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that in 2016, the total volume increased to an estimated 30,000 MBF Scribner as a result of increased harvesting in response to the spruce beetle and western spruce budworm epidemics by federal and other land owners (USFS 2016). Approximately 85 percent of the timber harvested in the study area was processed within the timber-processing area (TPA).

The species composition of the timber harvested in the study area was estimated to consist of primarily Engelmann spruce, lodgepole pine and ponderosa pine with smaller volumes of aspen, Douglas-fir and subalpine fir. Due to the impact of the spruce beetle and other forest insect pests, the majority of the timber harvested and utilized from these counties consisted of dead trees (R. Reinschmidt, USFS R2 South Zone Contracting Officer, pers. comm.). In 2012, sawmills received 97 percent of the timber harvested and utilized from these counties; the remaining volume was processed by house log, and post and small pole manufacturers.

GRAND MESA, UNCOMPAHGRE AND GUNNISON NATIONAL FORESTS TIMBER-PROCESSING AREA

The GMUG National Forests timber-processing area includes nine counties: Delta, Fremont, Garfield, Gunnison, Mesa, Montrose, Ouray, Saguache and San Miguel counties in Colorado (Figure 2).

Within the GMUG National Forest TPA there were 15 facilities currently operating as of 2016: Nine sawmills, one post and small pole facility and five log home manufacturers; in addition, there was one sawmill and one co-located sawmill and post and pole plant that were idle during that year (Table 1).

<table>
<thead>
<tr>
<th>Type</th>
<th>2003</th>
<th>2007</th>
<th>2012</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawmills</td>
<td>16</td>
<td>10</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Log home</td>
<td>15</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Log furniture</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post and pole</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
<td><strong>18</strong></td>
<td><strong>18</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Sources: Hayes and others, 2012; Sorenson and others, 2016, BBER, N.D.
Figure 2. GMUG National Forests timber-processing area.
Since 2003, capacity to process timber in the GMUG TPA has decreased from 77.5 MMBF to 55.1 MMBF due to a combination of mill closures, as well as technological upgrades to existing mills expanding their capacity and increasing their efficiency. Mills utilized approximately 55 percent of their capacity in 2016. The authors estimate that up to 13 percent (7,406 MBF) of the 55,646 MBF of existing capacity in the GMUG TPA was capable of processing trees <10 inches dbh, with 75 percent of that capacity utilized in 2016. However, as a proportion of their total timber processed, trees <10 inches dbh accounted for 18 percent of mills total timber use in 2016 (Table 2).

**DISCUSSION**

Mills prefer and often process trees that are larger than the smallest tree sizes they are capable of processing due to higher recovery rates (greater output per unit of input). As documented by Stewart et al. (2004) and others, the profitability of processing timber diminishes as the average diameter of the timber decreases.

Mill owners also spoke to the impact that the condition of timber, namely live versus dead, has on their ability to recover economic value from the material. Mills reported on their capability to process primarily dead timber, citing their capability to process timber <10 inches dbh would be greater if they were processing green trees, due to the associated higher recovery rates. Similar relationships among recovery, live versus dead trees and log size have been documented by Fahey, Snellgrove and Plank (1986).

Finally, while the region shows unutilized capability to process timber, mills reported using greater volumes of small diameter timber than they felt they were capable of efficiently and economically processing. This is likely a reflection of the fact that the national forests comprise the overwhelming majority of timberland, and the national forests are offering substantial quantities of small trees and relatively few larger trees in efforts to mitigate the impacts of widespread tree mortality due to insects, such as the spruce beetle.

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**Table 2. Annual capacity and capability to process trees by size class in the GMUG National Forests timber-processing area, 2016.**

<table>
<thead>
<tr>
<th>Tree diameter at breast height (dbh)</th>
<th>Capability</th>
<th>Use</th>
<th>Timber Use</th>
<th>Capacity utilized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10 in.</td>
<td>7,406 MBF</td>
<td>5,532 Thousand board feet, Scribner</td>
<td>18%</td>
<td>75%</td>
</tr>
<tr>
<td>10 in. and over</td>
<td>48,239 MBF</td>
<td>24,882 Thousand board feet, Scribner</td>
<td>82%</td>
<td>52%</td>
</tr>
<tr>
<td><strong>Total capacity</strong></td>
<td><strong>55,645</strong></td>
<td><strong>30,414</strong> Thousand board feet, Scribner</td>
<td><strong>100%</strong></td>
<td><strong>55%</strong></td>
</tr>
</tbody>
</table>

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**DEFINITIONS**

**Timber-processing area** – The group of counties where a majority of timber from an area of interest are processed into value-added products.

**Timber-processing capacity** - The total volume of timber (excluding pulpwood) that existing timber processors can utilize annually. It is a measure of the volume of logs that mills can process in a given year, given firm market demand and sufficient raw material. Estimates in this report include the capacity of active facilities, as well as idle facilities with equipment still in place. This analysis focuses on facilities that exclusively use timber in round form; this includes sawmills and facilities making house logs/log homes, posts and small poles, and log furniture. It does not include pulp mills or facilities which may use a mix of roundwood and mill residuals like sawdust, chips or bark.

**Capability** - The volume of trees of a certain size class (measured as diameter at breast height, or dbh) that existing timber processors can efficiently and economically process annually. Most facilities are designed to operate using trees of a given size class (e.g., veneer/plywood plants typically use trees ≥ 10 inches dbh and post manufacturers primarily use trees < 8 inches dbh). Capability at these facilities is readily classified in just one of the size classes. This is true for some sawmills, but sawmills can vary in equipment, product output and ability to process timber of various sizes.
When planning activities that involve removing trees from the landscape, land managers need to balance their need to remove small and/or dead trees with the local industry’s ability to profitably use that material. Offering larger quantities of small and/or dead trees than the industry can profitably use will lead to unsold sales and fewer acres being treated.

REFERENCES


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