2013 Indiana Forest Products Price Report and Trend Analysis

Editor’s Note: The complete Indiana Forest Products Price Report and Trend Analysis for 1942, 1954-2013 may be viewed at: https://ag.purdue.edu/fnr/Extension/Pages/timberMarket.aspx

Survey Procedures and Response

Survey procedures were the same as previous years. The survey was mailed to 216 firms, compared to 275 in 2012. Ten were returned as undeliverable. There was an initial mailing and one reminder postcard sent to non-respondents. Purdue’s Department of Forestry and Natural Resources pays for the assistance of the Indiana Office of USDA’s Agricultural Statistics Service using funds from its John S. Wright Endowment, not tax-based funds.

Forty-seven mills reported some useful data, compared to 52 in 2012, 56 in 2011, 62 in 2010, 73 in 2009 and 88 in 2008. Seventeen mills were dropped because their phones were disconnected, or they reported being out of business. The number of mills contributing price data for each product is shown in the second and third columns in Tables 1 and 2, and in the second column in Tables 3 and 4. Forty-three mills reported their 2012 board foot production, compared to 39 in 2011. Sixteen mills reported producing 1 million board feet (MMBF) or less. Fourteen mills reported production of 5 MMBF or greater. Total production reported was 151 MMBF compared to 134 MMBF in 2011, and 103 MMBF in 2010. The largest single mill production reported was 19 MMBF. These annual levels are not comparable since they do not represent a statistical estimate of total production.

Prices for most species had increased by the first of September. Log prices are directly tied to lumber prices since logs are delivered to mills on a continuing basis. This allows mills to base the price they pay on current lumber market prices. The connection to prices paid for standing timber is less direct, depending on how far in advance of logging a stand of timber is purchased.

Sawlog Prices

The number of mills reporting sawlog prices was up slightly again this year (Table 1). Almost without exception sawlog prices of the premium species were up significantly; changes of course varied by species.

Selected Hardwood Species

All oak species were up significantly, generally in the 15 to 20 percent range.

All four grades of logs increased. Black oak prices were slightly below red oak’s, but many mills reported paying the same price for both species. It can be difficult to distinguish these two species of logs on a mill’s log...
Calendar of Events

January 6-8, 2014
Annual Conference of Soil and Water Conservation Districts
Indianapolis downtown Marriott hotel
www.iaswcd.org

February 4-6
Indiana Hardwood Lumbermen’s Association Convention
Indianapolis Marriott Downtown
See www.ihla.org or call 800-640-4452.

February 13 through April 3
Helping Families Conserve Nature on Their Land
Lafayette, Tippecanoe County
8 weekly evening session and 1 Saturday field trip
Registration fee.
Contact macgowan@purdue.edu or 765-647-3538

February 18 through April 8
Forest Management for the Private Woodland Owner
Martinsville, Morgan County
8 weekly evening sessions and 2 Saturday field days
Registration fee.
Contact lfarlee@purdue.edu or 765-494-2153.

February 19 through April 9
Helping Families Conserve Nature on Their Land
Bloomington (Monroe Co.) and Nashville (Brown Co.)
8 weekly evening session and 1 Saturday field trip
Registration fee.
Contact macgowan@purdue.edu or 765-647-3538

February 19
Tree Planting Workshop
1-4 PM EST
Rochester, Fulton County
Call 219-843-4827 to register.

February 19-20
Midwest Women in Agriculture Conference
Jeffersonville, Clark County
Call 574-372-2340 for more information.

March 14-15
Tree Farm Forest Landowners Clinic
Spring Mill State Park, Mitchell
Contact lfarlee@purdue.edu or 765-494-2153.

April 2
Hardwood Lumber: Producing, Using and Selling
Wright Center, West Lafayette, Tippecanoe County
Contact dcassens@purdue.edu for more information.

April 9
Hardwood Lumber: Producing, Using and Selling
SE PAC Purdue Ag Center, Butlerville, Jennings County
Contact dcassens@purdue.edu for more information.

April 16
Hardwood Lumber: Producing, Using and Selling
SIPAC, Dubois, Dubois County
Contact dcassens@purdue.edu for more information.

May 31
Forest & Wildlife Research Field day
SEPAC Purdue Ag Center, Butlerville, Jennings County
Contact lfarlee@purdue.edu or 765-494-2153.
Effect of EAB on Ash Wood Quality, Qualitative Observations

By Daniel Cassens

The Department of Forestry and Natural Resources at Purdue University has received conflicting reports about the suitability of Emerald Ash Borer (EAB) killed Ash trees for both lumber and mulch. As a result, about 15 saw log sized trees of various ages and vigor and infected with EAB were processed one at a time on a portable band mill. This process allowed all logs in each tree to be carefully examined for any quality issues.

Background

Considering growth rate and wood color, ash is an extremely variable wood and this variation could be creating some of the confusion in regards to its utilization. Ash, like oak, locust, elm, hackberry and a few minor species, is a ring porous wood. Each year the tree initiates a new growth ring and the very first cells (pores) formed are large in diameter and thin walled. Later in the growing season small diameter thick walled strong cells are formed. The transition between the thin walled cells (early wood) and the small thick walled cells (latewood) is abrupt. The latewood cells provide the density and strength that most ash is known for. If the tree lacks vigor and is slow growing, the latewood band of cells will be very narrow. The density and strength of all slow growth ring porous species goes down, and in extreme cases, the wood can be brash.

Wood color in ash can also create confusion. Color in any of the hardwoods and especially the light colored ones are difficult to quantify. Ash, like hard maple, basswood and other white wood species, does not form true heartwood. The brown and sometimes mottled or variegated "heartwood" is formed in response to wounding or branch stubs failing to heal promptly. Fast growth vigorous trees will be predominately white lustrous sapwood. Old trees and trees lacking vigor will have much larger heartwood (Figure 1).

To further complicate the situation, the color of the white sapwood in healthy live ash can be affected by processing techniques. Allowing fresh ash logs or dead piled lumber to lie during warm weather will quickly result in oxidation stain. Oxidation stain is a chemical reaction in the wood which initially results in a somewhat darker, off white or graying of the wood. Oxidation stain is followed by fungal staining most commonly known as blue stain and then by actual decay.

Wood manufacturers who mass produce products, and especially those with a light natural finish generally prefer the white sapwood of ash. Mixing of the white sapwood with the brown and often variegated heartwood creates contrast and can lead to questions from the consumer. On the other hand, the variegated heartwood provides a decorative appearance and might be preferred by some custom wood manufacturers (Figure 2). From a strength standpoint, there is nothing wrong with either the sapwood or heartwood, unless the wood is very slow grown.

Figure 1. White ash log (left) with a very small heartwood and wide bands of sapwood. Ash log (right) with large variegated heartwood. It is important to examine the top end of butt logs as the heartwood seems to develop just a short distance up the stem.

Figure 2. Color variation as seen in several pieces of ash lumber. A. Lustrous white sapwood color in well cared for and well manufactured Ash board. B. Slightly off colored board and some staining due to EAB. C. Uniformly brown heartwood in ash. D. Heavily variegated heartwood color in Ash. E. Shows a commercially produced sapwood board with oxidation stain. F. Shows a second commercially produced board with some oxidation stain near the bottom and brown heartwood near the top.

cont’d on page 8
Increased demand for black walnut has caught mills and brokers with their inventories down. Production apparently hasn’t caught up with demand yet, so further price increases are likely for lumber and logs. Good markets increase the demand for good logs more than for the lower grades, thus increases of less than 2 percent for No. 2 and 3 logs. There are reports of men in new big white Cadillac’s prospecting the hinterlands for decent walnut timber. If the price cycles over the last 10 years are at all predictive, there is room for further price increases.

The increase in black cherry log prices was much greater than would be expected given steady lumber prices. However, in September the prices for the lower grades of lumber had increased slightly. Prices remain well below their peak in 2004.

Housing construction and rehab has pulled up the price of hard maple lumber and consequently the price of sawlogs. Prime logs were up almost 25 percent and No. 1’s almost 30 percent. This clearly indicates that mills are paying higher prices to get loggers to bring in this species. Hard and soft maple are not substitutes in finished goods markets, thus their prices can be expected to behave differently. Soft maple prices were essentially steady.

Although ash lumber prices have held steady for the last 24-month period, the average price of Prime logs was up 13.7 percent. This may be an indication that in parts of the state hard hit by EAB mortality, log supplies are tight. The average price for No. 1 and 2 logs was up about 8 percent.

Tulip poplar was up, over 20 percent for Prime and No. 1 logs. This is consistent with rising lumber prices. Foresters are concerned about the health of this species due to several years of dry weather. It grows best in bottoms and on north facing slopes. Drought will kill trees growing off-site. It’s
hard to say whether this will mean more logs coming on the market. Extension Forester Lenny Farlee notes, however, that mortality occurs over several years as declining trees die slowly. The wood decays quickly making it necessary to harvest declining trees as soon as possible.

**Softwood Logs**

The price of pine sawlogs increased by $30 to $233 per MBF. Red cedar decreased by a similar amount. Compared to last year four more mills reported pine and cedar prices.

**Veneer Log Prices**

The number of mills reporting veneer log price was up substantially (Table 2). Prices were reported by both veneer mills and sawmills. Sawmills resell their inventory of veneer logs to veneer mills, exporters, and in some cases they saw these logs for specialty cuts like quarter and rift. The variation in prices would be reduced if only prices reported by veneer mills were used. Purdue Wood Products Professor Dan Cassens reports that there are only 16 face veneer plants still operating in the U.S. Plants that close can easily sell their equipment to firms in China. Thus, it will be necessary for this report to better reflect prices paid for logs being exported.

Veneer log prices were up broadly. When markets are strong mills can generally pay higher prices for larger and better quality logs. Likewise the reduced demand for the smaller and lower grade logs tends to drive down their price. This is the case for the average prices of smaller black walnut, white oak, and black cherry. Price reductions were greatest for black cherry. Except for black cherry the veneer log price increases were greater than the increase in the lumber prices of the same species. Both average and median prices increased because of the number of mills reporting large increases. Median prices change less than mean (average) price when price changes are smaller.

<table>
<thead>
<tr>
<th>Species/Grade</th>
<th>Range 2013 ($/MBF)</th>
<th>No. Responses</th>
<th>Mean 2012 ($/MBF)</th>
<th>Median 2012 ($/MBF)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sycamore Prime</td>
<td>150 – 350</td>
<td>9</td>
<td>241</td>
<td>250</td>
<td>-4.3</td>
</tr>
<tr>
<td>No. 1</td>
<td>150 – 320</td>
<td>10</td>
<td>222</td>
<td>245</td>
<td>3.3</td>
</tr>
<tr>
<td>No. 2</td>
<td>150 – 310</td>
<td>10</td>
<td>207</td>
<td>220</td>
<td>8.5</td>
</tr>
<tr>
<td>No. 3</td>
<td>150 – 310</td>
<td>9</td>
<td>202</td>
<td>220</td>
<td>9.2</td>
</tr>
<tr>
<td>Sweetgum Prime</td>
<td>150 – 300</td>
<td>8</td>
<td>235</td>
<td>245</td>
<td>-4.4</td>
</tr>
<tr>
<td>No. 1</td>
<td>150 – 300</td>
<td>12</td>
<td>210</td>
<td>220</td>
<td>7.5</td>
</tr>
<tr>
<td>No. 2</td>
<td>150 – 250</td>
<td>7</td>
<td>211</td>
<td>240</td>
<td>2.9</td>
</tr>
<tr>
<td>No. 3</td>
<td>150 – 250</td>
<td>7</td>
<td>217</td>
<td>240</td>
<td>0.2</td>
</tr>
<tr>
<td>Black Walnut Prime</td>
<td>1000 – 2750</td>
<td>18</td>
<td>1203</td>
<td>1100</td>
<td>18.9</td>
</tr>
<tr>
<td>No. 1</td>
<td>500 – 2750</td>
<td>19</td>
<td>953</td>
<td>900</td>
<td>16.8</td>
</tr>
<tr>
<td>No. 2</td>
<td>400 – 1500</td>
<td>18</td>
<td>708</td>
<td>800</td>
<td>1.5</td>
</tr>
<tr>
<td>No. 3</td>
<td>150 – 800</td>
<td>13</td>
<td>369</td>
<td>350</td>
<td>1.7</td>
</tr>
<tr>
<td>Sweetgum Prime</td>
<td>150 – 300</td>
<td>8</td>
<td>235</td>
<td>245</td>
<td>-4.4</td>
</tr>
<tr>
<td>No. 1</td>
<td>150 – 300</td>
<td>12</td>
<td>210</td>
<td>220</td>
<td>7.5</td>
</tr>
<tr>
<td>No. 2</td>
<td>150 – 250</td>
<td>7</td>
<td>211</td>
<td>240</td>
<td>2.9</td>
</tr>
<tr>
<td>No. 3</td>
<td>150 – 250</td>
<td>7</td>
<td>217</td>
<td>240</td>
<td>0.2</td>
</tr>
<tr>
<td>Black Walnut Prime</td>
<td>1000 – 2750</td>
<td>18</td>
<td>1203</td>
<td>1100</td>
<td>18.9</td>
</tr>
<tr>
<td>No. 1</td>
<td>500 – 2750</td>
<td>19</td>
<td>953</td>
<td>900</td>
<td>16.8</td>
</tr>
<tr>
<td>No. 2</td>
<td>400 – 1500</td>
<td>18</td>
<td>708</td>
<td>800</td>
<td>1.5</td>
</tr>
<tr>
<td>No. 3</td>
<td>150 – 800</td>
<td>13</td>
<td>369</td>
<td>350</td>
<td>1.7</td>
</tr>
<tr>
<td>Softwood Pine</td>
<td>150 – 300</td>
<td>8</td>
<td>235</td>
<td>245</td>
<td>-4.4</td>
</tr>
<tr>
<td>Red cedar</td>
<td>150 – 425</td>
<td>3</td>
<td>333</td>
<td>400</td>
<td>-8.5</td>
</tr>
</tbody>
</table>

Table 2. Prices paid for delivered veneer logs by Indiana mills, May 2012 and May 2013.

<table>
<thead>
<tr>
<th>Species</th>
<th>Range 2013 ($/MBF)</th>
<th>No. Responses</th>
<th>Mean 2012 ($/MBF)</th>
<th>Median 2012 ($/MBF)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Walnut Prime</td>
<td>12–13</td>
<td>850 – 3000</td>
<td>5</td>
<td>2640</td>
<td>2000</td>
</tr>
<tr>
<td>14–15</td>
<td>2200 – 3000</td>
<td>5</td>
<td>3240</td>
<td>3000</td>
<td>3.8</td>
</tr>
<tr>
<td>16–17</td>
<td>3000 – 6500</td>
<td>6</td>
<td>3708</td>
<td>4000</td>
<td>20.2</td>
</tr>
<tr>
<td>18–20</td>
<td>3000 – 7500</td>
<td>7</td>
<td>3979</td>
<td>4000</td>
<td>47.7</td>
</tr>
<tr>
<td>21–23</td>
<td>3000 – 9000</td>
<td>5</td>
<td>4950</td>
<td>5500</td>
<td>32.8</td>
</tr>
<tr>
<td>24–28</td>
<td>3000 – 10000</td>
<td>4</td>
<td>5063</td>
<td>5250</td>
<td>48.1</td>
</tr>
<tr>
<td>&gt;28</td>
<td>3000 – 10000</td>
<td>4</td>
<td>5563</td>
<td>5750</td>
<td>34.8</td>
</tr>
<tr>
<td>Select  12–13</td>
<td>350 – 2000</td>
<td>4</td>
<td>1488</td>
<td>1500</td>
<td>-11.9</td>
</tr>
<tr>
<td>14–15</td>
<td>350 – 4000</td>
<td>4</td>
<td>1788</td>
<td>1500</td>
<td>17.9</td>
</tr>
<tr>
<td>16–17</td>
<td>2000 – 5000</td>
<td>4</td>
<td>2038</td>
<td>2000</td>
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<tr>
<td>18–20</td>
<td>2000 – 6000</td>
<td>4</td>
<td>2413</td>
<td>2275</td>
<td>65.8</td>
</tr>
<tr>
<td>21–23</td>
<td>2000 – 7000</td>
<td>3</td>
<td>2183</td>
<td>2400</td>
<td>121.4</td>
</tr>
<tr>
<td>24–28</td>
<td>2000 – 9000</td>
<td>3</td>
<td>2350</td>
<td>2500</td>
<td>148.2</td>
</tr>
<tr>
<td>&gt;28</td>
<td>2000 – 9000</td>
<td>3</td>
<td>2417</td>
<td>2500</td>
<td>158.6</td>
</tr>
<tr>
<td>White Oak Prime</td>
<td>13–14</td>
<td>1200 – 1500</td>
<td>2</td>
<td>1775</td>
<td>1775</td>
</tr>
<tr>
<td>15–17</td>
<td>1150 – 2000</td>
<td>3</td>
<td>1933</td>
<td>2000</td>
<td>-7.3</td>
</tr>
<tr>
<td>18–20</td>
<td>2000 – 2500</td>
<td>4</td>
<td>1950</td>
<td>2000</td>
<td>16.5</td>
</tr>
<tr>
<td>21–23</td>
<td>2000 – 3500</td>
<td>3</td>
<td>2467</td>
<td>2500</td>
<td>11.5</td>
</tr>
<tr>
<td>24–28</td>
<td>2000 – 5000</td>
<td>3</td>
<td>2633</td>
<td>2750</td>
<td>36.1</td>
</tr>
<tr>
<td>&gt;28</td>
<td>2000 – 8000</td>
<td>3</td>
<td>2800</td>
<td>3000</td>
<td>60.7</td>
</tr>
</tbody>
</table>
Miscellaneous Products

The prices paid for or received for various raw-wood products increased, Table 3. Pallet logs increased by $30 per MBF. These are lower quality and sometimes smaller logs purchased in batches of random species to be sawn or chipped into cants. The cants are re-sawn into boards used for pallets, blocking, railroad ties or other industrial applications. Some mills restrict purchases to specific species or exclude specific species, depending on the markets they sell to. The price per ton went up $1 per ton.

Custom Costs

Costs of custom services were generally down (Table 4). The two mills that reported an hourly charge for sawing logs into lumber indicated a large increase in the hourly rate. Logging costs as reported in this survey indicate a decrease in cost from $163 to $106 per MBF. This may be due in part to an increase in the number of active logging firms, relative to the three previous years when the poor economy drove many out of business.

Indiana Timber Price Index

The delivered log prices collected in the Indiana Forest Products Price Survey are used to calculate the delivered log value of typical stands of timber. This provides trend-line information that can be used to monitor long-term prices for timber. The weights are based primarily on the 1967 Forest Survey of Indiana. Adjusting the weights for more recent forest surveys did not change the series enough to justify converting to a new series.

The nominal (not deflated) price is a weighted average of the delivered log prices reported in the price survey. The price indexes are the series of nominal prices divided by the price in 1957, the base year, multiplied by 100. Thus, the index is the percentage of the 1957 price. For example, the average price in 2013 for the average stand was 807.6 percent of the 1957 price. This year the index for a quality stand increased from 739.9 percent to 997.5 percent. This is the largest increase on record for this index.
Table 3. Prices of miscellaneous products reported by Indiana mills, May 2012 and May 2013, free on board (fob) the producing mill.

<table>
<thead>
<tr>
<th>Product</th>
<th>No. Responses</th>
<th>Range</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallet logs, $/MBF</td>
<td>23</td>
<td>150 - 420</td>
<td>236</td>
<td>266</td>
</tr>
<tr>
<td>Pallet logs, $/ton</td>
<td>5</td>
<td>10 – 38</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Sawn cants</td>
<td>3</td>
<td>328 - 460</td>
<td>320</td>
<td>376</td>
</tr>
<tr>
<td>Pulpwood, $/ton</td>
<td>4</td>
<td>30 - 36</td>
<td>35</td>
<td>33</td>
</tr>
<tr>
<td>Pulp chips, $/ton</td>
<td>12</td>
<td>16 - 40</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Sawdust, $/ton</td>
<td>6</td>
<td>5 – 26.6</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Sawdust, $/cu. yd.</td>
<td>14</td>
<td>2 - 15</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Bark, $/ton</td>
<td>2</td>
<td>5 - 12</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Bark, $/cu. yd.</td>
<td>17</td>
<td>1 - 25</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Mixed, $/ton</td>
<td>1</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
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Table 4. Custom costs reported by Indiana mills, May 2012 and May 2013.

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>No. Responses</th>
<th>Range</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawing ($/MBF)</td>
<td>16</td>
<td>200 - 625</td>
<td>315</td>
<td>306</td>
</tr>
<tr>
<td>Sawing ($/hour)</td>
<td>2</td>
<td>125 - 130</td>
<td>68</td>
<td>128</td>
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<tr>
<td>Logging ($/MBF)</td>
<td>5</td>
<td>50 - 150</td>
<td>163</td>
<td>106</td>
</tr>
<tr>
<td>Hauling ($/MBF)</td>
<td>6</td>
<td>40 - 100</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td>Distance (miles)</td>
<td>4</td>
<td>20 - 100</td>
<td>41</td>
<td>55</td>
</tr>
<tr>
<td>$/MBF/mile</td>
<td>7</td>
<td>1 – 3.5</td>
<td>4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

The real prices are the nominal prices deflated by the producer price index for finished goods, with 1982 as the base year. The real price series represents the purchasing power of dollars based on a 1982 market basket of finished producer goods. It’s this real price trend that is important for evaluating long-term investments like timber and the log input cost of mills. Receiving a rate of return less than the inflation rate means that the timber owner is losing purchasing power, a negative real rate of return.

The price index used for the current year is the last one reported for the month when the analysis is conducted: July this year. The index increased from 194.2 for 2012 to 198.1 as of July 2013. Inflation in the 1 to 2 percent range is generally considered a sign of a healthy, growing economy. The change from 2012 to 2013 is about 2 percent.

The nominal weighted average price for a stand of average quality increased from $382.2 in 2012 to $449.1 this year. This is a 17.5 percent increase. This is just slightly below the peak of $452 in 2004. Remember that this series is based on delivered log prices, not stumpage prices. The deflated, or real, price increased from $197.9 in 2012 to $226.7 this year, a 15.2 increase (Figure 1).

The nominal weighted average price for a high-quality stand increased from $492.70 in 2012 to $664.1 this year. This is a 34.8 percent increase, the largest on record. The average real price series for a high-quality stand increased from an adjusted $253.7 in 2012 to 335.3 this year. This is a 32.2 percent increase (Figure 2).

Implications

The extent to which holding a stand of timber increases purchasing power depends on when you take ownership and when you liquidate. The 57 year period used in this analysis is much longer than the typical length of ownership. This year’s increase in average value bodes well for the future if these prices hold up. The rate of increase in the trend line doesn’t include the return resulting from increase in volume per acre by physical growth, nor the potential increase in unit price as trees get larger in diameter and increase in quality. Maximizing these increases in value requires timber management.

William L. Hoover, Professor of Forestry, Department of Forestry and Natural Resources, Purdue University; Greg Matli, Deputy Director, Indiana Agricultural Statistics Service; and Duane McCoy, LTB Forester, Indiana Department of Natural Resources, Division of Forestry.
Although the white sapwood is generally preferred in ash, the *National Hardwood Lumber Association Rules for the Measurement and Inspection of Hardwood and Cypress* lumber make no provisions for separation based on wood color. Neither of the two wholesale lumber pricing reports mentions color. So, the issue is left for the buyer and seller to determine what is acceptable. Heartwood or slightly off color wood is more acceptable in those products with a dark finish. For hard maple and birch the rules are very specific in regards to separation of the white sapwood and brown heartwood when specified.

**Results**

Vigorous 50 to 60 year-old ash trees with about 50 percent or more of their foliage dead were processed into lumber. These trees had very small heartwood and surprisingly, the sapwood looked white. During sawing, the logs had a fermenting smell and the wood looked only slightly off-white. After some drying (Figure 3) occasional light blue stain could be seen near the bark followed by a light brown discoloration further into the log. Normal white wood was also present. The discoloration in the EAB trees is lightly mottled almost like the heartwood formed in non-EAB trees but not near as dark.

The top of trees is attacked by EAB first and then the insect continues to move down the stem. Upper logs are probably more deteriorated than butt logs. The attack is not uniform around the tree so some parts of the wood are more affected than others. The scattered light blue stain probably is the result of initial EAB attack. The hole allowed the blue stain fungus to enter the tree.

Very slowly grown, non-vigorous trees in the later stages of defoliation were also processed. This wood was predominately brown, lighter weight and probably brash. This condition is due to the slow growth of the trees and not EAB.

EAB trees that had been dead for an entire summer were not available for examination, but based on previous experience with dead ash trees discoloration will occur rapidly followed by decay. Shortly after an EAB tree loses its foliage discoloration will be complete and the material will be acceptable only for industrial lumber where color is not important. Probably within a year, decay will commence and the structural integrity of the wood is compromised.

**Action To Take**

From the onset, foresters and industry have correctly recommended the removal of all merchantable ash which had the potential of being infected by EAB. Although infected trees still have merchantable wood the timber buyer may not be able to commence harvesting in time to maximize value and will likely not pay more than pallet log price. Ash is not a highly valued species and the landowner should weigh the value of what the ash is worth and the impact of its harvest on any forest management plans for the specific stand. It is important to market ash trees prior to infestation.

Where only a few trees are involved it might be better to salvage the trees with a portable band mill. The material could be used for flooring, paneling or other local uses. Ash is subject to powder post beetle damage, even after kiln drying. Infestation is highly variable. Wood products with a finish applied are protected because the beetle cannot penetrate the surface cells or pores to deposit eggs. Beetles are controlled by fumigation or heating to somewhat over 132 degrees Fahrenheit.

Daniel Cassens is an Extension Specialist and Professor of Wood Products with the Department of Forestry and Natural Resources, Purdue University.
Is fire a four-letter word when considering its use in woodlands? The answer is complicated and undoubtedly depends on the specific management objectives of a particular piece of woodland.

Since the retreat of the Wisconsinan glacier some 13,000 years ago, the vegetation communities occupying Indiana’s landscape have seen remarkable change. Pollen cores taken from the natural lakes of northeast Indiana help assist scientists in recreating what our woods looked like through time. Our woods were dominated by conifers, primarily spruce and pine, for the first 4,000 years post glaciation. Hardwoods were present, but were minor components of the forest. Hardwoods began dominating the landscape from about 8,000 to around 100 years ago, with oaks being the predominate trees. Annual plants currently represent the dominate pollen deposition in natural lakes, not surprisingly given the dominance of agriculture on our landscape. Today’s woodlands are currently undergoing another major transition.

Forestry Inventory Analysis conducted by the United States Forest Service throughout the Central Hardwoods indicate that, while oak is still a dominate overstory tree in many woodlands, the mid- and understory are composed mostly of shade tolerant species, including maples and poplars. These surveys indicate relatively few, if any oaks, are naturally regenerating. Further compounding the regeneration issue is the preponderance of exotic shrubs invading the woods. If oak was such a dominate component of our woods for so long, why are we having an oak regeneration problem today?

We know that oak is a disturbance species, requiring adequate amounts of sunlight in order to regenerate. The standard silvicultural practices of disturbing woodlands to promote sunlight reaching the forest floor, and therefore attempting to stimulating oak regeneration, has been tree harvesting. What we are seeing, however, is that tree harvesting alone has not reversed the oak regeneration problem.

The likely disturbance mechanism impacting the historic species composition of our woodlands was likely fire. Lightning induced fire is relatively rare in the eastern United States, as most thunderstorms are accompanied by rain. Native Americans would have been the ignition source of such fire. Humans have occupied Indiana since the glaciers retreated, and have had substantial impact on natural communities. We know that Native Americans burned for many reasons. They used fire as a means of clearing land for agriculture and to facilitate travel. They used it in warfare, burning out their enemies and to keep fuel loads low around their villages to keep enemies from burning them out. Perhaps the most widely use of fire by Native Americans was for accessibility to food. Fire was used to improve forage for wild game as well as to increase yields of, and accessibility to, berries, nuts, seeds and other wild vegetable foods. Fires were used as a hunting tool, to improve visibility and drive game species.

Because oaks have a long history of association of fire, they have evolved several adaptations to living in a fire environment. They have thick bark, making it more difficult for heat to penetrate the cambium layers. Should a fire get hot enough to damage part of the cambium, oaks can quickly seal the damage through compartmentalization. Compartments created by fire leave scars that are used by dendrochronologists to determine how frequently high intensity fires occurred on the landscape. The fire return interval for southern Indiana was estimated to be between 5 and 10 years. Oaks also exhibit deep and wide rooting allowing for vigorous resprouting. When acorns germinate, their cotyledons are often placed below ground. This places the root collar below the soil surface where they are more protected from fire.

*Fire and Woodland Management*

By Rob Chapman

Burning under specific weather condition can result in patchy burns. Burning every three to five years, combined with butt swell, prevents fuel accumulation around the tree stem and reduces damage potential to cambium layers.

cont’d on page 13
The story of forestry management at Crane is not so different than many public properties throughout southern Indiana. The forests of Crane were purchased during the Great Depression era under a federal program within the Farm Securities Administration (FSA). The FSA was tasked to find land under cultivation that was susceptible to erosion, purchase the land, and return the land back to its proper forest coverage. From 1935 to 1939, approximately 32,000 acres were purchased. The original plans were to create multiple reservoirs of a smaller size to provide recreational opportunities to the local towns of Mountain Springs, Blankenship, Owensburg, and Burns City. Instead, planners decided to create what was at the time the largest manmade lake in the state when they dammed First Creek and created 800-acre Lake Greenwood. With a marina, arboretum, cabins, campsites and miles of hiking trails it was dedicated on 15-September of 1939 as the White River Land Utilization Project.

A mere 4 months later US Navy surveyors were on site drawing up plans for purchasing additional land to provide for a ordnance storage facility for Navy weaponry. With the war heating up in Europe, the Navy was in desperate need to store their munitions out of the range of a bombing raid from and squadron of planes launched from an enemy Aircraft Carrier. An additional 35,000 acres were purchased by the Navy without regard to productivity of the soil and inhabitant to create a contiguous block of land in which the installation could be created. The towns of Mountain Springs and Blankenship were totally engulfed and are but a gathering of foundation stones today. On December 1st, 1941, the Installation was dedicated as Naval Ammunitions Depot, Burns City. The town that would provide the modern name given to the installation would not be constructed until 1944 and bear the name of the first Chief of the Bureau of Ordnance, Commodore William Montgomery Crane.

Forest Management plans were initially created and carried out by the nearby US Forest Service Office in Lawrence County. The first Navy-employed forester was hired in the mid-1950’s and oversaw a large part of the reforestation effort. Much of the construction of the installation left the landscape highly eroded and in need of repair. Thousands of acres of reforestation and erosion control were performed throughout the 1950’s. In 1957, the first large scale soil and water conservation project was undertaken. The Boggs Creek Watershed project had plans for the construction of 2 medium sized flood control structures and numerous other smaller flood control ponds. It also included aspects of forest and wildlife management. Dedicated in 1961, it was the first Navy generated landscape level natural resources project at Crane.

In September 1960, the Department of Defense created its own, internally funded Forestry and Natural Resources program with the Sikes Act. By the end of the 1960’s the US Navy funded Crane Foresters were authoring their own long term forest management plans and conducting timber harvests and were on their way to establishing the most profitable Forestry program within the US Navy.

The 1960s saw mostly improvement and cull cuts throughout the landscape. With the majority of the land having been under cultivation a mere 25 years prior, the harvests were intended to prepare for the future. The 1970s saw a slowdown in the amount of harvesting with the exception to a small increase in the mid-1970s to salvage a 3,000 acre area defoliated by the forest-tent caterpillar. The 1980s was the decade in which a small increase in harvesting occurred but the program itself was still not creating a substantial profit. Other than paying for the staff foresters and funding the supplies, the forest was just beginning to reach its full potential.

The plan drafted in 1990, which would run through the year 2000, was the plan that began to reap what had been sown in the past 4 decades of management. Harvesting levels increased from an annual harvest of approximately 315,000 boardfeet to approximately 2,300,000 boardfeet. Average harvested acreage went from a 226 acre per year average to nearly 1,350 acres. During this decade, the Forestry program at Crane skyrocketed past all other Navy installations as the most profitable and productive in the Navy.

With Crane’s thin, unglaciated soils the production of the highly prized black walnut (Juglans nigra) is very limited. Black cherry (Prunus serotina) is another highly profitable tree requiring the deep, rich soils found more to the north of the state. White oak (Quercus alba), Black Oak (Quercus velutina), and hickory (Carya ovata and glabra) make up the species most suited for the poor soils of Crane. In addition, Tulip Poplar (Liriodendron tulipifera) is making up a larger and larger portion of the landscape in the absence of burning and grazing as time goes on. While this is certainly a tree of value, it is problematic as it is highly susceptible to drought stress on the soils at Crane as the summers of 2012 and 2013 have shown.
With the goal focusing on Oak regeneration, the harvesting method employed is a single-tree selection with group selections when applicable. Typically the group selections are placed on south or west aspects where the oak regeneration is able to better compete with the faster growing tulip poplar. From time to time, fire is utilized but it is not a viable option to burn on a large scale due to conflicts with the military mission. Another method that is assisting in maintaining an oak component is through a “weeding and cleaning” style of Crop Tree Release within 10 years of creating an opening. This work is performed on contract bid upon by local consulting foresters with the goal of selecting the oak within a regeneration opening and releasing them from competition. Our 30-year harvest rotation will usually allow us to re-enter the stand and release these same oaks again during the next harvest.

Crane has its share of challenges as well. The ever growing challenge of invasive species is an ongoing battle. Each year, approximately $50,000 is spent on fighting the battle in keeping ailanthus, autumn olive and bush honeysuckle at bay. Kudzu eradication is a seemingly reachable goal and the “next big invasive”, callery pear (*Pyrus calleryana*), is especially bad at Crane due to an abandoned nursery on station.

Another challenge is achieving silvicultural goals while being located within the summertime flying range of the Indiana bat. In order to keep from taking, or killing, one of these endangered bats, Crane has elected to follow the USFWS guidelines set forth to protect the bat and its habitat. The major guidelines are restricting harvesting to the months of October through March, leaving the shagbark hickory (*Carya ovata*) uncut, maintaining at least a 60% canopy coverage throughout the stand, and leaving undisturbed riparian buffers along streams. The greatest of these challenges has been the harvesting during the time of year when the weather is typically less suitable. The companies are required to perform extra duties to avoid soil compaction and erosion including having a dozer equipped with a 6-way blade on site at all times, shut down skidding operations when damage is likely to occur, and repair all soil damage before performance bond will be released. While this may slightly impact the value of the timber, the overall cost is low.

Crane is now well underway with its 3rd decade in the “modern” era since the elevated harvesting began in 1990. The latest timber inventories are indicating even with the harvesting levels at approximately 3,000,000 board feet per year, we are cutting merely 40% of what we are growing annually. This fact will ensure that there will be a viable forest resource here for as long as there are hands willing to manage it.

_Trent Osman is a forester for the Naval Surface Warfare Center - Crane._
It’s not uncommon for Ward Wilkins to pack a lunch, walk into his 36 acres of forest in the morning and not be seen again until sunset.

There, he might be cutting down a tree ready for harvesting, or he might be clearing out the dreaded bush honeysuckle on the forest carpet. All the while he is spending some time amid the tranquility of his woods.

“It’s a peaceful place to be,” he says. “I never come out in a bad mood.”

Wilkins is among woodlands owners whom Purdue University forestry experts say do it right—stewards who care deeply about the natural resource of their property and manage it well so it can thrive for future generations to enjoy. He has taken the research-based advice of Purdue’s Department of Forestry and Natural Resources on how to effectively manage his woodlands to meet his objectives and has offered his land for field work for FNR and agronomy students.

Wilkins himself is a fifth-generation farmer of 620 acres of family-owned land near Linden in west-central Indiana. In addition to the woodlands, the land is used for growing crops such as corn, soybeans, wheat and alfalfa. For the Wilkins family, a management plan has been a long-term commitment. It has to be for forestland, which requires nurturing over many years to produce what an owner wants from it.

Wilkins sells wood that he cuts from a variety of trees: white and red oak, white ash, black cherry, black walnut, Kentucky coffee bean and hickory.

He doesn’t know what percentage of his total income comes from wood sales—only that it is very small, hardly worth mentioning. For him, selling wood is an excellent way to “fill in the winter” after the crops have been harvested and make a little extra money. In fact, because his woodlands involve few costs, they historically have generated more net income per acre than his traditional row crops, at least until commodity prices skyrocketed in recent years.

Indiana Gaining Forest Acreage

Surprisingly, there is more forestland in Indiana now than there was 15-20 years ago—4.7 million acres, up 200,000. Purdue Extension forester Lenny Farlee cites several reasons for this.

• The livestock industry’s move from raising animals outdoors to indoors has resulted in gradual, natural conversion of some pastures and haylands to forestland.

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See the Forest For the Trees

By Keith Robinson

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Fire and Woodland Management  (cont’d from page 9)

Oak leaves have further fire adaptations. They are thick and contain tannins, both of which increase decay resistance. Oak leaves tend to be drier, making them more flammable than other hardwoods, and they curl which increases fire spread. While these characteristics promote hot fires, the fires often move quickly through the understory. The low residence time of fast burning does not impact mineral soil, reduces damage to mature trees, and promotes the recycling of mineral back to the soil.

So, I will ask my original question again, in different terms. Can we use fire for woodland management in Indiana? The answer is certainly yes. But the answer depends on the specific management objectives of a particular woods and the land manager’s ability to incorporate fire in an effective and safe manner. Should you use fire and how often you burn often dictates the vegetation community of the forest floor. Burning once every three to five years favors an understory of grasses, sedges, and fall blooming wildflowers. Native legumes will also be more abundant following a frequent fire prescription. A 10-25 year burn interval results in fewer grasses and sedges and promotes spring wildflowers.

Research on fire use in mixed oak woodlands has shown that a single, low intensity fire will do little to promote oak regeneration. However, a single high-intensity fire increases oak regeneration. This research has resulted in the following guidelines for fire use to manage oak woodlands:

1. Fire is best used 3-5 years following a shelterwood harvest in which about 50 percent of the overstory is reduced. It may be necessary to protect valuable residual trees by clearing the area around those trees of leaves or other fuels. Leaf blowers work well in this situation.

2. Burns can be conducted anytime from leaf fall to leaf expansion (late October to mid-Spring).

3. Where insufficient oak seedlings exist, fire can create conditions suitable for oak establishment by reducing litter and competition in the under-and mid stories. Burns would ideally be conducted prior to an abundant acorn crop. Do not burn immediately following an abundant acorn crop or when oak seedlings are small or recently established.

4. Following a regeneration cut, a burn will give oak a competitive advantage when other species occur in higher densities. Burns should occur 3 to five times for the first ten years, then decreased to once every 10-25 years.

5. Deer browse could increase as oak seedlings vigorously sprout after burning. In areas with high deer densities, it may be necessary to increase hunting pressure. Exclusion activities may also be necessary to further reduce browsing pressure.

Fire is an ecological process that helped shape the composition and structure of our woods and certainly has a place in the land manager’s toolbox. Fire is inherently risky and should only be conducted by following a carefully prepared prescribed fire plan. Such a plan will include specific objectives, design and location of fire breaks, the season and weather conditions necessary to safely and effectively conduct the fire, and a contingency plan should a fire escape. It is important that private landowners participate in a prescribed fire workshop given by the Indiana Department of Natural Resources. Cost share for prescribed burning may be available under some Farm Bill programs. If you have any questions about prescribed fire, please feel free to contact me at Rnchapman@purdue.edu. Contact your DNR District Forester or District Wildlife Biologist for technical assistance and information on cost share options and availability.

Rob Chapman is an Extension wildlife specialist in the Department of Forestry and Natural Resources at Purdue University.
See the forest for the trees (cont’d from page 12)

- Conservation programs encouraging landowners to plant trees have returned marginal agricultural land to forests.
- Grass, brush and wetlands habitats are becoming forests as more trees grow up in those areas.

“That being said, I think we recognize the potential for a slowdown or even a reverse,” Farlee says.

He is concerned that high prices farmers are receiving for their crops these days will tempt some to convert forestland to farmland so they can grow more crops. That could be a mistake because some forest soil and terrain is unsuitable for farming.

Urban sprawl—the expansion of cities into rural areas—continues to cut into woodlands, although the pace has slowed as proposed housing and retail developments are put on hold in a weak economy.

Farlee considers invasive plant species the biggest threat to forests. One, bush honeysuckle, is native to Asia and Eastern Europe and promoted in the U.S. as an ornamental plant, as an erosion control, and to provide cover and food for wildlife. But it spreads rapidly, forming dense canopies that hinder development of tree seedlings.

Purdue Extension offers programs such as educational field days and an eight-week course to help woodlands owners solve such problems and better manage their property. It also has publications on topics that include marketing timber and improving forest health.

Reasons to Manage

The state and federal governments offer incentives to property owners who agree to manage their woodlands. About 600,000 acres, including Wilkins’ 36, are enrolled in the Indiana Classified Forest and Wildlands Program, which requires that the land be protected from development, livestock grazing and destructive practices that threaten the natural resource. In return, the land is assessed at only $1 per acre for property tax purposes.

There also is incentive in the monetary value of hardwood, used in making furniture, flooring and veneer. Wilkins says some black walnut trees can bring thousands of dollars.

Indiana grows some of the best black walnut and white oak in the world.

“So if you’ve got some of them you’ve got to manage them well to get the most value out of them,” he says.

Highly prized trees in well-managed woodlands can increase in value by 6-8 percent a year—even more in a stronger economy, when the housing demand for hardwoods is greater.

Some owners, especially those with very small parcels, might not want anything from their woodlands other than to enjoy the view.

That is a property owner’s right, notes Liz Jackson of FNR and executive director of the Indiana Forestry and Woodland Owners Association, which has more than 800 members with 125,000 acres of forests. But she says well-managed woodlands ensure that old trees will be replaced with the new, called regeneration, and that the view will be pleasing for years to come.

“Many property owners believe their woodlands are very important and feel a real connection,” she says. “Others drive by every day and take them for granted. But if we think about the wonderful aesthetics we have in our woodlands, it brings us a value that you can’t put a price tag on.”

Woodlands do more than give us a nice view and contribute more than $9 billion to Indiana’s economy annually through recreation, tourism, manufacturing and sales of forest products. Jackson says they help to filter the water we drink, clean the air we breathe, offer recreation, and provide food and shelter to wildlife.

HARDWOOD LUMBER: PRODUCING, USING, AND SELLING WORKSHOPS in 2014

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The WOODland Steward

14
**Ask the Steward**

By Dan Ernst

**Question:** Where do skunks go in the winter?

**Answer:** The only skunk native to Indiana is the Striped Skunk and it is widespread across the state and one of our most common mammals. In the wild, skunks inhabit woodlands, grasslands and drier grounds around wetlands. Skunks will den in burrows dug with their strong front claws or under buildings – primarily abandoned buildings.

They are not true hibernators, but will shelter for extended periods of time during the coldest winter months. During this time of dormancy they have an extended inactive period and rarely feed or move about. Come February-March, the breeding season kicks in and a litter of 4-6 kits are born approximately 66 days later. The kits will stay near the mother for up to a year. She is very protective of the kits while they are young – and will spray with little provocation.

Fully grown a skunk may weigh around 11 pounds.

Interestingly skunks have poor eyesight and generally are unable to see objects more than 10 feet away. This partially explains why they are vulnerable to death by road traffic.

**Question:** What is the longest river in Indiana?

**Answer:** That would easily be the Wabash River at nearly 512 miles. The mighty Wabash, Indiana’s official State river, has its beginnings in western Ohio, approximately 30 miles east of Portland, Indiana. The name ‘Wabash’ comes from the Miami Indian word “wah-bah-shik-ki”, or in French - ‘Oubache’. This means “pure white” and refers to the white limestone riverbed in its Northern reaches, particularly noted in Huntington County.

The Wabash includes the nation’s longest stretch of free flowing river east of the Mississippi, and forms a 230-mile boundary between southern Indiana and Illinois until it empties into the Ohio River at Indiana’s Southwest corner.

For 200 years the Wabash was a major trading route, linking Canada and the Great Lakes to the Mississippi River; however, 1905 saw the last steamboat journey on the river. The Wabash is a remarkable river, and within its reach lies some of the finest bottomland hardwood forests in the world!

Dan Ernst is an Assistant State Forester with the Indiana Division of Forestry. He oversees the state forests in Indiana and has authored the “Ask the Steward” column for years. Have a question for the column? Email Dan at dernst@dnr.in.gov.
Every county in Indiana has a SWCD whose mission is to provide information about soil, water and related natural resource conservation. One way SWCD's accomplish this mission is through the support of the Woodland Steward Newsletter. The counties listed above contributed funds for the printing and mailing of the Woodland Steward Newsletter to the landowners in their county. The next time you visit your local SWCD, thank them for their support of the Woodland Steward Newsletter or encourage them to support the newsletter in future years.

Thank you to all the supporting SWCD's. Without your support many landowners in Indiana would not receive the Woodland Steward Newsletter.

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