber (LVL) does not need wood as clear as peelers. About 8% of the harvested logs go to plywood, LVL, and veneer mills. Production has generally increased from 1940 until the peak in 2005 (Figure 1). The BC Forest Service⁴ has been the only agency documenting production of veneer and the more valuable grades of plywood.

Most of the logs (about 84%) go to lumber mills to be manufactured into dimensional lumber, such as 2×4s. Lumber has long been the primary product from British Columbia's forests because of its value as building material. Lumber production has generally increased as harvest has increased over time, although in 2009 it was at its lowest point since 1975 (Figure 2).

Once the log has gone through the lumber mill, the extra bits—edging, sawdust, and such—are generally chipped and sent to pulp and paper mills. Paper is the second largest consumer product manufactured from British Columbia's wood biomass. Paper is made primarily from residues from lumber mills. Only about 5% of the logs harvested go directly to be chipped in such facilities as pulp mill wood rooms. Since 1914, the production of newsprint has gone from 90 to 25% of the total paper made in British Columbia (Figure 3). The “other papers” include uses for stationery, magazines, and printers. Paper is an important part of industry because of the ability to use lumber mill residues and sell at a profit.

Oriented strand board (OSB), medium density fibreboard, particle board, hard board, and other panels have long been a part of British Columbia's forest products because they too can be made from mill resi-

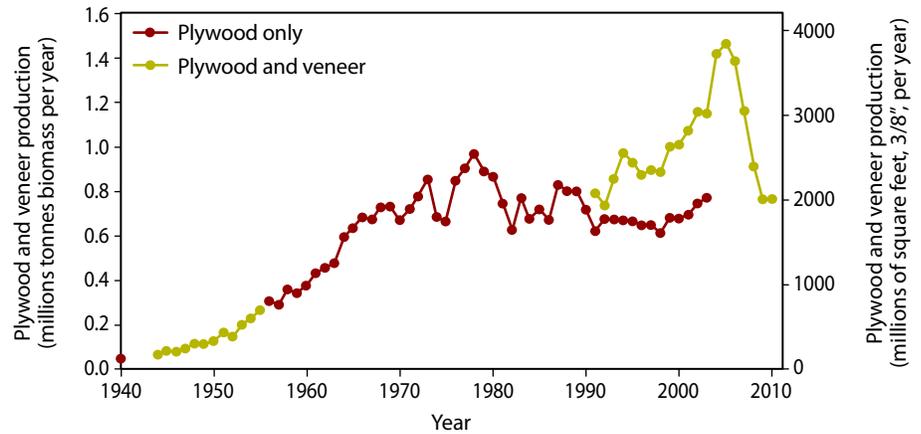


FIGURE 1 Amount of plywood, veneer, and laminated veneer lumber produced annually in British Columbia, 1940–2010. Estimated values for 2010.

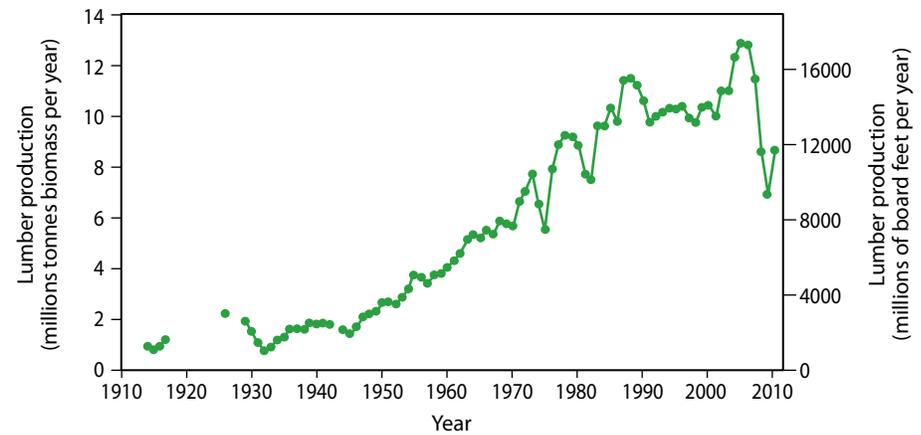


FIGURE 2 Annual production of dimensional lumber from the harvest in British Columbia, 1914–2010.

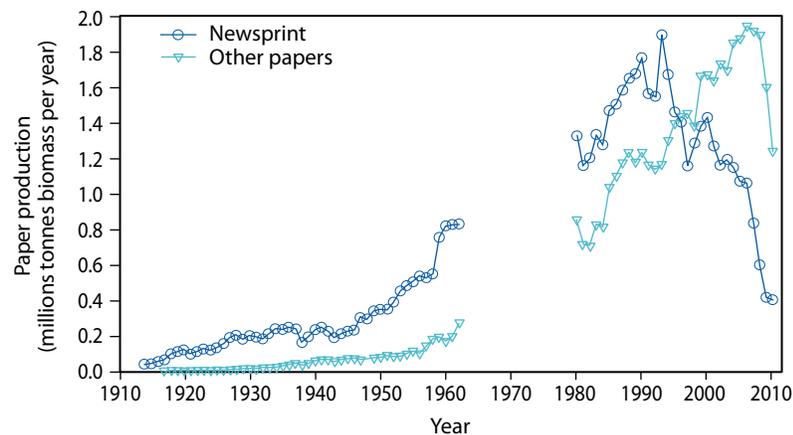


FIGURE 3 Annual production of papers in British Columbia, 1914–2010. Newsprint is used for phone books, newspapers, and comic books. Other papers are used for stationery, printers, and magazines.

4 The use of the colloquial term “BC Forest Service” in this report is to simplify the many different names for the provincial government agencies responsible for collecting and maintaining data on forest products over the past 100 years. Currently, these responsibilities are carried out by people in the Ministry of Forests, Lands and Natural Resource Operations, the Ministry of Environment, and the Ministry of Jobs, Tourism and Innovation.

dues. Historically, panels have been a minor part of production, so data have been available only since 1988 (Figure 4). It may be that the BC Forest Service data on panel production are incomplete, given that Statistics Canada reports higher estimates for exported panels of British Columbia origin.

Some of the logs and wood fibre harvested in British Columbia are exported before being manufactured into consumer goods. Log exports have fluctuated over time, peaking in 2011, a distinctly different trend from that of the consumer products (Figure 5). Pulp is a major export, which peaked in 1994, then declined until 2009 (Figure 6). Pellets, chips, and other mill residue exports are minor parts of the flow of wood biomass but are important components of the current industry because, with the exception of chips, their trends have also been increasing in recent years (Figure 7). Not included in this report are production estimates of shakes and shingles, poles, posts, and other minor products because the data are sparse and are difficult to convert into biomass.

All wood and paper products, plus exports, account for about 70% of the harvested biomass over the last 23 years (Figure 8). The grey space in the graph between the cumulative products and the harvested biomass represents the gap in the story of our logs from truck to product. This gap—likely of mill residues—ranged from 7.4 to 13.4 million tonnes of biomass between 2000 and 2010. A significant amount goes into bioenergy (estimated at 10 million tonnes biomass in 2010). However, we have no data for other years or other uses of that biomass.

The proportions of harvest that are produced as dimensional lumber, panels, plywood, and log exports have

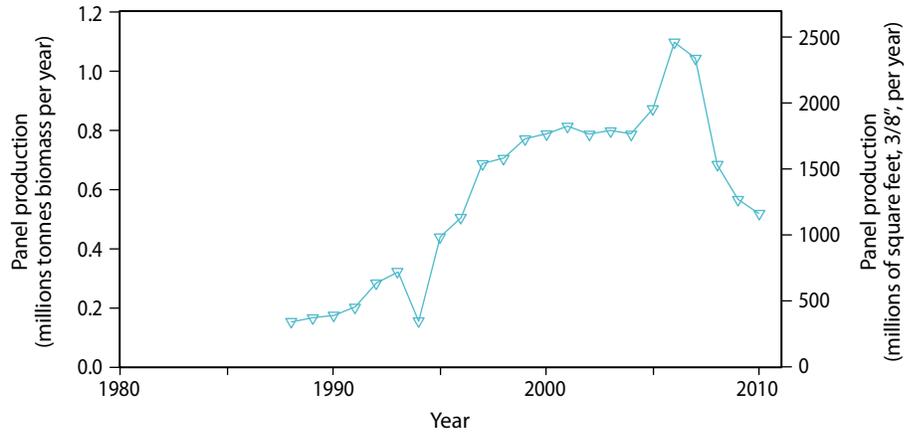


FIGURE 4 Annual production of oriented strand board, particle board, fibre board, and other panels in British Columbia, 1988–2010. Estimated values for 2010.

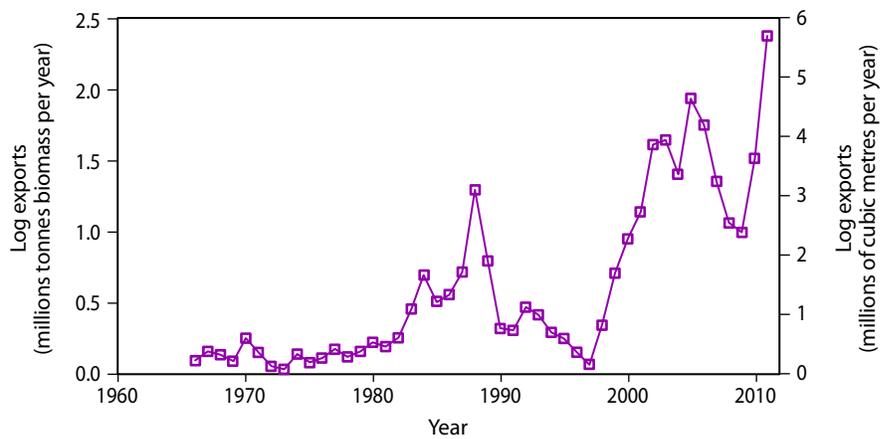


FIGURE 5 Amount of wood in logs harvested in British Columbia and exported each year, 1966–2010.

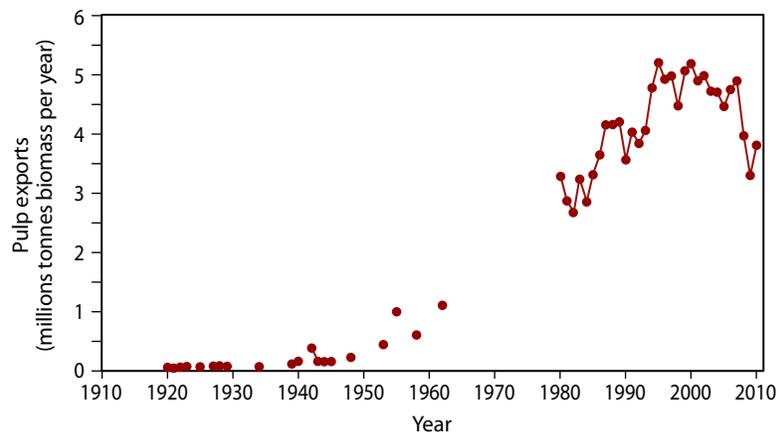


FIGURE 6 Amount of pulp produced in and exported annually from British Columbia, 1920–2010.

each increased significantly over time (Figure 8).⁵ The proportion of harvest that is exported as chips has decreased significantly, while the other commodities do not show a single trend.

Conclusion

Most of the wood biomass from our logs ends up in building products. However, the data gap in the story of our logs is a bit like starting to read a novel and finding that the last third of the book is missing. It makes it difficult to write the sequel—in this case, the new bio-economy.

Estimates of fibre availability from mill residues vary widely because of incomplete data on production, use of biomass for bioenergy, and proprietary information on mill efficiency. This can create conflict over fibre supply and barriers to new companies. By working together with wood and pulp product manufacturers and bioenergy facilities, we could improve upon the information in this report and optimize fibre distribution in an era of dwindling supply.

Data Sources

Harvesting and production data were collected from BC Forest Service mill survey data sets,⁶ annual reports,⁷ greenhouse gas inventories,⁸ Royal Commission reports,⁹ Statistics Canada,¹⁰ and the United States Forest Service.¹¹

We converted harvest-scaled volume and exported logs from cubic metres into biomass using wood density (oven-dry weight per green volume), weighted by species, for

5 Please contact me for statistics if interested

6 BC Forest Service (1990–2009)

7 BC Forest Service (1912–1978)

8 British Columbia Ministry of Environment (2011)

9 Sloan (1945), Sloan (1956), Pearse (1976)

10 Statistics Canada (2011)

11 Warren (2010)

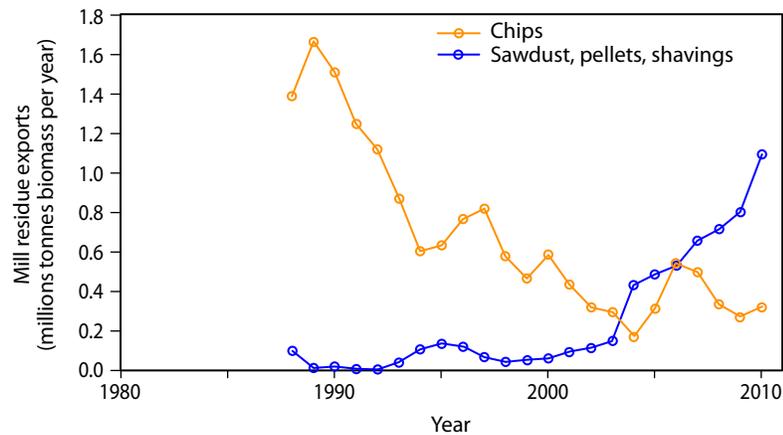


FIGURE 7 Amount of mill residues of British Columbia origin exported annually, 1988–2010. Pellets for bioenergy are not reported separately by Statistics Canada.

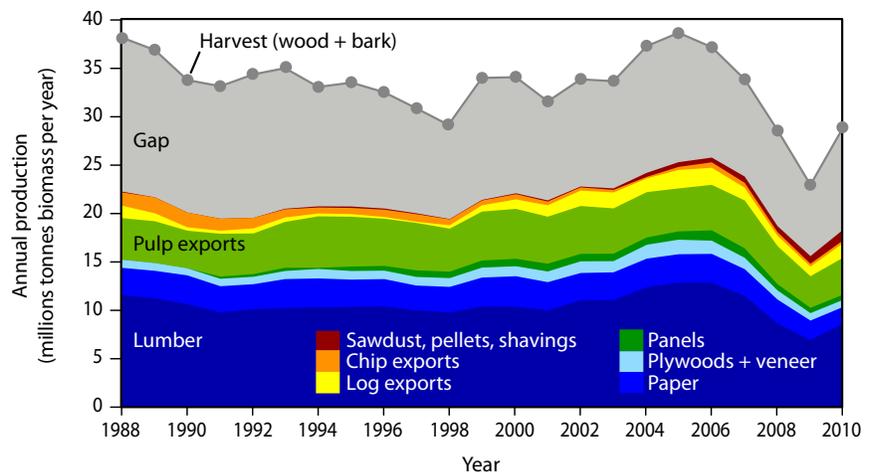


FIGURE 8 Harvested biomass, including wood and bark, relative to the cumulative annual manufacturing and export output in British Columbia, 1988–2010. 2010 values estimated for plywood and veneer and panels.

each year. We approximated bark biomass as 11% of the under-bark scaled mass.¹² Lumber board feet were converted to cubic metres using the factor for dry, planed lumber: 1.7 m³ / thousand board feet.¹³ We used the same book for conversion factor (0.000885 m³/ft² on a 3/8-inch basis) to convert plywood, veneer, OSB, particle board, medium-density fibreboard, and other panels to cubic metres. Then the cubic metres quantity was converted to biomass using an oven-dry wood density,

12 Ung et al. (2008)

13 Briggs (1994)

weighted by species, for each year, or 0.5 t/m³ for panels. The remaining products are reported in tonnes of biomass.

Biomass consumption for bioenergy in 2010 was estimated from industry reports of greenhouse gas emissions from biomass burning.¹⁴ The GJ of energy produced from waste wood was multiplied by 0.052083 t/GJ, and the amount of energy from pulping liquor was multiplied by 0.074074 t/GJ.

14 British Columbia Ministry of Environment (2012)

Literature Cited

- BC Forest Service. 1912–1978. Annual reports of the British Columbia Forest Service. Government B.C., Victoria, B.C. www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Annual/annualrpt.htm.
- . 1990–2009. Annual mill survey. Government B.C., Victoria, B.C. www.for.gov.bc.ca/het/fibre.htm.
- Briggs, D.G. 1994. Forest products measurements and conversion factors: with special emphasis on the U.S. Pacific Northwest. Univ. Washington Inst. For. Resources, AR-10, Seattle, Wash. www.ruraltech.org/projects/conversions/briggs_conversions/briggs_book.asp.
- British Columbia Ministry of Environment. 2011. 2010 facility greenhouse gas emissions reports. www.env.gov.bc.ca/cas/mitigation/ggrcta/reporting-regulation/2010-emissions-reports.html.
- . 2012. Reporting Regulation-Greenhouse Gas Reduction (Cap and Trade) Act. www.env.gov.bc.ca/cas/mitigation/ggrcta/reporting-regulation/one_window.html.
- BW McCloy & Associates. 1999. Estimated production, consumption and surplus mill residues in British Columbia-1998. Forest Sector Table, Vancouver, B.C.
- . 2006. Estimated production, consumption and surplus mill wood residues in Canada-2004. Canadian Forest Service and the Forest Products Association, Ottawa, Ont.
- Pearse, P.H. 1976. Structure and dimensions of the British Columbia forest industry. In: Report of the Royal Commission on Forest Resources Timber Rights and Forest Policy in British Columbia. Part 2. Appendix B. Victoria, B.C.
- Sloan, G. M. 1945. Public Inquiries Act. The Forest Resources of British Columbia-Report of the Commissioner. Vol. 1. Victoria, B.C. www.for.gov.bc.ca/hfd/pubs/Mr.htm#RC.
- . 1956. Public Inquiries Act. The Forest Resources of British Columbia-Report of the Commissioner. Vol. 1. Victoria, B.C.
- Statistics Canada. 2011. British Columbia origin, production and shipment of forest products 1949-2011. In: Monthly Survey of Manufacturing. CANSIM Tables 303-0005, 303-0009, C746 :000-0001, C20 :000-0001.
- Ung, C.-H., Bernier, P., and Guo, X.-J. 2008. Canadian national biomass equations: new parameter estimates that include British Columbia data. *Can. J. For. Res.* 38: 1123–1132.
- Warren, D.D. 2010. Production, prices, employment, and trade in Northwest forest industries, 1958-2009. U.S. For. Serv., Portland, Ore. Resource Bull. PNW-RB-260.
- Wood, S.M. and D.B. Layzell. 2003. A Canadian biomass inventory: feedstocks for a bio-based economy. Industry Canada, Ottawa, Ont.

Acknowledgements

Many thanks to Jim Johnston, Jie Shu, and John Pinn for their help in gathering and understanding various data sets. Thanks also to Katherine McCallion, Judith Elkins, and James Sandland for providing feedback on an earlier version of this report.

Citation

Dymond, Caren C. Our log's story from truck to product. *Prov. B.C., Victoria, B.C. Exten. Note 107.* www.for.gov.bc.ca/hfd/pubs/Docs/En/En107.htm

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the Government of British Columbia of any product or service to the exclusion of others that may also be suitable. This Extension Note should be regarded as technical background only. Uniform Resource Locators (URLs), addresses, and contact information contained in this document are current at the time of printing unless otherwise noted.

