Timber Use, Processing Capacity, and Capability to Utilize Small-Diameter Timber within USDA Forest Service, Region One Timber-processing Area

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Report Highlights

- The Region One Timber-processing Area (R1-TPA) includes three eastern Washington counties, 25 Idaho counties, and 33 Montana counties.

- Within the R1-TPA, there were 298 timber-processing facilities in operation as of August 30, 2003: 110 sawmills, 101 house log /log home facilities, 42 post and small pole producers, 23 manufacturers of log furniture, 12 cedar products producers, seven plywood and veneer plants, and three utility pole producers.

- Annual capacity to process timber within the R1-TPA is 576 million cubic feet (MMCF) excluding pulpwood.

- Mills utilized 79 percent of capacity, processing 456 MMCF of timber during the 12 months prior to August 30, 2003. Over 91 percent of the timber processed (416 MMCF) was from trees ≥ 10" dbh, with slightly more than 7 percent (33 MMCF) from trees 7 – 9.9" dbh, and less than 2 percent (6 MMCF) from trees < 7" dbh.

- About 410 MMCF (71 percent) of timber-processing capacity cannot operate on trees < 10" dbh.

- More than 153 MMCF of timber-processing capacity (27 percent of total capacity) in the R1-TPA are capable of efficiently operating on trees 7 – 9.9" dbh.

- Most mills capable of efficiently processing trees 7 – 9.9" dbh are also capable of processing trees ≥ 10" dbh, and these mills process substantial volumes of these larger trees. Over the past 12 months, more than 79 MMCF of milling capacity capable of using trees 7 – 9.9" dbh were used to process trees ≥ 10" dbh within the R1-TPA.

- About 13 MMCF of existing infrastructure in the R1-TPA are capable of using trees < 7" dbh, and about 45 percent is currently being used. Utilization of large volumes of trees < 7" dbh would require an increase in total timber-processing capacity or increased use by the existing pulp and paper industry.

- Managers from about two-thirds of the mills surveyed said they were willing to make *modest* improvements that would enhance their ability to process small-diameter logs. An overwhelming majority of mill managers commented that a guaranteed, long-term supply of logs would be needed to make *any* investment in new small log technology. Mill managers expressed skepticism about the Forest Service's ability to offer reasonably priced timber on a long-term basis due to existing regulations and litigation.

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Introduction

Landowners, managers, and planners interested in selling trees have a need for information on the processing capacity and capability of the timber-processing industry in their region to process trees of various sizes. The expressed need to treat millions of acres in the western United States for fire hazard or ecosystem restoration has made accurate information on timber milling capacity and the capability of mills to handle timber of various sizes even more important. Implementing treatments designed to restore desired ecological conditions often calls for the removal of timber valuable enough to underwrite the costs of treatment (Fiedler et al.1999). However, these treatments also require removing smaller trees with limited value and markets. Quantification of current milling capacity and elucidation of the sizes and types of materials that existing mills are capable of using are key components of an overall financial analysis of a timber sale or fire hazard reduction/ecosystem restoration program.

Goals and Objectives

The goal of this study is to provide Forest Service planners with estimates of the forest products industry's total timber-processing capacity and capability to utilize trees of various sizes from USDA Forest Service lands in Region One. The specific project objectives are:

1. identify the timber-processing area supplied by Region One,
2. estimate timber-processing capacity of facilities in the area,
3. quantify the volume of timber currently processed from trees of various sizes, and
4. estimate the capability of existing facilities to utilize trees of various diameters.

The study focuses its examination on facilities that exclusively use timber in round form. Timber use and processing capacity of the pulp and paper industry, which primarily uses mill residues, are discussed separately from timber used for sawn and roundwood products. Timber-

processing capacity, volume of timber processed, and capability of using trees of various sizes are examined and discussed on a state-by-state basis, as well as for the identified timber-processing area, in cubic feet and board foot Scribner. In this report, "capacity" refers to the total volume of timber (excluding pulpwood) that existing mills could utilize annually, and "capability" refers to the volume of trees of a certain size class that existing mills can efficiently process annually.

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Methods

Data Sources and Timber-processing Capacity

The major sources of information used to estimate timber-processing capacity (excluding pulpwood) and volumes of timber processed were periodic censuses and annual surveys of the forest products industry. These censuses and surveys have been performed on a regular basis for the past 27 years by the BBER at The University of Montana-Missoula, the University of Idaho's Department of Forest Products, and the Department of Natural Resource Science at Washington State University. Follow-up telephone interviews with mill managers, conducted between May and August 2003, were used to update volumes of timber processed, as well as timber-processing capacity and capability to use timber of various sizes.

BBER has released recent mill census results for Idaho (Keegan et al. 1997, Morgan et al. in review) and Montana (Keegan et al. 1995 and 2001). Data from the periodic censuses of the Idaho and Montana forest products industry are stored in BBER's Forest Industries Data Collection System (FIDACS), which was developed through cooperative efforts with the USDA Forest Service's Interior West Forest Inventory and Analysis (IW-FIA) program. FIDACS focuses on the (geographic and ownership) source and volume of timber used, as well as manufacturers utilizing that timber, on a state-by-state basis. Mill-level data can be combined to create county, state, and multi-state (regional) summaries while protecting individual firm data. Forest products manufacturers provide the following detailed information to FIDACS through written questionnaires for each plant for a given calendar year:

- production employment,
- annual production capacity,
- volume of raw material received, by county and ownership,
- species and sizes of timber received,
- volume, sales value, and market location of finished products,

- utilization and marketing of manufacturing residue,
- plant production equipment, and
- beginning and ending inventory levels of raw materials and finished products.

In cooperation with the University of Idaho's Department of Forest Products, BBER has published annual survey results identifying (among other things) major capital investments and changes in capacity (Keegan 2001, Keegan et al. 2002, Keegan et al. 2003a and b). The Department of Natural Resource Science at Washington State University has released similar annual survey results for eastern Washington's timber processing industry (Blatner et al. 2003, Cohn and Blatner 2003, Schlosser and Blatner 2001 and 2003).

Because the surveys and censuses used to collect mill-level data include questions addressing total volume of timber processed annually and total volume of products produced (e.g., thousand board feet of lumber, thousand square feet of plywood), recovery per unit of timber input can be readily calculated and applied to reported production capacity in units of output for each mill. Thus annual capacity can be expressed in common units of timber input (thousand cubic feet), and the capacity figures for various segments of the industry (i.e., sawmills, plywood plants, post and pole plants) can be combined to estimate the industry's total capacity to process timber (excluding pulpwood), referred to as timber-processing capacity.

Timber-processing Area

The following steps were taken to determine the timber-processing area for USDA Forest Service Region One:

1. Counties containing Region One non-reserved timberland were identified.
2. Using FIDACS, timber harvest and flow was analyzed for all ownerships within the above counties.
3. Based on this timber harvest and flow analysis, all mills receiving timber harvested from those counties with Region One non-reserved timberland were identified.

4. The counties with the above mills were designated as the Region One Timber-Processing Area (R1-TPA).

Destinations of small volumes (< 50 thousand cubic feet) of timber that moved extraordinarily long distances were not included in the final delineation of the timber processing area. The mills and associated counties receiving these volumes--often for specialty products like house logs--were not included because these long-distance flows of timber were one-time events rather than shipments that would be expected to occur repeatedly.

Timber Use by Size Class

Three tree diameter classes were used to categorize timber use and milling capacity and capability: trees < 7" diameter at breast height (dbh), trees 7 – 9.9" dbh, and trees ≥ 10" dbh. These size classes were based on:

- previous analysis that identified minimum tree sizes that can be processed by the region's sawmilling industry, which historically has processed over 80 percent of the region's timber (Wagner et al. 1998 and 2000);
- descriptions of mill equipment and product lines, including log sizes used by post, pole, log home, and log furniture manufacturers (FIDACS 2003);
- analysis of ecological restoration/fire hazard reduction prescriptions, which indicate size distribution of trees removed (Fiedler et al. 2001); and
- discussions with Forest Service staff regarding the number and range of tree size classes that would meet their planning needs.

Estimates of the proportion of timber used in each of the three size classes were made for each mill within the R1-TPA. This was accomplished with the descriptions of equipment and products contained in FIDACS and with information collected during the telephone interviews. Virtually all timber used for plywood/veneer, house logs, cedar products, and utility poles was determined to come from trees ≥ 10" dbh. Post, small pole, and log furniture producers were

found to primarily utilize timber from trees < 7" dbh. Timber size was more variable for sawmills.

Sawmills, the largest segment of the wood products industry, revealed a variety of mill configurations, with a broad range of timber size requirements. Previous analysis of timber harvest in Montana (Morgan et al. in press) and discussions with mill managers established that virtually no trees < 7" dbh are currently being processed into lumber. Proportions of timber in the two larger size classes were calculated from total volume estimates and size class proportions provided by mill managers. Sawmill managers estimated, to the nearest 10 percent, the proportion of logs that their facility processed with small-end diameters < 7", 7 - 9.9", and ≥ 10". Logs in each size class were assumed to have 2" of taper per 16', and the average log (small-end) diameter in each size class was assumed to be 6", 8.5", and 12", respectively. Smalian's formula (Avery and Burkhart 1994) was then used to calculate the cubic volume of logs processed in each size class. Mill managers also provided an estimate of the proportion of logs with small-end diameter < 7" that came from the tops of trees versus the butt log. Using this proportion and the average taper assumption, the cubic volume of logs that came from trees of various breast-height diameters was calculated for each mill.

Capacity and Capability by Size Class

Information on total timber-processing capacity (excluding pulpwood) was collected from each mill within the R1-TPA, and the capability of each mill to efficiently utilize trees was estimated for each of the three size classes. The proportions of mill capacity capable of processing trees in each of the three size classes were estimated using wood product prices for the period 1999-2001 (BBER various years), mill equipment and configuration details from

FIDACS, as well as recent financial analyses of sawmills (Wagner et al. 1998 and 2000, Stewart et al. in press) and additional data collected during telephone interviews. Among the questions posed to mill managers were several asking how their facility could and would respond to increased availability of small-diameter (small-end diameter < 7") trees, and what their shift and annual capacities currently are.

Most facilities are designed to operate using trees of a given size class (e.g., veneer/plywood plants, which use trees ≥ 10" dbh, or post manufacturers, which use almost exclusively trees < 7" dbh). Capacity at these facilities was readily classified as being capable of processing timber of just one of the size classes. This was also true for some sawmills, but sawmills vary greatly in equipment, product output, and ability to process timber of various sizes. Financial feasibility analyses, involving repeated simulations of processing logs of a range of sizes through different sawmill configurations (Wagner et al. 1998 and 2000, Stewart et al. in press), were used to estimate the potential for individual sawmills to use trees of each size class. In some cases, particularly where a mill has both small-log processing equipment and large-log processing equipment in the same mill, expert opinion of the authors was employed to estimate the proportion of smaller trees the mill is capable of using.

Mills often process trees that are larger than the smallest tree sizes they are capable of processing. In other words, most mills capable of efficiently processing trees 7 – 9.9" dbh are also capable of processing trees ≥ 10" dbh, and indeed these mills do process substantial volumes of these larger trees. However, some mills that process larger trees are not capable of processing smaller-diameter trees. For this reason, this report presents capability to process trees ≥ 10" dbh as the proportion of total capacity not capable of efficiently using trees < 10" dbh. Whereas,

capability to process trees < 7" dbh and 7 – 9.9" dbh are presented as maximum volumes of trees of these size classes that can be processed efficiently.

Species Preference

Information on mills' species preferences and volumes of timber harvested and processed by species was developed from a variety of sources. Timber volumes harvested and processed by species and timber product type (e.g., house log or sawtimber) are available from FIDACS at the individual mill level. However, timber volumes *by species and size class* are not available at the individual mill level. Telephone interviews of mill managers provided additional data on facilities' most and least preferred species, as well as minimum log size and purchase price by species. Preference and use of species by size class, therefore, is only discussed in terms of general trends in the sizes and species most commonly used for products manufactured by the different industry sectors. Timber product types were designated based on the following end uses of timber:

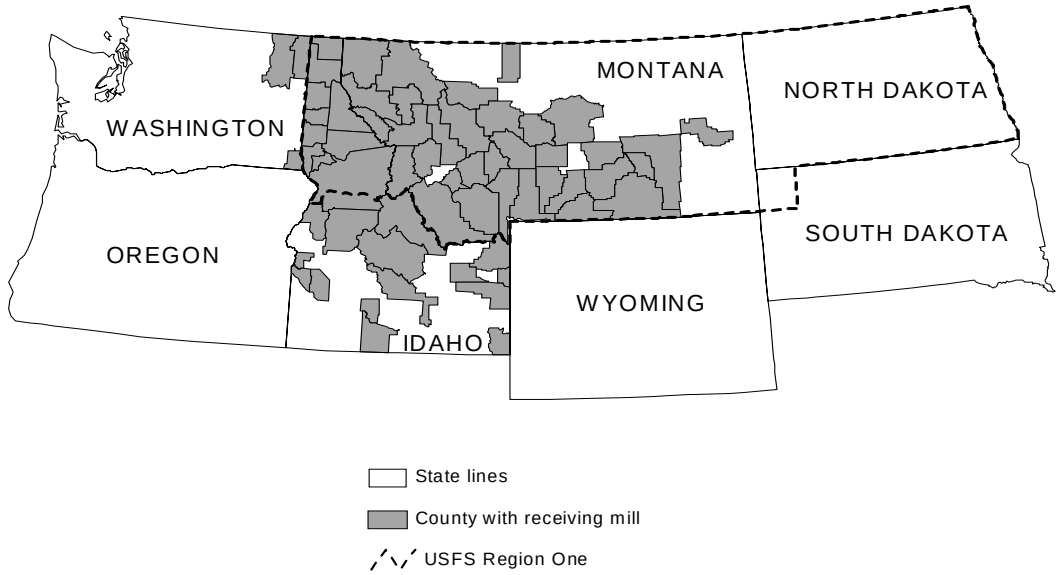
- Sawtimber used to produce lumber, plywood, veneer, pilings, or utility poles. Sawtimber is defined as "trees or logs cut from trees with minimum diameter and length and with stem quality suitable for conversion to lumber" (Helms 1998),
- House logs used for log homes,
- Timber used for posts, small poles, or roundwood log furniture, and
- Cedar products timber used to make shakes, shingles, or split rail fencing.

Results

Timber-processing Area

The geographic expanse identified as the Region One Timber-processing Area (R1-TPA) includes three eastern Washington counties, 25 Idaho counties, and 33 Montana counties (Figure 1). Within the R1-TPA, there were 298 timber-processing facilities in operation as of August 30, 2003: 110 sawmills, 101 house log /log home facilities, 42 post and small pole producers, 23 manufacturers of log furniture, 12 cedar products producers, seven plywood and veneer plants, and three utility pole producers.

Figure 1: USDA Forest Service, Region One Timber- Processing Area



In addition to the Idaho, Montana, and Washington mills mentioned above, several mills in northern Wyoming and western South Dakota have consistently received timber harvested from counties containing Region One non-reserved timberland. Due to confidentiality issues related to the limited number of these mills, they are not included in the overall discussion of the R1-TPA.

Table 1: Timber-processing Capacity and Timber Volume Processed by Size Class (Excluding Pulpwood)

			Volume Used by Size Class		
Sub-region	**Capacity**	**Volume Used**	dbh < 7 in.	dbh 7 - 9.9 in.	dbh 10+ in.
			Thousand Cubic Feet of Timber		
Eastern Washington	85,007	59,869	*	1,944	57,925
Idaho	264,876	222,085	2,975	11,379	207,732
Montana	226,580	173,705	2,729	20,162	150,814
Total	**576,463**	**455,659**	**5,704**	**33,485**	**416,471**
			Volume Used by Size Class		
Sub-region	**Capacity**	**Volume Used**	dbh < 7 in.	dbh 7 - 9.9 in.	dbh 10+ in.
			Thousand Board Feet Scribner of Timber		
Eastern Washington	337,056	237,383	*	7,465	229,918
Idaho	1,126,110	944,186	2,975	43,695	897,516
Montana	980,549	751,727	2,729	77,422	671,576
Total	**2,443,716**	**1,933,296**	**5,704**	**128,582**	**1,799,010**

***** Note: small volume, not disclosed because too few mills.

Timber-processing Capacity and Volume Processed

Annual capacity to process timber within the R1-TPA as of August 30, 2003 was 576 million cubic feet (MMCF) excluding pulpwood. Approximately 15 percent of timber-processing capacity was located in eastern Washington, 39 percent in Montana, and 46 percent in Idaho (Table 1). Region wide, these mills utilized 79 percent of capacity, processing 456 MMCF of timber during the 12 months prior to August 30, 2003. Utilization ranged from 70 percent of

capacity in eastern Washington to 84 percent in Idaho; Montana mills utilized almost 77 percent of capacity, processing nearly 174 MMCF of timber.

Timber Volume Processed by Size Class

Within the R1-TPA, the proportions of timber used by size class varied slightly by state (Table 1). In Montana, 87 percent (151 MMCF) of timber used was from trees ≥ 10" dbh, while 97 percent of timber (58 MMCF) used by eastern Washington mills was from this larger size class. Almost 2 percent of timber used by Montana mills was from trees < 7" dbh, slightly more than 1 percent of timber used in Idaho was from this smallest size class, while less than 0.5 percent of timber processed in eastern Washington was from trees < 7"dbh. Across the entire R1-TPA, over 91 percent of the timber processed (416 MMCF) was from trees ≥ 10" dbh, with slightly more than 7 percent (33 MMCF) from trees 7 – 9.9" dbh, and less than 2 percent (6 MMCF) from trees < 7" dbh.

Timber Volume Processed by Product Type and Size Class

Over 95 percent (435 MMCF) of timber processed in the R1-TPA was green sawtimber used to produce lumber, plywood, veneer, pilings, or utility poles (Table 2). These products are based predominantly on live/green timber, with the major exception that sawmills will occasionally substitute large quantities of dead timber from salvage operations. Producers of house logs, small roundwood products (posts, small poles and roundwood furniture, and cedar products) each consumed slightly more than 1 percent of the total timber processed in the region. House log producers use dead timber for the majority of their raw material; cedar products

producers used about 40 percent dead timber. Post, small pole, and roundwood furniture producers almost always use live timber.

Table 2: Timber Volume Used by Product Type and Size Class (Excluding Pulpwood)

Tree Size Class	Sawtimber	House Logs	Posts, Small Poles, Log Furniture	Cedar Products	All Products
			Thousand Cubic Feet		
dbh < 7 in.	*	*	5,703	-	5,703
dbh 7 - 9.9 in.	31,532	555	1,400	-	33,487
dbh 10+ in.	403,955	6,054	-	6,461	416,470
Total	**435,487**	**6,609**	**7,103**	**6,461**	**455,660**

***** Note: small volume, not disclosed because too few mills.

Nearly all of the 435 MMCF of sawtimber used to produce lumber, plywood, veneer, pilings, and utility poles came from trees ≥ 7" dbh, with about 92 percent coming from trees ≥ 10" dbh (Table 2). Timber used for house logs and cedar products was almost exclusively from trees ≥ 10" dbh. Trees used for posts, small poles, and roundwood log furniture showed a much different distribution, with virtually all timber from trees < 10" dbh and 80 percent from trees < 7" dbh.

Timber Volume Processed by Size Class, Species, and Product Type

As mentioned in the Methods section, timber use by size class and species is summarized by product types for purposes of this analysis. Most timber used by post, pole, and log furniture manufacturers in R1-TPA was from lodgepole pine in the smallest (dbh < 7") size class, whereas most sawtimber used by veneer and plywood manufacturers was from Douglas-fir and western larch in the largest (dbh ≥ 10") size class. Cedar products manufacturers and utility pole plants primarily used western redcedar from the largest size class. Log home manufacturers used

mostly lodgepole pine and Engelmann spruce also from the largest size class, while sawmills in the R1-TPA used the full variety of species almost exclusively from the two larger size classes (dbh ≥ 7").

Table 3: Timber-processing Capacity and Capability by Size Class (Excluding Pulpwood)

		Capability by Size Class		
Sub-region	**Capacity**	dbh < 7 in. [a]	dbh 7 - 9.9 in. [a]	dbh 10+ in. [b]
	Thousand Cubic Feet of Timber			
Eastern Washington	85,007	c	41,420	43,587
Idaho	264,876	3,911	34,524	226,441
Montana	226,580	9,130	77,329	140,121
Total	**576,463**	**13,041**	**153,273**	**410,149**

		Capability by Size Class		
Sub-region	**Capacity**	dbh < 7 in. [a]	dbh 7 - 9.9 in. [a]	dbh 10+ in. [b]
	Thousand Board Feet Scribner of Timber			
Eastern Washington	337,056	c	159,053	178,003
Idaho	1,126,110	3,911	132,572	989,627
Montana	980,549	9,130	296,944	674,475
Total	**2,443,716**	**13,041**	**588,569**	**1,842,106**

Notes: a - Maximum volume of trees in size class capable of being used efficiently;
b - Portion of total capacity NOT capable of efficiently using trees with dbh < 10 in.;
c - Small volume, not disclosed because too few mills.

Capability to Process Timber of Various Sizes

Estimates of the capability to process timber of various sizes in the R-1 TPA were based on the physical characteristics of mills and the market conditions referred to in the Methods section. About 410 MMCF (71 percent) of timber-processing capacity cannot operate on trees < 10" dbh (Table 3). Some of this capability is in mills designed to operate solely on larger timber (trees ≥ 10" dbh) and some is at "two-sided" mills, with part of the mill designed to process small logs and the other part large logs. About 55 percent (226 MMCF) of this large-log-only

capability is in Idaho, where it accounts for more than 85 percent of total timber-processing capacity. In Montana, large-log-only capability accounts for about 62 percent of total timber-processing capacity, while in eastern Washington it accounts for just 51 percent of total capacity.

More than 153 MMCF of timber-processing capacity (27 percent of total capacity) in the R1-TPA are capable of efficiently operating on trees 7 – 9.9" dbh, with about one-half of the capacity to process trees in this size class in Montana, 27 percent in Washington, and 23 percent in Idaho. Only about 13 MMCF (3 percent) of the total timber-processing capacity (excluding pulpwood processors) within the R1-TPA would be capable of operating on trees < 7" dbh. Of this 13 MMCF of capacity, 70 percent is in Montana and 30 percent in Idaho.

Discussion and Conclusions

Assuming that forest restoration and fuel reduction treatments are deemed desirable by society, can be conducted in an ecologically sound manner, and will, to some degree, involve the mechanical removal of trees, land managers need to understand what volume of trees of various sizes could be processed by the forest products industry in their National Forest planning zone. This study addresses several topics worthy of consideration by those planning large-scale treatments that could result in the removal of substantial volumes of trees of various sizes. The two most relevant topics, because of their perceived likelihood of occurrence and impact on regional timber use, are expanded utilization of current timber-processing capacity and use of timber by the pulp and paper industry. Discussion of these issues is followed by a brief reflection on the possibilities of increased timber-processing capacity and increased timber output from national forest land.

Expanded Utilization of Current Timber-processing Capacity

Utilization of timber-processing capacity in the R1-TPA is at 79 percent, leaving almost 121 MMCF of milling capacity unutilized. Mill managers indicated that they would increase capacity utilization if raw material availability increased. However, mills have rarely operated at more than 90 percent of capacity (Keegan et al. 1997 and 2001, Cohn and Blatner 2003, Schlosser and Blatner 2001 and 2003). Thus, it is unlikely that *all* of the unutilized capacity would be used, but the existing industry infrastructure could readily process an additional 60 – 80 MMCF of timber annually. Additional volumes of trees ≥ 10" dbh would be most preferred by existing mills because more than 70 percent of the region's milling capacity is not capable of using smaller diameter trees.

Results of this study indicate a distinct opportunity to expand the use of trees 7 – 9.9" dbh with no change in industry infrastructure. Over the 12-month period ending August 30, 2003, mills processed 33 MMCF of timber (Table 1) in this size class; they *could* process closer to 153 MMCF (Table 3). Processing more volume in the 7 – 9.9" dbh size class could come about if more volume became available in this size class and mills substituted these smaller trees for larger timber. However, while many mills may be capable of processing a larger volume of trees in the 7 – 9.9" dbh class, they prefer trees ≥ 10" dbh and often process larger trees in place of smaller diameter timber. In fact, over the past 12 months, more than 79 MMCF of milling capacity capable of using trees 7 – 9.9" dbh were used to process trees ≥ 10" dbh within the R1-TPA.

Expanded utilization of timber-processing capacity in the smallest size (trees < 7" dbh) class is somewhat more limited. Study results indicate that only 13 MMCF of existing infrastructure in the R1-TPA are capable of using trees < 7" dbh, and about 45 percent is currently being used. Much of this processing capacity is in facilities like post plants with a strong preference for a single species--lodgepole pine. If very large volumes of small trees were made available from fuel reduction or restoration treatments, existing small-log sawmills, log furniture manufacturers, and post and pole producers would be able to use only a small fraction of the material. Thus, utilization of large volumes of trees < 7" dbh would require an increase in total timber-processing capacity or increased use by the existing pulp and paper industry.

Use of Timber by the Pulp and Paper Industry

Timber used as a raw material by the pulp and paper industry is referred to as roundwood pulpwood. Roundwood pulpwood is dealt with separately from other timber products in this

report because it has historically been a large-volume user of trees < 10" dbh, and because use of roundwood pulpwood has been variable and relatively unpredictable from year to year. Erratic use of roundwood pulpwood by mills outside the R1-TPA, including overseas purchasers, has also occurred. Reported roundwood pulpwood use, including some timber for industrial fuelwood by pulp and paper mills, within the R1-TPA has ranged from less than 20 MMCF to more than 40 MMCF annually in recent years. An estimated 30 - 40 percent of this material has been from green trees < 10" dbh, with the remainder coming from larger cull trees.

Variability and unpredictability of the roundwood pulpwood market exist primarily because timber in round form is an alternative to the major source of raw material of the pulp and paper industry--mill residue from sawmills (Keegan et al. 1999). The year-to-year wood-fiber requirements of pulp and paper mills vary less than the supply of mill residue varies. Pulp and paper mills have much higher fixed costs and are much more expensive to operate at varying production levels than sawmills. Thus during recessions, when lumber production and related mill residue supplies decline substantially more than pulp and paper production, demand for roundwood pulpwood increases to fill the raw-material void. Decreased lumber production and increased demand for chips come both from within the Region One TPA and from other areas, including overseas.

Among the myriad of factors influencing the variability and predictability for roundwood pulpwood are:

- Declines in lumber and plywood production in the northwest U.S. related to large declines in federal timber offerings since the late 1980s. Pulp and paper capacity also declined, but to a lesser degree.
- Increases in pulp and paper capacity throughout the world in the last decade.
- A weak global economy combined with a strong U.S. dollar through much of the period 1998 – 2002, leading plants in other parts of the world to seek other sources of supply and dramatically dampening use of chips and roundwood pulpwood from the western U.S.

- Increased use of recycled paper and use of wood fiber from intensive culture plantations on agricultural land in the lower Columbia River Basin region.

In response to telephone interview questions about the possibility of increased volumes of small timber, pulp and paper mills in the R1-TPA offered positive, but somewhat mixed, views of the future. Some mill managers noted that increased availability of "low cost" small timber might lead to increased use of roundwood pulpwood and timber for industrial fuel, which could bring about very modest expansion of the region's pulp and paper industry. Other respondents within the region's pulp and paper industry saw increased removal of small-diameter trees as having a favorable impact on their facilities because it could stimulate production at small-log sawmills, thus increasing availability of mill residue. This could potentially reduce the pulp and paper industry's demand for roundwood pulpwood. Thus, an across-the-board increase in small-diameter timber availability does not ensure a commensurate increase in utilization of that timber by existing pulpwood processors.

Increased Timber-processing Capacity

Two avenues could lead to increased use of small-diameter trees and increased total timber-processing capacity in the R1-TPA: development of new facilities to process more small trees and expansion of capacity at currently operating facilities. Both of these options will be dealt with in detail in a forthcoming companion paper. However, results from that analysis are relevant to the current discussion and some highlights are included here.

Considering new mills to use large volumes of small timber, financial analyses indicated a potential to develop new small-log sawmills. Construction of new pulp mills would be extremely unlikely, and oriented strand board plants would be viable only with a large, long-term

subsidy (Stewart et al. in press, and Wagner et al. 2000). Regarding potential changes in production and operations at existing mills, a brief summary of comments provided by mill managers in the R1-TPA follows.

Managers from about two-thirds of the mills surveyed said they were willing to make *modest* improvements that would enhance their ability to process small-diameter logs. These improvements included automating more of their operation and improving the efficiency of the following: sorting and material handling, conveyor work, down-line processing, and breakdown procedures. Other improvements include upgrading machinery and modifying saws and planers to handle small-diameter material. Slightly more than one-half of the respondents said they would make a *major* capital investment to expand the mill, while less than one-half would not. Mill managers that stated they would make a capital investment tempered their replies by stressing the need for an assured, long-term supply of logs in order to recoup investment costs. An overwhelming majority of mill managers commented that a guaranteed, long-term supply of logs would be needed to make *any* investment in new small log technology. Good lumber markets, profitability, less expensive logs, and investment capital were also mentioned.

Mill managers expressed interest in purchasing and processing small-diameter timber from national forests and other lands. Over half of the mill managers stated that they currently had an adequate supply of logs. Despite having adequate volume, some mills (in all three states) want a different mix of sizes and species than is currently available. Competition and difficulty in procuring both private and national forest timber were cited as reasons for an inadequate supply.

Increased Timber Output from National Forest Lands

When asked about expanding existing mills in response to additional small-diameter timber from National Forest lands, about one-half of mill managers said they would, one-fourth said they would not, and another one-fourth said "maybe." Again, those who indicated they would expand wanted a guaranteed long-term supply of logs. Comments by those who said "maybe" indicated that they would adjust shifts or invest in small log technology if log prices and the species mix were right.

In regards to policy, environmental regulation, or contract changes that the Forest Service could make that would lead to mill expansion, the overwhelming response by mill managers was that the Forest Service would need to provide a guaranteed supply of wood. In their opinion, changes in the appeals process and logging contracts that offer more flexible operations and longer harvest time would be required. Respondents said these changes could lead to investment and expansion in milling capacity. However, mill managers expressed skepticism about the Forest Service's ability to offer reasonably priced timber on a long-term basis due to existing regulations and litigation.

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