Small Mills as Means of Utilizing Wood from Pest Epidemics: An Educational Project to Expand Capability

Accomplishment Report January 2017

John Ball and Greg Carlson
Extension Specialists
Department of Plant Science
South Dakota State University

Forest Resources of South Dakota

South Dakota, while not well-known for its forest resources, has approximately 1.8 million acres of timberland. The majority of this land, about 1.2 million acres, is ponderosa pine (*Pinus ponderosa*) timberland located in the Black Hills. Deciduous forests occupy much of the 200,000 acres of timberland located east of the Missouri River. There is also significant nonforest land, mostly in the eastern half of the state, which is occupied by windbreaks or community forest. The composition of this nonforest land is dominanted by green ash (*Fraxinus pennsylvanica*) and American elm (*Ulmus americana*). There is estimated to be about 24 million ash in non-forested land, along with another 11 million elms.

Current and Impending Forest Health Threats

There are two forest health issues that are dominating South Dakota at this time, one is beginning to decline, the other anticipated. The mountain pine beetle (*Dendroctonus ponderosae*) epidemic that began in the late 90s is beginning its endemic phase leaving millions of dead ponderosa pines. The sapwood of these infested trees is marred by blue stain as the result of colonization by a complex of fungi carried to the tree by the beetle. While the discoloration does not impact the strength or durability of the wood, the commercial mills limit their purchase of infested wood as these logs earn a lower price. The mills are only able process about one-third of their total volume in blue stained wood. Increasing the percentage of blue stained wood would make their milling operations unprofitable due to the lack of a market. Consequently, there is an overabundance of standing infested trees on National Forest and private lands.

The other problem is the anticipated arrival of emerald ash borer (*Agrilus planipennis*). This East Asian boring insect was first detected in the Detroit, Michigan area in 2002 and since that time has spread to much of eastern North America with infestations extending as far west as Omaha, Nebraska and Minneapolis, Minnesota. There is also an isolated infestation in the Boulder, Colorado area. There is a high likelihood that emerald ash borer will be detected in South Dakota within a few years. When the beetle does eventually arrive the projected outcome will be devastating to the impacted communities due to their overreliance of ash as a street and residential tree. Some communities have almost half their urban trees composed of ash. Once the insect does arrive the resources to remove and destroy the infested trees have been overwhelmed in communities that have already experience extensive losses. Small mills can be a means of reducing the costs of disposal of these infested trees.

While mountain pine beetle and emerald ash borer are the most pressing forest health issues in the state, they are not the only ones. Dutch elm disease (*Ophiostoma novo-ulmi*) is still impacting communities across the state with loss rate commonly approaching two percent per year. Despite the losses of American elm to this disease since its introduction in 1967, this species is one of the most common urban trees in South Dakota. Communities are still

struggling with the disposal of the wood from infected elm trees. The infested trees typically are hauled to community landfills and burned rather than utilized.

The Challenge

These challenges to wood disposal are also opportunities for small mobile mills that cater to more specialized products. There are numerous small mills operating throughout the state that mill urban, forest or windbreak trees, usually on shares with the tree owner or harvester. Many of these mills are recent start-ups that are struggling due to inexperience with mill operations and business practices for buying and selling wood and wood products. Also some owners lack the forestry background to know how to determine volume in trees and logs, wood quality of the various species and defects.

The urban logging program had three major outreach efforts: 1) workshops to demonstrate small mobile mill operations and managing threats to our forest resources, 2) a series of factsheets to explain the various aspects of mill operation and wood characteristics and 3) a series of video vignettes to correspond with the fact sheets.

Workshops

Three half-day workshops were held in late summer-fall 2016 to demonstrate the operation of small mobile mills. The workshops also covered working with infested or infected trees to avoid spreading the pests. One workshop was held in Rapid City and the other two in Brookings. The workshops covered mill operation and costs, different methods of drying, wood products and markets and how infested trees must be handled to avoid spreading pests. The Rapid City has 11 attendees and the Brookings workshop attracted a total of 37 participants.

A workshop on emerald ash borer and thousand cankers disease was held spring of 2015 at South Dakota State University to discuss the identification and management of these threats. The workshop speakers included regional urban foresters and researchers who are involved in managing these pests. The workshop was attended by 87 natural resource managers, urban foresters and commercial tree company managers.

Factsheets/Video vignettes

The project produced 20 video vignettes covering various aspects of small mill operation and urban logging. Video vignettes are short films that cover a single aspect of a larger topic; for example how to calculate the volume in a tree by height and diameter. The videos ranged in length from approximately 2 to 5 minutes. The videos are posted on the South Dakota State University iGrow web site under the name "*Today's Forest*." The site allows visitors to open and view the video vignettes and download the associated factsheet.

While the videos have only been available for viewing since mid-Autumn 2016, we have already experienced traffic. The most popular videos involve measurements, estimating volume in standing trees and estimating volume in logs.

Video vignette topics	Viewings
Measuring wood volume in standing trees	472
Measuring wood volume in logs	396
Economics of mobile and small scale mill operations: production costs	255
Processing mountain pine beetle infested logs	161
Processing wood: saw patterns	143
Identification of diffuse porous woods	104
Drying boards and lumber	101
Identification of ring porous woods	100
Tree felling techniques	87
Introduction to milling urban woods	77
Identification of nonporous woods	73
Economics of mobile and small scale mill operations: capital costs	67
Stumpage	62
Lumber marketing	56
Processing emerald ash borer infested wood	55
Processing wood: maintaining saw blades (3 videos)	50
Use of proper personal protective equipment (PPE)	40
Contaminants	39

There are two- to four-page factsheets associated with each video that can be downloaded to cover the subject. The text and pictures in these factsheets closely follows the associated video. The data regarding the number of website visits and factsheets downloaded will not be available till March when iGrow tabulates this information for all their pages and factsheets.