

# Arizona and New Mexico Logging Utilization, 2012-2017

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## Introduction

This is the second poster in a companion series highlighting logging utilization studies in Montana, Arizona, and New Mexico conducted by the Bureau of Business and Economic Research at the University of Montana. Statewide studies of logging utilization were conducted in Arizona and New Mexico from 2012 to 2017. Please see the Montana logging utilization poster for a discussion of the methods used for these studies.

## Arizona Results

### Logging methods & equipment

Logging operations included hand and mechanical felling methods, ground skidding and cable yarding systems, and hand and mechanical processors.

- Mechanical felling occurred on 93 percent of the sites while ground based skidding occurred on all 30 sites.
- At all but one of the sites trees were skidded whole tree (tree length). Two sites had trees processed with chainsaws and at all but one site trees were merchandised at the landing.

### Characteristics of trees

For this study, 750 felled trees on 30 sites were measured, ranging from 5.0 inches to 26.7 inches dbh.

- About half of the harvested trees were  $\leq 12.4$  inches dbh, accounted for 25 percent of the mill delivered volume, 31 percent of the total growing-stock logging residue, and produced 27 cubic feet (cf) of logging residue (2.7 percent residue factor) for every 1,000 cubic feet (MCF) delivered to the mill (figure 2).
- Trees  $>15$  inches dbh accounted for 20 percent of the harvested trees, 40 percent of the total growing stock logging residue, 41 percent of the mill delivered volume, and produced 24 cf of growing-stock logging residue (2.4 percent residue factor) for every MCF delivered to the mill. In Arizona, due to the number of sites with whole tree chipping/ grinding for biomass, small tree utilization was higher and the residue factor lower than in Montana or New Mexico.
- Ponderosa pine accounted for 97 percent of the mill delivered volume and Douglas-fir the remainder. Although other tree species are harvested in Arizona crews did not measure any.
- Douglas-fir exhibited the highest residue factor of the two species (6.8 percent), owing to a small sample of trees with considerable defect, and on sites without biomass utilization.

### Removals

Factors quantifying harvesting impacts on forest inventory, revealed that:

- For every 1,000 cf of volume delivered to the mill 986 cf of growing-stock volume was removed from inventory (table 1 Arizona).
- For every 1,000 cf of volume delivered to the mill 24 cf of growing-stock logging residue was left on site.
- In addition, 38 cf of non-growing stock from stumps and tops went to the mill.
- For all tree components, growing stock and non-growing stock, only 3.8 percent of the harvested tree bole volume was left on site as logging residue (figure 3).

### Acknowledgements

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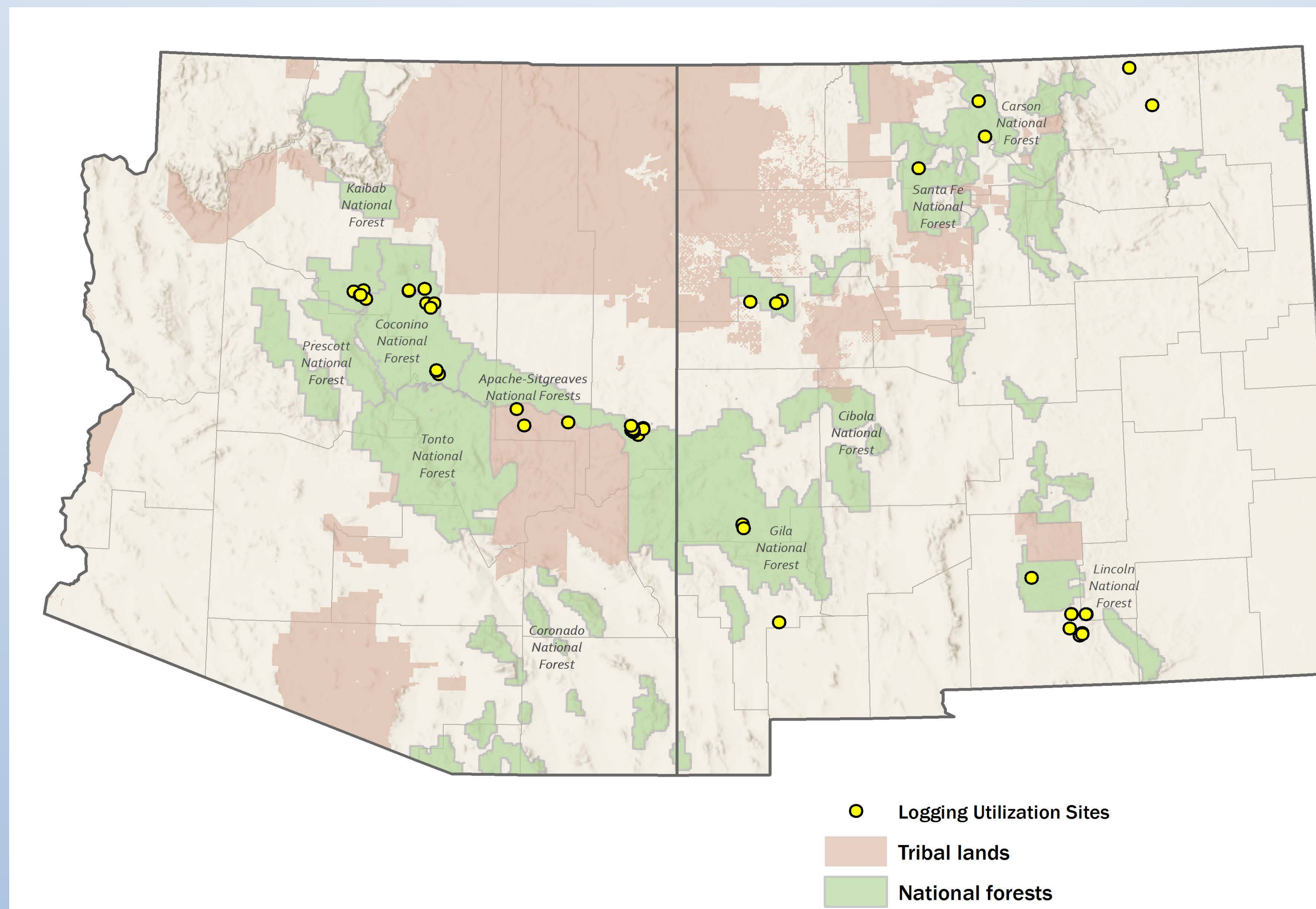


Figure 1: Sampled logging sites, 2012-2017.

Figure 2: Percent of harvested trees, mill delivered volume, and residue as a percent of delivered volume by tree dbh class.

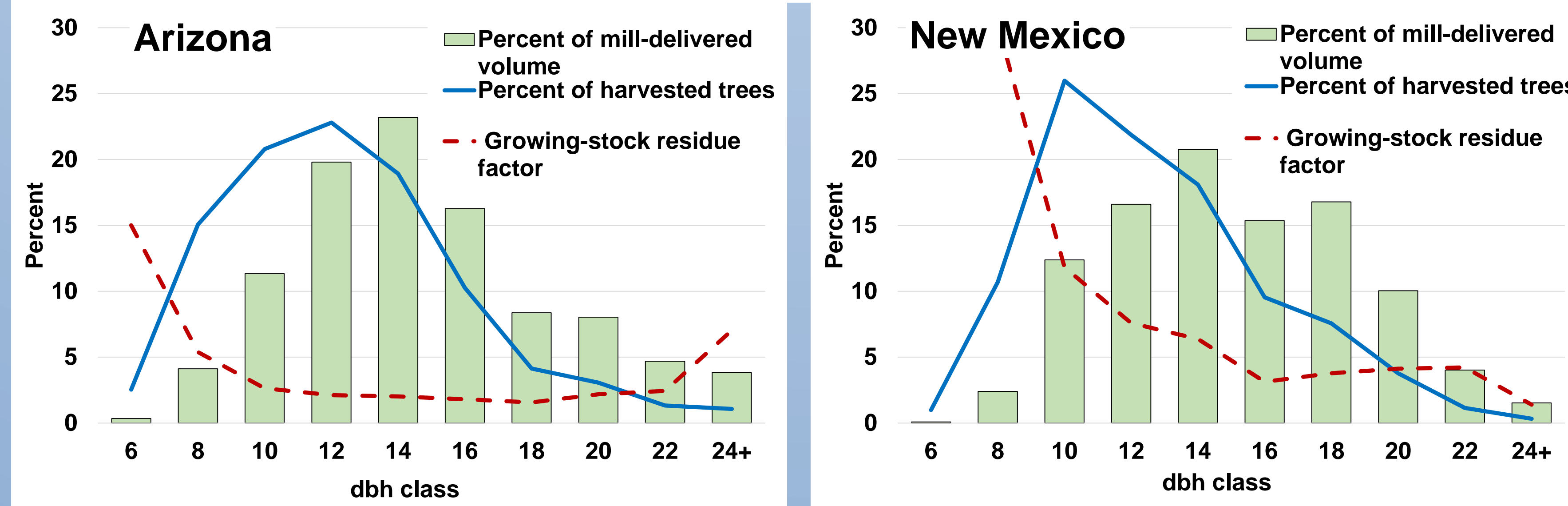
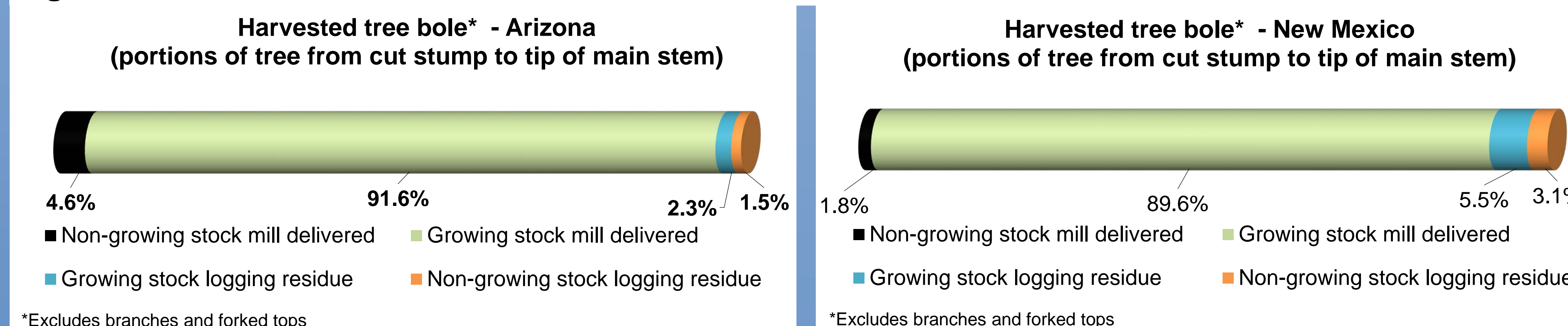


Table 1 - Arizona and New Mexico logging utilization factors for each 1,000 cubic feet of green material delivered to mills, selected years.

Factor	Arizona			New Mexico		
	1968 <sup>a</sup>	1985 <sup>b</sup>	2012-17	1968 <sup>a</sup>	1987 <sup>c</sup>	2012-17
Non-growing stock product delivered to mills	-	0	38	-	4	20
Growing-stock product delivered to mills	1,000	1,000	962	1,000	996	980
Growing-stock logging residue	122	71	24	122	43	65
Removals from growing stock	1,122	1,071	986	1,122	1,039	1,045

Sources: <sup>a</sup>Setzer et al. 1970; <sup>b</sup>McLain 1988; <sup>c</sup>McLain 1989.

Figure 3 - Arizona and New Mexico harvested tree bole utilization, 2012-2017.



\*Excludes branches and forked tops

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## New Mexico Results

### Logging methods & equipment

Logging operations included hand and mechanical felling methods, ground skidding and cable yarding systems, and hand and mechanical processors.

- Mechanical felling occurred on 54 percent of the 24 sites in the study. All sites employed ground based skidding.
- At one third of the sites trees were felled and merchandised with chainsaws in the unit. All but two of the remaining sites had mechanical processors at the landing. Two sites had trees felled and merchandised with chainsaws at the landing.

### Characteristics of trees

For this study, 608 felled trees on 24 sites were measured, ranging from 6.4 inches to 27.1 inches dbh.

- About half of the harvested trees were  $\leq 12.4$  inches dbh, accounted for only 24 percent of the mill delivered volume, 44 percent of the total growing-stock logging residue, and produced 111 cubic feet (cf) of logging residue (11.1 percent residue factor) for every 1,000 cubic feet (MCF) delivered to the mill (figure 2).
- Trees  $>15$  inches dbh accounted for 22 percent of the harvested trees, 26 percent of the total logging residue, nearly 48 percent of the mill delivered volume, and produced 36 cf of growing-stock logging residue (3.6 percent residue factor) for every MCF delivered to the mill. In general, smaller trees produced proportionally less volume and more residue for every cf delivered to the mill.
- Ponderosa pine and Douglas-fir accounted for 79 percent of the mill-delivered volume. Other species, primarily spruce, accounted for the rest.
- Ponderosa pine and Douglas fir residue factors were nearly the same, 6.9 and 6.8 percent respectively.

### Removals

Factors quantifying harvesting impacts on forest inventory, revealed that:

- For every 1,000 cf of volume delivered to the mill 1,045 cf of growing-stock volume was removed from inventory (table 1).
- For every 1,000 cf of volume delivered to the mill 65 cf of growing-stock logging residue was left on site.
- In addition, 20 cf of non-growing stock from stumps and tops went to the mill.
- For all tree components, growing stock and non-growing stock, 8.6 percent of the harvested tree bole volume was left on site as logging residue (figure 3).

### Comparisons

Since the 60's utilization of non-growing stock portions of trees has increased in Arizona and New Mexico. Growing stock logging residue has decreased by 80 percent in Arizona and 47 percent in New Mexico. Since the last study in Arizona growing stock logging residue has decreased by over 70 percent while in New Mexico it has increased by 50 percent. This finding in New Mexico is different than what has been found in other western states. This condition is likely a result of a decrease in the state's wood products industry's processing capabilities of smaller diameter material while Arizona has access to local markets for biomass utilization.

### Contact us

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