FOREST INDUSTRY RESEARCH PROGRAM
UNIVERSITY OF MONTANA

Timber Processing Capacity and Capability: North Yuba Forest Partnership Collaborative Forest Landscape Restoration Project

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Introduction

The North Yuba Forest Partnership Collaborative Forest Landscape Restoration Project covers 356,000 acres, 74 percent of which are Tahoe and Plumas national forests lands (Tahoe and Plumas National Forests, 2020).

According to The North Yuba Forest Partnership Tier 2 proposal:

> Given this watershed's regional importance, residents, agencies, and non-profit organizations recognize an urgent need to address its high to very high wildfire hazard potential. Furthermore, large areas are currently occupied by dense stands of smaller-sized, less resilient trees that are more susceptible to insects, disease, and drought. A large, severe wildfire or widespread insect or disease infestation would have long-term catastrophic consequences for communities, forests, air, soils, water, habitats, recreational opportunities, and local and downstream economies (Tahoe and Plumas National Forests, 2020).

The North Yuba Forest Partnership Project (NYFPP) landscape lies primarily within Sierra County, California, with smaller portions in Yuba County and Plumas County and a much smaller amount within Nevada County. Sierra, Yuba, and Plumas counties make up the "Study Area" in this report (figure 1). Nevada County has been excluded from the NYFPP Study Area because it is a relatively small portion of the NYFPP landscape and within that portion, only a small amount is national forest. The Study Area covers 2.7 million acres. Analysis of timber flow indicates that timber harvested in the NYFPP Study Area is processed by facilities located inside and outside its boundaries. All counties that contain one or more facilities that process timber harvested in the Study Area constitute the "Timber Processing Area" or TPA. The TPA for the NYFPP includes the three Study Area counties and Butte, Nevada, Placer, Shasta, Sutter, and Trinity counties in California.

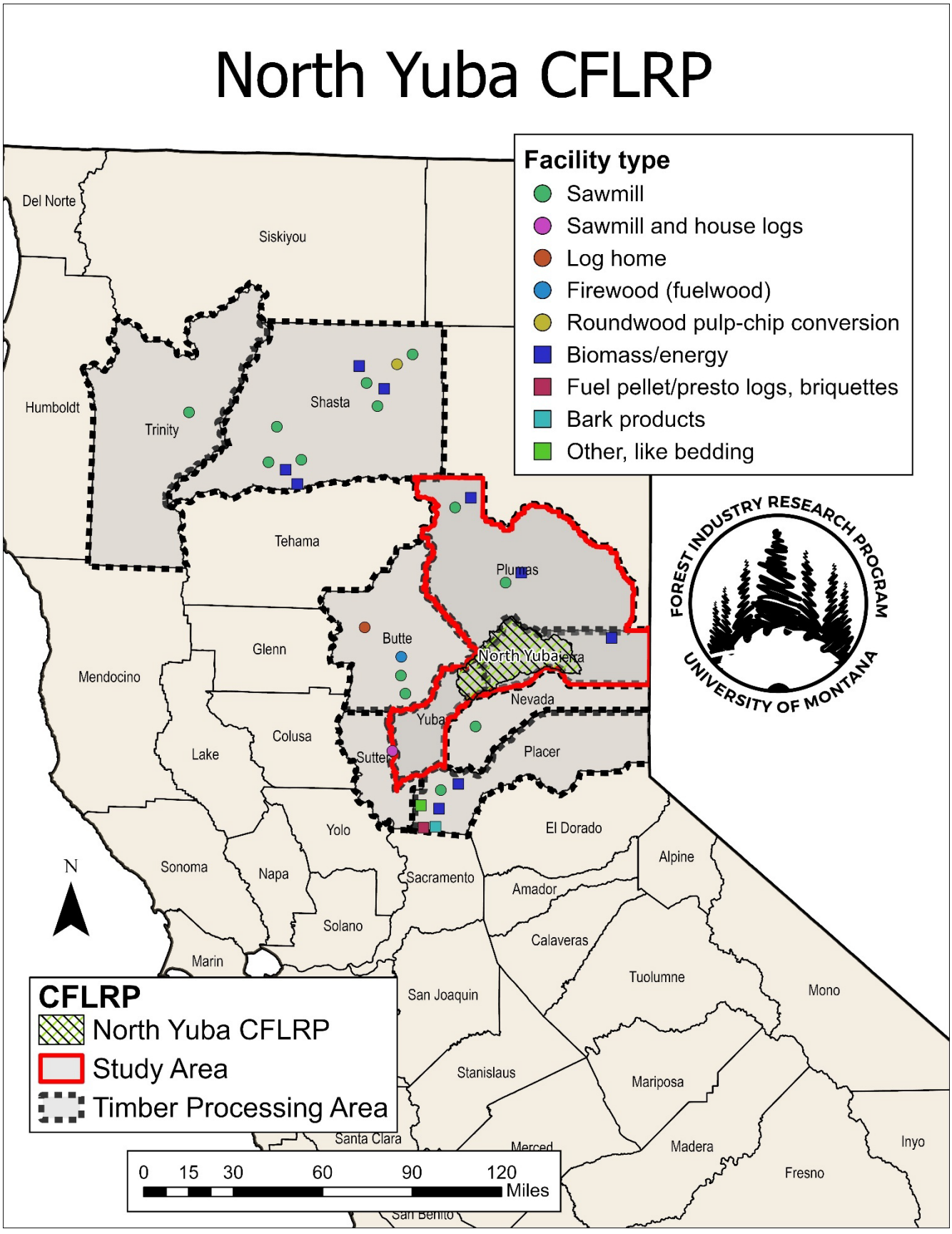
The data used to develop the information presented in this report were collected from timber-processing facilities by the University of Montana's Forest Industry Research Program (FIRP) within the Bureau of Business and Economic Research. FIRP would like to thank the timber-processing facilities for their participation, without which, analyses such as this one would not be possible.

The data were collected and processed by FIRP under joint venture agreements with the USDA Forest Service's Pacific Northwest Research Station. FIRP conducted a census of timber-processing facilities in California in 2000, 2006, 2012, 2016, and 2021. In 2018 FIRP began conducting annual sampling of timber-processing facilities in California. All but one of the tables in this report summarize data from the periodic census. Table 6 summarizes data from both the periodic census and from annual sampling.

FIRP makes every effort to identify and collect data from all commercial timber-processing facilities that buy logs and sell output products across the West. Hobbyists and timber processors that supply their own logs or saw for hire may not be included in FIRP's database. If the reader identifies facilities in the TPA counties that are missing from this analysis, please let FIRP know.

Additional information from FIRP is available upon request; however, mill- or company-level data are confidential and will not be released.

Figure 1. The NYFPP, Study Area, Timber Processing Area, and facilities.



There are 29 timber processing facilities in the NYFPP TPA, including 13 sawmills, 1 sawmill and house logs facility, 9 biomass/energy facilities, 1 log home facility, 1 fuel pellet/presto logs or briquettes facility, 1 firewood facility, 1 bark products facility, 1 animal bedding facility, and 1 roundwood pulp-chip conversion facility (table 1).

Table 1. NYFPP TPA timber-processing facilities.

Facility name	Facility type	State	County	Current Facility Status	Included in log-processing capacity analysis
Apex Lumber Co	Sawmill	CA	Butte	Active	Yes
Hot Wood - California	Firewood (fuelwood)	CA	Butte	Active	Yes
Sierra Log Homes	Log home	CA	Butte	Active	Yes
SPI - Oroville Sawmill	Sawmill	CA	Butte	Active	Yes
Kubich Lumber Company	Sawmill	CA	Nevada	Active	Yes
Mallard Creek - Animal Bedding	Other, like bedding	CA	Placer	Active	No
Mallard Creek - Bark	Bark products	CA	Placer	Active	No
Mallard Creek - Pellets	Fuel pellet/presto logs, briquettes	CA	Placer	Active	No
Rio Bravo Rocklin	Biomass/energy	CA	Placer	Active	No
SPI - Lincoln Cogen	Biomass/energy	CA	Placer	Active	No
SPI - Lincoln Sawmill	Sawmill	CA	Placer	Active	Yes
Collins Pine CoGen	Biomass/energy	CA	Plumas	Active	No
Collins Pine Sawmill	Sawmill	CA	Plumas	Active	Yes
SPI - Quincy Cogen	Biomass/energy	CA	Plumas	Active	No
SPI - Quincy Sawmill	Sawmill	CA	Plumas	Active	Yes
Burney Forest Products	Biomass/energy	CA	Shasta	Active	No
Hat Creek Lumber	Sawmill	CA	Shasta	New	No
Rath Industries, Inc	Sawmill	CA	Shasta	New	No
Shasta Green Inc.	Sawmill	CA	Shasta	Active	Yes
Shasta-Sustainable Resource Management	Biomass/energy	CA	Shasta	Active	No
SPI - Anderson Cogen	Biomass/energy	CA	Shasta	Active	No
SPI - Anderson Sawmill	Sawmill	CA	Shasta	Active	Yes
SPI - Burney Cogen	Biomass/energy	CA	Shasta	Active	No
SPI - Burney Sawmill	Sawmill	CA	Shasta	Active	Yes
SPI - Shasta Lake Sawmill	Sawmill	CA	Shasta	Active	Yes
West Biofuels - Hat Creek Bioenergy, LLC	Roundwood pulp-chip conversion	CA	Shasta	New	No
Lignum Support - Loyalton	Biomass/energy	CA	Sierra	Active	No
Unity Forest Products	Sawmill and house logs	CA	Sutter	Active	Yes
TRL - Trinity River Lumber Co	Sawmill	CA	Trinity	Active	Yes

Timber harvest within the NYFPP Study Area

The total volume of timber harvested from the NYFPP Study Area and processed into commercial products in 2021 was estimated at 461,948 hundred cubic feet (CCF) or 232,212 thousand board feet (MBF), Scribner (table 2). In 2012 and 2016 the harvest was 314,866 and 395,171 CCF or 134,649 and 174,852 MBF, Scribner, respectively. Plumas County provided nearly half of the total harvest in 2012 and 2016. In 2021, the Plumas County harvest constituted 97 percent of the total, and was 54 times larger than the Yuba County harvest and 90 times larger than the Sierra County harvest.

Table 2. Timber harvested in the NYFPP Study Area, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2012, 2016 and 2021.

	2012			2016			2021		
Study Area	MBF	CCF	Percent	MBF	CCF	Percent	MBF	CCF	Percent
Plumas County	83,267	153,464	49%	96,021	180,816	46%	225,494	448,645	97%
Sierra County	30,518	56,099	18%	56,056	105,382	27%	2,519	4,988	1%
Yuba County	20,864	105,303	33%	22,774	108,973	28%	4,199	8,315	2%
Total	**134,649**	**314,866**	**100%**	**174,852**	**395,171**	**100%**	**232,212**	**461,948**	**100%**

A large majority of timber harvested in the NYFPP Study Area in 2012, 2016, and 2021 were saw logs, at 72 percent, 78 percent, and 97 percent of the total harvest, respectively (table 3). Energywood chipped in the woods made up 26 percent of the harvest in 2012 and 21 percent in 2016.

Table 3. Timber harvested by timber product type in the NYFPP Study Area, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2012, 2016 and 2021.

	2012			2016			2021		
Product	MBF	CCF	Percent	MBF	CCF	Percent	MBF	CCF	Percent
Saw log	123,502	227,484	72%	163,886	308,057	78%	226,515	448,545	97%
Post or pole	164	232	0%	-	-	0%	-	-	0%
Log home	-	-	0%	100	199	0%	100	199	0%
Firewood log	2,835	5,670	2%	2,613	5,226	1%	2,613	7,466	2%
Piling or utility pole	-	-	0%	104	209	0%	2,984	5,738	1%
Energywood log chipped in the woods	8,148	81,480	26%	8,148	81,480	21%	-	-	0%
Total	**134,649**	**314,866**	**100%**	**174,852**	**395,171**	**100%**	**232,212**	**461,948**	**100%**

White fir constituted the greatest portion of timber harvested in the NYFPP Study Area in 2012, 2016, and 2021, while ponderosa pine and Douglas-fir made up the second and third greatest proportions, respectively (table 4).

Table 4. Timber harvest by species in the NYFPP Study Area, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2012, 2016 and 2021.

	2012			2016			2021		
Species	MBF	CCF	Percent	MBF	CCF	Percent	MBF	CCF	Percent
White fir	52,561	127,866	41%	62,885	149,303	38%	82,653	163,667	35%
California red fir	1,871	3,440	1%	2,541	4,777	1%	1,142	2,262	0%
Port-Orford-cedar	-	-	0%	5	10	0%	21	42	0%
Arizona cypress	-	-	0%	3	5	0%	-	-	0%
Incense-cedar	7,070	13,661	4%	9,970	19,413	5%	4,617	9,141	2%
Knobcone pine	-	-	0%	4	7	0%	776	1,536	0%
Lodgepole pine	3,022	6,014	2%	808	1,524	0%	2,073	4,151	1%
Jeffrey pine	2,245	4,127	1%	3,049	5,732	1%	-	-	0%
Sugar pine	18,030	44,587	14%	18,277	45,603	12%	19,919	39,442	9%
Western white pine	-	-	0%	21	39	0%	1,198	2,373	1%
Ponderosa pine	30,334	69,361	22%	40,314	89,060	23%	58,154	115,479	25%
Douglas-fir	19,515	45,809	15%	34,406	74,608	19%	54,790	108,349	23%
Redwood	-	-	0%	201	377	0%	4,521	8,953	2%
Western redcedar	-	-	0%	200	376	0%	-	-	0%
Western hemlock	-	-	0%	-	-	0%	180	356	0%
Oak-decidious	-	-	0%	-	-	0%	2,169	6,197	1%
California black oak	-	-	0%	2,169	4,338	1%	-	-	0%
Total	**134,649**	**314,866**	**100%**	**174,852**	**395,171**	**100%**	**232,212**	**461,948**	**100%**

In 2012, 2016, and 2021 private land timber harvest made up the bulk of the harvest in the NYFPP Study Area, with national forest harvest making up 19 percent, 21 percent, and 16 percent, respectively (table 5).

Table 5. Timber harvest by ownership in the NYFPP Study Area, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2012, 2016 and 2021.

	2012			2016			2021		
Ownership	MBF	CCF	Percent	MBF	CCF	Percent	MBF	CCF	Percent
National forest	31,676	58,687	19%	43,752	82,252	21%	36,444	72,168	16%
Private	102,697	255,672	81%	131,100	312,919	79%	195,124	388,505	84%
Other public	276	507	0%	-	-	0%	644	1,275	0%
Total	**134,649**	**314,866**	**100%**	**174,852**	**395,171**	**100%**	**232,212**	**461,948**	**100%**

In 2019 and 2020, 83 percent of the Study Area timber harvest was harvested live (table 6). In 2021, the majority of the harvest was dead and this trend continued through 2023. Saw logs were a large majority of the harvest total and drove the live/dead average across the latter three years.

Table 6. Percentage of timber harvested live and dead by timber product type in the NYFPP Study Area, 2019-2023.

	2019		2020		2021		2022		2023	
Study Area	Live percent	Dead percent	Live percent	Dead percent	Live percent	Dead percent	Live percent	Dead percent	Live percent	Dead percent
Saw logs	83%	17%	87%	13%	43%	57%	34%	66%	32%	68%
House logs	0%	0%	97%	3%	97%	3%	97%	3%	97%	3%
Firewood logs	0%	0%	0%	0%	100%	0%	90%	10%	90%	10%
Energywood logs	0%	0%	0%	0%	0%	0%	6%	94%	0%	0%
Piling or utility pole	0%	0%	100%	0%	100%	0%	100%	0%	0%	0%
Energywood chipped in woods	0%	0%	70%	30%	0%	0%	0%	0%	25%	75%
Volume-weighted average	**83%**	**17%**	**83%**	**17%**	**45%**	**55%**	**37%**	**63%**	**33%**	**67%**

Timber-processing within the NYFPP Timber Processing Area

Facilities within the NYFPP TPA processed 94 percent of the timber harvested in the Study Area in 2021, with the remainder of the harvest going to counties considered too far to haul (table 7).

Table 7. Processing location for timber harvested in the NYFPP Study Area, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

Study Area harvest	Processed within the county of harvest	Processed elsewhere within the Study Area	Processed outside the Study Area and inside the Timber Processing Area	Processed outside the Timber Processing Area
Plumas County	35%	0%	61%	4%
Sierra County	0%	91%	9%	0%
Yuba County	0%	0%	3%	97%
Total	**34%**	**1%**	**59%**	**6%**

Of the total timber processed by facilities in the NYFPP TPA in 2021, 67 percent came from within the TPA and 27 percent came from other California counties (table 8).

Table 8. Origin of timber processed within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

Origin of timber	Volume (MBF)	Volume (CCF)	Proportion of the total timber received
From Study Area	219,136	436,055	26%
From TPA outside Study Area	350,838	694,760	41%
From other California counties	230,895	457,053	27%
From other states	52,511	103,919	6%
Total	**853,380**	**1,691,786**	**100%**

Timber-processing capacity and capability

The purpose of this report is to provide the NYFPP with information on 1) The current use of timber by primary wood-processing facilities in the vicinity of the NYFPP, and 2) The maximum amount of timber these facilities could economically use in their current configuration. This information is intended to help the NYFPP understand the available milling capacity within the TPA.

The term “capacity” refers to the maximum total volume of timber that existing timber processors within the TPA could use annually, given firm market demand for products, sufficient raw material, and ordinary downtime for maintenance. Also known as “timber-processing capacity”, it is a measure of mills’ timber *input* capacity and is

expressed in MBF, Scribner and CCF per year. Input capacity is a useful measure when attempting to express the capacity of multiple types of mills in a common unit of measure. It is estimated from production (output) capacity information provided by facilities. Estimates in this report include the capacity of active facilities as well as idle (inactive) facilities with equipment still in place. Facilities that are permanently closed are not included. This analysis focuses on facilities that exclusively use timber in round form, including sawmills and plywood mills, among others. Facilities that use a mix of roundwood and non-roundwood inputs, such as chips, sawdust, shavings, and bark (e.g., biomass facilities) are not included in the capacity analysis because the combination of roundwood and non-roundwood inputs can vary widely from year to year, potentially over- or under-estimating capacity and use of roundwood by substantial margins.

The term "capability" refers to the volume of trees of a certain size class (measured as diameter at breast height, or dbh) that existing timber processors can economically process annually. This report uses three dbh classes: <7", 7 to 9.9", and ≥10". These size classes were chosen to focus analysis on the smallest log sizes that are merchantable in the western U.S. and that are often harvested in restoration treatments conducted on national forest lands. Some facilities are designed to operate using only trees of a given size class. Capability at these facilities is readily classified in just one of the size classes (e.g., plywood plants typically only use trees ≥10" dbh, and post manufacturers primarily use trees <10" dbh). Many facilities can and do use timber from a variety of size classes, especially sawmills, which often process logs that are larger than the smallest tree size they are capable of processing due to greater profitability. However, some mills that process larger logs are not capable of processing smaller-diameter timber due to the configuration of their equipment.

"Use" refers to the volume of timber, both in total and by tree dbh class, that facilities are currently processing.

Annual processing capacity, capability, and utilization

The estimated annual timber-processing capacity of facilities in the NYFPP TPA was 1,946,795 CCF or 982,007 MBF, Scribner (table 9). Of this volume, 88 percent (1,709,928 CCF or 863,512 MBF, Scribner) was in the ≥10" dbh size class, 11 percent (214,699 CCF or 107,412 MBF, Scribner) was in the 7-9.9" dbh size class and 1 percent was in the <7" dbh size class. As such, a large majority of the NYFPP TPA facilities' timber-processing capacity is for larger logs and may not be able to process smaller ones, either due to their equipment or because such processing would have a profit margin too small to be economical.

Table 9. Annual timber processing capacity and capability, by the dbh size class, of facilities within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

Tree dbh	*Thousand board feet, Scribner (MBF)*	*Hundred cubic feet (CCF)*
< 7 in.	11,083	22,169
7 - 9.9 in.	107,412	214,699
≥ 10 in.	863,512	1,709,928
Total	**982,007**	**1,946,795**

Timber-processing facilities in the NYFPP TPA used 86 percent (1,670,824 CCF or 842,829 MBF, Scribner) of their timber-processing capacity (table 10). Counties in table 10 and 11 are grouped to prevent disclosure of firm-level data.

Table 10. Annual timber processing capacity and consumption by facilities within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

	------Capacity to process timber------		-----Actual timber consumption-----		
Timber Processing Area	*Thousand board feet Scribner (MBF)*	*Hundred cubic feet (CCF)*	*Thousand board feet Scribner (MBF)*	*Hundred cubic feet (CCF)*	**Most recent utilization**
Butte, Nevada, Placer, Plumas, and Sutter counties	494,973	982,373	403,550	800,964	82%
Shasta and Trinity counties	487,034	964,423	439,279	869,859	90%
Total	**982,007**	**1,946,796**	**842,829**	**1,670,824**	**86%**

Of the total timber processing capability for logs <7” dbh, 89 percent has gone unused while 68 percent of the 7-9.9” dbh capability has gone unused. By contrast, less than 7 percent of the ≥10” dbh capability has gone unused (table 11). The negative unused volume (5,355 CCF) for Shasta and Trinity counties in the largest size class is likely due to facilities substituting larger logs for smaller, when available, because larger logs are more economical to process.

Table 11. Annual timber processing capability and unused capability for facilities within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

	Capability to process timber by dbh size class (CCF)			Unused capability to process timber by dbh size class (CCF)		
Timber Processing Area	*<7"dbh*	*7-9.9" dbh*	*≥10" dbh*	*<7" dbh*	*7-9.9" dbh*	*≥10" dbh*
Butte, Nevada, Placer, Plumas, and Sutter counties	8,529	88,549	885,295	7,895	57,889	115,624
Shasta and Trinity counties	13,640	126,151	824,632	11,799	88,120	(5,355)
Total	**22,169**	**214,699**	**1,709,928**	**19,694**	**146,009**	**110,269**

Timber use by facilities in the NYFPP TPA in the ≥10" dbh size class was at a rate 23 times greater than the rate of use of the 7-9.9" dbh size class in 2021 (table 12). The facilities in the TPA used timber in the 7-9.9" dbh size class at a rate 28 times greater than the <7" dbh size class.

Table 12. Timber use, by dbh size class, for facilities within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

Tree dbh	Thousand board feet, Scribner (MBF)	Hundred cubic feet (CCF)	Percent
<7 in.	1,250	2,474	0%
7 - 9.9 in.	33,771	68,690	4%
≥10 in.	807,808	1,599,660	96%
Total	**842,829**	**1,670,824**	**100%**

In 2021 there was 275,972 CCF (139,178 MBF, Scribner) of unused timber processing capacity in the NYFPP TPA, 40 percent of which was for trees ≥10" dbh (table 12). The unused timber processing capability for trees 7-9.9" dbh constituted 53 percent of the total unused capacity while unused capability to process the smallest size class was 7 percent to the total.

Table 12. Unused timber processing capacity, by dbh size class, for facilities within the NYFPP TPA, in thousand board feet, Scribner (MBF) and hundred cubic feet (CCF), 2021.

Tree dbh	Thousand board feet, Scribner (MBF)	Hundred cubic feet (CCF)	Percent
<7 in.	9,833	19,694	7%
7 - 9.9 in.	73,641	146,009	53%
≥10 in.	55,704	110,269	40%
Total	**139,178**	**275,972**	**100%**

Discussion

The capacity utilization levels presented in this report indicate that the forest products industry in the NYFPP TPA has capacity available to process an increased yield of timber resulting from mechanized fuels reduction (table 12). However, the size and quality of timber available, as well as prevailing market prices and the availability of qualified labor, also affect the level of capacity at which primary processors are able to operate and in what size class(es) capability is concentrated. Fuels reduction treatments frequently involve the harvesting of smaller-diameter timber, the profitability of which diminishes as tree diameter decreases (Stewart et al. 2004). Harvesting salvage (standing dead) timber can become similarly unprofitable, especially if logs are less than 10" dbh, due to the lower grade recovery for these logs (Fahey et al. 1986).

While some operators have configurations capable of accommodating the processing of large and small logs, not all processors are able to do so. Processing a greater volume of logs from smaller trees, that typically yield lower recovery, could reduce profit margins to the point of a mill becoming unprofitable, especially in a weak lumber market.

Sources

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