

# The **WOOD**land Steward

Promoting the Wise Use of Indiana's Forest Resources

## 2010 Indiana Consulting Foresters Stumpage Timber Price Report

*by Indiana Association of Consulting Foresters*

This stumpage report is provided annually and should be used in association with the Indiana Forest Products Price Report and Trend Analysis written by Dr. William Hoover in cooperation with Indiana's forest products companies. Dr. Hoover's report is published in the Fall issue of the *Woodland Steward*.

Stumpage price was obtained via a survey to all known professional consulting foresters operating in Indiana. Reported prices are for sealed bid timber sales only (not negotiated sales) between a motivated timber seller and a licensed Indiana timber buyer. The data represents approximately 10 to 15 percent of the total volume of stumpage purchased during the periods from June 16, 2009 through June 15, 2010.

The results of this stumpage price survey are not meant as a guarantee that amounts offered for your timber will reflect the range in prices reported in this survey. The results simply provide an additional source of information to gauge market conditions.

### WHAT ARE SEALED BID

**TIMBER SALES:** The sealed bid timber sale process is for trees marked by a professional forester. The species, number of trees and volume in a sealed bid sale are determined prior to the notice of sale. A notice is sent to licensed timber buyers who then inspect

the timber and offer a price for said trees at a predetermined time and place. Under conditions determined in the bid notice, the owner then accepts or rejects the bids. Upon acceptance of the bids by the owner and the fee paid, the owner then conveys the right to cut the advertised trees to the purchaser. This is frequently referred to as a lump sum timber sale. More detailed information on this process is available in Purdue FNR publication 111 – "Marketing Timber" or FNR – 138 "How to get the Most from Your Timber Sale". These publication and others are available on line at: <http://www.agcom.purdue.edu/agcom/Pubs/fnr.htm>.

This report reflects "spot market" prices, not the average price paid by timber buyers. The bidding process used by consultants "spots" the maximum amount any buyer is willing to pay for a particular lot of timber at a particular time and place, not the average price paid for timber. High bids frequently reflect an urgent need for timber because of special orders for lumber or veneer, low log inventories at the buyer's mill, poor logging conditions due to wet weather, or other special conditions.

Hardwood lumber is sold in a highly competitive commodity market. Competition comes from mills within the state, region, and hardwood lumber producers in the Lake States, Northeast, South and

*cont'd on page 4*



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## Calendar of Events

### August 7

#### **Forestry Field Day**

9:00 am - Noon EDT

Mill Pond Woods, Marshall Co.

Bush honeysuckle control & other topics.

Arrow Head Country RC&D

Contact Bruce Wakeland at  
[bwakeland@centurylink.net](mailto:bwakeland@centurylink.net).

### August 14

Tippecanoe, Clinton, Howard, Tipton  
and surrounding counties.

### August 28

Allen, Huntington, Wabash, Wells and  
surrounding counties.

#### **Private Land Management and Indiana's Wildlife Action Plan**

How to use state and federal  
conservation programs.

Contact [stoelting@indianawildlife.org](mailto:stoelting@indianawildlife.org)  
or (317) 875-9453 to RSVP.

### August 26

#### **Forest Landowner Program**

SEPAC, Jennings Co.

4:30 pm – 9:00 pm

Contact (812) 689-6511 or [osbornda@purdue.edu](mailto:osbornda@purdue.edu).

### September 8

Dagaz Acres at Rising Sun, IN,  
Switzerland Co.

### September 9

Dull's Tree Farm at Thorntown, IN,  
Boone Co.

#### **Natural Resources Enterprise Programs**

See [www.fnr.purdue.edu/  
NREnterprises/](http://www.fnr.purdue.edu/NREnterprises/) or call (765) 647-3538  
for more info.

### September 11

#### **Nature Daze 2010**

Free landowner field day with lunch

9:00 am – 3:30 pm

Brown County

Visit [www.bcnwp.org](http://www.bcnwp.org) for more info.

### September 18th

#### **Forestry Field Day**

9:00 am

Moore Tree Farm, Montgomery Co.

Plantation management, invasive plant  
control.

Contact (765) 653-9785 or [stred@  
sycamoretrails.org](mailto:stred@sycamoretrails.org).

Martin County SWCD

### September 25, 2010

#### **Forestry Field Day**

Martin State Forest

Contact the Martin Co. SWCD

812-247-2423

### September 25

#### **Public Lands Day event**

Pioneer Mothers Memorial Forest,  
Orange Co.

Trail work and other restoration work.

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Contact [tligman@fs.fed.us](mailto:tligman@fs.fed.us) or (812)  
276-4757.

### September 30

#### **Stump to Product Tour**

1:00 pm

Orange County, Paoli area

Industry and woods tour followed by  
dinner and speaker

RSVP to White River RC&D at (812)  
883-3704, ext 5 or [maryjane.deel@  
in.usda.gov](mailto:maryjane.deel@in.usda.gov).

### October 9

#### **Forestry Field Day**

Free landowner field day with lunch

10:00 am – 3:00 pm

Wehr farm, Crawford Co.

RSVP to Lincoln Hills RC&D at (812)  
649-9136, ext 5.

### November 5-6

#### **Annual Landowner Conference**

Indiana Forestry & Woodland Owners  
Association

Richmond Holiday Inn, Richmond

See [www.ifwoa.org](http://www.ifwoa.org) or (765) 583-  
3501.

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*The opinions expressed by the authors  
do not necessarily reflect those of  
the Woodland Steward Institute.  
The objectives of the newsletter are  
to provide general and technical  
natural resource information to  
woodland owners of Indiana, improve  
information distribution and build  
support for responsible forest resource  
management.*

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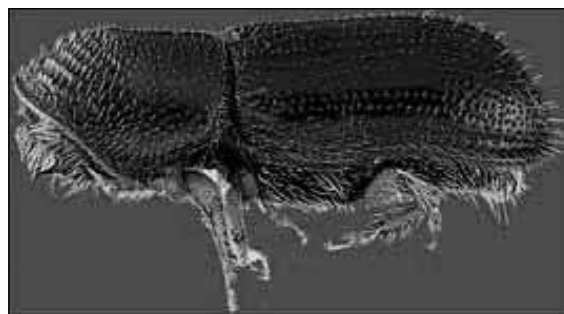


## Thousand Cankers Disease of Black Walnut – New Threat to an Important Tree to Forest Landowners and the Timber Industry

by Marcus McDonough and Phil Marshall

Thousand Cankers Disease is a recently discovered disease of *Juglans* species. It is a fungus (*Geosmithia morbida*) spread by the walnut twig beetle (*Pityophthorus juglandis*). The fungus infects the tree every time a beetle bores into a branch. The fungus creates cankers in the phloem and cambium robbing the tree of nutrients. The cankers grow together from each initial infection and eventually girdle branches. These cankers are usually not visible unless the bark is peeled from infected areas. External symptoms, yellowing leaves, suddenly wilting leaves and branch dieback mark the end stage of this disease. Death of the tree occurs 2-3 years after leaf yellowing is first observed.

Currently, Thousand Cankers Disease is only known to occur in the western United States (AZ, CA, CO, ID, NM, OR, UT, WA). There is major concern over the spread of Thousand Cankers Disease to the Eastern United States and it is the movement of infected walnut products by man that poses the greatest risk for spreading the disease to new areas.



Walnut twig beetle, side view.

Jim LaBonte, Oregon Department of Agriculture.

established and announced their quarantine May 7, 2010. Michigan Department of Agriculture established and announced their quarantine May 27, 2010.

Following these quarantines, the Indiana Department of Natural Resources, Division of Entomology and Plant Pathology is considering a similar quarantine to help protect valuable black walnut resource in Indiana's forests and plantations.

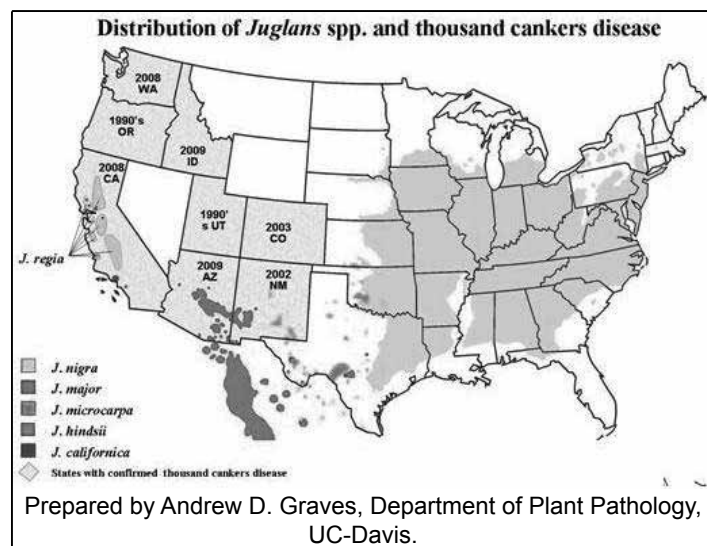
The U.S. Forest Service, along with state natural resource and agricultural agencies and university researchers are currently working to develop a national response plan for this disease. For more information on the disease go to [www.thousandcankerdisease.com/](http://www.thousandcankerdisease.com/).

To view the quarantines, visit the website for each state:  
Missouri - [mda.mo.gov/plants/pests/thousandcankers.php](http://mda.mo.gov/plants/pests/thousandcankers.php)  
Michigan - [www.michigan.gov/mda](http://www.michigan.gov/mda)

Marcus McDonough is a nursery inspector and compliance officer for the IDNR Division of Entomology and Plant Pathology. Phil Marshall is director of the IDNR Division of Entomology and Plant Pathology.



Symptoms of the walnut twig beetle. Ned Tisserat.



One action state regulatory agencies are taking is the creation of an external quarantine that prevents and restricts the entrance and movement of *Juglans* sp. plants, logs, lumber, hardwood firewood and other products into the state from the western states.

Three states have created an external quarantine for Thousand Canker Disease. Missouri Department of Agriculture established and announced their quarantine April 12, 2010. Nebraska Department of Agriculture

**Price Report** (cont'd from cover)

Southeastern production areas. This market competition means that the cost of stumpage in other producing regions determines in part the amount Indiana mill and loggers can pay for stumpage. If all timber were sold on a bid basis the spot market would no longer exist and the average of the highest bid price offered would be lower than now observed. This explanation isn't meant to deter you from seeking the best available price. It's meant to explain the apparent discrepancy between the two price reporting systems.

**CATAGORIES OF TIMBER**

**REPORTED:** The prices reported are broken into three sale types: high quality, average quality, and low quality. A high quality sale is one where more than 50 percent of the volume is # 2 grade or better red oak, white oak, sugar maple, black cherry, or black walnut. The low quality sale has more than 70 percent of the volume in # 3 "pallet" grade or is cottonwood, beech, elm, sycamore, hackberry, pin oak, aspen, black gum, black locust, honey locust, catalpa, or sweet gum. The average sale is a sale that is not a low quality sale or a high quality sale as defined above.

In the 2008 report, some minor adjustments were made in the categories from previous surveys. White ash was previously included as a component of the high quality tim-

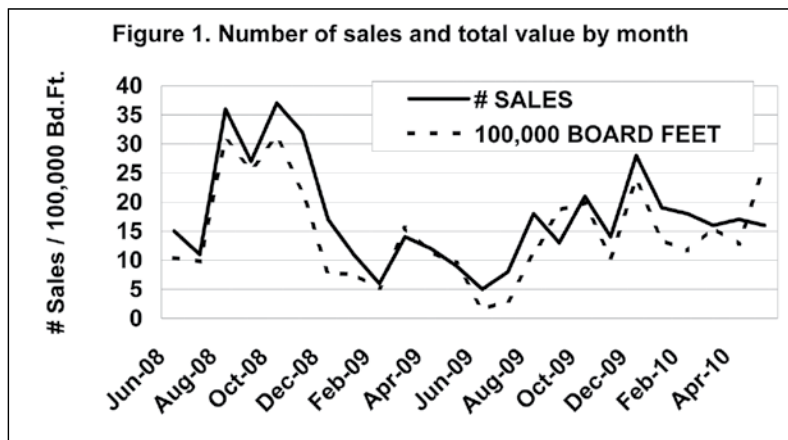
ber sales and hickory was previously in the low quality group. No changes in the groups were made this year, so the 2010 data should compare well with the 2008 and 2009 data.

**REDUCTION IN SALES CONTINUED DURING THE 2008-2010 PERIODS:** In 2010, 206 sales were reported compared to 247 sales in 2009 and 283 during the same period in 2008. We had more consulting firms (21) submit data in 2010 than in 2009 (16) or 2008 (11 firms). All firms reporting in 2009 also reported in 2010 with most showing fewer sales and less overall volume than in the 2009 reporting period continuing the trend from 2008, however, activity seems to be picking up (Figure 1). This reduction is in large part due to reluctance among most consultants to sell timber since late 2008 or early 2009 due to the economic downturn and its effect on the timber markets. A few firms did not sell any timber during this reporting period. Sales by quality type for the 2010 period were 67 (82 in 2009) high quality sales, 111

(123 in 2009) medium quality, and 28 (42 in 2009) low quality sales.

**BIDDING REMAINS STRONG:**

In 2010 a total of 1,177 bids were received for the 206 sales or 5.7 bids per sale (Figure 2). This is the highest total recorded since the report began in 2000. The 5.7 average number of bids offered per sale included 6.8 bids for high quality, 5.6 bids for medium quality (an increase from 2009, 6.4 and 4.6, respectively) and 3.6 for low quality (a decline from 4.2 in 2009). For six sales of very high quality in 2010 (defined as sales with 5 percent or more of the estimated volume with white oak or black walnut veneer) the average number of bids was 9.2 – up from 2009 but very similar to 8.9 recorded in 2008. These figures continue to show that higher quality timber offered for sale increases buyer interest and the number of bids offered. The increase in the number of bids per sale this year may in part be due to a decreased



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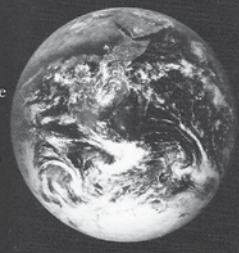
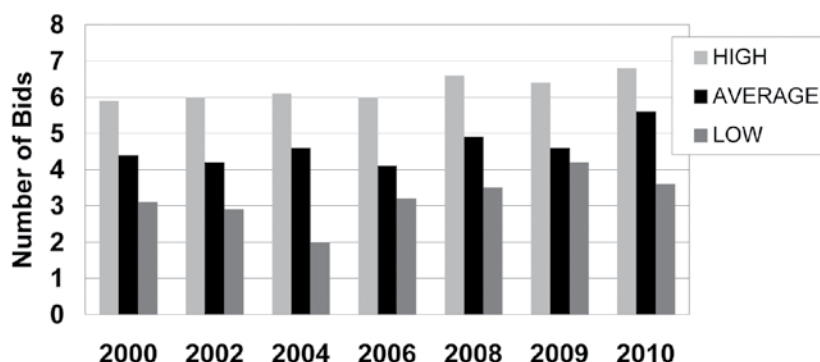


Figure 2. Number of Bids per Sale by Quality Group



volume of timber on the market.

### REDUCTION IN VOLUME / VALUE SOLD, ESPECIALLY FOR HIGHER GRADES:

A total stumpage volume of 17,687,648 board feet were sold during the 2010 reporting period compared to 19,256,439 board feet in 2009 which was down from over 25 million board feet in 2008 and 2006. High quality sales totaled 4,930,776 board feet down slightly from 2009 but down significantly from over 10 million board feet in 2008 and 2006. Medium quality sales totaled 11,299,801 board feet up slightly from 10,746,917 board feet and similar to totals from 2008 and 2006. Low quality sales totaled 1,457,071 board feet down from nearly 3 million board feet in 2009, 2008, and 2006. Some consulting firms have commented that they continued to delay some higher quality sales until recently due to the economy. Total timber value sold in the 2010 reporting period was \$ 6,889,190, down

slightly from \$7,278,302 in 2009. Total value by type was \$ 2,621,020 for high, \$ 3,920,356 for medium, and \$ 347,914 for low.

### EFFECTS OF THE ECONOMIC DOWNTURN:

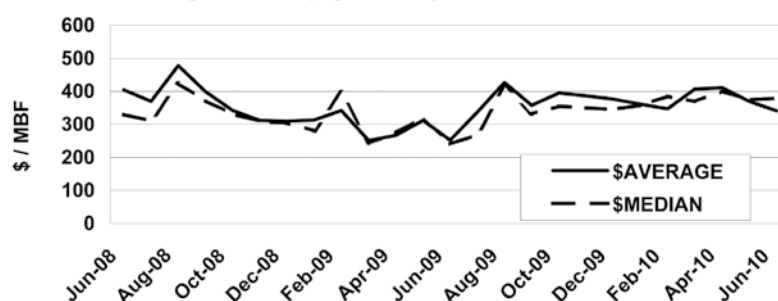
Due to the drastic change in the economy in 2008, it was decided last year to collect information on the date of the timber sale in order to track month-by-month activity (Figure 1). Although the data set is relatively small, it seems to reflect market trends. Historically, late winter and early spring is typically a slower period due to wet weather and high inventories at the sawmills. The levels in the summer and fall of 2008, prior to the downturn were

consistent with previous years. Beginning in December 2008 and generally continuing through July 2009 the number of sales and timber marketed dropped considerably. Since then activity has increased, although at a gradual level. Activity did drop in late winter as it typically does, even though sawmill inventories were low. Indications for the last few months show an increase level of activity and most consultants have indicated they plan to sell more timber this year.

Stumpage Value (\$/MBF) has dropped from the fall of 2008 until the summer of 2009, showing a spike in August of 2009 then receding slightly then trending mostly upward (Figure 3). The median price appears to be a better indicator due to less influence of higher quality sales that can distort the average price. Comments by several consultants indicate they believe current prices are similar to 2007 levels, which the data supports. (See Figures 4 and 5.)

*cont'd on next page*

Figure 3. Stumpage value by month - all sales



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*Price Report (cont'd from page 5)*

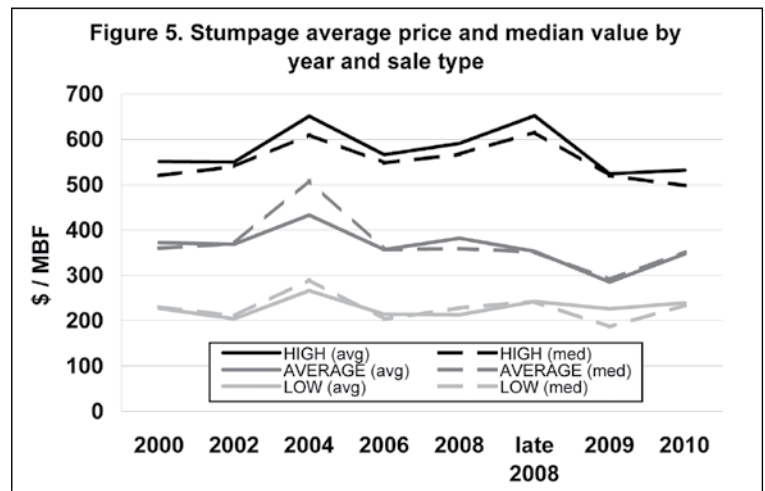
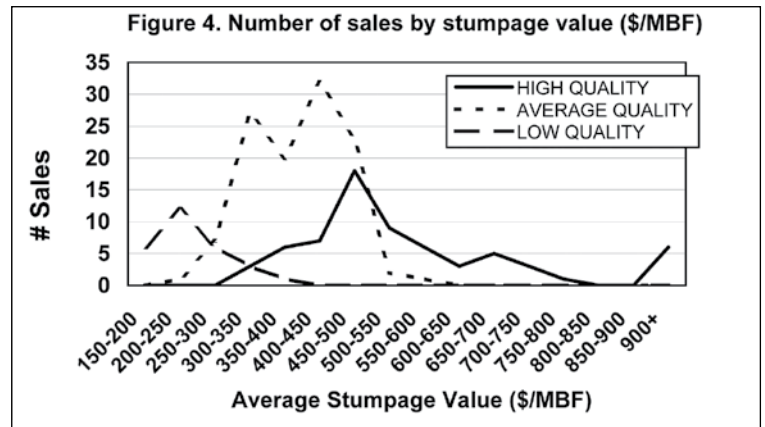
**STUMPAGE PRICE**

**INCREASING FROM 2009:** The average stumpage price for 2010 for high quality was \$532 – down from \$572 in 2009 (median price \$498 vs. \$549 in 2009) (Figure 4). Although this level is down, last year's values for high quality only dropped 3 % for the year. The largest influence may be due to the reluctance of consultants to sell quality timber, especially sales with much black cherry, which has seen steep drops in prices. The percentage of high quality sales has dropped from an average of approximately 40% of sales sold in 2004 thru 2008 to 28 % for 2009 and 2010. All indications are that black walnut and larger diameter white oak are doing extremely well.

The average stumpage price for average quality was \$347 in 2010 – up from \$320 in 2009 (median price \$352 vs. \$314 in 2009). The median price for average quality was similar to the median stumpage price in 2008 (\$359) and 2006 (\$357). The number of sales and volume of average quality timber sold has remained fairly constant at 11 to 12 million board feet per year since 2006.

The average stumpage price for low quality was \$239 in 2010 – up from \$225 in 2009 (median price \$234 vs. \$228 in 2009). The price for low quality has trended up for several years.

The weighted average and median stumpage price by sale type (obtained from this survey in 2000, 2002, 2004, 2006, 2008, 2009, and 2010) is reported in Figure 5. The weighted average of the stumpage price is the total value (\$) for each sales group (high, average, low) divided by the total volume by sales group. The median price is the amount where half of the sales are higher and half are lower. The price reported is per 1000 board feet (MBF) of standing timber. To obtain a price per board foot, divide the price by 1000. An average price of \$378 per thousand MBF is the same as 37.8 cents per board foot stumpage. This compares to an average stumpage price for high quality sale was \$532/MBF, \$347/MBF for average quality, and \$239/MBF for low quality. Below is a



statistical summary for all three sale types.

**SUMMARY:** The last 18 months to 24 months have been very volatile. Fortunately, things are looking up. Prices mostly are back to 2007 levels so more timber is going on the market. Concerns over an increase in capital gains tax (anticipating increasing from 15 % to 20 % in 2011) may also influence the supply of timber for the rest of 2010.

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**Table 1. Statistical Summary for High, Average, and Low Quality Sealed Bid Timber Sales.**  
June 16, 2009 thru June 15, 2010.

	HIGH (67 sales)				AVERAGE (111 sales)				LOW (28 sales)			
	Bd. Ft	Price	Bids	\$ MBF*	Bd. Ft	Price	Bids	\$ MBF	Bd. Ft	Price	Bids	\$ MBF
Total	4,930,776	\$2,621,020	454	\$532	11,299,801	\$3,920,356	621	\$347	1,457,071	\$347,914	102	\$239
Low	7,876	\$3,850	1	\$320	10,205	\$3,800	1	\$199	10,241	\$2,525	1	\$139
High	324,705	\$132,252	19	\$3,496	803,634	\$290,307	12	\$536	115,039	\$27,100	7	\$364
Mean	73,594	\$39,120	6.8	\$532	101,800	\$35,319	5.6	\$347	52,038	\$12,425	3.6	\$239
Median	45,920	\$25,378	6	\$498	77,282	\$24,500	5	\$352	43,936	\$9,644	3.5	\$234

many sawmills had large inventories of standing timber, logs, and lumber. Those inventories have been reduced resulting in an increase in demand for standing timber. Although demand is less than a few years ago the current supply of timber on the market appears to be less than the current supply. The industry seems to be carrying a smaller inventory and cutting sales quicker than in the past, creating more of a spot market for timber sold. The values for some species such as cherry are still low so there still is some reluctance by some consultants to sell timber from some woods.

The comment section below is offered to our readers by the consulting foresters who participated in this survey:

- Cautiously optimistic about the timber markets and the economy therefore planning to put more timber on the market in 2010.
- Current mill inventories and

inventories of standing timber are very low resulting in more demand for standing timber. Current supply on the market appears to be less than current demand resulting in higher prices at this time at least for standing timber.

- Timber industry is still struggling with stumpage prices increasing and lumber prices remaining low.
- Wet weather this spring has reduced delivered logs and has reduced sawmill inventories.
- Black walnut moving extremely well with larger diameter white oak also in high demand.
- Black cherry market still soft, so I am not marking healthy, good quality cherry. Sugar maple and red oak improving.
- Now is a good time for landowners to apply for timber stand improvement (TSI) cost share money as funds are readily available thru the local USDA offices.

Consulting Foresters that have contributed to this report in alphabetical order include: Arbor Terra Consulting (Mike Warner) Jim Akard, Crowe Forest Management LLC (Tom Crowe), Doll Forestry Consulting, LLC (Steve Doll), ABC Forest Management (Brian Cruser), Christopher Egolf, Forest Management Services, Inc. (Larry Owen), Gandy Timber Management (Brian Gandy), Gregg Forestry Services (Mike Gregg), Haney Forestry, LLC (Stuart Haney), Haubry Forestry Consulting, Inc. (Rob Haubry), Multi-Resource Management, Inc. (Fred Hadley, Thom Kinney, Justin Herbaugh), Meisberger Woodland Management (Dan Meisberger), North Slope Forestry (Don Duncan), Stambaugh Forestry (John Stambaugh), Steele Forestry Consulting (Rhett Steele), Tree Inc. (Tim Martin), Turner Forestry, Inc. (Stewart Turner), and Forestry Options (Barry Wilson), Wakeland Forestry Consultants, Inc. (Bruce Wakeland).

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## Indiana Forest Land Market Values as Evidenced by Liquidation of Kimball International, Inc. Holdings

By William L. Hoover

Kimball International (KI) has its roots in the wood products industry of Jasper, Indiana. The original company was founded by W.W. Kimball in 1857 as a piano dealership. Over the life of the company, forest land was acquired in Indiana and Kentucky. Changes in KI's markets, however, mandated an assessment of KI's capital assets.

This study reports on the sale of KI's 9,422 acres of forest land in six counties in south-central Indiana. It's important to note the scales involved in this discussion. "Large" private forest land holdings in Indiana are in the 10,000 to 15,000 acre range. Institutional investors generally limit their transactions to ownerships of 100,000 acres and greater. This limits the demand for Indiana forest land to residents of the state and adjacent metropolitan areas, or individuals with roots in the state.

### Data Source

The sale of 117 tracts occurred on November 6, 2008. This analysis is based entirely on the publicly available information from the auction company including maps of the tracts, color aerial photos, acreage of each, brief descriptions of their positive attributes, and timber inventory data based on KI's management units (not sale tracts). Bidders submitted a single written bid for each sale tract. The auction company's website reported the combined winning bid price for the combination of tracts purchased by each buyer.

### Sale Summary

KI held the land in 35 tracts averaging 272 acres each (range 2 to 1,731). These were divided by the auction company into 117 sale tracts. A majority of the sale tracts were

completely forested. However, several small tracts, apparently originally acquired with the adjacent forested land, were primarily cropland. Several parcels were dominated by pre-merchantable hardwood plantations. Mature softwood plantations were scattered across many of the larger parcels. The number of sale combinations was 73 (Figure 1).

The sale price for auction tracts was determined using the average price for the block of sale tracts purchased together. The stocking in MBF per acre for sale tracts was also determined by allocating the estimated stocking for each KI set of tracts to each sale tract in proportion to acreage. The average was adjusted by the forest cover percentage of each sale tract. Similarly, the timber quality distribution was allocated to each sale tract.

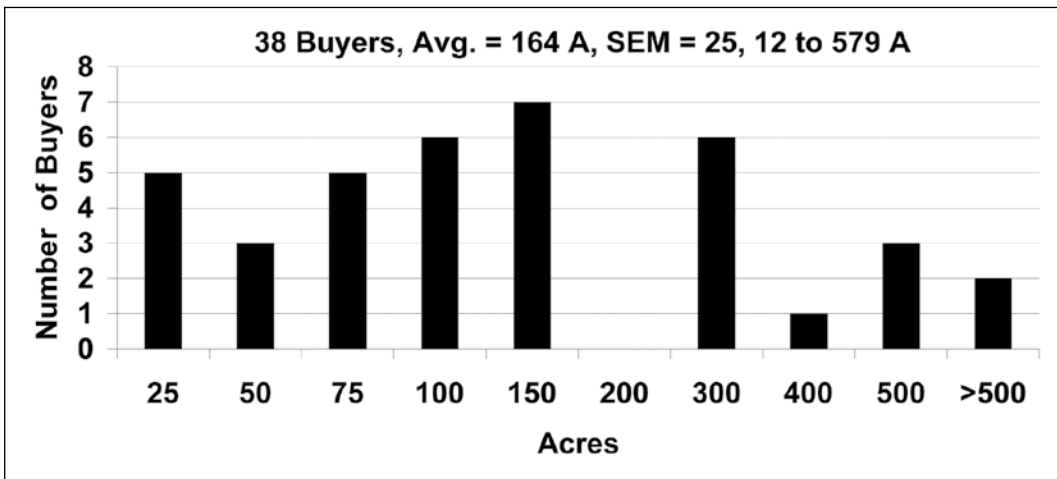
Sale price averaged \$1,632 per acre and ranged from \$819 to \$2,637 (Figure 2). The bare land average value of \$712 per A and was estimated by subtracting the allocated timber value from the allocated timber value. Based on conversations with individuals familiar with land markets, the sale prices were well below expectations. These properties sold at a recent low point in the U.S. economy. Quarter-to-quarter growth in GDP in real dollars was a negative 5.8 percent at the time. In June of 2008, the average price for low quality cropland in southwest Indiana was \$2,718 (Purdue Agricultural Economics Report, June 2008, p. 2); this average was \$2,701/acre in June 2009 (Purdue Agricultural Economics Report, August 2009, p. 2). Given that all the tracts sold had some timber stocking, a price of \$1,632 could be interpreted as an indication that the market continues to discount the capital value of intermittent timber sales relative to the capital value of annual cropland

income on tillable land. In addition, the poor economy at the time may have reduced the willingness or ability of potential buyers to enter this market.

### Contributing Factors to Sale Price

The theory that price per acre declines as size increases was tested by regressing the per acre sale price against the total acres purchased by

**Figure 1.** Number of acres purchased per buyer.



a given buyer. There was a weak support for this theory. Addition of 100 acres to a sale may reduce the price by \$38 per acre on average (Figure 3).

The data supported a stronger relationship between sale price and estimated timber value. Timber inventory data was available for 68 of the sale tracts. Timber value was estimated by multiplying the quality percentages reported by KI's forester to prices per MBF of \$1,500 for veneer quality timber, \$900 for prime sawlogs timber, \$500 for No. 1 sawlog quality timber, \$300 for No. 2 sawlog quality timber, and an equivalent of \$100 per MBF for pulpwood. The allocated sale price for these sale tracts was regressed against the total value of timber indicating that each \$1.00 worth of timber increased the sale price of the land by \$1.04.

Road access, adjacency to public land, and development potential are frequently cited as factors positively correlated with the value of rural land. The significance of these factors in determining the allocated per acre sales price was assessed. Adjacency to public land was expected to be positively correlated given the values assigned and the assumption that buyers were primarily interested in "rural retreats." Development potential was expected to be negatively correlated with sale price per acre based on the assumption that buyers were looking for rural retreats at a bargain, not land for development. Surprisingly, sale price

per acre was negatively related to adjacency to public land, road access, and development potential

### Summary

The lack of transactions evidence not requiring allocation of the sales price and/or timber inventory data to the sale tracts casts doubt on the reliability of all results. All conclusions must take this into account.

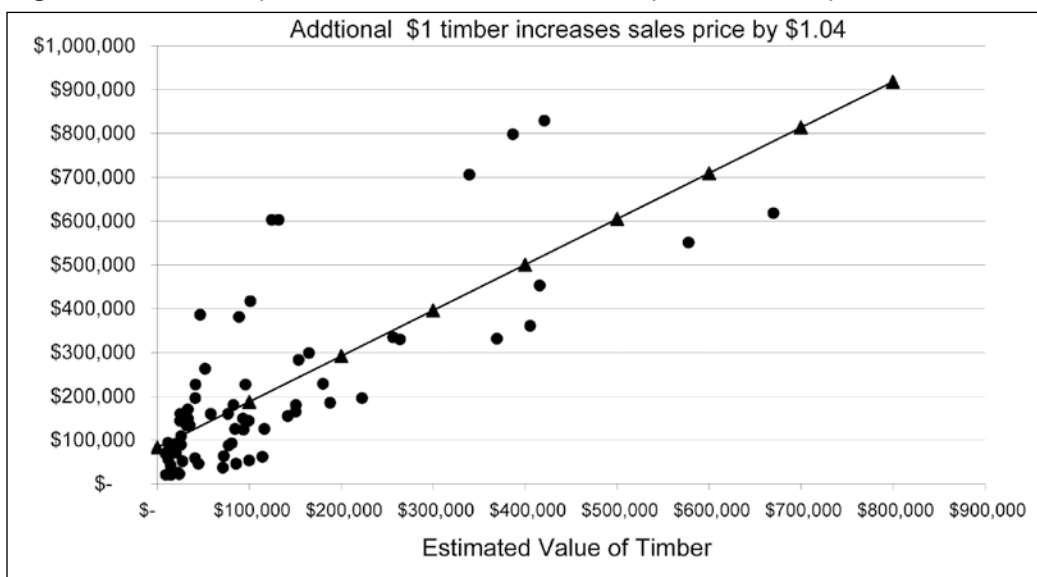
The auction data analyzed appears to indicate that buyers were able to purchase land at prices below retail. Reducing sales price by the estimated timber value indicates a low bare land value of \$172 per A. The analysis indicates that development potential had a negative effect on price because buyers were bidding based on a desire to acquire recreation land.

The analysis of the contribution of timber value to total sale price did indicate that buyers factored the potential value of timber into their bids. It is doubtful that many

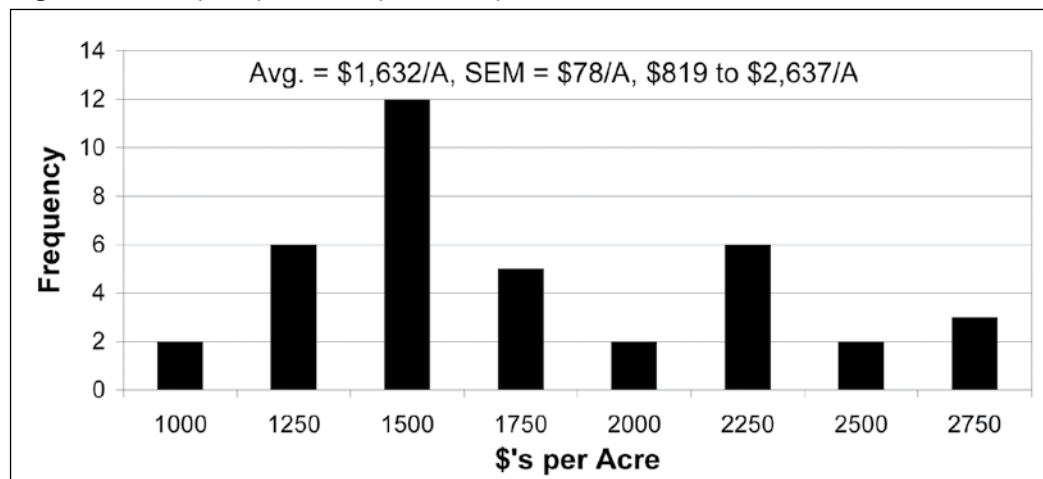
bidders had timber appraised. However, it appears that they did view sale tracts closely enough to make a general assessment of timber quality.

*Dr. William Hoover is a Professor of Forestry and Assistant Head of the Department of Forestry and Natural Resources at Purdue University. He is founder of the National Timber Tax Website, [www.timbertax.org](http://www.timbertax.org).*

**Figure 3. Relationship of estimated value of timber to per acre sales price.**



**Figure 2. Price paid per acre by each buyer.**



## The Hardwood Ecosystem Experiment - Part 1

by Brian MacGowan

Forests appear to us to be static and unchanging over time; a visit to your woods today may not look much different than 10 or 20 years from now. In truth, though our forests undergo constant change. Orderly, unidirectional change in the composition and structure of an ecological community is called ecological succession. In most cases, succession is gradual and goes unnoticed in our fast-paced lifestyles. But succession is interrupted occasionally by disturbance. Many disturbances including fires, tornados, insect outbreaks, and timber harvesting can be immediate and dramatic. Within our forests, these disturbances result in changes in plant species composition and structure that are important to Indiana's forests and the wildlife that live in them.

While much attention has been given to forest wildlife, the scope of disturbance can also affect what tree species will inhabit a site in the future. For example, oak species make up a large part (up to 80%) of the overstory in forests within Indiana and the Central Hardwoods Region. However, succession without disturbance has led to the understory has become increasingly dominated by shade-tolerant beech and sugar maple trees. This disparity has been attributed to fire suppression and the reduction/absence of even-aged timber harvesting in recent history.

We harvest timber to make furniture, build houses, and much more. But it can also serve to mimic natural disturbance and create early successional communities upon which many species of wildlife depend. Given the trend in forest ownership patterns (60% of Indiana forest landowners own <9 acres), scientists do not believe that creating a balance of early successional habitat stages will be feasible on small private land



*Though visually disturbing to most people, clear-cuts can mimic disturbance and create early successional forest within a larger forested block (picture taken August 26, 2009; site harvested September 2008). The HEE project is studying the response of insects, reptiles, amphibians, birds and mammals to this type of disturbance in Indiana.*

ownerships. Research in other states tells us that early successional habitats are most beneficial to wildlife species when they occur in large blocks of forest cover (>1,000 acres) adjacent to older stands of hardwoods. Thus, large tracts of public forests may offer the best opportunity to maintain early successional habitats.

Disturbance will impact plants and animals in different ways. Some species will benefit while others will not. The challenge we face is that disturbance of some type is necessary to continually create early successional habitats, but late-successional habitats must also be provided. How do we achieve a balance of successional habitats in Indiana forests? The Hardwood Ecosystem Experiment is a long-term, scientifically rigorous study designed to provide land managers the answer to that and more.

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## What is the HEE?

The Hardwood Ecosystem Experiment (HEE), initiated May 2006, is a collaborative project among the Indiana Division of Forestry; scientists from Purdue University, Indiana State University, Ball State University, and Drake University (Iowa); and partners including the Indiana Division of Fish and Wildlife, The Nature Conservancy in Indiana, and the USDA Forest Service. The main goal of the HEE is to understand the ecological and social impacts of forest management on public and private lands.

Research efforts have focused on sites at Morgan-Monroe and Yellowwood State Forests where scientists are studying how even-aged (10-acre clearcut and shelterwood) and uneven-aged (single tree and group selection) harvesting impacts plants and animals compared to control sites. Nine study areas ranging 900-1000 acres in size were randomly drawn from 11 possible areas. Each of the nine units was randomly assigned to a treatment, with 3 control units, 3 uneven-aged management units, and 3 even-aged management units.

From 2006 to 2008, researchers collected data prior to any harvesting activity. A variety of different species/communities were

included in the study with special emphasis on threatened and endangered species. Researchers are studying forest dynamics, oak mast, bird communities, Cerulean warblers, wood boring and long-horn beetles, moths, small mammals, bats, salamanders, eastern box turtles, timber rattlesnakes, deer browsing, and perceptions and attitudes of people. During the fall of 2008 through winter of 2009, timber harvests were conducted on the six treatment units but not on the three control units. Since 2009 and beyond, researchers will continue data collection on all of the units.

The design and scale of the HEE is unique. By comparing data collected among control, even-aged, and uneven-aged units both before and after harvesting, researchers will begin to understand how harvesting impacts a wide suite of plants and animals. Part 2 of this story will feature some of the preliminary findings of the HEE and what that means for forest management. Visit [HEEForestStudy.org](http://HEEForestStudy.org) for more information.

*Brian MacGowan is an Extension Wildlife Specialist with Purdue University's Department of Forestry and Natural Resources and studies box turtles and timber rattlesnakes on the Hardwood Ecosystem Experiment.*


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## Maximizing future timber through forest improvement today

by Ron Rathfon  
& Mike Saunders

Forest improvement includes implementing practices that protect and sustain forest health and achieve landowner goals. It may simply involve fencing livestock out of the forest or preventing wildfires. Commonly, however, forest improvement includes *timber stand improvement* (TSI). Timber stand improvement focuses on increasing timber value of a forest through: 1) increasing the proportion of valuable timber tree species in a forest stand; 2) increasing the proportion of trees that have good timber form, high quality, and defect-free wood volume (i.e., crop trees); and 3) reducing the time it takes for crop trees to grow to maturity by increasing growth rates. Timber stand improvement may also improve wildlife habitat, control invasive species, and enhance environmental, scenic, and recreational values of the forest.

Forest improvement is an investment in the future of your forest and should be a part of any written forest management plan. According to Dr. William Hoover, Professor of Forest Economics at Purdue University, it is not uncommon for annual rates of return from a forest improvement operation on average to high-quality sites to exceed 10-15%. Reinvesting a small percentage of timber sale income back into the forest as forest improvement work makes good business sense.

Forest improvement practices range from simply cutting grape vines to the very complex task of marking trees for an improvement harvest or a commercial thinning. Often, more than one of these practices is done in a single operation. With a little instruction,



landowners can control vines and prune young crop trees. However, many landowners will want the assistance of a forester for doing most other forest improvement practices.

**Pruning** - This practice removes side branches from the lower trunk of a tree in order to produce clear, knot-free, and hence higher-valued wood. Do not prune species that self-prune naturally, such as tulip poplar.

**Grapevine control** - Wild grapevines should be controlled in areas where trees are being grown for timber, particularly on highly productive sites, and in areas soon to be harvested and regenerated under full sunlight. Grapevines can be controlled at any stage of development.

**Invasive plant control** - Following a disturbance in the forest, such as a timber harvest, invasive plants capitalize on the new open

space and quickly spread into the disturbed area. Many invasive plants threaten forest regeneration, while others can destroy existing native trees (e.g., kudzu vine). If invasive plants are present in the stand or in adjoining stands or areas, their management and control should be included in the forest management plan.



**Cull tree removal** - Severely damaged, excessively branchy, deformed, and diseased trees often have little or no current or future commercial timber value. Depending on the tree species (e.g., oaks), you may retain these cull trees for wildlife food and cover, or as a seed source for future forest regeneration. Leave 4 to 6 cull trees per acre at least 11 inches in diameter for wildlife.

**Preparing for forest regeneration** - To regenerate a forest stand, older, mature trees are harvested from an area to create favorable light conditions on the forest floor for a new generation of sun-loving tree seedlings to get established. Harvest, kill, or coppice all trees in the area to be regenerated, including the unmarketable ones.

**Thinning** - This practice removes selected trees from a stand to reduce competition and favor the growth, health and development of remaining trees in the stand. Timely thinning keeps crop trees healthy and growing to their full potential. Thinning can be done at any stage of stand development following crown closure, or when individual tree crowns begin to interlock and significantly reduce the amount of sunlight reaching the forest floor, and prior to stand maturity.

### Summary

With a little instruction, landowners can control vines and prune young crop trees. However, many landowners will want the assistance of a forester for doing most other forest improvement practices. Federal and state cost share programs may be available to help pay for this work. A district forester can help identify and enroll properties in cost share programs, assuming funding is available. Visit [www.in.gov/dnr/forestry](http://www.in.gov/dnr/forestry) for more contact information.

For more in depth information on forest improvement, see the *Forest Improvement Handbook*, FNR-IDNR-414 (28 pgs). Printed copies and web only versions are available from Purdue University Extension ([www.extension.purdue.edu/store/](http://www.extension.purdue.edu/store/)).

*Ron Rathfon is an Extension Forester with Purdue University's Department of Forestry and Natural Resources. Mike Saunders is an Assistant Professor of Silviculture in the Department of Forestry and Natural Resources at Purdue University.*

## A Summer Wildflower Tour in Indiana Woodlands

by Cliff Chapman

Hoosiers need to break a bad habit: only visiting our beautiful and rich woodlands in the spring and fall, looking for ephemeral wildflowers and panoramic views of changing leaf colors. Summer brings long days, allowing more time to stroll through a forest after work or other obligations. This time of year also showcases dozens of species of butterflies and nesting birds along with an impressive array of woodland wildflowers.

The Central Indiana Land Trust owns sixteen nature preserves that cover a geographic area large enough to represent much of the state. Burnett Woods in Avon is typical of a flatwoods community. In summer, the dominant forest herb is stinging nettle. Yes, its prickly hairs do sting, but it boasts beautiful ivory flowers and is host to an impressive number of moths, skippers and butterflies who in their larval stage are very important to sustaining birds after they arrive from their wintering grounds.

A less common but perhaps more interesting summer flower at Burnett Woods is puttyroot orchid. Puttyroot has an attractive single striped leaf that comes up in the fall, stays green all winter and then fades in the spring taking advantage of no light competition. In summer, it sends up a leafless flower stalk of delicate, green flowers often tinged with purple. Another orchid that has the same life cycle in southern Indiana is crane-fly orchid which has purple flowering stalks in summer.

Hemlock Ridge Nature Preserve located in Putnam County contains steep slopes and a relict stand of Eastern hemlocks. Areas of the preserve with acidic soils support plants like the ground hugging evergreen partridge berry that is interesting in that its white flowers are in pairs that produce a single bright red berry. These berries may persist on the plant for many months, even in winter. Another summer flower that exists here is goat's beard, named after its thick white plume of flowers. The rich slopes of glacial origin also harbor

false hellebore, a plant whose foliage is as beautiful as its flowers. A member of lily family, false hellebore has very large striped leaves below tall purple flowering spikes.

Wapihani Nature Preserve sits along the White River in Fishers and is indicative of many floodplain forests across the state. Summer brings American bellflower with its sky blue flowers with elephant trunk-like curved pistils, and big showy cut-leaved coneflower and wingstem, both boasting large yellow sunflowers growing right next to the river. Jewelweed is found in low areas and dangles orange trumpet-like flowers that when in fruit propel their seeds up to eight feet, lending to its other common name, touch-me-not.

Shalom Woods, located in Morgan County, shares the characteristics of hilly woodlands across the southern half of the state. With bone-dry ridge tops, steep slopes and rich stream valleys, it supports a wide variety of plants and animals. Much smaller and more delicate than its cousin growing along roadsides, blue-stemmed goldenrod flowers only where leaves meet its glossy stem giving it a wand like appearance in the forest. White bergamot is one of our showiest mints and is commonly found along ridges in summer. Not to be outdone, another mint, dittany with its rose-purple flowers is very common on dry oak slopes. There are several different species of blue asters that

add color late in the growing season. The summertime mix of yellow from woodland goldenrods and blue asters is truly beautiful!

An often overlooked plant that loves to grow along trails or logging roads is Indian tobacco. A lobelia-like cardinal flower, it exudes a milky substance if a leaf is pulled from the stem. It has small white flowers but more interesting is that its seed pods inflate. These bladder-like structures catch the wind and teeter about releasing tiny seeds in the fall. Although later found to be poisonous, it gets its common name from Native Americans smoking its dried leaves.

Oliver's Woods has a mix of oak, walnut and maple right in Indianapolis and is our newest nature preserve. Summer brings acres of spiderwort with its purple-petaled flowers with bright yellow stamens. Virginia knotweed is very common here with its curved spike of white flowers and is a member of the smartweed family, known more from wetlands. It is also called jumpseed as it propels its seeds like touch-me-nots. One of Indiana's most common woodland flowers is here too, white snakeroot. This showy white flowered plant with large heart-shaped leaves is notorious in American history as it is toxic and can poison livestock. Often, however, the poison doesn't kill the grazing animal but is passed on through its milk, causing fatal milk sickness. Abraham Lincoln's mother died from milk sickness while the family lived in southern Indiana.

There truly are too many summer woodland flowers to list here. Indiana's forests are incredibly rich with life and warrant pleasurable hikes in between the flush of color from spring wildflowers and autumn foliage.

*Cliff Chapman is the Conservation Director for the Central Indiana Land Trust, [www.conservingindiana.org](http://www.conservingindiana.org). He has previously worked for the Nature Conservancy in Washington state and as a regional ecologist for the Indiana Division of Nature Preserves.*



Spiderwort. [pocahontaschapter-vnps.org](http://pocahontaschapter-vnps.org).

Management of *Microstegium vimineum* (Japanese stiltgrass)

by S. Luke Flory

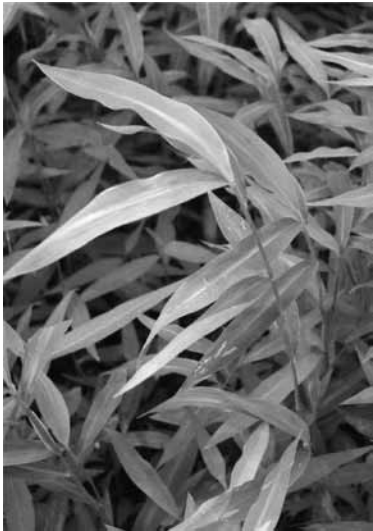
Introduction

*Microstegium vimineum* (Japanese stiltgrass) is a non-native annual grass that was introduced to the southeastern U.S. from Asia in the early 1900s. Following a lag period of more than 60 years, it became highly invasive and is now found throughout the eastern U.S. *Microstegium* is listed as an invasive species in more than 20 states from New York to Florida, from the eastern seaboard to Missouri. It is often found invading along roads, trails, and streams but can colonize a variety of habitats including sunny, open ridgetops and bottomland riparian habitats. Areas that have recently been naturally or anthropogenically disturbed (e.g. windthrows or timber harvests) are especially vulnerable to invasions. *Microstegium* produces abundant seed, spreads quickly, and can require years of management to eradicate. Natural areas managers should be diligent in locating and eradicating new populations.

Species biology and identification

Researchers believe that *Microstegium* may be filling an empty niche in eastern deciduous forests where most native grasses are C<sub>3</sub> species (i.e. cool season grasses). *Microstegium* employs the C<sub>4</sub> photosynthetic mechanism (i.e. it is a warm-season grass) but is very unusual because it is also highly shade tolerant. *Microstegium* germinates in late spring but is relatively small (< 20 cm tall) until mid to late June. It is most productive during the warm summer months when native species are less active and can grow to more than 2 m in height, although it often falls prostrate and roots at nodes along the stem.

*Microstegium* can be identified by its relatively broad, bright green leaves that often form a shallow ‘v’ as they extend from the stem (see photo below). Leaves also have a faint silver line down the mid-section. *Microstegium* can be confused with native *Leersia* spp., *Dicanthelium clandestinum*, and other species, but is distinguished by its growth form: it is most often found in dense patches > 1 m in diameter. *Microstegium* produces seed in September and October and then senesces to create a dense layer of thatch that may inhibit native species including tree regeneration.



Effects on native species and ecosystems

Invasions of *Microstegium* can quickly crowd out native species resulting in significant reductions in herbaceous species abundance and diversity. Invasions can also reduce tree regeneration, but there appear to be differential effects among tree species, suggesting that invasions may alter forest composition. *Microstegium* may impact native species through multiple mechanisms including competitive exclusion, changing soil properties, reducing light availability, and increasing native consumer activity. Recent evidence shows that the abundance and diversity of arthro-

Methods for controlling <i>Microstegium</i> invasions		
Method	Recommended?	Notes
Fire	NO	Not currently recommended; more information is needed to determine if properly timed fires might help control invasions
Glyphosate (e.g. RoundUp)	NO	Results in damage to native species; equally effective selective herbicides are available
Grass-specific herbicides	YES	Mix 22 ml herbicide with 15 ml of surfactant and apply at 40 psi with a backpack sprayer*
Hand-weeding	YES	Practical only for very small invasions, must be repeated throughout the season
Mowing	YES	Can be used late in the season when plants begin to flower but before seed has matured; must be repeated yearly
Pre-emergent herbicides	NO	Effective at eradicating invasions but prevents establishment of native species

\*Grass-specific herbicides include those with the active ingredients fluazifop-P-butyl, sethoxydim, or fenoxaprop-ethyl. Recommendation above is for fluazifop-P-butyl; check labels for proper application rates and regulations. Generally, *Microstegium* is effectively killed at much lower application rates than what is recommended on labels.

## Congratulations, Ken!

Ken Day retired from the US Forest Service June 1, 2010. Ken's Forest Service career spanned over 35 years and found him in many locations. Over the course of his career, Ken worked in Georgia, Indiana, Kentucky, Missouri, and West Virginia. Ken has been on the Hoosier National Forest since 1990 when he came as the Natural Resources Officer on the, then, Wayne-Hoosier National Forest. Ken became Acting Forest Supervisor for the Hoosier in 1993, and was appointed to the position in 1995. Under Ken's leadership the Hoosier gained over 10,800 acres through an active acquisition program. Additionally the Forest restored 567 acres of wetlands and developed 265 miles of designated trails for hiking, biking, and horseback riding, during Ken's tenure as Forest Supervisor.



Forest Supervisor Ken Day plants a tree in Washington D.C., 2005.

Throughout his career, Ken put a lot of value in working with partners and groups outside of the Forest Service. Ken has worked with the National Wild Turkey Federation, Indiana Society of American Foresters, Indiana Hardwood Lumberman's Association, and the Woodland Stewart Institute.

Ken has served on the Woodland Steward Board of Directors since 1998 when the US Forest Service became a member organization. Ken has been an active participant on the committee and he and his staff have contributed numerous articles over the years. The Woodland Steward Institute would like to thank Ken for all of his hard work and dedication to private woodland owners across the state. Congratulations on your retirement and thank you for all you have done for forestry in Indiana.

podis is reduced in invaded areas. In addition, nitrogen and carbon cycling processes can be altered by invasions. Senesced *Microstegium* is slow to decompose, resulting in a dense mat that can inhibit native species recruitment. Fortunately, removing *Microstegium* with grass-specific herbicides or hand-weeding, significantly increases native species biomass and diversity and tree regeneration.

### Management solutions

*Microstegium* often invades very large areas (i.e. acres), so although multiple methods may be used to kill *Microstegium*, there are few practical techniques. Suggested methods include hand-weeding, mowing, and non-selective and selective herbicides. Recent research has shown that invasions can be successfully removed with hand-weeding, mowing, or selective herbicides but that the recovery of the native community and return of invasions the following season vary greatly among removal methods. Hand-weeding is effective for small invasions and mowing helps to reduce seed production in flat, easily accessible areas such as along roadsides if conducted as plants begin to flower. For large invasions in areas with trees or steep topography, selective herbicides

are preferred. Grass-specific herbicides can economically eradicate large invasions, prevent re-invasion the following year, and allow native species to recover. Fluazifop-P-butyl (12 oz/ac; Fusilade DX; Syngenta Crop Protection, Inc., Greensboro, NC) mixed with a nonionic adjuvant surfactant and applied with a backpack sprayer for example kills more than 99% of standing *Microstegium* and prevents recolonization of sites the following year. Removal of *Microstegium* with this method results in increased native species productivity and diversity, including more than 120% increase in native tree regeneration. Other grass-specific post-emergent herbicides have been shown to have similar effects.

Various online and in-print documents have recommended mowing, fire, pre-emergent herbicides, and non-selective herbicides such as glyphosate. However, these methods may either increase the rate of *Microstegium* spread (e.g. mowing spreads seeds) or inhibit native species recruitment or recovery (e.g. glyphosate and pre-emergent herbicides kill all species) and are therefore much less preferred over grass-specific herbicides for controlling *Microstegium* invasions.

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