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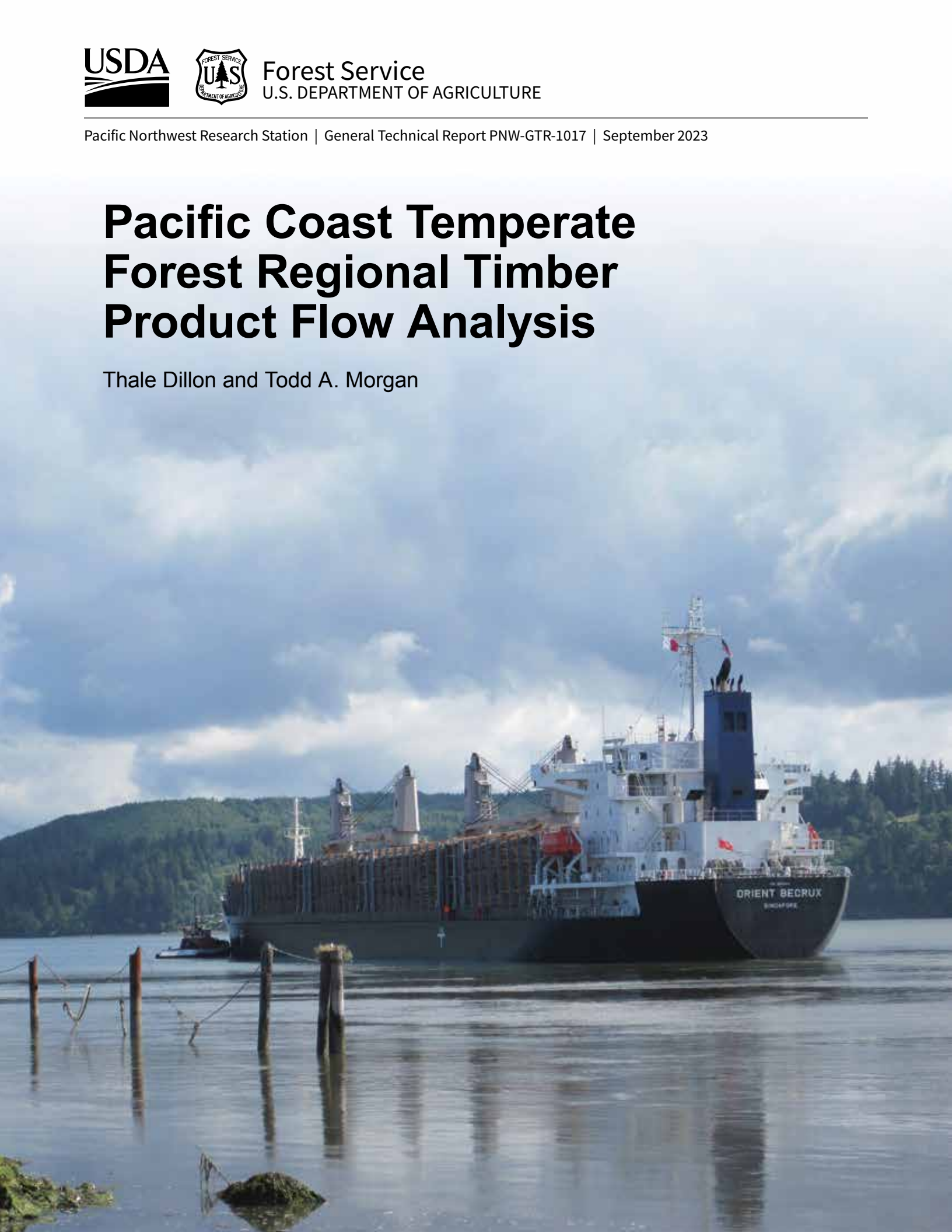
Pacific Coast Temperate Forest Regional Timber Product Flow Analysis

Thale Dillon and Todd A. Morgan



Authors

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Cover photo: Log export ship leaving Coos Bay, Oregon. Photo by Jean Daniels.

Abstract

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The U.S. Department of Agriculture Forest Service Pacific Northwest (PNW) Research Station has launched a research initiative to improve and organize policy-relevant understanding of forest carbon accounting and fill knowledge gaps about forest carbon dynamics. There are several dimensions to forest carbon accounting, including tracking wood products flow from the forest to various destinations. More information is needed to improve the accounting of timber harvested within the Pacific coast region (PCR; British Columbia, California, Oregon, and Washington) but processed elsewhere. We used publicly available data to examine PCR timber harvest volumes and the flow of sawlogs, pulplogs, and woodchips between the PCR and the rest of the world for the period 1990–2018. We found that most timber harvested within the PCR is processed within the jurisdiction of harvest. The largest percentage of exported volumes consisted of sawlogs at close to two-thirds of the total, with the remaining volumes consisting of logs or chips for pulp, paper, and composite panels. Our analysis concludes that the volume of timber exported from the PCR was less than 10 percent over the course of the study period and, as such, is unlikely to affect the overall harvested wood products carbon accounting for the PCR.

Keywords: Pacific coast region, pulplogs, sawlogs, softwood sawlogs, timber products, timber product exports, timber product imports, woodchips.

Summary

The U.S. Department of Agriculture Forest Service Pacific Northwest (PNW) Research Station has launched a research initiative to improve and organize policy-relevant understanding of forest carbon (C) accounting and fill knowledge gaps about forest carbon dynamics. The PNW Carbon Research Initiative seeks to use existing social science, ecosystem, and wood products models; calibrate them with inventory and monitoring data; and analyze the impacts of alternative policies and land management scenarios. The overarching goal of the initiative, identified through dialog with managers, is to increase understanding of the tradeoffs and possible synergies between managing forests for carbon sequestration and other values of interest (e.g., wood products, wildlife habitat, etc.) and effects on human economies and communities. There are several dimensions to forest carbon accounting, one of which is tracking where and how different quantities of wood products flow from the forest to various destinations.

More information is needed to improve the accounting of timber harvested within the Pacific coast region (PCR; British Columbia, California, Oregon, and Washington) but processed elsewhere. Having reliable estimates of the amounts of timber harvest that are exported is fundamental to this aspect of accounting. If export volumes are very small, any differences in processing or use of the exported timber compared to domestic use are likely to have little influence on the overall harvested wood product (HWP) C analysis. However, if export quantities are large, then processing, use, and disposal of exported wood may have a much larger impact on overall HWP C analyses for the PCR.

This analysis (1) examines total timber harvest in the PCR (see fig. 1), (2) quantifies the magnitude of timber volume exported from the PCR, and (3) quantifies other attributes of exports from the PCR in the form of timber products (i.e., raw roundwood logs and woodchips) to be processed into primary wood products (e.g., lumber, veneer, pulp, or paper) elsewhere. The analysis uses existing publicly available data compiled by the Forest Inventory and Analysis (FIA) program's Timber Product Output (TPO) research as well as data from the Canadian Council of Forest Ministers, the U.S. International Trade Commission (USITC), and BC Stats.

This analysis considers regional exports and imports of timber products into and out of the PCR as a whole, treating the four jurisdictions (three states and one province) as a single region. In other words, exports from California, Oregon, and Washington do not include exports to British Columbia. Further, exports from British Columbia do not include exports to California, Oregon, or Washington. Exports to all other countries are included in the totals.

Total harvest volumes within the PCR have fluctuated widely over the past three decades but have remained above 100 million m^3 for all but 1 year (see fig. 2). During this period, harvest volumes exported from the region totaled 9.6 percent

of PCR harvest volume and did not exceed 24 million m^3 or 15 percent of annual regional harvest volumes (see fig. 3).

Among the three timber products examined in this analysis—sawlogs, roundwood pulplogs, and woodchips—sawlogs constituted the largest share (61.6 percent) of exports between 1990 and 2018 (see table S.1). Exported volumes of roundwood pulplogs were quite small throughout the period, comprising 0.5 percent of total exports. Together, Oregon and Washington consistently produced the largest volume of timber product exports; however, British Columbia exports have increased in more recent years (see fig. 4).

From 1990 through 2010, among all the PCR's trade partners, Japan received the largest amounts of timber products, with volumes remaining substantial through 2018 but surpassed by volumes exported to China starting in 2011 (see fig. 5). Export volumes to South Korea were significantly lower than to Japan throughout the period, and volumes exported to places other than these Pacific Rim countries were minimal.

Table S.1—Pacific coast region (PCR) exports by product type

	Total PCR harvest	Total PCR exports		PCR sawlog exports	PCR roundwood pulplog exports	PCR woodchip exports
	- - - - - Cubic meters - - - - - -		*Percent of harvest*	*- - - Percent of total exports - - -*		
Total	3 919 001 098	376 698 789	9.6	61.6	0.5	37.9

Contents

Introduction

The U.S. Department of Agriculture Forest Service Pacific Northwest (PNW) Research Station launched a research initiative to improve our understanding of forest carbon (C) accounting and fill knowledge gaps about forest carbon dynamics. The PNW Carbon Dynamics Research for Land and Watershed Managers Initiative (hereafter PNW Carbon Research Initiative) seeks to use existing social science, ecosystem, and wood products models; calibrate them with inventory and monitoring data; and analyze the impacts of alternative policies represented by different land management scenarios. The overarching goal of the initiative, identified through dialog with managers, is to increase understanding of the tradeoffs and possible synergies between managing forest for carbon sequestration, other values of interest (e.g., wood products, wildlife habitat, water, recreation, etc.), and effects on human economies and communities. A diverse group of stakeholders and scientists identified key research needs and working groups during the PNW Research Station's Carbon Dynamics Workshop for Land and Watershed Managers held in Portland, Oregon, September 9–12, 2019.

An objective of the PNW Carbon Research Initiative is to complete a comprehensive report that describes the status and trends in the C stock and flux of forest ecosystems and harvested wood products (HWPs) throughout the cross-boundary region.[1] The Pacific coast region (PCR) includes British Columbia, California, Oregon, and Washington (fig. 1). HWPs include products manufactured from wood, including lumber, structural (e.g., plywood) and nonstructural (e.g., particleboard) panels, paper, paperboard, and wood used for fuel (Skog 2008).

Reliable estimates of carbon stocks and flux in forest ecosystems and HWPs provide a foundation for analyzing relationships between the climate benefits of carbon storage and other forest management objectives, which can inform forest managers, policymakers, and the public (Galik and Jackson 2009, McKinley et al. 2011, Ryan et al. 2010, Smyth et al. 2020a, Xie et al. 2021). Although HWP C constitutes a relatively small fraction of forest carbon relative to ecosystem carbon (Christensen et al. 2018, Domke et al. 2019, Morgan et al. 2020), it is a fundamental component of carbon accounting, a base of information for evaluating various strategies to reduce atmospheric carbon dioxide (CO_2) concentrations, and a dynamic system. There is strong international recognition that additional climate benefits can result from integrating HWPs that can substitute for emission-intensive materials into sustainable forest management (IPCC 2019, Smyth 2020b).

This report focuses on timber harvested in the PCR and exported to be manufactured into products or burned as fuelwood outside the PCR. It examines flows of sawlogs, roundwood pulplogs, and chips between the PCR and other parts of the world. The Intergovernmental Panel on Climate Change (IPCC) tier

[1] See the Carbon Dynamics Research for Land and Watershed Managers Web page: https://www.fs.usda.gov/research/pnw/centers/cdri.

Figure 1—Pacific coast region map.

3 production accounting approach[2] considers only timber harvested or "produced" in a particular area of study, including exported timber and wood products, and ignores imported timber and wood products that originate outside the study area. Most timber harvested within the PCR (fig. 2) is processed within that particular jurisdiction of origin (BC Ministry of Forests 2017, Marcille et al. 2020, Simmons et al. 2021, WA DNR 2018). State-level HWP C analyses have been conducted in British Columbia (Xie 2020), California (Loeffler et al. 2019), Oregon (Morgan et al. 2020), and Washington (Nichols et al., n.d.).

Evaluating the amount and proportion of timber harvested within the PCR but processed elsewhere is fundamental to understanding the effect of timber exports on HWP C accounting. If export volumes are very small, any differences in processing or use of the exported timber are likely to have little influence on the overall HWP C analysis. However, if export quantities are sufficiently large, then differences in processing, use, and disposal of the exported wood may have a larger influence on overall HWP C, and further investigation to understand differences

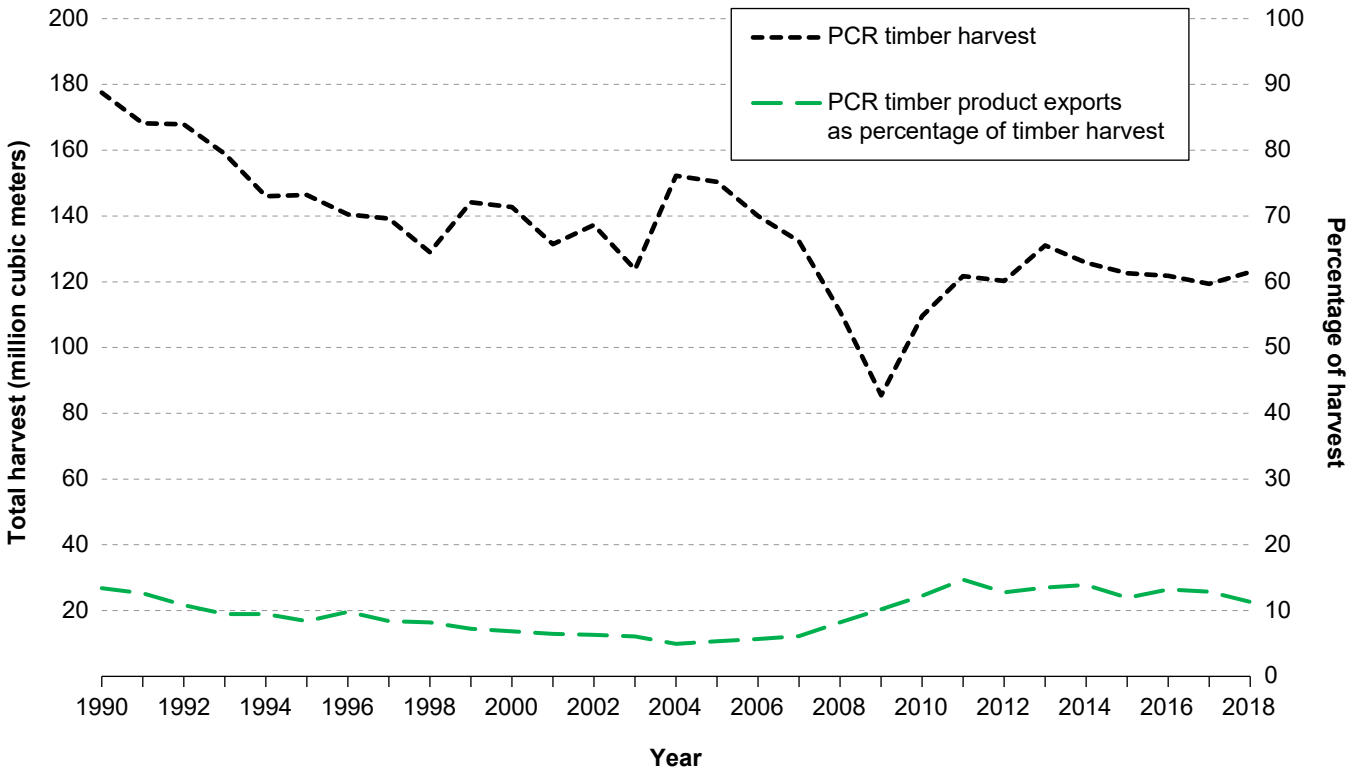

Figure 2—Pacific coast region timber harvest and timber product exports as the percentage of harvest, 1990–2018.

[2] The IPCC classifies greenhouse gas inventory methodologies in three different tiers according to complexity. Tier 3 is the most demanding method, requiring highly detailed data (e.g., from field plots, annual timber harvest records, and annual export data) and the use of simulation models. Tiers 1 and 2 use more general data that result in higher levels of uncertainty. For a definition of the production accounting approach, see page 29 of Chapter 12: Harvested Wood Products in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_12_Ch12_HWP.pdf).

may be necessary. Exports of primary wood products (e.g., lumber, veneer, or pellets) manufactured within the PCR are being examined separately by other authors (i.e., Sam Evans and Matthew Potts; University of California–Berkeley, Department of Environmental Science, Policy, and Management). Imports of logs and chips into the PCR are not germane to the production accounting approach to be used for the PCR's HWP C analyses; however, they are briefly addressed in this report to provide context. Likewise, intraregional movement of timber products within the PCR is not considered in the HWP C production accounting approach but is summarized for additional context.

Data

This report presents the quantities of timber harvest and timber (i.e., roundwood logs and chips) exports, imports, and intraregional transfers among British Columbia, California, Oregon, and Washington. Timber flows are summarized at state, region, and timber product (e.g., sawlog, roundwood pulplog, or woodchip) levels.

This study uses existing publicly available data compiled for the Forest Inventory and Analysis (FIA) program's Timber Product Output (TPO) research, as well as the Canadian Council of Forest Ministers, the U.S. International Trade Commission (USITC), and BC Stats.

These data are all reported by calendar year and were gathered for the period 1990–2018, with 2018 being the most recent year for which all data were available at the time of analysis. Years of availability for harvest data vary from one jurisdiction to the next; USITC trade data are consistently available back to 1990, and BC Stats trade data are consistently available back to 1988.

Timber harvest measurement units for British Columbia data were provided in cubic meters (m^3), and harvest data for California, Oregon, and Washington were provided in thousands of board feet (MBF) Scribner. Import and export data for sawlogs and pulplogs for all areas were provided in cubic meters, while import and export data for woodchips for all areas were provided in metric tons (t). To conduct a meaningful analysis, all measurement units were converted to cubic meters. For timber harvest from U.S. states, MBF Scribner was converted to cubic meters using a factor of 6.76 m^3 per 1 MBF Scribner for Oregon and Washington. For California, a factor of 5.25 m^3 per MBF Scribner was used because of the state's use of Scribner short-log rather than long-log rule for its harvest (Fonseca 2021,[3] Spelter 2003). For woodchips, metric tons were converted to cubic meters of solid wood equivalents (SWE) using the method outlined in appendix 1. All mentions of woodchips in this text refer to bone-dry SWE.

[3] Fonseca, M. 2021. Personal communication. Project leader, United Nations Economic Commission for Europe, Forestry and Timber Section, Trade and Timber Division, Palais des Nations, CH-1211 Geneva 10, Switzerland, matthew.fonseca@unece.org.

Trade flow for British Columbia includes volumes passing through all British Columbia ports. California trade flow includes volumes passing through ports within three customs districts—Los Angeles, San Diego, and San Francisco. For the purposes of this analysis, Oregon and Washington trade flows are combined because the Columbia-Snake Customs District includes all Oregon ports plus the ports of Longview and Vancouver, Washington, which confounds the compilation of state-level trade statistics.[4] The Seattle Customs District processes import and export volumes passing through Washington ports, except for Longview and Vancouver.

Regional exports and imports of timber products represent the overall flow into and out of the PCR as a whole, treating these four jurisdictions as one region. In other words, exports from California, Oregon, and Washington do not include exports to British Columbia. Further, exports from British Columbia do not include exports to California, Oregon, or Washington. All other countries are included in the totals.

Two data sources cover the flow between British Columbia and U.S. Pacific coast states—the U.S. International Trade Commission (USITC) and Canada's BC Stats. This report uses data from BC Stats as they contain a greater level of detail, providing data at the province level. By contrast, USITC data are limited to country level.

We recognize that a portion of the volume exported from the PCR jurisdictions may constitute transshipments. Examples of transshipments include timber from Idaho being exported through the Port of Longview, Washington. We also recognize that a portion of the PCR timber harvest may be exported to other U.S. states or Canadian provinces. Data from recent reports indicate these transshipments to be small relative to harvest and shipments within PCR jurisdictions, and the timber moving intraregionally is typically used for manufacturing lumber (Marcille et al. 2020, Simmons et al. 2021, Smith and Larson 2017). Annual estimates of these transshipments are not available.

Additionally, the authors recognize that exported volumes of woodchips, despite being reported in customs data as roundwood chips rather than mill residue chips, likely consist of some portion of mill residue. Recent mill surveys in the PCR suggest that operations producing roundwood chips are supplying them to users within the PCR and not producing quantities as large as those reported as exported through PCR customs districts. It is also possible that these woodchip export volumes represent a fair amount of transshipments.

Pacific Rim countries (China, Taiwan, Japan, and South Korea) constitute the major trading partners with the PCR in terms of sawlogs, pulplogs, and woodchips. This is true both in terms of volume and consistency over time. Other individual trading partners (i.e., countries) are numerous, but exports to these countries are sporadic, minimal in volume, or both and are therefore not included in this report.

[4] According to Simmons et al. (2021) and Smith and Larson (2017), about 50 percent of the Longview, Washington, export volume is from timber harvested in Oregon, though exact volumes and proportions vary from year to year.

Results

Pacific Coast Region Harvest

The total land area of British Columbia is larger than the size of the other three PCR jurisdictions combined, at 94.5 million ha (USDC CB 2021, World Atlas 2021) (table 1). The province's total forest land area is almost twice the size of that of the other three jurisdictions combined at over 61.1 million ha. The three U.S. states combined have larger areas (15.3 million ha) of unreserved public land than reserved public land (5.3 million ha) and roughly 13.1 million ha of private forest land. However, the opposite is true for British Columbia, with just 5.3 million ha of private forest, 21.3 million ha of unreserved public land, and 34.5 million ha of reserved public land (Christensen et al., n.d.).[5]

British Columbia timber harvest volumes have exceeded that of California, Oregon, and Washington combined for the past 30 years (table 2). Though volumes fluctuated widely over the past three decades (fig. 2), between 1990 and 2018, British Columbia saw a 7 percent decrease in harvest volume and California harvest volume decreased 59 percent, while Oregon harvest decreased 37 percent, and Washington harvest decreased 52 percent. All areas within the PCR experienced a sizeable dip in harvest in 2009 owing to the Great Recession (Keegan et al. 2012). In total, PCR harvest volume was down 31 percent between 1990 and 2018.

Table 1—Pacific coast region (PCR) land and forest land area

	Total area	Reserved public land[a]	Unreserved public land[a]	Private forest land[a]	Total forest land
	Thousand hectares				
British Columbia	94 500[b]	34 500	21 300	5300	61 100
California	42 400[c]	2600	5100	5100	12 800
Oregon	25 500[c]	1100	6600	4300	12 000
Washington	18 500[c]	1600	3600	3700	8900
Total	180 900	39 800	36 600	18 400	94 800

[a] Source: Christensen (n.d.).

[b] Source: World Atlas (2021).

[c] Source: USDC CB (2021).

[5] Christensen, G.A.; Tase, N.; Gray, A.N.; Kuegler, O.; Drummond, J.; Dymond, C.C.; Kurz, W.A.; Dillon, T.; Morgan; T.A.; Evans, S.; Scott, S.; Henly, R. [N.d.]. Pacific coast region temperate forest carbon dynamics: A regional forest and harvested wood product assessment of British Columbia, California, Oregon, and Washington, 2001–2019. Manuscript in preparation. On file with: G.A. Christensen, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 1220 SW 3rd Ave., Suite 1410, Portland, OR 97204.

Table 2—Timber harvest in the Pacific coast region by state and province, 1990–2018

Year	British Columbia[a]	California[b]	Oregon[b]	Washington[b]	Pacific coast region
			Cubic meters		
1990	73 860 843	22 065 750	42 040 440	39 539 240	177 506 273
1991	74 705 594	17 855 250	41 100 800	34 503 040	168 164 684
1992	78 578 959	16 537 500	38 815 920	33 921 680	167 854 059
1993	78 003 675	15 760 500	35 787 440	29 270 800	158 822 415
1994	75 093 050	14 637 000	28 168 920	28 094 560	145 993 530
1995	74 622 122	12 983 250	29 095 040	29 696 680	146 397 092
1996	72 252 291	12 825 750	26 512 720	28 838 160	140 428 921
1997	69 297 654	13 597 500	27 587 560	28 702 960	139 185 674
1998	65 937 645	12 017 250	23 876 320	27 188 720	129 019 935
1999	76 929 867	12 484 500	25 113 400	29 627 586	144 155 353
2000	78 457 322	11 088 000	24 903 840	28 233 600	142 682 762
2001	71 895 565	9 198 000	25 248 600	25 119 998	131 462 163
2002	77 864 057	9 198 000	26 512 720	23 714 080	137 288 857
2003	65 357 574	9 203 250	27 053 520	22 132 240	123 746 584
2004	86 997 549	9 502 500	30 088 760	25 620 400	152 209 209
2005	86 880 467	9 675 750	29 818 360	24 018 280	150 392 857
2006	80 059 018	8 625 750	29 257 280	22 037 600	139 979 648
2007	75 447 662	9 129 750	25 681 240	21 997 040	132 255 692
2008	61 805 187	7 812 000	23 261 160	18 177 640	111 055 987
2009	48 030 843	4 882 500	18 576 480	13 972 920	85 462 743
2010	62 246 354	6 903 750	21 814 520	18 569 720	109 534 344
2011	69 203 564	7 460 250	24 667 240	20 340 840	121 671 894
2012	68 831 918	7 360 500	25 343 240	18 718 440	120 254 098
2013	71 135 020	8 993 250	28 386 606	22 483 760	130 998 636
2014	66 500 243	8 106 000	27 891 760	23 247 640	125 745 643
2015	67 969 770	8 557 500	25 606 880	20 482 476	122 616 626
2016	66 379 661	8 636 250	26 282 880	20 496 320	121 795 111
2017	64 357 821	8 694 000	26 032 760	20 246 971	119 331 552
2018	68 441 448	9 045 750	26 546 520	18 955 040	122 988 758
Total	2 077 142 743	312 837 000	811 072 926	717 948 430	3 919 001 098

[a] Source: Canadian Council of Forest Ministers (2020).

[b] Source: UM BBER (2020).

Pacific Coast Region Trade Flow

Total annual regional timber product export volumes remained below 25 million m^3 and accounted for less than 15 percent of total annual harvest volume between 1990 and 2018 (fig. 3). From 2000 to 2009, annual timber exports dropped below 10 million m^3 to less than 10 percent of total timber harvest. Starting in 2010, exports from all ports exceeded 10 million m^3 annually and reached a high of close to 18 million m^3 in 2013. Export volumes fluctuated between 2009 and 2018, with annual changes frequently exceeding 1 million m^3.

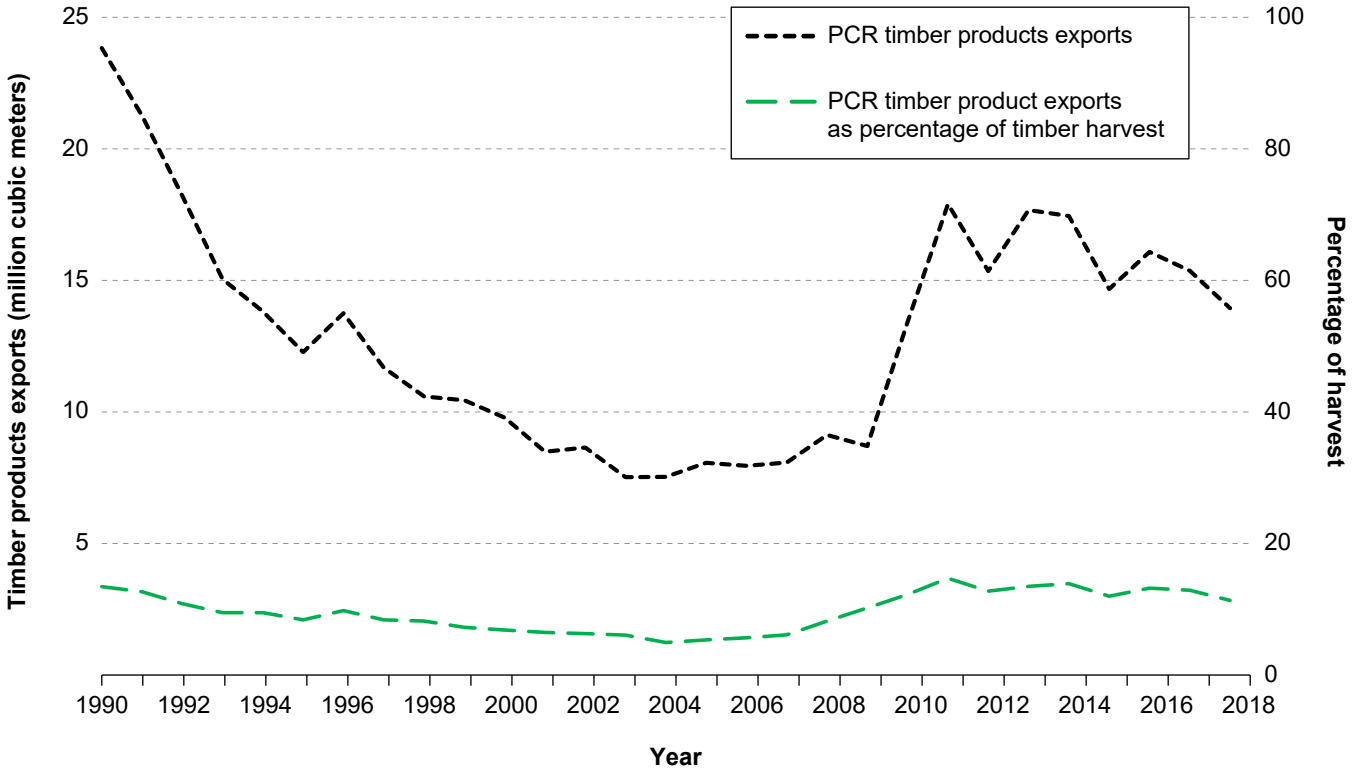

Figure 3—Pacific coast region timber product exports as volume and percentage of region timber harvest, 1990–2018.

Timber product import volumes into the PCR were relatively small during the past three decades (table 3). Imports of sawlogs, roundwood pulplogs, and woodchips into the PCR consisted primarily of volume originating from other U.S. states (Alaska, Idaho, and Montana), with imports of these products from international sources being extremely variable. Import volumes saw three extreme peaks in 1995, 1997, and 2000. During those years, annual import totals were close to or exceeded 1.5 million m^3 before falling off sharply to 372 000 m^3 in 2005 and down further to about 298 000 m^3 in 2009. The low for the 1990–2018 period was 96 000 m^3 in 1992. In total, timber product imports were equivalent to just 6.5 percent of the region's timber product exports and about 0.5 percent of the PCR timber harvest during 1998–2018.

Pacific Coast Region Overall Exports

Overall PCR exports include timber products exported from the region to other countries. The PCR is treated as a single region; thus products traded among the four PCR jurisdictions are excluded from these export estimates. Exports do include products leaving British Columbia for non-Pacific coast U.S. states as well as exports leaving California, Oregon, and Washington for Canadian provinces other than British Columbia.

Among the three timber products addressed in this analysis—sawlogs, roundwood pulplogs, and woodchips—sawlogs constituted the largest portion of

Table 3—Pacific coast region net timber harvest and products trade flow

Year	Harvest volume	Total export volume	Total exports as percentage of total harvest volume	Total import volume	Total imports as percentage of total export volume
	- - - - - *Cubic meters* - - - - -		*Percent*	*Cubic meters*	*Percent*
1990	177 506 273	23 831 382	13	107 143	0
1991	168 164 684	21 264 879	13	226 162	1
1992	167 854 059	18 214 672	11	95 968	1
1993	158 822 415	15 046 613	9	957 091	7
1994	145 993 530	13 824 250	9	980 496	8
1995	146 397 092	12 275 674	8	1 600 484	13
1996	140 428 921	13 755 412	10	1 260 977	9
1997	139 185 674	11 685 315	8	1 530 535	13
1998	129 019 935	10 591 244	8	1 106 764	10
1999	144 155 353	10 443 303	7	1 166 694	11
2000	142 682 762	9 784 072	7	1 455 778	14
2001	131 462 163	8 487 758	6	915 187	11
2002	137 288 857	8 651 345	6	707 975	9
2003	123 746 584	7 521 396	6	631 264	9
2004	152 209 209	7 526 555	5	401 131	6
2005	150 392 857	8 065 593	5	372 221	4
2006	139 979 648	7 951 155	6	410 304	6
2007	132 255 692	8 078 414	6	412 901	6
2008	111 055 987	9 126 658	8	356 838	5
2009	85 462 743	8 705 285	10	297 939	5
2010	109 534 344	13 432 816	12	560 428	6
2011	121 671 894	17 898 932	15	743 708	6
2012	120 254 098	15 350 328	13	644 935	6
2013	130 998 636	17 675 463	13	580 782	5
2014	125 745 643	17 446 359	14	726 617	6
2015	122 616 626	14 673 476	12	650 060	7
2016	121 795 111	16 080 562	13	608 367	6
2017	119 331 552	15 365 851	13	576 159	6
2018	122 988 758	13 944 027	11	558 385	6
Average	—	—	9.6	—	6.5
Total	3 919 001 098	376 698 789		Total 20 643 293	

exports (table 4), at about 61.6 percent of total exported volume in 1990. Annual sawlog export volumes peaked that year at close to 15 million m^3, as did exports of woodchips at 8.8 million m^3. Roundwood pulplog volumes peaked in 1995 at 313 400 m^3. Overall, of the 3.92 billion m^3 of timber harvested in the PCR from 1990 through 2018, a total of 376.7 million m^3, or 9.6 percent, was exported. Total timber product exports for the period were composed of 61.6 percent sawlogs, 37.9 percent woodchips, and 0.5 percent roundwood pulplogs.

Table 4—Total Pacific coast region exports by timber product type

Year	Total export volume	Sawlog exports as percentage of total export volume	Roundwood pulplog exports as percentage of total export volume	Woodchip exports as percentage of total export volume
	Cubic meters	- - - - - - - - - - - - - - - - - - *Percent* - - - - - - - - - - - - - - - - - -		
1990	23 831 382	63	0	37
1991	21 264 879	61	0	39
1992	18 214 672	61	0	39
1993	15 046 613	57	0	42
1994	13 824 250	56	1	44
1995	12 275 674	58	3	40
1996	13 755 412	51	1	48
1997	11 685 315	42	0	58
1998	10 591 244	42	0	58
1999	10 443 303	43	1	56
2000	9 784 072	46	1	54
2001	8 487 758	49	0	51
2002	8 651 345	57	2	42
2003	7 521 396	65	0	35
2004	7 526 555	64	0	35
2005	8 065 593	58	0	42
2006	7 951 155	60	0	40
2007	8 078 414	62	0	38
2008	9 126 658	60	0	39
2009	8 705 285	62	0	38
2010	13 432 816	63	1	37
2011	17 898 932	71	1	28
2012	15 350 328	71	1	28
2013	17 675 463	77	0	23
2014	17 446 359	73	0	27
2015	14 673 476	68	0	32
2016	16 080 562	71	0	29
2017	15 365 851	72	0	28
2018	13 944 027	70	0	30
Average		61.6	0.5	37.9
Total	376 698 789			

Most exported sawlogs, roundwood pulplogs, and woodchips from the PCR originated from Oregon-Washington followed by British Columbia (fig. 4). Exports from California ports remained well below 1 million m^3 for most of the period; however, in 1990, they peaked at 1.4 million m^3. Oregon-Washington export volumes peaked in 1990 at 19.5 million m^3 and again in 2011 at 11.2 million m^3. British Columbia exports peaked in 2013 at 6.5 million m^3.

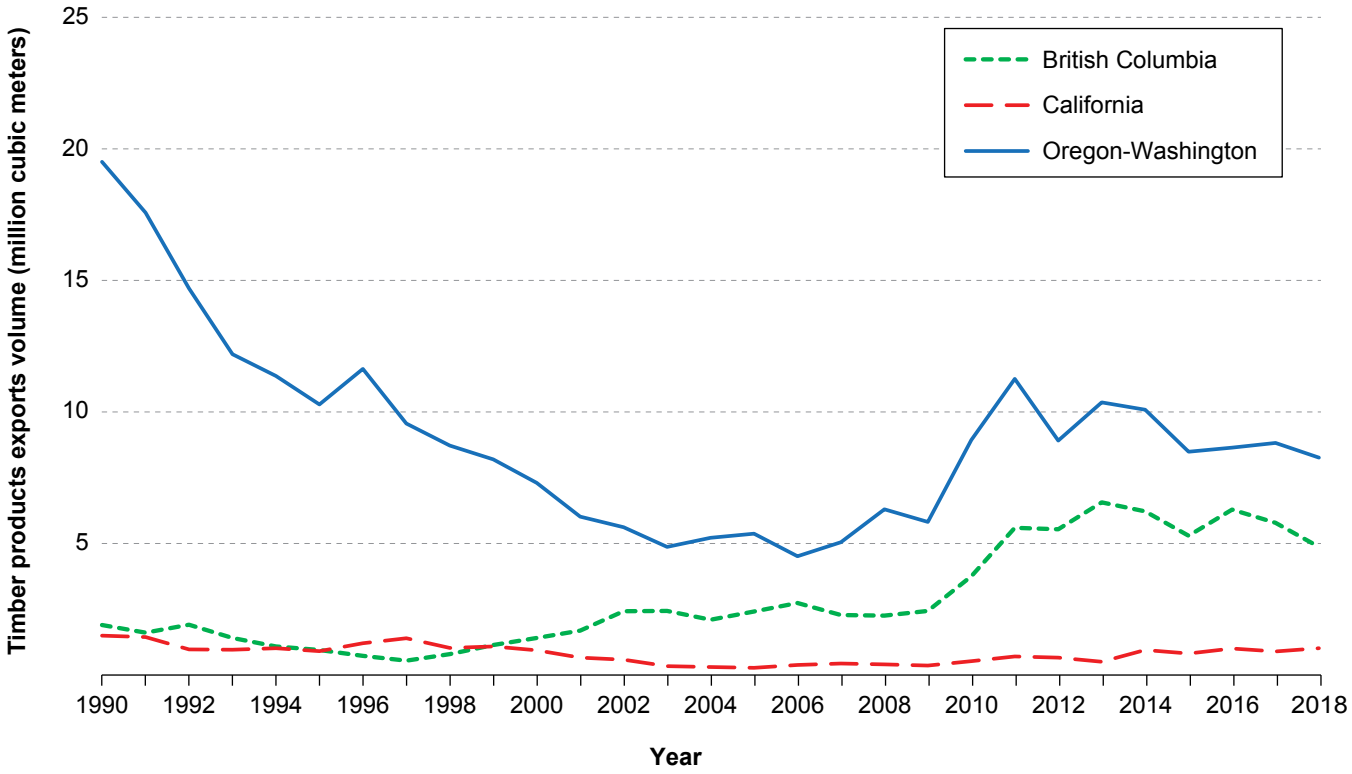

Figure 4—Pacific coast region timber product export volume by jurisdiction of origin, 1990–2018.

From 1990 through 2010, Japan received the largest volumes of sawlogs, roundwood pulplogs, and woodchips, with volumes remaining substantial through 2018, as compared to other countries. Japan's import volumes were surpassed by volumes imported by China starting in 2011 (fig. 5). Exports to South Korea peaked at 2.4 million m^3 in 1991 and again at 2.1 million m^3 in 2011. Export volumes of these products to all other countries were minimal, in aggregate typically around 500 000 m^3 annually or less. For more information on exports to China, see appendix 2.

Pacific Coast Region Exports by Product Type

Breaking down total exports by the three different product types (see app. 3) reveals greater variation and allows for closer examination of trends associated with each.

Sawlog exports—
Oregon and Washington combined dominated the sawlog export market between 1990 and 2015 at which point they were surpassed by British Columbia (fig. 6). In 1990, volumes of sawlogs exported from Oregon-Washington exceeded 13.6 million m^3, whereas British Columbia and California combined totaled only 1.3 million m^3. Total sawlog exports from the PCR fell to a low of 4.2 million m^3 in 2001 but then increased to a recent high of 13.6 million m^3 in 2013.

Sawlog export volumes from the PCR were shipped predominantly to Japan until 2010, when exports to China increased sharply (fig. 7). Although export volumes varied between 2010 and 2018, exports to China during these years were frequently more than double that of any other destination.

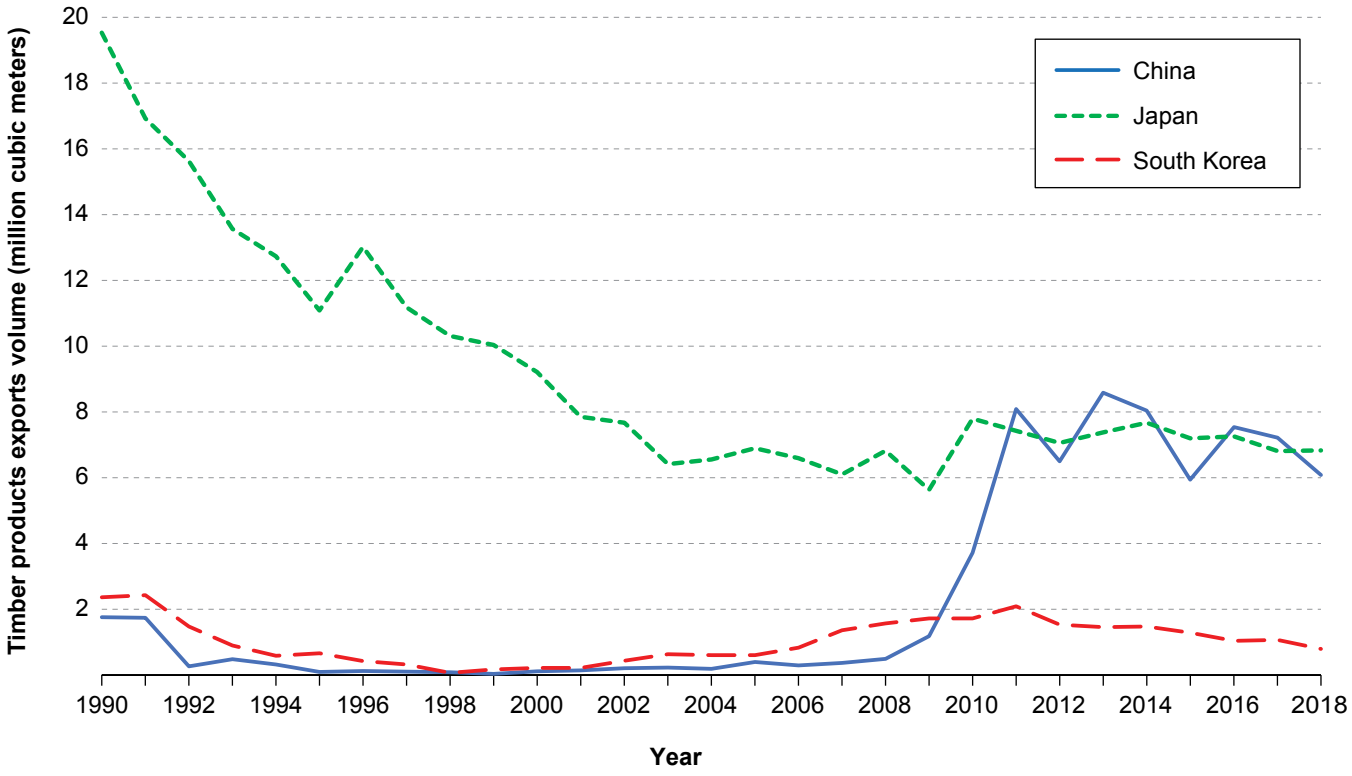

Figure 5—Pacific coast region timber product export volume by destination country, 1990–2018.

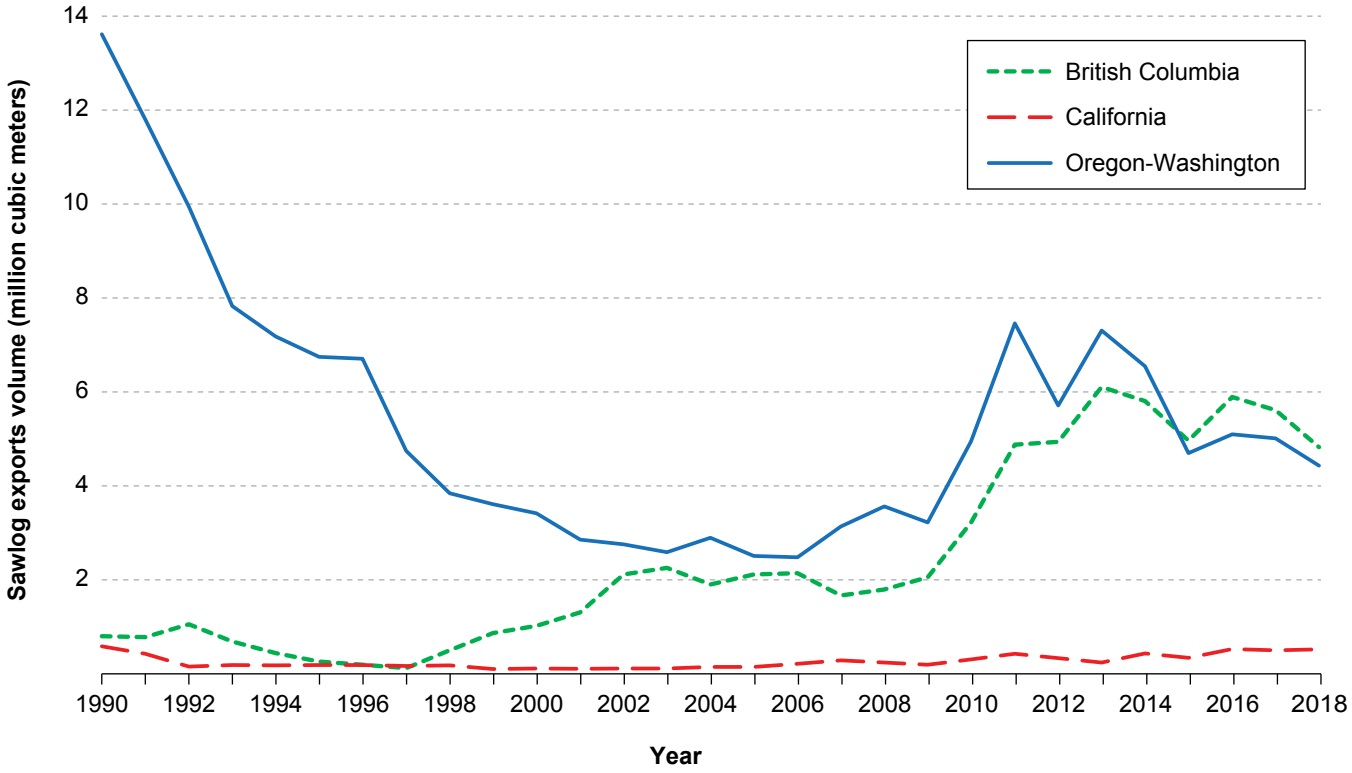

Figure 6—Pacific coast region sawlog exports by jurisdiction of origin, 1990–2018.

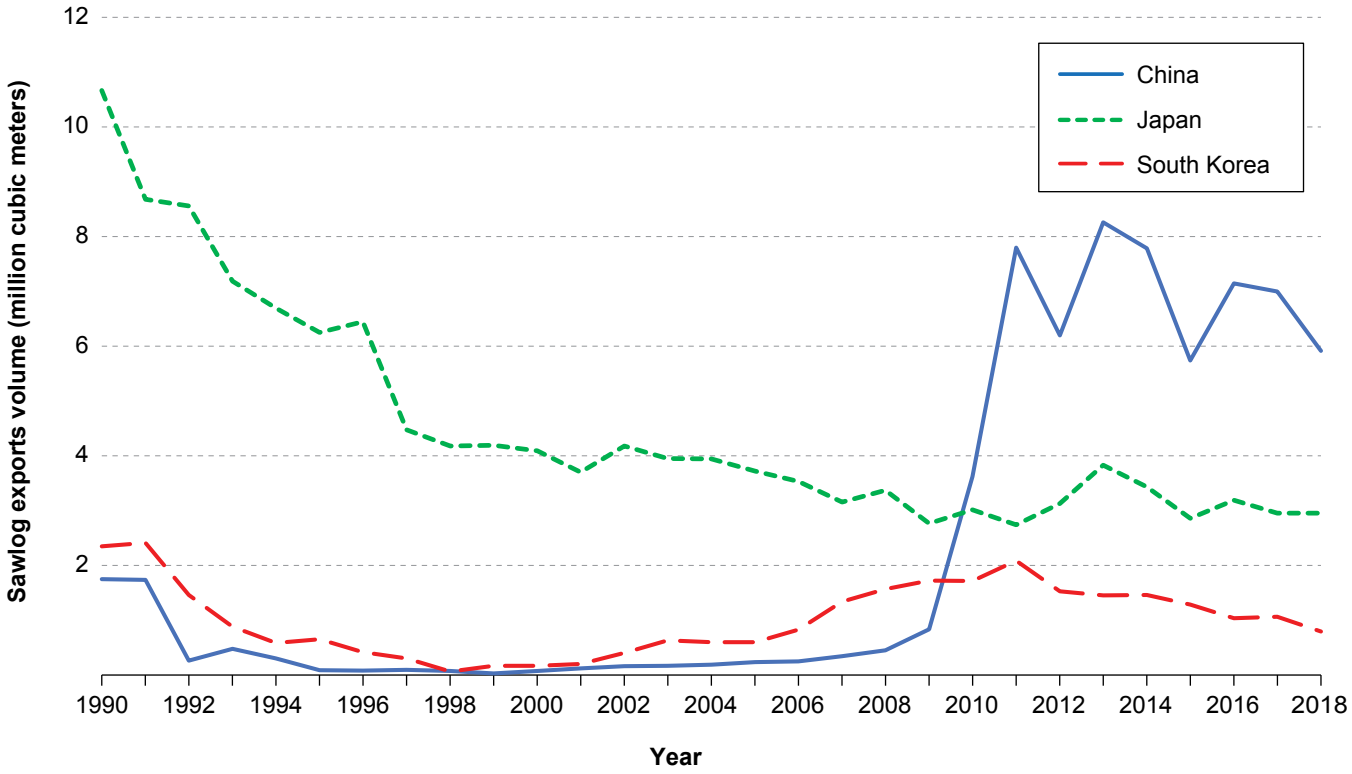

Figure 7—Pacific coast region sawlog exports by destination country, 1990–2018.

Roundwood pulplog exports—

British Columbia led roundwood pulplog exports during most of 1990–2018, with extreme variations between exporting PCR jurisdictions and from one year to the next (fig. 8). The high point for total pulplog exports occurred in 1995 at 313 400 m^3, with a secondary peak in 2011 at 165 400 m^3, while the low point occurred in 2013 at 1470 m^3. The amount of pulplogs exported was a small portion (0.5 percent) of the total volume of timber product exports (table 4).

Relatively small volumes of pulplogs were exported to Japan, China, and South Korea during the beginning of the 1990–2018 period (fig. 9). Starting in 2008, export volumes to China exceeded those to Japan; however, export volumes to China peaked slightly above 140 000 m^3 in 2011 but then ranged between 1400 and 62 300 m^3 from 2013 to 2018.

Woodchip exports—

We recognize that the exported volume of woodchips reported here, despite being reported in customs data as roundwood chips rather than residue, exceeds the amount of roundwood chips reported as produced within the region and, as such, likely consists of some amount of chips from mill residue. It is also possible that a portion of these woodchip export volumes constitute transshipments originating outside the PCR.

Exports of woodchips were highly variable across the time series and those from Oregon-Washington frequently totaled more than twice the volume from British Columbia and California combined (fig. 10). There were multiple peaks in

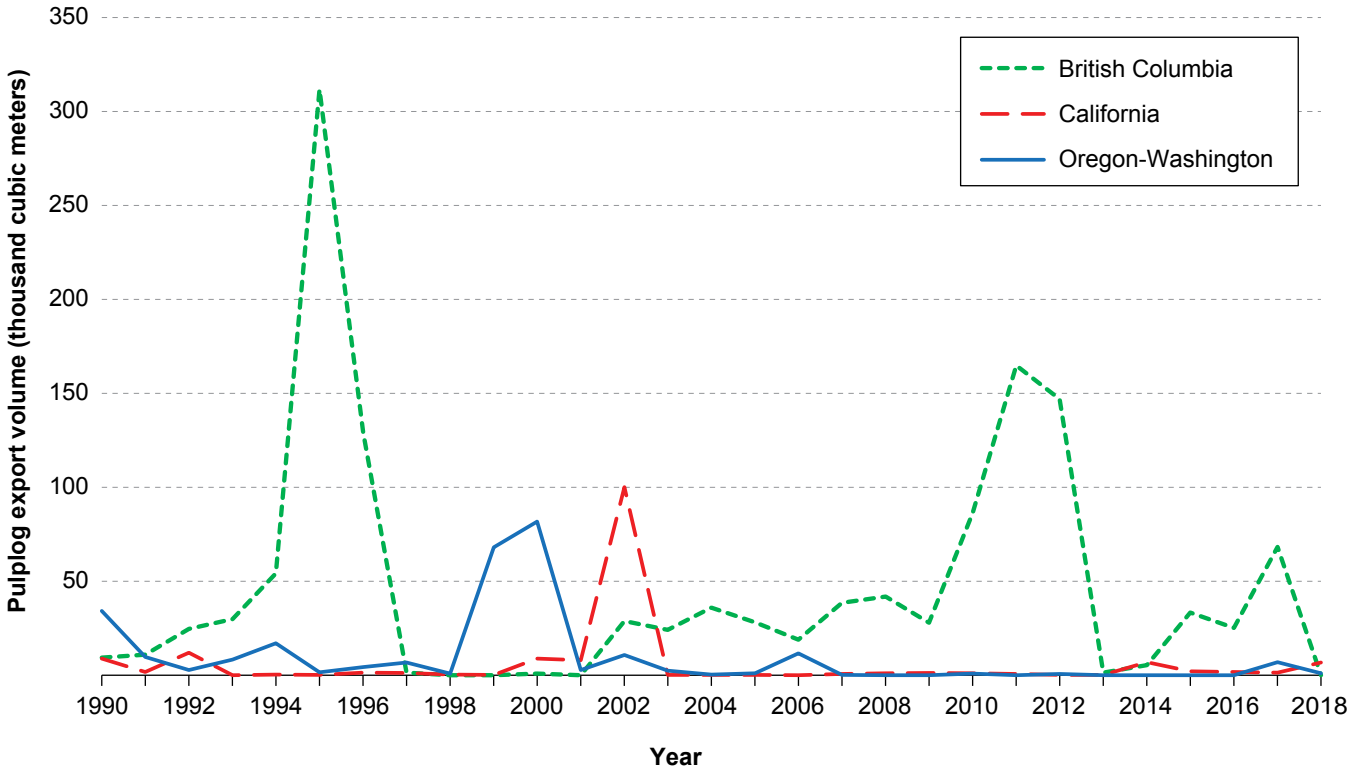

Figure 8—Pacific coast region roundwood pulplog exports by jurisdiction of origin, 1990–2018.

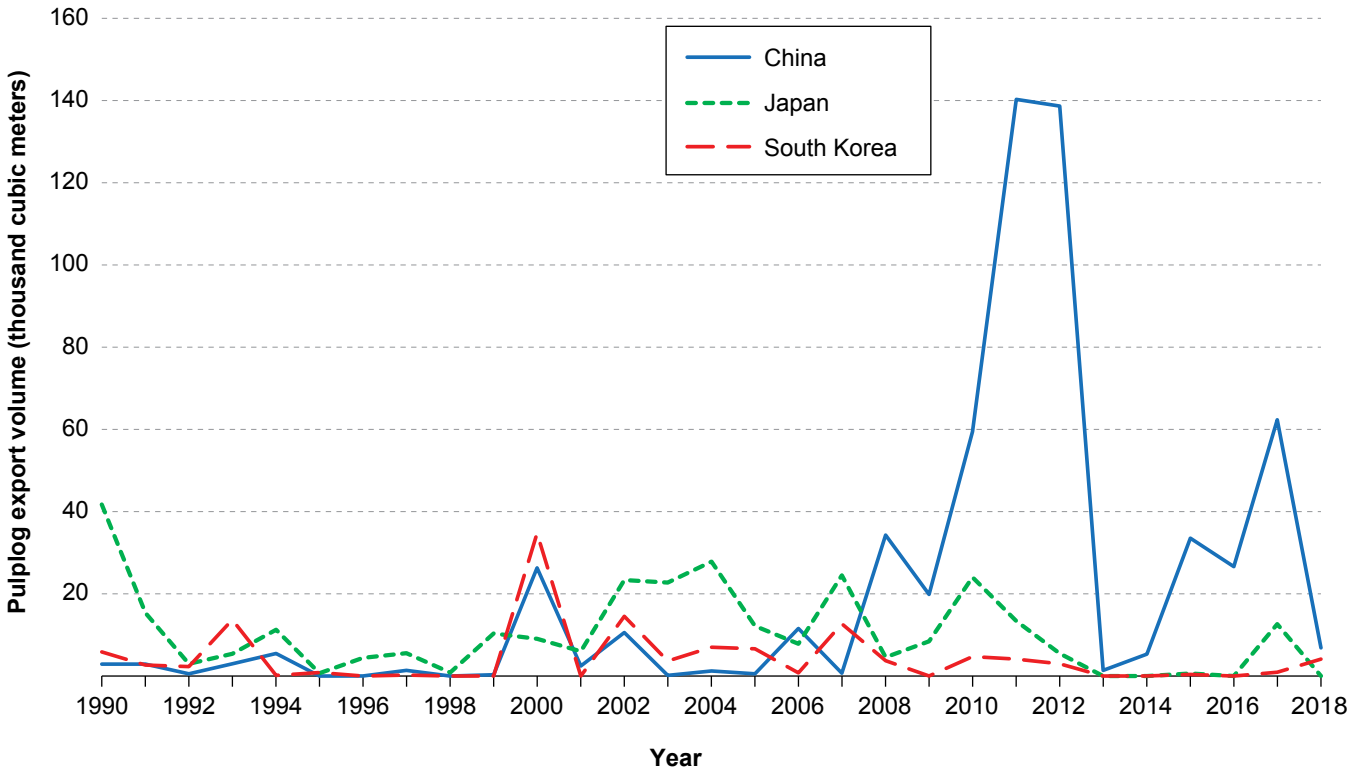

Figure 9—Pacific coast region roundwood pulplog exports by destination country, 1990–2018.

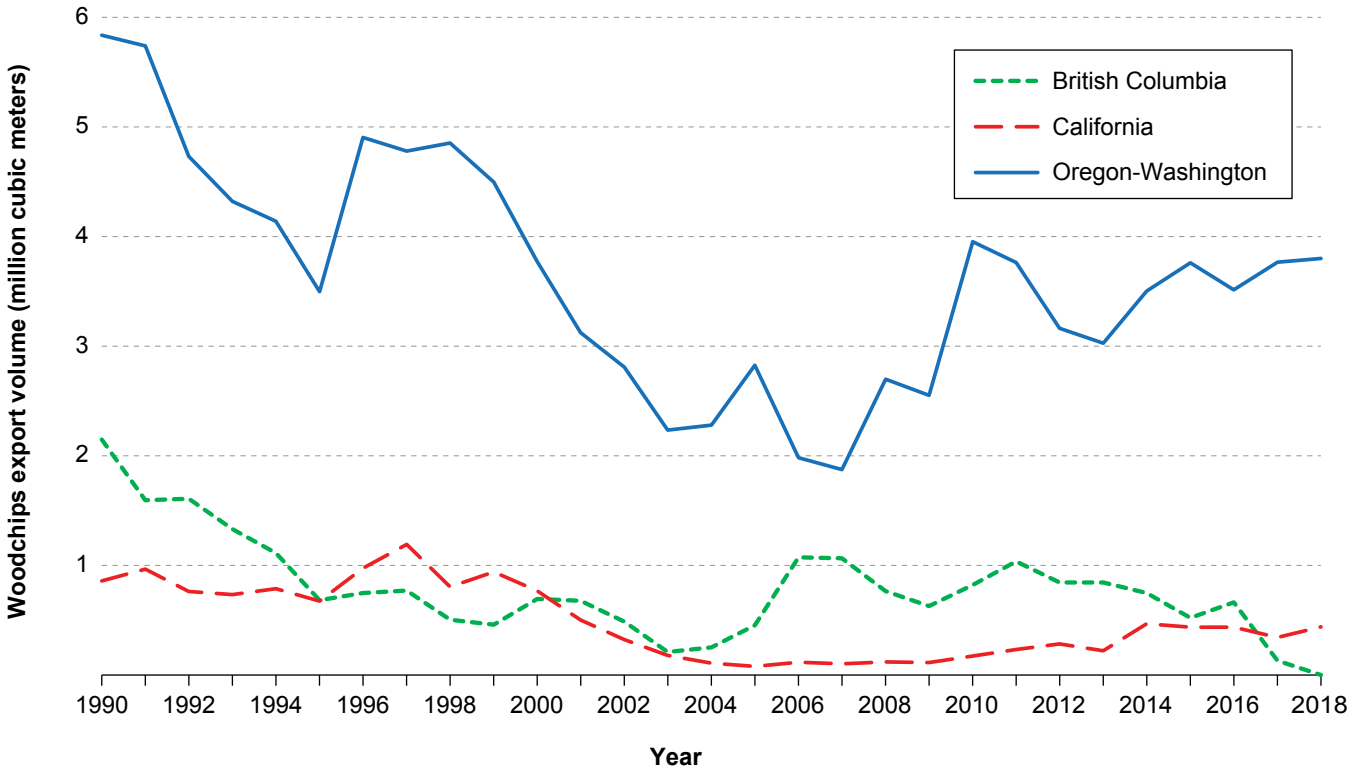

Figure 10—Pacific coast region woodchip exports by jurisdiction of origin, 1990–2018.

exports of woodchips across the time series from Oregon-Washington, with the highest exceeding 5.8 million m^3 in 1990. The lowest export volume from Oregon-Washington occurred in 2007 at 1.9 million m^3. Exports of woodchips from British Columbia started the 1990–2018 period at about 2.1 million m^3, then dropped to a low of 211 100 m^3 in 2003. Additional peaks were seen in 2006, 2007, and in 2011, when British Columbia woodchip exports exceeded 1 million m^3. Exports of woodchips from California reached 966 600 m^3 in 1991, then dropped to below 200 000 m^3 from 2003 through 2010, before more than doubling at the end of the time series.

Shipments to Japan exceeded 8.8 million m^3 in 1990 (fig. 11), dropped to a low of 2.5 million m^3 in 2003, and then climbed to over 4.6 million m^3 in both 2010 and 2011. Exports of woodchips to China exceeded 300 000 m^3 in 4 years across the times series, while exports to South Korea remained well under 20 000 m^3.

Pacific Coast Region Exports by Origin

Examining exports from the individual PCR jurisdictions provides information that may prove useful to state- and province-level agencies and resource professionals. The export figures in this section include all foreign destinations. In other words, export volumes from California, Oregon, and Washington include exports to British Columbia, while export volumes from British Columbia include exports to California, Oregon, and Washington.

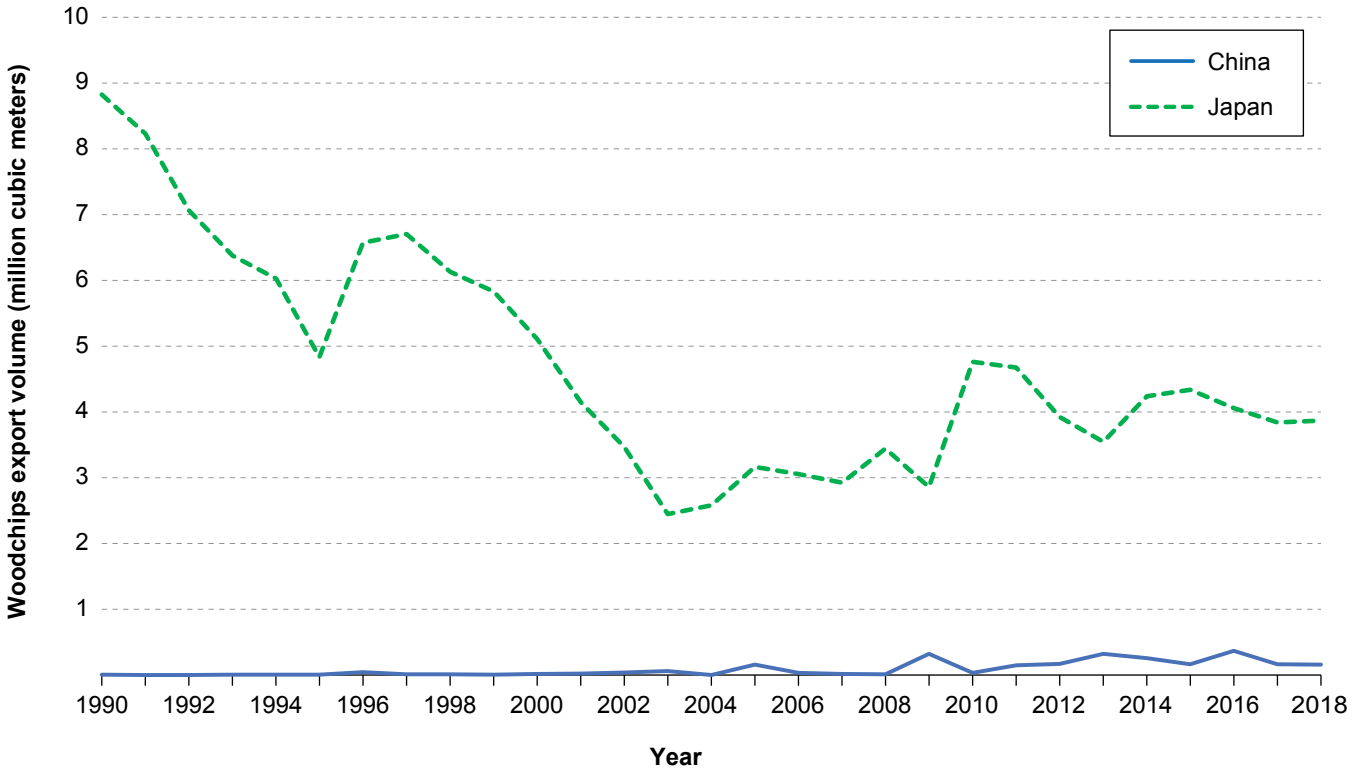

Figure 11—Pacific coast region woodchip exports by destination country, 1990–2018.

British Columbia exports—

Timber product exports from British Columbia to all countries, including U.S. PCR states, fluctuated widely over the past three decades, especially for sawlog volumes (fig. 12). Roundwood pulplog and woodchip annual export volumes averaged 55 000 and 789 000 m^3, respectively. Sawlog volumes fluctuated from a low of 166 700 m^3 in 1997 to a high of 6.7 million m^3 in 2013, with several peaks and troughs throughout the period.

Until 2007, U.S. Pacific coast states and Japan received most of British Columbia's timber product exports (fig. 13). Japan received the largest quantities for a few years before being surpassed by China in 2011. Since 2011, British Columbia's timber product export volumes to China far outpaced that to all other areas, often exceeding the volume going to all other countries combined. Between 2005 and 2009, exports to the U.S. Pacific coast states dropped by 86 percent and remained below 700 000 m^3 for the rest of the period (fig. 14).

California exports—

Between 1991 and 2003, California export volumes were dominated by woodchips shipped to Japan before dropping off below export volumes of sawlogs in 2005 (fig. 15). Roundwood pulplog exports remained minimal throughout the period except in 2002, when pulplog exports to India exceeded 100 000 m^3. Exports of sawlogs increased erratically from 78 800 m^3 in 2003 to 485 500 m^3 in 2018.

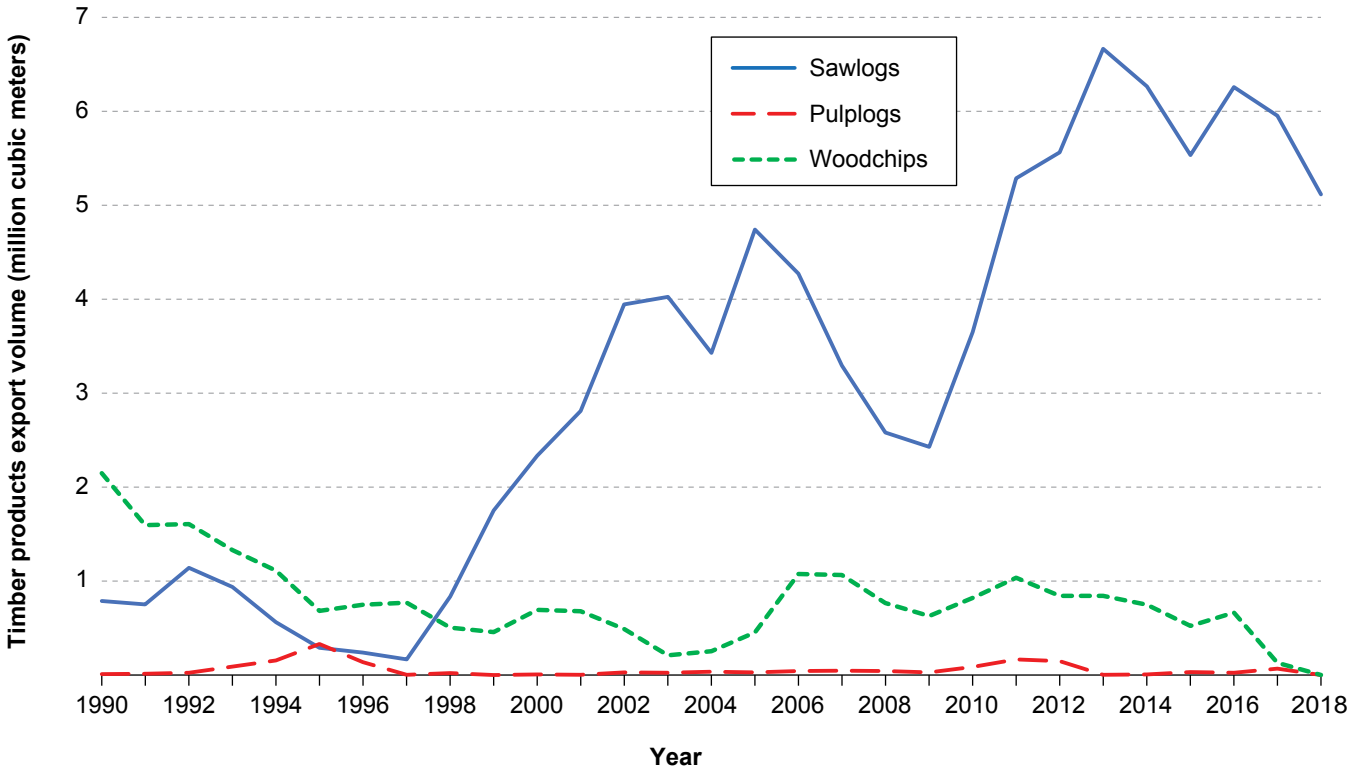

Figure 12—British Columbia timber product exports to all foreign destinations by product type, 1990–2018.

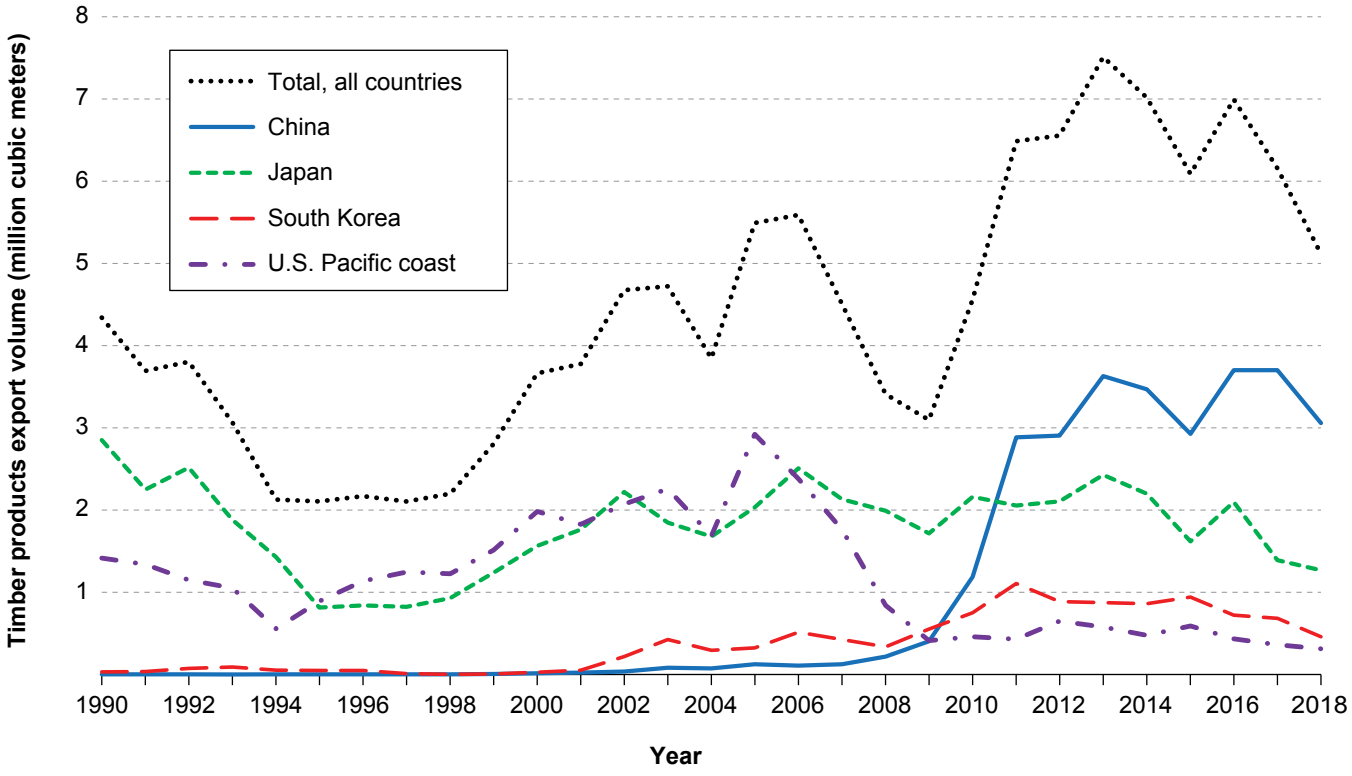

Figure 13—British Columbia timber product exports to all foreign destinations by destination country, 1990–2018.

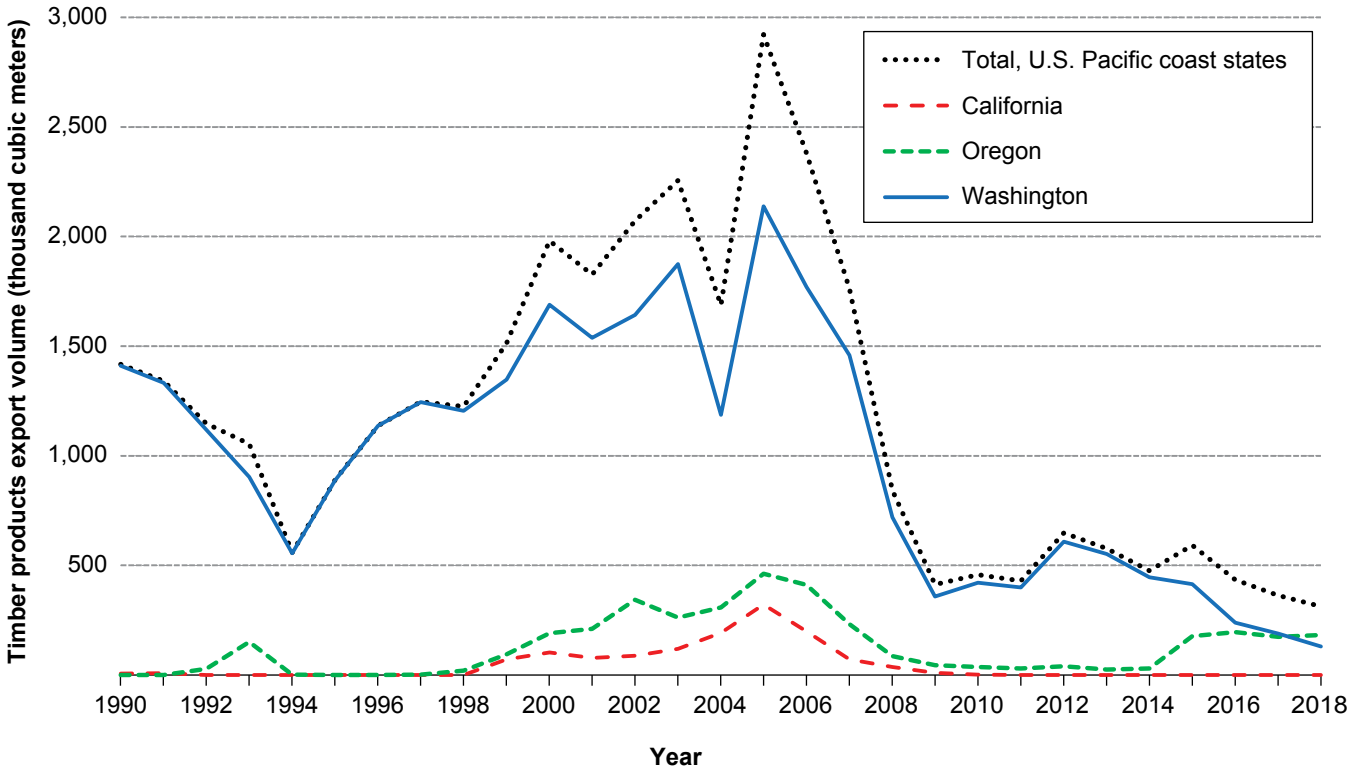

Figure 14—British Columbia timber product exports to U.S. Pacific coast states, 1990–2018.

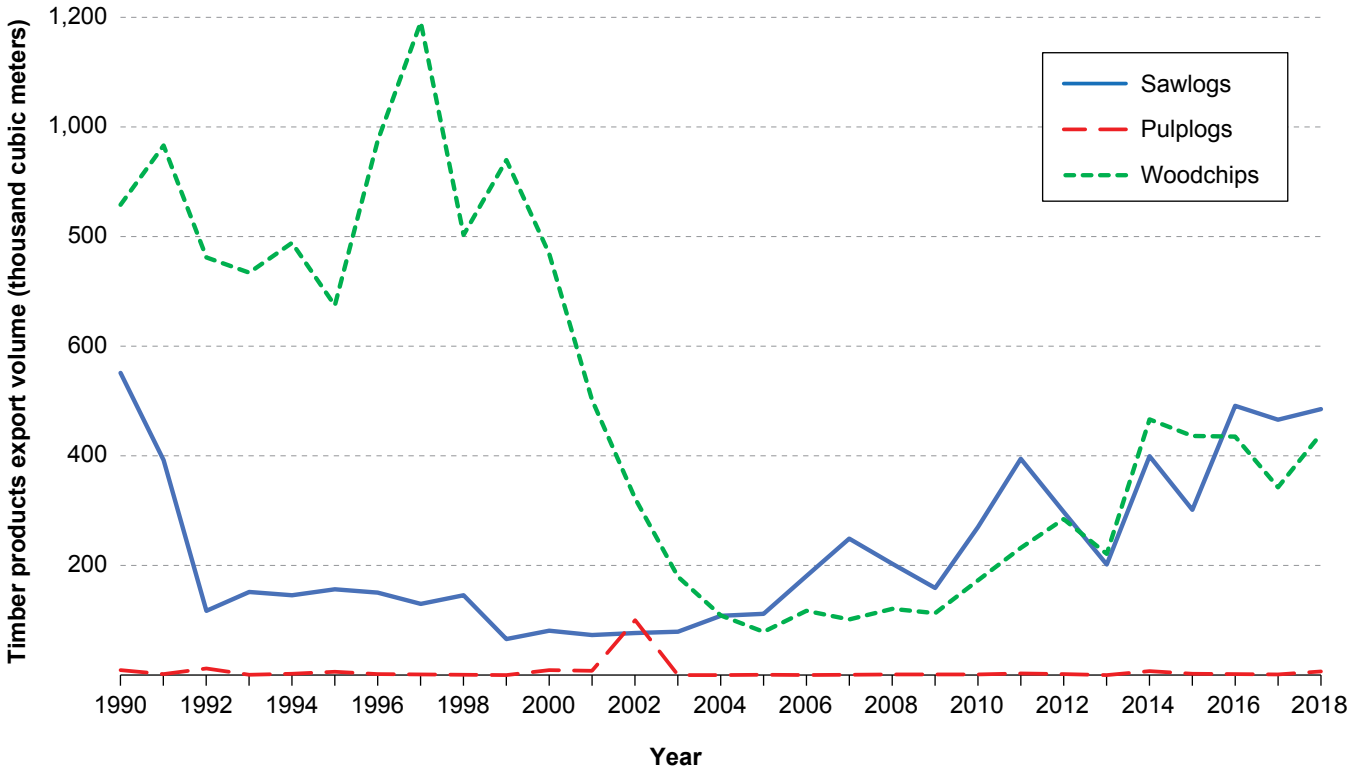

Figure 15—California timber product exports to all foreign destinations by product type, 1990–2018.

In 1990, exports of timber products to Japan from California were 1.2 million m^3, then declined to 18 500 m^3 by 2009. In 2005, China became the primary destination for California timber product exports (fig. 16), increasing to 515 200 m^3 by 2018. Exports to South Korea ranged from 73 400 m^3 in 1990 down to 3700 m^3 in 1998. Exports to other countries were relatively insignificant.

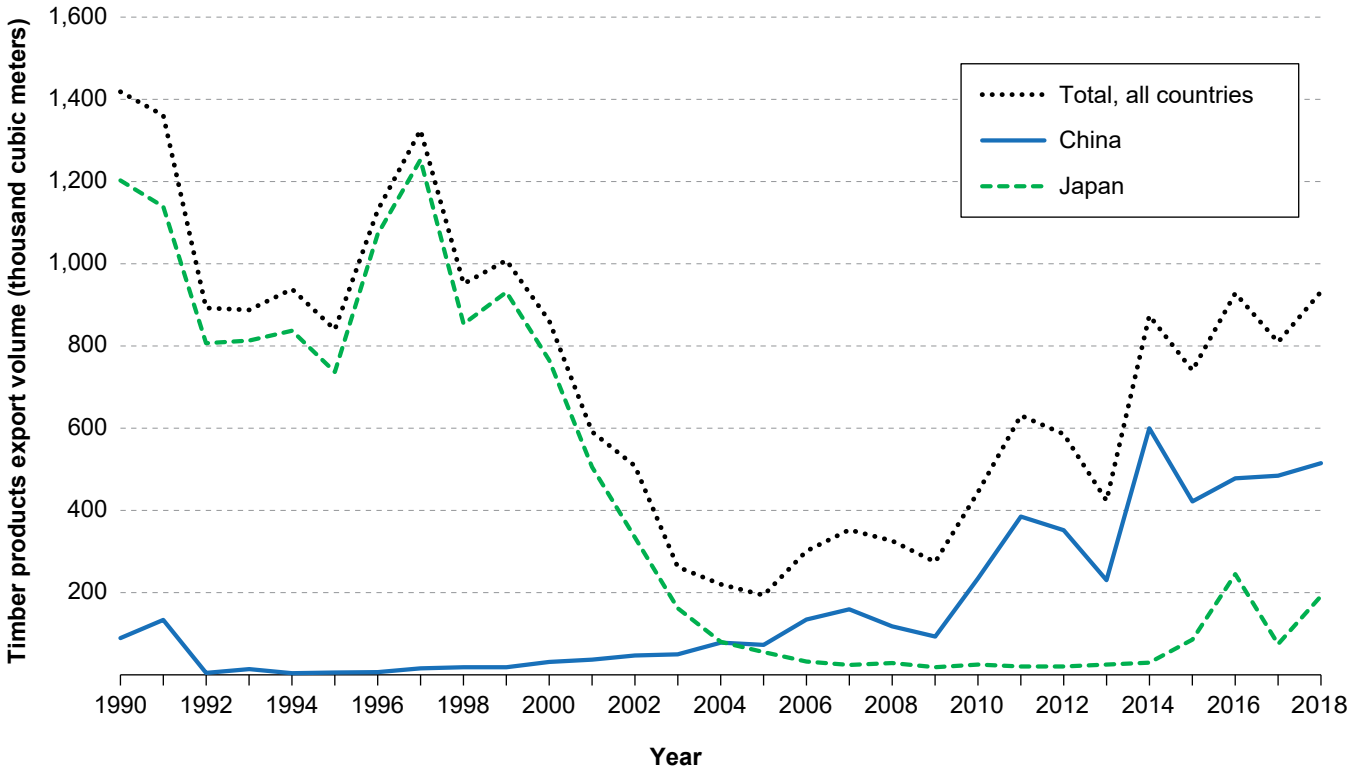

Figure 16—California timber product exports to all foreign destinations by destination country, 1990–2018.

Oregon-Washington exports—
Throughout the 1990–2018 period, exports of pulplogs from Oregon-Washington ports remained negligible (fig. 17). Exports of woodchips remained below 6 million m^3 across the time series. Exports of sawlogs declined from 13.8 million m^3 in 1990 to 2.5 million m^3 in 2006, then climbed to an average of 5.8 million m^3 after 2010.

Through the entire 1990–2018 period, Japan was the primary trade partner for Oregon-Washington timber products (fig. 18). From a high of 15.5 million m^3 in 1990, volumes exported to Japan fell to 3.9 million m^3 in 2009 and remained between 4 and 6 million m^3 until 2018. Starting in 2011, China approached Japan as the primary market for Oregon-Washington timber products, peaking at 4.8 million m^3 during that year but being highly variable since. Export volumes to all of Canada, including British Columbia, exceeded 2 million m^3 in only 3 years during the 1990–2018 period, while volumes to South Korea peaked at 1.2 million m^3 in 2008.

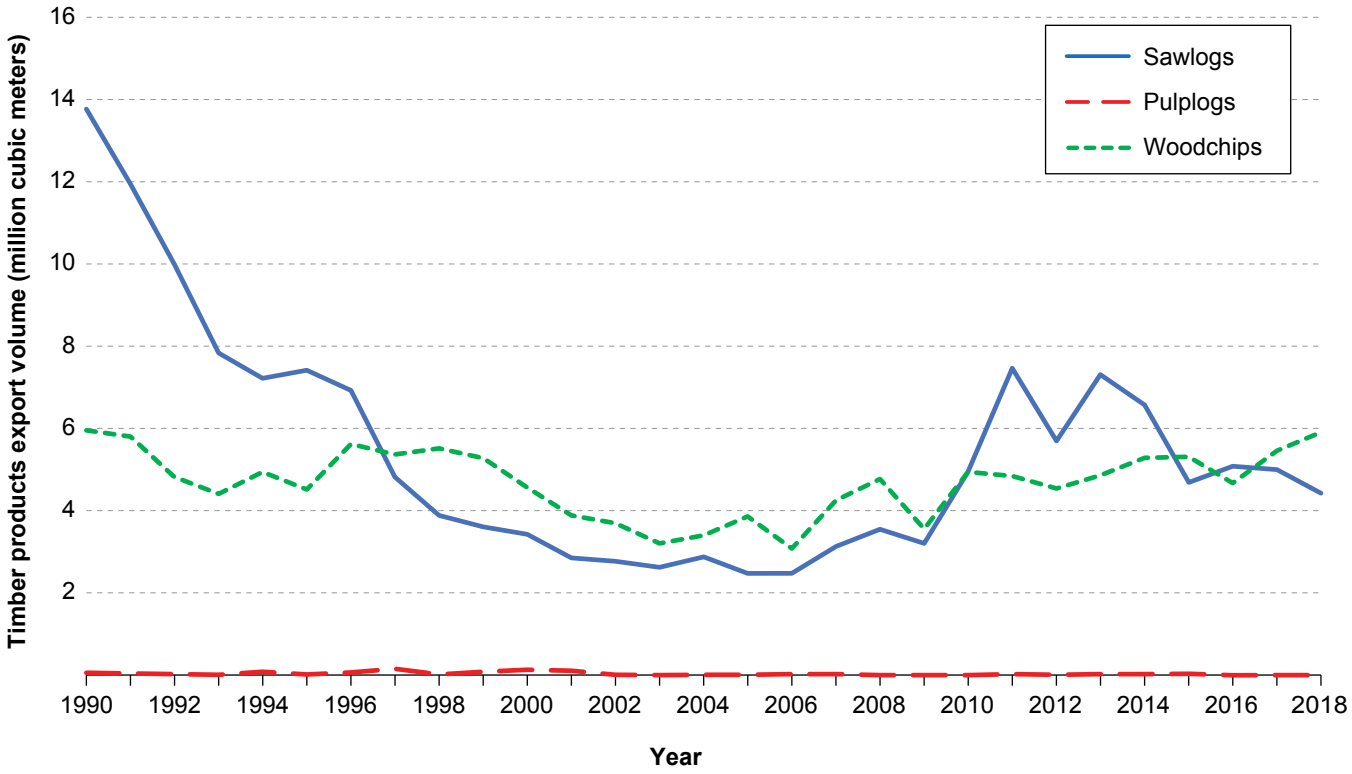

Figure 17—Oregon-Washington timber product exports to all foreign destinations by product type, 1990–2018.

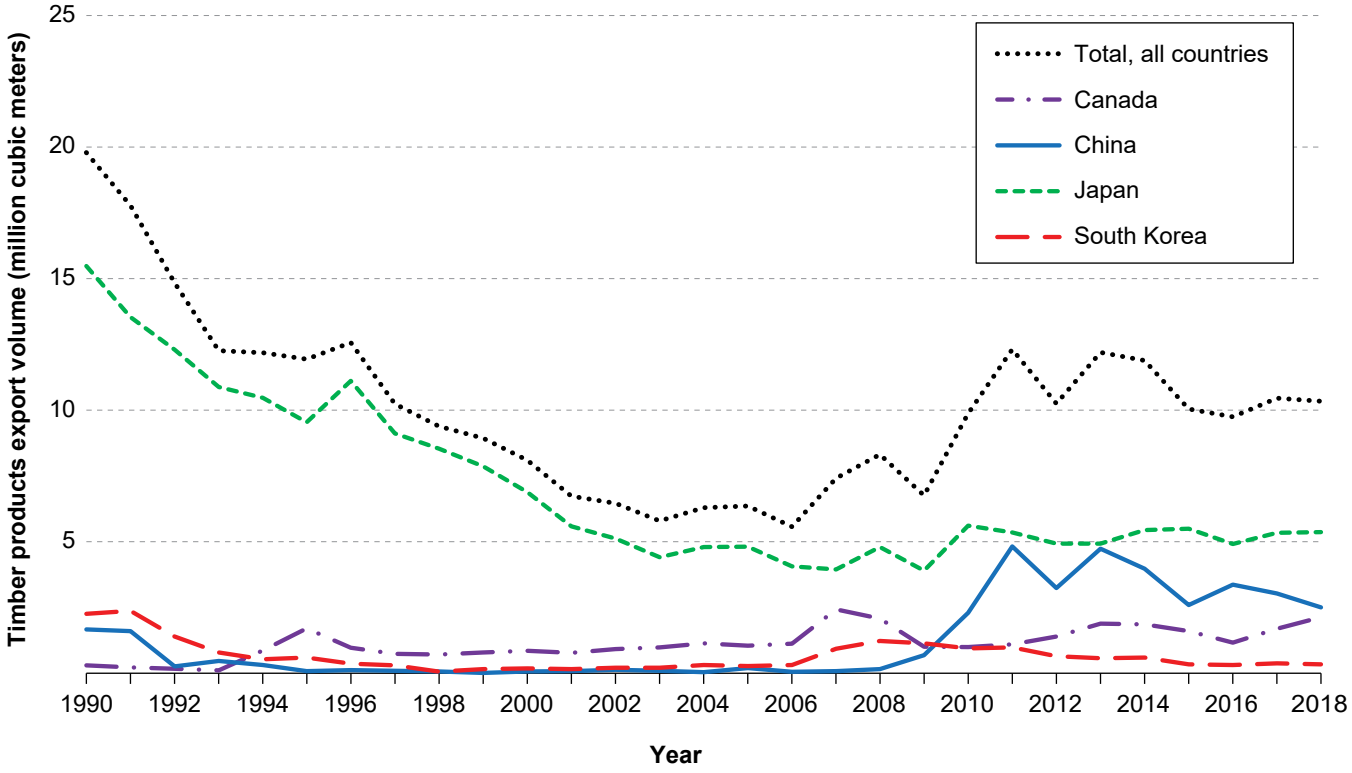

Figure 18—Oregon-Washington timber product exports to all foreign destinations by destination country, 1990–2018.

Pacific Coast Region Imports

Most sawlogs, roundwood pulplogs, and woodchips imported into the PCR originated in U.S. states (i.e., other than California, Oregon, and Washington), primarily Alaska, Idaho, and Montana. During the 1990–2018 period, total import volume reached its peak in 1997 at 1.5 million m^3 before dropping to 298 000 m^3 in 2009 (fig. 19). Total import volumes were relatively modest during the 1990–2018 period. Between 1992 and 1998, woodchips were imported in the greatest volumes, to be surpassed by roundwood pulplogs during 1998 and from 2001 to 2003. Imports of roundwood pulplogs peaked at 597 000 m^3 in 1997. Both woodchip and sawlog imports peaked in 1995 at 1 million m^3 and 420 000 m^3, respectively.

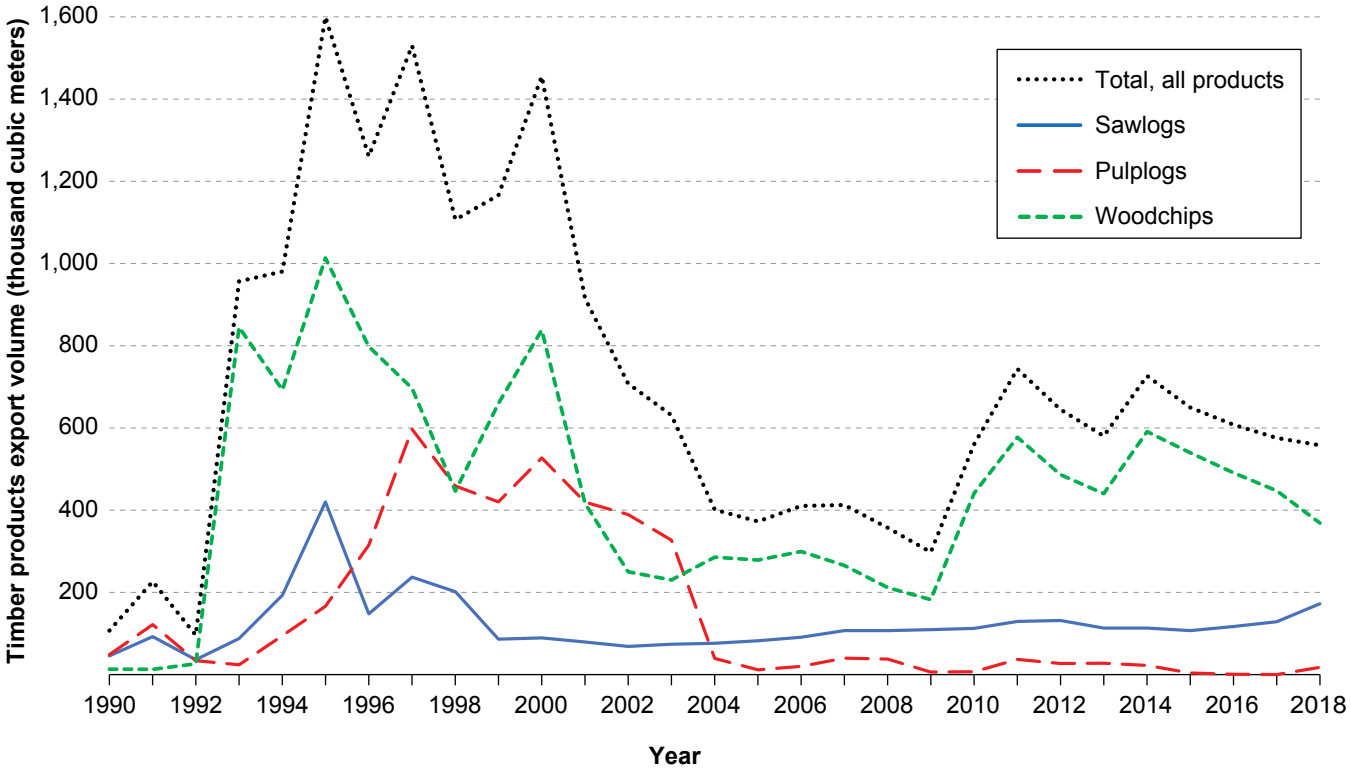

Figure 19—Pacific coast region timber product imports by product type, 1990–2018.

Intraregion Timber Flow

Data from the Forest Industries Data Collection System (FIDACS) at the University of Montana, Bureau of Business and Economic Research (BBER); Washington State Department of Natural Resources (DNR); and BC Stats show that the PCR engages in significant intraregion timber products trade (i.e., trade among British Columbia, California, Oregon, and Washington). Although BC Stats data are annual, FIDACS data are based on information gathered from periodic (4- to 6-year) censuses of the forest industry in all Western states except Washington, which uses biannual mill surveys conducted by Washington State DNR. Thus, most

intraregion trade data are periodic. Tables 5 through 8 present simplified summaries of the available data. For more detailed tables, see appendix 4.

British Columbia—

Trade data for the flow of timber products between British Columbia and the U.S. Pacific coast states are available on an annual basis. The data are reported as being received by each of the U.S. Pacific coast states, indicating the state of the custom district where the shipments originate or are received. Considering the previously described issues related to the Columbia-Snake Customs District in Oregon including the ports of Longview and Vancouver in Washington, the volumes reported for Oregon and Washington can be somewhat misleading.

Over the years, British Columbia intraregion timber export volumes have generally been far greater than imports (table 5). Following the peak of intraregion timber flow in the early 2000s, trade with California has all but vanished. On the other hand, in 2018, British Columbia imported from Washington more than five times the amount it exported to this jurisdiction.

Table 5—British Columbia intraregion timber products trade, selected years

Trade flow	2000	2006	2012	2018
		Cubic meters		
To British Columbia from:				
California customs districts[a]	3028	1591	2364	54
Columbia-Snake Customs District	9017	1068	18 418	32 944
Seattle Customs District	439 567	558 432	669 320	721 943
From British Columbia to:				
California customs districts[a]	101 944	197 038	191	199
Columbia-Snake Customs District	163 426	407 678	39 514	182 419
Seattle Customs District	1 396 363	1 674 107	607 937	129 922

[a] California customs districts include Los Angeles, San Francisco, and San Diego.

California: California customs districts—

Intraregion timber product import and export data for California are available for 2000, 2006, 2012, and 2016 (table 6). During these years, California received highly variable amounts of exports from the other three PCR jurisdictions. Volumes imported from Washington were zero in both 2012 and 2016, and volumes imported from British Columbia were zero in 2016. California export volumes to Washington were zero for all reported years, and export volumes to British Columbia were small, while export volumes to Oregon exceeded imports.

Table 6—California intraregion timber products trade, selected years

Trade flow	2000	2006	2012	2016
		Cubic meters		
To California from:				
British Columbia[a]	101 944	197 038	191	0
Oregon	351 466	140 304	14 211	232 497
Washington	510 042	311 176	0	0
From California to:				
British Columbia[a]	3028	1591	2364	471
Oregon	627 806	354 811	189 971	235 132
Washington	0	0	0	0

[a] To and from California customs districts (Los Angeles, San Francisco, and San Diego).

Oregon: Columbia-Snake Customs District—

Intraregion timber product import and export data for Oregon are available for 2003, 2008, 2013, and 2017 (table 7). Data for these years are also available for trade with British Columbia. During these years, the amount of timber Oregon received was highly variable from the other three PCR jurisdictions. Volumes imported from British Columbia varied, while Oregon export volumes to British Columbia were small. The flow of timber products was greater from California to Oregon than from Oregon to California. Principal trade flow between Oregon and Washington changed direction between the beginning of the data period and the end. In 2003, Oregon imported more than twice the volume it exported. By 2017, Oregon exported nearly five times the volume it imported.

Table 7—Oregon intraregion timber products trade, selected years

Trade flow	2003	2008	2013	2017
		Cubic meters		
To Oregon from:				
British Columbia[a]	248 039	84 850	24 776	174 035
California	353 735	248 834	375 449	168 263
Washington	1 764 536	1 499 456	782 233	260 044
From Oregon to:				
British Columbia[a]	14 970	15 207	251 849	152 388
California	193 836	19 983	10 681	11 323
Washington	823 909	2 794 341	3 343 259	1 206 315

[a] To and from the Columbia-Snake Customs District.

Washington: Seattle Customs District—
Data for Washington's intraregion timber product imports and exports are somewhat different than for the three other jurisdictions because of Washington State DNR's mill survey occurring in even-numbered years and not including any out-of-state timber-processing facilities. The Washington State DNR mill survey data do not include any intraregion export volumes for Washington and intraregion import volumes for Oregon only (table 8). Import and export data between Washington and British Columbia are available annually from USITC and BC Stats. In 2000, the volume Washington imported from British Columbia was three times the volume it exported. Imports from California were zero for 2000, 2006, 2013, and 2016, while export volumes remained below 350 000 m^3 for these 4 years. Exports to Oregon more than doubled between 2000 and 2016, while imports dropped significantly between 2000 and 2017.

Table 8—Washington intraregion timber products trade, selected years

Trade flow	2000	2006	2012	2016
		Cubic meters		
To Washington from:				
British Columbia[a]	1 396 363	1 674 107	607 937	215 568
California	0	0	0	0
Oregon	532 261	670 929	427 034	1 407 892
From Washington to:				
British Columbia[a]	439 567	478 694	669 320	676 763
California	341 789	—	143 171	—
Oregon	—	1 182 448	—	174 260

— = No data.
[a] To and from the Seattle Customs District.

Conclusion

The harvested wood product carbon production accounting approach relies on knowing or estimating the mix of products, downstream uses, and eventual dispositions of the wood fiber harvested within the study area. This analysis of timber product flow between the PCR and other destinations indicates that log and chip exports from the PCR are relatively small, totaling less than 10 percent and never exceeding 15 percent (on an annual basis) of the regional harvest volume over the 29-year period examined. Thus, we conclude that the volume of timber exported from the PCR is relatively small compared to the harvest volume. The timber product mix of exports consists of 61.6 percent sawlogs by volume, with the remaining exports identified as logs or chips for pulp, paper, and composite panels, which suggests that uses of exported timber products are similar to intraregion

uses. As such, the assumption that logs harvested within the PCR and processed outside the region have similar uses and downstream fates as logs processed within the region cannot be dismissed.

Recent analysis of primary wood products (e.g., lumber and panels) flows suggests that substantial quantities of these products produced within and outside the PCR flow into the region, particularly into the most populous state—California.[6] It is not possible to know with a high degree of certainty what fraction of primary wood products imported into the PCR was manufactured from wood fiber originally harvested within that region. However, the finished products analysis does indicate that PCR primary wood products are mostly traded domestically, including within the PCR.[6] This further supports the notion that timber and wood products harvested or produced within the PCR have similar destinations and downstream uses whether or not they are exported. Combined with the relatively small percentage of PCR timber that is exported, we conclude that exported timber products have similar uses and downstream fates as timber processed within the PCR, and additional efforts to quantify different primary product ratios or disposal fates would unlikely affect the overall harvested wood product carbon analysis for the PCR.

Acknowledgments

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[6] Evans, S.; Potts, M. [n.d.]. Manuscript in preparation. The flow of primary wood products in the Pacific coast region. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

U.S. Standard Equivalents

When you know:	Multiply by:	To find:
Cubic meters (m^3)	35.3	Cubic feet
Hectares (ha)	2.47	Acres
Tonnes (t)	1.102	Tons

Metric Equivalents

When you know:	Multiply by:	To find:
Yards (yd)	.914	Meters
Cubic yards (yd^3)	.7645	Cubic meters
Cubic feet (ft^3)	.0283	Cubic meters
Pounds (lb)	454	Grams

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Appendix 1: Conversions

We reported most data collected for this analysis in metric units—cubic meters (m^3) and metric tons (t). However, we reported California, Oregon, and Washington harvests in thousand board feet (MBF), Scribner. We converted all measurement units to cubic meters. For timber harvest from U.S. states, we converted MBF Scribner to cubic meters using a factor of 6.76 m^3 per 1 MBF Scribner for Oregon and Washington. For California, we used a factor of 5.25 m^3 per 1 MBF Scribner because of the state's use of Scribner short-log rather than long-log rule for its harvest (Fonseca 2021, Spelter 2003).

Further, we reported sawlog and pulplog exports in cubic meters, whereas woodchips were reported in metric tons (t) of oven-dry loose chips and needed to be converted to cubic meters of solid wood equivalents (SWE) using the following conversion factors:

- 1 t oven-dry loose hardwood chips = 2.0352 m^3 SWE (table A1.1)
- 1 t oven-dry loose softwood chips = 2.3773 m^3 SWE (table A1.2)

These conversion factors are based on density estimates for loose chips by Briggs (1994) and SWE estimates for the U.S. from FAO et al. (2020).

Table A1.1—Calculating hardwood chips weight-to-volume conversion factor

Original unit		Converted unit
1 t oven-dry loose hardwood chips	=	2,205 oven-dry loose lb
1 yd^3	=	27.0000 ft^3
1 m^3 loose chips	=	0.3289 m^3 solid wood equivalent (SWE)[a]
Hardwood whole-tree chips density	=	13.2 lb/ft^3[b]
Hardwood chips, loose	=	27.0000 ft^3 × 13.2 lb/ft^3 = 356.4004 lb/yd^3
1 t oven-dry loose hardwood chips	=	2,205 lb ÷ 356.4004 lb/yd^3 = 6.1869 m^3
1 t oven-dry loose hardwood chips	=	6.1869 m^3 × 0.3289 = 2.0352 m^3 solid wood equivalent

Note: Calculations are rounded to nearest four decimals.

[a] Source: Fonseca (2010).

[b] Source: Briggs (1994).

Table A1.2—Calculating softwood chips weight-to-volume conversion factor

Original unit		Converted unit
1 t oven-dry loose softwood chips	=	2,205 oven-dry loose lb
1 yd^3	=	27.0000 ft^3
1 m^3 loose chips	=	0.3289 m^3 solid wood equivalent[a]
Softwood whole-tree chips density	=	11.3 lb/ft^3[b]
Softwood chips, loose	=	27.0000 ft^3 × 11.3 lb/ft^3 = 305.1003 lb/yd^3
1 t oven-dry loose softwood chips	=	2,205 lb ÷ 305.1003 lb/yd^3 = 7.2271 m^3
1 t oven-dry loose softwood chips	=	7.2271 m^3 × 0.3289 = 2.3773 m^3 solid wood equivalent

Note: Calculations are rounded to nearest four decimals.

[a] Source: Fonseca (2010).

[b] Source: Briggs (1994).

Appendix 2: Pacific Coast Region Exports to China

The most notable aspect of Pacific coast region (PCR) timber exports over the past two decades is the dramatic increase in exports to China starting in 2009–2010 (fig. A2.1). With China dominating the timber products export market since 2011, this portion of the trade flow warrants closer examination, both in terms of export product type and PCR area of origin. Softwood sawlogs drove the trend, accounting for most (92.6 percent) timber exports to China from 1990 through 2018. Hardwood sawlog, pulplog, and woodchip volumes combined, though varying over time, remained below 300 000 m^3 throughout most of the 1990–2018 period, with the exception of 2009, 2013, and 2016, when woodchip exports to China spiked above 300 000 m^3 (fig. A2.2).

Focusing on softwood sawlog exports to China, combined volume for all areas totaled less than 1 million m^3 for the greater part of the 1990–2009 period, before jumping to 3.7 million m^3 in 2010 (fig. A2.3). Although California export volume did see some growth, the dramatic increase was spread across British Columbia and Oregon-Washington, and led by Oregon-Washington before 2015 and by British Columbia after 2015.

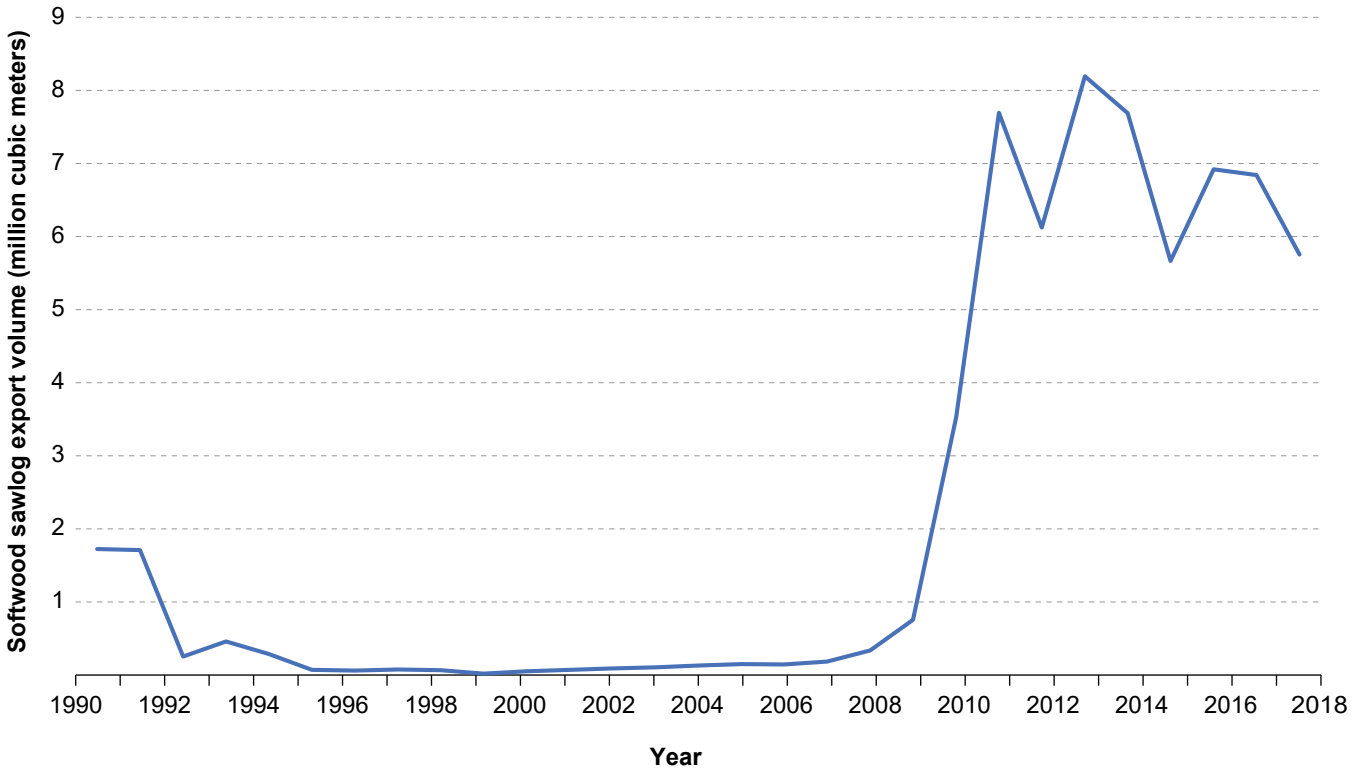

Figure A2.1—Pacific coast region exports of softwood sawlogs to China, 1990–2018.

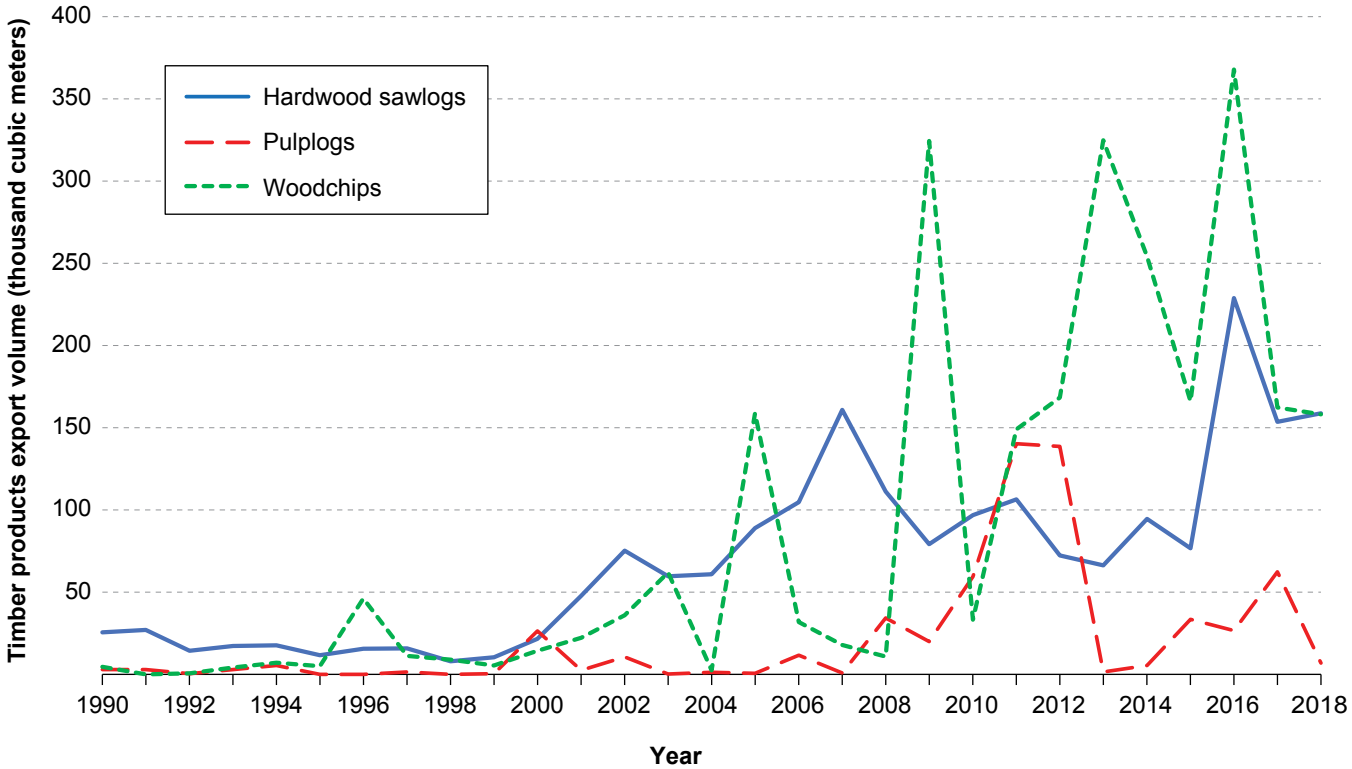

Figure A2.2—Pacific coast region exports of hardwood sawlogs, roundwood pulplogs, and woodchips to China, 1990–2018.

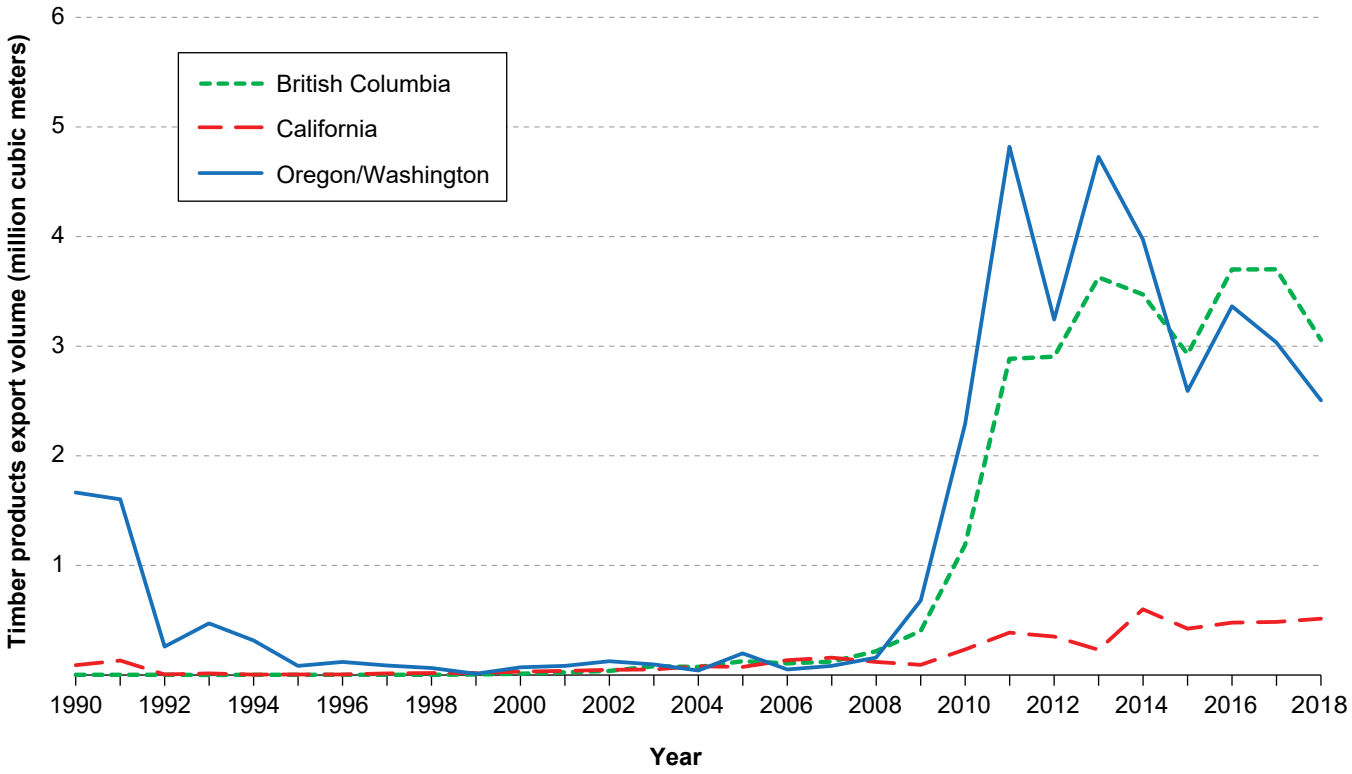

Figure A2.3—Pacific coast region timber products exports to China by origin, 1990–2018.

Appendix 3: Harmonized Tariff Schedule Codes

Tables A3.1 through A3.5 show the harmonized tariff schedule codes used for timber product trade (USITC 2020c). A species list of common names, scientific names, and authorities for all species mentioned in the tariff schedules is included (table A.3.6).

Table A3.1—Commodity codes for softwood sawlogs (adapted from USITC 2020c)

Hts10	Commodity description
4403200020	Pine, southern yellow, long leaf, pitch, short leaf, slash and Virginia, logs and timber, in the rough, not treated
4403200025	Ponderosa pine (*Pinus ponderosa*), logs and timber, in the rough, not treated
4403200030	Pine, NESOI, logs and timber, in the rough, not treated
4403200035	Spruce (*Picea* spp.), logs and timber, in the rough, not treated
4403200040	Douglas-fir (*Pseudotsuga menziesii*), logs and timber, in the rough, not treated
4403200042	Fir NESOI; balsam logs and timber, in the rough, coniferous, not treated
4403200045	Port Orford cedar (*Chamaecyparis lawsoniana*), logs and timber, in the rough, not treated
4403200050	Western hemlock (*Tsugo meterophylla*), logs and timber, in the rough, not treated
4403200052	Hemlock NESOI logs and timber, in the rough, coniferous, not treated
4403200055	Western red cedar (*Thuja plicata*), logs and timber, in the rough, not treated
4403200057	Cedar NESOI logs and timber, in the rough, coniferous, not treated
4403200060	Logs and timber, in the rough, coniferous, not treated, NESOI
4403200063	Logs and timber in the rough, coniferous NESOI, not treated
4403200064	Logs and timber in the rough, not treated, coniferous, NESOI
4403200065	Wood in the rough, whether or not stripped of bark or sapwood, or roughly squared, coniferous, not treated, NESOI
4403230035	Spruce (*Picea*) logs and timber in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more
4403230042	Fir, balsam logs and timber in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more, NESOI
4403230065	Fir (*Abies*) and spruce (*Picea*) wood in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more, NESOI
4403240035	Spruce (*Picea*) logs and timber in the rough, not treated, of which any cross-sectional dimension is less than 15 cm (5.9 in)
4403240042	Fir, balsam logs and timber in the rough, not treated, of which any cross-sectional dimension is less than 15 cm (5.9 in), NESOI
4403240065	Fir and spruce, in the rough, not treated, coniferous, any cross-section dimension is less than 15 cm, NESOI
4403250040	Douglas-fir (*Pseudotsuga menziesii*) logs and timber in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more
4403250050	Western hemlock (*Tsuga heterophylla*) logs and timber in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more
4403250052	Other hemlock logs and timber, in the rough, not treated, coniferous, any cross-section dimension is 15 cm or more
4403250055	Western red cedar (*Thuja plicata*) logs and timber in the rough, not treated, of which any cross-sectional dimension is 15 cm (5.9 in) or more
4403260040	Douglas-fir (*Pseudotsuga menziesii*) logs and timber in the rough, not treated, of which any cross-sectional dimension is less than 15 cm (5.9 in)
4403260050	Western hemlock (*Tsuga heterophylla*) logs and timber in the rough, not treated, of which any cross-sectional dimension is less than 15 cm (5.9 in)
4403260052	Other hemlock logs and timber, in the rough, not treated, coniferous, any cross-section dimension is less than 15 cm
4403260055	Western red cedar (*Thuja plicata*) logs and timber in the rough, not treated, of which any cross-sectional dimension is less than 15 cm (5.9 in)
4403260057	Other cedar logs and timber, in the rough, not treated, coniferous, any cross-section dimension is less than 15 cm

NESOI = Not elsewhere specified or indicated.

Table A3.2—Commodity codes for hardwood sawlogs (adapted from USITC 2020c)

Hts10	Commodity description
4403490000	Tropical wood, NESOI, wood in rough, not treated, w/o stripped of bark/sapwood, or roughly squared etc.
4403490100	Tropical wood, NESOI, wood in rough, not treated
4403990030	Birch (*Betula* spp.) wood in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990040	Ash wood, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990050	Western red alder wood, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990055	Cherry wood, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990060	Maple (*Acer* spp.) wood in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990065	Yellow poplar wood, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990070	Walnut (*Juglans* spp.) wood in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990075	Paulownia wood, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990090	Nonconiferous wood, NESOI, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990092	Nonconiferous wood, NESOI, in the rough, whether or not stripped of bark or sapwood, or roughly squared, not treated
4403990123	Nonconiferous pulpwood in the rough, not treated, NESOI
4403990140	Ash (*Fraxinus*) wood in the rough, not treated, NESOI
4403990150	Western red alder (*Alnus rubra*) wood in the rough, not treated, NESOI
4403990155	Cherry (*Prunus*) wood in the rough, not treated, NESOI
4403990160	Maple (*Acer*) wood in the rough, not treated, NESOI
4403990170	Walnut (*Juglans*) wood in the rough, not treated, NESOI
4403990175	Paulownia (*Paulownia*) wood in the rough, not treated, NESOI
4403990195	Wood, in the rough, not treated, nonconiferous, NESOI

NESOI = Not elsewhere specified or indicated.

Table A3.3 Commodity codes for softwood pulpwood (adapted from USITC 2020c)

Hts10	Commodity description
4403200004	Pulpwood of balsam, fir, or spruce
4403200005	Pulpwood, coniferous
4403200008	Pulpwood, coniferous NESOI
4403240004	Pulpwood, in the rough, not treated, coniferous of fir and spruce, any cross-sectional dimension is less than 15 cm

NESOI = Not elsewhere specified or indicated.

Table A3.4—Commodity codes for hardwood pulpwood (adapted from USITC 2020c)

Hts10	Commodity description
4403990018	Pulpwood, in the rough, nonconiferous
4403990020	Pulpwood, nonconiferous
4403990022	Pulpwood of poplar, aspen, or cottonwood
4403990024	Pulpwood, nonconiferous NESOI
4403990123	Nonconiferous pulpwood in the rough, not treated, NESOI

NESOI = Not elsewhere specified or indicated.

Table A3.5—Commodity codes for woodchips (adapted from USITC 2020c)

Hts10	Commodity description
4401210000	Wood in chips or particles, coniferous
4401220000	Wood in chips or particles, nonconiferous

Table A.3.6—Species list

Common name	Scientific name and authority
Balsam fir	*Abies balsamea* (L.) Mill.
Fir spp.	*Abies* Mill. spp.
Maple spp.	*Acer* L. spp.
Western red alder	*Alnus rubra* Bong.
Birch spp.	*Betula* L. spp.
Port Orford cedar	*Chamaecyparis lawsoniana* (A. Murray bis) Parl.
Ash spp.	*Fraxinus* L. spp.
Walnut spp.	*Juglans* L. spp.
Yellow poplar (tuliptree)	*Liriodendron tulipifera* L.
Paulownia	*Paulownia* Siebold & Zucc.
Spruce spp.	*Picea* spp.
Shortleaf pine/southern yellow pine	*Pinus echinata* Mill.
Slash pine	*Pinus elliottii* Engelm.
Longleaf pine	*Pinus palustris* Mill.
Ponderosa pine	*Pinus ponderosa* Lawson & C. Lawson
Pitch pine	*Pinus rigida* Mill.
Virginia pine	*Pinus virginiana* Mill.
Cottonwood	*Populus* L. spp.
Poplar spp.	*Populus* spp.
Aspen	*Populus* spp.
Cherry spp.	*Prunus* spp.
Douglas-fir	*Pseudotsuga menziesii* (Mirb.) Franco
Western red cedar	*Thuja plicata* Donn ex D. Don
Western hemlock	*Tsuga heterophylla* (Raf.) Sarg.
Hemlock spp.	*Tsuga* spp.

Appendix 4: Annual Intraregion Timber Product Imports and Exports

Tables A4.1 through A4.8 show the annual intraregion timber product imports and exports, 2000–2019.

Table A4.1—British Columbia intraregion timber product imports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
					Cubic meters					
To British Columbia from:										
California customs districts[a]	3028	3749	4892	2076	1602	1380	1591	1567	554	825
Columbia-Snake Customs District	9017	5229	3900	14 970	7655	830	1,068	2148	15 207	2485
Seattle Customs District	439 567	387 268	451 986	478 694	558 698	517 708	558 432	1 205 482	1 005 188	494 629
Trade flow	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
					Cubic meters					
To British Columbia from:										
California customs districts[a]	763	4538	2364	176	259	249	471	130	54	63 626
Columbia-Snake Customs District	750	3179	18 418	251 849	174 945	67 903	686	152 388	329 444	285 089
Seattle Customs District	488 391	539 433	669 320	690 959	770 180	740 306	565 783	676 763	721 943	798 950

[a] From all California customs districts (Los Angeles, San Francisco, and San Diego).

Source: BC Stats.

Table A4.2—British Columbia intraregion timber product exports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
					Cubic meters					
From British Columbia to:										
California customs districts[a]	101 944	77 509	87 369	118 120	192 981	321 246	197 038	69 287	36 759	9746
Columbia-Snake Customs District	163 361	206 110	342 771	248 039	298 526	454 076	407 678	228 967	84 850	44 860
Seattle Customs District	1 396 363	1 396 817	1 533 713	1 654 852	1 130 916	2 009 304	1 674 107	1 412 095	708 526	353 877
Trade flow	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
					Cubic meters					
From British Columbia to:										
California customs districts[a]	866	396	191	72	0	323	0	16	199	175
Columbia-Snake Customs District	36 846	29 378	39 514	24 776	29 841	176 883	193 650	174 035	182 419	267 319
Seattle Customs District	418 355	398 351	607 937	551 716	445 726	414 525	215 568	186 280	129 922	114 418

[a] To all California customs districts (Los Angeles, San Francisco, and San Diego).

Source: BC Stats.

Table A4.3—California intraregion timber product imports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
To California from:										
British Columbia[a]	101 944	77 509	87 369	118 120	192 981	321 246	197 038	69 287	36 759	9746
Oregon	235 524	—	—	129 893	—	—	94 020	—	13 391	—
Washington	341 789	—	—	—	—	—	208 525	—	341 789	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
To California from:										
British Columbia[a]	866	396	191	72	0	323	0	16	199	175
Oregon	—	—	143 171	7157	—	—	155 800	7588	—	—
Washington	—	—	0	—	—	—	0	—	—	—

— = No data.

[a] To all California customs districts (Los Angeles, San Francisco, and San Diego).

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System.

Table A4.4—California intraregion timber product exports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
From California to:										
British Columbia[a]	3028	3749	4892	2076	1602	1380	1591	1567	554	825
Oregon	541 706	—	—	305 222	—	—	306 151	—	214 708	—
Washington	0	—	—	—	—	—	0	—	—	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
From California to:										
British Columbia[a]	763	4538	2364	176	259	249	471	130	54	63 626
Oregon	—	—	163 918	323 958	—	—	202 885	7588	—	—
Washington	—	—	0	—	—	—	0	—	—	—

— = No data.

[a] From all California customs districts (Los Angeles, San Francisco, and San Diego).

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System; Washington State Department of Natural Resources.

Table A4.5—Oregon intraregion timber product imports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
To Oregon from:										
British Columbia[a]	163 361	206 110	342 771	248 039	298 526	454 076	407 678	228 967	84 850	44 860
California	541 706	—	—	305 222	—	—	306 151	—	214 708	—
Washington	—	—	—	1 182 448	—	—	—	—	1 004 813	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
To Oregon from:										
British Columbia[a]	36 846	29 378	39 514	24 776	29 841	176 883	193 650	174 035	182 419	267 319
California	—	—	163 918	323 958	—	—	202 885	145 187	—	—
Washington	—	—	—	524 189	—	—	—	174 260	—	—

— = No data.

[a] To Columbia-Snake Customs District.

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System.

Table A4.6—Oregon intraregion timber product exports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
From Oregon to:										
British Columbia[a]	9017	5229	3900	14 970	7655	830	1068	2148	15 207	2485
California	235 524	—	—	129 893	—	—	94 020	—	13 391	—
Washington	532 261	—	325 417	552 116	454 291	—	670 929	—	1 872 539	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
From Oregon to:										
British Columbia[a]	750	3179	18 418	251 849	174 945	67 903	686	152 388	329 444	285 089
California	—	—	143 171	7157	—	—	155 800	7588	—	—
Washington	554 200	—	427 034	2 240 379	1 900 738	—	1 407 892	808 374	264 717	—

— = No data.

[a] From Columbia-Snake Customs District.

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System.

Table A4.7—Washington intraregion timber product imports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
To Washington from:										
British Columbia[a]	1 396 363	1 396 817	1 533 713	1 654 852	1 130 916	2 009 304	1 674 107	1 412 095	708 526	353 877
California	0	—	—	—	—	—	0	—	—	—
Oregon	532 261	—	325 417	—	454 291	—	670 929	—	376 094	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
To Washington from:										
British Columbia[a]	418 355	398 351	607 937	551 716	445 726	414 525	215 568	186 280	129 922	114 418
California	—	—	0	—	—	—	0	—	—	—
Oregon	554 200	—	427 034	—	1 900 738	—	1 407 892	—	264 717	—

— = No data.

[a] To Seattle Customs District.

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System; Washington State Department of Natural Resources.

Table A4.8—Washington intraregion timber product exports

Trade flow	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	Cubic meters									
From Washington to:										
British Columbia[a]	439 567	387 267	451 986	478 694	558 698	517 708	558 432	1 205 482	1 005 188	494 629
California	341 789	—	—	—	—	—	208 525	—	—	—
Oregon	—	—	—	1 182 448	—	—	—	—	1 004 813	—

Trade flow	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Cubic meters									
From Washington to:										
British Columbia[a]	488 391	539 433	669 320	690 959	770 180	740 306	565 783	676 763	721 943	798 950
California	—	—	143 171	—	—	—	0	—	—	—
Oregon	—	—	—	524 189	—	—	—	174 260	—	—

— = No data.

[a] From Seattle Customs District.

Sources: BC Stats; University of Montana, Bureau of Business and Economic Research, Forest Industries Data Collection System; Washington State Department of Natural Resources.

Glossary

board foot—The amount of wood in an unfinished board 1 inch thick by 12 inches long by 12 inches wide.

carbon pool—A system that has the capacity to accumulate or release carbon, such as harvested wood products.

carbon stocks—The quantity of carbon contained within a system (pool), such as harvested wood products.

cross-boundary region—A geographic region made up of several autonomous geographical entities.

FIA—Forest Inventory and Analysis program, a program that collects, analyzes, and reports information on the status and trends of America's forests (https://www.fia.fs.usda.gov/).

FIDACS—Forest Industries Data Collection System, a system developed to collect, compile, and report data from primary forest product manufacturers in the Rocky Mountain and Pacific Northwest regions.

HWP—Harvested wood products. Wood-based products such as lumber, furniture, plywood, paper products, or energy.

intraregion—Within a specified region.

Scribner log rule—A log rule based on the diameter of a log at the small end, disregarding taper.

PCR—Pacific coast region, consisting of British Columbia, California, Oregon, and Washington.

primary wood product—A rough or finished product (lumber, wood pulp, veneer sheathing, etc.) manufactured from roundwood products at primary wood-using mills.

pulplog—A log used to produce pulp for the manufacture of paper products.

sawlog—A log of sufficient size and quality to be suitable for conversion to lumber or other products.

SWE—Solid wood equivalent, the amount of wood fiber, in any form, equivalent to that found in a given volume of solid, green wood of the same species.

timber product—A product obtained wholly from the processing of timber (e.g., logs, woodchips).

TPO—Timber Products Output studies, studies that estimate industrial and nonindustrial uses of roundwood across the United States (https://www.fia.fs.usda.gov/program-features/tpo/).

transshipments—The shipment of goods to an intermediate destination, then on to another destination.

woodchips—A small piece of wood used to make pulp, wood composites, or energy, generally uniform in size and larger and coarser than sawdust.

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